APPENDIX E

HYDROLOGIC ANALYSIS INFORMATION

ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Bay County, Michigan

Map symbol	Soil name	Acres	Percent
12	Corunna-Tappan Sandy Loams	7,688	2.6
13	Belleville Loamy Sand	17,577	6.0
16	Essexville Loamy Sand	4,954	1.7
17A	Wixom Loamy Sand, 0 To 3 Percent Slopes	24,912	8.6
23	Tappan Loam	81,629	28.0
25A	Pipestone Fine Sand, Loamy Substratum, 0 To 3 Percent Slopes	5,809	2.0
31	Sloan Loam	1,549	0.5
35A	Pipestone Fine Sand, 0 To 3 Percent Slopes	13,726	4.7
37B	Rousseau Fine Sand, 0 To 6 Percent Slopes	4,941	1.7
43A	Londo Loam, 0 To 1 Percent Slopes	32,591	11.2
49A	Londo-Poseyville Complex, 0 To 3 Percent Slopes	25,252	8.7
50	Cohoctah Loamy Fine Sand	3,136	1.1
51	Urban Land	1,659	0.6
52	Urban Land-Tappan Complex	3,897	1.3
53A	Urban Land-Londo Complex, 0 To 1 Percent Slopes	2,129	0.7
54B	Urban Land-Rousseau Complex, 0 To 6 Percent Slopes	456	0.2
55	Aquents,sandy And Loamy	3,781	1.3
56	Dumps	333	0.1
57A	Poseyville Loamy Sand, 0 To 3 Percent Slopes	4,543	1.6
58A	Tappan-Poseyville Complex, 0 To 3 Percent Slopes	19,438	6.7
59	Tobico Fine Sand	5,874	2.0
60	Urban Land-Essexville Complex	1,334	0.5
61	Cohoctah Fine Sandy Loam	1,150	0.4
62A	Sanilac-Bach Very Fine Sandy Loams, 0 To 3 Percent Slopes	1,329	0.5
63A	Rapson-Bach Complex, 0 To 3 Percent Slopes	1,775	0.6
64B	Londo-Wixom Complex, 0 To 4 Percent Slopes	3,875	1.3
65B	Guelph-Menominee Complex, 2 To 8 Percent Slopes	2,473	0.8
66A	Pipestone-Tobico Fine Sands, 0 To 3 Percent Slopes	3,557	1.2
67	Belleville Loamy Sand, Ponded	856	0.3
68	Cohoctah Loamy Fine Sand, Rarely Flooded	409	0.1
W	Water	8,408	2.9
	Total	291,040	100.0

* Less than 0.1 percent.

Nontechnical Soil Descriptions

Bay County, Michigan

Nontechnical soil descriptions describe soil properties to a soil map unit or group of map units, shown in the NonTechnical Descriptions report. These descriptions are written in terminology that Non-technical users of soil survey information can understand.

12 - Corunna-Tappan Sandy Loams

The Corunna soil is poorly drained. This soil formed in loamy material. It is on glacial lake plains and till plains. The permeability is moderate or moderately rapid in the upper part of the soil and moderate or moderately slow in the lower part. The available water capacity is high. The surface runoff is very slow or ponded. The seasonal high water table is at or near the surface during prolonged wet periods. This soil is subject to frequent ponding.
The Tappan soil is poorly drained. This soil formed in loamy material. It is on glacial till plains and moraines. The permeability is moderate or moderately slow in the upper part of the soil and slow in the lower part. The available water capacity is moderate or high. The surface runoff is very slow or ponded. The seasonal high water table is at or near the surface during prolonged wet periods. This soil is subject to frequent ponding.

13 - Belleville Loamy Sand

The Belleville soil is poorly or very poorly drained. This soil formed in sandy deposits 20 to 40 inches thick over loamy material. It is on glacial lake plains and till plains. The permeability is rapid in the upper part of the soil and moderately slow in the lower part. The available water capacity is low to high. The surface runoff is very slow or ponded. The seasonal high water table is at or near the surface during prolonged wet periods. This soil is subject to frequent ponding.

16 - Essexville Loamy Sand

The Essexville soil is poorly or very poorly drained. This soil formed in sandy deposits 18 to 35 inches thick over loamy material. It is on glacial lake plains and till plains. The permeability is rapid in the upper part of the soil and moderately slow in the lower part. The available water capacity is moderate or high. The surface runoff is very slow or ponded. The seasonal high water table is at or near the surface during prolonged wet periods. This soil is subject to frequent ponding.

17A - Wixom Loamy Sand, 0 To 3 Percent Slopes

The Wixom soil is somewhat poorly drained. This soil formed in sandy deposits 20 to 40 inches thick over loamy material. It is on glacial till plains, outwash plains and lake plains. The permeability is rapid in the upper part of the soil and moderately slow in the lower part. The available water capacity is low to high. The surface runoff is slow. The seasonal high water table fluctuates between .5 to 1.5 feet of the surface during prolonged wet periods.

23 - Tappan Loam

The Tappan soil is poorly drained. This soil formed in loamy material. It is on glacial till plains and moraines. The permeability is moderate or moderately slow in the upper part of the soil and slow in the lower part. The available water capacity is moderate or high. The surface runoff is very slow or ponded. The seasonal high water table is at or near the surface during prolonged wet periods. This soil is subject to frequent ponding.

Nontechnical Soil Descriptions--Continued

25A - Pipestone Fine Sand, Loamy Substratum, 0 To 3 Percent Slopes

The Pipestone, loamy substratum soil is somewhat poorly drained. This soil formed in sandy deposits greater than 40 inches thick over loamy material. It is on glacial outwash plains, lake plains, beach ridges and till plains. The permeability is rapid. The available water capacity is low. The surface runoff is slow or very slow. The seasonal high water table fluctuates between .5 to 1.5 feet of the surface during prolonged wet periods.

31 - Sloan Loam

The Sloan soil is very poorly drained. This soil formed in loamy material on floodplains. The permeability is moderate or moderately slow. The available water capacity is high. The surface runoff is very slow or ponded. The seasonal high water table is at or near the surface during prolonged wet periods. This soil is subject to frequent ponding. It is also subject to common floodings for brief periods.

35A - Pipestone Fine Sand, 0 To 3 Percent Slopes

The Pipestone soil is somewhat poorly drained. This soil formed in sandy material. It is on glacial outwash plains, lake plains, beach ridges and till plains. The permeability is rapid. The available water capacity is low. The surface runoff is slow or very slow. The seasonal high water table fluctuates between .5 to 1.5 feet of the surface during prolonged wet periods.

37B - Rousseau Fine Sand, 0 To 6 Percent Slopes

The Rousseau soil is moderately well drained. This soil formed in sandy material. It is on glacial lake sand dunes, lake plains and outwash plains. The permeability is rapid. The available water capacity is low. The surface runoff is slow or very slow. The seasonal high water table fluctuates from 2.5 to 6 of the surface during prolonged wet periods.

43A - Londo Loam, 0 To 1 Percent Slopes

The Londo soil is somewhat poorly drained. This soil formed in loamy material. It is on low glacial moraines and till plains. The permeability is moderate or moderately slow. The available water capacity is moderate or high. The surface runoff is slow to medium depending on the slope. The seasonal high water table fluctuates between 1 to 2 feet of the surface during prolonged wet periods.

49A - Londo-Poseyville Complex, 0 To 3 Percent Slopes

The Poseyville soil is somewhat poorly drained. This soil formed in sandy deposits 13 to 24 inches thick over loamy material. It is on glacial lake plains and till plains. The permeability is rapid in the upper part of the soil and moderate or moderately slow in the lower part. The available water capacity is low or moderate. The surface runoff is slow. The seasonal high water table fluctuates between 1 to 2 feet of the surface during prolonged wet periods.
The Londo soil is somewhat poorly drained. This soil formed in loamy material. It is on low glacial moraines and till plains. The permeability is moderate or moderately slow. The available water capacity is moderate or high. The surface runoff is slow to medium depending on the slope. The seasonal high water table fluctuates between 1 to 2 feet of the surface during prolonged wet periods.

50 - Cohoctah Loamy Fine Sand

The Cohoctah soil is poorly or very poorly drained. This soil formed in loamy material on floodplains. The permeability is moderately rapid. The available water capacity is moderate. The surface runoff is very slow or ponded. The seasonal high water table is at or near the surface during prolonged wet periods. This soil is subject to frequent ponding. It is also subject to common floodings for brief to long periods.

51 - Urban Land

The Urban Land map unit is a miscellaneous land type. This area is may be covered by commercial buildings, condominiums and apartment buildings, parking lots, streets, sidewalks, driveways, railroad yards, industrial complexes and other structures.

Nontechnical Soil Descriptions--Continued

52 - Urban Land-Tappan Complex

The Tappan soil is poorly drained. This soil formed in loamy material. It is on glacial till plains and moraines. The permeability is moderate or moderately slow in the upper part of the soil and slow in the lower part. The available water capacity is moderate or high. The surface runoff is very slow or ponded. The seasonal high water table is at or near the surface during prolonged wet periods. This soil is subject to frequent ponding.
The Urban Land map unit is a miscellaneous land type. This area is may be covered by commercial buildings, condominiums and apartment buildings, parking lots, streets, sidewalks, driveways, railroad yards, industrial complexes and other structures.

53A - Urban Land-Londo Complex, 0 To 1 Percent Slopes

The Londo soil is somewhat poorly drained. This soil formed in loamy material. It is on low glacial moraines and till plains. The permeability is moderate or moderately slow. The available water capacity is moderate or high. The surface runoff is slow to medium depending on the slope. The seasonal high water table fluctuates between 1 to 2 feet of the surface during prolonged wet periods.
The Urban Land map unit is a miscellaneous land type. This area is may be covered by commercial buildings, condominiums and apartment buildings, parking lots, streets, sidewalks, driveways, railroad yards, industrial complexes and other structures.

54B - Urban Land-Rousseau Complex, 0 To 6 Percent Slopes

The Rousseau soil is well drained. This soil formed in sandy material. It is on glacial lake sand dunes, lake plains and outwash plains. The permeability is rapid. The available water capacity is low. The surface runoff is slow or very slow.
The Urban Land map unit is a miscellaneous land type. This area is may be covered by commercial buildings, condominiums and apartment buildings, parking lots, streets, sidewalks, driveways, railroad yards, industrial complexes and other structures.

55 - Aquents,sandy And Loamy

Aquents, sandy and loamy are poorly drained and very poorly drained soils formed in outwash plains, till plains, lake plains and moraines. These soils have been greatly altered by leveling.They vary in color, texture and thickness of individual layers.

56 - Dumps

Dumps are a miscellaneous map unit. These areas are filled with refuse and trash. Most areas are active landfills and do not have vegetative cover. In some places layers of soil material cover the refuse.

57A - Poseyville Loamy Sand, 0 To 3 Percent Slopes

The Poseyville soil is somewhat poorly drained. This soil formed in sandy deposits 13 to 24 inches thick over loamy material. It is on glacial lake plains and till plains. The permeability is rapid in the upper part of the soil and moderate or moderately slow in the lower part. The available water capacity is low or moderate. The surface runoff is slow. The seasonal high water table fluctuates between 1 to 2 feet of the surface during prolonged wet periods.

58A - Tappan-Poseyville Complex, 0 To 3 Percent Slopes

The Poseyville soil is somewhat poorly drained. This soil formed in sandy deposits 13 to 24 inches thick over loamy material. It is on glacial lake plains and till plains. The permeability is rapid in the upper part of the soil and moderate or moderately slow in the lower part. The available water capacity is low or moderate. The surface runoff is slow. The seasonal high water table fluctuates between 1 to 2 feet of the surface during prolonged wet periods.
The Tappan soil is poorly drained. This soil formed in loamy material. It is on glacial till plains and moraines. The permeability is moderate or moderately slow in the upper part of the soil and slow in the lower part. The available water capacity is moderate or high. The surface runoff is very slow or ponded. The seasonal high water table is at or near the surface during prolonged wet periods. This soil is subject to frequent ponding.

Nontechnical Soil Descriptions--Continued

59 - Tobico Fine Sand

The Tobico soil is poorly or very poorly drained. This soil formed in sandy material. It is on glacial outwash plains and lake benches. The permeability is rapid. The available water capacity is low. The surface runoff is very slow or ponded. The seasonal high water table is at or near the surface during prolonged wet periods. This soil is subject to frequent ponding.

60 - Urban Land-Essexville Complex

The Essexville soil is poorly or very poorly drained. This soil formed in sandy deposits 18 to 35 inches thick over loamy material. It is on glacial lake plains and till plains. The permeability is rapid in the upper part of the soil and moderately slow in the lower part. The available water capacity is moderate or high. The surface runoff is very slow or ponded. The seasonal high water table is at or near the surface during prolonged wet periods. This soil is subject to frequent ponding.
The Urban Land map unit is a miscellaneous land type. This area is may be covered by commercial buildings, condominiums and apartment buildings, parking lots, streets, sidewalks, driveways, railroad yards, industrial complexes and other structures.

61 - Cohoctah Fine Sandy Loam

The Cohoctah soil is poorly or very poorly drained. This soil formed in loamy material on floodplains. The permeability is moderately rapid. The available water capacity is moderate. The surface runoff is very slow or ponded. The seasonal high water table is at or near the surface during prolonged wet periods. This soil is subject to frequent ponding. It is also subject to common floodings for brief to long periods.

62A - Sanilac-Bach Very Fine Sandy Loams, 0 To 3 Percent Slopes

The Bach soil is poorly drained or very poorly drained. This soil formed in sandy, loamy and silty material. It is on glacial lake plains. The permeability is moderate or moderately slow. The available water capacity is high. The surface runoff is very slow or ponded. The seasonal high water table is at or near the surface during prolonged wet periods. This soil is subject to frequent ponding.
The Sanilac soil is somewhat poorly drained. This soil formed in loamy and silty deposits 10 to 40 inches over stratified loamy, silty and sandy material. It is on glacial lake plains and drainageways. The permeability is moderate or moderately slow. The surface runoff is slow. The seasonal high water table fluctuates between 1 to 2 feet of the surface during prolonged wet periods.

63A - Rapson-Bach Complex, 0 To 3 Percent Slopes

The Bach soil is poorly drained or very poorly drained. This soil formed in sandy, loamy and silty material. It is on glacial lake plains. The permeability is moderate or moderately slow. The available water capacity is high. The surface runoff is very slow or ponded. The seasonal high water table is at or near the surface during prolonged wet periods. This soil is subject to frequent ponding.
The Rapson soil is somewhat poorly drained. This soil formed in sandy deposits 20 to 38 inches thick over stratified sandy, silty and loamy material. It is on glacial outwash plains, lake plains and beach ridges. The permeability is rapid in the upper part of the profile and moderate in the lower part. The available water capacity is low to high. The surface runoff is very slow or slow. The seasonal high water table fluctuates between 1 to 2 feet of the surface during prolonged wet periods.

Nontechnical Soil Descriptions--Continued

64B - Londo-Wixom Complex, 0 To 4 Percent Slopes

The Wixom soil is somewhat poorly drained. This soil formed in sandy deposits 20 to 40 inches thick over loamy material. It is on glacial till plains, outwash plains and lake plains. The permeability is rapid in the upper part of the soil and moderately slow in the lower part. The available water capacity is low to high. The surface runoff is slow. The seasonal high water table fluctuates between .5 to 1.5 feet of the surface during prolonged wet periods.
The Londo soil is somewhat poorly drained. This soil formed in loamy material. It is on low glacial moraines and till plains. The permeability is moderate or moderately slow. The available water capacity is moderate or high. The surface runoff is slow to medium depending on the slope. The seasonal high water table fluctuates between 1 to 2 feet of the surface during prolonged wet periods.

65B - Guelph-Menominee Complex, 2 To 8 Percent Slopes

The Menominee soil is well drained. This soil formed in sandy deposits 20 to 40 inches over loamy material. It is on glacial moraines, till plains, outwash plains and lake plains. The permeability is rapid in the upper part of the soil and moderate or moderately slow in the lower part. The available water capacity is low to moderate. The surface runoff is very slow to medium depending on slope.
The Guelph soil is well drained. This soil formed in loamy material. It is on glacial moraines and till plains. The permeability is moderately slow. The available water capacity is moderate or high. The surface runoff is medium to very rapid depending on the slope.

66A - Pipestone-Tobico Fine Sands, 0 To 3 Percent Slopes

The Tobico soil is poorly or very poorly drained. This soil formed in sandy material. It is on glacial outwash plains and lake benches. The permeability is rapid. The available water capacity is low. The surface runoff is very slow or ponded. The seasonal high water table is at or near the surface during prolonged wet periods. This soil is subject to frequent ponding.
The Pipestone soil is somewhat poorly drained. This soil formed in sandy material. It is on glacial outwash plains, lake plains, beach ridges and till plains. The permeability is rapid. The available water capacity is low. The surface runoff is slow or very slow. The seasonal high water table fluctuates between .5 to 1.5 feet of the surface during prolonged wet periods.

67 - Belleville Loamy Sand, Ponded

The Belleville, ponded soil is very poorly drained. This soil formed in sandy deposits 20 to 40 inches thick over loamy material. It is on glacial lake plains and till plains. The permeability is rapid in the upper part of the soil and moderately slow in the lower part. The available water capacity is low to high. The surface runoff is very slow or ponded. The seasonal high water table is at or near the surface most of the year. Only in the driest years do these areas dry up. This soil is subject to frequent ponding.

Water Features
Bay County, Michigan

(See text for definitions of terms used in this table. Upper limit, Lower limit, and Surface water depth are in feet. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydrologic group	Month	Water Table Depth			Ponding			Flooding	
			Upper limit	Lower limit	Water table kind	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft.	Ft.		Ft.				
12:										
Corunna	B/D	Jan-May	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	---	---	None
		Nov-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
Tappan	B/D	Jan-May	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jun-Sep	> 6.0	> 6.0	---	---	---	---	---	None
		Oct-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
13:										
Belleville	B/D	Jan-May	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	---	---	None
		Nov-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
16:										
Essexville	A/D	Jan-May	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	---	---	None
		Nov-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
17A:										
Wixom	B	Jan-Jun	0.5-1.5	1.5-3.5	Perched	---	---	None	---	None
		Jul-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	0.5-1.5	1.5-3.5	Perched	---	---	None	---	None
23:										
Tappan	B/D	Jan-May	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jun-Sep	> 6.0	> 6.0	---	---	---	---	---	None
		Oct-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
25A:										
Pipestone	B	Jan-May	0.5-1.5	> 6.0	Apparent	---	---	None	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	0.5-1.5	> 6.0	Apparent	---	---	None	---	None
31:										
Sloan	B/D	Jan-Jun	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Frequent
		Jul-Oct	> 6.0	> 6.0	---	---	---	---	---	None
		Nov-Dec	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Frequent
35A:										
Pipestone	B	Jan-Jun	0.5-1.5	> 6.0	Apparent	---	---	None	---	None
		Jul-Sep	> 6.0	> 6.0	---	---	---	None	---	None
		Oct-Dec	0.5-1.5	> 6.0	Apparent	---	---	None	---	None
37B:										
Rousseau	A	Jan	> 6.0	> 6.0	---	---	---	None	---	None
		Feb-May	2.5-6.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Dec	> 6.0	> 6.0	---	---	---	None	---	None
43A:										
Londo	C	Jan-May	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
49A:										
Londo	C	Jan-May	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
Poseyville	C	Jan-May	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	1.0-2.0	> 6.0	Apparent	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table Depth: Upper limit	Water Table Depth: Lower limit	Water Table Depth: Water table kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft		Ft				
50:										
Cohoctah	B/D	Jan-Apr	0.0-1.0	> 6.0	Apparent	---	---	---	Long	Frequent
		May	0.0-1.0	> 6.0	Apparent	---	---	---	---	None
		Jun-Aug	> 6.0	> 6.0	---	---	---	---	---	None
		Sep-Oct	0.0-1.0	> 6.0	Apparent	---	---	---	---	None
		Nov-Dec	0.0-1.0	> 6.0	Apparent	---	---	---	Long	Frequent
51:										
Urban land	---	Jan-Dec	> 6.0	> 6.0	---	---	---	---	---	---
52:										
Urban land	---	Jan-Dec	> 6.0	> 6.0	---	---	---	---	---	---
Tappan	B/D	Jan-May	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jun-Sep	> 6.0	> 6.0	---	---	---	---	---	None
		Oct-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
53A:										
Urban Land	---	Jan-Dec	> 6.0	> 6.0	---	---	---	---	---	---
Londo	C	Jan-May	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
54B:										
Urban land	---	Jan-Dec	> 6.0	> 6.0	---	---	---	---	---	---
Rousseau	A	Jan	> 6.0	> 6.0	---	---	---	None	---	None
		Feb-May	2.5-6.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Dec	> 6.0	> 6.0	---	---	---	None	---	None
55:										
Aquents	D	Jan-Dec	0.0	> 6.0	Apparent	0.0-1.0	Very long	Frequent	---	None
56:										
Dumps	---	Jan-Dec	> 6.0	> 6.0	---	---	---	---	---	---
57A:										
Poseyville	C	Jan-May	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
58A:										
Tappan	B/D	Jan-May	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jun-Sep	> 6.0	> 6.0	---	---	---	---	---	None
		Oct-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
Poseyville	C	Jan-May	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
59:										
Tobico	A/D	Jan-Jun	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jul-Aug	> 6.0	> 6.0	---	---	---	---	---	None
		Sep-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
60:										
Essexville	A/D	Jan-May	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	---	---	None
		Nov-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
61:										
Cohoctah	B/D	Jan-Apr	0.0-1.0	> 6.0	Apparent	---	---	---	Long	Occasional
		May	0.0-1.0	> 6.0	Apparent	---	---	---	---	None
		Jun-Aug	> 6.0	> 6.0	---	---	---	---	---	None
		Sep-Oct	0.0-1.0	> 6.0	Apparent	---	---	---	---	None
		Nov-Dec	0.0-1.0	> 6.0	Apparent	---	---	---	Long	Occasional

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table Depth: Upper limit	Water Table Depth: Lower limit	Water Table Depth: Water table kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft		Ft				
62A:										
Sanilac	B	Jan-Jun	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
		Jul-Sep	> 6.0	> 6.0	---	---	---	None	---	None
		Oct-Dec	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
Bach	B/D	Jan-Jun	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jul-Aug	> 6.0	> 6.0	---	---	---	---	---	None
		Sep-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
63A:										
Rapson	B	Jan-May	0.5-1.5	> 6.0	Apparent	---	---	None	---	None
		Jun-Nov	> 6.0	> 6.0	---	---	---	None	---	None
		Dec	0.5-1.5	> 6.0	Apparent	---	---	None	---	None
Bach	B/D	Jan-Jun	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jul-Aug	> 6.0	> 6.0	---	---	---	---	---	None
		Sep-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
64B:										
Londo	C	Jan-May	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
Wixom	B	Jan-Jun	0.5-1.5	1.5-3.5	Perched	---	---	None	---	None
		Jul-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	0.5-1.5	1.5-3.5	Perched	---	---	None	---	None
65B:										
Geulph	B	Jan-Apr	2.5-6.0	3.0-4.0	Perched	---	---	None	---	None
		May-Nov	> 6.0	> 6.0	---	---	---	None	---	None
		Dec	2.5-6.0	3.0-4.0	Perched	---	---	None	---	None
Menominee	A	Jan-Apr	2.5-4.0	3.0-4.0	Perched	---	---	None	---	None
		May-Nov	> 6.0	> 6.0	---	---	---	None	---	None
		Dec	2.5-4.0	3.0-4.0	Perched	---	---	None	---	None
66A:										
Pipestone	B	Jan-Jun	0.5-1.5	> 6.0	Apparent	---	---	None	---	None
		Jul-Sep	> 6.0	> 6.0	---	---	---	None	---	None
		Oct-Dec	0.5-1.5	> 6.0	Apparent	---	---	None	---	None
Tobico	A/D	Jan-Jun	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jul-Aug	> 6.0	> 6.0	---	---	---	---	---	None
		Sep-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
67:										
Belleville	D	Jan-Jul	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Aug	> 6.0	> 6.0	---	---	---	---	---	None
		Sep-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
68:										
Cohoctah	D	Jan-May	0.0-1.0	> 6.0	Apparent	---	---	---	---	None
		Jun-Aug	> 6.0	> 6.0	---	---	---	---	---	None
		Sep-Oct	0.0-1.0	> 6.0	Apparent	---	---	---	Very brief	Rare
		Nov-Dec	0.0-1.0	> 6.0	Apparent	---	---	---	---	None
W:										
Water	---	Jan-Dec	> 6.0	> 6.0	---	---	---	---	---	---

Water Features--Continued

ENDNOTE--WATER FEATURES

This table provides estimates of various water features. The estimates are used in land use planning that involves engineering considerations

HYDROLOGIC SOIL GROUPS are based on estimates of ronoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms. The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltrate rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils tha are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

WATER TABLE refers to a saturated zone in the soil. The table indicates by month, depth to the top (upper limit) and base (lower limit) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

PONDING is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates surface water depth and the duration and frequency of ponding. Duration is expressed as very brief if less than 2 days, brief if 2 to 7 days, long if 7 to 30 days, and very long if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. None means that ponding is not probable; rare that is is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); occasional that is occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and frequent that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

FLOODING is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

DURATION AND FREQUENCY are estimated. Duration is expressed as extremely brief if 0.1 hour to 4 hours, very brief if 4 hours to 2 days, brief if 2 to 7 days, long if 7 to 30 days, and very long if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. None means that flooding is not probable; very rare that it is unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); rare that is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 1 percent to 5 percent in any year); occasional that is occurs infrequently under normal weather conditions (the chance of flooding is 5 to 20 percent in any year); frequent that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and very frequent that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development. Also considered are local information about the extent and levels of flooding and relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Water Features
Bay County, Michigan

(See text for definitions of terms used in this table. Upper limit, Lower limit, and Surface water depth are in feet. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydrologic group	Month	Water Table Depth			Ponding			Flooding	
			Upper limit	Lower limit	Water table kind	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft.	Ft.		Ft.				
12:										
Corunna	B/D	Jan-May	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	---	---	None
		Nov-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
Tappan	B/D	Jan-May	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jun-Sep	> 6.0	> 6.0	---	---	---	---	---	None
		Oct-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
13:										
Belleville	B/D	Jan-May	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	---	---	None
		Nov-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
16:										
Essexville	A/D	Jan-May	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	---	---	None
		Nov-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
17A:										
Wixom	B	Jan-Jun	0.5-1.5	1.5-3.5	Perched	---	---	None	---	None
		Jul-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	0.5-1.5	1.5-3.5	Perched	---	---	None	---	None
23:										
Tappan	B/D	Jan-May	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jun-Sep	> 6.0	> 6.0	---	---	---	---	---	None
		Oct-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
25A:										
Pipestone	B	Jan-May	0.5-1.5	> 6.0	Apparent	---	---	None	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	0.5-1.5	> 6.0	Apparent	---	---	None	---	None
31:										
Sloan	B/D	Jan-Jun	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Frequent
		Jul-Oct	> 6.0	> 6.0	---	---	---	---	---	None
		Nov-Dec	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Frequent
35A:										
Pipestone	B	Jan-Jun	0.5-1.5	> 6.0	Apparent	---	---	None	---	None
		Jul-Sep	> 6.0	> 6.0	---	---	---	None	---	None
		Oct-Dec	0.5-1.5	> 6.0	Apparent	---	---	None	---	None
37B:										
Rousseau	A	Jan	> 6.0	> 6.0	---	---	---	None	---	None
		Feb-May	2.5-6.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Dec	> 6.0	> 6.0	---	---	---	None	---	None
43A:										
Londo	C	Jan-May	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
49A:										
Londo	C	Jan-May	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
Poseyville	C	Jan-May	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	1.0-2.0	> 6.0	Apparent	---	---	None	---	None

Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water Table Depth: Upper limit	Water Table Depth: Lower limit	Water Table Depth: Water table kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft.	Ft.		Ft.				
50:										
Cohoctah	B/D	Jan-Apr	0.0-1.0	> 6.0	Apparent	---	---	---	Long	Frequent
		May	0.0-1.0	> 6.0	Apparent	---	---	---	---	None
		Jun-Aug	> 6.0	> 6.0	---	---	---	---	---	None
		Sep-Oct	0.0-1.0	> 6.0	Apparent	---	---	---	---	None
		Nov-Dec	0.0-1.0	> 6.0	Apparent	---	---	---	Long	Frequent
51:										
Urban land	---	Jan-Dec	> 6.0	> 6.0	---	---	---	---	---	---
52:										
Urban land	---	Jan-Dec	> 6.0	> 6.0	---	---	---	---	---	---
Tappan	B/D	Jan-May	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jun-Sep	> 6.0	> 6.0	---	---	---	---	---	None
		Oct-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
53A:										
Urban Land	---	Jan-Dec	> 6.0	> 6.0	---	---	---	---	---	---
Londo	C	Jan-May	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
54B:										
Urban land	---	Jan-Dec	> 6.0	> 6.0	---	---	---	---	---	---
Rousseau	A	Jan	> 6.0	> 6.0	---	---	---	None	---	None
		Feb-May	2.5-6.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Dec	> 6.0	> 6.0	---	---	---	None	---	None
55:										
Aquents	D	Jan-Dec	0.0	> 6.0	Apparent	0.0-1.0	Very long	Frequent	---	None
56:										
Dumps	---	Jan-Dec	> 6.0	> 6.0	---	---	---	---	---	---
57A:										
Poseyville	C	Jan-May	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
58A:										
Tappan	B/D	Jan-May	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jun-Sep	> 6.0	> 6.0	---	---	---	---	---	None
		Oct-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
Poseyville	C	Jan-May	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
59:										
Tobico	A/D	Jan-Jun	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jul-Aug	> 6.0	> 6.0	---	---	---	---	---	None
		Sep-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
60:										
Essexville	A/D	Jan-May	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	---	---	None
		Nov-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
61:										
Cohoctah	B/D	Jan-Apr	0.0-1.0	> 6.0	Apparent	---	---	---	Long	Occasional
		May	0.0-1.0	> 6.0	Apparent	---	---	---	---	None
		Jun-Aug	> 6.0	> 6.0	---	---	---	---	---	None
		Sep-Oct	0.0-1.0	> 6.0	Apparent	---	---	---	---	None
		Nov-Dec	0.0-1.0	> 6.0	Apparent	---	---	---	Long	Occasional

Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table Depth: Upper limit	Water Table Depth: Lower limit	Water Table Depth: Water table kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft.	Ft		Ft				
62A:										
Sanilac	B	Jan-Jun	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
		Jul-Sep	> 6.0	> 6.0	---	---	---	None	---	None
		Oct-Dec	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
Bach	B/D	Jan-Jun	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jul-Aug	> 6.0	> 6.0	---	---	---	---	---	None
		Sep-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
63A:										
Rapson	B	Jan-May	0.5-1.5	> 6.0	Apparent	---	---	None	---	None
		Jun-Nov	> 6.0	> 6.0	---	---	---	None	---	None
		Dec	0.5-1.5	> 6.0	Apparent	---	---	None	---	None
Bach	B/D	Jan-Jun	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jul-Aug	> 6.0	> 6.0	---	---	---	---	---	None
		Sep-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
64B:										
Londo	C	Jan-May	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
		Jun-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	1.0-2.0	> 6.0	Apparent	---	---	None	---	None
Wixom	B	Jan-Jun	0.5-1.5	1.5-3.5	Perched	---	---	None	---	None
		Jul-Oct	> 6.0	> 6.0	---	---	---	None	---	None
		Nov-Dec	0.5-1.5	1.5-3.5	Perched	---	---	None	---	None
65B:										
Geulph	B	Jan-Apr	2.5-6.0	3.0-4.0	Perched	---	---	None	---	None
		May-Nov	> 6.0	> 6.0	---	---	---	None	---	None
		Dec	2.5-6.0	3.0-4.0	Perched	---	---	None	---	None
Menominee	A	Jan-Apr	2.5-4.0	3.0-4.0	Perched	---	---	None	---	None
		May-Nov	> 6.0	> 6.0	---	---	---	None	---	None
		Dec	2.5-4.0	3.0-4.0	Perched	---	---	None	---	None
66A:										
Pipestone	B	Jan-Jun	0.5-1.5	> 6.0	Apparent	---	---	None	---	None
		Jul-Sep	> 6.0	> 6.0	---	---	---	None	---	None
		Oct-Dec	0.5-1.5	> 6.0	Apparent	---	---	None	---	None
Tobico	A/D	Jan-Jun	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Jul-Aug	> 6.0	> 6.0	---	---	---	---	---	None
		Sep-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
67:										
Belleville	D	Jan-Jul	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
		Aug	> 6.0	> 6.0	---	---	---	---	---	None
		Sep-Dec	0.0	> 6.0	Apparent	0.0-1.0	Long	Occasional	---	None
68:										
Cohoctah	D	Jan-May	0.0-1.0	> 6.0	Apparent	---	---	---	---	None
		Jun-Aug	> 6.0	> 6.0	---	---	---	---	---	None
		Sep-Oct	0.0-1.0	> 6.0	Apparent	---	---	---	Very brief	Rare
		Nov-Dec	0.0-1.0	> 6.0	Apparent	---	---	---	---	None
W:										
Water	---	Jan-Dec	> 6.0	> 6.0	---	---	---	---	---	---

Water Features--Continued

ENDNOTE--WATER FEATURES

This table provides estimates of various water features. The estimates are used in land use planning that involves engineering considerations

HYDROLOGIC SOIL GROUPS are based on estimates of ronoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms. The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltrate rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils tha are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

WATER TABLE refers to a saturated zone in the soil. The table indicates by month, depth to the top (upper limit) and base (lower limit) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

PONDING is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates surface water depth and the duration and frequency of ponding. Duration is expressed as very brief if less than 2 days, brief if 2 to 7 days, long if 7 to 30 days, and very long if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. None means that ponding is not probable; rare that is is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); occasional that is occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and frequent that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

FLOODING is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

DURATION AND FREQUENCY are estimated. Duration is expressed as extremely brief if 0.1 hour to 4 hours, very brief if 4 hours to 2 days, brief if 2 to 7 days, long if 7 to 30 days, and very long if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. None means that flooding is not probable; very rare that it is unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); rare that is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 1 percent to 5 percent in any year); occasional that is occurs infrequently under normal weather conditions (the chance of flooding is 5 to 20 percent in any year); frequent that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and very frequent that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development. Also considered are local information about the extent and levels of flooding and relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Physical Properties of Soils
Bay County, Michigan

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply to the surface layer)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	in/hr	In/in	Pct					
12:											
Corunna---------	0-10	5-15	1.10-1.60	1.98-5.95	0.12-0.15	0.0-2.9	.20	.20	5	3	86
	10-29	10-18	1.30-1.60	0.57-5.95	0.08-0.14	0.0-2.9	.20	.20			
	29-60	18-35	1.45-1.70	0.20-0.57	0.16-0.20	3.0-5.9	.43	.43			
Tappan----------	0-10	12-20	1.20-1.60	1.98-5.95	0.12-0.15	0.0-2.9	.20	.20	5	3	86
	10-29	18-30	1.60-1.80	0.20-1.98	0.14-0.19	3.0-5.9	.32	.32			
	29-60	15-30	1.60-1.80	0.06-0.20	0.15-0.19	3.0-5.9	.37	.37			
13:											
Belleville------	0-11	3-12	0.90-1.60	5.95-19.98	0.10-0.12	0.0-2.9	.17	.17	4	2	134
	11-36	2-12	1.45-1.70	5.95-19.98	0.06-0.10	0.0-2.9	.17	.17			
	36-60	25-35	1.45-1.80	0.20-0.57	0.14-0.20	3.0-5.9	.32	.32			
16:											
Essexville------	0-11	10-15	1.35-1.50	5.95-19.98	0.10-0.14	0.0-2.9	.17	.17	5	2	134
	11-26	2-12	1.40-1.55	5.95-19.98	0.04-0.12	0.0-2.9	.17	.17			
	26-60	10-35	1.45-1.65	0.20-0.57	0.12-0.20	0.0-2.9	.32	.32			
17A:											
Wixom----------	0-9	2-12	1.20-1.60	5.95-19.98	0.10-0.12	0.0-2.9	.17	.17	5	2	134
	9-26	2-14	1.40-1.70	5.95-19.98	0.06-0.11	0.0-2.9	.15	.15			
	26-60	18-35	1.50-1.70	0.20-0.57	0.14-0.20	0.0-2.9	.43	.43			
23:											
Tappan----------	0-10	15-25	1.20-1.60	0.57-1.98	0.18-0.22	3.0-5.9	.28	.28	5	5	56
	10-29	18-30	1.60-1.80	0.20-1.98	0.14-0.19	3.0-5.9	.32	.32			
	29-60	15-30	1.60-1.80	0.06-0.20	0.15-0.19	3.0-5.9	.37	.37			
25A:											
Pipestone-------	0-9	2-10	1.30-1.50	5.95-19.98	0.06-0.10	0.0-2.9	.15	.15	5	1	220
	9-55	2-12	1.20-1.60	5.95-19.98	0.04-0.08	0.0-2.9	.17	.17			
	55-60	12-35	1.40-1.70	0.06-0.57	0.16-0.18	0.0-2.9	.32	.32			
31:											
Sloan----------	0-11	15-27	1.20-1.40	0.57-1.98	0.19-0.24	0.0-2.9	.28	.28	5	6	48
	11-60	22-35	1.25-1.55	0.20-1.98	0.15-0.19	3.0-5.9	.37	.37			
35A:											
Pipestone-------	0-4	2-12	1.30-1.50	5.95-19.98	0.07-0.10	0.0-2.9	.15	.15	5	1	220
	4-8	2-12	1.30-1.70	5.95-19.98	0.06-0.10	0.0-2.9	.15	.15			
	8-12	2-12	1.40-1.70	5.95-19.98	0.06-0.09	0.0-2.9	.15	.15			
	12-60	2-12	1.40-1.65	5.95-19.98	0.05-0.07	0.0-2.9	.15	.15			
37B:											
Rousseau--------	0-6	0-10	1.30-1.55	5.95-19.98	0.07-0.09	0.0-2.9	.15	.15	5	1	250
	6-23	0-10	1.30-1.60	1.98-19.98	0.06-0.11	0.0-2.9	.15	.15			
	23-60	0-10	1.50-1.65	5.95-19.98	0.05-0.07	0.0-2.9	.15	.15			
43A:											
Londo----------	0-7	10-18	1.40-1.70	0.57-1.98	0.18-0.22	0.0-2.9	.32	.32	5	5	56
	7-20	20-35	1.40-1.75	0.20-1.98	0.14-0.19	3.0-5.9	.32	.32			
	20-60	20-32	1.45-1.75	0.20-1.98	0.12-0.19	3.0-5.9	.32	.32			
49A:											
Londo----------	0-7	10-18	1.40-1.70	0.57-1.98	0.18-0.22	0.0-2.9	.32	.32	5	5	56
	7-20	20-35	1.40-1.75	0.20-1.98	0.14-0.19	3.0-5.9	.32	.32			
	20-60	20-32	1.45-1.75	0.20-1.98	0.12-0.19	3.0-5.9	.32	.32			
Poseyville------	0-7	2-12	1.30-1.50	5.95-19.98	0.09-0.12	0.0-2.9	.17	.17	5	2	134
	7-22	12-18	1.55-1.70	0.57-1.98	0.06-0.14	0.0-2.9	.24	.24			
	22-60	18-35	1.45-1.70	0.20-1.98	0.12-0.19	3.0-5.9	.37	.37			

Physical Properties of Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	in/hr	In/in	Pct					
Cohoctah--------	0-11	0-15	1.20-1.50	5.95-19.98	0.10-0.15	0.0-2.9	.17	.17	5	2	134
	11-18	5-18	1.45-1.65	1.98-5.95	0.12-0.20	0.0-2.9	.28	.28			
	18-60	2-18	1.45-1.65	1.98-5.95	0.08-0.20	0.0-2.9	.28	.28			
51:											
Urban land------	---	---	---	---	---	---	---	---	-	---	---
52:											
Urban land------	---	---	---	---	---	---	---	---	-	---	---
Tappan----------	0-10	15-25	1.20-1.60	0.57-1.98	0.18-0.22	3.0-5.9	.28	.28	5	5	56
	10-29	18-30	1.60-1.80	0.20-1.98	0.14-0.19	3.0-5.9	.32	.32			
	29-60	15-30	1.60-1.80	0.06-0.20	0.15-0.19	3.0-5.9	.37	.37			
53A:											
Urban land------	---	---	---	---	---	---	---	---	-	---	---
Londo----------	0-7	10-18	1.40-1.70	0.57-1.98	0.18-0.22	0.0-2.9	.32	.32	5	5	56
	7-20	20-35	1.40-1.75	0.20-1.98	0.14-0.19	3.0-5.9	.32	.32			
	20-60	20-32	1.45-1.75	0.20-1.98	0.12-0.19	3.0-5.9	.32	.32			
54B:											
Urban land------	---	---	---	---	---	---	---	---	-	---	---
Rousseau--------	0-6	0-10	1.30-1.55	5.95-19.98	0.07-0.09	0.0-2.9	.15	.15	5	1	250
	6-23	0-10	1.30-1.60	1.98-19.98	0.06-0.11	0.0-2.9	.15	.15			
	23-60	0-10	1.50-1.65	5.95-19.98	0.05-0.07	0.0-2.9	.15	.15			
55:											
Aquents---------	0-60	---	---	---	---	---	---	---	-	---	---
56:											
Dumps----------	---	---	---	---	---	---	---	---	-	---	---
57A:											
Poseyville------	0-7	2-12	1.30-1.50	5.95-19.98	0.09-0.12	0.0-2.9	.17	.17	5	2	134
	7-22	12-18	1.55-1.70	0.57-1.98	0.06-0.14	0.0-2.9	.24	.24			
	22-60	18-35	1.45-1.70	0.20-1.98	0.12-0.19	3.0-5.9	.37	.37			
58A:											
Tappan----------	0-10	15-25	1.20-1.60	0.57-1.98	0.18-0.22	3.0-5.9	.28	.28	5	5	56
	10-29	18-30	1.60-1.80	0.20-1.98	0.14-0.19	3.0-5.9	.32	.32			
	29-60	15-30	1.60-1.80	0.06-0.20	0.15-0.19	3.0-5.9	.37	.37			
Poseyville------	0-7	2-12	1.30-1.50	5.95-19.98	0.09-0.12	0.0-2.9	.17	.17	5	2	134
	7-22	12-18	1.55-1.70	0.57-1.98	0.06-0.14	0.0-2.9	.24	.24			
	22-60	18-35	1.45-1.70	0.20-1.98	0.12-0.19	3.0-5.9	.37	.37			
59:											
Tobico----------	0-8	2-10	0.90-1.60	5.95-19.98	0.06-0.11	0.0-2.9	.15	.15	5	1	220
	8-60	0-10	1.45-1.70	19.98-19.98	0.04-0.07	0.0-2.9	.15	.15			
60:											
Essexville------	0-11	10-15	1.35-1.50	5.95-19.98	0.10-0.14	0.0-2.9	.17	.17	5	2	134
	11-26	2-12	1.40-1.55	5.95-19.98	0.04-0.12	0.0-2.9	.17	.17			
	26-60	10-35	1.45-1.65	0.20-0.57	0.12-0.20	0.0-2.9	.32	.32			
61:											
Cohoctah--------	0-11	5-20	1.20-1.50	1.98-5.95	0.13-0.22	0.0-2.9	.24	.24	5	3	86
	11-18	5-18	1.45-1.65	1.98-5.95	0.12-0.20	0.0-2.9	.28	.28			
	18-60	2-18	1.45-1.65	1.98-5.95	0.08-0.20	0.0-2.9	.28	.28			
62A:											
Sanilac---------	0-10	3-15	1.40-1.70	1.98-5.95	0.15-0.22	0.0-2.9	.37	.37	5	3	86
	10-42	0-18	1.45-1.80	0.20-1.98	0.06-0.22	0.0-2.9	.37	.37			
	42-60	0-18	1.50-1.90	0.20-1.98	0.06-0.22	0.0-2.9	.37	.37			

Physical Properties of Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Erosion factors K	Erosion factors Kf	Erosion factors T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	in/hr	In/in	Pct					
Bach [illegible]	0-13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5	3	86
	13-60	0-18	1.50-1.70	0.20-1.98	0.14-0.22	0.0-2.9	.43	.43			
63A:											
Rapson----------	0-9	2-15	1.35-1.70	5.95-19.98	0.06-0.12	0.0-2.9	.17	.17	5	2	134
	9-29	1-15	1.35-1.65	5.95-19.98	0.06-0.11	0.0-2.9	.17	.17			
	29-60	10-20	1.45-1.70	0.57-1.98	0.05-0.20	0.0-2.9	.43	.43			
Bach----------	0-13	2-15	1.30-1.60	1.98-5.95	0.20-0.22	0.0-2.9	.32	.32	5	3	86
	13-60	0-18	1.50-1.70	0.20-1.98	0.14-0.22	0.0-2.9	.43	.43			
64B:											
Londo----------	0-7	5-18	1.40-1.70	1.98-5.95	0.14-0.18	0.0-2.9	.24	.24	5	3	86
	7-20	20-35	1.40-1.75	0.20-1.98	0.14-0.19	3.0-5.9	.32	.32			
	20-60	20-32	1.45-1.75	0.20-1.98	0.12-0.19	3.0-5.9	.32	.32			
Wixom----------	0-9	2-12	1.20-1.60	5.95-19.98	0.10-0.12	0.0-2.9	.17	.17	5	2	134
	9-26	2-14	1.40-1.70	5.95-19.98	0.06-0.11	0.0-2.9	.15	.15			
	26-60	18-35	1.50-1.70	0.20-0.57	0.14-0.20	0.0-2.9	.43	.43			
65B:											
Geulph----------	0-8	12-20	1.40-1.65	0.57-1.98	0.14-0.16	0.0-2.9	.24	.24	5	3	86
	8-15	12-35	1.40-1.65	0.20-1.98	0.15-0.18	0.0-2.9	.28	.28			
	15-22	18-35	1.40-1.70	0.20-0.57	0.14-0.18	0.0-2.9	.32	.32			
	22-60	18-32	1.45-1.65	0.20-0.57	0.14-0.18	0.0-2.9	.32	.32			
Menominee-------	0-9	1-15	1.35-1.65	1.98-5.95	0.10-0.12	0.0-2.9	.17	.17	5	2	134
	9-33	1-15	1.30-1.70	5.95-19.98	0.04-0.10	0.0-2.9	.17	.24			
	33-60	18-35	1.45-1.70	0.20-0.57	0.14-0.18	3.0-5.9	.32	.32			
66A:											
Pipestone-------	0-4	2-12	1.30-1.50	5.95-19.98	0.07-0.10	0.0-2.9	.15	.15	5	1	220
	4-8	2-12	1.30-1.70	5.95-19.98	0.06-0.10	0.0-2.9	.15	.15			
	8-12	2-12	1.40-1.70	5.95-19.98	0.06-0.09	0.0-2.9	.15	.15			
	12-60	2-12	1.40-1.65	5.95-19.98	0.05-0.07	0.0-2.9	.15	.15			
Tobico----------	0-8	2-10	0.90-1.60	5.95-19.98	0.06-0.11	0.0-2.9	.15	.15	5	1	220
	8-60	0-10	1.45-1.70	19.98-19.98	0.04-0.07	0.0-2.9	.15	.15			
67:											
Belleville------	0-11	2-12	1.35-1.50	5.95-19.98	0.10-0.12	0.0-2.9	.17	.17	4	8	0
	11-36	2-15	1.40-1.55	5.95-19.98	0.06-0.10	0.0-2.9	.17	.17			
	36-60	18-35	1.46-1.80	0.20-0.57	0.14-0.20	3.0-5.9	.32	.32			
68:											
Cohoctah--------	0-11	0-15	1.20-1.50	5.95-19.98	0.10-0.15	0.0-2.9	.17	.17	4	3	86
	11-18	5-18	1.45-1.65	1.98-5.95	0.12-0.20	0.0-2.9	.28	.28			
	18-60	2-18	1.45-1.65	1.98-5.95	0.08-0.20	0.0-2.9	.28	.28			
W:											
Water----------	---	---	---	---	---	---	---	---	-	---	---

Physical Properties of Soils--Continued

ENDNOTE--PHYSICAL PROPERTIES OF SOILS

The above table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

CLAY as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. The estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

MOIST BULK DENSITY is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar(33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. The estimatred moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influence by texture, kind of clay, content of organic matter, and soil structure.

PERMEABILITY(Ksat) refers to the ability of a soil to transmit water or air. The term permeability, as used in soil surveys, indicates saturated hydraulic conductivity (Ksat). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

AVAILABLE WATER CAPACITY refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irritation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

LINEAR EXTENSIBILITY refers to the change in length of an unconfined clod as moisture contest is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension(33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil. Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

EROSION FACTORS are shown as the K factor (K and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) sand the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand , and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

EROSION FACTOR K indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

EROSION FACTOR Kf indicates the erodibility of the fine-earth, or the material less than 2 millimeters in size.

EROSION FACTOR T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

WIND ERODIBILITY GROUPS are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material and sapric soil material.

3. Coarse sandy loams, sandy loams, find sandy loams, and very fine sandy loams.

Physical Properties of Soils--Continued

4L. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcereous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of rock fragments on the surface or because of surface wetness.

WIND ERODIBILITY INDEX is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

24-Hour Rainfall in Michigan (inches)						
County	2-year	5-year	10-year	25-year	50-year	100-year
ALCONA	2.33	2.86	3.25	3.75	4.17	4.62
ALGER	2.30	2.68	3.00	3.50	4.00	4.50
ALLEGAN	2.67	3.45	3.95	4.50	5.25	5.87
ALPENA	2.30	2.80	3.17	3.68	4.13	4.56
ANTRIM	2.36	2.85	3.20	3.75	4.13	4.56
ARENAC	2.41	2.96	3.35	3.87	4.33	4.81
BARAGA	2.44	2.92	3.30	3.80	4.25	4.68
BARRY	2.60	3.25	3.70	4.37	4.87	5.43
BAY	2.43	2.98	3.37	3.87	4.37	4.90
BENZIE	2.45	3.00	3.40	3.95	4.43	4.87
BERRIEN	2.80	3.58	4.00	4.50	5.50	6.00
BRANCH	2.58	3.17	3.62	4.25	4.75	5.20
CALHOUN	2.57	3.15	3.60	4.25	4.75	5.12
CASS	2.73	3.47	4.00	4.50	5.25	5.87
CHARLEVOIX	2.31	2.77	3.12	3.62	4.00	4.50
CHEBOYGAN	2.26	2.72	3.05	3.56	4.00	4.50
CHIPPEWA	2.20	2.60	3.00	3.50	4.00	4.50
CLARE	2.48	3.07	3.50	4.12	4.56	5.00
CLINTON	2.51	3.05	3.45	4.00	4.50	4.96
CRAWFORD	2.40	2.92	3.30	3.87	4.31	4.70
DELTA	2.36	2.77	3.05	3.50	4.00	4.50
DICKINSON	2.45	2.90	3.25	3.68	4.13	4.50
EATON	2.55	3.10	3.50	4.12	4.62	5.00
EMMET	2.26	2.72	3.05	3.50	4.00	4.50
GENESEE	2.40	2.92	3.32	3.78	4.28	4.78
GLADWIN	2.45	3.02	3.40	3.96	4.43	4.90
GOGEBIC	2.57	3.15	3.60	4.25	4.69	5.20
GRAND TRAVERSE	2.42	2.97	3.36	3.93	4.38	4.81
GRATIOT	2.51	3.05	3.47	4.06	4.50	4.96
HILLSDALE	2.54	3.05	3.45	4.00	4.48	4.96
HOUGHTON	2.40	2.92	3.35	3.87	4.30	4.80
HURON	2.32	2.87	3.27	3.65	4.16	4.65
INGHAM	2.50	2.98	3.38	3.95	4.43	4.90
IONIA	2.56	3.17	3.60	4.25	4.75	5.25
IOSCO	2.37	2.90	3.30	3.78	4.28	4.70
IRON	2.49	3.00	3.37	3.87	4.30	4.77
ISABELLA	2.51	3.12	3.55	4.15	4.62	5.10
JACKSON	2.51	2.98	3.38	3.95	4.43	4.93
KALAMAZOO	2.65	3.33	3.85	4.50	5.06	5.62
KALKASKA	2.41	2.95	3.32	3.90	4.31	4.75
KENT	2.62	3.30	3.80	4.50	5.06	5.62
KEWEENAW	2.35	2.82	3.25	3.68	4.13	4.58
LAKE	2.53	3.20	3.65	4.31	4.81	5.37
LAPEER	2.35	2.88	3.28	3.68	4.19	4.68
LEELANAU	2.38	2.90	3.25	3.81	4.18	4.62
LENAWEE	2.50	2.97	3.36	3.87	4.37	4.83
LIVINGSTON	2.46	2.95	3.34	3.83	4.33	4.81
LUCE	2.20	2.60	3.00	3.50	4.00	4.50
MACKINAC	2.20	2.62	3.00	3.50	4.00	4.50

MACOMB	2.32	2.85	3.25	3.62	4.10	4.61
MANISTEE	2.50	3.10	3.50	4.12	4.62	5.12
MARQUETTE	2.40	2.82	3.15	3.62	4.00	4.50
MASON	2.55	3.25	3.70	4.37	4.93	5.50
MECOSTA	2.55	3.20	3.65	4.31	4.81	5.31
MENOMINEE	2.45	2.90	3.20	3.68	4.13	4.50
MIDLAND	2.47	3.03	3.43	3.96	4.46	4.93
MISSAUKEE	2.45	3.10	3.45	4.00	4.50	4.93
MONROE	2.43	2.92	3.30	3.77	4.23	4.73
MONTCALM	2.56	3.17	3.65	4.25	4.75	5.25
MONTMORENCY	2.32	2.82	3.17	3.71	4.13	4.56
MUSKEGON	2.65	3.40	3.95	4.50	5.25	5.87
NEWAYGO	2.60	3.30	3.80	4.50	5.00	5.60
OAKLAND	2.37	2.88	3.28	3.71	4.22	4.70
OCEANA	2.60	3.32	3.85	4.50	5.13	5.75
OGEMAW	2.42	2.95	3.35	3.87	4.37	4.78
ONTONAGON	2.51	3.70	3.50	4.12	4.56	5.10
OSCEOLA	2.51	3.15	3.55	4.22	4.73	5.18
OSCODA	2.37	2.90	3.27	3.81	4.25	4.68
OTSEGO	2.33	2.83	3.20	3.75	4.13	4.50
OTTAWA	2.67	3.43	3.95	4.50	5.31	5.87
PRESQUE ISLE	2.26	2.75	3.10	3.62	4.00	4.50
ROSCOMMON	2.43	3.00	3.37	3.96	4.43	4.87
SAGINAW	2.45	2.97	3.37	3.87	4.37	4.87
SANILAC	2.31	2.85	3.25	3.62	4.13	4.62
SCHOOLCRAFT	2.27	2.67	3.00	3.50	4.00	4.50
SHIAWASSEE	2.46	2.97	3.37	3.90	4.37	4.87
ST CLAIR	2.30	2.83	3.23	3.56	4.06	4.56
ST JOSEPH	2.66	3.32	3.82	4.50	5.04	5.50
TUSCOLA	2.37	2.91	3.31	3.71	4.25	4.71
VAN BUREN	2.73	3.47	4.00	4.50	5.35	5.87
WASHTENAW	2.45	2.93	3.33	3.83	4.31	4.81
WAYNE	2.37	2.86	3.27	3.65	4.19	4.68
WEXFORD	2.47	3.10	3.50	4.06	4.56	5.00

Monthly Rainfall by County for Michigan
(inches)

County	Jan_P	Feb_P	Mar_P	Apr_P	May_P	Jun_P	Jul_P	Aug_P	Sep_P	Oct_P	Nov_P	Dec_P	Annual
Alcona	1.63	1.32	1.89	2.47	2.75	2.89	3.04	3.34	3.49	2.49	2.43	1.97	29.71
Alger	2.02	1.48	1.97	2.36	2.8	3.19	3.05	3.53	3.68	2.83	2.87	2.33	32.11
Allegan	2.21	1.67	2.48	3.53	3.14	3.56	3.39	3.33	3.64	2.96	3.03	2.78	35.72
Alpena	1.63	1.32	1.89	2.47	2.75	2.89	3.04	3.34	3.49	2.49	2.43	1.97	29.71
Antrim	1.94	1.41	1.87	2.69	2.58	2.94	2.86	3.3	3.83	2.91	2.79	2.23	31.35
Arenac	1.67	1.46	2.17	2.7	2.67	3.06	2.78	3.17	3.52	2.55	2.54	2.1	30.39
Baraga	1.86	1.35	2	2.4	3.25	3.62	3.39	3.78	3.61	2.81	2.62	2.08	32.77
Barry	1.7	1.53	2.3	3.19	3.04	3.58	3.28	3.36	3.24	2.53	2.58	2.2	32.53
Bay	1.67	1.46	2.17	2.7	2.67	3.06	2.78	3.17	3.52	2.55	2.54	2.1	30.39
Benzie	1.94	1.41	1.87	2.69	2.58	2.94	2.86	3.3	3.83	2.91	2.79	2.23	31.35
Berrien	2.21	1.67	2.48	3.53	3.14	3.56	3.39	3.33	3.64	2.96	3.03	2.78	35.72
Branch	1.7	1.53	2.3	3.19	3.04	3.58	3.28	3.36	3.24	2.53	2.58	2.2	32.53
Calhoun	1.7	1.53	2.3	3.19	3.04	3.58	3.28	3.36	3.24	2.53	2.58	2.2	32.53
Cass	2.21	1.67	2.48	3.53	3.14	3.56	3.39	3.33	3.64	2.96	3.03	2.78	35.72
Charlevoix	1.94	1.41	1.87	2.69	2.58	2.94	2.86	3.3	3.83	2.91	2.79	2.23	31.35
Cheboygar	1.63	1.32	1.89	2.47	2.75	2.89	3.04	3.34	3.49	2.49	2.43	1.97	29.71
Chippewa	2.02	1.48	1.97	2.36	2.8	3.19	3.05	3.53	3.68	2.83	2.87	2.33	32.11
Clare	1.65	1.34	2.15	2.98	2.86	3.15	2.76	3.57	3.66	2.68	2.59	2.14	31.53
Clinton	1.7	1.53	2.3	3.19	3.04	3.58	3.28	3.36	3.24	2.53	2.58	2.2	32.53
Crawford	1.63	1.32	1.89	2.47	2.75	2.89	3.04	3.34	3.49	2.49	2.43	1.97	29.71
Delta	2.02	1.48	1.97	2.36	2.8	3.19	3.05	3.53	3.68	2.83	2.87	2.33	32.11
Dickinson	1.86	1.35	2	2.4	3.25	3.62	3.39	3.78	3.61	2.81	2.62	2.08	32.77
Eaton	1.7	1.53	2.3	3.19	3.04	3.58	3.28	3.36	3.24	2.53	2.58	2.2	32.53
Emmet	1.94	1.41	1.87	2.69	2.58	2.94	2.86	3.3	3.83	2.91	2.79	2.23	31.35
Genesee	1.73	1.66	2.38	3.08	2.82	3.35	3.03	3.23	2.88	2.37	2.64	2.32	31.49
Gladwin	1.65	1.34	2.15	2.98	2.86	3.15	2.76	3.57	3.66	2.68	2.59	2.14	31.53
Gogebic	1.86	1.35	2	2.4	3.25	3.62	3.39	3.78	3.61	2.81	2.62	2.08	32.77
Grand Trav	1.94	1.41	1.87	2.69	2.58	2.94	2.86	3.3	3.83	2.91	2.79	2.23	31.35
Gratiot	1.65	1.34	2.15	2.98	2.86	3.15	2.76	3.57	3.66	2.68	2.59	2.14	31.53
Hillsdale	1.7	1.53	2.3	3.19	3.04	3.58	3.28	3.36	3.24	2.53	2.58	2.2	32.53
Houghton	1.86	1.35	2	2.4	3.25	3.62	3.39	3.78	3.61	2.81	2.62	2.08	32.77
Huron	1.67	1.46	2.17	2.7	2.67	3.06	2.78	3.17	3.52	2.55	2.54	2.1	30.39
Ingham	1.7	1.53	2.3	3.19	3.04	3.58	3.28	3.36	3.24	2.53	2.58	2.2	32.53
Ionia	1.7	1.53	2.3	3.19	3.04	3.58	3.28	3.36	3.24	2.53	2.58	2.2	32.53
Iosco	1.63	1.32	1.89	2.47	2.75	2.89	3.04	3.34	3.49	2.49	2.43	1.97	29.71
Iron	1.86	1.35	2	2.4	3.25	3.62	3.39	3.78	3.61	2.81	2.62	2.08	32.77

Monthly Rainfall by County for Michigan
(inches)

Isabella	1.65	1.34	2.15	2.98	2.86	3.15	2.76	3.57	3.66	2.68	2.59	2.14	31.53
Jackson	1.7	1.53	2.3	3.19	3.04	3.58	3.28	3.36	3.24	2.53	2.58	2.2	32.53
Kalamazoo	2.21	1.67	2.48	3.53	3.14	3.56	3.39	3.33	3.64	2.96	3.03	2.78	35.72
Kalkaska	1.94	1.41	1.87	2.69	2.58	2.94	2.86	3.3	3.83	2.91	2.79	2.23	31.35
Kent	2.21	1.67	2.48	3.53	3.14	3.56	3.39	3.33	3.64	2.96	3.03	2.78	35.72
Keweenaw	1.86	1.35	2	2.4	3.25	3.62	3.39	3.78	3.61	2.81	2.62	2.08	32.77
Lake	2.22	1.62	2.3	3.14	2.71	2.9	2.71	3.62	3.57	3.16	3.1	2.55	33.6
Lapeer	1.73	1.66	2.38	3.08	2.82	3.35	3.03	3.23	2.88	2.37	2.64	2.32	31.49
Leelanau	1.94	1.41	1.87	2.69	2.58	2.94	2.86	3.3	3.83	2.91	2.79	2.23	31.35
Lenawee	1.73	1.66	2.38	3.08	2.82	3.35	3.03	3.23	2.88	2.37	2.64	2.32	31.49
Livingston	1.73	1.66	2.38	3.08	2.82	3.35	3.03	3.23	2.88	2.37	2.64	2.32	31.49
Luce	2.02	1.48	1.97	2.36	2.8	3.19	3.05	3.53	3.68	2.83	2.87	2.33	32.11
Mackinac	2.02	1.48	1.97	2.36	2.8	3.19	3.05	3.53	3.68	2.83	2.87	2.33	32.11
Macomb	1.73	1.66	2.38	3.08	2.82	3.35	3.03	3.23	2.88	2.37	2.64	2.32	31.49
Manistee	1.94	1.41	1.87	2.69	2.58	2.94	2.86	3.3	3.83	2.91	2.79	2.23	31.35
Marquette	1.86	1.35	2	2.4	3.25	3.62	3.39	3.78	3.61	2.81	2.62	2.08	32.77
Mason	2.22	1.62	2.3	3.14	2.71	2.9	2.71	3.62	3.57	3.16	3.1	2.55	33.6
Mecosta	1.65	1.34	2.15	2.98	2.86	3.15	2.76	3.57	3.66	2.68	2.59	2.14	31.53
Menominee	1.86	1.35	2	2.4	3.25	3.62	3.39	3.78	3.61	2.81	2.62	2.08	32.77
Midland	1.65	1.34	2.15	2.98	2.86	3.15	2.76	3.57	3.66	2.68	2.59	2.14	31.53
Missaukee	1.94	1.41	1.87	2.69	2.58	2.94	2.86	3.3	3.83	2.91	2.79	2.23	31.35
Monroe	1.73	1.66	2.38	3.08	2.82	3.35	3.03	3.23	2.88	2.37	2.64	2.32	31.49
Montcalm	1.65	1.34	2.15	2.98	2.86	3.15	2.76	3.57	3.66	2.68	2.59	2.14	31.53
Montmorer	1.63	1.32	1.89	2.47	2.75	2.89	3.04	3.34	3.49	2.49	2.43	1.97	29.71
Muskegon	2.22	1.62	2.3	3.14	2.71	2.9	2.71	3.62	3.57	3.16	3.1	2.55	33.6
Newaygo	2.22	1.62	2.3	3.14	2.71	2.9	2.71	3.62	3.57	3.16	3.1	2.55	33.6
Oakland	1.73	1.66	2.38	3.08	2.82	3.35	3.03	3.23	2.88	2.37	2.64	2.32	31.49
Oceana	2.22	1.62	2.3	3.14	2.71	2.9	2.71	3.62	3.57	3.16	3.1	2.55	33.6
Ogemaw	1.63	1.32	1.89	2.47	2.75	2.89	3.04	3.34	3.49	2.49	2.43	1.97	29.71
Ontonagon	1.86	1.35	2	2.4	3.25	3.62	3.39	3.78	3.61	2.81	2.62	2.08	32.77
Osceola	1.65	1.34	2.15	2.98	2.86	3.15	2.76	3.57	3.66	2.68	2.59	2.14	31.53
Oscoda	1.63	1.32	1.89	2.47	2.75	2.89	3.04	3.34	3.49	2.49	2.43	1.97	29.71
Otsego	1.63	1.32	1.89	2.47	2.75	2.89	3.04	3.34	3.49	2.49	2.43	1.97	29.71
Ottawa	2.21	1.67	2.48	3.53	3.14	3.56	3.39	3.33	3.64	2.96	3.03	2.78	35.72
Presque Is	1.63	1.32	1.89	2.47	2.75	2.89	3.04	3.34	3.49	2.49	2.43	1.97	29.71
Roscommo	1.63	1.32	1.89	2.47	2.75	2.89	3.04	3.34	3.49	2.49	2.43	1.97	29.71
Saginaw	1.67	1.46	2.17	2.7	2.67	3.06	2.78	3.17	3.52	2.55	2.54	2.1	30.39

Monthly Rainfall by County for Michigan
(inches)

St Clair	1.73	1.66	2.38	3.08	2.82	3.35	3.03	3.23	2.88	2.37	2.64	2.32	31.49
St Joseph	1.7	1.53	2.3	3.19	3.04	3.58	3.28	3.36	3.24	2.53	2.58	2.2	32.53
Sanilac	1.67	1.46	2.17	2.7	2.67	3.06	2.78	3.17	3.52	2.55	2.54	2.1	30.39
Schoolcraf	2.02	1.48	1.97	2.36	2.8	3.19	3.05	3.53	3.68	2.83	2.87	2.33	32.11
Shiawasse	1.7	1.53	2.3	3.19	3.04	3.58	3.28	3.36	3.24	2.53	2.58	2.2	32.53
Tuscola	1.67	1.46	2.17	2.7	2.67	3.06	2.78	3.17	3.52	2.55	2.54	2.1	30.39
Van Buren	2.21	1.67	2.48	3.53	3.14	3.56	3.39	3.33	3.64	2.96	3.03	2.78	35.72
Washtenav	1.73	1.66	2.38	3.08	2.82	3.35	3.03	3.23	2.88	2.37	2.64	2.32	31.49
Wayne	1.73	1.66	2.38	3.08	2.82	3.35	3.03	3.23	2.88	2.37	2.64	2.32	31.49
Wexford	1.94	1.41	1.87	2.69	2.58	2.94	2.86	3.3	3.83	2.91	2.79	2.23	31.35

A-F CN=78 P=3.37 (10-yr)

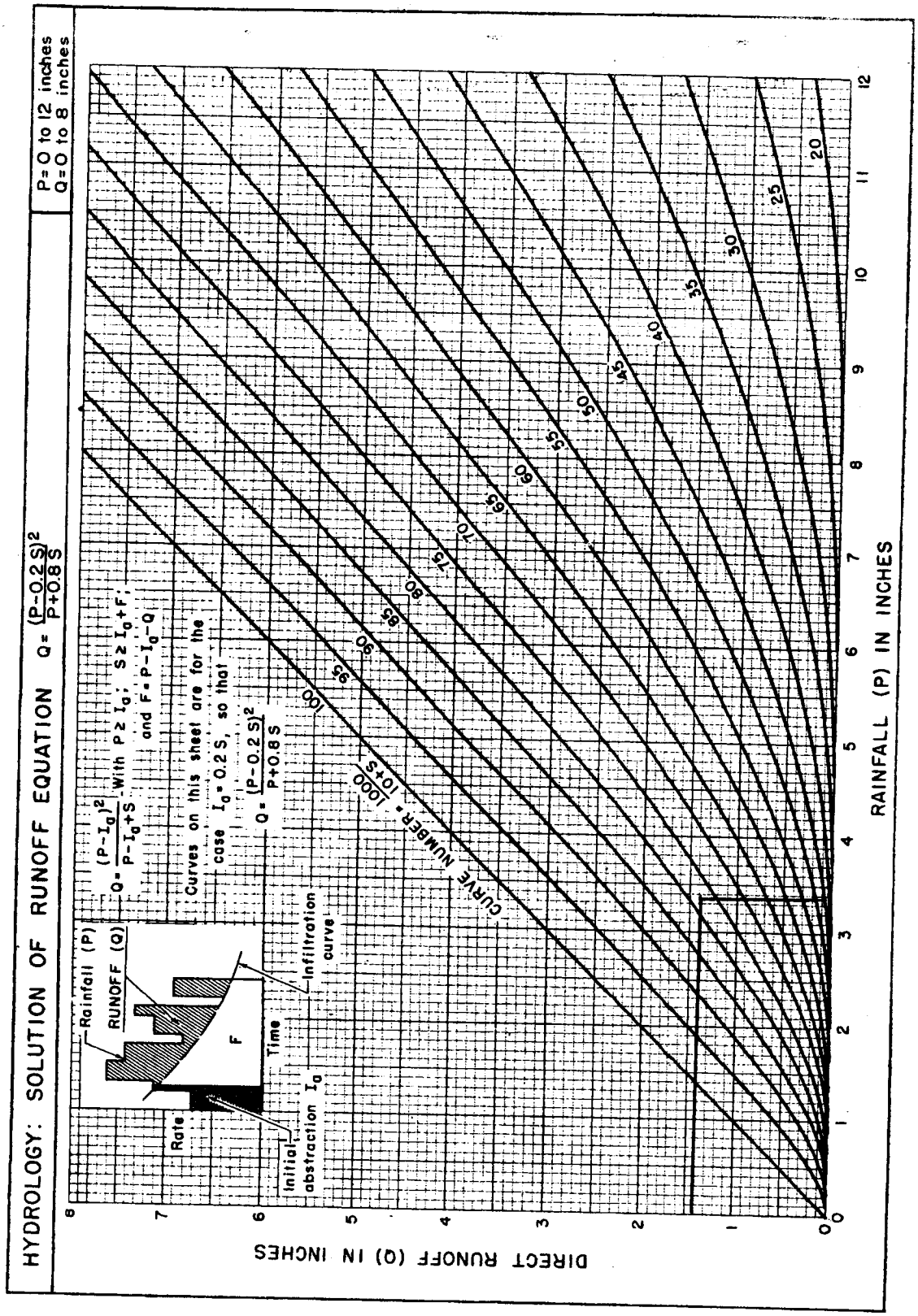


Figure 3.--Solution of the runoff equation, $Q = \frac{(P - 0.2S)}{P + 0.8S}$

Q = 1.4 inches

A-F CN = 78 P = 3.87 (25-yr)

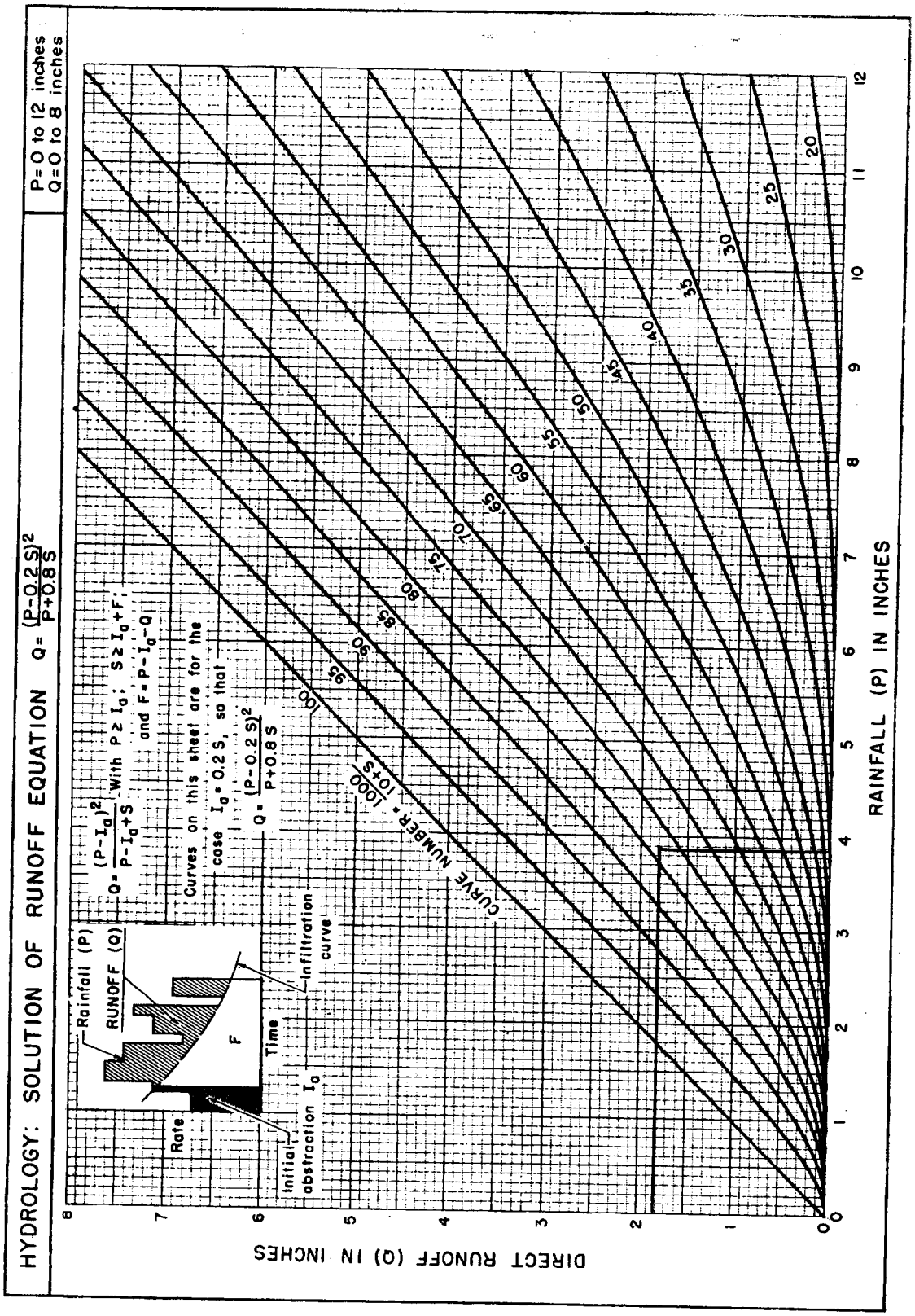


Figure 3.--Solution of the runoff equation, $Q = \frac{(P - 0.2S)^2}{P + 0.8S}$

Q = 1.8 inches

A-F CN = 78 P = 4.37 (50-yr)

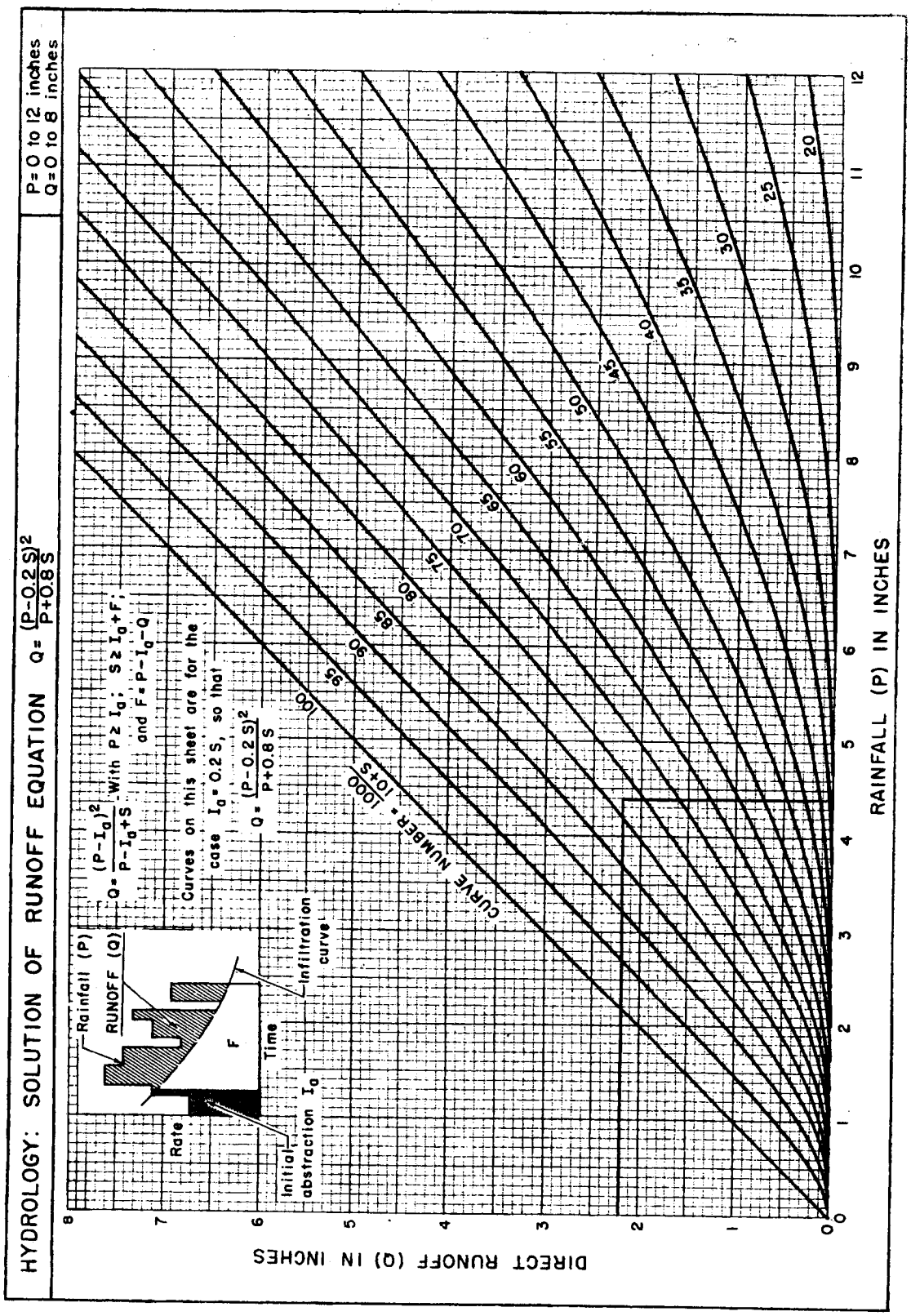


Figure 3.--Solution of the runoff equation, $Q = \frac{(P - 0.2S)^2}{P + 0.8S}$

Q = 2.2 inches

A-F CN = 78 P = 4.90 (100-yr)

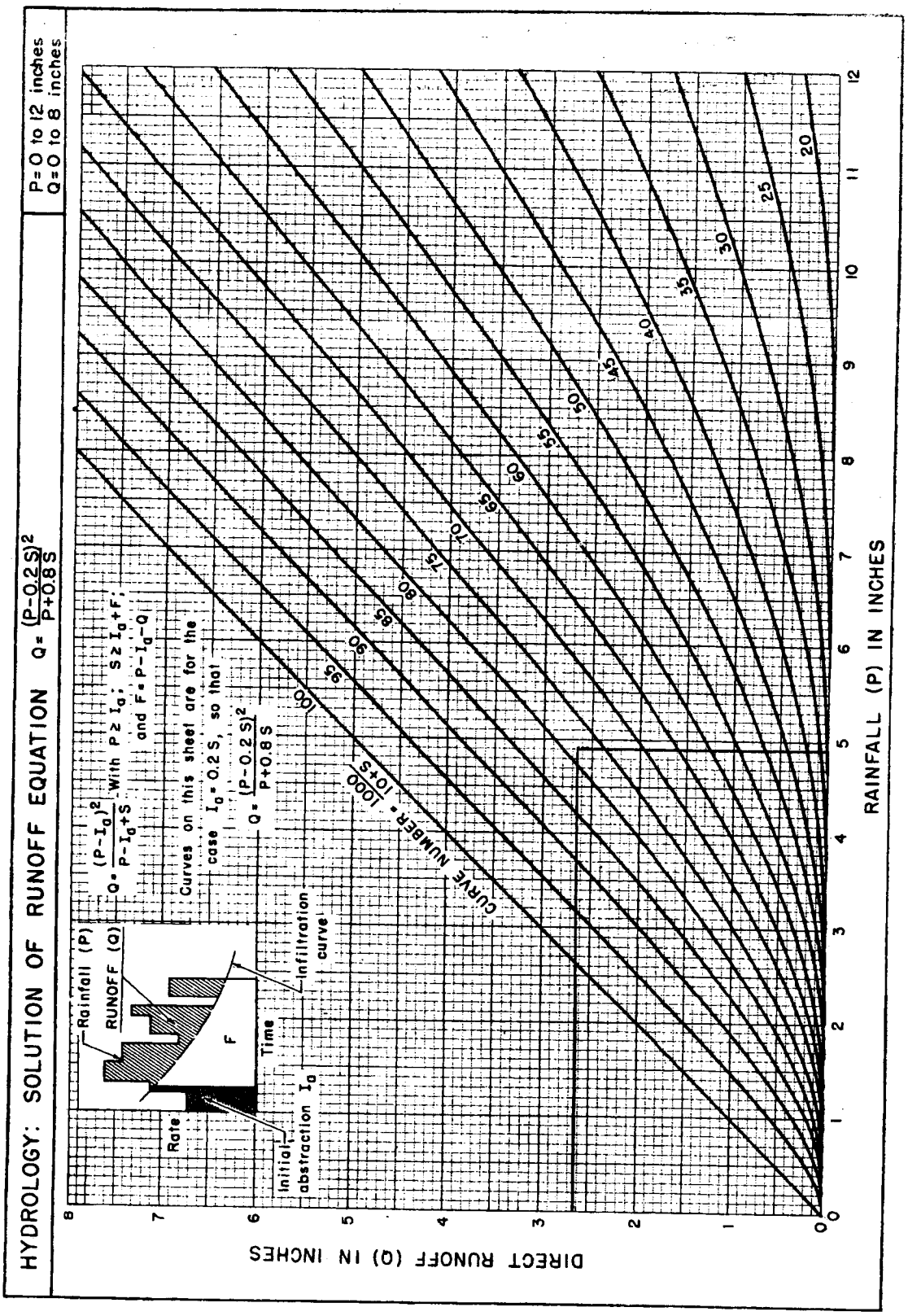


Figure 3.--Solution of the runoff equation, $Q = \frac{(P - 0.2S)^2}{P + 0.8S}$

Q = 2.65 inches

G CN = 55 P = 3.37 (10-4r)

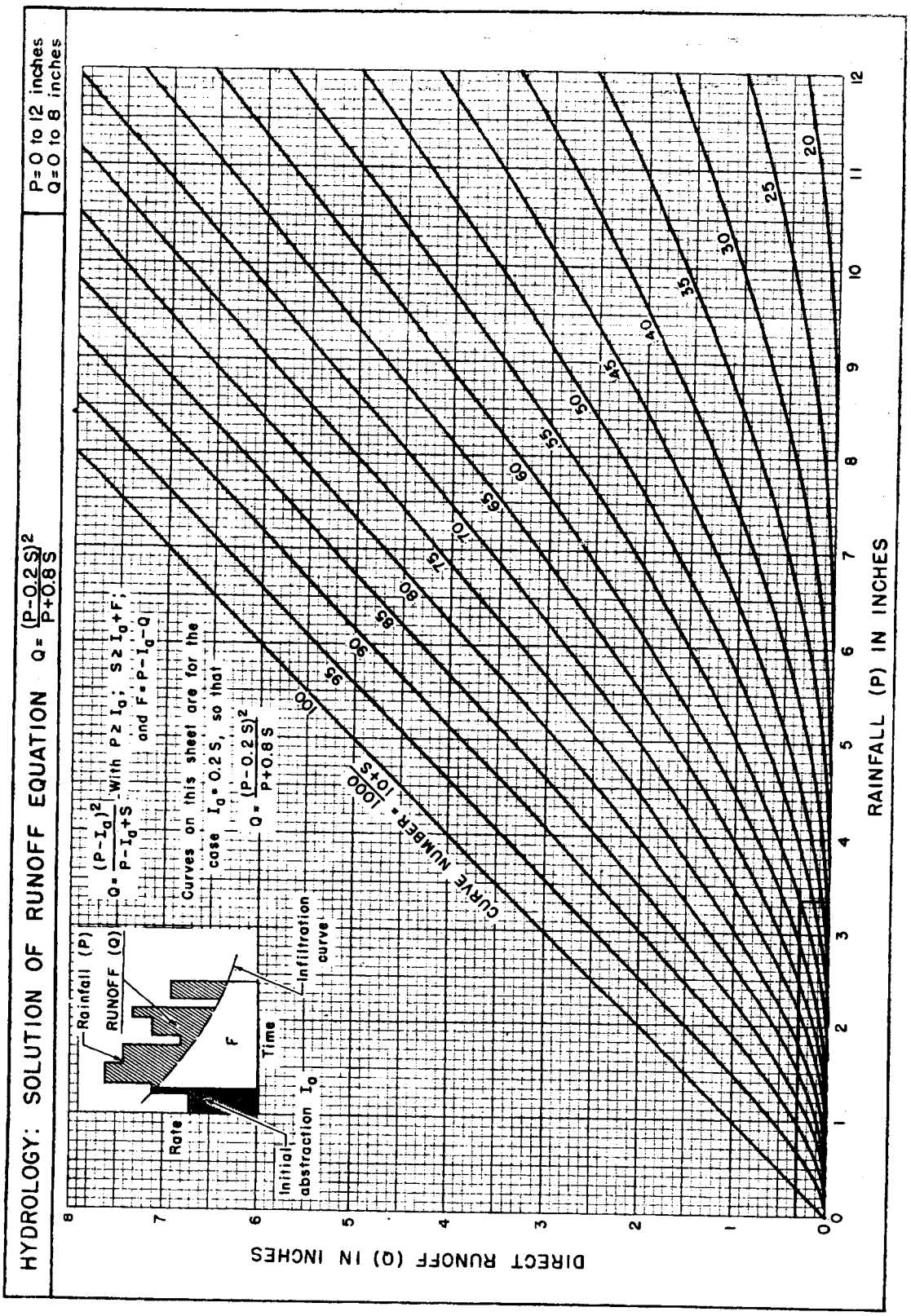


Figure 3.--Solution of the runoff equation, $Q = \frac{(P - 0.2S)^2}{P + 0.8S}$

Q = 0.3 inches

G CN = 55 P = 3.87

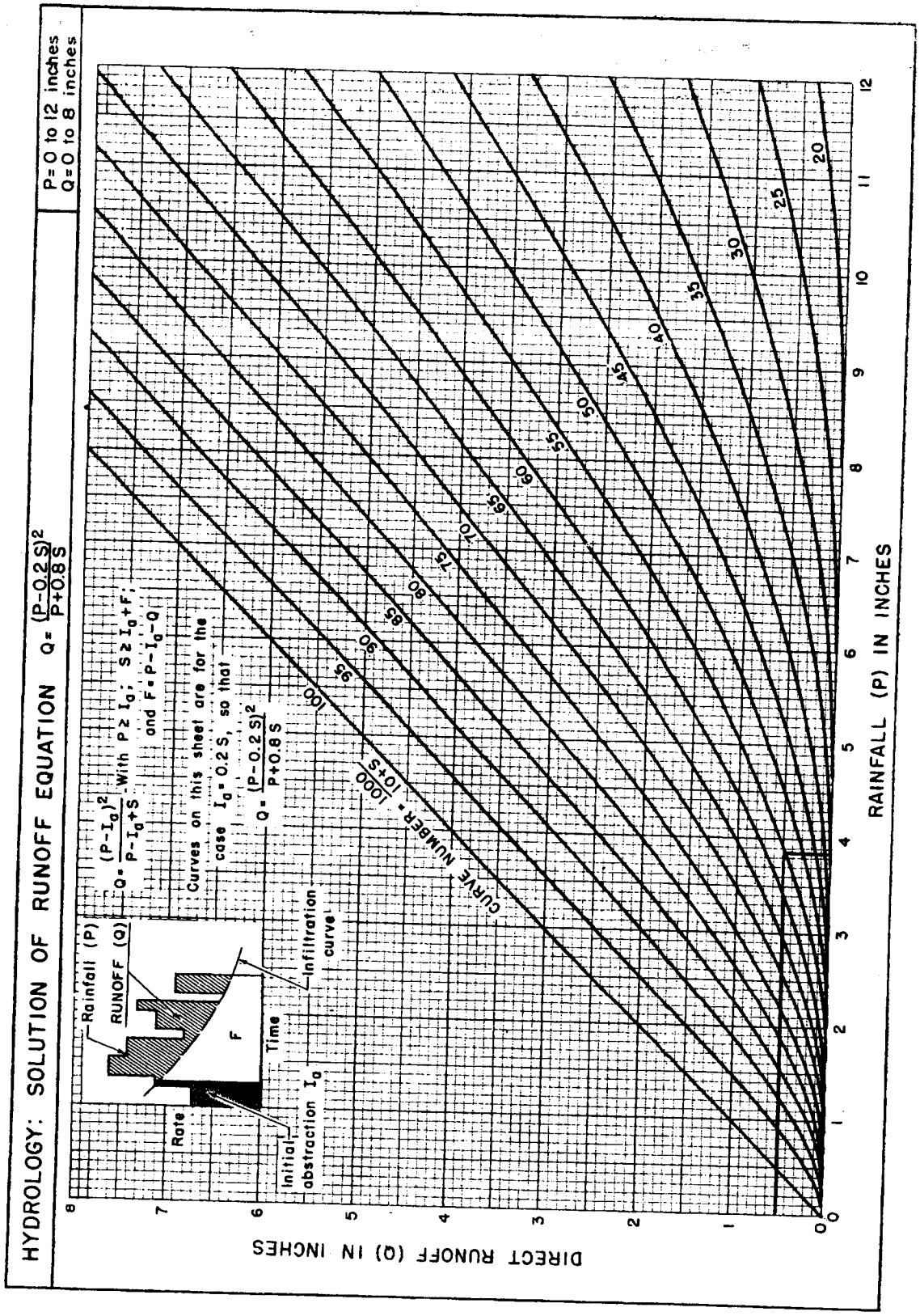


Figure 3.--Solution of the runoff equation, $Q = \frac{(P - 0.2S)^2}{P + 0.8S}$

Q = 0.5 inches

G CN = 55 P = 4.37

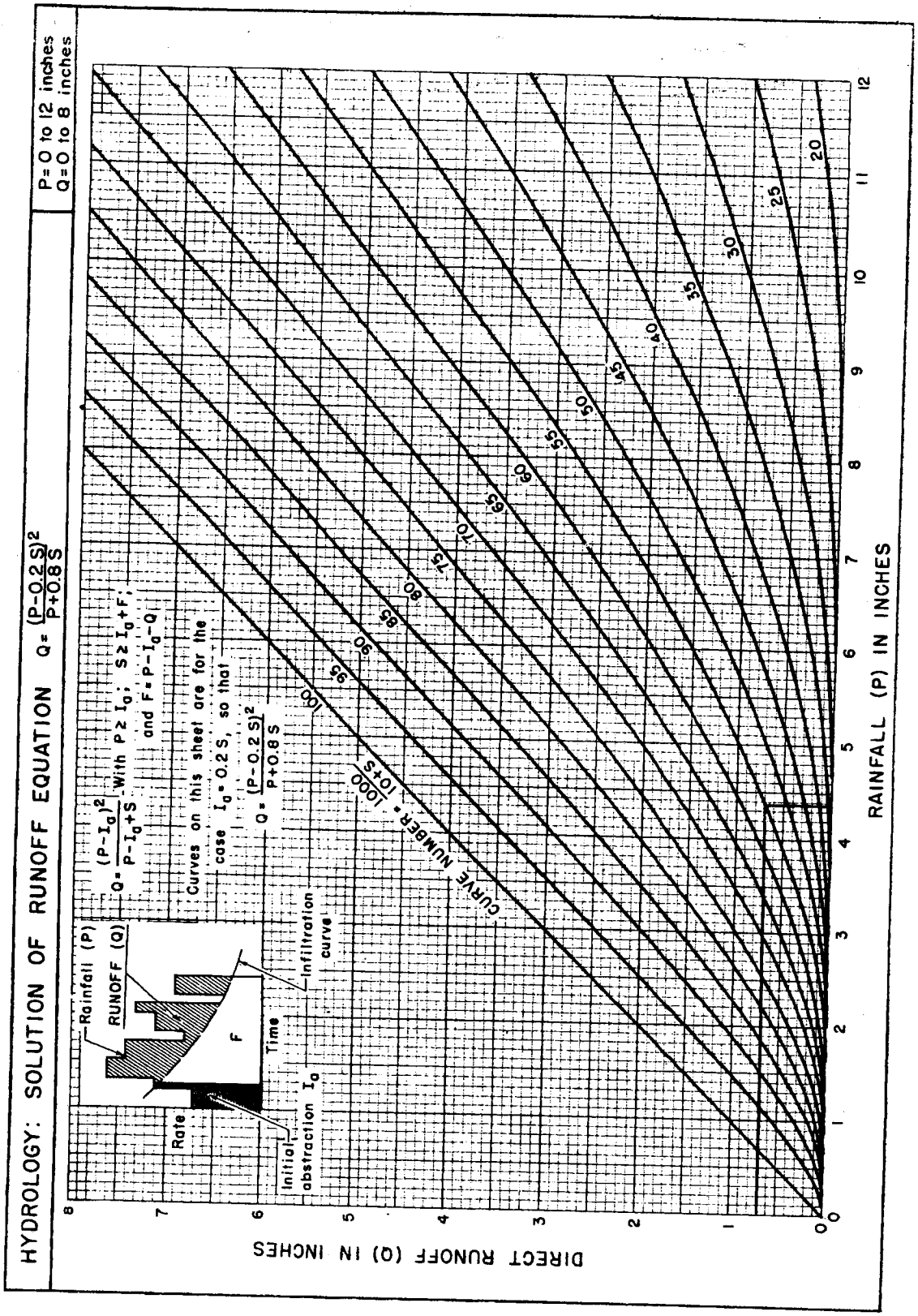


Figure 3.--Solution of the runoff equation, $Q = \frac{(P - 0.2S)^2}{P + 0.8S}$

Q = 0.7 inches

G CN = 55 P = 4.9

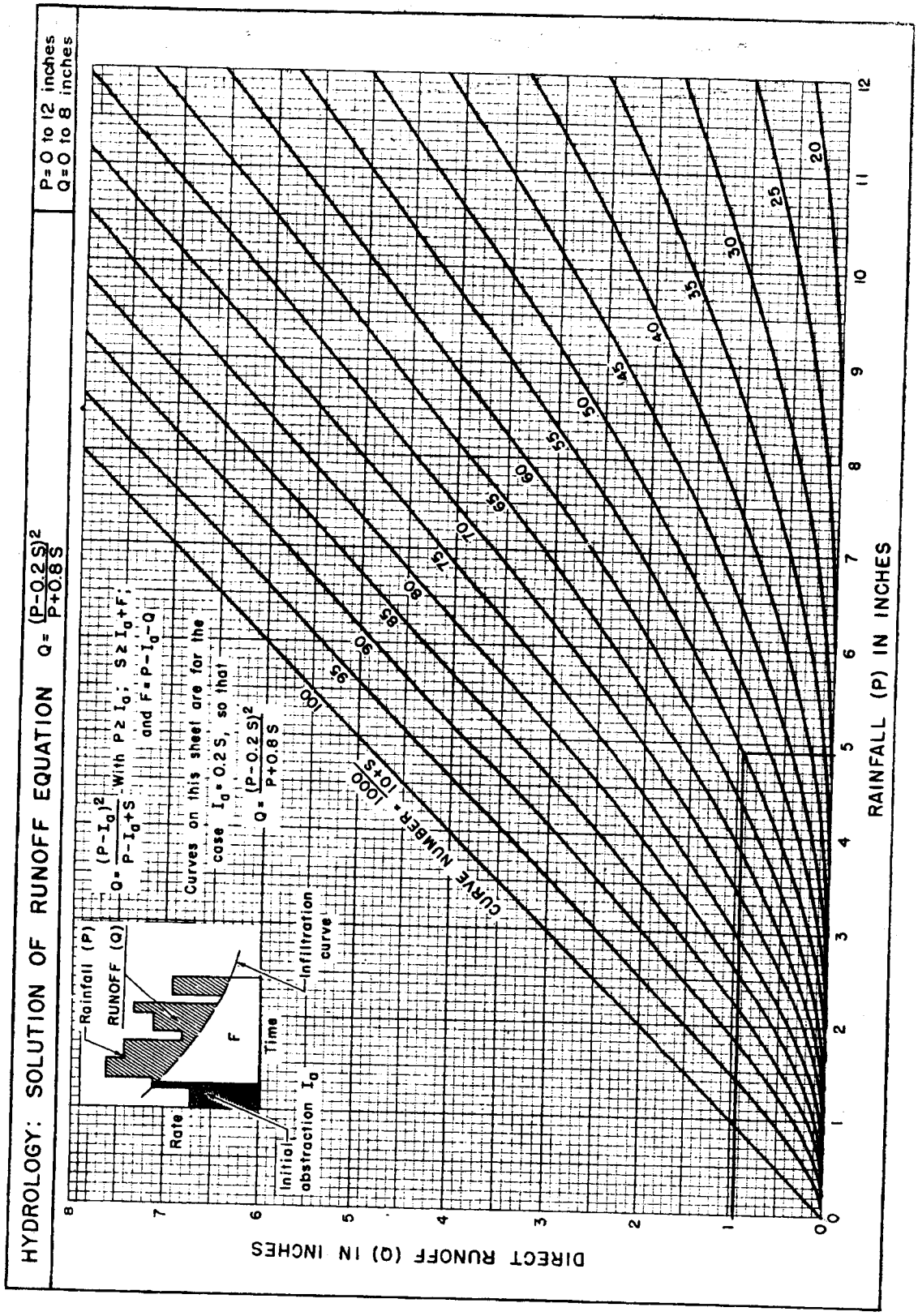


Figure 3.--Solution of the runoff equation, $Q = \frac{(P - 0.2S)^2}{P + 0.8S}$

Q = 0.95 inches

A ℓ = 6938 Y = 1% CN = 78

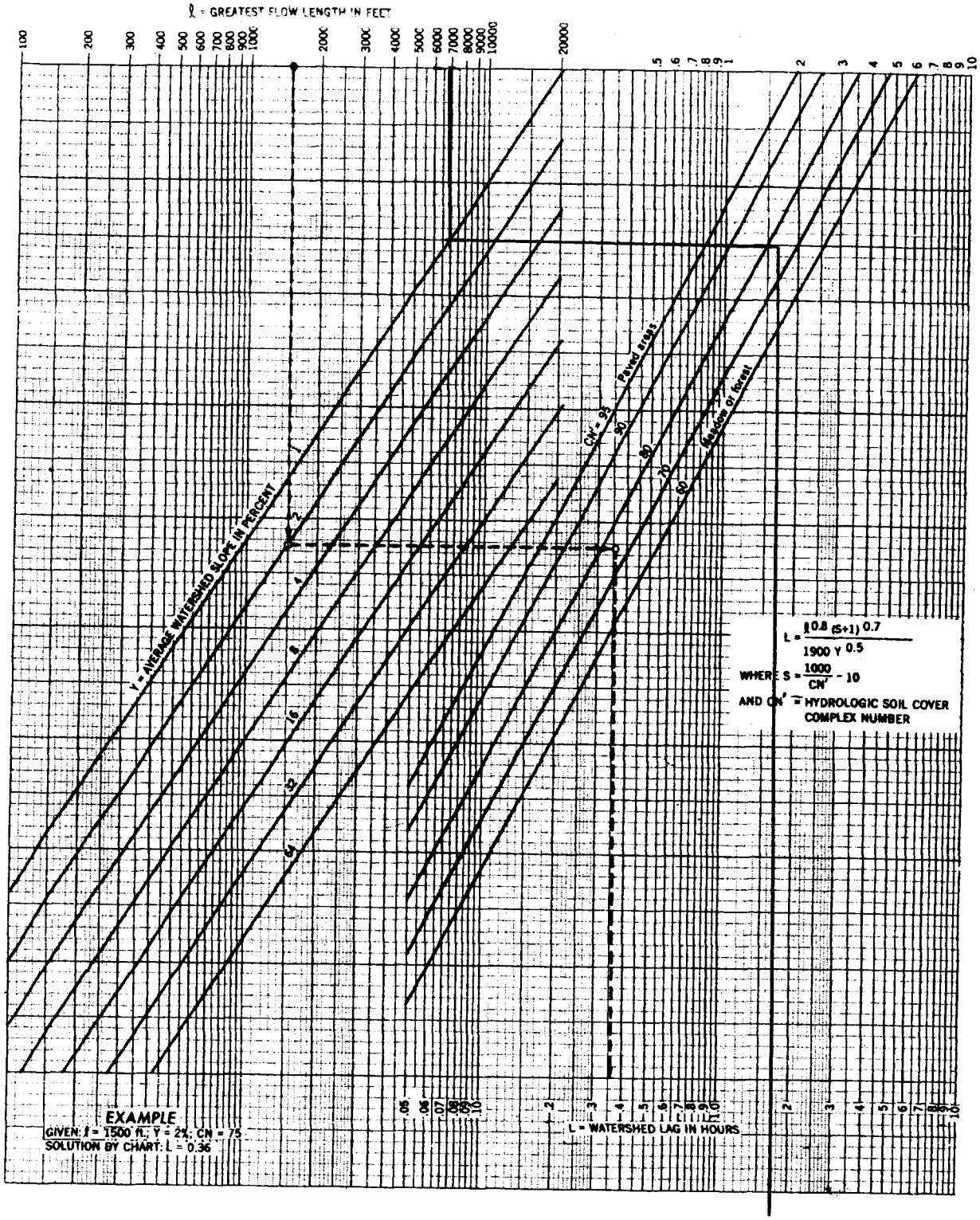


Figure 6.--Watershed lag (NEH-4 January 1971).

L = 1.7 hrs

B ℓ = 9377 Y = 1% CN = 78

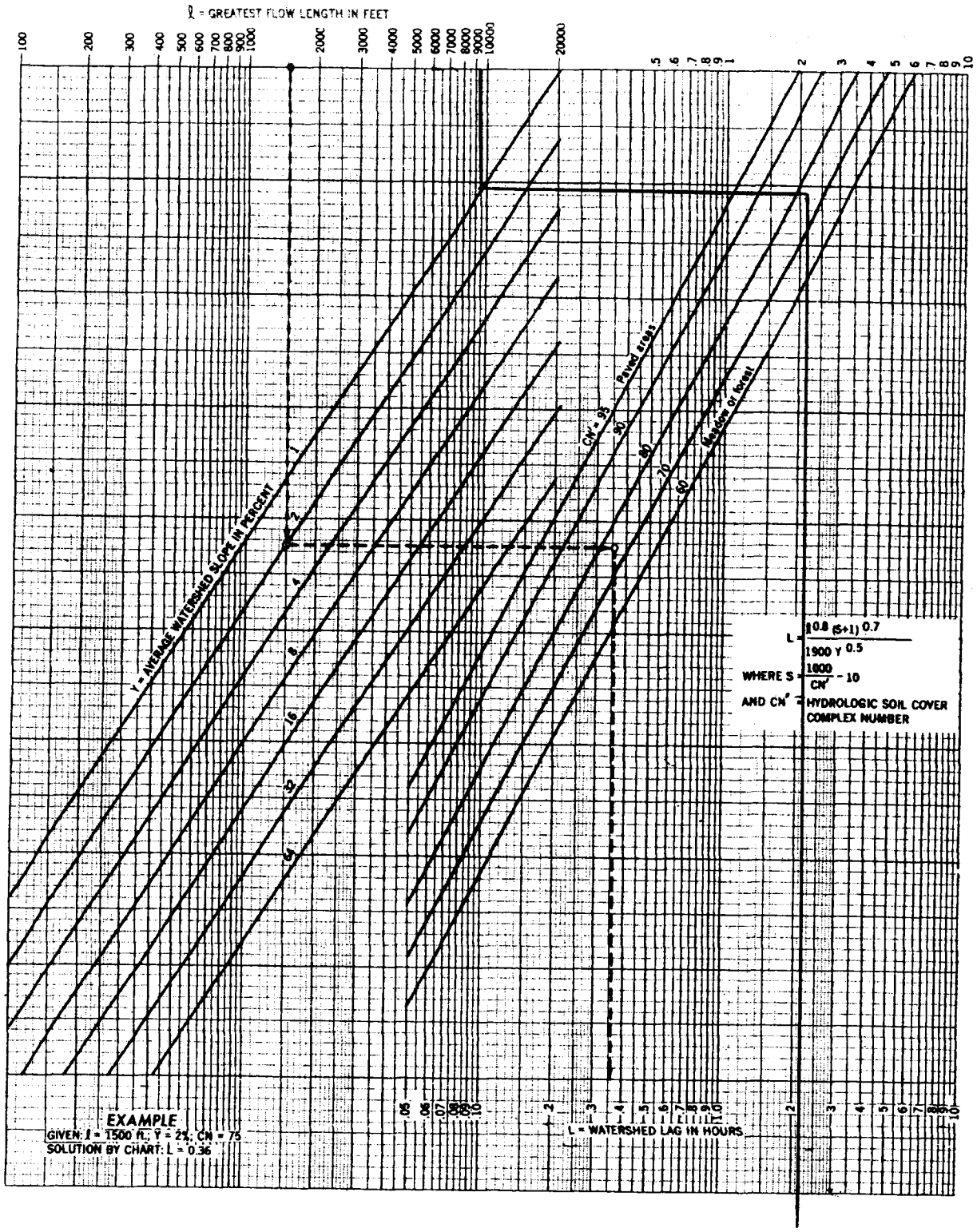


Figure 6.--Watershed lag (NEH-4 January 1971).

L = 2.15 hrs

C l = 7270 Y = 1.90 CN = 78

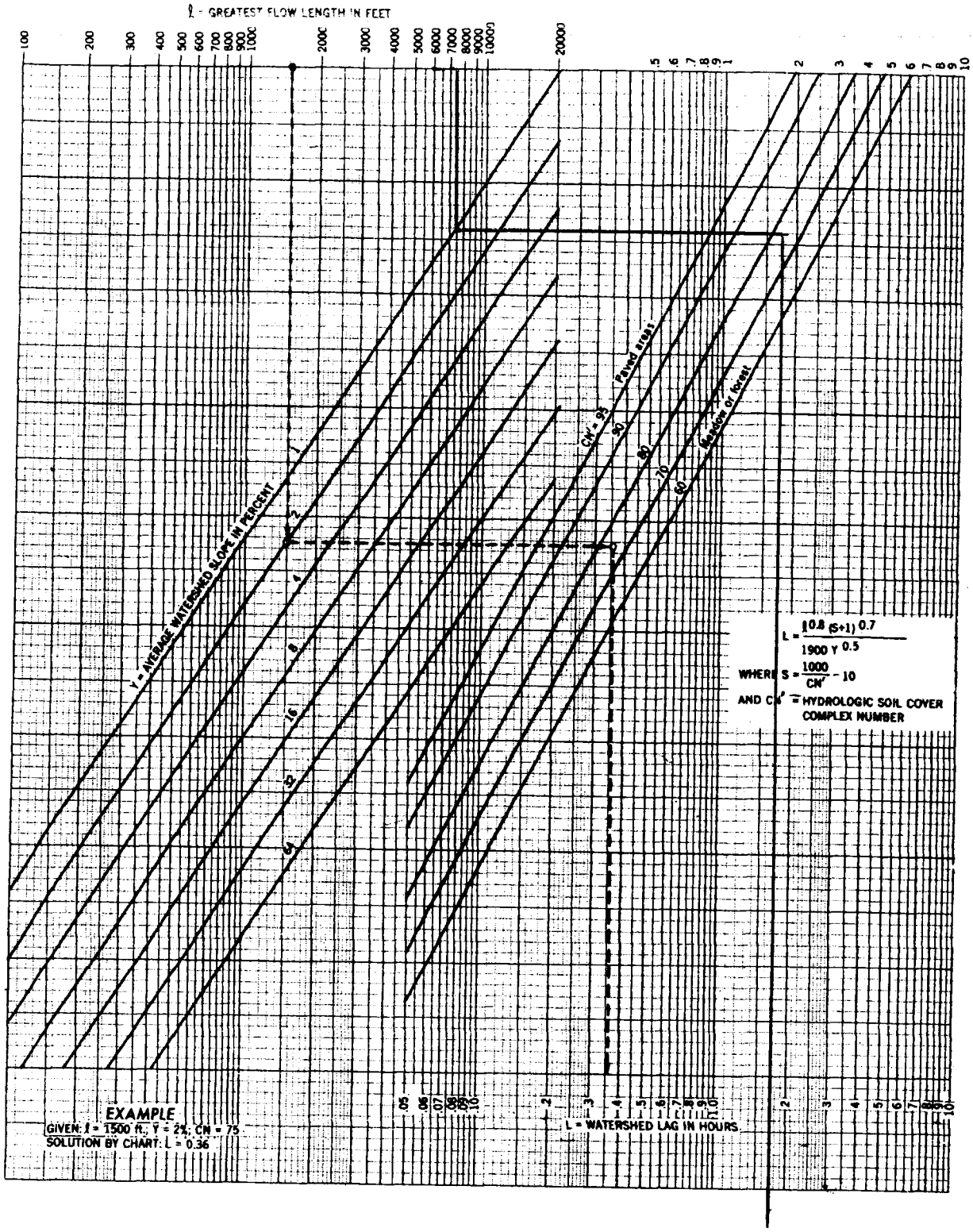


Figure 6.--Watershed lag (NEH-4 January 1971).

L = 1.7hr

D l = 7624 Y = 1% CN = 78

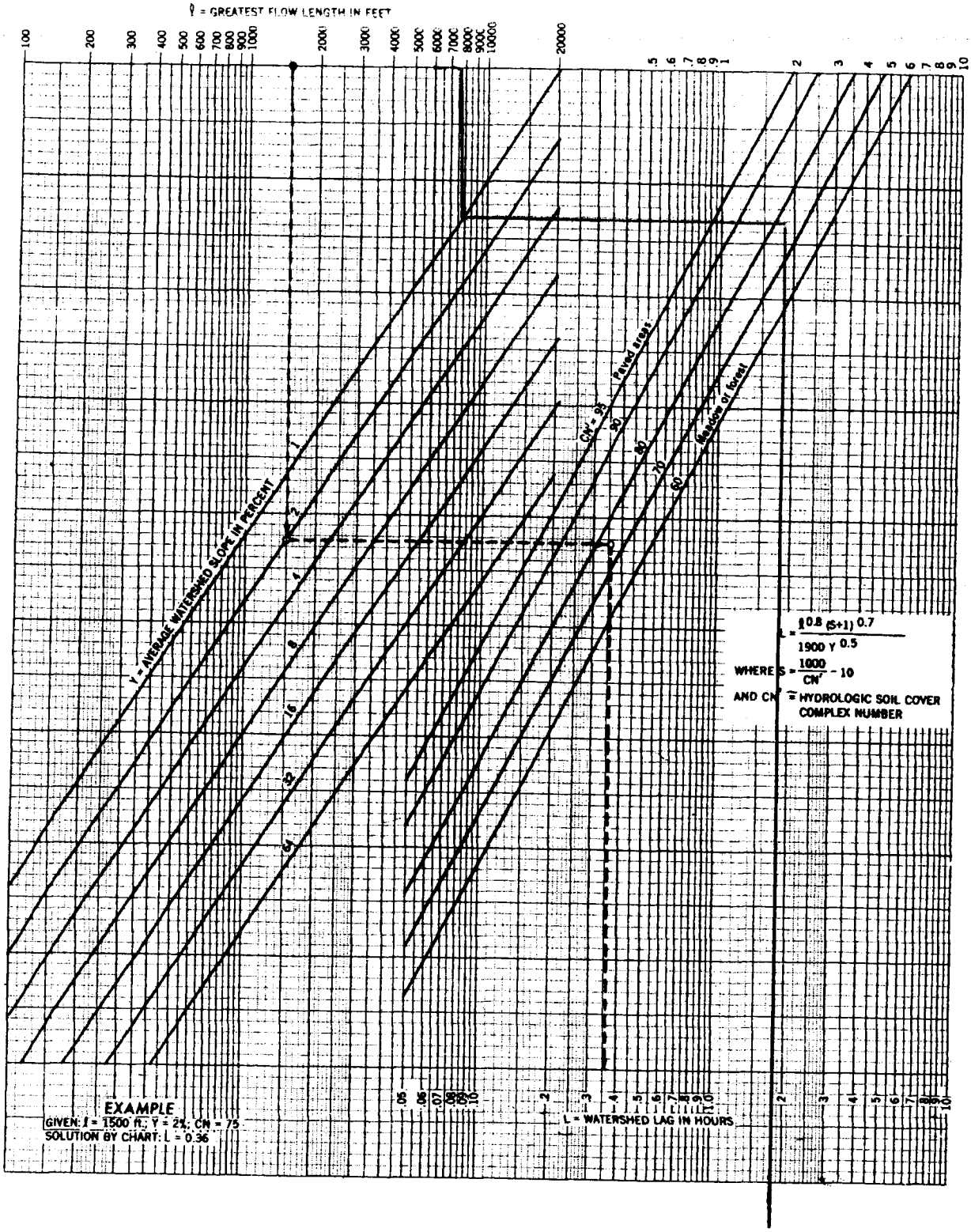


Figure 6.--Watershed lag (NEH-4 January 1971).

L = 1.8 hrs

E l = 10515 Y = 1.90 CN = 78

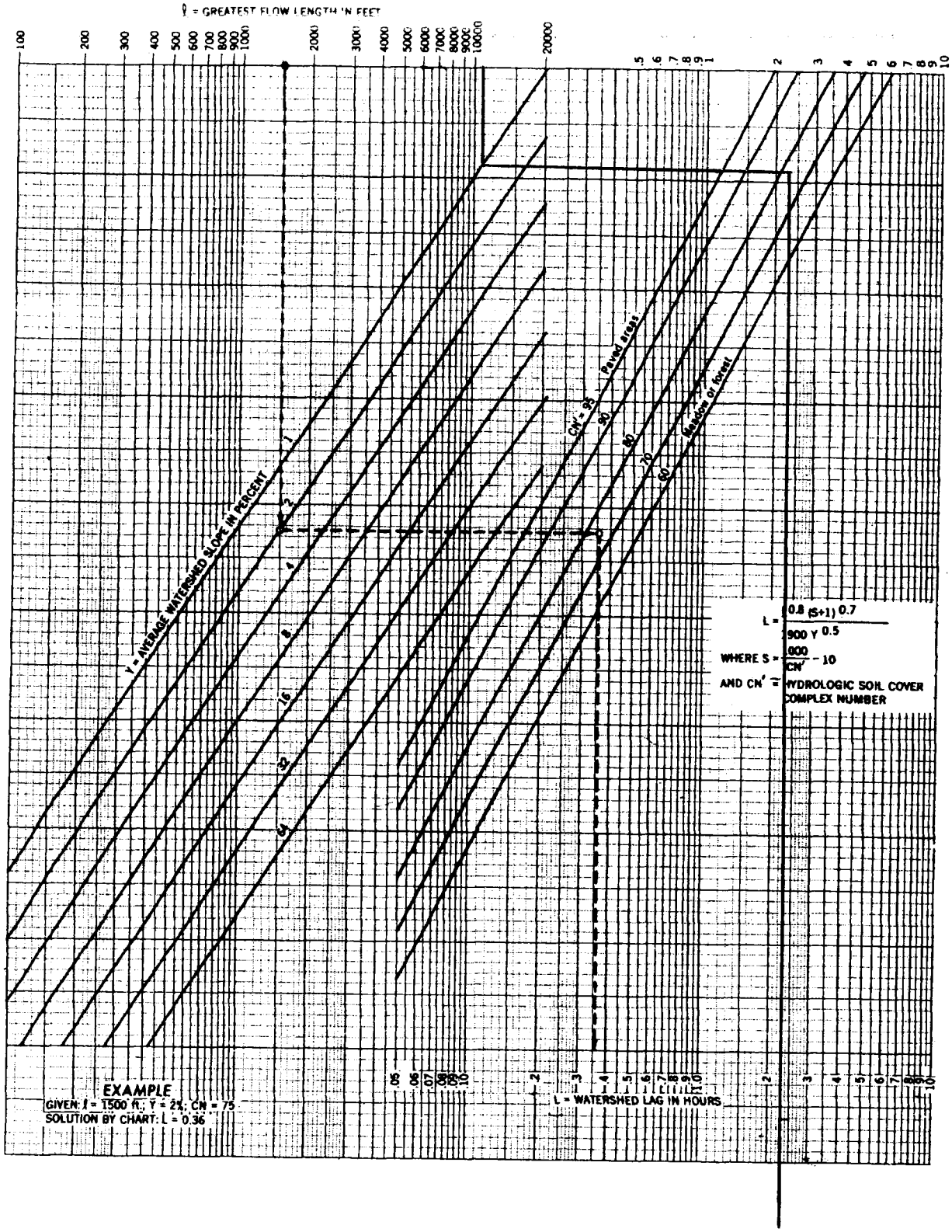


Figure 6.--Watershed lag (NEH-4 January 1971).

L = 2.3 hrs

F $\ell = 8637$ $Y = 1\%$ CN = 78

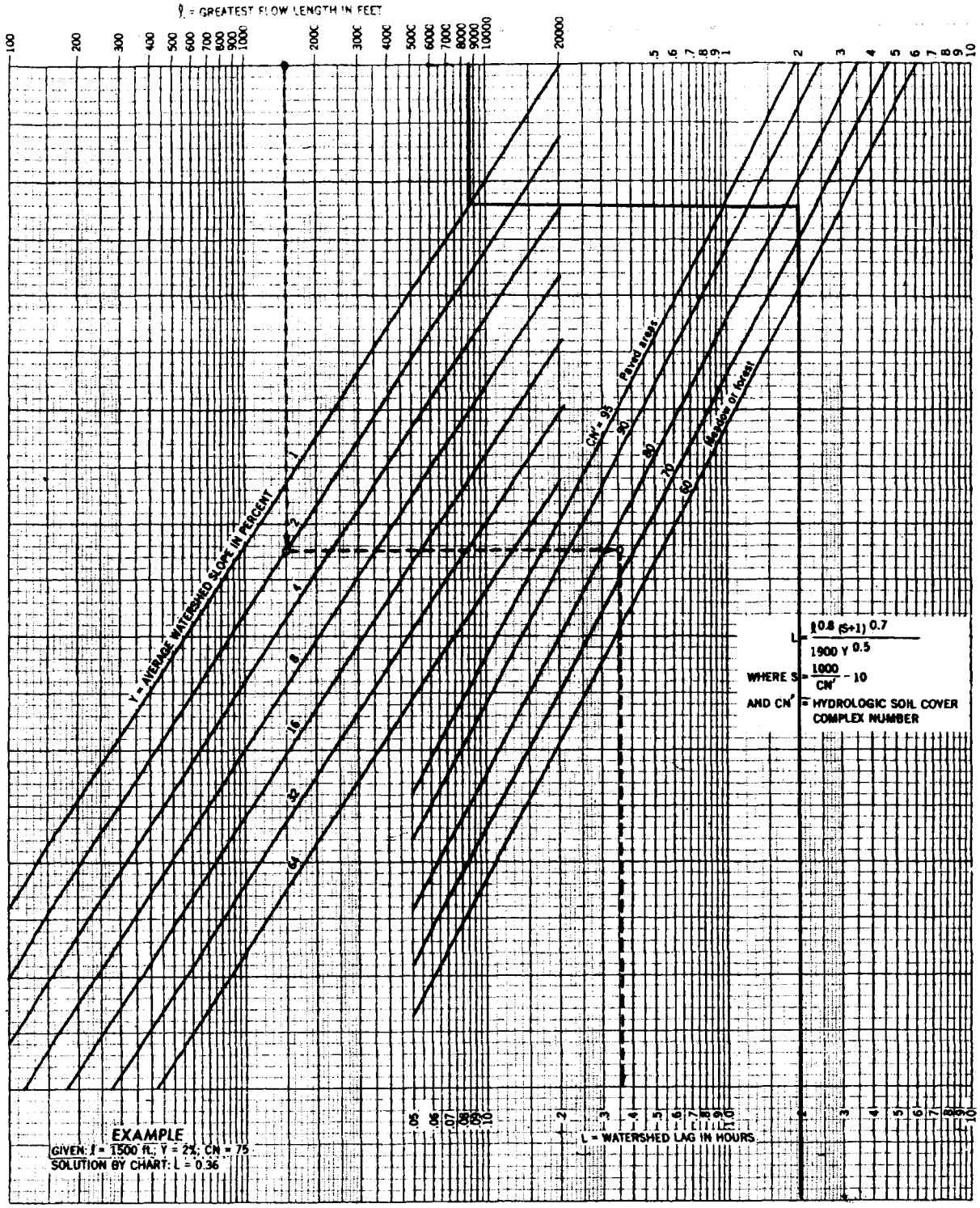


Figure 6.--Watershed lag (NEH-4 January 1971).

L = 2 hrs

G $l = 12077$ $Y = 1\%$ $CN = 55$

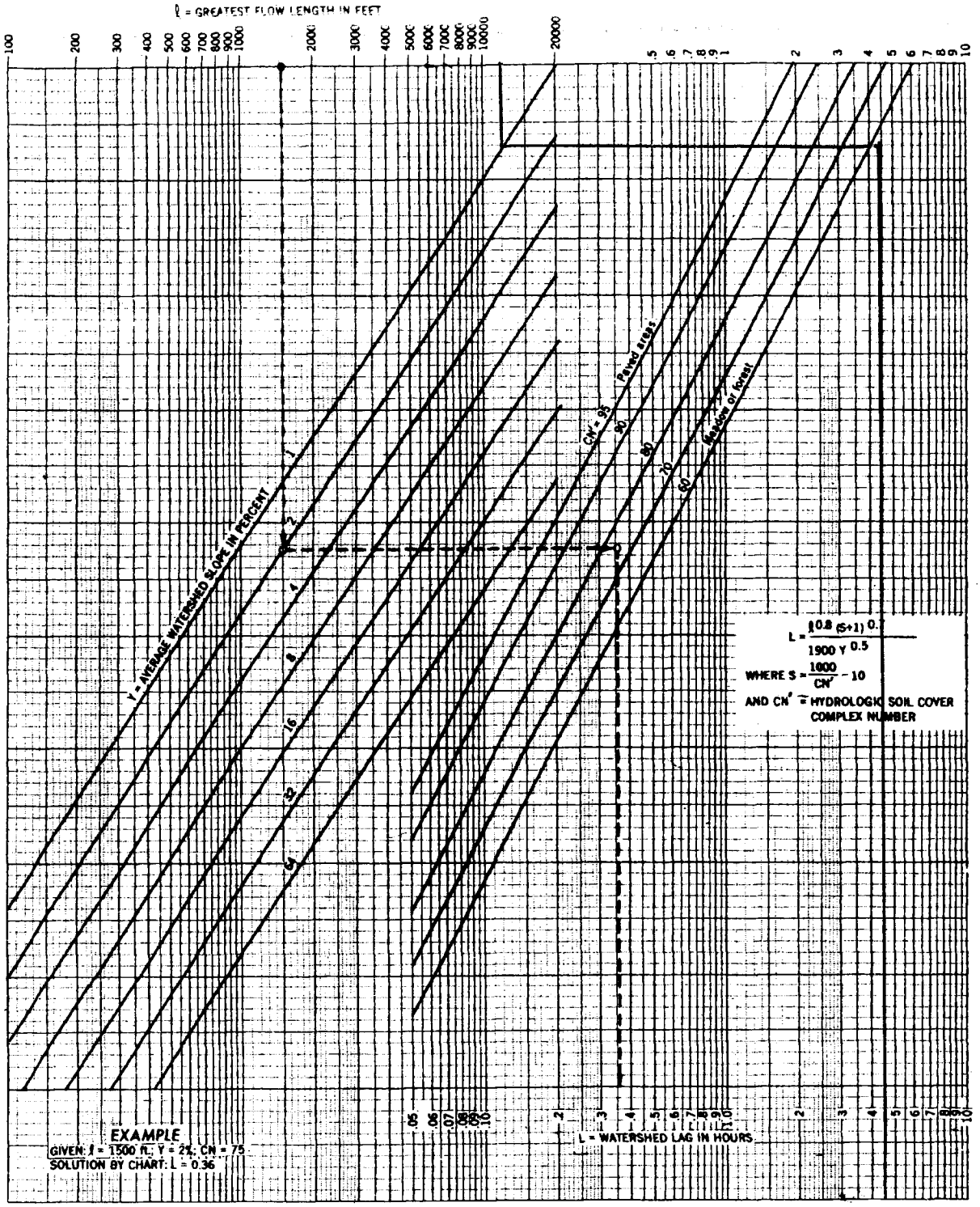


Figure 6.--Watershed lag (NEH-4 January 1971).

L = 4.5 hrs

H $l = 12360$ $Y = 1\%$ $CN = 100$

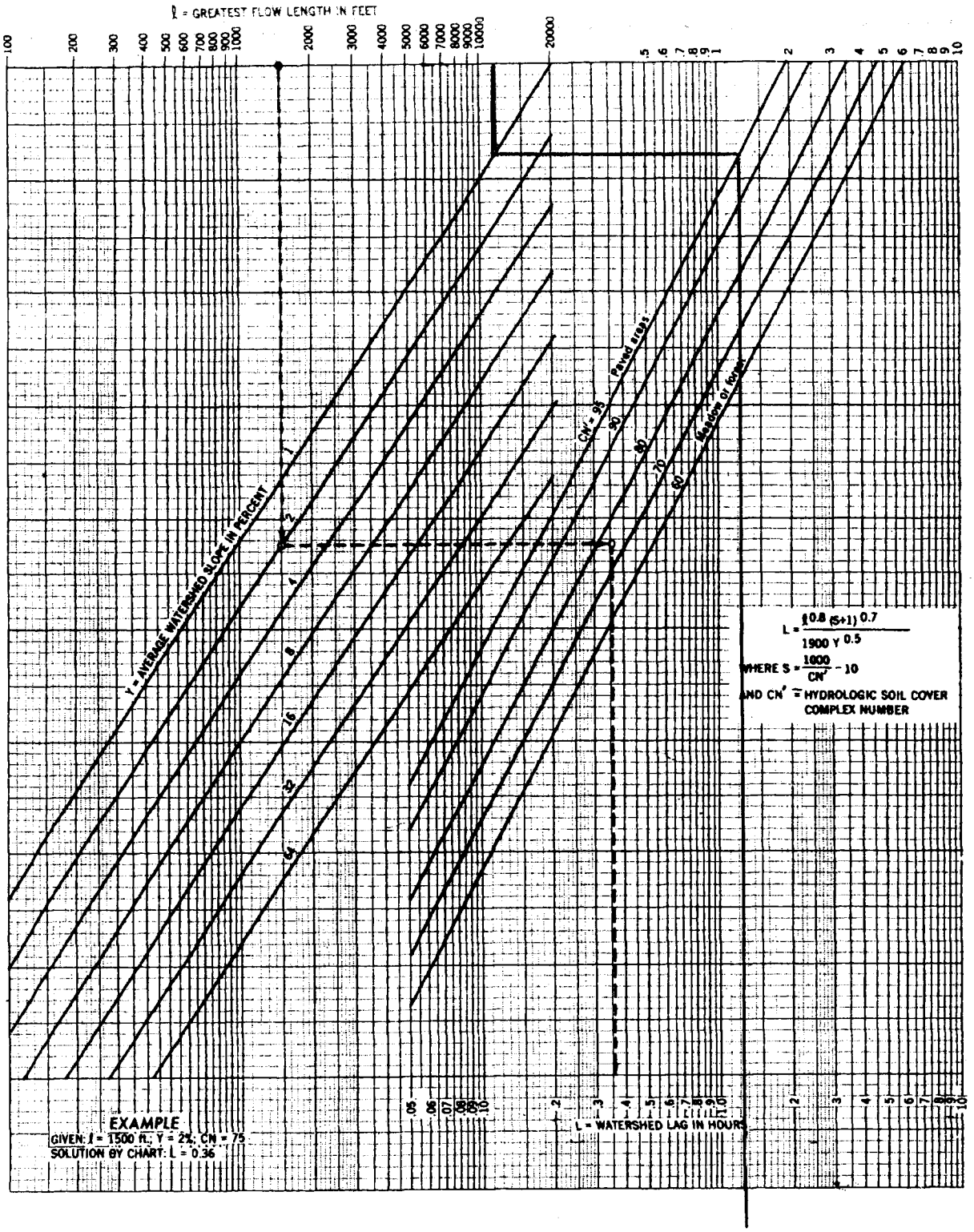


Figure 6.--Watershed lag (NEH-4 January 1971).

$L = 1.25$ hrs

TOBICO MARSH WATERSHED
HYDROLOGIC CALCULATIONS SUMMARY
SAGINAW BAY, MICHIGAN

Subwatershed		*Catchment Area (acres)*	*Catchment Area (square miles)*	*Soil Group*	*Primary Land Use*	*Treatment Class*	*Hydrologic Condition*	*Runoff Curve Number*
A	Hadd Drain	342.9	0.54	B	Agricultural	Row Crops, Straight Row, Lightly Grazed	Good	78
B	Dubay Drain	566.5	0.89	B	Agricultural	Row Crops, Straight Row, Lightly Grazed	Good	78
C	Wetters Drain	370.7	0.58	B	Agricultural	Row Crops, Straight Row, Lightly Grazed	Good	78
D	Tobico Drain	401.2	0.63	B	Agricultural	Row Crops, Straight Row, Lightly Grazed	Good	78
E	Lesperance Drain	685.6	1.07	B	Agricultural	Row Crops, Straight Row, Lightly Grazed	Good	78
F	Van Alstine Drain	494.0	0.77	B	Agricultural	Row Crops, Straight Row, Lightly Grazed	Good	78
G	Tobico Marsh State Game A	863.7	1.35	B	Woods, Forest	Protected from Grazing	Good	55
H	Tobico Marsh	897.7	1.40	B	Marsh	Water Surface	n/a	100

Lag was calculated using the curve number method

TOBICO MARSH WATERSHED
HYDROLOGIC CALCULATIONS SUMMARY
SAGINAW BAY, MICHIGAN

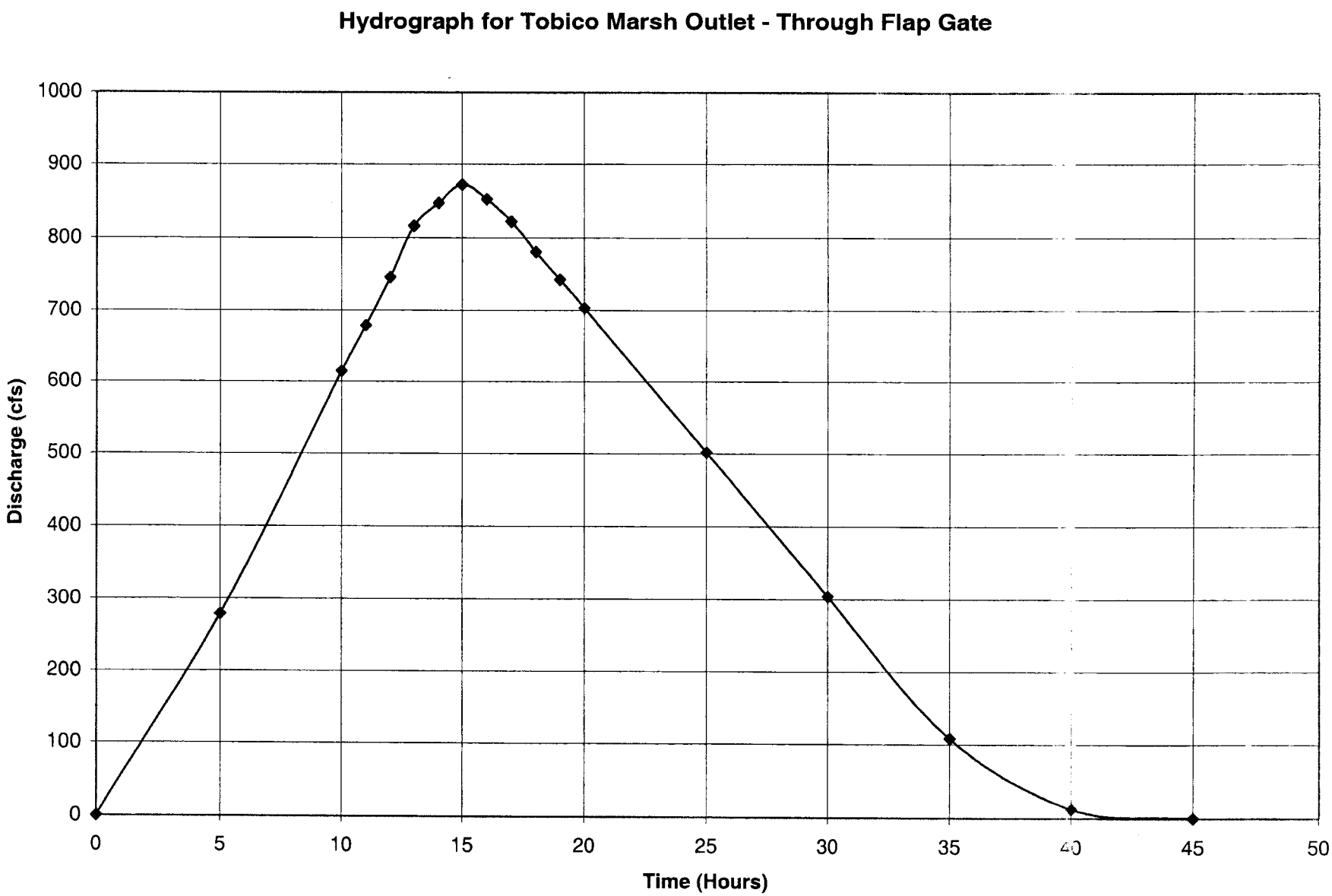
Subwatershed		24-hour Rainfall in Bay County, Michigan				Watershed Parameters				
		10-year	25-year	50-year	100-year	Hydraulic Length (feet)	Average Slope (% slope)	Lag (hours)	Tc (hours)	Lag to Marsh Outlet (hours)
		3.37	3.87	4.37	4.9					
		Direct Runoff (inches)								
A	Hadd Drain	1.4	1.8	2.2	2.65	6938	1.0%	1.7	2.8	2.2
B	Dubay Drain	1.4	1.8	2.2	2.65	9377	1.0%	2.2	3.6	1.9
C	Wetters Drain	1.4	1.8	2.2	2.65	7270	1.0%	1.7	2.8	1.5
D	Tobico Drain	1.4	1.8	2.2	2.65	7624	1.0%	1.8	3.0	1.1
E	Lesperance Drain	1.4	1.8	2.2	2.65	10515	1.0%	2.3	3.8	0.9
F	Van Alstine Drain	1.4	1.8	2.2	2.65	8637	1.0%	2.0	3.3	0.0
G	Tobico Marsh State Game A	0.3	0.5	0.7	0.95	12077	1.0%	4.5	7.5	0.0
H	Tobico Marsh	3.4	3.9	4.4	4.9	12360	1.0%	1.3	2.2	0.0

TOBICO MARSH WATERSHED
HYDROLOGIC CALCULATIONS SUMMARY
SAGINAW BAY, MICHIGAN

Subwatershed		10-year, 24-hour Design Storm Parameters Time to Peak Discharge (hours)	Peak Discharge (cfs)	Time to Base (hours)	Total Volume of Water (cubic feet)
A	Hadd Drain	13.58	98.64	36.2586	1.74E+06
B	Dubay Drain	14.08	126.62	37.5936	2.88E+06
C	Wetters Drain	13.58	106.78	36.2586	1.88E+06
D	Tobico Drain	13.68	109.55	36.5256	2.04E+06
E	Lesperance Drain	14.18	145.61	37.8606	3.48E+06
F	Van Alstine Drain	13.88	120.50	37.0596	2.51E+06
G	Tobico Marsh State Game A	16.38	93.90	43.7346	9.41E+05
H	Tobico Marsh	13.18	337.06	35.1906	1.11E+07
					2.66E+07

TOBICO MARSH WATERSHED
PEAK FLOW THROUGH FLAP GATE
SAGINAW BAY, MICHIGAN

Subwatershed		Catchment Area (acres)	Lag to Marsh Outlet (hours)	Contribution from each reach to Marsh Outlet (cfs)																	
				Time (hours)	0	5	10	11	12	13	14	15	16	17	18	19	20	25	30	35	40	45
B	Dubay Drain	566.5	1.9		0	28	72	80	90	99	108	117	126	121	115	110	105	78	51	24	0	0
C	Wetters Drain	370.7	1.5		0	26	66	74	83	90	98	107	102	97	92	88	83	60	37	14	0	0
D	Tobico Drain	401.2	1.1		0	32	72	80	88	96	103	109	102	98	93	89	84	60	35	12	0	0
E	Lesperance Drain	685.6	0.9		0	40	92	102	112	122	133	143	140	133	128	122	116	85	54	23	0	0
G	Tobico Marsh State Game Area	863.7	0.0		0	28	58	63	68	74	80	86	92	93	88	84	81	64	47	30	12	0
H	Tobico Marsh	897.7	0.0		0	125	255	280	305	335	325	310	290	280	265	250	235	155	80	5	0	0
		3785.4			0	279	615	679	746	816	847	$\boxed{872}$	852	822	781	743	704	502	304	108	12	0


Hydrograph for Tobico Marsh Outlet - Through Flap Gate
Discharge (cfs)
1000
900
800
700
600
500
400
300
200
100
0
0
5
10
15
20
25
30
35
40
45
50
Time (Hours)

TOBICO MARSH WATERSHED
PEAK FLOW THROUGH TOBICO LAGOON
SAGINAW BAY, MICHIGAN

	Subwatershed	*Catchment Area (acres)*	*Lag to Marsh Outlet (hours)*	*Contribution from each reach to Marsh Outlet (cfs)*																	
				Time (hours)	0	5	10	11	12	13	14	15	16	17	18	19	20	25	30	35	40	45
B	Dubay Drain	566.5	1.9		0	28	72	80	90	99	108	117	126	121	115	110	105	78	51	24	0	0
C	Wetters Drain	370.7	1.5		0	26	66	74	83	90	98	107	102	97	92	88	83	60	37	14	0	0
D	Tobico Drain	401.2	1.1		0	32	72	80	88	96	103	109	102	98	93	89	84	60	35	12	0	0
E	Lesperance Drain	685.6	0.9		0	40	92	102	112	122	133	143	140	133	128	122	116	85	54	23	0	0
F	Van Alstine Drain	494.0	0.0		0	44	86	95	104	113	120	115	109	104	99	94	89	63	36	10	0	0
G	Tobico Marsh State Game Area	863.7	0.0		0	28	58	63	68	74	80	86	92	93	88	84	81	64	47	30	12	0
H	Tobico Marsh	897.7	0.0		0	125	255	280	305	335	325	310	290	280	265	250	235	155	80	5	0	0
		4279.4			0	323	701	774	850	929	967	987	961	926	880	837	793	565	340	118	12	0

Entire Marsh Together as one Catchment Area

Area	4279	acres
Hydraulic Length	25000	feet
Lag	1.9	hours
Time of Concentration	3.16666667	

PEAK DISCHARGE HYDROGRAPH
SUBWATERSHED A
TOBICO MARSH WATERSHED
SAGINAW BAY, MICHIGAN

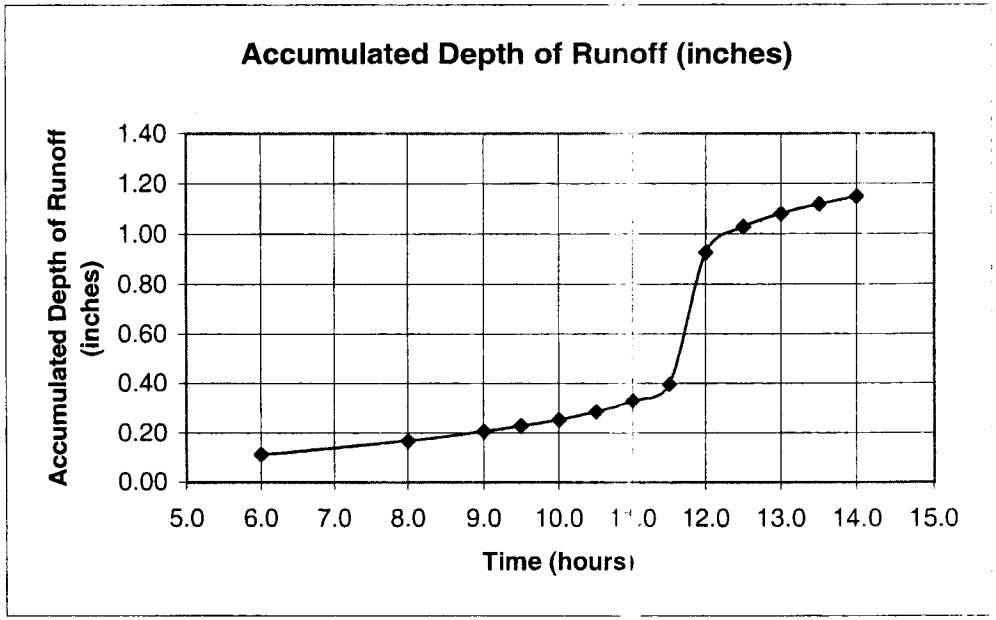
Sub-Watershed A

Catchment Area (square miles)	*D = 24-hour Rainfall in Bay County, Michigan (inches)*				*Watershed Parameters - Type II*			*Effective Peak Producing Period*	
	10-year	*25-year*	*50-year*	*100-year*	*Hydraulic Length (feet)*	*Average Slope (% slope)*	*Lag (hours)*	*ΔD (hours)*	*7ΔD (hours)*
0.54	*3.37*	*3.87*	*4.37*	*4.9*					
		Direct Runoff (inches)							
	1.4	1.8	2.2	2.65	6938	1%	1.7	0.68	4.76

Peak Discharge - Tp (hrs)	*Peak Discharge (cfs) if uniform storm assumed*			
13.7	26.50	34.07	41.64	50.16

10-year

Time (hours)	P_x/P_{24}	Mass P (inches)	Mass Q (inches)
6.0	0.080	0.27	0.11
8.0	0.120	0.40	0.17
9.0	0.147	0.50	0.21
9.5	0.163	0.55	0.23
10.0	0.181	0.61	0.25
10.5	0.204	0.69	0.29
11.0	0.235	0.79	0.33
11.5	0.283	0.95	0.40
12.0	0.663	2.23	0.93
12.5	0.735	2.48	1.03
13.0	0.772	2.60	1.08
13.5	0.799	2.69	1.12
14.0	0.820	2.76	1.15



From Graph - Midpoint of Maximum Increment of Runoff
11.88

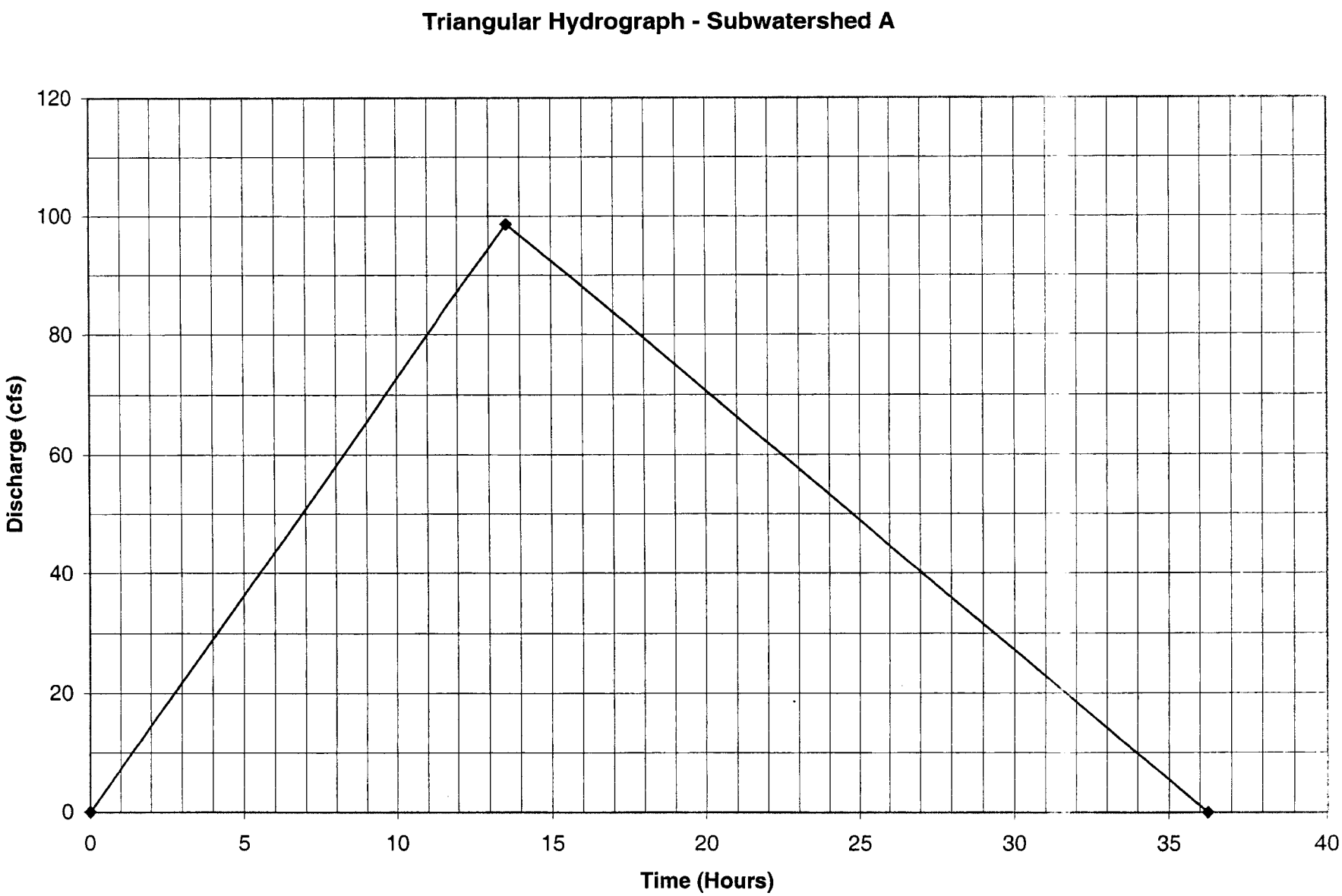
Starting Point of Effective Peak Producing Period
8.82

Peak Discharge if non-uniform rainfall (more realistic) - SCS Method

PEAK DISCHARGE HYDROGRAPH
SUBWATERSHED A
TOBICO MARSH WATERSHED
SAGINAW BAY, MICHIGAN

Increment	Time (hours)	Mass Runoff (inches)	ΔQ (inches)	Δq (cfs)	Proportion contributing	Discharge (cfs)	
ΔD_1	8.82	0.20	0.03	3.8135018	0.20	0.76	
ΔD_2	9.50	0.23	0.03	3.8135018	0.40	1.53	
ΔD_3	10.18	0.26	0.06	7.6270037	0.60	4.58	
ΔD_4	10.86	0.32	0.09	11.440506	0.80	9.15	
ΔD_5	11.54	0.41	0.57	72.456535	1.00	72.46	
ΔD_6	12.22	0.98	0.09	11.440506	0.67	7.63	
ΔD_7	12.90	1.07	0.06	7.6270037	0.33	2.54	
	13.58	1.13				98.64	Peak Discharge

Triangular Hydrograph	Time	Discharge
Start of Storm	0	0
Time to Peak	13.58	98.64
Time to Base	36.2586	0


Triangular Hydrograph - Subwatershed A
Discharge (cfs)
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
Time (Hours)

PEAK DISCHARGE HYDROGRAPH
SUBWATERSHED B
TOBICO MARSH WATERSHED
SAGINAW BAY, MICHIGAN

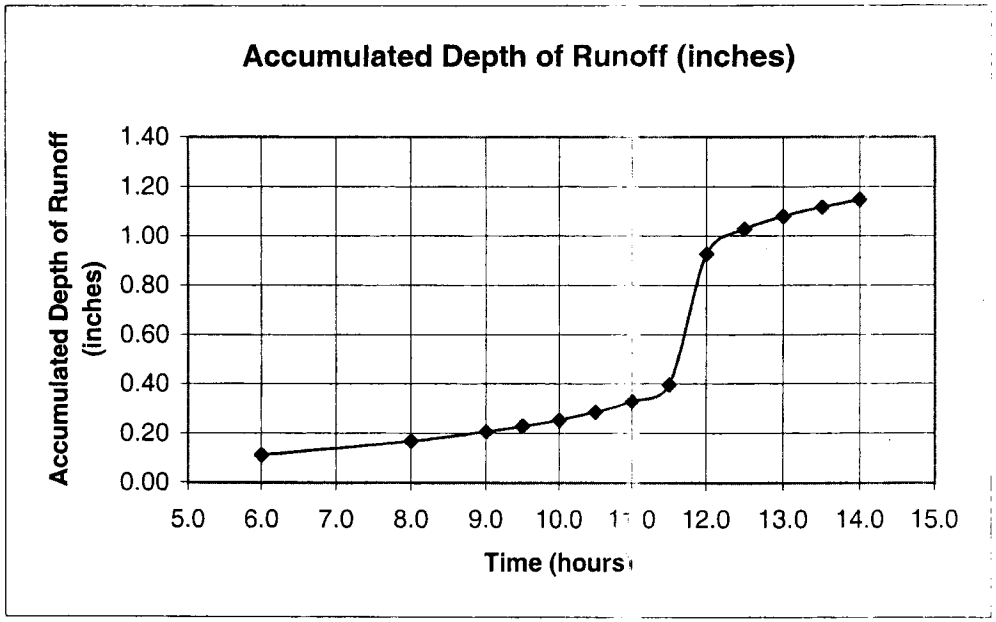
Sub-Watershed B

Catchment Area (square miles)	*D = 24-hour Rainfall in Bay County, Michigan (inches)*				*Watershed Parameters - Type II*			*Effective Peak Producing Period*	
	10-year	*25-year*	*50-year*	*100-year*	*Hydraulic Length (feet)*	*Average Slope (% slope)*	*Lag (hours)*	*ΔD (hours)*	*7ΔD (hours)*
0.89	*3.37*	*3.87*	*4.37*	*4.9*					
		Direct Runoff (inches)							
	1.4	1.8	2.2	2.65	9377	1%	2.2	0.88	6.16

Peak Discharge - Tp (hrs)	*Peak Discharge (cfs) if uniform storm assumed*			
14.2	42.47	54.60	66.74	80.39

10-year

Time (hours)	P_x/P_{24}	Mass P (inches)	Mass Q (inches)
6.0	0.080	0.27	0.11
8.0	0.120	0.40	0.17
9.0	0.147	0.50	0.21
9.5	0.163	0.55	0.23
10.0	0.181	0.61	0.25
10.5	0.204	0.69	0.29
11.0	0.235	0.79	0.33
11.5	0.283	0.95	0.40
12.0	0.663	2.23	0.93
12.5	0.735	2.48	1.03
13.0	0.772	2.60	1.08
13.5	0.799	2.69	1.12
14.0	0.820	2.76	1.15



From Graph - Midpoint of Maximum Increment of Runoff
11.88

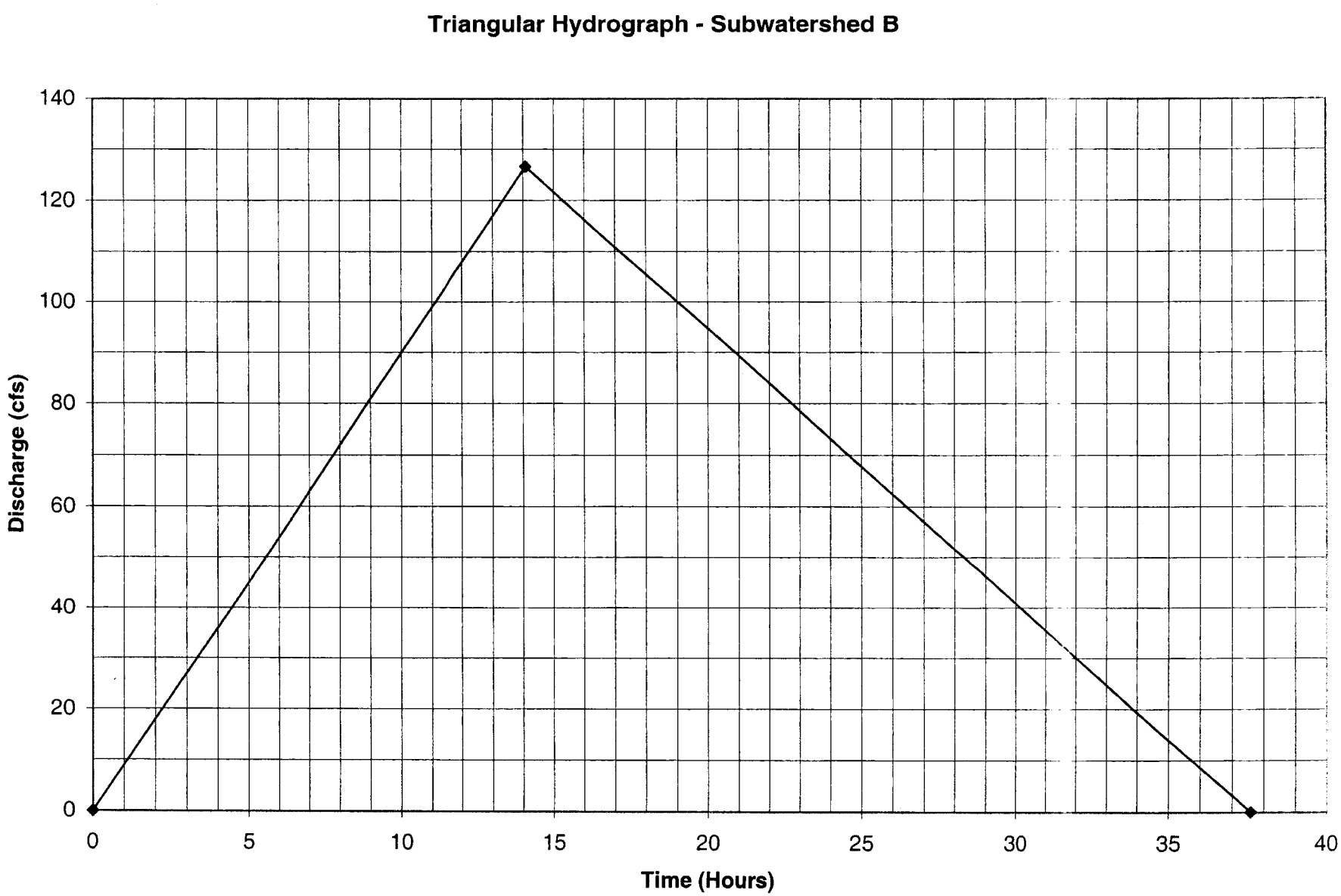
Starting Point of Effective Peak Producing Period
7.92

Peak Discharge if non-uniform rainfall (more realistic) - SCS Method

PEAK DISCHARGE HYDROGRAPH
SUBWATERSHED B
TOBICO MARSH WATERSHED
SAGINAW BAY, MICHIGAN

Increment	Time (hours)	Mass Runoff (inches)	ΔQ (inches)	Δq (cfs)	Proportion contributing	Discharge (cfs)	
ΔD_1	7.92	0.20	0.03	4.895	0.20	0.98	
ΔD_2	8.80	0.23	0.03	4.895	0.40	1.96	
ΔD_3	9.68	0.26	0.06	9.79	0.60	5.87	
ΔD_4	10.56	0.32	0.09	14.685	0.80	11.75	
ΔD_5	11.44	0.41	0.57	93.005	1.00	93.01	
ΔD_6	12.32	0.98	0.09	14.685	0.67	9.79	
ΔD_7	13.20	1.07	0.06	9.79	0.33	3.26	
	14.08	1.13				126.62	Peak Discharge

Triangular Hydrograph	Time	Discharge
Start of Storm	0	0
Time to Peak	14.08	126.62
Time to Base	37.5936	0


Triangular Hydrograph - Subwatershed B
Discharge (cfs)
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
Time (Hours)

PEAK DISCHARGE HYDROGRAPH
SUBWATERSHED C
TOBICO MARSH WATERSHED
SAGINAW BAY, MICHIGAN

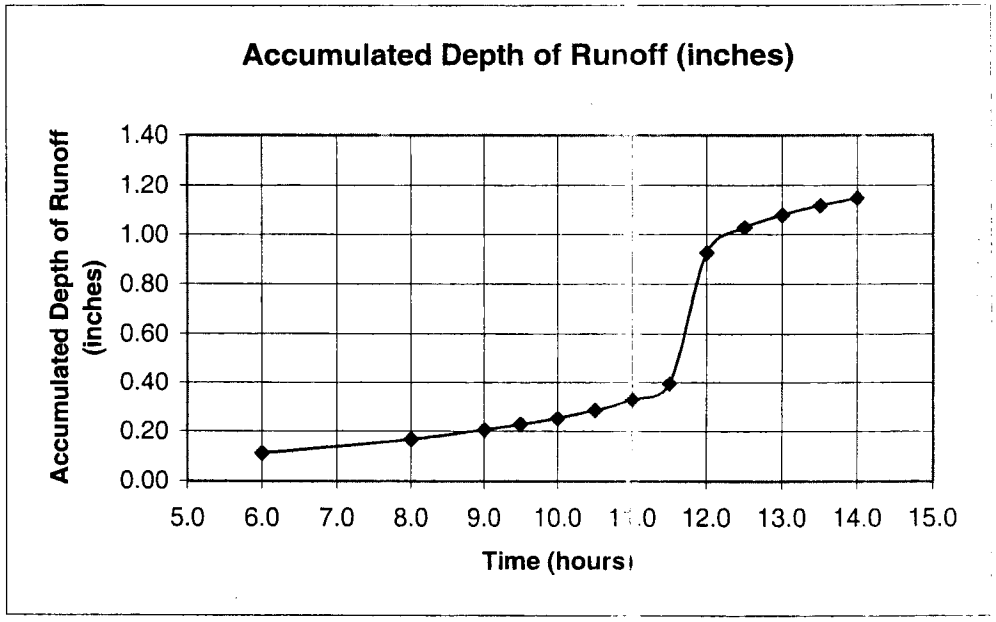
Sub-Watershed C

Catchment Area (square miles)	*D = 24-hour Rainfall in Bay County, Michigan (inches)*				*Watershed Parameters - Type II*			*Effective Peak Producing Period*	
	10-year	*25-year*	*50-year*	*100-year*	*Hydraulic Length (feet)*	*Average Slope (% slope)*	*Lag (hours)*	*ΔD (hours)*	*7ΔD (hours)*
0.58	*3.37*	*3.87*	*4.37*	*4.9*					
		Direct Runoff (inches)							
	1.4	1.8	2.2	2.65	7270	1%	1.7	0.68	4.76

Peak Discharge - Tp (hrs)	*Peak Discharge (cfs) if uniform storm assumed*			
13.7	28.69	36.88	45.08	54.30

10-year

Time (hours)	P_x/P_{24}	Mass P (inches)	Mass Q (inches)
6.0	0.080	0.27	0.11
8.0	0.120	0.40	0.17
9.0	0.147	0.50	0.21
9.5	0.163	0.55	0.23
10.0	0.181	0.61	0.25
10.5	0.204	0.69	0.29
11.0	0.235	0.79	0.33
11.5	0.283	0.95	0.40
12.0	0.663	2.23	0.93
12.5	0.735	2.48	1.03
13.0	0.772	2.60	1.08
13.5	0.799	2.69	1.12
14.0	0.820	2.76	1.15



From Graph - Midpoint of Maximum Increment of Runoff
11.88

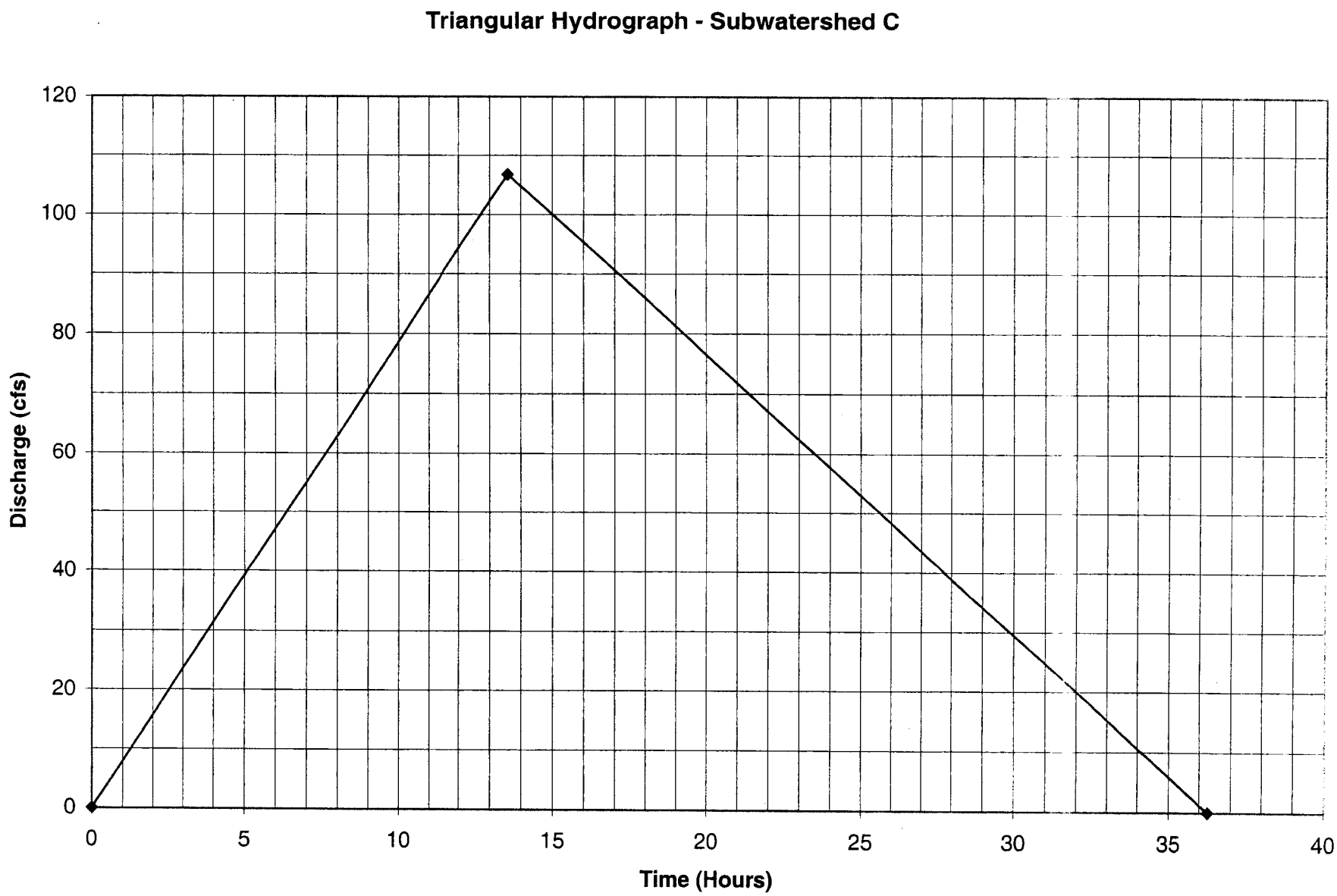
Starting Point of Effective Peak Producing Period
8.82

Peak Discharge if non-uniform rainfall (more realistic) - SCS Method

PEAK DISCHARGE HYDROGRAPH
SUBWATERSHED C
TOBICO MARSH WATERSHED
SAGINAW BAY, MICHIGAN

Increment	Time (hours)	Mass Runoff (inches)	ΔQ (inches)	Δq (cfs)	Proportion contributing	Discharge (cfs)	
ΔD_1	8.82	0.20	0.03	4.1282353	0.20	0.83	
ΔD_2	9.50	0.23	0.03	4.1282353	0.40	1.65	
ΔD_3	10.18	0.26	0.06	8.2564706	0.60	4.95	
ΔD_4	10.86	0.32	0.09	12.384706	0.80	9.91	
ΔD_5	11.54	0.41	0.57	78.436471	1.00	78.44	
ΔD_6	12.22	0.98	0.09	12.384706	0.67	8.26	
ΔD_7	12.90	1.07	0.06	8.2564706	0.33	2.75	
	13.58	1.13				106.78	Peak Discharge

Triangular Hydrograph	Time	Discharge
Start of Storm	0	0
Time to Peak	13.58	106.78
Time to Base	36.2586	0


Triangular Hydrograph - Subwatershed C
Discharge (cfs)
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
Time (Hours)

PEAK DISCHARGE HYDROGRAPH
SUBWATERSHED D
TOBICO MARSH WATERSHED
SAGINAW BAY, MICHIGAN

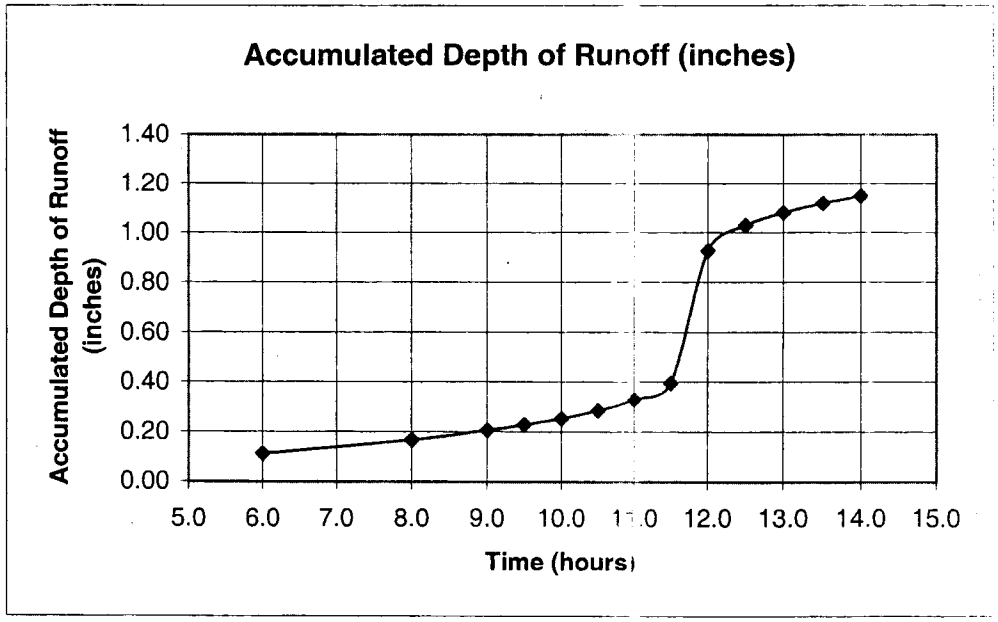
Sub-Watershed D

Catchment Area (square miles)	*D = 24-hour Rainfall in Bay County, Michigan (inches)*				*Watershed Parameters - Type II*			*Effective Peak Producing Period*	
	10-year	*25-year*	*50-year*	*100-year*	*Hydraulic Length (feet)*	*Average Slope (% slope)*	*Lag (hours)*	*ΔD (hours)*	*7ΔD (hours)*
0.63	*3.37*	*3.87*	*4.37*	*4.9*					
		Direct Runoff (inches)							
	1.4	1.8	2.2	2.65	7624	1%	1.8	0.72	5.04

Peak Discharge - Tp (hrs)	*Peak Discharge (cfs) if uniform storm assumed*			
13.8	30.93	39.77	48.61	58.55

10-year

Time (hours)	P_x/P_{24}	Mass P (inches)	Mass Q (inches)
6.0	0.080	0.27	0.11
8.0	0.120	0.40	0.17
9.0	0.147	0.50	0.21
9.5	0.163	0.55	0.23
10.0	0.181	0.61	0.25
10.5	0.204	0.69	0.29
11.0	0.235	0.79	0.33
11.5	0.283	0.95	0.40
12.0	0.663	2.23	0.93
12.5	0.735	2.48	1.03
13.0	0.772	2.60	1.08
13.5	0.799	2.69	1.12
14.0	0.820	2.76	1.15



From Graph - Midpoint of Maximum Increment of Runoff
11.88

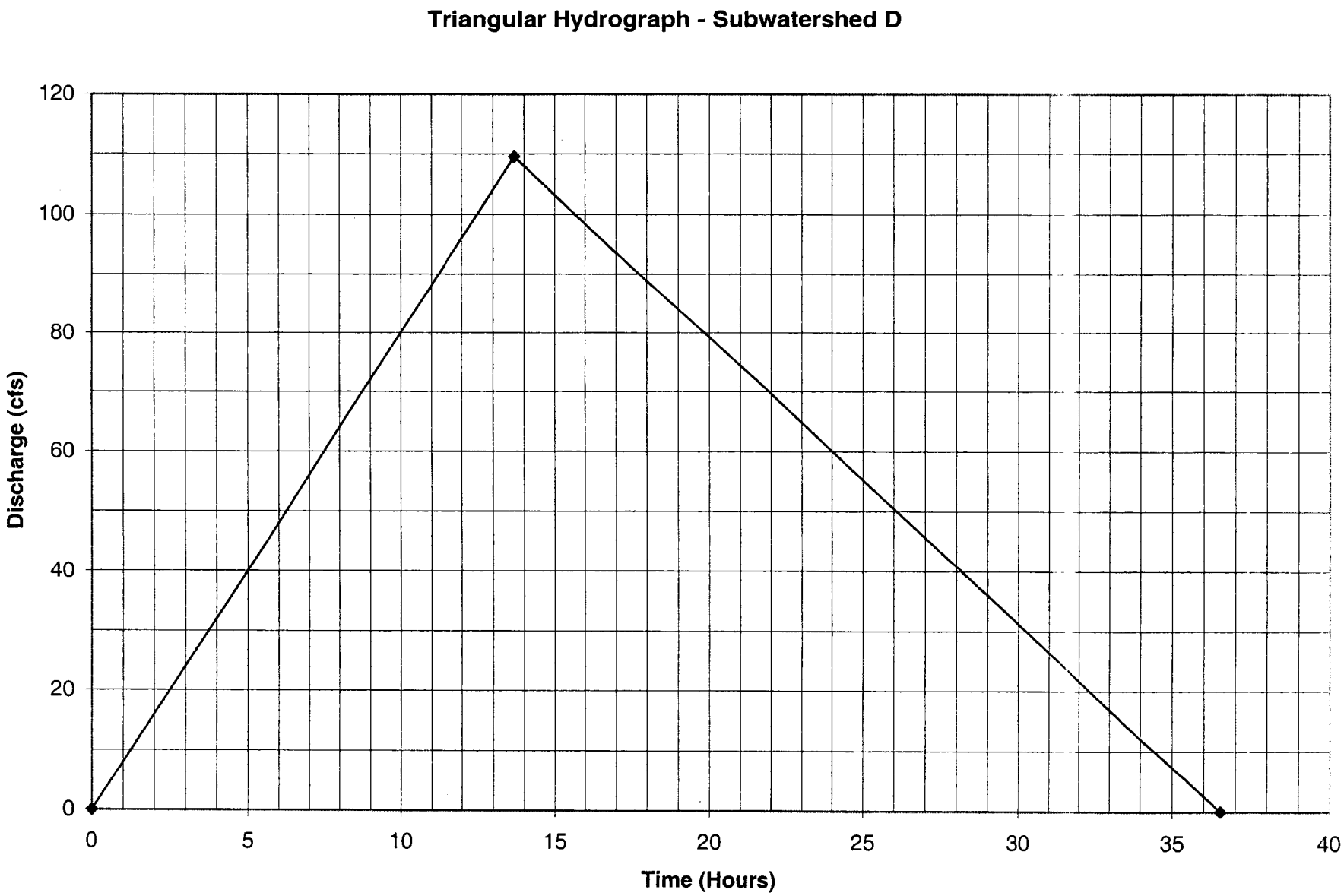
Starting Point of Effective Peak Producing Period
8.64

Peak Discharge if non-uniform rainfall (more realistic) - SCS Method

PEAK DISCHARGE HYDROGRAPH
SUBWATERSHED D
TOBICO MARSH WATERSHED
SAGINAW BAY, MICHIGAN

Increment	Time (hours)	Mass Runoff (inches)	ΔQ (inches)	Δq (cfs)	Proportion contributing	Discharge (cfs)	
ΔD_1	8.64	0.20	0.03	4.235	0.20	0.85	
ΔD_2	9.36	0.23	0.03	4.235	0.40	1.69	
ΔD_3	10.08	0.26	0.06	8.47	0.60	5.08	
ΔD_4	10.80	0.32	0.09	12.705	0.80	10.16	
ΔD_5	11.52	0.41	0.57	80.465	1.00	80.47	
ΔD_6	12.24	0.98	0.09	12.705	0.67	8.47	
ΔD_7	12.96	1.07	0.06	8.47	0.33	2.82	
	13.68	1.13				109.55	Peak Discharge

Triangular Hydrograph	Time	Discharge
Start of Storm	0	0
Time to Peak	13.68	109.55
Time to Base	36.5256	0


Triangular Hydrograph - Subwatershed D
Discharge (cfs)
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
Time (Hours)

PEAK DISCHARGE HYDROGRAPH
SUBWATERSHED E
TOBICO MARSH WATERSHED
SAGINAW BAY, MICHIGAN

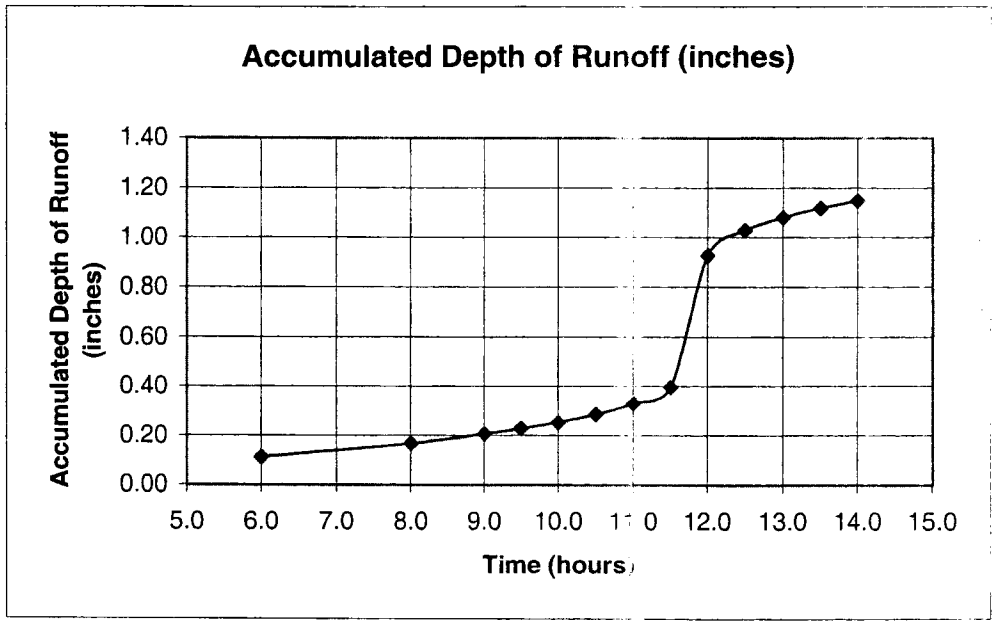
Sub-Watershed E

Catchment Area (square miles)	*D = 24-hour Rainfall in Bay County, Michigan (inches)*				*Watershed Parameters - Type II*			*Effective Peak Producing Period*	
	10-year	*25-year*	*50-year*	*100-year*	*Hydraulic Length (feet)*	*Average Slope (% slope)*	*Lag (hours)*	*ΔD (hours)*	*7ΔD (hours)*
1.07	*3.37*	*3.87*	*4.37*	*4.9*					
		Direct Runoff (inches)							
	1.4	1.8	2.2	2.65	10515	1%	2.3	0.92	6.44

Peak Discharge - Tp (hrs)	*Peak Discharge (cfs) if uniform storm assumed*			
14.3	50.70	65.19	79.67	95.97

10-year

Time (hours)	P_x/P_{24}	Mass P (inches)	Mass Q (inches)
6.0	0.080	0.27	0.11
8.0	0.120	0.40	0.17
9.0	0.147	0.50	0.21
9.5	0.163	0.55	0.23
10.0	0.181	0.61	0.25
10.5	0.204	0.69	0.29
11.0	0.235	0.79	0.33
11.5	0.283	0.95	0.40
12.0	0.663	2.23	0.93
12.5	0.735	2.48	1.03
13.0	0.772	2.60	1.08
13.5	0.799	2.69	1.12
14.0	0.820	2.76	1.15



From Graph - Midpoint of Maximum Increment of Runoff
11.88

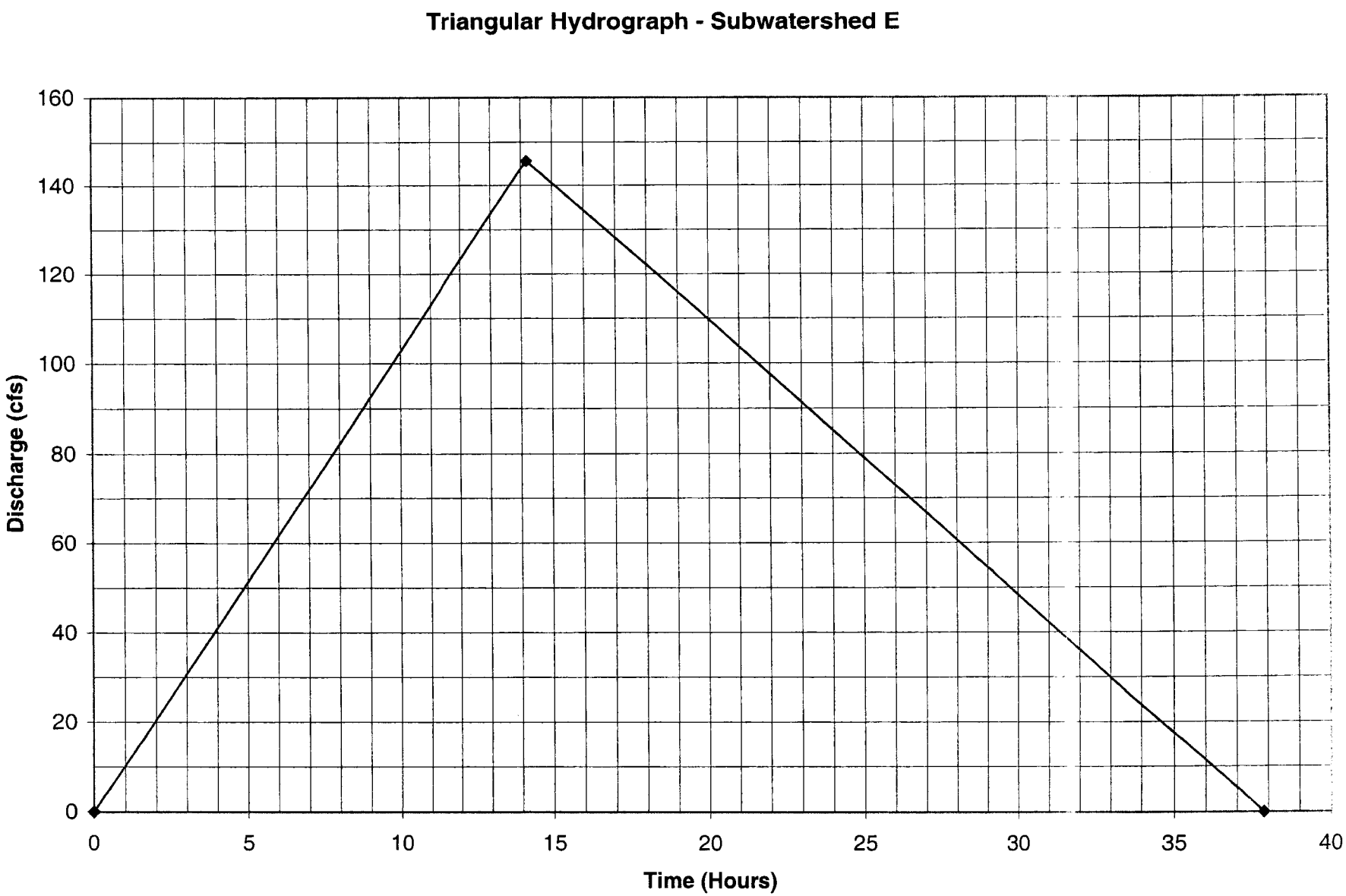
Starting Point of Effective Peak Producing Period
7.74

Peak Discharge if non-uniform rainfall (more realistic) - SCS Method

PEAK DISCHARGE HYDROGRAPH
SUBWATERSHED E
TOBICO MARSH WATERSHED
SAGINAW BAY, MICHIGAN

Increment	Time (hours)	Mass Runoff (inches)	ΔQ (inches)	Δq (cfs)	Proportion contributing	Discharge (cfs)	
ΔD_1	7.74	0.20	0.03	5.6291304	0.20	1.13	
ΔD_2	8.66	0.23	0.03	5.6291304	0.40	2.25	
ΔD_3	9.58	0.26	0.06	11.258261	0.60	6.75	
ΔD_4	10.50	0.32	0.09	16.887391	0.80	13.51	
ΔD_5	11.42	0.41	0.57	106.95348	1.00	106.95	
ΔD_6	12.34	0.98	0.09	16.887391	0.67	11.26	
ΔD_7	13.26	1.07	0.06	11.258261	0.33	3.75	
	14.18	1.13				145.61	Peak Discharge

Triangular Hydrograph	Time	Discharge
Start of Storm	0	0
Time to Peak	14.18	145.61
Time to Base	37.8606	0


Triangular Hydrograph - Subwatershed E
Discharge (cfs)
160
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
Time (Hours)

PEAK DISCHARGE HYDROGRAPH
SUBWATERSHED F
TOBICO MARSH WATERSHED
SAGINAW BAY, MICHIGAN

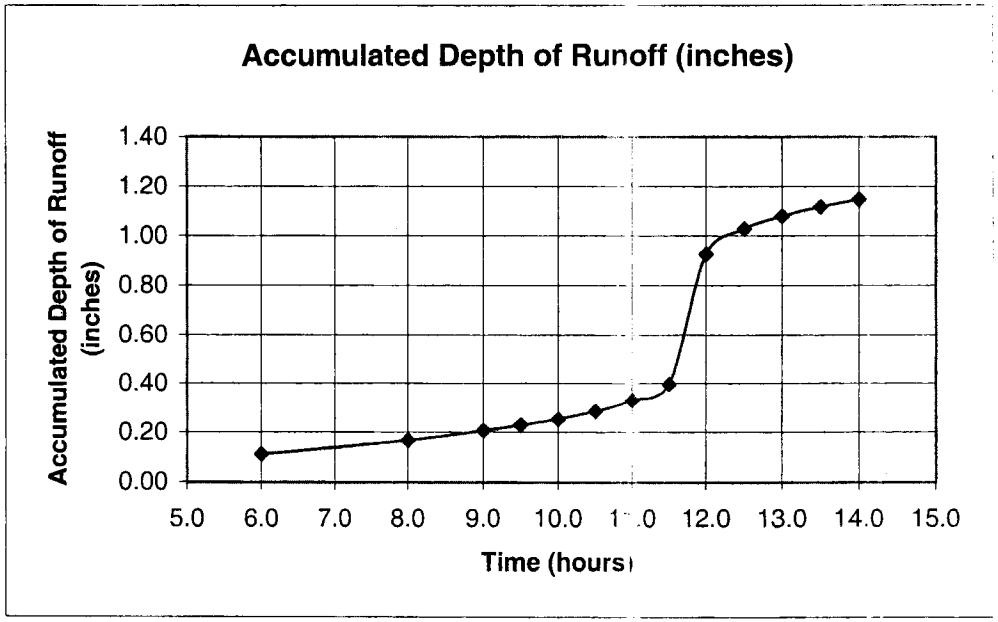
Sub-Watershed F

Catchment Area (square miles)	*D = 24-hour Rainfall in Bay County, Michigan (inches)*				*Watershed Parameters - Type II*			*Effective Peak Producing Period*	
	10-year	*25-year*	*50-year*	*100-year*	*Hydraulic Length (feet)*	*Average Slope (% slope)*	*Lag (hours)*	*ΔD (hours)*	*7ΔD (hours)*
0.77	*3.37*	*3.87*	*4.37*	*4.9*					
		Direct Runoff (inches)							
	1.4	1.8	2.2	2.65	8637	1%	2.0	0.8	5.6

Peak Discharge - Tp (hrs)	*Peak Discharge (cfs) if uniform storm assumed*			
14	37.27	47.92	58.56	70.54

10-year

Time (hours)	P_x/P_{24}	Mass P (inches)	Mass Q (inches)
6.0	0.080	0.27	0.11
8.0	0.120	0.40	0.17
9.0	0.147	0.50	0.21
9.5	0.163	0.55	0.23
10.0	0.181	0.61	0.25
10.5	0.204	0.69	0.29
11.0	0.235	0.79	0.33
11.5	0.283	0.95	0.40
12.0	0.663	2.23	0.93
12.5	0.735	2.48	1.03
13.0	0.772	2.60	1.08
13.5	0.799	2.69	1.12
14.0	0.820	2.76	1.15



From Graph - Midpoint of Maximum Increment of Runoff
11.88

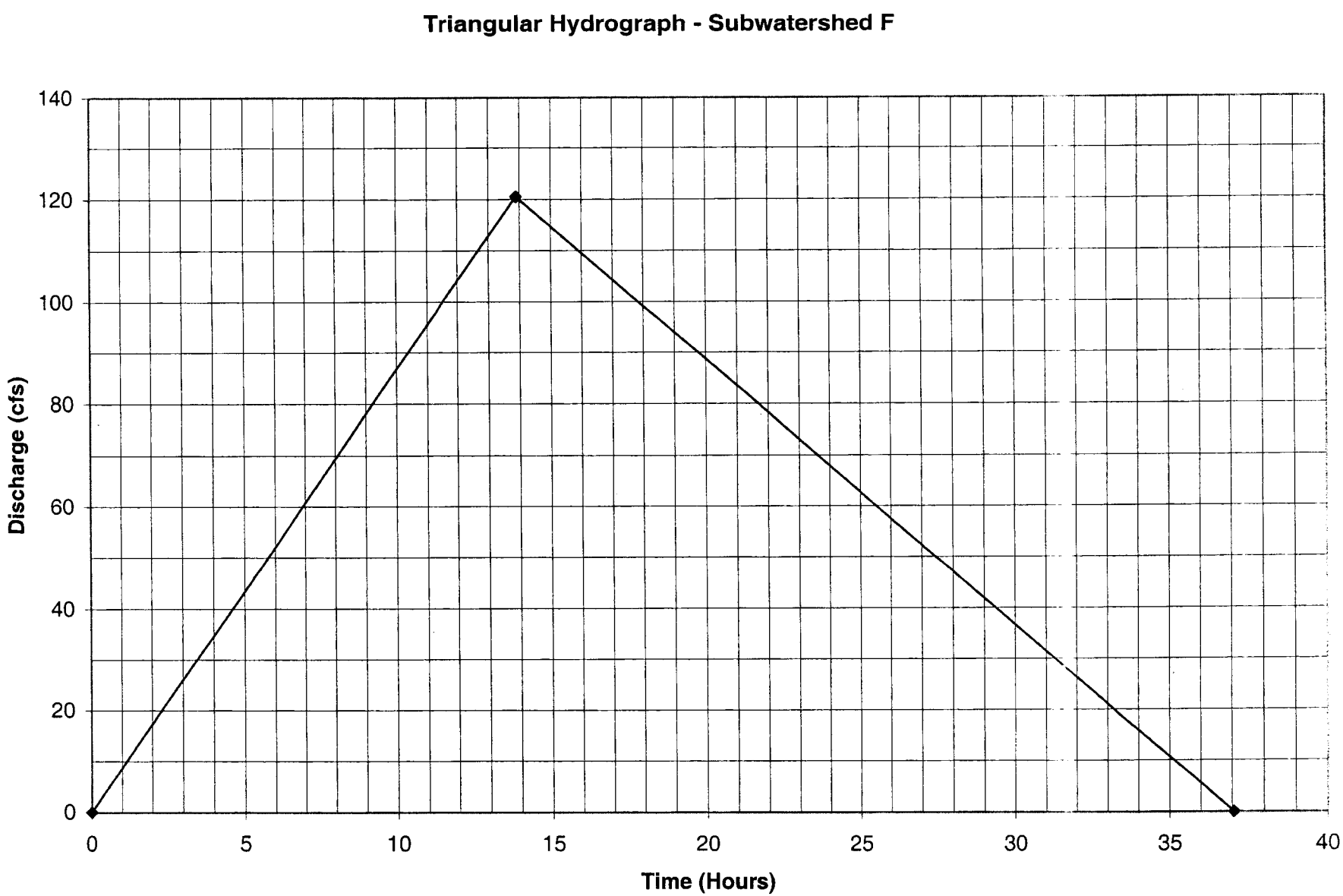
Starting Point of Effective Peak Producing Period
8.28

Peak Discharge if non-uniform rainfall (more realistic) - SCS Method

PEAK DISCHARGE HYDROGRAPH
SUBWATERSHED F
TOBICO MARSH WATERSHED
SAGINAW BAY, MICHIGAN

Increment	Time (hours)	Mass Runoff (inches)	ΔQ (inches)	Δq (cfs)	Proportion contributing	Discharge (cfs)	
ΔD_1	8.28	0.20	0.03	4.6585	0.20	0.93	
ΔD_2	9.08	0.23	0.03	4.6585	0.40	1.86	
ΔD_3	9.88	0.26	0.06	9.317	0.60	5.59	
ΔD_4	10.68	0.32	0.09	13.9755	0.80	11.18	
ΔD_5	11.48	0.41	0.57	88.5115	1.00	88.51	
ΔD_6	12.28	0.98	0.09	13.9755	0.67	9.32	
ΔD_7	13.08	1.07	0.06	9.317	0.33	3.11	
	13.88	1.13				120.50	Peak Discharge

Triangular Hydrograph	Time	Discharge
Start of Storm	0	0
Time to Peak	13.88	120.50
Time to Base	37.0596	0


Triangular Hydrograph - Subwatershed F
Discharge (cfs)
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
Time (Hours)

PEAK DISCHARGE HYDROGRAPH
SUBWATERSHED G
TOBICO MARSH WATERSHED
SAGINAW BAY, MICHIGAN

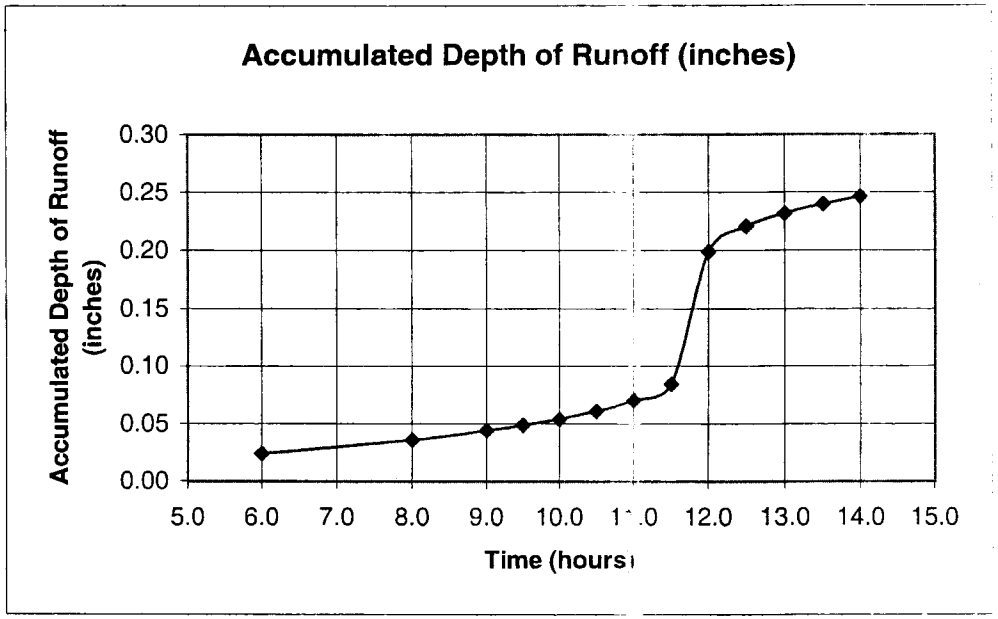
Sub-Watershed G

Catchment Area (square miles)	*D = 24-hour Rainfall in Bay County, Michigan (inches)*				*Watershed Parameters - Type II*			*Effective Peak Producing Period*	
	10-year	*25-year*	*50-year*	*100-year*	*Hydraulic Length (feet)*	*Average Slope (% slope)*	*Lag (hours)*	*ΔD (hours)*	*7ΔD (hours)*
1.35	*3.37*	*3.87*	*4.37*	*4.9*					
		Direct Runoff (inches)							
	0.3	0.5	0.7	0.95	12077	1%	4.5	1.8	12.6

Peak Discharge - Tp (hrs)	*Peak Discharge (cfs) if uniform storm assumed*			
16.5	11.88	19.80	27.72	37.62

10-year

Time (hours)	P_x/P_{24}	Mass P (inches)	Mass Q (inches)
6.0	0.080	0.27	0.02
8.0	0.120	0.40	0.04
9.0	0.147	0.50	0.04
9.5	0.163	0.55	0.05
10.0	0.181	0.61	0.05
10.5	0.204	0.69	0.06
11.0	0.235	0.79	0.07
11.5	0.283	0.95	0.08
12.0	0.663	2.23	0.20
12.5	0.735	2.48	0.22
13.0	0.772	2.60	0.23
13.5	0.799	2.69	0.24
14.0	0.820	2.76	0.25



From Graph - Midpoint of Maximum Increment of Runoff
11.88

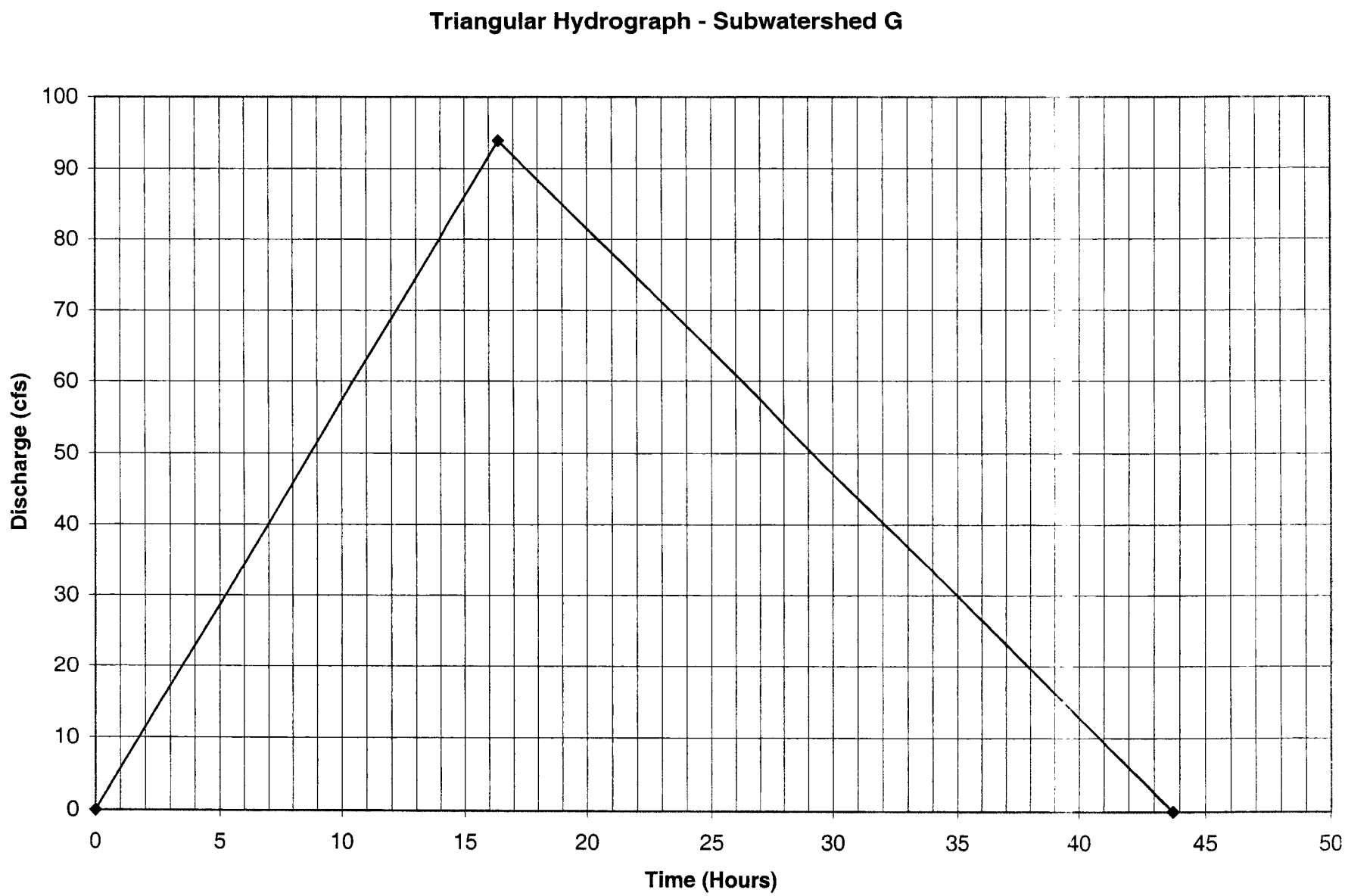
Starting Point of Effective Peak Producing Period
3.78

Peak Discharge if non-uniform rainfall (more realistic) - SCS Method

PEAK DISCHARGE HYDROGRAPH
SUBWATERSHED G
TOBICO MARSH WATERSHED
SAGINAW BAY, MICHIGAN

Increment	Time (hours)	Mass Runoff (inches)	ΔQ (inches)	Δq (cfs)	Proportion contributing	Discharge (cfs)	
ΔD_1	3.78	0.20	0.03	3.63	0.20	0.73	
ΔD_2	5.58	0.23	0.03	3.63	0.40	1.45	
ΔD_3	7.38	0.26	0.06	7.26	0.60	4.36	
ΔD_4	9.18	0.32	0.09	10.89	0.80	8.71	
ΔD_5	10.98	0.41	0.57	68.97	1.00	68.97	
ΔD_6	12.78	0.98	0.09	10.89	0.67	7.26	
ΔD_7	14.58	1.07	0.06	7.26	0.33	2.42	
	16.38	1.13				93.90	Peak Discharge

Triangular Hydrograph	Time	Discharge
Start of Storm	0	0
Time to Peak	16.38	93.90
Time to Base	43.7346	0


Triangular Hydrograph - Subwatershed G
Discharge (cfs)
100
90
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
50
Time (Hours)

PEAK DISCHARGE HYDROGRAPH
SUBWATERSHED H
TOBICO MARSH WATERSHED
SAGINAW BAY, MICHIGAN

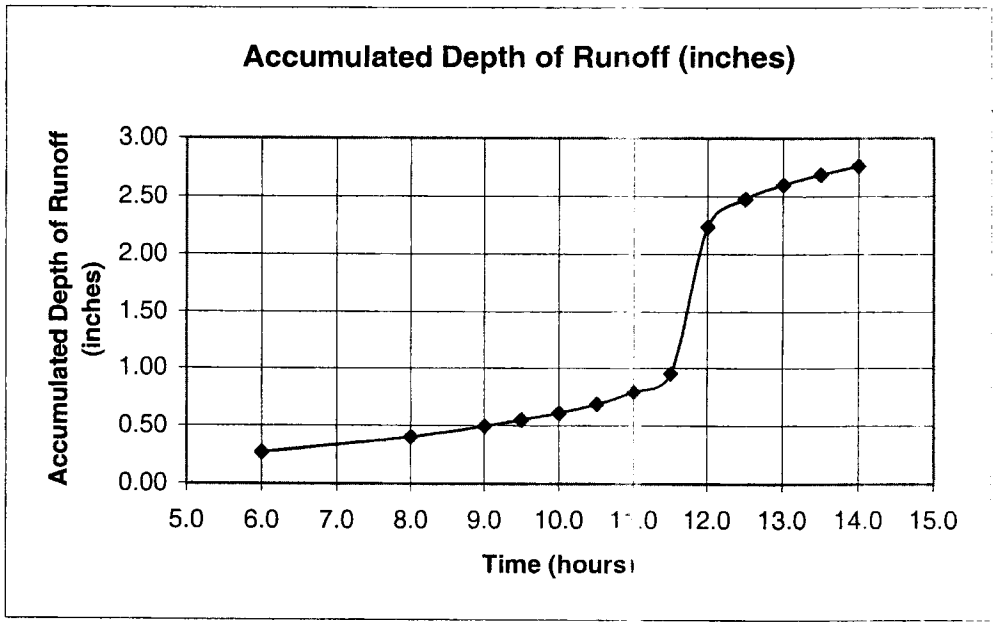
Sub-Watershed H

Catchment Area (square miles)	*D = 24-hour Rainfall in Bay County, Michigan (inches)*				*Watershed Parameters - Type II*			*Effective Peak Producing Period*	
	10-year	*25-year*	*50-year*	*100-year*	*Hydraulic Length (feet)*	*Average Slope (% slope)*	*Lag (hours)*	*ΔD (hours)*	*7ΔD (hours)*
1.40	*3.37*	*3.87*	*4.37*	*4.9*					
		Direct Runoff (inches)							
	3.37	3.87	4.37	4.9	12360	1%	1.3	0.52	3.64

Peak Discharge - Tp (hrs)	*Peak Discharge (cfs) if uniform storm assumed*			
13.3	171.69	197.17	222.64	249.64

10-year

Time (hours)	P_x/P_{24}	Mass P (inches)	Mass Q (inches)
6.0	0.080	0.27	0.27
8.0	0.120	0.40	0.40
9.0	0.147	0.50	0.50
9.5	0.163	0.55	0.55
10.0	0.181	0.61	0.61
10.5	0.204	0.69	0.69
11.0	0.235	0.79	0.79
11.5	0.283	0.95	0.95
12.0	0.663	2.23	2.23
12.5	0.735	2.48	2.48
13.0	0.772	2.60	2.60
13.5	0.799	2.69	2.69
14.0	0.820	2.76	2.76



From Graph - Midpoint of Maximum Increment of Runoff
11.88

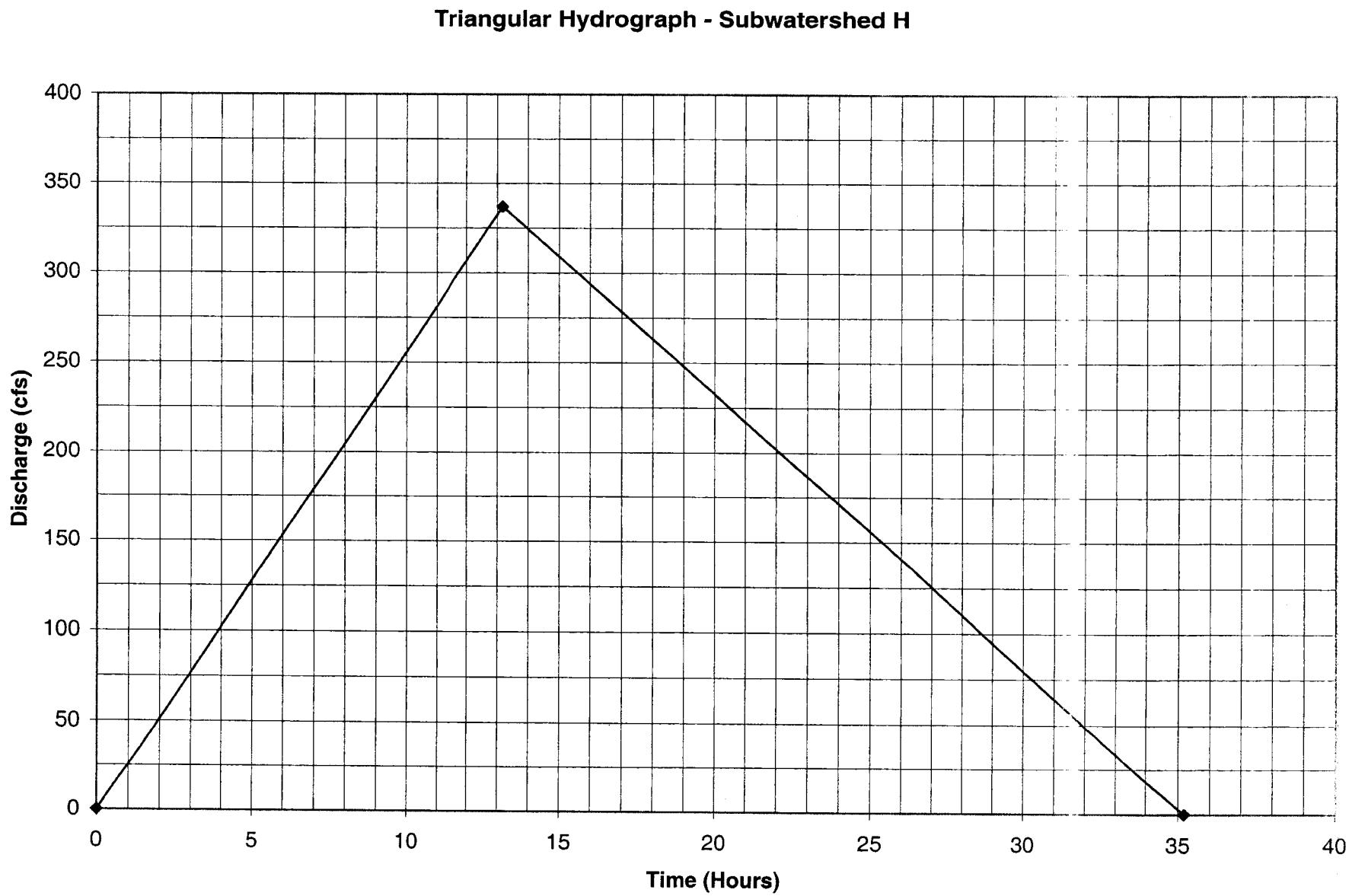
Starting Point of Effective Peak Producing Period
9.54

Peak Discharge if non-uniform rainfall (more realistic) - SCS Method

PEAK DISCHARGE HYDROGRAPH
SUBWATERSHED H
TOBICO MARSH WATERSHED
SAGINAW BAY, MICHIGAN

Increment	Time (hours)	Mass Runoff (inches)	ΔQ (inches)	Δq (cfs)	Proportion contributing	Discharge (cfs)	
ΔD_1	9.54	0.20	0.03	13.030769	0.20	2.61	
ΔD_2	10.06	0.23	0.03	13.030769	0.40	5.21	
ΔD_3	10.58	0.26	0.06	26.061538	0.60	15.64	
ΔD_4	11.10	0.32	0.09	39.092308	0.80	31.27	
ΔD_5	11.62	0.41	0.57	247.58462	1.00	247.58	
ΔD_6	12.14	0.98	0.09	39.092308	0.67	26.06	
ΔD_7	12.66	1.07	0.06	26.061538	0.33	8.69	
	13.18	1.13				337.06	Peak Discharge

Triangular Hydrograph	Time	Discharge
Start of Storm	0	0
Time to Peak	13.18	337.06
Time to Base	35.1906	0


Triangular Hydrograph - Subwatershed H
Discharge (cfs)
400
350
300
250
200
150
100
50
0
0
5
10
15
20
25
30
35
40
Time (Hours)

RUNOFF CURVE NUMBER COMPUTATION

Version 2.10
Project : Tobico Marsh User: CRA Date: 11-28-2002
County : USA State: MI Checked: ____ Date: _____
Subtitle: Marsh as 1 watershed
Subarea : Dubay

COVER DESCRIPTION			Hydrologic Soil Group A	B	C	D
				Acres (CN)		
CULTIVATED AGRICULTURAL LANDS						
Row crops	Straight row (SR)	good	-	2518(78)	-	-
OTHER AGRICULTURAL LANDS						
Woods		good	-	864(55)	-	-
Total Area (by Hydrologic Soil Group)				3382		

SUBAREA: Dubay TOTAL DRAINAGE AREA: 3382 Acres WEIGHTED CURVE NUMBER: 72*

* - Generated for use by GRAPHIC method

GRAPHICAL PEAK DISCHARGE METHOD

Version 2.10
Project : Tobico Marsh User: CRA Date: 11-28-2002
County : USA State: MI Checked: ____ Date: _____

Subtitle: Marsh as 1 watershed

Data: Drainage Area : 4280 * Acres
Runoff Curve Number : 73 *
Time of Concentration: 3.20 Hours
Rainfall Type : II
Pond and Swamp Area : NONE

Storm Number	1	2	3	4
Frequency (yrs)	10	25	50	100
24-Hr Rainfall (in)	3.37	3.87	4.37	4.90
Ia/P Ratio	0.22	0.19	0.17	0.15
Runoff (in)	1.09	1.43	1.80	2.20
Unit Peak Discharge (cfs/acre/in)	0.223	0.229	0.234	0.237
Pond and Swamp Factor 0.0% Ponds Used	1.00	1.00	1.00	1.00
Peak Discharge (cfs)	1044	1407	1798	2238

* - Value(s) provided from TR-55 system routines

RUNOFF CURVE NUMBER COMPUTATION

Version 2.10
Project : Tobico Marsh User: CRA Date: 11-28-2002
County : USA State: MI Checked: ____ Date: _____
Subtitle: Marsh as 1 watershed
Subarea : Dubay

COVER DESCRIPTION		Hydrologic Soil Group A	B	C	D
			Acres (CN)		
CULTIVATED AGRICULTURAL LANDS					
Row crops Straight row (SR)	good	-	3416(78)	-	-
OTHER AGRICULTURAL LANDS					
Woods	good	-	864(55)	-	-
Total Area (by Hydrologic Soil Group)			4280		

SUBAREA: Dubay TOTAL DRAINAGE AREA: 4280 Acres WEIGHTED CURVE NUMBER: 73*

* - Generated for use by GRAPHIC method

GRAPHICAL PEAK DISCHARGE METHOD

Version 2.10
Project : Tobico Marsh User: CRA Date: 11-28-2002
County : USA State: MI Checked: ____ Date: _____
Subtitle: Marsh as 1 watershed

Data: Drainage Area : 4280 * Acres
Runoff Curve Number : 73 *
Time of Concentration: 3.20 Hours
Rainfall Type : II
Pond and Swamp Area : .5 Sq miles 0.0 % of Drainage Area

Storm Number	1	2	3	4
Frequency (yrs)	10	25	50	100
24-Hr Rainfall (in)	3.37	3.87	4.37	4.90
Ia/P Ratio	0.22	0.19	0.17	0.15
Runoff (in)	1.09	1.43	1.80	2.20
Unit Peak Discharge (cfs/acre/in)	0.223	0.229	0.234	0.237
Pond and Swamp Factor 5.0% Ponds Used	0.72	0.72	0.72	0.72
Peak Discharge (cfs)	752	1013	1295	1611

* - Value(s) provided from TR-55 system routines