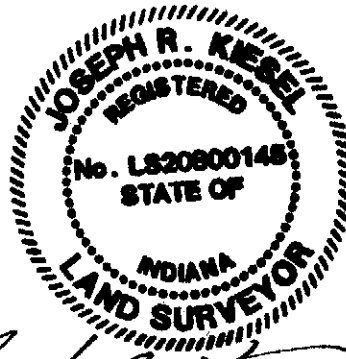FINAL
DRAINAGE REPORT
FOR

THE STABLES
THE STABLES-SOUTH

2400 S Green River Road
Vanderburgh County, Indiana

for

2400 Green River Investments, LLC
3801 N Burkhardt Road
Evansville, IN 47715
Phone (812) 457-9003

Report by:
Kiesel Wagner Survey, LLC
2711 W. S.R. 68
Haubstadt, IN 47639

APPROVED

JUL 2 1 2015

VANDERBURGH COUNTY
DRAINAGE BOARD

July 14, 2015

The Stables South-FINAL DRAINAGE PLAN

13.04.095 Conditions of drainage plan approval.
In order for an applicant to obtain approval of a final drainage plan, the following requirements must be met:

A.   The applicant shall be eligible under the terms of this chapter to apply for and obtain drainage plan approval.

B.   The drainage plan and supporting submittals required by this chapter shall have been prepared and submitted in a timely and proper manner in accordance with the provisions of this chapter. **Final Drainage Plan submitted on 7/14/2015**

C.   The drainage plan and supporting submittals shall reflect compliance with the requirements of this chapter, and compliance with any conditions of approval applied to the plan by the drainage board. **Required Revisions are shown in red.**

D.   The submitted data shall be gathered, analyzed, assembled into the drainage plan and supporting submittals; and shall be certified, and presented to the drainage board all by a civil engineer or land surveyor regularly engaged in stormwater drainage design, and registered to practice in the state of Indiana. **Stamped by Professional Surveyor**

E.   An easement has been dedicated to house any off-site drainage facilities if such facilities are required to serve the project's stormwater drainage system. ??

F.   The person, persons, partnership, corporation, or other entity to whom approval of the drainage plan is granted must be the person, persons, partnership, corporation, or entity who will be responsible for accomplishing the project for which the drainage plan is developed. **2400 GreeN River Investments, LLC, 3801 n Burkhardt Road, Evansville, IN 47715**

13.04.125 Building permits conditioned.
The Vanderburgh County building commissioner shall not allow construction of buildings, or other impervious structures or facilities to commence at the site of a project requiring final drainage plan approval until:

A.   Such approval has been expressed by the drainage board;

B.   And all storm drainage facilities are constructed. **See comment under Section 13.04.130**

13.04.130 Phased development of large projects allowed.

Large projects may be divided into phases for the purpose of constructing drainage facilities and obtaining permits in accordance with the requirements of this chapter. **No phasing is planned**

13.04.160 Contents of preliminary drainage plan.

A.   The contents of the preliminary drainage plan shall include a map based on the most current county planimetric maps, or a topographic map prepared from a more recent aerial photo reconnaissance that provides more accurate data, complete with contour lines, and showing the following: **Preliminary Drainage Plan approved on June 23, 2015.**

    1.   The extent and area of each watershed affecting the design of the drainage facilities for the project; **Provided**

    2.   The soil types based on the most current information available from the SWCD; **Provided**

    3.   Zone "A" floodplain based on the current FIRM panels; **Provided**

    4.   The existing man-made and natural waterways, ponds, basins, pipes, culverts, and other drainage facilities or features within or affecting the project; **Provided**

    5.   The preliminary layout and design of the streets, and all stormwater drainage facilities, including depressed pavements used to convey or temporarily store overflow from the heavier storms, and all outlets for the storm water drainage facilities; **Provided. Label the swales as overflow swales on the final plan.**

    6.   The existing streams, floodways, and floodplains to be maintained, and new channels to be constructed, their locations, cross sections, profiles, and materials used; **Provided**

    7.   The proposed culverts and bridges to be built, with the specific materials to be used, elevations, waterway openings, and the basis of their design; **Layout of the proposed culverts is difficult to follow. Provided**

    8.   Existing detention basins or ponds within the project, or outside the project but affecting it, to be maintained, enlarged, or otherwise altered, together with any new basins or ponds to be built; and their basis of design; **No basins planned**

    9.   The estimated depth and amount of storage required of the basins and ponds, and their available freeboards; **No basins planned as a request is being made with submittal to exempt. If a basin is required, storage requirement would be 11,705 ft^3**

    10.   The estimated location and percentage of impervious surface existing and expected to be constructed at completion of the project. **Provided**

    11.   Any interim plan which is to be incorporated into the project pending its completion according to the final drainage plan. **According to meeting with developer, no phasing is planned.**

B.   Notations and Explanations on the Preliminary Plan. All notations necessary to indicate the existing conditions, and the proposed functions of the various features shown thereon; and shall include the following. **Provided**

C.   Geographic Orientation Required. A north arrow, scale, location insert, and other information necessary for geographic clarification shall be included on a preliminary plan. **The submitted plan requests exemption of storage requirements due to close proximity of Aiken Ditch. A map showing the project location, Aiken ditch and the pathway of the drainage to Aiken Ditch was submitted to assist in this determination.**

D.   Data Required to Accompany Preliminary Plan. Descriptive data sufficient to support the feasibility of the preliminary drainage plan with regard to the requirements of this chapter, including calculations of the predevelopment and post development runoff rates using rainfall data supplied herein shall accompany a preliminary drainage plan. **Provided**

13.04.165 Contents of the final drainage plan.
The contents of the final drainage plan shall include all the items listed above for a preliminary drainage plan, plus:

A.   Soils Map. A soils map indicating soils names and their hydrologic classification must be provided for a proposed project. **Provided**

B.   Location and Topographic Map. In addition, a location and topographic map must be provided showing the land to be developed, and such adjoining land whose location and topography may affect or be affected by the layout or drainage of the project. **Provided**

C.   Contour Intervals.

   1.   The contour intervals shown on the topographic map shall be two and one-half feet for slopes less than four percent; and five feet for slopes four percent or greater; or best available; **One Foot**

   2.   The location of streams and other stormwater conveyance channels, both natural and man-made; and the vertical and horizontal limits of the one hundred (100) year floodplain, according to FIRM panels, and/or the building commissioner; all properly identified; .

   3.   The normal shoreline of lakes, ponds, swamps, and basins, their floodplains, and lines of inflow and outflow; **Dry Basin to the South**

   4.   The location of exiting regulated drains, farm drains, inlets and outfalls; **No regulated drains. Drainage from Subdivision will flow to Aiken Ditch. No farm drains, inlets or outlets observed.**

   5.   Storm, sanitary, and combined sewers, and outfalls; **Existing storm sewers are shown. Proposed or actual location of sanitary sewers is are shown.**

6. Wells, septic tank systems, and outfalls, if any; None observed or noticed during survey.

7. Seeps, springs, sinkholes, caves, shafts, faults, or other such geological features visible, or of record;. None observed or noticed during survey.

8. The limits of the entire proposed project and the limits of the expected extent of land disturbance required to accomplish the project Entire Project

9. The location of the streets, lot lines, and easements;

10. A scale, preferably one inch equals fifty (50) feet; 1"=50 '

11. An arrow indicating North. Provided

D. On-Site Bench Mark Required. A benchmark determined by "Mean Sea Level Datum 1929," is required to be located within the project limits. Could not find on any drawing Provided on revised Index Drawing submitted 7-20-2015

13.04.170 Final drainage plan layout.

A. In addition to the requirements listed for a preliminary drainage plan, the final drainage plan shall depict the following:

1. The extent and area of each watershed tributary to the drainage facilities within the project; Information regarding developed basins is not shown. Provided

2. The final layout and design of proposed storm sewers, their inlet and outfall locations and elevations, the receiving streams or channels; all with the basis of their design; Provided

3. The location and design of the proposed street system, including depressed pavements used to convey or detain overflow from storm sewers and over-the-curb runoff resulting from heavier rainstorms, and the outlets for such overflows; all with their designed elevations; Provided

4. The locations, cross sections, and profiles of existing streams, floodways, and floodplains to be maintained, and the same for all new channels to be constructed. Provided

5. The materials, elevations, waterway openings, size, and basis for design of the proposed culverts and bridges; Provided

6. Existing ponds and basins to be altered, enlarged, filled, or maintained; and new ponds, basins, swales, to be built, and the basis of their design No ponds-swale information provided

7.   The location and percentage of impervious surfaces existing and expected to be constructed; **Provided**

8.   The material types sizes slopes grades and other details of all the stormwater drainage facilities; **Provided**

9.   The estimated depth and amount of storage required in the new ponds or basins, the freeboard above the normal pool and highwater pool of wet basins, and details of the emergency overflows from the basins ; **No storage is planned-exempted with Preliminary Drainage Plan Approval**

10.   For all controlled release basins, a plot or tabulation of the storage volumes with corresponding water surface elevations, and a plot or tabulation of the basin outflow rates for those water surface elevations; **No storage is planned-exempted with Preliminary Drainage Plan Approval**

11.   The location of any applicable "impacted drainage areas" or other areas designated to remain totally undisturbed, natural, or for common and/or recreational use **None Noted**

B.   Protection of Structures From One Hundred Year Flooding. All structures to be occupied as residences or businesses shall have finished floor elevations two feet above the high water calculated to occur during a one hundred (100) year return period storm for the subject building site; and the required floor elevations shall be depicted on the plan drawings for such affected sites. **Located within the area of Vanderburgh County behind levee**

13.04.175 Submittal of a written drainage design report.
The final drainage plan shall be accompanied by a written report containing the following:

A.   Any significant stormwater drainage problems existing or anticipated to be associated with the project; **None Noted**

B.   The analysis procedure used to identify and evaluate the drainage problems associated with the project; **Rational**

C.   Any assumptions or special conditions associated with the use of the procedures, especially hydrologic or hydraulic methods, used to identify and evaluate drainage problems associated with the project; **None noted**

D.   The proposed design of the drainage control system; **Provided**

E.   The results of the analysis of the proposed drainage control system showing that it does solve the project's identified and anticipated drainage problems; **Provided**

F. A detailed description, depiction, and log of all hydrologic and hydraulic calculations or modeling, and the results obtained thereby; together with the input and output files for all computer runs; Provided

G. Maps showing individual drainage areas within the project subdivided for use in the analysis thereof Provided

13.04.180 Typical cross sections of the drainage facilities.
One or more typical cross sections must be provided for each existing and proposed channel, basin, pond, or other open drainage facility, which cross sections No Basins-cross sections provided for channels

A. Must show the elevation of the existing land immediately adjacent to all drainage facilities;

B. Must show the high water elevations adjacent to all waterways and impoundments as expected from the one hundred (100) year storm in relationship to permanent structures

13.04.440 General detention/retention basin design requirements.

The Preliminary Plan was approved with no detention therefore requirements for design basin of detention/retention pond therefore have not been addressed.

13.04.460 Responsibility for drainage facility maintenance.
The installation, maintenance, repair, and replacement of all stormwater drainage facilities, and erosion and siltation control measures for a project during the period of construction, and until final approval by the county engineer, shall be the responsibility of the land developer(s), and/or the property owner(s) of record.

The assignment of responsibility for the maintenance and repair of all stormwater drainage systems and facilities outside of county accepted road rights-of-way after the completion of the project, and final approval thereof by the county engineer, shall be determined before the final drainage plan is approved; and shall be documented by appropriate covenants and restrictions applied to the subdivision and to the property deeds thereof, and shall be printed clearly upon all recorded plats of the project.

Plan B Proposed

There is an offsite drainage easement and agreement between Betty and Jeffrey Carneal and the developer. This agreement must be recorded. Also the agreement must be noted on the plat prior to approval. How will the assignment of the responsibility for this maintenance be handled to the individual lot owners? Revised Language submitted on 7-20-2015 which has Homeowners Association responsible was development is complete. Recommend that plat includes language plus additional language that should Homeowners Association no longer exist that the responsibility become that the costs be spread equally between each individual lot within the subdivision.

KIESEL-WAGNER SURVEY LLC

2711 W SR 68
Haubstadt, IN 47639
Chad Wagner: 812-319-3910
Joe Kiesel: 812-305-6256

To:
**Vanderburgh County Surveyor's Office
Civic Center Complex**

Attention:	Mr. Jeff Mueller
Re:	The Stable South
Job Number:	116-2015-005

We are sending you

☐ Attached	☐		
☐ Shop Drawings	☐ Prints	☐ Plans	☐ Other:
☐ Copy of Letter	☐ Change Order	☐ Samples	
☐ Total Quantity	☐ Reproducible	☐ Specification	

Submittal	Quantity	Date	DWG. #	Description
	1 sheet	7-20-2015		Updated INDEX sheet with Benchmark data
	1	7-20-2015		Updated page 4 of Final Drainage Report

These are transmitted as checked below

☐ For Review	☐ Approved as Submitted	☐ Resubmit copies for approval
☐ For Your Use	☐ Approved as Noted	☐ Submit [#] copies for distribution
☐ As Required	☐ Returned for Corrections	☐ Return [#] corrected prints

Comments:

Copy to:

File

Chad Wagner, Co-Owner

Stormwater Detention:

Due to the site's location in the reach of the large watershed of Akin Ditch, detention was exempted for *The Stables* under sections 13.04.015A & 13.04.025A of the Vanderburgh County Drainage Ordinance. *The Stables South,* being in the same vicinity as shown in the Akin Ditch proximity Exhibit, has requested the detention exemption similarly. This request is on the basis that direct discharge has been determined to benefit this tributary watershed under section 13.04.015A.

Proposed Design:

Portions of the development will drain to the existing swales along all of the boundaries. The proposed northern swale has been shifted approximately 6'north from *The Stables* Final Drainage Plan. There is also the addition of the proposed north/south connecting street which bisects said rear yard swale at an effective crest whereupon the water drains away north & south in the street, and east in west in the respective rear yard swales. Please see the Drainage Plan for details and for locations of storm and sanitary sewer locations. No combination sewers are proposed on this site.

The stormwater runoff will be conveyed to the collection systems by a combination of sloping lawns, grassed swales and ditches, concrete lined swales, roadway pavement, and concrete drainage pipes.

Responsibility for Drainage Facility Maintenance

Plan "B" of the section 13.04.460 will be enacted in this development. The developer shall present to the county commissioners, at the same time and along with the submission of the street and drainage plans, a cashiers check or a certified check in the amount equal to two dollars per lineal foot of storm sewer pipe located outside of dedicated road rights-of-way as shown on the attached plans. The method of maintenance, being Plan "B", shall be clearly printed on the subsequent secondary plats of The Stables South utilizing the language as set forth in items 1 through 7 of part 2 of section 13.04.460 of the Vanderburgh County Drainage Ordinance. Financial responsibility of maintenance associated with the privately maintained 30" HDPE storm pipe located immediately adjacent to the east of the subject property is split into percentages. The developer, being 2400 Green River Investments LLC is responsible to pay for 40% of the costs associated with the maintenance, repair, or replacement of said 30" pipe. The developer will retain this responsibility until all lots are built upon in this development. Once all lots are built upon, the home owners association will retain the 40% stake in the maintenance responsibility.

Transmittal Letter

July 14, 2015

KIESEL-WAGNER SURVEY LLC

2711 W SR 68
Haubstadt, IN 47639
Chad Wagner: 812-319-3910
Joe Kiesel: 812-305-6256

To:
Vanderburgh County Surveyor's Office
Civic Center Complex

Attention: Mr. Jeff Mueller

Re: The Stable South

Job Number: 116-2015-005

We are sending you

☐ Attached		☐					
☐ Shop Drawings	☐	Prints	☐	Plans	☐	Other:	
☐ Copy of Letter	☐	Change Order	☐	Samples			
☐ Total Quantity	☐	Reproducible	☐	Specification			

Submittal	Quantity	Date	DWG. #	Description
	8 sheets	7-14-2015		Plans for The Stables South
	1	7-14-2015		Final Drainage Report
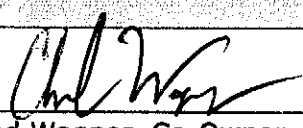
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Comments:

Copy to:

File

Chad Wagner, Co-Owner

THE STABLES SOUTH

Project Name and Location

The Stables South
2400 South Green River Road
Knight Township
Section 1, T 7 S, R 10 W
Vanderburgh County, Indiana

Landowner Name and Address

2400 Green River Investments, LLC
Chris A Combs, Member
3801 N Burkhardt Road
Evansville, IN 47715
Phone (812) 457-9003

Drainage Plan Preparer

Kiesel Wagner Survey, LLC
2711 W. S.R. 68
Haubstadt, IN 47639
(812) 319-3910

Site Location:

The proposed development is a 6.409 acre site located in southeast Vanderburgh County, Indiana on the east side of South Green River Road, south of Pollack Avenue and north of I-69. It is proposed to add approximately 2.67 acres of impervious area in the form of new asphalt streets and 32 houses, drives, and patios.

Existing Site Conditions:

The site is comprised of level terrain at 0-2% grades. All areas, not improved, will be "converted" to grassy lawns, or left in existing conditions. The site is surrounded on all sides by swales. The majority of the site drains in the general northeast direction. The majority of this runoff will reach Akin Ditch, which is less than 900 feet from the northeast corner of the project site.

An existing 30" HDPE storm drain is located immediately east of the subject property, and is owned by a private entity. An agreement has been reached to allow this site to connect to said storm drain. The easement deed and agreement are attached as an exhibit. The capacity of this drain was found to be approximately 53 cfs.

The no regulated drains are present on site. No farm drain inlets, outfalls, wells, septic tank systems, seeps, springs, sinkholes, caves, shafts, faults or any other geological features were noticed or observed at the time of field survey.

Significant Existing or Anticipated Drainage Problems:

No new significant drainage problems are anticipated by the development of the proposed residential subdivision once the new drainage system is operational.

It is the intent of the developer to build the infrastructure proposed in this plan in a single phase of construction.

A previously existing farm pond has tentatively been acknowledged by the Army Corp. of Engineers as a non-wetland. A formal response to elucidate this point is impending. In the event mitigation would be required it would be provided offsite.

Analysis Procedure:

The Rational Method, valid for watershed areas up to 200 acres, was used for computations of storm water runoff. The post development storm water runoff during a twenty-five (25) year return period storm was designed to be contained within the storm drainage system.

Stormwater Detention:

Due to the site's location in the reach of the large watershed of Akin Ditch, detention was exempted for *The Stables* under sections 13.04.015A & 13.04.025A of the Vanderburgh County Drainage Ordinance. *The Stables South,* being in the same vicinity as shown in the Akin Ditch proximity Exhibit, has requested the detention exemption similarly. This request is on the basis that direct discharge has been determined to benefit this tributary watershed under section 13.04.015A.

Proposed Design:

Portions of the development will drain to the existing swales along all of the boundaries. The proposed northern swale has been shifted approximately 6'north from *The Stables* Final Drainage Plan. There is also the addition of the proposed north/south connecting street which bisects said rear yard swale at an effective crest whereupon the water drains away north & south in the street, and east in west in the respective rear yard swales. Please see the Drainage Plan for details and for locations of storm and sanitary sewer locations. No combination sewers are proposed on this site.

The stormwater runoff will be conveyed to the collection systems by a combination of sloping lawns, grassed swales and ditches, concrete lined swales, roadway pavement, and concrete drainage pipes.

Responsibility for Drainage Facility Maintenance

Plan "B" of the section 13.04.460 will be enacted in this development. The developer shall present to the county commissioners, at the same time and along with the submission of the street and drainage plans, a cashiers check or a certified check in the amount equal to two dollars per lineal foot of storm sewer pipe located outside of dedicated road rights-of-way as shown on the attached plans. The method of maintenance, being Plan "B", shall be clearly printed on the subsequent secondary plats of The Stables South utilizing the language as set forth in items 1 through 7 of part 2 of section 13.04.460 of the Vanderburgh County Drainage Ordinance.

Index

Appendix

Soils Map
Firmette
Offsite Easement Deed & Agreement
Akin Ditch Proximity Exhibit
Upstream Watershed Exhibit
Cross Sections of existing ditch on east side of property
Final Drainage Plan (INDEX sheet, attached)
Developed Watershed Basins Exhibit (Roll set, attached)

UNDEVELOPED CALCULATIONS FLOW FOR A 10 YEAR STORM

Project: STABLES SOUTH

Job Name/Basin #:	STABLES SOUTH	Basin A		279,393 Total SF	6.41 AC

Exist. Impervious surfaces (2-5%) C=0.94

LAKES	1 Total	14,000 SF		14,000 Total SF	0.32 AC
Building	1 Total	3,000 SF		3,000 Total SF	0.07 AC
Pavement	0 Width (ft)	0 L (ft)		0 Total SF	0.00 AC
				17,000 **TOTAL**	0.39 AC

Proposed Impervious surfaces (2-5%) C=0.94

Structures	0 Total	0 SF		0 Total SF	0.00 AC
Drives	0 Total	0 SF		0 Total SF	0.00 AC
Pavement	0 L (ft)	0 Width (ft)		0 Total SF	0.00 AC
Patios	0 Total	0 SF		0 Total SF	0.00 AC
Sidewalks	0 Width (ft)			0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

Exist cultivated fields:

0-2% slope	C=0.20	262,393 SF		262,393 Total SF	6.02 AC
2-5% slope	C=0.35	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.50	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.65	0 SF		0 Total SF	0.00 AC
				262,393 **TOTAL**	6.02 AC

For lawn areas:

0-2% slope	C=0.15	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.25	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.40	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.55	0 SF		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

For woodland areas:

0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.24	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.36	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

			Check	279,393 **GT**
Wt'd C =	0.25			
Wt'd N =	0.19			
High Pt El	380.00 ft			
Inlet El	370.50 ft			
Length	950.00 ft			
Slope	0.0100			
t_c	27.37 min			

0 1	Is 5<t_c<10?	i_{10}=	0.00 in/hr		
0 1	Is 10<t_c<15?	i_{10}=	0.00 in/hr		
1 1	Is 15<t_c<30?	i_{10}=	3.05 in/hr		
1 0	Is 30<t_c<60?	i_{10}=	0.00 in/hr		

Q5= **4.79 cfs**   Date: 7/14/2015

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM

Job Name/Basin #:	THE STABLES SOUTH		dev coeff.		279,393 Total SF	6.41 AC

Exist. Impervious surfaces (2-5%) C=0.94

Structures	0 Total		0 SF		0 Total SF	0.00 AC
Drives	0 Total		0 SF		0 Total SF	0.00 AC
Pavement	0 Width (ft)		0 L (ft)		0 Total SF	0.00 AC
					0 **TOTAL**	0.00 AC

Proposed Impervious surfaces (2-5%) C=0.94

Structures	32 Total		1,800 SF		57,600 Total SF	1.32 AC
Drives	32 Total		600 SF		19,200 Total SF	0.44 AC
Pavement	29 Width (ft)		1,230 L (ft)		35,670 Total SF	0.82 AC
Patios	32 Total		120 SF		3,840 Total SF	0.09 AC
Sidewalks	0 Width (ft)				0 Total SF	0.00 AC
					116,310 **TOTAL**	2.67 AC

Exist cultivated fields:

0-2% slope	C=0.20		0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.35		0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.50		0 SF		0 Total SF	0.00 AC
10+% slope	C=0.65		0 SF		0 Total SF	0.00 AC
					0 **TOTAL**	0.00 AC

For lawn areas:

0-2% slope	C=0.15		163,083 SF		163,083 Total SF	3.74 AC
2-5% slope	C=0.25		0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.40		0 SF		0 Total SF	0.00 AC
Lake	C=1.00		0 SF		0 Total SF	0.00 AC
					163,083 **TOTAL**	3.74 AC

For woodland areas:

0-2% slope	C=0.12		0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.24		0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.36		0 SF		0 Total SF	0.00 AC
10+% slope	C=0.48		0 SF		0 Total SF	0.00 AC
					0 **TOTAL**	0.00 AC

				Check	279,393 **GT**	0

Wt'd C =	0.48	
Wt'd N =	0.24	
High Pt El	381.00	ft
Inlet El	370.50	ft
Length	1,510.00	ft
Slope	0.0070	
tc	41.50	min

0 1	Is 5<tc<10?	i 25=	0.00	in/hr
0 1	Is 10<tc<15?	i 25=	0.00	in/hr
0 1	Is 15<tc<30?	i 25=	0.00	in/hr
1 1	Is 30<tc<60?	i 25=	3.04	in/hr

Q25=	**9.35 cfs**		Date: 7/14/2015

Vanderburgh County Drainage Board
Form 800

Computation Sheet for Detention Storage Using the Rational Method

Project: STABLES SOUTH   **Date:** 07/14/15

Detention Facility Design Return Period   25 years

Release Rate Return Period   10 years

Watershed Area   6.40 acres
Undeveloped Time of Concentration   27.37 minutes
Undeveloped Rainfall Intensity (iu)   3.05 inches/hour
Weighted Undeveloped Runoff Coefficient (Cu)   0.25
Undeveloped Runoff Rate (O=Cu x iu x Au)   4.88 cfs
Developed Runoff Coefficient (Cd)   0.48

Storm Duration td	Rainfall Intensity id	Inflow Rate I(td) Cd x id x Ad	Outflow Rate O Cu x iu x Au	Storage Rate (I x td) - O	Required Storage [I(td)-O]x[td/12]
min	inches/hr	cfs	cfs	cfs	acre-ft
5	7.208	22.14	4.88	17.26	0.1199
10	5.925	18.20	4.88	13.32	0.1850
15	5.033	15.46	4.88	10.58	0.2204
20	4.571	14.04	4.88	9.16	0.2545
25	4.108	12.62	4.88	7.74	0.2687
30	3.646	11.20	4.88	6.32	0.2634
40	3.123	9.59	4.88	4.71	0.2619
50	2.601	7.99	4.88	3.11	0.2160
60	2.078	6.38	4.88	1.50	0.1253
90	1.578	4.85	4.88	-0.03	-0.0040

Required Storage =   0.2687   x 43,560 sf/ac=   11,705   cubic feet

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM

Job Name/Basin #:	THE STABLES SOUTH	Basin A-1		56,284 Total SF	1.29 AC

Exist. Impervious surfaces (2-5%) C=0.94

Structures	0 Total	0 SF		0 Total SF	0.00 AC
Drives	0 Total	0 SF		0 Total SF	0.00 AC
Pavement	0 Width (ft)	0 L (ft)		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

Proposed Impervious surfaces (2-5%) C=0.94

Structures	6 Total	2,400 SF		14,400 Total SF	0.33 AC
Drives	12 Total	600 SF		7,200 Total SF	0.17 AC
Pavement	650 Width (ft)	15 L (ft)		9,425 Total SF	0.22 AC
Patios	0 Total	120 SF		0 Total SF	0.00 AC
Sidewalks	0 Width (ft)			0 Total SF	0.00 AC
				31,025 **TOTAL**	0.71 AC

Exist cultivated fields:

0-2% slope	C=0.20	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.35	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.50	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.65	0 SF		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

For lawn areas:

0-2% slope	C=0.15	25,259 SF		25,259 Total SF	0.58 AC
2-5% slope	C=0.25	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.40	0 SF		0 Total SF	0.00 AC
Lake	C=1.00	0 SF		0 Total SF	0.00 AC
				25,259 **TOTAL**	0.58 AC

For woodland areas:

0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.24	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.36	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

			Check	56,284 **GT**	0
	Wt'd C =	0.59			
	Wt'd N =	0.19			
	High Pt El	383.00 ft			
	Inlet El	378.00 ft			
	Length	450.00 ft			
	Slope	0.0111			
	tc	18.91 min			

0 1	Is 5<tc<10?	i 25=	0.00 in/hr		
0 1	Is 10<tc<15?	i 25=	0.00 in/hr		
1 1	Is 15<tc<30?	i 25=	4.67 in/hr		
1 0	Is 30<tc<60?	i 25=	0.00 in/hr		

	Q25=	**3.53 cfs**		Date: 7/14/2015

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM

Job Name/Basin #:	THE STABLES SOUTH	Basin A-2		31,123 Total SF	0.71 AC

Exist. Impervious surfaces (2-5%) C=0.94

Structures	0 Total	0 SF		0 Total SF	0.00 AC
Drives	0 Total	0 SF		0 Total SF	0.00 AC
Pavement	0 Width (ft)	0 L (ft)		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

Proposed Impervious surfaces (2-5%) C=0.94

Structures	3.5 Total	2,400 SF		8,400 Total SF	0.19 AC
Drives	7 Total	600 SF		4,200 Total SF	0.10 AC
Pavement	14.5 Width (ft)	525 L (ft)		7,613 Total SF	0.17 AC
Patios	0 Total	120 SF		0 Total SF	0.00 AC
Sidewalks	0 Width (ft)			0 Total SF	0.00 AC
				20,213 **TOTAL**	0.46 AC

Exist cultivated fields:

0-2% slope	C=0.20	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.35	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.50	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.65	0 SF		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

For lawn areas:

0-2% slope	C=0.15	10,911 SF		10,911 Total SF	0.25 AC
2-5% slope	C=0.25	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.40	0 SF		0 Total SF	0.00 AC
Lake	C=1.00	0 SF		0 Total SF	0.00 AC
				10,911 **TOTAL**	0.25 AC

For woodland areas:

0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.24	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.36	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

			Check	31,123 **GT**	0

Wt'd C =	0.66	
Wt'd N =	0.15	
High Pt El	383.00	ft
Inlet El	378.00	ft
Length	470.00	ft
Slope	0.0106	
tc	17.60	min

0 1	Is 5<tc<10?	i 25=	0.00 in/hr	
0 1	Is 10<tc<15?	i 25=	0.00 in/hr	
1 1	Is 15<tc<30?	i 25=	4.79 in/hr	
1 0	Is 30<tc<60?	i 25=	0.00 in/hr	

Q25=   **2.27 cfs**   Date: 7/14/2015

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM

Job Name/Basin #:	THE STABLES SOUTH	Basin A-3	20,678 Total SF	0.47 AC

Exist. Impervious surfaces (2-5%) C=0.94

Structures	0 Total	0 SF	0 Total SF	0.00 AC
Drives	0 Total	0 SF	0 Total SF	0.00 AC
Pavement	0 Width (ft)	0 L (ft)	0 Total SF	0.00 AC
			0 **TOTAL**	0.00 AC

Proposed Impervious surfaces (2-5%) C=0.94

Structures	2 Total	2,400 SF	4,800 Total SF	0.11 AC
Drives	4 Total	600 SF	2,400 Total SF	0.06 AC
Pavement	395 Width (ft)	15 L (ft)	5,728 Total SF	0.13 AC
Patios	0 Total	120 SF	0 Total SF	0.00 AC
Sidewalks	0 Width (ft)		0 Total SF	0.00 AC
			12,928 **TOTAL**	0.30 AC

Exist cultivated fields:

0-2% slope	C=0.20	0 SF	0 Total SF	0.00 AC
2-5% slope	C=0.35	0 SF	0 Total SF	0.00 AC
5-10% slope	C=0.50	0 SF	0 Total SF	0.00 AC
10+% slope	C=0.65	0 SF	0 Total SF	0.00 AC
			0 **TOTAL**	0.00 AC

For lawn areas:

0-2% slope	C=0.15	7,751 SF	7,751 Total SF	0.18 AC
2-5% slope	C=0.25	0 SF	0 Total SF	0.00 AC
5-10% slope	C=0.40	0 SF	0 Total SF	0.00 AC
Lake	C=1.00	0 SF	0 Total SF	0.00 AC
			7,751 **TOTAL**	0.18 AC

For woodland areas:

0-2% slope	C=0.12	0 SF	0 Total SF	0.00 AC
2-5% slope	C=0.24	0 SF	0 Total SF	0.00 AC
5-10% slope	C=0.36	0 SF	0 Total SF	0.00 AC
10+% slope	C=0.48	0 SF	0 Total SF	0.00 AC
			0 **TOTAL**	0.00 AC

			Check	20,678 GT	0

Wt'd C =	0.64	
Wt'd N =	0.16	
High Pt El	381.00 ft	
Inlet El	377.00 ft	
Length	380.00 ft	
Slope	0.0105	
tc	16.42 min	

0 1	Is 5<tc<10?	i 25=	0.00 in/hr
0 1	Is 10<tc<15?	i 25=	0.00 in/hr
1 1	Is 15<tc<30?	i 25=	4.90 in/hr
1 0	Is 30<tc<60?	i 25=	0.00 in/hr

Q25=   **1.50 cfs**   Date: 7/14/2015

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM

Job Name/Basin #:	THE STABLES SOUTH	Basin A-4		33,242 Total SF	0.76 AC

Exist. Impervious surfaces (2-5%) C=0.94

Structures	0 Total	0 SF		0 Total SF	0.00 AC
Drives	0 Total	0 SF		0 Total SF	0.00 AC
Pavement	0 Width (ft)	0 L (ft)		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

Proposed Impervious surfaces (2-5%) C=0.94

Structures	4.5 Total	2,400 SF		10,800 Total SF	0.25 AC
Drives	0 Total	600 SF		0 Total SF	0.00 AC
Pavement	0 Width (ft)	15 L (ft)		0 Total SF	0.00 AC
Patios	9 Total	120 SF		1,080 Total SF	0.02 AC
Sidewalks	0 Width (ft)			0 Total SF	0.00 AC
				11,880 **TOTAL**	0.27 AC

Exist cultivated fields:

0-2% slope	C=0.20	21,362 SF		21,362 Total SF	0.49 AC
2-5% slope	C=0.35	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.50	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.65	0 SF		0 Total SF	0.00 AC
				21,362 **TOTAL**	0.49 AC

For lawn areas:

0-2% slope	C=0.15	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.25	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.40	0 SF		0 Total SF	0.00 AC
Lake	C=1.00	0 SF		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

For woodland areas:

0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.24	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.36	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

			Check	33,242 GT	0

Wt'd C =	0.46	
Wt'd N =	0.14	
High Pt El	381.00	ft
Inlet El	377.00	ft
Length	273.00	ft
Slope	0.0147	
tc	11.98	min

0 1	Is 5<tc<10?	i 25=	0.00	in/hr
1 1	Is 10<tc<15?	i 25=	5.57	in/hr
1 0	Is 15<tc<30?	i 25=	0.00	in/hr
1 0	Is 30<tc<60?	i 25=	0.00	in/hr

Q25= 1.98 cfs   Date: 7/14/2015

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM

Job Name/Basin #:	THE STABLES SOUTH	Basin A-5		30,571 Total SF	0.70 AC

Exist. Impervious surfaces (2-5%) C=0.94

Structures	0 Total	0 SF		0 Total SF	0.00 AC
Drives	0 Total	0 SF		0 Total SF	0.00 AC
Pavement	0 Width (ft)	0 L (ft)		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

Proposed Impervious surfaces (2-5%) C=0.94

Structures	3 Total	2,400 SF		7,200 Total SF	0.17 AC
Drives	0 Total	600 SF		0 Total SF	0.00 AC
Pavement	0 Width (ft)	15 L (ft)		0 Total SF	0.00 AC
Patios	3 Total	120 SF		360 Total SF	0.01 AC
Sidewalks	0 Width (ft)			0 Total SF	0.00 AC
				7,560 **TOTAL**	0.17 AC

Exist cultivated fields:

0-2% slope	C=0.20	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.35	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.50	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.65	0 SF		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

For lawn areas:

0-2% slope	C=0.15	23,011 SF		23,011 Total SF	0.53 AC
2-5% slope	C=0.25	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.40	0 SF		0 Total SF	0.00 AC
Lake	C=1.00	0 SF		0 Total SF	0.00 AC
				23,011 **TOTAL**	0.53 AC

For woodland areas:

0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.24	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.36	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

			Check	30,571 **GT**	0
	Wt'd C =	0.35			
	Wt'd N =	0.31			
	High Pt El	381.00 ft			
	Inlet El	377.00 ft			
	Length	273.00 ft			
	Slope	0.0147			
	tc	17.51 min			

0 1	Is 5<tc<10?	i 25=	0.00 in/hr		
0 1	Is 10<tc<15?	i 25=	0.00 in/hr		
1 1	Is 15<tc<30?	i 25=	4.80 in/hr		
1 0	Is 30<tc<60?	i 25=	0.00 in/hr		

Q25=   **1.16 cfs**   Date: 7/14/2015

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM

Job Name/Basin #:	THE STABLES SOUTH	Basin B-1		46,726 Total SF	1.07 AC

Exist. Impervious surfaces (2-5%) C=0.94

Structures	0 Total	0 SF		0 Total SF	0.00 AC
Drives	0 Total	0 SF		0 Total SF	0.00 AC
Pavement	0 Width (ft)	0 L (ft)		0 Total SF	0.00 AC
				0 TOTAL	0.00 AC

Proposed Impervious surfaces (2-5%) C=0.94

Structures	10 Total	2,400 SF		24,000 Total SF	0.55 AC
Drives	5 Total	600 SF		3,000 Total SF	0.07 AC
Pavement	500 Width (ft)	15 L (ft)		7,250 Total SF	0.17 AC
Patios	0 Total	120 SF		0 Total SF	0.00 AC
Sidewalks	0 Width (ft)			0 Total SF	0.00 AC
				34,250 TOTAL	0.79 AC

Exist cultivated fields:

0-2% slope	C=0.20	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.35	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.50	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.65	0 SF		0 Total SF	0.00 AC
				0 TOTAL	0.00 AC

For lawn areas:

0-2% slope	C=0.15	12,476 SF		12,476 Total SF	0.29 AC
2-5% slope	C=0.25	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.40	0 SF		0 Total SF	0.00 AC
Lake	C=1.00	0 SF		0 Total SF	0.00 AC
				12,476 TOTAL	0.29 AC

For woodland areas:

0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.24	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.36	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC
				0 TOTAL	0.00 AC

			Check	46,726 GT	0

Wt'd C =	0.73	
Wt'd N =	0.12	
High Pt El	381.00	ft
Inlet El	377.00	ft
Length	350.00	ft
Slope	0.0114	
tc	13.54	min

0 1	Is 5<tc<10?		i 25=	0.00 in/hr	
1 1	Is 10<tc<15?		i 25=	5.29 in/hr	
1 0	Is 15<tc<30?		i 25=	0.00 in/hr	
1 0	Is 30<tc<60?		i 25=	0.00 in/hr	

Q25=	**4.14 cfs**	Date: 7/14/2015

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM

Job Name/Basin #:	THE STABLES SOUTH	Basin C-1		63,829 Total SF	1.47 AC

Exist. Impervious surfaces (2-5%) C=0.94

Structures	0 Total	0 SF		0 Total SF	0.00 AC
Drives	0 Total	0 SF		0 Total SF	0.00 AC
Pavement	0 Width (ft)	0 L (ft)		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

Proposed Impervious surfaces (2-5%) C=0.94

Structures	9 Total	2,400 SF		21,600 Total SF	0.50 AC
Drives	0 Total	600 SF		0 Total SF	0.00 AC
Pavement	0 Width (ft)	15 L (ft)		0 Total SF	0.00 AC
Patios	18 Total	120 SF		2,160 Total SF	0.05 AC
Sidewalks	0 Width (ft)			0 Total SF	0.00 AC
				23,760 **TOTAL**	0.55 AC

Exist cultivated fields:

0-2% slope	C=0.20	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.35	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.50	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.65	0 SF		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

For lawn areas:

0-2% slope	C=0.15	40,069 SF		40,069 Total SF	0.92 AC
2-5% slope	C=0.25	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.40	0 SF		0 Total SF	0.00 AC
Lake	C=1.00	0 SF		0 Total SF	0.00 AC
				40,069 **TOTAL**	0.92 AC

For woodland areas:

0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.24	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.36	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

				Check	63,829 GT	0

Wt'd C =	0.44	
Wt'd N =	0.26	
High Pt El	381.00	ft
Inlet El	370.50	ft
Length	1,500.00	ft
Slope	0.0070	
tc	42.62	min

0 1	Is 5<tc<10?	i 25=	0.00 in/hr
0 1	Is 10<tc<15?	i 25=	0.00 in/hr
0 1	Is 15<tc<30?	i 25=	0.00 in/hr
1 1	Is 30<tc<60?	i 25=	2.99 in/hr

Q25= **1.94 cfs**   Date: 7/14/2015

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM

Job Name/Basin #:	THE STABLES SOUTH	Basin D-1		53,835 Total SF	1.24 AC

Exist. Impervious surfaces (2-5%) C=0.94

Structures	0 Total	0 SF		0 Total SF	0.00 AC
Drives	0 Total	0 SF		0 Total SF	0.00 AC
Pavement	0 Width (ft)	0 L (ft)		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

Proposed Impervious surfaces (2-5%) C=0.94

Structures	7 Total	2,400 SF		16,800 Total SF	0.39 AC
Drives	0 Total	600 SF		0 Total SF	0.00 AC
Pavement	0 Width (ft)	15 L (ft)		0 Total SF	0.00 AC
Patios	14 Total	120 SF		1,680 Total SF	0.04 AC
Sidewalks	0 Width (ft)			0 Total SF	0.00 AC
				18,480 **TOTAL**	0.42 AC

Exist cultivated fields:

0-2% slope	C=0.20	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.35	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.50	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.65	0 SF		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

For lawn areas:

0-2% slope	C=0.15	35,355 SF		35,355 Total SF	0.81 AC
2-5% slope	C=0.25	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.40	0 SF		0 Total SF	0.00 AC
Lake	C=1.00	0 SF		0 Total SF	0.00 AC
				35,355 **TOTAL**	0.81 AC

For woodland areas:

0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.24	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.36	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

				Check	53,835 GT	0

Wt'd C =	0.42	
Wt'd N =	0.27	
High Pt El	381.00	ft
Inlet El	377.80	ft
Length	656.00	ft
Slope	0.0049	
tc	32.13	min

0 1	Is 5<tc<10?	i 25=	0.00	in/hr
0 1	Is 10<tc<15?	i 25=	0.00	in/hr
0 1	Is 15<tc<30?	i 25=	0.00	in/hr
1 1	Is 30<tc<60?	i 25=	3.53	in/hr

Q25=	**1.84 cfs**		Date: 7/14/2015

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM

Job Name/Basin #:	THE STABLES SOUTH	Basin E-10		13,894 Total SF	0.32 AC

Exist. Impervious surfaces (2-5%) C=0.94

Structures	0 Total	0 SF		0 Total SF	0.00 AC
Drives	0 Total	0 SF		0 Total SF	0.00 AC
Pavement	0 Width (ft)	0 L (ft)		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

Proposed Impervious surfaces (2-5%) C=0.94

Structures	0.75 Total	2,400 SF		1,800 Total SF	0.04 AC
Drives	2 Total	600 SF		1,200 Total SF	0.03 AC
Pavement	14.5 Width (ft)	290 L (ft)		4,205 Total SF	0.10 AC
Patios	0 Total	120 SF		0 Total SF	0.00 AC
Sidewalks	0 Width (ft)			0 Total SF	0.00 AC
				7,205 **TOTAL**	0.17 AC

Exist cultivated fields:

0-2% slope	C=0.20	6,689 SF		6,689 Total SF	0.15 AC
2-5% slope	C=0.35	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.50	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.65	0 SF		0 Total SF	0.00 AC
				6,689 **TOTAL**	0.15 AC

For lawn areas:

0-2% slope	C=0.15	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.25	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.40	0 SF		0 Total SF	0.00 AC
Lake	C=1.00	0 SF		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

For woodland areas:

0-2% slope	C=0.12	0 SF		0 Total SF	0.00 AC
2-5% slope	C=0.24	0 SF		0 Total SF	0.00 AC
5-10% slope	C=0.36	0 SF		0 Total SF	0.00 AC
10+% slope	C=0.48	0 SF		0 Total SF	0.00 AC
				0 **TOTAL**	0.00 AC

				Check	13,894 **GT**	0

Wt'd C =	0.58	
Wt'd N =	0.11	
High Pt El	380.00 ft	
Inlet El	377.16 ft	
Length	240.00 ft	
Slope	0.0118	
tc	10.59 min	

0 1	Is 5<tc<10?	i 25=	0.00 in/hr
1 1	Is 10<tc<15?	i 25=	5.82 in/hr
1 0	Is 15<tc<30?	i 25=	0.00 in/hr
1 0	Is 30<tc<60?	i 25=	0.00 in/hr

Q25=   **1.08 cfs**   Date: 7/14/2015

DEVELOPED CALCULATIONS FLOW FOR A 25 YEAR STORM

Job Name/Basin #:	THE STABLES SOUTH	Basin UPSTREAM WATERSHED	1,177,927 Total SF	27.04 AC

Exist. Impervious surfaces (2-5%) C=0.94

Structures	2 Total	400 SF	800 Total SF	0.02 AC
Drives	1 Total	2,280 SF	2,280 Total SF	0.05 AC
Pavement	29 Width (ft)	200 L (ft)	5,800 Total SF	0.13 AC
			8,880 **TOTAL**	0.20 AC

Proposed Impervious surfaces (2-5%) C=0.94

Structures	0 Total	2,400 SF	0 Total SF	0.00 AC
Drives	0 Total	600 SF	0 Total SF	0.00 AC
Pavement	0 Width (ft)	15 L (ft)	0 Total SF	0.00 AC
Patios	0 Total	120 SF	0 Total SF	0.00 AC
Sidewalks	0 Width (ft)		0 Total SF	0.00 AC
			0 **TOTAL**	0.00 AC

Exist cultivated fields:

0-2% slope	C=0.20	738,281 SF	738,281 Total SF	16.95 AC
2-5% slope	C=0.35	0 SF	0 Total SF	0.00 AC
5-10% slope	C=0.50	0 SF	0 Total SF	0.00 AC
10+% slope	C=0.65	0 SF	0 Total SF	0.00 AC
			738,281 **TOTAL**	16.95 AC

For lawn areas:

0-2% slope	C=0.15	421,566 SF	421,566 Total SF	9.68 AC
2-5% slope	C=0.25	0 SF	0 Total SF	0.00 AC
5-10% slope	C=0.40	0 SF	0 Total SF	0.00 AC
Lake	C=1.00	0 SF	0 Total SF	0.00 AC
			421,566 **TOTAL**	9.68 AC

For woodland areas:

0-2% slope	C=0.12	9,200 SF	9,200 Total SF	0.21 AC
2-5% slope	C=0.24	0 SF	0 Total SF	0.00 AC
5-10% slope	C=0.36	0 SF	0 Total SF	0.00 AC
10+% slope	C=0.48	0 SF	0 Total SF	0.00 AC
			9,200 **TOTAL**	0.21 AC

	Check	1,177,927 **GT**	0

Wt'd C =	0.19	
Wt'd N =	0.27	
High Pt El	382.00 ft	
Inlet El	370.50 ft	
Length	2,420.00 ft	
Slope	0.0048	
tc	59.86 min	

0 1	Is 5<tc<10?	i 25=	0.00 in/hr
0 1	Is 10<tc<15?	i 25=	0.00 in/hr
0 1	Is 15<tc<30?	i 25=	0.00 in/hr
1 1	Is 30<tc<60?	i 25=	2.08 in/hr

Q25=   **10.54 cfs**   Date: 7/14/2015

EXIST. 50

$HW = 375.5 - 370.5$

$$\frac{HW = 5'}{D = 2.5} = 2$$

Figure 33

HEADWATER DEPTH FOR CIRCULAR CONCRETE PIPE CULVERTS WITH INLET CONTROL

EXAMPLE

D = 36 inches (3.0 feet)
Q = 66 cfs

	$\frac{HW^*}{D}$	HW feet
(1)	1.8	5.4
(2)	1.55	4.7
(3)	1.6	4.8

*D in feet

DIAMETER OF CULVERT (D) IN INCHES

DISCHARGE (Q) IN CFS

HEADWATER DEPTH IN DIAMETERS (HW/D)

To use scale (2) or (3) draw a straight line through known values of size and discharge to intersect scale (1). From point on scale (1) project horizontally to solution on either scale (2) or (3).

HW/D SCALE	ENTRANCE TYPE
(1)	Square edge
(2)	Groove end with headwall
(3)	Groove end projecting

Q = 53 cfs

HEADWATER SCALES 2&3
REVISED MAY 1964

Free Online Manning Formula Trapezoidal Channel Calculator

Manning Formula Uniform Trapezoidal Channel Flow at Given Slope and Depth

Can you help me translate this calculator to your language or host this calculator at your web site?

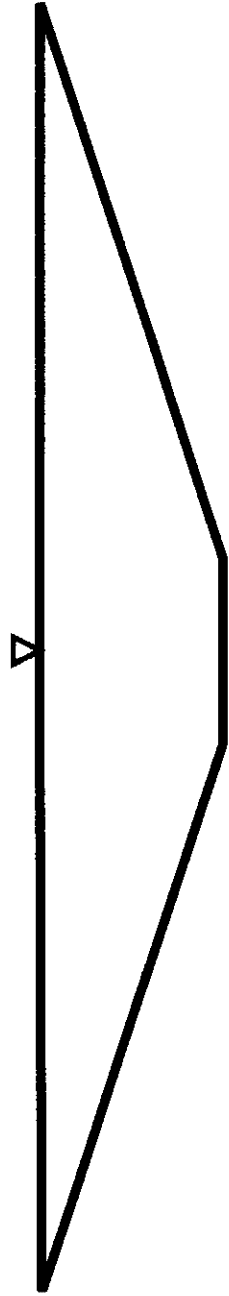# The Stables South ditch section "A" (conc. liner)

The Stables South

Set units: | m | mm | ft | inches

Input	Value	Unit
Bottom width	1	ft
Side slope 1 (horiz./vert.)	3	
Side slope 2 (horiz./vert.)	3	
Manning roughness, n ?	.025	
Channel slope	.0034	rise/run
Flow depth	1	ft
Bend Angle? (for riprap sizing)	0	
Stone specific gravity (2.65)	0	

Results:

Result	Value	Unit
Flow area	4.00	ft^2
Wetted perimeter	7.32	ft
Hydraulic radius	0.55	ft
Velocity, v	2.32	ft/sec
Flow, q	9.2619	cfs
Velocity head, h_v	0.08	ft
Top width, T	7.00	ft
Froude number, F	0.54	
Shear stress (tractive force), tau	0.21	psf
Implied riprap size based on n	0.07	ft
Required bottom angular riprap size, D50, Maricopa County	-0.10	
Required side slope 1 angular riprap size, D50, Maricopa County	-0.11	ft
Required side slope 2 angular riprap size, D50, Maricopa County	-0.11	ft
Required angular riprap size, D50, per Maynord, Ruff, and Abt (1989)	NaN	ft

2015							Onli|	ning|	la Trq	la CH	Calcu|

Required angular riprap size, D50, per Searcy (1967)

0.04 ft ▼

Please give us your valued words of suggestion or praise. Did this free calculator exceed your expectations in every way?

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Last Modified 06/18/2015 23:42:13

Free Online Manning Formula Trapezoidal Channel Calculator

Manning Formula Uniform Trapezoidal Channel Flow at Given Slope and Depth

Can you help me translate this calculator to your language or host this calculator at your web site?

The Stables South ditch section "A" (conc. liner)

The Stables South

Set units:	m	mm	ft	inches		
Bottom width	1				ft	▼
Side slope 1 (horiz./vert.)	3					
Side slope 2 (horiz./vert.)	3					
Manning roughness, n ?	.025					
Channel slope	.0034	rise/run	▼			
Flow depth	1				ft	▼
Bend Angle? (for riprap sizing)	0					
Stone specific gravity (2.65)	0					

Results:

Flow area	4.00	ft^2	▼
Wetted perimeter	7.32	ft	▼
Hydraulic radius	0.55	ft	▼
Velocity, v	2.32	ft/sec	▼
Flow, q	9.2619	cfs	▼
Velocity head, h_v	0.08	ft	▼
Top width, T	7.00	ft	▼
Froude number, F	0.54		
Shear stress (tractive force), tau	0.21	psf	▼
Implied riprap size based on n	0.07	ft	▼
Required bottom angular riprap size, D50, Maricopa County	-0.10	ft	▼
Required side slope 1 angular riprap size, D50, Maricopa County	-0.11	ft	▼
Required side slope 2 angular riprap size, D50, Maricopa County	-0.11	ft	▼
Required angular riprap size, D50, per Maynord, Ruff, and Abt (1989)	NaN	ft	▼

2015			Onlin[	ring f[	ia Trd	ia Trd	al Ctf	Calcd

Required angular riprap size, D50, per Searcy (1967) | 0.04 | ft ▼

Please give us your valued words of suggestion or praise. Did this free calculator exceed your expectations in every way?

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Last Modified 06/18/2015 23:42:13

THE STABLES SOUTH

Engineer: ___ NRM Design Storm 25 Year Storm 10/15 Sh Manning's "n" 0.011

Basin Number	Upstream Manhole	Downstream Manhole	Pipe Length (ft)	C	A (Acres)	A*C	Sum A*C	Inlet Time tc (min)	t cum. (min)	i (in/hr)	Q (cfs)	Pipe Diameter (in)	Pipe Slope (%)	Pipe Capacity (cfs)	Pipe Capacity Check	Velocity (ft/s)	Travel Time (min)	Rim Elevation (Upstream)	Rim Elevation (Downstream)	Invert Elevation (Upstream)	Invert Elevation (Downstream)	Pipe Cover (Upstream)	Pipe Cover (Downstream)	Pipe Type
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	23	24
A-1	600	603	54.0	0.59	1.29	0.76	0.76	18.91	18.91	4.67	3.55	15	0.55	5.66	O.K.	4.61	0.20	378.18	378.60	375.68	375.38	1.25	1.97	RCP
A-2	601	602	29.0	0.66	0.71	0.47	0.47	17.60	19.22	4.79	2.24	12	0.29	2.26	O.K.	2.88	0.17	377.93	377.93	375.66	375.60	1.25	1.33	RCP
A-3	602	603	10.0	0.64	0.47	0.30	0.77	16.42	19.30	4.90	3.77	15	0.25	3.81	O.K.	3.11	0.05	377.93	378.60	375.40	375.38	1.28	1.98	RCP
-	603	604	74.0				1.53		19.33	4.90	7.50	18	0.37	7.55	O.K.	4.27	0.29	378.60	379.00	375.18	374.91	1.92	2.59	RCP
-	604	605	185.0						19.62	4.90	7.50	18	0.37	7.55	O.K.	4.27	0.72	379.00	378.00	374.91	374.23	2.59	2.27	RCP
A-4	605	606	180.0	0.46	0.76	0.35	1.88	11.98	20.34	5.57	9.45	18	0.58	9.45	O.K.	5.35	0.56	378.00	378.00	374.23	373.19	2.27	3.31	RCP
A-5	606	607	140.0	0.70	0.35	0.25	2.13	17.51	20.90	4.80	10.20	18	0.68	10.23	O.K.	5.79	0.40	378.00	375.00	373.19	372.24	3.31	1.26	RCP
-	607	608	85.0						21.30	4.80	10.20	18	1.46	14.99	O.K.	8.48	0.17	375.00	ES	372.24	371.00	1.26	ES	
B-1	609	610	99.0	0.73	1.07	0.78	0.78	13.54	13.54	5.29	4.13	12	2.93	7.19	O.K.	9.16	0.18	378.78	ES	374.00	371.10	3.78	ES	RCP
C-1	611	612	18.0	0.44	1.47	0.65	0.65	42.62	42.62	2.99	1.93	12	1.10	4.41	O.K.	5.61	0.05	375.00	ES	372.50	372.30	1.50	ES	RCP

16.49

0	1	0.00	5<tc<10
0	1	0.00	10<tc<15
1	1	4.90	15<tc<30
1	0	0.00	30<tc<60

Basin Number	Upstream Manhole	Downstream Manhole	Pipe Length (ft)	A (Acres)	C	A*C	Sum A*C	Inlet Time tc (min)	t cum (min)	i (in/hr)	Q (cfs)	Pipe Diameter (in)	Pipe Slope (%)	Pipe Capacity (cfs)	Pipe Capacity Check	Velocity (ft/s)	Travel Time (min)	Rim Elevation (Upstream)	Rim Elevation (Downstream)	Invert Elevation (Upstream)	Invert Elevation (Downstream)	Pipe Cover (Upstream)	Pipe Cover (Downstream)	Pipe Type
1	2	3	4	6	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	23	24
A-1	500	501	248.0	0.34	0.50	0.17	0.17	12.18	12.18	5.54	0.94	12	0.15	1.63	O.K.	2.07	1.99	375.50	375.50	373.50	373.13	1.00	1.37	RCP
A-2	501	502	137.5	0.40	0.45	0.18	0.35	14.28	14.28	5.16	1.81	12	0.20	1.88	O.K.	2.39	0.96	375.50	378.00	373.13	372.86	1.37	4.14	RCP
-	502	A1#B	54.5	0.00	0.00	0.00	0.35	0.00	15.24	5.01	1.75	12	0.20	1.88	O.K.	2.39	0.38	378.00	377.93	372.86	372.75	4.14	4.18	RCP
A-3	503	504	29.0	0.41	0.68	0.28	0.28	13.55	13.55	5.29	1.47	12	0.15	1.63	O.K.	2.07	0.23	377.00	377.00	374.50	374.46	1.50	1.54	RCP
A-4	504	A1#B	104.7	0.77	0.53	0.41	0.69	16.72	16.72	4.87	3.35	12	0.69	3.49	O.K.	4.44	0.39	377.00	378.00	374.46	373.74	1.54	3.26	RCP
B-1	505	506	34.3	0.50	0.60	0.30	0.30	15.36	-	5.00	1.50	12	0.15	1.63	O.K.	2.07	0.28	377.00	376.85	374.50	374.45	1.50	1.40	RCP
B-2	506	507	46.5	0.48	0.57	0.27	0.57	15.10	15.65	4.97	2.85	12	0.50	2.97	O.K.	3.78	0.20	376.85	377.00	374.45	374.22	1.40	1.78	RCP
B-3	507	A1#D	66.8	0.28	0.44	0.12	0.70	14.31	15.85	4.95	3.45	12	3.80	8.19	O.K.	10.43	0.11	377.00	379.50	374.22	371.68	1.78	6.82	RCP
D-1	508	509	29.0	0.77	0.76	0.59	0.59	13.08	13.08	5.38	3.15	12	0.60	3.26	O.K.	4.14	0.12	377.00	377.00	375.00	374.83	1.00	1.17	RCP
D-2	509	510	8.0	0.77	0.76	0.59	1.17	13.08	13.20	5.35	6.26	12	2.30	6.37	O.K.	8.11	0.02	377.00	377.50	374.83	374.65	1.17	1.85	RCP
-	510	513	519.7	0.00	0.00	0.00	1.17	-	13.22	5.35	6.26	18	0.26	6.33	O.K.	3.58	2.42	377.50	378.00	374.25	372.90	1.75	3.60	RCP
D-5	511	512	29.0	0.59	0.68	0.40	0.40	15.83	15.83	4.96	1.99	12	0.23	2.02	O.K.	2.57	0.19	377.50	378.00	375.00	374.93	1.00	2.37	RCP
D-6	512	513	23.1	0.74	0.76	0.56	0.96	14.55	16.03	4.94	4.76	12	1.30	4.79	O.K.	6.10	0.06	377.00	378.00	374.93	374.63	1.07	2.37	RCP
-	513	514	140.2	0.00	0.00	0.00	2.13	0.00	16.10	4.93	10.50	18	0.72	10.53	O.K.	5.96	0.39	378.00	374.00	372.90	371.89	3.60	0.61	RCP
D-3/4	514	515	80.5	0.68	0.50	0.34	2.47	-	16.49	4.90	12.10	18	0.96	12.16	O.K.	6.88	0.20	378.00	374.00	371.89	371.12	4.61	1.38	RCP
E-1	516	517	245.0	0.44	0.51	0.22	0.22	13.77	13.77	5.25	1.18	12	0.15	1.63	O.K.	2.07	1.97	378.00	378.00	376.00	375.63	1.00	1.37	RCP
E-2	517	519	184.5	0.66	0.45	0.30	0.52	14.57	15.76	4.96	2.59	12	0.60	3.26	O.K.	4.14	0.74	378.00	378.00	375.63	374.52	1.37	2.48	RCP
E-3	518	519	307.5	0.77	0.48	0.37	0.37	20.84	20.84	4.49	1.66	12	0.48	2.91	O.K.	3.71	1.38	378.00	378.00	376.00	374.52	1.00	2.48	RCP
E-4	519	520	124.3	0.67	0.45	0.30	1.19	14.64	23.23	4.27	5.08	15	0.45	5.12	O.K.	4.17	0.50	378.00	376.83	374.32	373.76	2.43	1.99	RCP
E-5	520	521	29.0	0.87	0.58	0.50	1.69	20.48	23.72	4.23	7.17	15	0.90	7.23	O.K.	5.89	0.08	376.83	376.83	373.76	373.50	1.82	2.08	RCP
E-6	521	522	8.0	0.60	0.56	0.34	2.03	18.58	24.62	4.22	8.57	15	1.50	9.34	O.K.	7.61	0.02	376.83	377.50	373.52	373.40	2.08	2.85	RCP
-	522	614	102.0	0.00	0.00	0.00	2.03	18.58	24.64	4.22	8.57	21	0.25	9.36	O.K.	3.89	0.44	377.50	377.50	373.00	372.75	2.75	3.01	RCP
E-10	613	614	22.8	0.32	0.58	0.19	0.19	9.64	25.08	5.97	1.11	12	8.42	12.19	O.K.	15.53	0.02	377.16	378.18	374.66	372.74	1.50	3.76	RCP
-	614	528	61.3	0.00	0.00	0.00	2.22	-	25.10	4.22	9.35	21	0.25	9.36	O.K.	3.89	0.26	377.50	378.18	372.74	372.59	3.01	3.84	RCP
-	528	525	360.7	0.00	0.00	0.00	2.22	-	25.36	4.22	9.35	21	0.25	9.36	O.K.	3.89	1.54	378.18	377.50	372.59	371.69	3.84	4.06	RCP
E-7	523	524	29.0	0.51	0.56	0.29	0.29	14.65	14.65	5.10	1.46	12	0.14	1.57	O.K.	2.00	0.24	377.00	377.00	374.75	374.71	1.25	1.29	RCP
E-8	524	525	25.2	0.76	0.60	0.46	0.74	16.56	16.56	4.89	3.63	12	0.75	3.64	O.K.	4.63	0.09	377.00	377.50	374.71	374.52	1.29	1.98	RCP
-	525	526	158.9	0.00	0.00	0.00	2.94	23.00	25.46	4.07	11.97	21	0.44	12.42	O.K.	5.16	0.51	377.50	373.75	371.69	370.99	4.06	1.01	RCP
E-9	526	527	80.9	1.17	0.30	0.35	3.29	34.32	34.32	3.42	11.26	21	0.37	11.39	O.K.	4.74	0.28	373.75	375.50	370.99	370.69	1.01	3.06	RCP

16.49

	5<tc<10	
0	1	0.00
0	1	10<tc<15	0.00
1	1	15<tc<30	4.90
1	0	30<tc<60	0.00

APPENDIX

The Stables South

Final Drainage Report

MAP SCALE 1" = 1000'

500 0 1000 2000
FEET
METER

PANEL 0205D

FIRM

FLOOD INSURANCE RATE MAP

VANDERBURGH COUNTY, INDIANA
AND INCORPORATED AREAS

PANEL 205 OF 275

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EVANSVILLE, CITY OF	180257	0205	D
VANDERBURGH COUNTY	180256	0205	D

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

**MAP NUMBER
18163C0205D**

**EFFECTIVE DATE
MARCH 17, 2011**

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

NFIP

CLAYTON AVENUE
HELMUTH AVENUE
CASS AVENUE
SWEETSER AVENUE
CONLIN AVENUE
POLSTER DRIVE
EUCLID DRIVE
KENMORE DRIVE
MARGYBETH AVENUE
BURDETTE AVENUE
KATHLEEN AVENUE
FRISSE AVENUE
E. RIVERSIDE DRIVE

T. 6 S.
T. 7 S.

Levee

330

2
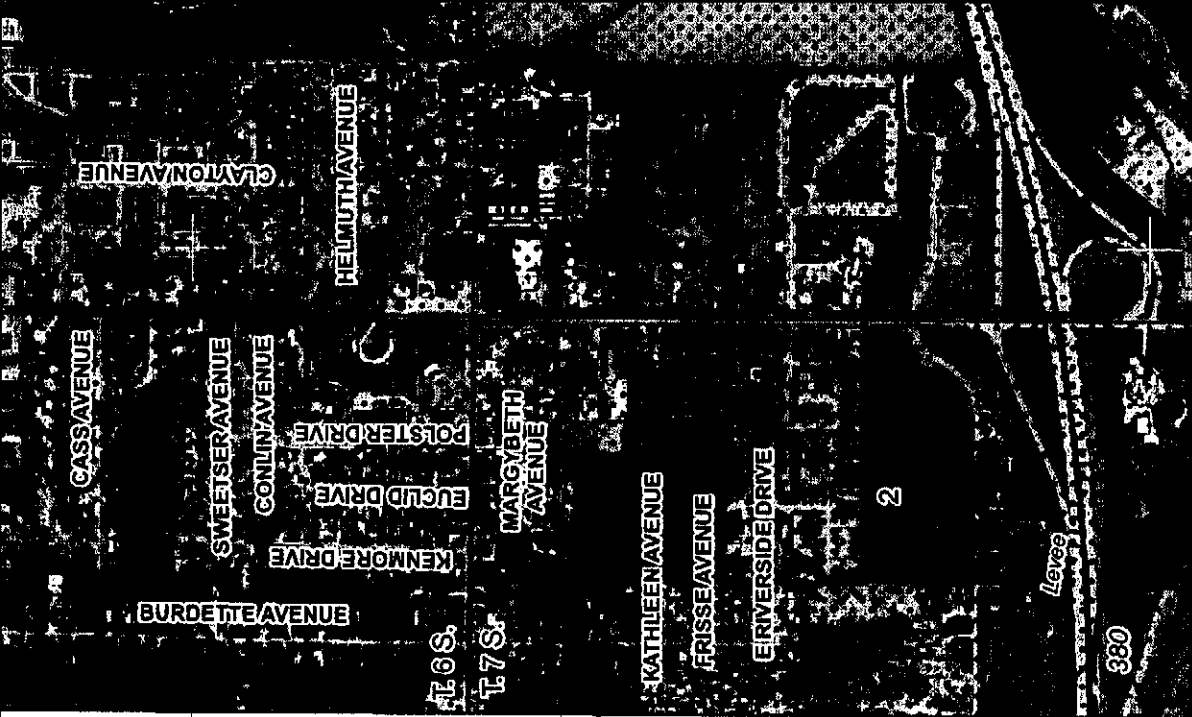
Eagle Creek

Note: This area is shown as being protected from the 1- percent- annual- chance or greater flood hazard by a levee system that has been provisionally accredited. Overtopping or failure of any levee system is possible. For additional information see the "Provisionally Accredited Levee Note" in Notes to Users.

JOINS PANEL

985000 FT

980000 FT

37°56'15"
87°30'00"

457000mE

92-14136   **DRAINAGE EASEMENT**

MARY E. ALVEY, of Vanderburgh County, Indiana, hereinafter "Grantor" in consideration of One Dollar ($1.00) the receipt of which is acknowledged, and the prospective benefits to be derived by reason of the locating, establishing, constructing and maintaining a certain drainage ditch as described below, do hereby CONVEY, GRANT AND RELEASE to WILLIAM H. CARNEAL and BETTY CARNEAL, husband and wife and JEFFREY H. CARNEAL, all of Vanderburgh County, Indiana, hereinafter "Grantees" a perpetual and assignable easement for the purpose of locating, establishing, constructing and maintaining a certain drainage ditch over, under, along, across and through certain real property owned by the Grantors and located in Vanderburgh County, Indiana, and more particularly described as follows, to-wit:

Part of the Southwest Quarter of the Northwest Quarter of Section One (1), Township Seven (7) South, Range Ten (10) West, in Vanderburgh County, Indiana, being more particularly described as follows:

Beginning at the Northeast corner of said quarter quarter section; thence along the East line thereof, South One (1.0) foot to the true point of beginning; thence continue along the East line thereof, South Two Hundred Thirty (230) feet; thence West, parallel with the North line of said quarter quarter section Ten (10.0) feet; thence North, parallel with the East line of said quarter quarter section, Two Hundred Thirty-nine (239.0) feet; thence East Ten (10.0) feet to the point of beginning, containing 0.05 acres. AS RECORDED IN DEED VOL. Y54 PAGE 362.

The Grantees join in this instrument for the purposes of stipulating that the Grantees shall be responsible for all the construction costs for the proper construction of said drainage ditch when the entire 30 foot width is acquired by a similar easement from the adjacent and abutting property owners to the above described real estate.

Grantees agree that after the construction of said drainage ditch, that Grantees will be responsible for and pay all costs of maintenance on a pro rata basis determined by a ratio that the linear feet of said drainage easement conveyed by the Grantor bears to the total linear feet of said easement. It is further understood by and among the Grantor and the Grantees that all drainage easements shall provide for the Grantees to bear the maintenance on a pro rata basis determined by the number of lineal feet each property owner has conveyed as it relates to the total lineal feet of said open drainage ditch easement. Maintenance of said open drainage ditch shall be determined by that portion of lineal feet of said ditch on Grantor's property in relation to the total lineal feet of the open portion of said ditch as it relates to the other owners' portion. Provided, however, Grantees' obligation to maintain said drainage ditch shall be contingent so long as the Grantor's property remains in the same condition and for the same single family residential use. Upon the transfer of title by Grantor to the third party, or to the development by Grantor of the property other than single family residential use, whichever event occurs first, then the responsibility for the ongoing maintenance of the drainage ditch shall be the responsibility of Grantor or to the successors in interest of the property conveyed from Grantor. Included in the definition of maintenance is the prevention of erosion from the ditch onto the Grantor's real estate. Maintenance, as defined in this instrument, shall not include any maintenance, repairs, construction or reconstruction of the piped portion of said drainage project to the North of the Grantor's real estate.

The drainage ditch is for the collection of surface water drainage only and for no other purpose. This drainage ditch shall inure to the benefit of the Grantor and her successors in title who shall have a right to drain the surface water on the Grantor's

property into said open drainage ditch. Grantees shall not be responsible to construct said drainage ditch until Grantees have acquired the entire 30 foot wide drainage easement.

Grantees agree to repair or replace the fencing on the Grantor's property of sufficient type and strength with which horses can be secured.

Grantees have furnished Grantor a proposed ditch alignment and cross section exhibit drawings, which specifications are incorporated herein by reference and made a part hereof as though fully set forth. Said drainage ditch shall be constructed in compliance with said drawings.

Grantor assigns to Grantees, Grantees' successors, heirs or assigns, the right to dedicate the above described drainage easement to the public domain, with the provision that the appropriate governmental body will accept the easement into its drainage system and will consent to maintain said drainage easement.

This easement shall run with the land and shall be for the benefit and use of the Grantor, Grantees, their respective heirs, assigns, successors in interest and legal representatives.

IN WITNESS WHEREOF, the Grant r and the Grantees have hereunto set their respective hands and seals this _14th_ day of _May_____, 1992.

_____
MARY E. ALVEY

"Grantor"

_____   _____
WILLIAM H. CARNEAL   BETTY CARNEAL

                                      _____
                                      JEFFERY H. CARNEAL

"Grantees"

STATE OF INDIANA   )
) SS:
COUNTY OF VANDERBURGH   )

Before me, the undersigned, a Notary Public, in and for said County and State, personally appeared the within named MARY E. ALVEY, who acknowledged the execution of the foregoing drainage easement to be her voluntary act and deed.

Witness my hand and Notarial Seal this _14th_ day of _May_____, 1992.

_____
NOTARY PUBLIC, a resident of
Warrick County, Indiana

_____
PRINTED NAME   Michele Noblett

_11-17-95_
MY COMMISSION EXPIRES

STATE OF INDIANA   )
) SS:

COUNTY OF VANDERBURGH   )

     Before me, the undersigned, a Notary Public, in and for said County and State, personally appeared the within named WILLIAM H. CARNEAL, BETTY CARNEAL and JEFFREY H. CARNEAL, who acknowledged the execution of the foregoing drainage easement to be their voluntary act and deed.

     Witness my hand and Notarial Seal this 14th day of
_____, 1992.

                                     NOTARY PUBLIC, a resident of
                                   _____ County, Indiana

11-17-95

MY COMMISSION EXPIRES   PRINTED NAME

THIS INSTRUMENT PREPARED BY P. MICHAEL MITCHELL, ATTORNEY AT LAW, 522 MAIN STREET, EVANSVILLE, INDIANA 47708.   (812) 423-4216.

(4/28/92)

DRAINAGE EASEMENT AND AGREEMENT

THIS INDENTURE WITNESSETH, that **BETTY CARNEAL** and **JEFFREY H. CARNEAL** ("Grantors"), both of Vanderburgh County, State of Indiana, for and in consideration of the sum of One Dollar ($1.00) and other considerations, the receipt of which is hereby acknowledged, does hereby **GRANT AND CONVEY** unto **2400 SOUTH GREEN RIVER ROAD, LLC,** 3801 North Burkhardt Road, Evansville, Indiana 47715 ("Grantee"), the rights to share the use of the perpetual and assignable easement granted to the Grantors by Jerry D. Kreitzer and Celesta L. Krietzer, as recorded in Deed Drawer 6, Card 7404, in the Office of the Recorder of Vanderburgh County, Indiana, for storm water drainage.

Grantee agrees that said monetary consideration is for the use of a drainage ditch and 30" diameter PVC pipe within said easement, all within said easement and further subject to:
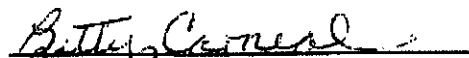
1. Approval by the Grantors.

2. Construction of the storm drainage improvements shall be in compliance plans approved by the Vanderburgh County Drainage Board.
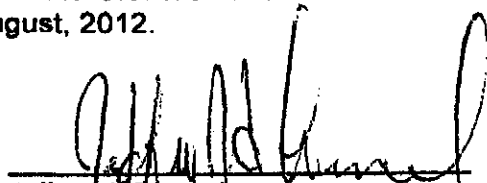
Grantors, Grantors' successors, heirs, or assigns agree to be responsible for and pay for 20% of maintenance, repair or replacement of said drainage ditch and pipe.

Grantee, Grantee's successors, heirs, or assigns agree to be responsible for and pay for 40% of the maintenance, repair or replacement of said drainage ditch and pipe.

IN WITNESS WHEREOF, the Grantors and the Grantee have hereunto set their respective hands and seals this 3rd day of August, 2012.

"GRANTOR"

Betty Carneal

Jeffrey H. Carneal

"GRANTEE"

2400 SOUTH GREEN RIVER ROAD, LLC

By _____

Chris Combs, as Managing Member

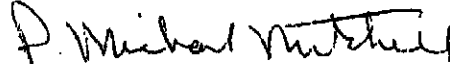STATE OF INDIANA   )
) SS:

COUNTY OF VANDERBURGH)

     Before me, the undersigned, a Notary Public in and for said County and State, personally appeared the within named **BETTY CARNEAL** (Grantor), who acknowledged the execution of the foregoing instrument to be her voluntary act and deed.

     WITNESS my hand and notarial seal this ___ day of August, 2012.

My County of Residence Is:

_____

State of Indiana, and
My Commission Expires:

_____

Notary Public

Printed Name: P. MICHAEL MITCHELL
Resident of Vanderburgh County, IN
Commission Expires: April 16, 2016

STATE OF INDIANA   )
) SS:
COUNTY OF VANDERBURGH   )

Before me, the undersigned, a Notary Public in and for said County and State, personally appeared the within named **JEFFREY H. CARNEAL** (Grantor), who acknowledged the execution of the foregoing instrument to be his voluntary act and deed.

WITNESS my hand and notarial seal this _3rd_ day of August, 2012.

My County of Residence Is:

_____
State of Indiana, and
My Commission Expires:

_____

Notary Public

Printed Name: P. MICHAEL MITCHELL
[SEAL] Resident of Vanderburgh County, IN
Commission Expires: April 16, 2016

STATE OF INDIANA   )
) SS:
COUNTY OF VANDERBURGH   )

Before me, the undersigned, a Notary Public in and for said County and State, personally appeared the within named **CHRIS COMBS**, as Managing Member of **2400 SOUTH GREEN RIVER ROAD, LLC** (Grantee), who acknowledged the execution of the foregoing instrument to be his voluntary act and deed.

WITNESS my hand and notarial seal this _3rd_ day of August, 2012.
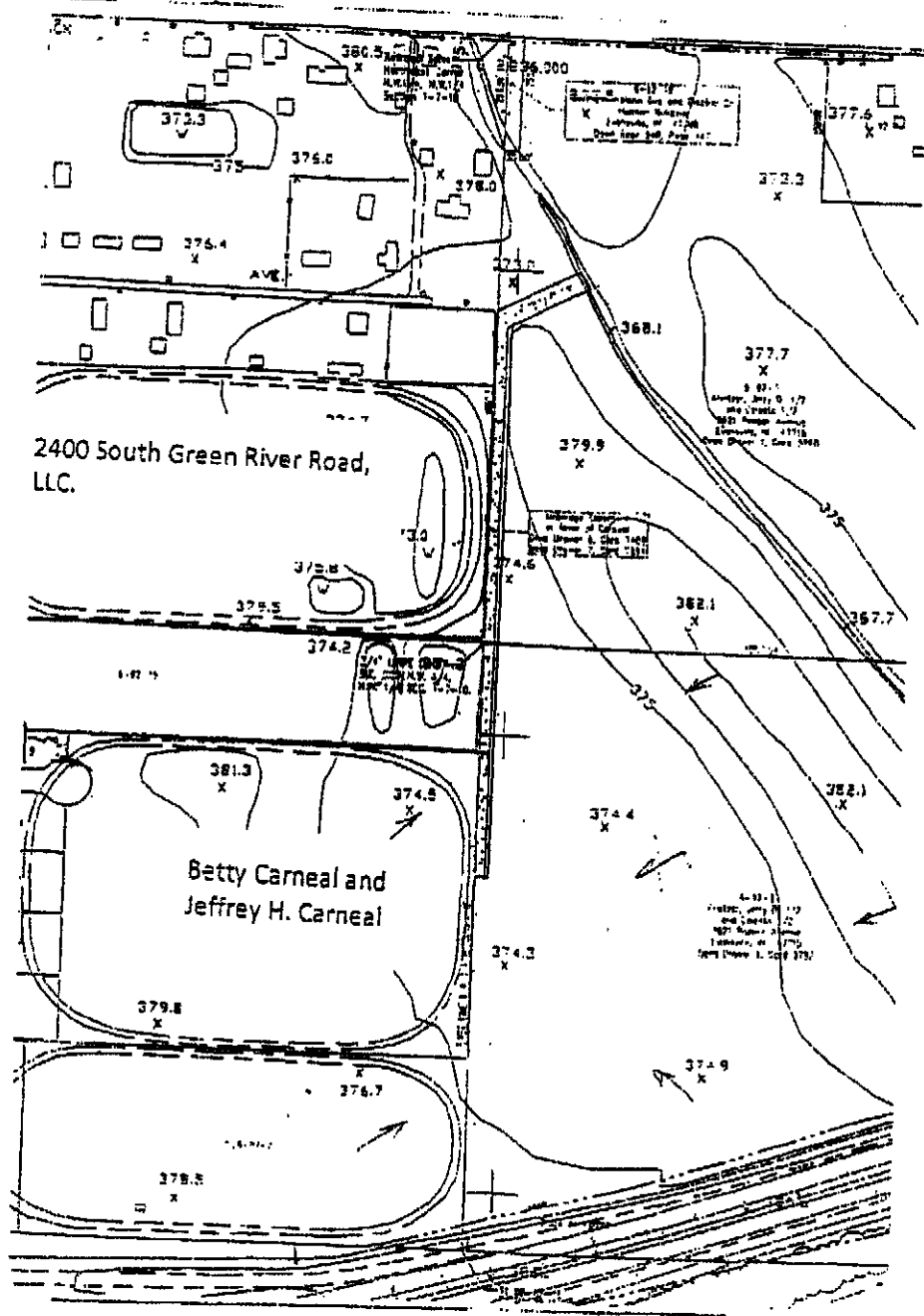
My County of Residence Is:

_____
State of Indiana, and
My Commission Expires:
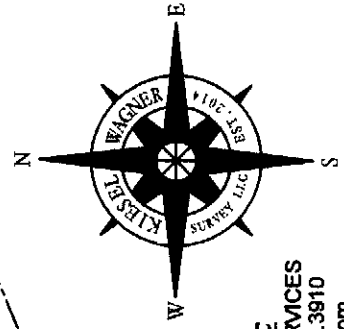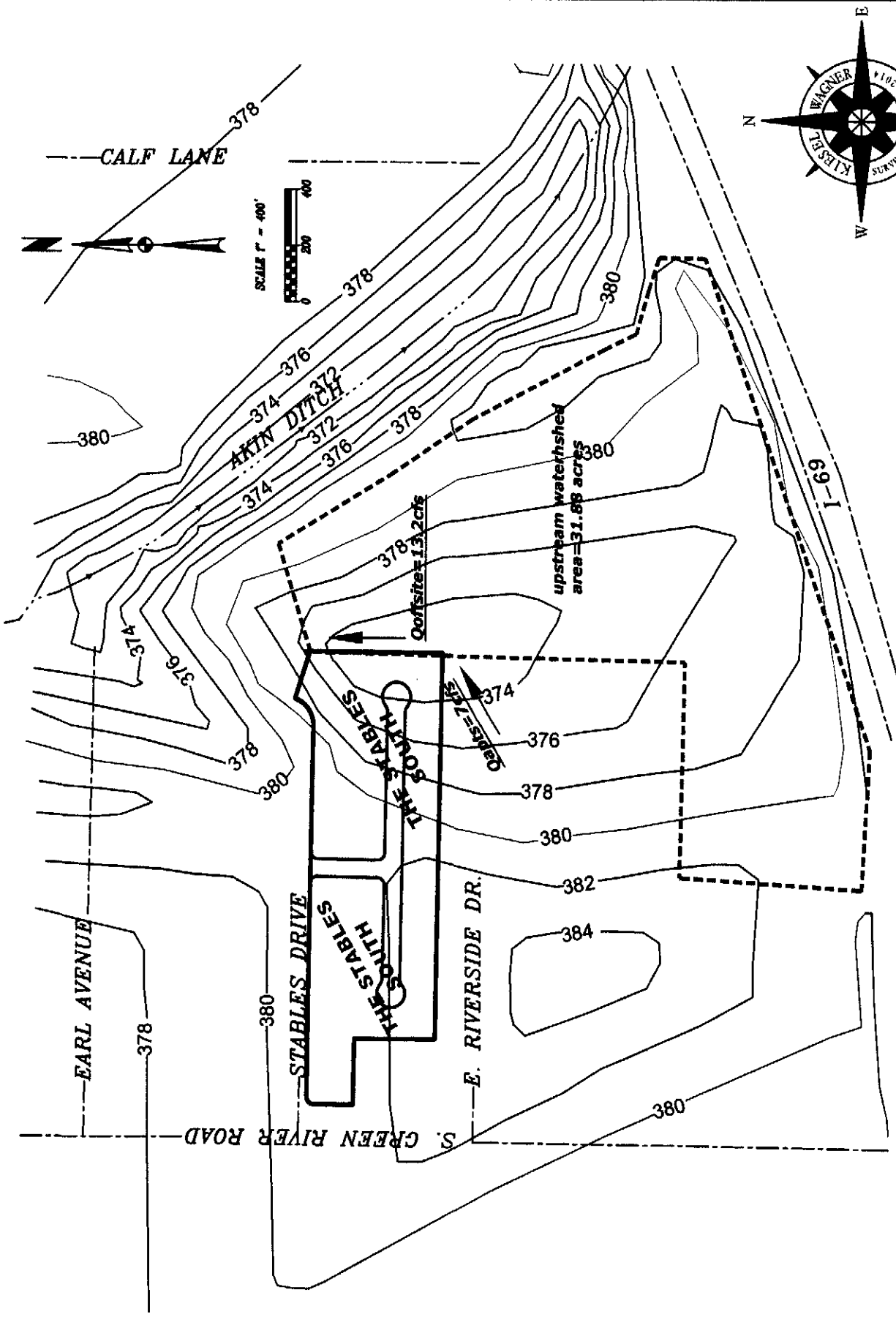
_____

Notary Public

_____
Printed Name

THIS INSTRUMENT WAS PREPARED BY P. MICHAEL MITCHELL, ATTORNEY AT LAW, OF THE LAW FIRM OF BAMBERGER, FOREMAN, OSWALD & HAHN, LLP, 20 NW FOURTH STREET, SEVENTH FLOOR, POST OFFICE BOX 657, EVANSVILLE, INDIANA 47704-0657.

I AFFIRM UNDER PENALTIES FOR PERJURY THAT I HAVE TAKEN REASONABLE CARE TO REDACT EACH SOCIAL SECURITY NUMBER IN THIS DOCUMENT, UNLESS REQUIRED BY LAW. [P. MICHAEL MITCHELL]

2400 South Green River Road, LLC.

Betty Carneal and
Jeffrey H. Carneal

WATERSHED EXHIBIT

CALF LANE

SCALE 1" = 400'

AKIN DITCH

378
376
374
372
380

Qoffsite=13.2cfs

upstream watershed area=31.89 acres

380

378

374

Qabs=7cfs

376

378

380

382

384

380

THE SOUTH STABLES

THE SOUTH STABLES

STABLES DRIVE

EARL AVENUE

S. GREEN RIVER ROAD

E. RIVERSIDE DR.
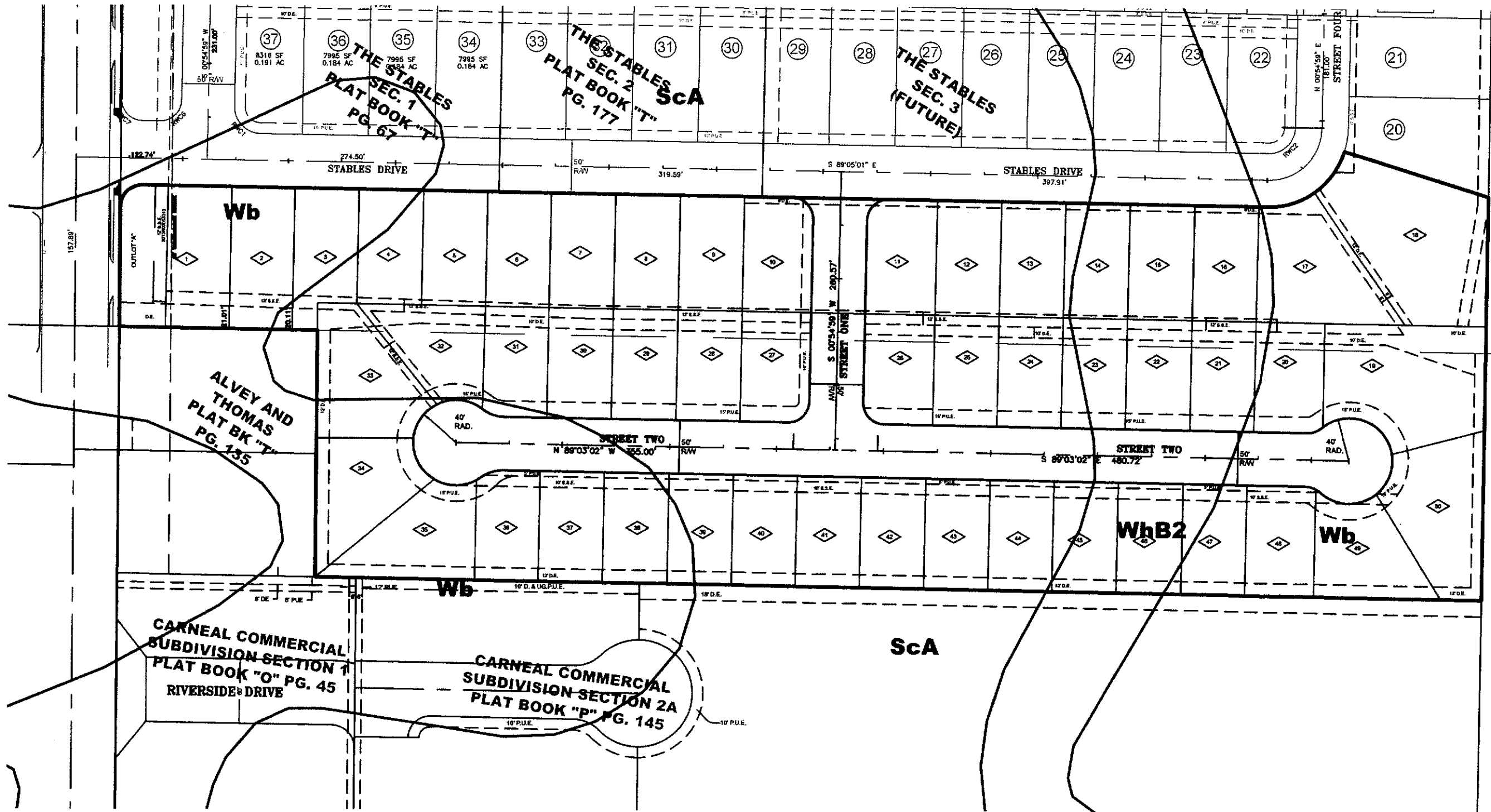
I-69

SOILS MAP EXHIBIT
THE STABLES SOUTH

Soil map data was obtained from the Web soil survey site published by the USDA, department of National Resources Conservation Service.
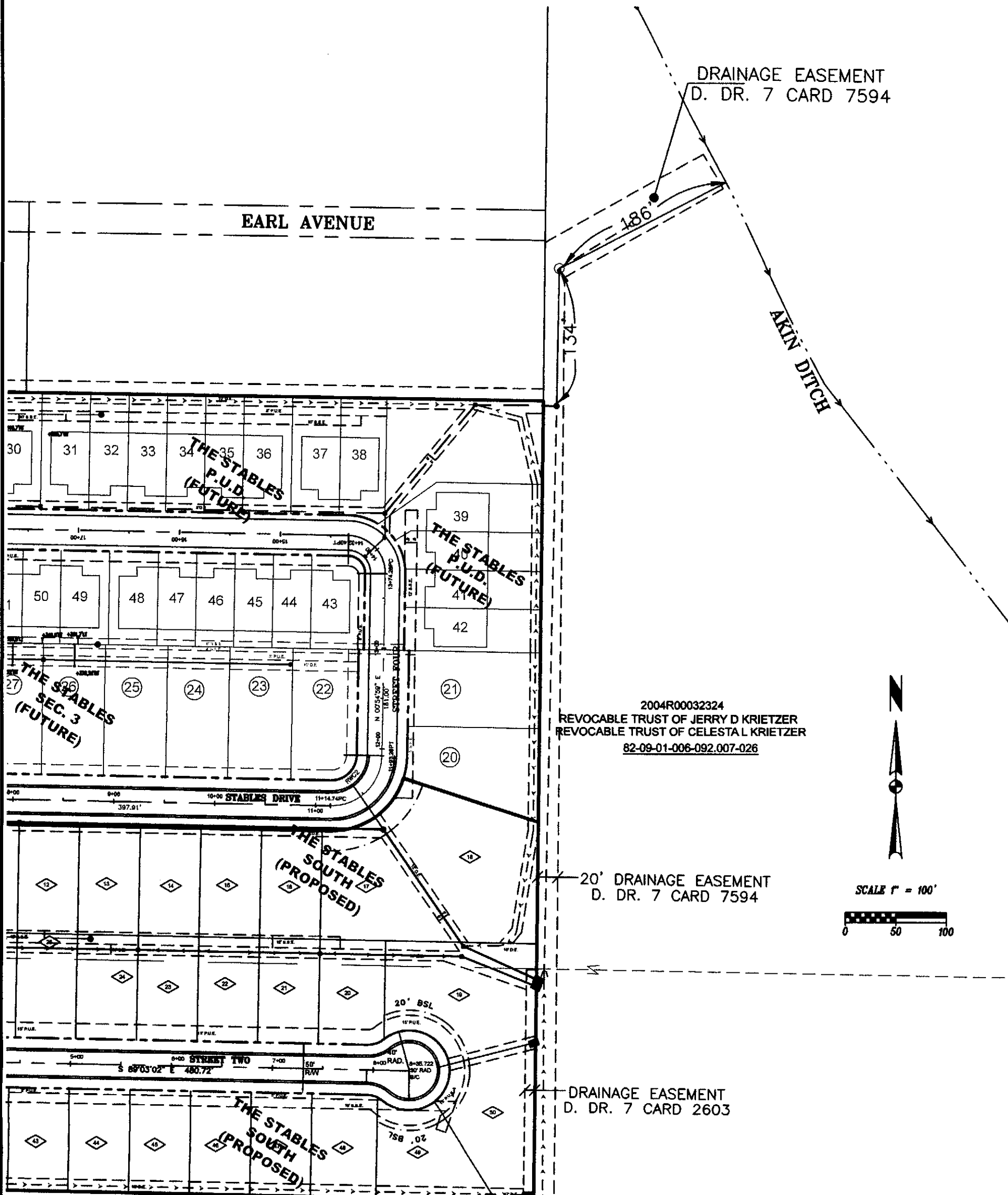
Wb-Weinbach silt loam: The limitations for residential development are limited. The limitations for local roads are also limited. Depth of water table is 6-24 inches.

ScA- Sciotoville silt loam 0-2% slopes: The limitations for residential development are somewhat limited. The limitations for local roads are also limited. ; Depth to water table 6-24 inches.

WhB2-Wheeling loam 2-6% slopes- The limitations for residential development are not limited. The limitations for local roads are somewhat limited.

SCALE 1" = 100'

0   50   100

AKIN DITCH
PROXIMITY EXHIBIT

EARL AVENUE

DRAINAGE EASEMENT
D. DR. 7 CARD 7594

186'

134'

AKIN DITCH

THE STABLES P.U.D. (FUTURE)

THE STABLES P.U.D. (FUTURE)

THE STABLES SEC. 3 (FUTURE)

30 31 32 33 34 35 36 37 38

39

50 49 48 47 46 45 44 43

42

25 24 23 22 21

20

STABLES DRIVE   397.91'   11+14.74PC

THE STABLES SOUTH (PROPOSED)

2004R00032324
REVOCABLE TRUST OF JERRY D KRIETZER
REVOCABLE TRUST OF CELESTA L KRIETZER
82-09-01-006-092.007-026

SCALE 1" = 100'

0   50   100

20' DRAINAGE EASEMENT
D. DR. 7 CARD 7594

20' BSL

STREET TWO   S 89°03'02" E 480.72'

THE STABLES SOUTH (PROPOSED)

DRAINAGE EASEMENT
D. DR. 7 CARD 2603

20' BSL

REVOCABLE TRUST OF JERRY D KRIETZER
REVOCABLE TRUST OF CELESTA L KRIETZER
2004R00032324
82-09-01-006-092.008-026

LOT 6
CARNEAL COMMERCIAL
SUBDIVISION SECTION 2A
PLAT BOOK "P" PG. 145

EVANSVILLE PLACE APARTMENTS LLC
2010R00010364
82-09-01-004-169.002-026

THIS INSTRUMENT PREPARED BY:

KIESEL-WAGNER SURVEY, LLC
LAND SURVEYING AND CONSULTING SERVICES
2711 W S.R. 68, HAUBSTADT, IN 47639
PHONE: Joe: 812.305.6256/ Chad: 812.319.3910
EMAIL: joe@kws-llc.com/chad@kws-llc.com

CROSS SECTION "A"

CROSS SECTION "B"

CROSS SECTION "C"

CROSS SECTION "D"

CROSS SECTION "E"

Horizontal Scale 20
Vertical Scale 5