FINAL DRAINAGE REPORT for

Eleanor's Place Subdivision Vanderburgh County, Indiana

Project No.: 11822.4.001-B **April 26, 2022**

Prepared For:

New Residential Development, LLC 304 E State Road 68 Haubstadt, IN 47639

Prepared By:

Morley 4800 Rosebud Ln. Newburgh, IN 47630 Office: 812.464.9585

Fax: 812.464.2514

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Received by the Vanderburgh County Surveyor's Office

APR 2 6 2022

Time 10:00 AV Initials AR



ARCHITECTS | ENGINEERS | SURVEYORS

- > 812,464,9585 office 812,464,2514 Fax
- 4800 Rosebud Ln., Newburgh, IN 47630
- morleycorp.com

APPLICANT INFORMATION FORM 801

Project Name:	Eleanor's Place
Approximate Location:	13800 N Green River Road Evansville, IN 47725
Applicant Name:	New Residential Development LLC
Applicant is (check one)	☐ Individual (s) ☑ Partnership or legal LLC ☐ Corporation
Applicant Address: City: State: Zip Code:	304 E. State Road 68 Haubstadt IN 47639
Email:	phil@reinbrechthomes.com
For Individual (s)	
further understand that upon completion of statement as required by the Vanderburgh of provide such certification could result in fine	n contained on this application is to true and correct. I (we) if the project that an as built drawing or certification County Code will be submitted as required and that failure to es under Section 13.04.110 and/or make me (us) ineligible in time as an as built drawing or certification is submitted.
Signature	Date
Signature	Date

For Partnership (s)

I (we) do hereby certify that the Information contained on this application is to true and correct. I (we) further understand that upon completion of the project that an as built drawing or certification statement as required by the Vanderburgh County Code will be submitted as required and that failure to provide such certification could result in fines under Section 13.04.110 and/or make me (us) ineligible for future drainage plan approvals until such time as an as built drawing or certification is submitted.

	er
If partnership does not have a Senior of Signature Printed Name Phil Reia Wecht	Managing Partner than signatures of all partners Date $\frac{11/30/31}{}$
Signature Printed Name SEY Epperson	Date 11/30/2)
Signature Printed Name	
Signature Printed Name	
SignaturePrinted Name	
For Corporation	
understand that upon completion of the required by the Vanderburgh County Co certification could result in fines under S	contained on this application is to true and correct. I further project that an as built drawing or certification statement as de will be submitted as required and that failure to provide such section 13.04.110 and/or make the corporation ineligible for a time as an as built drawing or certification is submitted.
Signature Printed Name	Date
	(note if not a vice president or above of applicant company,



- ▶ 812.464.9585 office 812.464.2514 Fax
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- ▶ morleycorp.com

Letter of Transmittal

Regarding: Final Drainage

Eleanor's Place

To: Linda Freeman

Vanderburgh County Surveyor Civic Center Complex-Room 325

Evansville, IN 47708

Project No: 11822.4.001-B

Date:

April 26, 2022

We are sending you by: Messenger

We are sending:

COPIES	DOC. DATE	DESCRIPTION
1	4/26/2022	Final Drainage Report
1	4/26/2022	Road and Drainage Plan/Details

These are transmitted: For Approval Choose an item.

Remarks:

Please call if you have any questions.

Copies to: FILE

Received by the Vanderburgh County Surveyor's Office

APR 2 6 2022

Signed:

Cody Simpson, El

VC 11822 - VC LOT.docx

Time 10:00 AM Initials AR



> 812.464.9585 office 812.464.2514 Fax

4800 Rosebud Ln., Newburgh, IN 47630

morleycorp.com

April 26, 2022

Attn: Linda Freeman Vanderburgh County Drainage Board 1 NW Martin L King Jr Blvd #325 Evansville, IN 47708

Re: Eleanor's Place - Bench Mark Data

Morley Project No: 11822.4.001-B

Dear Linda.

Please see the Bench Mark Data below for Eleanor's Place.

<u>TBM #1</u> - South head bolt of fire hydrant located on the West side of Green River Road approximately 1,235' South of Spanish Moss Boulevard. Elevation = 422.74' (NAVD 1988)

<u>TBM #2</u> - Chiseled "X" on the most Northwest head bolt of fire hydrant located at the Southeast corner of Spanish Moss Boulevard and Persimmon Lane. Elevation = 411.90' (NAVD 1988)

If you have any questions, feel free to contact our office.

Sincerely,

James E. Morley, P.E., P.S

President

CC: John Stoll

Jessee Swain

File

Received by the Vanderburgh County Surveyor's Office

APR 2 6 2022

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82-04-11-009-073.019-030

WALTERS, E LON & MARGARET 13450 N GREEN RIVER RD

511, 1 Family Dwell - Unplatted (0 to 9.9

SCOTT 70801

1/2



Introduction

Eleanor's Place is a proposed single-family detached residential subdivision. The site is located at the extension of Persimmon Lane south of Magnolia Ridge Section 1. The site is within Section 11, Township 5 South, Range 10 West located in Scott Township, Vanderburgh County. Please refer to the location map provided within this report for further details.

Existing Conditions

Site Conditions

The 41.79-acre (original tract) site was originally included in Magnolia Ridge primary plat approval from 2018, prepared by Cash Waggner & Associates PC for The Oakridge Group LLC.

The original tract includes Parcels 2 & 3 from Magnolia Parcelization (PAR-2018-016).

A primary plat for the proposed 132 lot residential subdivision was filed and approved at the March 3, 2022 Area Plan Commission meeting.

The current conditions of the 41.79-acre tract is cultivated row crop fields with rolling terrain and mild slopes. Water and sewer are available to the site by extension.

Soils Information

The Soil Survey of Vanderburgh County indicates the soils to be Hosmer silt loam (HoA) with 0 to 2 percent slopes, Hosmer silt loam (HoB2) with 2 to 5 percent slopes, Hosmer silt loam (HoC3) with 5 to 10 percent slopes, severely eroded, and Stendal silt loam (St). Please refer to the attached soils map.

Floodplain Information

The property lies within Zone X. The site was scaled on the Flood Insurance Rate Map (FIRM) for Vanderburgh County, Indiana, Community Panel Number 18163C0130D, dated March 17, 2011. Please refer to the enclosed excerpt from this map.

Proposed Development

The proposed project contains 132 residential lots. Lots are generally 0.20 acres or larger. This development includes typical elements of a single-family detached subdivision: houses, driveways, streets, landscaping, and a storm sewer system. The expected total impervious surface included within the development is approximately 653,500 SF, or 36% of the total project site.

The proposed design of the drainage control system

The storm system is designed to closely replicate the existing drainage patterns while capturing a large portion of the runoff created from the site, and discharging only a minimal amount of runoff undetained. Only a small portion along the north and south edges of the subdivision are expected to leave the site undetained to the north and south, respectively. Generally, these areas follow these drainage patterns in the existing condition.



The storm system is comprised of swales, inlets and storm sewer that work together to direct runoff to the proposed basins throughout the project. In general, runoff from an individual lot will be directed either to the gutter of the streets and enter the storm sewer through curb inlets, or to a backyard swale that will either enter the storm sewer through a flared end section, or will discharge directly into the proposed basin.

The proposed project will consist of 4 separate basins, all onsite. The 4 separate basins will function independently, with each basin reducing the amount of post-developed runoff leaving the site to the allowable release rate, as determined by the associated pre-developed subbasins.

Assumptions or Special Conditions

In the analysis of the drainage control system, any assumptions made are for the purpose of being conservative. As with most single-family developments, certain assumptions must be made. The following assumptions were used during the analysis:

- Each lot has 3,500 SF of impervious area, typically split evenly between what drains to the front yard and what drains to the back yard.
 - o 2,500 SF of which is assumed to be rooftop
 - 500 SF is assumed in both the front and rear yards for things such as driveways, decks, patios, etc.

Results of the Analysis

Analysis of the pre-developed site delineated 4 subbasins, as shown on the pre-developed subbasin exhibit. For the pre-developed site, the runoff coefficient for cultivated (2%-5%) and cultivated (5%-10%) were used. The Time of Concentration calculations and Q_{10} values are shown for each of the pre-developed subbasins. Detailed calculations are included as an attachment.

Pre-Developed Subbasin 1:

- Area = 19.97 acres
- C = 0.425
- $T_c = 21.93 \text{ mins}$
- Q₁₀ = 30.15 CFS

Pre-Developed Subbasin 2:

- Area = 4.22 acres
- C = 0.35
- T_c = 19.92 mins
- $Q_{10} = 5.59 \text{ CFS}$



Pre-Developed Subbasin 3:

- Area = 12.93 acres
- C = 0.35
- T_c = 22.8 mins
- Q₁₀ = 15.65 CFS

Pre-Developed Subbasin 4:

- Area = 4.15 acres
- C = 0.35
- T_c = 22.72 mins
- $Q_{10} = 5.03 \text{ CFS}$

Once the project is fully developed, 55 new sub-basins will be created resulting in a total drainage area of approximately 41.60 acres. The weighted runoff coefficient, C, was calculated for each individual post-developed subbasin based on the aforementioned impervious area assumptions for each individual lot.

Developed Sub-basin Summary:

- Sub-basins 2, 4, 5 and 7-22 will be collected and detained in the North basin.
 - o Offsite Sub-basins B and C will be collected and passed through the North basin.
- Sub-basins 23-25 and 38-39 will be collected and detained in the Northeast basin.
 - Offsite Sub-basins E and F will be collected and passed through the Northeast basin.
- Sub-basins 26-37 and 42-46 will be collected and detained in the South basin
- Sub-basins 40, 41, 47, and 49 will be collected and detained in the Southeast basin.
 - Offsite Sub-basin D will be collected and passed through the southeast basin.
- Sub-basins 1, 3 and 6 will release undetained to the north to the existing ditch.
 - Offsite Sub-basin A will release undetained to the north to the existing ditch.
- Sub-basin 48 will release undetained to the south to the existing ditch.



The following analysis is provided using the Techincal Memorandum for undetained drainage areas.

Subbasin 1

- Area = 0.75 acres
- C = 0.5433

Subbasin 3

- Area = 0.48 acres
- C = 0.5891

Subbasin 6

- Area = 0.28 acres
- C = 0.55

Subbasin 48

- Area = 0.82
- C = 0.4564

Criteria #1

• 0.75 Ac. + 0.48 Ac. + 0.28 Ac. + 0.82 Ac. = 2.33 Ac. < 41.79 Ac. * 0.1 = 4.179 Ac.

Criteria #2

- Pre-Developed Subbasin 1
 - o 0.75 Ac. + 0.48 Ac. + 0.28 Ac. = 1.59 Ac. < 19.97 Ac.
- Pre-Developed Subbasin 4
 - o 0.82 Ac. < 4.15 Ac.

Criteria #3

- Pre-Developed Subbasin 1
 - \circ A * c_u = 8.49
 - \circ A * c_d = 0.84
 - o Therefore, A * c_d < A * c_u



- Pre-Developed Subbasin 4
 - \circ A * $c_u = 1.45$
 - \circ A * c_d = 0.37
 - o Therefore, A * c_d < A * c_u

Details for each of the proposed retention basins are provided below. All 4 basins are proposed wet retention basins, with an outlet pipe as the discharge mechanism, and an earthen weir as the emergency overflow.

North Basin Details:

- Pool Elevation = 402.50
- 25-Yr Storage Elevation = 404.75
- Emergency Overflow = 405.25
 - Depth of Flow through spillway = 9"
- 24" Discharge
- Q₂₅ Release = 19.98 CFS

Northeast Basin Details:

- Outlet Elevation = 412.00
- 25-Yr Storage Elevation = 413.50
- Emergency Overflow = 414.00
 - Depth of Flow through spillway = 6"
- 12" Discharge
- Q₂₅ Release = 3.33 CFS

South Basin Details:

- Pool Elevation = 410.50
- 25-Yr Storage Elevation = 412.75
- Emergency Overflow = 413.25
 - Depth of Flow through spillway = 9"
- 18" Discharge
- Q₂₅ Release = 11.19 CFS



Southeast Basin Details:

- Pool Elevation = 412.65
- 25-Yr Storage Elevation = 414.50
- Emergency Overflow = 415.00
 - Depth of Flow through spillway = 6"
- 12" Discharge w/ 7" Orifice
- Q₂₅ Release = 1.63 CFS

Permitting

The ditch along the northern property line is assumed to be jurisdictional and we are actively pursuing permits.

Curb Inlet Calculations

Curb inlet capacity calculations were performed using LTAP Chapter 5.3 – Flow in Inlets.

A summary of the calculations is provided below:

- Minimum Capacity for inlets on a continuous grade = 2.65 CFS
 - a. Equation 5.3.1 LTAP
- ii. Minimum Capacity for sump inlets (single inlet) = 2.76 CFS
 - a. Equation 5.3.2 LTAP
- iii. Minimum Capacity for sump inlets (double inlet) = 4.15 CFS
 - a. Equation 5.3.2 LTAP
- iv. Minimum Capacity for curb opening at sump inlets (single inlet) = 1.06 CFS
 - a. Equation 5.3.8 LTAP
- v. Minimum Capacity for curb opening at sump inlets (double inlet) = 2.13 CFS
 - a. Equation 5.3.8 LTAP

Per Vanderburgh County Code, the inlets were sized for the 10-year storm event. In general, the capacities i-iii above were used to size the inlets throughout the site. These capacities only take into account the gutter inlets and ignore flow through the curb opening, which will provide additional capacity if the gutter inlets become overwhelmed for any reason.

In one unique scenario, DCI-318, the double curb inlet was selected, although the Q(10) for that subbasin was calculated to be 4.59 CFS. Through discussion with the County Engineer's office and County Surveyor's office, it was determined that the double curb inlet would be sufficient,



because the curb opening at the back of the double curb inlet will provide additional capacity. Therefore, for DCI-318, the capacity of the double curb inlet is taken to be 6.28 CFS.

Northern Boundary Line

The existing ditch along the northern boundary line was examined in further detail. A brief summary of the analysis is provided in the appendix along with the supporting documentation. The peak runoff for the 50-year storm was calculated to be 75 CFS. Proposed Subbasins 1, 3 and OS-A enter the existing ditch upstream of the proposed Culvert P141 via sheet flow, or Swale S-1. Therefore, the 50-year runoff from Subbasins 1, 3 and OS-A were added to the 75 CFS to size P141. Q(50) for P141 was calculated to be 89 CFS. Using HY-8, an 8' x 4' box culvert, 20% buried, passes the 50-year peak runoff under gravity flow conditions.

Additionally, the existing ditch cross-sections were examined under the 100-year peak flow. Two cases were considered separately, upstream of P141 and downstream of P141. Upstream of P141, the same analysis was performed to calculate the 100-year peak runoff from the upstream, off-site watersheds. The 100-year runoff from Subbasins 1, 3, and OS-A were added to find the total 100-year peak flow in the existing ditch. An average of the most upstream and most downstream cross section of this section of the ditch along the northern property line was used when comparing to the 100-year peak flow. It was determined that the 100-year peak flow can pass at the TOB of the existing stream. Best practices would recommend that homes adjoining the existing ditch be constructed at least 2' above the 100-year peak flow, in this case the existing TOB. Below are the 100-year water elevations at each lot adjoining the stream, upstream of P-141

Magnolia Ridge 100-Year Water Elevation:

Lot 50 = 411.93

Lot 51 = 410.18

Lot 64 = 408.93

Eleanor's Place 100-Year Water Elevation:

Lot 29 MFF = 408.93

Lot 30 MFF = 408.93

Lot 31 MFF = 409.30

Lot 32 MFF = 411.93

not on If on A/20/2022

Downstream of P141, additional runoff was added to the 100-year peak flow that was calculated upstream of P141. The North Basin of Eleanor's Place and Post Subbasin 6 both release directly to the existing ditch. Basin 1 from Magnolia Ridge along with Post Subbasins 16, 17, and 22 all release downstream off P-141 and were considered during the 100-year peak flow through the existing ditch. An average of the most upstream and most downstream cross



section of this section of the ditch along the northern property line was used when comparing to the 100-year peak flow. It was determined that the 100-year peak flow can pass at 0.9' above the TOB of the existing stream. Best practices would recommend that homes adjoining the existing ditch be constructed at least 2' above the 100-year peak flow, in this case 0.9' above the existing TOB. Below are the 100-year water elevations at each lot adjoining the stream, upstream of P-141

Magnolia Ridge 100-Year Water Elevation:

Lot 1 = 404.27

Lot 2 = 404.62

Lot 3 = 404.88

Lot 4 = 405.22

Lot 5 = 405.50

Lot 6 = 405.78

Lot 7 = 406.64

Lot 8 = 406.64

Lot 9 = 407.04

Lot 10 = 407.04

Lot 11 = 408.11

Eleanor's Place 100-Year Water Elevation:

Lot 12 = 405.50

Lot 13 = 405.78

Lot 14 = 405.78

Lot 15 = 406.64

Lot 16 = 406.64

Lot 17 = 407.04

Lot 18 = 407.04

Lot 19 = 407.04

Lot 28 = 408.11



Southeastern Adjoiner - 82 - 04 - 11 - 009 - 073,019 - 030

The adjoiner directly south of the Southeast basin was taken into consideration when designing the emergency overflow weir for the southeast basin. The finish floor of the house, 415.44, and the lowest adjacent grade, 413.76, were located in the field on 4/22/2022. An elevation two feet below the finish floor elevation, 413.44, was used as the governing elevation for the 100-yr flow through the emergency overflow at the downstream elevation of the overflow channel.

Basin Maintenance Report

This brief report will highlight the wet retention basins' design and maintenance in accordance with the latest Vanderburgh County Drainage Ordinance Section 13.04.440, Technical Memorandums and supplements. The wet basin will have a maintenance path, slopes leading to the water's edge, emergency overflow weir, and outlet pipe. Per the approved drainage plan, the outlet pipe will serve to discharge excess storm water stored in the basin at a controlled rate. The emergency overflow weir will act as an automatic spillway should the outlet pipe be obstructed or capacity exceeded.

Maintenance of the basin shall include but is not limited to: mowing, removing debris and obstructions; removal of overgrown vegetation, mitigating erosion, and any other requirements set forth by the Vanderburgh County Drainage Board. Over time the wet basin's bottom will fill up with sediment. This excess sediment will need to be removed as directed by the latest Vanderburgh County Drainage Ordinance or as needed.

No tree limbs, trunks, refuse from legally burnt vegetation, nor construction waste, demolition materials, or other man made material may be buried within the area in which an impounding structure will be located. Notice shall be placed on construction drawings noting the prohibition to the burying of any such materials. Certain natural materials such as large rocks may be located in the bottom of wet basins in order to provide fish habitat or habitat breeding areas provided that such materials are not included within the calculations for required storage volumes and will not block outlet structures.

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

All calculations, logs, exhibits, and modeling are enclosed within this report.

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

All calculations, logs, exhibits, and modeling are enclosed within this report.



Summary

The proposed development is a 132-lot detached single family home residential subdivision. This report has provided analysis and proposed conditions which ultimately lessen the overall drainage impact of the project site and its downstream adjoiners.

Total Pre-Developed Release Q_{10} = 56.42 CFS Onsite Basins Developed Release Q_{25} = 34.39 CFS -Undetained Sub-Basins #1, 3, 6, and 48 Developed Release Q_{25} = 8.52 CFS Total Developed Release Q_{25} = 42.91 CFS

Overall, the developed project will release less stormwater runoff during the 25-year storm than it's pre-developed area during the 10-year storm.

Eleanor's Place

13.04.085 Request by applicant for plan review and approval.

A. All requests for drainage plan approval shall be made by the applicant to the drainage board through the county surveyor's office by the presentation to the surveyor of the drainage plan and the supporting data, all in duplicate, by the close of the business day two full weeks prior to the meeting at which approval of the drainage plan shall be sought.

Drainage Plan submitted on 04-26-2022

C. be	Included with the Drainage Plan shall be the following information regarding the applicant that shall rovided on FORM 801.
	For an individual(s), legal name, current mailing address, email address, name of project and general location of the project. The application must be signed by the individual(s) making such application.
	2. For a partnership, corporation or other private entity the legal name of the partnership, corporation or other private entity, mailing address, email address, name of project and general location of the project. For a partnership, the application must be signed by the managing or senior partner or if none exists by all partners. For a Limited Liability Company (LLC), the application must be signed by the manager, or senior member or if one does not exist, by all members. For a corporation, the application must be signed by;
	i) the President or Vice-President of the corporation or
	ii) by a person whose authority has been delegated to sign such application. If the signature is by a person with a delegation of authority, a copy of such delegation must be included with the application.
n	In all cases the person signing the application will affirm that:

- D. In all cases the person signing the application will affirm that;
 - i) the information provided on the application FORM 801 is true and correct and
 - ii) that the applicant is committing with their signature that an as built plan or record drawing or certification statement will be provided upon completion of the project and that failure to provide an as built plan or record drawing or certification could result in fines under Section 13.04.110 and/or declaring the applicant ineligible for future drainage plan approvals for any project within the County Drainage Board's jurisdiction until such time as an as built drawing or certification is submitted. The County Surveyor or other Technical Advisors to the Board will inform the Drainage Board of any applicants that are not in compliance with submittal of an as built drawing or certification statement prior to any action being taken against such applicant.

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.

Drainage Plan submitted on 04-26-2022

- 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.
- 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.
- 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.

This project does not contain any off-site drainage facilities that necessitate an easement to be dedicated.

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.

New Residential Development LLC

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.

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.

This project will be developed in phases.

13.04.140 Information submittal and review schedule.

The required drainage plan and supporting data shall be submitted and reviewed by a schedule as follows:

H. For all new major subdivisions as defined in Title <u>16</u> of this code, which major subdivisions are shown to discharge an amount of stormwater in addition to that which is discharged prior to new development and all minor subdivisions, C-0 Through M-3, as defined in Title <u>16</u> of this code, which minor subdivisions are zoned for commercial use, the applicant shall notify all adjoining landowners and Registered Neighborhood Associations within 1/2 mile of any development of the proposed Drainage Plan.

This project is a major subdivision.

13.04.165 Contents of the final drainage plan.

A. Soils Map. The soil types based on the most current information available from the SWCD. A soils map indicating soils names and their hydrologic classification must be provided for a proposed project.

See Appendix of Drainage Report.

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. The map must also identify all adjoining landowners.

See Grading and Drainage Plans submitted with this report.

- 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;

Contour intervals are every one foot.

2. Zone "A" floodplain based on the current FIRM panels. 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;

See Appendix of Drainage Report.

3. The normal shoreline of lakes, ponds, swamps, and basins, their floodplains, and lines of inflow and outflow;

See Grading and Drainage Plans submitted with this report.

The location of exiting regulated drains, farm drains, inlets and outfalls;

See Grading and Drainage Plans submitted with this report.

Storm, sanitary, and combined sewers, and outfalls;

See Grading and Drainage Plans submitted with this report.

Wells, septic tank systems, and outfalls, if any;

There will be no wells, septic tank systems, or outfalls on this project.

7. Seeps, springs, sinkholes, caves, shafts, faults, or other such geological features visible, or of record;

No visible geological features are present at this project site.

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

See Grading and Drainage Plans submitted with this report.

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

See Grading and Drainage Plans submitted with this report.

10. A scale, preferably one inch equals fifty (50) feet;

An arrow indicating North.;

D. On-Site Bench Mark Required. A benchmark determined by "Mean Sea Level Datum 1929," is required to be located within the project limits.

See Grading and Drainage Plans submitted with this report.

13.04.170 Final drainage plan layout (Includes information from preliminary).

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 affecting the design of the drainage facilities for the project; The extent and area of each watershed tributary to the drainage facilities within the project; The existing man-made and natural waterways, ponds, basins, pipes, culverts, and other drainage facilities or features within or affecting the project.

See Appendix of the Drainage Report for watershed exhibits.

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;

See Grading and Drainage Plans and Appendix of this Drainage Report.

 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;

See Grading and Drainage Plans submitted with this report.

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;

See Grading and Drainage Plans submitted with this report.

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

See Grading and Drainage Plans and Appendix of this Drainage Report

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;

See Grading and Drainage Plans and Appendix of this Drainage Report.

7. The location and percentage of impervious surfaces existing and expected to be constructed;
See Appendix for location and percentage of impervious surfaces existing and expected to be constructed.

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

See Grading and Drainage Plans submitted with this report.

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;

See Grading and Drainage Plans submitted with this report.

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;

See Appendix of the Drainage Report

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.

The site is not located in any applicable "impacted drainage areas".

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.

All structures are above the 100 year floodplain shown on plans.

13.04.175 Submittal of a written drainage design report. 🗸



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:

See Grading and Drainage Plans submitted with this report.

13.04.440 General detention/retention basin design requirements.

The following design principles shall be observed for detention and retention basins:

Provided

A. Duration of Storage. The maximum volume of water stored and subsequently released at the design release rate shall not result in a storage duration in excess of forty-eight (48) hours, unless additional storms occur within the period.

Provided

B. Depth of Stored Water. The maximum depth of stormwater to be stored, without a permanent pool shall not exceed four feet; and the maximum depth of stormwater to be stored above a permanent pool shall not exceed four feet.

N/A

C. Finished Floor Elevations Adjacent to Basins. The lowest floor of any building or structure occupied by humans must be at least two (2) feet above the one-hundred (100) year storm water elevation of detention/retention basins.

Provided

D. Earthen Side Slopes 4:1 Maximum Steepness for Basins. All detention and retention basins with grassed, earthen side slopes shall have side slopes no steeper than four horizontal units of measurement to one vertical unit of measurement (4:1) to the base of dry basins, and to the typical low waterline of wet basins.

N/A

E. Riprap Side Slopes 2:1 Maximum Steepness for Basins. Wet retention basins with riprap armored side slopes shall have slopes no steeper than two horizontal units of measurements to one vertical unit of measurement (2:1) at any point in the side slope.

N/A

F. Riprap to Extend Two Vertical Feet Below Waterline. The armored portion of the side slope must extend to a minimum depth below the permanent pool elevation of two vertical feet.

N/A

G. Underwater Earthen Side Slopes 2:1 Maximum Steepness. Nonarmored earthen side slopes shall have slopes no steeper than two horizontal units of measurement to one vertical unit of measurements from a point two vertical feet below permanent pool, thence downward.

N/A

H. Minimum Depth of Riprap Application. Riprap side slope armor shall be a minimum twelve (12) inches in depth at all points of application.

N/A

I. Drain Recommended for Maintenance of Wet Basins. If possible, a drain should be installed to lower the pool of wet basins to a level sufficient to repair any wave action erosion along the waterline, and to perform other periodic maintenance.

Provided

J. Safety Ledges and/or Fencing of Wet Basins. Safety fencing surrounding the basin, and/or shallow safety ledges shall be provided if deemed necessary by the design engineer or the board.

Provided

K. Outlet Controls to Operate Automatically. Outlet control structures shall be designed to operate as simply as possible, and shall require little or no maintenance for proper operation.

Provided

- L. Designed Water Level Control Required. A controlled positive outlet shall be required to maintain the designed water level in wet basins, and provide the required detention storage above the designed low water level. Wet basins shall have a minimum depth of 6 feet over 50% of the basin area and no extensive shallow areas shall be allowed except as required for the safety ledge.
- M. Emergency Spillway Requirements.

Provided

1. An emergency overflow spillway shall be provided for the release of storm runoffs exceeding the designed maximum detention volume, or all overflow volumes in emergency conditions, should the normal discharge devices become totally or partially inoperative.

Provided

2. A minimum freeboard of one-half foot above the calculated elevation of the design storm detention high water level to the elevation of the spillway flowline peak is required as a safety factor for all basins.

Provided

N. Automatically Operating Emergency Spillway Required. The emergency overflow spillway shall be designed so that it operates openly, automatically, does not require manual attention, and will pass all the one hundred (100) year return period storm flow with a one-half foot vertical minimum above the one hundred (100) year return storm flow to the lowest dirt elevation in the surrounding earthwork.

N/A

O. All Permanent Pools Require Water Quality Provisions. Designers of basins with permanent pools shall consult available manuals from the soil and water conservation district, and incorporate provisions therefrom for maintaining water quality, safety, and soil stability.

N/A

P. Dry Basin Cover and Maintenance. Dry basins shall be planted and maintained in vegetative cover equal to that of residential lawns.

Provided

Q. Side Slopes to Remain Stable. All side slopes of a basin shall be constructed stable and shall be maintained in a stable condition by the same criteria as specified herein for open channels.

Provided

R. Wet Basin Cover and Maintenance. The earthen side slopes of wet basins shall be provided with grass cover above the low water elevation, which shall be maintained equal to turfed residential lawns, and in no case shall the cover growth exceed twelve (12) inches in height, or the most current county standard.

Provided

S. Maintenance Pathway for Basins. A flat pathway with a minimum width of ten (10) feet shall be constructed completely around the top of the embankment of all detention/retention basins.

See Plan

- T. Maintenance Easement for Basins. An easement dedicated for the purpose of accessing and maintaining the basin and its appurtenances shall be provided, and the easement shall be configured so that it includes the entire basin, the entire earthwork encompassing the basin, the maintenance pathways into and around the basin, and all inletting and outletting appurtenances of the basin. The basins and maintenance easements shall not be located with the right of way of any county, state or federal road or highway.
- U. Maintenance Report Required for Basin.

Provided

1. A brief and concise report shall be prepared, by the design engineer, consisting of a description of the location, intended function of all parts appurtenant to the basin, together with a description of the ways in which the basin and its appurtenances should be maintained, all worded in language easily understood by residential or commercial property owners; and;

Provided

2. The report shall be attached to the restrictions for the property on which the basin and its parts are located.

Provided

3. Such restrictions shall be shown to exist prior to the board's final approval of the drainage plan for a project whose plans include a basin.

N/A

V. Copy of Report Must be Submitted With the As-Builts. A copy of the maintenance report described above shall be included with the as-built plans required to be submitted hereinabove.

N/A

W. Elevation of Dry Basin Bottom Marked. A continuous concrete liner at least equal in characteristics to that described in Section 13.04.315F shall be installed in all dry basins from the point of inflow of each channel entering a basin to the point of outflow from the basin. The concrete liner shall be installed at an elevation slightly lower than the earthen floor of the basin, so that it may serve as a trickle trough or low flow liner.

N/A

X. No tree limbs, trunks, refuse from legally burnt vegetation, nor construction waste, demolition materials, or other man made material may be buried within the area in which an impounding structure will be located. Notice shall be placed on construction drawings noting the prohibition to the burying of any such materials. Certain natural materials such as large rocks may be located in the bottom of wet basins in order to provide fish habitat or habitat breeding areas provided that such materials are not included within the calculations for required storage volumes and will not block outlet structures.

N/A

Y. For small sites of less than 5 acres, infiltration trenches may be utilized instead of a wet or dry basin. In utilizing an infiltration trench, the storage volume is equal to the void ratio multiplied by the total volume of the trench. Information must be provided in advance validating the void ratio as well as testing proposal to validate the void ratio. The infiltration trench must have an outlet that restricts the flow per code provisions.

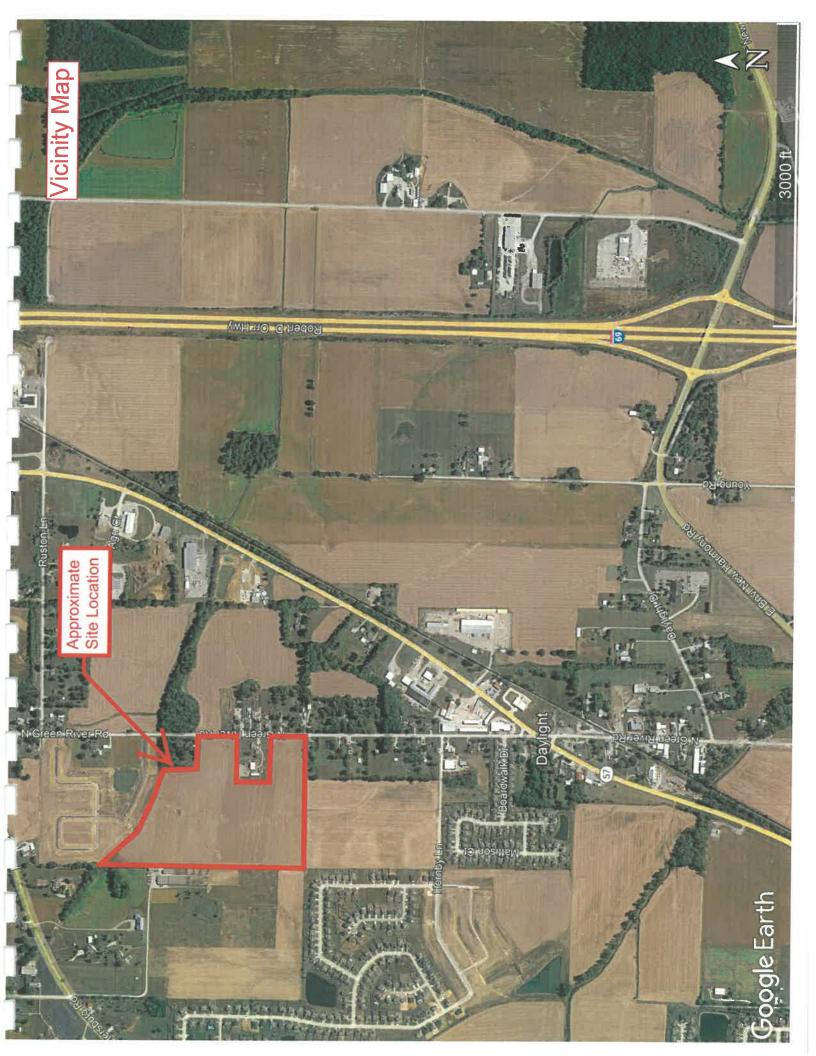
N/A

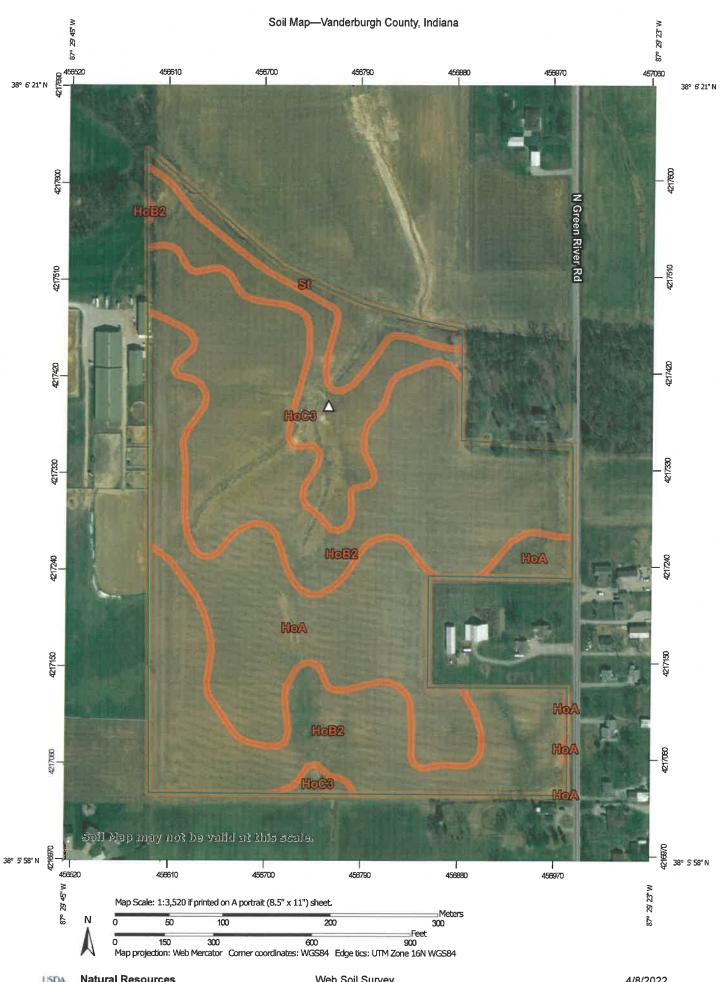
Z. No retention basin shall be allowed within the flowline of a Regulated Drain of Vanderburgh County. The Drainage Board cannot use its rights to discretionary decisions granted under Section 13.04.025 to exempt this restriction.

Other comments:

APPENDIX 'A'

Vicinity Map A.01 USDA Soil Survey A.02 Flood Insurance Rate Map (FIRM) A.03 HUC 14 Map A.04 Wetlands Inventory Map A.05





MAP LEGEND

Special Line Features 1 Canals Very Stony Spot Stony Spot Spoil Area Wet Spot Other Œ 6 * Soil Map Unit Polygons Area of Interest (AOI) Soil Map Unit Points Soil Map Unit Lines Special Point Feature Borrow Pit Area of Interest (AOI) Clay Spot Blowout 9 Soils

oint reatures		
Blowout	Water Features	ıtures
Borrow Pit	}	Streams and Canals
40.00	Transportation	ation
ciay spot	‡	Rails
Closed Depression	3	Interstate Highways
Gravel Pit		IIS Douter
Gravelly Spot		Major Boads
Landfill		major roads



Marsh or swamp

Lava Flow

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot Sandy Spot

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

contrasting soils that could have been shown at a more detailed misunderstanding of the detail of mapping and accuracy of soil Enlargement of maps beyond the scale of mapping can cause line placement. The maps do not show the small areas of

Please rely on the bar scale on each map sheet for map measurements.

Coordinate System: Web Mercator (EPSG:3857) Web Soil Survey URL:

Source of Map: Natural Resources Conservation Service

distance and area. A projection that preserves area, such as the Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required. This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Vanderburgh County, Indiana

Survey Area Data: Version 21, Sep 9, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger. Date(s) aerial images were photographed: Feb 12, 2016—Mar

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Severely Eroded Spot

Slide or Slip

Sinkhole

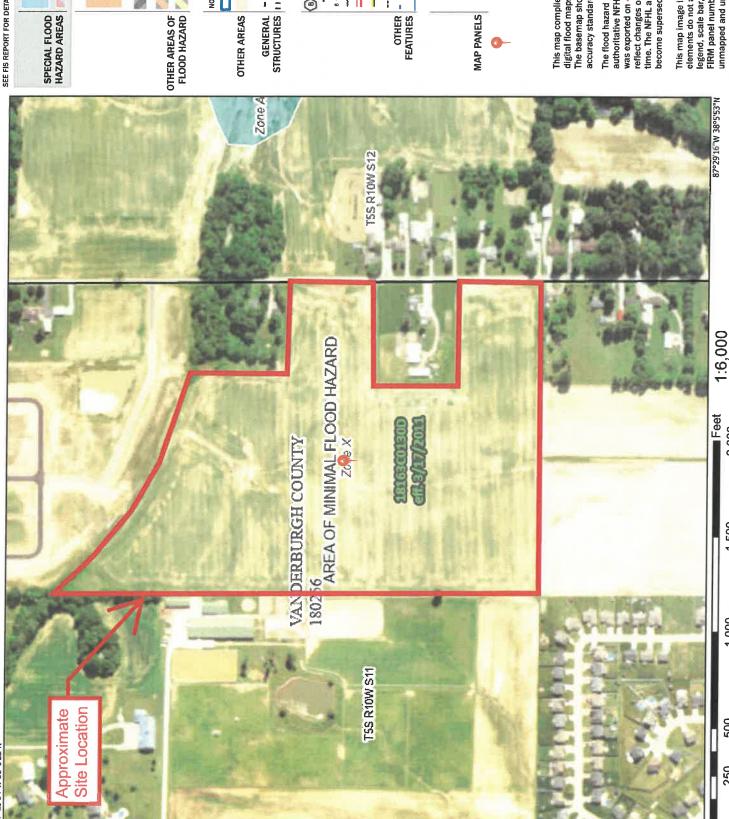
Sodic Spot

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
HoA	Hosmer silt loam, 0 to 2 percent slopes	11.0	27.0%
HoB2	Hosmer silt loam, 2 to 5 percent slopes, eroded	23.1	56.8%
HoC3	Hosmer silt loam, 5 to 10 percent slopes, severely eroded	4.7	11.5%
St	Stendal silt loam	1.9	4.7%
Totals for Area of Interest		40.8	100.0%

National Flood Hazard Layer FIRMette





Legend

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

With BFE or Depth Zone AE, AO. AH. VE, AR Without Base Flood Elevation (BFE) Regulatory Floodway

SPECIAL FLOOD HAZARD AREAS

0.2% Annual Chance Flood Hazard, Area of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile zone Future Conditions 1% Annual

Area with Flood Risk due to Levee Zone D Area with Reduced Flood Risk due to Levee. See Notes. Zone.

Chance Flood Hazard Zone

No screen Area of Minimal Flood Hazard Zone X Effective LOMRs

Area of Undetermined Flood Hazard $z_{
m one}$

Channel, Culvert, or Storm Sewer GENERAL | ---- Channel, Culvert, or Storn STRUCTURES | 1111111 Levee, Dike, or Floodwall Cross Sections with 1% Annual Chance Water Surface Elevation 17.5

Coastal Transect

Base Flood Elevation Line (BFE) Limit of Study men flamen

Jurisdiction Boundary

Coastal Transect Baseline Hydrographic Feature Profile Baseline

OTHER FEATURES

Digital Data Available

No Digital Data Available

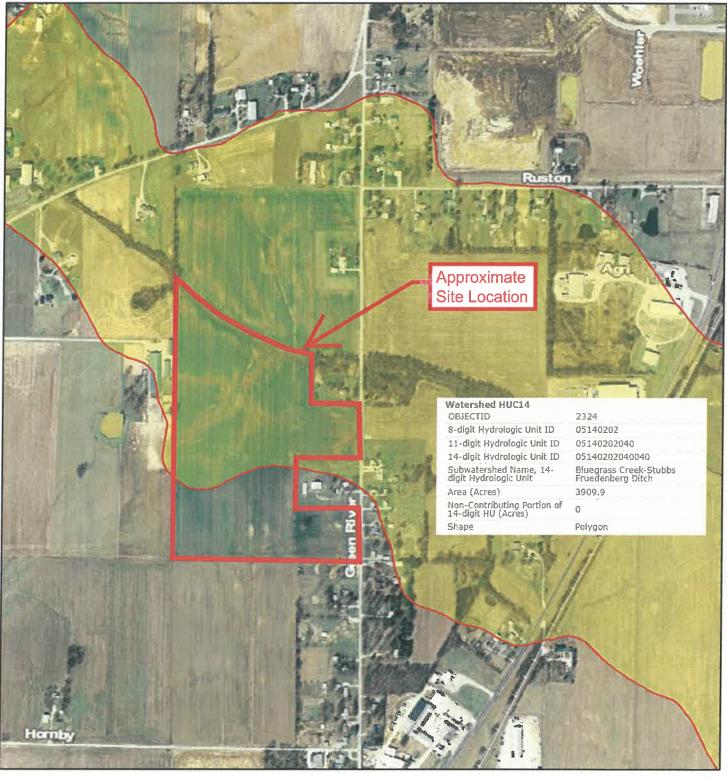
Unmapped

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

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

authoritative NFHL web services provided by FEMA. This map reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or The flood hazard information is derived directly from the was exported on 4/8/2022 at 3:59 PM and does not become superseded by new data over time. This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

HUC 14 - 1

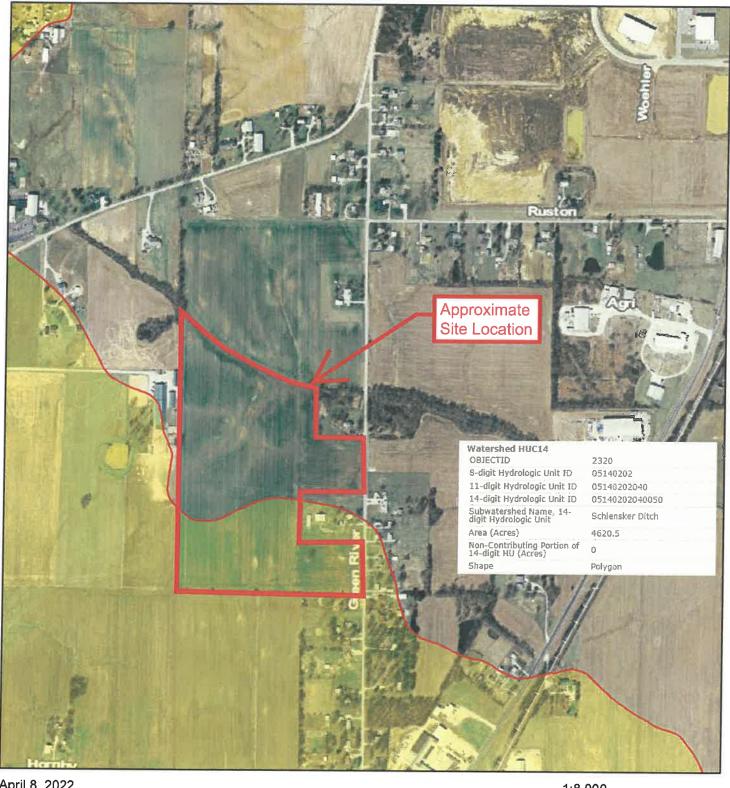


April 8, 2022

1:8,000

0 0.05 0.1 0.2 mi

HUC 14 - 2



April 8, 2022

1:8,000

0 0.05 0.1 0.2 mi
0 0.1 0.2 0.4 km

April 8, 2022

Wetlands

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

Lake

Services for responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

This map is for general reference only. The US Fish and Wildlife

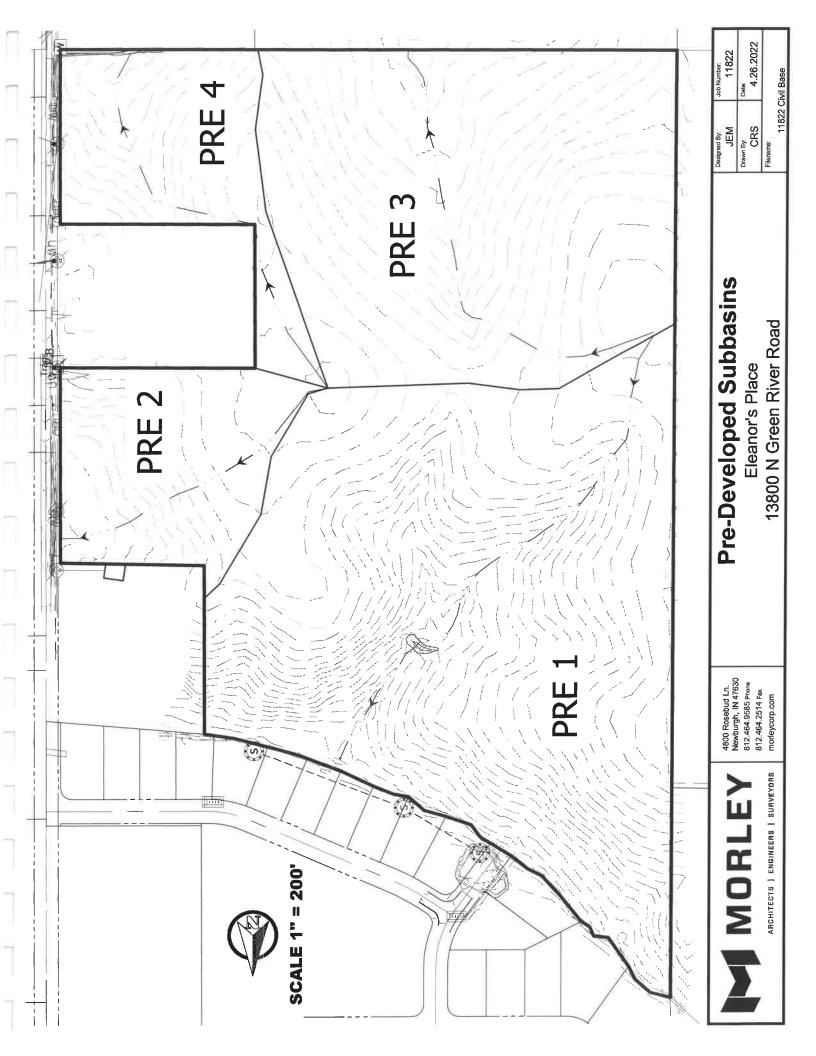
Other

Riverine

National Wetlands Inventory (NWI) This page was produced by the NWI mapper

APPENDIX 'B'

Pre-Developed Drainage Information B.01
Developed Drainage Information B.02
Drainage Calculations B.03
Form 800 B.04
Detention Calculations B0.5



Area	(Ac)	=

19.97

Project 11822 Area (Sf) = 869,784

Weighted Runoff Coefficient	IA					To.	A*a	7
Surface	Area	S.F.	=	0,00	AC.	0.92	A*c 0.00	-
Structures & Pavement (<2%)								4
Structures & Pavement (2-5%)		S.F.	=	0.00	AC.	0.94	0.00	-
Structures & Pavement (5-10%) Structures & Pavement (>10%)		S.F.	=	0.00	AC.	0.96	0.00	-
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50	0.00	-
Gravel (25 yr Storm)		S.F.	-	0.00	AC.	0.60	0.00	-
Gravel (50-100 yr Storm)		S.F.	-	0.00	AC.	0.65	0.00	-
Lawn (<2%)	+	S.F.	-	0.00	AC.	0.05	0.00	-
Lawn (2-5%)		S.F.	-	0.00	AC.	0.25	0.00	-
Lawn (5-10%)		S.F.	=	0.00	AC.	0.40	0.00	1
Lawn (>10%)		S.F.	=	0.00	AC.	0.55	0.00	1
Woodland Flat (<2%)	_	S.F.	=	0.00	AC.	0.12	0.00	1
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00	1
Woodland Rolling (5-10%)	-	S.F.	=	0.00	AC.	0.36	0.00	1
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.00	1
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00	1
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00	1
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00	1
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00	1
Cultivated (<2%)		S.F.	-	0.00	AC.	0.20	0.00	
Cultivated (2-5%)	434,892	S.F.	=	9.98	AC.	0.35	3.49	
Cultivated (5-10%)	434,892	S.F.	-	9.98	AC.	0.50	4.99]
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00]
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00	1
Water		S.F.	=	0.00	AC.	1.00	0.00	
	869,784			19.97			8.49	
Wc =	0.4250							
Ti 6 O								
Time of Concentration								
Overland Flow			400					0 1 151 7
Length, L (max 100ft)		=	100	feet			-	Overland Flow To
Slope, S		=	1.07%				t _o =	[0.42*(L ^{u.8})*(n ^{u.8})]/[P ^{0.5})*(S ^{u.4})]
Manning Coefficient, n		=	0.170	Cultivated			t _o =	13.70 min
P _{2/24}		=	3.3					
Shallow Flow								
Length, L (Paved or Unpaved)	Unpaved	=	1081	feet			V =	16.1345*(S0.5)
Slope, S	O.,paroa	=	1.84%				_	2.189 ft/s = 131.32 ft/min
Velocity, V		=	2.19	ft/sec			t _s =	Shallow Flow Tc
voiceity, v			2110				-	(L/V) = 8.23 min
							ري	(L/V) = 0.25 IIIII
Channel Flour								
Channel Flow		_		F4			· -	(1.49/n)*R ^{0.67} *S ^{0.5}
Length, L		=	0	feet	^		V =	
Difference in Elevation		=	U	to	0			ft/s = ft/min
Slope, S		=					t _c =	
								Channel Flow Tc
Manning Coefficient, n		=	0.000				t _c =	Channel Flow Tc (L/V) = 0.00 min
Manning Coefficient, n Wetted Perimeter, Wp		=	0.000	feet			t _c =	
-				feet sqft			t _c =	
Wetted Perimeter, Wp		=	0				t _c =	
Wetted Perimeter, Wp Area, A		=	0				t _c =	
Wetted Perimeter, Wp Area, A Hydraulic Radius, R		=	0	sqft			t _c =	
Wetted Perimeter, Wp Area, A Hydraulic Radius, R		= = =	0	sqft ft/s			t _c =	
Wetted Perimeter, Wp Area, A Hydraulic Radius, R	į.	= = =	0	sqft	atio n		t _c =	
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Project 11822

Area (Ac) =	4.22	Area (Sf) =	183,753
Mainhard Downess Confficient			

Weighted Runoff Coefficient Surface	Area					С	A*c	7
Structures & Pavement (<2%)	1	S.F.	=	0.00	AC.	0.92		
Structures & Pavement (2-5%)		S.F.	=	0.00	AC.	0.94	0.00	
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.00	7
Structures & Pavement (>10%)		S.F.	=	0.00	AC.	0.98	0.00	
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50		
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60		
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65		
Lawn (<2%)		S.F.	=	0.00	AC.	0.15		
Lawn (2-5%)		S.F.	=	0.00	AC.	0.25		
Lawn (5-10%)		S.F.	=	0.00	AC.	0.40		
Lawn (>10%)		S.F.	=	0.00	AC.	0.55		1
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12		4
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24		
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36		1
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.00	4
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12		4
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24		-
Pasture Rolling (5-10%)		S.F.	-	0.00	AC.	0.36		-
Pasture Hilly (>10%)		S.F.		0.00	AC.	0.48	0.00	4
Cultivated (<2%)	400.750	S.F.	-	4.22	AC.	0.20	1.48	-
Cultivated (2-5%)	183,753	S.F.	=	0.00	AC.	0.50		-
Cultivated (5-10%)		S.F.	-	0.00	AC.	0.65	0.00	1
Cultivated (>10%) Bare Soil		S.F.	-	0.00	AC.	0.00	0.00	1
Water Soil		S.F.	-	0.00	AC.	1.00	0.00	1
7 7 61.61	183,753	Wife i		4.22	1.00	1.00	1.48	1
Wc =	0.3500	_		1	_		11.10	4
Time of Concentration Overland Flow Length, L (max 100ft)		=	100	feet			t _o =	Overland Flow Tc
				ieet			_	[0.42*(L ^{us})*(n ^{us})]/[P ^{u.5})*(S ^{u.4})]
Slope, S		=	0.73%				-0	
Manning Coefficient, n		=	0.170	Cultivated			t _o =	15.96 min
P _{2/24}		=	3.3					
Shallow Flow Length, L (Paved or Unpaved) Slope, S Velocity, V	Unpaved	= =	561 2.14% 2.36	feet ft/sec			V = = t _s = t _s =	16.1345*(S0.5) 2.360 ft/s = 141.62 ft/min Shallow Flow Tc (L/V) = 3.96 min
Channel Flow		=		for all			V =	(1.49/n)*R ^{0.67} *S ^{0.5}
Length, L		=	0	feet to	0		V -	ft/s = ft/min
Difference in Elevation			U	to .	0			Channel Flow Tc
Slope, S		=					-	
Manning Coefficient, n		=	0.000				t _c =	(L/V) = 0.00 min
Wetted Perimeter, Wp		=	0	feet				
Area, A		=	0	sqft				
Hydraulic Radius, R		=						
Velocity, V		=		ft/s				
	t t	= =	Total Time Σto + Σts + 19.92	of Concentra Σtc (Min 5 Min				
			0.33	Hour				
ntensity (Vanderburgh Co.)								
	l ₂		2.86	in/hr				
	I ₅		3.35	in/hr				
	I ₁₀	=	3.78	in/hr				
	l ₂₅		4.44	in/hr				
	I ₅₀	=	5.01	in/hr				
	l ₁₀₀	=	5.66	in/hr				
Peak Runoff Rate								
TOR KUNDA KAR	0 - 0:4							
	Q _{yr} = CiA							
	Q ₂		4.22	cfs				
	Q ₅		<u>4.95</u>	cfs				
	Q ₁₀		<u>5.59</u>	cfs				
	^	=	6.56	cfs				
	Q ₂₅							
	Q ₅₀		7.40	cfs				
	Q ₅₀	=	7.40	cfs				

Area (Ac) =

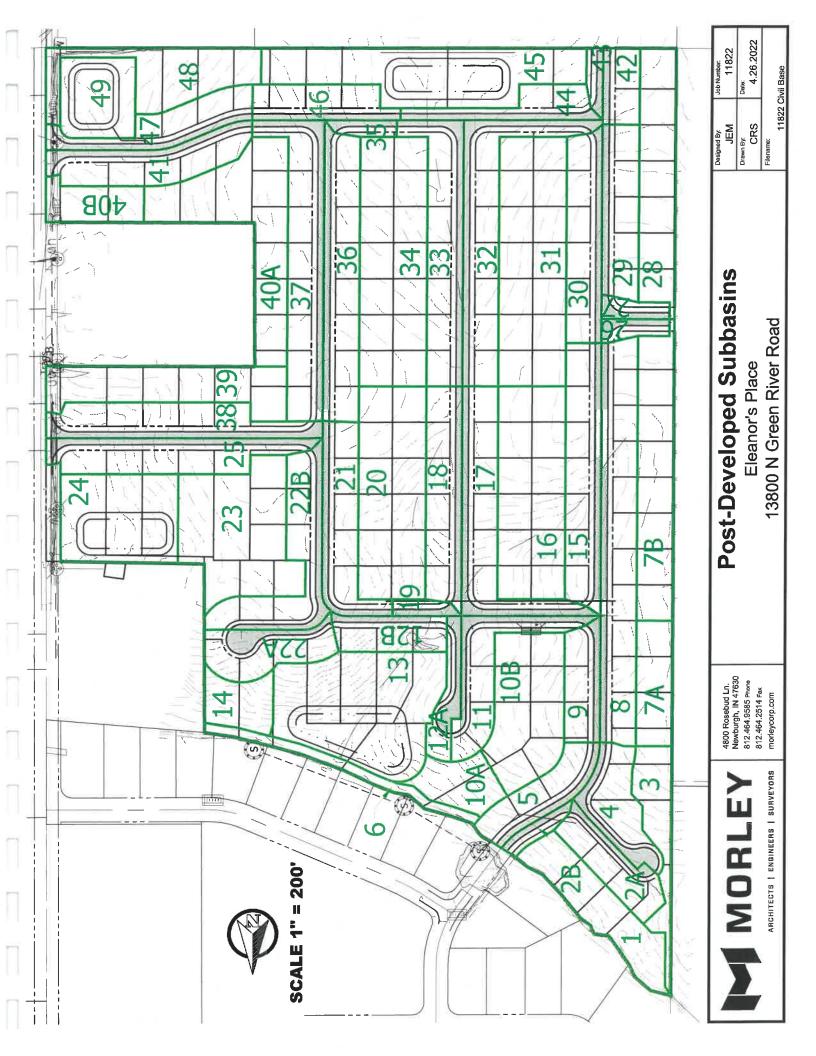
12.93

Project 11822 Area (Sf) = 563,162

Weighted Runoff Coefficient Surface	Area					С	A*c	:	1			
Structures & Pavement (<2%)	7404	S.F.	=	0.00	AC.	0.92		.00	1			
Structures & Pavement (2-5%)		S.F.	=	0.00	AC.	0.94	0	.00	1			
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96		.00				
Structures & Pavement (>10%)		S.F.	=	0.00	AC.	0.98		.00				
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50		.00	4			
Gravel (25 yr Storm)	_	S.F.	-	0.00	AC.	0.60		.00	4			
Gravel (50-100 yr Storm) Lawn (<2%)	+	S.F.		0.00	AC.	0.05		.00	1			
Lawn (2-5%)	1	S.F.	=	0.00	AC.	0.25		.00	1			
Lawn (5-10%)		S.F.	=	0.00	AC.	0.40		.00	1			
Lawn (>10%)		S.F.	=	0.00	AC.	0.55	0	.00	j			
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12		.00]			
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24		.00]			
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36		.00	1			
Woodland Hilly (10-30%)	-	S.F.	=	0.00	AC.	0.48		.00	-			
Pasture Flat (<2%) Pasture Flat (2-5%)	-	S.F.		0.00	AC.	0.12		.00	1			
Pasture Rolling (5-10%)	+	S.F.	=	0.00	AC.	0.36		.00	1			
Pasture Hilly (>10%)	-	S.F.	=	0.00	AC.	0.48		.00	1			
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20		.00]			
Cultivated (2-5%)	563,162	S.F.	=	12.93	AC.	0.35		.52				
Cultivated (5-10%)		S.F.	_ =	0.00	AC.	0.50		.00	-			
Cultivated (>10%)	1	S.F.	-	0.00	AC.	0.65		.00	-			
Bare Soil Water		S.F.		0.00	AC.	1.00		.00	+			
vvater	563,162	0.1		12.93	Au.	1.00		52	1			
Wc =	0.3500	_		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					1			
Length, L (max 100ft) Slope, S Manning Coefficient, n P _{2/24}		= =	100 0.77% 0.170 3.3	feet Cultivated			to to to	=	Overlan [0.42*(L 15.62	^{u.s})*(n ^{u.s}))/[P ^{u.5})*(S	^{u.4})]
F 2/24		_	3.3									
Shallow Flow Length, L (Paved or Unpaved)	Unpaved	=	893	feet			٧		16.1345		101.05	# foote
Slope, S		=	1.65%					=	2.073	ft/s =	124.35	ft/min
Velocity, V		=	2.07	ft/sec			t, t,	=	Shallow (L/V) =	7,18		
							•		•			
Channel Flow										-0.670	5	
Length, L		=		feet			V	=	(1.49/n) ⁴		.5	
Difference in Elevation		=	0	to	0			=	0	ft/s =		ft/min
Slope, S		=					t _c	=	Channel			
Manning Coefficient, n		=	0.000				t _c	=	(└/√) =	0.00	min	
Wetted Perimeter, Wp		=	0	feet								
Area, A		=	0	sqft								
Hydraulic Radius, R Velocity, V		=		ft/s								
	ţ.			of Concentra	ntion							
	t ·	=	Σto + Σts + 22.80		utael							
	t	=	22.80 0.38	(Min 5 Min Hour	utes)							
			0.30	rivui								
ntensity (Vanderburgh Co.)												
ntensity (Vanderburgh Co.)	l _a		2.61	in/hr								
ntensity (Vanderburgh Co.)	l ₂		2.61 3.06	in/hr in/hr								
ntensity (Vanderburgh Co.)	l _s		2.61 3.06 3.46	in/hr in/hr in/hr								
ntensity (Vanderburgh Co.)	I _s	=	3.06 3.46	in/hr in/hr								
ntensity (Vanderburgh Co.)	l _s I ₁₀ I ₂₅	=	3.06 3.46 4.06	in/hr in/hr in/hr								
ntensity (Vanderburgh Co.)	I ₅ I ₁₀ I ₂₅ I ₅₀	=	3.06 3.46	in/hr in/hr								
	l _s I ₁₀ I ₂₅	=	3.06 3.46 4.06 4.58	in/hr in/hr in/hr in/hr								
	l ₅ 1 ₁₀ 1 ₂₅ 1 ₅₀	=	3.06 3.46 4.06 4.58	in/hr in/hr in/hr in/hr								
	$\begin{array}{c} I_{5} \\ I_{10} \\ I_{25} \\ I_{50} \\ I_{100} \\ \end{array}$ $Q_{yr} = CiA$	= =	3.06 3.46 4.06 4.58 5.17	in/hr in/hr in/hr in/hr in/hr								
	$\begin{array}{c} I_{5} \\ I_{10} \\ I_{25} \\ I_{50} \\ I_{100} \\ \end{array}$ $Q_{yr} = \text{CiA} \\ Q_{2}$	= =	3.06 3.46 4.06 4.58 5.17	in/hr in/hr in/hr in/hr in/hr								
	$\begin{array}{c} I_{5} \\ I_{10} \\ I_{25} \\ I_{50} \\ I_{100} \\ \\ \\ Q_{yr} = CiA \\ \\ Q_{2} \\ \\ Q_{5} \end{array}$	= =	3.06 3.46 4.06 4.58 5.17 11.81 13.87	in/hr in/hr in/hr in/hr in/hr cfs								
	$\begin{array}{c} I_{5} \\ I_{10} \\ I_{25} \\ I_{50} \\ I_{100} \\ \\ \\ Q_{yr} = CiA \\ \\ Q_{2} \\ \\ Q_{5} \\ Q_{10} \\ \\ \end{array}$	= =	3.06 3.46 4.06 4.58 5.17 11.81 13.87 15.65	in/hr in/hr in/hr in/hr in/hr cfs cfs cfs								
	Is I I I I I I I I I	= = =	3.06 3.46 4.06 4.58 5.17 11.81 13.87 15.65 18.37	in/hr in/hr in/hr in/hr in/hr cfs cfs cfs cfs								
ntensity (Vanderburgh Co.) Peak Runoff Rate	$\begin{array}{c} I_{5} \\ I_{10} \\ I_{25} \\ I_{50} \\ I_{100} \\ \\ \\ Q_{yr} = CiA \\ \\ Q_{2} \\ \\ Q_{5} \\ Q_{10} \\ \\ \end{array}$	= = =	3.06 3.46 4.06 4.58 5.17 11.81 13.87 15.65	in/hr in/hr in/hr in/hr in/hr cfs cfs cfs								

Project 11822 Area (Sf) = 180,685

			Project :	11822					
Area (Ac) =	4.15		Area (Sf) =	= 180,685					
. ,									
Weighted Runoff Coefficient									
Surface	Area					С	A*c		
Structures & Pavement (<2%)		S.F.	=	0.00	AC.	0.92	0.00		
Structures & Pavement (2-5%)		S.F.	=	0.00	AC.	0.94	0.00		
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.00	1	
Structures & Pavement (>10%)		S.F.	=_	0.00	AC.	0.98	0.00	4	
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50	0.00	-	
Gravel (25 yr Storm)		S.F.	-	0.00	AC.	0.60	0.00	-	
Gravel (50-100 yr Storm)	-	S.F.		0.00	AC.	0.65	0.00		
Lawn (<2%) Lawn (2-5%)		S.F.		0.00	AC.	0.15	0.00	-	
Lawn (5-10%)	_	S.F.		0.00	AC.	0.40	0.00	-	
Lawn (>10%)		S.F.	-	0.00	AC.	0.55	0.00	-	
Woodland Flat (<2%)	-	S.F.	=	0.00	AC.	0.12	0.00	.	
Woodland Flat (2-5%)	1	S.F.		0.00	AC.	0.24			
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00	76	
Woodland Hilly (10-30%)		S.F.		0.00	AC.	0.48	0.00		
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00		
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00		
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00	9	
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00	<u> </u>	
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00		
Cultivated (2-5%)	180,685	S.F.	_=_	4.15	AC.	0.35	1.45	-	
Cultivated (5-10%)		S.F.		0.00	AC.	0.50	0.00	-	
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00	-	
Bare Soil Water		S.F.		0.00	AC.	1.00	0.00	4	
yvaler	+	S.F.		4.15	Inc.	1.00	1.45	1	
Wc =	0.3500			4.10	_	1	1.40	3	
VIC -	0.0000								
Time of Concentration									
Overland Flow									
Length, L (max 100ft)		=	100	feet			t _o =	Overland Flow Tc	
Slope, S		=	0.75%				t _o =	[0.42*(L ^{0.8})*(n ^{0.8})]/[P ^{0.5})*(S ^{0.4})]	
		=		Cultivated			-0		
Manning Coefficient, n			0.170	Cultivated			t _o =	15.79 min	
P _{2/24}		=	3.3						
Shallow Flow			000	e				40 4045***********	
Length, L (Paved or Unpaved)	Unpaved	=	830	feet			V =	16.1345*(\$0.5)	
Slope, S		=	1.53%	04			=	1.996 ft/s = 119.74 ft/mi	n
Velocity, V		=	2.00	ft/sec			-	Shallow Flow Tc	
							t _s =	(L/V) = 6,93 min	
Channel Flow								0.67+=0.5	
Length, L		=		feet			V =	(1.49/n)*R ^{0.67} *S ^{0.5}	_
Difference in Elevation		=	0	to	0		=	ft/s = ft/mi	П
Slope, S		=					-	Channel Flow Tc	
Manning Coefficient, n		=	0.000				t _c =	(L/V) = 0.00 min	
Wetted Perimeter, Wp		=	0	feet					
Area, A		=	0	sqft					
Hydraulic Radius, R		=							
Velocity, V		=		ft/s					
	t		Total Time	of Concentra	tion				
	t		Σto + Σts +		illon				
	-								
	t	=	22.72	(Min 5 Min	utes				
Internality (Manufactures Ca.)			0.38	Hour					
ntensity (Vanderburgh Co.)			2.62	in/hr					
	I ₂								
	. l ₅		3.07	in/hr					
	I ₁₀		3.47	in/hr					
	125		4.07	in/hr					
	I ₅₀		4.59	in/hr					
	I ₁₀₀	=	5.18	in/hr					
Peak Runoff Rate	_								
	$Q_{yr} = CiA$								
	Q_2		3.80	cfs					
	Q ₅		4.46	cfs					
	Q ₁₀		5.03	cfs					
	Q ₂₅		5.91	cfs					
	Q ₂₅ Q ₅₀		6.67	cfs					
			7.53	cfs					
	Q ₁₀₀	-	1.33	013					



0.75

Project 11822 Area (Sf) = 32,485

Surface	Area						С	A*c		
Structures & Pavement (<2%)	1		S.F.	-	0.00	AC.	0.92	0.00		
Structures & Pavement (2-5%)	2,000)	S.F.	-	0.05	AC.	0.94	0.04		
Structures & Pavement (5-10%)			S.F.	-	0.00	AC.	0.96	0.00		
Structures & Pavement (>10%)	5,000		S.F.	=	0.11	AC.	0.98	0.11		
Gravel (10 yr Storm)			S.F.	=	0.00	AC.	0.50	0.00	1	
Gravel (25 yr Storm)			S.F.		0.00	AC.	0.60	0.00	1	
Gravel (50-100 yr Storm)			S.F.	=	0.00	AC.	0.65	0.00	1	
Lawn (<2%)			S.F.	-	0.00	AC.	0.15	0.00		
Lawn (2-5%)			S.F.	2	0.00	AC.	0.25	0.00		
Lawn (5-10%)	20,98		S.F.	=	0.48	AC.	0.40	0.19	1	
Lawn (>10%)	4,500		S.F.	=	0.10	AC.	0.55	0.06	1	
Woodland Flat (<2%)	4,500		S.F.	=	0.00	AC.	0.12	0.00	1	
			S.F.	=	0,00	AC.	0.24	0.00	1	
Woodland Flat (2-5%) Woodland Rolling (5-10%)	+		S.F.	=	0.00	AC.	0.36	0.00	1	
	+		S.F.	=	0.00	AC.	0.48	0.00	-	
Woodland Hilly (10-30%)			\$.F.		0.00	AC.	0.12	0.00	-	
Pasture Flat (<2%)				=			0.12	0.00	-	
Pasture Flat (2-5%)	-		S.F.		0.00	AC.		0.00	4	
Pasture Rolling (5-10%)	+		S.F.	=	0.00	AC.	0.36		4	
Pasture Hilly (>10%)			S.F.	=	0.00	AC.	0.48	0.00	4	
Cultivated (<2%)			S.F.	=	0.00	AC.	0.20	0.00	4	
Cultivated (2-5%)			S.F.	=	0.00	AC.	0.35	0.00	4	
Cultivated (5-10%)			S.F.	=	0.00	AC.	0.50	0.00	4	
Cultivated (>10%)			S.F.	=	0.00	AC.	0.65	0.00	1	
Bare Soil			S.F.	-	0.00	AC.	0.72	0.00	1	
Water			S.F.	=	0.00	AC.	1.00	0.00	1	
	32,48	5			0.75			0.41]	
Wc =	0.5433									
Time of Concentration										
Overland Flow										
Length, L (max 100ft)			=	76	feet			t _o =	Overland Flow Tc	
Slope, S			=	10.00%				t _o =	[0.42*(L ^{U,8})*(n ^{U,8})]/[P ^{U,5})*(S ^{U,}	1(*
• •			=	0.240	Grass			t _o =	5.93 min	
Manning Coefficient, n					Glass			ω	5.95 Itilii	
P _{2/24}			=	3.3						
Shallow Flow										
Length, L (Paved or Unpaved)	Unpaved		=	0	feet			V =	, , ,	
Slope, S			=	0.00%				=	0.000 ft/s = 0.00	ft/min
Velocity, V			=	0.00	ft/sec			t _s =	Shallow Flow Tc	
7,								t, =	(L/V) = 0.00 min	
								79	(= 1,	
Channel Flow										
					foot.			V =	(1.49/n)*R ^{0.67} *S ^{0.5}	
Length, L			=	0	feet			v =		ft/min
Difference in Elevation			=	0	to	0				VIIII
Slope, S			=					t _c =	Channel Flow Tc	
Manning Coefficient, n			=	0.000				t _c =	(L/V) = 0.00 min	
Wetted Perimeter, Wp			=	0	feet					
Area. A			=	ō	sqft					
Hydraulic Radius, R			=		-41.					
Velocity, V			=		ft/s					
velocity, v			_		103					
			=	Total Time	of Concentr	ration				
		æ			of Concentr	ration				
		t	=	Σto + Σts +	Σtc					
				Σto + Σts + 5.93	Σtc (Min 5 Mi					
		t	=	Σto + Σts +	Σtc					
ntensity (Vanderburgh Co.)		t	=	Σto + Σts + 5.93 0.10	Σtc (Min 5 Mi Hour					
ntensity (Vanderburgh Co.)		t	=	Σto + Σts + 5.93	Σtc (Min 5 Mi					
ntensity (Vanderburgh Co.)		t t	=	Σto + Σts + 5.93 0.10	Σtc (Min 5 Mi Hour					
ntensity (Vanderburgh Co.)		t t	=	Σto + Σts + 5.93 0.10 4.82 5.66	Σtc (Min 5 Mi Hour in/hr in/hr					
ntensity (Vanderburgh Co.)		t t	=	Σto + Σts + 5.93 0.10 4.82 5.66 6.39	Σtc (Min 5 Mi Hour in/hr in/hr					
ntensity (Vanderburgh Co.)		t t l ₂ l ₅ l ₁₀ l ₂₅	= =	5.93 0.10 4.82 5.66 6.39 7.49	Σtc (Min 5 Mi Hour in/hr in/hr in/hr					
ntensity (Vanderburgh Co.)		t t l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀	= = = =	Σto + Σts + 5.93 0.10 4.82 5.66 6.39 7.49 8.46	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr					
ntensity (Vanderburgh Co.)		t t l ₂ l ₅ l ₁₀ l ₂₅	= =	5.93 0.10 4.82 5.66 6.39 7.49	Σtc (Min 5 Mi Hour in/hr in/hr in/hr					
		t t l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀	= = = =	Σto + Σts + 5.93 0.10 4.82 5.66 6.39 7.49 8.46	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr					
ntensity (Vanderburgh Co.) Peak Runoff Rate		t t l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀	= = = =	Σto + Σts + 5.93 0.10 4.82 5.66 6.39 7.49 8.46	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr					
	Q _{yr} = CiA	t t l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀	= = = =	Σto + Σts + 5.93 0.10 4.82 5.66 6.39 7.49 8.46	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr					
	Q _{yr} = CiA	t t l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀	= = = =	Σto + Σts + 5.93 0.10 4.82 5.66 6.39 7.49 8.46 9.55	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr					
	Q _{yr} = CiA	t t 2 5 10 25 50 100	= = = =	Σto + Σts + 5.93 0.10 4.82 5.66 6.39 7.49 8.46 9.55	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr cr/s					
	Q _{yr} = CiA	t t l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀ l ₁₀₀	= = = = =	Σto + Σts + 5.93 0.10 4.82 5.66 6.39 7.49 8.46 9.55	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr cin/hr cfs cfs					
	Q _{yr} = CiA	l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀ l ₁₀₀ Q ₂ Q ₅ Q ₁₀	= = = = = = =	Σto + Σts + 5.93 0.10 4.82 5.66 6.39 7.49 8.46 9.55 1.95 2.29 2.59	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr cfs cfs cfs					
	Q _{yr} = CiA	l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀ l ₁₀₀ C ₂₅ C ₁₀ C ₂₅	= = = = = = = = = = = = = = = = = = = =	Σto + Σts + 5.93 0.10 4.82 5.66 6.39 7.49 8.46 9.55	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr cfs cfs cfs cfs					
	Q _{yr} = CiA	l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀ l ₁₀₀ Q ₂ Q ₅ Q ₁₀	= = = = = = =	Σto + Σts + 5.93 0.10 4.82 5.66 6.39 7.49 8.46 9.55 1.95 2.29 2.59	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr cfs cfs cfs					

0.59

Project 11822 Area (Sf) = 25,860

Weighted Runoff Coefficient										-			
Surface	Area		10 =		1 6 6 6	140		A*c		4			
Structures & Pavement (<2%)		_	S.F.	=	0.00	AC.	0.92		.00	4			
Structures & Pavement (2-5%)	7,50	0	S.F.	=	0.17	AC.	0.94		.16	4			
Structures & Pavement (5-10%)		_	S.F.	=	0.00	AC.	0.96		.00	4			
Structures & Pavement (>10%)	4,37	5	S.F.	=	0.10	AC.	0.98		.10	-			
Gravel (10 yr Storm) Gravel (25 yr Storm)	_	_	S.F.	=	0.00	AC.	0.50		.00	-			
Gravel (50-100 yr Storm)	+	_	S.F.	=	0.00	AC.	0.65		.00	-			
Lawn (<2%)	+	_	S.F.	=	0.00	AÇ.	0.05		.00	1			
Lawn (2-5%)	13,98	25	S.F.	==	0.32	AC.	0.15		.08	1			
Lawn (5-10%)	10,00	,,,	S.F.	=	0.00	AC.	0.40		.00	1			
Lawn (>10%)	+	_	S.F.	=	0.00	AC.	0.55		.00	1			
Woodland Flat (<2%)		_	S.F.	=	0.00	AC.	0.12		.00	1			
Woodland Flat (2-5%)	+		S.F.	-	0.00	AC.	0.24		00	1			
Woodland Rolling (5-10%)	-	_	S.F.	=	0.00	AC.	0.36		00	1			
Woodland Hilly (10-30%)	_		S.F.	=	0.00	AC.	0.48		00	1			
Pasture Flat (<2%)			S.F.	=	0.00	AC.	0.12		.00	1			
Pasture Flat (2-5%)			S.F.	-	0.00	AC.	0.24	0.	.00	1			
Pasture Rolling (5-10%)	1	-	S.F.	=	0.00	AC.	0.36	0.	.00	1			
Pasture Hilly (>10%)			S.F.	-	0.00	AC.	0.48	0.	.00	1			
Cultivated (<2%)			S.F.	=	0.00	AC.	0.20	0.	.00]			
Cultivated (2-5%)			S.F.	=	0.00	AC.	0.35	0.	.00				
Cultivated (5-10%)			S.F.	= =	0.00	AC.	0,50	0.	00				
Cultivated (>10%)			S.F.	=	0.00	AC.	0.65		00				
Bare Soil	W		S.F.	=	0.00	AC.	0.72		00				
Water			S.F.	=	0.00	AC.	1.00		00				
	25,86	0			0.59			0.	34				
Wc =	0.5736												
Time of Concentration													
Overland Flow													
Length, L (max 100ft)			=	100	feet			ŧ,	=	Overland F			
Slope, S			=	5.00%				t,	=	[0.42*(L ^{u.a})	*(n ^{v.8})]/]	P ^{0.5})*(S	^{U.4})]
Manning Coefficient, n			=	0,240	Grass			t,	=	9.74 m	in		
P _{2/24}			=	3.3				•					
2/24				0.0									
Shallow Flow													
Length, L (Paved or Unpaved)	Paved		=	360	feet			٧	=	20.3282*(5	30.5)		
Slope, S			=	5.00%					=	4.546 ft/	's = :	272.73	ft/min
Velocity, V			=	4.55	ft/sec			t _s	=	Shallow Flo	ow Tc		
								t,	=	(L/V) =	1.32	min	
Channel Flow													
Length, L			=		feet			V	=	(1.49/n)*R ⁰	0.67*S ^{0.5}		
Difference in Elevation			=	0	to	0		•	=		's =		ft/min
			=	v	10			t,		Channel Fl			10111111
Slope, S				0.000								1	
Manning Coefficient, n			=	0.000				t _c	=	(L/V) =	0.00	min	
Wetted Perimeter, Wp			=	0	feet								
Area, A			=	0	sqft								
Hydraulic Radius, R			=										
Velocity, V			=		ft/s								
			_	Total Time	of Concontr	ation							
		t		Total Time o		ation							
		t	=	Σto + Σts + 2	Σtc								
				Σto + Σts + 2 11.06	Etc (Min 5 Min								
		t	=	Σto + Σts + 2	Σtc								
ntensity (Vanderburgh Co.)		t	=	Σto + Σts + 3 11.06 0.18	Etc (Min 5 Min Hour								
ntensity (Vanderburgh Co.)		t	=	Σto + Σts + 2 11.06	Etc (Min 5 Min								
ntensity (Vanderburgh Co.)		t t	=	Σto + Σts + 3 11.06 0.18	Etc (Min 5 Min Hour								
ntensity (Vanderburgh Co.)		t t	=	Σto + Σts + 2 11.06 0.18 3.90	Etc (Min 5 Min Hour in/hr								
ntensity (Vanderburgh Co.)		t t l ₂ l ₅	=	Σto + Σts + 2 11.06 0.18 3.90 4.58 5.17	Etc (Min 5 Min Hour in/hr in/hr in/hr								
ntensity (Vanderburgh Co.)		t t l ₂ l ₅ l ₁₀ l ₂₅	=	Σto + Σts + 2 11.06 0.18 3.90 4.58 5.17 6.06	Etc {Min 5 Min Hour in/hr in/hr in/hr in/hr								
ntensity (Vanderburgh Co.)		t t	= = =	Σto + Σts + 2 11.06 0.18 3.90 4.58 5.17 6.06 6.84	Etc (Min 5 Min Hour in/hr in/hr in/hr in/hr								
		t t l ₂ l ₅ l ₁₀ l ₂₅	=	Σto + Σts + 2 11.06 0.18 3.90 4.58 5.17 6.06	Etc {Min 5 Min Hour in/hr in/hr in/hr in/hr								
	0 - 5	t t	= = =	Σto + Σts + 2 11.06 0.18 3.90 4.58 5.17 6.06 6.84	Etc (Min 5 Min Hour in/hr in/hr in/hr in/hr								
	$Q_{yr} = CiA$	t t	= = =	Σto + Σts + 3 11.06 0.18 3.90 4.58 5.17 6.06 6.84 7.73	Etc (Min 5 Min Hour in/hr in/hr in/hr in/hr								
	$Q_{yr} = CiA$	t t	= = =	Σto + Σts + 2 11.06 0.18 3.90 4.58 5.17 6.06 6.84	Etc (Min 5 Min Hour in/hr in/hr in/hr in/hr								
	$Q_{yr} = CiA$	t t	= = =	Σto + Σts + 3 11.06 0.18 3.90 4.58 5.17 6.06 6.84 7.73	Etc (Min 5 Min Hour in/hr in/hr in/hr in/hr								
	$Q_{yr} = CiA$	t t 2 15 10 125 150 100 Q2 Q5	= = =	Σto + Σts + Σ 11.06 0.18 3.90 4.58 5.17 6.06 6.84 7.73 1.33 1.56	Etc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr in/hr cfs cfs								
	$Q_{yr} = CiA$	t t 12 15 10 100	= = = =	Σto + Σts + Σ 11.06 0.18 3.90 4.58 5.17 6.06 6.84 7.73 1.33 1.56 1.76	Etc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr in/hr in/hr in/hr cfs cfs cfs								
ntensity (Vanderburgh Co.) Peak Runoff Rate	$Q_{y_f} = CiA$	$\begin{array}{c} t \\ t \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	= = = = = = = = = = = = = = = = = = = =	Σto + Σts + Σ 11.06 0.18 3.90 4.58 5.17 6.06 6.84 7.73 1.33 1.56 1.76 2.06	Etc {Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr in/hr in/hr cfs cfs cfs cfs								
	$Q_{y_f} = CiA$	t t 12 15 10 100	= = = =	Σto + Σts + Σ 11.06 0.18 3.90 4.58 5.17 6.06 6.84 7.73 1.33 1.56 1.76	Etc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr in/hr in/hr in/hr cfs cfs cfs								

Area (Ac) =

0.47

Project 11822 Area (Sf) = 20,688

Weighted Runoff Coefficient Surface	Area						С	A*c	
Structures & Pavement (<2%)			S.F.		0.00	AC.	0.92	0.00	
Structures & Pavement (2-5%)	6,00	00	S.F.		0.14	AC.	0.94		
Structures & Pavement (5-10%)			S.F.		0.00	AC.	0.96		
Structures & Pavement (>10%)	3,50	00	S.F.		0.08	AC.	0.98		
Gravel (10 yr Storm) Gravel (25 yr Storm)	_		S.F.		0.00	AC.	0.60		
Gravel (50-100 yr Storm)	+	_	S.F.	=	0.00	AC.	0.65		
Lawn (<2%)	_		S.F.		0.00	AC.	0.15		
Lawn (2-5%)	11,18	88	S.F.	=	0.26	AC.	0.25		
Lawn (5-10%)			S.F.	=	0.00	AC.	0.40	0.00	7
Lawn (>10%)			S.F.	=	0.00	AC.	0.55	0.00	
Woodland Flat (<2%)			S.F.		0.00	AC.	0.12		
Woodland Flat (2-5%)			S.F.	-	0.00	AC.	0.24		
Woodland Rolling (5-10%)			S.F.	=	0.00	AC.	0.36	0.00	
Woodland Hilly (10-30%)			S.F.	-	0.00	AC.	0.48	0.00	
Pasture Flat (<2%)	-	_	S.F.	=	0.00	AC.	0.12	0.00	
Pasture Flat (2-5%) Pasture Rolling (5-10%)	-	_	S.F.	-	0.00	AC.	0.36	0.00	
Pasture Hilly (>10%)	-	_	S.F.	-	0.00	AC.	0.48	0.00	1
Cultivated (<2%)			S.F.	-	0.00	AC.	0.20		
Cultivated (2-5%)			S.F.	-	0.00	AC.	0.35		
Cultivated (5-10%)			S.F.		0.00	AC.	0.50	0.00	
Cultivated (>10%)			S.F.	=	0.00	AC.	0.65	0.00	
Bare Soil			S.F.	_ =	0.00	AC.	0.72	0.00	
Water			S.F.	=	0.00	AC.	1.00		
	20,68	88			0.47			0.27	
Wc =	0.5736								
Time of Concentration									
Overland Flow									
Length, L (max 100ft)			=	65	feet			t, =	Overland Flow To
Slope, S			=	5.00%	ICCI			t _o =	
• •					C			-0	
Manning Coefficient, n			=	0.240	Grass			t _o =	6.90 min
P _{2/24}			=	3.3					
A. II. =									
Shallow Flow	Paved		=	85	feet			V =	20.3282*(S0.5)
Length, L (Paved or Unpaved) Slope, S	raveu		_	2.00%	icci			v =	
Velocity, V			=	2.87	ft/sec			t _s =	
velocity, v			_	2.01	10300			t, =	
								ι _s –	(00) = 0.49 11111
Channel Flow									
Length, L			=		feet			V =	(1.49/n)*R ^{0.67} *S ^{0.5}
Difference in Elevation			=	0	to	0		• =	ft/s = ft/mi
Slope, S			=					t _c =	
Manning Coefficient, n			=	0.000				t. =	
			_	0.000	feet			٠ -	(DV) = 0.00 IIIII
Wetted Perimeter, Wp Area, A			_	0	sqft				
Hydraulic Radius, R			=	U	oqit				
Velocity, V			=		ft/s				
volocky, v									
		t	=	Total Time	of Concentr	ation			
		t	=	Σto + Σts +	Σtc				
		t	=	7.39	(Min 5 Mi	nutes)			
				0.12	Hour				
ntensity (Vanderburgh Co.)									
		I ₂		4.52	in/hr				
		15		5.31	in/hr				
		110	=	5.99	in/hr				
		I ₂₅		7.03	in/hr				
		150	=	7.94	in/hr				
		I ₁₀₀	=	8.96	in/hr				
Sarah Duna eff Data									
Peak Runoff Rate	$Q_{vr} = CiA$								
Peak Runott Rate	yı	_		1.23	cfs				
reak Runott Rate	yi	Q ₂							
reak Runom Rate	-yı	Q₂ Q₅		1.45	cfs				
eak Runom Rate	-yı ·	Q_5	=						
eak Runom Rate	-yı	Q ₅ Q ₁₀	=======================================	1.45	cfs				
eak Kunon Kate	-yı	Q_5 Q_{10} Q_{25}		1.45 1.63 1.92	cfs cfs cfs				
eak Runom Rate	-yi	Q ₅ Q ₁₀ Q ₂₅ Q ₅₀	=	1.45 1.63 1.92 2.16	cfs cfs cfs cfs				
eak Runom Rate	-yi	Q_5 Q_{10} Q_{25}	=	1.45 1.63 1.92	cfs cfs cfs				

0.12

Project 11822 Area (Sf) = 5,172

Weighted Runoff Coefficient Surface	Агеа			7	W		С	A*c]			
Structures & Pavement (<2%)			ì.F.		0.00	AC.	0.92		00				
Structures & Pavement (2-5%)	1,500		ŝ.F.	=	0.03	AC.	0.94		.03				
Structures & Pavement (5-10%)			ì.F.	=	0.00	AC.	0.96		.00	1			
Structures & Pavement (>10%)	875		3.F.	=	0.02	AC.	0.98		02	4			
Gravel (10 yr Storm)			S.F.	=	0.00	AC.	0.50		.00	4			
Gravel (25 yr Storm)			3.F.	=	0.00	AC.	0.60		.00	-			
Gravel (50-100 yr Storm)			S.F.	=	0.00	AC.	0.65		.00	4			
Lawn (<2%)			<u>.F.</u>	=	0.00	AC.	0.15		00	-			
Lawn (2-5%)	2,797		3.F.	=	0.06	AC.	0.25		02	-			
Lawn (5-10%)			3.F.	=	0.00	AC.	0.40		00	-			
Lawn (>10%)	-		3.F.	=	0.00	AC.	0.12		00	4			
Woodland Flat (<2%)			3.F.	=	0.00	AC.	0.12		00	-			
Woodland Flat (2-5%)			3.F.	-	0.00	AC.	0.24		00	-			
Woodland Rolling (5-10%)			3.F. 3.F.		0.00	AC.	0.48		00	-			
Woodland Hilly (10-30%)	-		3.F.		0.00	AC.	0.12		.00	1			
Pasture Flat (<2%)	+		.F.	=	0.00	AC.	0.24		00	1			
Pasture Flat (2-5%) Pasture Rolling (5-10%)			.F.	— -	0.00	AC.	0.36		00	1			
Pasture Hilly (>10%)	+		.F.	=	0.00	AC.	0.48		00	1			
Cultivated (<2%)	+		.F.	-	0.00	AC.	0.20		00	1			
Cultivated (2-5%)	1		.F.	-	0.00	AC.	0.35		.00	1			
Cultivated (5-10%)	1		.F.	-	0,00	AC.	0.50		.00	1			
Cultivated (>10%)			.F.	-	0.00	AC.	0.65		00	1			
Bare Soil			S.F.	-	0.00	AC.	0.72		.00				
Water			F.	-	0.00	AC	1.00		00	1			
17,0107	5,172		211.3		0.12		1		07	1			
Wc =	0.5736						-			-			
Time of Concentration Overland Flow Length, L (max 100ft)			=	100	feet			t _o	=	Overland			
Slope, S			=	5.00%				t,	=	[0.42*(L ^{u.}	')*(n ^{0.8})]/[P ^{0.5})*(8	^{(0.4})]
Manning Coefficient, n			=	0.011	Grass			t,	=	0.83 r	nin		
•			=	3.3	Q1450			~					
P _{2/24}			_	3.3									
Length, L (Paved or Unpaved) Slope, S Velocity, V	Paved		= =	45 5.00% 4.55	feet ft/sec			V t _s t _s	= =	20.3282*(4.546 f Shallow F (L/V) =	t/s =		ft/mir
Channel Flow			_		feet			v	=	(1.49/n)*F	0.67**	.5	
Length, L Difference in Elevation			_	0	to	0		٠	=		t/s =		ft/mir
			_	· ·	10	0		t,	=	Channel f			
Slope, S													
Manning Coefficient, n			=	0.000				t _c	=	(L/V) =	0.00	min	
Wetted Perimeter, Wp			=	0	feet								
Area, A			=	0	sqft								
Hydraulic Radius, R			=										
Velocity, V			=		ft/s								
			=	Total Time	of Concent	ration							
		t t	=	Σto + Σts + 5.00 0.08	Σtc (Min 5 Mi Hour	nutes)							
intensity (Vanderburgh Co.)		t	=	Σto + Σts + 5.00	(Min 5 Mi	nutes)							
Intensity (Vanderburgh Co.)		t	=	Σto + Σts + 5.00	(Min 5 Mi	nutes)							
intensity (Vanderburgh Co.)		t t	=	Σto + Σts + 5.00 0.08 5.02	(Min 5 Mi Hour	nutes)							
intensity (Vanderburgh Co.)		l l ₂ l ₅	=	Σto + Σts + 5.00 0.08 5.02 5.90	(Min 5 Mi Hour in/hr	inutes)							
intensity (Vanderburgh Co.)		l ₂ l ₅ l ₁₀	=	Σto + Σts + 5.00 0.08 5.02 5.90 6.66	(Min 5 Mi Hour in/hr in/hr in/hr	inutes)							
intensity (Vanderburgh Co.)		l ₂ l ₅ l ₁₀ l ₂₅	=	Σto + Σts + 5.00 0.08 5.02 5.90 6.66 7.81	(Min 5 Mi Hour in/hr in/hr in/hr	inutes)							
intensity (Vanderburgh Co.)		l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀	= =	Σto + Σts + 5.00 0.08 5.02 5.90 6.66 7.81 8.82	(Min 5 Mi Hour in/hr in/hr in/hr in/hr	inutes)							
intensity (Vanderburgh Co.)		l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀	=	Σto + Σts + 5.00 0.08 5.02 5.90 6.66 7.81	(Min 5 Mi Hour in/hr in/hr in/hr	nutes)							
		l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀	= =	Σto + Σts + 5.00 0.08 5.02 5.90 6.66 7.81 8.82	(Min 5 Mi Hour in/hr in/hr in/hr in/hr	inutes)							
Intensity (Vanderburgh Co.) Peak Runoff Rate		l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀	= =	Σto + Σts + 5.00 0.08 5.02 5.90 6.66 7.81 8.82	(Min 5 Mi Hour in/hr in/hr in/hr in/hr	inutes)							
	$Q_{yr} = CiA$	l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀ l ₁₀₀ Q ₂ Q ₅ Q ₁₀ Q ₂₅	= = = = = = = = = = = = = = = = = = = =	Σto + Σts + 5.00 0.08 5.02 5.90 6.66 7.81 8.82 9.95 0.34 0.40 0.45 0.53	(Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr cfs cfs cfs cfs	inutes)							
	$Q_{yr} = CiA$	l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀ l ₁₀₀ Q ₂ Q ₅ Q ₁₀ Q ₂₅ Q ₅₀ Q ₅₀	= = = = =	Σto + Σts + 5.00 0.08 5.02 5.90 6.66 7.81 8.82 9.95	(Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr	inutes)							

0.48

Project 11822 Area (Sf) = 20,745

Surface	Area					c	A*c	1	
Structures & Pavement (<2%)	1	S.F.	=	0.00	AC.	0.92	0.00	1	
Structures & Pavement (2-5%)	1,500	S.F.		0.03	AC.	0.94	0.03	1	
Structures & Pavement (5-10%)	1,000	S.F.		0.00	AC.	0.96	0.00	1	
Structures & Pavement (>10%)	3,750	S.F.	=	0.09	AC.	0.98	0.08		
Gravel (10 yr Storm)	-,	S.F.	=	0.00	AC.	0,50	0.00		
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60	0.00	1	
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65	0.00	1	
Lawn (<2%)	1	S.F.	=	0.00	AC.	0.15	0.00	1	
Lawn (2-5%)		S.F.	=	0.00	AC.	0.25	0.00	1	
Lawn (5-10%)	9,245	S.F.	=	0.21	AC.	0.40	0.08	1	
Lawn (>10%)	6,250	S.F.	=	0.14	AC.	0.55	0.08	1	
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00]	
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00		
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00]	
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.00	1	
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00		
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00	1	
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00	1	
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00	1	
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00	1	
Cultivated (2-5%)		S.F.	=	0.00	AC.	0.35	0.00	1	
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50	0.00	1	
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00	1	
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00	1	
Water		S.F.	_ =_	0.00	AC.	1.00	0.00	4	
	20,745			0.48			0.28		
Wc =	0.5891								
Time of Concentration Overland Flow									
Length, L (max 100ft)		=	80	feet			t _o =	Overland Flow Tc	
Slope, S		=	5.00%				t _o =	[0.42*(L ^{0.8})*(n ^{0.8})]/[P ^{0.5})*(S	^{∪.4})}
-		=	0.240	Grass			t, =	8.15 min	
Manning Coefficient, n				Glass			٠ -	6.13 IIIII	
P _{2/24}		=	3.3						
Shallow Flow								40 40 45 (00 5)	
Length, L (Paved or Unpaved)	Unpaved	=	0	feet			V =	16.1345*(S0.5)	Almin
Slope, S		=	0.00%				. =	0.000 ft/s = 0.00	fl/min
Velocity, V		=	0.00	ft/sec			t _s =	Shallow Flow Tc	
							t _s =	(L/V) = 0.00 min	
Channel Flow								0.07 0.5	
Length, L		=	520	feet			V =	(1.49/n)*R ^{0.67} *S ^{0.5}	
Difference in Elevation		=	405.2	to	400		=	3.027 ft/s = 181.59	ft/min
Slope, S		=	1.00%				t _c =	Channel Flow Tc	
Manning Coefficient, n		=	0.035				t _c =	(L/V) = 2.86 min	
				feet			٠c –	(L) V) = 2.00 Mill	
Wetted Perimeter, Wp		=	8.32						
Area, A		=	5	sqft					
		=	0.60	**					
Hydraulic Radius, R			0.00						
Velocity, V		=	3.03	ft/s					
	t			nvs of Concentr	ation				
		=	Total Time	of Concentr	ation				
	t	=	Total Time Σto + Σts +	of Concentr Σtc					
		=	Total Time Σto + Σts + 11.01	of Concentr Σtc (Min 5 Mi					
Velocity, V	t	=	Total Time Σto + Σts +	of Concentr Σtc					
	t t	=	Total Time Σto + Σts + 11.01 0.18	of Concentr Σtc (Min 5 Mi Hour					
Velocity, V	t t	= = = = = = = = = = = = = = = = = = = =	Total Time Σto + Σts + 11.01 0.18 3.91	of Concentr Etc (Min 5 Mi Hour in/hr					
Velocity, V	t t	= = = 1 ₂	Total Time Σto + Σts + 11.01 0.18 3.91 4.59	of Concentr Σtc (Min 5 Mi Hour in/hr					
Velocity, V	t t	= = = 1 ₂ 5 ₅ = =	Total Time Σto + Σts + 11.01 0.18 3.91 4.59 5.18	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr					
Velocity, V	t t	= = = 1 ₂	Total Time Σto + Σts + 11.01 0.18 3.91 4.59 5.18 6.08	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr in/hr					
Velocity, V	t t	= = = 1 ₂ 5 ₅ = =	Total Time Σto + Σts + 11.01 0.18 3.91 4.59 5.18	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr					
Velocity, V	t t	= = = = = = = = = = = = = = = = = = =	Total Time Σto + Σts + 11.01 0.18 3.91 4.59 5.18 6.08	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr in/hr					
Velocity, V	t t	= = = = = = = = = = = = = = = = = = =	Total Time Σto + Σts + 11.01 0.18 3.91 4.59 5.18 6.08 6.86	of Concentr Σtc {Min 5 Mi Hour in/hr in/hr in/hr in/hr					
Velocity, V	t t	= = = = = = = = = = = = = = = = = = =	Total Time Σto + Σts + 11.01 0.18 3.91 4.59 5.18 6.08 6.86	of Concentr Σtc {Min 5 Mi Hour in/hr in/hr in/hr in/hr					
Velocity, V ntensity (Vanderburgh Co.)	t t	= = = = = = = = = = = = = = = = = = =	Total Time Σto + Σts + 11.01 0.18 3.91 4.59 5.18 6.08 6.86	of Concentr Σtc {Min 5 Mi Hour in/hr in/hr in/hr in/hr					
Velocity, V ntensity (Vanderburgh Co.)	t t t l l l l l l l l l l l l l l l l l	= = 1	Total Time Σto + Σts + 11.01 0.18 3.91 4.59 5.18 6.08 6.86 7.74	of Concentr Etc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr					
Velocity, V ntensity (Vanderburgh Co.)	t t t l l l l l l l l l l l l l l l l l	= =	Total Time Σto + Σts + 11.01 0.18 3.91 4.59 5.18 6.08 6.86 7.74	of Concentr Etc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr					
Velocity, V ntensity (Vanderburgh Co.)	C C C C C C C C C C C C C C C C C C C	= =	Total Time Eto + Ets + 11.01 0.18 3.91 4.59 5.18 6.08 6.86 7.74 1.10 1.29	of Concentr Etc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr cfs cfs					
Velocity, V ntensity (Vanderburgh Co.)	C _{yr} = CiA	= = 1	Total Time Σto + Σts + 11.01 0.18 3.91 4.59 5.18 6.08 6.86 7.74	of Concentr Etc (Min 5 Mi Hour in/hr in/hr in/hr in/hr cfs cfs					
Velocity, V ntensity (Vanderburgh Co.)	C C C C C C C C C C C C C C C C C C C	= = 1	Total Time Σto + Σts + 11.01 0.18 3.91 4.59 5.18 6.08 6.86 7.74 1.10 1.29 1.45 1.70	of Concentr Etc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr cin/hr cfs cfs cfs cfs					
Velocity, V ntensity (Vanderburgh Co.)	C _{yr} = CiA	= = 1	Total Time Σto + Σts + 11.01 0.18 3.91 4.59 5.18 6.08 6.86 7.74	of Concentr Etc (Min 5 Mi Hour in/hr in/hr in/hr in/hr cfs cfs					

0.55

Project 11822 Area (Sf) = 23,965

Weighted Runoff Coefficient Surface	Area					С	A*c	
Structures & Pavement (<2%)		S.F	=	0.00	AC.	0.92	0.00	
Structures & Pavement (2-5%)	7,500	S.F	-	0.17	AC.	0.94	0.16	
Structures & Pavement (5-10%)		S.F	=	0.00	AC.	0.96	0.00	
Structures & Pavement (>10%)	3,125	S.F	=	0.07	AC.	0.98	0.07	
Gravel (10 yr Storm)		S.F	=	0.00	AC.	0.50	0.00	
Gravel (25 yr Storm)		S.F	=	0.00	AC.	0.60	0.00	
Gravel (50-100 yr Storm)		S.F	=	0.00	AC.	0.65	0.00	
Lawn (<2%)		S.F	=	0.00	AC.	0.15	0.00	
Lawn (2-5%)	13,340	S.F	=	0.31	AC.	0.25	0.08	
Lawn (5-10%)		S.F.		0.00	AC.	0.40	0.00	
Lawn (>10%)		S.F.	=	0.00	AC.	0.55	0.00	
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00	
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00	
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00	
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.00	
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00	
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00	
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00	
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00	
Cultivated (<2%)		S.F.		0.00	AC.	0.20	0.00	
Cultivated (2-5%)		S.F.		0.00	AC.	0.35	0.00	
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50	0.00	
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00	
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00	
Water		S.F.		0.00	AC.	1.00	0.00	
	23,965			0.55			0.31	
Wc =	0.5611				-1	-0		
Time of Concentration								
Overland Flow								
Length, L (max 100ft)		=	60	feet			t _o =	Overland Flow Tc
Slope, S		=	5.00%				t _o =	[0.42*(L ^{u.s})*(n ^{u.s})]/[P ^{u.s})*(S ^{u.4})]
Manning Coefficient, n		=	0.240	Grass			t _o =	6.47 min
•				Glass			۰ –	0.47
P _{2/24}		=	3.3					
0								
Shallow Flow	David	_	400				V =	20 2292*(60 6)
Length, L (Paved or Unpaved)	Paved	=	130	feet			v =	20.3282*(\$0.5) 4.546 ft/s = 272.73 ft/mii
Slope, S		=	5.00%	***				
Velocity, V		=	4.55	ft/sec			t _s =	Shallow Flow Tc
							t _s =	(L/√) = 0.48 min
Channel Flow								
Length, L		=		feet			V =	(1.49/n)*R ^{0.67} *S ^{0.5}
Difference in Elevation		_	0	to	0		. =	ft/s = ft/mi
		=	· ·	10				Channel Flow Tc
Slope, S								
Manning Coefficient, n		=	0.000				t _c =	(L/V) = 0.00 min
Wetted Perimeter, Wp		=	0	feet				
Area, A		=	0	sqft				
Hydraulic Radius, R		=		•				
Velocity, V		=		ft/s				
•								
	0.50			of Concentr	ation			
		=	Σto + Σts +					
	t			(Min 5 Mi	nutes)			
	t t	=	6.95					
		=	6.95 0.12	Hour				
Intensity (Vanderburgh Co.)		=		Hour				
intensity {Vanderburgh Co.}				Hour in/hr				
intensity (Vanderburgh Co.)		l ₂	0.12 4.61					
ntensity (Vanderburgh Co.)	t	l ₂ l ₅	0.12 4.61 5.41	ln/hr in/hr				
intensity (Vanderburgh Co.)	t	l ₂ l ₅	0.12 4.61 5.41 6.11	in/hr in/hr in/hr				
ntensity {Vanderburgh Co.}	t	l ₂ l ₅ l ₁₀ =	0.12 4.61 5.41 6.11 7.17	in/hr in/hr in/hr in/hr				
intensity (Vanderburgh Co.)	t	l ₂ l ₅ l ₁₀ = l ₂₅ l ₅₀ =	0.12 4.61 5.41 6.11 7.17 8.09	in/hr in/hr in/hr in/hr in/hr				
ntensity {Vanderburgh Co.}	t	l ₂ l ₅ l ₁₀ =	0.12 4.61 5.41 6.11 7.17	in/hr in/hr in/hr in/hr				
	t	l ₂ l ₅ l ₁₀ = l ₂₅ l ₅₀ =	0.12 4.61 5.41 6.11 7.17 8.09	in/hr in/hr in/hr in/hr in/hr				
	t I	l ₂ l ₅ l ₁₀ = l ₂₅ l ₅₀ =	0.12 4.61 5.41 6.11 7.17 8.09	in/hr in/hr in/hr in/hr in/hr				
	t	l ₂ l ₅ l ₁₀ = l ₂₅ l ₅₀ =	0.12 4.61 5.41 6.11 7.17 8.09	in/hr in/hr in/hr in/hr in/hr				
	t I. Q _{yr} = CiA	l ₂ l ₅ l ₁₀ = l ₂₅ l ₅₀ =	0.12 4.61 5.41 6.11 7.17 8.09	in/hr in/hr in/hr in/hr in/hr				
	\mathbf{t} . I. $\mathbf{Q}_{yr} = \mathbf{CiA}$	l ₂ l ₅ l ₁₀ = l ₂₅ l ₅₀ = l ₀₀ =	0.12 4.61 5.41 6.11 7.17 8.09 9.13	In/hr in/hr in/hr in/hr in/hr				
	\mathbf{t} $\mathbf{Q}_{yr} = \mathbf{C}\mathbf{i}\mathbf{A}$	l ₂ l ₅ l ₁₀ = l ₂₅ l ₅₀ = l ₁₀₀ =	0.12 4.61 5.41 6.11 7.17 8.09 9.13	in/hr in/hr in/hr in/hr in/hr cfs				
	\mathbf{t} $Q_{yr} = \mathbf{C}i\mathbf{A}$	l ₂ l ₅ l ₁₀ = l ₂₅ l ₅₀ = l ₁₀₀ =	0.12 4.61 5.41 6.11 7.17 8.09 9.13 1.42 1.67 1.89	in/hr in/hr in/hr in/hr in/hr in/hr cfs cfs cfs				
	t	l ₂ l ₅ l ₁₀ = l ₂₅ = l ₅₀ = l ₀₀ =	0.12 4.61 5.41 6.11 7.17 8.09 9.13 1.42 1.67 1.89 2.21	in/hr in/hr in/hr in/hr in/hr in/hr in/hr cfs cfs cfs cfs				
ntensity (Vanderburgh Co.) Peak Runoff Rate	t Q _{yr} = CiA	l ₂ l ₅ l ₁₀ = l ₂₅ l ₅₀ = l ₁₀₀ =	0.12 4.61 5.41 6.11 7.17 8.09 9.13 1.42 1.67 1.89	in/hr in/hr in/hr in/hr in/hr in/hr cfs cfs cfs				

0.51

Project 11822 Area (Sf) = 22,015

Structures & Pavement (2-7%) S.F. = 0.00 AC. 0.92 0.00	Weighted Runoff Coefficient Surface	Area	-0,				С	A*c		
Sizuclures & Pavement (5-10%) S.F. = 0.00	Structures & Pavement (<2%)		S.F.	=	0.00		0.92	0.00		
Sizuclures & Pavement (5-10%) S.F. = 0.00		6,100	S.F.	= -		AC.	0.94	0.13		
Sizuclures & Pavement (10%) 3,760 S.F. = 0.09 A.C. 0.80 0.08 Gravel (19 yr Storm)					0.00	AC.				
S.F. = 0.00		3,750								
Size	Gravel (10 yr Storm)		S.F.	=						
Lawn (25%)			S.F.	=	0.00					
Lismn 2-6%									1	
Limm 10% 12,165 S.F. = 0.28 AC. 0.40 0.11	Lawn (<2%)									
Lism 2-10% S.F. = 0.00 AC. 0.55 0.00 No.	Lawn (2-5%)									
Woodland Flat (2%)		12,165								
Woodland Flating 51% S.F. = 0.00									1	
Woodland Rolling (5-10%)									1	
Woodland Hilly (10-39%)									1	
Pasture Fild (25%) S.F. = 0.00 AC. 0.12 0.00 Pasture Fild (25%) S.F. = 0.00 AC. 0.24 0.00 Pasture Rolling (5-10%) S.F. = 0.00 AC. 0.34 0.00 Pasture Fild (25%) S.F. = 0.00 AC. 0.36 0.00 Cultivated (25%) S.F. = 0.00 AC. 0.36 0.00 Cultivated (25%) S.F. = 0.00 AC. 0.35 0.00 Cultivated (25%) S.F. = 0.00 AC. 0.35 0.00 Cultivated (5-10%) S.F. = 0.00 AC. 0.35 0.00 Cultivated (5-10%) S.F. = 0.00 AC. 0.55 0.00 Cultivated (5-10%) S.F. = 0.00 AC. 0.72 0.00 Cultivated (5-10%) S.F. = 0.00 AC. 0.00 Cultivated (5-10%) S.F. = 0.00 AC. 0.72 0.00 Cultivated (5-10%) S.F. = 0.00 AC. 0.72 0.00 Cultivated (5-10%) S.F. = 0.00 AC. 0.72 0.00 Cultivated (5-10%)									1	
Pasture Politing 5-10% S.F. = 0.00 AC. 0.24 0.00									4	
Pasture Rolling (5-10%)									-	
Pasture Hilly (*10**)									4	
Cultivated (2%)									-	
S.F. = 0.00 A.C. 0.35 0.00										
S.F. = 0.00 A.C. 0.59 0.00									-	
S.F. = 0.00 A.C. 0.25 0.00		+							-	
Bare Soil		+							+	
Water									-	
								- District Contract	-	
Time of Concentration Coverlend Flow Coverlend Flo	vvater	22.015	3.1	-		no.	1,00		-	
Time of Concentration Overland Flow Length, L (max 100ft) Slope, S S	Mr. =		_		1 0.01			0.00	1	
Chength Company Comp	****	0.0404								
Chength Company Comp	Time of Concentration									
Length C max 100ft										
Slope, S			=	60	feet			t. =	Overland Flow To	
Manning Coefficient, n = 0.240 Grass t ₀ = 6.47 min P ₂₂₄ = 3.3 Shallow Flow Length, L (Paved or Unpaved) Length, L (Paved or Unpaved) Velocity, V = 16.1345°(\$0.5) Slope, S Velocity, V = 3.61 ft/sec V = 16.1345°(\$0.5) Slope, S Velocity, V = 3.61 ft/sec V = 16.1345°(\$0.5) Slope, S Velocity, V = 3.61 ft/sec V = 1.49/n) R _{0.057*8} 0.5 Velocity, V = 1.					1001			-		4)1
Shallow Flow Length, L. (Paved or Unpaved) Unpaved = 3.00 feet V = 16.1345*(S0.5) Slope, S Velocity, V = 3.608 ft/sec t _s = Shallow Flow TC t _s = (L/V) = 1.39 min Channel Flow Length, L. (Paved or Unpaved) Elength, L. (Paved or					_				,	/1
Length, L (Paved or Unpaved) Unpaved = 300 feet V = 16.1345*(S0.5) = 3.608 ft/se 216.47 ft/mir Slope, S = 5.00% = 3.601 ft/sec t _s = Shallow Flow To t _s = (L/V) = 1.39 min	Manning Coefficient, n		=	0.240	Grass			t _o =	6.47 min	
Length, L (Paved or Unpaved Unpaved = 3.000 feet V = 16.1345 \(\begin{array}{c ccccccccccccccccccccccccccccccccccc	P _{2/24}		=	3.3						
Length, L (Paved or Unpaved Unpaved = 3.000 feet V = 16.1345 \(\begin{array}{c ccccccccccccccccccccccccccccccccccc										
Slope, S	Shallow Flow									
Velocity, V = 3.61 ft/sec t, = Shallow Flow TC t, = (L/V) = 1.39 min Channel Flow Length, L = feet V = (1.49/n)* $R^{0.67}$ * $S^{0.5}$ Difference in Elevation = 0 to 0 = ft/s = ft/min Slope, S = 0.000 t, = Channel Flow TC Manning Coefficient, n = 0.000 t, = (L/V) = 0.00 min Wetted Perimeter, Wp = 0 feet Hydraulic Radius, R = 0 sqft Hydraulic Radius, R = ft/s $t = Total Time of Concentration $	Length, L (Paved or Unpaved)	Unpaved	=	300	feet			V =	16.1345*(S0.5)	
Channel Flow Length, L Difference in Elevation $= 0$ to 0 $= 0$ ft/s $= 0$ ft/min Slope, S $= 0.0000$ Wetted Perimeter, Wp $= 0.0000$ Area, A $= 0.000$ $= 0.000$ Wetted Perimeter, Wp $= 0.0000$ $= 0.000$ Area, A $= 0.000$ $= 0.000$ Flow Tc $= 0.000$ Manning Coefficient, n $= 0.0000$ $= 0.000$ The elect of	Slope, S	,	=	5.00%				=	3.608 ft/s = 216.47 ft	ft/min
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Velocity, V		=	3.61	ft/sec			t _s =	Shallow Flow Tc	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	•							t. =	(LAA) = 1.39 min	
Length, L								-8	(24)	
Length, L										
Length, L	Channel Flow									
Difference in Elevation $= 0$ to $0 = Rt/s = Rt/mir$ Slope, $S = 0.000$ $t_c = Channel Flow Tc$ Manning Coefficient, $n = 0.000$ $t_c = Channel Flow Tc$ Manning Coefficient, $n = 0.000$ $t_c = Channel Flow Tc$ Wetted Perimeter, $Np = 0 feet$ Area, $A = 0 sqft$ Hydraulic Radius, $R = 0 ft/s$ $Velocity, V = Total Time of Concentration to t = \Sigma to + \Sigma ts + \Sigma tc t = 7.86 (Min 5 Minutes) 0.13 Hour Intensity (Vanderburgh Co.) Intensity (Vanderburgh Co.) V = V = V = V = V = V = V = V = V = V =$			_		feet			V =	(1.49/n*R ^{0.67} *S ^{0.5}	
Slope, S =				0		0				t/min
Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V										
Wetted Perimeter, Wp $= 0$ feet Area, A $= 0$ sqft Hydraulic Radius, R $= 0$ fit/s $= 0$ sqft Hydraulic Radius, R $= 0$ fit/s $= 0$ for the square $= 0$ sqft Hydraulic Radius, R $= 0$ fit/s $= 0$ f				0.000						
Area, A $= 0$ sqft Hydraulic Radius, R $= 1$ ft/s $= 1$ Total Time of Concentration $= 1$ to								Ę =	(□/V) = 0.00 min	
Hydraulic Radius, R $Velocity, V = \int_{0}^{1} $										
$ \begin{array}{rclcrcl} Velocity, V & = & fi/s \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & & \\ & & \\ & & & \\ &$				0	sqft					
$\begin{array}{rclcrcl} t & = & Total \ Time \ of \ Concentration \\ t & = & \Sigma to + \Sigma ts + \Sigma tc \\ t & = & 7.86 & (Min 5 \ Minutes) \\ 0.13 & Hour \\ & & & & & & & & & & & & & & & & & & $										
$t = \sum to + \sum tc + \sum tc \\ t = 7.86 \{Min 5 \text{ Minutes}\} \\ 0.13 Hour$ $t = 1.8 5.21 in/hr \\ 1.9 5.88 in/hr \\ 1.95 6.90 in/hr \\ 1.90 = 7.79 in/hr \\ 1.90 = 8.79 in/hr$ $t = 1.90 1.71 cfs \\ t = 2.55 cfs$	Velocity, V		=		ft/s					
$t = \sum to + \sum tc + \sum tc \\ t = 7.86 \{Min 5 \text{ Minutes}\} \\ 0.13 Hour$ $t = 1.8 5.21 in/hr \\ 1.9 5.88 in/hr \\ 1.95 6.90 in/hr \\ 1.90 = 7.79 in/hr \\ 1.90 = 8.79 in/hr$ $t = 1.90 1.71 cfs \\ t = 2.55 cfs$										
$t = \sum to + \sum tc + \sum tc \\ t = 7.86 \{Min 5 \text{ Minutes}\} \\ 0.13 Hour$ $t = 1.8 5.21 in/hr \\ 1.9 5.88 in/hr \\ 1.95 6.90 in/hr \\ 1.90 = 7.79 in/hr \\ 1.90 = 8.79 in/hr$ $t = 1.90 1.71 cfs \\ t = 2.55 cfs$				T-1-1 The 1-1		_4*				
t = 7.86 (Min 5 Minutes) 0.13 Hour It = 7.86 (Min 5 Minutes) 1.3 Hour It = 7.86 (Min 5 Minutes) 1.4 Hour It = 7.86 (Minutes) 1.4 Hour It = 7.86						auon				
ntensity (Vanderburgh Co.)										
ntensity (Vanderburgh Co.) $\begin{array}{cccccccccccccccccccccccccccccccccccc$		t	=			nutes)				
$\begin{array}{cccccccccccccccccccccccccccccccccccc$				0.13	Hour					
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	ntensity (Vanderburgh Co.)									
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		I,	2	4.44	in/hr					
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		I,	5	5.21	in/hr					
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		I ₁	. =	5.88	in/hr					
$\begin{array}{rcl} I_{50} & = & 7.79 & in/hr \\ I_{100} & = & 8.79 & in/hr \\ \end{array}$ Peak Runoff Rate $\begin{array}{rcl} Q_{yr} = CiA & & & \\ Q_{2} & \underline{1.45} & cfs \\ Q_{6} & \underline{1.71} & cfs \\ Q_{10} & = & \underline{1.93} & cfs \\ Q_{25} & = & \underline{2.26} & cfs \\ Q_{50} & = & \underline{2.55} & cfs \\ \end{array}$		l ₂	5	6.90	in/hr					
$\begin{array}{cccccccccccccccccccccccccccccccccccc$				7.79	in/hr					
Peak Runoff Rate $\begin{array}{cccccccccccccccccccccccccccccccccccc$			•							
$Q_{yr} = CiA$ Q_2 1.45 cfs Q_6 1.71 cfs $Q_{10} = 1.93$ cfs $Q_{25} = 2.26$ cfs $Q_{50} = 2.55$ cfs		1104	,	-110						
$Q_{yr} = CiA$ Q_2 1.45 cfs Q_6 1.71 cfs $Q_{10} = 1.93$ cfs $Q_{25} = 2.26$ cfs $Q_{50} = 2.55$ cfs	Peak Runoff Rate									
$\begin{array}{ccccc} \mathbf{Q}_2 & & \underline{1.45} & \text{cfs} \\ \mathbf{Q}_5 & & \underline{1.71} & \text{cfs} \\ \mathbf{Q}_{10} & = & \underline{1.93} & \text{cfs} \\ \mathbf{Q}_{25} & = & \underline{2.26} & \text{cfs} \\ \mathbf{Q}_{50} & = & \underline{2.55} & \text{cfs} \\ \end{array}$	Miloti itate	O = CiA								
Q_{s} $\frac{1.71}{1.93}$ cfs $Q_{10} = \frac{1.93}{2.5}$ cfs $Q_{25} = \frac{2.26}{2.55}$ cfs					-6					
$Q_{10} = 1.93$ cfs $Q_{25} = 2.26$ cfs $Q_{50} = 2.55$ cfs										
$Q_{25} = 2.26$ cfs $Q_{50} = 2.55$ cfs		Q	3							
$Q_{50} = \frac{2.55}{}$ cfs		Q ₁₀	=	1.93	cfs					
$Q_{50} = \underline{2.55} \text{cfs}$					cfs					
										
7100		_								
		⊸ €700	•							

Project 11822

Area (Ac) =			Area (CA)	= 12.135				
	0.28		Area (Sf)	= 12,133				
Weighted Runoff Coefficient								
Surface	Area					С	A*c	
Structures & Pavement (<2%)		S.F.		0.00	AC.	0.92	0.00	1
Structures & Pavement (2-5%)		S.F.		0.00	AC.	0.94	0.00	-
Structures & Pavement (5-10%) Structures & Pavement (>10%)	+	S.F.		0.00	AC.	0.98	0.00	+
Gravel (10 yr Storm)	+	S.F.		0.00	AC.	0.50	0.00	1
Gravel (25 yr Storm)		S.F.		0.00	AC.	0.60	0.00	1
Gravel (50-100 yr Storm)		S.F.	-	0.00	AC.	0.65	0.00	1
Lawn (<2%)	1	S.F.	=	0.00	AC.	0.15	0.00	
Lawn (2-5%)		S.F.	=	0.00	AC.	0.25	0.00	
Lawn (5-10%)		S.F.	=	0.00	AC.	0.40	0.00	4
Lawn (>10%)	12,135	S.F.	-	0.28	AC.	0.55	0.15	4
Woodland Flat (<2%) Woodland Flat (2-5%)	+	S.F.		0.00	AC.	0.12	0.00	1
Woodland Rolling (5-10%)	1	S.F.	=	0.00	AC.	0.36	0.00	1
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.00	1
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00]
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00	
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00	1
Pasture Hilly (>10%)		S.F.	-	0.00	AC.	0.48	0.00	-
Cultivated (<2%)	-	S.F.	=	0.00	AC.	0.20	0.00	+
Cultivated (2-5%) Cultivated (5-10%)	+	S.F.	=	0.00	AC.	0.50	0.00	1
Cultivated (>10%)	1	S.F.	=	0.00	AC.	0.65	0.00	†
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00	
Water		S.F.	=	0.00	AC.	1.00	0.00]
	12,135			0.28			0.15]
Vc =	0.5500							
Time of Concentration								
Overland Flow								
ength, L (max 100ft)		=	20	feet			t _o =	Overland Flow Tc
Slope, S		-	10.00%				t _o =	[0.42*(L ^{U.8})*(n ^{U.8})]/[P ^{U.5})*(S ^{U.4})]
Manning Coefficient, n		=	0.240	Grass			t _o =	2.04 min
2/24		=	3.3	Ciass			-0	2.07
2/24		_	5.5					
Shallow Flow								
Length, L (Paved or Unpaved)	Unpaved	=	0	feet			V =	16.1345*(S0.5)
Slope, S		=	0.00%				=	0.000 ft/s = 0.00 ft/mir
Velocity, V		=	0.00	ft/sec			t _s =	Shallow Flow Tc
							t _s =	(L/V) = 0.00 min
151								
Channel Flow				44			v -	(1.49/n)*R ^{0.67} *S ^{0.5}
Length, L Difference in Elevation		=	0	feet to	0		V =	(1.49/ft)"R "5 ft/s = ft/mir
		_	U	ıo	U		t _c =	Channel Flow Tc
Slope, S		=	0.000				t _c =	(L/V) = 0.00 min
Manning Coefficient, n			0.000	foot			ر	(DV) = 0.00 min
Wetted Perimeter, Wp Area, A		=	0	feet saft				
Hydraulic Radius, R		=	U	aqıı				
		=		ft/s				
Velocity, V				ft/s				
		==	Total Time		ration			
	t	=		of Concentr	ation			
	t	=======================================	Σto + Σts +	of Concentr Σtc				
		=	Σto + Σts + 5.00	of Concentr Σtc (Min 5 Mi				
Velocity, V	t	=======================================	Σto + Σts +	of Concentr Σtc				
	t t	= = =	Σto + Σts + 5.00 0.08	of Concentr Σtc (Min 5 Mi Hour				
Velocity, V	t t	= = = =	Σto + Σts + 5.00 0.08 5.02	of Concentr Σtc (Min 5 Mi Hour in/hr				
Velocity, V	t t	= = = = = = = = = = = = = = = = = = = =	Σto + Σts + 5.00 0.08	of Concentr Σtc (Min 5 Mi Hour				
Velocity, V	t t !	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 5.00 0.08 5.02 5.90	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr				
Velocity, V	t t l l	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 5.00 0.08 5.02 5.90 6.66	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr in/hr				
Velocity, V	t t l l, l ₂	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 5.00 0.08 5.02 5.90 6.66 7.81 8.82	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr				
Velocity, V	t t l l	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 5.00 0.08 5.02 5.90 6.66 7.81	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr				
Velocity, V	t t l, l, l, l,	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 5.00 0.08 5.02 5.90 6.66 7.81 8.82	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr				
Velocity, V ntensity (Vanderburgh Co.)	t t l l, l ₂	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 5.00 0.08 5.02 5.90 6.66 7.81 8.82	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr				
Velocity, V ntensity (Vanderburgh Co.)	t t l, l, l, l,	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 5.00 0.08 5.02 5.90 6.66 7.81 8.82	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr				
Velocity, V ntensity (Vanderburgh Co.)	t t I ₁ I ₂ I ₁₀ Q _{yr} = CiA	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 5.00 0.08 5.02 5.90 6.66 7.81 8.82 9.95	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr				
Velocity, V ntensity (Vanderburgh Co.)	t t t l_1 l_2 l_4 l_{10} $Q_{yr} = CiA$ Q	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 5.00 0.08 5.02 5.90 6.66 7.81 8.82 9.95	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr				
Velocity, V ntensity (Vanderburgh Co.)	t t 1, 1, 1,0 0,0 0,0 0,0 0	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 5.00 0.08 5.02 5.90 6.66 7.81 8.82 9.95	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr cfs cfs				
Velocity, V ntensity (Vanderburgh Co.)	$\label{eq:continuous} \begin{array}{c} t\\ t\\ \end{array}$ $\begin{array}{c} I_1\\ I_2\\ I_{10}\\ \end{array}$ $\begin{array}{c} I_2\\ I_{10}\\ \end{array}$ $\begin{array}{c} Q_{\gamma r}=CiA\\ Q_{\Omega}\\ Q_{\Omega}\\ \end{array}$	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 5.00 0.08 5.02 5.90 6.66 7.81 8.82 9.95 0.77 0.90 1.02	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr				

Peak Runoff Calculation

SUB-BASIN #7 (7A+7B)

Post-Developed

Area (Ac) =

1.48

Project 11822 Area (Sf) = 64,665

Weighted Runoff Coefficient Surface	Area			1.5		С	A*c	
Structures & Pavement (<2%)		S.F.	2	0.00	AC.	0.92	0.00	
Structures & Pavement (2-5%)	5,750	S.F.	=	0.13	AC.	0.94	0.12	
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.00	
Structures & Pavement (>10%)	14,375	S.F.	=	0.33	AC.	0.98	0.32	
Gravel (10 yr Storm)		S.F.	_ =	0.00	AC.	0.50	0.00	
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60	0.00	
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65	0.00	
awn (<2%)		S.F.	=	0.00	AC.	0.15	0.00	
awn (2-5%)	33,790	S.F.	=	0.78	AC.	0.25	0.19	
Lawn (5-10%)		S.F.	=	0.00	AC.	0.40	0.00	
Lawn (>10%)	10,750	S.F.	=	0.25	AC.	0.55	0.14	
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00	
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00	
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00	1
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.00	
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00	-
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00	1
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00	
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00	
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00	4
Cultivated (2-5%)		S.F.	=	0.00	AC.	0.35	0.00	-
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50	0.00	4
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00	-
Bare Soil		S.F.	_=	0.00	AC.	0.72	0.00	4
vvater	0.4 405	S,F.	-	0.00	AC.	1.00	0.00	-
	64,665			1.48		\perp	0.78	1
Wc =	0.5235							
Time of Concentration								
Overland Flow								
		_	05	61				Overdend Flow To
Length, L (max 100ft)		=	85	feet			t _o =	Overland Flow To
Slope, S		=	5.00%				t _o =	[0.42*(L ^{u.8})*(n ^{u.8})]/[P ^{u.5})*(S ^{u.4})]
Manning Coefficient, n		=	0.240	Grass			t _o =	8.55 min
P _{2/24}		=	3.3					
Shallow Flow								
Length, L (Paved or Unpaved)	Unpaved	=	0	feet			V =	16.1345*(S0.5)
Slope, S	O. pavoa	=	0.00%				_	0,000 ft/s = 0.00 ft/mi
Velocity, V		=	0.00	ft/sec			t _s =	Shallow Flow Tc
t olovity, i			0.00				-	(L/V) = 0.00 min
							·s –	(EV) = 0.00 IIIII
Channel Flow								
		=	545	feet			V =	(1.49/n)*R ^{0.67} *S ^{0.5}
Length, L		=	405.45	to	400		=	3.027 ft/s = 181.59 ft/mir
Difference in Elevation				to	400			
Slope, S		=	1.00%				t _c =	Channel Flow Tc
Manning Coefficient, n		=	0.035				t _c =	(L/V) = 3.00 min
Wetted Perimeter, Wp		=	8.32	feet				
Area, A		=	5	sqft				
Hydraulic Radius, R		=	0.60					
Velocity, V		=	3.03	ft/s				
	t			of Concentr	ation			
	t	=	Σto + Σts +	Σtc				
	t	=	11.55	(Min 5 Min	nutes)			
	-		0.19	Hour	,			
ntensity (Vanderburgh Co.)			*****	,,,,,,,				
	1,		3.83	in/hr				
	ì		4.49	in/hr				
		-	5.07	in/hr				
	l ₁ ,							
	l ₂ ,		5.95	in/hr				
	J ₅₁		6.72	in/hr				
	l ₁₀	_D =	7.58	in/hr				
	*10.							
	*10							
eak Runoff Rate								
eak Runoff Rate	Q _{yr} = CiA							
eak Runoff Rate	Q _{yr} = CiA	,	2.97	cfs				
eak Runoff Rate	Q _{yr} = CiA Q _t		2.97 3.49					
eak Runoff Rate	Q _{yr} = CiA Q _i	5	3.49	cfs				
eak Runoff Rate	Q _{yr} = CiA Q _t Q _t Q _{to}	s , =	3.49 3.94	cfs cfs				
eak Runoff Rate	Q _{yr} = CiA Q _t Q _t Q ₁₀ Q _{2t}	5 5 = 5 =	3.49 3.94 4.62	cfs cfs cfs				
Peak Runoff Rate	Q _{yr} = CiA Q _t Q _t Q _{to}	5 5 = 5 =	3.49 3.94	cfs cfs				

0.45

Project 11822 Area (Sf) = 19,400

Weighted Runoff Coefficient Surface	Area		_				С	A*c		1			
Structures & Pavement (<2%)	/ Ca		S.F.	-	0.00	AC.	0.92		.00	1			
Structures & Pavement (2-5%)	1,725		S.F.	-	0.04	AC.	0.94		.04	1			
Structures & Pavement (5-10%)	1,720		S.F.	=	0.00	AC.	0.96		.00	1			
Structures & Pavement (>10%)	4,313		S.F.	=	0.10	AC.	0.98		.10	1			
Gravel (10 yr Storm)			S.F.	-	0.00	AC.	0.50	0	.00	1			
Gravel (25 yr Storm)			S.F.	=	0.00	AC.	0.60	0	.00	1			
Gravel (50-100 yr Storm)			S.F.	=	0.00	AC.	0.65	0	.00				
Lawn (<2%)			S.F.	=	0.00	AC.	0.15		.00				
Lawn (2-5%)	10,137	7	S.F.	=	0.23	AC.	0.25		.06				
Lawn (5-10%)			S.F.	==	0.00	AC.	0.40		.00				
Lawn (>10%)	3,225		S.F.	-	0.07	AC.	0.55		.04				
Woodland Flat (<2%)			S.F.	=	0.00	AC.	0.12		.00				
Woodland Flat (2-5%)			S.F.	=	0.00	AC.	0.24		.00	1			
Woodland Rolling (5-10%)			S.F.	=	0.00	AC.	0.36		.00	1			
Woodland Hilly (10-30%)			S.F.	=	0.00	AC.	0.48		.00	-			
Pasture Flat (<2%)			S.F.	=	0.00	AC.	0.12		.00	Į			
Pasture Flat (2-5%)			S.F.	=	0.00	AC.	0.24		.00	-			
Pasture Rolling (5-10%)			S.F.	=	0.00	AC.	0.36		.00	-			
Pasture Hilly (>10%)			S.F.	_=_	0.00	AC.	0.48		.00	-			
Cultivated (<2%)	+		S.F.	=	0.00	AC.	0.20		.00	1			
Cultivated (2-5%)			S.F.	=	0.00	AC.	0.35		.00	1			
Cultivated (5-10%)			S.F.	=	0.00	AC.	0.50		.00	1			
Cultivated (>10%)			S.F.	=	0.00	AC.	0.72		.00	1			
Bare Soil	+		S.F.	=	0.00	AC.	1.00		.00	1			
Water	19,400		J.F.		0.00	٦٠.	1,00		23	1			
Wc =	0.5235		_		0.40		_			1			
Length, L (max 100ft) Slope, S			=	85 5.00%	feet			t _o	=	Overlan [0.42*(L	^{υ.8})*(n ^{υ.8})		S ^{u.4})]
Manning Coefficient, n			=	0.240	Grass			t,	=	8.55	min		
P _{2/24}			=	3.3									
Shallow Flow													
Length, L (Paved or Unpaved) Slope, S	Unpaved		=	0 0.00%	feet			٧	=	16.1345 0.000	*(\$0.5) ft/s =	0.00	ft/min
Velocity, V			=	0.00	ft/sec			t,	=	Shallow	Flow To		
								t,	=	(L/V) =	0.00	min	
Channel Flow											-0.67+-0	5	
Length, L			=	265	feet			V	=	(,			
Difference in Elevation			=	423.08	to	421.7			=	2.184	ft/s =	131.04	ft/min
Slope, S			=	0.52%				ţ,	=	Channel	Flow To	;	
Manning Coefficient, n			=	0.035				t,	=	(L/V) =	2.02	min	
Wetted Perimeter, Wp			=	8.32	feet								
Area, A			=	5	sqft								
Hydraulic Radius, R			=	0.60	-								
Velocity, V			=	2.18	ft/s								
		t	_	Total Time	of Concont	ration							
			Ξ	= = = = = = = = = = = = = = = = = = = =		lation							
		t	-	210 + 21S +									
	1	t	=	10.58	(Min 5 M	inutes)							
				0.18	Hour								
latera etter (Manuela ubronnia Ca.)		I ₂		2.07	in/hr								
Intensity (Vanderburgh Co.)		la la		3.97									
Intensity (Vanderburgh Co.)					in/hr								
Intensity (Vanderburgh Co.)		i ₅		4.66									
ntensity (Vanderburgh Co.)		i ₅	=	5.27	in/hr								
ntensity (Vanderburgh Co.)		i ₅ I ₁₀ I ₂₅	=	5.27 6.18	in/hr								
ntensity (Vanderburgh Co.)		i ₅	=	5.27									
ntensity (Vanderburgh Co.)		i ₅ I ₁₀ I ₂₅		5.27 6.18	in/hr								
		i ₅ l ₁₀ l ₂₅ l ₅₀	=	5.27 6.18 6.97	in/hr in/hr								
		i ₅ l ₁₀ l ₂₅ l ₅₀	=	5.27 6.18 6.97	in/hr in/hr								
	Q _{yr} = CİA	i ₅ l ₁₀ l ₂₅ l ₅₀	=	5.27 6.18 6.97	in/hr in/hr								
		i ₅ l ₁₀ l ₂₅ l ₅₀	=	5.27 6.18 6.97	in/hr in/hr								
		I ₅ I ₁₀ I ₂₅ I ₅₀ I ₁₀₀	=	5.27 6.18 6.97 7.87	in/hr in/hr in/hr								
	Q _{yr} = CiA	I ₅ I ₁₀ I ₂₅ I ₅₀ I ₁₀₀ Q ₂ Q ₅	=	5.27 6.18 6.97 7.87 0.93 1.09	in/hr in/hr in/hr								
	Q _{yr} = CiA	I ₅ I ₁₀ I ₂₅ I ₅₀ I ₁₀₀ Q ₂ Q ₅ Q ₁₀	=	5.27 6.18 6.97 7.87 0.93 1.09 1.23	in/hr in/hr in/hr cfs cfs cfs								
	Q _{yr} = CÍA	I ₅ I ₁₀ I ₂₅ I ₅₀ I ₁₀₀ Q ₂ Q ₅ Q ₁₀ Q ₂₅	= =	5.27 6.18 6.97 7.87 0.93 1.09 1.23 1.44	in/hr in/hr in/hr cfs cfs cfs cfs								
intensity (Vanderburgh Co.) Peak Runoff Rate	Q _{yr} = CİA	I ₅ I ₁₀ I ₂₅ I ₅₀ I ₁₀₀ Q ₂ Q ₅ Q ₁₀	= =	5.27 6.18 6.97 7.87 0.93 1.09 1.23	in/hr in/hr in/hr cfs cfs cfs								

1.04

Project 11822 Area (Sf) = 45,266

Surface	Агеа		4			С	A*c]			
Structures & Pavement (<2%)		S.F.	=	0.00	AC.	0.92	0.0					
Structures & Pavement (2-5%)	4,025	S.F.	=	0.09	AC.	0.94	0.0	9	1			
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.0	0]			
Structures & Pavement (>10%)	10,063	S.F.	-	0.23	AC.	0.98	0.2	23]			
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50	0.0					
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60	0.0	10				
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65	0.0	10				
Lawn (<2%)		S.F.	=	0.00	AC.	0.15	0.0	10]			
Lawn (2-5%)	23,653	S.F.	=	0.54	AC.	0.25	0.1	4				
Lawn (5-10%)		S.F.	=	0.00	AÇ.	0.40	0,0	10				
Lawn (>10%)	7,525	S.F.	=	0.17	AC.	0.55	0.1	0				
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.0					
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.0]			
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.0]			
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.0		1			
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.0					
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.0		1			
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.0		1			
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.0		1			
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.0		1			
Cultivated (2-5%)		S.F.	=	0.00	AC.	0.35	0.0		1			
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50	0.0		1			
Cultivated (>10%)		S.F.	-	0.00	AC.	0.65	0.0		1			
Bare Soil		S.F.	=	0.00	AC.	0.72	0.0		1			
VVater		S.F.	=	0.00	AC.	1.00	0.0		1			
	45,266			1.04			0.5	4	1			
Wc =	0.5235											
=1												
Time of Concentration												
Overland Flow			0.5	er of				_	A	3 Fl T.		
Length, L (max 100ft)		=	85	feet			t,			d Flow To		-114
Slope, S		=	5.00%				t,	=	[0.42*(L	^{0,8})*(n ^{0,8})]	/[P***)*(507)]
Manning Coefficient, n		=	0.240	Grass			t _o	=	8.55	min		
P _{2/24}		=	3.3									
1 2/24			0.0									
Shallow Flow												
Length, L (Paved or Unpaved)	Unpaved	=	0	feet			V	=	16.1345	*(S0.5)		
Slope, S	Onparoa	=	0.00%				•	=		ft/s =	0.00	ft/min
Velocity, V		=	0.00	ft/sec			ŧ,	=	Shallow			
velocity, v		_	0.00	10300			t,		(L/V) =	0.00	min	
							's	_	(04)-	0.00	111111	
Channel Flow											_	
Length, L		=	545	feet			V	=	(1.49/n) ⁴	'R ^{0.67} *\$ ^{0.6}	5	
Difference in Elevation		=	423.32	to	421.7				1.650	ft/s =	99.00	ft/min
Slope, S		=	0.30%				t _c	=	Channel	Flow To		
•		=	0.035				t,		(L/V) =	5.50	min	
Manning Coefficient, n							rc.	_	(L/V) -	3.30	1411111	
Wetted Perimeter, Wp		=	8.32	feet								
Area, A		=	5	sqft								
Hydraulic Radius, R		=	0.60	01-								
Velocity, V		=	1.65	ft/s								
	t	=	Total Time	of Concentr	ration							
		=	Σto + Σts +	Σtc								
	t	-			nutes)							
			14.06	(Min 5 Mi								
	t t	=	14.06 0.23	(Min 5 Mi Hour	ilutes							
intensity (Vanderburgh Co.)			14.06 0.23	(Min 5 Mi Hour	ilutes							
ntensity (Vanderburgh Co.)	t	=			ilutes							
intensity (Vanderburgh Co.)	t	=	0.23 3,49	Hour in/hr	ilutes							
ntensity (Vanderburgh Co.)	t	= ₂ ₅	0.23 3,49 4.09	Hour In/hr in/hr	nutes							
intensity (Vanderburgh Co.)	t I	= 2 5 5 =	0.23 3.49 4.09 4.62	Hour in/hr in/hr in/hr	nutes							
intensity (Vanderburgh Co.)	t 1. 1,	= 2 5 5 = 55	0.23 3,49 4.09 4.62 5.42	Hour in/hr in/hr in/hr in/hr	nutes							
ntensity (Vanderburgh Co.)	t !,	= 2 5 5 = 55 =	0.23 3,49 4.09 4.62 5.42 6.12	Hour in/hr in/hr in/hr in/hr	mues							
ntensity (Vanderburgh Co.)	t 1. 1,	= 2 5 5 = 55 =	0.23 3,49 4.09 4.62 5.42	Hour in/hr in/hr in/hr in/hr	nuces,							
	t !,	= 2 5 5 = 55 =	0.23 3,49 4.09 4.62 5.42 6.12	Hour in/hr in/hr in/hr in/hr	naces,							
	t 1. 1; 1,	= 2 5 5 = 55 =	0.23 3,49 4.09 4.62 5.42 6.12	Hour in/hr in/hr in/hr in/hr	naces,							
	t !,	= 2 5 5 = 55 =	0.23 3,49 4.09 4.62 5.42 6.12	Hour in/hr in/hr in/hr in/hr	naces,							
	t 1. 1; 1,	=	0.23 3,49 4.09 4.62 5.42 6.12	Hour in/hr in/hr in/hr in/hr	intes							
	t	= 2 5 5 6 6 6 6 6 6 6 6	0.23 3,49 4.09 4.62 5.42 6.12 6.91	Hour In/hr in/hr in/hr in/hr in/hr	intes							
	t	= 12 15 10 = 15 10 = 10 10 = 12	0.23 3.49 4.09 4.62 5.42 6.12 6.91 1.90 2.23	in/hr in/hr in/hr in/hr in/hr in/hr cin/hr	intes							
	t I I I I I I I I I I I I I I I I I I	=	0.23 3.49 4.09 4.62 5.42 6.12 6.91 1.90 2.23 2.51	Hour In/hr in/hr in/hr in/hr in/hr in/hr cfs cfs cfs	intes							
	1. I.	=	0.23 3.49 4.09 4.62 5.42 6.12 6.91 1.90 2.23 2.51 2.95	Hour In/hr in/hr in/hr in/hr in/hr in/hr cfs cfs cfs cfs	intes							
ntensity {Vanderburgh Co.} Peak Runoff Rate	t I I I I I I I I I I I I I I I I I I	= 22 5 0 = 15 15 0 = 15 15 0 = 15 15 0 = 15 15 0 0 = 15 15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.23 3.49 4.09 4.62 5.42 6.12 6.91 1.90 2.23 2.51	Hour In/hr in/hr in/hr in/hr in/hr in/hr cfs cfs cfs	intes							

Area (Ac) =

1.45

Project 11822 Area (Sf) = 63,375

Weighted Runoff Coefficient	Aras	_					lc 1	A*n		1			
Surface	Area	14	2 5	=	0.00	TAC	0.92	A*c 0.00		1			
Structures & Pavement (<2%)	47.000		S.F.			AC.	0.92	0.00	_	1			
Structures & Pavement (2-5%)	17,900		S.F.		0.41	AC.	0.94	0.00		1			
Structures & Pavement (5-10%)	44 976		3.F.		0.00	AC.	0.98	0.00		1			
Structures & Pavement (>10%)	14,375		3.F. 3.F.		0.33	AC.	0.50	0.00		1			
Gravel (10 yr Storm)	-									-			
Gravel (25 yr Storm)	_		3.F.		0.00	AC.	0.60	0.00					
Gravel (50-100 yr Storm)			3.F.		0.00	AC.	0.65	0.00					
awn (<2%)			S.F.	=	0.00	AC.	0.15	0.00					
_awn (2-5%)	31,100		3.F.		0.71	AC.	0.25	0.18					
_awn (5-10%)	-		S.F.		0.00	AC.	0.40	0.00					
_awn (>10%)			3.F.		0.00	AC.	0.55	0.00					
Woodland Flat (<2%)			S.F.	=	0.00	AC.	0.12	0.00					
Woodland Flat (2-5%)	1		3.F.		0.00	AC.	0.24	0,00					
Woodland Rolling (5-10%)			S.F.	=	0.00	AC.	0.36	0.00					
Woodland Hilly (10-30%)			3.F.		0.00	AC.	0.48	0.00					
Pasture Flat (<2%)			S.F.	=	0.00	AC.	0.12	0.00					
Pasture Flat (2-5%)			3.F.	=	0.00	AC.	0.24	0.00	_				
asture Rolling (5-10%)			3.F.	=	0.00	AC.	0.36	0.00					
Pasture Hilly (>10%)		15	3.F.	=	0.00	AC.	0.48	0.00					
Cultivated (<2%)		5	S.F.	=	0.00	AC.	0.20	0.00					
Cultivated (2-5%)			3.F.	=	0.00	AC.	0.35	0.00					
Cultivated (5-10%)		15	S.F.	=	0.00	AC.	0.50	0.00					
Cultivated (>10%)			3.F.	=	0.00	AC.	0.65	0.00					
Bare Soil	1		S.F.	=	0.00	AC.	0.72	0.00					
Vater			S.F.	=	0.00	AC.	1.00	0.00					
E-MESSAL)	63,375		111.4		1.45			0.89					
Vc =	0.6105					_							
Time of Concentration													
overland Flow													
ength, L (max 100ft)			=	65	feet			t _o =	:	Overland	Flow T	c	
Slope, S			=	5.00%				t _o =		[0.42*(L"			3 ^{0.4})1
• '					_			•				'21. / \	- /1
Manning Coefficient, n			=	0.240	Grass			t _o =	•	6.90	min		
2/24			=	3.3									
Shallow Flow													
Length, L (Paved or Unpaved)	paved		=	720	feet			V =	:	20.3282*	(S0.5)		
Slope, S			=	2.00%							ft/s =	172.49	ft/mii
Velocity, V			=	2.87	ft/sec			t _s =		Shallow I			
velocity, v			_	2.01	10300								
								t _s =		(L/V) =	4.17	min	
Sharand Flour													
hannel Flow										(1.49/n)*l	-0.670	1.5	
Length, L			=		feet			V =					
Difference in Elevation			=	0	to	0		=			ft/s =		ft/mii
Slope, S			=					t _c =		Channel	Flow To	3	
Manning Coefficient, n			=	0.000				t. =		(L/V) =	0.00	min	
Wetted Perimeter, Wp			=	0	feet					· /			
Area. A			=	0	sqft								
			_	U	aqıı								
Hydraulic Radius, R					e (n								
Velocity, V			=		ft/s								
			_	Total Time	of Concentr	otion							
		ţ.		Total Time		ation							
	,	t	=	Σto + Σts +	Σtc								
	,			Σto + Σts + 11.08	Σtc (Min 5 Mi								
	,	t	=	Σto + Σts +	Σtc								
ntensity (Vanderburgh Co.)	,	t	=	Σto + Σts + 11.08	Σtc (Min 5 Mi								
ntensity (Vanderburgh Co.)	,	t	=	Σto + Σts + 11.08	Σtc (Min 5 Mi								
ntensity (Vanderburgh Co.)	,	t t	=	Σto + Σts + 11.08 0.18 3.90	Σtc (Min 5 Mi Hour in/hr								
ntensity (Vanderburgh Co.)	,	t t l ₂ l ₅	=	Σto + Σts + 11.08 0.18 3.90 4.57	Σtc (Min 5 Mi Hour in/hr in/hr								
ntensity (Vanderburgh Co.)	,	t t I ₂ I ₅ I ₁₀	=	Σto + Σts + 11.08 0.18 3.90 4.57 5.16	Σtc (Min 5 Mi Hour in/hr in/hr in/hr								
ntensity (Vanderburgh Co.)	,	t t l ₂ l ₅ l ₁₀	=	Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06	Σtc (Min 5 Mi Hour in/hr in/hr in/hr								
ntensity {Vanderburgh Co.}	1	l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀	=======================================	Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr								
itensity (Vanderburgh Co.)	1	t t l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀	=	Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06	Σtc (Min 5 Mi Hour in/hr in/hr in/hr								
-	1	l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀	=======================================	Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr								
-	1	l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀	=======================================	Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr								
-	1	l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀	=======================================	Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr								
-	1	t t I ₂ I ₅ I ₁₀ I ₂₅ I ₅₀ I ₁₀₀	=======================================	Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84 7.72	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr								
-	1	t t	=======================================	Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84 7.72	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr in/hr								
-	$Q_{yr} = CiA$	I ₂ I ₅ I ₁₀ I ₂₅ I ₅₀ I ₁₀₀ Q ₂ Q ₅	= = =	Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84 7.72	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr								
-	$Q_{yr} = CiA$	I ₂ I ₅ I ₁₀ I ₂₅ I ₅₀ I ₁₀₀ Q ₂ Q ₅ Q ₁₀	= = = =	Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84 7.72 3.46 4.06 4.59	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr cfs cfs cfs								
	$Q_{y_{f}} = CiA$	l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀ l ₁₀₀ Q ₂ Q ₅ Q ₁₀ Q ₂₅	= = =	Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84 7.72 3.46 4.06 4.59 5.38	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr cfs cfs cfs cfs								
	$Q_{y_{f}} = CiA$	l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀ l ₁₀₀ Q ₂ Q ₅ Q ₁₀ Q ₂₅	= = = =	Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84 7.72 3.46 4.06 4.59	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr cfs cfs cfs								
ntensity (Vanderburgh Co.) Peak Runoff Rate	$Q_{yr} = CiA$	t t	= = = = = = = = = = = = = = = = = = = =	Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84 7.72 3.46 4.06 4.59 5.38	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr cfs cfs cfs cfs								

Area (Ac) =

Project 11822 Area (Sf) = 18,350

0.42

Surface	Area					С	A*c		J			
Structures & Pavement (<2%)		S.F.	=	0.00	AC.	0.92	0.	00				
Structures & Pavement (2-5%)	5,350	S.F.	=	0.12	AC.	0.94	0.	12	1			
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.	.00	1			
Structures & Pavement (>10%)	3,750	S.F.	-	0.09	AC.	0.98	0.	80	1			
Gravel (10 yr Storm)	3,1.55	S.F.	=	0.00	AC.	0.50		00	1			
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60		00	1			
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65		00	1			
Lawn (<2%)		S.F.	=	0.00	AC.	0.15		00	1			
Lawn (2-5%)	9,250	S.F.	=	0.21	AC.	0.25		05	1			
Lawn (5-10%)	5,200	S.F.	=	0.00	AC.	0.40		00	1			
Lawn (>10%)	_	S.F.	=	0.00	AC.	0.55		00	1			
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12		00	1			
	+	S.F.	=	0.00	AC.	0.24		00	1			
Woodland Flat (2-5%)	+	S.F.	=	0.00	AC.	0.36		00	-			
Woodland Rolling (5-10%)	+	S.F.	<u> </u>	0.00	AC.	0.30		00	-			
Woodland Hilly (10-30%)	+	S.F.		0.00	AC.	0.12		00	-			
Pasture Flat (<2%)			<u> </u>	0.00	AC.	0.12		00	-			
Pasture Flat (2-5%)	-	S.F.		0.00		0.36		00	1			
Pasture Rolling (5-10%)	-	S.F.	=		AC.			00	-			
Pasture Hilly (>10%)	+	S.F.	=	0.00	AC.	0.48			-			
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20		00	-			
Cultivated (2-5%)		S.F.	=	0.00	AC.	0.35		00	-			
Cultivated (5-10%)		S.F.	=	0,00	AC.	0.50		00	4			
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65		00	4			
Bare Soil	1	S.F.	=	0.00	AC.	0.72		00	4			
Water	1	S.F.	=	0.00	AC.	1.00		00	4			
	18,350			0.42	1		0.	25	J			
Wc =	0.6004											
Time of Concentration												
Overland Flow												
Length, L (max 100ft)		=	65	feet			t,	=	Overlan	d Flow T	C	
Slape, S		=	5.00%				t,	=	[0.42*(L	8)*(n ^{0.8}))/[P ^{u.5})*(8	50.4)]
Manning Coefficient, n		=	0.240	Grass			ŧ,	=	6.90	min		
		=		0.200			۰					
P _{2/24}		=	3.3									
Length, L (Paved or Unpaved) Slope, S Velocity, V	Unpaved	= = =	250 2.00% 2.28	feet ft/sec			V t _s t _s	=======================================	16.1345 2.282 Shallow (L/V) =	ft/s =		ft/mir
<u>Channel Flow</u> Length, L		=		feet			v	=	(1.49/n) ¹	R ^{0.67} *S).5	
Difference in Elevation		=	0	to	0		-	=	(,	ft/s =		ft/mir
Slope, S		=					ŧ,	=	Channel			
• •			0.000									
Manning Coefficient, n		=	0.000	-			t _c	=	(L/V) =	0.00	min	
Wetted Perimeter, Wp		=	0	feet								
Area, A		=	0	sqft								
Hydraulic Radius, R		=										
11.1 0 11		=		ft/s								
Velocity, V												
Velocity, V												
Velocity, V												
Velocity, V	t			of Concentr	ation							
velocity, v	t t		Total Time Σto + Σts +		ation							
velocity, v												
velocity, v	t	=	Σto + Σts + 8.73	Σtc								
	t	=	Σto + Σts +	Σtc (Min 5 Min								
velocity, v ntensity (Vanderburgh Co.)	t t	=	Σto + Σts + 8.73 0.15	Σtc (Min 5 Min								
	t t	= =	Σto + Σts + 8.73 0.15 4.28	Σtc (Min 5 Min Hour in/hr								
	t t	= = 2 5	Σto + Σts + 8.73 0.15 4.28 5.02	Σtc (Min 5 Min Hour in/hr in/hr								
	t t 	= = 2 5 0 =	Σto + Σts + 8.73 0.15 4.28 5.02 5.67	Σtc (Min 5 Min Hour in/hr in/hr in/hr								
	t t !- !-	= = = 5 0 =	Σto + Σts + 8.73 0.15 4.28 5.02 5.67 6.65	Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr								
	t t ! !,	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 8.73 0.15 4.28 5.02 5.67 6.65 7.51	Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr								
	t t !- !-	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 8.73 0.15 4.28 5.02 5.67 6.65	Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr								
ntensity (Vanderburgh Co.)	t t ! !,	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 8.73 0.15 4.28 5.02 5.67 6.65 7.51	Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr								
	t t l ₁ l ₂ l ₄	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 8.73 0.15 4.28 5.02 5.67 6.65 7.51	Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr								
ntensity (Vanderburgh Co.)	t t ! !,	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 8.73 0.15 4.28 5.02 5.67 6.65 7.51	Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr								
ntensity (Vanderburgh Co.)	t t I ₁ I ₂ I ₁₀ Q _{yr} = CiA	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 8.73 0.15 4.28 5.02 5.67 6.65 7.51	Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr								
ntensity (Vanderburgh Co.)	t t l l l l l l l c l c l d d d d d d d d d	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 8.73 0.15 4.28 5.02 5.67 6.65 7.51 8.48	Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr								
ntensity (Vanderburgh Co.)	$\label{eq:continuous} \begin{cases} t \\ t \end{cases}$ $\begin{subarray}{c} I_1 \\ I_2 \\ I_3 \\ I_4 \\ I_5 \\ I_6 $	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 8.73 0.15 4.28 5.02 5.67 6.65 7.51 8.48	Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr cfs cfs								
ntensity (Vanderburgh Co.)	$\label{eq:continuous} \begin{array}{c} t \\ t \\ \end{array}$ $\begin{array}{c} I_{1} \\ I_{2} \\ I_{1} \\ \end{array}$ $\begin{array}{c} I_{1} \\ I_{2} \\ \end{array}$ $\begin{array}{c} Q_{yr} = CiA \\ Q_{Q} \\ \end{array}$	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 8.73 0.15 4.28 5.02 5.67 6.65 7.51 8.48 1.08 1.27 1.43	Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr cfs cfs cfs								
ntensity (Vanderburgh Co.)	\mathbf{t} \mathbf{t} \mathbf{l}_{1} \mathbf{l}_{2} \mathbf{l}_{3} $\mathbf{Q}_{yr} = \mathbf{C}\mathbf{i}\mathbf{A}$ \mathbf{Q} \mathbf{Q} \mathbf{Q}	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 8.73 0.15 4.28 5.02 5.67 6.65 7.51 8.48 1.08 1.27 1.43 1.68	Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr cfs cfs cfs cfs								
ntensity (Vanderburgh Co.)	$\label{eq:continuous} \begin{array}{c} t \\ t \\ \end{array}$ $\begin{array}{c} I_{1} \\ I_{2} \\ I_{1} \\ \end{array}$ $\begin{array}{c} I_{1} \\ I_{2} \\ \end{array}$ $\begin{array}{c} Q_{yr} = CiA \\ Q_{Q} \\ \end{array}$	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 8.73 0.15 4.28 5.02 5.67 6.65 7.51 8.48 1.08 1.27 1.43	Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr cfs cfs cfs								

Peak Runoff Calculation

SUB-BASIN #10 (10A+10B)

Post-Developed

Project 11822

Area (Ac) =	1.44
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Area (Sf)	=	62	,560

Surface	Area					С	A*c
Structures & Pavement (<2%)		S.F.	=	0.00	AC.	0.92	0.00
Structures & Pavement (2-5%)	5,000	S.F.	=	0.11	AC.	0.94	0.11
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.00
Structures & Pavement (>10%)	12,500	S.F.	=	0.29	AC.	0.98	0.28
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50	0.00
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60	0.00
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65	0.00
Lawn (<2%)		S.F.	= =	0.00	AC.	0.15	0.00
Lawn (2-5%)		S.F.	=	0.00	AC.	0.25	0.00
Lawn (5-10%)	39,960	S.F.	=	0.92	AC.	0.40	0.37
Lawn (>10%)	5,100	S.F.	=	0.12	AC.	0.55	0.06
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Woodland Flat (2-5%)		S.F.	Ξ	0.00	AC.	0.24	0.00
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Woodland Hilly (10-30%)		S.F.	-	0.00	AC.	0.48	0.00
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0,00
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00
Cultivated (2-5%)		S.F.	=	0.00	AC.	0.35	0.00
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50	0.00
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00
Water		S.F.	=	0.00	AC.	1.00	0.00
	62,560			1.44			0.82

Time	as C	2000	atrat	ion

Length, L (max 100ft)	=	85	feet	to		Overland Flow Tc
Slope, S	=	5.00%		t _o	Ξ	[0.42*(L ^{u.8})*(n ^{u.8})]/[P ^{u.5})*(S ^{u.4})]
Manning Coefficient, n	=	0.240	Grass	t _o	=	8.55 min
P _{2/24}	=	3.3				

Shallow Flow Length, L Slope, S

Length, L (Paved or Unpaved)	Unpaved	=	0	feet
Slope, S		=	0.00%	
Velocity, V		=	0.00	ft/sec

0	feet	V	=	16.1345*(\$0.5)
0.00%	i i		=	0.000 ft/s = 0.00 ft/min
0.00	ft/sec	t _s	=	Shallow Flow Tc
		f	_	$(1 \Delta t) = 0.00 \text{ min}$

 $V = (1.49/n)*R^{0.67*}S^{0.5}$ = 3.027 ft/s = 181.59 ft/min

Channel Flow Length, L

Length, L	=	390	teet
Difference in Elevation	=	403.9	to
Slope, S	=	1.00%	
Manning Coefficient, n	=	0.035	
Wetted Perimeter, Wp	=	8.32	feet
Area, A	=	5	saft
Hydraulic Radius, R	=	0.60	
Velocity, V	=	3.03	ft/s

=	1.00%		t _c	=	Channel F	Flow To	;
=	0.035		tc	=	(L/V) =	2.15	min
=	8.32	feet					
=	5	sqft					
=	0.60						
=	3.03	ft/s					

Intensity (Vanderburgh Co.)

		0.18	Hour	
l ₂		3.96	in/hr	
l ₅		4.64	in/hr	
110	=	5.24	in/hr	
l ₂₅		6.15	in/hr	
I ₅₀	=	6.94	in/hr	
I ₁₀₀	=	7.83	in/hr	

= Total Time of Concentration = Σ to + Σ ts + Σ tc

10.70 (Min 5 Minutes)

Peak Runoff Rate

Area (Ac) =

Project 11822 Area (Sf) = 16,891

Weighted Runoff Coefficient Surface	Area	_				c	A*c	7
Structures & Pavement (<2%)	Alea	S.F.	=	0.00	AC.	0.92	0.00	-
	4.050	S.F.		0.00	AC.	0.94		-
Structures & Pavement (2-5%)	1,350	S.F.		0.00	AC.	0.94		4
Structures & Pavement (5-10%)	2 275		-	0.08		0.98	0.08	-
Structures & Pavement (>10%)	3,375	S.F.	=	0.00	AC.	0.50	0.00	-
Gravel (10 yr Storm)		S.F.	=			0.60		4
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.65	0.00	4
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.		0.00	-
Lawn (<2%)		S.F.	=		AC.	0.15		4
Lawn (2-5%)	10.700	S.F.	=	0.00	AC.	0.25		4
Lawn (5-10%)	10,789	S.F.	=	0.25	AC.	0.40		4
Lawn (>10%)	1,377	S.F.	3	0.03	AC.	0.55	0.02	4
Woodland Flat (<2%)	_	S.F.	=	0.00	AC.	0.12	0.00	4
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24		-
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00	4
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.00	4
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00	4
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24		4
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00	4
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00	4
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00	4
Cultivated (2-5%)		S.F.	=	0.00	AC.	0.35	0.00	4
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50	0.00	4
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00	4
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00	4
Water		S.F.	=	0.00	AC.	1.00	0.00	4
	16,891			0.39			0.22	1
Wc =	0.5713							
Time of Concentration								
Overland Flow								Overdend Flow To
Length, L (max 100ft)		=	80	feet			t _o =	
Slope, S		=	2.00%				t _o =	[0.42*(L ^{0.8})*(n ^{0.8})]/[P ^{0.9})*(S ^{0.4})]
Manning Coefficient, п		=	0.240	Grass			t _o =	11.75 min
P _{2/24}		=	3.3				•	
7 2/24		_	5.5					
Shallow Flow								
Length, L (Paved or Unpaved)	Unpaved	=	20	feet			V =	16.1345*(S0.5)
Slope, S	Olipaved	=	25.00%	1661				8.067 ft/s = 484.04 ft/min
• •		=		4/				
Velocity, V		=	8.07	ft/sec			-5	*··
							t _s =	(L/V) = 0.04 min
Channel Flow								
		_		f4			V =	(1.49/n)*R ^{0.67} *S ^{0.5}
Length, L		=	0	feet	400		v –	ft/s = ft/min
Difference in Elevation			U	to	400			
Slope, S		=					t _o =	Channel Flow Tc
Manning Coefficient, n		=	0.000				t _c =	(L/V) = 0.00 min
Wetted Perimeter, Wp		=	0	feet				
Area, A		=	0	sqft				
Hydraulic Radius, R		=		•				
Velocity, V		=		ft/s				
	t	=	Total Time	of Concent	ration			
	t	=	Σto + Σts +	Σtc				
	t	=	11.80	(Min 5 Mi	inutes)			
			0.20	Hour	matoo,			
ntensity (Vanderburgh Co.)			0.20	Hour				
interiors (variationally)			3.79	in/hr				
		2						
		5	4.45	in/hr				
	I ₁		5.02	in/hr				
	l ₂	5	5.89	in/hr				
	15	0 =	6.65	in/hr				
	I ₁₀	o =	7.51	in/hr				
Peak Runoff Rate								
- cak Kulloli Kate	$Q_{vr} = CiA$							
- cak Kulloli Kate			0.84	cfs				
ear Ruion Rate	*	2						
- cak Kulloli Kate	Q			cfe				
eak Runon Rate	Q Q	5	0.99	cfs				
ear Ruivii Rate	Q Q Q ₁	s 0 =	0.99 1.11	cfs				
ear ruidii rate	Q Q Q ₁ , Q ₂ ,	5 0 = 5 =	0.99 1.11 1.31	cfs cfs				
ear ruivii rate	Q Q Q ₁	5 0 = 5 =	0.99 1.11	cfs				
ear Ruivii Rate	Q Q Q ₁ , Q ₂ ,	5 0 = 5 = 0 =	0.99 1.11 1.31	cfs cfs				
ear Ruidii Rate	Q Q Q ₁ Q ₂ Q ₃	5 0 = 5 = 0 =	0.99 1.11 1.31 1.47	cfs cfs cfs				

Area (Ac) =

Project 11822 Area (Sf) = 45,669

Surface	Area					С	A*c
Structures & Pavement (<2%)		S.F.	=	0.00	AC.	0.92	0.00
Structures & Pavement (2-5%)	3,650	S.F.	=	0.08	AC.	0.94	0.08
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.00
Structures & Pavement (>10%)	9,125	S.F.	=	0.21	AC.	0.98	0.21
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50	0.00
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60	0.00
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65	0.00
Lawn (<2%)		S.F.	=	0.00	AC.	0.15	0.00
Lawn (2-5%)		S.F.	=	0.00	AC.	0.25	0.00
Lawn (5-10%)	29,171	S.F.	=	0.67	AC.	0.40	0.27
Lawn (>10%)	3,723	S.F.	=	0.09	AC.	0.55	0.05
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.00
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00
Cultivated (2-5%)		S.F.	-	0.00	AC.	0.35	0.00
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50	0.00
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00
Water		S.F.	=	0.00	AC.	1.00	0.00
	45,669			1.05			0.60
Nc =	0.5713						

1.05

Wc =	0.5713				-	-		-			
Time of Concentration											
Overland Flow											
Length, L (max 100ft)		=	85	feet		t,	=		d Flow T		
Slope, S		=	5.00%			t,	=	[0.42*(L	.u.a)*(nu.a)	M(P==)*(5	5°'')]
Manning Coefficient, n		=	0.240	Grass		t _o	=	8.55	min		
P _{2/24}		=	3.3								
Shallow Flow											
Length, L. (Paved or Unpaved)	Unpaved	=	0	feet		V	=	16.1345			
Slope, S		=	0.00%				=	0.000	ft/s =	0.00	ft/min
Velocity, V		=	0.00	ft/sec		t _s	=	Shallow	Flow Tc		
						ts	=	(L/V) =	0.00	min	
Channel Flow										_	
Length, L		=	285	feet		V	=	(1.49/n)	*R ^{0.67} *S ^{0.}	.5	
Difference in Elevation		=	412.28	to	410		=	2.707	ft/s =	162.42	ft/min
Slope, S		=	0.80%			t _c	=	Channe	I Flow To	;	
Manning Coefficient, n		=	0,035			t.	=	(L/V) =	1.75	min	
Wetted Perimeter, Wp		=	8.32	feet				` '			
Area. A		=	5	sqft							
Hydraulic Radius, R		=	0.60								
Velocity, V		=	2.71	ft/s							

.t	=	Total Time	of Concentration
t t	=	Σto + Σts +	Σtc
t	=	10.31 0.17	(Min 5 Minutes) Hour
l ₂		4.02	in/hr
I ₅		4.71	in/hr
I10	=	5.32	in/hr
125		6.24	in/hr
150	=	7.05	in/hr
I ₁₀₀	=	7.96	in/hr

Peak Runoff Rate

Intensity (Vanderburgh Co.)

 $Q_{yr} = CiA$ Q₂ Q₅ Q₁₀ = Q₂₅ = Q₅₀ = Q₁₀₀ = 2.41 2.82 3.19 3.74 4.22 cfs cfs cfs cfs cfs cfs

0.64

Project 11822 Area (Sf) = 28,005

Weighted Runoff Coefficient Surface	Area						c	A*c](
Structures & Pavement (<2%)			S.F.	=	0.00	AC.	0.92	0.00]
Structures & Pavement (2-5%)	9,15	50	S.F.		0.21	AC.	0.94	0.20]
Structures & Pavement (5-10%)			S.F.		0.00	AC.	0.96	0.00	
Structures & Pavement (>10%)	4,37	5	S.F.		0.10	AC.	0.98	0.10	-
Gravel (10 yr Storm)		_	S.F.		0.00	AC.	0.50	0.00	-
Gravel (25 yr Storm) Gravel (50-100 yr Storm)		_	S.F.		0.00	AC.	0.65	0.00	1
Lawn (<2%)		_	S.F.		0.00	AC.	0.15		1
Lawn (2-5%)	14,4	80	S.F.		0.33	AC.	0.25	0.08	1
Lawn (5-10%)			S.F.	=	0.00	AC.	0.40	0.00	
Lawn (>10%)			S.F.	=	0.00	AC.	0.55	0.00	
Woodland Flat (<2%)			S.F.	=	0,00	AC.	0.12	0.00	
Woodland Flat (2-5%)			S.F.	=	0.00	AC.	0.24		
Woodland Rolling (5-10%)	_	_	S.F.	=	0.00	AC.	0.36	0.00	-
Woodland Hilly (10-30%) Pasture Flat (<2%)		_	S.F.	=	0.00	AC.	0.12	0.00	1
Pasture Flat (2-5%)			S.F.		0.00	AC.	0.24	0.00	
Pasture Rolling (5-10%)			S.F.	-	0.00	AC.	0.36	0.00	
Pasture Hilly (>10%)			S.F.	=	0.00	AC.	0.48	0.00	
Cultivated (<2%)			S.F.	=	0.00	AC.	0.20		
Cultivated (2-5%)	4		S.F.	=	0.00	AC.	0.35	0.00	
Cultivated (5-10%)	4		S.F.	=	0.00	AC.	0.50	0.00	-
Cultivated (>10%)			S.F.	=	0.00	AC.	0.65	0.00	1
Bare Soil Water		_	S.F.		0.00	AC.	1.00	0.00	
7.7.41	28,00)5	3440		0.64	1, 10.	7.00	0.38	
Wc =	0.5895						-		•
Time of Concentration Overland Flow Length, L (max 100ft) Slope, S			=	58 5.00%	feet			t _o = t _o =	Overland Flow Tc [0.42*(L ^{0.8})*(n ^{0.8})]/[P ^{0.8})*(S ^{0.4})]
Manning Coefficient, n			=	0.240	Grass			t _o =	6.30 min
				3.3	Glass			٠ –	0.50 11111
P _{2/24}			=	3.3					
Shallow Flow Length, L (Paved or Unpaved) Slope, S Velocity, V	Paved		= =	230 1.00% 2.03	feet ft/sec			V = = t _s = =	20.3282*(S0.5) 2.033 ft/s = 121.97 ft/mir Shallow Flow Tc (L/V) = 1.89 min
Channel Flow									
Length, L			=		feet				(1.49/n)*R ^{0.67} *S ^{0.5}
Difference in Elevation			=	0	to	0		=	ft/s = ft/mir
Slope, S			=					t _c =	Channel Flow Tc
Manning Coefficient, n			=	0.000				t _c =	(L/V) = 0.00 min
Wetted Perimeter, Wp			=	0	feet				
Area, A			=	0	sqft				
Hydraulic Radius, R Velocity, V			=		ft/s				
		t		Total Time Σto + Σts +					
		t t	=	8.19 0.14	(Min 5 Mi Hour	•			
ntensity (Vanderburgh Co.)		t		0.14	Hour	•			
ntensity (Vanderburgh Co.)		t l ₂		0.14 4.38	Hour in/hr	•			
ntensity (Vanderburgh Co.)		t I ₂ I ₅	=	0.14 4.38 5.14	Hour in/hr in/hr	•			
ntensity (Vanderburgh Co.)		t l ₂ l ₅ l ₁₀		0.14 4.38 5.14 5.80	Hour in/hr in/hr in/hr	•			
ntensity (Vanderburgh Co.)		t I ₂ I ₅ I ₁₀ I ₂₅	=	0.14 4.38 5.14 5.80 6.80	Hour in/hr in/hr in/hr in/hr	•			
ntensity (Vanderburgh Co.)		t	=	0.14 4.38 5.14 5.80 6.80 7.68	in/hr in/hr in/hr in/hr in/hr				
		t I ₂ I ₅ I ₁₀ I ₂₅	= =	0.14 4.38 5.14 5.80 6.80	Hour in/hr in/hr in/hr in/hr				
	Q.,, ≃ Ci∆	t	= =	0.14 4.38 5.14 5.80 6.80 7.68	in/hr in/hr in/hr in/hr in/hr				
	Q _{yr} = CiA	l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀ l ₁₀₀	= =	0.14 4.38 5.14 5.80 6.80 7.68 8.67	Hour in/hr in/hr in/hr in/hr in/hr				
	Q _{yr} = CiA	t 12 15 140 150 1400 Q2	= =	0.14 4.38 5.14 5.80 6.80 7.68 8.67	Hour in/hr in/hr in/hr in/hr in/hr in/hr				
	Q _{yr} = CiA	t	= = =	0.14 4.38 5.14 5.80 6.80 7.68 8.67	Hour in/hr in/hr in/hr in/hr in/hr in/hr cfs				
	Q _{yr} = CiA	t	= = = =	0.14 4.38 5.14 5.80 6.80 7.68 8.67 1.66 1.95 2.20	Hour in/hr in/hr in/hr in/hr in/hr in/hr cfs cfs cfs				
ntensity (Vanderburgh Co.) Peak Runoff Rate	Q _{yr} = CiA	l ₂ l ₅ l ₁₀ l ₂₅ l ₅₀ l ₁₀₀ Q ₂ Q ₅ Q ₁₀ Q ₂₅	= = = = = = = = = = = = = = = = = = = =	0.14 4.38 5.14 5.80 6.80 7.68 8.67 1.66 1.95 2.20 2.58	Hour in/hr in/hr in/hr in/hr in/hr in/hr cfs cfs cfs cfs				
	Q _{yr} = CiA	t	= = = =	0.14 4.38 5.14 5.80 6.80 7.68 8.67 1.66 1.95 2.20	Hour in/hr in/hr in/hr in/hr in/hr in/hr cfs cfs cfs				

Peak Runoff Calculation

SUB-BASIN #12 (12A+12B)

Post-Developed

Area (Ac) =

Project 11822 Area (Sf) = 29,495

Surface	Area					С	A*c
Structures & Pavement (<2%)		S.F.	=	0,00	AC.	0.92	0.00
Structures & Pavement (2-5%)	9,100	S.F.	=	0.21	AC.	0.94	0.20
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.00
Structures & Pavement (>10%)	3,750	S.F.	=	0.09	AC.	0.98	0.08
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50	0.00
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60	0.00
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65	0.00
Lawn (<2%)		S.F.	=	0.00	AC.	0.15	0.00
Lawn (2-5%)	16,645	S.F.	-	0.38	AC.	0.25	0.10
Lawn (5-10%)		S.F.	=	0.00	AC.	0.40	0.00
Lawn (>10%)		S.F.	-	0.00	AC.	0.55	0.00
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Woodland Flat (2-5%)		S.F.	-	0.00	AC.	0.24	0.00
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Woodland Hilly (10-30%)		S.F.	-	0.00	AC.	0.48	0.00
Pasture Flat (<2%)		S.F.	-	0.00	AC.	0.12	0.00
Pasture Flat (2-5%)		S.F.	-	0.00	AC.	0.24	0.00
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00
Cultivated (2-5%)		S.F.	=	0.00	AC.	0.35	0.00
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50	0.00
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00
Water		S.F.	=	0.00	AC.	1.00	0.00
11005000	29,495			0.68	10.		0.38

Time of Concentration

Overland Flow			
Length, L (max 100ft)	=	58	feet
Slope, S	=	5.00%	
Manning Coefficient, n	=	0.240	Grass
P _{2/24}	=	3.3	

0.68

Shallow Flow

Length, L (Paved or Unpaved)	Paved	=	325	reet	
Slope, S		=	1.00%		
Velocity, V		=	2.03	ft/sec	

Channel Flow

Length, L	=		feet
Difference in Elevation	=	0	to
Slope, S	=		
Manning Coefficient, n	=	0.000	
Wetted Perimeter, Wp	=	0	feet
Area, A	=	0	sqft
Hydraulic Radius, R	=		
Velocity, V	=		ft/s

Hour 0.15 Intensity (Vanderburgh Co.) in/hr l₂ 4.24 4.97 in/hr Ito 5.62 in/hr 6.59 in/hr I_{25} 7.44 in/hr 150 8.40 in/hr I₁₀₀

Peak Runoff Rate

 $Q_{yr} = CiA$ Q_2 <u>1.59</u> cfs Q_5 1.87 cfs Q₁₀ 2.11 cfs Q₂₅ cfs 2.48 cfs Q_{50} 2.80 cfs <u>3.16</u>

Total Time of Concentration
 Σto + Σts + Σtc

(Min 5 Minutes)

8.96

 t_o = Overland Flow Tc

 $t_o = [0.42*(L^{u.d})*(n^{u.d})]/[P^{u.5})*(S^{u.4})]$

t_o = 6.30 min

V = 20.3282*(S0.5) = 2.033 ft/s = 121.97 ft/min

= Shallow Flow Tc

= (L/V) = 2.66 min

 $V = (1.49/n)*R^{0.67}*S^{0.5}$ ft/s =

ft/min

= Channel Flow Tc

 $t_c = (L/V) = 0.00 \text{ min}$

Peak Runoff Calculation SUB-BASIN #12A Post-Developed

Area (Ac) =

0.41

Project 11822 Area (Sf) = 17,697

Surface	Area					С	A*c	T)	
Structures & Pavement (<2%)		S.F	. =	0.00	AC.	0.92	0.00		
Structures & Pavement (2-5%)	5,460	S.F	=	0.13	AC.	0.94	0.12		
Structures & Pavement (5-10%)		S.F	. =	0.00	AC.	0.96	0.00		
Structures & Pavement (>10%)	2,250	S.F	. =	0.05	AC.	0.98	0.05		
Gravel (10 yr Storm)		S.F		0.00	AC.	0.50	0.00		
Gravel (25 yr Storm)		S.F		0.00	AC.	0.60	0.00	4	
Gravel (50-100 yr Storm)		S.F		0.00	AC.	0.65	0.00	4	
Lawn (<2%)		S.F		0.00	AC.	0.15	0.00	4	
Lawn (2-5%)	9,987	S.F		0.23	AC.	0.25	0.06	4	
Lawn (5-10%)		S.F		0.00	AC.	0.40	0.00	4	
Lawn (>10%)		S.F		0.00	AC.	0.55	0.00	4	
Woodland Flat (<2%)		S.F		0.00	AC.	0.12	0.00	4	
Woodland Flat (2-5%)		S.F		0.00	AC.	0.24	0.00	4	
Woodland Rolling (5-10%)		S.F		0.00	AC.	0.30	0.00	-	
Woodland Hilly (10-30%) Pasture Flat (<2%)		S.F		0.00	AC.	0.12	0.00	-	
Pasture Flat (2-5%)	-	S.F		0.00	AC.	0.24	0.00	1	
Pasture Rolling (5-10%)	-	S.F		0.00	AC.	0.36	0.00		
Pasture Hilly (>10%)	1	S.F		0.00	AC.	0.48	0.00	1	
Cultivated (<2%)	1	S.F		0.00	AC.	0.20	0.00	1	
Cultivated (2-5%)	1	S.F		0.00	AC.	0.35	0.00	1	
Cultivated (5-10%)		S.F		0.00	AC.	0.50	0.00	1	
Cultivated (>10%)		S.F		0.00	AC.	0.65	0.00	1	
Bare Soil		S.F		0.00	AC.	0.72	0.00		
Water		S.F		0.00	AC.	1.00	0.00		
	17,697			0.41			0.23		
Wc =	0.5557								
Time of Concentration Overland Flow			25	64				Overdend Slave To	
Length, L (max 100ft)		=	35	feet			-	Overland Flow Tc [0.42*(L ^{0.8})*(n ^{0.8})]/[P ^{0.5})*(S ⁰	J.4\1
Slope, S		=	5.00%				t _o =		Л
Manning Coefficient, n		=	0.240	Grass			t _o =	4.21 min	
P _{2/24}		=	3.3						
Length, L (Paved or Unpaved) Slope, S Velocity, V	Paved	=	250 0.70% 1.70	feet ft/sec			V =	20.3282*(S0.5) 1.701 ft/s = 102.05 Shallow Flow Tc (L/V) = 2.45 min	ft/mii
Channel Flow				60.01			v -	(1.49/n)*R ^{0.67} *S ^{0.5}	
Length, L		=	0	feet			V =		ft/mii
Difference in Elevation			Ü	to	0				IVITIII
Slope, S		=					t _c =	Channel Flow Tc	
Manning Coefficient, n		=	0.000				t _c =	(L/V) = 0.00 min	
Wetted Perimeter, Wp		=	0	feet					
Wetted I cililicter, WP		=	0	sqft					
Area, A									
		=							
Area, A		=		ft/s					
Area, A Hydraulic Radius, R				ft/s					
Area, A Hydraulic Radius, R		=							
Area, A Hydraulic Radius, R	t	=	Total Time	of Concenti	ration				
Area, A Hydraulic Radius, R	t	=	Σto + Σts +	of Concentr					
Area, A Hydraulic Radius, R		=	Σto + Σts + 6.66	of Concenti Σtc (Min 5 Mi					
Area, A Hydraulic Radius, R Velocity, V	t	=	Σto + Σts +	of Concentr					
Area, A Hydraulic Radius, R	t	= = =	Σto + Σts + 6.66 0.11	of Concenti Σtc (Min 5 Mi Hour					
Area, A Hydraulic Radius, R Velocity, V	t	= = = =	Σto + Σts + 6.66 0.11 4.67	of Concenti Σtc (Min 5 Mi Hour in/hr					
Area, A Hydraulic Radius, R Velocity, V	t	= = =	Σto + Σts + 6.66 0.11	of Concent Σtc (Min 5 Mi Hour in/hr					
Area, A Hydraulic Radius, R Velocity, V	t	= = = =	Σto + Σts + 6.66 0.11 4.67	of Concenti Σtc (Min 5 Mi Hour in/hr					
Area, A Hydraulic Radius, R Velocity, V	t	= = = = = ₂	Σto + Σts + 6.66 0.11 4.67 5.48	of Concent Σtc (Min 5 Mi Hour in/hr					
Area, A Hydraulic Radius, R Velocity, V	t t	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 6.66 0.11 4.67 5.48 6.19	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr					
Area, A Hydraulic Radius, R Velocity, V	t t	=	Σto + Σts + 6.66 0.11 4.67 5.48 6.19 7.26 8.19	of Concentr Σtc (Min 5 Mi Hour in/hr in/hr in/hr					
Area, A Hydraulic Radius, R Velocity, V	t t	=	Σto + Σts + 6.66 0.11 4.67 5.48 6.19 7.26	of Concents Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr					
Area, A Hydraulic Radius, R Velocity, V ntensity (Vanderburgh Co.)	t t	=	Σto + Σts + 6.66 0.11 4.67 5.48 6.19 7.26 8.19	of Concents Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr					
Area, A Hydraulic Radius, R Velocity, V ntensity (Vanderburgh Co.)	t t	=	Σto + Σts + 6.66 0.11 4.67 5.48 6.19 7.26 8.19	of Concents Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr					
Area, A Hydraulic Radius, R Velocity, V ntensity (Vanderburgh Co.)	\mathbf{t}	=	Σto + Σts + 6.66 0.11 4.67 5.48 6.19 7.26 8.19 9.25	of Concents Stc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr					
Area, A Hydraulic Radius, R Velocity, V ntensity (Vanderburgh Co.)	\mathbf{t}	=	Σto + Σts + 6.66 0.11 4.67 5.48 6.19 7.26 8.19 9.25	of Concentr Stc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr					
Area, A Hydraulic Radius, R Velocity, V ntensity (Vanderburgh Co.)	\mathbf{t} \mathbf{t}	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 6.66 0.11 4.67 5.48 6.19 7.26 8.19 9.25	of Concents Stc (Min 5 Mi Hour in/hr in/hr in/hr in/hr on/hr cfs cfs					
Area, A Hydraulic Radius, R Velocity, V	\mathbf{t}	= I ₂	Σto + Σts + 6.66 0.11 4.67 5.48 6.19 7.26 8.19 9.25 1.05 1.24 1.40	of Concents Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr in/hr cfs cfs cfs					
Area, A Hydraulic Radius, R Velocity, V ntensity (Vanderburgh Co.)	$\mathbf{q}_{yr} = \mathbf{CiA}$	= I2 I5 I10 = I25 I100 = I25 I25 I25 I25 I25 I25 I25 I25 = I25	Σto + Σts + 6.66 0.11 4.67 5.48 6.19 7.26 8.19 9.25 1.05 1.24 1.40 1.64	of Concents Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr cfs cfs cfs cfs cfs					
Area, A Hydraulic Radius, R Velocity, V ntensity (Vanderburgh Co.)	$Q_{yr} = CiA$	= I ₂	Σto + Σts + 6.66 0.11 4.67 5.48 6.19 7.26 8.19 9.25 1.05 1.24 1.40	of Concents Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr in/hr cfs cfs cfs					

0.27

Project 11822 Area (Sf) = 11,798

Area					С	A*c	
	S.F.	=	0.00	AC.	0.92	0.00	
3,640	S.F.	=	0.08	AC.	0.94	0.08	1
	S.F.	=	0.00	AC.	0.96	0.00	
1,500		=	0.03	AC.	0.98	0.03	1
	S.F.	=	0.00	AC.	0.50	0.00	
		=					1
							4
							4
6,658							4
1							4
							4
+							4
							4
-							
+							-
+							il de la companya de la companya de la companya de la companya de la companya de la companya de la companya de
+							4
							1
1		=					1
			0.00	AC.	0.35	0.00	1
	S.F.	=	0.00	AC.	0.50	0.00	1
	S.F.		0.00	AC.	0.65	0.00	1
	S.F.	=	0.00	AC.	0.72	0.00]
	S.F.	=	0.00	AC.	1.00	0.00	
			0.27			0.15	
0.5557							
	=	100 4.00%	feet			t _o =	Overland Flow Tc [0.42*(L ^{u.8})*(n ^{u.8})]/[P ^{u.5})*(S ^{u.4})]
	=	0.011	Pavement	:		t _o =	0.90 min
	=	3.3					
Paved	=	70 4.00% 4.07	feet ft/sec			V = = t _s = t _s =	20.3282*(S0.5) 4.066 ft/s = 243.94 ft/m Shallow Flow Tc (L/V) = 0.29 min
	=		feet			V =	(1.49/n)*R ^{0.67} *S ^{0.5}
	=	0	to	0		=	ft/s = ft/m
	=	•		_		t _c =	Channel Flow Tc
	=	0.000					(L/V) = 0.00 min
			foot			·c -	(D 4) = 0.00 Hills
		U	ayıı				
			ft/s				
	_		100				
t	=	Total Time	of Concentra	ation			
t	=	Σ to + Σ ts +	Σtc				
t	=	5.00	(Min 5 Min	iutes)			
		0.08	Hour				
		5.02	in/hr				
	l ₂	5.02					
	1 ₂ 1 ₅	5.90	in/hr				
	15		in/hr in/hr				
	I ₅ =	5.90 6.66	in/hr				
	15	5.90					
	1,500 6,658 11,798 0.5557	S.F. S.F.	S.F. =	S.F. = 0.00	S.F. = 0.00 AC. 1,500 S.F. = 0.03 AC. S.F. = 0.00 AC. S.F.	S.F. = 0.00 AC. 0.96	S.F. = 0.00 AC. 0.96 0.00

0.76 0.89 1.00 1.18

1.33 1.50

 $\begin{array}{c} Q_{yr} = CiA \\ Q_2 \\ Q_5 \\ Q_{10} \\ Q_{25} \\ Q_{25} \\ Q_{30} \\ Q_{30} \\ Q_{100} \end{array}$

Peak Runoff Rate

cfs cfs cfs cfs

cfs cfs

Area (Ac) =

1.72

Project 11822 Area (Sf) = 75,060

Weighted Runoff Coefficient Surface	Area						С	A*c]		
Structures & Pavement (<2%)			S.F.	=	0.00	AC.	0.92	_	00			
Structures & Pavement (2-5%)	2,50	0	S.F.	=	0.06	AC.	0.94		05]		
Structures & Pavement (5-10%)			S.F.	=	0.00	AC.	0.96		00	1		
Structures & Pavement (>10%)	6,25	0	S.F.		0.14	AC.	0.98		14	1		
Gravel (10 yr Storm)	-		S.F.	=	0.00	AC.	0.50		00	-		
Gravel (25 yr Storm) Gravel (50-100 yr Storm)	-	_	S.F.	-	0.00	AC.	0.65		00	1		
Lawn (<2%)		_	S.F.	=	0.00	AC.	0.15		00	1		
Lawn (2-5%)		_	S.F.	=	0.00	AC.	0.25		00	1		
Lawn (5-10%)	48,31	0	S.F.	=	1.11	AC.	0.40	0.	44]		
Lawn (>10%)			S.F.	=	0.00	AC.	0.55		00]		
Woodland Flat (<2%)			S.F.	=	0.00	AC.	0.12		00	1		
Woodland Flat (2-5%)		_	S.F.	=	0.00	AC.	0.24		00	ļ		
Woodland Rolling (5-10%) Woodland Hilly (10-30%)		_	S.F. S.F.	=	0.00	AC.	0.36		00	1		
Pasture Flat (<2%)	-	_	S.F.	=	0.00	AC.	0.12		00	1		
Pasture Flat (2-5%)	-	_	S.F.	-	0.00	AC.	0.24		00			
Pasture Rolling (5-10%)			S.F.	=	0.00	AC.	0.36		00	1		
Pasture Hilly (>10%)			S.F.	=	0.00	AC.	0.48		00			
Cultivated (<2%)			S.F.	=	0.00	AC.	0.20		00			
Cultivated (2-5%)			S.F.	=	0.00	AC.	0.35		00			
Cultivated (5-10%)	_	_	S.F.	-	0.00	AC.	0.50		00	1		
Cultivated (>10%) Bare Soil	-	-	S.F.	-	0.00	AC.	0.65		00	1		
Water	18.00	0	S.F.		0.00	AC.	1.00	0.				
rvate:	75,06		Q.11.		1.72	7,10.	11.00		05	1		
Wc =	0.6102				-1					,		
Overland Flow Length, L (max 100ft) Slope, S Manning Coefficient, n P _{2/24}			= = =	100 5.00% 0.240 3.3	feet Grass			to ta ta	= =	Overland Flor [0.42*(L ^{u.s})*(n 9.74 min		S ^{u.4})]
Shallow Flow												
Length, L (Paved or Unpaved)	Unpaved		=	70	feet			٧		16.1345*(S0. 3.608 ft/s =		ft/mir
Slope, S Velocity, V			=	5.00% 3.61	ft/sec			t _s	=	Shallow Flow		IVIIII
Channel Flow												
Length, L			=		feet			V		(1.49/n)*R ^{0.67}		
Difference in Elevation			=	0	to	0			=	ft/s =		ft/mir
Slope, S			=					t _c	=	Channel Flow		
Manning Coefficient, n			=	0.000				t _c	=	(LN) = 0.0	00 min	
Wetted Perimeter, Wp			=	0	feet							
Area, A			=	0	sqft							
Hydraulic Radius, R Velocity, V			=		ft/s							
		t t	===	Total Time Σto + Σts +		ation						
		t	=	10.06 0.17	(Min 5 Mi Hour	nutes)						
ntensity (Vanderburgh Co.)		l ₂		4.06	in/hr							
ntensity (Vanderburgh Co.)					in/hr							
ntensity (Vanderburgh Co.)				4.76								
ntensity (Vanderburgh Co.)		I ₅	=	4.76 5.37	in/hr							
ntensity (Vanderburgh Co.)		₅ ₁₀	=	4.76 5.37 6.31								
ntensity (Vanderburgh Co.)		I ₅ I ₁₀ I ₂₅		5.37 6.31	in/hr							
ntensity (Vanderburgh Co.)		₅ ₁₀	=	5.37	in/hr in/hr							
		I ₅ I ₁₀ I ₂₅ I ₅₀	=	5.37 6.31 7.12	in/hr in/hr in/hr							
ntensity (Vanderburgh Co.) Peak Runoff Rate		I ₅ I ₁₀ I ₂₅ I ₅₀	=	5.37 6.31 7.12	in/hr in/hr in/hr							
	$Q_{yr} = CiA$	I ₅ I ₁₀ I ₂₅ I ₅₀ I ₁₀₀	=	5.37 6.31 7.12 8.03	in/hr in/hr in/hr in/hr							
	$Q_{yr} = CiA$	I ₅ I ₁₀ I ₂₅ I ₅₀ I ₁₀₀	=	5.37 6.31 7.12 8.03	in/hr in/hr in/hr in/hr							
	Q _{yr} = CiA	I ₅ I ₁₀ I ₂₅ I ₅₀ I ₁₀₀	=	5.37 6.31 7.12 8.03 4.26 5.00	in/hr in/hr in/hr in/hr cfs cfs							
	Q _{yr} = CiA	I ₅ I ₁₀ I ₂₅ I ₅₀ I ₁₀₀ Q ₂ Q ₅ Q ₁₀	= =	5.37 6.31 7.12 8.03 4.26 5.00 5.65	in/hr in/hr in/hr in/hr cfs cfs cfs							
	$Q_{yr} = CiA$	I ₅ I ₁₀ I ₂₅ I ₅₀ I ₁₀₀ Q ₂ Q ₅ Q ₁₀ Q ₂₅	= = =	5.37 6.31 7.12 8.03 4.26 5.00 5.65 6.63	in/hr in/hr in/hr in/hr cfs cfs cfs cfs							
		I ₅ I ₁₀ I ₂₅ I ₅₀ I ₁₀₀ Q ₂ Q ₅ Q ₁₀	= =	5.37 6.31 7.12 8.03 4.26 5.00 5.65	in/hr in/hr in/hr in/hr cfs cfs cfs							

0.35

Project 11822 Area (Sf) = 15,340

Surface	Агеа					С	A*c
Structures & Pavement (<2%)		S.F.	=	0.00	AC.	0.92	0.00
Structures & Pavement (2-5%)	1,000	S.F.	=	0.02	AC.	0.94	0.02
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.00
Structures & Pavement (>10%)	3,610	S.F.	=	0.08	AC.	0.98	0.08
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50	0.00
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60	0.00
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65	0.00
Lawn (<2%)		S.F.	=	0.00	AC.	0.15	0.00
Lawn (2-5%)		S.F.	=	0.00	AC.	0.25	0.00
Lawn (5-10%)	10,730	S.F.	=	0.25	AC.	0.40	0.10
Lawn (>10%)		S.F.	=	0.00	AC.	0.55	0.00
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Woodland Rolling (5-10%)		S.F.		0.00	AC.	0.36	0.00
Woodland Hilly (10-30%)		S.F.	-	0.00	AC.	0.48	0.00
Pasture Flat (<2%)		S.F.	-	0.00	AC.	0.12	0.00
Pasture Flat (2-5%)		S.F.		0.00	AC.	0.24	0.00
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Pasture Hilly (>10%)		S.F.	= ,	0.00	AC.	0.48	0.00
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00
Cultivated (2-5%)		S.F.	=	0.00	AC.	0.35	0.00
Cultivated (5-10%)		S.F.	= =	0.00	AC.	0.50	0,00
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00
Water		S.F.	=	0.00	AC.	1.00	0.00
	15,340			0.35			0.20
Wc =	0.5717						

	15,340			0.35		0.2	20				
Wc =	0.5717					-					
Time of Concentration											
Overland Flow											
Length, L (max 100ft)		=	100	feet		t,	=		nd Flow T		
Slope, S		=	10.00%			t _o	=	[0.42*(L	. ^{0.8})*(n ^{0.8})]/[P ^{0.5})*(S	0.4)]
Manning Coefficient, n		=	0.240	Grass		t _o	=	7.38	min		
P _{2/24}		=	3.3								
Shallow Flow											
Length, L (Paved or Unpaved)	Unpaved	=	40	feet		V		16.1345			
Slope, S		=	10.00%				=	5.102		306.13	ft/min
Velocity, V		=	5.10	ft/sec		t,	=	Shallow	Flow To		
						t _s	=	(L/V) =	0.13	min	
Channel Flow											
Length, L		=		feet		V	=	(1.49/n)	*R ^{0.67} *S ⁰	.5	
Difference in Elevation		=	0	to	0	•	=	(1.40/11)	ft/s =		ft/min
Slope, S		=				t,	=	Channe	I Flow To	:	
Manning Coefficient, n		=	0.000			t _c	=	(L/V) =	0.00	min	
Wetted Perimeter, Wp		=	0	feet		*		\—··/			
Area. A		=	Ō	sqft							
Hydraulic Radius, R		=									
Velocity, V		=		ft/s							
	t	=	Total Time	of Concentr	ration						
	ì	=	Σto + Σts +								
	-										

	t	=	210 + 215 +	≥tc
	t	=	7.51	(Min 5 Minutes)
			0.13	Hour
ntensity (Vanderburgh Co.)				
	l ₂		4.50	in/hr
	l ₅		5.28	in/hr
	I ₁₀	=	5.96	in/hr
	I ₂₅		7.00	in/hr
	I ₅₀	=	7.90	in/hr
	I ₁₀₀	=	8.92	in/hr

Peak Runoff Rate

 Area (Ac) =

0.95

Project 11822 Area (Sf) = 41,235

Surface	Area						A*c					
Structures & Pavement (<2%)	W.	S.F.	=	0.00	AC.	0.92	0.00					
Structures & Pavement (2-5%)	11,775	S.F.	=	0.27	AC.	0.94	0.25					
Structures & Pavement (5-10%)	U.I.	S.F.	=	0.00	AC.	0.96	0.00	_				
Structures & Pavement (>10%)	8,750	S.F.		0.20	AC.	0.98	0.20					
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50	0.00	-				
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60	0.00	-				
Gravel (50-100 yr Storm)	-	S.F.	-	0.00	AC.	0.65	0.00	-				
Lawn (<2%)	00.740	S.F.	-	0.00	AC.	0.15	0.00	-				
Lawn (2-5%) Lawn (5-10%)	20,710	S.F.	=	0.00	AC.	0.40	0.00	+				
Lawn (>10%)	+	S.F.	=	0.00	AC.	0.55	0.00					
Woodland Flat (<2%)	+	S.F.	<u> </u>	0.00	AC.	0.12	0.00	-				
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00					
Woodland Rolling (5-10%)	1	S.F.	=	0.00	AC.	0.36	0.00					
Woodland Hilly (10-30%)	1	S.F.	=	0.00	AC.	0.48	0.00					
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00					
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00					
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00					
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00					
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00	4				
Cultivated (2-5%)		S.F.	=	0.00	AC.	0.35	0.00	-				
Cultivated (5-10%)		S.F.	-	0,00	AC.	0.50	0.00	-				
Cultivated (>10%)		S.F.	-	0.00	AC.	0.65	0.00	-				
Bare Soil		S.F.	=	0.00	AC.	1.00	0.00	-				
Water	41,235	S.F.	=	0.00	AC.	1.00	0.00	-				
Wc =	0.6019			0.55			0.01					
Length, L (max 100ft) Slope, S Manning Coefficient, n		=	65 5.00% 0.240	feet Grass			t _o = t _o =	[0.43		Flow Tc i)*(n ^{u.a})]/[nin	P ^{u.5})*(S	^{U.4})]
				Glass			۰ -	0.	00 1	11111		
P _{2/24}		=	3.3									
Length, L (Paved or Unpaved) Slope, S Velocity, V	Unpaved	= =	550 2.00% 2.28	feet ft/sec			V = t _s = t _s =	Sha	2 fi low F		136,91 min	ft/m
<u>Channel Flow</u> Length, L Difference in Elevation		=	0	feet to	0		V =		fl	t ^{0.67} *S ^{0.5} t/s =		ft/mi
Slope, S		=					t _c =			low Tc		
Manning Coefficient, n		=	0.000				t _c =	(L/V) =	0.00 r	min	
Wetted Perimeter, Wp		=	0	feet								
Area, A		=	0	sqft								
Hydraulic Radius, R		=										
Velocity, V		=		ft/s								
	t t	= ;	Total Time Σto + Σts + 10.92 0.18	of Concentr Σtc (Min 5 Mi Hour								
ntensity (Vanderburgh Co.)		=	Σto + Σts + 10.92 0.18	Σtc (Min 5 Mi Hour								
intensity (Vanderburgh Co.)	t	=	Σto + Σts + 10.92 0.18 3.92	Σtc (Min 5 Mi Hour in/hr								
ntensity (Vanderburgh Co.)	t t	= =	Σto + Σts + 10.92 0.18 3.92 4.60	Σtc (Min 5 Mi Hour in/hr In/hr								
ntensity (Vanderburgh Co.)	t t !	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 10.92 0.18 3.92 4.60 5.20	Σtc (Min 5 Mi Hour in/hr in/hr								
ntensity (Vanderburgh Co.)	t t	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 10.92 0.18 3.92 4.60	Σtc (Min 5 Mi Hour in/hr In/hr								
ntensity (Vanderburgh Co.)	t t !	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 10.92 0.18 3.92 4.60 5.20	Σtc (Min 5 Mi Hour in/hr in/hr								
ntensity (Vanderburgh Co.)	t t 1 14	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 10.92 0.18 3.92 4.60 5.20 6.10	Σtc (Min 5 Mi Hour in/hr in/hr in/hr								
	t t i i i	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 10.92 0.18 3.92 4.60 5.20 6.10 6.88	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr								
	t t l-1 l-2 l-1 l-1	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 10.92 0.18 3.92 4.60 5.20 6.10 6.88	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr in/hr								
	t t I ₁ I ₂ I ₁ I ₁₀ Q _{yr} = CiA	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 10.92 0.18 3.92 4.60 5.20 6.10 6.88 7.77	Σtc (Min 5 Mi Hour in/hr In/hr in/hr in/hr in/hr								
	t t t t t t t t t t t t t t t t t t t	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 10.92 0.18 3.92 4.60 5.20 6.10 6.88 7.77	Σtc (Min 5 Mi Hour in/hr In/hr in/hr in/hr in/hr								
	$C_{yr} = CiA$	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 10.92 0.18 3.92 4.60 5.20 6.10 6.88 7.77	Σtc (Min 5 Mi Hour in/hr in/hr in/hr in/hr cfs cfs								
	$\label{eq:continuous} \begin{array}{c} 1 \\ \mathbf{t} \\ \\ \mathbf{I}_{1} \\ \\ \mathbf{I}_{2} \\ \\ \mathbf{I}_{3} \\ \\ \mathbf{I}_{10} \\ \\ \\ \mathbf{Q}_{3r} = \mathbf{CiA} \\ \\ \mathbf{Q}_{0} \\ \\ \mathbf{Q}_{1} \end{array}$	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 10.92 0.18 3.92 4.60 5.20 6.10 6.88 7.77	Σtc (Min 5 Mi Hour in/hr In/hr in/hr in/hr in/hr cfs cfs cfs								
ntensity (Vanderburgh Co.) Peak Runoff Rate	1 t t l l l l l l l l l l l l l l l l l	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 10.92 0.18 3.92 4.60 5.20 6.10 6.88 7.77 2.23 2.62 2.96 3.47	Σtc (Min 5 Mi Hour in/hr In/hr in/hr in/hr in/hr cfs cfs cfs cfs cfs								
	$\label{eq:continuous} \begin{array}{c} 1 \\ \mathbf{t} \\ \\ \mathbf{I}_{1} \\ \\ \mathbf{I}_{2} \\ \\ \mathbf{I}_{3} \\ \\ \mathbf{I}_{10} \\ \\ \\ \mathbf{Q}_{3r} = \mathbf{CiA} \\ \\ \mathbf{Q}_{0} \\ \\ \mathbf{Q}_{1} \end{array}$	= = = = = = = = = = = = = = = = = = =	Σto + Σts + 10.92 0.18 3.92 4.60 5.20 6.10 6.88 7.77	Σtc (Min 5 Mi Hour in/hr In/hr in/hr in/hr in/hr cfs cfs cfs								

Area (Ac) =

1.43

Project 11822 Area (Sf) = 62,300

Area					C	A*c
	S.F.	=	0.00	AC.	0.92	0.00
6,000	S.F.	=	0.14	AC.	0.94	0.13
	S.F.	=	0.00	AC.	0.96	0.00
15,000	S.F.	=	0.34	AC.	0.98	0.34
	S.F.	=	0.00	AC.	0.50	0.00
	S.F.	=	0.00	AC.	0.60	0.00
	S.F.	=	0.00	AC.	0.65	0.00
	S.F.	=	0.00	AC.	0.15	0.00
35,975	S.F.	=	0.83	AC.	0.25	0.21
	S.F.	=	0.00	AC.	0.40	0.00
5,325	S.F.	=	0.12	AC.	0.55	0.07
	S.F.	=	0.00	AC.	0.12	0.00
	S.F.	=	0.00	AC.	0.24	0.00
	S.F.	=	0.00	AC.	0.36	0.00
	S.F.	=	0.00	AC.	0.48	0.00
	S.F.	=	0.00	AC.	0.12	0.00
	S.F.	=	0.00	AC.	0.24	0.00
	S.F.	=	0.00	AC.	0.36	0.00
	S.F.	-	0.00	AC.	0.48	0.00
-	S.F.	=	0.00	AC.	0.20	0.00
	S.F.	=	0.00	AC.	0.35	0.00
	S.F.	=	0.00	AC.	0.50	0.00
	S.F.	=	0.00	AC.	0.65	0.00
	S.F.	=	0.00	AC.	0.72	0.00
	S.F.	=	0.00	AC.	1.00	0.00
62,300			1,43			0.74
	6,000 15,000 35,975 5,325	S.F. 6,000 S.F. S.F. S.F. 15,000 S.F. S.F. S.F. S.F. S.F. S.F. S.F. S.F.	S.F. =	S.F. = 0.00	S.F. = 0.00 AC.	S.F. = 0.00 AC. 0.92

Time	of Concentrat	ion

Overland Flow			
Length, L (max 100ft)	=	85	feet
Slope, S	=	5.00%	
Manning Coefficient, n	=	0.240	Grass
P _{2/24}	=	3.3	

Shallow Flow Length, L (Paved or Unpaved) Unpaved 0 feet Slope, S 0.00%

0,00 ft/sec Velocity, V

Channel Flow Length, L 385 feet Difference in Elevation 403.85 Slope, S 1.00% Manning Coefficient, n 0.035 Wetted Perimeter, Wp 8.32 feet sqft Area, A Hydraulic Radius, R 0.60 Velocity, V 3.03 ft/s

= Total Time of Concentration Σto + Σts + Σtc (Min 5 Minutes) 10.67 0.18 Hour

Intensity (Vanderburgh Co.) 3.96 in/hr l₂ 4.65 in/hr I₁₀ 5.25 in/hr 6.16 in/hr I₂₅ 6.95 in/hr 150 7.84 l₁₀₀ in/hr

Peak Runoff Rate

 $Q_{yr} = CiA$ \mathbf{Q}_{2} 2.93 cfs Q₅ 3.44 cfs Q₁₀ = cfs 3.88 cfs Q₂₅ = 4.56 = cfs Q_{50} <u>5,15</u> Q₁₀₀ <u>5.81</u> cfs t_o = Overland Flow Tc

 $t_0 = [0.42*(L^{u.8})*(n^{u.8})]/[P^{u.5})*(S^{u.4})]$

8.55 min

V = 16.1345*(S0.5)= 0.000 ft/s =

= Shallow Flow Tc

= (L/V) = 0.00 min

400

= (1.49/n)*R^{0.67}*S^{0.5} = 3.027 ft/s = 181.59 ft/min

= Channel Flow Tc

 $t_c = (L/V) = 2.12 \text{ min}$

Area	(Ac) =	

0.97

Project 11822 Area (Sf) = 42,420

Weighted Runoff Coefficient Surface	Area						С	A*c	1
	Area		e E	=	0.00	AC.	0.92	0.00	4
Structures & Pavement (<2%)	11.00		S.F.						4
Structures & Pavement (2-5%)	14,20	JU	S.F.	=	0.33	AÇ.	0.94		4
Structures & Pavement (5-10%)			S.F.	=	0.00	AC.	0.96	0.00	4
Structures & Pavement (>10%)	7,50	0	S.F.	=	0.17	AC.	0.98	0.17	1
Gravel (10 yr Storm)			S.F.	=	0.00	AC.	0.50	0.00	
Gravel (25 yr Storm)			S.F.	=	0.00	AC.	0.60	0.00	
Gravel (50-100 yr Storm)			S.F.	=	0.00	AC.	0.65	0.00	
Lawn (<2%)			S.F.	=	0.00	AC.	0.15	0.00	
Lawn (2-5%)	20,72	20	S.F.	=	0.48	AC.	0.25	0.12	
Lawn (5-10%)			S.F.	=	0,00	AC.	0.40	0.00	
Lawn (>10%)			S.F.	=	0.00	AC.	0.55	0.00	1
Woodland Flat (<2%)			S.F.	=	0.00	AC.	0.12	0.00	1
Woodland Flat (2-5%)			S.F.	=	0.00	AC.	0.24	0.00	1
Woodland Rolling (5-10%)	_		S.F.	=	0.00	AC.	0.36	0.00	1
Woodland Hilly (10-30%)	_		S.F.	=	0.00	AC.	0.48	0.00	1
Pasture Flat (<2%)		_	S.F.	=	0.00	AC.	0.12	0.00	1
Pasture Flat (2-5%)		_	S.F.	- -	0.00	AC.	0.24	0.00	-
		_	S.F.	=	0.00	AC.	0.36	0.00	-
Pasture Rolling (5-10%)		_							-
Pasture Hilly (>10%)		_	S.F.	-	0.00	AC.	0.48	0.00	-
Cultivated (<2%)		_	S.F.	-	0.00	AC.	0.20	0.00	4
Cultivated (2-5%)			S.F.	-	0.00	AC.	0.35	0.00	4
Cultivated (5-10%)	2		S.F.	=	0.00	AC.	0.50	0.00	4
Cultivated (>10%)			S.F.	=	0.00	AC.	0.65	0.00	4
Bare Soil			S.F.	=	0.00	AC.	0.72	0.00	4
Water			S.F.	=	0.00	AC.	1.00	0.00	4
	42,42	.0			0.97	1		0.59	}
Wc =	0.6100								
Time of Concentration									
Overland Flow									
Length, L (max 100ft)			=	65	feet			t _o =	
Slope, S			=	5.00%				t _o =	$[0.42*(L^{U.5})*(n^{U.5})]/[P^{U.5})*(S^{U.4})]$
• •					_			•	
Manning Coefficient, ก			=	0.240	Grass			t _o =	6.90 min
P _{2/24}			=	3.3					
Shallow Flow									
Length, L (Paved or Unpaved)	Paved		=	455	feet			V =	20.3282*(S0.5)
Slope, S	1 4404		=	1.00%	1001				2.033 ft/s = 121.97 ft/m
			=		6 /000				
Velocity, V			-	2.03	ft/sec				Shallow Flow Tc
								t _s =	(L/V) = 3.73 min
Channel Flow									
Length, L			=		feet			V =	(1.49/n)*R ^{0.67} *S ^{0.5}
Difference in Elevation			=	0	to	0		=	ft/s = ft/m
Slope, S			=	_				t _c =	Channel Flow Tc
• •									
Manning Coefficient, n			=	0.000				t _c =	(L/V) = 0.00 min
Wetted Perimeter, Wp			=	0	feet				
Area, A			=	0	sqft				
Hydraulic Radius, R			=		•				
Velocity, V			=		ft/s				
,									
		t	=	Total Time	of Concentr	ration			
		-				20011			
		t .		≥to + ≥ts +					
		t	=	10.63	(Min 5 Mi	nutes)			
				0.18	Hour				
ntensity (Vanderburgh Co.)									
		l ₂		3.97	in/hr				
		l ₅		4.65	in/hr				
		I ₁₀	=	5.25	in/hr				
		I ₂₅		6.17	in/hr				
			_						
		I ₅₀	=	6.96	in/hr				
		_		7.86	in/hr				
		I ₁₀₀	=	1.00					
		_	=	7.00					
eak Runoff Rate		_	=	7.00					
eak Runoff Rate	Q _{yr} = CiA	_	=	7.00					
eak Runoff Rate	Q _{yr} = CiA	I ₁₀₀	=		cfs				
eak Runoff Rate	Q _{yr} = CiA	I ₁₀₀	=	2.36	cfs				,
Peak Runoff Rate	Q _{yr} = CiA	I ₁₀₀ Q ₂ Q ₅		2.36 2.77	cfs				
eak Runoff Rate	Q _{yr} = CiA	I ₁₀₀	=	2.36 2.77 3.12					
^p eak Runoff Rate	Q _{yr} = CiA	I ₁₀₀ Q ₂ Q ₅		2.36 2.77	cfs				
eak Runoff Rate	Q _{yr} = CiA	Q ₂ Q ₅ Q ₁₀ Q ₂₅	=	2.36 2.77 3.12 3.66	cfs cfs				
'eak Runoff Rate	•	Q ₂ Q ₅ Q ₁₀	=	2.36 2.77 3.12	cfs cfs cfs				

Area (Ac) =

0.78

Project 11822 Area (Sf) = 34,055

Area		_				С	A*c	:	1
7.1.54	S	.F.	=	0.00	AC.	0,92		.00	1
10,000		.F.		0.23	AC.	0.94		.22	1
15,500			=	0.00	AC.	0.96			1
7,500			=	0.17	AC.	0.98			
			=	0.00	AC.	0.50			1
			=	0.00	AC.	0.60			1
	S	.F.	=	0.00	AC.	0.65	0	.00	1
			=	0.00	AC.	0.15	0	.00	1
16,555			-	0.38	AC.	0.25	0	.10	1
	S	ī.F.	=	0.00	AC.	0.40	0	.00	1
	S	.F.	=	0.00	AC.	0.55	0	.00	
	S	.F.	=	0.00	AC.	0.12	0	.00	
	S	.F.	=	0.00	AC.	0.24	0	.00]
			-						
									1
									1
									-
									1
									4
									-
-								_	4
+									4
+									-
24.055		F.			AC.	1,00			1
		_		U.76			U.	.40	1
0.0104									
									0 1 150 7
		=	65	feet					Overland Flow Tc
		=	5.00%				t _o	=	[0.42*(L ^{0,8})*(n ^{0,8})]/[P ^{0,5})*(S ^{0,4})]
		=	0.240	Grass			t,	=	6.90 min
		=	3.3						
Paved		=	455	feet			٧	=	20.3282*(S0.5)
		=	1.00%					=	2.033 ft/s = 121.97 ft/m
		=	2.03	ft/sec			t,	=	Shallow Flow Tc
							t.	=	(L/V) = 3.73 min
									,
							V		(1.49/n)*R ^{0.67} *S ^{0.5}
			0	to	0				ft/s = ft/m
		=					t _c	=	Channel Flow Tc
		=	0.000				ţ,	=	(L/V) = 0.00 min
		=	0	feet					, ,
	;	=	0	sqft					
	:	=	_	•					
		=		ft/s					
t	:	=	Total Time	of Concentr	ation				
t	,								
					nutael				
•			0.18	Hour	ilutes				
			0.10	noui					
	I.		3.97	in/hr					
	1 ₂								
	l _s		4.65	in/hr					
	_	=	5.25	in/hr					
	L ₁₀ :								
	l ₁₀ :		6.17	in/hr					
	l ₁₀ :		6.96	in/hr					
	l ₁₀ :	=							
	l ₁₀ : l ₂₅ :	=	6.96	in/hr					
ı	l ₁₀ : l ₂₅ :	=	6.96	in/hr					
I Q _{yr} = CiA	I ₁₀ : I ₂₅ : I ₅₀ : 100	=	6.96 7.86	in/hr in/hr					
Q _{yr} = CiA	I ₁₀ : I ₂₅ : I ₅₀ : 100 :	=	6.96 7.86 <u>1.90</u>	in/hr in/hr cfs					
Q _{yr} = CiA	I ₁₀ : I ₂₅ : I ₅₀ : 100	=	6.96 7.86	in/hr in/hr					
Q _{yr} = CiA	I ₁₀ : I ₂₅ : I ₅₀ : 100 :	=	6.96 7.86 <u>1.90</u>	in/hr in/hr cfs					
Q _{yr} = CiA	I ₁₀ : I ₂₅ : I ₅₀ : 100 :	=	6.96 7.86 1.90 2.23	in/hr in/hr cfs cfs					
Q _{yr} = CiA	I ₁₀ : I ₂₅ : I ₅₀ : I ₀₀ : Q ₂ : Q ₅ :	= =	6.96 7.86 1.90 2.23 2.52	in/hr in/hr cfs cfs cfs					
	34,055 0.6134	7,500 S S S S S S S S S S S S S S S S S S	S.F. S.F. S.F. S.F. S.F. S.F. S.F. S.F.	7,500 S.F. = S.F	7,500 S.F. = 0.17 S.F. = 0.00	7,500 S.F. = 0.17 AC. S.F. = 0.00 AC. S.F. = 0	7,500 S.F. = 0.17 AC. 0.98 S.F. = 0.00 AC. 0.50 S.F. = 0.00 AC. 0.65 S.F. = 0.00 AC. 0.65 S.F. = 0.00 AC. 0.65 S.F. = 0.00 AC. 0.55 S.F. = 0.00 AC. 0.42 S.F. = 0.00 AC. 0.42 S.F. = 0.00 AC. 0.42 S.F. = 0.00 AC. 0.48 S.F. = 0.00 AC. 0.48 S.F. = 0.00 AC. 0.48 S.F. = 0.00 AC. 0.48 S.F. = 0.00 AC. 0.48 S.F. = 0.00 AC. 0.48 S.F. = 0.00 AC. 0.36 S.F. = 0.00 AC. 0.36 S.F. = 0.00 AC. 0.35 S.F. = 0.00 AC. 0.36 S.F. = 0.00 AC. 0.35 S.F. = 0.00 AC. 0.35 S.F. = 0.00 AC. 0.35 S.F. = 0.00 AC. 0.35 S.F. = 0.00 AC. 0.35 S.F. = 0.00 AC. 0.35 S.F. = 0.00 AC. 0.50 S.F. = 0.00 AC. 0.50 S.F. = 0.00 AC. 0.50 S.F. = 0.00 AC. 0.50 S.F. = 0.00 AC. 0.50 S.F. = 0.00 AC. 0.78 Paved = 455 feet = 1.00% = 0.240 Grass = 3.3 Paved = 455 feet = 1.00% = 0 feet = 0 sqft = 0 feet = 0 sqft = 0 feet = 0 sqft = 1.00%	7,500 S.F. = 0.17 AC. 0.98 0.98 0.98 0.5F. = 0.00 AC. 0.60	7,500 S.F. = 0.17 AC. 0.98 0.17 S.F. = 0.00 AC. 0.50 0.00 S.F. = 0.00 AC. 0.65 0.00 S.F. = 0.00 AC. 0.65 0.00 S.F. = 0.00 AC. 0.15 0.00 S.F. = 0.00 AC. 0.25 0.10 S.F. = 0.00 AC. 0.40 0.00 S.F. = 0.00 AC. 0.40 0.00 S.F. = 0.00 AC. 0.42 0.00 S.F. = 0.00 AC. 0.36 0.00 S.F. = 0.00 AC. 0.36 0.00 S.F. = 0.00 AC. 0.48 0.00 S.F. = 0.00 AC. 0.48 0.00 S.F. = 0.00 AC. 0.36 0.00 S.F. = 0.00 AC. 0.65 0.00

Area (Ac) =

0.10

Project 11822 Area (Sf) = 4,330

Surface	Area					С	A*c
Structures & Pavement (<2%)		S.F.	=	0.00	AC.	0.92	0.00
Structures & Pavement (2-5%)	2,100	S.F.	=	0.05	AC.	0.94	0.05
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.00
Structures & Pavement (>10%)		S.F.	=	0.00	AC.	0.98	0.00
Gravel (10 yr Storm)		Ş.F.	=	0.00	AC.	0.50	0.00
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60	0.00
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65	0.00
Lawn (<2%)		S.F.	=	0.00	AC.	0.15	0.00
Lawn (2-5%)	2,230	S.F.	=	0.05	AC.	0.25	0.01
Lawn (5-10%)		S.F.	=	0.00	AC.	0.40	0.00
Lawn (>10%)		S.F.	-	0.00	AC.	0.55	0.00
Woodland Flat (<2%)		S.F.	-	0.00	AC.	0.12	0.00
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Woodland Hilly (10-30%)		S.F.	-	0.00	AC.	0.48	0.00
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Pasture Flat (2-5%)		S.F.	-	0.00	AC.	0.24	0.00
Pasture Rolling (5-10%)		S.F.	= (0.00	AC.	0.36	0.00
Pasture Hilly (>10%)		S.F.	= ;	0.00	AC.	0.48	0.00
Cultivated (<2%)		S.F.	-	0.00	AC.	0.20	0.00
Cultivated (2-5%)		S.F.	=	0.00	AC.	0.35	0.00
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50	0.00
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00
Water		S.F.		0.00	AC.	1.00	0.00
	4,330			0.10			0.06
Nc =	0.5846						

vvc =	0.5846								
Time of Concentration Overland Flow									
Length, L (max 100ft)		=	100	feet		t _o	=	Overland Flow Tc	
Slope, S		=	2.00%	$t_0 = [0.4]$				[0.42*(L ^{u.8})*(n ^{u.8})]/[P ^{u.5})*(S ^{u.}	·*)]
Manning Coefficient, n		=	0.011	Pavement		t,	=	1.19 min	
P _{2/24}		=	3.3			_			
Shallow Flow									
Length, L (Paved or Unpaved)	Unpaved	=	0	feet		V	=	16.1345*(S0.5)	
Slope, S		=	0.00%				=		ft/min
Velocity, V		=	0.00	ft/sec		ŧ,	=	Shallow Flow Tc	
						t _s	=	(L/V) = 0.00 min	
Channel Flow									
Length, L		=		feet		V	=	(1.49/n)*R ^{0,67} *S ^{0,5}	
Difference in Elevation		=	0	to	0		=		ft/min
Slope, S		=				t _c	=	Channel Flow Tc	
Manning Coefficient, n		=	0.000			ŧ.	=	(L/V) = 0.00 min	
Wetted Perimeter, Wp		=	0	feet					
Area, A		=	0	sqft					
Hydraulic Radius, R		=							
Velocity, V		=		ft/s					

	ι	=	rotal rime	or Concentration
	t	=	Σto + Σts +	Σtc
	t	=	5.00	(Min 5 Minute
			0.08	Hour
Intensity (Vanderburgh Co.)				
	l ₂		5.02	in/hr
	I ₅		5.90	in/hr
	F ₁₀	=	6.66	in/hr
	I ₂₅		7.81	in/hr
	I ₅₀	=	8.82	in/hr
	I ₁₀₀	=	9.95	in/hr

Peak Runoff Rate

1.43

Project 11822 Area (Sf) = 62,300

Surface	Area					С	A*c
Structures & Pavement (<2%)		S.F.	= 1	0.00	AC.	0.92	0.00
Structures & Pavement (2-5%)	6,000	S.F.	=	0.14	AC.	0.94	0.13
Structures & Pavement (5-10%)		S.F.	-	0.00	AC.	0.96	0.00
Structures & Pavement (>10%)	15,000	S.F.	=	0.34	AC.	0.98	0.34
Gravel (10 yr Storm)		S.F.	= 1	0.00	AC.	0.50	0.00
Gravel (25 yr Storm)		S.F.	= 1	0.00	AC.	0.60	0.00
Gravel (50-100 yr Storm)		S.F.	= 1	0.00	AC.	0.65	0.00
Lawn (<2%)		S.F.	- 1	0.00	AC.	0.15	0.00
Lawn (2-5%)	35,975	S.F.	= 1	0.83	AC.	0.25	0.21
Lawn (5-10%)		S.F.	-	0.00	AC.	0.40	0.00
Lawn (>10%)	5,325	S.F.	- 1	0.12	AC.	0.55	0.07
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0,36	0,00
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.00
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Pasture Rolling (5-10%)		S.F.	_	0.00	AC.	0.36	0.00
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00
Cultivated (2-5%)		S.F.	=	0.00	AC.	0.35	0.00
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50	0.00
Cultivated (>10%)	1	S.F.	= 1	0.00	AC.	0.65	0.00
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00
Water		S.F.	=	0.00	AC.	1.00	0.00
	62,300			1.43			0.74
Wc =	0.5179						

	02,000	_		11.75			U. / T	
Wc =	0.5179					nn-		
Time of Concentration								
Overland Flow								
Length, L (max 100ft)		=	85	feet		t _o	=	
Slope, S		=	5.00%			t,	=	[0.42*(L ^{u.8})*(n ^{u.8})]/[P ^{u.5})*(S ^{u.4})]
Manning Coefficient, n		=	0.240	Grass		t,	=	
P _{2/24}		=	3.3			·		
Shallow Flow								
Length, L (Paved or Unpaved)	Unpaved	=	0	feet		V	=	16,1345*(S0.5)
Slope, S	Olipaved	=	0.00%	1001		•	=	0.000 ft/s = 0.00 ft/min
Velocity. V		=	0.00	ft/sec		t,	=	Shallow Flow Tc
						t,	=	
						•		,_ ,,
Channel Flow								0.67 0.5
Length, L		=	385	feet		V		(1.49/n)*R ^{0.67} *S ^{0.5}
Difference in Elevation		=	403.85	to	400			3.027 ft/s = 181.59 ft/min
Slope, S		=	1.00%			t _c	=	Channel Flow Tc
Manning Coefficient, n		=	0.035			t _c	=	(L/V) = 2.12 min
Wetted Perimeter, Wp		=	8.32	feet				
Area, A		=	5	sqft				
Hydraulic Radius, R		=	0.60					
Velocity, V		=	3.03	ft/s				
		=	Total Time	of Concentra	otion			
	t t	_	Σto + Σts +	-	auon			
	t	=	10.67	(Min 5 Min	autoc)			
	L		0.18	Hour	iutes			
Intensity (Vanderburgh Co.)			0.10	noui				
intensity (valider builgir Co.)	I ₂		3.96	in/hr				
	l _s		4.65	in/hr				
	15 I ₁₀	=	5.25	in/hr				
	10 I ₂₅	_	6.16	in/hr				
	I ₅₀	=	6.95	in/hr				
		=	7.84	in/hr				
	I ₁₀₀	_	7.04					
Beach Book of Bake								

Peak Runoff Rate

2.93 3.44 3.88 4.56 5.15

cfs cfs cfs cfs cfs cfs

<u>5.81</u>

Area (Ac) =

0.69

Project 11822 Area (Sf) = 29,865

Surface	Area					С	A*c	7
Structures & Pavement (<2%)	7.000	S.F.	=	0.00	AC.	0.92	0.00	
Structures & Pavement (2-5%)	9,300	S.F.		0.21	AC.	0.94	0.20	1
Structures & Pavement (5-10%)	0,000	S.F.		0.00	AC.	0.96	0.00	1
Structures & Pavement (>10%)	5,625	S.F.		0.13	AC.	0.98	0.13	1
Gravel (10 yr Storm)	,	S.F.		0.00	AC.	0.50	0.00	1
Gravel (25 yr Storm)		S.F.		0.00	AC.	0.60	0.00	
Gravel (50-100 yr Storm)		S.F.	-	0.00	AC.	0.65	0.00	1
Lawn (<2%)	1	S.F.	-	0.00	AC.	0.15	0.00	
Lawn (2-5%)	14,940	S.F.	=	0.34	AC.	0.25	0.09	
Lawn (5-10%)		S.F.	=	0.00	AC.	0.40	0.00	
Lawn (>10%)		S.F.	=	0.00	AC.	0.55	0.00	1
Woodland Flat (<2%)		S.F.	-	0.00	AC.	0.12	0.00	
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00	
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00	
Woodland Hilly (10-30%)		S.F.	_=	0.00	AC.	0.48	0.00	1
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00	1
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00	1
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00	4
Pasture Hilly (>10%)	1	S.F.	=	0.00	AC.	0.48	0.00	4
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00	4
Cultivated (2-5%)	+	S.F.	=	0.00	AC.	0.35	0.00	4
Cultivated (5-10%)	-	S.F.	=	0.00	AC.	0.50	0.00	-
Cultivated (>10%)	1	S.F.	=	0.00	AC.	0.65	0.00	4
Bare Soil	-	S.F.	=	0.00	AC.	0.72	0.00	4
Water	29,865	S.F.	=	0.00	AC.	1.00	0.00	4
Nc =	0.6024			0.09		4	0.41	1
ength, L (max 100ft) Slope, S Manning Coefficient, n		=	65 5.00% 0.240	feet Grass			t _o = t _o = t _o =	Overland Flow Tc [0.42*(L ^{u,s})*(n ^{u,s})]/[P ^{u,s})*(S ^{u,s})] 6.90 min
2/24		=	3.3					
Slope, S Velocity, V		=	1.00% 2.03	ft/sec			t _s = t _s =	2.033 ft/s = 121.97 ft/n Shallow Flow Tc (L/V) = 4.18 min
Channel Flow Length, L Difference in Elevation		=	0	feet to	0		=	
Length, L Difference in Elevation Slope, S		=			0		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation		=	0.000		0		t _c =	ft/s = ft/m
Length, L Difference in Elevation Slope, S		=		ta feet	0		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A		= =	0.000	ta	0		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R		= = =	0.000	to feet sqft	0		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A		= = =	0.000	ta feet	0		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V	t t	= = = = =	0.000 0 0	feet sqft ft/s of Concentr	ation		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R	t t	= = = = = =	0.000 0 0 Total Time Σto + Σts + 11.08 0.18	feet sqft ft/s of Concentr Σtc (Min 5 Min Hour	ation		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V	t t	= = = = = = = = = = = = = = = = = = =	0.000 0 0 Total Time Σto + Σts + 11.08 0.18 3.90	to feet sqft ft/s of Concentr Σtc (Min 5 Min Hour in/hr	ation		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V	t t	= = = = = = = = = = = = = = = = = = =	0.000 0 0 Total Time Σto + Σts + 11.08 0.18 3.90 4.57	feet sqft ft/s of Concentre Σtc (Min 5 Min Hour in/hr	ation		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V	t t I I	= = = = = = = = = = = = = = = = = = =	0.000 0 0 Total Time Σ to + Σ ts + 11.08 0.18 3.90 4.57 5.16	feet sqft ft/s of Concentre Σtc (Min 5 Min Hour in/hr in/hr	ation		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V	t t I I ₁ I ₂	= = = = = = = = = = = = = = = = = = = =	0.000 0 0 Total Time Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06	to feet sqft ft/s of Concentr Σtc (Min 5 Min Hour in/hr in/hr in/hr	ation		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V	t t I I I ₂ I ₅	= = = = = = = = = = = = = = = = = = = =	0.000 0 0 Total Time Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84	to feet sqft ft/s of Concentro Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr	ation		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V	t t I I ₁ I ₂	= = = = = = = = = = = = = = = = = = = =	0.000 0 0 Total Time Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06	to feet sqft ft/s of Concentr Σtc (Min 5 Min Hour in/hr in/hr in/hr	ation		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V	t t I I I ₂ I ₅	= = = = = = = = = = = = = = = = = = = =	0.000 0 0 Total Time Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84	to feet sqft ft/s of Concentro Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr	ation		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V	t t I I ₁ I ₂ I ₅	= = = = = = = = = = = = = = = = = = = =	0.000 0 0 Total Time Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84	to feet sqft ft/s of Concentro Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr	ation		t _c =	ft/s = ft/n Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V	t t I I I ₂ I ₅	= = = = = = = = = = = = = = = = = = = =	0.000 0 0 Total Time Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84	to feet sqft ft/s of Concentro Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr	ation		t _c =	ft/s = ft/n Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V	t t I I ₁ I ₂ I ₅	= = = = = = = = = = = = = = = = = = =	0.000 0 0 Total Time Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84	to feet sqft ft/s of Concentro Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr	ation		t _c =	ft/s = ft/n Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V	t t I I I ₁ I ₂ I ₅ I ₄₀ Q _{yr} = CiA		0.000 0 0 Total Time Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84 7.72	feet sqft ft/s of Concentre Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr	ation		t _c =	ft/s = ft/n Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V	t t 1 1 1 1 1 1 1 2 1 1 1 0 0 0 0 0 0 0 0		0.000 0 0 Total Time Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84 7.72	feet sqft ft/s of Concentro Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr in/hr in/hr	ation		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V	$\label{eq:continuous} \begin{cases} \mathbf{t} \\ \mathbf{t} \\ \mathbf{I} \\ \mathbf{I}_{2} \\ \mathbf{I}_{5} \\ \mathbf{I}_{10} \\ \mathbf{Q}_{yr} = \mathbf{CiA} \\ \mathbf{Q}_{Q} \\ \mathbf{Q}_{1} \\ \mathbf{Q}_{1} \end{cases}$		0.000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	feet sqft ft/s of Concentro Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr in/hr in/hr cfs cfs	ation		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V	$\begin{array}{c} \mathbf{i} \\ \mathbf{t} \\ \mathbf{i} \\ \mathbf{I} \\ \mathbf{I}_2 \\ \mathbf{I}_5 \\ \mathbf{I}_{10} \\ \\ \mathbf{Q}_{10} \\ \\ \mathbf{Q}_{11} \\ \\ \mathbf{Q}_{22} \\ \end{array}$		0.000 0 0 Total Time Σto + Σts + 11.08 0.18 3.90 4.57 5.16 6.06 6.84 7.72	feet sqft ft/s of Concentre Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr cfs cfs cfs cfs	ation		t _c =	ft/s = ft/m Channel Flow Tc
Length, L Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp Area, A Hydraulic Radius, R Velocity, V	$\label{eq:continuous} \begin{cases} \mathbf{t} \\ \mathbf{t} \\ \mathbf{I} \\ \mathbf{I}_{2} \\ \mathbf{I}_{5} \\ \mathbf{I}_{10} \\ \mathbf{Q}_{yr} = \mathbf{CiA} \\ \mathbf{Q}_{Q} \\ \mathbf{Q}_{1} \\ \mathbf{Q}_{1} \end{cases}$		0.000 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	feet sqft ft/s of Concentro Σtc (Min 5 Min Hour in/hr in/hr in/hr in/hr in/hr cfs cfs cfs	ation		t _c =	ft/s = ft/m Channel Flow Tc

Peak Runoff Calculation

SUB-BASIN #22 (22A+22B)

Post-Developed

Area (Ac) =

1.38

Project 11822 Area (Sf) = 59,975

Surface	Area					C	A*c
Structures & Pavement (<2%)		S.F.	=	0.00	AC.	0.92	0.00
Structures & Pavement (2-5%)	16,325	S.F.	=	0.37	AC.	0.94	0.35
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.00
Structures & Pavement (>10%)	11,390	S.F.	=	0.26	AC.	0.98	0.26
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50	0.00
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60	0.00
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65	0.00
Lawn (<2%)		S.F.	=	0.00	AC.	0.15	0.00
Lawn (2-5%)	32,260	S.F.	=	0.74	AC.	0.25	0.19
Lawn (5-10%)		S.F.	=	0.00	AC.	0.40	0.00
Lawn (>10%)		S.F.	-	0.00	AC.	0.55	0.00
Woodland Flat (<2%)		S.F.		0.00	AC.	0.12	0.00
Woodland Flat (2-5%)		S.F.	-	0.00	AC.	0.24	0.00
Woodland Rolling (5-10%)	10	S.F.	-	0.00	AC.	0.36	0.00
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.00
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00
Cultivated (2-5%)		S.F.	=	0.00	AC.	0.35	0.00
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50	0.00
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00
Water		S.F.	=	0.00	AC.	1.00	0.00
	59,975			1.38	1		0.79

Time	ot (Conc	entra	tion
Over	and	Flow	9	

Length, L (max 100ft)	=	65	feet
Slope, S	=	5.00%	
Manning Coefficient, n	=	0.240	Grass
P _{2/24}	=	3.3	

Shallow Flow Length, L (Paved or Unpaved) Slope, S Velocity, V	Paved	= =	600 1.00% 2.03	feet ft/sec	

Channel Flow

Length, L	=		feet
Difference in Elevation	=	0	to
Slope, S	=		
Manning Coefficient, n	=	0.000	
Wetted Perimeter, Wp	=	0	feet
Area, A	=	0	sqft
Hydraulic Radius, R	=		
Velocity, V	=		ft/s

Intensity (Vanderburgh Co.)

	_		
ŧ	=	11.82	(Min 5 Minutes)
		0.20	Hour
l ₂		3.79	in/hr
I۶		4.45	in/hr
I ₁₀	=	5.02	in/hr
125		5.89	in/hr
I ₅₀	=	6.65	in/hr
1	-	7.50	in/hr

= Total Time of Concentration = Σto + Σts + Σtc

Peak Runoff Rate

t_o = Overland Flow Tc

 $t_o = [0.42*(L^{u.8})*(n^{u.8})]/[P^{u.5})*(S^{u.4})]$

t_o = 6.90 min

V = 20.3282*(\$0.5) = 2.033 ft/s = 121.97 ft/min = Shallow Flow Tc

= (L/V) = 4.92 min

 $V = (1.49/n)*R^{0.67}*S^{0.5}$ ft/s =

ft/min

t_c = Channel Flow Tc

 $t_c = (L/V) = 0.00 \text{ min}$

Area (Ac) =

0.55

Project 11822 Area (Sf) = 23,990

Surface	Area						C	A*c					
Structures & Pavement (<2%)			S.F.	=	0.00	AC.	0.92	0.0	00	1			
Structures & Pavement (2-5%)	6,53	0	S.F.	=	0.15	AC.	0.94	0.1	14	1			
Structures & Pavement (5-10%)			S.F.	=	0.00	AC.	0.96	0.0	00	1			
Structures & Pavement (>10%)	4,55	6	S.F.	-	0.10	AC.	0.98	0.1	10	1			
Gravel (10 yr Storm)			S.F.	-	0.00	AC.	0.50	0.0	00]			
Gravel (25 yr Storm)			S.F.		0.00	AC.	0.60	0.0	00]			
Gravel (50-100 yr Storm)			S.F.	=	0.00	AC.	0.65	0.0]			
Lawn (<2%)			S.F.	=	0.00	AC.	0.15	0.0]			
Lawn (2-5%)	12,9)4	S.F.	=	0.30	AC.	0.25	0.0]			
Lawn (5-10%)			S.F.	=	0.00	AC.	0.40	0.0	00]			
Lawn (>10%)			S.F.	=	0.00	AC.	0.55	0.0]			
Woodland Flat (<2%)			S.F.	=	0.00	AC.	0.12	0.0	00]			
Woodland Flat (2-5%)			S.F.	=	0.00	AC.	0.24	0.0	00]			
Woodland Rolling (5-10%)			S.F.	=	0.00	AC.	0.36	0.0	00]			
Woodland Hilly (10-30%)			S.F.	=	0.00	AC.	0.48	0.0	00]			
Pasture Flat (<2%)			S.F.	=	0.00	AC.	0.12	0.0	00]			
Pasture Flat (2-5%)			S.F.	=	0.00	AC.	0.24	0.0	0]			
Pasture Rolling (5-10%)			S.F.	=	0.00	AC.	0.36	0.0	0]			
Pasture Hilly (>10%)			S.F.	=	0.00	AC.	0.48	0.0	0]			
Cultivated (<2%)			S.F.	=	0.00	AC.	0.20	0.0	10	1			
Cultivated (2-5%)			S.F.	=	0.00	AC.	0.35	0.0	0	1			
Cultivated (5-10%)			S.F.	=	0.00	AC.	0.50	0.0	0]			
Cultivated (>10%)			S.F.	=	0.00	AC.	0.65	0.0		1			
Bare Soil			S.F.	=	0.00	AC.	0.72	0.0		1			
Vater			S.F.	=	0.00	AC.	1.00	0.0		1			
	23,99	90			0.55			0.3		f			
Nc =	0.5765		-		-					ē.			
Fime of Concentration Overland Flow Length, L (max 100ft) Slope, S			=	65 5.00%	feet			t,	=	Overlan (0.42*(L		Tc)]/[P ^{u,5})*(\$	S ^{u.4})]
Manning Coefficient, n			=	0.240	Grass			t,	=	6.90	min		
					Glass			ъ	_	0.50	1111111		
2/24			=	3.3									
Length, L (Paved or Unpaved) Slope, S Velocity, V	Paved		= =	600 0.70% 1.70	feet ft/sec			V t _s t _s	=	1.701	ft/s =		ft/mi
Channel Flow													
Length, L			=		feet			V	=	(1.49/n)	*R ^{0.67} *S	0.5	
Difference in Elevation			=	0	to	0			=		ft/s =		ft/mi
Slope, S			=					t,	=	Channel	Flow T	С	
-			=	0.000				t.		(L/V) =		min	
Manning Coefficient, n					foot			*0	_	(100) -	0.00		
Wetted Perimeter, Wp			=	0	feet								
Area, A			=	0	sqft								
Hydraulic Radius, R Velocity, V			=		ft/s								
velocity, v					140								
		t			of Concent	ration							
		t	=	Σto + Σts +		mander - 4							
		t	=	12.78	(Min 5 Mi	nutes)							
				0.21	Hour								
ntensity (Vanderburgh Co.)		_											
		l ₂		3.65	in/hr								
		I ₅		4.29	in/hr								
		110	=	4.84	in/hr								
		125		5.68	in/hr								
		150	=	6.41	in/hr								
		L ₁₀₀	=	7.24	in/hr								
		-100											
eak Runoff Rate													
	Q _{vr} = CiA												
	Syr - OIA			4.40	afa								
		Q_{10}	=	<u>1.54</u>	cfs								
		Q ₂₅	=	1.80	cfs								
		^	=	2.04	cfs								
		Q_{50}	_	2.04	CIS								
			=	1.80	cfs								

Peak Runoff Calculation

SUB-BASIN #22B

Post-Developed

Area (Ac) =

0.83

Project 11822 Area (Sf) = 35,985

> t_o = Overland Flow Tc $t_o = [0.42*(L^{u.s})*(n^{u.s})]/[P^{u.s})*(S^{u.4})]$

 $V = (1.49/n)*R^{0.67}*S^{0.5}$

= Channel Flow Tc = (L/V) = 0.00 min

0

= Total Time of Concentration = Σ to + Σ ts + Σ tc

V = 20.3282*(S0.5) = 1.701 ft/s = 102.05 ft/min = Shallow Flow Tc = (L/V) = 2.06 min

ft/s =

ft/min

t_o = 6.90 min

Surface	Area					C	A*c
Structures & Pavement (<2%)		S.F.	=	0.00	AC.	0.92	0.00
Structures & Pavement (2-5%)	9,795	S.F.	=	0.22	AC.	0.94	0.21
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.00
Structures & Pavement (>10%)	6,834	S.F.	=	0.16	AC.	0.98	0.15
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50	0.00
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60	0.00
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65	0.00
Lawn (<2%)		S.F.	=	0.00	AC.	0.15	0.00
Lawn (2-5%)	19,356	S.F.	= =	0.44	AC.	0.25	0.11
Lawn (5-10%)		S.F.	=	0.00	AC.	0.40	0.00
Lawn (>10%)		S.F.	=	0.00	AC.	0.55	0.00
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.00
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00
Cultivated (2-5%)		S.F.	=	0.00	AC.	0.35	0.00
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50	0.00
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00
Water		S.F.	=	0.00	AC.	1.00	0.00
	35,985			0.83			0.48

Time of Concentration

Overland Flow			
Length, L (max 100ft)	=	65	feet
Slope, S	=	5.00%	
Manning Coefficient, n	=	0.240	Grass
P _{2/24}	=	3.3	

Shallow Flow

Length, L (Paved or Unpaved)	Paved	=	210	reet
Slope, S		=	0.70%	
Velocity, V		=	1.70	ft/sec

Channel Flow

Length, L	=		feet
Difference in Elevation	=	0	to
Slope, S	=		
Manning Coefficient, n	=	0.000	
Wetted Perimeter, Wp	=	0	feet
Area, A	=	0	sqft
Hydraulic Radius, R	=		
Velocity, V	=		ft/s

In

	t	=	8.96 0.15	(Min 5 Minutes) Hour
ntensity (Vanderburgh Co.)				
	l ₂		4.24	in/hr
	I ₅		4.98	in/hr
	I ₁₀	=	5.62	in/hr
	I ₂₅		6.59	in/hr
	I ₅₀	=	7.44	in/hr
	1100	=	8.40	in/hr

Peak Runoff Rate

1.39

Project 11822 Area (Sf) = 60,605

Alea (AC) -	1.33		Alea (31) -	- 00,000						
Weighted Runoff Coefficient	Ta					-	A+-	-		
Surface	Area	S.F.	=	0.00	AC.	0.92	A*c	-		
Structures & Pavement (<2%)	4 000			_		_	0.00			
Structures & Pavement (2-5%) Structures & Pavement (5-10%)	4,000	S.F.	=	0.09	AC.	0.94	0.09	1		
Structures & Pavement (>10%)	10,000	S.F.	-	0.00	AC.	0.98	0.00			
Gravel (10 yr Storm)	10,000	S.F.		0.00	AC.	0.50	0.00	-		
Gravel (25 yr Storm)		S.F.	-	0.00	AC.	0.60	0.00			
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65		1		
Lawn (<2%)	_	S.F.	=	0.00	AC.	0.15	0.00			
awn (2-5%)	41,805	S.F.	=	0.96	AC.	0.25	0.24	1		
awn (5-10%)		S.F.	=	0.00	AC.	0.40	0.00	1		
Lawn (>10%)	4,800	S.F.	=	0.11	AC.	0.55	0.06	1		
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00			
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00	7		
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00			
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48				
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00			
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24		1		
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36		1		
Pasture Hilly (>10%)		S.F.	=	0,00	AC.	0.48		1		
Cultivated (<2%)		S.F.	=	0.00	AC.	0.20	0.00	1		
Cultivated (2-5%)		S.F.	=	0.00	AC.	0.35	0.00	4		
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50		_		
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00	4		
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00	-		
Water	60,605	S.F.		1.39	AC.	1.00	0.00	-		
Nc =	0.4398			1.38			0.01	J		
Overland Flow Length, L (max 100ft) Slope, S Manning Coefficient, n		= = =	90 5.00% 0.240	feet Grass			t _o = t _o = t _o =	Overland Flow [0.42*(L ^{0.8})*(n ^{0.0} 8.95 min		S ^{u.} *)]
2/24		=	3.3							
Length, L (Paved or Unpaved) Slope, S Velocity, V	Unpaved	= =	0 0.00% 0.00	feet ft/sec			V = = t _s = t _s =	16.1345*(S0.5) 0.000 ft/s = Shallow Flow T (L/V) = 0.00	0.00 c	ft/mir
Channel Flow		=	225	foot			V =	(1.49/n)*R ^{0.67} *S	0.5	
Length, L Difference in Elevation Slope, S		=	325 403.25 1.00%	feet to	400		v = t _c =	3.027 ft/s = Channel Flow T	181.59	ft/min
Manning Coefficient, n Wetted Perimeter, Wp		=	0.035 8.32	feet			t _c =	(L/V) = 1.79	min	
Area, A		=	5	sqft						
Hydraulic Radius, R Velocity, V		=	0.60 3.03	ft/s						
	t t t		Total Time (Σto + Σts + 10.74 0.18							
ntensity (Vanderburgh Co.)										
		l ₂	3,95	in/hr						
		l _s	4.63	in/hr						
		10 =	5.23	in/hr						
		10 25	6.14	in/hr						
			6.93	in/hr						
		40	7.82	in/hr						
	I ₁	00 -	1.02	100111						
eak Runoff Rate										
		25 =	2.42 2.84 3.20 3.76 4.24	cfs cfs cfs cfs cfs						
		50 =	4.24 4.79	cfs cfs						

Peak Runoff Calculation

SUB-BASIN #24 Post-Developed

Area (Ac) =

Project 11822 Area (Sf) = 45,200

Weighted	Runoff	Coefficient
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Surface	Area					С	A*c
Structures & Pavement (<2%)		S.F.	=	0.00	AC.	0.92	0.00
Structures & Pavement (2-5%)	1,500	S.F.	=	0.03	AC.	0.94	0.03
Structures & Pavement (5-10%)		S.F.	=	0.00	AC.	0.96	0.00
Structures & Pavement (>10%)	3,750	S.F.	=	0,09	AC.	0.98	0.08
Gravel (10 yr Storm)		S.F.	=	0.00	AC.	0.50	0.00
Gravel (25 yr Storm)		S.F.	=	0.00	AC.	0.60	0.00
Gravel (50-100 yr Storm)		S.F.	=	0.00	AC.	0.65	0.00
Lawn (<2%)		S.F.	=	0.00	AC.	0.15	0.00
Lawn (2-5%)		S.F.	=	0.00	AC.	0.25	0.00
Lawn (5-10%)	27,950	S.F.	=	0.64	AC.	0.40	0.26
Lawn (>10%)		S.F.	-	0.00	AC.	0.55	0.00
Woodland Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Woodland Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Woodland Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Woodland Hilly (10-30%)		S.F.	=	0.00	AC.	0.48	0.00
Pasture Flat (<2%)		S.F.	=	0.00	AC.	0.12	0.00
Pasture Flat (2-5%)		S.F.	=	0.00	AC.	0.24	0.00
Pasture Rolling (5-10%)		S.F.	=	0.00	AC.	0.36	0.00
Pasture Hilly (>10%)		S.F.	=	0.00	AC.	0.48	0.00
Cultivated (<2%)		S.F.	_	0.00	AC.	0.20	0.00
Cultivated (2-5%)		S.F.	=	0.00	AC.	0.35	0.00
Cultivated (5-10%)		S.F.	=	0.00	AC.	0.50	0.00
Cultivated (>10%)		S.F.	=	0.00	AC.	0.65	0.00
Bare Soil		S.F.	=	0.00	AC.	0.72	0.00
Water	12,000	S.F.	=	0.28	AC.	1.00	0.28
	45,200			1.04	1	1	0.65

Wc =

0.6253

1.04

Time of Concentration

Overland Flow

Length, L (max 100ft) Slope, S

Manning Coefficient, n

Shallow Flow

Length, L (Paved or Unpaved)

Slope, S Velocity, V

0.00

100

5.00%

0.240

3.3

0.00%

0

feet

Grass

= 16.1345*(\$0.5) feet 0.000 ft/s = = Shallow Flow Tc

= (L/V) = 0.00 min

= (1.49/n)*R^{0.67}*S^{0.5}

= Channel Flow Tc

ft/s =

(L/V) = 0.00 min

= Overland Flow Tc

9.74 min

 $= [0.42*(L^{0.8})*(n^{0.8})]/[P^{0.5})*(S^{0.4})]$

ft/min

ft/min

Channel Flow Length, L

Difference in Elevation Slope, S Manning Coefficient, n Wetted Perimeter, Wp

Area, A Hydraulic Radius, R Velocity, V

feet 0

0.000 0 feet 0 sqft

Total Time of Concentration

ft/s

 Σ to + Σ ts + Σ tc

9.74 (Min 5 Minutes) 0.16 Hour

Intensity (Vanderburgh Co.)

4.11 in/hr 12 I₅ 4.82 in/hr I₁₀ 5.44 in/hr l₂₅ 6.39 in/hr f₅₀ 7.21 in/hr 8.14 in/hr I₁₀₀

Peak Runoff Rate

 $Q_{yr} = CiA$

t

 Q_2 <u>2,67</u> cfs Q_5 3.13 cfs Q10 3.53 cfs Q_{25} 4.14 cfs Q50 cfs 4.68 Q₁₀₀ 5.28 cfs