



CASH WAGGNER

& ASSOCIATES, P.C.

CONSULTING ENGINEERS • LAND SURVEYORS

DATE: 09.25.18
 PROJECT NO.: 15-2184
 REFERENCE: Saddle Creek Estates
 - Section 1
 YOUR FILE NO.:

ATTENTION: Jeff Mueller
 COMPANY: Vanderburgh County
 Surveyor
 ADDRESS: Civic Center Complex -
 Room 325
 CITY, ST, ZIP: Evansville, IN 47708
 PHONE:

THE FOLLOWING ITEMS:

COPIES:	ORIG./LAST REV. DATE:	DESCRIPTION:
1	09.24.18	Revised Drainage Plan & Details
1	09.24.18	Revised Final Drainage Report

LETTER OF TRANSMITTAL

ARE TRANSMITTED:

- PER YOUR REQUEST
- FOR YOUR FILES
- FOR REVIEW & COMMENT
- OTHER

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COMMENTS:

If you have any questions or comments, please give me a call. Thank you

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FROM:

GLEN MERITT, JR., P.E.

cc: File
**RECEIVED BY THE
 VANDERBURGH COUNTY
 SURVEYOR'S OFFICE**
 9-26-18 *ca*



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CONSULTING ENGINEERS • LAND SURVEYORS

September 24, 2018

Mr. Jeff Mueller
Vanderburgh County Surveyor
Room 325 Civic Center - 1 NW Martin Luther King Jr. Blvd.
Evansville, IN 47708

RE: Final Drainage Report
Saddle Creek Estates – Section 1
Baumgart Road
Our Project #: 15-2184



Mr. Mueller:

Below is a summary of the drainage calculations for the above-referenced project.

SITE DESCRIPTION

Section 1 of this development will consist of a single-family residential subdivision with 47 lots and its associated improvements (i.e. roads, utilities). Section 1 is located on a 36.58-acre parcel that lies on the west side of Baumgart Road approximately 1,200 feet southwest of the Browning Road and Baumgart Road intersection. All of Section 1 which includes detention basin #2 will be constructed in one phase. P-609 will not be installed during Section 1 construction. This portion of the subdivision is heavily wooded and 50' on either side of the centerline of the roadways will be cleared to allow the roads and utilities to be constructed. All of the trees will be cleared from Lots 21 - 26 to allow fill to be placed and detention basin #2 to be constructed. Some of the remaining trees will be removed from the individual lots to allow the homes and driveways to be constructed once the secondary plat is recorded.

The developer will be utilizing Repair Fund "B" for the maintenance and repair of all storm water drainage systems and facilities outside the county accepted road right-of-way. Upon the completion of construction, Tenbarger – Green Alliance seed mixture will be used for permanent seeding all green space areas and the earthen side slopes of the basins. No tree limbs, refuse from legally burnt vegetation, nor construction waste, demolition materials or other man-made material may be buried within detention basin #2.

No regulated drains, inlets or outfalls exist on this site. An existing 8" sanitary sewer main is located along the west property line of Lot 116. No existing combined sewers or outfalls are located on this site. No known wells, septic tanks systems or outfalls exist on this site. No seeps, springs, sinkholes, caves, shafts, faults or other such geological features are visible or of record on this site.

The existing ditches that meander through Saddle Creek Estates and collect the majority of the runoff from Bentwood Estates and Plantation Estates will remain in

their existing condition with the exception of the two concrete culverts that will be installed to allow Road #2 to be constructed. A dam 3 -4 feet in height would have to be installed in the existing ditches in order to block the off-site runoff and back water onto the adjoining subdivisions.

The following statements will be included on the recorded plat for Saddle Creek Estates – Section 1:

The individual lot owners shall be responsible, including financially, for maintaining that part of the storm water system and its easements which exist on his or her property in proper working order including:

1. Mowing grass, controlling weeds and maintaining the designed cover of waterways, storage basins and easements in accordance with all applicable ordinances.
2. Keeping all parts of the storm water system operating as designed and as constructed and free of all trash, debris and obstructions to the flow of water.
3. Keeping the channels, embankments, shorelines and bottoms of waterways and basins free from erosion and sedimentation.
4. Maintaining that part of the storm water system which lies on his or her property in accordance with the conditions described on the approved street and/or drainage plans on file in the County Surveyor's Office and/or in the County Engineer's Office and in compliance with the County Drainage Ordinance.

The detention basin located within Bentwood Estates will be clearly shown on the recorded plat and a note stating that the outflow from the Bentwood Estates detention basin drains directly to the existing stream that is located on Lots 116 – 120.

DRAINAGE PATTERNS

Undeveloped sub-basin UN-2 contains 52.56-acres (UN-2) of which 44.62-acres is heavily wooded and 7.94-acres is a cultivated field that drains to an existing ditch that meanders through the wooded area along the west boundary of Section 1. See attached Undeveloped Sub-basin Exhibit for the location of this sub-basin.

The 25-year flows were calculated for each developed sub-basin. Undetained runoff will account for 35.98-acres and 11.52-acres will be collected by detention basin #2. There is also 16.30-acres of off-site runoff from the south that will be collected by detention basin #2. Section 1 was divided into four (4) developed sub-basins and one (1) off-site sub-basin. Sub-basin #1 and OS-4 will be collected by detention basin #2 while sub-basin #2, #4 & #5 will be allowed to exit the site undetained. See attached Developed Sub-basin Exhibit for the locations of each sub-basin.

A drainage swale and storm sewer network will be installed within the development to capture the storm water runoff and convey it to detention basin #2 located at the southwest corner of Section 1. All storm sewers will be constructed with reinforced concrete pipe. Due to the existing topography, Lots 1 - 8 will be graded from the rear of the lot to the front of the lot. I have shown 10 foot drainage easements



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along these property lines to allow side yard swales to be constructed when the homes are built which will divert the upstream runoff away from the homes. The primary outlet and emergency spillway of Detention Basin #2 will discharge into the existing ditch that is located on the west side of the detention basin. All runoff ultimately discharges to Little Pigeon Creek.

CALCULATIONS

A hydrologic and hydraulic analyses was performed for detention basin #2 using HydroCAD Stormwater Modeling System, version 9.1, developed by HydroCAD Software Solutions LLC. HydroCAD is capable of modeling the hydrology and hydraulics of stormwater runoff using the hydrology techniques developed by the NRCS and various other accepted H&H calculation techniques. The program calculates the peak runoff rates and total runoff volume for each sub-basin and routes the resulting hydrographs through the network of storm pipes, inlets and basins defined in the model. The program routes the various converging flows together, taking into account differences in time of concentration and travel time through the network structures to accurately calculate peak and total discharge rates for sizing of the detention basin outlet structures.

Peak discharge and total runoff volume calculations were performed using the NRCS (formerly SCS) Curve Number Method. Rainfall data was obtained from the Type II 24-hr storm for Vanderburgh County. The watershed sub-basin areas for the detention basin were then combined into one large sub-basin for each storm sewer run to simplify the modeling process. The weighted developed runoff Curve Number, C_N , for each sub-basin was determined for the proposed conditions based on land use and hydrologic soil group rating. The models of the proposed drainage system were subjected to H&H analyses for the 25-year return period storm event.

The outlet structure for detention basin #2 was sized for the 25-year design storm event while allowing a discharge rate less than the undeveloped 10-year storm event from the system minus the undetained 25-year runoff plus the 25-year off-site runoff. The emergency spillway for detention basin #2 was designed to convey the 100-year storm flow. The overall depth provided in the emergency spillway is 1.0' instead of the 0.9' minimum requirement per code. The extra 0.10' is provided to account for the 0.5' freeboard requirement per Section K2.

Below is a summary of the detention basin design elements:

Detention Basin #2		NOTES
Detention Basin #2 Developed Q(25)	94.65 - cfs	#1
Detention Basin #2 Developed Q(100)	134.97 - cfs	#1
Detention Basin #2 Undeveloped Q(10)	85.34 - cfs	Undeveloped Sub-basin UN-2
Undetained Developed Q(25)	103.10 - cfs	#2, #4 & #5
Off-Site Developed Q(25)	45.39 - cfs	Off-Site Sub-basin OS-4



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25-year Provided Storage Volume	145,980 - cf	
25-year Required Storage Volume	145,896 - cf	
Allowable Detention Basin Release Rate	27.63 - cfs	Undeveloped Q(10) - Undetained Developed Q(25) + Off-Site Developed Q(25)
<i>Proposed Detention Basin Release Rate</i>	14.11 - cfs	<i>Detention Basin #2 Primary Outlet</i>
<i>Primary Outlet Structure</i>	<i>45-LF of 18" R.C.P.</i>	<i>P-607</i>
Primary Outlet I.E.	402.60	
25-year Storage Vol. Elev.	406.10	
HW (25-yr. elev. - I.E.)	3.50 - ft.	
Minimum Top/Bank	407.10	

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