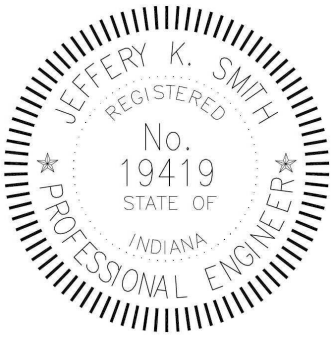
Final Drainage Report for

Cornett Building at Hurricane Industrial Park - Lots 6

Dated: October 25, 2024



Calculations Prepared By:

PROJECTS plus

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Jeffery K. Smith, P.E. 19419

REPORT INDEX:

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- Allowable HYDRAFLOW Hydrograph Runoff Calculations
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TECHNICAL INFORMATION DATA

Development Conditions:

The proposed development for the Cornett Building is located at the 1442 Amy Lane, Franklin, IN 46131 on Lot #6 in the Hurricane Industrial Park - Section 3. Existing ground cover is grass with soil hydrologic groups type 'B' and 'C'. The proposed development includes the construction of a 9,850 S.F. building with asphalt pavement. Drainage will be provided by a combination of sheet flow and drainage swales, with flow to existing culverts and road side swales. Additional construction activities include a sanitary sewer lateral, domestic water service line, and other utility connections to building.

The drainage watershed for the site is part of an approved drainage system for Hurricane Industrial Park, prepared by Steven B. Williams, Franklin Engineering Dated February 20, 2001. The approved drainage report had a post-development runoff coefficient of 0.60 for the entire subdivision. The existing detention pond located within the industrial park was designed and built to provide detention for lot 6. The project site is located within Basin 'A' in the drainage basin map depicted within the "Approved Post-Development, Detention and Storm Sewer Calculations" section of this report.

In 2011, the City of Franklin requested updated detention pond calculations when Lots #9 and #10 were developed as lots were being developed it became apparent that the original approved coefficient was not conservative enough for a, industrial subdivision. Therefore in new drainage coefficient and calculations were prepared by Projects Plus, with a new runoff coefficient being established for all existing and future post-development runoff. A coefficient of 0.70 was determined for the overall development and a coefficient of 0.74 was determined for Lot #6, with a impervious coverage of 85% assumed.

The calculations listed below for the proposed development project is to verify that the site is under the allowable impervious coverage and runoff coefficient.

Lot #6 – 1.11 acres

Proposed and future impervious = 0.90 acres

Grass Area = 0.21 acres

Weighted 'C' = [(0.90 x 0.85) + (0.21 x 0.20)] / 1.11

Weighted 'C' = 0.73 < 0.74

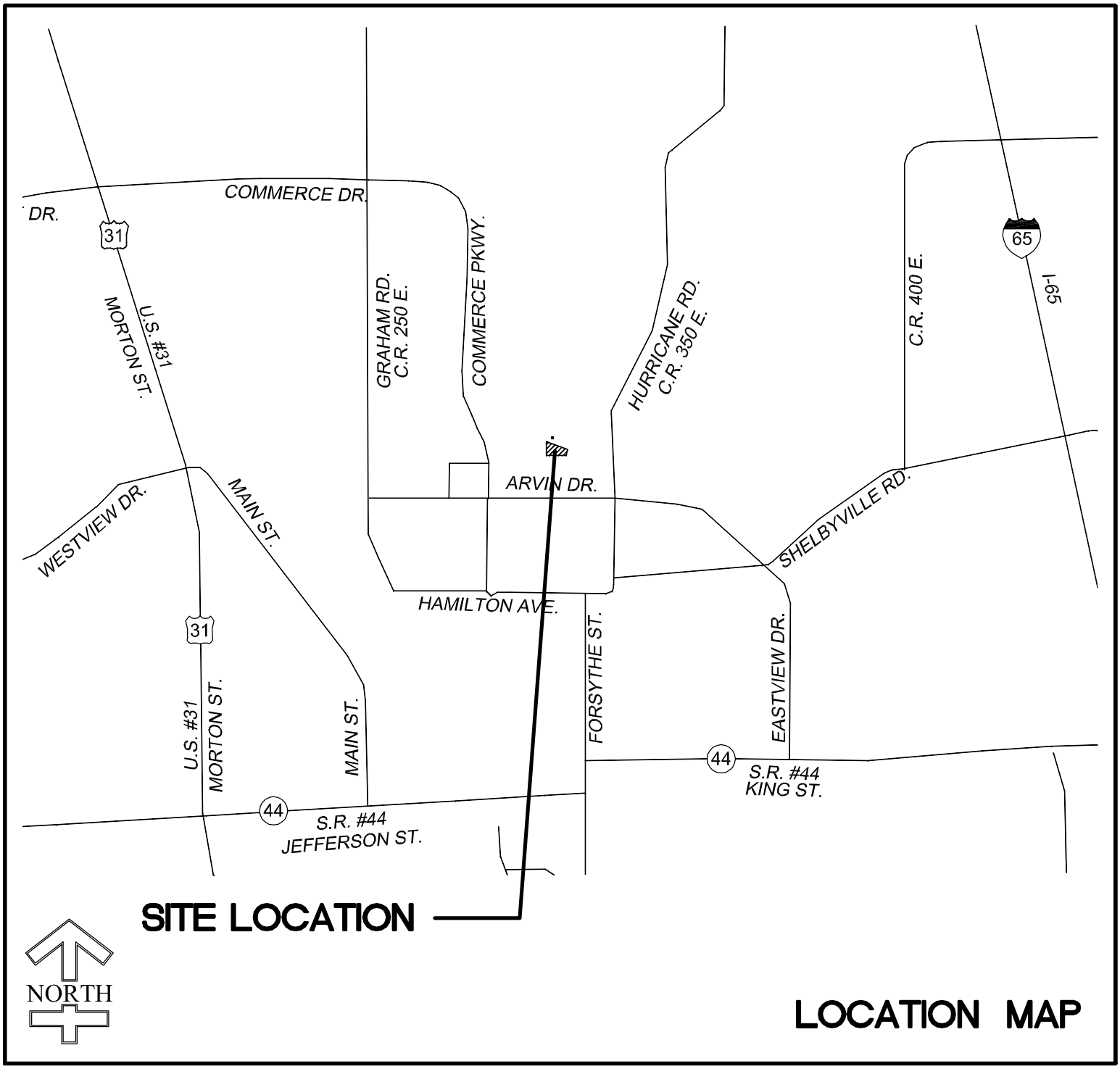
The proposed runoff coefficient for Lot #6 is less than the weighted coefficient for future developments included in the Projects Plus report, no additional detention is required for this project.

Water Quality Methodology:

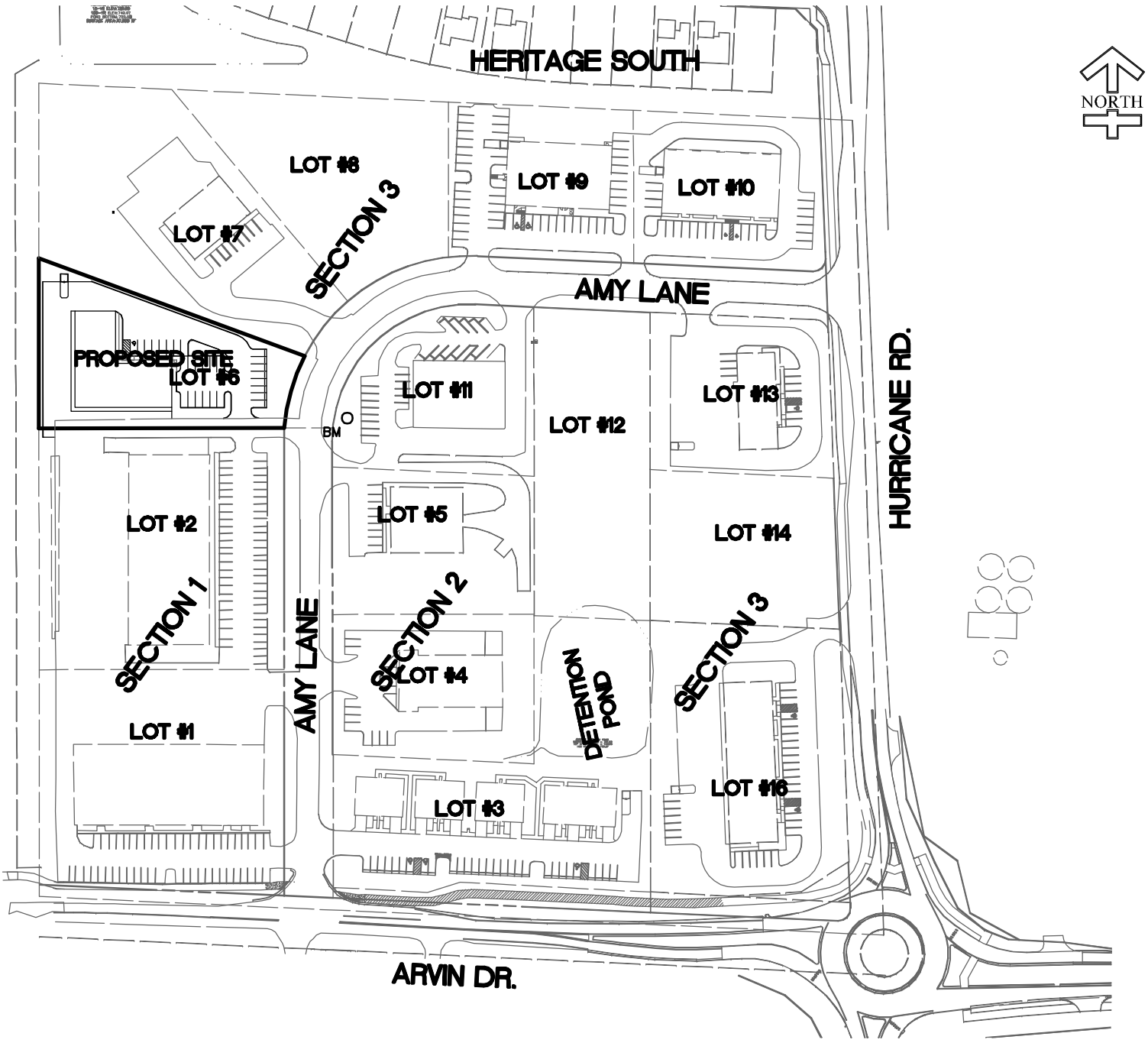
Water Quality for the site will be achieved by routing the storm runoff to the existing detention pond, which will provide treatment in addition to the existing vegetated swale which will provide pre-treatment prior to release to the detention pond. The wet detention pond acts as a permanent stormwater control structure providing both detention and treatment of contaminated stormwater runoff. The ponds natural physical, biological and chemical processes then work to remove pollutants.

Stormwater Pollution Prevention:

The land disturbing activities will be greater than 1 acre, so a IDEM Construction Stormwater General Permit (CSGP) submittal is required. A Stormwater Pollution Prevention Plan (SWPPP) with an activities schedule will be submitted as part of the construction plans. Standard maintenance schedules and details will be included. All swales and pond banks will be mulch-seeded and have an erosion control blanket installed. All drainage easements will be mulch-seeded and the rights-of-way will be temporary seeded. A perimeter filter fence will be installed where needed as well as at all ditch inlets.



LOCATION MAP


HERITAGE SOUTH
NORTH
LOT #8
LOT #9
LOT #10
LOT #7
SECTION 3
AMY LANE
PROPOSED SITE
LOT #6
LOT #11
LOT #13
BM
LOT #12
HURRICANE RD.
LOT #2
LOT #5
LOT #14
SECTION 1
AMY LANE
SECTION 2
SECTION 3
LOT #4
DETENTION POND
LOT #1
LOT #16
LOT #3
ARVIN DR.

National Flood Hazard Layer FIRMette

FEMA

86°2'52"W 39°29'52"N

86°2'15"W 39°29'24"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

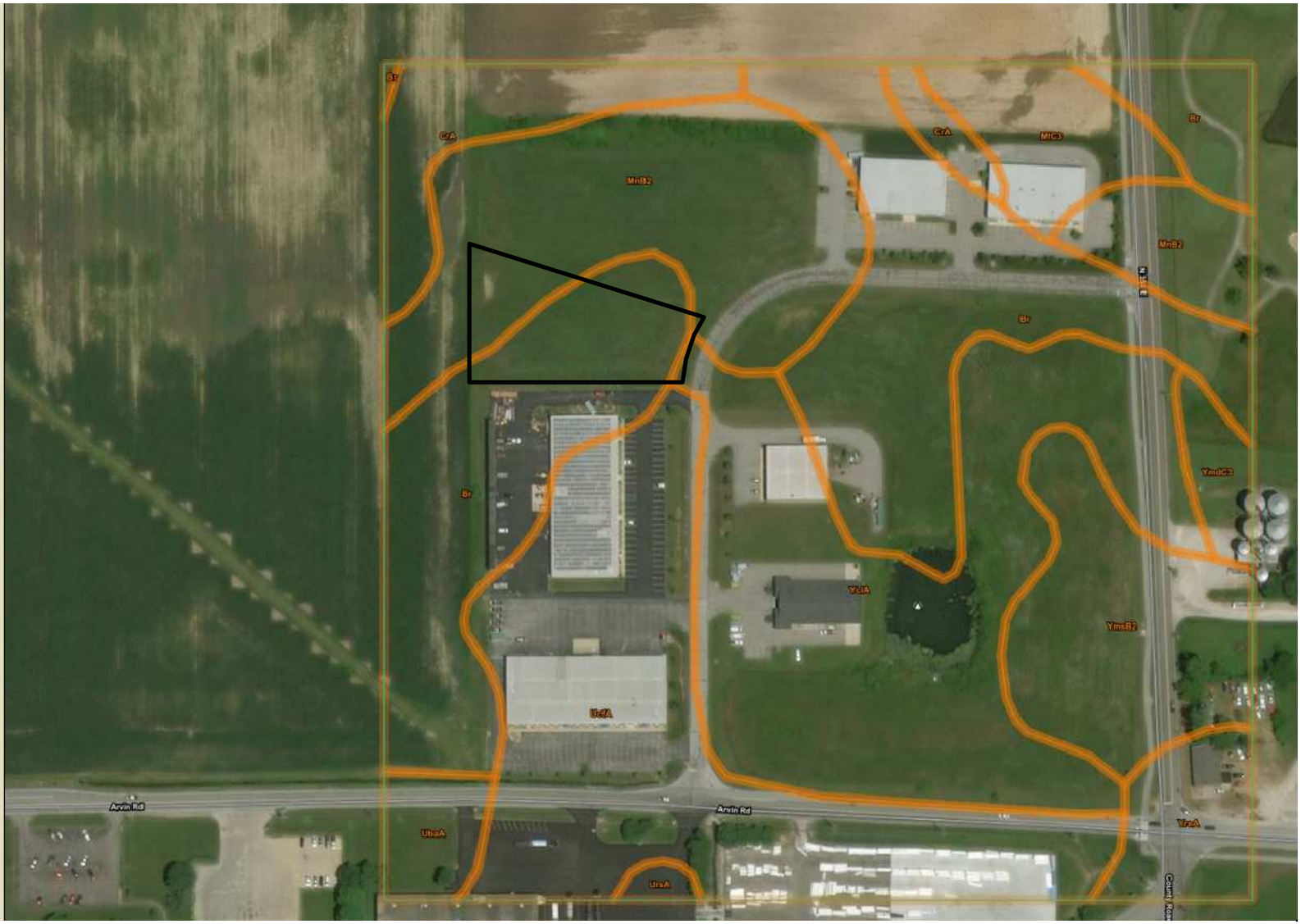
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 2/9/2023 at 9:54 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Johnson County, Indiana (IN081)

Johnson County, Indiana (IN081)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Br	Brookston silty clay loam, 0 to 2 percent slopes	9.4	24.7%
CrA	Crosby silt loam, fine-loamy subsoil, 0 to 2 percent slopes	1.8	4.8%
MnB2	Miami silt loam, 2 to 6 percent slopes, eroded	5.7	15.0%
MtC3	Miami clay loam, 6 to 12 percent slopes, severely eroded	1.3	3.4%
UbaA	Urban land-Brookston complex, 0 to 2 percent slopes	0.6	1.7%
UcfA	Urban land-Crosby silt loam complex, fine-loamy subsoil, 0 to 2 percent	7.0	18.3%



NORTH

SOILS MAP

Hours	Minutes	Return Period - Rainfall Intensity (in/hr)					
		2	5	10	25	50	100
0.08	5	4.75	6.14	6.99	8.08	8.83	9.69
0.17	10	3.63	4.75	5.48	6.40	7.07	7.77
0.25	15	2.97	3.92	4.55	5.34	5.94	6.53
0.5	30	1.98	2.64	3.09	3.65	4.10	4.50
1	60	1.25	1.67	1.96	2.31	2.62	2.88
2	120	0.76	1.02	1.20	1.40	1.59	1.75
3	180	0.56	0.75	0.88	1.03	1.17	1.29
6	360	0.33	0.44	0.52	0.60	0.68	0.75
12	720	0.20	0.26	0.30	0.35	0.39	0.43
24	1440	0.11	0.15	0.17	0.20	0.22	0.25

Hours	Minutes	Return Period - Rainfall Depth (in)					
		2	5	10	25	50	100
0.08	5	0.40	0.51	0.58	0.67	0.74	0.81
0.17	10	0.61	0.79	0.91	1.07	1.18	1.30
0.25	15	0.74	0.98	1.14	1.34	1.49	1.63
0.5	30	0.99	1.32	1.55	1.83	2.05	2.25
1	60	1.25	1.67	1.96	2.31	2.62	2.88
2	120	1.52	2.04	2.40	2.80	3.18	3.50
3	180	1.68	2.25	2.64	3.09	3.51	3.87
6	360	1.98	2.64	3.12	3.60	4.08	4.50
12	720	2.40	3.12	3.60	4.20	4.68	5.16
24	1440	2.64	3.60	4.08	4.80	5.28	6.00

TABLE 202-02: IDF and IDD Tables for Indianapolis, IN

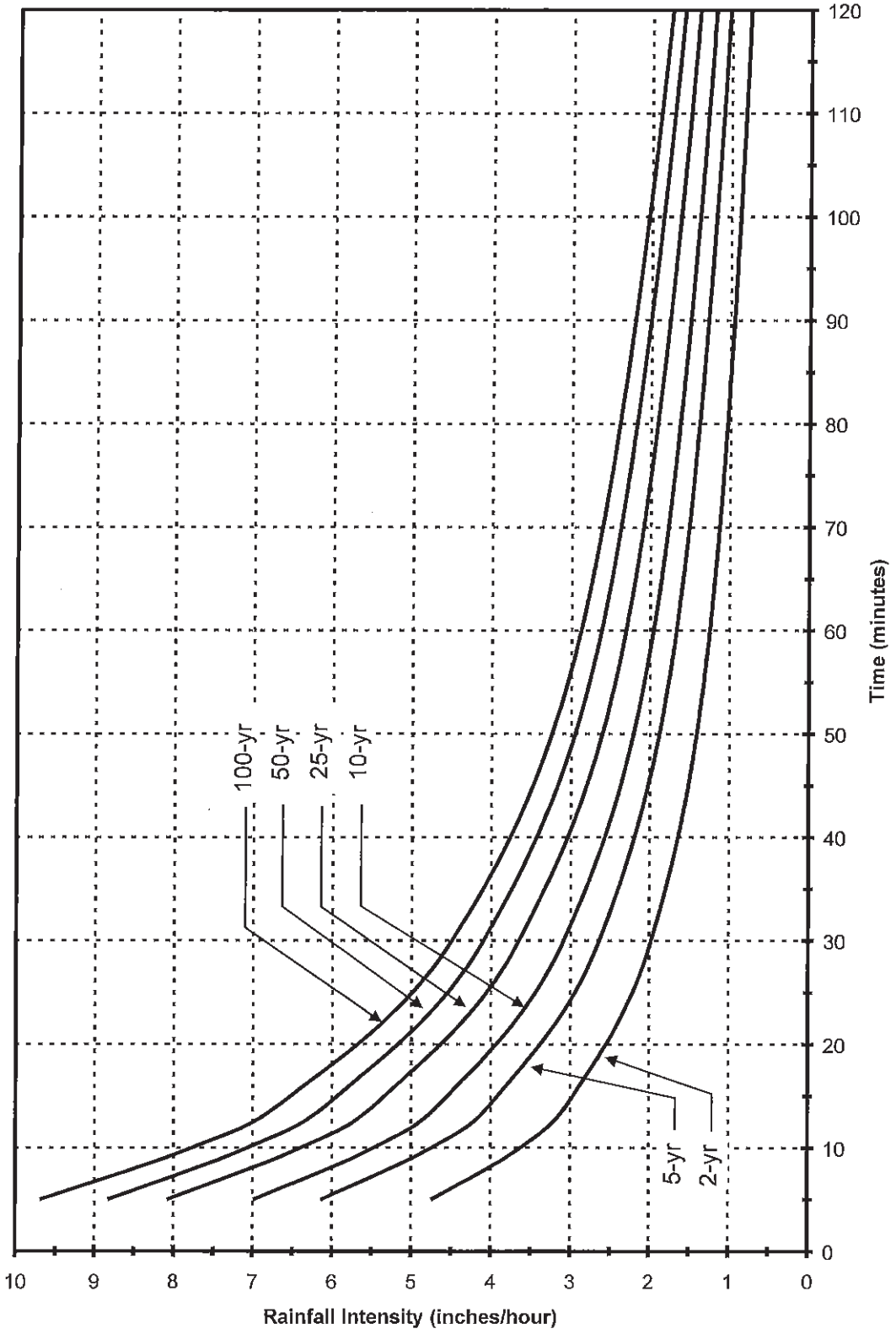


FIGURE 202-01: Indianapolis IDF Curve

Surface Description	n
Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated Soils: Residue cover </= 20% Residue cover > 20%	 0.06 0.17
Grass: Short grass prairie Dense grasses Bermuda grass	 0.15 0.24 0.41
Range (natural)	0.13
Woods: Light underbrush Dense underbrush	 0.40 0.80

TABLE 203-01: Roughness coefficients (Manning's n) for sheet flow

TYPE OF SURFACE	RUNOFF COEFFICIENT ©
Non-Urban Areas	
Bare earth	0.55
Steep grassed areas (slope 2:1)	0.60
Turf meadows	0.25
Forested areas	0.20
Cultivated fields	0.30
Urban Areas	
All watertight roof surfaces	0.90
Pavement	0.85
Gravel	0.85
Impervious soils (heavy)	0.55
Impervious soils (with turf)	0.45
Slightly pervious soil	0.25
Slightly pervious soil (with turf)	0.20
Moderately pervious soil	0.15
Moderately pervious soil (with turf)	0.10
Business, Commercial & Industrial	0.85
Apartments & Townhouses	0.70
Schools & Churches	0.55
Single Family Lots < 10,000 SF	0.45
Lots < 12,000 SF	0.45
Lots < 17,000 SF	0.40
Lots > ½ acre	0.35
Park, Cemetery or Unimproved Area	0.30

TABLE 204-01: Runoff Coefficients© for Use in the Rational Method

[Absence of an entry indicates the feature is not a concern. The symbol < means less than; > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	
					Ft			
Brookston: Br	B/D	Frequent	Brief	Dec–May	0–1.0	Apparent	Dec–May	High.
Crosby: CrA	C	None			1.0–3.0	Apparent	Jan–Apr	High.
[1] CsB2:								
Crosby part	C	None			1.0–3.0	Apparent	Jan–Apr	High.
Miami part	B	None			>6.0			Moderate.
Eel: Ee	C	Frequent	Brief	Oct–Jun	3.0–6.0	Apparent	Jan–Apr	High.
Fox: FoA, FoB2, [1] FxC2	B	None			>6.0			Moderate.
Genesee: Ge	B	Frequent	Brief	Oct–Jun	>6.0			Moderate.
Hennepin: HeF	B	None			>6.0			Moderate.
Martinsville: MgA, MgB2	B	None			>6.0			Moderate.
Miami: MmA, MmB2, MmC2, [1] MxD2, MxE2.	B	None			>6.0			Moderate.
Ockley: OcA, OcB2	B	None			>6.0			Moderate.
Rensselaer: Re	B/D	None			0–1.0	Apparent	Dec–May	High.
Shoals: Sh	C	Frequent	Brief	Oct–Jun	1.0–3.0	Apparent	Jan–Apr	High.
Sleeth: Sk	C	None			1.0–3.0	Apparent	Jan–Apr	High.
Sloan: So	B/D	Frequent	Long	Oct–Jun	0–0.5	Apparent	Nov–Jun	High.
Urban land:								
[1] Ub:								
Brookston part	B/D	Frequent	Brief	Dec–May	0–1.0	Apparent	Dec–May	High.
[1] Uc:								
Crosby part	C	None			1.0–3.0	Apparent	Jan–Apr	High.
[1] UfA:								
Fox part	B	None			>6.0			Moderate.
[1] UfC:								
Fox part	B	None			>6.0			Moderate.
[1] Ug:								
Genesee part	B	Frequent	Brief	Oct–Jun	>6.0			Moderate.
[1] UmB:								
Miami part	B	None			>6.0			Moderate.
[1] UmC:								
Miami part	B	None			>6.0			Moderate.
[1] Uw:								
Westland part	B/D	Frequent	Brief	Dec–May	0–1.0	Apparent	Dec–May	High.
Westland: We	B/D	Frequent	Brief	Dec–May	0–1.0	Apparent	Dec–May	High.
Whitaker: Wh	C	None			1.0–3.0	Apparent	Jan–Apr	High.

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 205-01: Soil and Water Features for Marion County, Indiana
(SOURCE: NRCS, Soil Survey of Marion county, Indiana, 1991)

Cover Description	Curve Numbers for Hydrologic Soil Groups				
Cover Type and Hydrologic Condition	Average Percent Impervious Area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[2]		68	79	86	89
Poor condition (grass cover < 50%)		49	69	79	84
Fair condition (grass cover 50% to 75%)		39	61	74	80
Good condition (grass cover > 75%)					
Impervious Areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and Roads:					
Paved; curbs and storm drains (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Urban Districts:					
Commercial and Business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential Districts by Average Lot Size:					
0.125 acre or less (townhouses)	65	77	85	90	92
0.25 acre	38	61	75	83	87
0.33 acre	30	57	72	81	86
0.50 acre	25	54	70	80	85
1.00 acre	20	51	68	79	84
2.00 acre	12	46	65	77	82
Developing Urban Areas					
Newly graded areas (pervious area only, no vegetation)		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in *Table 205-04*).					

[1] *Average runoff condition, and $I_a = 0.2S$*

[2] *The average percent impervious area shown was used to develop the composite CNs. Other assumptions are as follows: Impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. If the impervious area is not connected, the NRCS method has an adjustment to reduce the effect.*

[3] *CNs shown are equivalent to those of pasture. Composite CNs may be computed for other combinations of open space cover type.*

TABLE 205-02: Runoff Curve Numbers for Urban Areas
(SOURCE: 210-VI-TR-55, Second Ed., June 1986)

Cover Description	Curve Numbers for Hydrologic Soil Groups			
Cover Type and Hydrologic Condition	A	B	C	D
Cultivated Land (Row Crops) With conservation treatment Without conservation treatment	72 62	81 71	88 78	91 81
Pasture or Range Land Poor condition Good condition	68 39	79 61	86 74	89 80
Meadow Good condition	30	58	71	78
Wood or Forest Land Thin stand, poor cover, no mulch Good cover	45 25	66 55	77 70	83 77

TABLE 205-03: Runoff Curve Numbers for Undeveloped Areas
(SOURCE: 210-VI-TR-55, Second Ed., June 1986)

Cover Description	Curve Numbers for Hydrologic Soil Groups			
Cover Type and Hydrologic Condition	A	B	C	D
Pasture, grassland or range with continuous forage for grazing.				
Poor	68	79	86	89
Fair	49	69	79	84
Good	39	61	74	80
Meadow with continuous grass, protected from grazing and generally mowed for hay.	30	58	71	78
Brush/brush-weed-grass mixture with brush being the major element.				
Poor	48	67	77	83
Fair	35	56	70	77
Good	30	48	65	73
Woods and grass combination (orchard or tree farm).				
Poor	57	73	82	86
Fair	43	65	76	82
Good	32	58	72	79
Woods				
Poor	45	66	77	83
Fair	36	60	73	79
Good	30	55	70	77
Farmsteads	59	74	82	86

TABLE 205-04: Runoff Curve Numbers for Agricultural Lands
(SOURCE: 210-VI-TR-55, Second Ed., June 1986)

Approved Post-Development, Detention and Storm Sewer Calculations

Prepared by Steven B. Williams, Franklin Engineering
for the
Hurricane Industrial Park
Dated February 20, 2001

HURRICANE INDUSTRIAL PARK
DRAINAGE REPORT
REVISED: OCTOBER 2, 2000

REV: 2-20-01

Original Conditions:

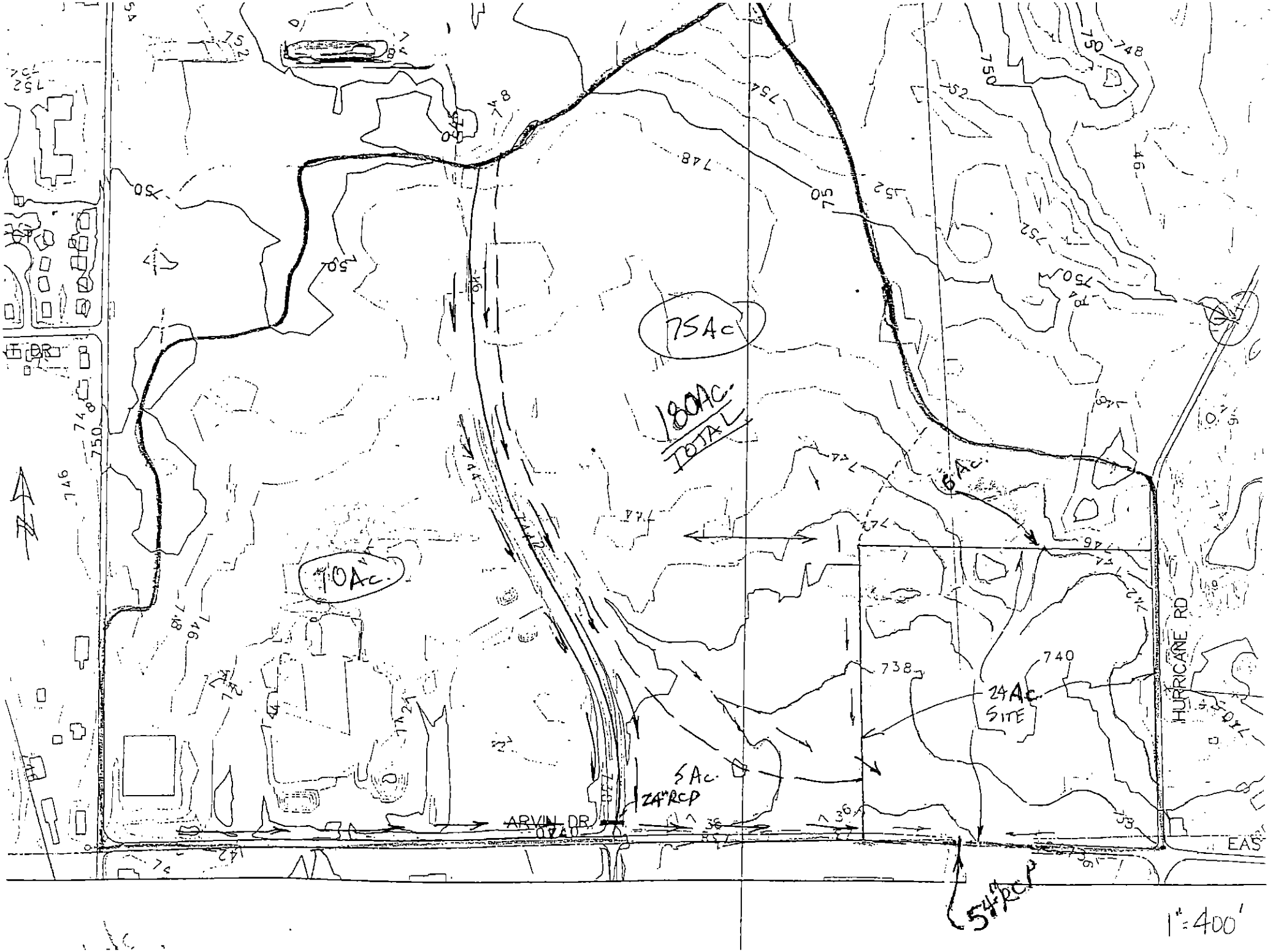
Onsite A = 24 Acres
C = .4 cropland D = 1200' H = 12' S = 1%
T = 30 min.
I_{10} = 3.1
Q_{10} = 24 (.4) 3.1 = 30 cfs

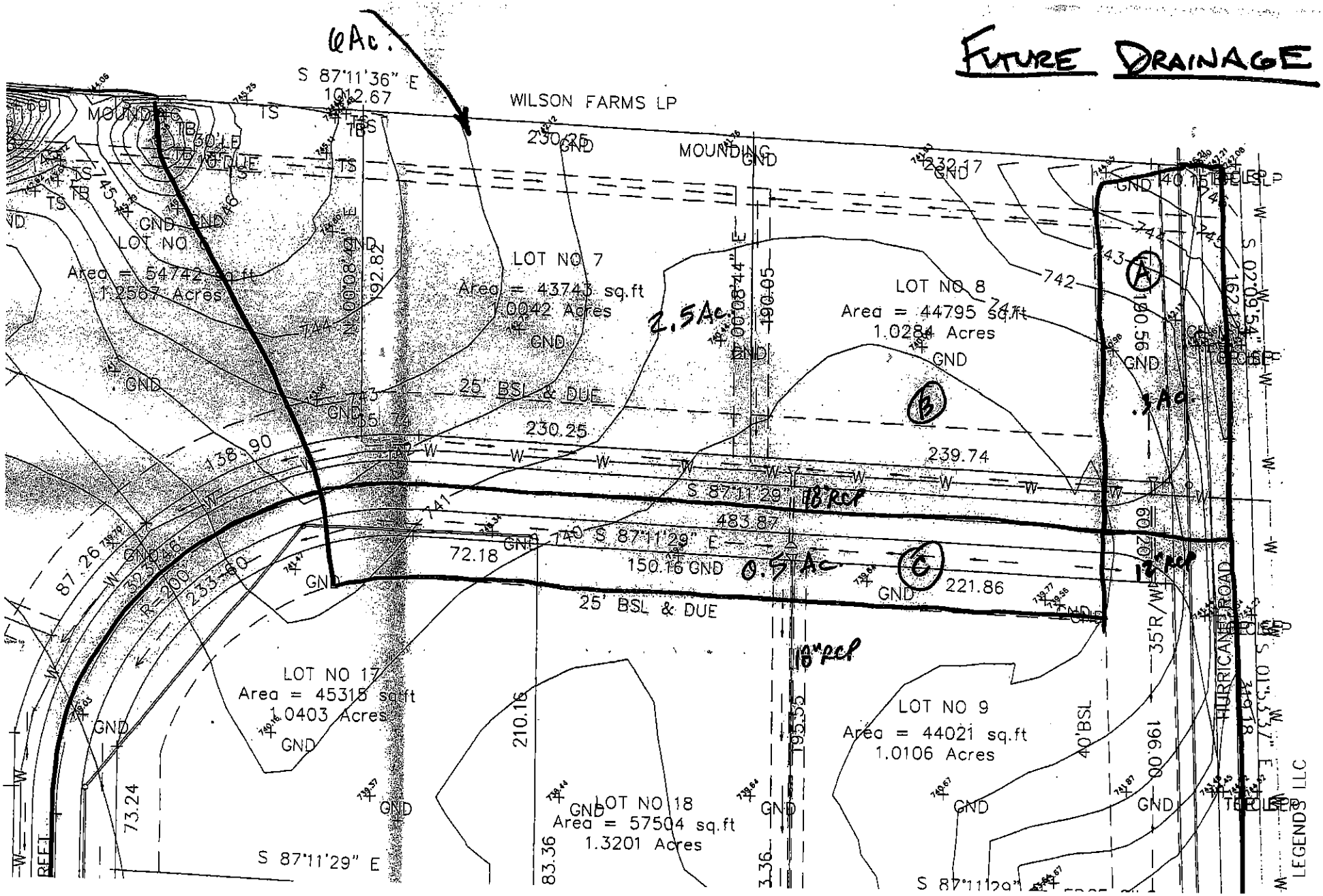
Future Conditions:

Onsite A = 24 Acres
C = .6 (estimated) D = 1500' C = .3 S = 1%
T = 40 min.
I_{100} = 3.9
3.9 (.6) (24) = 56 cfs
Required Storage = 26 cfs
Area to Pond = 81 Acres (offsite) & 18.3 Acres (onsite) = 99.3 acres
81 Acres @ C = .4 CA = 32.4
18.3 Acres @ C = .6 CA = 11.0
TOTAL CA = 43.4
D = 4500' C = .3 S = .5%
Tc = 77 min.
I_{10} = 1.87 I_{100} = 2.72
Q_{100} to Pond = 2.72 (43.4) = 118 cfs
Use 24" RCP @ .3% restrictive outlet pipe
@ HW/D = 3.375 Qcap 36.5 cfs
Peak Storage Required = 8 acre/feet
Storage Provided in pond and ditches = 8 acre/feet
Flow Stored at Peak = 80 cfs
Area to 36" east-west pipe under road = 82 acres
75 acres @ C = .4 CA = 30
7 Acres @ C = .6 CA = 4.2
TOTAL CA = 34.2
Q = 34.2 (1.87) = 63.9 cfs
Qcap 36" = 63.6 cfs
Qcap 54" RCP = 120 cfs
Flow to 54" = 63.3 + 38.1 + 5 + 5 = 111.4 cfs

Prepared by:

Steven B. Williams


75Ac
180Ac
TOTAL
10Ac
5Ac
24Ac
SITE
5Ac
24"RCP
54"RCP
ARVIN DR
HURRICANE RD
1"=400'


FUTURE DRAINAGE
6Ac.
S 87°11'36" E
1012.67
WILSON FARMS LP
MOUNDING
TB 50' LP
TB 10' DUE
TS
GND
LOT NO 6
Area = 54742 sq.ft
1.2567 Acres
LOT NO 7
Area = 43743 sq.ft
1.0042 Acres
2.5Ac.
LOT NO 8
Area = 44795 sq.ft
1.0284 Acres
.1Ac.
25' BSL & DUE
230.25
239.74
S 87°11'29" E
483.87
18"RCP
72.18
150.16
0.5Ac.
221.86
LOT NO 17
Area = 45318 sq.ft
1.0403 Acres
LOT NO 18
Area = 57504 sq.ft
1.3201 Acres
LOT NO 9
Area = 44021 sq.ft
1.0106 Acres
40'BSL
35'R/W
HURRICANE ROAD
LEGENDS LLC
S 01°55'37" E
319.18
S 87°11'29" E
73.24
83.36
210.16
195.35
138.90
87.26
R=200
233.60
N 00°08'44" E
190.05
S 02°09'54" E
190.56
162.09
60.20
00.96

Project D&S HURRICANE PARK Detention Facility Design Return Period 100 yrs.

Designer SBW Release Rate Return Period 10 yrs.

Watershed Area 180 acres

Time of Concentration (undeveloped watershed) 77 minutes

Rainfall Intensity (i_U) 1.87 inches/hr

Undeveloped Runoff Coefficient (C_U) 0.4

Undeveloped Runoff Rate ($O = C_U i_U A_U$) 135 cfs

Developed Runoff Coefficient (C_D) 0.6

Storm Duration t_d (hrs)	Rainfall Intensity i_d (inches/hr)	Inflow Rate $I(t_d)$ $(C_D i_d A_D)$ (cfs) CA=43.4	Outflow Rate O $(C_U i_U A_U)$ (cfs) 38.1	Storage Rate $I(t_d)-O$ (cfs)	Required Storage $\left[I(t_d)-O\right]\frac{t_d}{12}$ (acre-ft)
0.17					
0.25					
0.33					
0.42					
0.50	4.50	195.3		157.2	6.5
0.67					
0.83					
1.00	3.00	130.2		92.1	7.6
1.25					
1.50					
1.75					
2.00	2.00	86.8		48.7	8.0 ← PEAK
2.25					
2.50					
2.75					
3.00	1.50	65.1		27.0	6.7
3.25					
4.00	1.30	56.4		18.3	6.0

Figure 6.2 Computation Sheet for Detention Storage Calculations Using the Rational Method

OUTLET STRUCTURE REPORT

RECORD NUMBER : 1
TYPE : CIRCULAR CONCRETE w/ square edge w/ headwall
DESCRIPTION : 54"RCP

[RATING CURVE LIMIT]

Minimum Elevation	=	729.60 (ft)
Maximum Elevation	=	735.00 (ft)
Elevation Increment	=	0.10 (ft)

[OUTLET STRUCTURE INFORMATION]

Circular Radius	=	2.25000 (ft)
Culvert Invert Elevation	=	729.59998 (ft)
Slope	=	0.00000
Manning's N-value	=	0.01300
Orifice Coefficient	=	0.60000
Tailwater	=	730.29999 (ft)
Number barrels	=	1

[UNSUBMERGED EQUATION]

H/Diam = Hc/Diam + K *(Q/A*Diam^0.5))^M - 0.5*S^2

Coefficient K	=	0.00980
coefficient M	=	2.00000

[SUBMERGED EQUATION]

H/Diam = c*(Q/(A*Diam^0.5))^Z + Y - 0.5*S^2

Coefficient c	=	0.03980
Coefficient Y	=	0.67000

[DEFINITIONS]

H = Headwater depth above inlet control section invert, (ft)
Diam = Inerior height of culvert barrel, (ft)
Hc = Specific head at critical depth (dc + Vc^2/2g), (ft)
Q = Discharge, (cuft/s)
A = Full cross sectional area of culvert barrel, (sqft)
S = Culvert barrel slope, (ft/ft)

OUTLET STRUCTURE REPORT

RECORD NUMBER : 1
TYPE : CIRCULAR CONCRETE w/ square edge w/ headwall
DESCRIPTION : 54"RCP

[Culvert Weir Discharge Value vs. Stage]
(the elevation increment is 1.0)

STAGE	ELEVATION (ft)	FLOW (cfs)
3.00	732.60	23.20
4.00	733.60	67.64
5.00	734.60	104.78

OUTLET STRUCTURE REPORT

RECORD NUMBER : 2
TYPE : CIRCULAR CONCRETE w/ square edge w/ headwall
DESCRIPTION : 24"RCP

[Culvert Weir Discharge Value vs. Stage]
(the elevation increment is 1.0)

STAGE	ELEVATION (ft)	FLOW (cfs)
1.00	732.25	0.45
2.00	733.25	11.93
3.00	734.25	20.07
4.00	735.25	25.70
5.00	736.25	30.14
6.00	737.25	34.00
7.00	738.25	37.47
7.25	738.50	38.1

OUTLET STRUCTURE REPORT

RECORD NUMBER : 2
TYPE : CIRCULAR CONCRETE w/ square edge w/ headwall
DESCRIPTION : 24"RCP

[RATING CURVE LIMIT]

Minimum Elevation.....	=	731.25 (ft)
Maximum Elevation.....	=	738.50 (ft)
Elevation Increment.....	=	0.10 (ft)

[OUTLET STRUCTURE INFORMATION]

Circular Radius.....	=	1.00000 (ft)
Culvert Invert Elevation.....	=	731.25000 (ft)
Slope.....	=	0.00300
Manning's N-value.....	=	0.01300
Orifice Coefficient.....	=	0.60000
Tailwater.....	=	731.13000 (ft)
Number barrels.....	=	1

[UNSUBMERGED EQUATION]

H/Diam = Hc/Diam + K *(Q/A*Diam^0.5))^M - 0.5*S^2

Coefficient K.....	=	0.00980
coefficient M.....	=	2.00000

[SUBMERGED EQUATION]

H/Diam = c*(Q/(A*Diam^0.5))^Z + Y - 0.5*S^2

Coefficient c.....	=	0.03980
Coefficient Y.....	=	0.67000

[DEFINITIONS]

H = Headwater depth above inlet control section invert, (ft)
Diam = Inerior height of culvert barrel, (ft)
Hc = Specific head at critical depth (dc + Vc^2/2g), (ft)
Q = Discharge, (cuft/s)
A = Full cross sectional area of culvert barrel, (sqft)
S = Culvert barrel slope, (ft/ft)

OUTLET STRUCTURE REPORT

RECORD NUMBER : 3
TYPE : CIRCULAR CONCRETE w/ square edge w/ headwall
DESCRIPTION : 36"RCP

[RATING CURVE LIMIT]

Minimum Elevation	=	729.80 (ft)
Maximum Elevation	=	735.00 (ft)
Elevation Increment	=	0.10 (ft)

[OUTLET STRUCTURE INFORMATION]

Circular Radius	=	1.50000 (ft)
Culvert Invert Elevation	=	729.79999 (ft)
Slope	=	0.00500
Manning's N-value	=	0.01300
Orifice Coefficient	=	0.60000
Tailwater	=	729.59998 (ft)
Number barrels	=	1

[UNSUBMERGED EQUATION]

H/Diam = Hc/Diam + K *(Q/A*Diam^0.5)]^M - 0.5*S^2

Coefficient K	=	0.00980
coefficient M	=	2.00000

[SUBMERGED EQUATION]

H/Diam = c*(Q/(A*Diam^0.5))^Z + Y - 0.5*S^2

Coefficient c	=	0.03980
Coefficient Y	=	0.67000

[DEFINITIONS]

H = Headwater depth above inlet control section invert, (ft)
Diam = Inerior height of culvert barrel, (ft)
Hc = Specific head at critical depth (dc + Vc^2/2g), (ft)
Q = Discharge, (cuft/s)
A = Full cross sectional area of culvert barrel, (sqft)
S = Culvert barrel slope, (ft/ft)

OUTLET STRUCTURE REPORT

RECORD NUMBER : 3
TYPE : CIRCULAR CONCRETE w/ square edge w/ headwall
DESCRIPTION : 36"RCP

(Culvert Weir Discharge Value vs. Stage)
(the elevation increment is 1.0)

STAGE	ELEVATION (ft)	FLOW (cfs)
2.00	731.80	12.71
3.00	732.80	33.84
4.00	733.80	50.09
5.00	734.80	61.35
5.20	735.00	63.8

RAINFALL INTENSITY VALUES

Indianapolis, Indiana

Duration (Minutes)	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
5	4.50	5.50	6.30	7.30	8.00	8.50
6	4.30	5.30	6.00	7.00	7.70	8.20
7	4.10	5.10	5.75	6.75	7.40	7.90
8	3.90	4.90	5.50	6.50	7.10	7.60
9	3.70	4.70	5.25	6.25	6.80	7.30
10	3.50	4.50	5.00	6.00	6.50	7.00
15	2.90	3.70	4.40	5.10	5.60	6.10
20	2.50	3.30	3.80	4.50	5.00	5.50
25	2.25	2.95	3.45	4.05	4.50	5.00
30	2.00	2.60	3.10	3.60	4.00	4.50
40	1.65	2.25	2.60	3.10	3.50	3.90
50	1.45	2.00	2.30	2.75	3.10	3.40
60	1.25	1.75	2.10	2.50	2.70	3.00
120	0.78	1.10	1.30	1.60	1.70	2.00
180	0.58	0.80	1.00	1.20	1.30	1.50
240	0.47	0.65	0.80	0.95	1.10	1.30

For Additional Values See Referenced Publications

Values taken from graph prepared by U.S. Department of Commerce Weather Bureau based on recorded rainfalls from 1903 to 1951
See Technical Paper No. 25, Page 14, or Indiana State Highway Commission Hydraulic Design of Drainage Culverts, Page 35

OVERLAND FLOW AND RUN-OFF COEFFICIENT

FIGURE 5.3

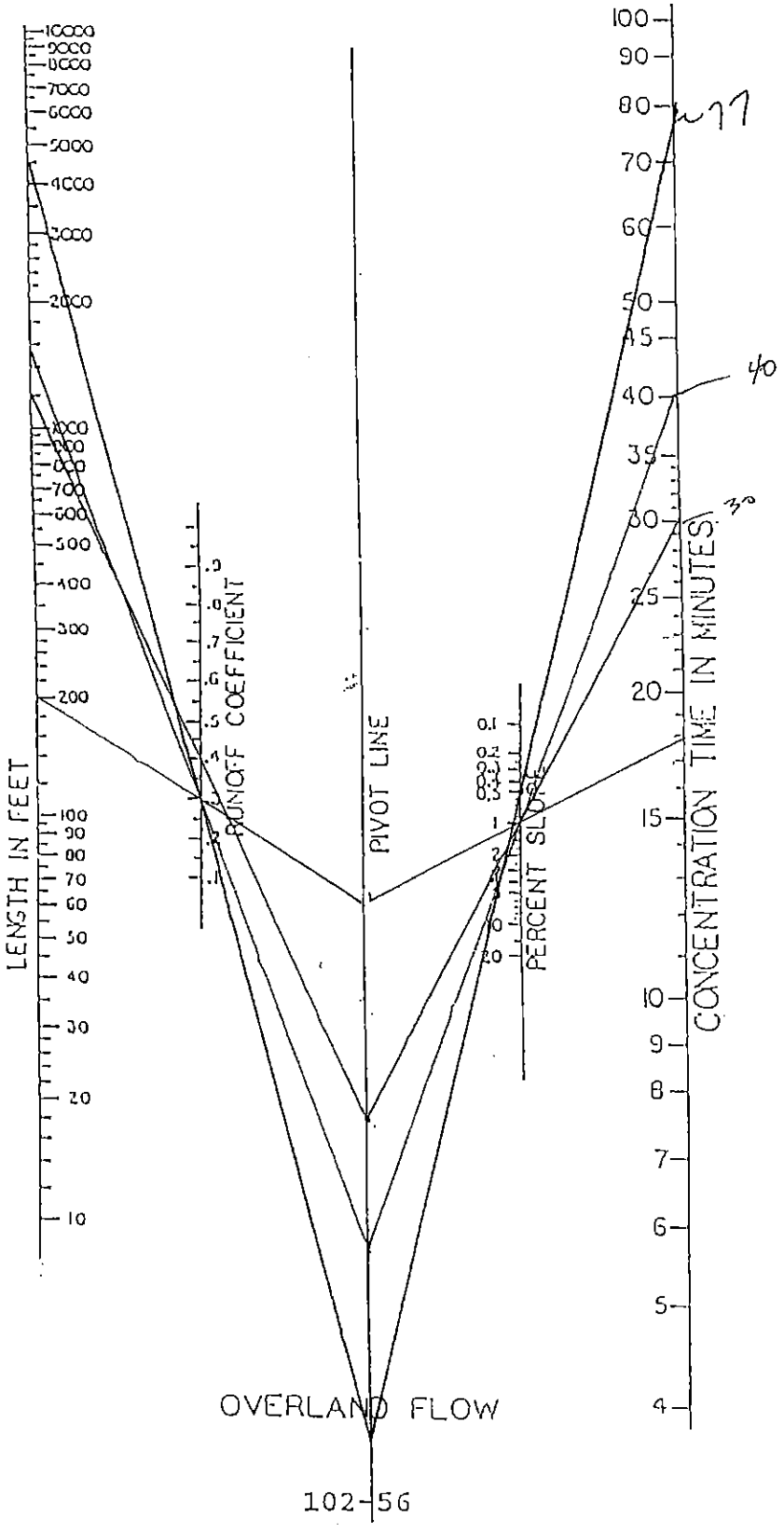


FIGURE 5

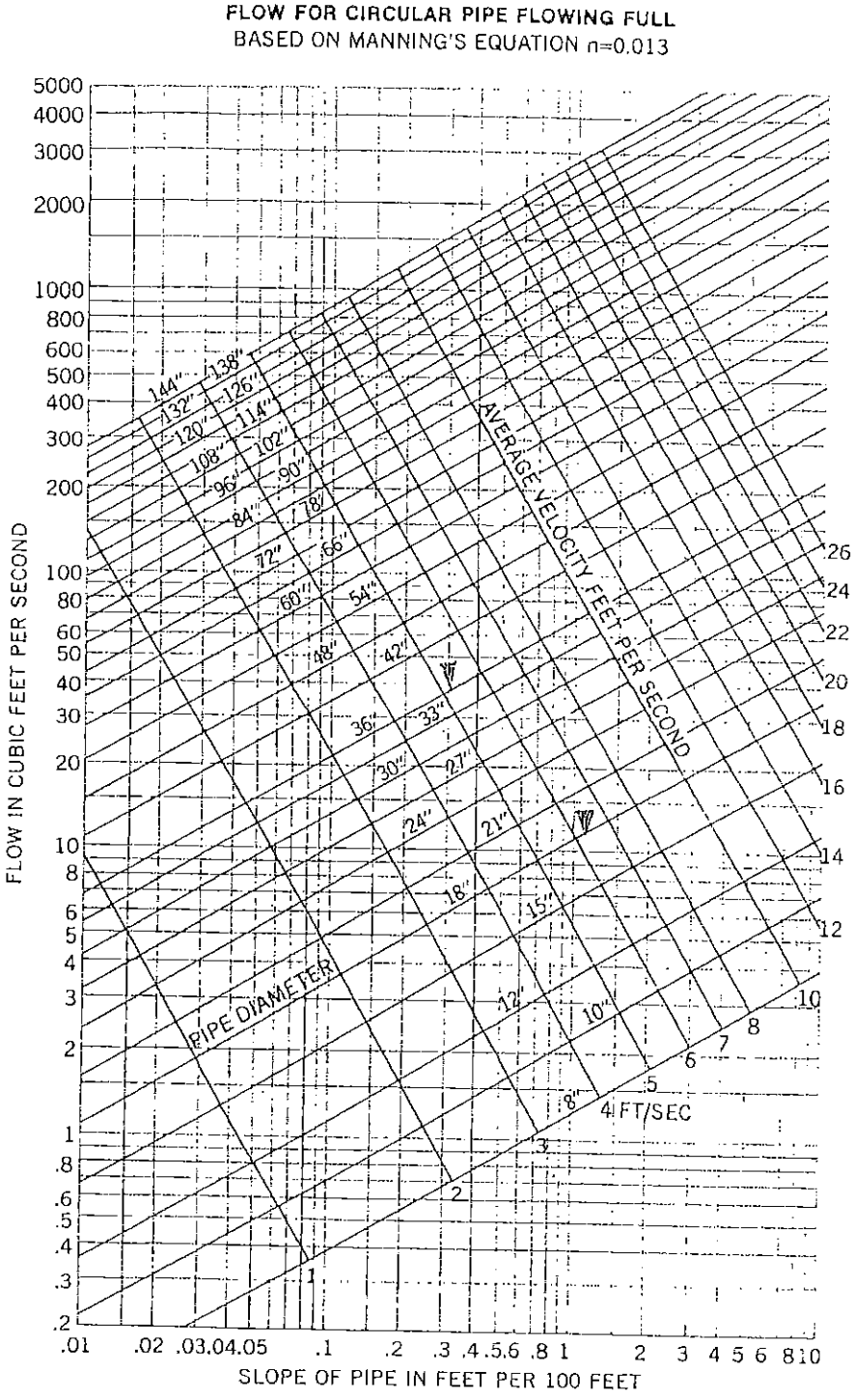
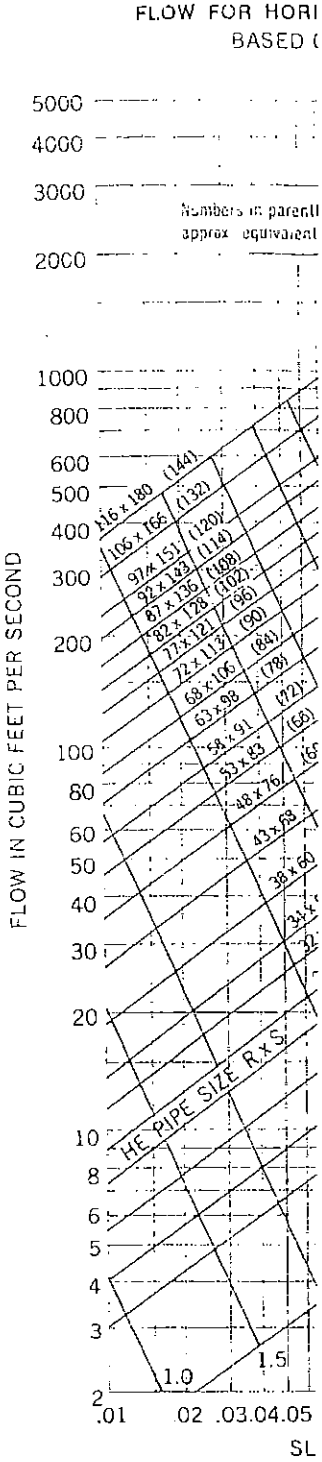


FIGURE 6



Reference:

DEPARTMENT OF PUBLIC WORKS
STORM DRAIN FLOW TABULATION FORM

LOCATION ARVIN & HURRICANE RDS.
DEVELOPMENT HURRICANE IND. PARK
MADE IN CONNECTION WITH J.O. NO
STORM FREQUENCY 10 YEAR

DATE 2-20 19 2001
SHEET 1 TOTAL IN COMP 1
COMPUTED BY SBW
CHECKED BY

LOCATION From	LOCATION To	AREA	ACRES Sub	ACRES Total	COEFF "C"	CA	CUM CA	TIME CONC. - MIN Inlet	TIME CONC. - MIN Drain	TIME CONC. - MIN Total	INTEN "I"	Q = CIA C F S	PIPE n = 0.013 Size	PIPE n = 0.013 Slope	PIPE n = 0.013 Vel	PIPE n = 0.013 Lgth	REMARKS
—	B	2.8	6	8.8	.6	1.68	4.12	30	—	30	3.1	12.8	18"	1.1	4	40'	
B	C	.5	8.8	9.3	.7	.35	4.47	30	1	31	3.0	13.4	18"	1.1	4	290'	
—	D	7	75	82	.42	4.2	34.2	77	—	77	1.87	63.9	36"	.5	5	40	
C&D	E	8	91	99	.44	4.8	43.4	77	-1	78	1.85	80.3	24"	*.1	7	30	
—	F	1.8	—	1.8	.6	1.08	1.08	30	—	30	3.1	3.35	15"	1.47	3	170	
E&F	G	2.2	100.8	103	.44	.97	44.37	78	2	80	1.8	3.35+1.75+35	54"	.1	5	240	
—	H	1.7	75	76.7	.405	1.0	31	78	—	78	1.85	57.35	36"	.5	5	40	

* REST. OUTLET

INDIANAPOLIS DEPARTMENT OF PUBLIC WORKS	STANDARD STORM DRAINAGE DESIGN FLOW TABULATION FORM	REVISED	DD 7

STANDARD FORM #8

Additional Detention Pond Calculations

Prepared by Projects Plus
for the
Hurricane Industrial Park - Lots 9 & 10
Dated April 11, 2011

4/11/11

Hurricane Industrial

Storm Sewer Calculations

			Ac.	%			"C"	
LOT #1	**"C" Factor =**	Lawn	0.32	13%	0.132	x	0.15 =	0.02
		Asphalt	1.56	64%	0.645	x	0.85 =	0.55
		Roof	0.54	22%	0.223	x	0.90 =	0.20
Area =		Culivated Field	0.00	0%	0.000	x	0.30 =	0.00
2.42 Acres							Weighted 'C'	**0.77**
LOT #2	**"C" Factor =**	Lawn	0.54	23%	0.234	x	0.15 =	0.04
		Asphalt	1.23	53%	0.532	x	0.85 =	0.45
		Roof	0.54	23%	0.234	x	0.90 =	0.21
Area =		Culivated Field	0.00	0%	0.000	x	0.30 =	0.00
2.31 Acres							Weighted 'C'	**0.70**
LOT #15	**"C" Factor =**	Lawn	0.50	43%	0.435	x	0.15 =	0.07
		Asphalt	0.46	40%	0.400	x	0.85 =	0.34
		Roof	0.19	17%	0.165	x	0.90 =	0.15
Area =		Culivated Field	0.00	0%	0.000	x	0.30 =	0.00
1.15 Acres							Weighted 'C'	**0.55**
LOT #16	**"C" Factor =**	Lawn	0.56	49%	0.487	x	0.15 =	0.07
		Asphalt	0.43	37%	0.374	x	0.85 =	0.32
		Roof	0.16	14%	0.139	x	0.90 =	0.13
Area =		Culivated Field	0.00	0%	0.000	x	0.30 =	0.00
1.15 Acres							Weighted 'C'	**0.52**
Lot #3,6-8 11-12,17	**"C" Factor =**	Lawn	1.37	15%	0.150	x	0.15 =	0.02
		Asphalt	7.74	85%	0.850	x	0.85 =	0.72
		Roof	0.00	0%	0.000	x	0.90 =	0.00
Area =		Culivated Field	0.00	0%	0.000	x	0.30 =	0.00
9.11 Acres							Weighted 'C'	**0.74**
Lots # 13-16	**"C" Factor =**	Lawn	1.24	25%	0.250	x	0.15 =	0.04
		Asphalt	3.72	75%	0.750	x	0.85 =	0.64
		Roof	0.00	0%	0.000	x	0.90 =	0.00
Area =		Culivated Field	0.00	0%	0.000	x	0.30 =	0.00
4.96 Acres							Weighted 'C'	**0.68**
Lots # 9-10	**"C" Factor =**	Lawn	0.74	29%	0.290	x	0.15 =	0.04
		Asphalt	1.31	51%	0.514	x	0.85 =	0.44
		Roof	0.50	20%	0.196	x	0.90 =	0.18
Area =		Culivated Field	0.00	0%	0.000	x	0.30 =	0.00
2.55 Acres							Weighted 'C'	**0.66**
		Lawn	5.27	22%	0.223	x	0.15 =	0.03
		Asphalt	16.45	70%	0.696	x	0.85 =	0.59
		Roof	1.93	8%	0.082	x	0.90 =	0.07
		Culivated Field	0.00	0%	0.000	x	0.30 =	0.00
							Weighted 'C'	**0.70**

EXISTING LOTS

PROPOSED LOT #6 DEVELOPMENT

FUTURE DEV.

CURRENT DEV.

← AVERAGE 'C' FOR DEVELOPMENT

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	53.30	1	40	127,912	----	------	------	Offsite - Frnk Eng
2	Rational	24.94	1	24	35,909	----	------	------	Onsite - Frnk Eng
3	Combine	61.61	1	40	163,821	1, 2	------	------	Total to Pond
4	Reservoir	23.13	1	63	163,476	3	734.48	111,407	Thru Pond
7	Rational	53.30	1	40	127,912	----	------	------	Offsite - Frnk Eng
8	Rational	29.09	1	24	41,894	----	------	------	Onsite - revised Proj +
9	Combine	62.99	1	40	169,806	7, 8	------	------	Total to Pond
10	Reservoir	23.81	1	62	169,459	9	734.58	114,967	Thru Pond

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	83.45	1	40	200,284	----	------	------	Offsite - Frnk Eng
2	Rational	38.76	1	24	55,816	----	------	------	Onsite - Frnk Eng
3	Combine	96.37	1	40	256,100	1, 2	------	------	Total to Pond
4	Reservoir	30.60	1	65	255,737	3	736.09	176,734	Thru Pond
7	Rational	83.45	1	40	200,284	----	------	------	Offsite - Frnk Eng
8	Rational	45.22	1	24	65,119	----	------	------	Onsite - revised Proj +
9	Combine	98.53	1	40	265,403	7, 8	------	------	Total to Pond
10	Reservoir	31.16	1	65	265,039	9	736.24	183,416	Thru Pond

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (cuft)	Hydrograph description
1	Rational	122.09	1	40	293,027	----	------	------	Offsite - Frnk Eng
2	Rational	56.20	1	24	80,922	----	------	------	Onsite - Frnk Eng
3	Combine	140.83	1	40	373,949	1, 2	------	------	Total to Pond
4	Reservoir	37.34	1	68	373,565	3	738.09	269,751	Thru Pond
7	Rational	122.09	1	40	293,027	----	------	------	Offsite - Frnk Eng
8	Rational	65.56	1	24	94,409	----	------	------	Onsite - revised Proj +
9	Combine	143.95	1	40	387,436	7, 8	------	------	Total to Pond
10	Reservoir	37.97	1	68	387,051	9	738.30	280,257	Thru Pond

Hydrograph Report

Hydraflow Hydrographs by Intelisolve — Monday, Apr 11 2011, 12:12 PM

Hyd. No. 1

Offsite - Frnk Eng

Hydrograph type	= Rational	Peak discharge	= 122.09 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 81.0 ac	Runoff coeff.	= 0.4
Intensity	= 3.768 in/hr	Tc by User	= 40 min
IDF Curve	= MARION.IDF	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 293,027 cuft

(Printed values >= 50% of Qp)

Hydrograph Discharge Table

Time – Outflow (hrs	cfs)	Time – Outflow (hrs	cfs)
0.33	61.05	0.90	79.36
0.35	64.10	0.92	76.31
0.37	67.15	0.93	73.26
0.38	70.20	0.95	70.20
0.40	73.26	0.97	67.15
0.42	76.31	0.98	64.10
0.43	79.36		
0.45	82.41		
0.47	85.47	...End	
0.48	88.52		
0.50	91.57		
0.52	94.62		
0.53	97.68		
0.55	100.73		
0.57	103.78		
0.58	106.83		
0.60	109.89		
0.62	112.94		
0.63	115.99		
0.65	119.04		
0.67	122.09 <<		
0.68	119.04		
0.70	115.99		
0.72	112.94		
0.73	109.88		
0.75	106.83		
0.77	103.78		
0.78	100.73		
0.80	97.68		
0.82	94.62		
0.83	91.57		
0.85	88.52		
0.87	85.47		
0.88	82.41		

Hydrograph Report

Hydraflow Hydrographs by Intelisolve — Monday, Apr 11 2011, 12:13 PM

Hyd. No. 2

Onsite - Frnk Eng

Hydrograph type	= Rational	Peak discharge	= 56.20 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 16.3 ac	Runoff coeff.	= 0.6
Intensity	= 5.118 in/hr	Tc by User	= 24 min
IDF Curve	= MARION.IDF	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 80,922 cuft

(Printed values >= 50% of Qp)

Hydrograph Discharge Table

Time – Outflow (hrs	cfs)
0.20	28.10
0.22	30.44
0.23	32.78
0.25	35.12
0.27	37.46
0.28	39.81
0.30	42.15
0.32	44.49
0.33	46.83
0.35	49.17
0.37	51.51
0.38	53.85
0.40	56.20 <<
0.42	53.85
0.43	51.51
0.45	49.17
0.47	46.83
0.48	44.49
0.50	42.15
0.52	39.81
0.53	37.46
0.55	35.12
0.57	32.78
0.58	30.44

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve — Monday, Apr 11 2011, 12:16 PM

Hyd. No. 3

Total to Pond

Hydrograph type	= Combine	Peak discharge	= 140.83 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyds.	= 1, 2		

Hydrograph Volume = 373,949 cuft

(Printed values >= 50% of Qp)

Hydrograph Discharge Table

Time (hrs)	Hyd. 1 + (cfs)	Hyd. 2 = (cfs)	Outflow (cfs)
0.40	73.26	56.20 <<	129.45
0.42	76.31	53.85	130.16
0.43	79.36	51.51	130.87
0.45	82.41	49.17	131.59
0.47	85.47	46.83	132.30
0.48	88.52	44.49	133.01
0.50	91.57	42.15	133.72
0.52	94.62	39.81	134.43
0.53	97.68	37.46	135.14
0.55	100.73	35.12	135.85
0.57	103.78	32.78	136.56
0.58	106.83	30.44	137.27
0.60	109.89	28.10	137.98
0.62	112.94	25.76	138.69
0.63	115.99	23.42	139.40
0.65	119.04	21.07	140.12
0.67	122.09 <<	18.73	140.83 <<
0.68	119.04	16.39	135.43
0.70	115.99	14.05	130.04

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve — Monday, Apr 11 2011, 12:17 PM

Hyd. No. 4

Thru Pond

Hydrograph type	= Reservoir	Peak discharge	= 37.34 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 3	Reservoir name	= Detention Pond
Max. Elevation	= 738.09 ft	Max. Storage	= 269,751 cuft

Storage Indication method used. — Outflow hydrograph volume = 373,565 cuft

(Printed values >= 50% of Qp)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.85	88.52	737.55	35.63	-----	-----	-----	-----	-----	-----	-----	-----	35.63
0.87	85.47	737.61	35.83	-----	-----	-----	-----	-----	-----	-----	-----	35.83
0.88	82.41	737.67	36.02	-----	-----	-----	-----	-----	-----	-----	-----	36.02
0.90	79.36	737.73	36.20	-----	-----	-----	-----	-----	-----	-----	-----	36.20
0.92	76.31	737.78	36.37	-----	-----	-----	-----	-----	-----	-----	-----	36.37
0.93	73.26	737.83	36.52	-----	-----	-----	-----	-----	-----	-----	-----	36.52
0.95	70.20	737.87	36.66	-----	-----	-----	-----	-----	-----	-----	-----	36.66
0.97	67.15	737.91	36.78	-----	-----	-----	-----	-----	-----	-----	-----	36.78
0.98	64.10	737.95	36.89	-----	-----	-----	-----	-----	-----	-----	-----	36.89
1.00	61.05	737.98	36.99	-----	-----	-----	-----	-----	-----	-----	-----	36.99
1.02	57.99	738.01	37.08	-----	-----	-----	-----	-----	-----	-----	-----	37.08
1.03	54.94	738.03	37.15	-----	-----	-----	-----	-----	-----	-----	-----	37.15
1.05	51.89	738.05	37.21	-----	-----	-----	-----	-----	-----	-----	-----	37.21
1.07	48.84	738.07	37.26	-----	-----	-----	-----	-----	-----	-----	-----	37.26
1.08	45.79	738.08	37.30	-----	-----	-----	-----	-----	-----	-----	-----	37.30
1.10	42.73	738.09	37.32	-----	-----	-----	-----	-----	-----	-----	-----	37.32
1.12	39.68	738.09	37.34	-----	-----	-----	-----	-----	-----	-----	-----	37.34
1.13	36.63	738.09 <<	37.34	-----	-----	-----	-----	-----	-----	-----	-----	37.34 <<
1.15	33.58	738.09	37.33	-----	-----	-----	-----	-----	-----	-----	-----	37.33
1.17	30.52	738.09	37.31	-----	-----	-----	-----	-----	-----	-----	-----	37.31
1.18	27.47	738.08	37.28	-----	-----	-----	-----	-----	-----	-----	-----	37.28
1.20	24.42	738.06	37.24	-----	-----	-----	-----	-----	-----	-----	-----	37.24
1.22	21.37	738.04	37.19	-----	-----	-----	-----	-----	-----	-----	-----	37.19
1.23	18.31	738.02	37.12	-----	-----	-----	-----	-----	-----	-----	-----	37.12
1.25	15.26	738.00	37.05	-----	-----	-----	-----	-----	-----	-----	-----	37.05
1.27	12.21	737.97	36.96	-----	-----	-----	-----	-----	-----	-----	-----	36.96
1.28	9.16	737.94	36.85	-----	-----	-----	-----	-----	-----	-----	-----	36.85
1.30	6.10	737.90	36.74	-----	-----	-----	-----	-----	-----	-----	-----	36.74
1.32	3.05	737.86	36.61	-----	-----	-----	-----	-----	-----	-----	-----	36.61
1.33	0.00	737.82	36.48	-----	-----	-----	-----	-----	-----	-----	-----	36.48
1.35	0.00	737.77	36.33	-----	-----	-----	-----	-----	-----	-----	-----	36.33
1.37	0.00	737.73	36.19	-----	-----	-----	-----	-----	-----	-----	-----	36.19
1.38	0.00	737.68	36.05	-----	-----	-----	-----	-----	-----	-----	-----	36.05
1.40	0.00	737.63	35.90	-----	-----	-----	-----	-----	-----	-----	-----	35.90
1.42	0.00	737.59	35.76	-----	-----	-----	-----	-----	-----	-----	-----	35.76
1.43	0.00	737.54	35.62	-----	-----	-----	-----	-----	-----	-----	-----	35.61
1.45	0.00	737.50	35.47	-----	-----	-----	-----	-----	-----	-----	-----	35.47

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve — Monday, Apr 11 2011, 12:14 PM

Hyd. No. 7

Offsite - Frnk Eng

Hydrograph type	= Rational	Peak discharge	= 122.09 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 81.0 ac	Runoff coeff.	= 0.4
Intensity	= 3.768 in/hr	Tc by User	= 40 min
IDF Curve	= MARION.IDF	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 293,027 cuft
(Printed values >= 50% of Qp)

Hydrograph Discharge Table

Time (hrs)	Outflow cfs	Time (hrs)	Outflow cfs
0.33	61.05	0.90	79.36
0.35	64.10	0.92	76.31
0.37	67.15	0.93	73.26
0.38	70.20	0.95	70.20
0.40	73.26	0.97	67.15
0.42	76.31	0.98	64.10
0.43	79.36		
0.45	82.41		
0.47	85.47	...End	
0.48	88.52		
0.50	91.57		
0.52	94.62		
0.53	97.68		
0.55	100.73		
0.57	103.78		
0.58	106.83		
0.60	109.89		
0.62	112.94		
0.63	115.99		
0.65	119.04		
0.67	122.09 <<		
0.68	119.04		
0.70	115.99		
0.72	112.94		
0.73	109.89		
0.75	106.83		
0.77	103.78		
0.78	100.73		
0.80	97.68		
0.82	94.62		
0.83	91.57		
0.85	88.52		
0.87	85.47		
0.88	82.41		

Hydrograph Report

Hydraflow Hydrographs by Intelisolve — Monday, Apr 11 2011, 12:15 PM

Hyd. No. 8

Onsite - revised Proj +

Hydrograph type	= Rational	Peak discharge	= 65.56 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Drainage area	= 18.3 ac	Runoff coeff.	= 0.7
Intensity	= 5.118 in/hr	Tc by User	= 24 min
IDF Curve	= MARION.IDF	Asc/Rec limb fact	= 1/1

Hydrograph Volume = 94,409 cuft
(Printed values >= 50% of Qp)

Hydrograph Discharge Table

Time (hrs)	Outflow cfs
0.20	32.78
0.22	35.51
0.23	38.24
0.25	40.98
0.27	43.71
0.28	46.44
0.30	49.17
0.32	51.90
0.33	54.64
0.35	57.37
0.37	60.10
0.38	62.83
0.40	65.56 <<
0.42	62.83
0.43	60.10
0.45	57.37
0.47	54.64
0.48	51.90
0.50	49.17
0.52	46.44
0.53	43.71
0.55	40.98
0.57	38.24
0.58	35.51
0.60	32.78

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve — Monday, Apr 11 2011, 12:16 PM

Hyd. No. 9

Total to Pond

Hydrograph type	= Combine	Peak discharge	= 143.95 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyds.	= 7, 8		

Hydrograph Volume = 387,436 cuft
(Printed values >= 50% of Qp)

Hydrograph Discharge Table

Time (hrs)	Hyd. 7 + (cfs)	Hyd. 8 = (cfs)	Outflow (cfs)
0.38	70.20	62.83	133.03
0.40	73.26	65.56 <<	138.82
0.42	76.31	62.83	139.14
0.43	79.36	60.10	139.46
0.45	82.41	57.37	139.78
0.47	85.47	54.64	140.10
0.48	88.52	51.90	140.42
0.50	91.57	49.17	140.74
0.52	94.62	46.44	141.06
0.53	97.68	43.71	141.38
0.55	100.73	40.98	141.70
0.57	103.78	38.24	142.02
0.58	106.83	35.51	142.35
0.60	109.89	32.78	142.67
0.62	112.94	30.05	142.99
0.63	115.99	27.32	143.31
0.65	119.04	24.59	143.63
0.67	122.09 <<	21.85	143.95 <<
0.68	119.04	19.12	138.16
0.70	115.99	16.39	132.38

...End

Hydrograph Report

Hydraflow Hydrographs by Intelisolve — Monday, Apr 11 2011, 12:18 PM

Hyd. No. 10

Thru Pond

Hydrograph type	= Reservoir	Peak discharge	= 37.97 cfs
Storm frequency	= 100 yrs	Time interval	= 1 min
Inflow hyd. No.	= 9	Reservoir name	= Detention Pond
Max. Elevation	= 738.30 ft	Max. Storage	= 280,257 cuft

Storage indication method used. — Outflow hydrograph volume = 387,051 cuft
(Printed values >= 97% of Qp)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
0.90	79.36	737.96	36.93	-----	-----	-----	-----	-----	-----	-----	-----	36.93
0.92	76.31	738.01	37.08	-----	-----	-----	-----	-----	-----	-----	-----	37.08
0.93	73.26	738.06	37.22	-----	-----	-----	-----	-----	-----	-----	-----	37.22
0.95	70.20	738.10	37.35	-----	-----	-----	-----	-----	-----	-----	-----	37.35
0.97	67.15	738.14	37.46	-----	-----	-----	-----	-----	-----	-----	-----	37.46
0.98	64.10	738.17	37.57	-----	-----	-----	-----	-----	-----	-----	-----	37.57
1.00	81.05	738.20	37.66	-----	-----	-----	-----	-----	-----	-----	-----	37.66
1.02	57.99	738.22	37.74	-----	-----	-----	-----	-----	-----	-----	-----	37.74
1.03	54.94	738.25	37.80	-----	-----	-----	-----	-----	-----	-----	-----	37.80
1.05	51.89	738.27	37.86	-----	-----	-----	-----	-----	-----	-----	-----	37.86
1.07	48.84	738.28	37.90	-----	-----	-----	-----	-----	-----	-----	-----	37.90
1.08	45.79	738.29	37.94	-----	-----	-----	-----	-----	-----	-----	-----	37.94
1.10	42.73	738.30	37.98	-----	-----	-----	-----	-----	-----	-----	-----	37.98
1.12	39.68	738.30	37.97	-----	-----	-----	-----	-----	-----	-----	-----	37.97
1.13	36.63	738.30 <<	37.97	-----	-----	-----	-----	-----	-----	-----	-----	37.97 <<
1.15	33.58	738.30	37.96	-----	-----	-----	-----	-----	-----	-----	-----	37.96
1.17	30.52	738.29	37.94	-----	-----	-----	-----	-----	-----	-----	-----	37.94
1.18	27.47	738.28	37.91	-----	-----	-----	-----	-----	-----	-----	-----	37.91
1.20	24.42	738.27	37.87	-----	-----	-----	-----	-----	-----	-----	-----	37.87
1.22	21.37	738.25	37.81	-----	-----	-----	-----	-----	-----	-----	-----	37.81
1.23	18.31	738.23	37.75	-----	-----	-----	-----	-----	-----	-----	-----	37.75
1.25	15.26	738.20	37.67	-----	-----	-----	-----	-----	-----	-----	-----	37.67
1.27	12.21	738.18	37.59	-----	-----	-----	-----	-----	-----	-----	-----	37.59
1.28	9.16	738.14	37.49	-----	-----	-----	-----	-----	-----	-----	-----	37.49
1.30	6.10	738.11	37.38	-----	-----	-----	-----	-----	-----	-----	-----	37.38
1.32	3.05	738.07	37.26	-----	-----	-----	-----	-----	-----	-----	-----	37.26
1.33	0.00	738.03	37.13	-----	-----	-----	-----	-----	-----	-----	-----	37.13
1.35	0.00	737.98	36.99	-----	-----	-----	-----	-----	-----	-----	-----	36.99
1.37	0.00	737.93	36.84	-----	-----	-----	-----	-----	-----	-----	-----	36.84

...End

Pond Report

Hydraflow Hydrographs by Intelisolve — Monday, Apr 11 2011, 12:11 PM

Pond No. 1 - Detention Pond

Pond Data

Pond storage is based on known contour areas. Average end area method used.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	731.00	26,323	0	0
1.00	732.00	29,098	27,711	27,711
2.00	733.00	32,500	30,799	58,510
3.00	734.00	36,500	34,500	93,010
4.00	735.00	39,500	38,000	131,010
5.00	736.00	43,500	41,500	172,510
6.00	737.00	46,000	44,750	217,260
7.00	738.00	49,500	47,750	265,010
7.50	738.50	51,000	25,125	290,135

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 731.00	0.00	0.00	0.00
Length (ft)	= 30.00	0.00	0.00	0.00
Slope (%)	= 0.30	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

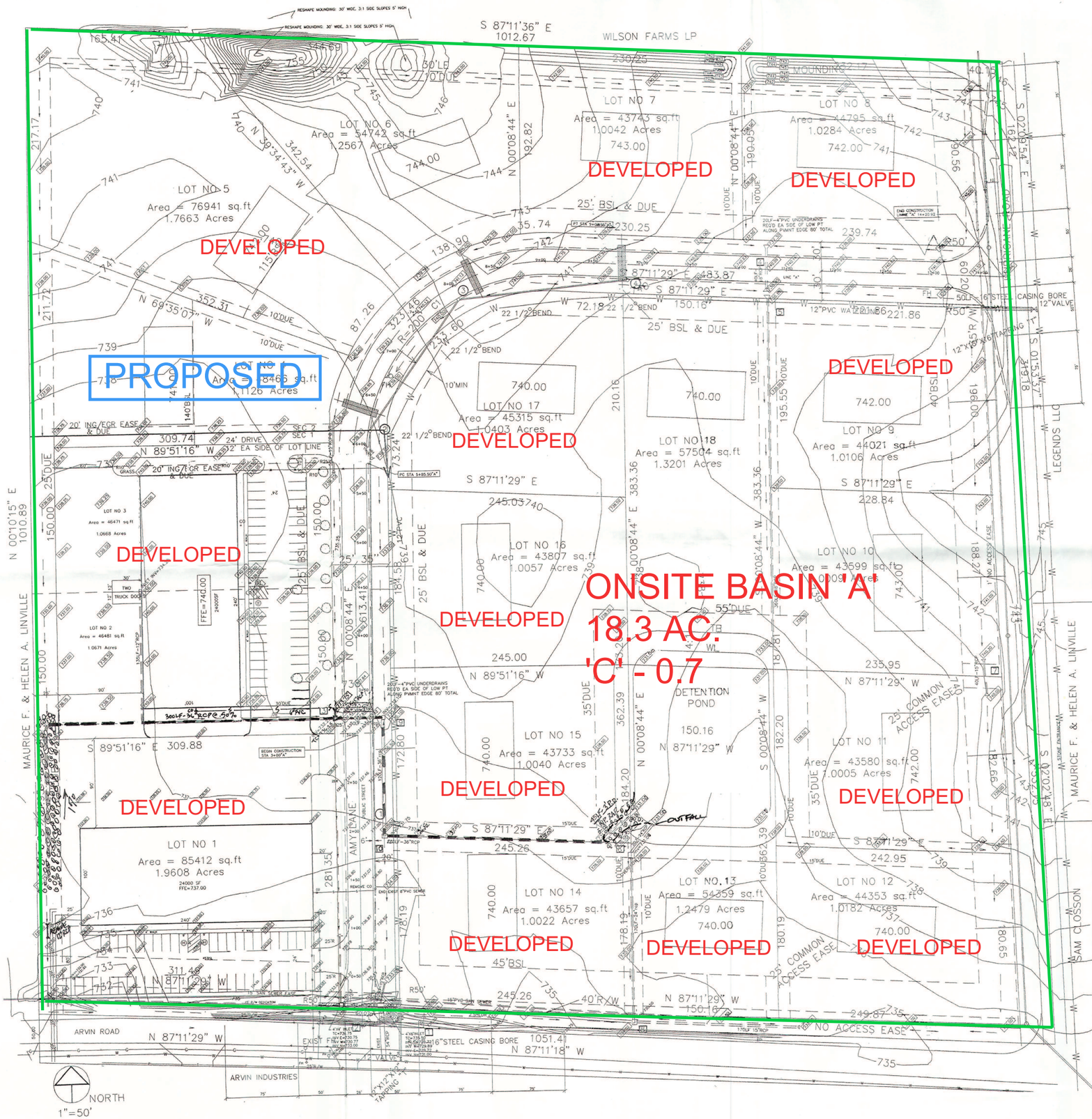
	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 0.00	0.00	0.00	0.00
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	Clv D cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Total cfs
0.00	0	731.00	0.00	---	---	---	---	---	---	---	---	0.00
1.00	27,711	732.00	2.77	---	---	---	---	---	---	---	---	2.77
2.00	58,510	733.00	5.53	---	---	---	---	---	---	---	---	5.53
3.00	93,010	734.00	19.25	---	---	---	---	---	---	---	---	19.25
4.00	131,010	735.00	26.20	---	---	---	---	---	---	---	---	26.20
5.00	172,510	736.00	30.25	---	---	---	---	---	---	---	---	30.25
6.00	217,260	737.00	33.82	---	---	---	---	---	---	---	---	33.82
7.00	265,010	738.00	37.05	---	---	---	---	---	---	---	---	37.05
7.50	290,135	738.50	38.56	---	---	---	---	---	---	---	---	38.56



9 / 744.50	LOT NUMBER / PAD GRADE
	EXISTING CONTOUR
744.20	PROPOSED GRADE
	STORM SEWER
	SANITARY SEWER
W W	WATER LINE
F.H.	FIRE HYDRANT
D. & U.E.	DRAINAGE AND UTILITY EASEMENT
B.S.L.	BUILDING SETBACK LINE

CONSTRUCTION NOTES

The Contractor shall remove the topsoil in the areas of the streets and building pads requiring fill and stockpile it in an area designated by the Owner/Developer, to be distributed in the front yard and rear yards after rough grade on the streets and pads have been completed.

The building pads are to be constructed to an extend of 50' x 100' feet behind the front building lines.

All fills in the streets and building pad areas shall be compacted to ninety-five (95) percent Standard Proctor (ASTM-D698).

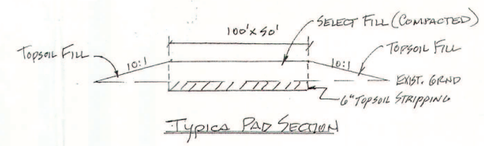
The Contractor is responsible for coordinating all construction work and inspections with the property Department of Public Works Sanitation, Department of Transportation and Project Engineer before commencing any work.

All disturbed areas outside the actual building pads, streets and paved areas shall be mulched seeded with erosion control methods as shown on the "Erosion Control Plan" included in this set.

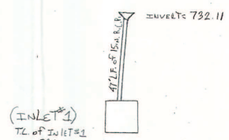
Driveways, sidewalks, and street trees are not a part of the site development construction, but are the responsibility of the individual residential builders for each lot.

The Contractor is responsible for the field verification of all underground utilities and having each located before commencing construction with him being liable for any and all disruption due to interrupting services.

All structure finished floor elevations shall be 0.5' above the pad grade shown. (MIN.)



Typical Pad Section



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GENERAL DEVELOPMENT PLAN

Engineers and Land Surveyors
Franklin Engineering Company
151 West Jefferson Street
Franklin, Indiana 46131
(317) 738-4549
(317) 736-7168

REVISIONS

DATE	REVISION
3/14/01	OTT
5/17/01	OTT
7/2/02	EXTENDED 36" RCP
8/29/02	36" RCP & TIE 2 LETS TOGETHER

PROJ. NO.
SCALE 1"=50'
DATE 2-16-01
FILE NO. 10028
SHT 3 OF 12