

$$Q_{in} = 266 \text{ cfs}$$

$$Q_{out} = 155 \text{ cfs}$$

$$\begin{aligned} \text{Storage} &= (266 - 155)(3)(15)(0.5)(60)(1.5) \\ &= 224,775 \text{ cu. ft} \\ &= 5.16 \text{ ac.-ft.} \end{aligned}$$

We have 4.19 ac. of storage available
Need to store to depth of 1.25'

$$\text{N. Pond} = 83,836 \text{ sq. ft}$$

$$\text{S. Pond} = 98,823 \text{ sq. ft}$$

$$\text{S. Pond Storage} = (98,823)(1.5) = (Q_{peak in} - 155)(3)(15)(0.5)(60)(1.5)$$

$$Q_{peak in} = 228 \text{ cfs S. Pond}$$

$$\begin{aligned} \text{N. Pond Storage} &= (83,836)(\text{Depth}) = (197.6 - 140.2)(3)(15)(0.5)(60)(1.5) \\ \text{Depth} &= 1.4' \end{aligned}$$

Auburn Hills 5th Addition

CURRENT DATE: 10-13-1999
CURRENT TIME: 10:58:09

FILE DATE: 10-13-1999
FILE NAME: NEVILLEW

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FHWA CULVERT ANALYSIS
HY-8, VERSION 6.0
SITE DATA
CULVERT SHAPE, MATERIAL, INLET
INLET OUTLET CULVERT BARRELS
ELEV. ELEV. LENGTH SHAPE SPAN RISE MANNING INLET
(ft) (ft) (ft) MATERIAL (ft) (ft) n TYPE
1 100.00 99.80 90.00 2 RCP 2.50 2.50 .012 CONVENTIONAL
2
3
4
5
6

```

SUMMARY OF CULVERT FLOWS (cfs) FILE: NEVILLEW DATE: 10-13-1999

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
100.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
100.85	6.0	6.0	0.0	0.0	0.0	0.0	0.0	0.00	1
101.23	12.0	12.0	0.0	0.0	0.0	0.0	0.0	0.00	1
101.54	18.0	18.0	0.0	0.0	0.0	0.0	0.0	0.00	1
101.81	24.0	24.0	0.0	0.0	0.0	0.0	0.0	0.00	1
102.06	30.0	30.0	0.0	0.0	0.0	0.0	0.0	0.00	1
102.30	36.0	36.0	0.0	0.0	0.0	0.0	0.0	0.00	1
102.51	42.0	42.0	0.0	0.0	0.0	0.0	0.0	0.00	1
102.76	48.0	48.0	0.0	0.0	0.0	0.0	0.0	0.00	1
103.00	54.0	54.0	0.0	0.0	0.0	0.0	0.0	0.00	1
103.04	54.8	54.8	0.0	0.0	0.0	0.0	0.0	0.00	1
104.00	74.1	74.1	0.0	0.0	0.0	0.0	0.0	0.00	OVERTOPPING

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: NEVILLEW DATE: 10-13-1999

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
100.00	0.000	0.00	0.00	0.00
100.85	0.000	6.00	0.00	0.00
101.23	0.000	12.00	0.00	0.00
101.54	0.000	18.00	0.00	0.00
101.81	0.000	24.00	0.00	0.00
102.06	0.000	30.00	0.00	0.00
102.30	0.000	36.00	0.00	0.00
102.51	0.000	42.00	0.00	0.00
102.76	0.000	48.00	0.00	0.00
103.00	0.000	54.00	0.00	0.00
103.04	0.000	54.80	0.00	0.00

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

PERFORMANCE CURVE FOR CULVERT 1 - 2(2.50 (ft) BY 2.50 (ft)) RCP

DIS- HEAD- INLET OUTLET
CHARGE WATER CONTROL CONTROL FLOW NORMAL CRIT. OUTLET TW OUTLET TW
FLOW ELEV. DEPTH DEPTH TYPE DEPTH DEPTH DEPTH DEPTH DEPTH VEL. VEL.
(cfs) (ft) (ft) (ft) <F4> (ft) (ft) (ft) (ft) (ft) (fps) (fps)

DIS-CHARGE FLOW (cfs)	HEAD- WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	100.00	0.00	-0.20	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
6.00	100.85	0.70	0.85	2-M2c	0.63	0.56	0.56	0.24	3.64	2.23
12.00	101.23	1.09	1.23	2-M2c	0.91	0.80	0.80	0.37	4.39	2.85
18.00	101.54	1.41	1.54	2-M2c	1.14	1.00	1.00	0.46	4.91	3.28
24.00	101.81	1.69	1.81	2-M2c	1.36	1.16	1.16	0.55	5.40	3.61
30.00	102.06	1.94	2.06	2-M2c	1.57	1.30	1.30	0.62	5.81	3.88
36.00	102.30	2.17	2.30	2-M2c	1.79	1.43	1.43	0.69	6.19	4.11
42.00	102.51	2.40	2.51	2-M2c	2.08	1.55	1.55	0.75	6.56	4.32
48.00	102.76	2.64	2.76	2-M2c	2.50	1.66	1.66	0.81	6.93	4.51
54.00	103.00	2.89	3.00	2-M2c	2.50	1.77	1.77	0.86	7.27	4.67
54.80	103.04	2.93	3.04	2-M2c	2.50	1.78	1.78	0.87	7.32	4.69

El. inlet face invert 100.00 ft El. outlet invert 99.80 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT *****
 INLET STATION 0.00 ft
 INLET ELEVATION 100.00 ft
 OUTLET STATION 90.00 ft
 OUTLET ELEVATION 99.80 ft
 NUMBER OF BARRELS 2
 SLOPE (V/H) 0.0022
 CULVERT LENGTH ALONG SLOPE 90.00 ft

***** CULVERT DATA SUMMARY *****
 BARREL SHAPE CIRCULAR
 BARREL DIAMETER 2.50 ft
 BARREL MATERIAL CONCRETE
 BARREL MANNING'S n 0.012
 INLET TYPE CONVENTIONAL
 INLET EDGE AND WALL SQUARE EDGE WITH HEADWALL
 INLET DEPRESSION NONE

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: Channel upstream of N. Det. Pond.

Comment: Use Heavy Stone Rip-Rap

Solve For Depth

Given Input Data:

Bottom Width.....	10.00 ft
Left Side Slope..	4.00:1 (H:V)
Right Side Slope.	4.00:1 (H:V)
Manning's n.....	0.060
Channel Slope....	0.0480 ft/ft
Discharge.....	63.80 cfs

Computed Results:

Depth.....	1.00 ft
Velocity.....	4.55 fps
Flow Area.....	14.02 sf
Flow Top Width...	18.01 ft
Wetted Perimeter.	18.26 ft
Critical Depth...	0.95 ft
Critical Slope...	0.0590 ft/ft
Froude Number....	0.91 (flow is Subcritical)

CURRENT DATE: 10-19-1999
CURRENT TIME: 14:33:25

FILE DATE: 10-19-1999
FILE NAME: NEVILMID

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FHWA CULVERT ANALYSIS
HY-8, VERSION 6.0
CULVERT SHAPE, MATERIAL, INLET
SITE DATA
CULVERT SHAPE, MATERIAL, INLET
INLET OUTLET CULVERT BARRELS
ELEV. ELEV. LENGTH SHAPE SPAN RISE MANNING INLET
(ft) (ft) (ft) MATERIAL (ft) (ft) n TYPE
1 1420.00 1416.25 150.05 3 RCP 3.00 3.00 .012 CONVENTIONAL
2
3
4
5
6

```

SUMMARY OF CULVERT FLOWS (cfs) FILE: NEVILMID DATE: 10-19-1999

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1420.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1420.83	15.0	15.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1421.32	30.0	30.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1421.72	45.0	45.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1422.06	60.0	60.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1422.37	75.0	75.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1422.66	90.0	90.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1422.96	105.0	105.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1423.27	120.0	120.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1423.60	135.0	135.0	0.0	0.0	0.0	0.0	0.0	0.00	1
1423.72	140.2	140.2	0.0	0.0	0.0	0.0	0.0	0.00	1
1424.00	151.3	151.3	0.0	0.0	0.0	0.0	0.0	0.00	OVERTOPPING

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: NEVILMID DATE: 10-19-1999

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1420.00	0.000	0.00	0.00	0.00
1420.83	0.000	15.00	0.00	0.00
1421.32	0.000	30.00	0.00	0.00
1421.72	0.000	45.00	0.00	0.00
1422.06	0.000	60.00	0.00	0.00
1422.37	0.000	75.00	0.00	0.00
1422.66	0.000	90.00	0.00	0.00
1422.96	0.000	105.00	0.00	0.00
1423.27	0.000	120.00	0.00	0.00
1423.60	0.000	135.00	0.00	0.00
1423.72	0.000	140.20	0.00	0.00

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

PERFORMANCE CURVE FOR CULVERT 1 - 3(3.00 (ft) BY 3.00 (ft)) RCP

DIS- HEAD- INLET OUTLET

CHARGE FLOW (cfs)	HEAD- WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1420.00	0.00	-0.25	0-NF	0.00	0.00	0.00	3.50	0.00	0.00
15.00	1420.83	0.83	0.83	1-S1f	0.40	0.69	0.80	3.50	3.28	0.00
30.00	1421.32	1.32	1.32	1-S1f	0.60	0.99	1.10	3.50	4.25	0.00
45.00	1421.72	1.72	1.72	1-S1f	0.72	1.23	1.40	3.50	4.63	0.00
60.00	1422.07	2.07	2.07	1-S1f	0.84	1.43	1.60	3.50	5.22	0.00
75.00	1422.37	2.37	2.37	1-S1f	0.95	1.61	1.80	3.50	5.65	0.00
90.00	1422.66	2.66	2.66	1-S1f	1.04	1.77	1.90	3.50	6.36	0.00
105.00	1422.96	2.96	2.96	1-S1f	1.13	1.92	2.10	3.50	6.62	0.00
120.00	1423.26	3.26	3.26	1-S1f	1.22	2.06	2.20	3.50	7.21	0.00
135.00	1423.60	3.60	3.60	1-S1f	1.30	2.18	2.30	3.50	7.75	0.00
140.20	1423.72	3.72	3.72	1-S1f	1.33	2.22	2.40	3.50	7.71	0.00

El. inlet face invert 1420.00 ft El. outlet invert 1416.25 ft

El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT *****

INLET STATION	0.00 ft
INLET ELEVATION	1420.00 ft
OUTLET STATION	150.00 ft
OUTLET ELEVATION	1416.25 ft
NUMBER OF BARRELS	3
SLOPE (V/H)	0.0250
CULVERT LENGTH ALONG SLOPE	150.05 ft

***** CULVERT DATA SUMMARY *****

BARREL SHAPE	CIRCULAR
BARREL DIAMETER	3.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.012
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE WITH HEADWALL
INLET DEPRESSION	NONE

CURRENT DATE: 10-13-1999
CURRENT TIME: 12:59:58

FILE DATE: 10-13-1999
FILE NAME: NEVILOUT

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.0

Table with columns: NO., ELEV. (ft), INLET ELEV. (ft), OUTLET ELEV. (ft), CULVERT LENGTH (ft), BARRELS, SHAPE, MATERIAL, SPAN (ft), RISE (ft), MANNING n, INLET TYPE. Row 1: 1, 1416.25, 1416.15, 50.00, 3, RCP, 2.00, 2.00, .012, CONVENTIONAL.

SUMMARY OF CULVERT FLOWS (cfs) FILE: NEVILOUT DATE: 10-13-1999

Table with columns: ELEV (ft), TOTAL, 1, 2, 3, 4, 5, 6, ROADWAY, ITR. Shows flow data for various elevations from 1416.25 to 1418.50.

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: NEVILOUT DATE: 10-13-1999

Table with columns: HEAD ELEV (ft), HEAD ERROR (ft), TOTAL FLOW (cfs), FLOW ERROR (cfs), % FLOW ERROR. Shows error data for elevations from 1416.25 to 1419.75.

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: NEVILWOFF

Comment: OFF-SITE DRAINAGE FROM WEST THRU SW COR.

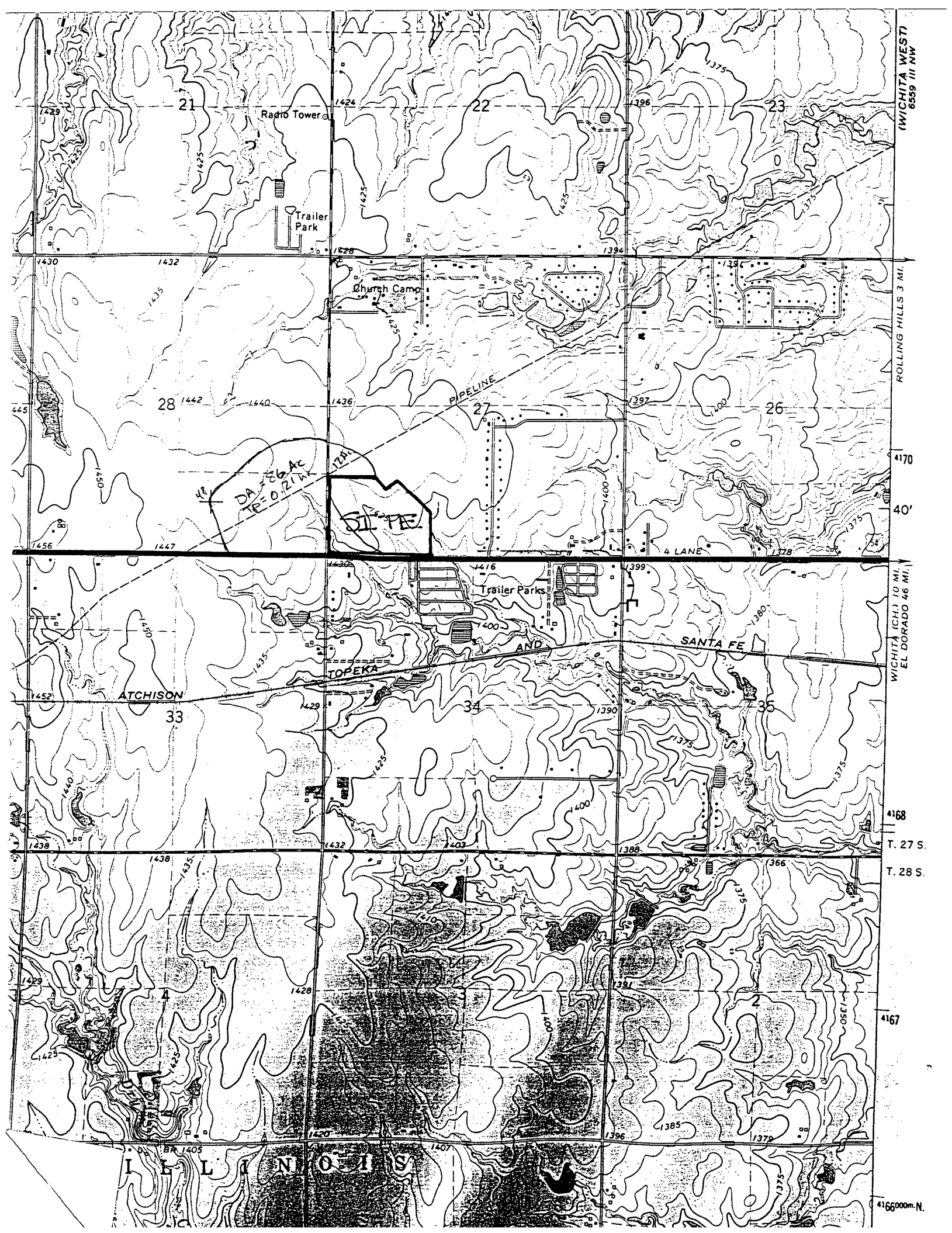
Solve For Depth

Given Input Data:

Bottom Width.....	5.00 ft
Left Side Slope..	4.00:1 (H:V)
Right Side Slope.	4.00:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.0055 ft/ft
Discharge.....	386.60 cfs

Computed Results:

Depth.....	3.51 ft
Velocity.....	5.77 fps
Flow Area.....	66.95 sf
Flow Top Width...	33.11 ft
Wetted Perimeter.	33.97 ft
Critical Depth...	3.01 ft
Critical Slope...	0.0112 ft/ft
Froude Number....	0.72 (flow is Subcritical)



WICHITA WEST
6559 III NW

ROLLING HILLS 3 MI.

4170
40'

WICHITA (CH.) 10 MI.
EL DORADO 46 MI.

4168

T. 27 S.

T. 28 S.

4167

4166000m.N.

21

22

23

28

27

26

33

34

35

Radio Tower

Trailer Park

Church Camp

PIPELINE

DAVE AC
TRADING

SANTA FE

Trailer Parks

SANTA FE

TOPEKA

AND

ATCHISON

ILLINOIS