PRELIMINARY DRAINAGE REPORT

for

Bridlewood Section 6

Vanderburgh County

Prepared For:

Bridlewood Development, LLC.

3614 Citadel Circle

Newburgh, IN 47630

Prepared By:

Morley and Associates, Inc.

600 S.E. Sixth Street

Evansville, Indiana 47713

Proj. No.: 5527-4(B)

March 7, 2003

Morley and Associates INC.

CONSULTING ENGINEERS • LAND SURVEYORS • ARCHITECTS

Bridlewood Subdivision – Section 6

The site is located directly adjacent to the existing Bridlewood Subdivision – Sections 1-5 which are located off of Boonville-New Harmony Road and Fisher Road.

The subject property is approximately 22.3 acres and consists mainly of cultivated field. A small portion of the site consists of an existing residence with some outbuildings with a gravel drive entrance. The entire site drains mainly to the field directly adjacent to the east, but portions also drain north to Schlensker Ditch, and/or to one of the two tributaries located directly adjacent to the property on the east and west sides. The floodway boundary is depicted on the enclosed plan drawing along with documentation from the Indiana Department of Natural Resources. The existing floodplain boundary, proposed new floodplain boundary, and the 100 year storm elevations are also shown on the enclosed plan with supporting documentation.

One basin will be constructed on site which will mainly be located within the Floodway boundary and will directly drain to Schlensker Ditch via a riprap lined channel. The basin will be constructed from the natural ground elevations down, and will not involve any fill located within the Floodway. A construction in a Floodway permit has been filed with the Indiana Department of Natural Resources. Storm water runoff will be conveyed to the basin via storm sewers and overland flow. A small portion of the site, the east cul-de-sac area, and a portion of the lots located directly adjacent to the swale within Bridlewood – Section 5, will convey stormwater to the existing Bridlewood retention basin. Due to the topography, storm runoff from the site will be allowed to exit the property undetained and will be made up for with the excess allowable discharge amounts discussed below.

The total allowable discharge rate for Bridlewood Sections 1-5 for the 10-year storm was 33.65 cfs, but was reduced to 14 cfs due to the excess capacity available in the existing retention basin. This leaves an excess allowable discharge amount equal to 19.65 cfs. The allowable discharge rate for Bridlewood Section 6 for the 10 year storm under undeveloped conditions has been determined to be 17.13 cfs. When taking into consideration the excess amount from Bridlewood Sections 1-5 plus the allowable discharge amount for Bridlewood Section 6, the total allowable discharge rate equals 36.78 cfs.

The primary retention for this property will utilize the existing retention basins excess storage capacity located within the existing Bridlewood Subdivision. The required storage volume for Bridlewood Sections 1-5 was 109,880 cubic feet. The available storage volume is 163,557 cubic feet, which leaves an excess amount equal to 53,677 cubic feet. The required storm water detention volume from the Form 800 for Bridlewood Section 6 has been determined to be 39,124 cubic feet for the 25-year storm, which is less than the excess amount available. Supportive data to show the excess allowable discharge amount and excess storage capacities within the existing basin are attached and were taken from the drainage report prepared and approved for Bridlewood Sections 1-5.

TABLE 803

UNDEVELOPED RUNOFF COEFFICIENTS (C_u)

SURFACE TYPE:

WOODLAND, TURFED MEADOWS
ROUGH PASTURE, FALLOW BRUSH:

SLOPE:	
Less than 2%	C = 0.12
2% to 5%	C = 0.24
5+% to 10%	C = 0.36
Over 10%	C = 0.48

CULTIVATED FIELDS:

Less than 2%	C = 0.20
2% to 5%	C = 0.35
5+% to 10%	C = 0.50
Over 10%	C = 0.65

TABLE 804

DEVELOPED RUNOFF COEFFICIENTS (C_d)

SURFACE TYPE:

PAVEMENT, ROOFTOP
OTHER IMPERVIOUS SURFACES:

Less than 2%	C = 0.92
2% to 5%	C = 0.94
5+% to 10%	C = 0.96
Over 10%	C = 0.98

LAWNS WITH TURF:

Less than 2%	C = 0.15
2% to 5%	C = 0.25
5+% to 10%	C = 0.40
Over 10%	C = 0.55

ALL WATER SURFACES
BASINS, PONDS & LAKES:

C = 1.00

Table 3.2.4 (cont'd)

Kerby (1959)

$$t_c = K\ (L\ N\ s^{-0.5})^{0.467}$$

where K is equal to 0.83 (US Customary units) or 1.44 (Metric units), L is the length of flow in ft (m), s is the average slope of overland flow, ft/ft (m/m), and N is the retardance roughness coefficient given in Table 3.2.5.

The length used in the equation is the straight-line distance from the most distant point of the watershed to the outlet, measured parallel to the slope of the land until a well-defined channel is reached. Watersheds of less than 10 acres were used to calibrate the model; slopes were less than 1%; N values were 0.8 and less and surface flow dominated (McCuen, 1989).

Izzard (1946)

$$t_c = \frac{K(B\bar{i} + c')\ L^{\frac{1}{3}}}{s^{\frac{1}{3}}\ i^{\frac{2}{3}}}$$

where K is equal to 41.025 for U.S. customary units (113.391 for metric), B is equal to 0.0007 for U.S custumary units (0.00027 for metric), c′ is the retardance coefficient given in Table 3.2.7, *i* is the rainfall intensity, in/hr (cm/hr), L is the length of flow path in ft (m), and s is the slope of overland flow path, ft/ft (m/m).

The product of *i* and L must be less than 500 in-ft/hr (390 cm-m/hr) to consider using this formula. In addition, well defined channels should **not** be present. This method was developed in laboratory experiments for the overland flow on roadway and turf surfaces.

Table 3.2.5
Values of N for Kerby's Formula (Kerby, 1959)

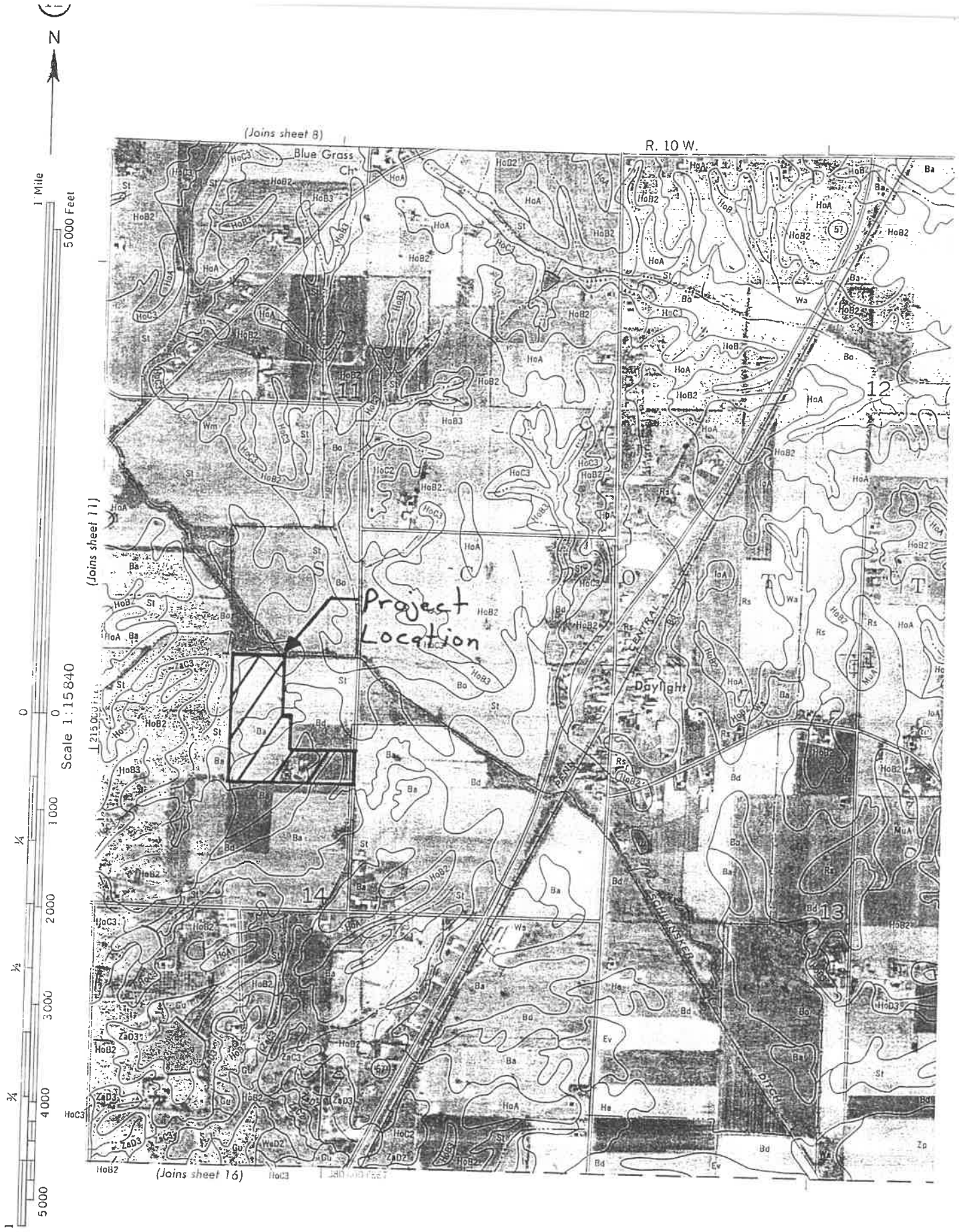
Type of Surface	N
Smooth impervious surface	0.02
Smooth bare packed soil	0.10
Poor grass, cultivated row crops or moderately rough bare surface	0.20
Deciduous timberland	0.60
Pasture or Overage grass	0.40
Conifer timberland, deciduous timberland with deep forest litter or dense grass	0.80

TABLE 807

RAINFALL INTENSITY-DURATION-FREQUENCY TABLE FOR EVANSVILLE

INTENSITY IN INCHES PER HOUR

STORM DURATION	STORM RETURN PERIOD IN YEARS				
	5	10	25	50	100
5 MIN	6.063	6.625	7.208	7.936	8.469
10 MIN	4.863	5.380	5.925	6.616	7.126
15 MIN	4.029	4.515	5.033	5.697	6.194
30 MIN	2.837	3.226	3.646	4.194	4.608
60 MIN	1.549	1.819	2.078	2.412	2.663
2.0 HRS	1.053	1.230	1.400	1.620	1.785
3.0 HRS	0.774	0.899	1.019	1.175	1.291
4.0 HRS	0.632	0.736	0.836	0.965	1.062
5.0 HRS	0.524	0.606	0.684	0.785	0.861
6.0 HRS	0.453	0.522	0.589	0.676	0.741
7.0 HRS	0.399	0.459	0.516	0.591	0.647
8.0 HRS	0.358	0.412	0.463	0.530	0.581
9.0 HRS	0.323	0.370	0.415	0.472	0.516
10 HRS	0.297	0.339	0.379	0.431	0.470
11 HRS	0.276	0.314	0.351	0.399	0.435
12 HRS	0.259	0.296	0.331	0.376	0.410
13 HRS	0.245	0.280	0.314	0.357	0.390
14 HRS	0.233	0.267	0.299	0.341	0.372
15 HRS	0.220	0.252	0.281	0.320	0.349
16 HRS	0.209	0.238	0.266	0.302	0.329
17 HRS	0.198	0.225	0.251	0.284	0.310



Land division corners are approximately positioned on this map.

SOIL SURVEY OF

Vanderburgh County, Indiana

United States Department of Agriculture
Soil Conservation Service
In cooperation with

Purdue University Agricultural
Experiment Station

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. Other information is given in tables as follows:

Acreage and extent, table 1, page 11.
Predicted yields, table 2, page 40.
Tree and shrub groups, table 3, page 50.
Wildlife, table 4, page 52.
Recreation, table 5, page 54.
Engineering, tables 6, 7, and 8, pages 58, 60, and 66.

Map symbol	Mapping unit	Described on page	Capability unit		Tree and shrub group
			Symbol	Page	Number
AlB2	Alford silt loam, 2 to 6 percent slopes, eroded	11	IIe-3	41	III
AlC2	Alford silt loam, 6 to 12 percent slopes, eroded	11	IIIe-3	43	III
AlC3	Alford silt loam, 6 to 12 percent slopes, severely eroded	12	IVe-3	45	III
AlD3	Alford silt loam, 12 to 18 percent slopes, severely eroded	12	VIe-1	46	III
Ba	Bartle silt loam	15	IIw-3	42	II
Bd	Birds silt loam	16	IIIw-10	44	I
Bo	Bonnie silt loam	16	IIIw-10	44	I
Br	Borrow pits	16	VIIe-3	46	IV
Ev	Evansville silt loam	17	IIw-1	41	I
Gn	Ginat silt loam	17	IIIw-12	45	I
Gu	Gullied land	17	VIIe-4	47	IV
He	Henshaw silt loam	19	IIw-2	42	II
HoA	Hosmer silt loam, 0 to 2 percent slopes	20	IIw-5	43	II
HoB2	Hosmer silt loam, 2 to 6 percent slopes, eroded	20	IIe-7	41	II
HoB3	Hosmer silt loam, 2 to 6 percent slopes, severely eroded	20	IIIe-7	43	II
HoC2	Hosmer silt loam, 6 to 12 percent slopes, eroded	20	IIIe-7	43	II
HoC3	Hosmer silt loam, 6 to 12 percent slopes, severely eroded	21	IVe-7	45	II
HoD3	Hosmer silt loam, 12 to 18 percent slopes, severely eroded	21	VIe-1	46	II
Ht	Huntington silty clay loam	22	I-2	41	III
Hu	Huntington fine sandy loam, sandy variant	22	I-2	41	III
IoA	Iona silt loam, 0 to 2 percent slopes	23	I-1	41	III
IoB2	Iona silt loam, 2 to 6 percent slopes, eroded	23	IIe-3	41	III
Iv	Iva silt loam	23	IIw-2	42	II
Ln	Lindside silty clay loam	24	I-2	41	III
Ma	Made land	24	VIIe-3	46	IV
MkB2	Markland silt loam, 2 to 6 percent slopes, eroded	24	IIIe-11	43	II
MkC2	Markland silt loam, 6 to 18 percent slopes, eroded	24	IVe-11	45	II
MlC3	Markland silty clay loam, 6 to 18 percent slopes, severely eroded	25	VIe-1	46	II
Mr	McGary silt loam	26	IIIw-6	44	II
MuA	Muren silt loam, 0 to 2 percent slopes	27	I-1	41	III
MuB2	Muren silt loam, 2 to 6 percent slopes, eroded	27	IIe-3	41	III
Nw	Newark silty clay loam	28	IIw-7	43	I
Pa	Patton silty clay loam	28	IIw-1	41	I
PrB	Princeton fine sandy loam, 2 to 6 percent slopes	28	IIe-11	41	III
Ra	Ragsdale silt loam	29	IIw-1	41	I
Rh	Rahm silty clay loam	29	IIw-7	43	I
Rs	Reesville silt loam	30	IIw-2	42	II
ScA	Sciotoville silt loam, 0 to 2 percent slopes	30	IIw-5	43	II
ScB2	Sciotoville silt loam, 2 to 6 percent slopes, eroded	31	IIe-7	41	II
St	Stendal silt loam	31	IIw-7	43	I
UnB2	Uniontown silt loam, 2 to 6 percent slopes, eroded	32	IIe-3	41	III
Wa	Wakeland silt loam	32	IIw-7	43	I
Wb	Weinbach silt loam	33	IIw-3	42	II
WeD2	Wellston silt loam, 12 to 18 percent slopes, eroded	34	IVe-3	45	III
WeD3	Wellston silt loam, 12 to 18 percent slopes, severely eroded	34	VIe-1	46	III
WeE2	Wellston silt loam, 18 to 25 percent slopes, eroded	34	VIe-1	46	III

Map symbol	Mapping unit	Described on page	Capability unit		Tree and
			Symbol	Page	
WeF	Wellston silt loam, 25 to 50 percent slopes	34	VIIe-1	46	
WhA	Wheeling loam, 0 to 2 percent slopes	35	I-1	41	
WhB2	Wheeling loam, 2 to 6 percent slopes, eroded	35	IIe-3	41	
Wm	Wilbur silt loam	36	I-2	41	
Wo	Woodmere silty clay loam	36	I-2	41	
ZaC2	Zanesville silt loam, 6 to 12 percent slopes, eroded	37	IIIe-7	43	
ZaC3	Zanesville silt loam, 6 to 12 percent slopes, severely eroded	37	IVe-7	45	
ZaD2	Zanesville silt loam, 12 to 18 percent slopes, eroded	38	IVe-7	45	
ZaD3	Zanesville silt loam, 12 to 18 percent slopes, severely eroded	38	VIe-1	46	
Zp	Zipp silty clay	38	IIIw-2	44	

Undeveloped Conditions

① Bridlewood Sections 1-5
10 year peak discharge rate
$Q_{10} = 33.65$ cfs

② → the 10 year peak discharge rate was reduced to $Q_{10} = 14$ cfs due to excess capacity available in retention basin

$Q_{10_1} - Q_{10_2} = 33.65 - 14 =$ 19.65 cfs excess

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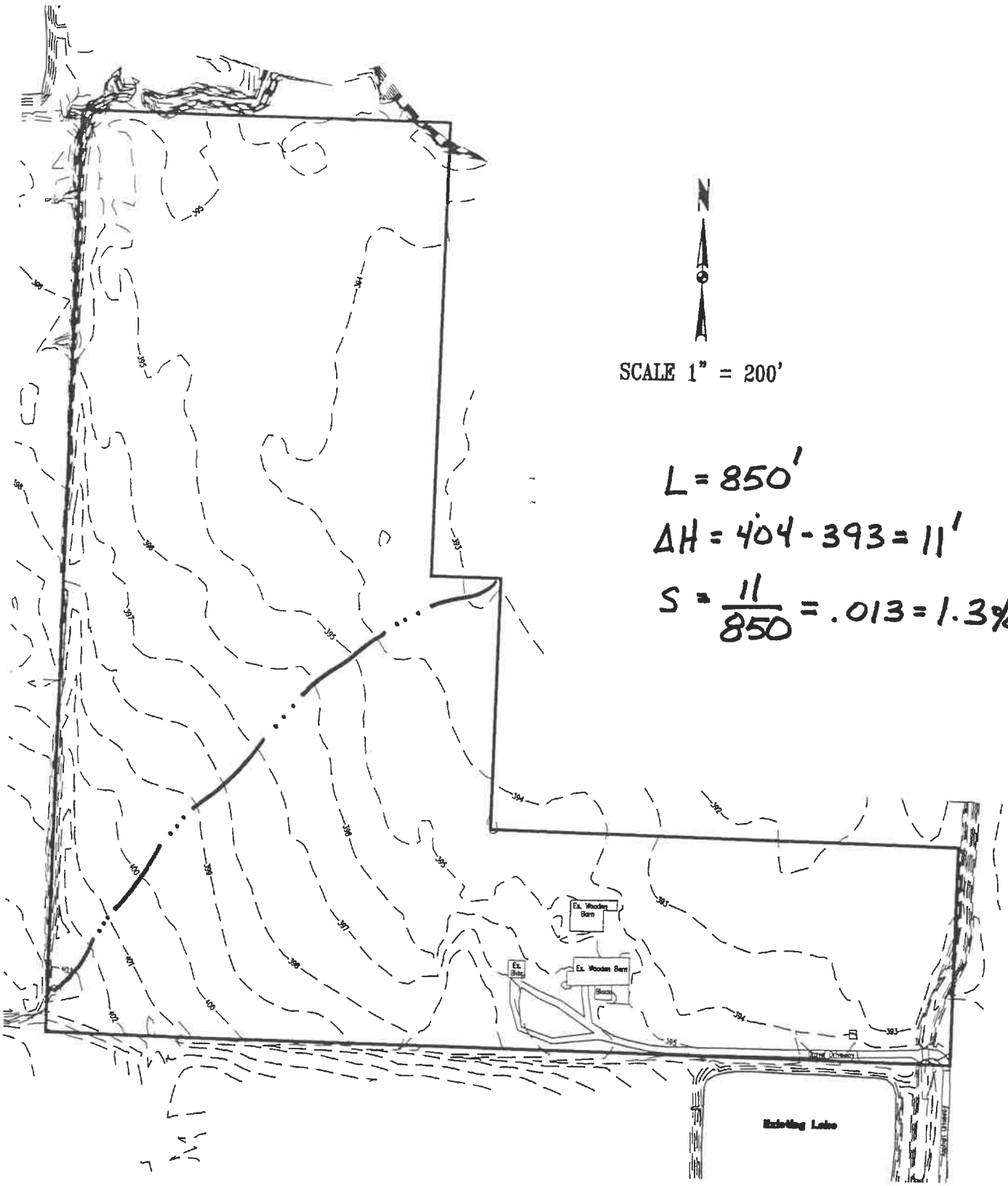
③ Bridlewood Section 6
10 year peak discharge rate
$Q_{10} = 17.13$ cfs

19.65 cfs (excess) + 17.13 cfs = 36.78 cfs
allowable

Q_{10} (allowable) = 36.78 cfs

Undeveloped Drainage Sub-basin



$L = 850'$

$\Delta H = 404 - 393 = 11'$

$S = \frac{11}{850} = .013 = 1.3\%$

Undeveloped Drainage Sub-Basins

Sub-basin No.: Overall									C	N
Total Area =				971,670	S.F. =	22.31	Ac.			
Surface										
Structures			7,482	S.F. =	7,482	S.F. =	0.17	Ac.	0.92	0.02
Gravel Drive	1	Total	8,700	S.F. =	8,700	S.F. =	0.20	Ac.	0.70	0.15
Concrete Pad	1	Total	122	S.F. =	122	S.F. =	0.003	Ac.	0.92	0.02
Lawn (0-2%)				S.F. =			0.00	Ac.	0.15	0.40
Lawn (2-5%)				S.F. =			0.00	Ac.	0.25	0.40
Lawn (5-10%)				S.F. =			0.00	Ac.	0.40	0.40
Lawn (>10%)				S.F. =			0.00	Ac.	0.55	0.40
Water				S.F. =			0.00	Ac.	1.00	0.00
Cultivated Field			955,366	S.F. =			21.93	Ac.	0.20	0.20

Weighted c =	0.210	
Weighted N =	0.198	
L =	850	Ft.
H =	11.0	Ft.
S =	0.0129	Ft./Ft.
tc =	25.01	Minutes (Min. 5 minutes)
I(10) =	3.655	In./Hr.
Q(10) =	17.13	CFS

Developed Drainage Sub-Basins

Sub-basin No.: Overall										C	N
Total Area =					971,670	S.F. =	22.31	Ac.			
Surface											
Structures	57	Total	2,000	S.F. =	114,000	S.F. =	2.62	Ac.		0.92	0.02
Drives	57	Total	600	S.F. =	34,200	S.F. =	0.79	Ac.		0.92	0.02
Pavement	2392	L.F.	29.0	Width =	69,368	S.F. =	1.59	Ac.		0.92	0.02
Patios	57	Total	150	S.F. =	8,550	S.F. =	0.20	Ac.		0.92	0.02
Sidewalks	4664	L.F.	4	Width =	18,656	S.F. =	0.43	Ac.		0.92	0.02
Lawn (0-2%)				S.F. =			0.00	Ac.		0.15	0.40
Lawn (2-5%)			661,774	S.F. =			15.19	Ac.		0.25	0.40
Lawn (5-10%)				S.F. =			0.00	Ac.		0.40	0.40
Lawn (>10%)				S.F. =			0.00	Ac.		0.55	0.40
Water			65,122	S.F. =			1.49	Ac.		1.00	0.00
Misc.				S.F. =			0.00	Ac.		0.92	0.02

Weighted c =	0.469
Weighted N =	0.277

Bridlewood - Section 1-5

SUB-BASIN DRAINAGE CALCULATIONS - UNDEVELOPED FLOW FOR A 10 YEAR STORM

Job Name/Basin #: Bridlewood-overall site

1,972,680 Total SF 45.29 AC

Structures	2 Total	2,000 SF	100 %	4,000 Total SF	0.09 AC
Drives	0 Total	0 SF		0 Total SF	0.00 AC
Pavement	10 Width (ft)	2,610 L (ft)		26,100 Total SF	0.60 AC
Patios	0 Total	0 SF		0 Total SF	0.00 AC
Sidewalks	0 Width (ft)			0 Total SF	0.00 AC
Impervious surfaces	C=0.92				

Terrain 1 (0-2%)	C=0.20	1,712,148 SF	1,712,148 Total SF	39.31 AC
Terrain 2 (2-4.99%)	C=0.35	230,432 SF	230,432 Total SF	5.29 AC
Terrain 3 (5-10%)	C=0.50	0 SF	0 Total SF	0.00 AC
Terrain 4 (10+ %)	C=0.65	0 SF	0 Total SF	0.00 AC
Terrain 5 (Lake)	C=1.00	0	0 Total SF	0.00 AC

Wt'd C =	0.23
Wt'd N =	0.20
High Pt El	417.50 ft
Inlet El	395.00 ft
Length	1400.00 ft
Slope	0.0161
tc	29.95 min

Is 5<tc<10?	i 10= 0.00 in/hr
Is 10<tc<15?	i 10= 0.00 in/hr
Is 15<tc<30?	i 10= 3.23 in/hr
Is 30<tc<60?	i 10= 0.00 in/hr

Q10= 33.38 cfs

Detention Volume Requirements

① Bridlewood Sections 1-5

25 year storm detention volume required for 14 cfs · Q_{10}

= 109,880 cubic feet

② Storage capacity available

25 year storm = 163,557 cubic feet

① - ② = 109,880 - 163,557 = 53,677 cubic feet excess

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③ Bridlewood Section 6

Storage capacity required Form 800

25 year storm = 39,124 cubic feet

53,677 c.f. excess > 39,124 c.f. required

VANDERBURGH COUNTY DRAINAGE BOARD
FORM 800

PROJECT: **Bridlewood Section 6**
DESIGNER: MORLEY & ASSOC.

DETENTION FACILITY DESIGN RETURN PERIOD: 25 YRS
RELEASE RATE RETURN PERIOD: 10 YRS

WATERSHED AREA:	22.31	ACRES
TIME OF CONCENTRATION (UNDEVELOPED WATERSHED):	25.01	MINUTES
RAINFALL INTENSITY (Iu):	3.655	INCHES/HR
UNDEVELOPED RUNOFF COEFFICIENT (Cu):	0.210	
UNDEVELOPED RUNOFF RATE (O = Cu*Iu*A):	17.12	CFS
DEVELOPED RUNOFF COEFFICIENT (Cd):	0.469	

STORM DURATION Td (HRS)	RAINFALL INTENSITY Id (INCH/HR)	INFLOW RATE I(Td) (Cd*Id*A) (CFS)	OUTFLOW RATE O (Cu*Iu*A) (CFS)	STORAGE RATE I(Td)-O (CFS)	REQUIRED STORAGE Td)-O)*Td/12 (ACRE-FT)
0.08	7.208	75.42	17.12	58.30	0.405
0.17	5.925	62.00	17.12	44.88	0.623
0.25	5.033	52.66	17.12	35.54	0.740
0.33	4.571	47.82	17.12	30.70	0.853
0.42	4.108	42.99	17.12	25.87	0.898
0.50	3.646	38.15	17.12	21.03	0.876
0.58	3.385	35.42	17.12	18.30	0.889
0.67	3.123	32.68	17.12	15.56	0.864
0.75	2.862	29.95	17.12	12.83	0.802
0.83	2.601	27.21	17.12	10.09	0.701
0.92	2.339	24.48	17.12	7.36	0.562
1.00	2.078	21.74	17.12	4.62	0.385
1.25	1.909	19.97	17.12	2.85	0.297
1.50	1.739	18.20	17.12	1.08	0.134
1.75	1.570	16.42	17.12	-0.70	-0.102
2.00	1.400	14.65	17.12	-2.47	-0.412
2.50	1.210	12.66	17.12	-4.46	-0.930
3.00	1.019	10.66	17.12	-6.46	-1.614
4.00	0.836	8.75	17.12	-8.37	-2.791

PEAK STORAGE (ACRE/FT):	0.90
PEAK STORAGE (CUBIC FT):	39,124

Existing Retention Basin

Vanderburgh County Drainage Board
Form 800

Computation Sheet for Detention Storage Using the Rational Method

Project: Bridlewood-Natural Basin

Detention Facility Design Return Period	25 years
Release Rate Return Period	10 years
Watershed Area	45.29 acres
Undeveloped Time of Concentration	29.95 minutes
Undeveloped Rainfall Intensity (iu)	3.23 inches/hour
Weighted Undeveloped Runoff Coefficient (Cu)	0.23
Undeveloped Runoff Rate (O=Cu x iu x Au)	14.00 cfs
Developed Runoff Coefficient (Cd)	0.42

Storm Duration td	**Rainfall Intensity** id	**Inflow Rate** I(td)	**Outflow Rate** O	**Storage Rate**	**Required Storage**
		Cd x id x Ad	Cu x iu x Au	(I x td) - O	[I(td)-O]x[td/12]
min	inches/hr	cfs	cfs	cfs	acre-ft
5	7.208	137.11	14.00	123.11	0.8549
10	5.925	112.70	14.00	98.70	1.3709
15	5.033	95.74	14.00	81.74	1.7028
20	4.571	86.95	14.00	72.95	2.0264
25	4.108	78.14	14.00	64.14	2.2271
30	3.646	69.35	14.00	55.35	2.3064
40	3.123	59.41	14.00	45.41	2.5225
50	2.601	49.48	14.00	35.48	2.4636
60	2.078	39.53	14.00	25.53	2.1273
90	1.578	30.02	14.00	16.02	2.0021

Required Storage = 2.5225 x 43,560 sf/ac= 109,880 cubic feet

Existing Retention Basin

TABLE 1
DETENTION VOLUME REQUIREMENTS

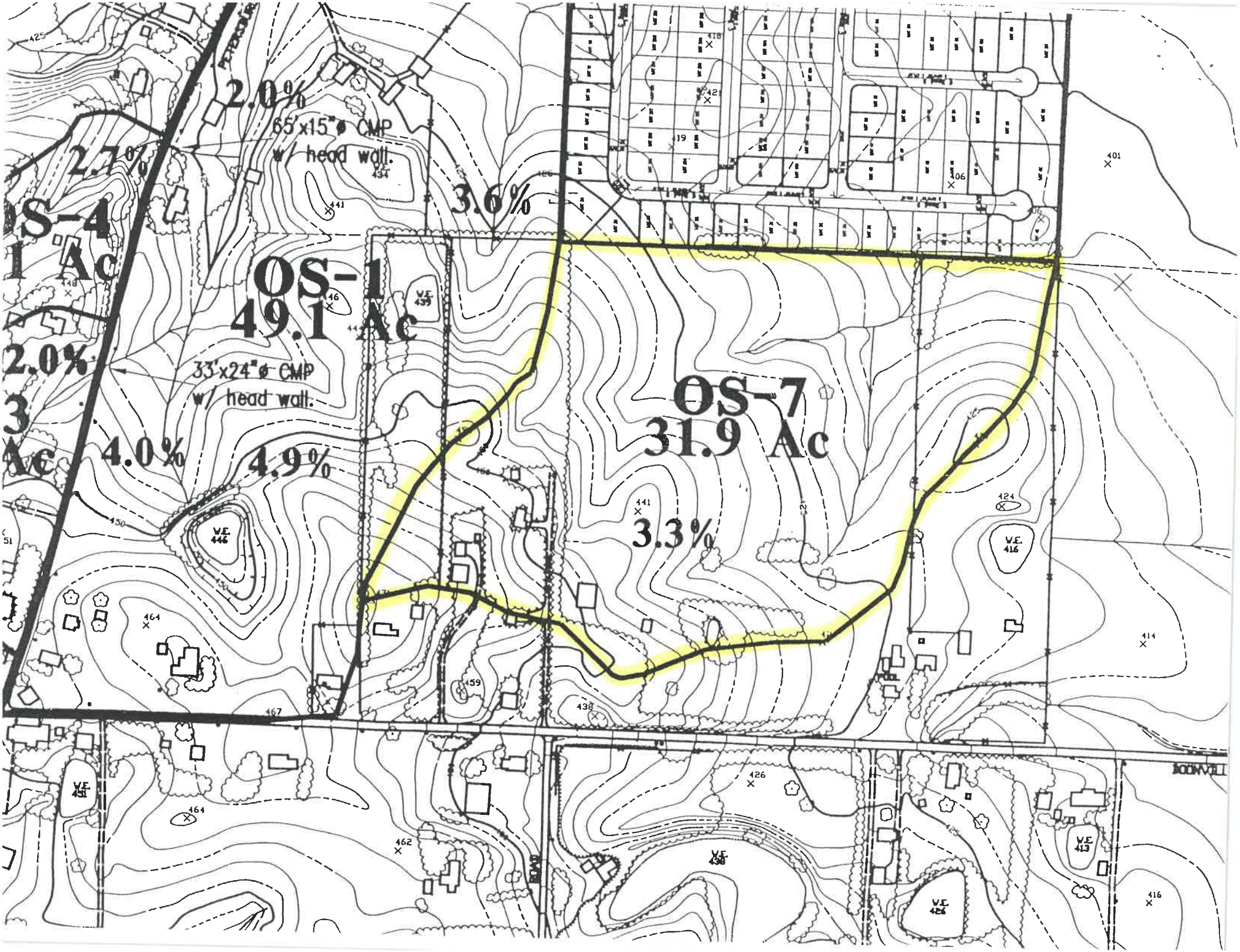
	10 year Undev. Release Rate	Required Storage *Sub. thru basin 25 year	50 year	100 year	Available Storage
Basin	33.65 cfs	67,300	100,868	112,302 cf	cf
Add. Detent.	14 cfs			154,120	163,557

Retention Volume >>

393 Storage Pool Elevation (spillway elev.)
- 391.00 Normal Pool Elevation
2 feet

85,102 Storage Pool Area
+ 78,455 Normal Pool Area
163,557 sq. ft.

Volume= **(1/2)x(163,557)x2.0=163,557** cu. ft. available


OS-4
1 Ac
2.7%
2.0%
65'x15"ø CMP
w/ head wall.
3.6%
OS-1
49.1 Ac
2.0%
3
Ac
33'x24"ø CMP
w/ head wall.
4.0%
4.9%
OS-7
31.9 Ac
3.3%

Morley & Associates, Inc.
Job # 4076: Stonecrest Subdivision
Developed: 11.05.98

Off Site Drainage Calculations.

Calculation of Average Slopes.

1

Off Site Drainage Area	Area (acres)	Slopes < 2% (C_u = 0.12)		Slope 2-5% (C_u = 0.24)		Slope 5-10% (C_u = 0.36)		Wt. Average Slope, S	Wt. Avg C_u
		Area (Ac)	Slope	Area (Ac)	Slope	Area (Ac)	Slope		
OS-1	49.1			49.1	3.6%			3.6%	0.24
OS-2	8.2	8.2	0.8%					0.8%	0.12
OS-3	10.5			6.5	2.0%	4.0	9.5%	4.9%	0.29
OS-4	7.1			5.1	2.7%	2.0	9.4%	4.6%	0.27
OS-5	102.9			44.7	2.2%	58.2	6.0%	4.3%	0.31
OS-6	25.2			20.9	2.4%	4.3	9.6%	3.6%	0.26
OS-7	31.9			31.9	3.3%			3.3%	0.24

Calculation of Weighted 'N' Values.

2

Off Site Drainage Area	Area (acres)	Estimated % Wooded	Estimated % Cropland	Determination of Weighted N		
				Wooded	Cropland	Total
OS-1	49.1	12.9%	87.1%	0.0772	0.1743	0.2515
OS-2	8.2	2.2%	97.8%	0.0133	0.1956	0.2089
OS-3	10.5	13.7%	86.3%	0.0823	0.1726	0.2548
OS-4	7.1	39.4%	60.6%	0.2361	0.1213	0.3574
OS-5	102.9	49.1%	50.9%	0.2943	0.1019	0.3962
OS-6	25.2	14.4%	85.6%	0.0862	0.1713	0.2575
OS-7	31.9	17.0%	83.0%	0.1020	0.1660	0.2680

N Value for Wooded Areas = 0.60

N Value for Row Crops = 0.20

3 Calculation of Time of Concentrations.

Off Site Drainage Area	Area (acres)	Length, L (Tc) (feet)	Tc (minutes)	i_{25} (iph)	Q_{25} = CiA (cfs)
OS-1	49.1	2815	38.58	3.197	37.7
OS-2	8.2	974	30.67	3.611	3.6
OS-3	10.5	1336	25.57	4.056	12.2
OS-4	7.1	1142	28.22	3.811	7.4
OS-5	102.9	3952	53.69	2.408	76.3
OS-6	25.2	2032	33.54	3.461	22.7
OS-7	31.9	1886	33.70	3.452	26.4

MAILED DEC 16 2002 DEC. 20 2002

DNR Indiana Department of Natural Resources

Frank O'Bannon, Governor
John Goss, Director
Division of Water
402 W. Washington Street
Room W264
Indianapolis, IN 46204-2748
PH: (317) 232-4160
FAX: (317) 233-4579

RECEIVED
DEC 20 2002
Morley and Associates, Inc.

December 16, 2002
Basin # 28

Michael J Sears
Morley & Associates, Inc
600 Southeast 6th Street
Evansville, IN 47713-1222

Re: Vanderburgh – Evansville North
S – Schlensker Ditch

Dear Mr. Sears:

Thank you for your request for revisions to the Schlensker Ditch hydraulic model at Stonecrest Subdivision. Based on your description, the parcel, which lies at the intersection of Sections 10, 11,14 and 15, Township 5S, Range 10W, extends from Petersburg Road east about 1500 feet and extends north from the section line about 1000 feet and south about 1500 feet near Evansville, Vanderburgh County.

Based on hydraulic modeling developed by your company and reviewed by the Division the 100-year frequency flood would reach an elevation of about 402.1 feet, National Geodetic Vertical Datum of 1929 (NGVD), at the upstream limit of the tract sloping (uniformly) to an elevation of about 395.4 feet, NGVD, at the downstream limit of the tract.

IC 14-28-1 prohibits constructing abodes or residences in or on a floodway and requires the prior approval of the Department of Natural Resources for any other type of construction, excavation, or filling in or on a floodway. To be approvable a project should be designed so that it will not restrict the floodway, be unsafe to life and property, nor adversely affect the fish, wildlife, or botanical resources.

The floodway of Schlensker Ditch passes through a portion of the tract. For your information, we have delineated this floodway in yellow on the enclosed floodway map. No new residential construction is allowed in the floodway area and detailed plans for other types of work in the floodway should be submitted for formal approval by the Department of Natural Resources under IC 14-28-1. A permit application and instructions are enclosed for your convenience.

The portion of the tract outside of the floodway and below the 100-year frequency flood elevation is called the floodway fringe area. While these portions of the tract would be subject to flooding, they are not required for the conveyance of flood waters during the 100-year event; therefore, approval by the Department of Natural Resources under IC 14-28-1 for portions of the project in this fringe area is not required unless a dam is to be constructed.

We recommend that any building which you propose for this site, noting again that residences are prohibited in the floodway under the provisions of IC 14-28-1, be provided with a lowest floor set at least 2 feet above the 100-year frequency flood elevation. If a basement is included, the basement floor should be considered to be the lowest floor.

You should note that portions of the tract are located in a "Special Flood Hazard Area" as defined by the Federal Emergency Management Agency. If any existing or proposed building lies within this "Special Flood Hazard Area" current or future owners may be required to purchase flood insurance as a condition of obtaining a mortgage on the property. The final determination regarding the flood

insurance requirement is the responsibility of the lending institution. Flood insurance might also be required for any direct federal assistance for this property, such as disaster aid.

Depending on the type of building and the lowest floor elevation, including basements, flood insurance premiums can be substantial under the regular phase of the National Flood Insurance Program. The owner should discuss this matter with an insurance agent before starting any plans for construction.

You may also have to obtain a permit from the Corps of Engineers under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act. Information relative to the Corps' of Engineers permits may be obtained from:

U.S. Army Corps of Engineers
Louisville District Office
P.O. Box 59
Louisville, Kentucky 40201
Telephone (502) 582-5607

You should not construe this letter to be a building permit, approval of the proposed project, or a waiver of the provisions of local building or zoning ordinances.

Thank you for this opportunity to be of assistance; your interest in providing safe floodplain development is appreciated. **If you have any questions regarding this letter, please contact Eric J Moster, Hydraulic Engineer, in our Engineering Service Center, at (317) 232-4160 or toll free at 1-877-928-3755.**

Sincerely,

Suzanne R. Delay

Suzanne R Delay, P.E.
Section Manager
Division of Water

SRD/EJM
pc: Vanderburgh County Plan Commission
Louisville District, Corps of Engineers
Enclosures: Permit Application and Instructions
Floodway Map

INDIANA DEPARTMENT OF NATURAL RESOURCES

Division of Water
Indiana Department of Natural Resources
Memorandum

Date: December 16, 2002

To: Evansville PFIS, Schlensker Ditch

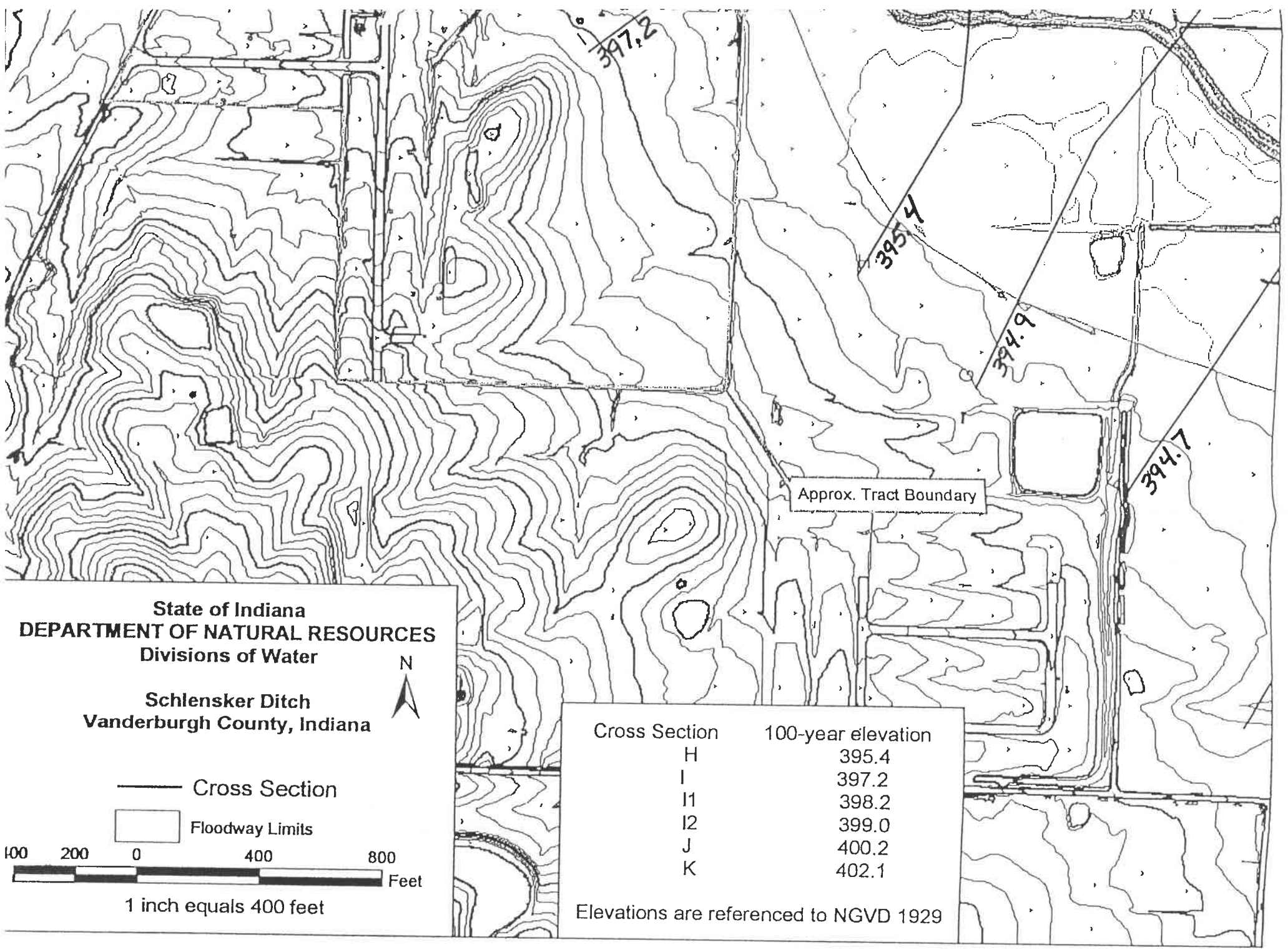
From: Eric J. Moster
Hydraulic Engineer
Engineering Service Center, South Basin Team

Subject: Schlensker Ditch model revisions for PFIS

Background: This is the third submittal for Schlensker Ditch. Changes were made to the encroachment stations and cross section geometry according to the comments in our memo dated November 4, 2002.

Comments: No other changes to the model were made so all other parameters are as accepted in the second submittal. However, the model could not find a subcritical answer for cross section 2.672. My supervisor and I concluded that the problem was probably that no ineffective flow stations were set at cross section 2.672 and the flow through the bridge just upstream was expanding too quickly. I called Mike Sears and explained the problem to him.

Other Comments: Mike added the ineffective flow stations using a 2:1 ratio and emailed the corrected model to me. The final model is located at O:\BASIN28\PROJECT\Schlensker Ditch\Morley 11-27-02\Origin4.prj



State of Indiana
DEPARTMENT OF NATURAL RESOURCES
Divisions of Water

Schlensker Ditch
Vanderburgh County, Indiana

N

Cross Section

Floodway Limits

400 200 0 400 800 Feet

1 inch equals 400 feet

Cross Section	100-year elevation
H	395.4
I	397.2
I1	398.2
I2	399.0
J	400.2
K	402.1

Elevations are referenced to NGVD 1929

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

VANDERBURGH
COUNTY,
INDIANA
UNINCORPORATED AREAS

PANEL 15 OF 100

N.W. OF N.E.

COMMUNITY-PANEL NUMBER
180256 0015 C

MAP REVISED:
AUGUST 5, 1991

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

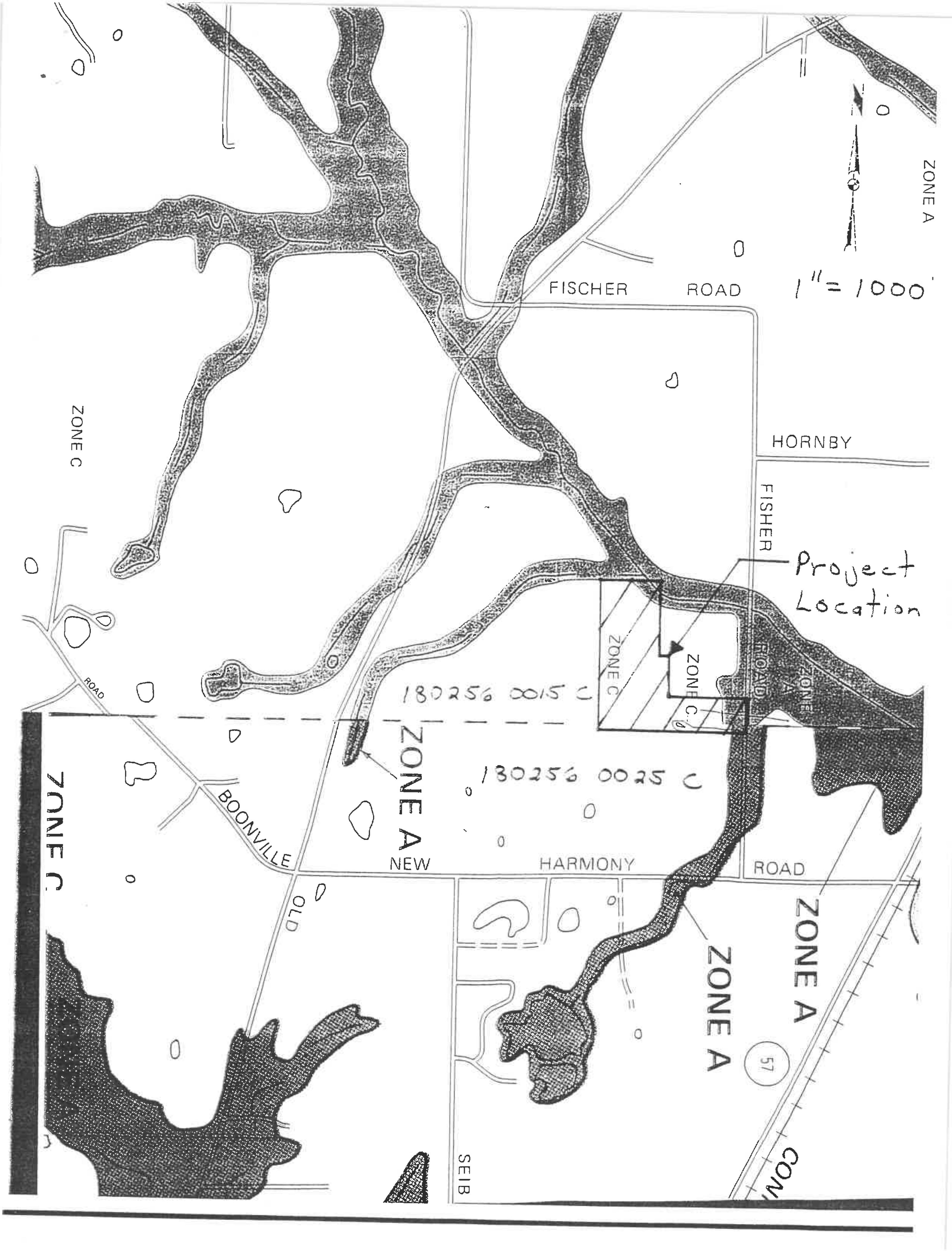
VANDERBURGH COUNTY, INDIANA
UNINCORPORATED AREAS

PANEL 25 OF 100

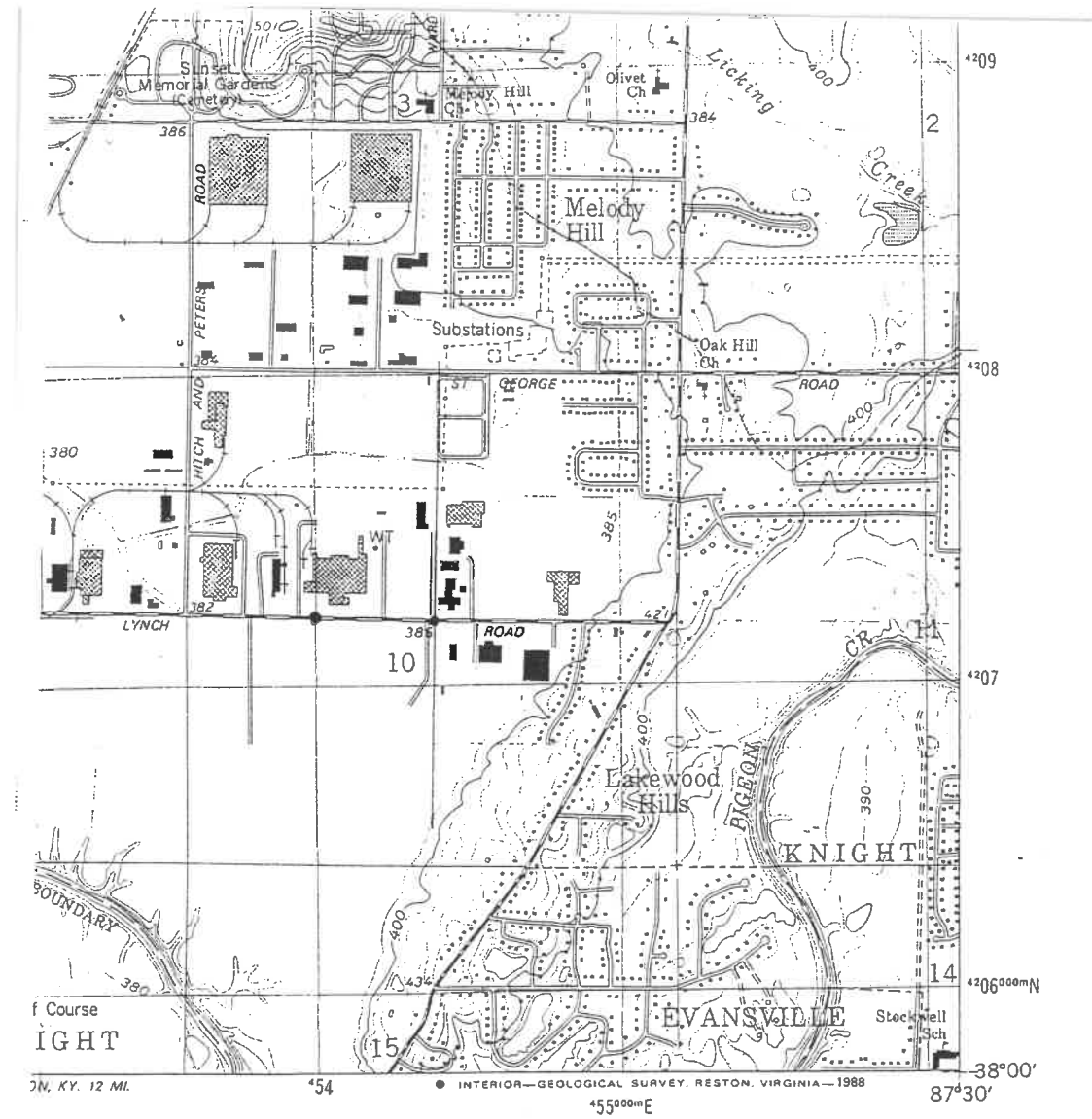
COMMUNITY-PANEL NUMBER
180256 0025 C

MAP REVISED:
AUGUST 5, 1991

Federal Emergency Management Agency



FISCHER ROAD
1" = 1000'
ZONE A
ZONE C
HORNBY
FISHER ROAD
Project Location
ZONE C
ZONE C
ZONE A
180256 0015 C
180256 0025 C
ZONE A
ROAD
BOONVILLE
NEW HARMONY ROAD
OLD
ZONE A
ZONE A
57
SEIB
ZONE C



f Course
IGHT

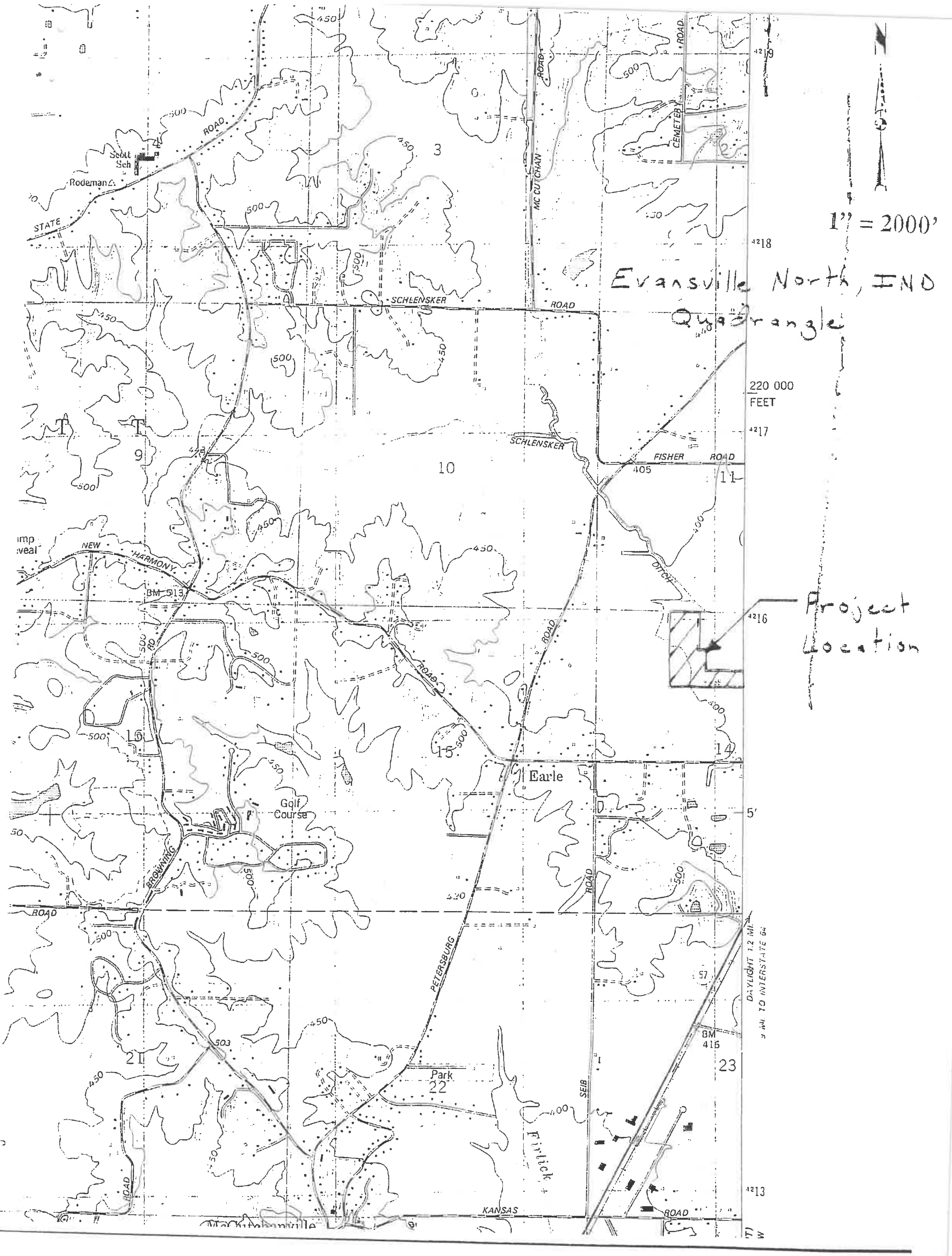
ON, KY. 12 MI.

(NEWBURGH) 3559 IV NW

NGLE LOCATION

in purple and woodland compiled in cooperation
ana agencies from aerial photographs
other sources. This information not field checked

IGLE NAMES


1" = 2000'
Evansville North, IND Quadrangle
Project Location
Scott Sch
Rodeman
STATE
ROAD
MC CUTCHAN
CEMETERY
SCHLENSKER
ROAD
FISHER ROAD
220 000 FEET
NEW HARMONY
ROAD
BM 513
BROWNING
ROAD
PETERSBURG
ROAD
Earle
Golf Course
Park
SEIB
ROAD
KANSAS
ROAD
DITCH
BM 416
DAYLIGHT 1.2 MI.
TO INTERSTATE 64
3
9
10
11
14
15
16
21
22
23