



**AGENDA**  
**REGULAR MEETING OF THE**  
**WINDSOR HEIGHTS**  
**PLANNING AND ZONING COMMISSION**  
**Wednesday, May 22, 2024 - 5:30 PM**  
**WINDSOR HEIGHTS COUNCIL CHAMBERS - 1133 66th ST**  
**ZOOM: <https://us02web.zoom.us/j/7832856334>**  
**Meeting ID: 783 285 6334**

1. **Call to Order**
2. **Approval of Agenda**
3. **Approval of the Minutes:**
  - A. Minutes: 2.28.24
4. **Public Hearing to review a new building site plan at 1148 63rd St**
  - A. Staff Presentation
  - B. Site Plan & Supporting Documents
5. **Adjourn**

\*It is possible that members, including a quorum of members of the City Council and other committees may be present. No City business will be discussed outside of this agenda.

**City of Windsor Heights Planning and Zoning Commission Meeting Minutes**  
**Wednesday, February 28, 2024 - 5:30 PM**  
**WINDSOR HEIGHTS COUNCIL CHAMBERS - 1133 66th ST**

**1. Call to Order**

Chair Geoffrey Wood called the meeting to order at 5:35 PM. Members present: Donna Mueller, Bob Bishop, Georgie Libbie, Tyler Holtorf, and David Ferree. Members absent: Diane Foss. Staff present: Deputy City Clerk Nate Leuthold, City Administrator Adam Plagge, City Attorney Erin Clanton, Acting City Planner Trey Rouse of Bolton & Menk, Senior Traffic Engineer Jennifer McCoy of Bolton & Menk, and City Engineer Justin Ernst of Bolton & Menk.

**2. Approval of Agenda**

Motion by Georgie Libbie to approve. Seconded by Bob Bishop. Motion passed 6-0

**3. Approval of the Minutes:**

Motion from Donna Mueller to approve. Seconded by Tyler Holtorff. Motion passed 6-0

- A. Consideration of the Planning and Zoning Commission Meeting Minutes on November 1st, 2023

**4. Public Hearing to Review a New Building Site Plan at 6961 University Ave**

Jennifer McCoy provided a review of the traffic impact study. Trey Rouse presented the staff report. Aaron Wolfe, Site Development manager with Casey's and Brian Sheriff, President of Colby Interests presented the site plan. Bob Bishop asked for some clarification. Aaron Wolfe and Wally Pelds of Pelds Design Services responded.

Motion by David Ferree to open the Public Hearing at 7:05 PM. Seconded by Bob Bishop. Motion passed 6-0

The following people spoke in opposition to Casey's

Adam Laithrop of 1716 Plaza Circle

A Clive resident of 7675 University Avenue

Jennifer Koonitz of 7015 Jefferson Avenue

Steve Lowe of 1214 68th Street

Steve Oliver of 1226 68th Street

Motion by Donna Mueller to close the Public Hearing at 7:26 PM. Seconded by Tyler Holtorff.

Motion passed 6-0

- A. Staff Presentation

- B. Site Plan & Supporting Documents

**5. Consideration of a New Building Site Plan at 6961 University Ave**

David Ferree spoke requesting clarification of the Commission's scope. Erin Clanton advised that they should consider the zoning code regulations as applied to the presented site plan. David Ferree spoke regarding the monument sign sizing. Donna Mueller spoke regarding the landscaping plan. Aaron Wolfe clarified the landscape plan and answered questions. Geoffrey Wood asked about hours and lighting. Aaron Wolfe advised that the hours were 5 AM to 11 PM, and showed compliance with the lighting code. Bob Bishop spoke regarding the Commission's responsibility to residents' health, safety, and welfare. Geoffrey Wood spoke in opposition due to traffic issues, walkability, and a lack of a main-street feel. Aaron Wolf responded regarding the opposition from public comments and items brought up by the Commission. David Ferree expressed concern in regards to traffic, walkability, the lack of a main-street feel, and architectural standards. Bob Bishop spoke regarding spills and gas stations near residential properties. Tyler Holtorff spoke in



favor of approval. Donna Mueller spoke regarding the lack of a main-street feel, the surrounding zoning, and the landscape plan.

Motion by Tyler Holtorff to approve the site plan with additional landscaping requirements and staff recommendations. Seconded by Donna Mueller. Motion failed 1-5. Yea: Tyler Hotorff. Nay: Geoffrey Wood, David Ferree, Georgie Libbie, Bob Bishop, and Donna Mueller. The recommendation to Council is to not approve the site plan.

6. **Consideration of an Updated Zoning Map**

Trey Rouse presented the map and clarified the formal process of updating the map.

Motion by Donna Mueller to approve. Seconded by Georgie Libbie. Motion passed 6-0.

A. Updated Zoning Map

7. **Adjourn**

Motion to adjourn by Bob Bishop. Seconded by Tyler Holtorff. Motion passed 6-0.

## STAFF REPORT

Date: May 22, 2024  
To: Windsor Heights Planning and Zoning Commission  
From: Trey Rouse  
Subject: Site Plan: University Avenue and 63<sup>rd</sup> Street Corner

### **General Information**

Applicant: Nick Jensen  
3611 NE Otterview Circle  
Ankeny, IA 50021  
Property Owner: The Windsor LLC  
Proposed Use: Residential, Multi-Family  
Zoning: UC (Urban Center District)  
Location: University Avenue and 63<sup>rd</sup> Street Corner

### **Summary**

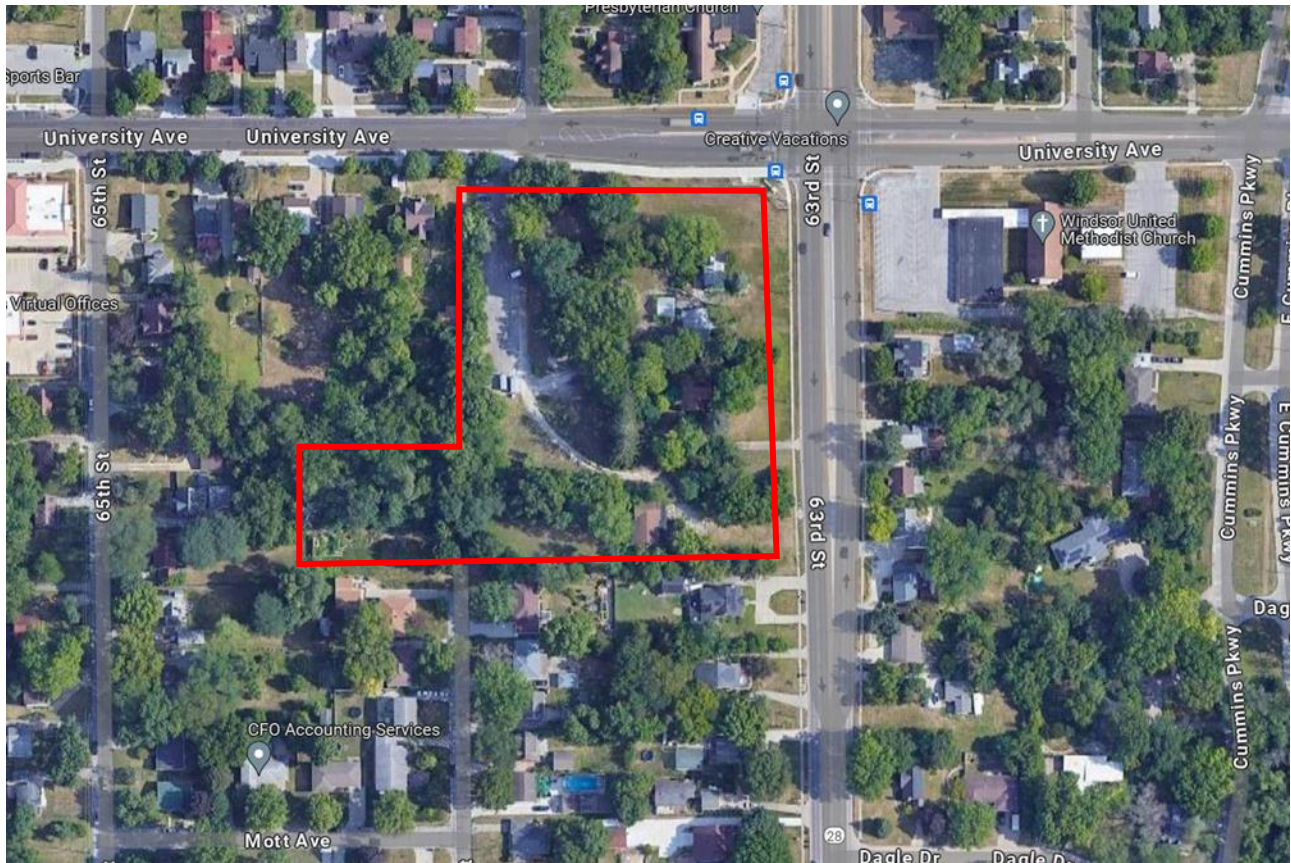
The applicant, Nick Jensen representing The Windsor LLC, is requesting to develop The Windsor Apartments, a 101-Unit Multi-Family Dwelling Unit Development in the UC District (Urban Center District) for the use of the property described as University Avenue and 63<sup>rd</sup> Street Corner. The UC District (Urban Center District) allows for Residential, Multi-Family use within the UC District by right. This development would include X 1-Bedroom Unit apartments, X 2-Bedroom apartments, all at market value with no restrictions such as age or income level that include on site surface parking (108 stalls), garage parking (40 garages), and underground parking (40 stalls). This development also includes short-term (26 parking spots) and long-term bike parking (11 parking spots) throughout the surface parking and underground parking. This project is also a recipient of a \$1 million workforce housing tax credit. This project also provides pedestrian access to University Avenue and 63<sup>rd</sup> Street in addition to dedicating property as part of the project that could help provide a future pedestrian access between 64<sup>th</sup> Street and University.

City Staff has completed a review of the documentation submitted by the applicant. The submitted application materials are attached to this report.

### **Existing Conditions**

The 10.49-acre lot is in the UC – Urban Center Zoning District. This Zoning District allows for up to 20 residential units/acre. The property has had the previous structures demolished and removed from the property. The developer has received a grading permit and is currently grading at their own risk in anticipation of this Site Plan submission. Currently only trees and vegetation

remain. This property currently has one full-access driveway onto the property from University Avenue. ROW Grading has begun on the property and the applicant received the ROW Grading Permit from City Council and Staff.



### **Legal Description**

PART OF PARCEL A IN LOT 1 OF HOPKINS PLACE, AN OFFICIAL PLAT, PER THAT PLAT OF SURVEY FILED IN BOOK 9221, PAGES 674-675 IN THE OFFICE OF THE RECORDER FOR POLK COUNTY, IOWA; AND PART OF LOTS 2, 3 AND 4 IN HOPKINS PLACE, AN OFFICIAL PLAT; AND PART OF LOTS 5, 11, 12, 22, 23, AND 24 IN HOPKINS-WOEHLER PLACE, AN OFFICIAL PLAT, ALL NOW INCLUDED IN AND FORMING A PART OF THE CITY OF WINDSOR HEIGHTS, POLK COUNTY, IOWA, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHWEST CORNER OF SAID PARCEL A IN LOT 1 OF HOPKINS PLACE, A POINT AT THE INTERSECTION OF THE SOUTH RIGHT-OF-WAY LINE OF UNIVERSITY AVENUE AS PRESENTLY ESTABLISHED AND THE EAST LINE OF SAID LOT 4 IN HOPKINS PLACE; THENCE SOUTH 00°37'08" EAST, 44.41 FEET ALONG THE WEST LINE OF SAID PARCEL A; THENCE NORTH 89°55'37" EAST, 95.76 FEET; THENCE SOUTH 00°04'23" EAST, 20.50 FEET; THENCE NORTH 89°55'37" EAST, 109.29 FEET TO THE EAST LINE OF SAID PARCEL A ALSO BEING THE WEST RIGHT-OF-WAY LINE OF 63RD STREET AS PRESENTLY ESTABLISHED; THENCE SOUTH 00°34'01" EAST, 26.00 FEET ALONG THE WEST RIGHT-OF-WAY LINE OF 63RD STREET TO THE SOUTHEAST CORNER OF SAID PARCEL A; THENCE SOUTH

## Site Plan for Development





### **Background of Parcel/Lot**

This parcel was previously nine parcels owned by Windsor Community Presbyterian Church that had single-family dwellings along with a parking lot in the wooded area to the west. The single-family dwellings have since been bought, demolished, and the parcels replatted for this project.

### **Adjacent Land Use**

| Direction | Zoning                     | Use                               |
|-----------|----------------------------|-----------------------------------|
| North     | Urban Center District (UC) | Church/Residential, Single Family |
| South     | Urban Center District (UC) | Residential, Single Family        |
| East      | N/A (Outside City Limits)  | Church/Residential, Single Family |
| West      | Urban Center District (UC) | Residential, Single Family        |

### **Zoning Bulk Regulations**

| Category           | UC                                                                                             |
|--------------------|------------------------------------------------------------------------------------------------|
| Lot Area           | 5,000 sq.ft.                                                                                   |
| Lot Width          | 25 ft                                                                                          |
| Front Yard Setback | 0 ft                                                                                           |
| Side Yard Setback  | 0 ft                                                                                           |
| Rear Yard Setback  | 10 ft (When abutting Residential Zoning District, must have fully landscaped or visual buffer) |

### **Traffic Study/Traffic Information**

At the request of the City, the applicant completed a traffic study on the University Avenue and 63<sup>rd</sup> Street corridor and determined the project's contribution to the current traffic in the corridor and has met on-site during peak P.M traffic to discuss the unique access challenges this property faces. A traffic study was completed by the applicant and reviewed by City Staff. The traffic study shows that the traffic created by The Windsor project would create further issues with the current congestion noticed by the University Avenue and 63<sup>rd</sup> Street corridor based upon their current design. Staff requested further information and clarification and provided solutions to the applicant. The applicant has retention of the full access on University Avenue instead of the suggested right-in/right-out by City Staff. 63<sup>rd</sup> St. access is under Iowa DOT jurisdiction and the developer is limited by the Iowa DOT to a Right In Right Out.

City staff reached out to City of Des Moines traffic staff regarding the signal timing at 63rd and University as potential issues were observed onsite during peak P.M. traffic. The City of Des

Moines manages this signal. They confirmed that the timings appear appropriate for the traffic volumes last captured at the intersection but stated they are looking to get updated counts to confirm if anything more could be changed here.

They also stated that this signal is due to get an updated controller next year which will allow the city of Des Moines to better monitor and adjust the signal timings in a more responsive manner.

The traffic study is attached.

### **Parkland Dedication**

With the development or redevelopment of a parcel or lot into residential (with the exception of Single-Family residential) there is a required Parkland Dedication attached to the development based upon the type or residential development and units developed.

As part of the site plan review process City staff and the developer met to discuss trail and parkland dedication. It was agreed to provide for City Council consideration for an exchange of property as shown on page 18 of the site plan. The City is to provide the developer with 7,287 sq. ft. of unutilized ROW property at the corner of University Ave. and 63<sup>rd</sup>, south of the trail and existing landscaping. In exchange, the developer is to provide 40,284 sq. ft. of property west of their proposed development as “Parkland”. This parkland includes the primary detention basin for The Windsor, which the developer will continue to be responsible for maintaining in its proposed form. However, the basin could be expanded in the future to efficiently serve additional redevelopment projects adjacent to The Windsor, while minimizing water surface area used for detention that would otherwise become undevelopable.

The land exchange and parkland dedication are intended to be mutually beneficial, allowing for The Windsor to incorporate their northern nyloplast basin on currently unutilized city property while incorporating a nascent city park and trail property as sketched out in the attached Park and Trail Concept on the developer’s property intended to be dedicated to the city. The concept anticipates potential future additional adjacent parkland dedications as adjoining properties redevelop as envisioned in the Future Land Use Map. These dedications would complete the trail connection between University and 64<sup>th</sup> St, create enough parkland for active use and efficiently satisfy future stormwater detention requirements.

Equation for Parkland Dedication:

$(\text{number of units}) \times (1.5 \text{ individuals/unit}) \times (.005 \text{ acres/individual})$

The Windsor Apartments Parkland Dedication Requirement:

$101 \text{ Units} \times 1.5 (\text{Individuals/Unit}) \times .005 (\text{Acres/Individual}) = 0.7575 \text{ Acres}$

The applicant has provided and set aside land to meet this requirement as stated by the City. This can be seen in the attached diagram and meets the minimum Parkland Dedication requirement and can be accepted by the City Council or another form of compensation can be met.

### **Landscaping and Plantings**

The applicant has provided a landscaping plan within the site plan (sheet 14) to illustrate the planting locations and types of plantings that will be on the development. The plantings provided and shown meet the requirements of the landscaping requirements by numbers and utilize plants on the approved Windsor Heights Tree/Plant list. The required number of trees and shrubs based upon the size of development are 58 trees (1/2000 sq. ft. of pervious area) and 286 shrubs (5/2000 sq. ft. of pervious area).

This requirement has been met as the applicant shows in the site plan to be providing 62 trees in total (utilizing 16 existing trees) and 299 shrubs.

In addition to this, A draft development requires the developer to plant 50 trees on the site in an effort to replace some of the lost tree canopy resulting from the project. The development agreement proposes any shortfall in trees planted on the site, to the proposed 50, be provided to the City for planting elsewhere in the City. Based on the proposed site plan, the developer will be required to provide the City eight trees.

### **Building Façade**

Within the Urban Center District, there is a building façade material requirement based upon the quality of the materials and the percentage of the primary street facing façade that the material covers. The Urban Center District requires 75% of the street facing façade be brick on the first floor (not including windows and doorways) with the remainder of the first floor being any grade A or grade B material. All other floors may be grade A or grade B materials.

The primary street frontages that need to meet this requirement are the north and east side of the development. Shown on sheet 22, the north side of the development meets these requirements with 75% brick and 25% other grade A or grade B material. Also shown on sheet 22, the east side of the development meets the requirements of having 99% brick façade with 1% being another material.

### **Stormwater/Drainage**

The applicant has provided a Stormwater Plan to address the stormwater drainage on the proposed site and to address the stormwater requirements that are outlined within the City Code. On sheets 5 – 11, the details of their stormwater plan are provided and how they impact the site. Having an underground north basin to supplement stormwater needs near University Avenue, along with basins that line the southern part of the site. These basins include the southeast basin, south basin, and west basin that is closest to 64<sup>th</sup> Street. Each of these are considered to be dry basins that fill during storms or rain and eventually discharge to become dry when not being directly filled. These basins also include within and surrounding them different plantings along the end and use a ditch mixture for absorption and storm detention. This is seen heavily within the west basin as the main director of where excess water heads towards 64<sup>th</sup> Street.

The applicant has provided updated Stormwater management plans but still has conditions of quality to be met along with other conditions that were agreed with City Staff to be considered conditions of approval for the Site Plan. At this time, the Site Plan does not meet the requirements as set forth by the City of Windsor Heights.

The Stormwater Management Plan is attached.

### **Parking Requirements**

Based upon the proposed site and development, minimum parking requirements have been established by the City of Windsor Heights.

Automotive Vehicle parking for a Multi-Family Dwelling use is 1 Parking Stall/Unit. This would require 101 parking stalls based upon the size of the development. The applicant meets this parking requirement by providing: 40 underground parking stalls, 40 garage parking stalls, and 108 surface parking stalls.

Bike parking is required at developments as well. Short-term and Long-term bike parking are considered to be separate and are required in different capacities. 1 Short-term bike parking stall is required for every 4 units. 1 Long-term bike parking stall is required for every 10 units. This creates the requirements of 26 short-term bike parking stalls and 11 long-term bike parking stalls. The applicant meets this requirement by providing 26 short-term bike parking stalls and 22 long-term bike parking stalls on the surface parking area and underground parking area.

### **Screenings and Buffers**

Screening and buffers are required to protect less intensive uses found in the R-1, R-2, and R-3 Districts from more intense uses that are commonly found in the UC, CC, and LI Districts. The Windsor Apartment project is located within the UC District and considered a more intensive district compared to surrounding Zoning Districts. The Windsor project abuts the R-2 District on its southern site boundary, so it is required to have a minimum of a 10 ft. fully opaque buffer according to Table 173.05-03-Screened Buffer Yard Requirements.

***Table 173.05-03 – Screened Buffer Yard Requirements***

|                                           |        | Less Intensive Adjacent District |
|-------------------------------------------|--------|----------------------------------|
|                                           |        | R-1*, R-2*, & R-3                |
| More Intensive District                   | UC, CC | 10 Feet                          |
|                                           | LI     | 20 Feet                          |
| <b>*Applies to residential uses only.</b> |        |                                  |

The following requirements need to be met for the opaque buffer between the Zoning Districts:

2. Opaque Barrier. An opaque barrier shall be provided which visually screens the conditions listed in subsection 1 from less intensive uses by employing one or more of the following in any combination to obtain a solid barrier of at least 6' in height:
  - a. A solid wood and/or masonry fence or wall at least six feet in height.



- b. A landscaped screen, using a minimum of 50% evergreen plant material, capable of providing a substantially opaque, hedge-like barrier and attaining a minimum height of six feet within three years of planting. (Note: All planting materials shall conform to the minimum caliper/size requirements set in Table 173-02)
- c. A landscaped earth berm with a maximum slope of three to one, rising no less than six feet above the existing grade of the lot line separating the zoning districts.
- d. Any combination of these methods that achieves a cumulative height of six feet.

The applicant is meeting this requirement with a fully landscaped buffer to create the required opaque residential buffer with approved planting materials as listed in Table 173-02.

### **Comprehensive Plan Review**

The Windsor Heights Comprehensive Plan has been reviewed by City Staff to make sure that this project aligns with the goals and ideals of the Comprehensive Plan. The proposed Windsor Apartment development project meets several of the goals identified and outlined within the Comprehensive Plan and addresses the following goals as determined by the City Staff. The Comprehensive Plan supports the proposed project as it is presented.

#### **Neighborhood Enhancement:**

- 1. Broaden the mix of housing to appeal to a wide range of people of all stages of life.
  - a. This project assists in achieving this goal by introducing more available housing for current or future residents of Windsor Heights. It also provides a diversity in housing as much of the surrounding area is Single-Family Dwelling Unit housing with this providing Multi-Family Dwelling Units.

#### **Economic Development:**

- 1. Support strategic redevelopment along key corridors, including University Avenue, Hickman Road, 73<sup>rd</sup> Street, and 63<sup>rd</sup> Street.
  - a. This project goes to supporting strategic redevelopment along both University Avenue and 63<sup>rd</sup> Street. With many new residents living in this area, it not only benefits the tax base of the area for the City, but also gives more opportunity to surrounding businesses for foot traffic and new patrons to their establishments.

### **Future Land Use Map**

The future land use map should be used as guidance for areas throughout the City. The map identifies this location as mixed use, which is defined on page 40 of the 2017 Comprehensive Plan. “Mixed Use. This area encourages combinations of limited commercial, office, and residential uses.

The proposed project conforms to the vision that has been laid out by the Comprehensive Plan Future Land Use Map.



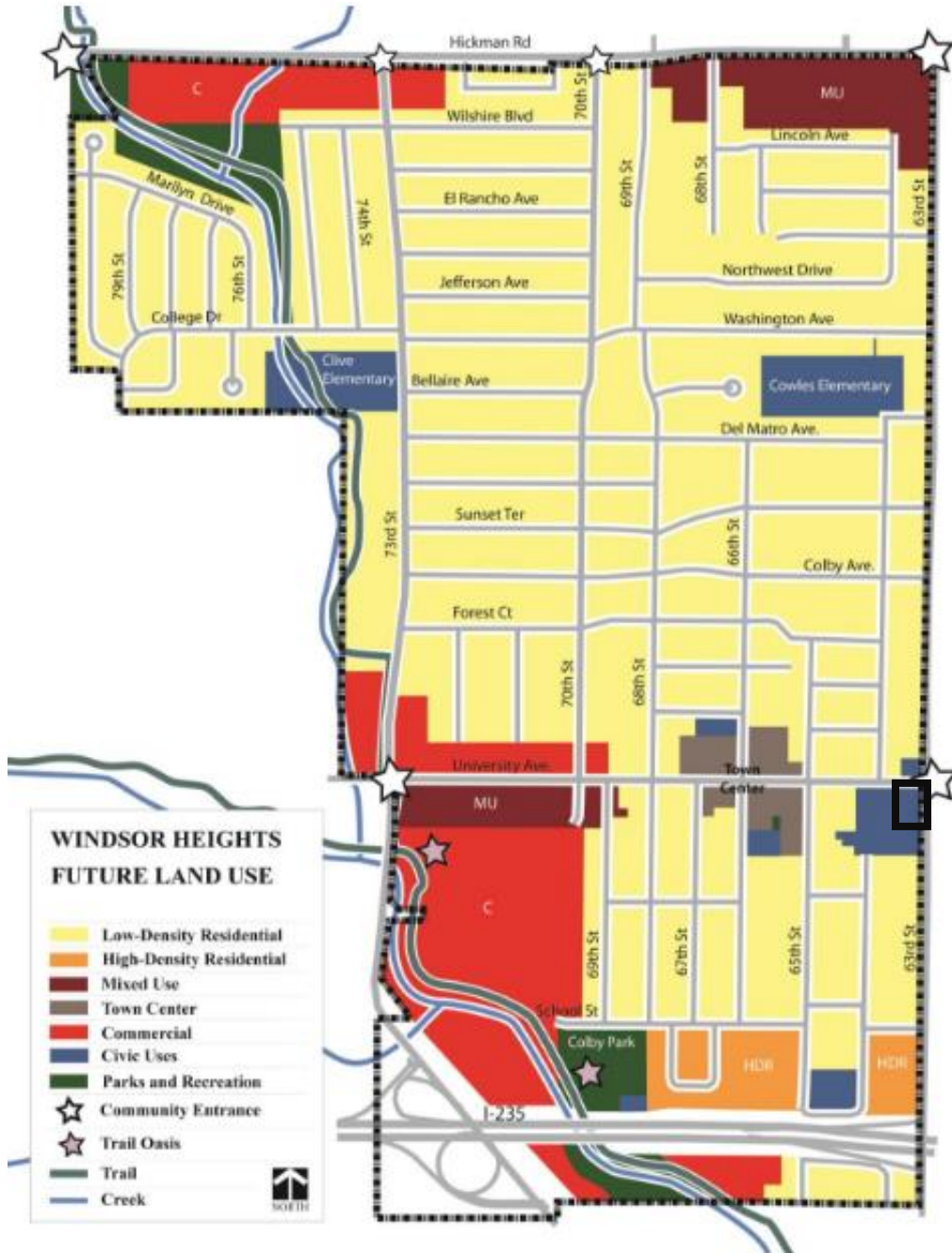


Figure 2: Windsor Heights' 2017 Comprehensive Plan's  
Future Land Use Map



## Zoning Map

The parcels are currently zoned for Urban Center District which is defined in [Table 168-1 Purposes of Zoning Districts](#) as “This district recognizes the mixed-use character primarily along the University Avenue corridor, which is the principal route through central Windsor Heights. This district contains a combination of residential, commercial, and office uses and is known for its walkability and main street feel.”

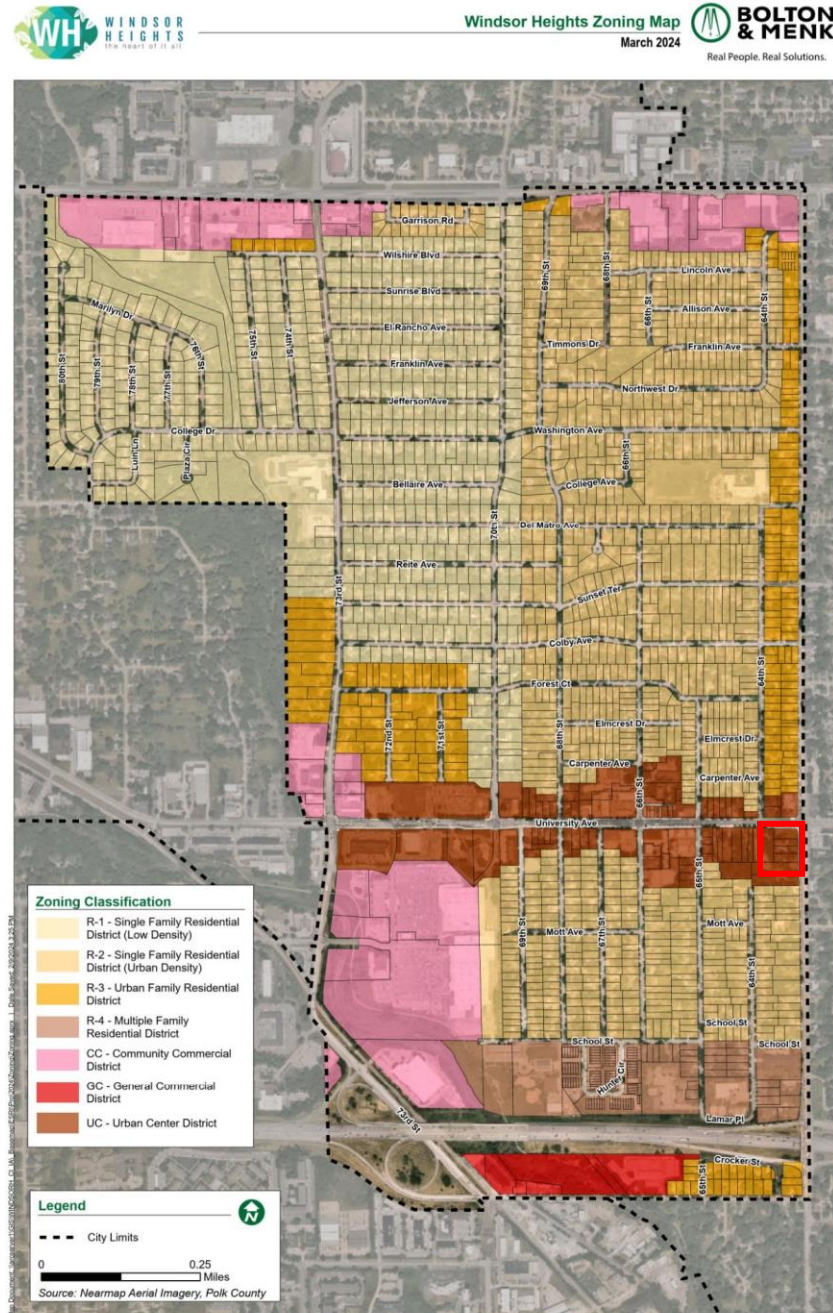


Figure 3: Current Zoning Map

### **Public Comments Received**

The City of Windsor Heights City Staff, at the time of the creation of this Staff Report, has not received public comment on the proposed project of The Windsor Apartment Development at this property. However, City Staff has met with some adjoining property owners over the past six months to discuss various project related issues.

### **Current Work Done at Site**

The developer has begun grading and received the necessary permits to begin this form of work on their site. The permits received (grading and shell building permits) can be approved outside of the Site Plan review process but the Site Plan review process needs to be complete for development to begin. The developer has been grading at their own risk and has obtained the shell building permit for footing construction, again this has been done at their own risk due to their timeline constraints and unresolved storm water design issues.

### **Conclusion and Recommendation**

After reviewing all of the documentation submitted by the applicant by City Staff and all City Departments, Staff compared the project to the goals and vision of the Comprehensive Plan and other City plans. After review and comparison, Staff came to their recommendation.

**The staff recommends to the Planning and Zoning Commission that they recommend approval of the site plan with the following conditions to the City Council.**

### **Recommended Motion**

**Motion to recommend for approval of the 1148 63<sup>rd</sup> Street Site Plan (The Windsor Apartments) with the conditions of approval laid out by City Staff to the City Council.**

### **Conditions:**

All of the following conditions will be met, reviewed by the city department assigned, and deemed complete before approval of the site plan and before any development can take place.

### **General Comments**

1. All permits related to the project will be held and released concurrently at the approval of the following:
  - a. Approval of signs and utility from Safe Building.
  - b. Revision of site plan application in accordance with the comment letter and all corresponding comments from each City Department.
  - c. Professional Signatures on Final Site Plan including Licensed Surveyor (Chapter 170.10)
  - d. City Council approval of site plan.

### **Storm Water General Comments**

1. The Rev calculation for the West Detention in Appendix H uses cumulative storage numbers that do not match the stage-storage curve for the West Basin within the model output. Please resolve the discrepancy.

2. The WQv standard is required by the Windsor Heights City Code. Please adjust the detention facilities to meet this standard.
3. Include a soil management plan in the report. Provide details for topsoil preservation and respread in the report and include notes in the plans (See 11. Topsoil Requirements in the Windsor Heights Storm Water Standards).

#### Storm Water Plan Sheet Comments

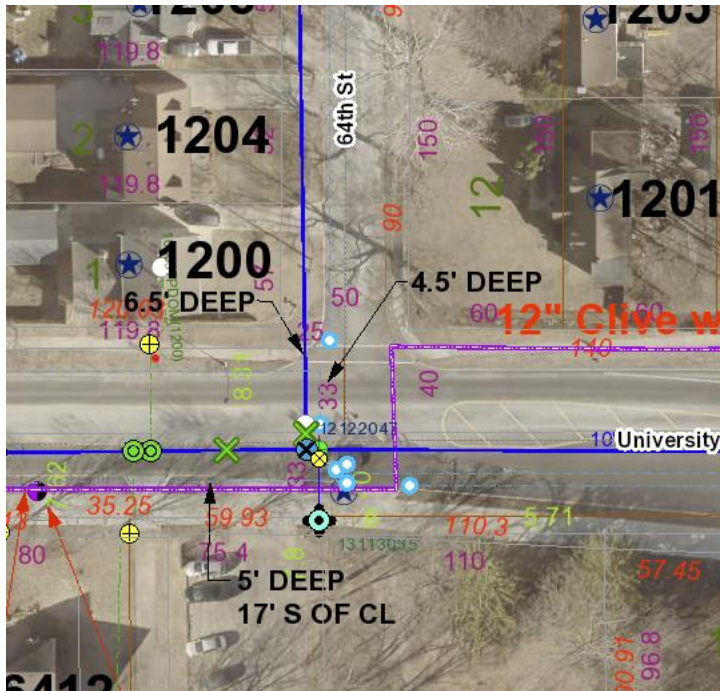
4. Add bioretention cell components (aggregate layer depth, amended soil depth, amended soil specs, etc.) to the plans if that is how the WQv standard will be met.
5. The emergency overflow of the West Basin is the entire south, north and west sides. What is the plan to protect that? Right now it just shows turf.
6. Ensure the 100-yr WSELs in the plans match the stormwater report. For example, see the Southeast Basin numbers.
7. Show details of the outlet onto 64<sup>th</sup> Street. (ie. FES, etc.). Plans show pipe run STSP-7.

#### Stormwater Other Comments

8. Adjust western water basin design to accommodate a walkway per 3/27/24 email and map or provide explanation for any alternative design. A walkway connection along the southern section of the pond is the highest priority.
9. Storm water agreement to match final signed site plan.

#### Des Moines Water Works Comments

1. The existing hydrant near the proposed entrance will need to be removed & a new hydrant assembly installed...instead of installing a 90 bend to head east, install tapping & sleeve & valve lay straight south to proposed location. The actual 12" Clive main location will need to be verified. The hydrant lead will need a minimum of 10' separation from the existing 12" 90 Bend. Note should be added for the contractor installing new hydrant assembly to protect & avoid existing thrust block on the 90-degree bend.
2. Hydrants and valves are to have a minimum separation of 10' from trees shrubs.



### Engineering Comments

1. Complete Stormwater Maintenance Agreement and submit per instructions. Final agreement once final property ownership is determined Complete Stormwater Maintenance Agreement and submit per instructions. Final agreement once final property ownership is determined. Presuming dedication of the western detention basin to the city, the maintenance agreement shall stipulate the developer maintain the detention basin, per the approved site plan, within the parkland dedication area in perpetuity.
2. Provided trail easement to be filed once site plan is approved.
3. Provide DOT approval of driveway.
4. Finalize easements once final property ownership is determined.
5. RECP to be minimum of Type 2, note on plans.
6. TRM to be minimum of Type 2, note on plans.

### Planning Comments

#### Parkland Dedication:

1. Fulfill Parkland Dedication requirement determined by City Council as either a physical dedication or monetary value substitute as determined by Section 172.15 of the Zoning Code.
  - a. Will be considered a condition of approval.
2. Remove any dead or diseased trees in parkland dedication area, per the direction of City Staff, prior to dedication as per the April 1<sup>st</sup>, 2024 City Council Parkland Dedication discussion.



3. Place native plantings in the parkland dedication area and establish those plantings before dedication as per the April 1<sup>st</sup> City Council Parkland Dedication discussion.

**Bike Parking:**

4. Indoor Long-Term Bike Parking and Car parking in garage don't work with the current design as people won't be able to get out of their cars. Please address.

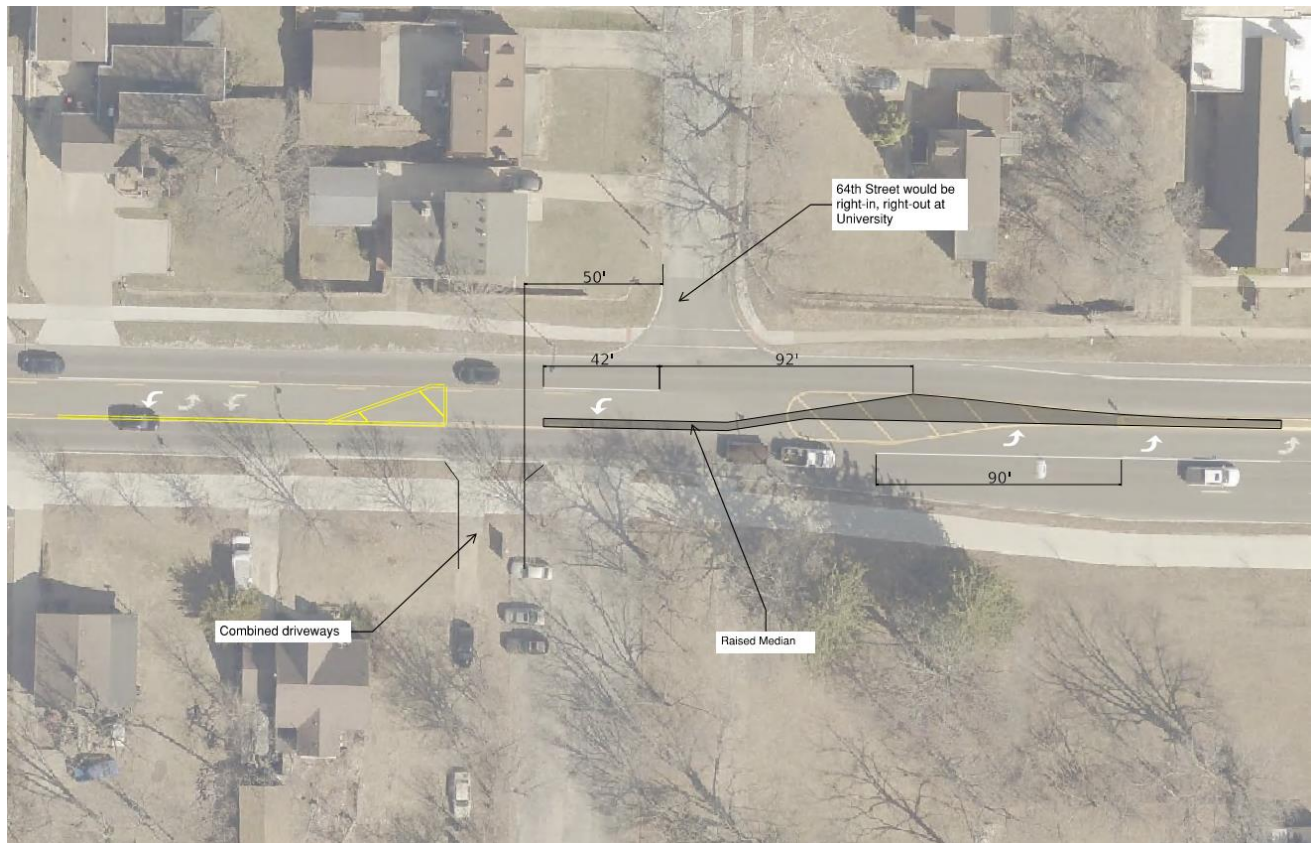
**Landscaping Comments**

**Photometric Plan:**

1. Show foot candle data at building entrances and pathways to said entrances from the parking lot and other public spaces.

**Traffic General Comments**

1. University Avenue Access (page 9)
  - a. As shown on the 4/15/24 site plan, the proposed driveway aligned with 64<sup>th</sup> Street on University is within the functional area of the intersection of 63<sup>rd</sup>/University. Queues are anticipated and have been observed to block this driveway in the peak hours. Per the report, the delay for residents leaving the apartment is LOS F. Creating a westbound left turn lane on University for the apartments will limit the ability to extend the eastbound left turn lane at 63<sup>rd</sup> street which is already a heavy movement.
    - i. It is encouraged that the developer work with adjacent property owners to move the full access driveway further west away from the intersection of 63<sup>rd</sup> Street. Note: Both city staff and/or the developer have reached out in person, letter, and phone to the owner of 6412 University Avenue to discuss options and received no response from the property owner.
    - ii. One idea for the driveway moved further west follows:



- iii. If the above is not an option, the developer should make the driveway right-in, right-out only by placing a median across the intersection with 64<sup>th</sup> Street.

### Traffic Other Comments

If Planning and Zoning chooses to recommend allowing the proposed full access on University Avenue, the City Administration recommends it be a temporary full access and a condition on the site plan approval. A temporary full-access shall be allowed on to University Ave as shown in the site plan. Said access shall be limited to a duration of five years from the date an occupancy certificate is issued for any structure built, after which time the City Council must review the access to determine if the temporary full-access may continue or otherwise terminated and converted to a right-in-right-out only access. Temporary full access may also be terminated prior to five years as directed by the Council if they so determine said access has contributed to additional traffic conflicts/accidents or if roadway improvements are determined necessary. When temporary full-access is terminated, any action needed to discourage use as a full-access shall be a cost of the developer.

### Attachments

1. Application Materials (as submitted)
2. Traffic Study
3. Park and Trail Concept

#### 4. Stormwater Management Plan



**NOTE:**  
THE LOCATION OF ALL UTILITIES INDICATED ON THE PLANS ARE TAKEN FROM EXISTING PUBLIC RECORDS. THE EXACT LOCATION AND ELEVATION OF ALL PUBLIC UTILITIES MUST BE DETERMINED BY THE CONTRACTOR. IT SHALL BE THE DUTY OF THE CONTRACTOR TO ASCERTAIN WHETHER ANY ADDITIONAL FACILITIES OTHER THAN THOSE SHOWN ON THE PLANS MAY BE PRESENT.

**APPLICANT/DEVELOPER/OWNER**

THE WINDSOR LLC  
3611 NE OTTERVIEW CIRCLE  
ANKENY, IA 50021  
NICK JENSEN  
515-333-4403  
NICK@CALIBERIOWA.COM

**OPEN SPACE:**

SITE AREA = 168,618 SF (3.87 AC)  
EXISTING IMPERVIOUS SURFACE = 24,948 SF (0.57 AC)  
MINIMUM OPEN SPACE = N/A  
BUILDING FOOTPRINT = 25,901 SF (0.59 AC)  
GARAGE BUILDING FOOTPRINTS = 11,319 SF (0.26 AC)  
SIDEWALK = 4,771 SF (0.11 AC)  
PAVEMENT = 53,072 SF (1.22 AC)  
(2,325 SF OPEN SPACE ISLANDS)  
TOTAL IMPERVIOUS = 95,063 SF (2.18 AC) 56.4%  
OPEN SPACE = 73,555 SF (1.69 AC) 43.6%

**SETBACKS**

FY = 0'  
SY = 0'  
RY = 10'

**UNITS:**

101 UNITS

**PARKING**

REQUIRED: 1/UNIT = 105 STALLS

PROVIDED:

BASEMENT PARKING = 40

ACCESSIBLE STALLS REQUIRED = 2

PROVIDED = 2

VAN ACCESSIBLE REQUIRED = 1

PROVIDED = 2

GARAGE PARKING = 40

ACCESSIBLE STALLS REQUIRED = 2

PROVIDED = 2

VAN ACCESSIBLE REQUIRED = 1

PROVIDED = 2

SURFACE PARKING = 108

ACCESSIBLE STALLS REQUIRED = 5

PROVIDED = 5

VAN ACCESSIBLE REQUIRED = 1

PROVIDED = 3

**BIKE PARKING**

REQUIRED:

SHORT TERM = 1/4 UNITS = 26

LONG TERM = 1/10 UNITS = 11

PROVIDED:

SHORT TERM = 13 RACKS FOR 2 BIKES EACH

LONG TERM = 11 RACKS FOR 2 BIKES EACH

**BUILDING COVERAGE**

60% MAXIMUM

PROVIDED = 16%

**FLOOR AREA RATIO**

1.00 MAXIMUM

PROVIDED = 0.71

**UTILITIES OWNERSHIP:**

STORM SEWERS CITY OF WINDSOR HEIGHTS  
SANITARY SEWERS CITY OF WINDSOR HEIGHTS  
WATER DUWV  
NATURAL GAS MID AMERICAN  
ELECTRIC MID AMERICAN  
TELEPHONE LUMEN

**BUILDING HEIGHT**

60' MAX

**CONSTRUCTION SCHEDULE:**

| ITEM                    | BEGIN | COMPLETED |
|-------------------------|-------|-----------|
| SITE DEMOLITION         | 02/24 | 05/24     |
| PAVING                  | 05/24 | 10/25     |
| GRADING/EROSION CONTROL | 02/24 | 10/25     |
| BUILDINGS               | 04/24 | 10/25     |
| LANDSCAPING             | 09/24 | 10/25     |

**LEGAL DESCRIPTION**

Part of Parcel A in Lot 1 of Hopkins Place, an Official Plat, per that Plat of Survey filed in Book 9221, Pages 674-675 in the Office of the Recorder for Polk County, Iowa; and part of Lots 2, 3 and 4 in Hopkins Place, an Official Plat; and part of Lots 5, 11, 12, 22, 23, and 24 in Hopkins-Woehler Place, an Official Plat, all now included in and forming a part of the City of Windsor Heights, Polk County, Iowa, being more particularly described as follows:

Beginning at the Northwest Corner of said Parcel A in Lot 1 of Hopkins Place, a point at the intersection of the South right-of-way line of University Avenue as presently established and the East line of said Lot 4 in Hopkins Place; thence South 00°37'08" East, 44.41 feet along the West line of said Parcel A; thence North 89°55'37" East, 95.76 feet; thence South 00°34'23" East, 20.50 feet; thence North 89°55'37" East, 109.29 feet to the East line of said Parcel A also being the West right-of-way line of 63rd Street as presently established; thence South 00°34'01" East, 26.00 feet along the West right-of-way line of 63rd Street to the Southeast corner of said Parcel A; thence South 00°38'53" East, 59.95 feet along the West right-of-way line of 63rd Street; thence South 00°35'55" East, 59.72 feet along the West right-of-way line of 63rd Street; thence South 00°38'11" East, 73.65 feet along the West right-of-way line of 63rd Street; thence South 00°37'06" East, 39.94 feet along the West right-of-way line of 63rd Street; thence South 02°11'11" East, 100.25 feet along the West right-of-way line of 63rd Street; thence South 02°17'50" East, 54.89 feet along the West right-of-way line of 63rd Street to the North line of the South 15 feet of said Lot 22 in Hopkins-Woehler Place; thence South 89°55'49" West, 359.03 feet along the North line of the South 15 feet of said Lot 22; thence North 00°38'30" West, 96.59 feet; thence South 89°25'06" West, 20.39 feet; thence North 00°34'54" West, 98.48 feet to the Southeast corner of the West 15 feet of said Lot 5 in Hopkins-Woehler Place; thence North 00°34'54" West, 291.23 feet along the East line of the West 15 feet of said Lot 5 to the South right-of-way line of University Avenue; thence South 87°44'11" East, 170.21 feet along the South right-of-way line of University Avenue to the point of beginning.

Containing 167,311 square feet (3.84 acres).

**PARKLAND DEDICATION**

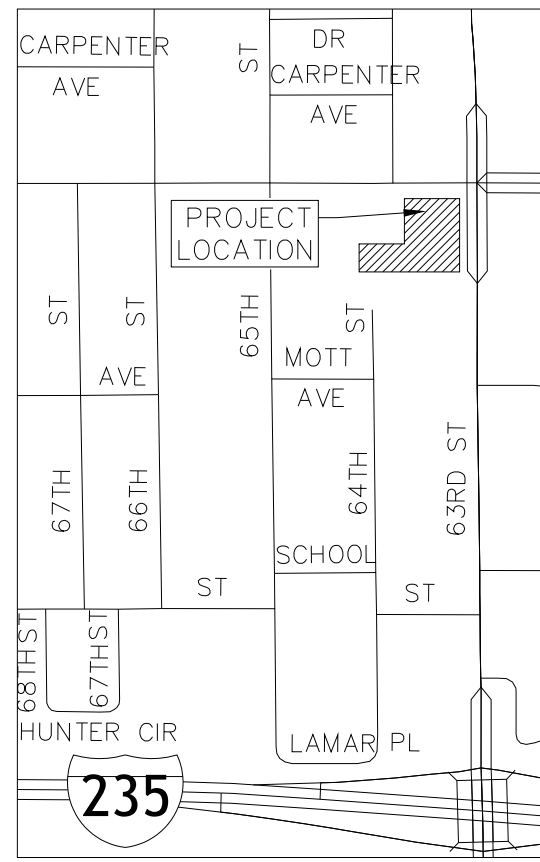
REQUIRED 0.005 ACRES PER RESIDENT  
105 UNITS x 1.5 x 0.005 = 0.788 ACRES

DANIEL BREDBECK  
1201 64TH ST

WINDSOR COMMUNITY  
PRESBYTERIAN CHURCH  
6301 UNIVERSITY AVE

**SHEET INDEX**

- 1 - PROJECT MAP
- 2 - GEOMETRIC PLAN
- 3 - GRADING PLAN - 1
- 4 - GRADING PLAN - 2
- 5 - STORM SEWER PLAN
- 6 - STORM DETAILS - 1
- 7 - STORM DETAILS - 2
- 8 - STORM DETAILS - 3
- 9 - STORM DETAILS - 4
- 10 - STORM DETAILS - 5
- 11 - STORM DETAILS - 6
- 12 - UTILITY PLAN
- 13 - DEMOLITION PLAN
- 14 - LANDSCAPING PLAN
- 15 - DETAIL SHEET
- 16 - CRASH ENCLOSURE DETAIL
- 17 - EROSION CONTROL PLAN
- 18 - LAND SWAP DIAGRAM
- 19 - STREET IMPROVEMENT
- 20 - TRAFFIC CONTROL
- 21 - TRAIL DETOUR
- 22 - BUILDING ELEVATIONS



VICINITY MAP  
NTS

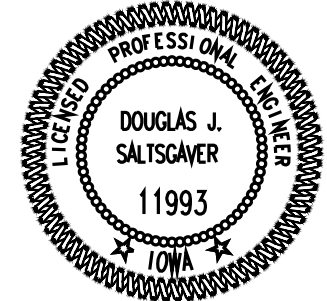
**GENERAL NOTES:**

1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE CURRENT URBAN STANDARDS SPECIFICATIONS FOR PUBLIC IMPROVEMENTS.
2. ALL DEBRIS SPILLED ON THE STREETS OR ADJACENT PROPERTY SHALL BE PROMPTLY REMOVED BY THE CONTRACTOR.
3. ALL CONSTRUCTION PROCEDURES AND MATERIALS TO MEET OR EXCEED MINIMUM REQUIREMENTS OF THE CITY.
4. ALL WORK SHALL BE DONE IN ACCORDANCE WITH CURRENT OSHA CODES AND STANDARDS. NOTHING INDICATED ON THESE PLANS SHALL RELIEVE THE CONTRACTOR FROM COMPLYING WITH ANY AND ALL APPROPRIATE SAFETY REGULATIONS.
5. THE CONTRACTOR SHALL FURNISH AND PLACE ALL NECESSARY SIGNS AND BARRICADES DURING CONSTRUCTION IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR GIVING THE CITY PROPER NOTICE FOR THE REQUIRED INSPECTIONS.
7. WORK SHALL INCLUDE CONNECTION TO EXISTING PUBLIC UTILITIES AND ANY AND ALL FITTINGS, CLEANOUTS AND APPURTENANCES REQUIRED BY CODES.
8. THE CONTRACTOR IS RESPONSIBLE FOR CLEARING & GRUBBING THE SITE, AND REMOVAL & DISPOSAL OF ANY DELETERIOUS AND EXCESS MATERIALS FROM THE SITE.
9. ANY DAMAGE DONE TO THE EXISTING FENCES, YARDS OR OTHER IMPROVEMENTS SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
10. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY AND ALL REQUIRED PERMITS FOR PERFORMING THE WORK INCLUDING SIDEWALK AND DRIVEWAY APPROACH.
11. A SIDEWALK AND DRIVEWAY APPROACH PERMIT WILL BE REQUIRED OF THE DEVELOPER OR CONTRACTOR.
12. LIGHTING MUST BE LOW GLARE CUT-OFF TYPE FIXTURES TO REDUCE THE GLARE OF LIGHT POLLUTION ON SURROUNDING PROPERTIES.
13. ALL WORK IN THE ROW OF UNIVERSITY AVENUE SHALL BE PER THE MOST CURRENT SUDAS SPECIFICATIONS.

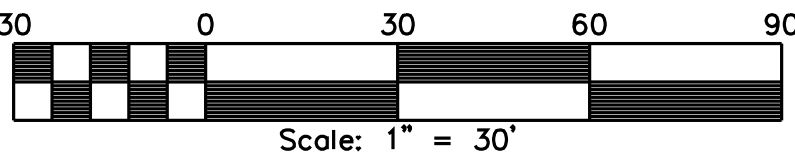
**P.C.C. PAVING:**

1. ALL SUBGRADE UNDER SLAB TO BE COMPACTED TO 95% STANDARD PROCTOR DENSITY FOR A MINIMUM OF 24".
2. MOISTEN SUBGRADE PRIOR TO PLACING CONCRETE.
3. CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4000 PSI.
4. AGGREGATE SHALL BE CLASS 3.
5. CONCRETE SURFACES SHALL BE BURLAP FINISH. CHECK SURFACE WITH TEMPLATE NO DEVIATION OVER 1/8" IN 10' IS PERMITTED. ALL CONCRETE SHALL SLOPE TO DRAIN.
6. ALL CONCRETE SHALL BE CURED WITH AN ASTM C309 TYPE 2, WATER BASED WHITE PIGMENTED CURING COMPOUND PER IDOT SEC. 4105.
7. SAW CUT JOINTS AS SOON AS CONCRETE HAS SET ENOUGH TO PREVENT RAVELING AND PRIOR TO ANY CRACKING.
8. SAW CUTS TO BE 1/8" TO 1/4" WIDE; DEPTH: LONGITUDINAL T/3, TRANSVERSE T/4.
9. LONGITUDINAL JOINT SPACING SHALL NOT BE GREATER THAN 12'. TRANSVERSE SPACING SHALL NOT BE GREATER THAN 15'. JOINT LAYOUT SHALL BE APPROVED BY THE ENGINEER.
10. BARS AT LONGITUDINAL JOINTS TO BE 1/2" X 30" DEFORMED AT 30" O.C.
11. ALL JOIS SHALL BE FILLED.
12. THE CONTRACTOR TO BARRICADE SLAB FOR 14 DAYS AFTER PLACING.
13. ON SITE PAVING THICKNESS SHALL BE AS FOLLOWS: 4" SIDEWALKS, 6" DRIVEWAYS, AND PARKING STALLS. DRIVE PAVEMENT WITHIN R/W (CURB TO BACK OF WALK) SHALL BE 7" MIN. PERIMETER SIDEWALK SHALL BE 5" MIN EXCEPT WITHIN DRIVE PAVEMENT.
14. SUBMIT DESIGN MIX AS DESIGNED BY INDEPENDENT TESTING LABORATORY PRIOR TO PLACING ANY CONCRETE.
15. ALL WORK TO COMPLY WITH CURRENT ACI STANDARDS.
16. THE CONTRACTOR SHALL PAINT PARKING STALLS.
17. ALL DEBRIS SPILLED ON THE CITY STREETS OR ADJACENT PROPERTY SHALL BE PROMPTLY REMOVED BY THE CONTRACTOR. NOTIFY CITY OF PROPOSED BORROW OR FILL SITE LOCATIONS AND HAUL ROUTES.

DSaltsgaver@gaconsultants.com



**ENGINEERING CERTIFICATION**  
I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT, SPECIFICATION OR REPORT WAS PREPARED BY ME, OR UNDER MY DIRECT PERSONAL SUPERVISION, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA.  
DOUGLAS J. SALTSGAVER, P.E. #11993  
MY REGISTRATION RENEWAL DATE IS DECEMBER 31, 2024  
PAGES OR SHEETS COVERED BY THIS SEAL  
1 - 21



UC  
ECCORCE LLC  
6424 UNIVERSITY AVE  
N89°32'09"E  
25.39'(M) UC  
GERHARD GENSCH  
6420 UNIVERSITY AVE  
N89°55'23"E 80.44'(M)  
UC  
TIMOTHY ANDERSON  
6414 UNIVERSITY AVE  
N89°46'20"E 79.28'(M)  
UC  
DENNIS BLOCK  
6412 UNIVERSITY AVE  
N89°38'48"E  
49.93'(M) UC  
FRANK MARTINEZ  
6410 UNIVERSITY AVE  
N89°55'06"E  
15.10'(M)

COLIN CHRISTENSEN R-2  
1139 65TH ST

HUGH & BRANDY VOIGT  
1135 65TH ST

R-2  
WJ PROPERTIES LLC  
1125 65TH ST

R-2  
ROBERT BISHOP  
1128 64TH ST

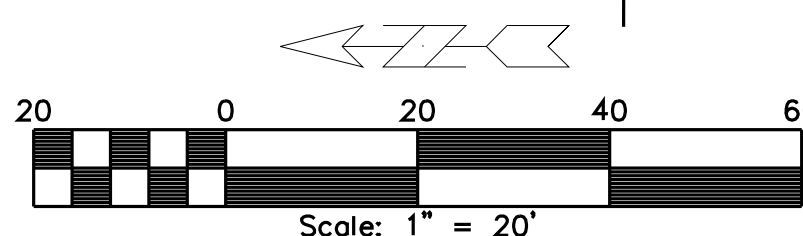
R-2  
JAMES & KAREN MCCONEGHEY  
1129 64TH ST

R-2  
GABRIEL & ESTELA PINOS  
1130 63RD ST

**IOWA LAND SURVEYOR CERTIFICATION**  
I HEREBY CERTIFY THAT THIS LAND SURVEYING DOCUMENT WAS PREPARED AND THE RELATED SURVEY WORK WAS PERFORMED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL LAND SURVEYOR UNDER THE LAWS OF THE STATE OF IOWA.  
DANIEL F. RITTEL, P.L.S. #15088  
MY LICENSE RENEWAL DATE IS DECEMBER 31, 2023  
DATE  
PAGES OR SHEETS COVERED BY THIS SEAL:  
**THIS SHEET ONLY**



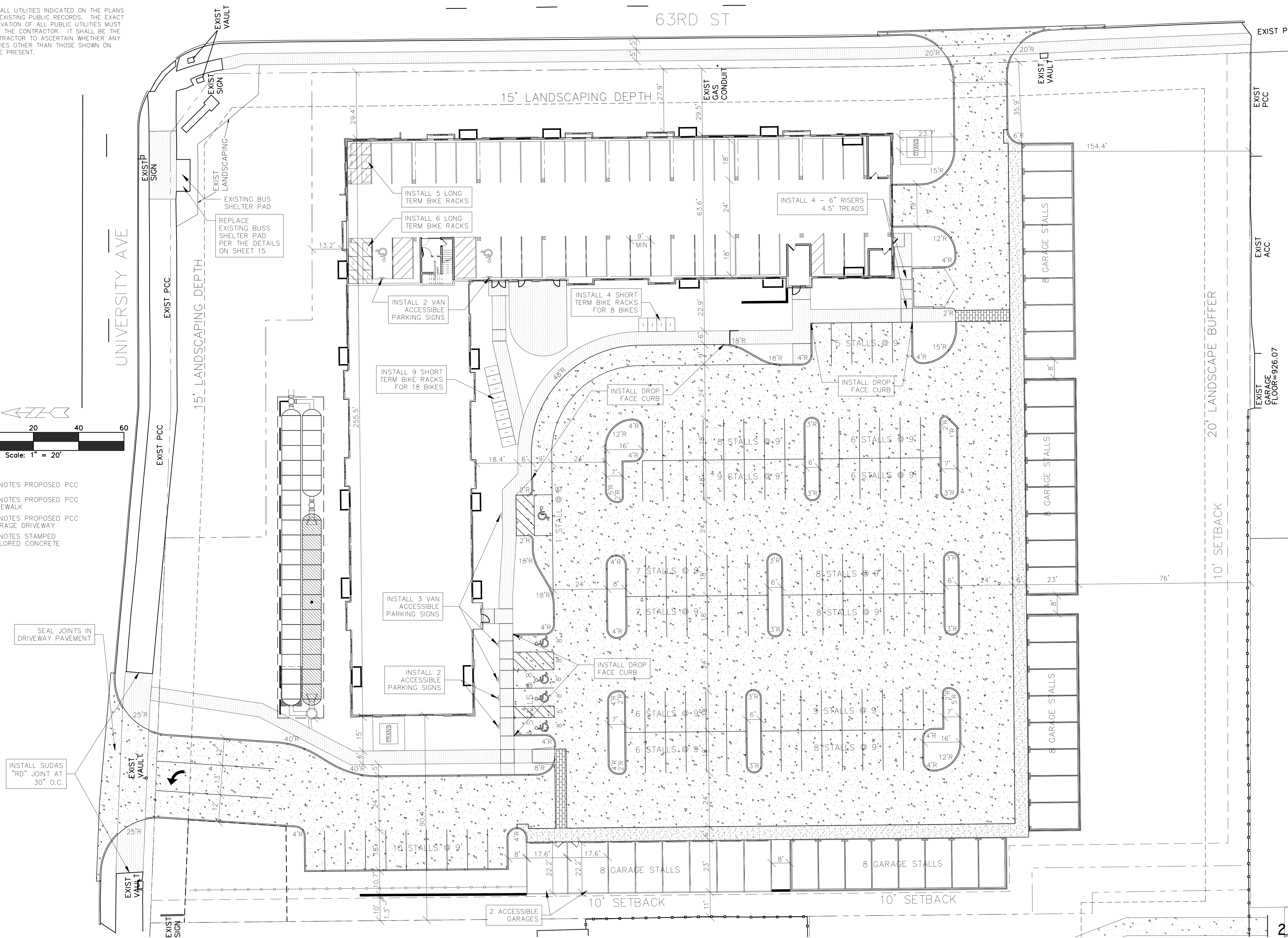
**NOTE:**  
THE LOCATION OF ALL UTILITIES INDICATED ON THE PLANS ARE TAKEN FROM EXISTING PUBLIC RECORDS. THE EXACT LOCATION AND ELEVATION OF ALL PUBLIC UTILITIES MUST BE DETERMINED BY THE CONTRACTOR. IT SHALL BE THE DUTY OF THE CONTRACTOR TO ASCERTAIN WHETHER ANY ADDITIONAL FACILITIES OTHER THAN THOSE SHOWN ON THE PLANS MAY BE PRESENT.



- |                                                                                     |                                         |
|-------------------------------------------------------------------------------------|-----------------------------------------|
|  | DENOTES PROPOSED PCC                    |
|  | DENOTES PROPOSED PCC<br>SIDEWALK        |
|  | DENOTES PROPOSED PCC<br>GARAGE DRIVEWAY |
|  | DENOTES STAMPED<br>COLORED CONCRETE     |

## SEAL JOINTS IN DRIVEWAY PAVEMENT

INSTALL SUDAS  
"RD" JOINT AT  
30" O.C.



# WINDSOR APARTMENTS - GEOMETRIC PLAN

Clapsaddle-Garber Associates, Inc.  
413 Grand Avenue  
Des Moines, Iowa 50312  
Ph 515-288-4823  
[www.cgaconsultants.com](http://www.cgaconsultants.com)



23-047

|     |          |      |    |     |           |                     |              |                  |
|-----|----------|------|----|-----|-----------|---------------------|--------------|------------------|
| NO. | REVISION | DATE | BY | FOR | LOCATION: | SCALE:              | DESIGNED BY: | DRAWN BY:        |
|     |          |      |    |     |           | DWG: 23-047-650.dwg | CHECKED BY:  | DATE: 04/15/2024 |
|     |          |      |    |     |           |                     | SHEET 2      | OF 22            |
|     |          |      |    |     |           |                     | FIELD BOOKS  | FILE NO.: 23-047 |

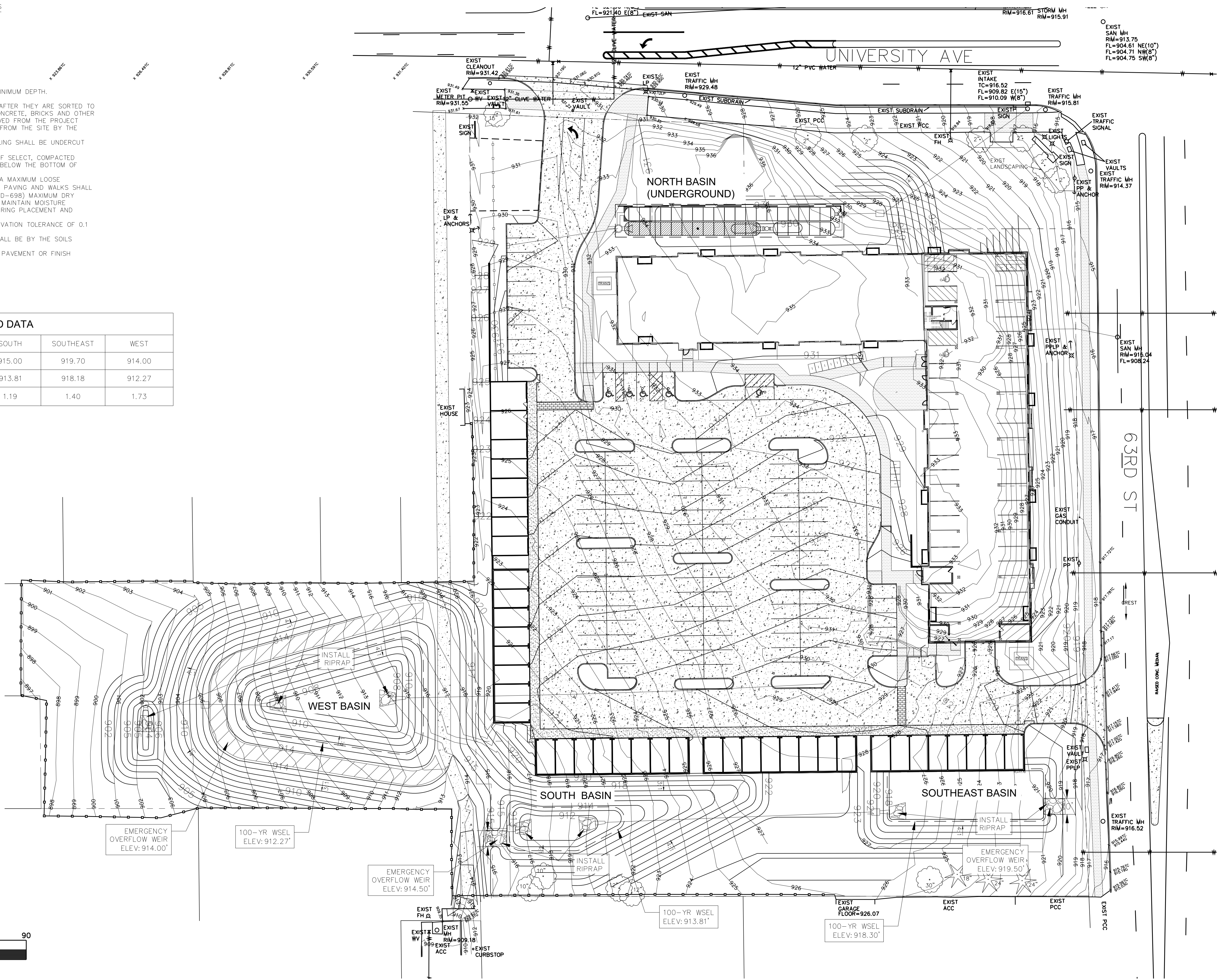
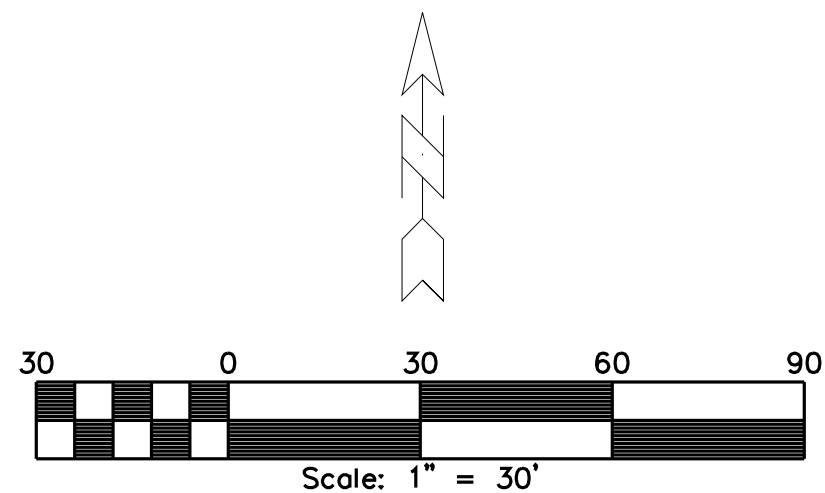


NOTE:  
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GRADING NOTES:

1. REMOVE ALL EXISTING ORGANIC MATERIAL TO 6" MINIMUM DEPTH.
2. PROOF ROLL THE EXPOSED SUB GRADE.
3. NATIVE SOILS MAY BE REUSED FOR COMMON FILL AFTER THEY ARE SORTED TO REMOVE ALL DELETERIOUS MATERIALS SUCH AS CONCRETE, BRICKS AND OTHER RUBBLE. DELETERIOUS MATERIALS SHALL BE REMOVED FROM THE PROJECT SITE. ALL EXCESS MATERIALS SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR.
4. ANY SOFT SPOTS DISCOVERED DURING PROOF ROLLING SHALL BE UNDERCUT AND RECOMPACTED.
5. ALL PAVEMENTS SHALL HAVE A MINIMUM OF 12" OF SELECT, COMPACTED MATERIAL OF CL OR ML CLASSIFICATION DIRECTLY BELOW THE BOTTOM OF SLAB.
6. FILL SHALL BE PLACED IN UNIFORM LIFTS HAVING A MAXIMUM LOOSE THICKNESS OF 9". COMPACTION BELOW SLABS AND PAVING AND WALKS SHALL BE AT LEAST 95% OF STANDARD PROCTOR (ASTM D-698) MAXIMUM DRY DENSITY. COMPACT TO 90% AT OTHER LOCATIONS. MAINTAIN MOISTURE CONTENT OF CONTROLLED FILL ABOVE OPTIMUM DURING PLACEMENT AND COMPACTION.
7. THE ENTIRE SITE SHALL BE FINE GRADED WITH ELEVATION TOLERANCE OF 0.1 FOOT.
8. OBSERVATION AND TESTING OF FILL OPERATION SHALL BE BY THE SOILS ENGINEER HIRED BY THE CONTRACTOR.
9. ALL PROPOSED SPOT ELEVATIONS ARE TO TOP OF PAVEMENT OR FINISH GRADE, UNLESS OTHERWISE NOTED.

| POND DATA   |        |        |           |        |
|-------------|--------|--------|-----------|--------|
|             | NORTH  | SOUTH  | SOUTHEAST | WEST   |
| TOP OF POND | 928.75 | 915.00 | 919.70    | 914.00 |
| 100YR EL    | 924.65 | 913.81 | 918.18    | 912.27 |
| FREEBOARD   | 4.10   | 1.19   | 1.40      | 1.73   |



WINDSOR APARTMENTS - GRADING PLAN - I



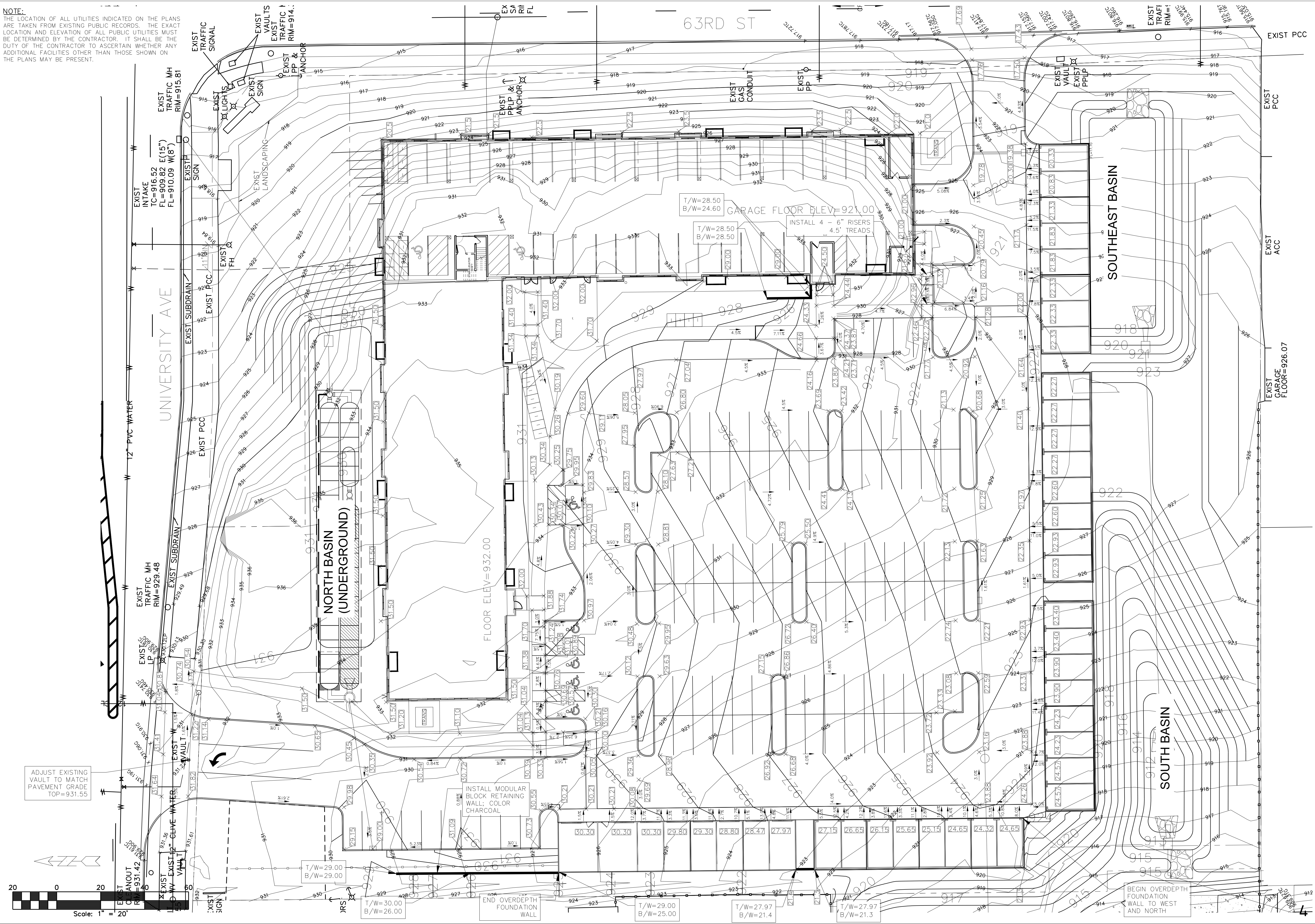
23-047

Clapsdille-Garber Associates, Inc.  
2413 Grand Avenue  
Des Moines, Iowa 50312  
Ph 515-268-4883  
www.clapsdillegarber.com

| NO. | REVISION | DATE | BY | FOR | LOCATION: | SCALE:              |  | AS NOTED | DESIGNED BY: | DJS     | DRAWN BY: | PJW              |
|-----|----------|------|----|-----|-----------|---------------------|--|----------|--------------|---------|-----------|------------------|
|     |          |      |    |     |           | DWG: 23-047-GRD.dwg |  |          |              |         |           |                  |
|     |          |      |    |     |           | FIELD BOOK:         |  |          | CHECKED BY:  | SHEET 3 | OF 22     | DATE: 04/15/2024 |
|     |          |      |    |     |           |                     |  |          |              |         |           | FILE NO.: 23-047 |



NOTE:  
THE LOCATION OF ALL UTILITIES INDICATED ON THE PLANS  
ARE TAKEN FROM EXISTING PUBLIC RECORDS. THE EXACT  
LOCATION AND ELEVATION OF ALL PUBLIC UTILITIES MUST  
BE DETERMINED BY THE CONTRACTOR. IT SHALL BE THE  
DUTY OF THE CONTRACTOR TO ASCERTAIN WHETHER ANY  
ADDITIONAL FACILITIES OTHER THAN THOSE SHOWN ON  
THE PLANS MAY BE PRESENT.



## WINDSOR APARTMENTS - GRADING PLAN - 2

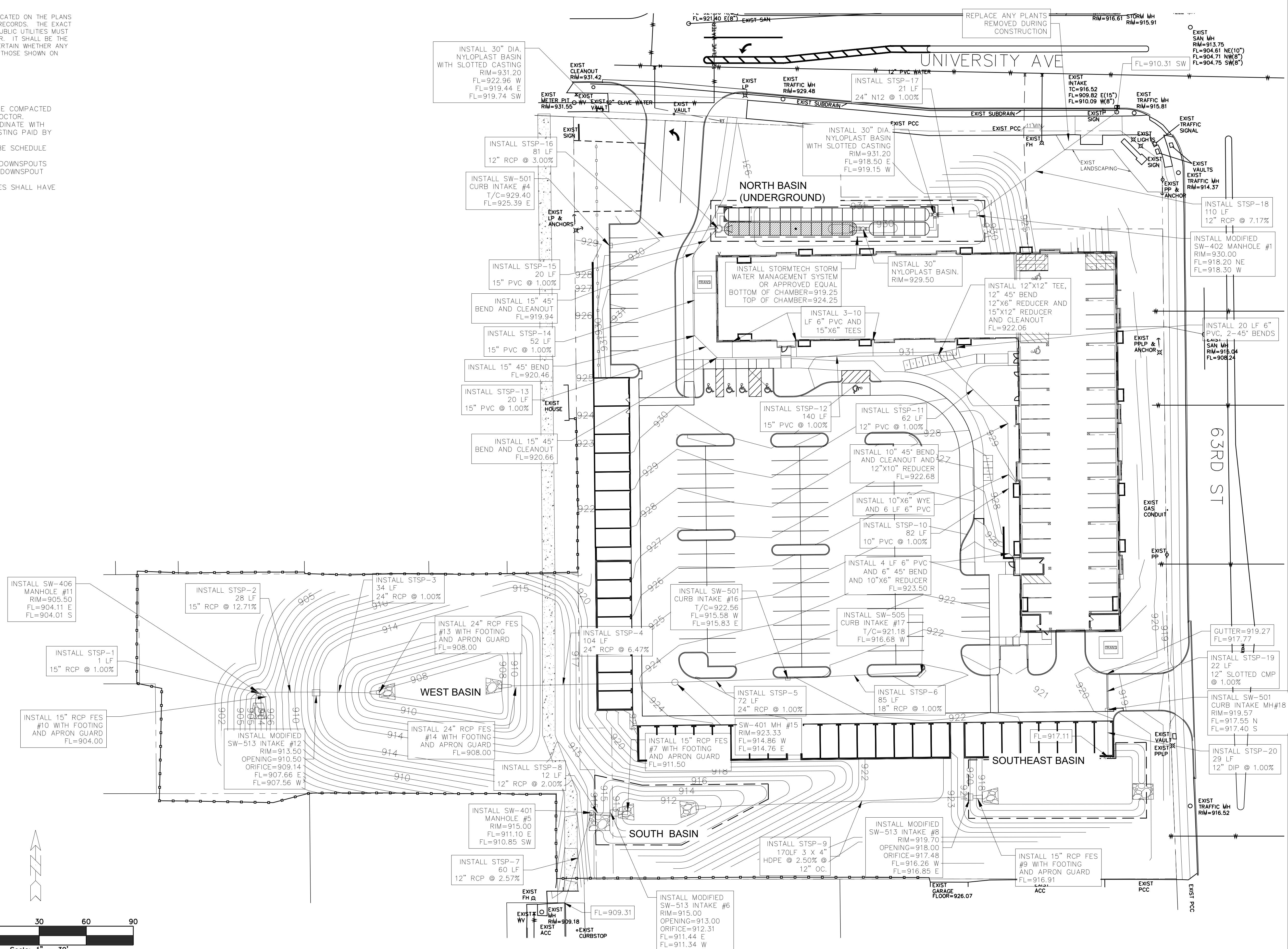
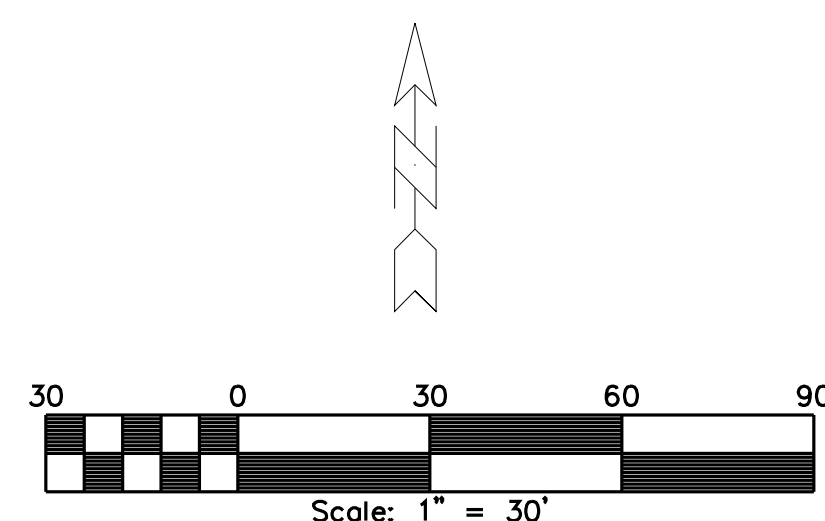
Clapsdille-Garber Associates, Inc.  
2413 Grand Avenue  
Des Moines, Iowa 50312  
Ph 515-268-4883  
www.clapsdillegarber.com

| NO. | REVISION | DATE | BY | FOR | LOCATION | SCALE:                | AS NOTED | DESIGNED BY: | DJS | DRAWN BY: | PJV        |
|-----|----------|------|----|-----|----------|-----------------------|----------|--------------|-----|-----------|------------|
|     |          |      |    |     |          | DWG: 23-047-GRD-2.dwg |          | CHECKED BY:  |     | DATE:     | 04/15/2024 |
|     |          |      |    |     |          | FIELD BOOK:           |          | SHEET        | 4   | OF        | 22         |
|     |          |      |    |     |          |                       |          | FILE NO.:    |     |           | 23-047     |

23-047



1. ALL BACKFILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR. CONTRACTOR TO COORDINATE WITH TESTING COMPANY. TESTING PAID BY OWNER.
2. ALL PVC PIPE SHALL BE SCHEDULE 40.
3. ALL CONNECTIONS TO DOWNSPOUTS SHALL INCLUDE A C.I. DOWNSPOUT BOOT.
4. ALL NYLOPLAST INTAKES SHALL HAVE MINIMUM 10" SUMP.



# WINDSOR APARTMENTS - STORM SEWER PLAN

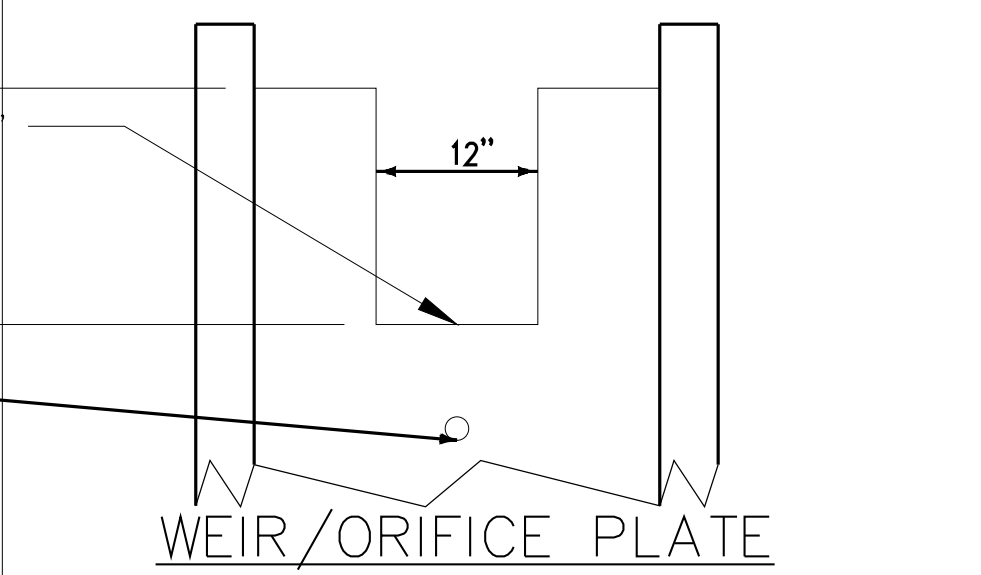
Tapsaddle-Garber Associates, Inc



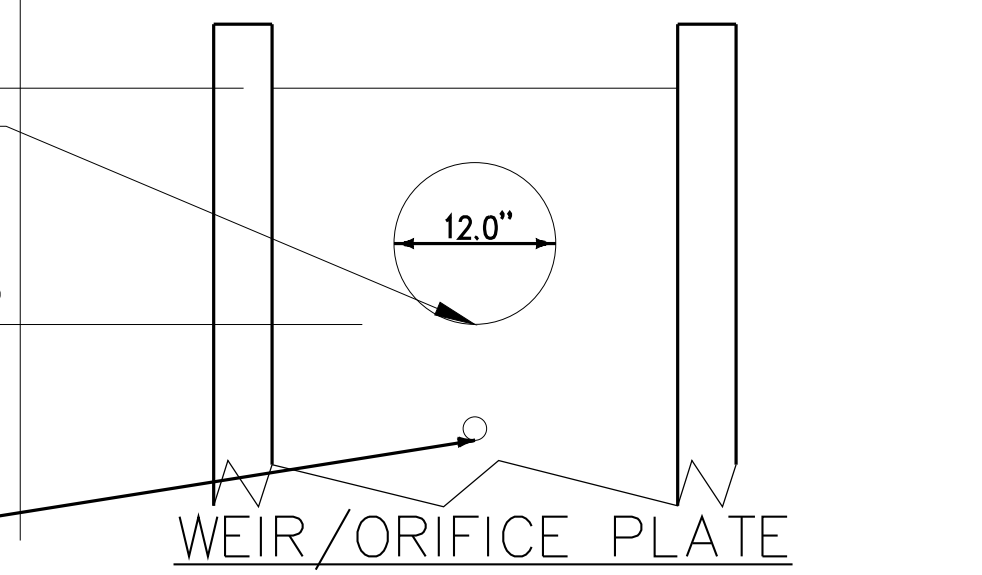
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| NO. | REVISION | DATE | BY | FOR: | LOCATION: | SCALE:                | DESIGNED BY:  | DRAWN BY: | PJW        |
|     |          |      |    |      |           | DWG. 23-047-STM-1.dwg | AS NOTED      | DJS       | 04/15/2024 |
|     |          |      |    |      |           | CHECKED BY:           |               |           | DATE:      |
|     |          |      |    |      |           | FIELD BOOK:           |               |           | FILE NO.:  |
|     |          |      |    |      |           |                       | SHEET 5 OF 22 |           | 23-047     |



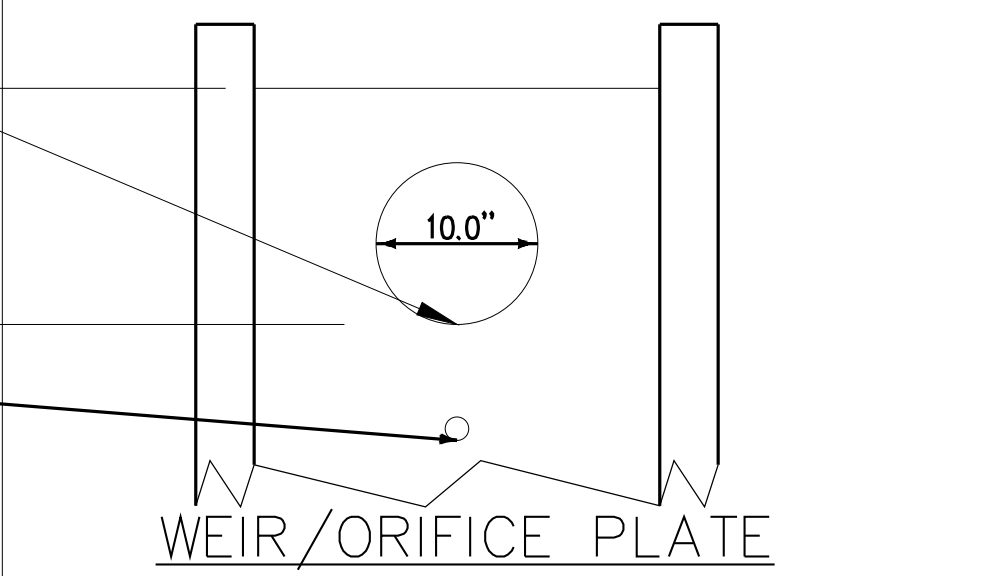


- ① Construct inlet openings with 15-inch #4 epoxy-coated bars at 8 inches on center. Embed bars a minimum of 3 inches into walls and top at all openings.
- ② Grade to inlet elevation on open sides. Grade to top elevation on closed sides.
- ③ Wall widths vary with pipe diameter. Provide 6 inches of wall width (minimum) each side of pipe opening. Minimum wall width is 36 inches. Maximum wall width is 72 inches.
- ④ Cast-in-place base shown. If base is precast integral with walls, the footprint of the base is not required to extend beyond the outer edge of the walls.
- ⑤ 12" minimum wall height above all pipes.

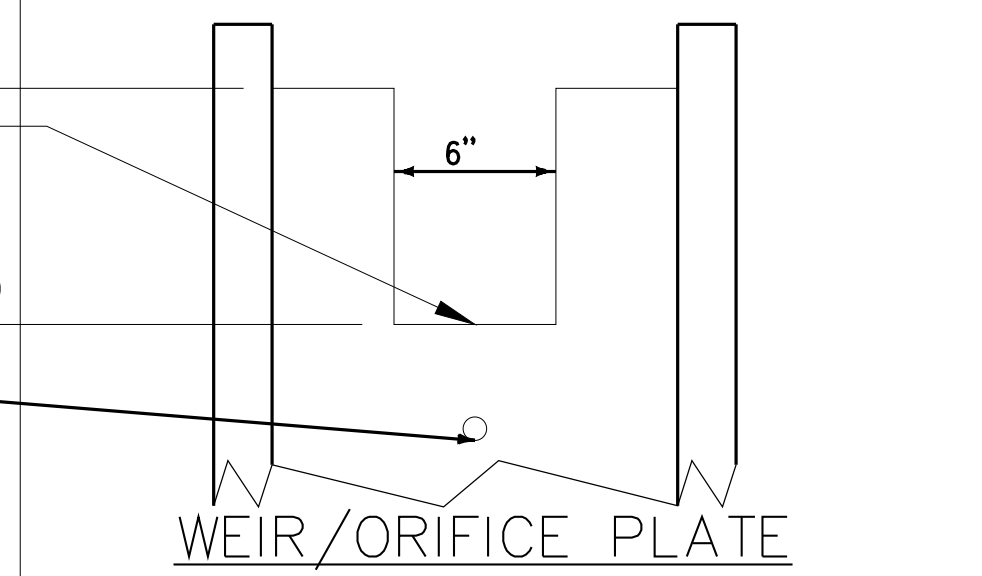


Adjacent walls may have different widths based upon pipe configuration, but structure must be rectangular.

- ① Cast-in-place base shown. If base is precast integral with walls, the footprint of the base is not required to extend beyond the outer edge of the walls.
- ② Wall widths vary with pipe diameter and range from 40 inches minimum to 77 inches maximum. Provide 6 inches of wall width (minimum) each side of pipe opening.
- ③ Provide two #4 hoop bars at top opening and at all pipe openings.
- ④ 12 inch minimum wall height above all pipes.



- ① Construct inlet openings with 15-inch #4 epoxy-coated bars at 8 inches on center. Embed bars a minimum of 3 inches into walls and top at all openings.
- ② Grade to inlet elevation on open sides. Grade to top elevation on closed sides.
- ⑤ Wall widths vary with pipe diameter. Provide 6 inches of wall width (minimum) each side of pipe opening. Minimum wall width is 36 inches. Maximum wall width is 72 inches.
- ⑥ Cast-in-place base shown. If base is precast integral with walls, the footprint of base is not required to extend beyond the outer edge of the walls.
- ⑧ 12" minimum wall height above all pipes.



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- ② Grade to inlet elevation on open sides. Grade to top elevation on closed sides.
- ⑤ Wall widths vary with pipe diameter. Provide 6 inches of wall width (minimum) each side of pipe opening. Minimum wall width is 36 inches. Maximum wall width is 72 inches.
- ⑥ Cast-in-place base shown. If base is present integral with walls, the footprint of base is not required to extend beyond the outer edge of the walls.
- ⑧ 12" minimum wall height above all pipes.



| PROJECT INFORMATION        |  |
|----------------------------|--|
| ENGINEERED PRODUCT MANAGER |  |
| ADS SALES REP              |  |
| PROJECT NO.                |  |



# 63RD & UNIVERSITY 2 CHAMBER

## WINDSOR HEIGHTS, IA, USA

### MC-7200 STORMTECH CHAMBER SPECIFICATIONS

- CHAMBERS SHALL BE STORMTECH MC-7200.
- CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101.
- CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
- THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
- CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
- ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
  - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
  - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
  - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
- CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

### IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-7200 CHAMBER SYSTEM

- STORMTECH MC-7200 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
- STORMTECH MC-7200 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-7200 CONSTRUCTION GUIDE".
- CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
  - STONESHOOTER LOCATED OFF THE CHAMBER BED.
  - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
  - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
- THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
- JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
- MAINTAIN MINIMUM - 9" (230 mm) SPACING BETWEEN THE CHAMBER ROWS.
- INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
- EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
- STONE SHALL BE BROUGHT UP EVENLY AROUND CHAMBERS SO AS NOT TO DISTORT THE CHAMBER SHAPE. STONE DEPTHS SHOULD NEVER DIFFER BY MORE THAN 12" (300 mm) BETWEEN ADJACENT CHAMBER ROWS.
- STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
- THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIAL BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
- ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

### NOTES FOR CONSTRUCTION EQUIPMENT

- STORMTECH MC-7200 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-7200 CONSTRUCTION GUIDE".
- THE USE OF EQUIPMENT OVER MC-7200 CHAMBERS IS LIMITED:
  - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
  - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-7200 CONSTRUCTION GUIDE".
  - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-7200 CONSTRUCTION GUIDE".
- FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

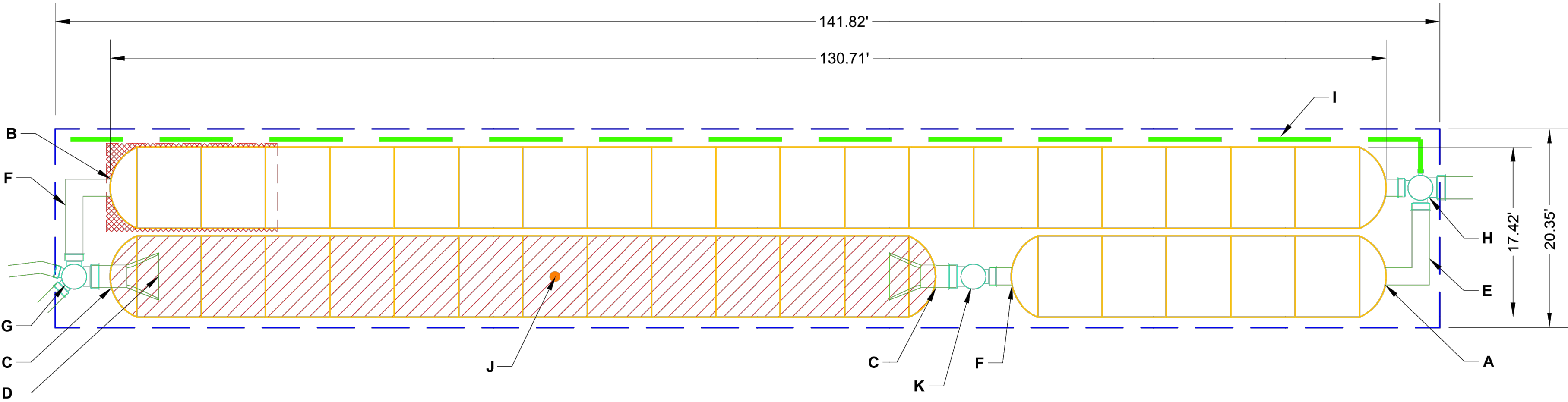
CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

|                                                                                                                                  |     |  |      |  |    |  |     |  |           |  |                       |  |                  |                  |
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| Clapsdille-Garber Associates, Inc.<br>2413 Grand Avenue<br>Des Moines, Iowa 50312<br>Ph 515-268-4823<br>www.garberassociates.com | NO. |  | DATE |  | BY |  | FOR |  | LOCATION: |  | SCALE: AS NOTED       |  | DESIGNED BY: DJS | DRAWN BY: PJW    |
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| PROPOSED LAYOUT |                                                                                                               | PROPOSED ELEVATIONS:                                      |        | *INVERT ABOVE BASE OF CHAMBER     |                       |                                                                                          |                                                                                                                 |             |  |
|-----------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------|-----------------------------------|-----------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------|--|
|                 |                                                                                                               |                                                           |        | PART TYPE                         | ITEM ON LAYOUT        | DESCRIPTION                                                                              | INVERT*                                                                                                         | MAX FLOW    |  |
| 36              | STORMTECH MC-7200 CHAMBERS                                                                                    | MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):        | 931.25 | PREFABRICATED END CAP             | A                     | 18" BOTTOM PARTIAL CUT END CAP, PART#: MC7200IEPP18B / TYP OF ALL 18" BOTTOM CONNECTIONS | 1.97"                                                                                                           |             |  |
| 6               | STORMTECH MC-7200 END CAPS                                                                                    | MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):           | 926.75 |                                   | PREFABRICATED END CAP | B                                                                                        | 18" TOP PARTIAL CUT END CAP, PART#: MC7200IEPP18T / TYP OF ALL 18" TOP CONNECTIONS                              | 29.36"      |  |
| 12              | STONE ABOVE (in)                                                                                              | MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):             | 926.25 |                                   |                       | C                                                                                        | 24" BOTTOM PARTIAL CUT END CAP, PART#: MC7200IEPP24B / TYP OF ALL 24" BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS | 2.26"       |  |
| 15              | STONE BELOW (in)                                                                                              | MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT): | 926.25 |                                   |                       | D                                                                                        | INSTALL FLAMP ON 24" ACCESS PIPE / PART#: MCFLAMP                                                               |             |  |
| 40              | STONE VOID                                                                                                    | MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):      | 926.25 | E                                 |                       | 18" x 18" BOTTOM MANIFOLD, ADS N-12                                                      | 1.97"                                                                                                           |             |  |
| 12314           | INSTALLED SYSTEM VOLUME (CF)<br>(PERIMETER STONE INCLUDED)<br>(COVER STONE INCLUDED)<br>(BASE STONE INCLUDED) | TOP OF STONE:                                             | 925.25 | MANIFOLD                          | F                     | 18" x 18" TOP MANIFOLD, ADS N-12                                                         | 29.36"                                                                                                          |             |  |
|                 |                                                                                                               | TOP OF MC-7200 CHAMBER:                                   | 924.25 |                                   |                       |                                                                                          |                                                                                                                 |             |  |
|                 |                                                                                                               | 18" x 18" TOP MANIFOLD INVERT:                            | 921.70 |                                   |                       |                                                                                          |                                                                                                                 |             |  |
|                 |                                                                                                               | 24" ISOLATOR ROW PLUS INVERT:                             | 919.44 |                                   |                       |                                                                                          |                                                                                                                 |             |  |
|                 |                                                                                                               | 18" x 18" BOTTOM MANIFOLD INVERT:                         | 919.41 |                                   |                       |                                                                                          |                                                                                                                 |             |  |
| 2887            | SYSTEM AREA (SF)                                                                                              | 18" BOTTOM CONNECTION INVERT:                             | 919.41 | NYLOPLAST (INLET W/ ISO PLUS ROW) | G                     | 30" DIAMETER (24.00" SUMP MIN)                                                           |                                                                                                                 | 5.5 CFS IN  |  |
| 324.3           | SYSTEM PERIMETER (ft)                                                                                         | BOTTOM OF MC-7200 CHAMBER:                                | 919.25 | NYLOPLAST (OUTLET)                | H                     | 30" DIAMETER (DESIGN BY ENGINEER)                                                        |                                                                                                                 | 8.0 CFS OUT |  |
|                 |                                                                                                               | UNDERDRAIN INVERT:                                        | 918.00 | UNDERDRAIN                        | I                     | 6" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN                                         |                                                                                                                 |             |  |
|                 |                                                                                                               | BOTTOM OF STONE:                                          | 918.00 | INSPECTION PORT                   | J                     | 6" SEE DETAIL                                                                            |                                                                                                                 |             |  |
|                 |                                                                                                               |                                                           |        | NYLOPLAST (INLET W/ ISO PLUS ROW) | K                     | 30" DIAMETER (24.00" SUMP MIN)                                                           |                                                                                                                 | 5.5 CFS IN  |  |



ISOLATOR ROW PLUS  
(SEE DETAIL)

PLACE MINIMUM 17.50' OF ADSPLUS175 WOVEN GEOTEXTILE OVER BEDDING  
STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL  
CHAMBER INLET ROWS

BED LIMITS

#### NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

|                                                                                                                                                                        |  |                                                                                                       |  |           |  |            |  |              |  |                          |  |
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| <div><div>4640 TRUEMAN BLVD<br/>HILLIARD, OH 43026<br/>1-800-733-7473</div></div> |  | <div><div>StormTech®</div><div>Chamber System</div></div> <div>888-892-2694   WWW.STORMTECH.COM</div> |  |           |  |            |  |              |  | 63RD AND UNIVERSITY      |  |
|                                                                                                                                                                        |  |                                                                                                       |  |           |  |            |  |              |  | WINDSOR HEIGHTS, IA, USA |  |
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## WINDSOR APARTMENTS - STORM DETAILS - 3

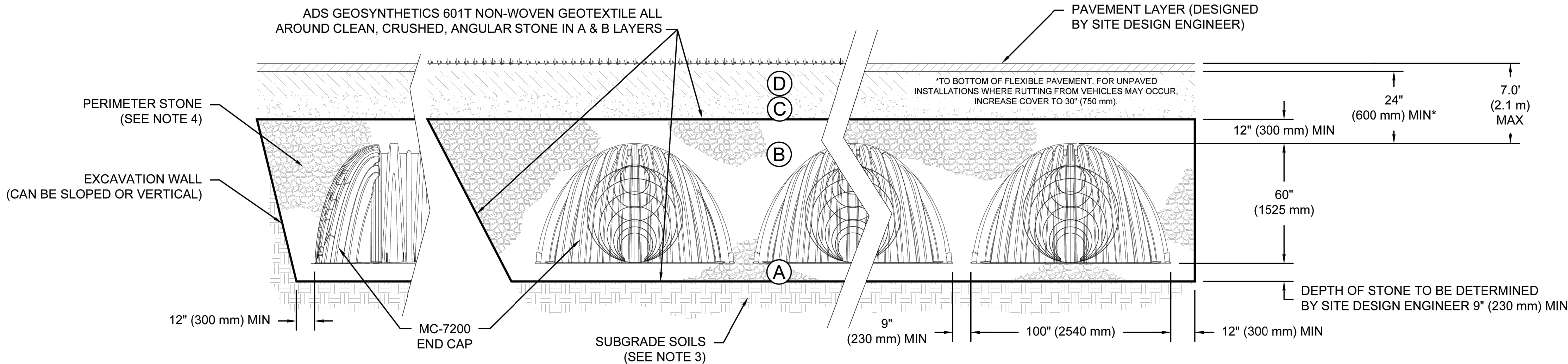
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| Clapsdille-Garber Associates, Inc.                                                       |  | DESIGNED BY: DJS |  | DRAWN BY: PJW    |  |
| 2413 Grand Avenue<br>Des Moines, Iowa 50312<br>Ph 515-268-4823<br>www.cgaconsultants.com |  | CHECKED BY: DJS  |  | DATE: 04/15/2024 |  |
| NO.                                                                                      |  | SHEET 8 OF 22    |  | FILE NO.: 23-047 |  |
| 23-047                                                                                   |  | FIELD BOOK:      |  | 23-047           |  |



ACCEPTABLE FILL MATERIALS: STORMTECH MC-7200 CHAMBER SYSTEMS

| MATERIAL LOCATION |                                                                                                                                                                                                                  | DESCRIPTION                                                                                                                                                | AASHTO MATERIAL CLASSIFICATIONS                                                                                                                   | COMPACTION / DENSITY REQUIREMENT                                                                                                                                                                                                                      |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| D                 | <b>FINAL FILL:</b> FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER  | ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.                                            | N/A                                                                                                                                               | PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.                                                                                                                               |
| C                 | <b>INITIAL FILL:</b> FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER. | GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE.<br><br>MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER. | AASHTO M145 <sup>1</sup><br>A-1, A-2-4, A-3<br><br>OR<br><br>AASHTO M43 <sup>1</sup><br>3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10 | BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. |
| B                 | <b>EMBEDMENT STONE:</b> FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.                                                                                              | CLEAN, CRUSHED, ANGULAR STONE                                                                                                                              | AASHTO M43 <sup>1</sup><br>3, 4                                                                                                                   | NO COMPACTION REQUIRED.                                                                                                                                                                                                                               |
| A                 | <b>FOUNDATION STONE:</b> FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.                                                                                                           | CLEAN, CRUSHED, ANGULAR STONE                                                                                                                              | AASHTO M43 <sup>1</sup><br>3, 4                                                                                                                   | PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. <sup>2,3</sup>                                                                                                                                                                                       |

- PLEASE NOTE:
- THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
  - STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
  - WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
  - ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 60x101
- MC-7200 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
- PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

63RD & UNIVERSITY 2 CHAMBER

WINDSOR HEIGHTS, IA, USA

DATE:   
 DRAWN: BH

PROJECT #:   
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WINDSOR APARTMENTS - STORM DETAILS - 4

CCGA

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2413 Grand Avenue  
Des Moines, Iowa 50312  
Ph 515-268-4823  
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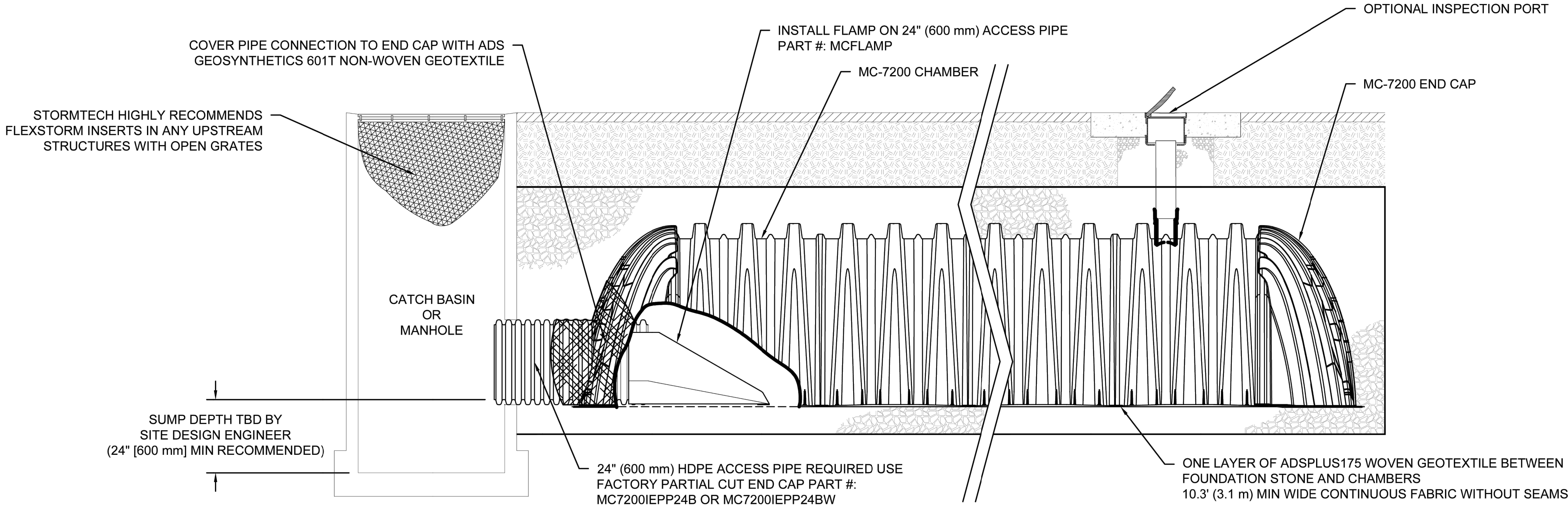
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FILE NO.: 23-047

DRAWN BY: PJW  
DATE: 04/15/2024  
FILE NO.: 23-047

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Page 29 of 342





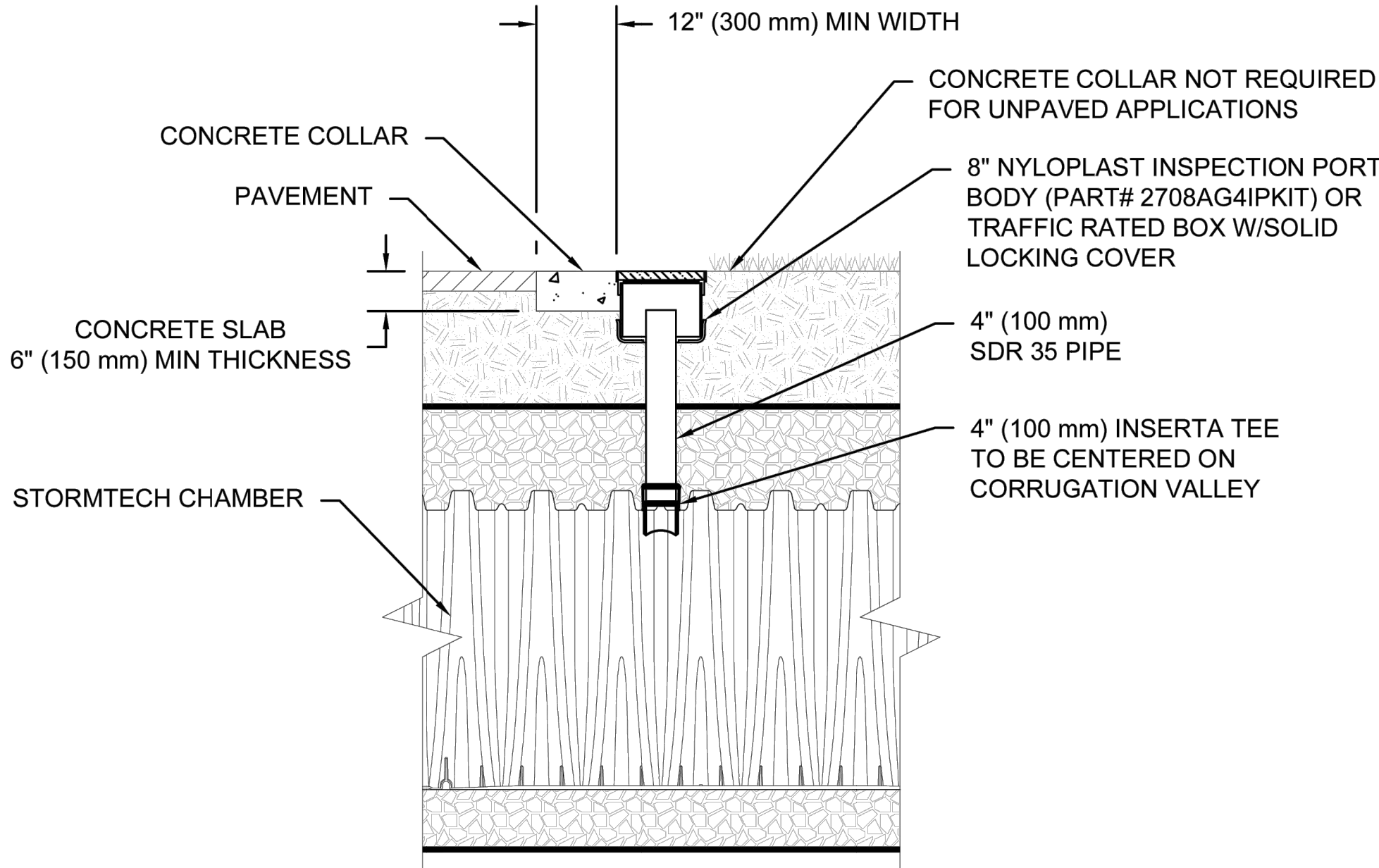
MC-7200 ISOLATOR ROW PLUS DETAIL  
NTS

INSPECTION & MAINTENANCE

- STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
    - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
    - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
    - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
    - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
    - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
  - B. ALL ISOLATOR PLUS ROWS
    - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
    - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
      - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
      - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
    - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
  - B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
  - C. VACUUM STRUCTURE SUMP AS REQUIRED
- STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.
- STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

- INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
- CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



NOTE:  
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY.

4" PVC INSPECTION PORT DETAIL  
(MC SERIES CHAMBER)  
NTS

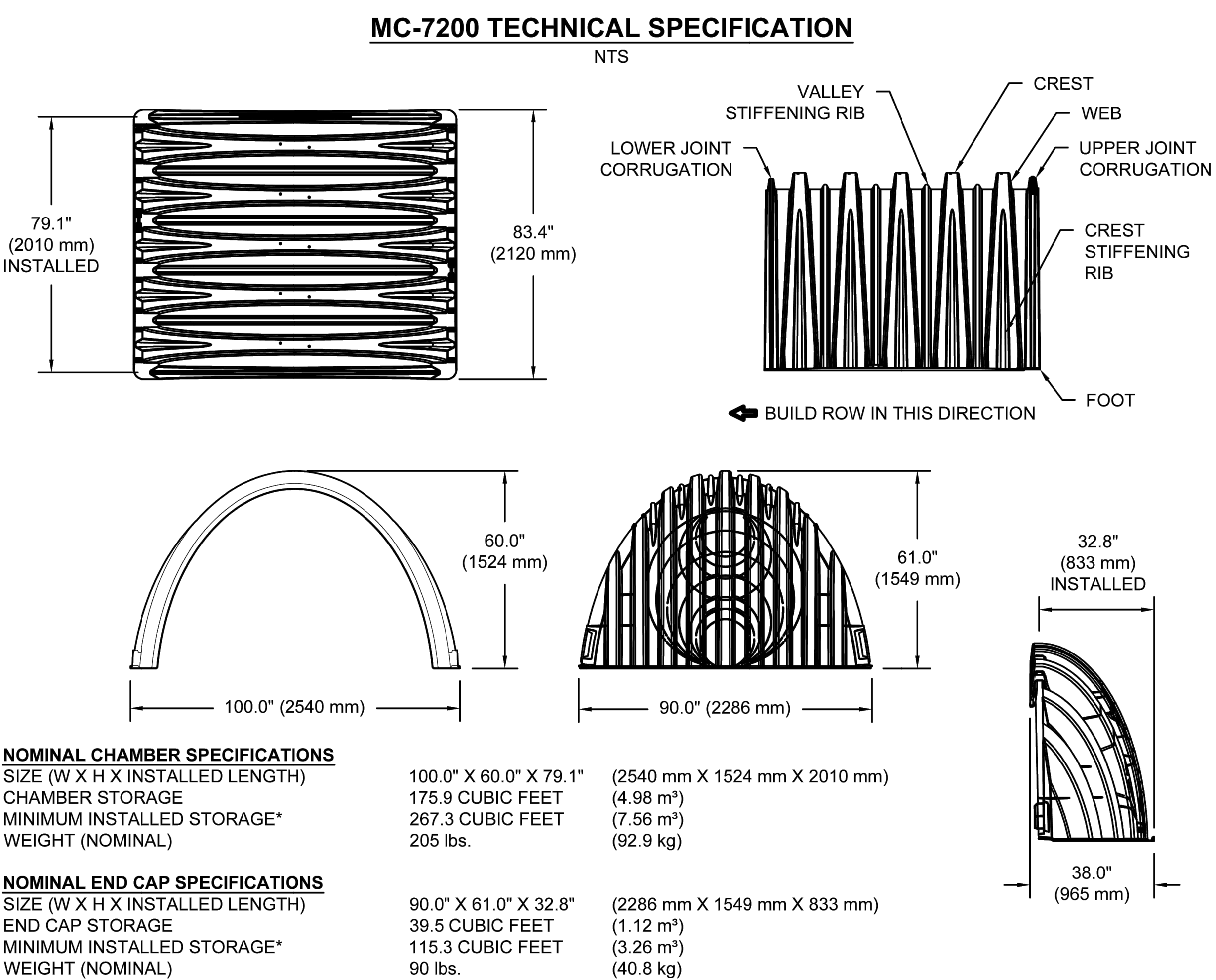
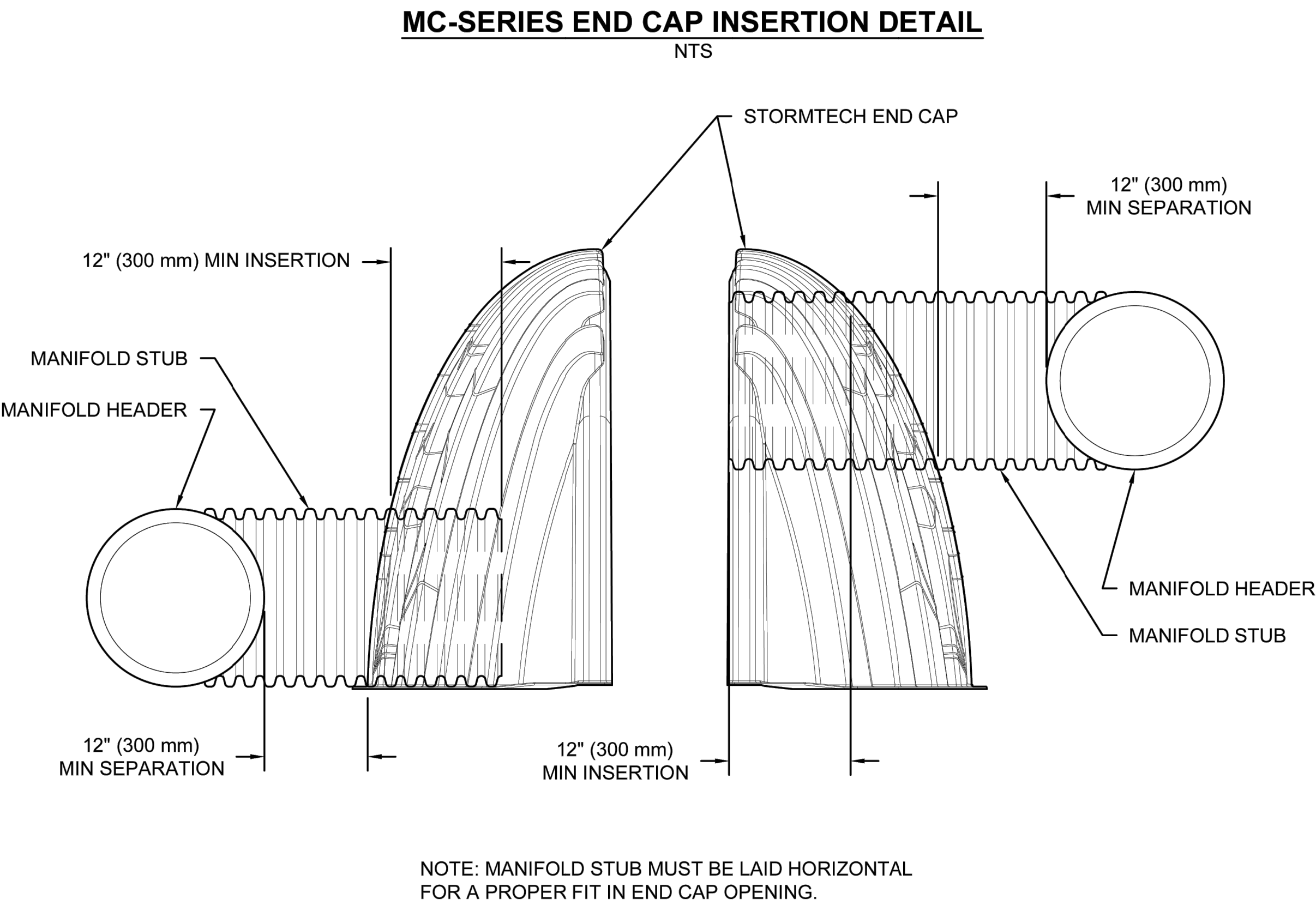
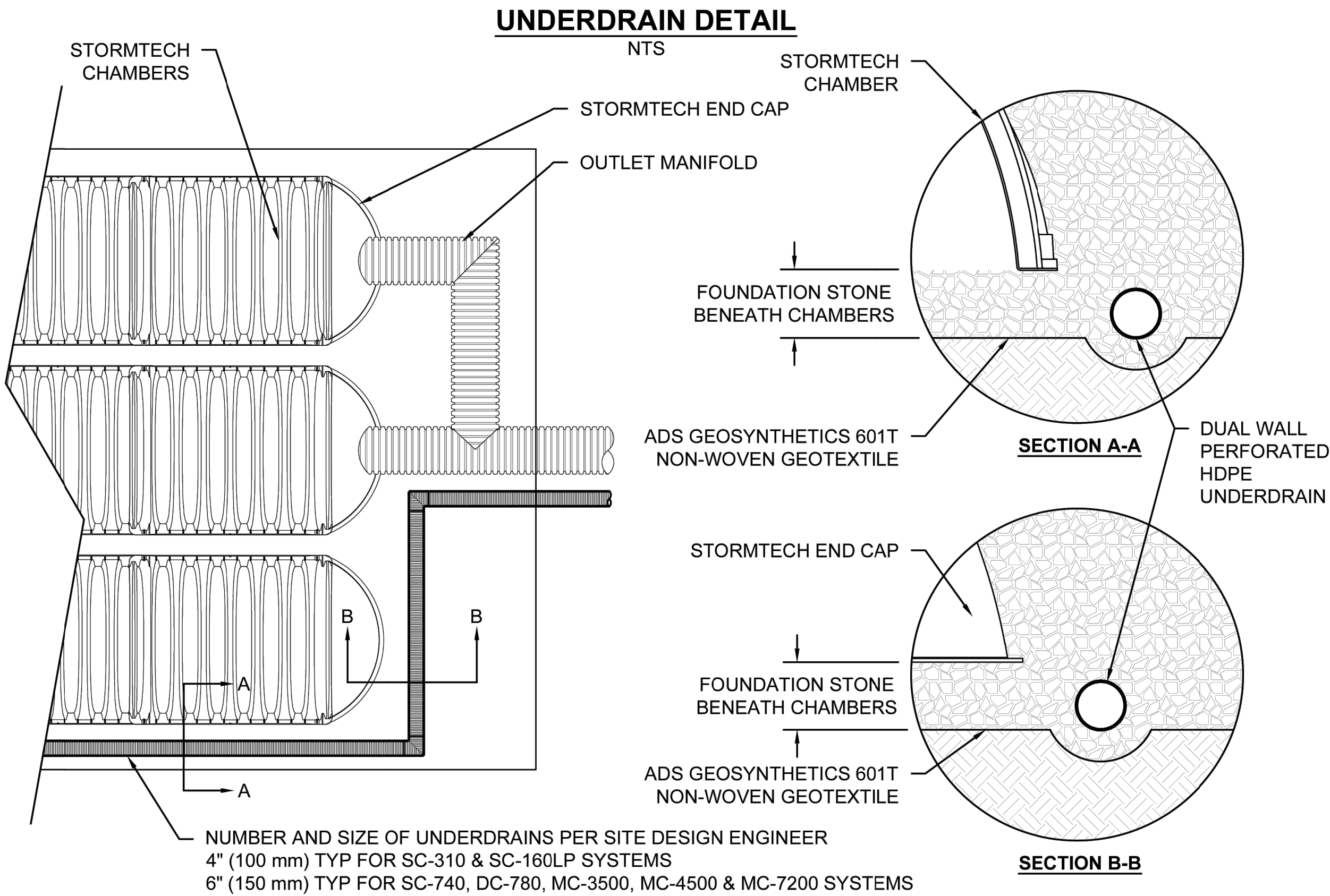
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| StormTech®<br>Chamber System                              | 63RD & UNIVERSITY 2 CHAMBER |     | WINDSOR HEIGHTS, IA, USA |      |
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|                                                           | PROJECT #:                  |     | CHECKED: N/A             |      |
|                                                           | DATE                        |     | PROJECT #:               |      |
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| SHEET<br>4 OF 5                                           |                             |     |                          |      |

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WINDSOR APARTMENTS - STORM DETAILS - 5

|                                                                                                                                       |                                   |                 |                  |    |     |
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| CCGA<br>Clapsdille-Garber Associates, Inc.<br>2413 Grand Avenue<br>Des Moines, Iowa 50312<br>Ph 515-268-4823<br>www.ccgainstitute.com | REVISION                          |                 | DATE             | BY | FOR |
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|                                                                                                                                       | DESIGNED BY: DJS                  |                 | DRAWN BY: PJW    |    |     |
|                                                                                                                                       | CHECKED BY: DWG: 23-047-STW-6.dwg |                 | DATE: 04/15/2024 |    |     |
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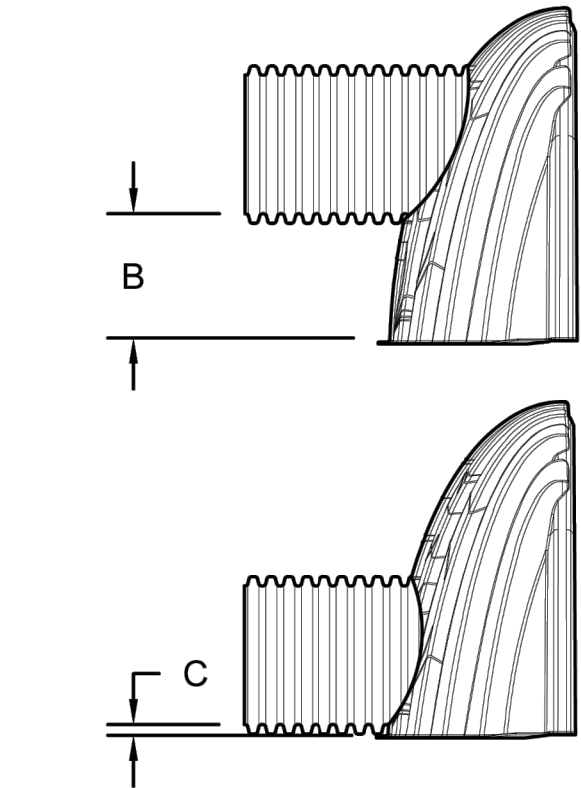


\*ASSUMES 12" (305 mm) STONE ABOVE, 9" (229 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

PARTIAL CUT HOLES AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"  
PARTIAL CUT HOLES AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"  
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

| PART #         | STUB          | B                | C             |
|----------------|---------------|------------------|---------------|
| MC7200IEPP06T  | 6" (150 mm)   | 42.54" (1081 mm) | ---           |
| MC7200IEPP06B  | ---           | ---              | 0.86" (22 mm) |
| MC7200IEPP08T  | 8" (200 mm)   | 40.50" (1029 mm) | ---           |
| MC7200IEPP08B  | ---           | ---              | 1.01" (26 mm) |
| MC7200IEPP10T  | 10" (250 mm)  | 38.37" (975 mm)  | ---           |
| MC7200IEPP10B  | ---           | ---              | 1.33" (34 mm) |
| MC7200IEPP12T  | 12" (300 mm)  | 35.69" (907 mm)  | ---           |
| MC7200IEPP12B  | ---           | ---              | 1.55" (39 mm) |
| MC7200IEPP15T  | 15" (375 mm)  | 32.72" (831 mm)  | ---           |
| MC7200IEPP15B  | ---           | ---              | 1.70" (43 mm) |
| MC7200IEPP18T  | 18" (450 mm)  | 29.36" (746 mm)  | ---           |
| MC7200IEPP18TW | ---           | ---              | ---           |
| MC7200IEPP18B  | ---           | ---              | 1.97" (50 mm) |
| MC7200IEPP18BW | ---           | ---              | ---           |
| MC7200IEPP24T  | 24" (600 mm)  | 23.05" (585 mm)  | ---           |
| MC7200IEPP24TW | ---           | ---              | ---           |
| MC7200IEPP24B  | ---           | ---              | 2.26" (57 mm) |
| MC7200IEPP24BW | ---           | ---              | ---           |
| MC7200IEPP30BW | 30" (750 mm)  | ---              | 2.95" (75 mm) |
| MC7200IEPP36BW | 36" (900 mm)  | ---              | 3.25" (83 mm) |
| MC7200IEPP42BW | 42" (1050 mm) | ---              | 3.55" (90 mm) |

NOTE: ALL DIMENSIONS ARE NOMINAL



CUSTOM PREFABRICATED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24" (300-600 mm) SIZE ON SIZE AND 15-48" (375-1200 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-7200 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

63RD & UNIVERSITY 2 CHAMBER

WINDSOR HEIGHTS, IA, USA

DATE:   
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WINDSOR APARTMENTS - STORM DETAILS - 6

|                                                                                                                                      |     |  |          |      |  |    |     |          |                                 |          |                             |     |                               |     |                     |
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NOTE:  
THE LOCATION OF ALL UTILITIES INDICATED ON THE PLANS ARE TAKEN FROM EXISTING PUBLIC RECORDS. THE EXACT LOCATION AND ELEVATION OF ALL PUBLIC UTILITIES MUST BE DETERMINED BY THE CONTRACTOR. IT SHALL BE THE DUTY OF THE CONTRACTOR TO ASCERTAIN WHETHER ANY ADDITIONAL FACILITIES OTHER THAN THOSE SHOWN ON THE PLANS MAY BE PRESENT.

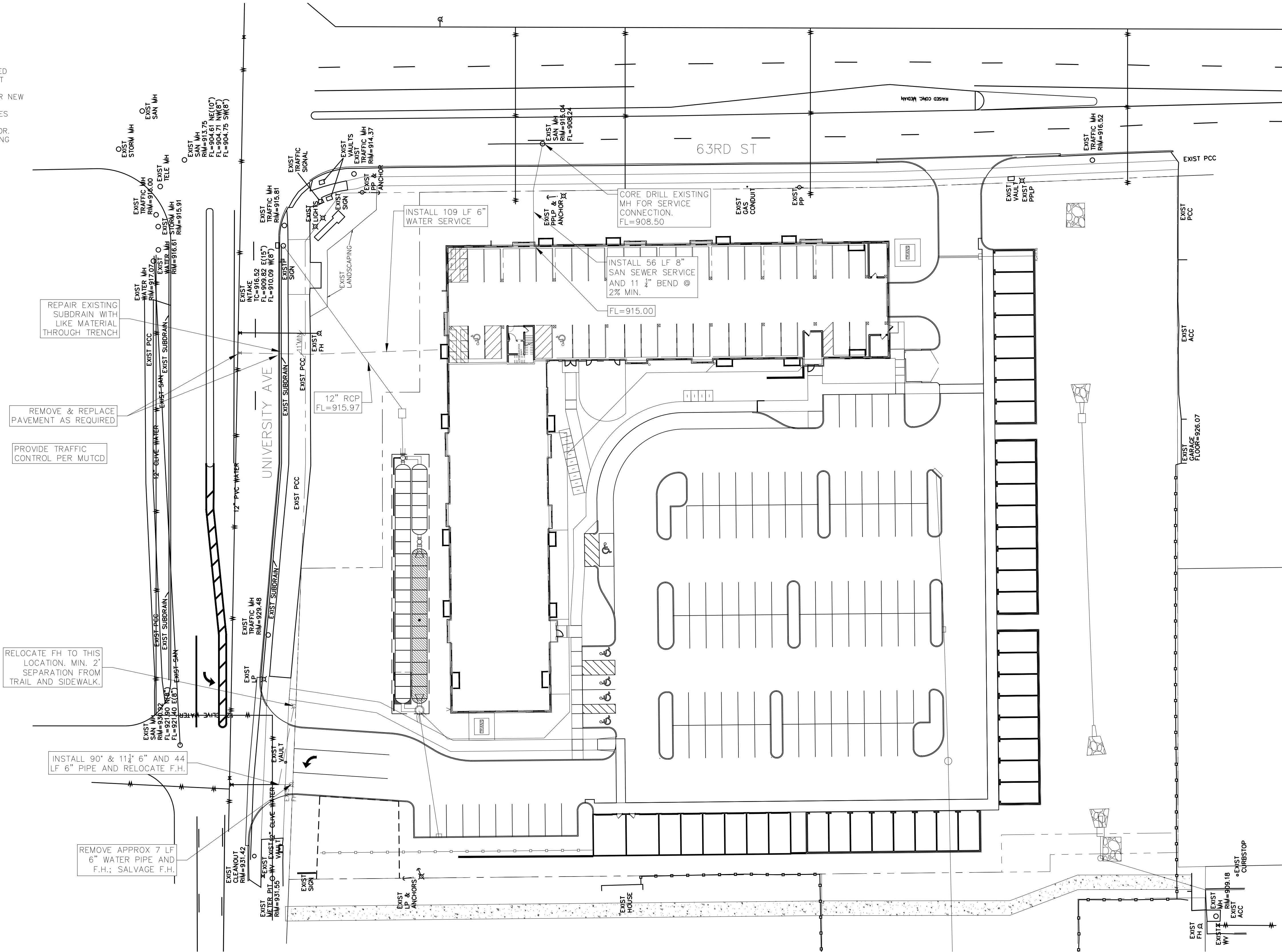
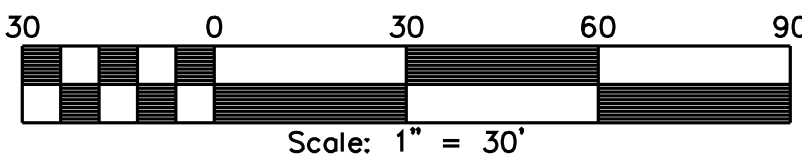
WATER SERVICE:

1. CONTRACTORS SHALL ARRANGE FOR AND PAY FOR ANY REQUIRED TAPS TO MAINS. OWNER TO PAY FOR ANY SYSTEM DEVELOPMENT FEES.
2. CONTRACTOR SHALL COMPLETE WATER SERVICE APPLICATION FOR NEW SERVICE.
3. THE CONTRACTOR SHALL COMPLY WITH ALL CITY AND DES MOINES WATER WORKS REGULATIONS.
4. ALL BACKFILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR. CONTRACTOR SHALL COORDINATE WITH TESTING COMPANY. TESTING PAID BY OWNER.

SANITARY SEWERS:

1. ALL TRENCHES SHALL BE COMPACTED TO 95% STANDARD PROCTOR
2. SERVICE SHALL BE 8".
3. INSTALL ALL CLEANOUTS REQUIRED BY PLUMBING CODE

ALL UNIVERSITY AVENUE PAVEMENT PATCHING TO FOLLOW SUDAS DETAIL 7040.101 OR 7040.102. MATCH EXISTING HMA OVERLAY THICKNESS. ALL HMA JOINTS TO BE SEALED. PAVEMENT MARKING TO BE RESTORED WITH EPOXY PAINT.



WINDSOR APARTMENTS - UTILITY PLAN

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LOCATION:

SCALE: AS NOTED

DESIGNED BY: DJS

DRAWN BY: PJW

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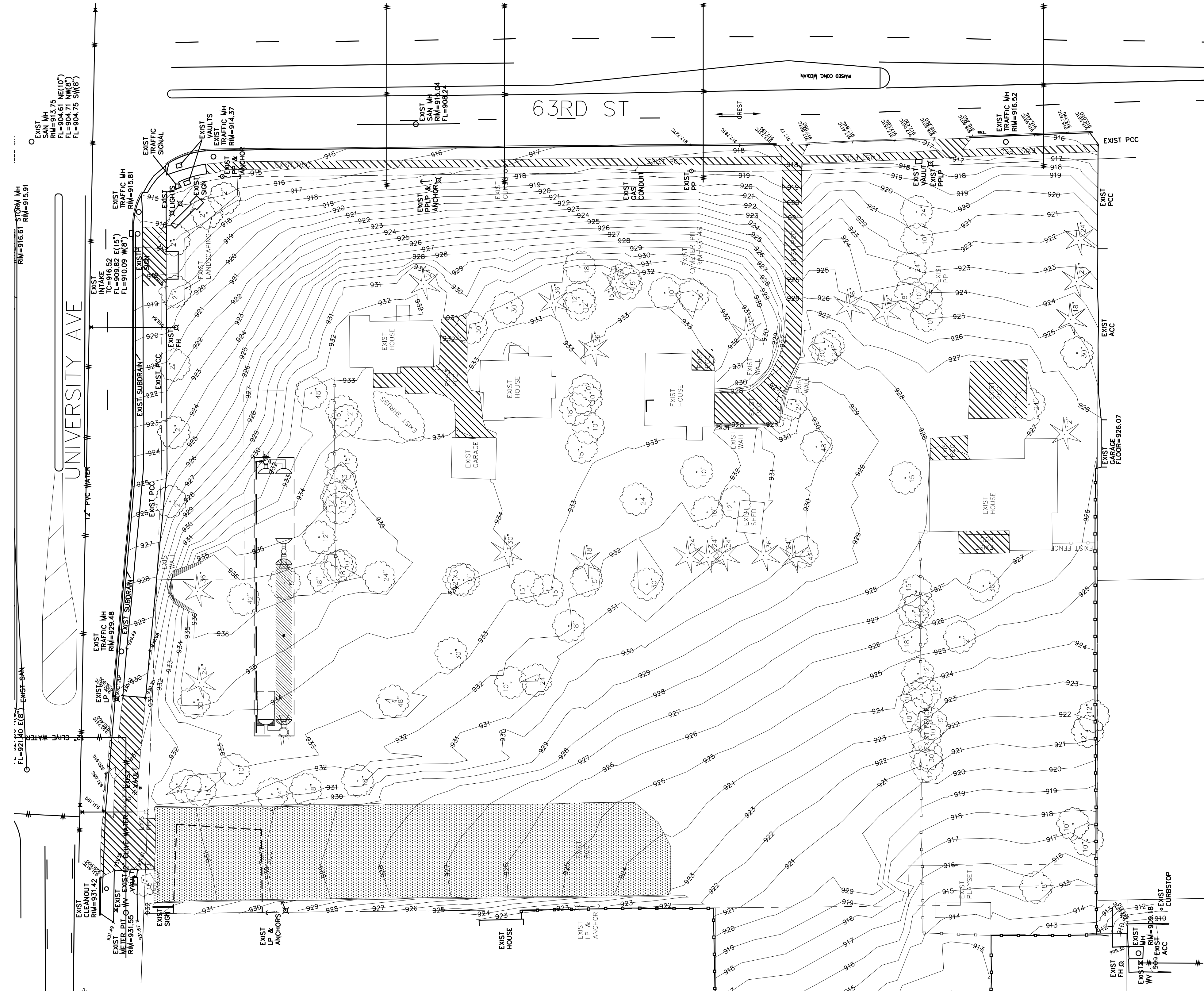
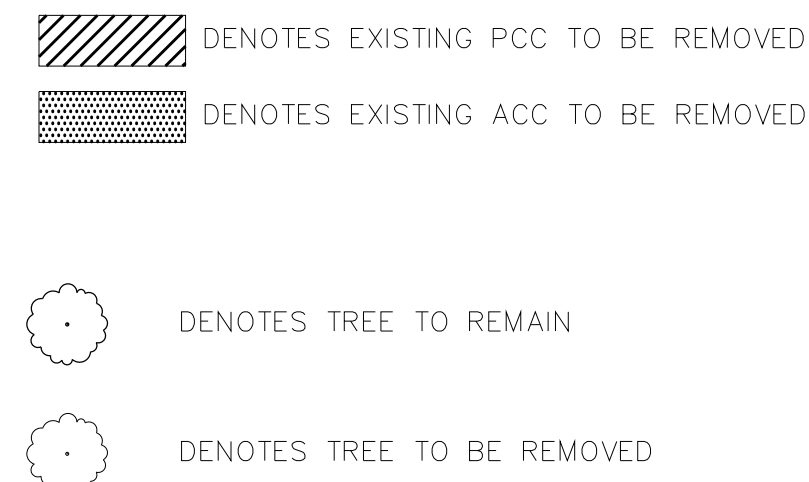
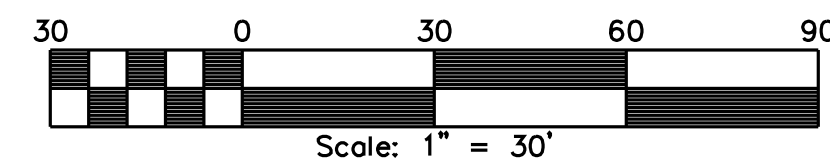
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SHEET 12 OF 22

FIELD BOOK: DWG: 23-047-UTL.dwg



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## WINDSOR APARTMENTS - DEMOLITION PLAN



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# WINDSOR APARTMENTS - DEMOLITION PLAN

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SHEET 13 OF 22

FILE NO.: 23-047



NOTES:

1. THE LOCATION OF ALL UTILITIES INDICATED ON THE PLANS ARE TAKEN FROM EXISTING PUBLIC RECORDS. THE EXACT LOCATION AND ELEVATION OF ALL PUBLIC UTILITIES MUST BE DETERMINED BY THE CONTRACTOR. IT SHALL BE THE DUTY OF THE CONTRACTOR TO ASCERTAIN WHETHER ANY ADDITIONAL FACILITIES OTHER THAN THOSE SHOWN ON THE PLANS MAY BE PRESENT.
2. CONTRACTOR SHALL PLACE ORGANIC MULCH AROUND ALL TREES AND IN ALL LANDSCAPE BEDS TO A DEPTH OF 3 INCHES.

LANDSCAPE REQUIREMENTS (UC)

REQUIRED:  
TREES: 1/2,000 SF OF PERVIOUS AREA  
SHRUBS: 5 /2,000 SF OF PERVIOUS AREA  
PERVIOUS AREA = 114,036 SF

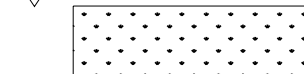
REQUIRED TREES = 58  
REQUIRED SHRUBS = 286

PLANTS PROVIDED

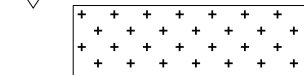
62 = TREES  
299 = SHRUBS  
16 = EXISTING TREES

LANDSCAPE CONSTRUCTION NOTES

A TYPE 1 (PERMANENT LAWN MIXTURE)

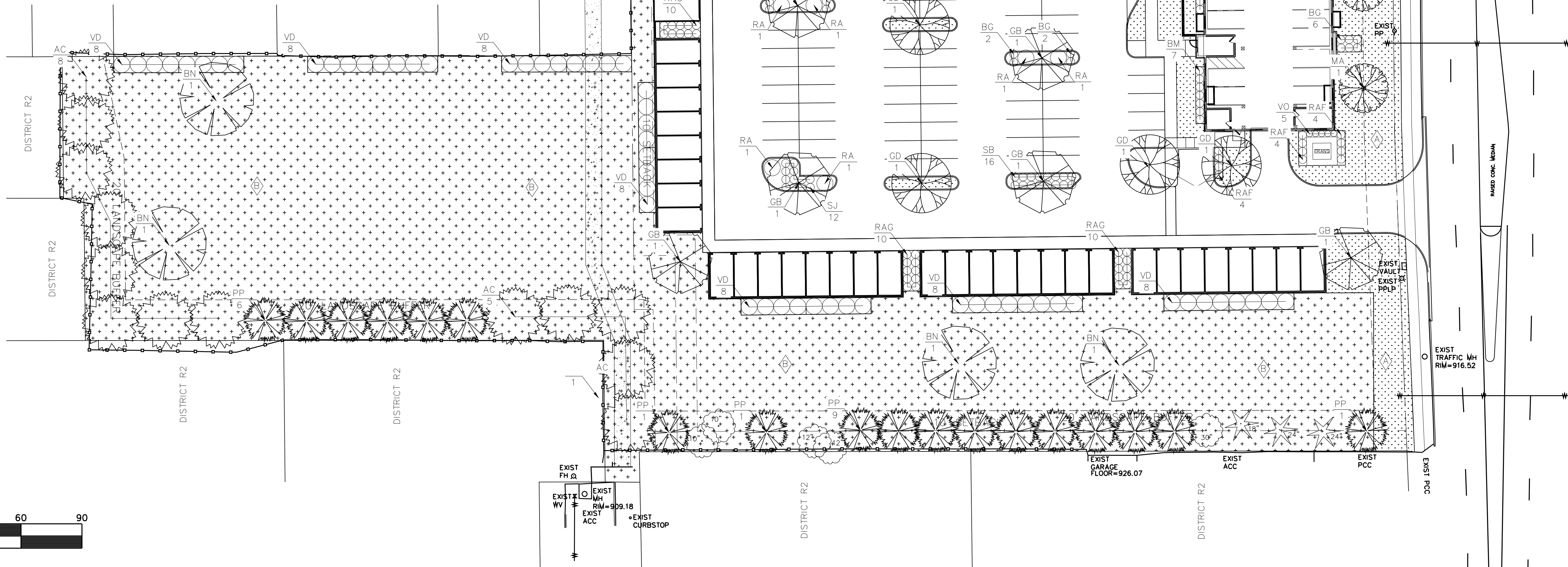


B TYPE 3 (PERMANENT WARM-SEASON SLOPE & DITCH MIXTURE)



PLANT SCHEDULE:

| Code | Common Name                        | Botanical Name                  | Quantity | Min. Planting size |
|------|------------------------------------|---------------------------------|----------|--------------------|
| BN   | River Birch                        | Betula Nigra                    | 4        | 2" cal. B&B        |
| GB   | Presidential Gold Ginkgo(Male)     | Ginkgo Biloba 'The President'   | 10       | 2" cal. B&B        |
| GD   | Espresso Kentucky Coffeetree(Male) | Gymnocladius dioicus 'Espresso' | 7        | 2" cal. B&B        |
| MA   | Amur Maackia                       | Maackia amurensis               | 10       | 2" cal. B&B        |
| PP   | Colorado Blue Spruce               | Picea pungens                   | 18       | 6'                 |
| AC   | White Fir                          | Abies concolor                  | 13       | 6'                 |
| RA   | Grow-Low Fragrant Sumac            | Rhus aromatica 'Grow-Low'       | 21       | 2 Gallon           |
| RAF  | Fragrant Sumac                     | Rhus aromatica                  | 18       | 2 Gallon           |
| BG   | Green Velvet Boxwood               | Buxus x 'Green Velvet'          | 32       | 2 Gallon           |
| SB   | Gold Flame Spirea                  | Spiraea x bumalda 'Goldflame'   | 56       | 2 Gallon           |
| SJ   | Gold Mound Spirea                  | Spiraea japonica 'Goldmound'    | 38       | 2 Gallon           |
| BM   | Boxwood Koreanus                   | Buxus microphylla koreana       | 25       | 2 Gallon           |
| RAG  | Green Mound Alpine Currant         | Ribes alpinum 'Green Mound'     | 30       | 2 Gallon           |
| VO   | Dwarf Cranerry Bush                | Viburnum opulus 'Nanum'         | 23       | 2 Gallon           |
| VD   | Arrowwood Viburnum                 | Viburnum dentatum               | 56       | 2 Gallon           |



WINDSOR APARTMENTS - LANDSCAPING PLAN

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www.clapsdellgarber.com

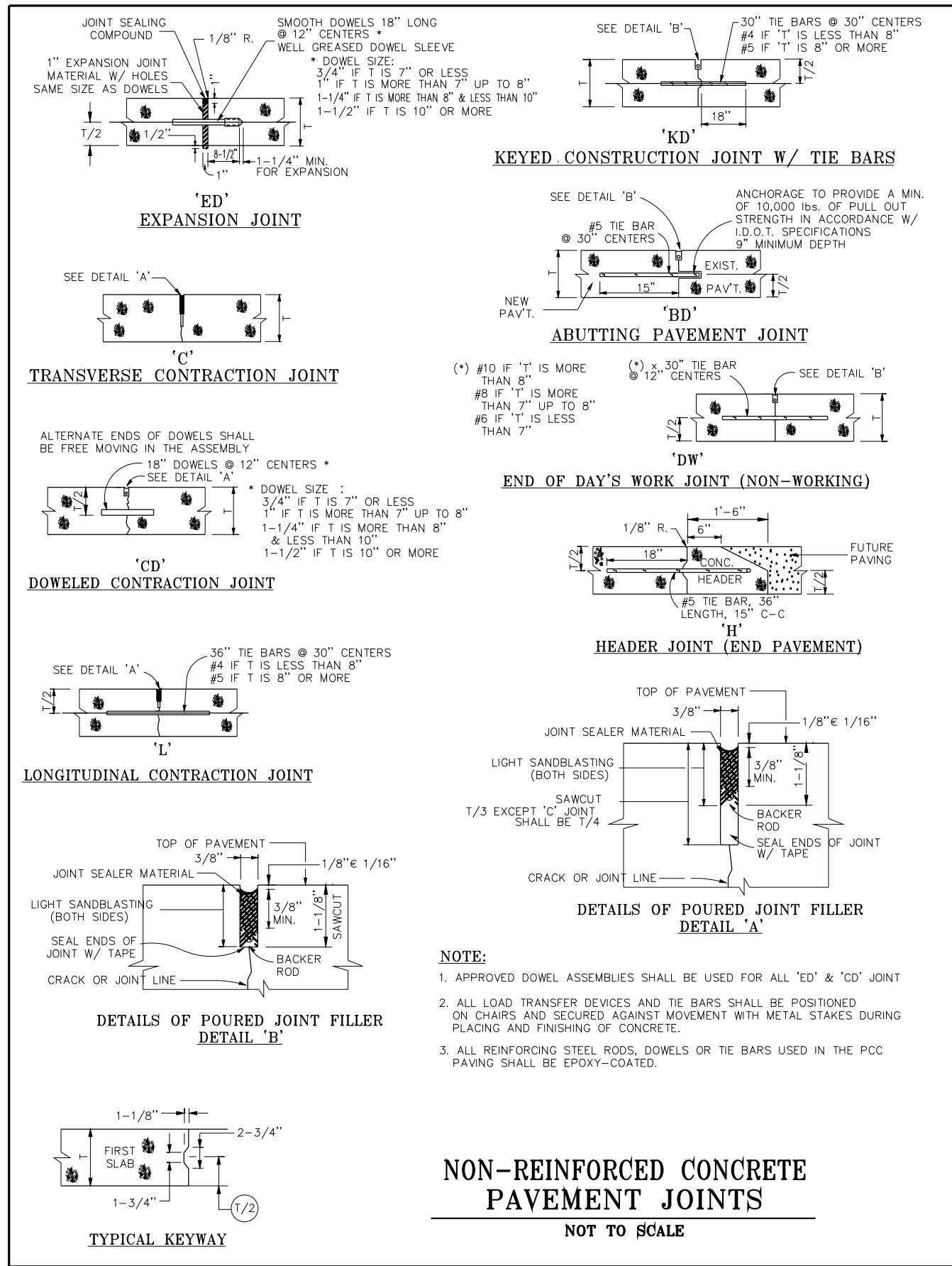


23-047

| NO. | REVISION | DATE | BY | FOR |
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| SCALE:      | AS NOTED       | DESIGNED BY: | DJS | DRAWN BY: | PJV        |
| DWG:        | 23-047-LND.dwg | CHECKED BY:  |     | DATE:     | 04/15/2024 |
| FIELD BOOK: |                | SHEET        | 14  | OF        | 22         |
|             |                | FILE NO.:    |     |           | 23-047     |







NOTE:  
THE LOCATION OF ALL UTILITIES INDICATED ON THE PLANS ARE TAKEN FROM EXISTING PUBLIC RECORDS. THE EXACT LOCATION AND ELEVATION OF ALL PUBLIC UTILITIES MUST BE DETERMINED BY THE CONTRACTOR. IT SHALL BE THE DUTY OF THE CONTRACTOR TO ASCERTAIN WHETHER ANY ADDITIONAL FACILITIES OTHER THAN THOSE SHOWN ON THE PLANS MAY BE PRESENT.

- 153— DENOTES EXIST. CONTOUR  
—155— DENOTES PROPOSED CONTOUR  
X 56.85 DENOTES PROPOSED SPOT ELEVATION  
T/W DENOTES TOP OF WALL ELEVATION  
B/W DENOTES BOTTOM OF WALL ELEVATION  
X=77.08G DENOTES EXISTING GUTTER ELEVATION  
X=74.02TC DENOTES DOWNSPOUT LOCATION  
DENOTES TREE TO BE REMOVED  
DENOTES PROPOSED ROLLED PERMANENT EROSION CONTROL PRODUCT, RE: SUDAS 9040.103  
DENOTES PROPOSED TURF REINFORCED MAT.  
—XXXX— DENOTES SILT FENCE OR FILTER SOCK  
DENOTES DIRECTION OF FLOW

NOTICE:  
ALL CONTRACTORS AND SUB-CONTRACTORS MUST SIGN THE NPDES CERTIFICATION STATEMENT PRIOR TO PERFORMING ANY WORK ON SITE. BY SIGNING THE CERTIFICATION STATEMENT, THE CONTRACTOR AND/OR SUBCONTRACTOR AGREES TO BECOME A CO-PERMITTEE WITH THE OWNER AND OTHER CO-PERMITTEES. AS A CO-PERMITTEE, YOU AND YOUR COMPANY ARE LEGALLY REQUIRED UNDER THE CLEAN WATER ACT AND THE CODE OF IOWA TO ENSURE COMPLIANCE WITH THE TERMS AND CONDITIONS OF THE STORM WATER POLLUTION PREVENTION PLAN DEVELOPED UNDER THE NPDES PERMIT. SIGNIFICANT PENALTIES MAY BE IMPOSED BY THE EPA AND/OR THE IDNR SHOULD A PERMITTEE OR CO-PERMITTEE VIOLATE NPDES PERMIT REQUIREMENTS.

INSTALL SILT FENCE OR FILTER SOCK (TYP)

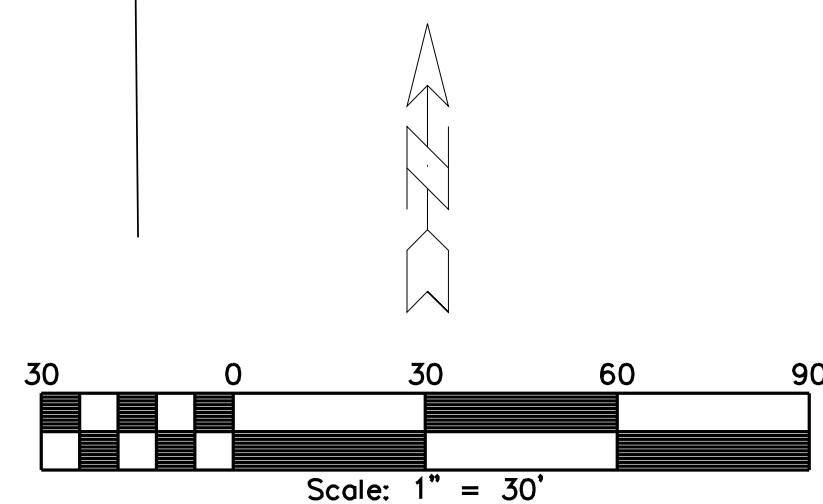
INSTALL TURF REINFORCED MAT (TYP)

2,849 LF OF SILT FENCE/FILTER SOCK

INTAKE PROTECTION:  
FOR STREET INTAKES, PLACE SILT FENCE AROUND INTAKES AFTER INTAKE INSTALLED. AFTER PAVEMENT PLACED, PLACE FILTER SOCK AND/OR BASKET IN INTAKE

DISTANCE FROM SITE TO RECEIVING WATERS  
OF WALNUT CREEK 3,000 FEET  
STORM WATER POLLUTION PREVENTION PLAN

| REVISION | DATE |
|----------|------|
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EXIST FH Q  
EXIST MH  
EXIST WY  
EXIST ACC  
EXIST CURBSTOP

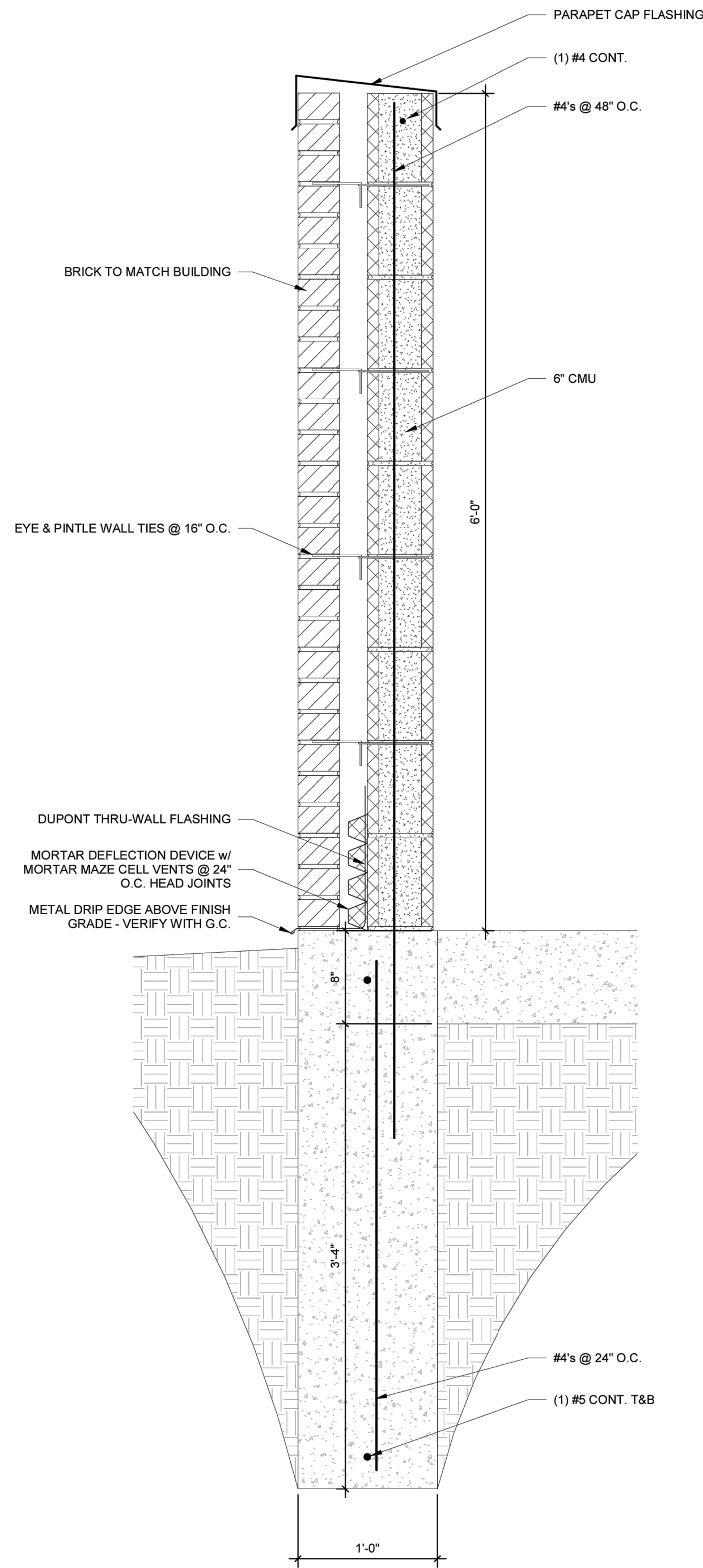


Clapsaddle-Garber Associates, Inc.  
2413 Grand Avenue  
Des Moines, Iowa 50312  
Ph 515-288-4823  
www.cgaconsultants.com

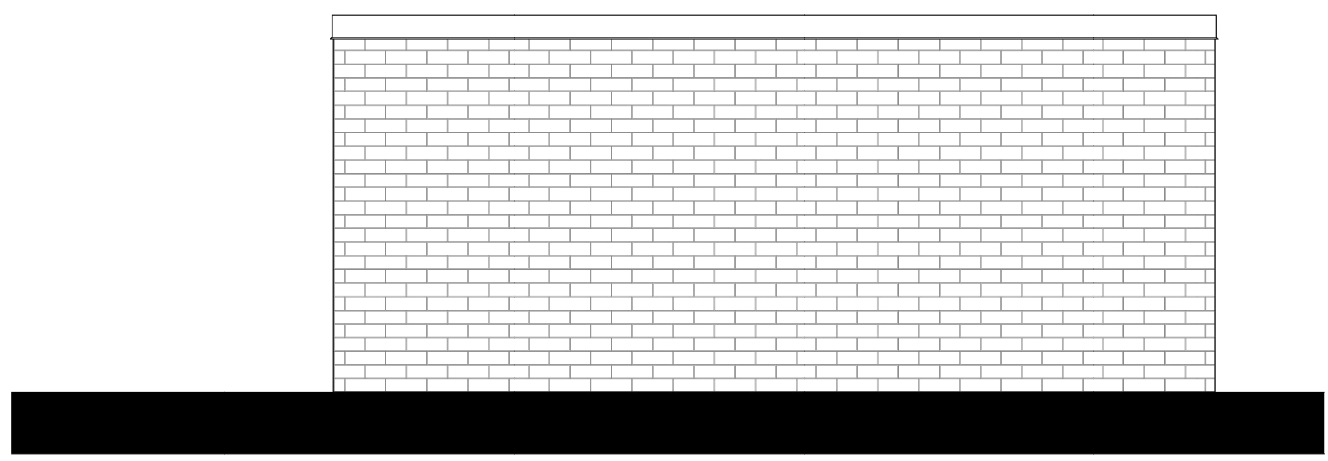
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FFE=926.00

APPROXIMATE LIMITS  
OF DISTURBANCE

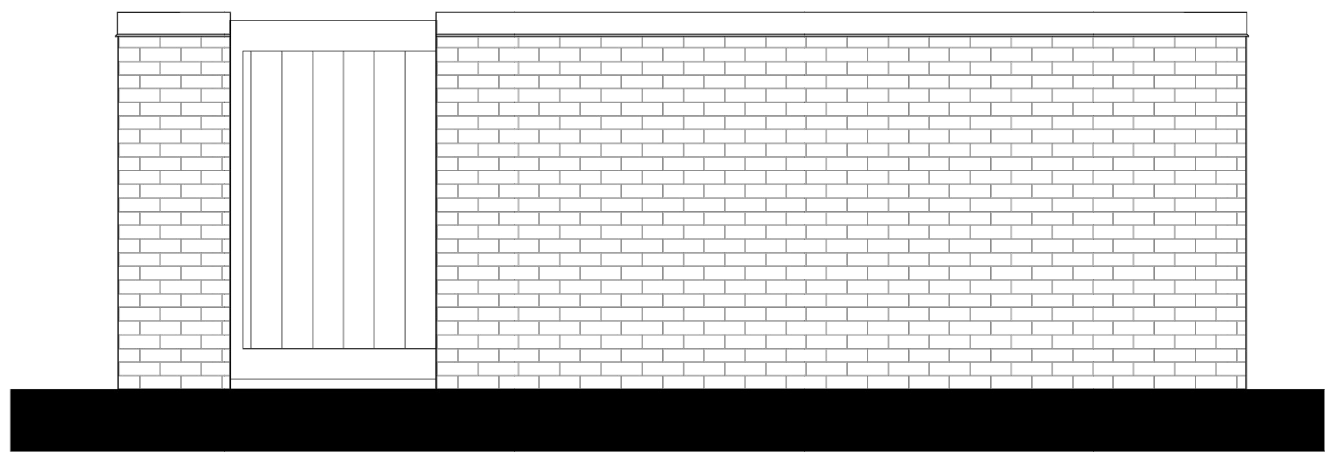




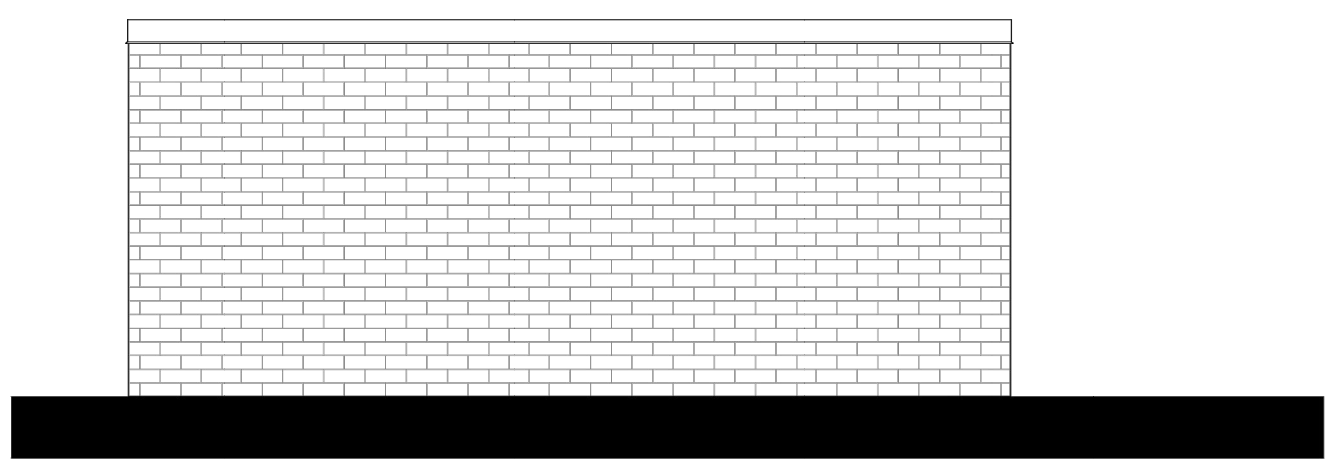
6 SECTION  
SCALE: 1 1/2" = 1'-0"



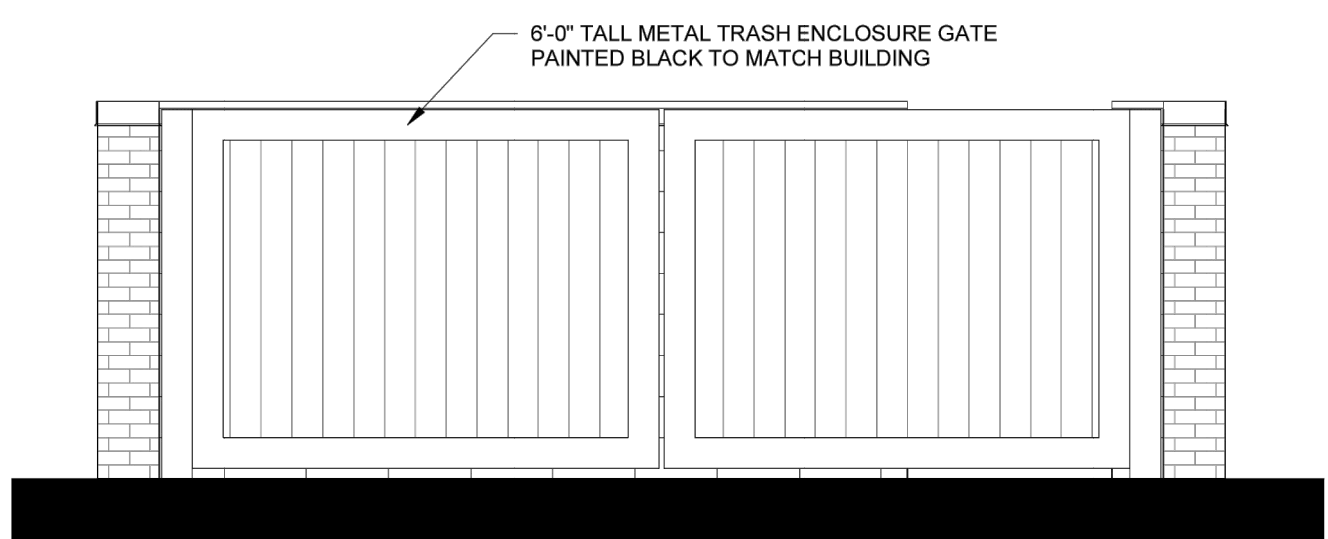
4 LEFT ELEVATION  
SCALE: 3/8" = 1'-0"



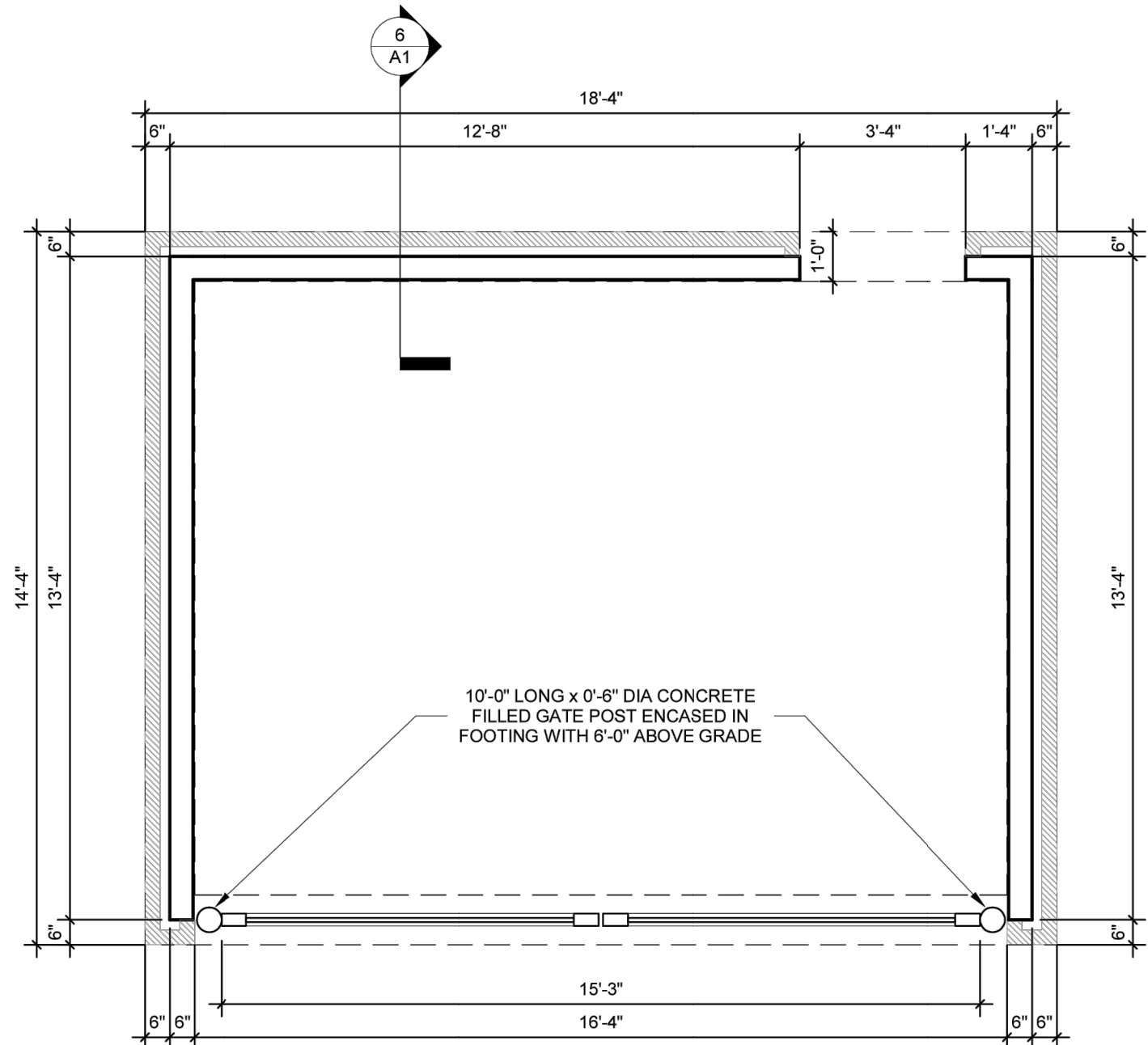
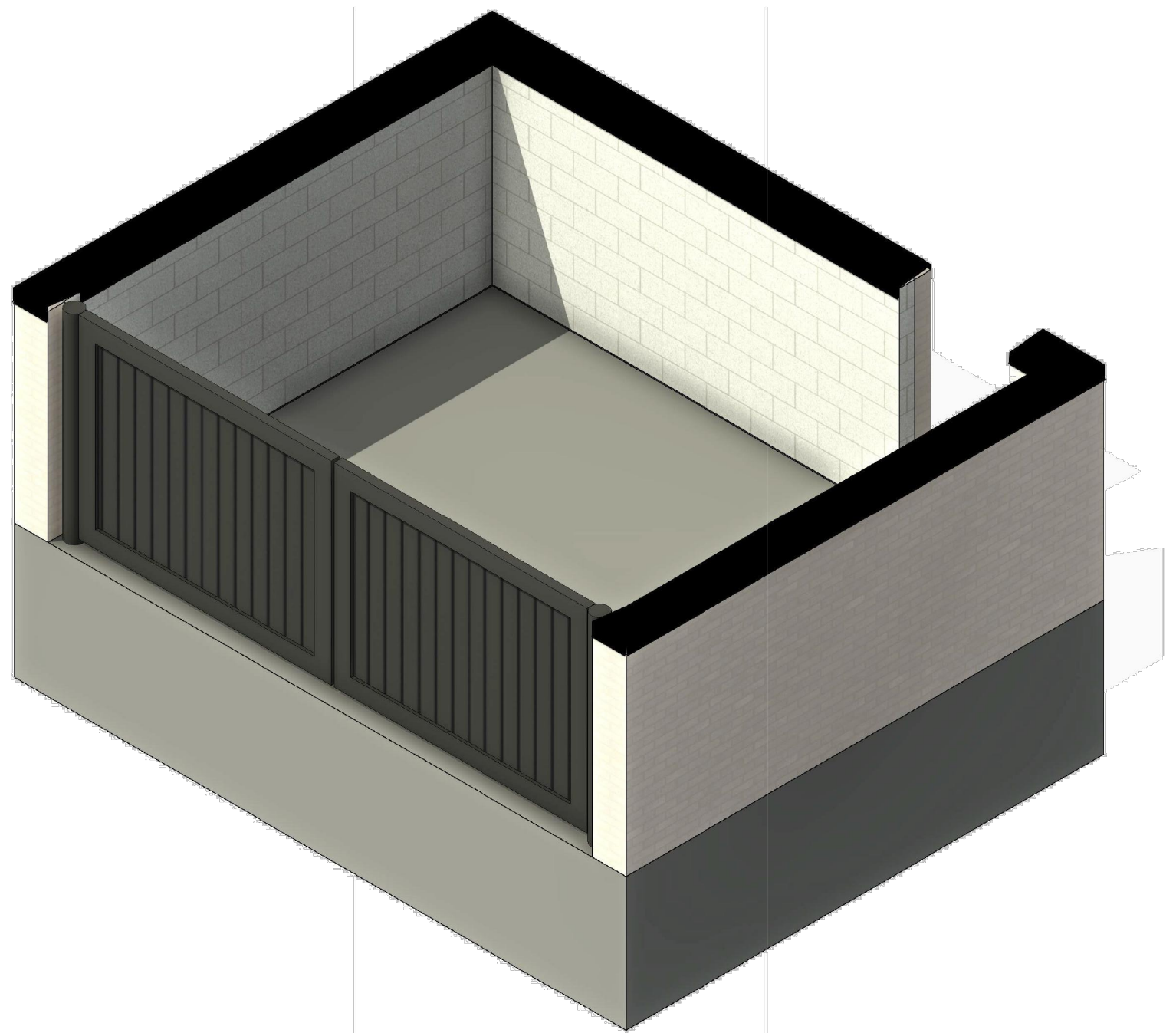
5 REAR ELEVATION  
SCALE: 3/8" = 1'-0"



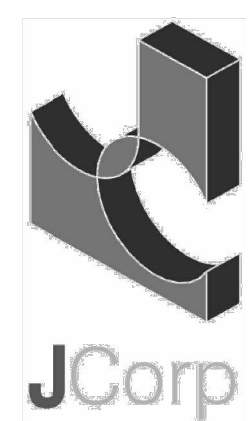
2 RIGHT ELEVATION  
SCALE: 3/8" = 1'-0"



3 FRONT ELEVATION  
SCALE: 3/8" = 1'-0"



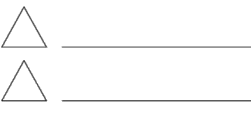
1 PLAN  
SCALE: 3/8" = 1'-0"



3511 NE Otterview Circle #43  
Ankeny, IA 50021  
Phone: (515) 597-5457  
www.jcorpdesignbuild.com

PROJECT:  
**Windsor - Trash Enclosure**

REVISIONS:



03 / 20 / 2024  
PROJECT NO: 00-000  
CONTENTS:  
Plan, Elevations, Sections

SHEET NO:  
**A1**

WINDSOR APARTMENTS - TRASH ENCLOSURE DETAIL

Clipsaddle-Garber Associates, Inc.  
2413 Grand Avenue  
Des Moines, Iowa 50312  
PH 515-268-4423  
www.garberassociates.com

| NO. | REVISION | DATE | BY | FOR |
|-----|----------|------|----|-----|
|     |          |      |    |     |
|     |          |      |    |     |
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|             |                  |              |     |           |            |
|-------------|------------------|--------------|-----|-----------|------------|
| SCALE:      | AS NOTED         | DESIGNED BY: | DJS | DRAWN BY: | PJV        |
| DWG:        | 23-047-DTL-2.dwg | CHECKED BY:  | DJS | DATE:     | 04/15/2024 |
| FIELD BOOK: |                  | SHEET        | 16  | OF        | 22         |
|             |                  | FILE NO.:    |     |           | 23-047     |



DESCRIPTION – CITY PROPERTY TO BE CONVEYED TO DEVELOPER

Part of Parcel A of that Plat of Survey filed in Book 9221, Pages 674–675, being part of Lot 1 in Hopkins Place, an Official Plat, now included in and forming a part of the City of Windsor Heights, Polk County, Iowa, and being more particularly described as follows:

Beginning at the Southeast corner of said Parcel A; thence South 89°(degrees) 55'(minutes) 37"(seconds) West, 204.83 feet along the South line of said Parcel A to the Southwest corner of said Parcel A; thence North 00°37'08" West, 46.50 feet along the West line of said Parcel A; thence North 89°55'37" East, 95.76 feet; thence South 00°04'23" East, 20.50 feet; thence North 89°55'37" East, 109.29 feet to the East line of said Parcel A; thence South 00°34'01" East, 26.00 feet along the East line of said Parcel A to the point of beginning.

Containing 7,287 square feet.

DESCRIPTION – DEVELOPER PROPERTY TO BE CONVEYED TO CITY

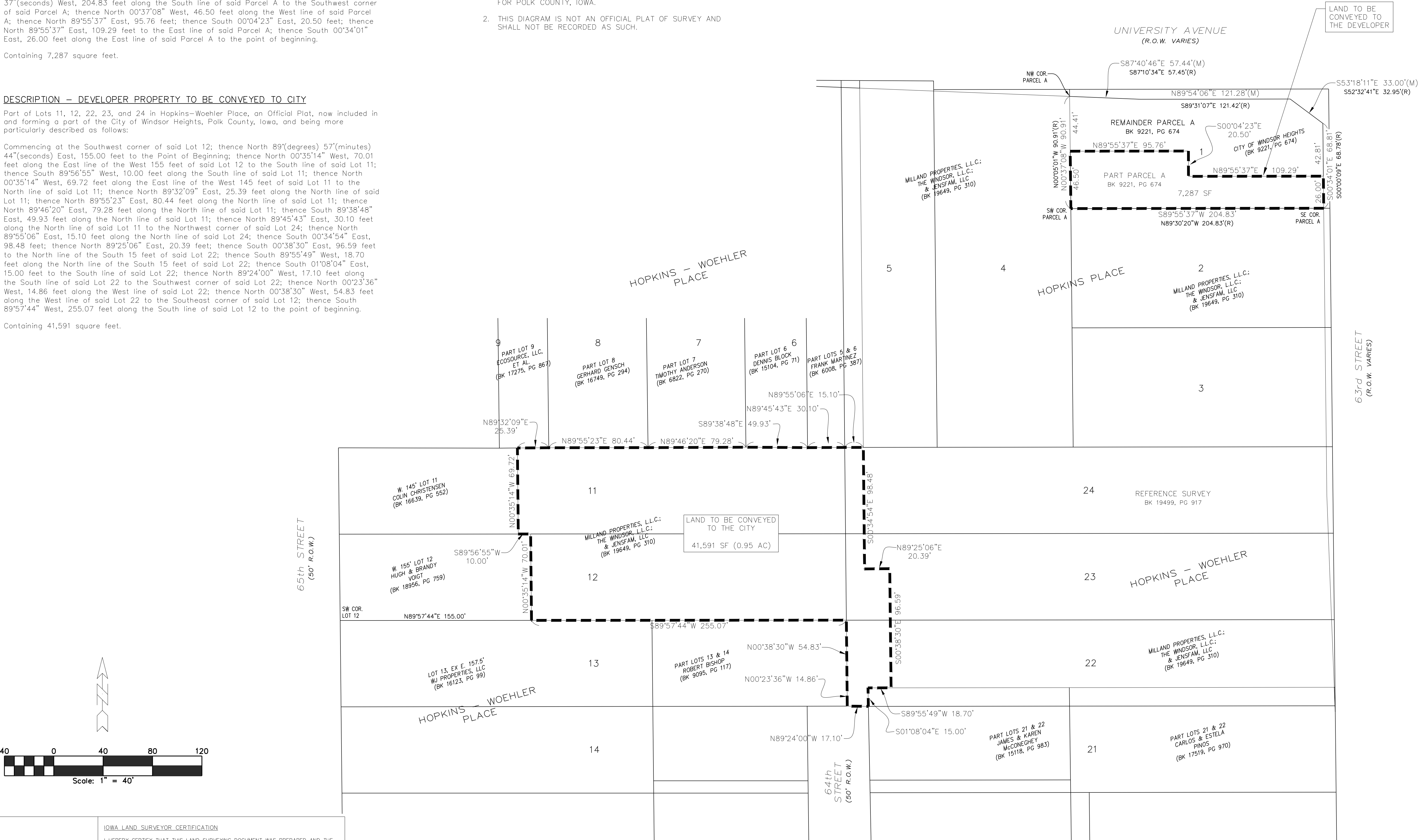
Part of Lots 11, 12, 22, 23, and 24 in Hopkins–Woehler Place, an Official Plat, now included in and forming a part of the City of Windsor Heights, Polk County, Iowa, and being more particularly described as follows:

Commencing at the Southwest corner of said Lot 12; thence North 89°(degrees) 57'(minutes) 44"(seconds) East, 155.00 feet to the Point of Beginning; thence North 00°35'14" West, 70.01 feet along the East line of the West 155 feet of said Lot 12 to the South line of said Lot 11; thence South 89°56'55" West, 10.00 feet along the South line of said Lot 11; thence North 00°35'14" West, 69.72 feet along the East line of the West 145 feet of said Lot 11 to the North line of said Lot 11; thence North 89°32'09" East, 25.39 feet along the North line of said Lot 11; thence North 89°55'23" East, 80.44 feet along the North line of said Lot 11; thence North 89°46'20" East, 79.28 feet along the North line of said Lot 11; thence South 89°38'48" East, 49.93 feet along the North line of said Lot 11; thence North 89°45'43" East, 30.10 feet along the North line of said Lot 11 to the Northwest corner of said Lot 24; thence North 89°55'06" East, 15.10 feet along the North line of said Lot 24; thence South 00°34'54" East, 98.48 feet; thence North 89°25'06" East, 20.39 feet; thence South 00°38'30" East, 96.59 feet to the North line of the South 15 feet of said Lot 22; thence South 89°55'49" West, 18.70 feet along the North line of the South 15 feet of said Lot 22; thence South 01°08'04" East, 15.00 feet to the South line of said Lot 22; thence North 89°24'00" West, 17.10 feet along the South line of said Lot 22 to the Southwest corner of said Lot 22; thence North 00°23'36" West, 14.86 feet along the West line of said Lot 22; thence North 00°38'30" West, 54.83 feet along the West line of said Lot 22 to the Southeast corner of said Lot 12; thence South 89°57'44" West, 255.07 feet along the South line of said Lot 12 to the point of beginning.

Containing 41,591 square feet.

NOTES

- PROPERTY LINES AND DIMENSIONS ON THIS DIAGRAM ARE BASED UPON A RETRACEMENT SURVEY OF THE PROPERTIES PREPARED BY ENGINEERING RESOURCE GROUP (PROJ. NO. 23–047) THAT IS FILED IN BOOK 19499 AT PAGE 917 IN THE OFFICE OF THE RECORDER FOR POLK COUNTY, IOWA.
- THIS DIAGRAM IS NOT AN OFFICIAL PLAT OF SURVEY AND SHALL NOT BE RECORDED AS SUCH.



|                                                                                                                                                                                                                                                       |      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| IOWA LAND SURVEYOR CERTIFICATION                                                                                                                                                                                                                      |      |
| I HEREBY CERTIFY THAT THIS LAND SURVEYING DOCUMENT WAS PREPARED AND THE RELATED SURVEY WORK WAS PERFORMED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL LAND SURVEYOR UNDER THE LAWS OF THE STATE OF IOWA. |      |
| DANIEL F. RITTEL, P.L.S. #15268<br>MY LICENSE RENEWAL DATE IS DECEMBER 31, 2023                                                                                                                                                                       | DATE |
| PAGES OR SHEETS COVERED BY THIS SEAL:<br><b>THIS SHEET ONLY</b>                                                                                                                                                                                       |      |

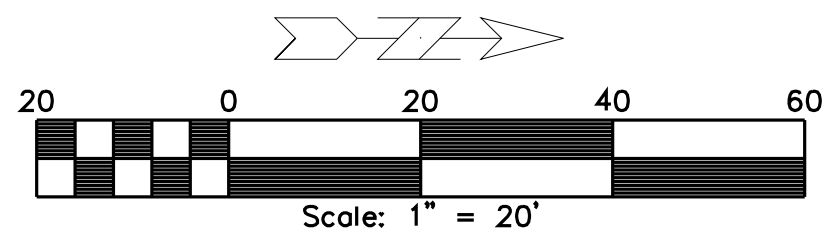
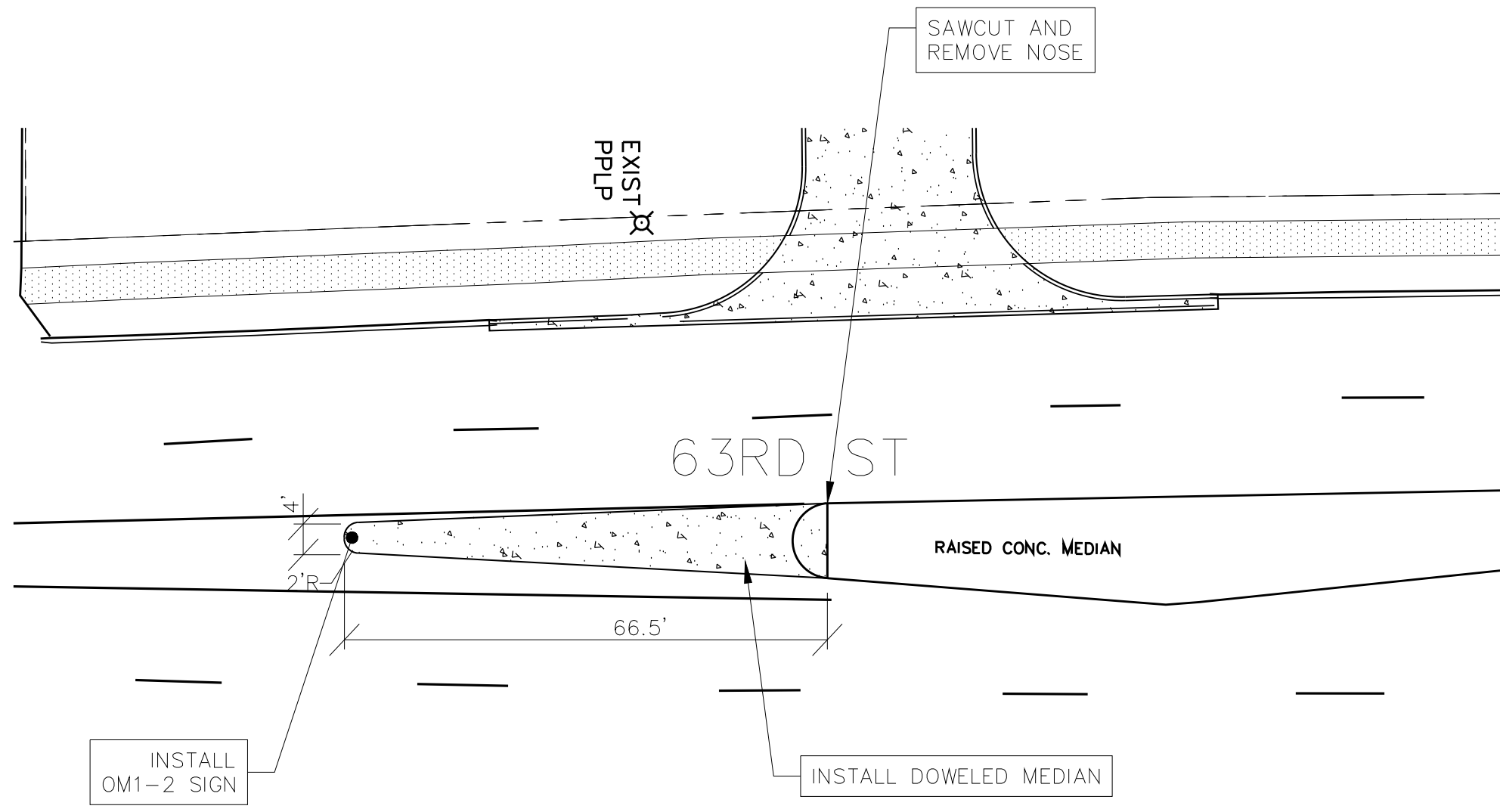
WINDSOR APARTMENTS - LAND SWAP DIAGRAM

|                                    |  |                                    |  |
|------------------------------------|--|------------------------------------|--|
| DRAWN BY: PJV                      |  | DATE: 04/15/2024                   |  |
| DESIGNED BY: DFR                   |  | CHECKED BY: DW/23-047-LANDSWAP.dwg |  |
| SCALE: AS NOTED                    |  | FIELD BOOK: 18 OF 22               |  |
| LOCATION:                          |  | NO. BY DATE                        |  |
| REVISION:                          |  | NO. BY DATE                        |  |
| Clapsaddle-Garber Associates, Inc. |  | 2413 Grand Avenue                  |  |
| Des Moines, Iowa 50312             |  | Ph 515-268-4883                    |  |
| www.garberassociates.com           |  | 23-047                             |  |

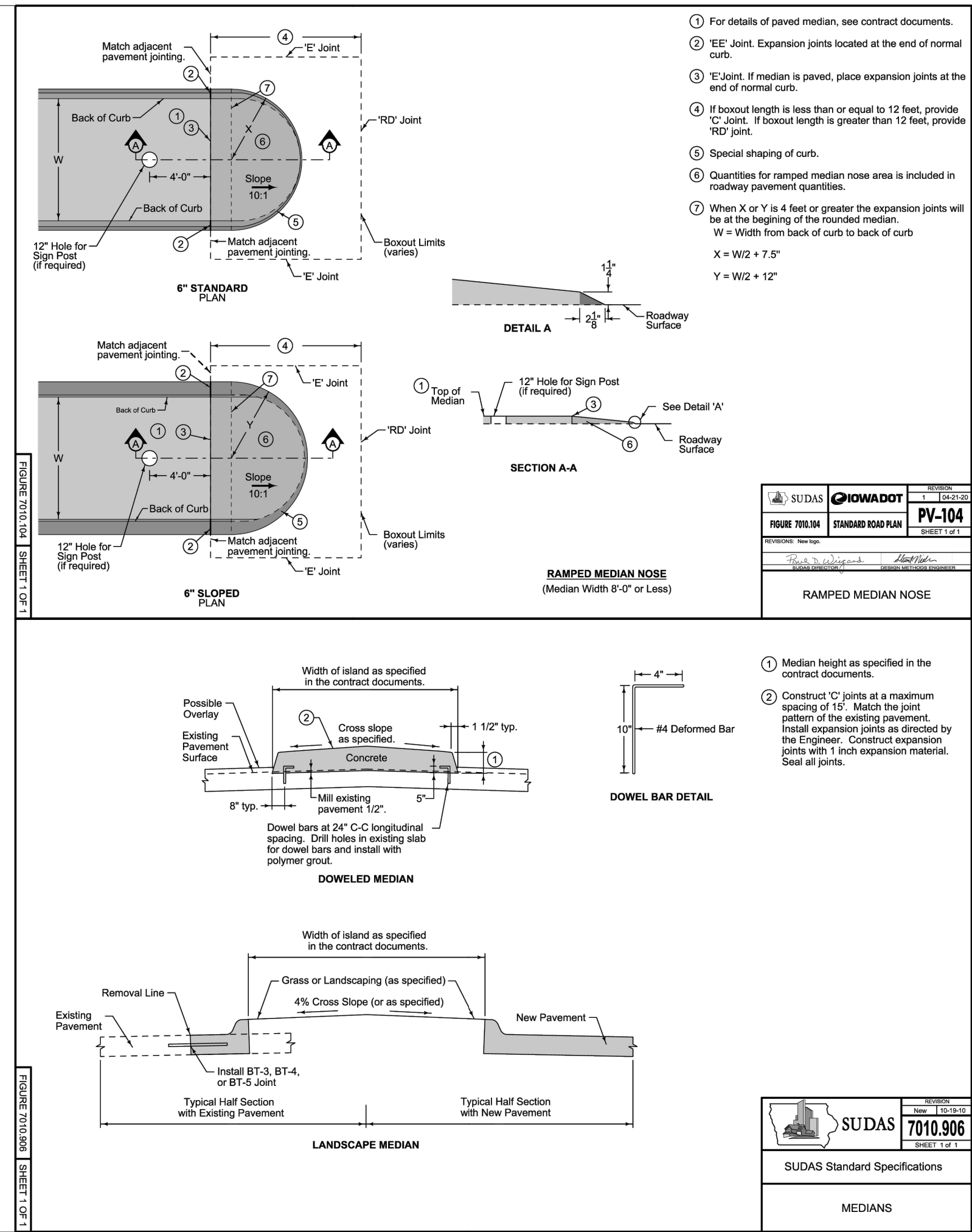




NOTE:  
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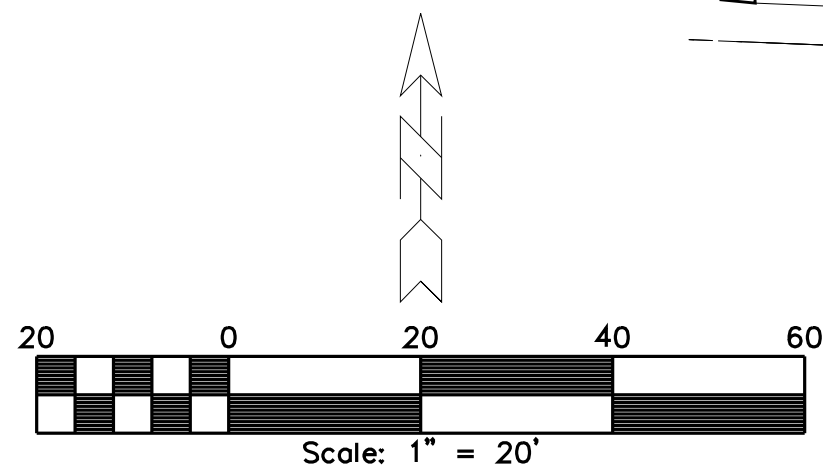
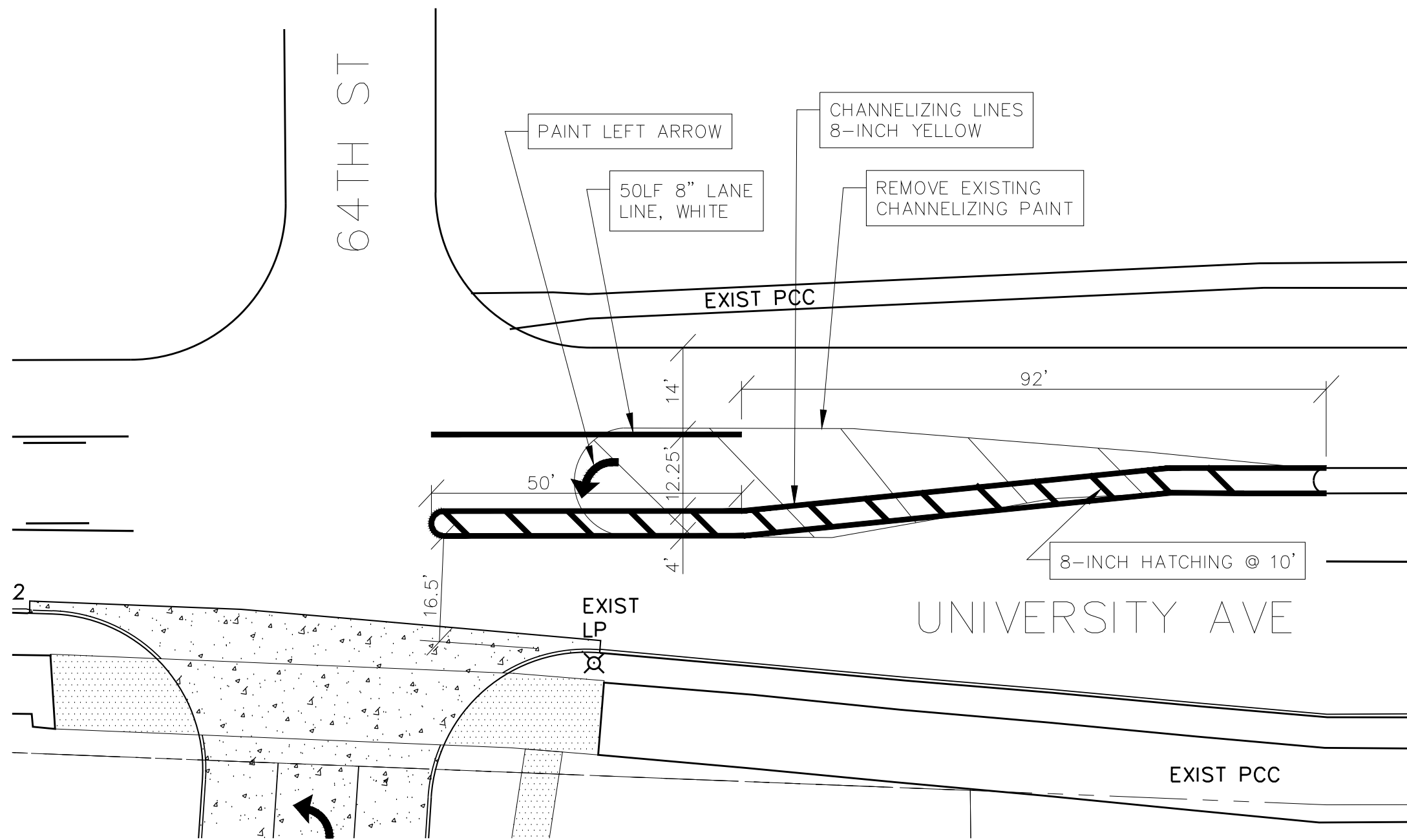


63RD STREET MEDIAN EXTENSION



NOTES:

1. THE ROADWAY SHALL MAINTAIN THROUGH BI-DIRECTIONAL TRAFFIC. ROADWAY WORK SHALL ONLY TAKE PLACE ON ONE SIDE OF THE STREET AT ANY ONE TIME.
2. MAINTAIN MINIMUM 10' CLEAR LANE WIDTHS.
3. ACCESS SHALL BE MAINTAINED TO ADJACENT BUSINESSES AND RESIDENTS AT ALL TIMES.
4. CONTRACTOR IS RESPONSIBLE TO MAKE SURE ALL SIGNAGE AND TRAFFIC CONTROL DEVICES ARE IN COMPLIANCE WITH CURRENT MUTCD MANUAL.
5. ALL PROPOSED SIGNS TO BE PLACED IN PLAIN VIEW.
6. THE CITY MAY REQUIRE THE USE OF FLAGGERS IF OPERATIONAL OR SAFETY CONCERNS DEVELOP WITH THE PROPOSED TRAFFIC CONTROL PLAN.
7. ALL PAVEMENT MARKINGS ON UNIVERSITY AVENUE SHALL BE EPOXY AND GROUND IN INCLUDING SYMBOLS.
8. REMOVAL OF PAVEMENT MARKINGS SHALL BE COMPLETED BY WATER BLASTING ONLY.
9. REFERENCE CURRENT VERSION OF MUTCD MANUAL FOR PAVEMENT MARKING AND SIGN PLACEMENT REQUIREMENTS.



UNIVERSITY TURN LANE

WINDSOR APARTMENTS - STREET IMPROVEMENT

Clapsdille-Garber Associates, Inc.  
2413 Grand Avenue  
Des Moines, Iowa 50312  
Ph 515-268-4853  
www.garberassociates.com



23-047

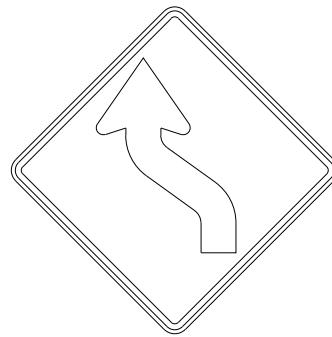
| NO. | REVISION | DATE | BY | FOR | LOCATION: | SCALE:                      | AS NOTED | DESIGNED BY: | DJS | DRAWN BY: | PJW        |
|-----|----------|------|----|-----|-----------|-----------------------------|----------|--------------|-----|-----------|------------|
|     |          |      |    |     |           | 23-047 - STREET IMPROVEMENT |          | checked BY:  |     | DATE:     | 04/15/2024 |
|     |          |      |    |     |           | FIELD BOOK:                 |          | SHEET        | 19  | OF        | 22         |
|     |          |      |    |     |           |                             |          |              |     | FILE NO.: | 23-047     |



TRAFFIC CONTROL NOTES

- ALL TRAFFIC CONTROL DEVICES & BARRIERS SHALL BE FURNISHED, ERECTED, MAINTAINED, & REMOVED BY THE CONTRACTOR.
- PROPOSED CHANGES TO THE TRAFFIC CONTROL PLAN SHALL BE REVIEWED WITH THE ENGINEER BEFORE CHANGES ARE MADE.
- ACCESS TO NEIGHBORING BUILDINGS SHALL BE MAINTAINED AT ALL TIMES.
- ALL UTILITY WORK WITHIN THE PUBLIC R.O.W. SHALL CONFORM TO THE CITY OF WINDSOR HEIGHTS STANDARDS & THE CURRENT ADDITION OF THE MUTCD.
- TWO-WAY TRAFFIC SHALL BE MAINTAINED AT ALL TIMES ALONG 63RD ST & UNIVERSITY AVE.
- THE CONTRACTOR SHALL USE CARE WHEN WORKING UNDER/OVER/AROUND ELECTRICAL LINES.
- FLASHING OR STEADY BURN WARNING LIGHTS ARE REQUIRED ON TYPE II BARRICADES FOR OVERNIGHT CLOSURES.
- WORK AREA MUST BE ENCLOSED WITH BARRICADES, FENCING, OR A COMBINATION OF THE TWO.
- REFERENCE DOT TC-228 FOR TRAFFIC CONTROL SPACING.

NOTE:  
THE LOCATION OF ALL UTILITIES INDICATED ON THE PLANS ARE TAKEN FROM EXISTING PUBLIC RECORDS. THE EXACT LOCATION AND ELEVATION OF ALL PUBLIC UTILITIES MUST BE DETERMINED BY THE CONTRACTOR. IT SHALL BE THE DUTY OF THE CONTRACTOR TO ASCERTAIN WHETHER ANY ADDITIONAL FACILITIES OTHER THAN THOSE SHOWN ON THE PLANS MAY BE PRESENT.



W1-4L  
48"x48"

A



W20-1  
48"x48"

B



G20-2A  
48"x24"

C

SIGN LEGEND

LEGEND



WORK ZONE



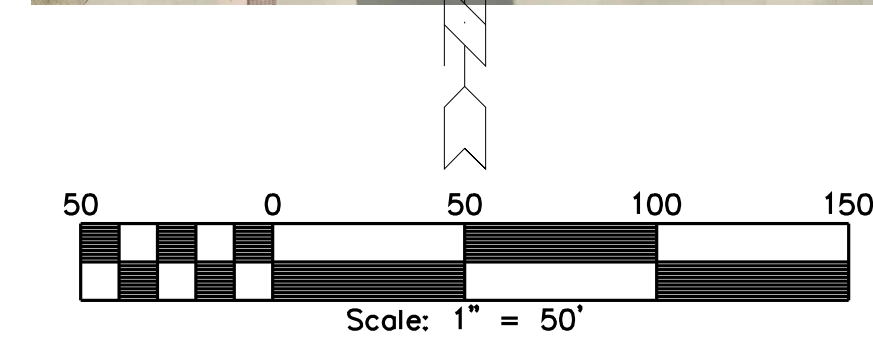
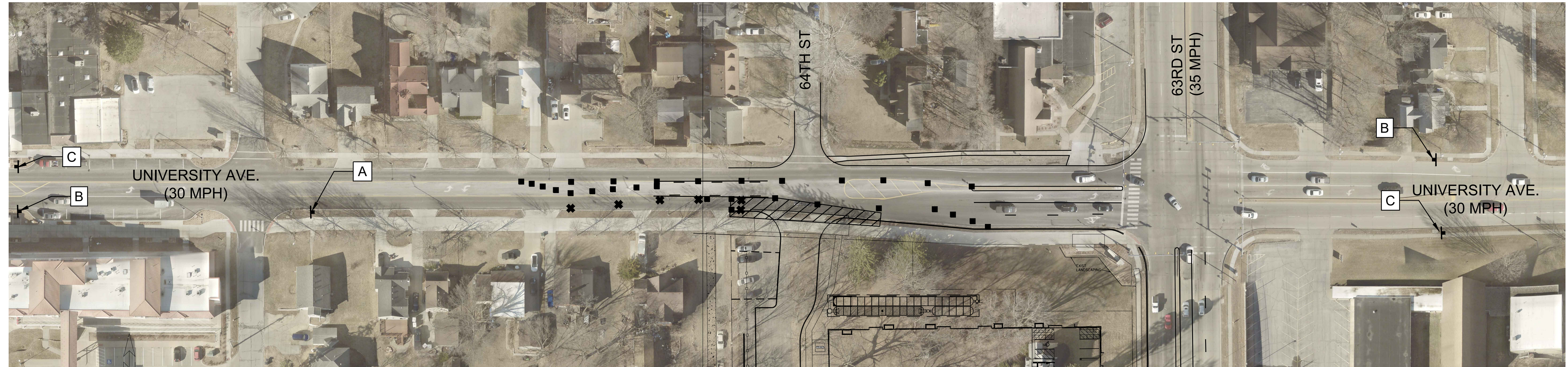
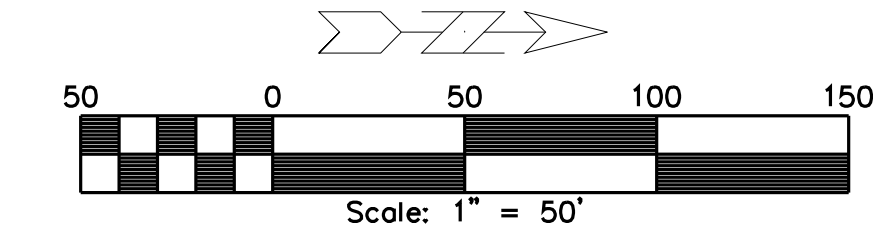
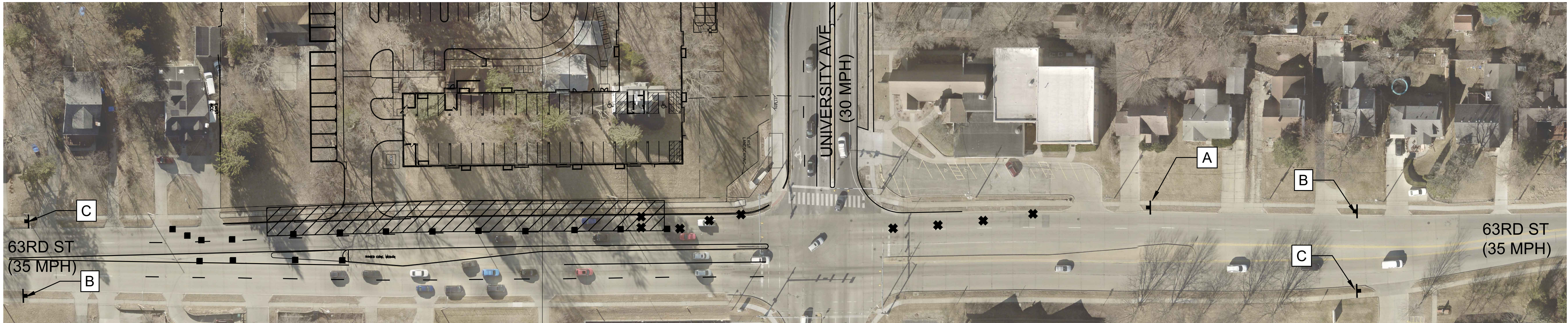
TEMPORARY SIGN



42" CHANNELIZER



DRUM



WINDSOR APARTMENTS - TRAFFIC CONTROL

Clapsdille-Garber Associates, Inc.  
2413 Grand Avenue  
Des Moines, Iowa 50312  
Ph 515-268-4883  
www.garberassociates.com



23-047

| NO. | REVISION | DATE | BY | FOR |
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|--------------------------|----------|--------------|-----|-----------|------------|
| SCALE:                   | AS NOTED | DESIGNED BY: | DJS | DRAWN BY: | PJV        |
| 23-047 - TRAFFIC-CONTROL | 4M       | CHECKED BY:  |     | DATE:     | 04/15/2024 |
| FIELD BOOK:              |          | SHEET        | 20  | OF        | 22         |
|                          |          | FILE NO.:    |     |           | 23-047     |



1. ALL TRAFFIC CONTROL DEVICES & BARRIERS SHALL BE FURNISHED, ERECTED, MAINTAINED, & REMOVED BY THE CONTRACTOR.
2. PROPOSED CHANGES TO THE TRAFFIC CONTROL PLAN SHALL BE REVIEWED WITH THE ENGINEER BEFORE CHANGES ARE MADE.
3. ACCESS TO NEIGHBORING BUILDINGS SHALL BE MAINTAINED AT ALL TIMES.
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5. TWO-WAY TRAFFIC SHALL BE MAINTAINED AT ALL TIMES ALONG 63RD ST & UNIVERSITY AVE.
6. THE CONTRACTOR SHALL USE CARE WHEN WORKING UNDER/OVER/AROUND ELECTRICAL LINES.
7. FLASHING OR STEADY BURN WARNING LIGHTS ARE REQUIRED ON TYPE II BARRICADES FOR OVERNIGHT CLOSURES.
8. WORK AREA MUST BE ENCLOSED WITH BARRICADES, FENCING, OR A COMBINATION OF THE TWO.
9. REFERENCE DOT C-228 FOR TRAFFIC CONTROL SPACING.
10. REFERENCE DOT C-601 FOR TRAIL CLOSING AND SPACING

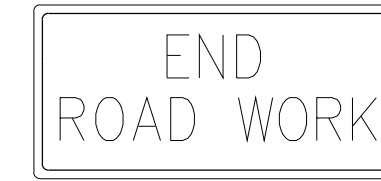


SIDEWALK CLOSED  
AHEAD  
←  
CROSS HERE

A



B



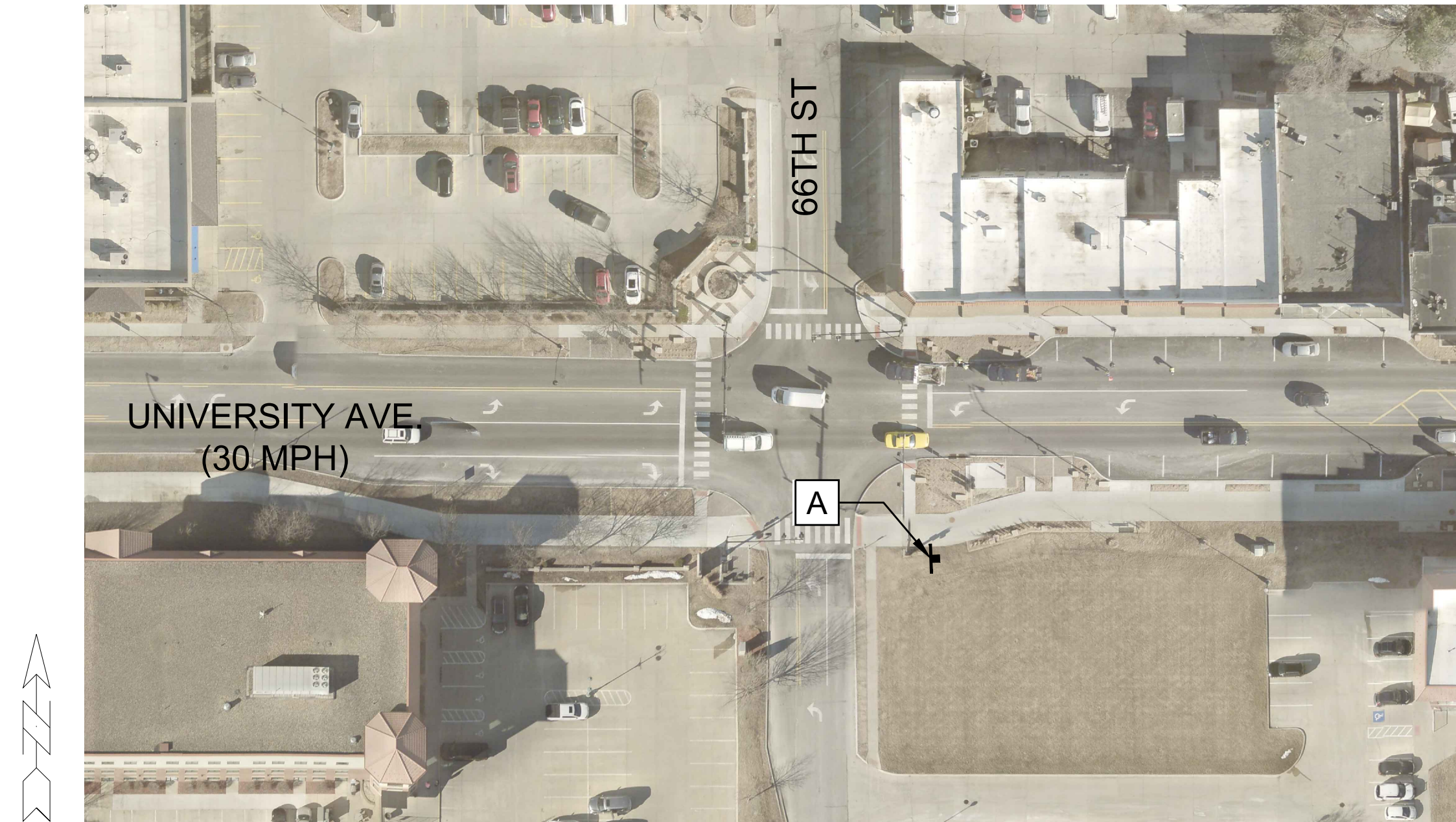
C

TEMPORARY SIGN

✖ DRUM

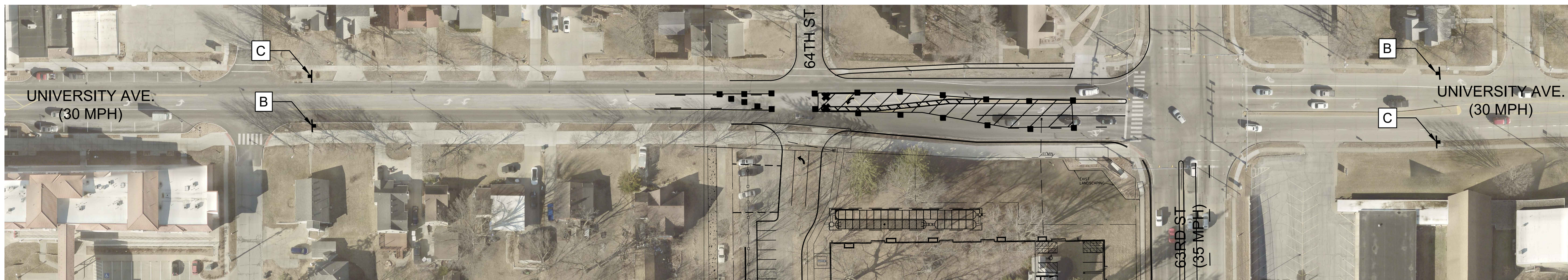
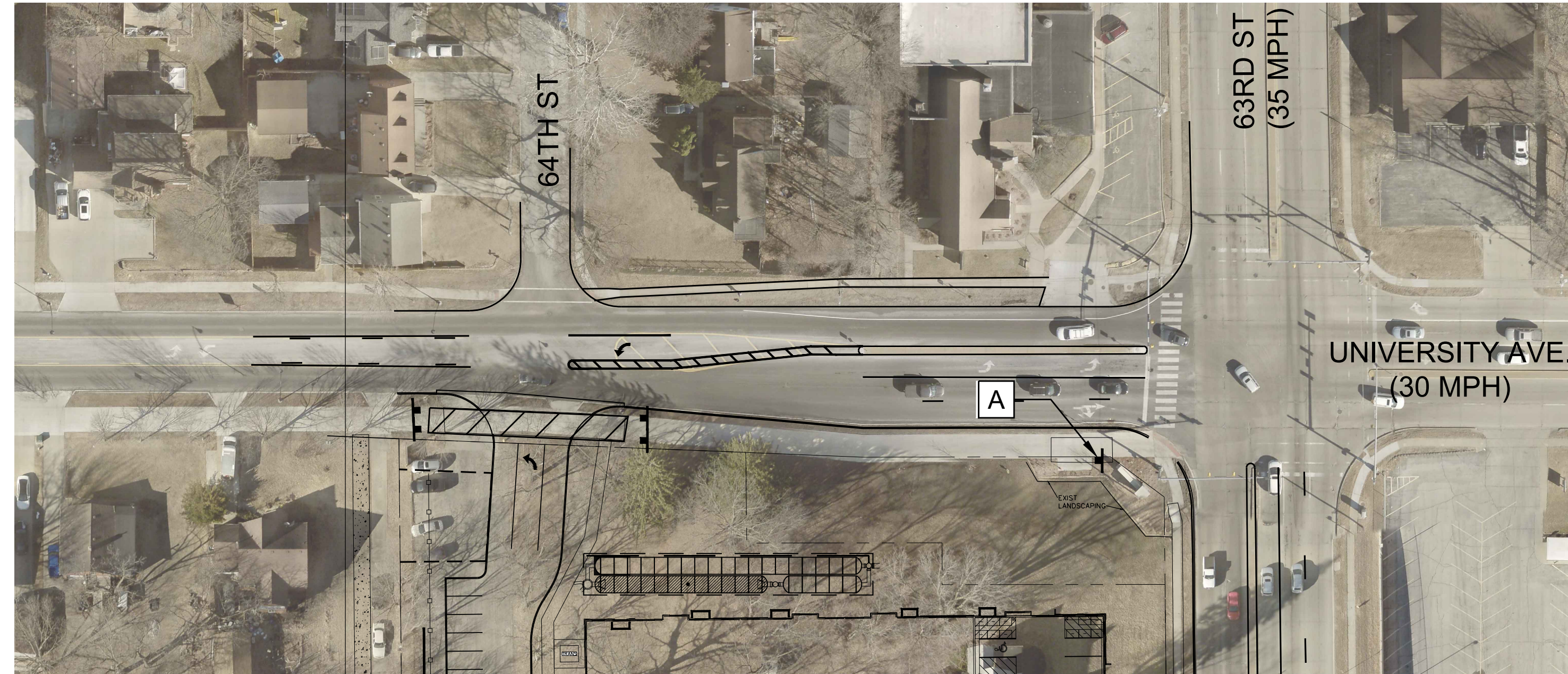


PEDESTRIAN PATH  
CLOSURE



50                      0                      50                      100                      150

Scale: 1" = 50'



50                      0                      50                      100                      150

Scale: 1" = 50'





5 NORTH ELEVATION  
SCALE: 1/16" = 1'-0"



1 WEST ELEVATION  
SCALE: 1/16" = 1'-0"



6 SOUTH ELEVATION  
SCALE: 1/16" = 1'-0"



2 EAST ELEVATION  
SCALE: 1/16" = 1'-0"



4 SOUTH (INNER) ELEVATION  
SCALE: 1/16" = 1'-0"



3 WEST (INNER) ELEVATION  
SCALE: 1/16" = 1'-0"

PRELIMINARY- NOT FOR CONSTRUCTION



PROJECT:  
**The Windsor**  
6400 University Ave.  
Windsor Heights, IA 50324

REVISIONS:  
02/28/2024  
CHECK SET

03 / 20 / 2024

PROJECT NO: 21-050

CONTENTS:  
Elevations

SHEET NO:

**A201**

## WINDSOR APARTMENTS - BUILDING ELEVATIONS

Clipsaddle-Garber Associates, Inc.  
2413 Grand Avenue  
Des Moines, Iowa 50312  
Ph 515-268-4623  
www.garberassociates.com



23-047

| NO. | REVISION | DATE | BY | FOR: | LOCATION: | SCALE:                | AS NOTED | DESIGNED BY: | DJS    | DRAWN BY: | PJV        |
|-----|----------|------|----|------|-----------|-----------------------|----------|--------------|--------|-----------|------------|
|     |          |      |    |      |           | DWG: 23-047-DTL-3.dwg |          | CHECKED BY:  | DJS    | DATE:     | 04/15/2024 |
|     |          |      |    |      |           | FIELD BOOK:           |          | SHEET        | 22     | OF        | 22         |
|     |          |      |    |      |           |                       |          | FILE NO.:    | 23-047 |           |            |



# STORM WATER MANAGEMENT CALCULATIONS

FOR

1148 63<sup>RD</sup> ST.  
63<sup>RD</sup> & University

Developer: Caliber Iowa  
3611 NE Otterview Circle  
Ankeny, IA 50021  
Contact: Duane Jensen  
Contact Phone No.: 515-290-3400

PROJECT NO. 23-047

May 9, 2024

Prepared by:

Clapsaddle-Garber Associates  
2413 Grand Avenue  
Des Moines, Iowa 50312  
515-288-4823

|                                                                                     |                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <u>ENGINEERING CERTIFICATION</u>                                                                                                                                                                                               |
|                                                                                     | I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT, SPECIFICATION OR REPORT WAS PREPARED BY ME, OR UNDER MY DIRECT PERSONAL SUPERVISION, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF IOWA. |
|                                                                                     | DOUGLAS J. SALTGAVER, P.E. #11993 _____ DATE _____<br>MY REGISTRATION RENEWAL DATE IS DECEMBER 31, 2024                                                                                                                        |
|                                                                                     | PAGES OR SHEETS COVERED BY THIS SEAL                                                                                                                                                                                           |
|                                                                                     | _____<br>_____<br>_____<br>_____                                                                                                                                                                                               |



## Table of Contents:

### Narrative

|                                          |      |
|------------------------------------------|------|
| 1.0 General .....                        | 3    |
| 2.0 Natural Conditions.....              | 3-4  |
| 3.0 Proposed Conditions .....            | 4    |
| 4.0 Storm Sewer Analysis .....           | 5    |
| 5.0 Stormwater Management Facility ..... | 5-8  |
| 6.0 Stormwater Regulations .....         | 8    |
| 7.0 Summary.....                         | 8-12 |
| Appendices .....                         | 13   |

### Appendices .....10

|                                                                         |  |
|-------------------------------------------------------------------------|--|
| Appendix A: Natural Conditions Drainage Map                             |  |
| Appendix B: Post Development Conditions Drainage Map                    |  |
| Appendix C: Hydrological Soil Report (Web Soil Survey)                  |  |
| Appendix D: Natural Conditions HydroCad Report                          |  |
| Appendix E: Post Development Conditions HydroCad Report                 |  |
| Appendix F: Post Development Conditions Detention Basin HydroCad Report |  |
| Appendix G: Water Quality Calculations                                  |  |
| Appendix H: Water Quality, Recharge Calculations                        |  |
| Appendix I: Stage-Storage Table                                         |  |
| Appendix J: Storm Sewer Calculations                                    |  |
| Appendix K: Site Plans                                                  |  |



## **Stormwater Management Overview**

### **1.0 GENERAL**

36<sup>th</sup> ON 6<sup>th</sup> LLC is proposing a new development including of an apartment complex at 1148 63<sup>rd</sup> ST, Windsor Heights, IA. The property is currently zoned UC (University Ave Mixed Use District). This stormwater management report will address the stormwater management and storm sewer system design associated with the site. This site will include a proposed apartment building, 5 garage units, parking lot, sidewalks, site development and corresponding utilities, stormwater management facility (SMF) and other site improvements.

The stormwater management for the site is generally governed by the Windsor Heights, IA Code of Ordinances that references the Iowa Stormwater Management Manual (ISWMM). The objective of the proposed storm water management facility is to collect, hold, treat, and provide a controlled flow release for surface water generated during the design year storm events. Section 6.0 further outlines the City's relevant ordinance.

### **2.0 NATURAL CONDITIONS**

#### **2.1 GENERAL**

This site is located at the intersection of University Ave and 63<sup>RD</sup> St. in Windsor Heights, IA.

#### **2.2 PRE-IMPROVEMENT CONDITIONS**

The project site is tributary to Walnut Creek, located approximately 0.6 Mi. southwest of the site. The pre-developed site area is largely comprised of grass and dense tree coverage. There are 4 existing single-family homes, a gravel/dirt path accessed from University Avenue, a paved driveway access from 63<sup>rd</sup> St. The north center of the site is a high point which slopes in multiple directions, North, West, Southwest and Southeast.

#### **2.3 FEMA FLOOD ZONES**

The entire site is located outside of mapped flood plains or flood ways as provided on the effective FIRM panel 19153C0327F, February 1, 2019.

#### **2.4 SOILS REPORT**

Construction Materials Testing report prepared exploration borings for the site and is included in the Appendix of this report. In addition, a Web Soil Survey was generated for this site. The result of this survey shows the site consists of type B soil, for more information see Appendix C.

#### **2.5 Natural Drainage Areas (Pre-Development Conditions)**



**Table 2.1 Natural Drainage Areas**

| Existing Drainage Areas (Pre-Development Conditions) |                 |                      |                    |              |                             |
|------------------------------------------------------|-----------------|----------------------|--------------------|--------------|-----------------------------|
| Drainage Area Label                                  | Total Area (AC) | Impervious Area (AC) | Pervious Area (AC) | Curve Number | Time of Concentration (min) |
| North                                                | 1.12            | 0                    | 1.12               | 58           | 9.0                         |
| West                                                 | 2.56            | 0                    | 2.56               | 58           | 9.4                         |
| South                                                | 0.67            | 0                    | 0.67               | 58           | 9.2                         |
| Southeast                                            | 0.69            | 0                    | 0.69               | 58           | 8.3                         |

### 3.0 PROPOSED CONDITIONS

#### 3.1 GENERAL

The proposed site development will include construction of a proposed building, the corresponding parking area, and associated utilities such as storm sewer. Stormwater management of the site improvements will be achieved by 4 detention basins located North, West, South, and Southeast on the property. Storm sewer systems will convey drainage from the proposed parking areas and building into the proposed detention basin.

The undetained area will be mostly grass area with 0.02 acres of pavement in the southeast undetained drainage area. See Table 3.1 for calculations. See landscape plan on sheet 14 for seeding details.

The proposed detention basins will provide stormwater management and will discharge into a proposed storm sewer system or overland and flow into Walnut Creek. A detailed map depicting the proposed drainage conditions is provided in Appendix B.

In addition to Windsor Height's storm water requirements, water quality has also been considered and will be addressed as follows. The North drainage area will be treated by an isolator row within the underground detention chambers. The above ground West detention pond will utilize Hydrodynamic Separators. The South and Southeast ponds meet recharge volume calculations are shown in Appendix H.

Recharge volumes have also been calculated based on Rev equations. The 3" orifice outlet has been designed to be at the elevation needed to meet the recharge volume requirements. Recharge calculations are shown in Appendix H. The site consists of Type B soils, expected infiltration rate is 0.34 in/hour per Iowa Storm Water Management Manual.



**Table 3.1 Proposed Drainage Areas**

| Proposed Drainage Areas |                 |                      |                    |              |                             |
|-------------------------|-----------------|----------------------|--------------------|--------------|-----------------------------|
| Drainage Area Label     | Total Area (AC) | Impervious Area (AC) | Pervious Area (AC) | Curve Number | Time of Concentration (min) |
| North                   | 0.98            | 0.74                 | 0.24               | 89           | 8.1                         |
| North Undetained        | 0.53            | 0                    | 0.53               | 61           | 5                           |
| West                    | 1.91            | 1.29                 | 0.62               | 86           | 6.7                         |
| West Undetained         | 0.54            | 0                    | 0.54               | 61           | 5                           |
| South                   | 0.48            | 0.11                 | 0.37               | 69           | 11.0                        |
| South Undetained        | 0.09            | 0                    | 0.09               | 61           | 5                           |
| Southeast               | 0.33            | 0.14                 | 0.19               | 76           | 7.3                         |
| Southeast Undetained    | 0.15            | 0.2                  | 0.15               | 61           | 5.0                         |

#### 4.0 STORM SEWER ANALYSIS

##### 4.1 GENERAL

The proposed storm sewer systems have been designed to convey surface drainage to the proposed detention basins. The SCS Method was utilized to estimate peak discharges for drainage areas. Area intakes were analyzed for both the 5-year and 100-year events. Storm sewer pipes were analyzed to convey the 10-year event to the proposed SMF.

**Table 4.1 Proposed Pipe Table**

| Pipe ID | Size (Inches) | Type        | Length (Feet) | Slope (%) | Capacity (CFS) | Peak Flow 100-YR (CFS) |
|---------|---------------|-------------|---------------|-----------|----------------|------------------------|
| STSP-1  | 15            | RCP         | 7             | 1.00      | *              | *                      |
| STSP-2  | 15            | RCP         | 34            | 13.33     | *              | *                      |
| STSP-3  | 24            | RCP         | 30            | 1.00      | *              | *                      |
| STSP-4  | 24            | RCP         | 98            | 1.00      | 22.62          | 18.13                  |
| STSP-5  | 24            | RCP         | 72            | 1.00      | 22.62          | 18.13                  |
| STSP-6  | 18            | RCP         | 85            | 1.00      | 10.50          | 10.44                  |
| STSP-7  | 12            | RCP         | 60            | 2.57      | *              | *                      |
| STSP-8  | 12            | RCP         | 8             | 3.00      | *              | *                      |
| STSP-9  | 4             | (3) DIP     | 30            | 1.00      | *              | *                      |
| STSP-10 | 10            | PVC         | 82            | 1.00      | 2.18           | 1.79                   |
| STSP-11 | 12            | PVC         | 62            | 1.00      | 3.56           | 3.28                   |
| STSP-12 | 15            | PVC         | 140           | 1.00      | 6.45           | 4.84                   |
| STSP-13 | 15            | PVC         | 20            | 1.00      | 6.46           | 5.74                   |
| STSP-14 | 15            | PVC         | 52            | 1.00      | 6.42           | 5.72                   |
| STSP-15 | 15            | PVC         | 20            | 1.00      | 6.27           | 5.65                   |
| STSP-16 | 12            | RCP         | 81            | 3.00      | 6.17           | 2.06                   |
| STSP-17 | 24            | N12         | 21            | 1.00      | *              | *                      |
| STSP-18 | 12            | RCP         | 104           | 7.59      | *              | *                      |
| STSP-19 | 12            | SLOTTED CMP | 22            | 1.00      | 2.01           | 1.09                   |
| STSP-20 | 12            | DIP         | 29            | 1.00      | 3.56           | 1.07                   |



\*Storm Sewer Pipe calculations have been included in the detention calculations Appendix F and are not shown on table 4.1.

## 5.0 STORMWATER MANAGEMENT FACILITY (SMF)

### 5.1 GENERAL

The drainage improvements are intended to provide treatment and limit the peak design storm maximum runoff rate from the onsite developed site to the outlet points.

The proposed SMF and control structure is sized to accept and provide treatment and a controlled flow release of the onsite flows collected. The proposed SMF will provide design storm event flood protection volume and the water quality volume & water quality recharge rate for the onsite area draining to it.

The proposed SMF detention basins and control structures will be sized to provide the required attenuation storage below the emergency overflow for the 100-year Natural Conditions 24-hour design storm event peak runoff rates using the USDA-NRCS WINTR-55 program identified by the County. This program computes the runoff rates and corresponding volumes for the post construction condition.

### 5.2 NPDES

This project will require an NPDES construction stormwater permit based on the size of the proposed work. This permit, along with all other necessary City stormwater, grading, and erosion control permits, will be obtained prior to commencing construction activities. The Stormwater Pollution Prevention Plan (SWPPP) sheets provided with the site plans identify the necessary measures for temporary and permanent erosion and sediment control. Refer to the Storm Water Pollution Prevention Plan provided with the site plan in Appendix G.

### 5.3 TIME OF CONCENTRATION

The NRCS velocity method in the HydroCAD programs were used to calculate the times of concentration for all scenarios and methods. Calculations are shown in the attached outputs.

### 5.4 PROJECT AREA

A post condition drainage basin map has been included in the Exhibit Section. This Exhibit shows the onsite and offsite tributary sub-catchment areas.

### 5.5 VARIABLES AND MODELING

#### 5.5.1 Runoff Curve Numbers

The proposed site and tributary area contain primarily type B hydrologic soil type. This classification of soil type was determined by the soils project engineer. This soil classification has been further confirmed by web soil survey. The runoff curve numbers used were associated with the soil type and normal (average) Antecedent Moisture Condition (AMC II) for type B soils.

The land use and weighted runoff curve number summary table is provided in the model output tables located in the Exhibits. The numbers



were weighted by the program based on the proportionate area assigned to each classification. The proposed numbers used reflect the pre-settlement (natural condition) and post improvement condition. The calculations do not include any additional rainfall loss method accommodations due to evaporation or infiltration in the pond.

#### 5.5.2 Rainfall Rates

The rainfall data used for both analyses is the recommended SUDAS values for central Iowa section 5. The standard settings include 24-hour rainfall depth duration using the NRCS SCS type II rainfall distribution and a dimensional unit hydrograph standard.

### 5.6 CONTROL STRUCTURE

The control structure is sized to satisfy as follows:

*(A) Water Quality Volume - To reduce potential increases in downstream erosion and water pollution, practices or techniques shall be employed that capture and treat runoff from a 1.25" rainfall event. The volume can be infiltrated or detained and released over a 24-hour period. To assist with water quality, the recharge rate has been calculated and provided. This standard addresses approximately 90% of Article 8. Stormwater and Erosion Control Management Division 1. Stormwater Runoff 128 rainfall events that occur in Central Iowa.*

*(B) Channel Protection Volume – To reduce potential increases in erosion and stream degradation, practices or techniques shall be employed that provide extended detention of the runoff that occurs during 1-year, 24-hour rainfall event. The volume shall be detained and released at a minimum over 24 hours and a maximum of 48 hours. This standard addresses approximately 98% of the rainfall events that occur in Central Iowa.*

*(C) Overbank Flood Protection - To minimize surcharge of downstream storm sewer systems and reduce the frequency of flash flooding, practices and techniques shall be employed that limit peak release rates that are anticipated to occur post development during the 2-, 5- and 10-year, 24-hour storm events to levels no greater than those expected to occur from natural conditions from a given site from the same storm event. Natural conditions are defined in Section 7 of this Division.*

*(D) Extreme Flood Protection - To reduce the frequency and impacts caused by larger flood events, practices and techniques shall be employed that limit peak release rates that are anticipated to occur post-development during the 25-, 50- and 100-year, 24- hour storm events to levels no greater than those expected to occur from natural conditions from a given site from the same storm event. Natural conditions are defined in Section 7 of this division.*

The calculations for the control structure multi-year outflow peak rates are included in the HydroCAD output and in the summary of this analysis.



Structures will use a SUDAS SW-513 storm sewer structure modified with multiple outlets (weirs/orifices) to limit the flow to the design release rates and provide water quality treatment with an added bioretention cell & required recharge volume. The upper outlet is provided to attenuate less frequent storm water peak flows. The 3" orifice has been placed at the elevation required to meet the recharge volume and can be found in the Exhibits section.

Should a design storm event occur that is greater than the detention basin capacity or any intakes become inoperative, water would be directed over the proposed emergency overflow. The SMF includes a top emergency broad crested weir for any extremely infrequent events. The secondary weir is located above the 100-year design storm maximum modeled stage and one foot below the top of SMF top of berm to provide one foot of freeboard in the detention basin.

## 6.0 STORMWATER REGULATIONS

The location of the project involves the City of Windsor Heights stormwater regulations. The regulations and design criteria are outline below in Table 6.1:

**Table 6.1 Design Criteria**

| Performance Standard                                                                | Requirements                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| City of Windsor Heights City Code Chapter 161 Post-Construction Storm Water Control | Any redevelopment disturbing 50% or more of a site shall provide stormwater management at the Water Quality Volume standard and shall meet the Channel Protection standard.                                                                                                                                                                                                                                 |
|                                                                                     | Provide on-site treatment during construction and post-construction to ensure no increases over pre-settlement conditions (meadow not in good condition, CD=58) for the one-year, 24-hour storm event, the five-year, 24-hour storm event, and the 100-year, 24-hour storm event.                                                                                                                           |
|                                                                                     | Provide on-site water quality treatment to reduce potential increases in downstream water pollution. Practices or techniques shall be employed that capture and treat runoff from a 1.25" rainfall event, as further defined within the ISWMM.                                                                                                                                                              |
|                                                                                     | Provide extended detention of the 1-year, 24-hour storm event – with release rates established as per methods defined within the ISWMM manual to provide a minimum drawdown period of 24 hours.                                                                                                                                                                                                             |
|                                                                                     | Practices and techniques shall be employed that limit allowable peak release rate that are anticipated to occur post-development during the 2, 5 and 10-year, 24-hour storm events to levels no greater than those expected to occur from natural conditions a given site from a similar storm event.                                                                                                       |
|                                                                                     | Practices and techniques shall be employed that limit allowable peak release rate that are anticipated to occur post-development during the 25, 50 and 100-year, 24-hour storm events to levels no greater than those expected to occur from natural conditions a given site from a similar storm event.                                                                                                    |
|                                                                                     | Retain on-site for recharge a portion of the water quality treatment volume calculated as a soil specific recharge factor multiplied by the volumetric runoff coefficient multiplied by the area and all divided by 12. The soil specific recharge factor is given as 0.08 for HSG D soils. The volumetric runoff coefficient is calculated as $0.05 + 0.009$ multiplied by the site impervious percentage. |



## 7.0 SUMMARY

The proposed stormwater management system consists of 4 proposed detention basins with control structures that outlet toward an existing public storm sewer system and ultimately drains toward Walnut Creek. A summary of the proposed SMF is provided in Table 7.1.

Statewide Urban Design and Specifications (SUDAS). The rainfall events analyzed include the water quality volume (1.25"), 1-year (2.67"), 2-year (3.08"), 5-year (3.81"), 10-year (4.46"), 25-year (5.44"), 50-year (6.26"), 100-year (7.12") design storms.

The below table summarizes the results of the stormwater model by comparing the stormwater runoff rates of the pre-development conditions to the proposed conditions for each design rainfall event. The proposed HydroCAD model is provided in Appendix E.

**Table 7.1 Site Runoff Calculations – North**

| Rainfall Event              | Pre-Development Peak Flow (CFS) | Post-Development Peak SWM Flow (CFS) |
|-----------------------------|---------------------------------|--------------------------------------|
|                             | South                           | South                                |
| 1-YR, 24-HR Storm (2.67")   | 0.10                            | 0.15*                                |
| 2-YR, 24-HR Storm (3.08")   | 0.30                            | 0.30                                 |
| 5-YR, 24-HR Storm (3.81")   | 0.80                            | 0.71                                 |
| 10-YR, 24-HR Storm (4.46")  | 1.37                            | 1.14                                 |
| 25-YR, 24-HR Storm (5.44")  | 2.36                            | 1.82                                 |
| 50-YR, 24-HR Storm (6.26")  | 3.29                            | 2.42                                 |
| 100-YR, 24-HR Storm (7.12") | 4.33                            | 3.07                                 |

\*The 1-year rainfall events are unable to meet the City of Windsor Height's stormwater release rate requirements for more information see description below table 7.5. Undetained runoff calculations have been included within this table.

**Table 7.2 Site Runoff Calculations – South/Southeast**

| Rainfall Event              | Pre-Development Peak Flow (CFS) | Post-Development Peak SWM Flow (CFS) |
|-----------------------------|---------------------------------|--------------------------------------|
|                             | South                           | South                                |
| 1-YR, 24-HR Storm (2.67")   | 0.13                            | 0.12                                 |
| 2-YR, 24-HR Storm (3.08")   | 0.37                            | 0.20                                 |
| 5-YR, 24-HR Storm (3.81")   | 0.98                            | 0.39                                 |
| 10-YR, 24-HR Storm (4.46")  | 1.68                            | 0.58                                 |
| 25-YR, 24-HR Storm (5.44")  | 2.90                            | 0.99                                 |
| 50-YR, 24-HR Storm (6.26")  | 4.04                            | 1.33                                 |
| 100-YR, 24-HR Storm (7.12") | 5.31                            | 1.85                                 |



**Table 7.4 Site Runoff Calculations - West**

| Rainfall Event              | Pre-Development Peak Flow (CFS) | Post-Development Peak SWM Flow (CFS) |
|-----------------------------|---------------------------------|--------------------------------------|
|                             | West                            | West                                 |
| 1-YR, 24-HR Storm (2.67")   | 0.22                            | 0.22                                 |
| 2-YR, 24-HR Storm (3.08")   | 0.67                            | 0.44                                 |
| 5-YR, 24-HR Storm (3.81")   | 1.80                            | 0.97                                 |
| 10-YR, 24-HR Storm (4.46")  | 3.07                            | 2.30                                 |
| 25-YR, 24-HR Storm (5.44")  | 5.30                            | 4.86                                 |
| 50-YR, 24-HR Storm (6.26")  | 7.39                            | 7.11                                 |
| 100-YR, 24-HR Storm (7.12") | 9.74                            | 9.42                                 |

**Table 7.5 Detention Calculations**

| Rainfall Event              | Conditions                               |                                           | Max Elevation of Detention Area Per Rainfall Event |                  |              |                  |              |                  |              |                  |
|-----------------------------|------------------------------------------|-------------------------------------------|----------------------------------------------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|
|                             | Pre-Development Peak Flow Combined (CFS) | Post-Development Peak Flow Combined (CFS) | North                                              |                  | South        |                  | Southeast    |                  | West         |                  |
|                             |                                          |                                           | Release Rate                                       | Top of Detention | Release Rate | Top of Detention | Release Rate | Top of Detention | Release Rate | Top of Detention |
|                             |                                          |                                           |                                                    | 928.75'          |              | 915.00'          |              | 920.00'          |              | 914.00'          |
| 1-YR, 24-HR Storm (2.67")   | 0.46                                     | 0.49*                                     | 0.09                                               | 921.15           | 0.03         | 912.44           | 0.02         | 917.57           | 0.20         | 909.96           |
| 2-YR, 24-HR Storm (3.08")   | 1.33                                     | 0.94                                      | 0.14                                               | 921.37           | 0.07         | 912.52           | 0.03         | 917.62           | 0.25         | 910.38           |
| 5-YR, 24-HR Storm (3.81")   | 3.58                                     | 2.07                                      | 0.23                                               | 921.90           | 0.14         | 912.81           | 0.09         | 917.73           | 0.87         | 910.81           |
| 10-YR, 24-HR Storm (4.46")  | 6.09                                     | 4.02                                      | 0.28                                               | 922.24           | 0.23         | 913.09           | 0.12         | 917.86           | 2.10         | 911.16           |
| 25-YR, 24-HR Storm (5.44")  | 10.56                                    | 7.67                                      | 0.36                                               | 923.33           | 0.60         | 913.32           | 0.18         | 918.05           | 4.37         | 911.64           |
| 50-YR, 24-HR Storm (6.26")  | 14.70                                    | 10.86                                     | 0.43                                               | 924.17           | 1.11         | 913.52           | 0.30         | 918.17           | 6.25         | 911.97           |
| 100-YR, 24-HR Storm (7.12") | 19.37                                    | 14.34                                     | 1.38                                               | 924.65           | 1.20         | 913.81           | 0.47         | 918.30           | 8.11         | 912.27           |



\*The 1-year rainfall event is unable to meet the City of Windsor Height's stormwater release rate requirements. This is due to the existing site conditions and topography; a majority of the site is being developed but the surrounding edges of the property need to tie into existing grade. This results in 1.62-acres of undetained area that cannot be captured on the 5.04-acre site. This results in small rain events being unable to be detained and released at or below the pre-development rate.

Per City requirements, each rainfall event's post construction peak flow rate must be equal to or less than the pre-development peak flow rates. The proposed underground & above ground detention basin designs meet this requirement for all, but the 1-year rain event shown in above Tables 7.1 - 7.5. The stormwater system was designed to meet the City of Windsor Heights post-construction stormwater management requirements and the outlet devices are depicted below. The water quality volume calculations are provided in Appendix G.

1. North Detention Basin Primary Outlet Device
  - a. The primary outlet device for underground systems is a 3" diameter circular orifice that will allow stormwater to exit the system over a 24-hour period. The 3" orifice outlet has been designed at an elevation that is required to meet recharge requirements. The secondary outlet is a 12" circular culvert that is used to contain the post-construction 50-year and 100-year storm events.
2. South Detention Basin Primary Outlet Device
  - a. The primary outlet device for the aboveground system is a 3" diameter circular orifice for the 1.25", 1-year, 2-year, and 5-year storm events. The 3" orifice outlet has been designed at an elevation that is required to meet recharge requirements. The secondary outlet is a 10" circular overflow weir that is used to contain the post-construction 10-year, 25-year, 50-year and 100-year storm events.
3. Southeast Detention Basin Primary Outlet Device
  - a. The primary outlet device for the aboveground system is a 3" diameter circular orifice for the 1.25", 1-year, 2-year, 5-year, and 10-year events. The 3" orifice outlet has been designed at an elevation that is required to meet recharge requirements. The secondary device is a 6" x 5.4" rectangular overflow weir that will contain the post-construction 25-year, 50-year and 100-year event storm.
4. West Detention Basin Primary Outlet Device
  - a. The primary outlet device for the aboveground system is a 3" diameter circular orifice for the 1.25", 1-year and 2-year events. The 3" orifice outlet has been designed at an elevation that is required to meet recharge requirements. The secondary outlet device is a 12" x 20" rectangular overflow weir that will contain the post-construction 5-year, 10- year, 25-year, 50-year and 100-year event storm.
  - b. Following the primary, secondary and final outlet device. The West Detention Basin will be piped to a secondary outfall. Due to the lack of existing storm sewer on site the most favorable outfall method to reduce erosion to the existing site is to be dispersed via level spreader. The secondary outfall of the west detention area is 4' below the west detention area and will be outlet on existing grade and will over top the designed weir elevation and flow off site.

Refer to Appendix F for details of the stormwater basin and outlet structures.

Refer to Appendix H for Recharge Volume calculations.



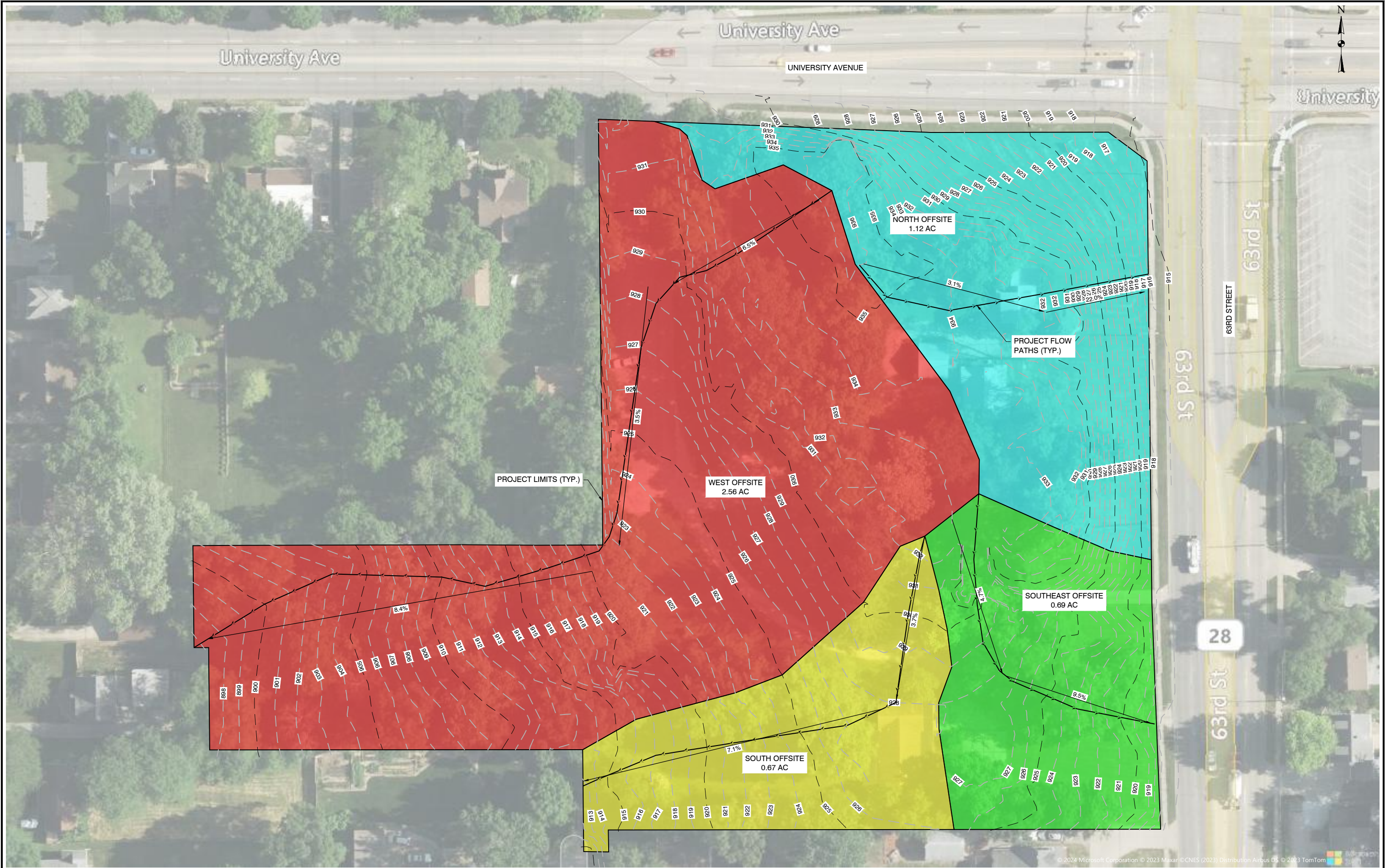
# Appendices



## Appendix A: Natural Conditions Drainage Map



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# APARTMENT COMPLEX

WINDSOR HEIGHTS, IOWA

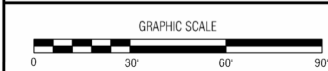
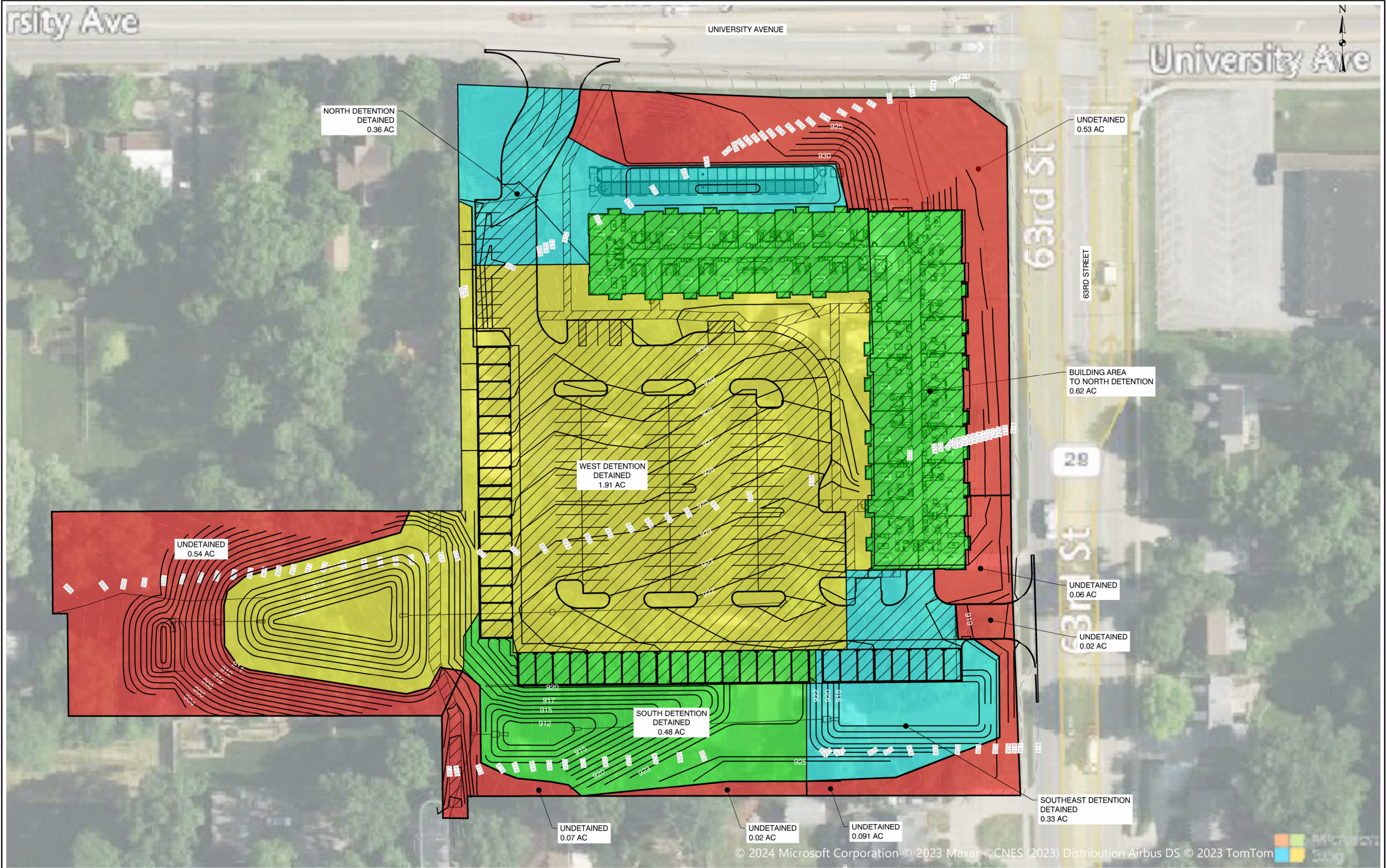
## NATURAL CONDITIONS DRAINAGE MAP

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## Appendix B: Post Development Conditions Drainage Map





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**APARTMENT COMPLEX**  
WINDSOR HEIGHTS, IOWA

**POST DEVELOPMENT  
CONDITIONS DRAINAGE MAP**

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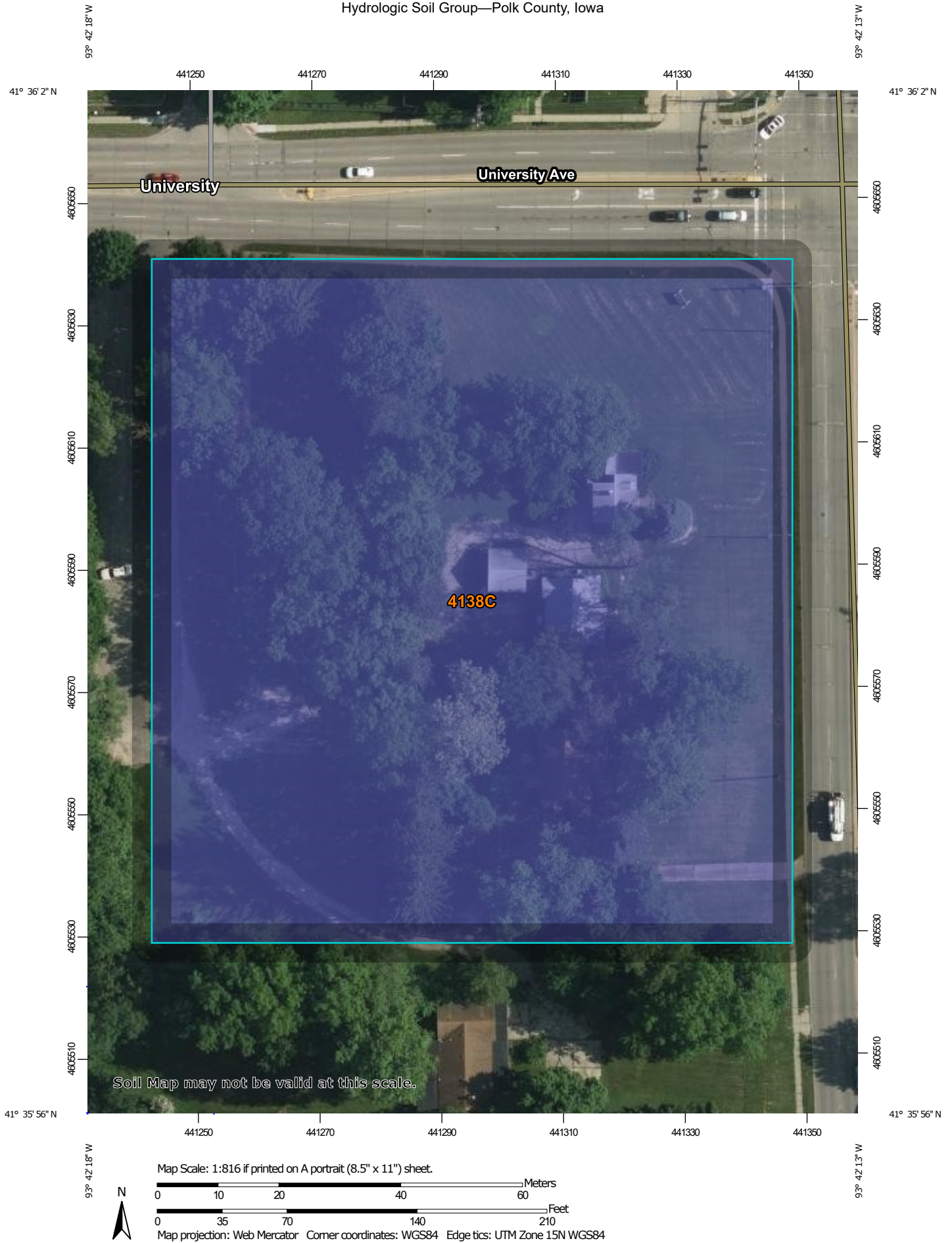
J:\2023 Projects\23-047\04-Design\Stormwater Calculations\23-047 Post-Development Conditions Drainage Map - 05-08-24 - 9:32am - rflageman



## Appendix C: Hydrological Soil Report



Hydrologic Soil Group—Polk County, Iowa





## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

#### Soil Rating Polygons

 A  
 A/D  
 B  
 B/D  
 C  
 C/D  
 D  
 Not rated or not available

#### Soil Rating Lines

 A  
 A/D  
 B  
 B/D  
 C  
 C/D  
 D  
 Not rated or not available

#### Soil Rating Points

 A  
 A/D  
 B  
 B/D

 C  
 C/D  
 D  
 Not rated or not available

### Water Features

 Streams and Canals

### Transportation

 Rails  
 Interstate Highways  
 US Routes  
 Major Roads  
 Local Roads

### Background

 Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL:  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the 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: Polk County, Iowa  
 Survey Area Data: Version 26, Sep 12, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 29, 2020—Jun 12, 2020

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.



## Hydrologic Soil Group

| Map unit symbol                    | Map unit name                                     | Rating | Acres in AOI | Percent of AOI |
|------------------------------------|---------------------------------------------------|--------|--------------|----------------|
| 4138C                              | Clarion-Urban land complex, 5 to 9 percent slopes | B      | 2.9          | 100.0%         |
| <b>Totals for Area of Interest</b> |                                                   |        | <b>2.9</b>   | <b>100.0%</b>  |

## Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

## Rating Options

*Aggregation Method:* Dominant Condition

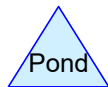
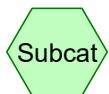
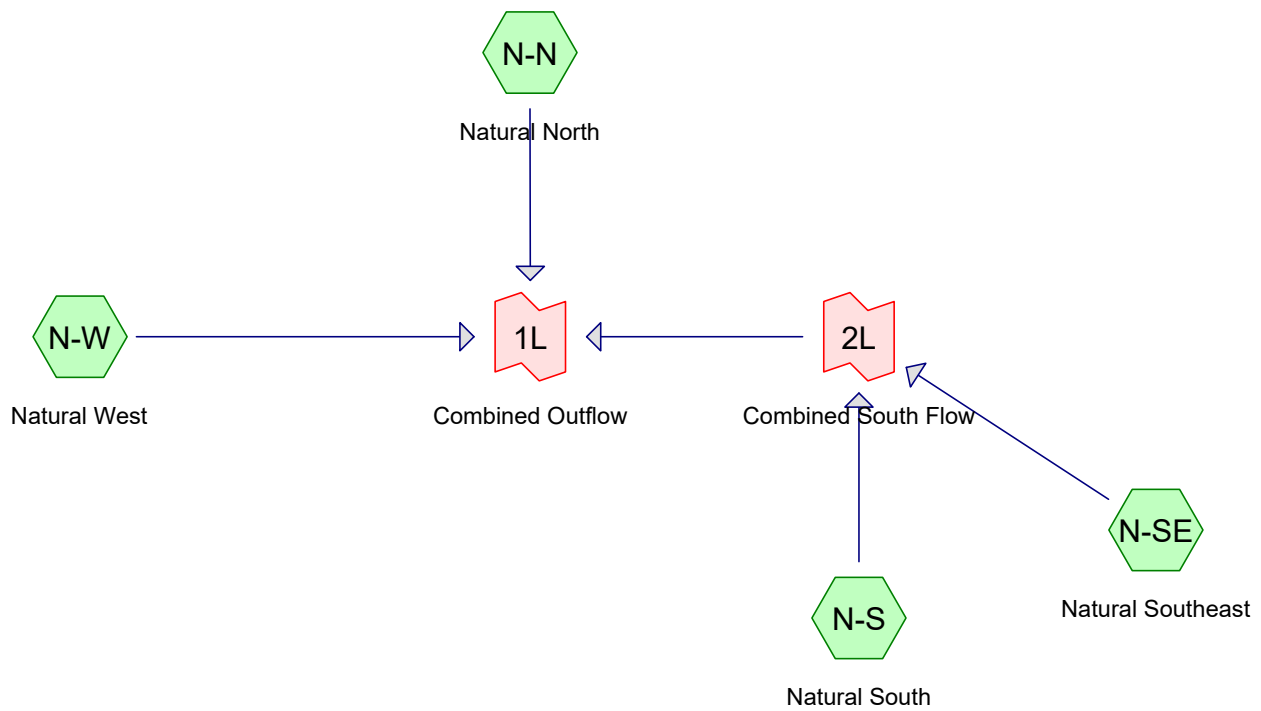


*Component Percent Cutoff: None Specified*

*Tie-break Rule: Higher*



## Appendix D: Natural Conditions HydroCad Report



**Routing Diagram for 23-047 Natural Site Conditions**  
Prepared by Clappsaddle-Garber Associates, Printed 5/7/2024  
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## **23-047 Natural Site Conditions**

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Page 2

### **Project Notes**

Rainfall events imported from "NRCS-Rain.txt" for 1476 IA Polk

## 23-047 Natural Site Conditions

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Page 3

### Rainfall Events Listing

| Event# | Event Name | Storm Type    | Curve | Mode    | Duration (hours) | B/B | Depth (inches) | AMC |
|--------|------------|---------------|-------|---------|------------------|-----|----------------|-----|
| 1      | 1-Year     | Type II 24-hr |       | Default | 24.00            | 1   | 2.67           | 2   |
| 2      | 2-Year     | Type II 24-hr |       | Default | 24.00            | 1   | 3.08           | 2   |
| 3      | 5-Year     | Type II 24-hr |       | Default | 24.00            | 1   | 3.81           | 2   |
| 4      | 10-Year    | Type II 24-hr |       | Default | 24.00            | 1   | 4.46           | 2   |
| 5      | 25-Year    | Type II 24-hr |       | Default | 24.00            | 1   | 5.44           | 2   |
| 6      | 50-Year    | Type II 24-hr |       | Default | 24.00            | 1   | 6.26           | 2   |
| 7      | 100-Year   | Type II 24-hr |       | Default | 24.00            | 1   | 7.12           | 2   |



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Page 4

### Area Listing (all nodes)

| Area<br>(acres) | CN        | Description<br>(subcatchment-numbers)           |
|-----------------|-----------|-------------------------------------------------|
| 5.040           | 58        | Meadow, non-grazed, HSG B (N-N, N-S, N-SE, N-W) |
| <b>5.040</b>    | <b>58</b> | <b>TOTAL AREA</b>                               |

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Page 5

### Soil Listing (all nodes)

| Area<br>(acres) | Soil<br>Group | Subcatchment<br>Numbers |
|-----------------|---------------|-------------------------|
| 0.000           | HSG A         |                         |
| 5.040           | HSG B         | N-N, N-S, N-SE, N-W     |
| 0.000           | HSG C         |                         |
| 0.000           | HSG D         |                         |
| 0.000           | Other         |                         |
| <b>5.040</b>    |               | <b>TOTAL AREA</b>       |



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Page 6

### Ground Covers (all nodes)

| HSG-A<br>(acres) | HSG-B<br>(acres) | HSG-C<br>(acres) | HSG-D<br>(acres) | Other<br>(acres) | Total<br>(acres) | Ground<br>Cover    | Subcatchment<br>Numbers |
|------------------|------------------|------------------|------------------|------------------|------------------|--------------------|-------------------------|
| 0.000            | 5.040            | 0.000            | 0.000            | 0.000            | 5.040            | Meadow, non-grazed | N-N, N-S,<br>N-SE, N-W  |
| <b>0.000</b>     | <b>5.040</b>     | <b>0.000</b>     | <b>0.000</b>     | <b>0.000</b>     | <b>5.040</b>     | <b>TOTAL AREA</b>  |                         |

## 23-047 Natural Site Conditions

Type II 24-hr 1-Year Rainfall=2.67"

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Page 7

Time span=2.00-26.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

### SubcatchmentN-N: Natural North

Runoff Area=1.120 ac 0.00% Impervious Runoff Depth=0.18"  
Flow Length=209' Tc=9.0 min CN=58 Runoff=0.10 cfs 0.016 af

### SubcatchmentN-S: Natural South

Runoff Area=0.670 ac 0.00% Impervious Runoff Depth=0.18"  
Flow Length=337' Tc=9.2 min CN=58 Runoff=0.06 cfs 0.010 af

### SubcatchmentN-SE: Natural Southeast

Runoff Area=0.690 ac 0.00% Impervious Runoff Depth=0.18"  
Flow Length=266' Tc=8.3 min CN=58 Runoff=0.07 cfs 0.010 af

### SubcatchmentN-W: Natural West

Runoff Area=2.560 ac 0.00% Impervious Runoff Depth=0.18"  
Flow Length=420' Tc=9.4 min CN=58 Runoff=0.22 cfs 0.038 af

### Link 1L: Combined Outflow

Inflow=0.46 cfs 0.074 af  
Primary=0.46 cfs 0.074 af

### Link 2L: Combined South Flow

Inflow=0.13 cfs 0.020 af  
Primary=0.13 cfs 0.020 af

**Total Runoff Area = 5.040 ac Runoff Volume = 0.074 af Average Runoff Depth = 0.18"**  
**100.00% Pervious = 5.040 ac 0.00% Impervious = 0.000 ac**



## 23-047 Natural Site Conditions

Prepared by Clappsaddle-Garber Associates

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Type II 24-hr 1-Year Rainfall=2.67"

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Page 8

### Summary for Subcatchment N-N: Natural North

Runoff = 0.10 cfs @ 12.07 hrs, Volume= 0.016 af, Depth= 0.18"  
Routed to Link 1L : Combined Outflow

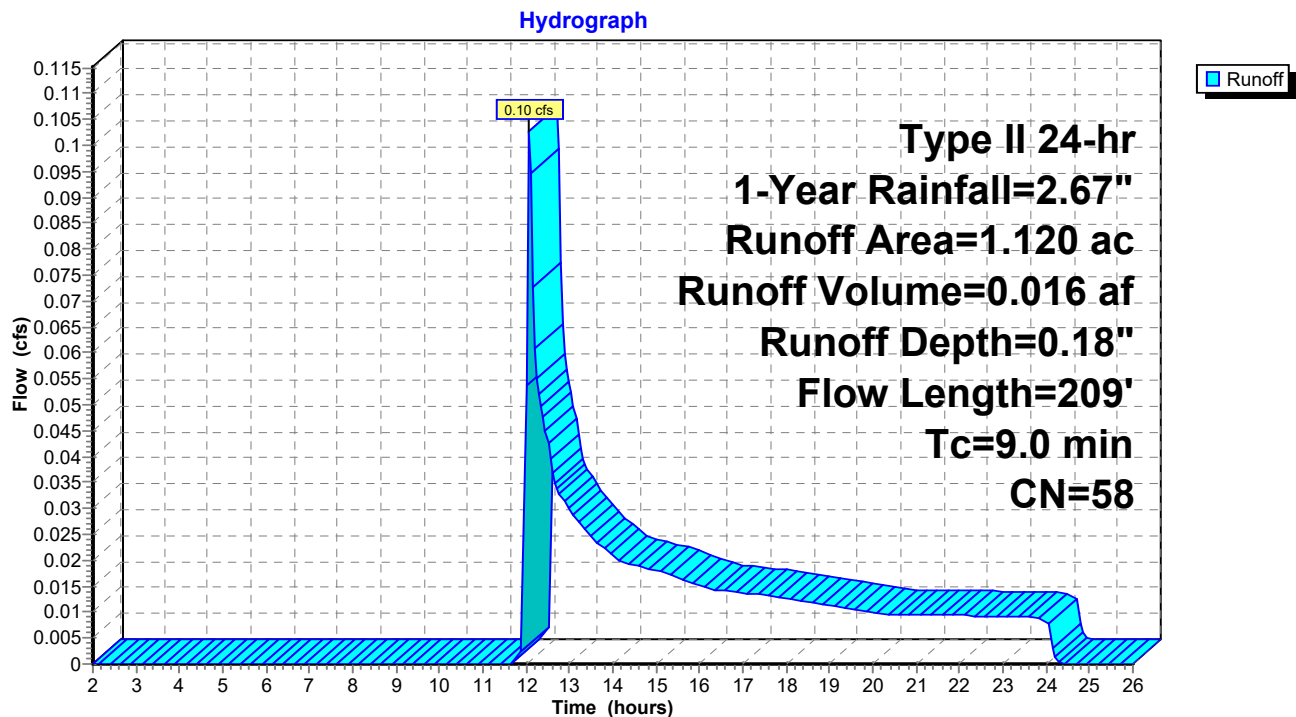
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 1-Year Rainfall=2.67"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 1.120     | 58 | Meadow, non-grazed, HSG B |
| 1.120     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 8.4      | 100           | 0.0310        | 0.20              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 0.6      | 109           | 0.2200        | 3.28              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.0      | 209           | Total         |                   |                |                                                                                       |

### Subcatchment N-N: Natural North



## 23-047 Natural Site Conditions

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Type II 24-hr 1-Year Rainfall=2.67"

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Page 9

### Summary for Subcatchment N-S: Natural South

Runoff = 0.06 cfs @ 12.07 hrs, Volume= 0.010 af, Depth= 0.18"  
Routed to Link 2L : Combined South Flow

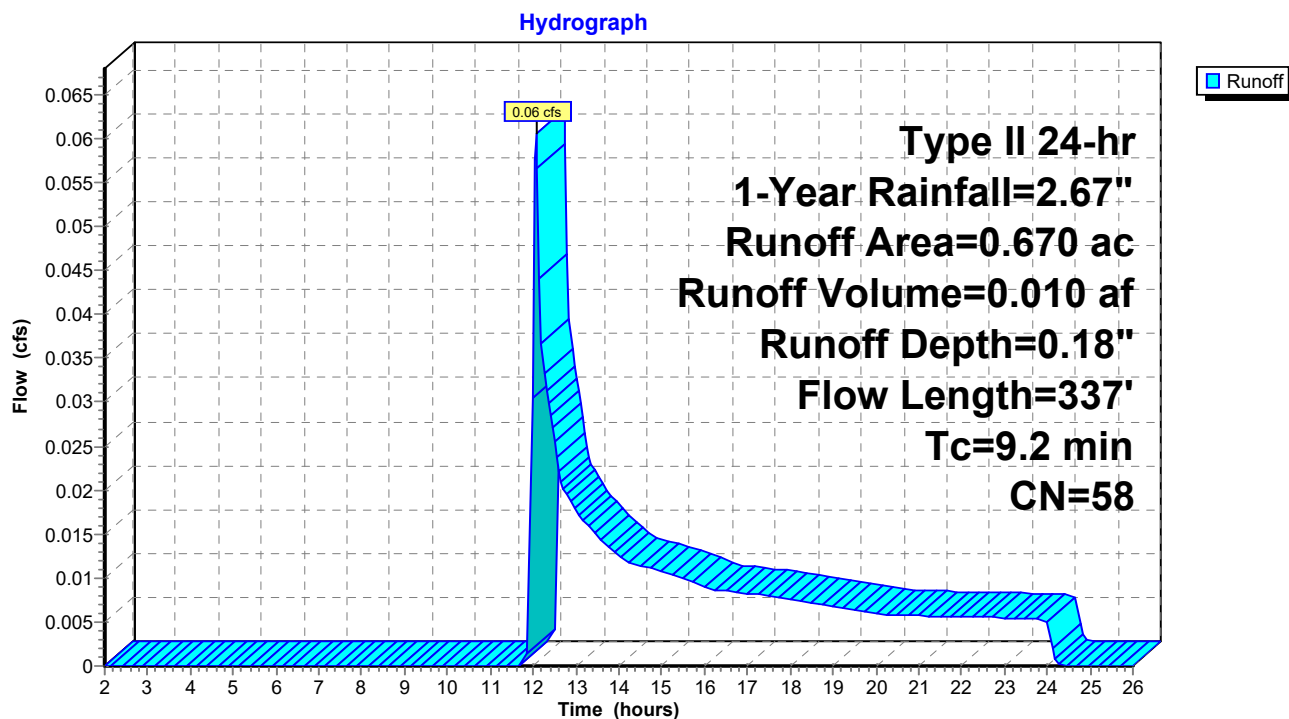
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 1-Year Rainfall=2.67"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 0.670     | 58 | Meadow, non-grazed, HSG B |
| 0.670     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 7.1      | 100           | 0.0480        | 0.24              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 2.1      | 237           | 0.0740        | 1.90              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.2      | 337           | Total         |                   |                |                                                                                       |

### Subcatchment N-S: Natural South





## 23-047 Natural Site Conditions

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Type II 24-hr 1-Year Rainfall=2.67"

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Page 10

### Summary for Subcatchment N-SE: Natural Southeast

Runoff = 0.07 cfs @ 12.06 hrs, Volume= 0.010 af, Depth= 0.18"  
Routed to Link 2L : Combined South Flow

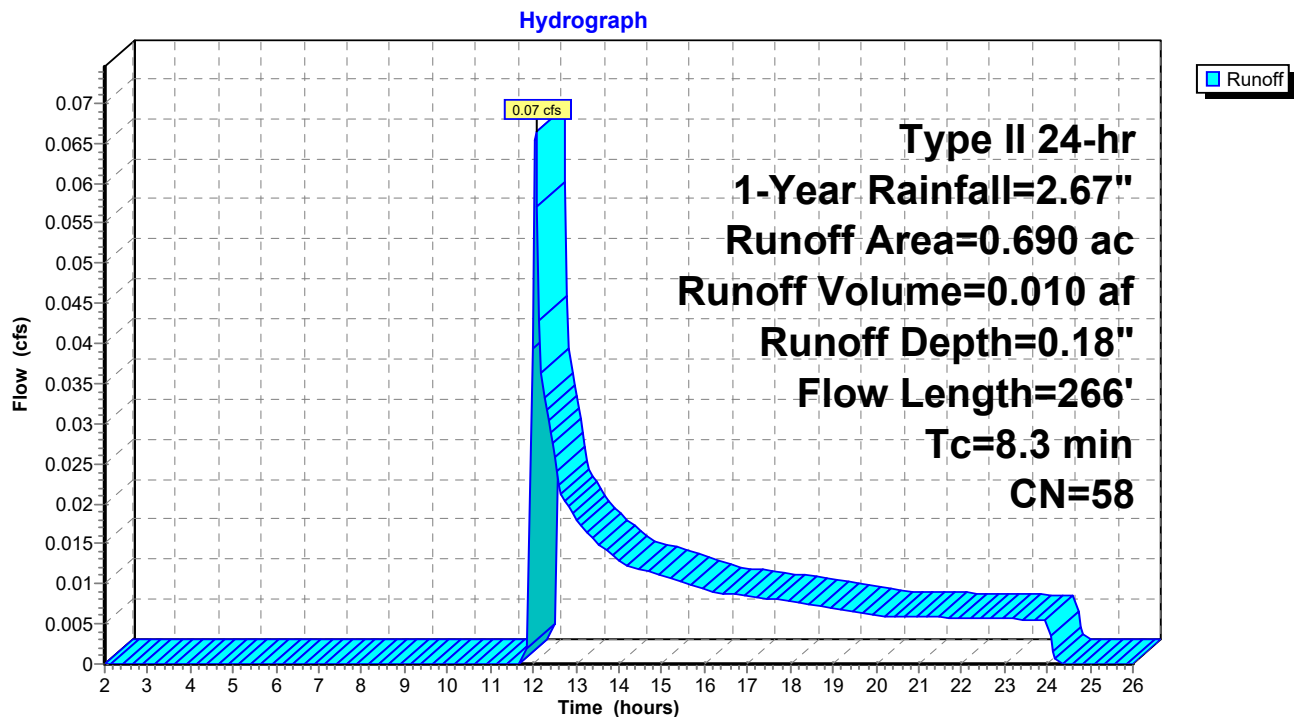
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 1-Year Rainfall=2.67"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 0.690     | 58 | Meadow, non-grazed, HSG B |
| 0.690     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                   |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------|
| 7.1      | 100           | 0.0470        | 0.23              |                | Sheet Flow,<br>Grass: Short n= 0.150 P2= 3.04"                |
| 1.2      | 166           | 0.1000        | 2.21              |                | Shallow Concentrated Flow,<br>Short Grass Pasture Kv= 7.0 fps |
| 8.3      | 266           | Total         |                   |                |                                                               |

### Subcatchment N-SE: Natural Southeast



## 23-047 Natural Site Conditions

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Type II 24-hr 1-Year Rainfall=2.67"

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Page 11

### Summary for Subcatchment N-W: Natural West

Runoff = 0.22 cfs @ 12.08 hrs, Volume= 0.038 af, Depth= 0.18"  
Routed to Link 1L : Combined Outflow

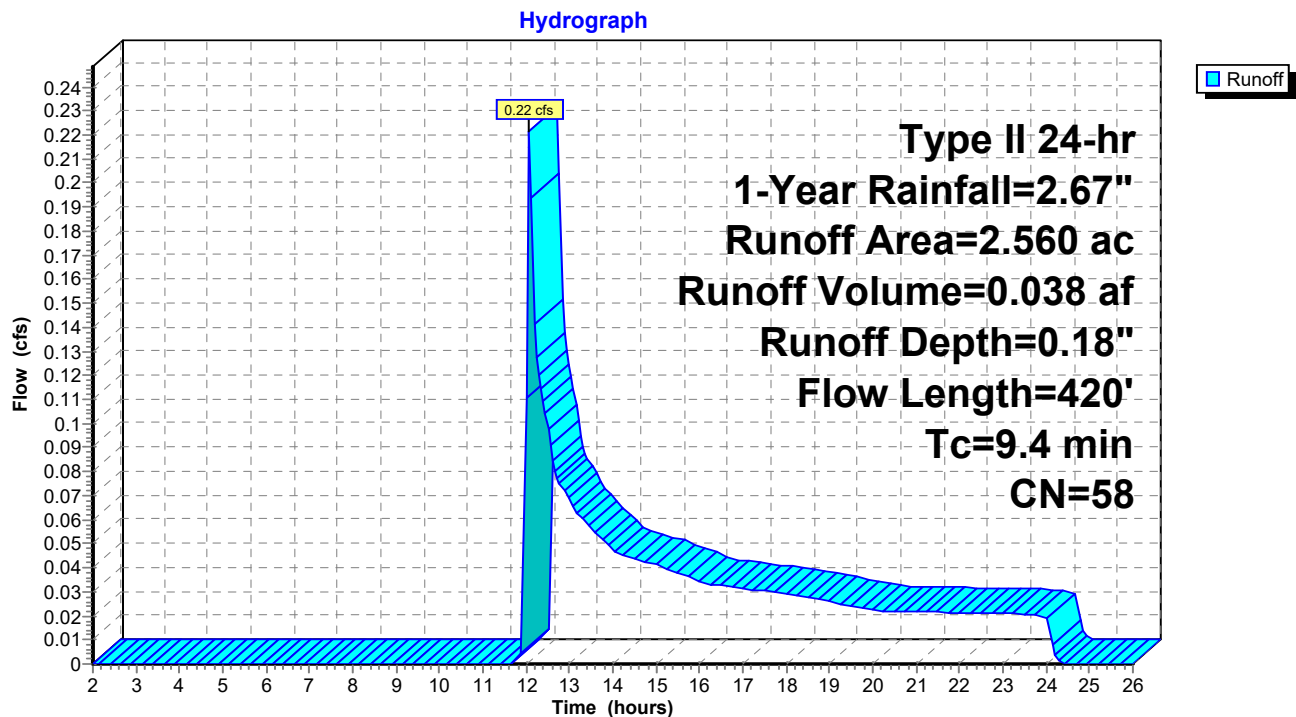
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 1-Year Rainfall=2.67"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 2.560     | 58 | Meadow, non-grazed, HSG B |
| 2.560     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 6.3      | 100           | 0.0650        | 0.27              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 3.1      | 320           | 0.0600        | 1.71              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.4      | 420           | Total         |                   |                |                                                                                       |

### Subcatchment N-W: Natural West





## 23-047 Natural Site Conditions

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Type II 24-hr 1-Year Rainfall=2.67"

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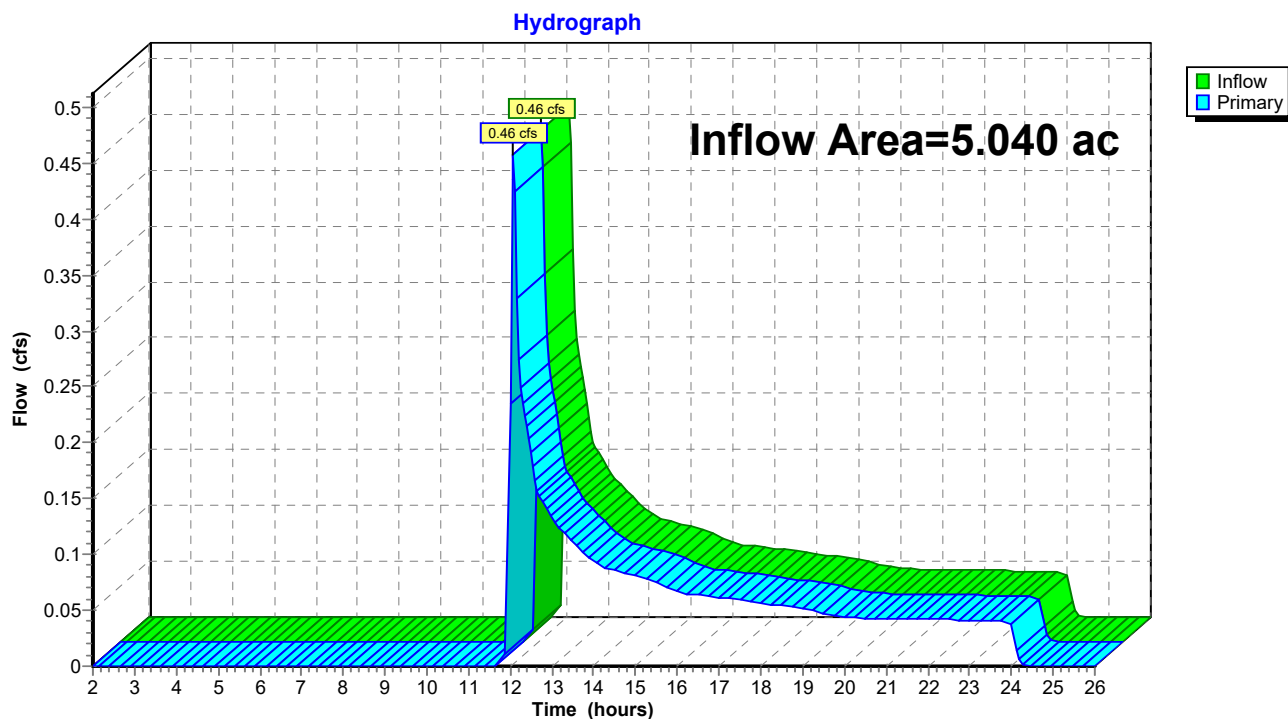
Page 12

### Summary for Link 1L: Combined Outflow

Inflow Area = 5.040 ac, 0.00% Impervious, Inflow Depth = 0.18" for 1-Year event  
Inflow = 0.46 cfs @ 12.07 hrs, Volume= 0.074 af  
Primary = 0.46 cfs @ 12.07 hrs, Volume= 0.074 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs

### Link 1L: Combined Outflow



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Type II 24-hr 1-Year Rainfall=2.67"

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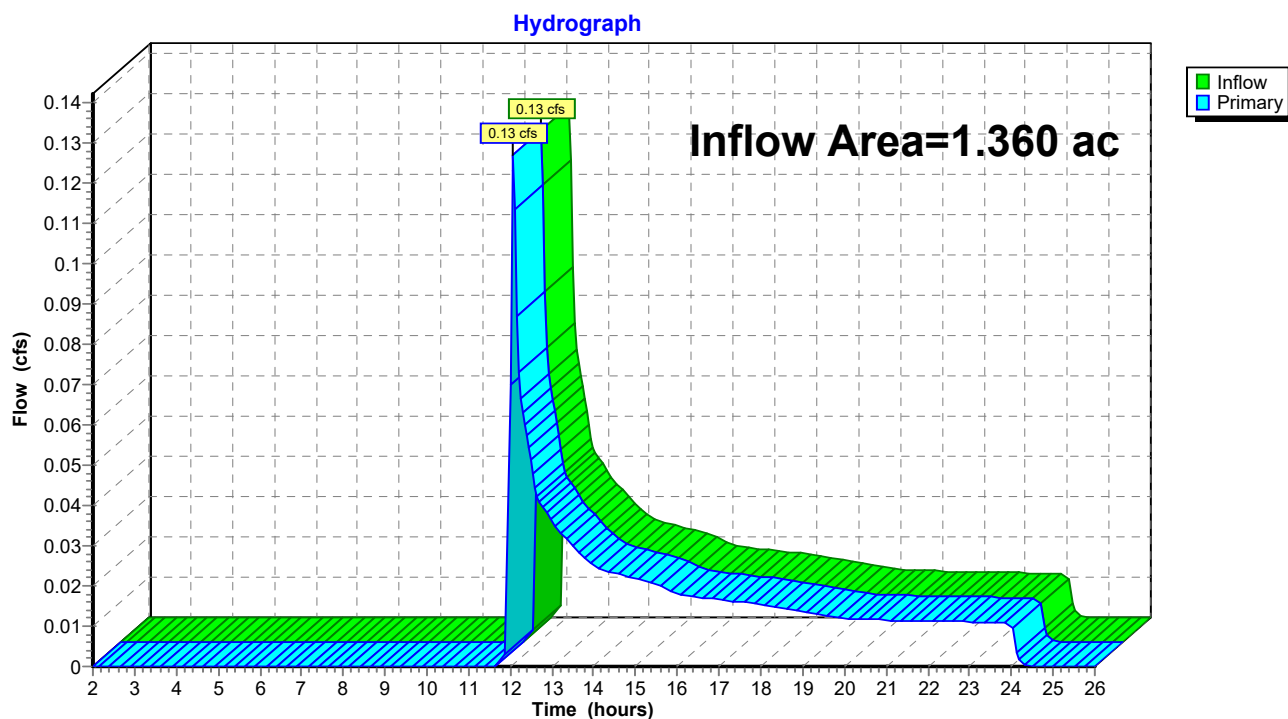
Page 13

### Summary for Link 2L: Combined South Flow

Inflow Area = 1.360 ac, 0.00% Impervious, Inflow Depth = 0.18" for 1-Year event  
Inflow = 0.13 cfs @ 12.07 hrs, Volume= 0.020 af  
Primary = 0.13 cfs @ 12.07 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min  
Routed to Link 1L : Combined Outflow

Primary outflow = Inflow, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs

### Link 2L: Combined South Flow





## 23-047 Natural Site Conditions

Type II 24-hr 2-Year Rainfall=3.08"

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Page 14

Time span=2.00-26.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

### SubcatchmentN-N: Natural North

Runoff Area=1.120 ac 0.00% Impervious Runoff Depth=0.30"  
Flow Length=209' Tc=9.0 min CN=58 Runoff=0.30 cfs 0.028 af

### SubcatchmentN-S: Natural South

Runoff Area=0.670 ac 0.00% Impervious Runoff Depth=0.30"  
Flow Length=337' Tc=9.2 min CN=58 Runoff=0.18 cfs 0.017 af

### SubcatchmentN-SE: Natural Southeast

Runoff Area=0.690 ac 0.00% Impervious Runoff Depth=0.30"  
Flow Length=266' Tc=8.3 min CN=58 Runoff=0.19 cfs 0.017 af

### SubcatchmentN-W: Natural West

Runoff Area=2.560 ac 0.00% Impervious Runoff Depth=0.30"  
Flow Length=420' Tc=9.4 min CN=58 Runoff=0.67 cfs 0.064 af

### Link 1L: Combined Outflow

Inflow=1.33 cfs 0.126 af  
Primary=1.33 cfs 0.126 af

### Link 2L: Combined South Flow

Inflow=0.37 cfs 0.034 af  
Primary=0.37 cfs 0.034 af

**Total Runoff Area = 5.040 ac Runoff Volume = 0.126 af Average Runoff Depth = 0.30"**  
**100.00% Pervious = 5.040 ac 0.00% Impervious = 0.000 ac**

## 23-047 Natural Site Conditions

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Type II 24-hr 2-Year Rainfall=3.08"

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Page 15

### Summary for Subcatchment N-N: Natural North

Runoff = 0.30 cfs @ 12.05 hrs, Volume= 0.028 af, Depth= 0.30"  
Routed to Link 1L : Combined Outflow

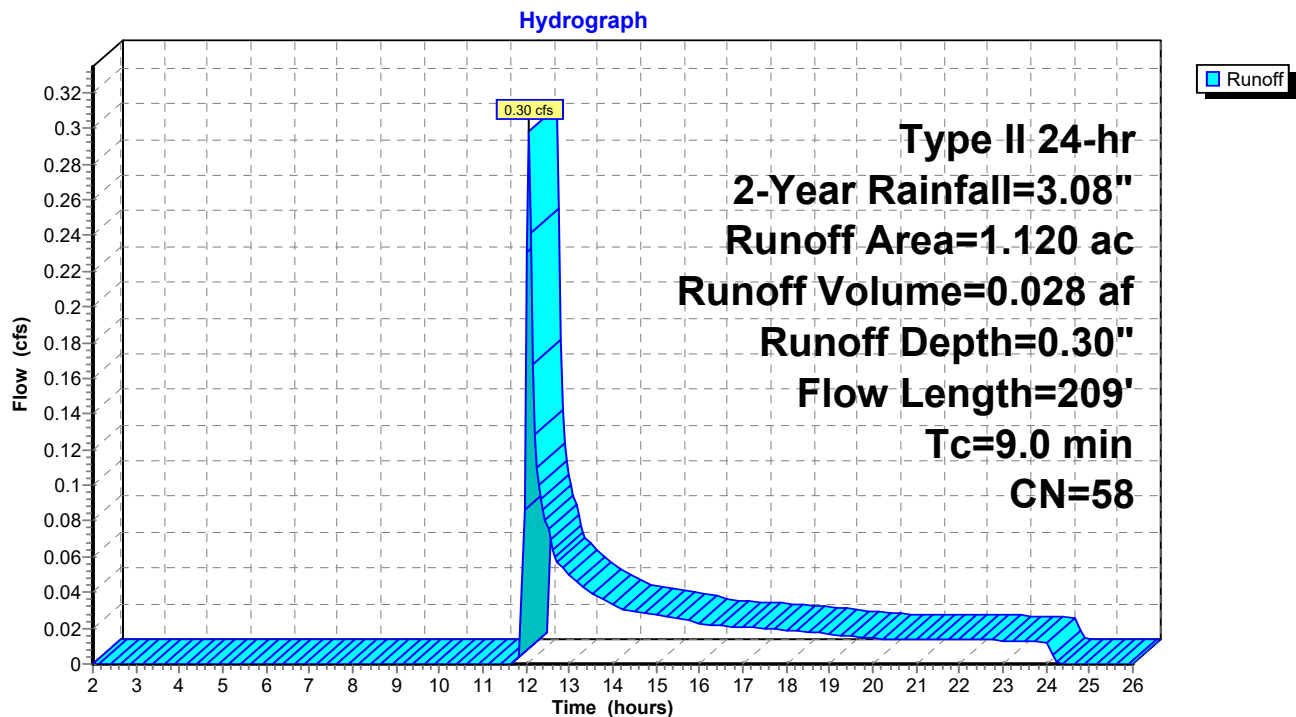
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2-Year Rainfall=3.08"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 1.120     | 58 | Meadow, non-grazed, HSG B |
| 1.120     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 8.4      | 100           | 0.0310        | 0.20              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 0.6      | 109           | 0.2200        | 3.28              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.0      | 209           | Total         |                   |                |                                                                                       |

### Subcatchment N-N: Natural North





## 23-047 Natural Site Conditions

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Type II 24-hr 2-Year Rainfall=3.08"

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Page 16

### Summary for Subcatchment N-S: Natural South

Runoff = 0.18 cfs @ 12.05 hrs, Volume= 0.017 af, Depth= 0.30"  
Routed to Link 2L : Combined South Flow

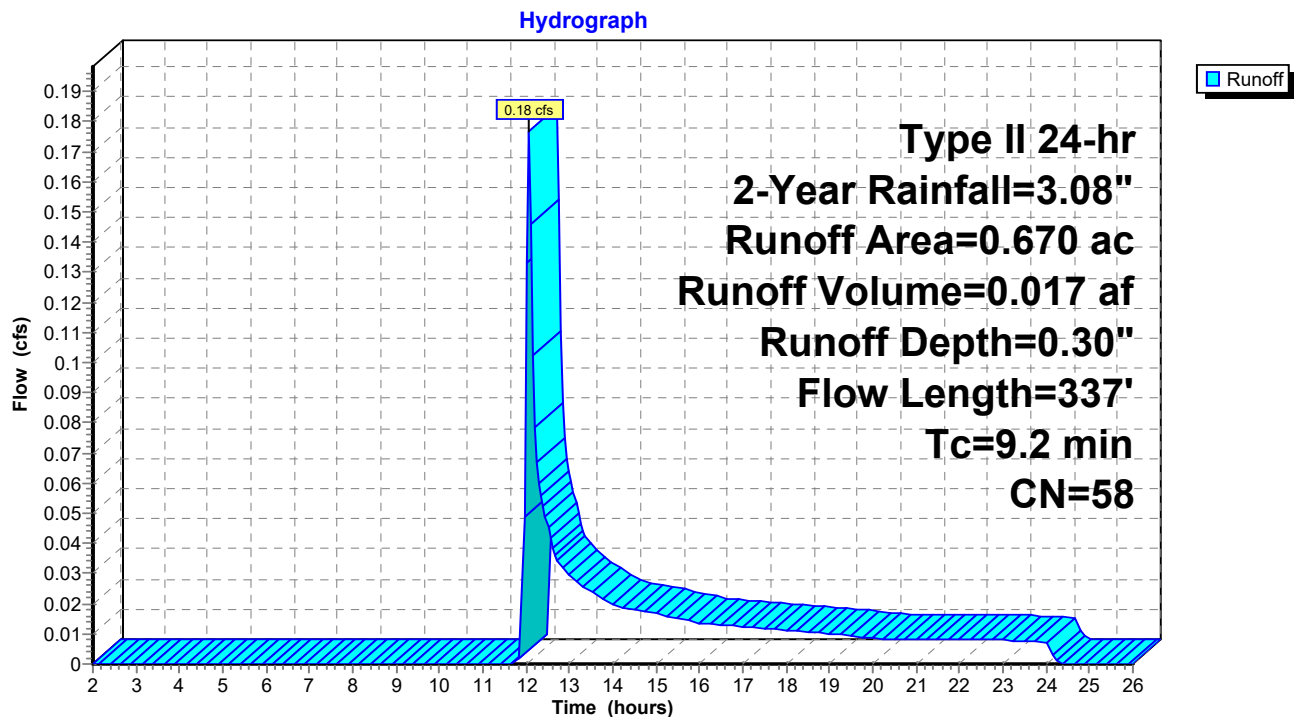
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2-Year Rainfall=3.08"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 0.670     | 58 | Meadow, non-grazed, HSG B |
| 0.670     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 7.1      | 100           | 0.0480        | 0.24              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 2.1      | 237           | 0.0740        | 1.90              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.2      | 337           | Total         |                   |                |                                                                                       |

### Subcatchment N-S: Natural South



## 23-047 Natural Site Conditions

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Type II 24-hr 2-Year Rainfall=3.08"

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Page 17

### Summary for Subcatchment N-SE: Natural Southeast

Runoff = 0.19 cfs @ 12.04 hrs, Volume= 0.017 af, Depth= 0.30"  
Routed to Link 2L : Combined South Flow

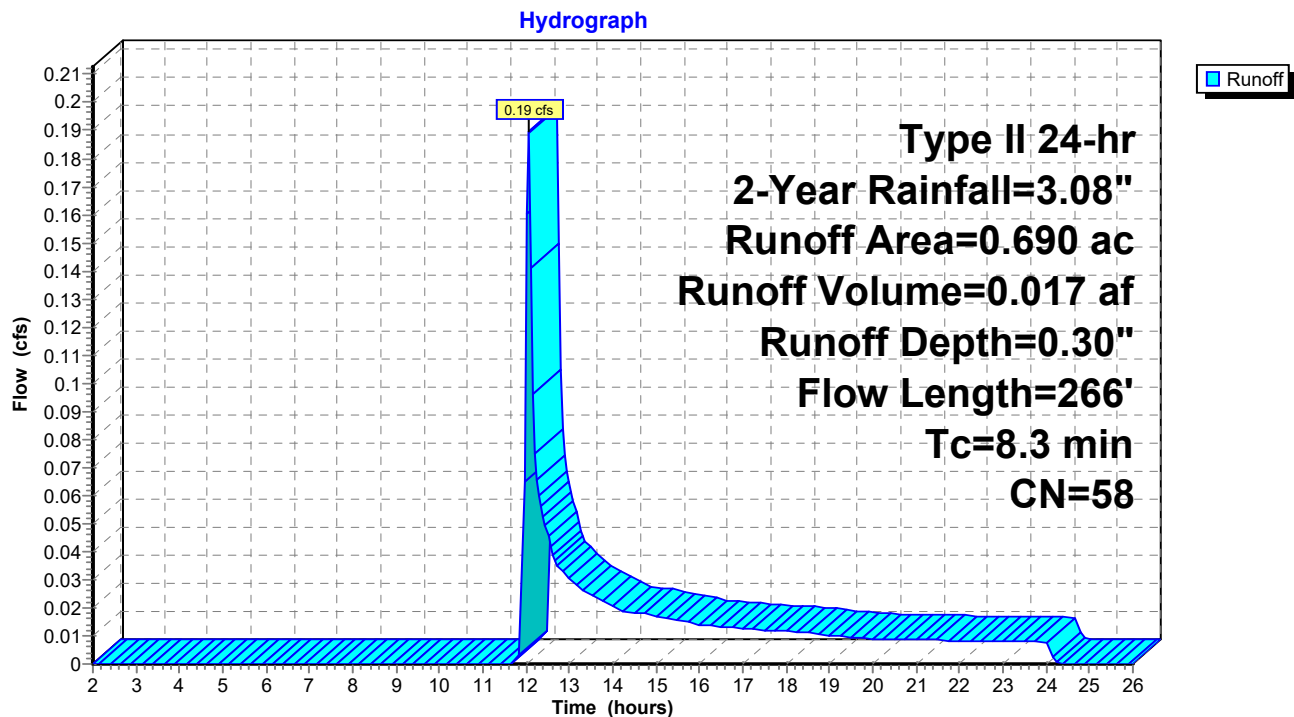
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2-Year Rainfall=3.08"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 0.690     | 58 | Meadow, non-grazed, HSG B |
| 0.690     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                   |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------|
| 7.1      | 100           | 0.0470        | 0.23              |                | Sheet Flow,<br>Grass: Short n= 0.150 P2= 3.04"                |
| 1.2      | 166           | 0.1000        | 2.21              |                | Shallow Concentrated Flow,<br>Short Grass Pasture Kv= 7.0 fps |
| 8.3      | 266           | Total         |                   |                |                                                               |

### Subcatchment N-SE: Natural Southeast





## 23-047 Natural Site Conditions

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Type II 24-hr 2-Year Rainfall=3.08"

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Page 18

### Summary for Subcatchment N-W: Natural West

Runoff = 0.67 cfs @ 12.06 hrs, Volume= 0.064 af, Depth= 0.30"  
Routed to Link 1L : Combined Outflow

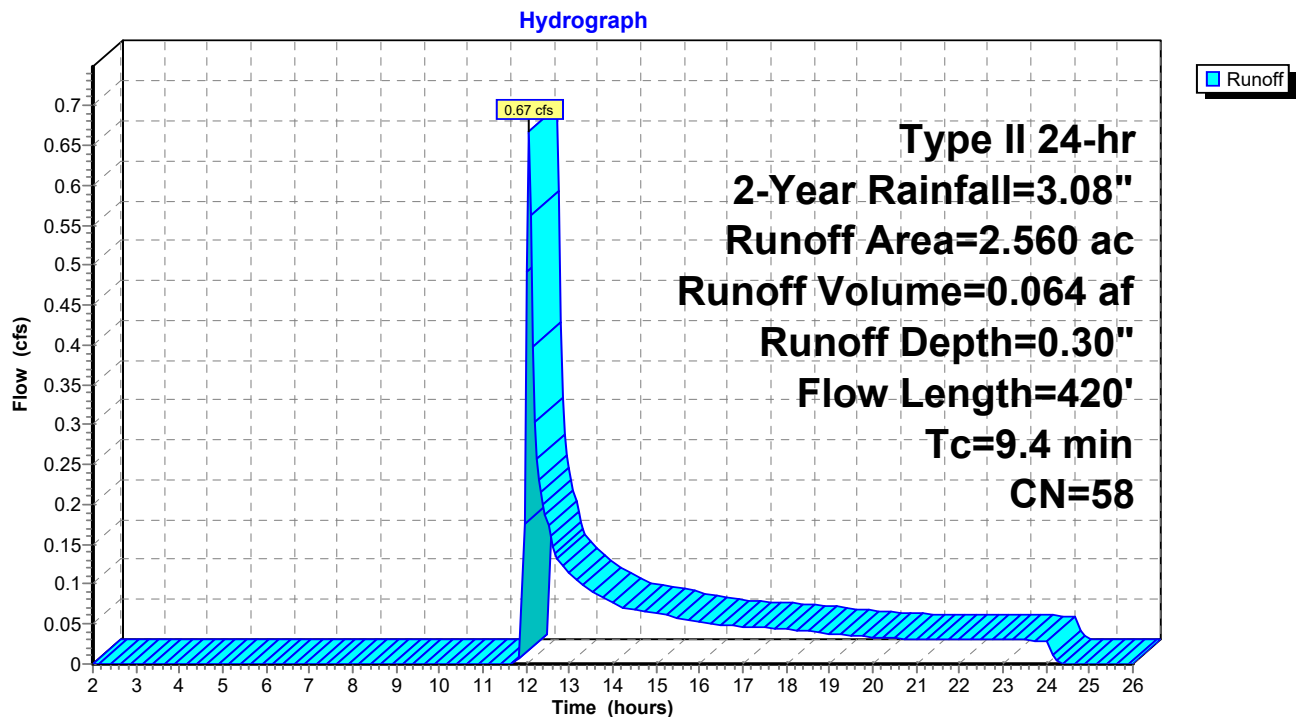
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2-Year Rainfall=3.08"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 2.560     | 58 | Meadow, non-grazed, HSG B |
| 2.560     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 6.3      | 100           | 0.0650        | 0.27              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 3.1      | 320           | 0.0600        | 1.71              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.4      | 420           | Total         |                   |                |                                                                                       |

### Subcatchment N-W: Natural West



## 23-047 Natural Site Conditions

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Type II 24-hr 2-Year Rainfall=3.08"

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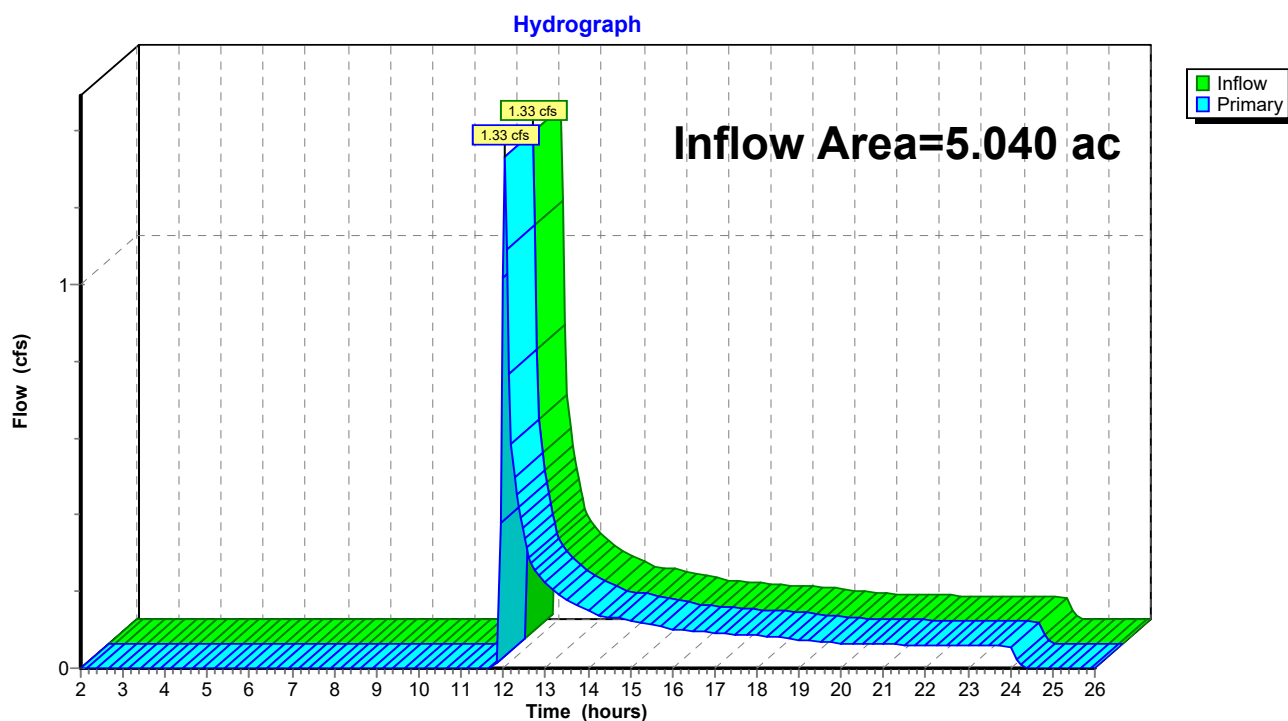
Page 19

### Summary for Link 1L: Combined Outflow

Inflow Area = 5.040 ac, 0.00% Impervious, Inflow Depth = 0.30" for 2-Year event  
Inflow = 1.33 cfs @ 12.05 hrs, Volume= 0.126 af  
Primary = 1.33 cfs @ 12.05 hrs, Volume= 0.126 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs

### Link 1L: Combined Outflow





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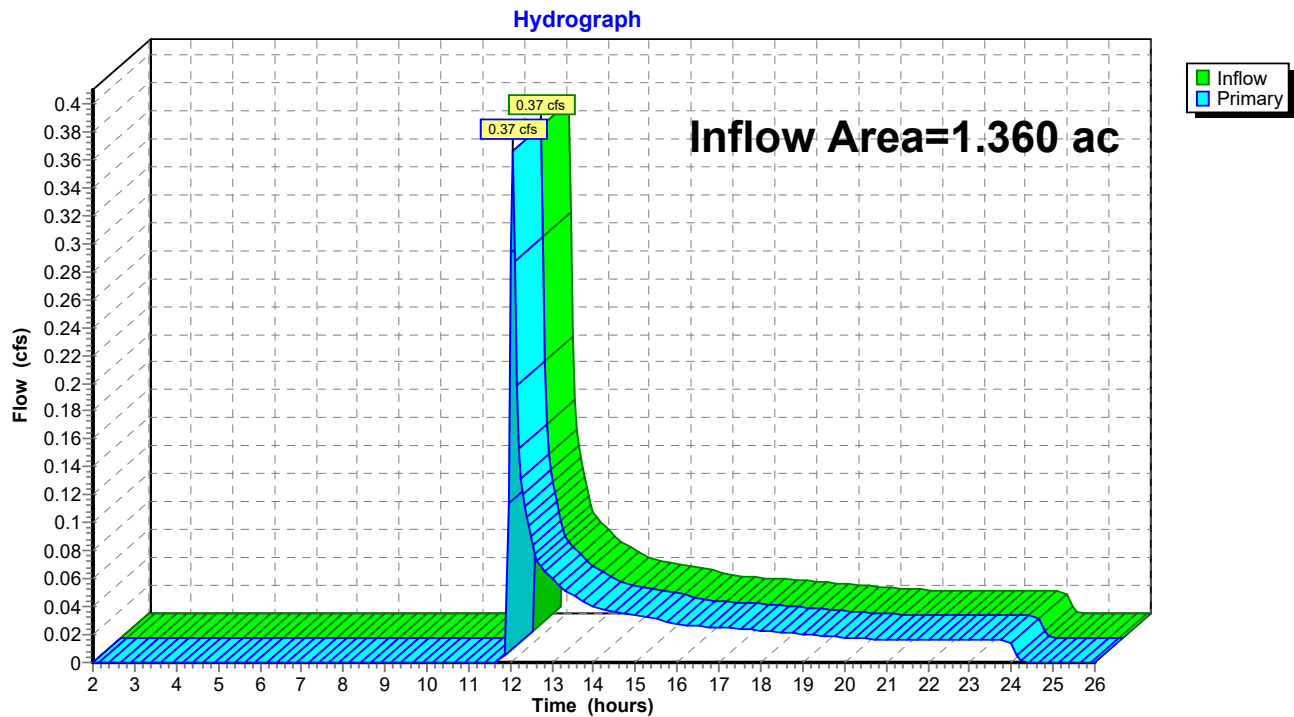
Page 20

### Summary for Link 2L: Combined South Flow

Inflow Area = 1.360 ac, 0.00% Impervious, Inflow Depth = 0.30" for 2-Year event  
Inflow = 0.37 cfs @ 12.05 hrs, Volume= 0.034 af  
Primary = 0.37 cfs @ 12.05 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min  
Routed to Link 1L : Combined Outflow

Primary outflow = Inflow, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs

### Link 2L: Combined South Flow



## 23-047 Natural Site Conditions

Type II 24-hr 5-Year Rainfall=3.81"

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Page 21

Time span=2.00-26.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

### SubcatchmentN-N: Natural North

Runoff Area=1.120 ac 0.00% Impervious Runoff Depth=0.58"  
Flow Length=209' Tc=9.0 min CN=58 Runoff=0.80 cfs 0.054 af

### SubcatchmentN-S: Natural South

Runoff Area=0.670 ac 0.00% Impervious Runoff Depth=0.58"  
Flow Length=337' Tc=9.2 min CN=58 Runoff=0.48 cfs 0.032 af

### SubcatchmentN-SE: Natural Southeast

Runoff Area=0.690 ac 0.00% Impervious Runoff Depth=0.58"  
Flow Length=266' Tc=8.3 min CN=58 Runoff=0.51 cfs 0.033 af

### SubcatchmentN-W: Natural West

Runoff Area=2.560 ac 0.00% Impervious Runoff Depth=0.58"  
Flow Length=420' Tc=9.4 min CN=58 Runoff=1.80 cfs 0.124 af

### Link 1L: Combined Outflow

Inflow=3.58 cfs 0.244 af  
Primary=3.58 cfs 0.244 af

### Link 2L: Combined South Flow

Inflow=0.98 cfs 0.066 af  
Primary=0.98 cfs 0.066 af

**Total Runoff Area = 5.040 ac Runoff Volume = 0.244 af Average Runoff Depth = 0.58"**  
**100.00% Pervious = 5.040 ac 0.00% Impervious = 0.000 ac**



## 23-047 Natural Site Conditions

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Type II 24-hr 5-Year Rainfall=3.81"

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Page 22

### Summary for Subcatchment N-N: Natural North

Runoff = 0.80 cfs @ 12.03 hrs, Volume= 0.054 af, Depth= 0.58"  
Routed to Link 1L : Combined Outflow

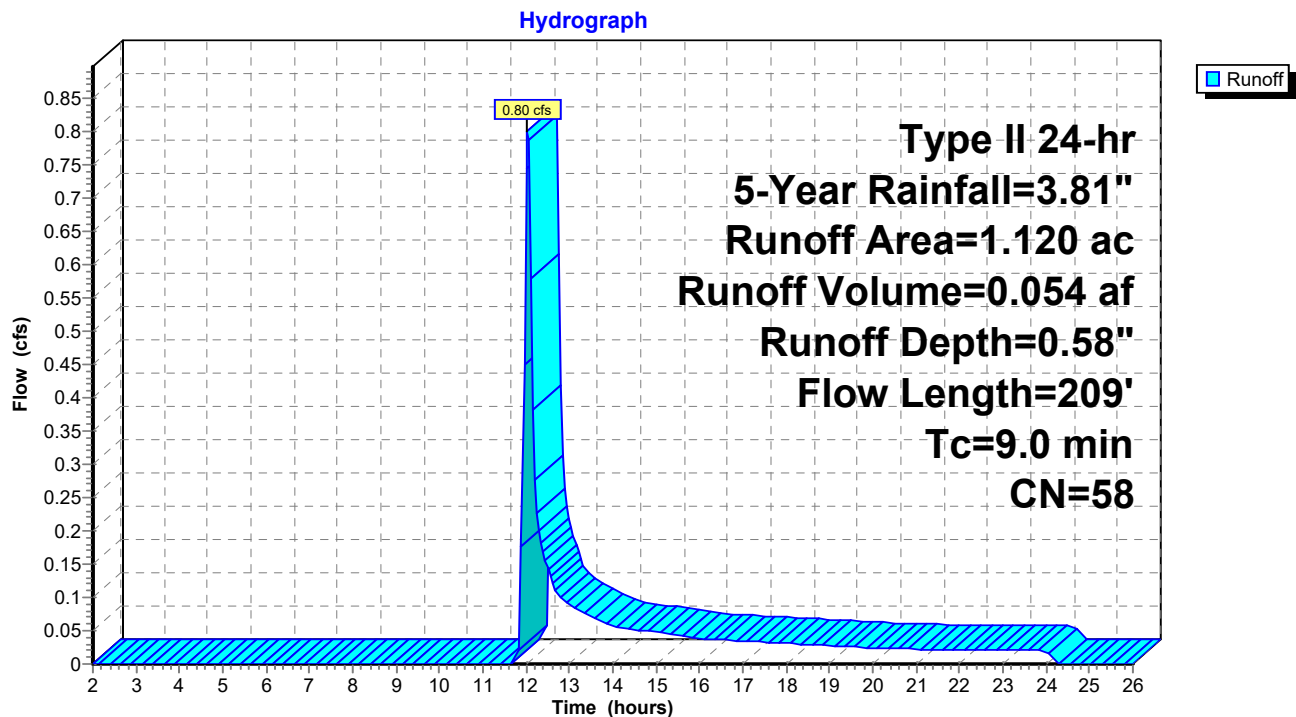
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 5-Year Rainfall=3.81"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 1.120     | 58 | Meadow, non-grazed, HSG B |
| 1.120     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 8.4      | 100           | 0.0310        | 0.20              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 0.6      | 109           | 0.2200        | 3.28              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.0      | 209           | Total         |                   |                |                                                                                       |

### Subcatchment N-N: Natural North



## 23-047 Natural Site Conditions

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Type II 24-hr 5-Year Rainfall=3.81"

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Page 23

### Summary for Subcatchment N-S: Natural South

Runoff = 0.48 cfs @ 12.04 hrs, Volume= 0.032 af, Depth= 0.58"  
Routed to Link 2L : Combined South Flow

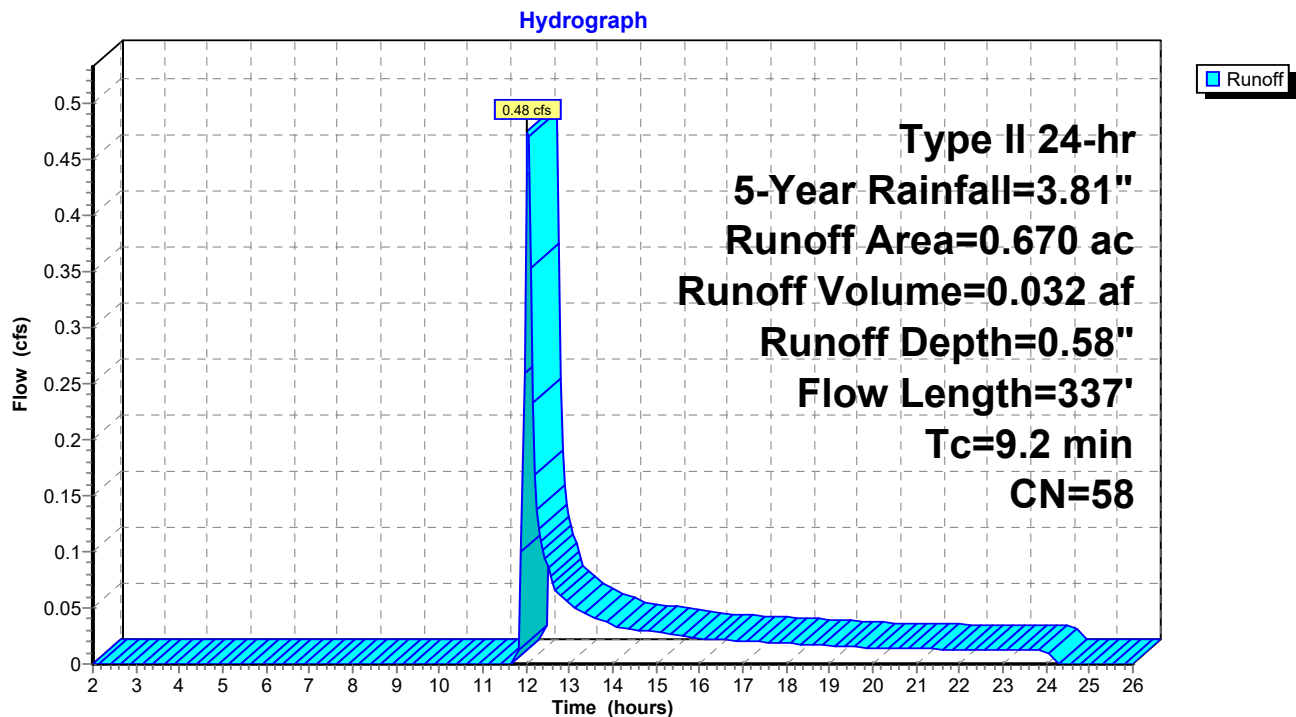
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 5-Year Rainfall=3.81"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 0.670     | 58 | Meadow, non-grazed, HSG B |
| 0.670     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 7.1      | 100           | 0.0480        | 0.24              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 2.1      | 237           | 0.0740        | 1.90              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.2      | 337           | Total         |                   |                |                                                                                       |

### Subcatchment N-S: Natural South





## 23-047 Natural Site Conditions

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Type II 24-hr 5-Year Rainfall=3.81"

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Page 24

### Summary for Subcatchment N-SE: Natural Southeast

Runoff = 0.51 cfs @ 12.02 hrs, Volume= 0.033 af, Depth= 0.58"  
Routed to Link 2L : Combined South Flow

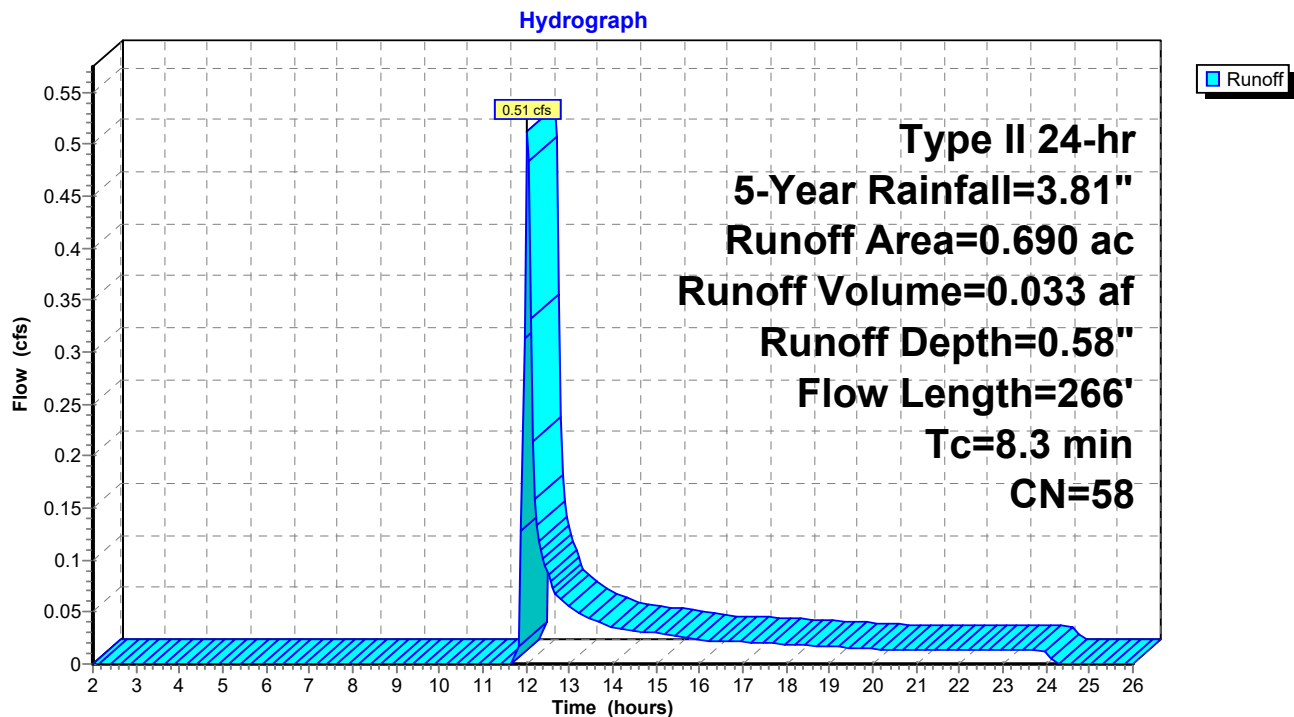
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 5-Year Rainfall=3.81"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 0.690     | 58 | Meadow, non-grazed, HSG B |
| 0.690     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                   |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------|
| 7.1      | 100           | 0.0470        | 0.23              |                | Sheet Flow,<br>Grass: Short n= 0.150 P2= 3.04"                |
| 1.2      | 166           | 0.1000        | 2.21              |                | Shallow Concentrated Flow,<br>Short Grass Pasture Kv= 7.0 fps |
| 8.3      | 266           | Total         |                   |                |                                                               |

### Subcatchment N-SE: Natural Southeast



## 23-047 Natural Site Conditions

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Type II 24-hr 5-Year Rainfall=3.81"

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Page 25

### Summary for Subcatchment N-W: Natural West

Runoff = 1.80 cfs @ 12.04 hrs, Volume= 0.124 af, Depth= 0.58"  
Routed to Link 1L : Combined Outflow

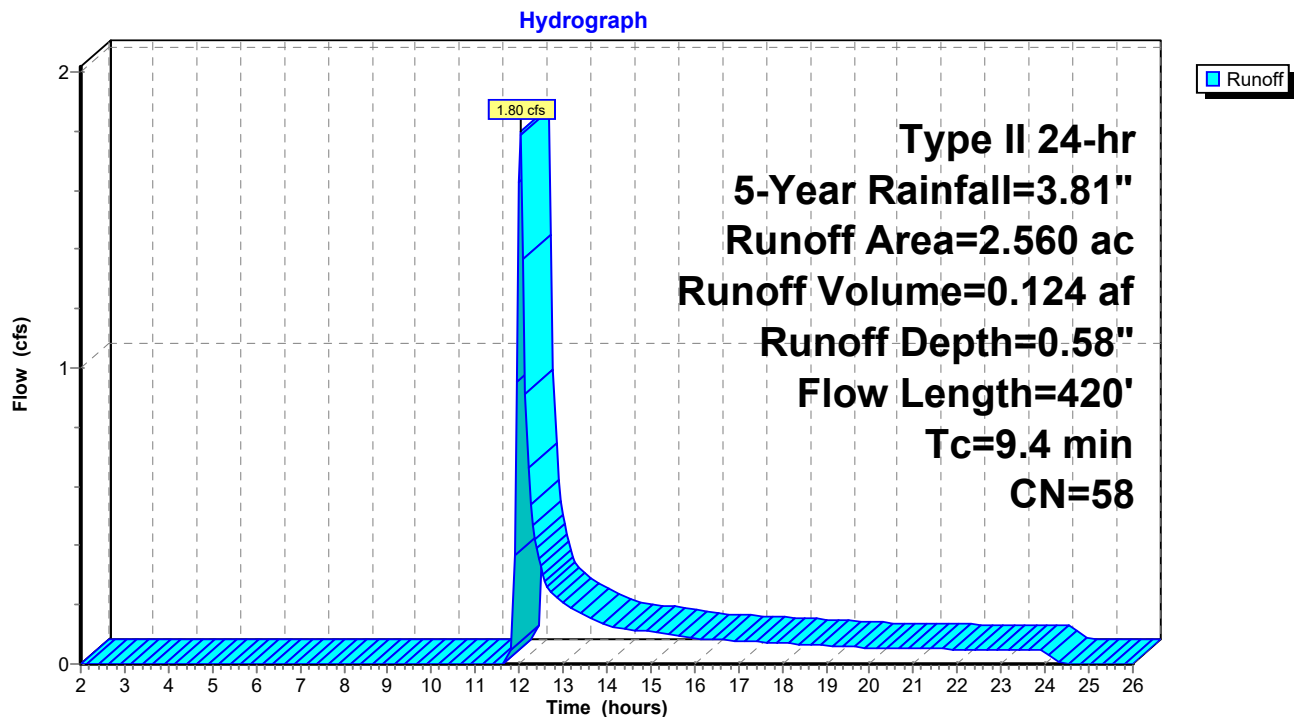
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 5-Year Rainfall=3.81"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 2.560     | 58 | Meadow, non-grazed, HSG B |
| 2.560     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 6.3      | 100           | 0.0650        | 0.27              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 3.1      | 320           | 0.0600        | 1.71              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.4      | 420           | Total         |                   |                |                                                                                       |

### Subcatchment N-W: Natural West





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Type II 24-hr 5-Year Rainfall=3.81"

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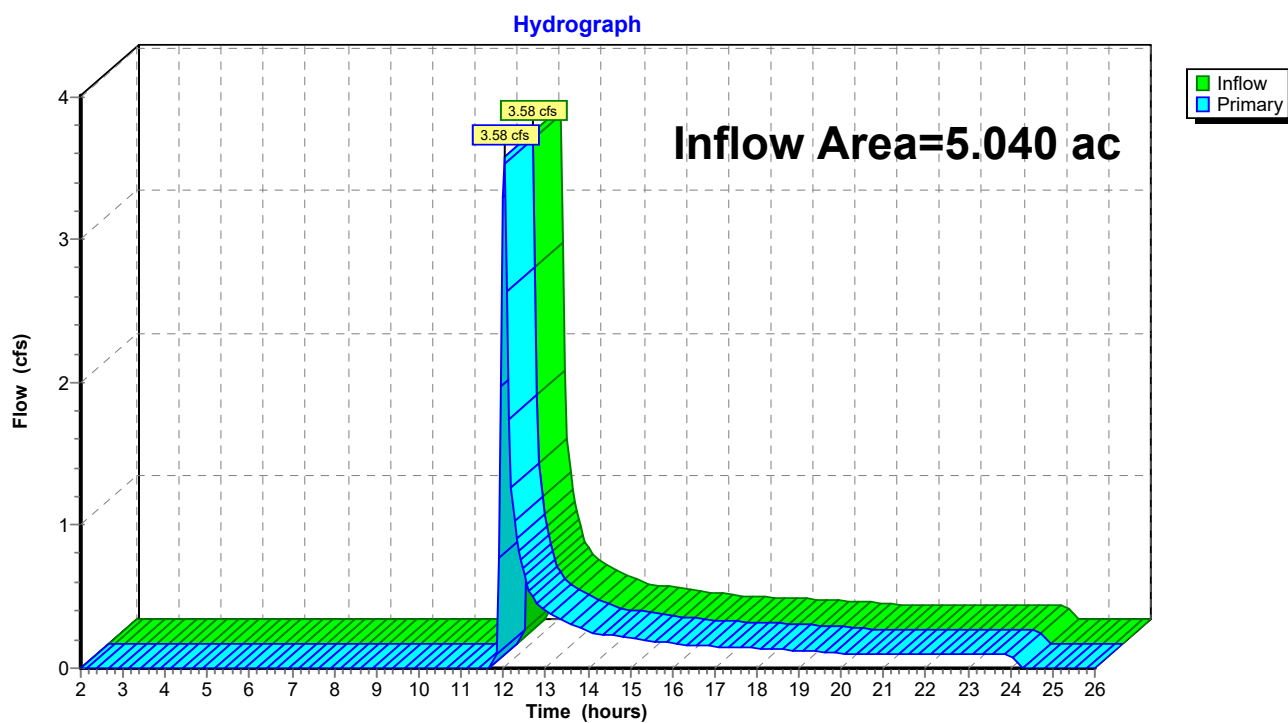
Page 26

### Summary for Link 1L: Combined Outflow

Inflow Area = 5.040 ac, 0.00% Impervious, Inflow Depth = 0.58" for 5-Year event  
Inflow = 3.58 cfs @ 12.04 hrs, Volume= 0.244 af  
Primary = 3.58 cfs @ 12.04 hrs, Volume= 0.244 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs

### Link 1L: Combined Outflow



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Type II 24-hr 5-Year Rainfall=3.81"

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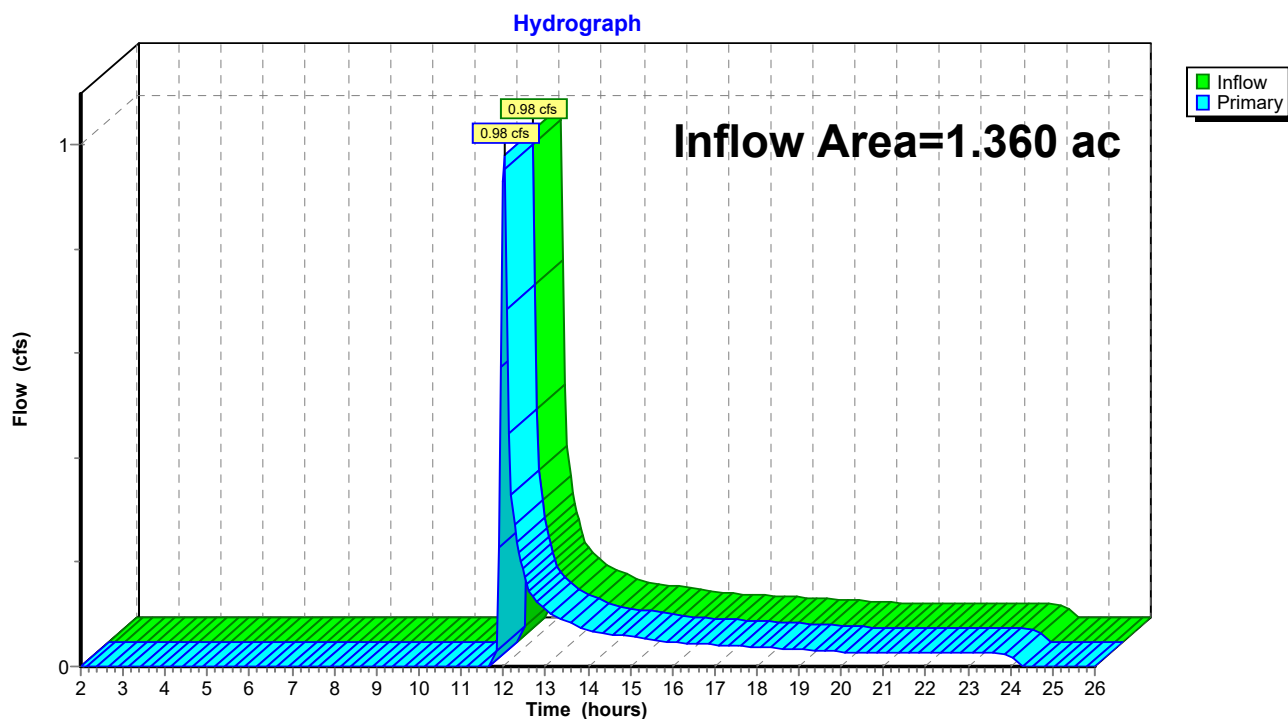
Page 27

### Summary for Link 2L: Combined South Flow

Inflow Area = 1.360 ac, 0.00% Impervious, Inflow Depth = 0.58" for 5-Year event  
Inflow = 0.98 cfs @ 12.03 hrs, Volume= 0.066 af  
Primary = 0.98 cfs @ 12.03 hrs, Volume= 0.066 af, Atten= 0%, Lag= 0.0 min  
Routed to Link 1L : Combined Outflow

Primary outflow = Inflow, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs

### Link 2L: Combined South Flow





## 23-047 Natural Site Conditions

Type II 24-hr 10-Year Rainfall=4.46"

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Page 28

Time span=2.00-26.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

### SubcatchmentN-N: Natural North

Runoff Area=1.120 ac 0.00% Impervious Runoff Depth=0.88"  
Flow Length=209' Tc=9.0 min CN=58 Runoff=1.37 cfs 0.083 af

### SubcatchmentN-S: Natural South

Runoff Area=0.670 ac 0.00% Impervious Runoff Depth=0.88"  
Flow Length=337' Tc=9.2 min CN=58 Runoff=0.81 cfs 0.049 af

### SubcatchmentN-SE: Natural Southeast

Runoff Area=0.690 ac 0.00% Impervious Runoff Depth=0.88"  
Flow Length=266' Tc=8.3 min CN=58 Runoff=0.87 cfs 0.051 af

### SubcatchmentN-W: Natural West

Runoff Area=2.560 ac 0.00% Impervious Runoff Depth=0.88"  
Flow Length=420' Tc=9.4 min CN=58 Runoff=3.07 cfs 0.189 af

### Link 1L: Combined Outflow

Inflow=6.09 cfs 0.372 af  
Primary=6.09 cfs 0.372 af

### Link 2L: Combined South Flow

Inflow=1.68 cfs 0.100 af  
Primary=1.68 cfs 0.100 af

**Total Runoff Area = 5.040 ac Runoff Volume = 0.372 af Average Runoff Depth = 0.88"**  
**100.00% Pervious = 5.040 ac 0.00% Impervious = 0.000 ac**

## 23-047 Natural Site Conditions

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Type II 24-hr 10-Year Rainfall=4.46"

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Page 29

### Summary for Subcatchment N-N: Natural North

Runoff = 1.37 cfs @ 12.02 hrs, Volume= 0.083 af, Depth= 0.88"  
Routed to Link 1L : Combined Outflow

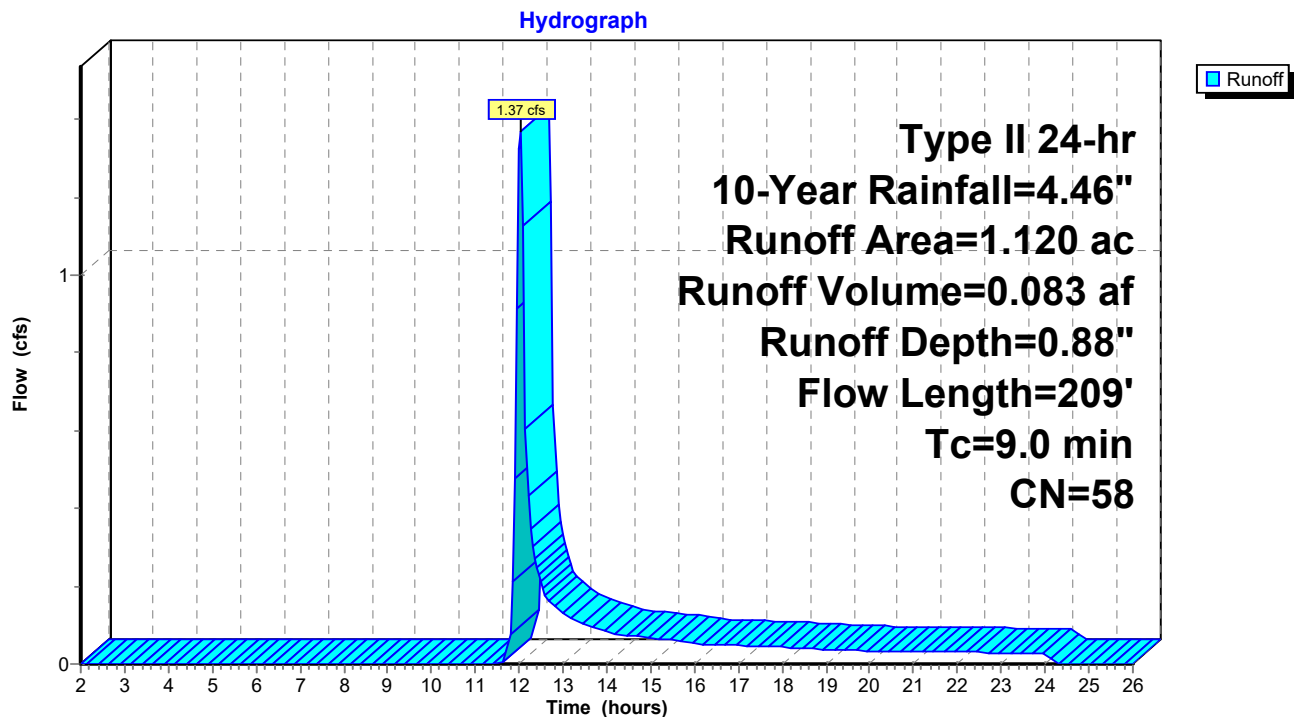
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10-Year Rainfall=4.46"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 1.120     | 58 | Meadow, non-grazed, HSG B |
| 1.120     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 8.4      | 100           | 0.0310        | 0.20              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 0.6      | 109           | 0.2200        | 3.28              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.0      | 209           | Total         |                   |                |                                                                                       |

### Subcatchment N-N: Natural North





## 23-047 Natural Site Conditions

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Page 30

### Summary for Subcatchment N-S: Natural South

Runoff = 0.81 cfs @ 12.03 hrs, Volume= 0.049 af, Depth= 0.88"  
Routed to Link 2L : Combined South Flow

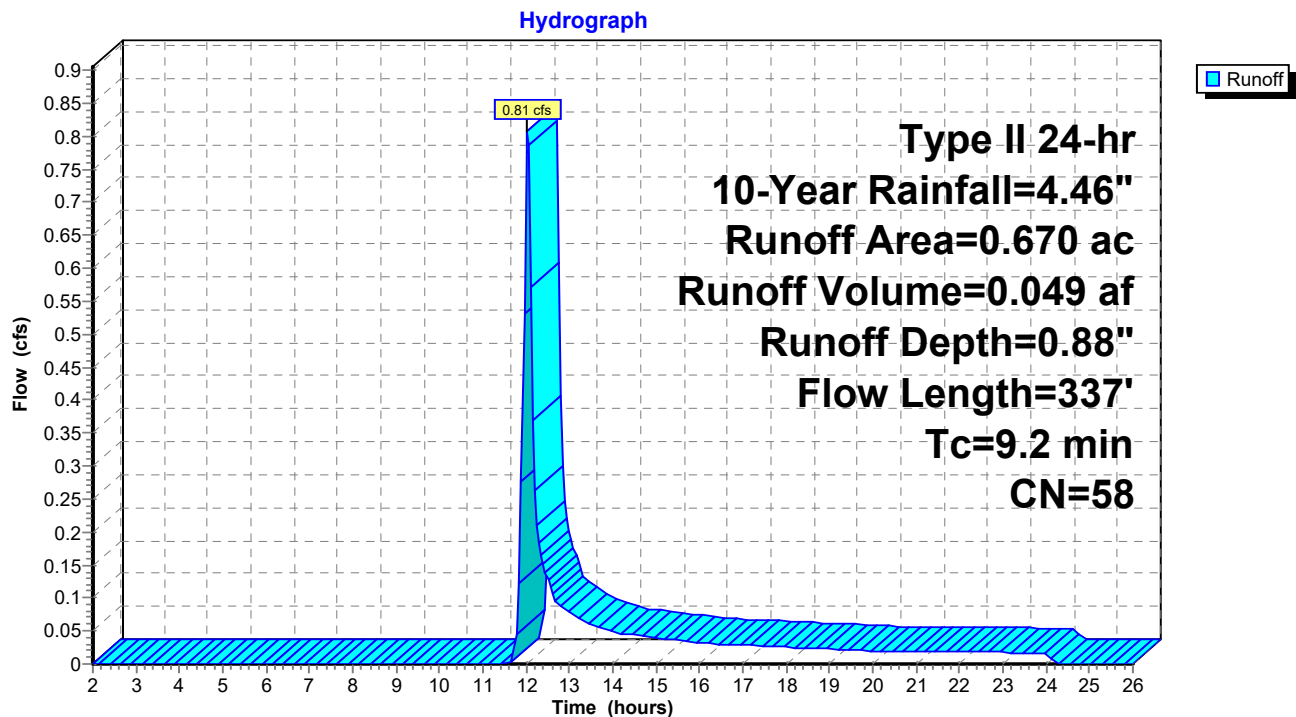
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10-Year Rainfall=4.46"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 0.670     | 58 | Meadow, non-grazed, HSG B |
| 0.670     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 7.1      | 100           | 0.0480        | 0.24              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 2.1      | 237           | 0.0740        | 1.90              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.2      | 337           | Total         |                   |                |                                                                                       |

### Subcatchment N-S: Natural South



## 23-047 Natural Site Conditions

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Type II 24-hr 10-Year Rainfall=4.46"

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Page 31

### Summary for Subcatchment N-SE: Natural Southeast

Runoff = 0.87 cfs @ 12.01 hrs, Volume= 0.051 af, Depth= 0.88"  
Routed to Link 2L : Combined South Flow

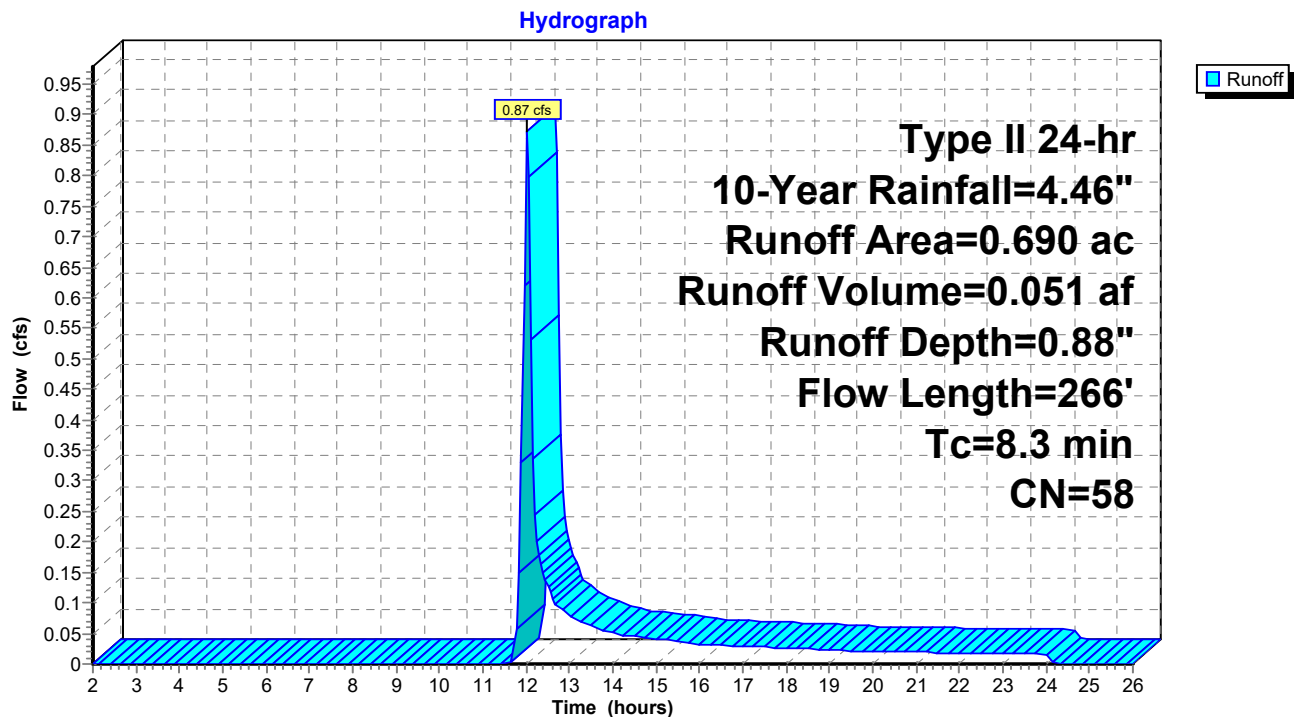
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10-Year Rainfall=4.46"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 0.690     | 58 | Meadow, non-grazed, HSG B |
| 0.690     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                   |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------|
| 7.1      | 100           | 0.0470        | 0.23              |                | Sheet Flow,<br>Grass: Short n= 0.150 P2= 3.04"                |
| 1.2      | 166           | 0.1000        | 2.21              |                | Shallow Concentrated Flow,<br>Short Grass Pasture Kv= 7.0 fps |
| 8.3      | 266           | Total         |                   |                |                                                               |

### Subcatchment N-SE: Natural Southeast





## 23-047 Natural Site Conditions

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Type II 24-hr 10-Year Rainfall=4.46"

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Page 32

### Summary for Subcatchment N-W: Natural West

Runoff = 3.07 cfs @ 12.03 hrs, Volume= 0.189 af, Depth= 0.88"  
Routed to Link 1L : Combined Outflow

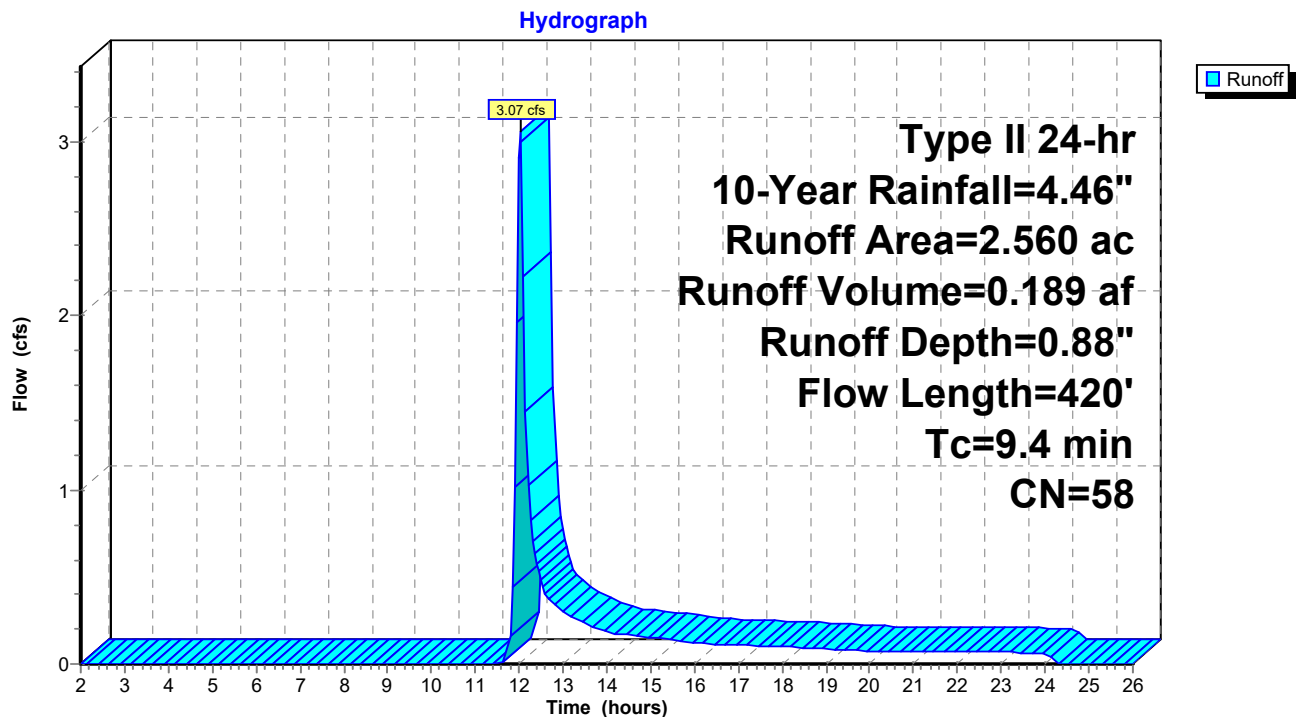
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10-Year Rainfall=4.46"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 2.560     | 58 | Meadow, non-grazed, HSG B |
| 2.560     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 6.3      | 100           | 0.0650        | 0.27              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 3.1      | 320           | 0.0600        | 1.71              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.4      | 420           | Total         |                   |                |                                                                                       |

### Subcatchment N-W: Natural West



## 23-047 Natural Site Conditions

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Type II 24-hr 10-Year Rainfall=4.46"

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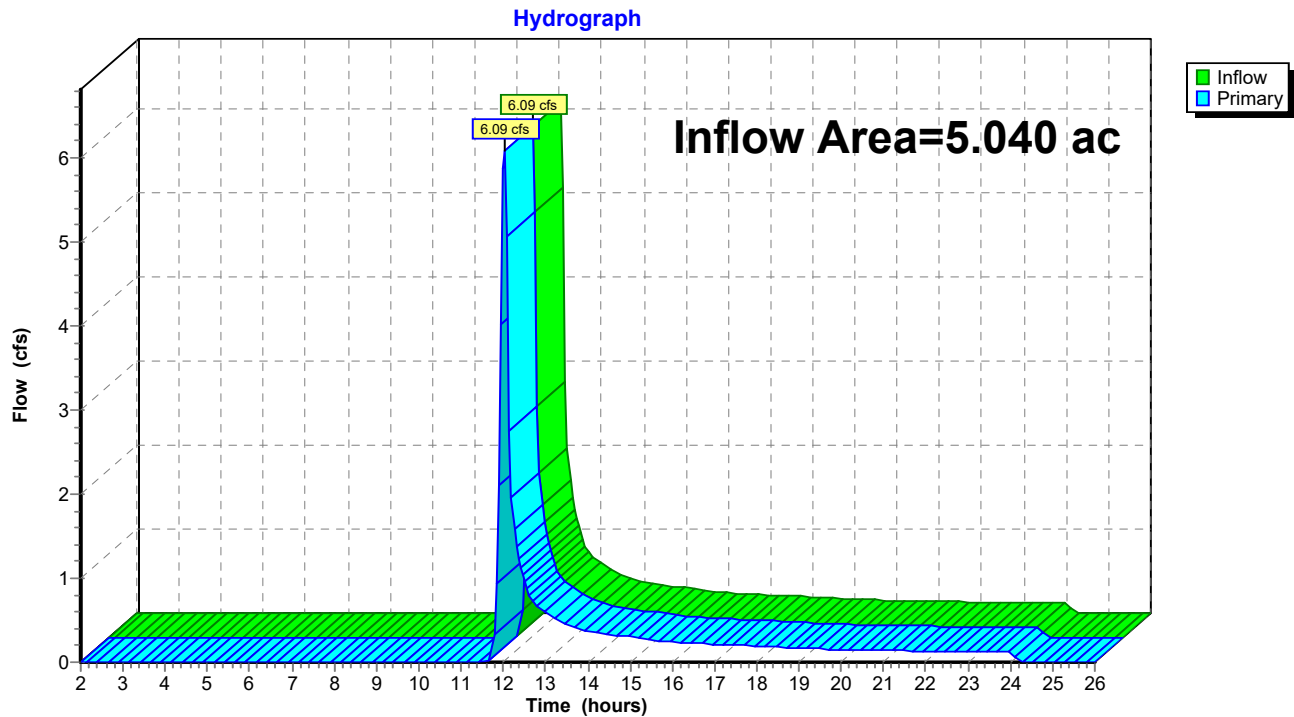
Page 33

### Summary for Link 1L: Combined Outflow

Inflow Area = 5.040 ac, 0.00% Impervious, Inflow Depth = 0.88" for 10-Year event  
Inflow = 6.09 cfs @ 12.03 hrs, Volume= 0.372 af  
Primary = 6.09 cfs @ 12.03 hrs, Volume= 0.372 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs

### Link 1L: Combined Outflow





## 23-047 Natural Site Conditions

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Type II 24-hr 10-Year Rainfall=4.46"

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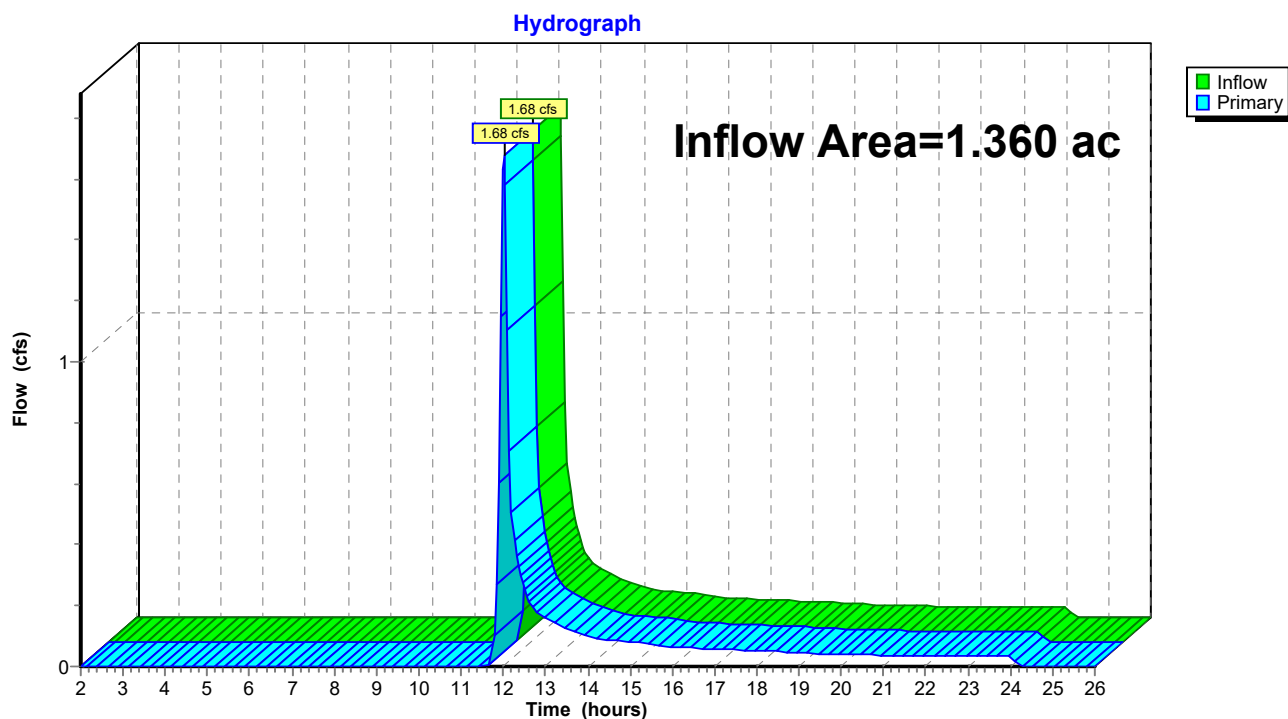
Page 34

### Summary for Link 2L: Combined South Flow

Inflow Area = 1.360 ac, 0.00% Impervious, Inflow Depth = 0.88" for 10-Year event  
Inflow = 1.68 cfs @ 12.02 hrs, Volume= 0.100 af  
Primary = 1.68 cfs @ 12.02 hrs, Volume= 0.100 af, Atten= 0%, Lag= 0.0 min  
Routed to Link 1L : Combined Outflow

Primary outflow = Inflow, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs

### Link 2L: Combined South Flow



## 23-047 Natural Site Conditions

Type II 24-hr 25-Year Rainfall=5.44"

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Page 35

Time span=2.00-26.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

### SubcatchmentN-N: Natural North

Runoff Area=1.120 ac 0.00% Impervious Runoff Depth=1.42"  
Flow Length=209' Tc=9.0 min CN=58 Runoff=2.36 cfs 0.132 af

### SubcatchmentN-S: Natural South

Runoff Area=0.670 ac 0.00% Impervious Runoff Depth=1.42"  
Flow Length=337' Tc=9.2 min CN=58 Runoff=1.40 cfs 0.079 af

### SubcatchmentN-SE: Natural Southeast

Runoff Area=0.690 ac 0.00% Impervious Runoff Depth=1.42"  
Flow Length=266' Tc=8.3 min CN=58 Runoff=1.50 cfs 0.082 af

### SubcatchmentN-W: Natural West

Runoff Area=2.560 ac 0.00% Impervious Runoff Depth=1.42"  
Flow Length=420' Tc=9.4 min CN=58 Runoff=5.30 cfs 0.303 af

### Link 1L: Combined Outflow

Inflow=10.56 cfs 0.596 af  
Primary=10.56 cfs 0.596 af

### Link 2L: Combined South Flow

Inflow=2.90 cfs 0.161 af  
Primary=2.90 cfs 0.161 af

**Total Runoff Area = 5.040 ac Runoff Volume = 0.596 af Average Runoff Depth = 1.42"**  
**100.00% Pervious = 5.040 ac 0.00% Impervious = 0.000 ac**



## 23-047 Natural Site Conditions

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Type II 24-hr 25-Year Rainfall=5.44"

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Page 36

### Summary for Subcatchment N-N: Natural North

Runoff = 2.36 cfs @ 12.02 hrs, Volume= 0.132 af, Depth= 1.42"  
Routed to Link 1L : Combined Outflow

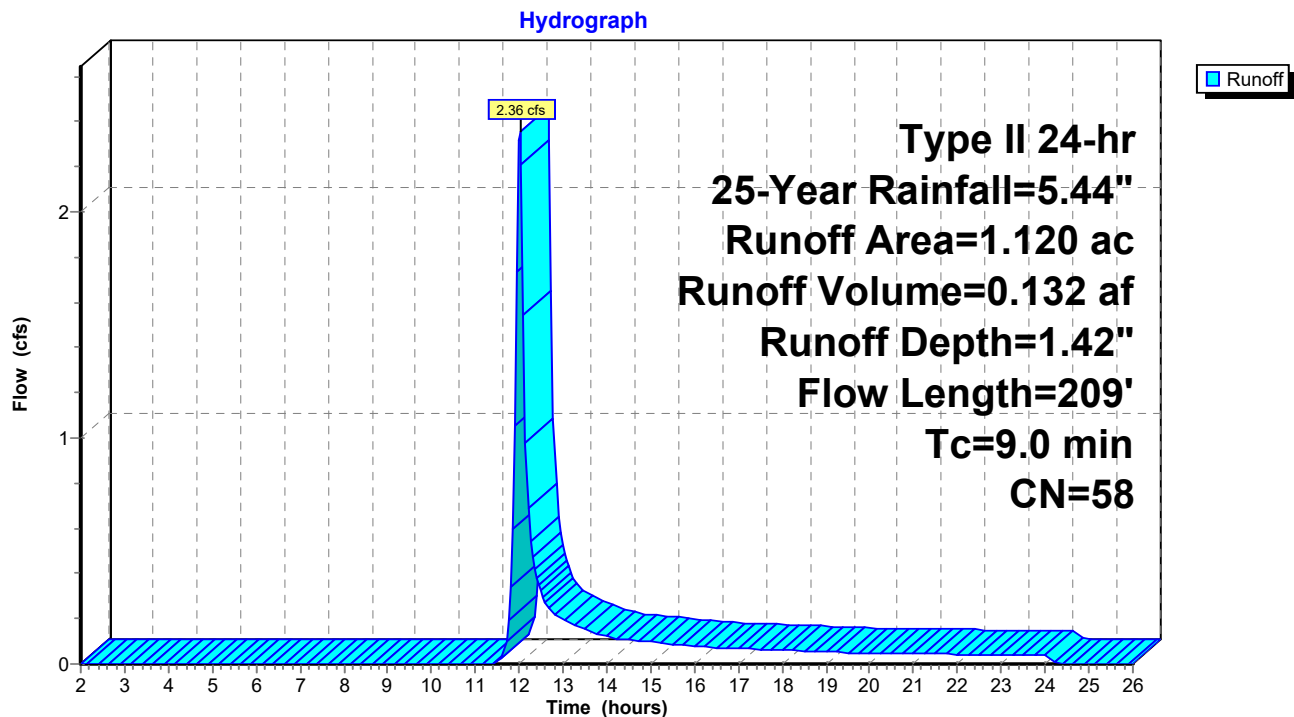
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 25-Year Rainfall=5.44"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 1.120     | 58 | Meadow, non-grazed, HSG B |
| 1.120     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 8.4      | 100           | 0.0310        | 0.20              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 0.6      | 109           | 0.2200        | 3.28              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.0      | 209           | Total         |                   |                |                                                                                       |

### Subcatchment N-N: Natural North



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Type II 24-hr 25-Year Rainfall=5.44"

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Page 37

### Summary for Subcatchment N-S: Natural South

Runoff = 1.40 cfs @ 12.02 hrs, Volume= 0.079 af, Depth= 1.42"  
Routed to Link 2L : Combined South Flow

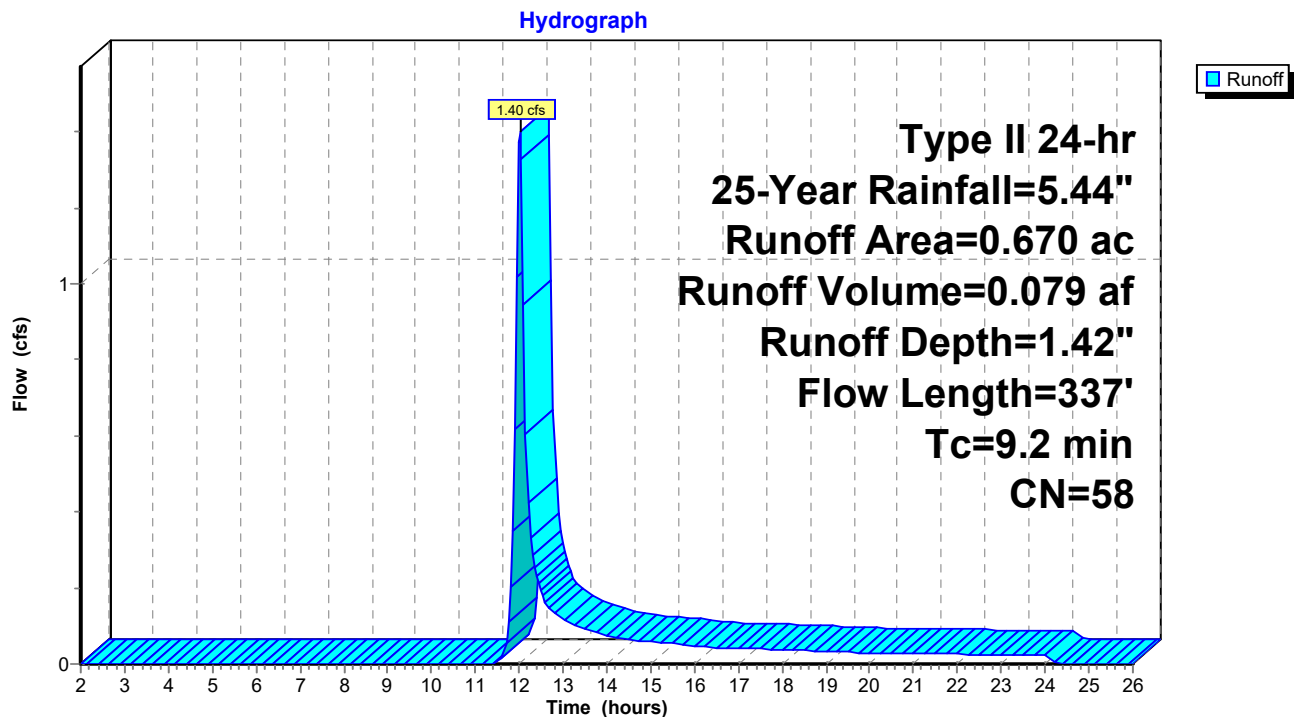
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 25-Year Rainfall=5.44"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 0.670     | 58 | Meadow, non-grazed, HSG B |
| 0.670     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 7.1      | 100           | 0.0480        | 0.24              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 2.1      | 237           | 0.0740        | 1.90              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.2      | 337           | Total         |                   |                |                                                                                       |

### Subcatchment N-S: Natural South





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Type II 24-hr 25-Year Rainfall=5.44"

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Page 38

### Summary for Subcatchment N-SE: Natural Southeast

Runoff = 1.50 cfs @ 12.01 hrs, Volume= 0.082 af, Depth= 1.42"  
Routed to Link 2L : Combined South Flow

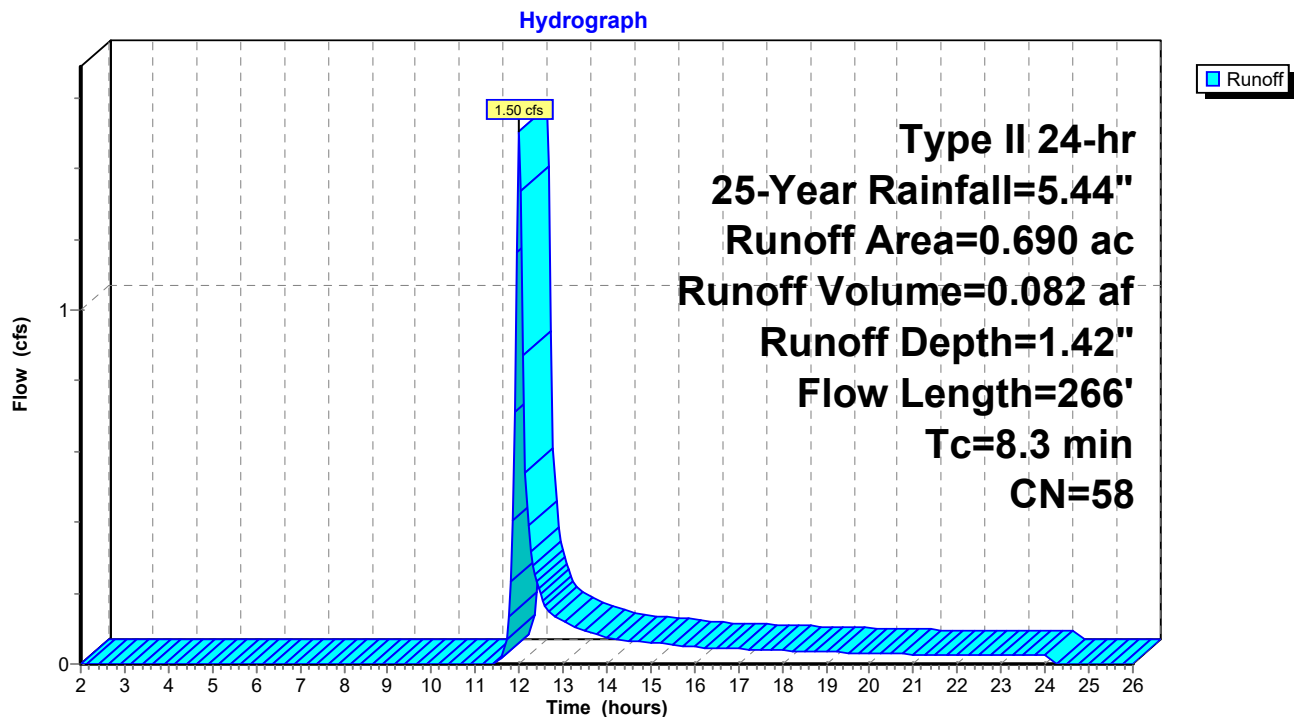
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 25-Year Rainfall=5.44"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 0.690     | 58 | Meadow, non-grazed, HSG B |
| 0.690     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                   |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------|
| 7.1      | 100           | 0.0470        | 0.23              |                | Sheet Flow,<br>Grass: Short n= 0.150 P2= 3.04"                |
| 1.2      | 166           | 0.1000        | 2.21              |                | Shallow Concentrated Flow,<br>Short Grass Pasture Kv= 7.0 fps |
| 8.3      | 266           | Total         |                   |                |                                                               |

### Subcatchment N-SE: Natural Southeast



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Type II 24-hr 25-Year Rainfall=5.44"

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Page 39

### Summary for Subcatchment N-W: Natural West

Runoff = 5.30 cfs @ 12.02 hrs, Volume= 0.303 af, Depth= 1.42"  
Routed to Link 1L : Combined Outflow

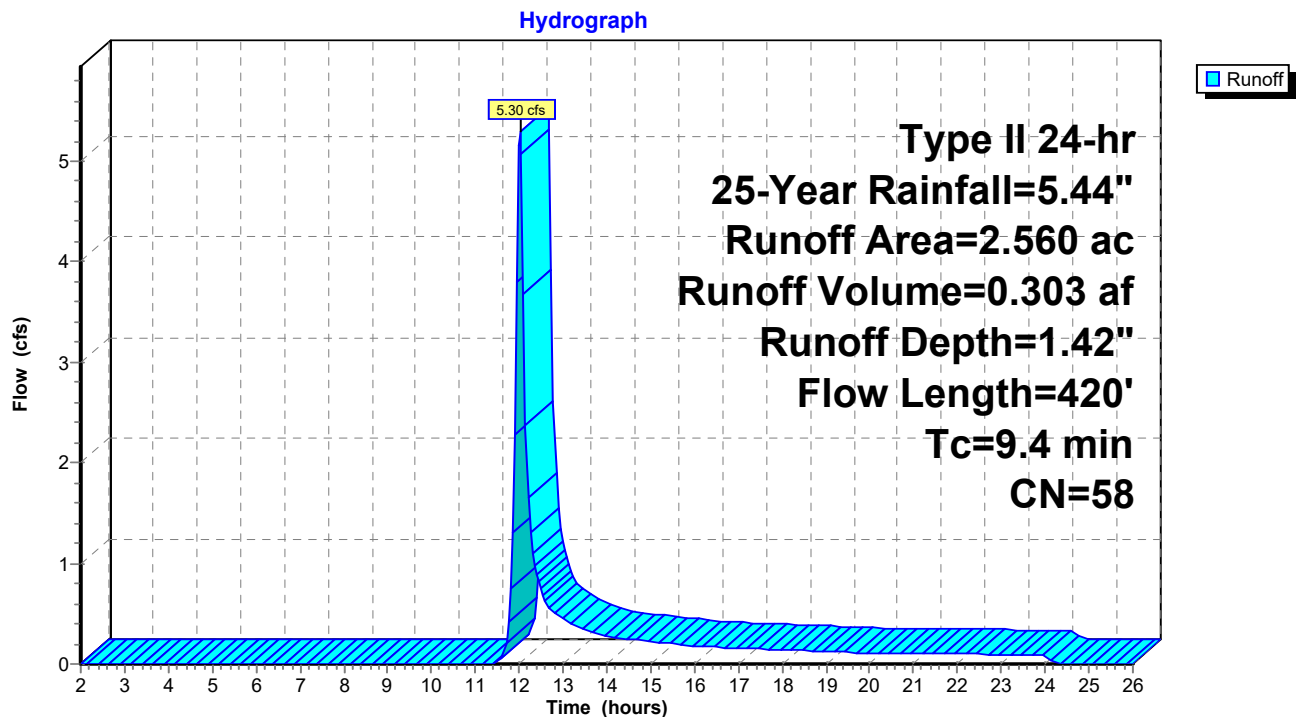
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 25-Year Rainfall=5.44"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 2.560     | 58 | Meadow, non-grazed, HSG B |
| 2.560     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 6.3      | 100           | 0.0650        | 0.27              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 3.1      | 320           | 0.0600        | 1.71              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.4      | 420           | Total         |                   |                |                                                                                       |

### Subcatchment N-W: Natural West





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Type II 24-hr 25-Year Rainfall=5.44"

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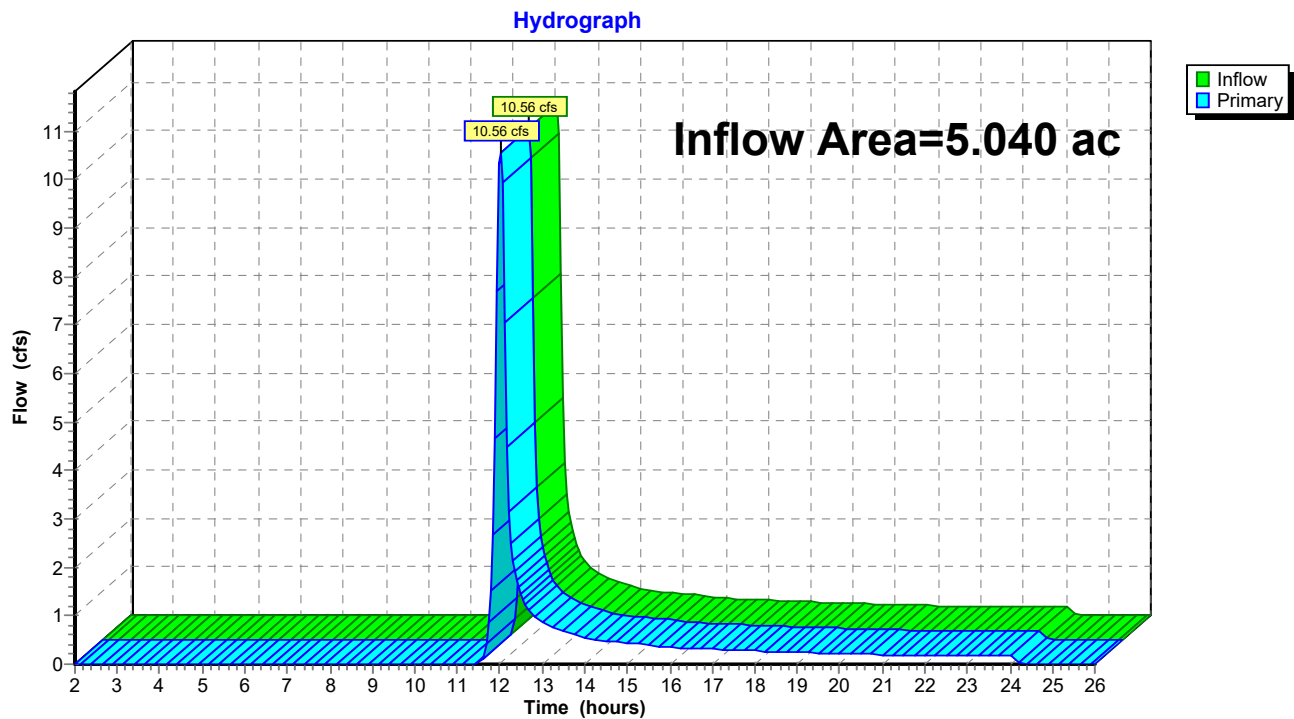
Page 40

### Summary for Link 1L: Combined Outflow

Inflow Area = 5.040 ac, 0.00% Impervious, Inflow Depth = 1.42" for 25-Year event  
Inflow = 10.56 cfs @ 12.02 hrs, Volume= 0.596 af  
Primary = 10.56 cfs @ 12.02 hrs, Volume= 0.596 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs

### Link 1L: Combined Outflow



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Type II 24-hr 25-Year Rainfall=5.44"

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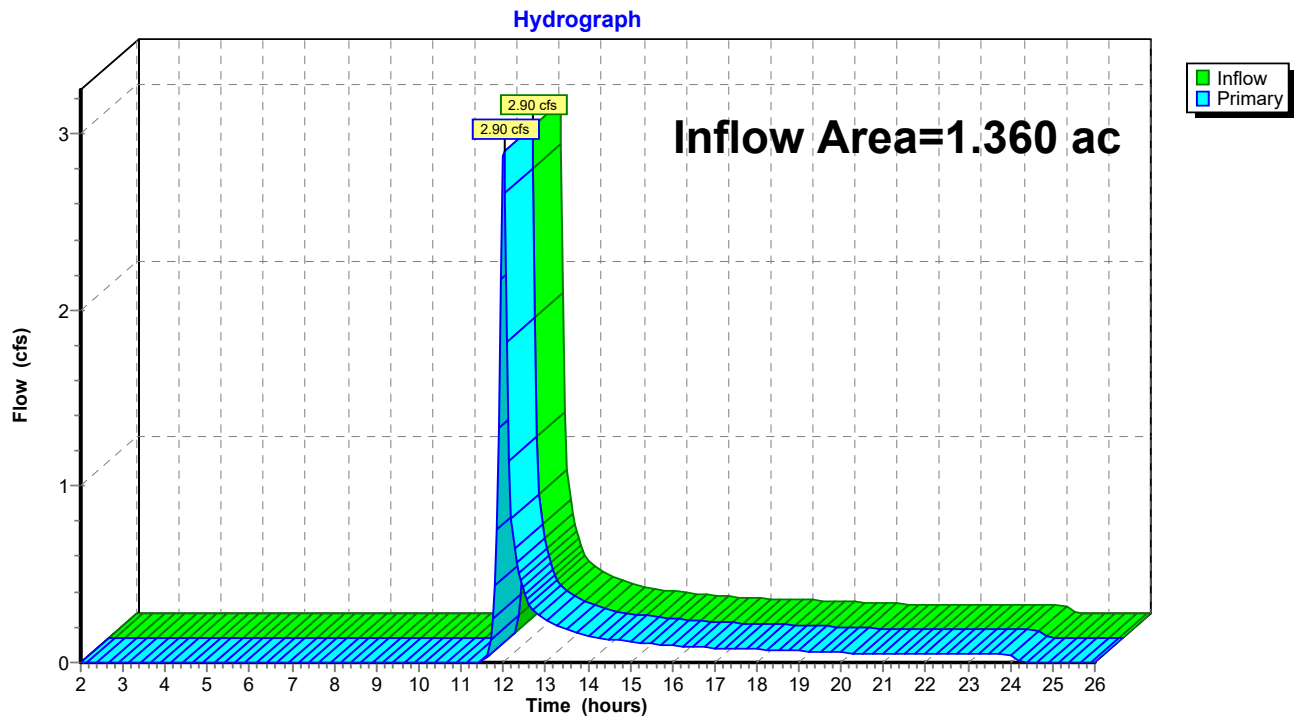
Page 41

### Summary for Link 2L: Combined South Flow

Inflow Area = 1.360 ac, 0.00% Impervious, Inflow Depth = 1.42" for 25-Year event  
Inflow = 2.90 cfs @ 12.01 hrs, Volume= 0.161 af  
Primary = 2.90 cfs @ 12.01 hrs, Volume= 0.161 af, Atten= 0%, Lag= 0.0 min  
Routed to Link 1L : Combined Outflow

Primary outflow = Inflow, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs

### Link 2L: Combined South Flow



## 23-047 Natural Site Conditions

Type II 24-hr 50-Year Rainfall=6.26"

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Page 42

Time span=2.00-26.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

### SubcatchmentN-N: Natural North

Runoff Area=1.120 ac 0.00% Impervious Runoff Depth=1.92"  
Flow Length=209' Tc=9.0 min CN=58 Runoff=3.29 cfs 0.179 af

### SubcatchmentN-S: Natural South

Runoff Area=0.670 ac 0.00% Impervious Runoff Depth=1.92"  
Flow Length=337' Tc=9.2 min CN=58 Runoff=1.95 cfs 0.107 af

### SubcatchmentN-SE: Natural Southeast

Runoff Area=0.690 ac 0.00% Impervious Runoff Depth=1.92"  
Flow Length=266' Tc=8.3 min CN=58 Runoff=2.09 cfs 0.110 af

### SubcatchmentN-W: Natural West

Runoff Area=2.560 ac 0.00% Impervious Runoff Depth=1.92"  
Flow Length=420' Tc=9.4 min CN=58 Runoff=7.39 cfs 0.410 af

### Link 1L: Combined Outflow

Inflow=14.70 cfs 0.807 af  
Primary=14.70 cfs 0.807 af

### Link 2L: Combined South Flow

Inflow=4.04 cfs 0.218 af  
Primary=4.04 cfs 0.218 af

**Total Runoff Area = 5.040 ac Runoff Volume = 0.807 af Average Runoff Depth = 1.92"**  
**100.00% Pervious = 5.040 ac 0.00% Impervious = 0.000 ac**



## 23-047 Natural Site Conditions

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Type II 24-hr 50-Year Rainfall=6.26"

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Page 43

### Summary for Subcatchment N-N: Natural North

Runoff = 3.29 cfs @ 12.01 hrs, Volume= 0.179 af, Depth= 1.92"  
Routed to Link 1L : Combined Outflow

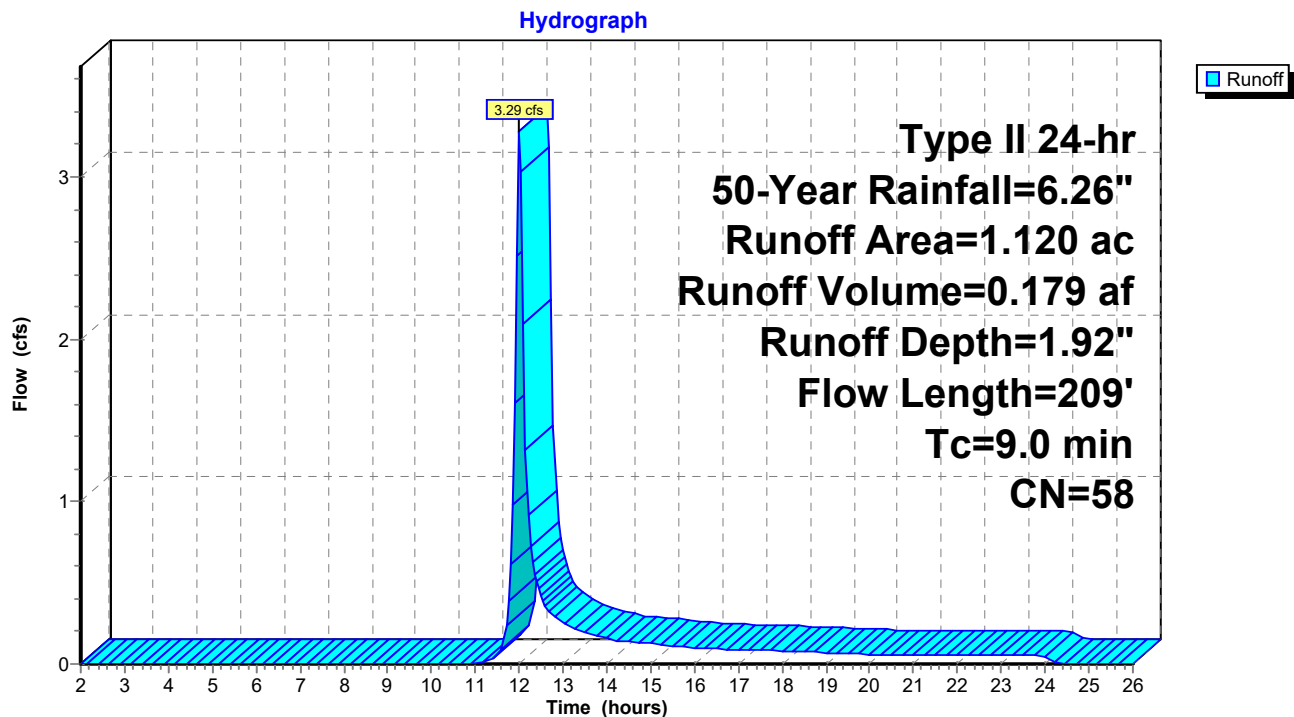
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 50-Year Rainfall=6.26"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 1.120     | 58 | Meadow, non-grazed, HSG B |
| 1.120     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 8.4      | 100           | 0.0310        | 0.20              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 0.6      | 109           | 0.2200        | 3.28              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.0      | 209           | Total         |                   |                |                                                                                       |

### Subcatchment N-N: Natural North



## 23-047 Natural Site Conditions

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Type II 24-hr 50-Year Rainfall=6.26"

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Page 44

### Summary for Subcatchment N-S: Natural South

Runoff = 1.95 cfs @ 12.02 hrs, Volume= 0.107 af, Depth= 1.92"  
Routed to Link 2L : Combined South Flow

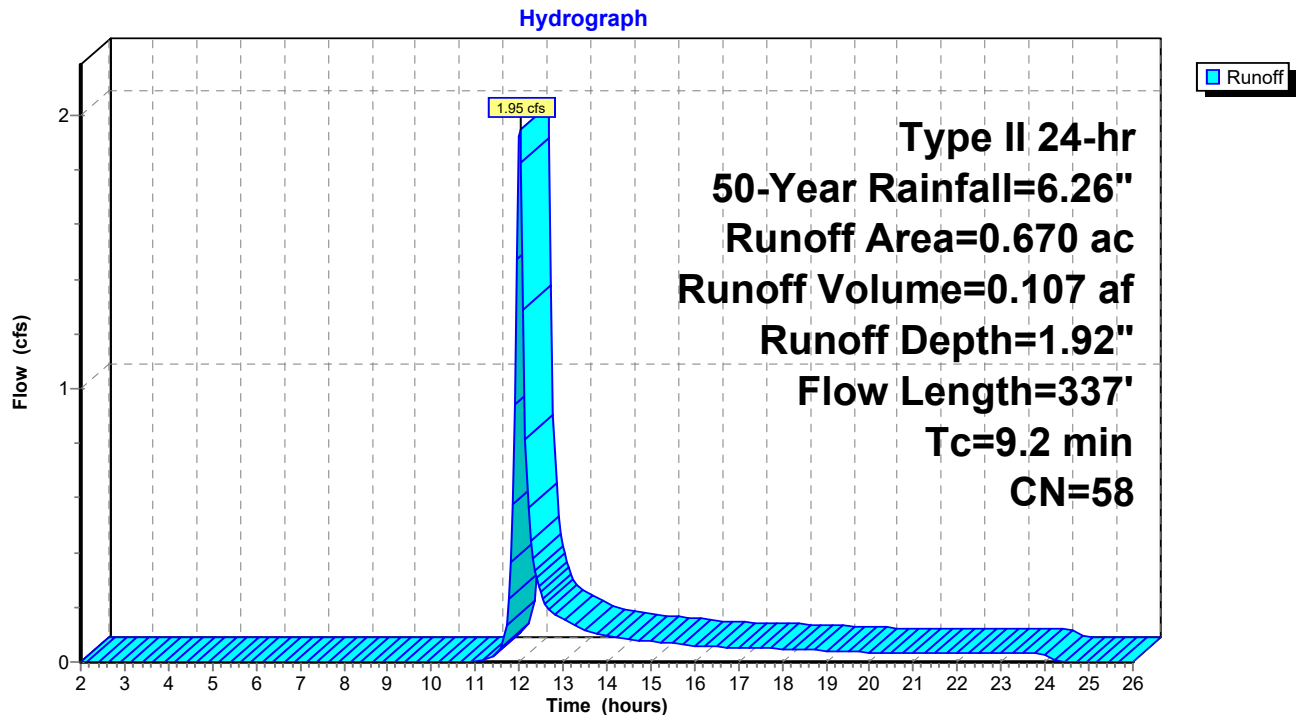
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 50-Year Rainfall=6.26"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 0.670     | 58 | Meadow, non-grazed, HSG B |
| 0.670     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 7.1      | 100           | 0.0480        | 0.24              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 2.1      | 237           | 0.0740        | 1.90              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.2      | 337           | Total         |                   |                |                                                                                       |

### Subcatchment N-S: Natural South



## 23-047 Natural Site Conditions

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Type II 24-hr 50-Year Rainfall=6.26"

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Page 45

### Summary for Subcatchment N-SE: Natural Southeast

Runoff = 2.09 cfs @ 12.01 hrs, Volume= 0.110 af, Depth= 1.92"  
Routed to Link 2L : Combined South Flow

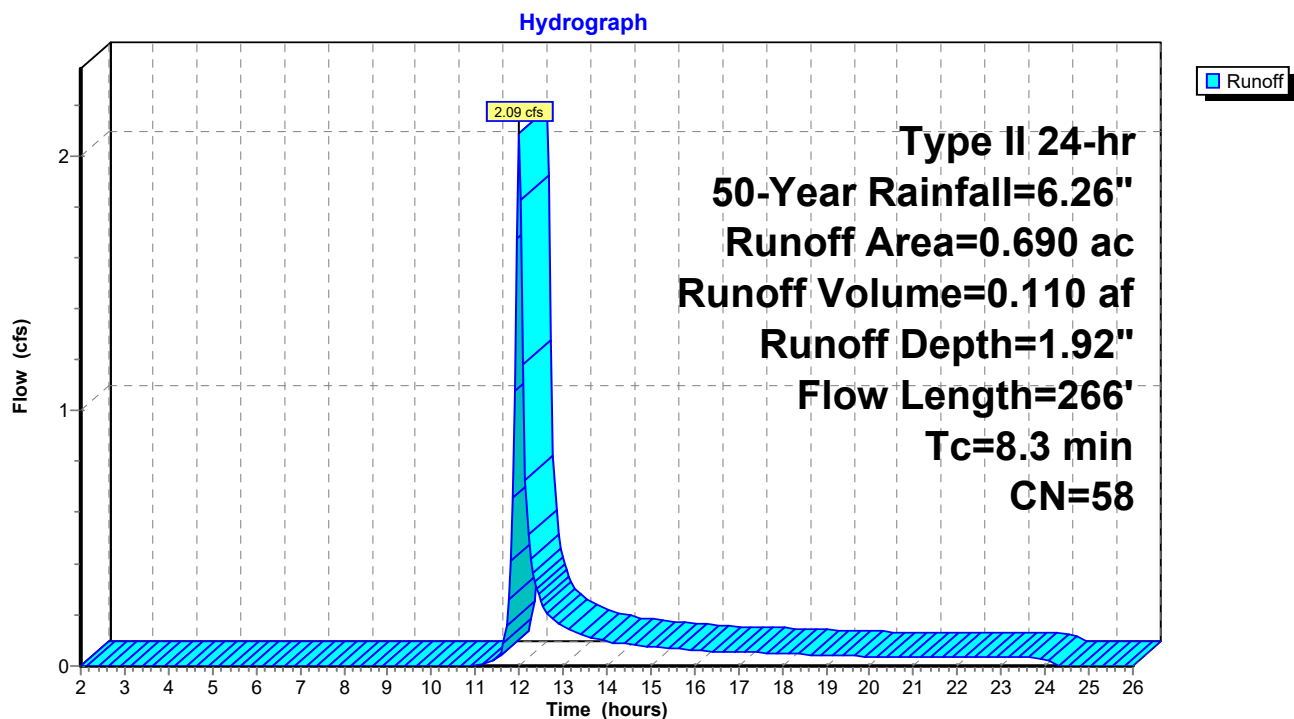
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 50-Year Rainfall=6.26"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 0.690     | 58 | Meadow, non-grazed, HSG B |
| 0.690     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                          |
|----------|---------------|---------------|-------------------|----------------|----------------------------------------------------------------------|
| 7.1      | 100           | 0.0470        | 0.23              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.04"                |
| 1.2      | 166           | 0.1000        | 2.21              |                | <b>Shallow Concentrated Flow,</b><br>Short Grass Pasture Kv= 7.0 fps |
| 8.3      | 266           | Total         |                   |                |                                                                      |

### Subcatchment N-SE: Natural Southeast





## 23-047 Natural Site Conditions

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Type II 24-hr 50-Year Rainfall=6.26"

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Page 46

### Summary for Subcatchment N-W: Natural West

Runoff = 7.39 cfs @ 12.02 hrs, Volume= 0.410 af, Depth= 1.92"  
Routed to Link 1L : Combined Outflow

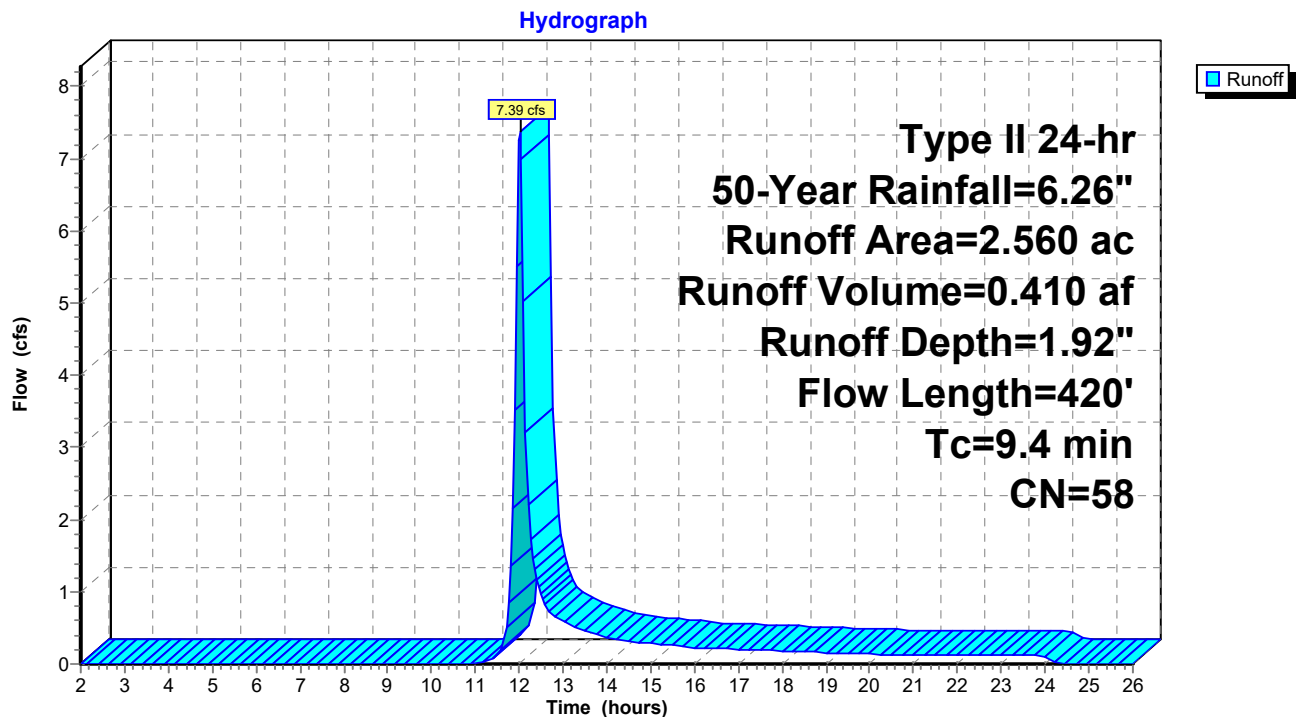
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 50-Year Rainfall=6.26"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 2.560     | 58 | Meadow, non-grazed, HSG B |
| 2.560     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 6.3      | 100           | 0.0650        | 0.27              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 3.1      | 320           | 0.0600        | 1.71              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.4      | 420           | Total         |                   |                |                                                                                       |

### Subcatchment N-W: Natural West



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Type II 24-hr 50-Year Rainfall=6.26"

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Page 47

### Summary for Link 1L: Combined Outflow

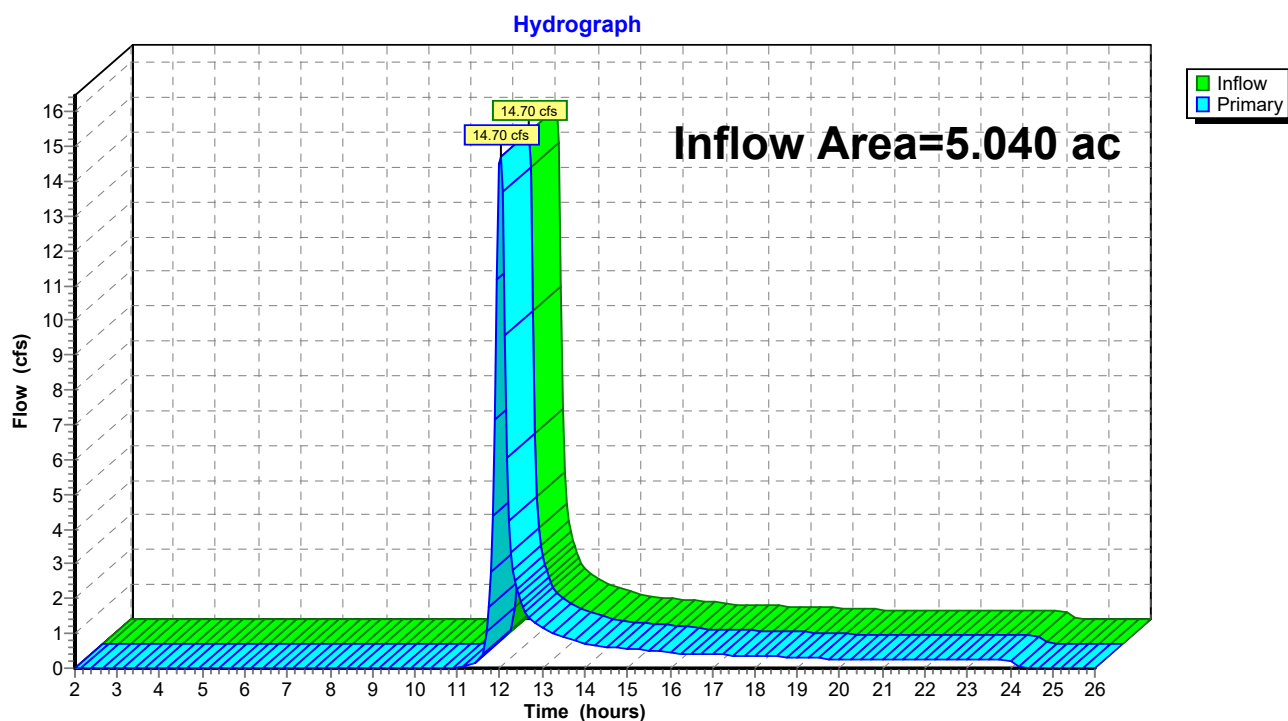
Inflow Area = 5.040 ac, 0.00% Impervious, Inflow Depth = 1.92" for 50-Year event

Inflow = 14.70 cfs @ 12.01 hrs, Volume= 0.807 af

Primary = 14.70 cfs @ 12.01 hrs, Volume= 0.807 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs

### Link 1L: Combined Outflow



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Type II 24-hr 50-Year Rainfall=6.26"

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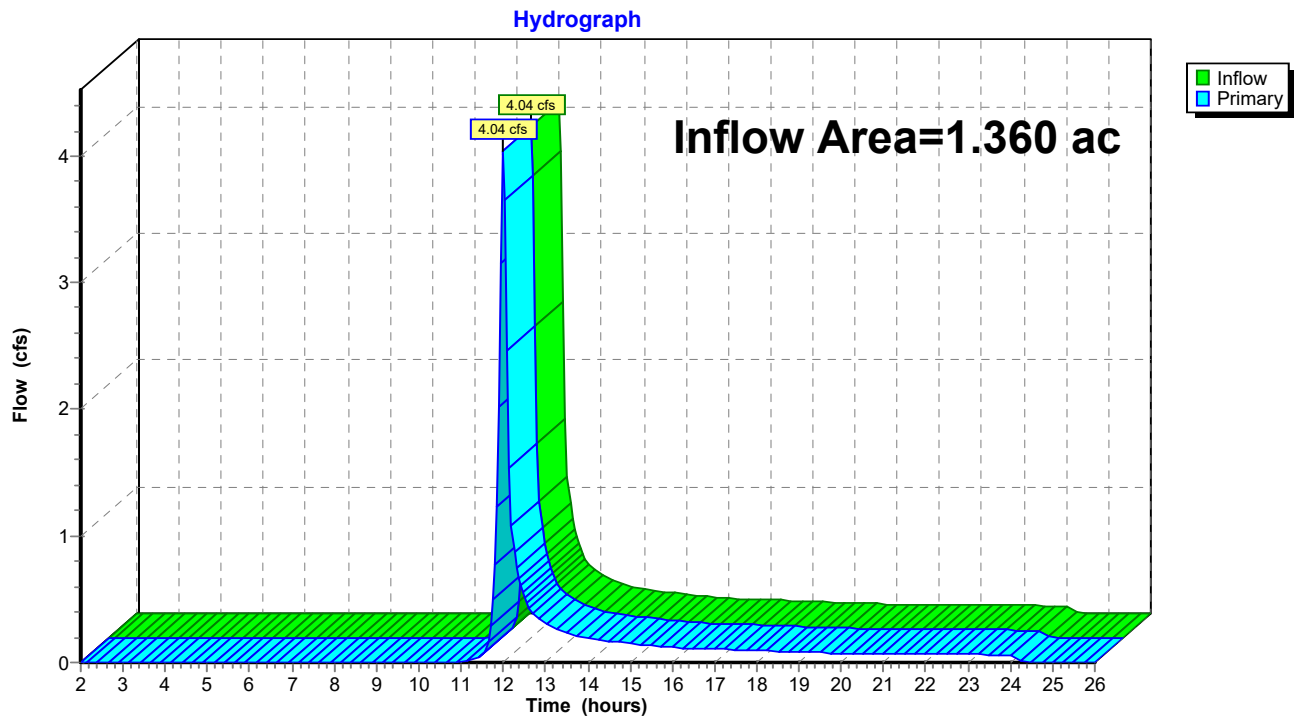
Page 48

### Summary for Link 2L: Combined South Flow

Inflow Area = 1.360 ac, 0.00% Impervious, Inflow Depth = 1.92" for 50-Year event  
Inflow = 4.04 cfs @ 12.01 hrs, Volume= 0.218 af  
Primary = 4.04 cfs @ 12.01 hrs, Volume= 0.218 af, Atten= 0%, Lag= 0.0 min  
Routed to Link 1L : Combined Outflow

Primary outflow = Inflow, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs

### Link 2L: Combined South Flow





## 23-047 Natural Site Conditions

Type II 24-hr 100-Year Rainfall=7.12"

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Page 49

Time span=2.00-26.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

### SubcatchmentN-N: Natural North

Runoff Area=1.120 ac 0.00% Impervious Runoff Depth=2.49"  
Flow Length=209' Tc=9.0 min CN=58 Runoff=4.33 cfs 0.233 af

### SubcatchmentN-S: Natural South

Runoff Area=0.670 ac 0.00% Impervious Runoff Depth=2.49"  
Flow Length=337' Tc=9.2 min CN=58 Runoff=2.57 cfs 0.139 af

### SubcatchmentN-SE: Natural Southeast

Runoff Area=0.690 ac 0.00% Impervious Runoff Depth=2.49"  
Flow Length=266' Tc=8.3 min CN=58 Runoff=2.75 cfs 0.143 af

### SubcatchmentN-W: Natural West

Runoff Area=2.560 ac 0.00% Impervious Runoff Depth=2.49"  
Flow Length=420' Tc=9.4 min CN=58 Runoff=9.74 cfs 0.531 af

### Link 1L: Combined Outflow

Inflow=19.37 cfs 1.046 af  
Primary=19.37 cfs 1.046 af

### Link 2L: Combined South Flow

Inflow=5.31 cfs 0.282 af  
Primary=5.31 cfs 0.282 af

**Total Runoff Area = 5.040 ac Runoff Volume = 1.046 af Average Runoff Depth = 2.49"**  
**100.00% Pervious = 5.040 ac 0.00% Impervious = 0.000 ac**

## 23-047 Natural Site Conditions

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Type II 24-hr 100-Year Rainfall=7.12"

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Page 50

### Summary for Subcatchment N-N: Natural North

Runoff = 4.33 cfs @ 12.01 hrs, Volume= 0.233 af, Depth= 2.49"  
Routed to Link 1L : Combined Outflow

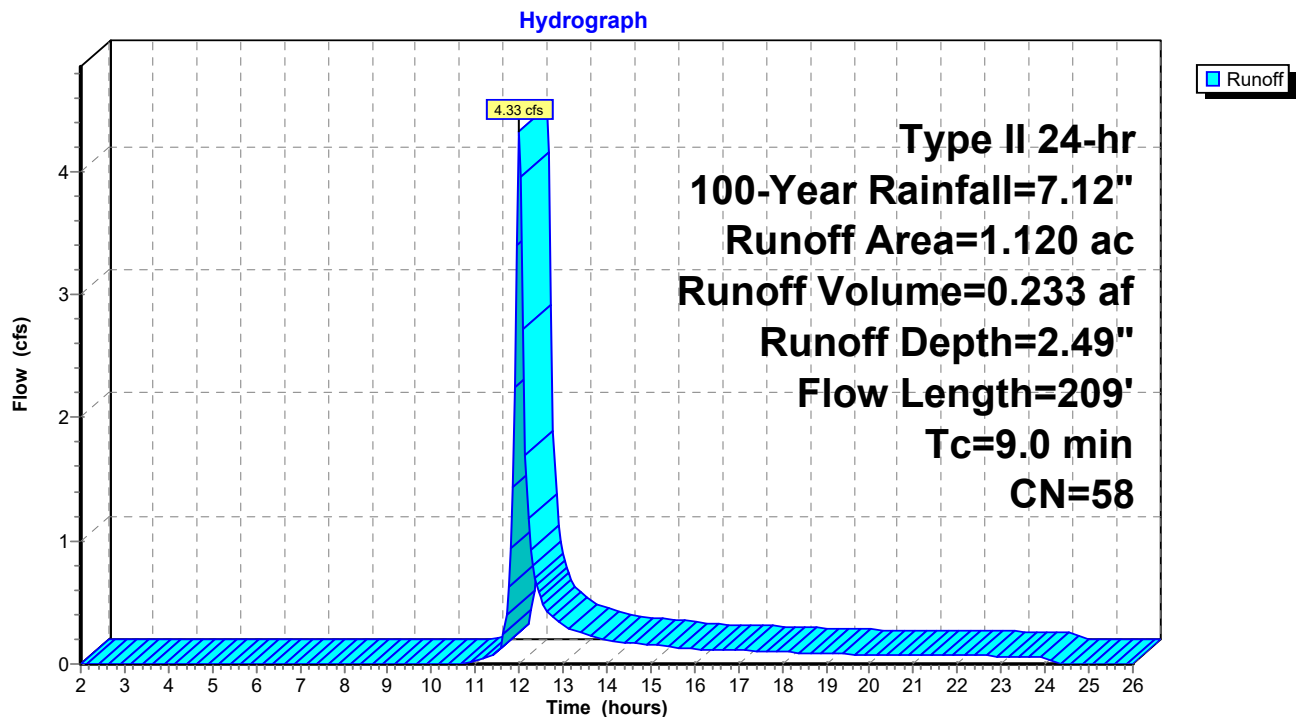
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-Year Rainfall=7.12"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 1.120     | 58 | Meadow, non-grazed, HSG B |
| 1.120     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 8.4      | 100           | 0.0310        | 0.20              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 0.6      | 109           | 0.2200        | 3.28              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.0      | 209           | Total         |                   |                |                                                                                       |

### Subcatchment N-N: Natural North



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Type II 24-hr 100-Year Rainfall=7.12"

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Page 51

### Summary for Subcatchment N-S: Natural South

Runoff = 2.57 cfs @ 12.01 hrs, Volume= 0.139 af, Depth= 2.49"  
Routed to Link 2L : Combined South Flow

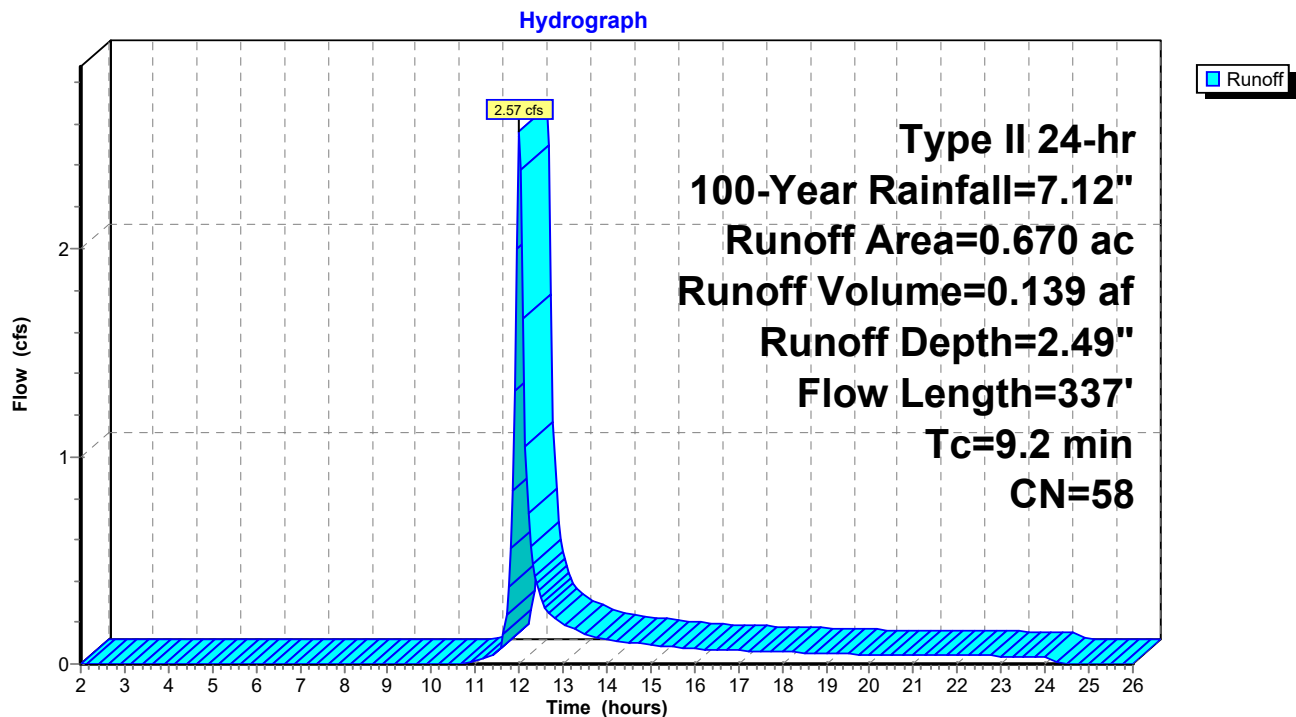
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-Year Rainfall=7.12"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 0.670     | 58 | Meadow, non-grazed, HSG B |
| 0.670     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 7.1      | 100           | 0.0480        | 0.24              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 2.1      | 237           | 0.0740        | 1.90              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.2      | 337           | Total         |                   |                |                                                                                       |

### Subcatchment N-S: Natural South





## 23-047 Natural Site Conditions

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Type II 24-hr 100-Year Rainfall=7.12"

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Page 52

### Summary for Subcatchment N-SE: Natural Southeast

Runoff = 2.75 cfs @ 12.00 hrs, Volume= 0.143 af, Depth= 2.49"  
Routed to Link 2L : Combined South Flow

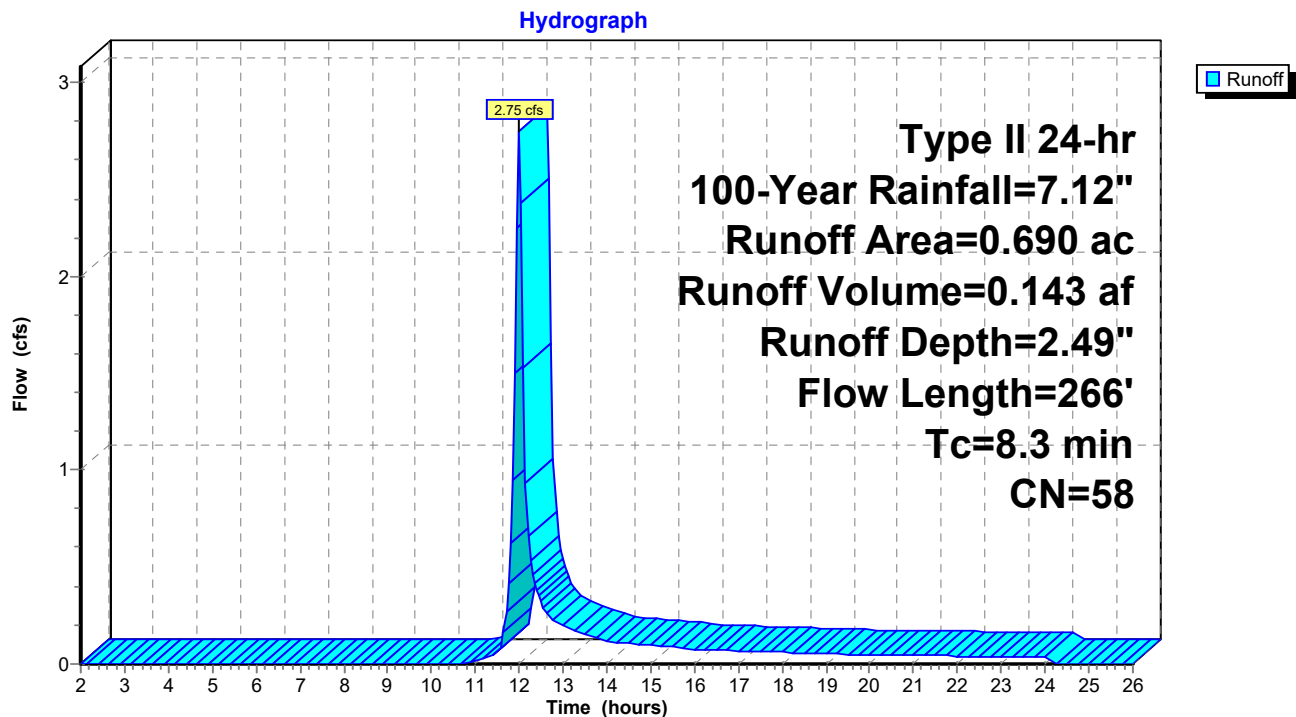
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-Year Rainfall=7.12"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 0.690     | 58 | Meadow, non-grazed, HSG B |
| 0.690     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                   |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------|
| 7.1      | 100           | 0.0470        | 0.23              |                | Sheet Flow,<br>Grass: Short n= 0.150 P2= 3.04"                |
| 1.2      | 166           | 0.1000        | 2.21              |                | Shallow Concentrated Flow,<br>Short Grass Pasture Kv= 7.0 fps |
| 8.3      | 266           | Total         |                   |                |                                                               |

### Subcatchment N-SE: Natural Southeast



## 23-047 Natural Site Conditions

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Type II 24-hr 100-Year Rainfall=7.12"

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Page 53

### Summary for Subcatchment N-W: Natural West

Runoff = 9.74 cfs @ 12.02 hrs, Volume= 0.531 af, Depth= 2.49"  
Routed to Link 1L : Combined Outflow

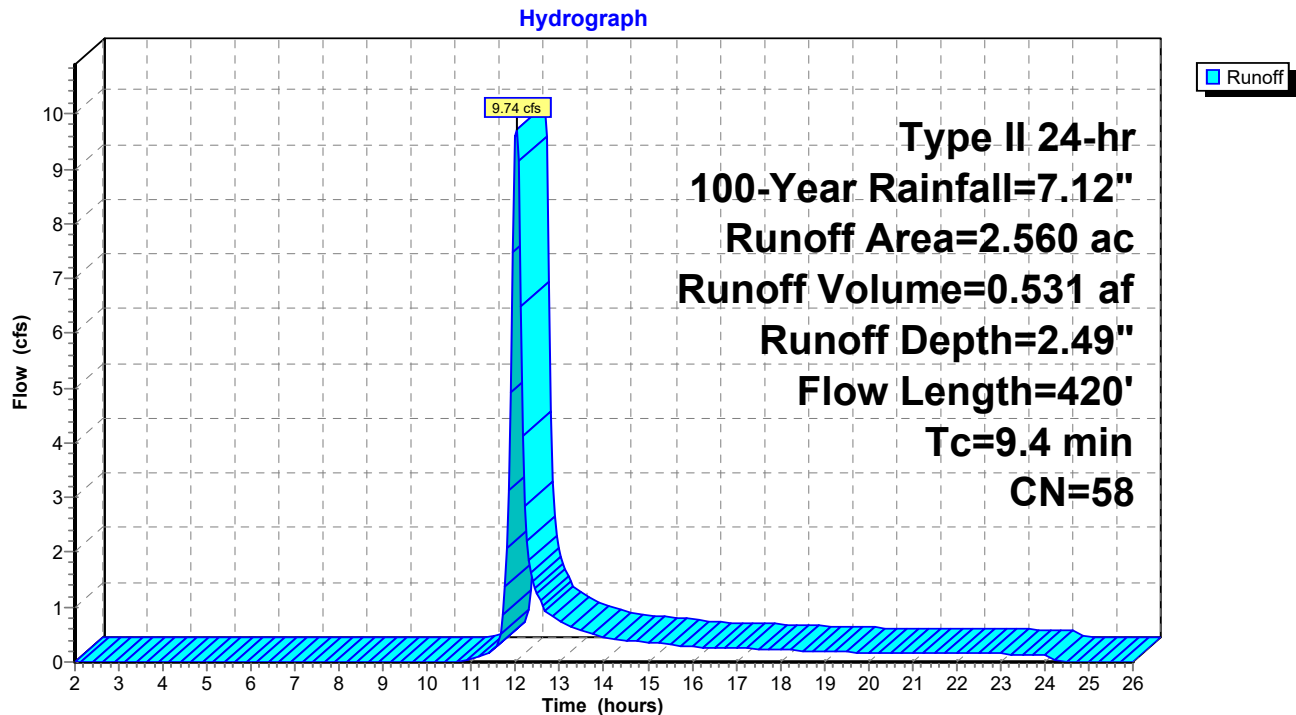
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-Year Rainfall=7.12"

| Area (ac) | CN | Description               |
|-----------|----|---------------------------|
| 2.560     | 58 | Meadow, non-grazed, HSG B |
| 2.560     |    | 100.00% Pervious Area     |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                           |
|----------|---------------|---------------|-------------------|----------------|---------------------------------------------------------------------------------------|
| 6.3      | 100           | 0.0650        | 0.27              |                | <b>Sheet Flow, SHEET (MEADOW)</b><br>Grass: Short n= 0.150 P2= 3.04"                  |
| 3.1      | 320           | 0.0600        | 1.71              |                | <b>Shallow Concentrated Flow, SHALLOW (MEADOW)</b><br>Short Grass Pasture Kv= 7.0 fps |
| 9.4      | 420           | Total         |                   |                |                                                                                       |

### Subcatchment N-W: Natural West



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Type II 24-hr 100-Year Rainfall=7.12"

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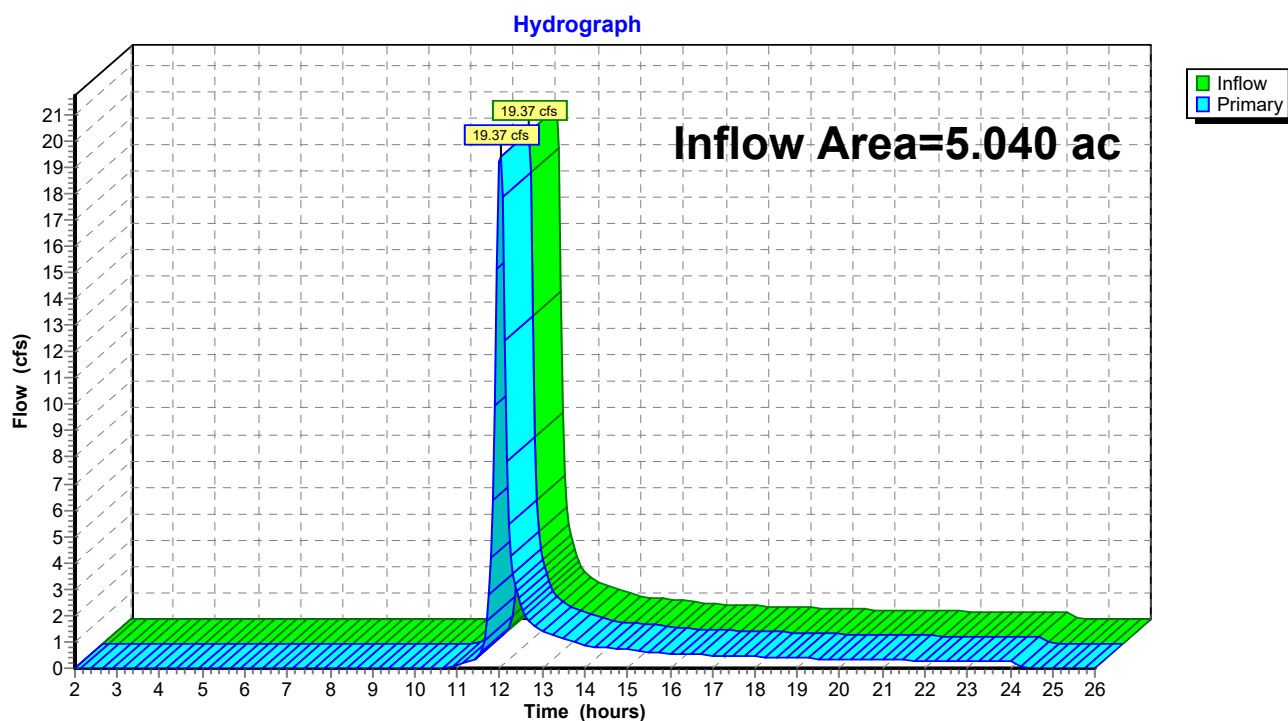
Page 54

### Summary for Link 1L: Combined Outflow

Inflow Area = 5.040 ac, 0.00% Impervious, Inflow Depth = 2.49" for 100-Year event  
Inflow = 19.37 cfs @ 12.01 hrs, Volume= 1.046 af  
Primary = 19.37 cfs @ 12.01 hrs, Volume= 1.046 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs

### Link 1L: Combined Outflow





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Type II 24-hr 100-Year Rainfall=7.12"

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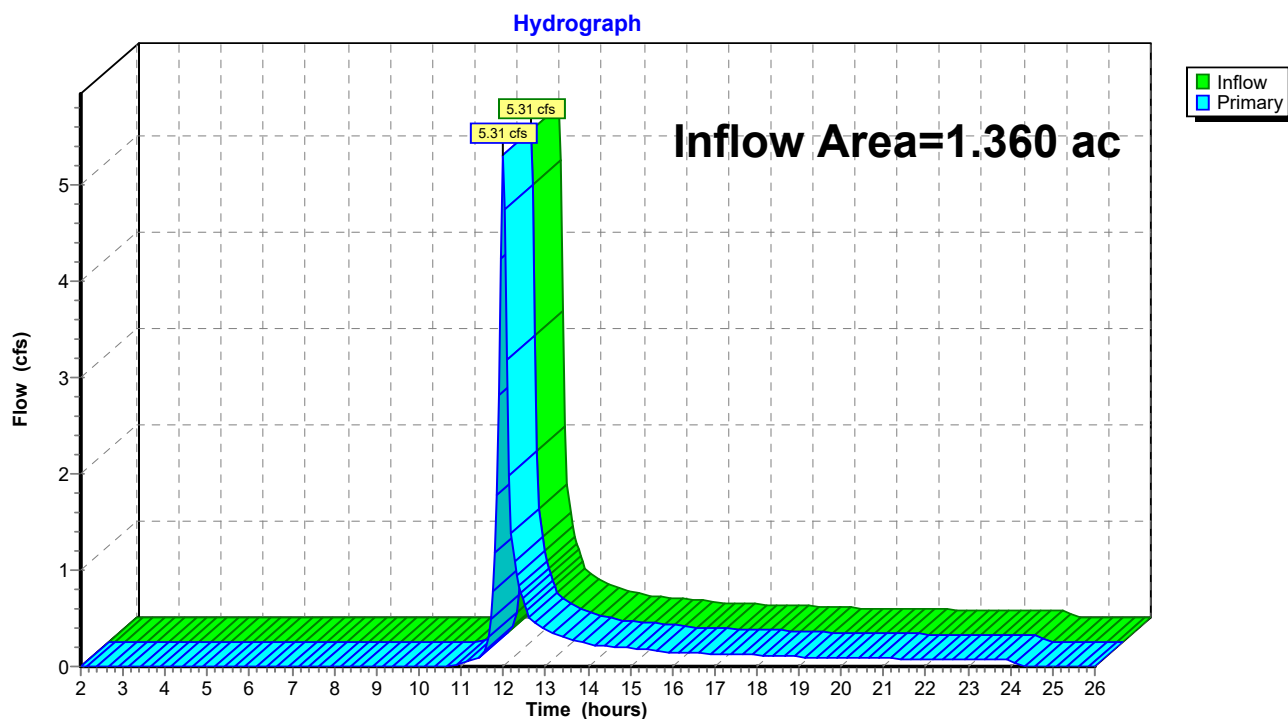
Page 55

### Summary for Link 2L: Combined South Flow

Inflow Area = 1.360 ac, 0.00% Impervious, Inflow Depth = 2.49" for 100-Year event  
Inflow = 5.31 cfs @ 12.01 hrs, Volume= 0.282 af  
Primary = 5.31 cfs @ 12.01 hrs, Volume= 0.282 af, Atten= 0%, Lag= 0.0 min  
Routed to Link 1L : Combined Outflow

Primary outflow = Inflow, Time Span= 2.00-26.00 hrs, dt= 0.05 hrs

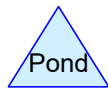
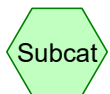
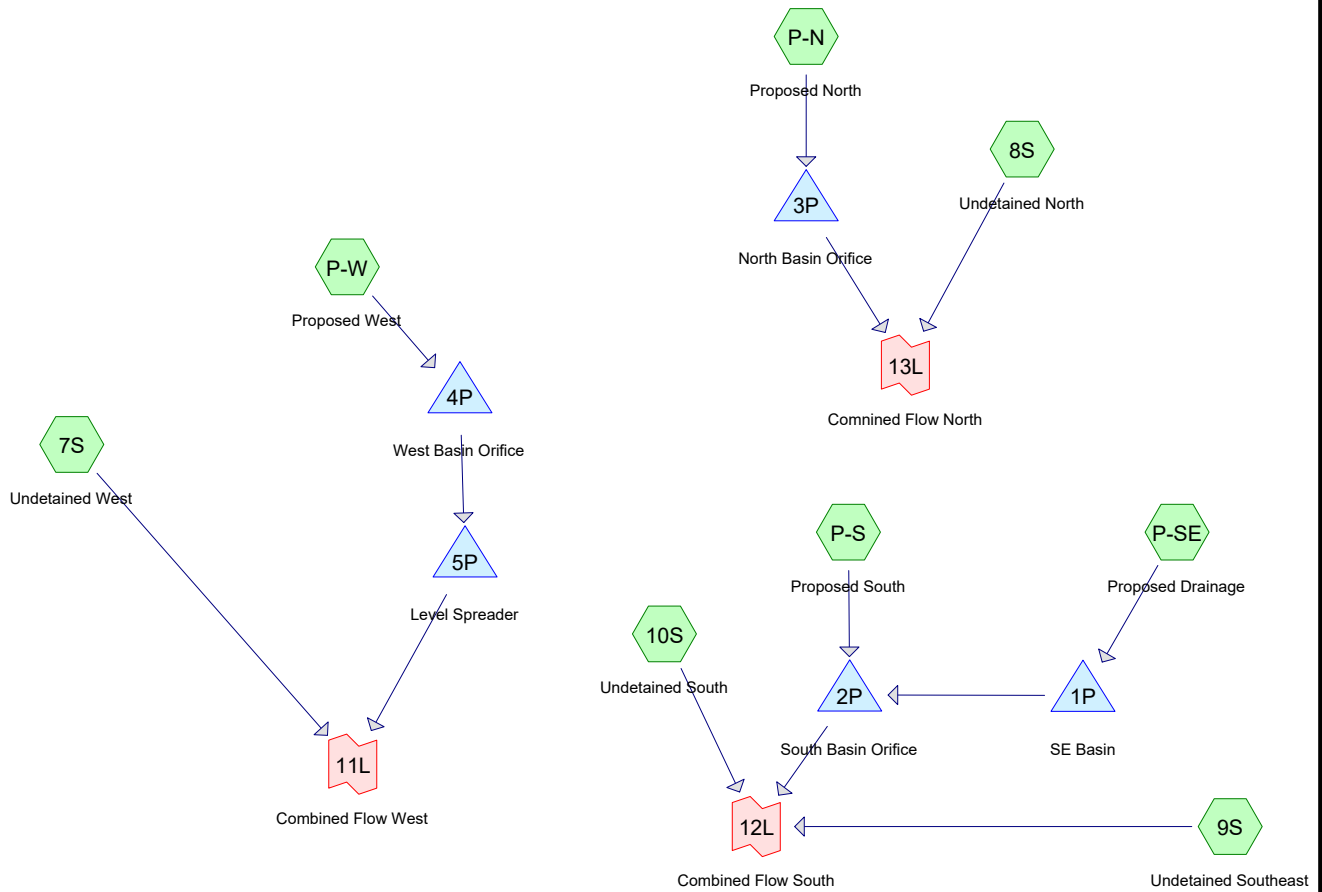
### Link 2L: Combined South Flow



## Appendix E: Post Development Conditions HydroCad Report

And

## Appendix F: Post Development Conditions Detention Basin HydroCad Report



**Routing Diagram for 23-047 Proposed Site Conditions\_5-7-24**  
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Page 2

### **Project Notes**

Rainfall events imported from "NRCS-Rain.txt" for 1476 IA Polk

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Page 3

**Rainfall Events Listing**

| Event# | Event Name | Storm Type    | Curve | Mode    | Duration (hours) | B/B | Depth (inches) | AMC |
|--------|------------|---------------|-------|---------|------------------|-----|----------------|-----|
| 1      | 1-Year     | Type II 24-hr |       | Default | 24.00            | 1   | 2.67           | 2   |
| 2      | 2-Year     | Type II 24-hr |       | Default | 24.00            | 1   | 3.08           | 2   |
| 3      | 5-Year     | Type II 24-hr |       | Default | 24.00            | 1   | 3.81           | 2   |
| 4      | 10-Year    | Type II 24-hr |       | Default | 24.00            | 1   | 4.46           | 2   |
| 5      | 25-Year    | Type II 24-hr |       | Default | 24.00            | 1   | 5.44           | 2   |
| 6      | 50-Year    | Type II 24-hr |       | Default | 24.00            | 1   | 6.26           | 2   |
| 7      | 100-Year   | Type II 24-hr |       | Default | 24.00            | 1   | 7.12           | 2   |

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Page 4

### Area Listing (all nodes)

| Area<br>(acres) | CN        | Description<br>(subcatchment-numbers)                                |
|-----------------|-----------|----------------------------------------------------------------------|
| 2.740           | 61        | >75% Grass cover, Good, HSG B (7S, 8S, 9S, 10S, P-N, P-S, P-SE, P-W) |
| 0.130           | 98        | Paved parking, HSG C (P-SE)                                          |
| 2.140           | 98        | Paved roads w/curbs & sewers, HSG C (P-N, P-S, P-W)                  |
| 0.020           | 98        | Pavement (9S)                                                        |
| <b>5.030</b>    | <b>78</b> | <b>TOTAL AREA</b>                                                    |



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### Soil Listing (all nodes)

| Area<br>(acres) | Soil<br>Group | Subcatchment<br>Numbers              |
|-----------------|---------------|--------------------------------------|
| 0.000           | HSG A         |                                      |
| 2.740           | HSG B         | 7S, 8S, 9S, 10S, P-N, P-S, P-SE, P-W |
| 2.270           | HSG C         | P-N, P-S, P-SE, P-W                  |
| 0.000           | HSG D         |                                      |
| 0.020           | Other         | 9S                                   |
| <b>5.030</b>    |               | <b>TOTAL AREA</b>                    |

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Page 6

**Ground Covers (all nodes)**

| HSG-A<br>(acres) | HSG-B<br>(acres) | HSG-C<br>(acres) | HSG-D<br>(acres) | Other<br>(acres) | Total<br>(acres) | Ground<br>Cover              | Subcatchment<br>Numbers                                            |
|------------------|------------------|------------------|------------------|------------------|------------------|------------------------------|--------------------------------------------------------------------|
| 0.000            | 2.740            | 0.000            | 0.000            | 0.000            | 2.740            | >75% Grass cover, Good       | 7S,<br>8S,<br>9S,<br>10<br>S,<br>P-<br>N,<br>P-<br>S,<br>P-<br>SE, |
| 0.000            | 0.000            | 0.130            | 0.000            | 0.000            | 0.130            | Paved parking                | P-<br>W<br>P-<br>SE                                                |
| 0.000            | 0.000            | 2.140            | 0.000            | 0.000            | 2.140            | Paved roads w/curbs & sewers | P-<br>N,<br>P-<br>S,<br>P-<br>W<br>9S                              |
| 0.000            | 0.000            | 0.000            | 0.000            | 0.020            | 0.020            | Pavement                     |                                                                    |
| <b>0.000</b>     | <b>2.740</b>     | <b>2.270</b>     | <b>0.000</b>     | <b>0.020</b>     | <b>5.030</b>     | <b>TOTAL AREA</b>            |                                                                    |

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Page 7

**Pipe Listing (all nodes)**

| Line# | Node<br>Number | In-Invert<br>(feet) | Out-Invert<br>(feet) | Length<br>(feet) | Slope<br>(ft/ft) | n     | Width<br>(inches) | Diam/Height<br>(inches) | Inside-Fill<br>(inches) |
|-------|----------------|---------------------|----------------------|------------------|------------------|-------|-------------------|-------------------------|-------------------------|
| 1     | P-N            | 0.00                | 0.00                 | 230.0            | 0.0150           | 0.013 | 0.0               | 15.0                    | 0.0                     |
| 2     | P-SE           | 0.00                | 0.00                 | 53.0             | 0.0100           | 0.013 | 0.0               | 15.0                    | 0.0                     |
| 3     | P-W            | 0.00                | 0.00                 | 378.0            | 0.0150           | 0.013 | 0.0               | 18.0                    | 0.0                     |
| 4     | 1P             | 916.26              | 915.96               | 30.2             | 0.0099           | 0.013 | 0.0               | 4.0                     | 0.0                     |
| 5     | 2P             | 911.34              | 909.31               | 68.0             | 0.0299           | 0.013 | 0.0               | 6.0                     | 0.0                     |
| 6     | 3P             | 918.30              | 910.25               | 104.0            | 0.0774           | 0.013 | 0.0               | 12.0                    | 0.0                     |
| 7     | 4P             | 908.00              | 904.00               | 32.0             | 0.1250           | 0.013 | 0.0               | 15.0                    | 0.0                     |



**23-047 Proposed Site Conditions\_5-7-24***Type II 24-hr 1-Year Rainfall=2.67"*

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Page 8

Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

|                                            |                                                                                                                           |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment7S: UndetainedWest</b>      | Runoff Area=0.540 ac 0.00% Impervious Runoff Depth=0.25"<br>Tc=5.0 min CN=61 Runoff=0.15 cfs 0.011 af                     |
| <b>Subcatchment8S: UndetainedNorth</b>     | Runoff Area=0.530 ac 0.00% Impervious Runoff Depth=0.25"<br>Tc=5.0 min CN=61 Runoff=0.15 cfs 0.011 af                     |
| <b>Subcatchment9S: UndetainedSoutheast</b> | Runoff Area=0.170 ac 11.76% Impervious Runoff Depth=0.36"<br>Tc=5.0 min CN=65 Runoff=0.09 cfs 0.005 af                    |
| <b>Subcatchment10S: UndetainedSouth</b>    | Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=0.25"<br>Tc=5.0 min CN=61 Runoff=0.03 cfs 0.002 af                     |
| <b>SubcatchmentP-N: Proposed North</b>     | Runoff Area=0.980 ac 75.51% Impervious Runoff Depth=1.60"<br>Flow Length=321' Tc=8.1 min CN=89 Runoff=2.57 cfs 0.131 af   |
| <b>SubcatchmentP-S: Proposed South</b>     | Runoff Area=0.480 ac 22.92% Impervious Runoff Depth=0.50"<br>Flow Length=237' Tc=11.1 min CN=69 Runoff=0.30 cfs 0.020 af  |
| <b>SubcatchmentP-SE: Proposed Drainage</b> | Runoff Area=0.330 ac 39.39% Impervious Runoff Depth=0.80"<br>Flow Length=118' Tc=7.3 min CN=76 Runoff=0.44 cfs 0.022 af   |
| <b>SubcatchmentP-W: Proposed West</b>      | Runoff Area=1.910 ac 67.54% Impervious Runoff Depth=1.38"<br>Flow Length=1,203' Tc=6.7 min CN=86 Runoff=4.59 cfs 0.220 af |
| <b>Pond 1P: SE Basin</b>                   | Peak Elev=917.57' Storage=566 cf Inflow=0.44 cfs 0.022 af<br>Outflow=0.02 cfs 0.012 af                                    |
| <b>Pond 2P: South Basin Orifice</b>        | Peak Elev=912.44' Storage=529 cf Inflow=0.30 cfs 0.032 af<br>Outflow=0.03 cfs 0.023 af                                    |
| <b>Pond 3P: North Basin Orifice</b>        | Peak Elev=921.15' Storage=3,719 cf Inflow=2.57 cfs 0.131 af<br>Outflow=0.09 cfs 0.062 af                                  |
| <b>Pond 4P: West Basin Orifice</b>         | Peak Elev=909.96' Storage=5,540 cf Inflow=4.59 cfs 0.220 af<br>Outflow=0.20 cfs 0.148 af                                  |
| <b>Pond 5P: Level Spreader</b>             | Peak Elev=904.01' Storage=1 cf Inflow=0.20 cfs 0.148 af<br>Outflow=0.20 cfs 0.148 af                                      |
| <b>Link 11L: Combined Flow West</b>        | Inflow=0.22 cfs 0.160 af<br>Primary=0.22 cfs 0.160 af                                                                     |
| <b>Link 12L: Combined Flow South</b>       | Inflow=0.12 cfs 0.030 af<br>Primary=0.12 cfs 0.030 af                                                                     |
| <b>Link 13L: Comnined Flow North</b>       | Inflow=0.15 cfs 0.073 af<br>Primary=0.15 cfs 0.073 af                                                                     |

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Page 9

**Total Runoff Area = 5.030 ac   Runoff Volume = 0.422 af   Average Runoff Depth = 1.01"**  
**54.47% Pervious = 2.740 ac   45.53% Impervious = 2.290 ac**

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Type II 24-hr 1-Year Rainfall=2.67"

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Page 10

**Summary for Subcatchment 7S: Undetained West**

Runoff = 0.15 cfs @ 12.00 hrs, Volume= 0.011 af, Depth= 0.25"  
Routed to Link 11L : Combined Flow West

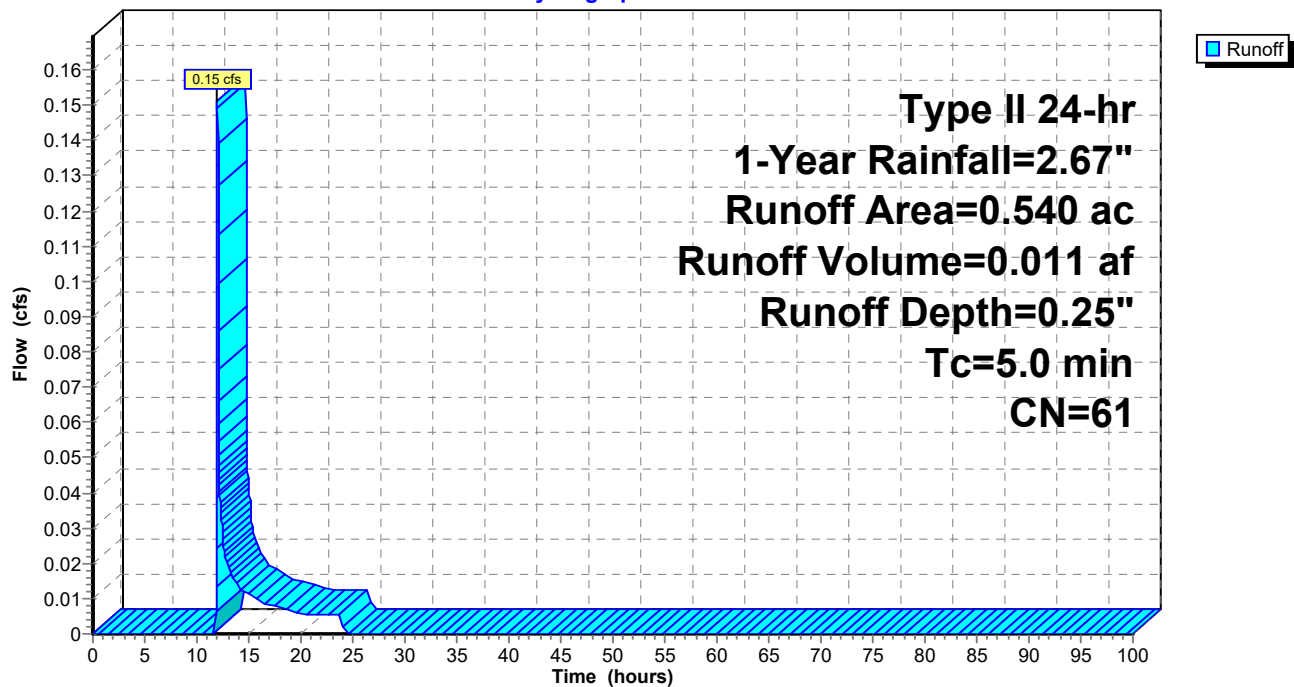
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 1-Year Rainfall=2.67"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.540   | 61 | >75% Grass cover, Good, HSG B |
| 0.540     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 7S: Undetained West**

Hydrograph





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Type II 24-hr 1-Year Rainfall=2.67"

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Page 11

**Summary for Subcatchment 8S: Undetained North**

Runoff = 0.15 cfs @ 12.00 hrs, Volume= 0.011 af, Depth= 0.25"  
Routed to Link 13L : Comnined Flow North

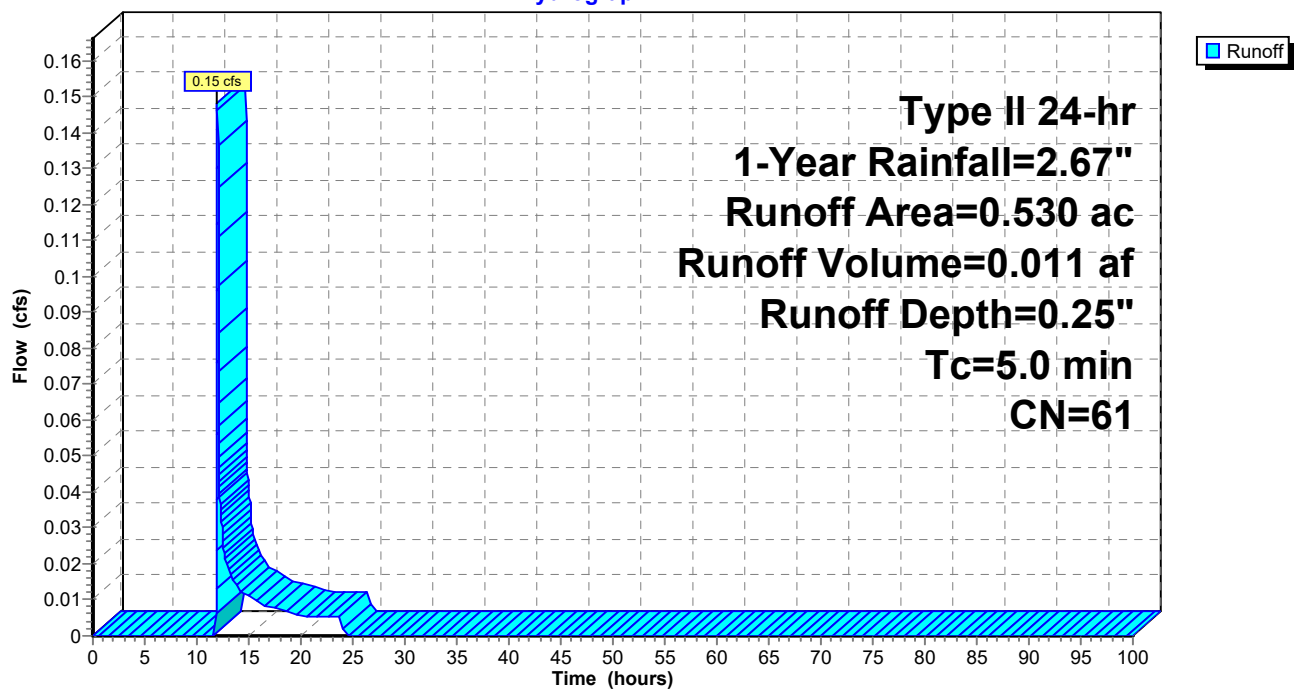
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 1-Year Rainfall=2.67"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.530   | 61 | >75% Grass cover, Good, HSG B |
| 0.530     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 8S: Undetained North**

Hydrograph



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Type II 24-hr 1-Year Rainfall=2.67"

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Page 12

**Summary for Subcatchment 9S: Undetained Southeast**

Runoff = 0.09 cfs @ 11.98 hrs, Volume= 0.005 af, Depth= 0.36"  
Routed to Link 12L : Combined Flow South

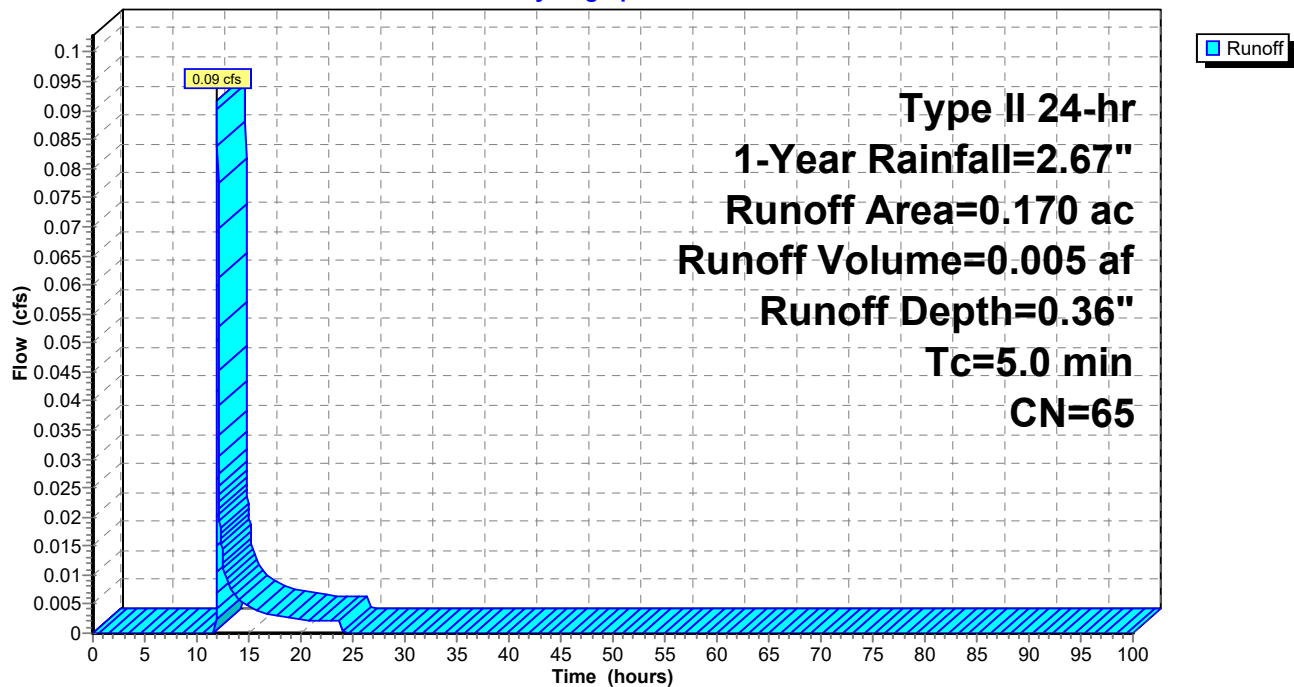
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 1-Year Rainfall=2.67"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.150   | 61 | >75% Grass cover, Good, HSG B |
| * 0.020   | 98 | Pavement                      |
| 0.170     | 65 | Weighted Average              |
| 0.150     |    | 88.24% Pervious Area          |
| 0.020     |    | 11.76% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 9S: Undetained Southeast**

Hydrograph



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Type II 24-hr 1-Year Rainfall=2.67"

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Page 13

**Summary for Subcatchment 10S: Undetained South**

Runoff = 0.03 cfs @ 12.00 hrs, Volume= 0.002 af, Depth= 0.25"  
Routed to Link 12L : Combined Flow South

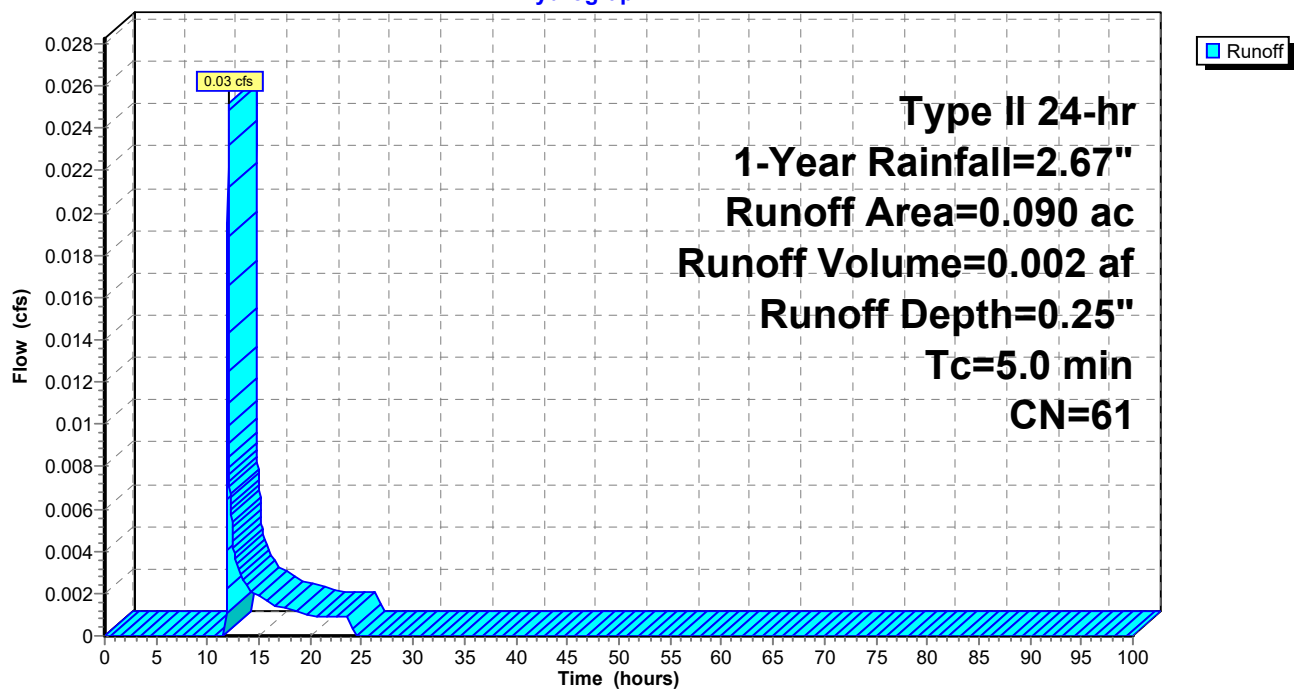
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 1-Year Rainfall=2.67"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.090   | 61 | >75% Grass cover, Good, HSG B |
| 0.090     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 10S: Undetained South**

Hydrograph





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Type II 24-hr 1-Year Rainfall=2.67"

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Page 14

**Summary for Subcatchment P-N: Proposed North**

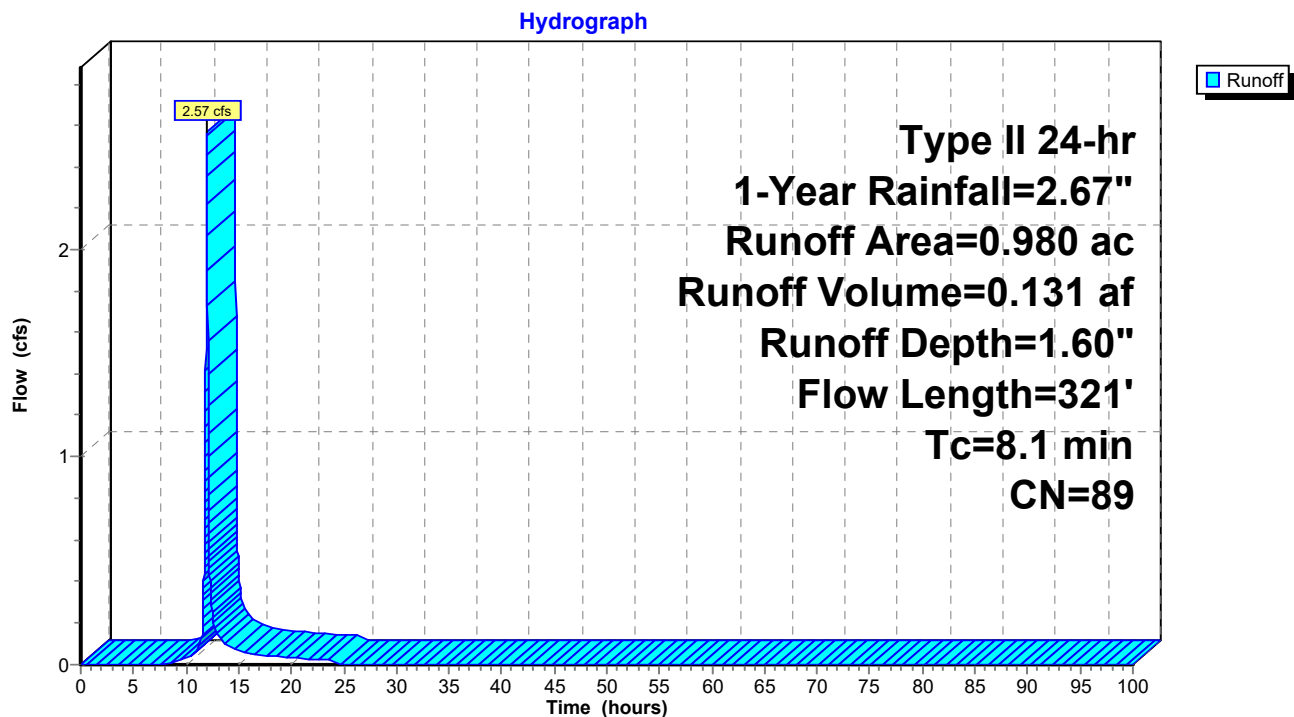
Runoff = 2.57 cfs @ 12.00 hrs, Volume= 0.131 af, Depth= 1.60"  
Routed to Pond 3P : North Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 1-Year Rainfall=2.67"

| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 0.740   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.240     | 61 | >75% Grass cover, Good, HSG B       |
| 0.980     | 89 | Weighted Average                    |
| 0.240     |    | 24.49% Pervious Area                |
| 0.740     |    | 75.51% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                            |
|----------|---------------|---------------|-------------------|----------------|----------------------------------------------------------------------------------------|
| 7.5      | 91            | 0.0350        | 0.20              |                | <b>Sheet Flow, SHEET (GRASS)</b><br>Grass: Short n= 0.150 P2= 3.04"                    |
| 0.6      | 230           | 0.0150        | 6.45              | 7.91           | <b>Pipe Channel, PIPE</b><br>15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'<br>n= 0.013 |
| 8.1      | 321           | Total         |                   |                |                                                                                        |

**Subcatchment P-N: Proposed North**

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Page 15

**Summary for Subcatchment P-S: Proposed South**

Runoff = 0.30 cfs @ 12.05 hrs, Volume= 0.020 af, Depth= 0.50"  
Routed to Pond 2P : South Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 1-Year Rainfall=2.67"

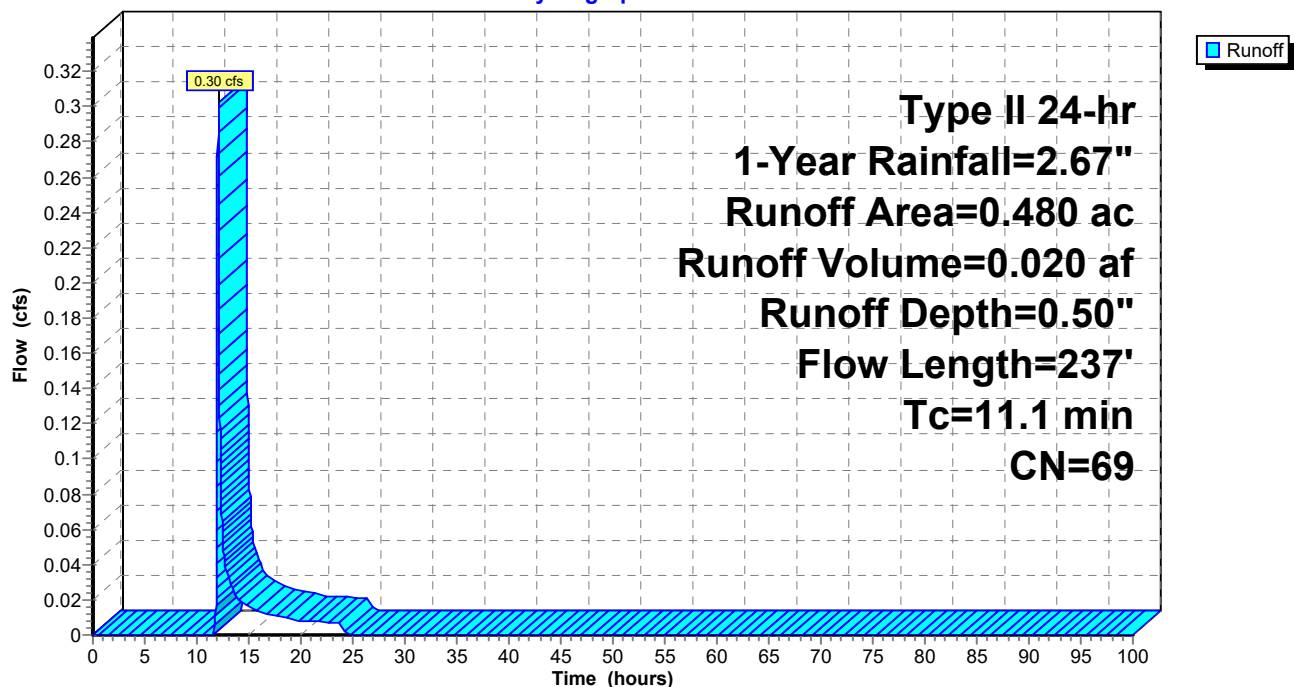
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 0.110   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.370     | 61 | >75% Grass cover, Good, HSG B       |
| 0.480     | 69 | Weighted Average                    |
| 0.370     |    | 77.08% Pervious Area                |
| 0.110     |    | 22.92% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                        |
|----------|---------------|---------------|-------------------|----------------|------------------------------------------------------------------------------------|
| 10.1     | 100           | 0.0200        | 0.17              |                | <b>Sheet Flow, SHEET (GRASS)</b><br>Grass: Short n= 0.150 P2= 3.04"                |
| 0.9      | 112           | 0.0200        | 2.12              |                | <b>Shallow Concentrated Flow, SHALLOW (GRASS)</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.1      | 25            | 0.2500        | 7.50              |                | <b>Shallow Concentrated Flow, SHALLOW (GRASS)</b><br>Grassed Waterway Kv= 15.0 fps |
| 11.1     | 237           | Total         |                   |                |                                                                                    |

**Subcatchment P-S: Proposed South**

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

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Type II 24-hr 1-Year Rainfall=2.67"

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Page 16

**Summary for Subcatchment P-SE: Proposed Drainage**

Runoff = 0.44 cfs @ 12.00 hrs, Volume= 0.022 af, Depth= 0.80"  
 Routed to Pond 1P : SE Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 1-Year Rainfall=2.67"

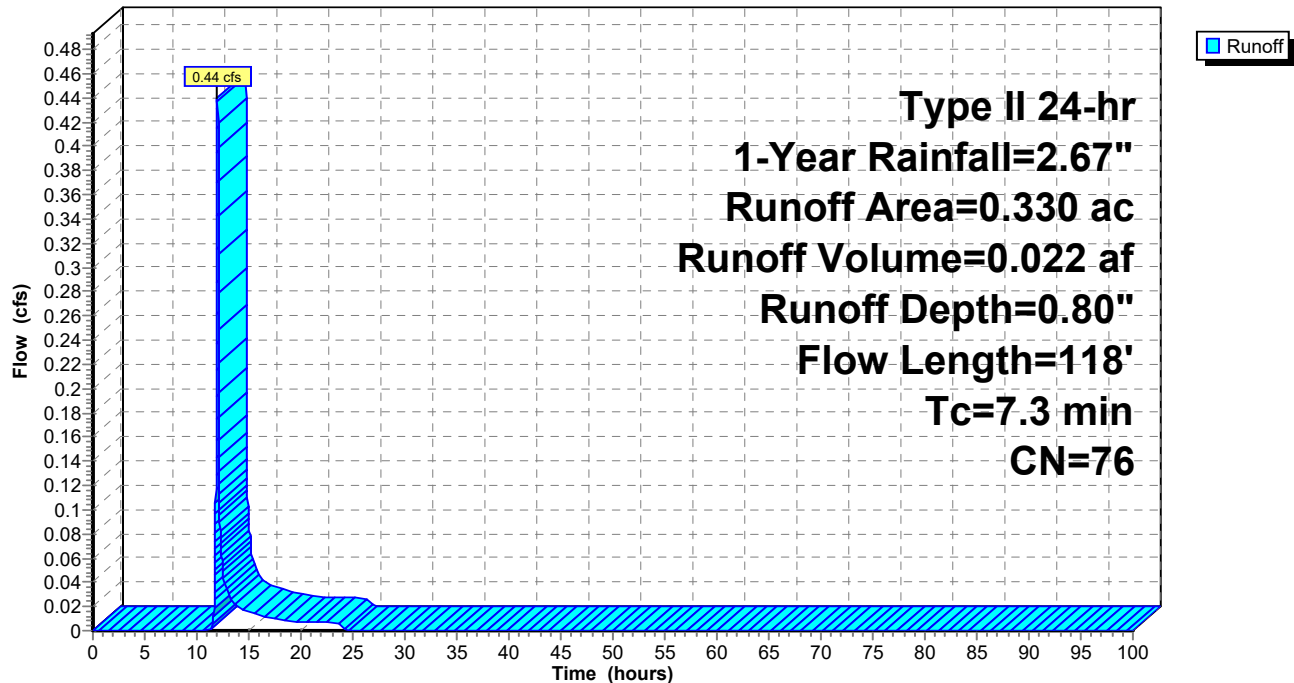
| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.130     | 98 | Paved parking, HSG C          |
| 0.200     | 61 | >75% Grass cover, Good, HSG B |
| 0.330     | 76 | Weighted Average              |
| 0.200     |    | 60.61% Pervious Area          |
| 0.130     |    | 39.39% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                       |
|----------|---------------|---------------|-------------------|----------------|-----------------------------------------------------------------------------------|
| 7.1      | 65            | 0.0200        | 0.15              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.04"                             |
| 0.2      | 53            | 0.0100        | 5.26              | 6.46           | <b>Pipe Channel,</b><br>15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'<br>n= 0.013 |
| 7.3      | 118           | Total         |                   |                |                                                                                   |

**Subcatchment P-SE: Proposed Drainage**

Hydrograph





**23-047 Proposed Site Conditions\_5-7-24**

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Type II 24-hr 1-Year Rainfall=2.67"

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Page 17

**Summary for Subcatchment P-W: Proposed West**

Runoff = 4.59 cfs @ 11.98 hrs, Volume= 0.220 af, Depth= 1.38"  
 Routed to Pond 4P : West Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 1-Year Rainfall=2.67"

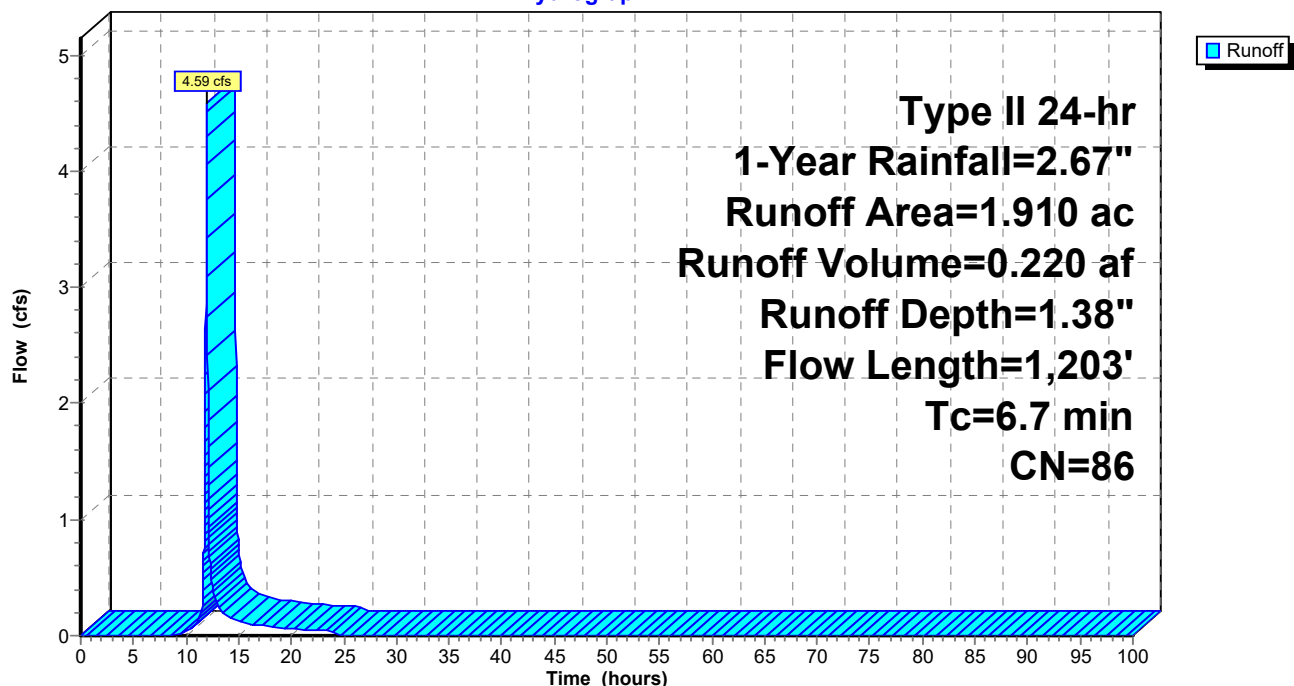
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 1.290   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.620     | 61 | >75% Grass cover, Good, HSG B       |
| 1.910     | 86 | Weighted Average                    |
| 0.620     |    | 32.46% Pervious Area                |
| 1.290     |    | 67.54% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                                   |
|----------|---------------|---------------|-------------------|----------------|-----------------------------------------------------------------------------------------------|
| 2.2      | 100           | 0.0050        | 0.77              |                | <b>Sheet Flow, SHEET (PAVED)</b><br>Smooth surfaces n= 0.011 P2= 3.04"                        |
| 3.6      | 725           | 0.0280        | 3.40              |                | <b>Shallow Concentrated Flow, SHALLOW (PAVED)</b><br>Paved Kv= 20.3 fps                       |
| 0.9      | 378           | 0.0150        | 7.28              | 12.87          | <b>Pipe Channel, Storm Sewer</b><br>18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38'<br>n= 0.013 |
| 6.7      | 1,203         | Total         |                   |                |                                                                                               |

**Subcatchment P-W: Proposed West**

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 1-Year Rainfall=2.67"

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Page 18

**Summary for Pond 1P: SE Basin**

Inflow Area = 0.330 ac, 39.39% Impervious, Inflow Depth = 0.80" for 1-Year event  
 Inflow = 0.44 cfs @ 12.00 hrs, Volume= 0.022 af  
 Outflow = 0.02 cfs @ 14.94 hrs, Volume= 0.012 af, Atten= 96%, Lag= 176.5 min  
 Primary = 0.02 cfs @ 14.94 hrs, Volume= 0.012 af  
 Routed to Pond 2P : South Basin Orifice

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 917.57' @ 14.94 hrs Surf.Area= 1,723 sf Storage= 566 cf

Plug-Flow detention time= 466.5 min calculated for 0.012 af (56% of inflow)  
 Center-of-Mass det. time= 329.8 min ( 1,194.6 - 864.8 )

| Volume | Invert  | Avail.Storage | Storage Description                                        |
|--------|---------|---------------|------------------------------------------------------------|
| #1     | 916.91' | 8,715 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 916.91              | 0                    | 0                         | 0                         |
| 918.00              | 2,856                | 1,557                     | 1,557                     |
| 919.00              | 3,551                | 3,204                     | 4,760                     |
| 920.00              | 4,358                | 3,955                     | 8,715                     |

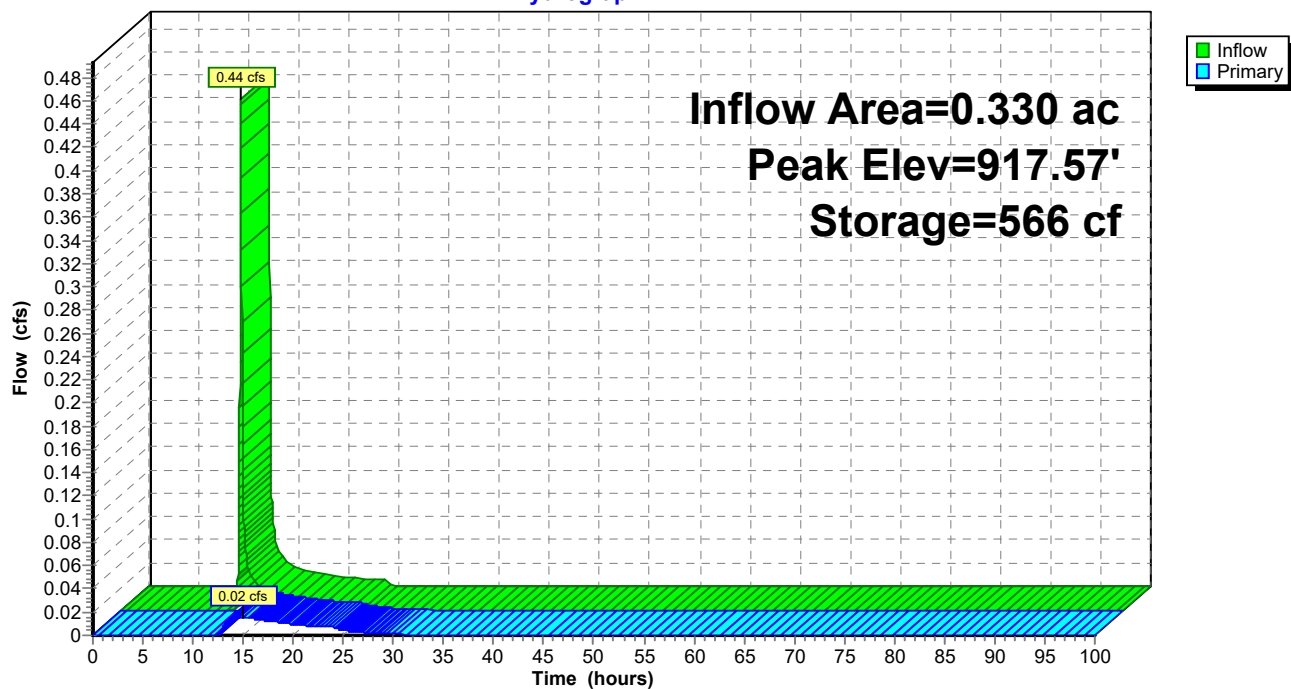
| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                             |
|--------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 916.26' | <b>4.0" Round Culvert X 3.00</b> L= 30.2' Ke= 0.500<br>Inlet / Outlet Invert= 916.26' / 915.96' S= 0.0099 '/' Cc= 0.900<br>n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.09 sf |
| #2     | Device 1 | 917.48' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                                 |
| #3     | Device 1 | 918.00' | <b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b><br>Head (feet) 0.00 0.45 0.45 0.95<br>Width (feet) 0.50 0.50 3.00 3.00                                                                      |

**Primary OutFlow** Max=0.02 cfs @ 14.94 hrs HW=917.57' (Free Discharge)

↑ **1=Culvert** (Passes 0.02 cfs of 1.00 cfs potential flow)  
 ↑ **2=Orifice/Grate** (Orifice Controls 0.02 cfs @ 1.01 fps)  
 ↑ **3=Custom Weir/Orifice** ( Controls 0.00 cfs)

# Pond 1P: SE Basin

## Hydrograph





**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 1-Year Rainfall=2.67"

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Page 20

**Summary for Pond 2P: South Basin Orifice**

Inflow Area = 0.810 ac, 29.63% Impervious, Inflow Depth = 0.48" for 1-Year event  
 Inflow = 0.30 cfs @ 12.05 hrs, Volume= 0.032 af  
 Outflow = 0.03 cfs @ 15.35 hrs, Volume= 0.023 af, Atten= 90%, Lag= 198.2 min  
 Primary = 0.03 cfs @ 15.35 hrs, Volume= 0.023 af  
 Routed to Link 12L : Combined Flow South

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 912.44' @ 15.35 hrs Surf.Area= 954 sf Storage= 529 cf

Plug-Flow detention time= 361.1 min calculated for 0.023 af (71% of inflow)  
 Center-of-Mass det. time= 201.3 min ( 1,211.5 - 1,010.2 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                        |
|---------------------|----------------------|---------------------------|------------------------------------------------------------|
| #1                  | 911.50'              | 5,431 cf                  | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                                  |
| 911.50              | 0                    | 0                         | 0                                                          |
| 912.00              | 682                  | 171                       | 171                                                        |
| 913.00              | 1,303                | 993                       | 1,163                                                      |
| 914.00              | 2,092                | 1,698                     | 2,861                                                      |
| 915.00              | 3,048                | 2,570                     | 5,431                                                      |

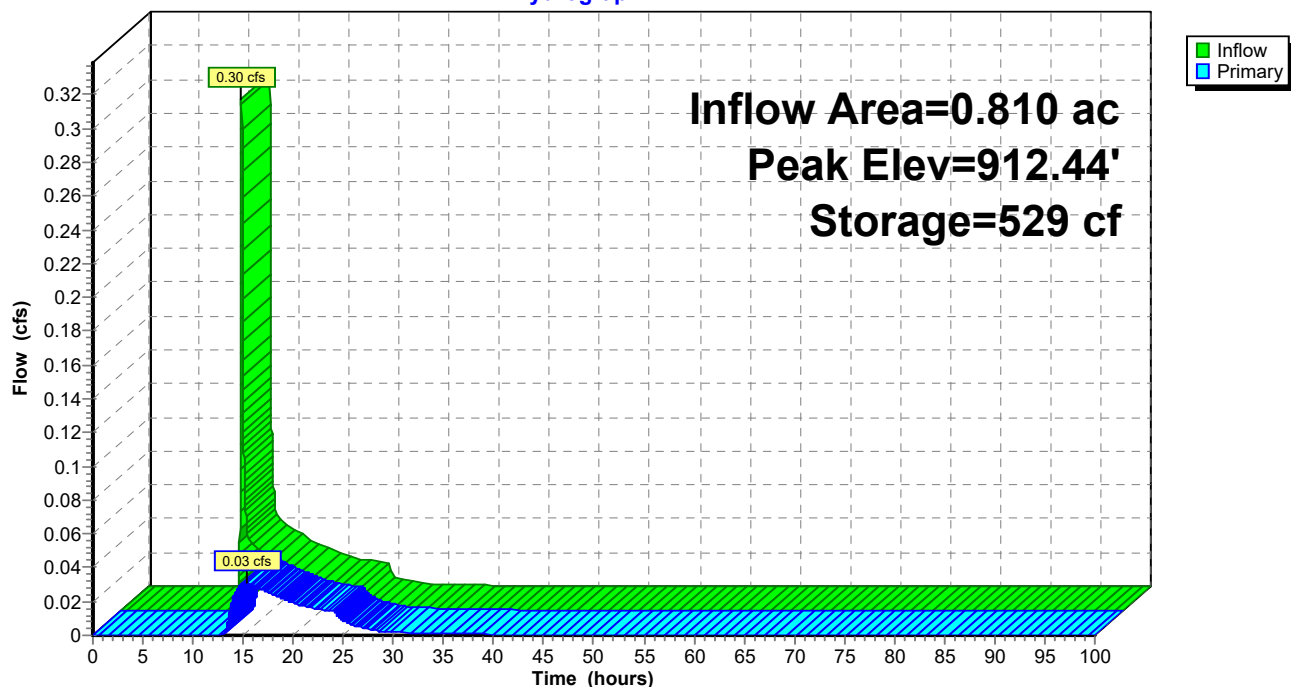
| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                 |
|--------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 911.34' | <b>6.0" Round Culvert</b><br>L= 68.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 911.34' / 909.31' S= 0.0299 '/' Cc= 0.900<br>n= 0.013, Flow Area= 0.20 sf |
| #2     | Device 1 | 912.31' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                     |
| #3     | Device 1 | 913.00' | <b>10.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                    |

**Primary OutFlow** Max=0.03 cfs @ 15.35 hrs HW=912.44' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.03 cfs of 0.87 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 1.22 fps)
- ↑ **3=Orifice/Grate** ( Controls 0.00 cfs)

# Pond 2P: South Basin Orifice

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 1-Year Rainfall=2.67"

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Page 22

**Summary for Pond 3P: North Basin Orifice**

Inflow Area = 0.980 ac, 75.51% Impervious, Inflow Depth = 1.60" for 1-Year event  
 Inflow = 2.57 cfs @ 12.00 hrs, Volume= 0.131 af  
 Outflow = 0.09 cfs @ 13.93 hrs, Volume= 0.062 af, Atten= 96%, Lag= 115.9 min  
 Primary = 0.09 cfs @ 13.93 hrs, Volume= 0.062 af  
 Routed to Link 13L : Combined Flow North

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 921.15' @ 13.93 hrs Surf.Area= 3,447 sf Storage= 3,719 cf

Plug-Flow detention time= 425.8 min calculated for 0.062 af (48% of inflow)  
 Center-of-Mass det. time= 308.5 min ( 1,125.9 - 817.4 )

| Volume | Invert  | Avail.Storage | Storage Description                                                                                                                                                                                                                                        |
|--------|---------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1A    | 919.40' | 6,149 cf      | <b>20.08'W x 171.65'L x 6.75'H Field A</b><br>23,269 cf Overall - 7,897 cf Embedded = 15,373 cf x 40.0% Voids                                                                                                                                              |
| #2A    | 920.15' | 7,897 cf      | <b>ADS_StormTech MC-7200 +Cap</b> x 44 Inside #1<br>Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf<br>Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap<br>44 Chambers in 2 Rows<br>Cap Storage= 39.5 cf x 2 x 2 rows = 158.0 cf |
|        |         | 14,046 cf     | Total Available Storage                                                                                                                                                                                                                                    |

Storage Group A created with Chamber Wizard

| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                   |
|--------|----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 918.30' | <b>12.0" Round Culvert</b><br>L= 104.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 918.30' / 910.25' S= 0.0774 '/' Cc= 0.900<br>n= 0.013, Flow Area= 0.79 sf |
| #2     | Device 1 | 920.87' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                       |
| #3     | Device 1 | 924.15' | <b>12.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                      |

**Primary OutFlow** Max=0.09 cfs @ 13.93 hrs HW=921.15' (Free Discharge)

↑ **1=Culvert** (Passes 0.09 cfs of 5.79 cfs potential flow)  
 ↑ **2=Orifice/Grate** (Orifice Controls 0.09 cfs @ 1.87 fps)  
 ↑ **3=Orifice/Grate** ( Controls 0.00 cfs)



## 23-047 Proposed Site Conditions\_5-7-24

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Type II 24-hr 1-Year Rainfall=2.67"

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Page 23

### Pond 3P: North Basin Orifice - Chamber Wizard Field A

**Chamber Model = ADS\_StormTechMC-7200+Cap (ADS StormTech®MC-7200 with cap volume)**

Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf

Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap

Cap Storage= 39.5 cf x 2 x 2 rows = 158.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

22 Chambers/Row x 6.59' Long +2.73' Cap Length x 2 = 150.48' Row Length +127.0" End Stone x 2 = 171.65' Base Length

2 Rows x 100.0" Wide + 9.0" Spacing x 1 + 16.0" Side Stone x 2 = 20.08' Base Width

9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

44 Chambers x 175.9 cf + 39.5 cf Cap Volume x 2 x 2 Rows = 7,896.5 cf Chamber Storage

23,269.3 cf Field - 7,896.5 cf Chambers = 15,372.8 cf Stone x 40.0% Voids = 6,149.1 cf Stone Storage

Chamber Storage + Stone Storage = 14,045.6 cf = 0.322 af

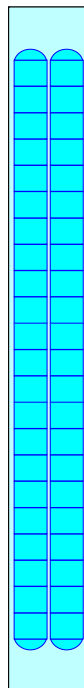
Overall Storage Efficiency = 60.4%

Overall System Size = 171.65' x 20.08' x 6.75'

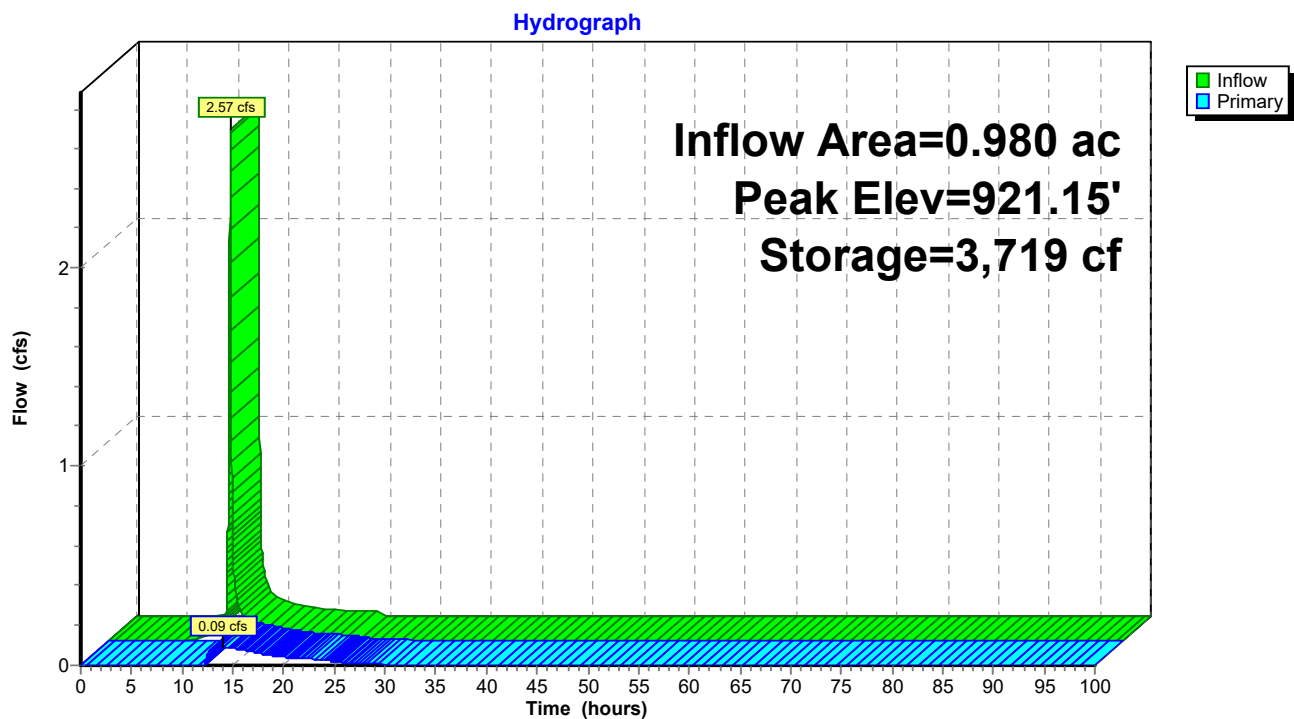
44 Chambers

861.8 cy Field

569.4 cy Stone



### Pond 3P: North Basin Orifice



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 1-Year Rainfall=2.67"

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Page 25

**Summary for Pond 4P: West Basin Orifice**

Inflow Area = 1.910 ac, 67.54% Impervious, Inflow Depth = 1.38" for 1-Year event  
 Inflow = 4.59 cfs @ 11.98 hrs, Volume= 0.220 af  
 Outflow = 0.20 cfs @ 13.51 hrs, Volume= 0.148 af, Atten= 96%, Lag= 91.8 min  
 Primary = 0.20 cfs @ 13.51 hrs, Volume= 0.148 af  
 Routed to Pond 5P : Level Spreader

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 909.96' @ 13.51 hrs Surf.Area= 3,327 sf Storage= 5,540 cf

Plug-Flow detention time= 350.2 min calculated for 0.148 af (67% of inflow)  
 Center-of-Mass det. time= 242.8 min ( 1,070.9 - 828.2 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                        |
|---------------------|----------------------|---------------------------|------------------------------------------------------------|
| #1                  | 907.00'              | 28,862 cf                 | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                                  |
| 907.00              | 0                    | 0                         | 0                                                          |
| 908.00              | 1,584                | 792                       | 792                                                        |
| 909.00              | 2,402                | 1,993                     | 2,785                                                      |
| 910.00              | 3,364                | 2,883                     | 5,668                                                      |
| 911.00              | 4,448                | 3,906                     | 9,574                                                      |
| 912.00              | 5,668                | 5,058                     | 14,632                                                     |
| 913.00              | 7,027                | 6,348                     | 20,980                                                     |
| 914.00              | 8,738                | 7,883                     | 28,862                                                     |

| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                  |
|--------|----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 908.00' | <b>15.0" Round Culvert</b><br>L= 32.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 908.00' / 904.00' S= 0.1250 '/' Cc= 0.900<br>n= 0.013, Flow Area= 1.23 sf |
| #2     | Device 1 | 909.14' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                      |
| #3     | Device 1 | 910.50' | <b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b><br>Head (feet) 0.00 1.25 1.25 1.75<br>Width (feet) 1.00 1.00 1.00 1.00                                                           |

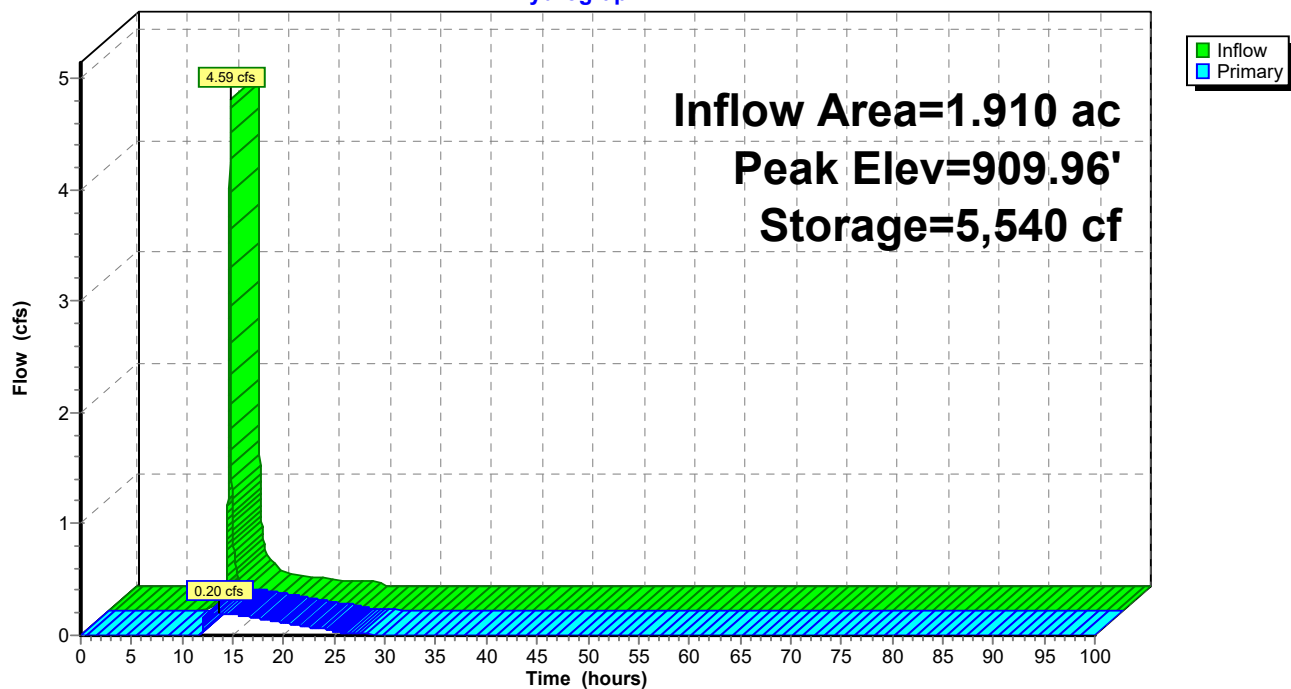
**Primary OutFlow** Max=0.20 cfs @ 13.51 hrs HW=909.96' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.20 cfs of 6.83 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.20 cfs @ 4.02 fps)
- ↑ **3=Custom Weir/Orifice** ( Controls 0.00 cfs)



# Pond 4P: West Basin Orifice

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 1-Year Rainfall=2.67"

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Page 27

**Summary for Pond 5P: Level Spreader**

[79] Warning: Submerged Pond 4P Primary device # 1 OUTLET by 0.01'

Inflow Area = 1.910 ac, 67.54% Impervious, Inflow Depth = 0.93" for 1-Year event  
 Inflow = 0.20 cfs @ 13.51 hrs, Volume= 0.148 af  
 Outflow = 0.20 cfs @ 13.51 hrs, Volume= 0.148 af, Atten= 0%, Lag= 0.1 min  
 Primary = 0.20 cfs @ 13.51 hrs, Volume= 0.148 af  
 Routed to Link 11L : Combined Flow West

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Peak Elev= 904.01' @ 13.51 hrs Surf.Area= 85 sf Storage= 1 cf

Plug-Flow detention time= 0.1 min calculated for 0.148 af (100% of inflow)

Center-of-Mass det. time= 0.1 min ( 1,071.0 - 1,070.9 )

| Volume | Invert  | Avail.Storage | Storage Description                                        |
|--------|---------|---------------|------------------------------------------------------------|
| #1     | 904.00' | 1,255 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |

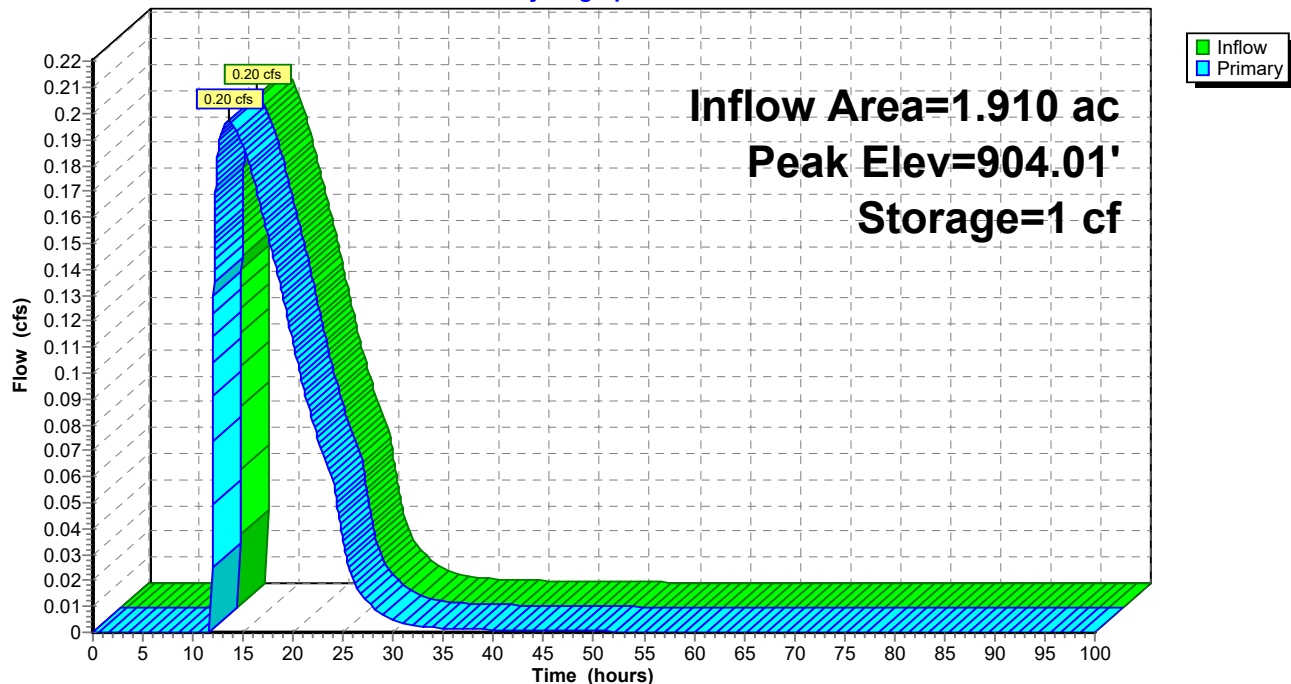
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 904.00              | 72                   | 0                         | 0                         |
| 905.00              | 961                  | 517                       | 517                       |
| 906.00              | 515                  | 738                       | 1,255                     |

| Device | Routing | Invert  | Outlet Devices                                                        |
|--------|---------|---------|-----------------------------------------------------------------------|
| #1     | Primary | 904.00' | <b>30.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s) |

**Primary OutFlow** Max=0.17 cfs @ 13.51 hrs HW=904.01' TW=902.00' (Fixed TW Elev= 902.00')↑**1=Sharp-Crested Rectangular Weir**(Weir Controls 0.17 cfs @ 0.39 fps)

# Pond 5P: Level Spreader

Hydrograph

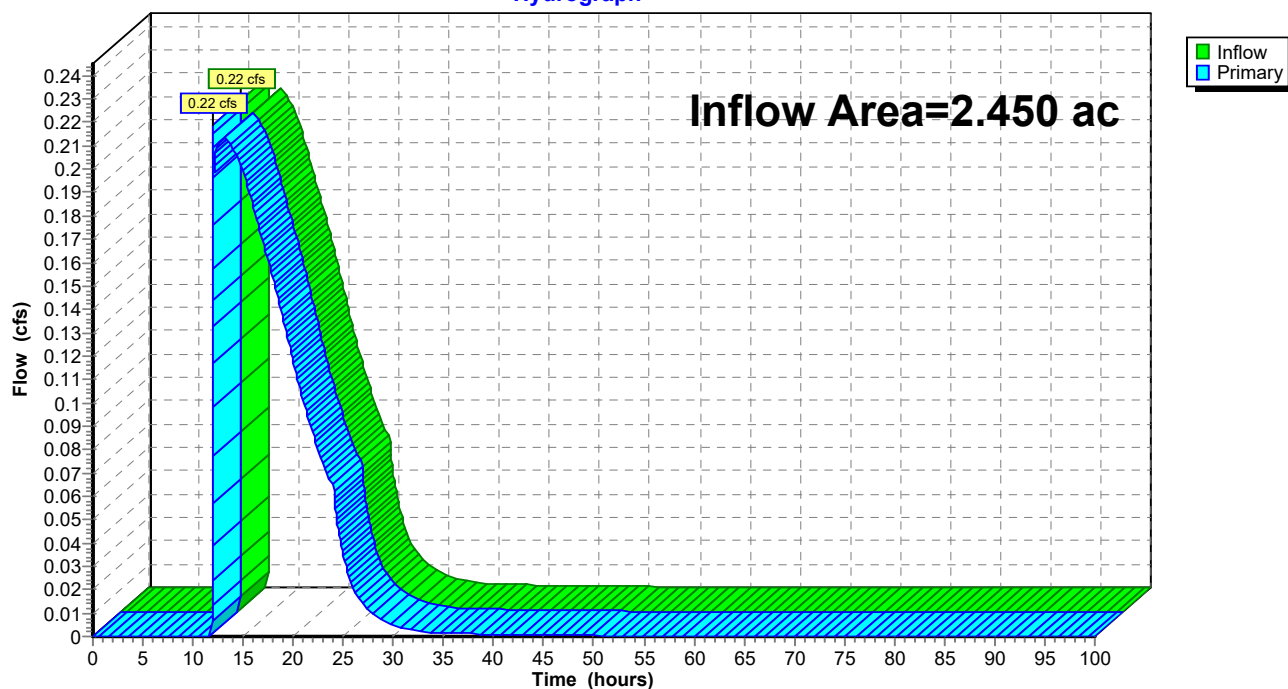




**Summary for Link 11L: Combined Flow West**

Inflow Area = 2.450 ac, 52.65% Impervious, Inflow Depth = 0.78" for 1-Year event  
Inflow = 0.22 cfs @ 12.03 hrs, Volume= 0.160 af  
Primary = 0.22 cfs @ 12.03 hrs, Volume= 0.160 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 15L

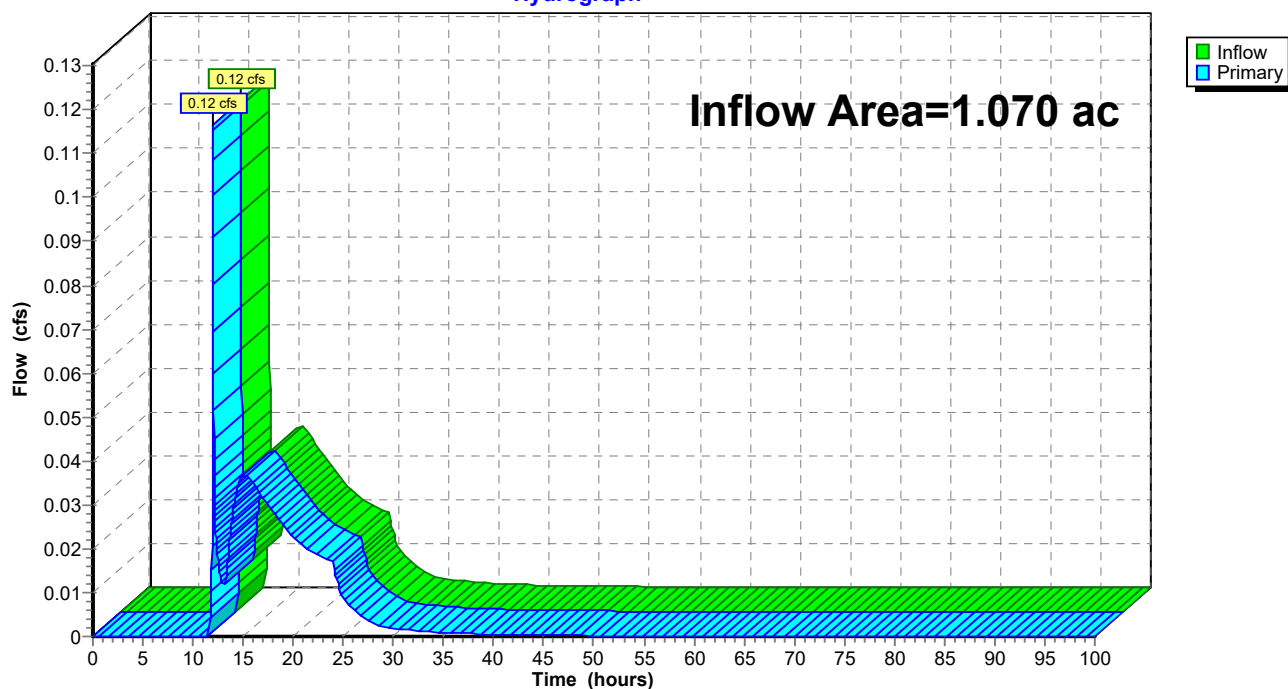
Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

**Link 11L: Combined Flow West****Hydrograph**

**Summary for Link 12L: Combined Flow South**

Inflow Area = 1.070 ac, 24.30% Impervious, Inflow Depth = 0.33" for 1-Year event  
Inflow = 0.12 cfs @ 11.99 hrs, Volume= 0.030 af  
Primary = 0.12 cfs @ 11.99 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 15L

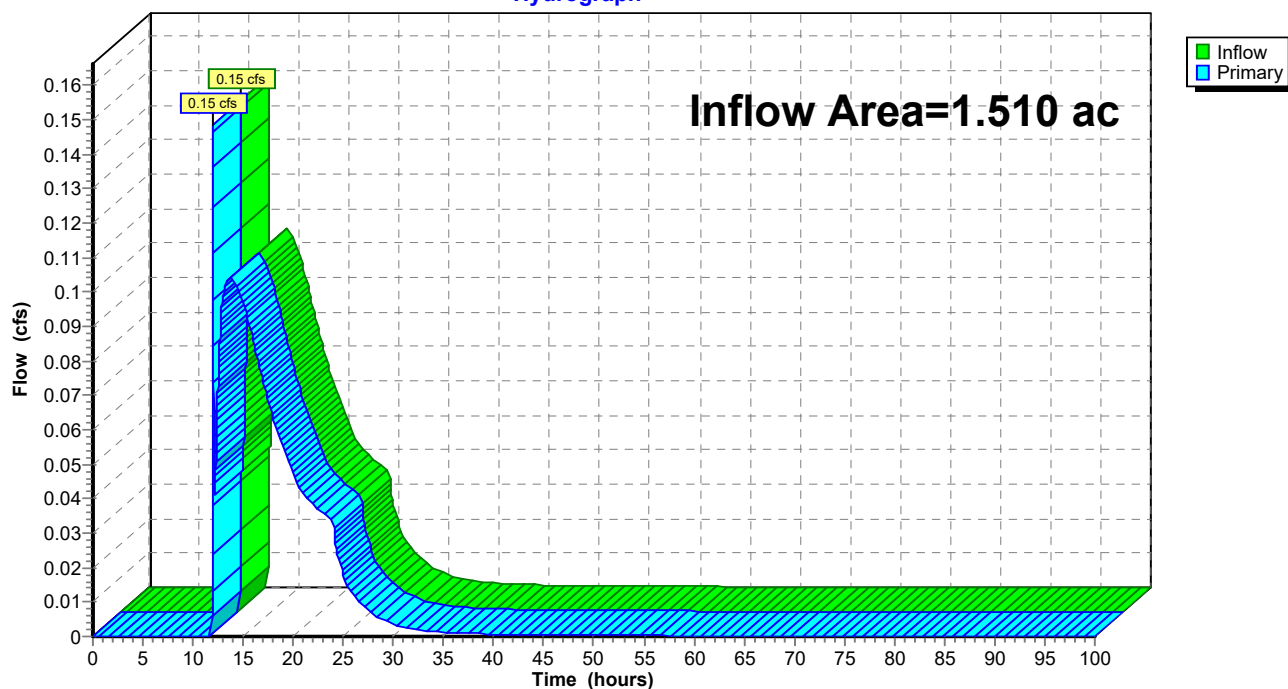
Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

**Link 12L: Combined Flow South****Hydrograph**

**Summary for Link 13L: Comnined Flow North**

Inflow Area = 1.510 ac, 49.01% Impervious, Inflow Depth > 0.58" for 1-Year event  
Inflow = 0.15 cfs @ 12.00 hrs, Volume= 0.073 af  
Primary = 0.15 cfs @ 12.00 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 15L

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

**Link 13L: Comnined Flow North****Hydrograph**



**23-047 Proposed Site Conditions\_5-7-24***Type II 24-hr 2-Year Rainfall=3.08"*

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Page 32

Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

|                                            |                                                                                                                           |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment7S: UndetainedWest</b>      | Runoff Area=0.540 ac 0.00% Impervious Runoff Depth=0.40"<br>Tc=5.0 min CN=61 Runoff=0.31 cfs 0.018 af                     |
| <b>Subcatchment8S: UndetainedNorth</b>     | Runoff Area=0.530 ac 0.00% Impervious Runoff Depth=0.40"<br>Tc=5.0 min CN=61 Runoff=0.30 cfs 0.017 af                     |
| <b>Subcatchment9S: UndetainedSoutheast</b> | Runoff Area=0.170 ac 11.76% Impervious Runoff Depth=0.54"<br>Tc=5.0 min CN=65 Runoff=0.15 cfs 0.008 af                    |
| <b>Subcatchment10S: UndetainedSouth</b>    | Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=0.40"<br>Tc=5.0 min CN=61 Runoff=0.05 cfs 0.003 af                     |
| <b>SubcatchmentP-N: Proposed North</b>     | Runoff Area=0.980 ac 75.51% Impervious Runoff Depth=1.97"<br>Flow Length=321' Tc=8.1 min CN=89 Runoff=3.13 cfs 0.161 af   |
| <b>SubcatchmentP-S: Proposed South</b>     | Runoff Area=0.480 ac 22.92% Impervious Runoff Depth=0.71"<br>Flow Length=237' Tc=11.1 min CN=69 Runoff=0.46 cfs 0.029 af  |
| <b>SubcatchmentP-SE: Proposed Drainage</b> | Runoff Area=0.330 ac 39.39% Impervious Runoff Depth=1.07"<br>Flow Length=118' Tc=7.3 min CN=76 Runoff=0.60 cfs 0.029 af   |
| <b>SubcatchmentP-W: Proposed West</b>      | Runoff Area=1.910 ac 67.54% Impervious Runoff Depth=1.73"<br>Flow Length=1,203' Tc=6.7 min CN=86 Runoff=5.71 cfs 0.276 af |
| <b>Pond 1P: SE Basin</b>                   | Peak Elev=917.62' Storage=652 cf Inflow=0.60 cfs 0.029 af<br>Outflow=0.03 cfs 0.020 af                                    |
| <b>Pond 2P: South Basin Orifice</b>        | Peak Elev=912.52' Storage=606 cf Inflow=0.46 cfs 0.048 af<br>Outflow=0.07 cfs 0.039 af                                    |
| <b>Pond 3P: North Basin Orifice</b>        | Peak Elev=921.37' Storage=4,316 cf Inflow=3.13 cfs 0.161 af<br>Outflow=0.14 cfs 0.093 af                                  |
| <b>Pond 4P: West Basin Orifice</b>         | Peak Elev=910.38' Storage=7,009 cf Inflow=5.71 cfs 0.276 af<br>Outflow=0.25 cfs 0.204 af                                  |
| <b>Pond 5P: Level Spreader</b>             | Peak Elev=904.02' Storage=1 cf Inflow=0.25 cfs 0.204 af<br>Outflow=0.25 cfs 0.204 af                                      |
| <b>Link 11L: Combined Flow West</b>        | Inflow=0.44 cfs 0.221 af<br>Primary=0.44 cfs 0.221 af                                                                     |
| <b>Link 12L: Combined Flow South</b>       | Inflow=0.20 cfs 0.049 af<br>Primary=0.20 cfs 0.049 af                                                                     |
| <b>Link 13L: Comnined Flow North</b>       | Inflow=0.30 cfs 0.110 af<br>Primary=0.30 cfs 0.110 af                                                                     |

**23-047 Proposed Site Conditions\_5-7-24***Type II 24-hr 2-Year Rainfall=3.08"*

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Page 33

**Total Runoff Area = 5.030 ac   Runoff Volume = 0.541 af   Average Runoff Depth = 1.29"**  
**54.47% Pervious = 2.740 ac   45.53% Impervious = 2.290 ac**

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Type II 24-hr 2-Year Rainfall=3.08"

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Page 34

**Summary for Subcatchment 7S: Undetained West**

Runoff = 0.31 cfs @ 11.99 hrs, Volume= 0.018 af, Depth= 0.40"  
Routed to Link 11L : Combined Flow West

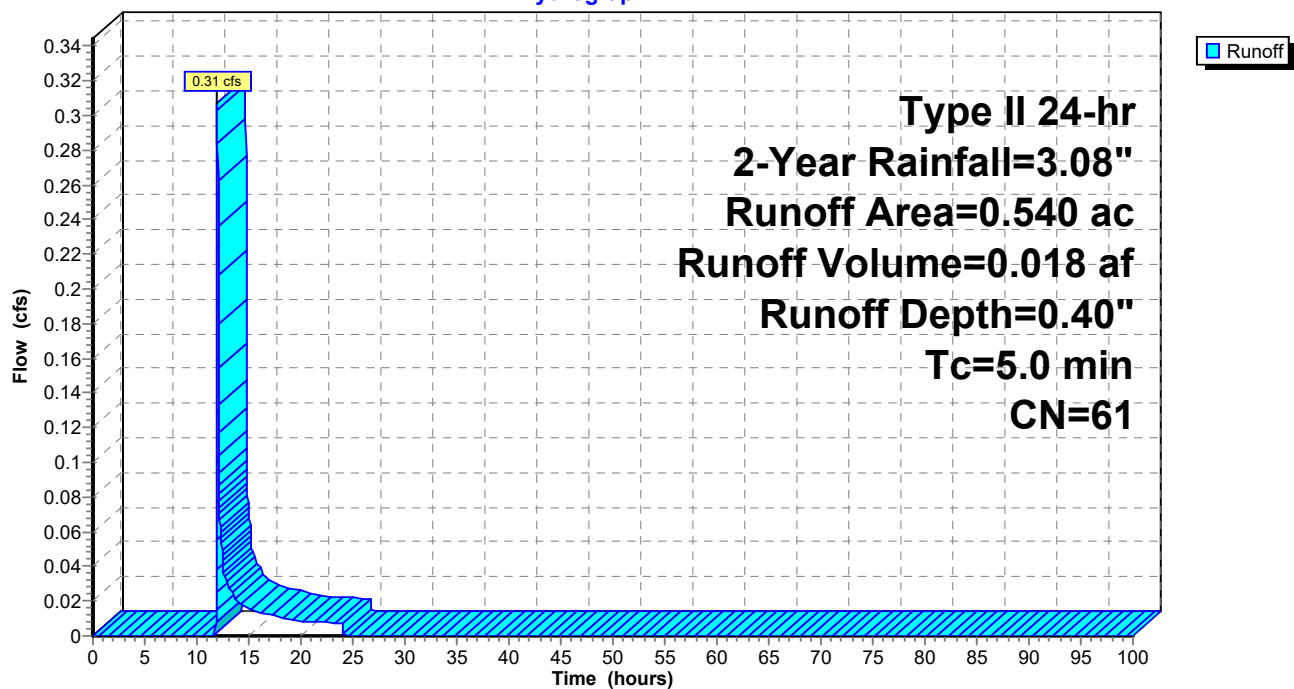
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 2-Year Rainfall=3.08"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.540   | 61 | >75% Grass cover, Good, HSG B |
| 0.540     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 7S: Undetained West**

Hydrograph



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Type II 24-hr 2-Year Rainfall=3.08"

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Page 35

**Summary for Subcatchment 8S: Undetained North**

Runoff = 0.30 cfs @ 11.99 hrs, Volume= 0.017 af, Depth= 0.40"  
Routed to Link 13L : Comnined Flow North

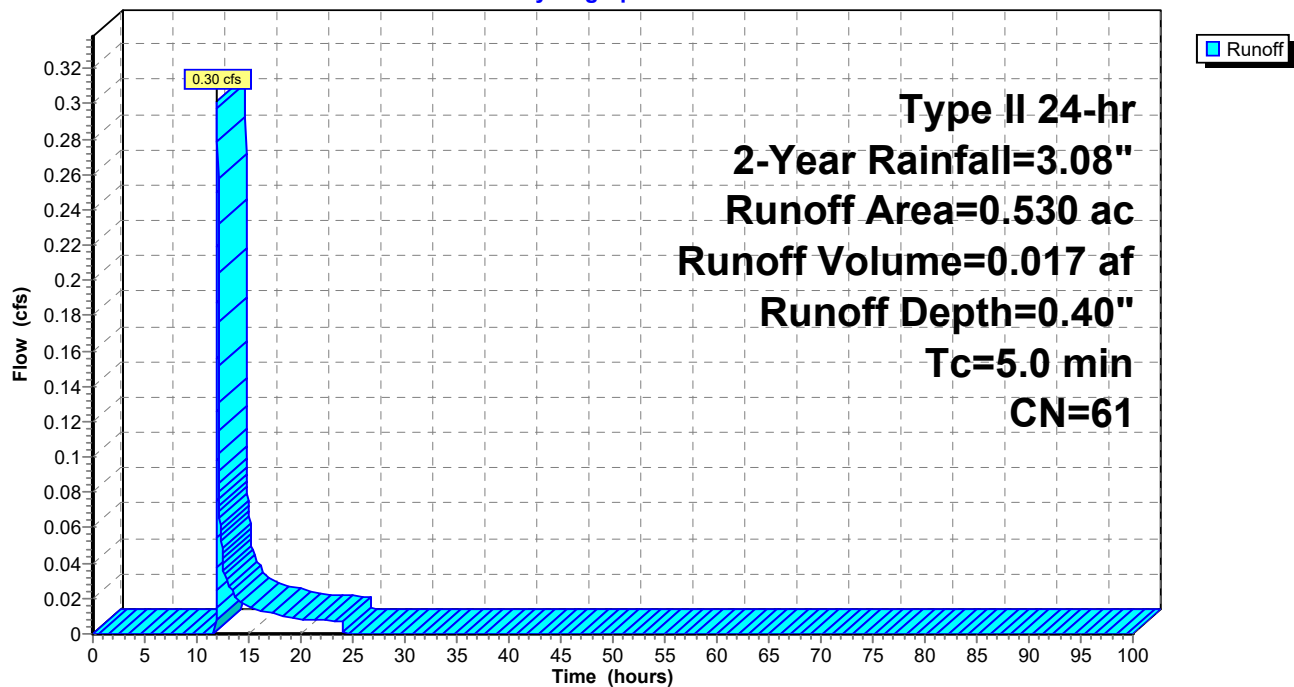
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 2-Year Rainfall=3.08"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.530   | 61 | >75% Grass cover, Good, HSG B |
| 0.530     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 8S: Undetained North**

Hydrograph





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Type II 24-hr 2-Year Rainfall=3.08"

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Page 36

**Summary for Subcatchment 9S: Undetained Southeast**

Runoff = 0.15 cfs @ 11.98 hrs, Volume= 0.008 af, Depth= 0.54"  
Routed to Link 12L : Combined Flow South

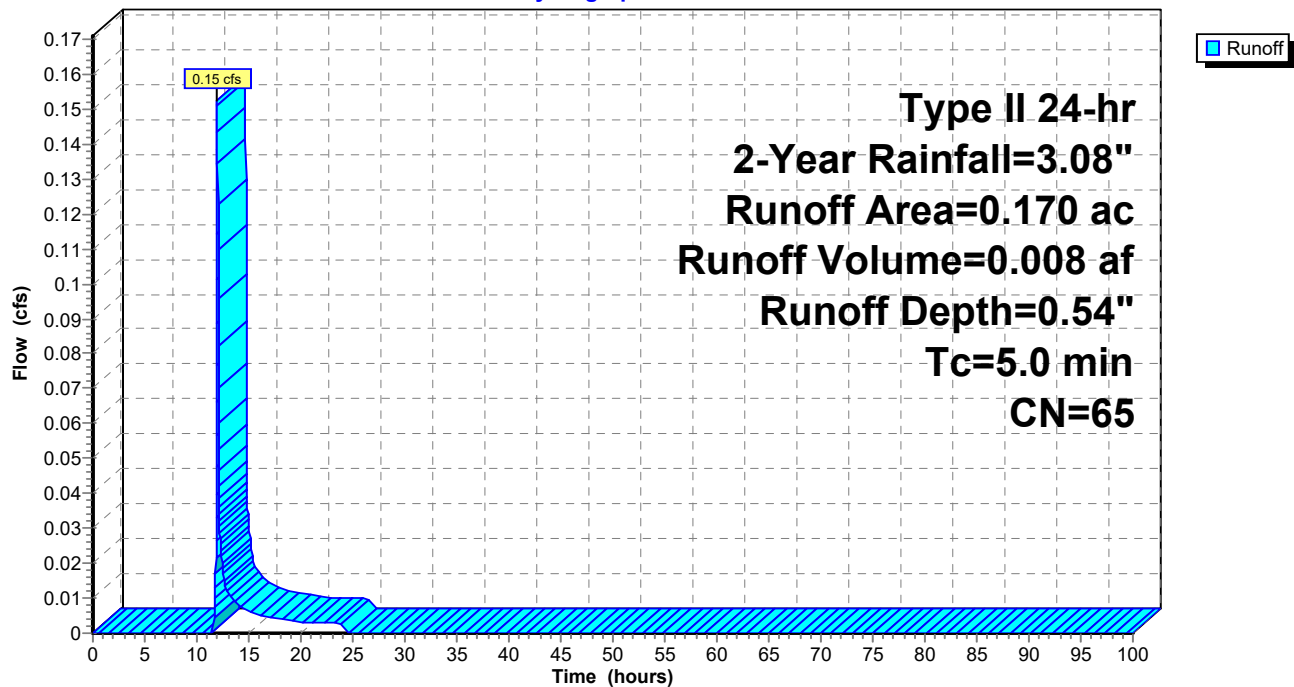
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 2-Year Rainfall=3.08"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.150   | 61 | >75% Grass cover, Good, HSG B |
| * 0.020   | 98 | Pavement                      |
| 0.170     | 65 | Weighted Average              |
| 0.150     |    | 88.24% Pervious Area          |
| 0.020     |    | 11.76% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 9S: Undetained Southeast**

Hydrograph



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Type II 24-hr 2-Year Rainfall=3.08"

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Page 37

**Summary for Subcatchment 10S: Undetained South**

Runoff = 0.05 cfs @ 11.99 hrs, Volume= 0.003 af, Depth= 0.40"  
Routed to Link 12L : Combined Flow South

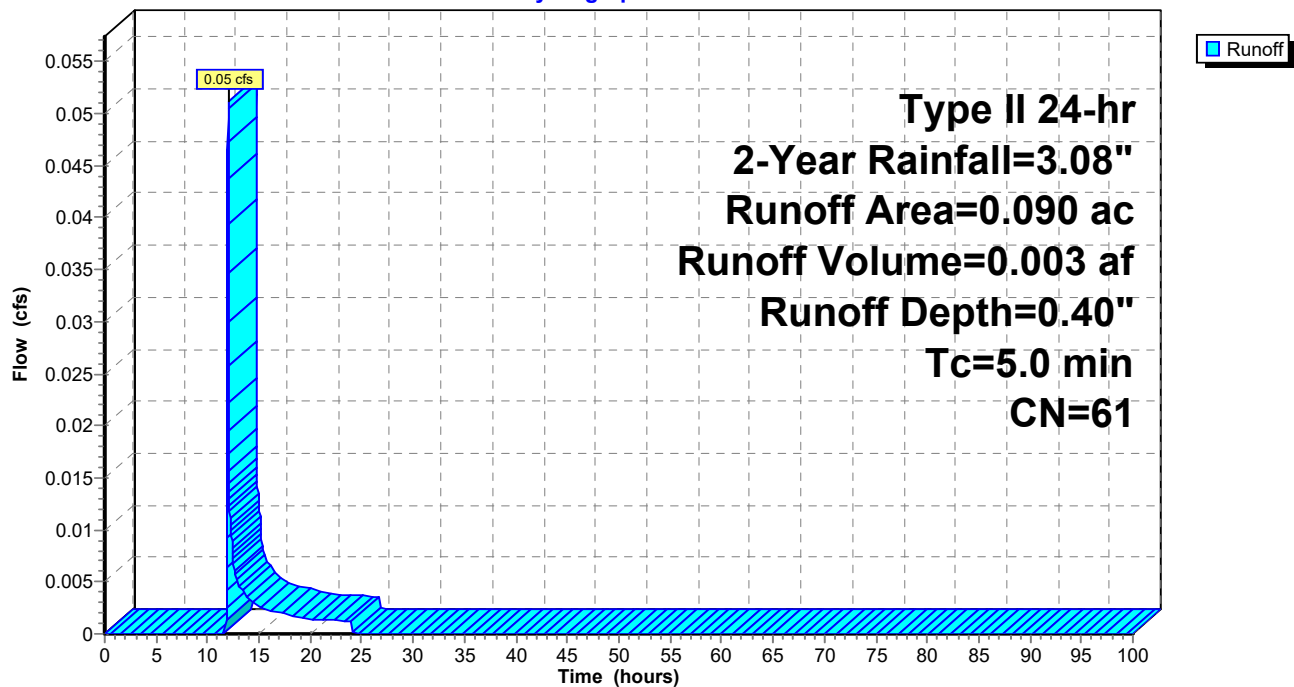
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 2-Year Rainfall=3.08"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.090   | 61 | >75% Grass cover, Good, HSG B |
| 0.090     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 10S: Undetained South**

Hydrograph



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Type II 24-hr 2-Year Rainfall=3.08"

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Page 38

**Summary for Subcatchment P-N: Proposed North**

Runoff = 3.13 cfs @ 11.99 hrs, Volume= 0.161 af, Depth= 1.97"  
Routed to Pond 3P : North Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 2-Year Rainfall=3.08"

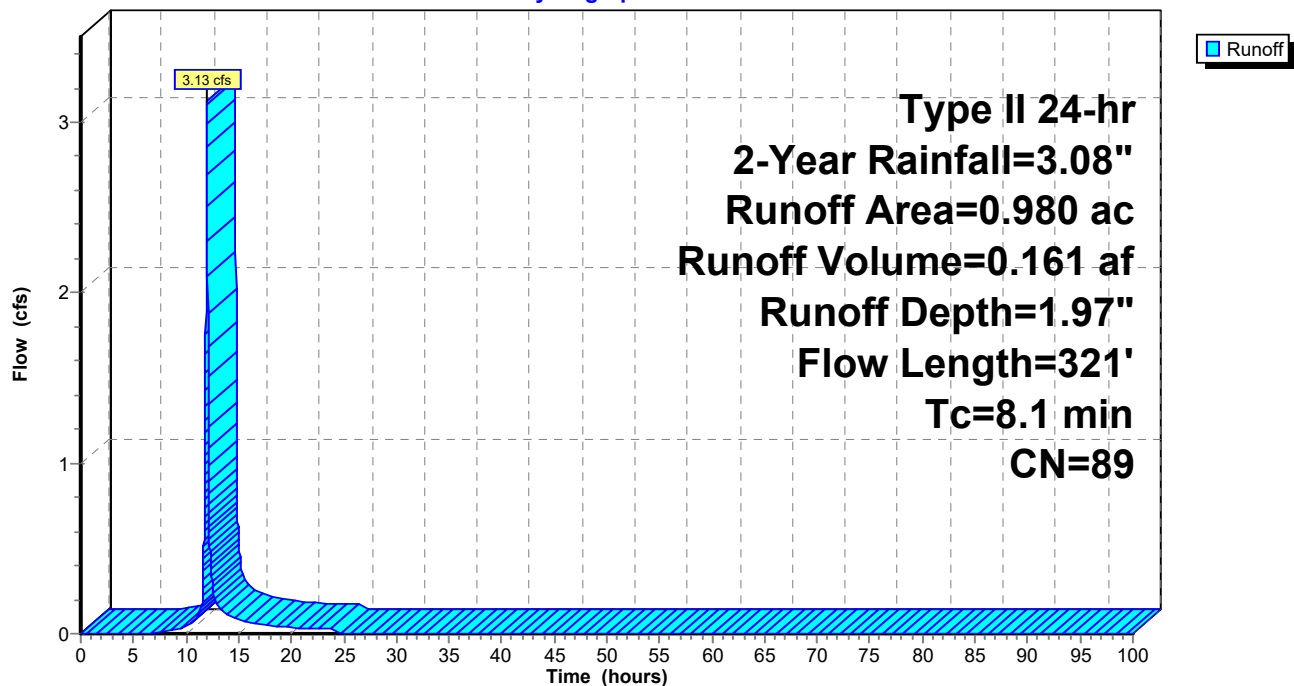
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 0.740   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.240     | 61 | >75% Grass cover, Good, HSG B       |
| 0.980     | 89 | Weighted Average                    |
| 0.240     |    | 24.49% Pervious Area                |
| 0.740     |    | 75.51% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                            |
|----------|---------------|---------------|-------------------|----------------|----------------------------------------------------------------------------------------|
| 7.5      | 91            | 0.0350        | 0.20              |                | <b>Sheet Flow, SHEET (GRASS)</b><br>Grass: Short n= 0.150 P2= 3.04"                    |
| 0.6      | 230           | 0.0150        | 6.45              | 7.91           | <b>Pipe Channel, PIPE</b><br>15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'<br>n= 0.013 |
| 8.1      | 321           | Total         |                   |                |                                                                                        |

**Subcatchment P-N: Proposed North**

Hydrograph



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Type II 24-hr 2-Year Rainfall=3.08"

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Page 39

**Summary for Subcatchment P-S: Proposed South**

Runoff = 0.46 cfs @ 12.05 hrs, Volume= 0.029 af, Depth= 0.71"  
Routed to Pond 2P : South Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 2-Year Rainfall=3.08"

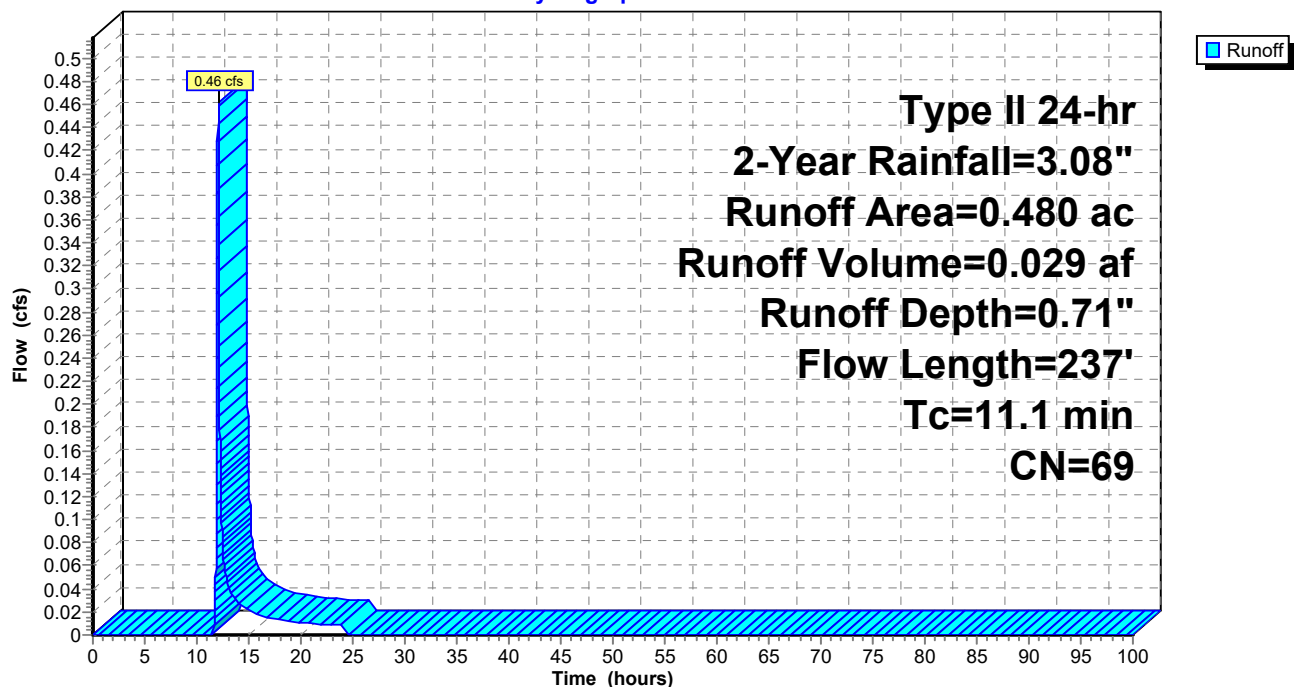
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 0.110   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.370     | 61 | >75% Grass cover, Good, HSG B       |
| 0.480     | 69 | Weighted Average                    |
| 0.370     |    | 77.08% Pervious Area                |
| 0.110     |    | 22.92% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                        |
|----------|---------------|---------------|-------------------|----------------|------------------------------------------------------------------------------------|
| 10.1     | 100           | 0.0200        | 0.17              |                | <b>Sheet Flow, SHEET (GRASS)</b><br>Grass: Short n= 0.150 P2= 3.04"                |
| 0.9      | 112           | 0.0200        | 2.12              |                | <b>Shallow Concentrated Flow, SHALLOW (GRASS)</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.1      | 25            | 0.2500        | 7.50              |                | <b>Shallow Concentrated Flow, SHALLOW (GRASS)</b><br>Grassed Waterway Kv= 15.0 fps |
| 11.1     | 237           | Total         |                   |                |                                                                                    |

**Subcatchment P-S: Proposed South**

Hydrograph





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Type II 24-hr 2-Year Rainfall=3.08"

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Page 40

**Summary for Subcatchment P-SE: Proposed Drainage**

Runoff = 0.60 cfs @ 11.99 hrs, Volume= 0.029 af, Depth= 1.07"  
 Routed to Pond 1P : SE Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 2-Year Rainfall=3.08"

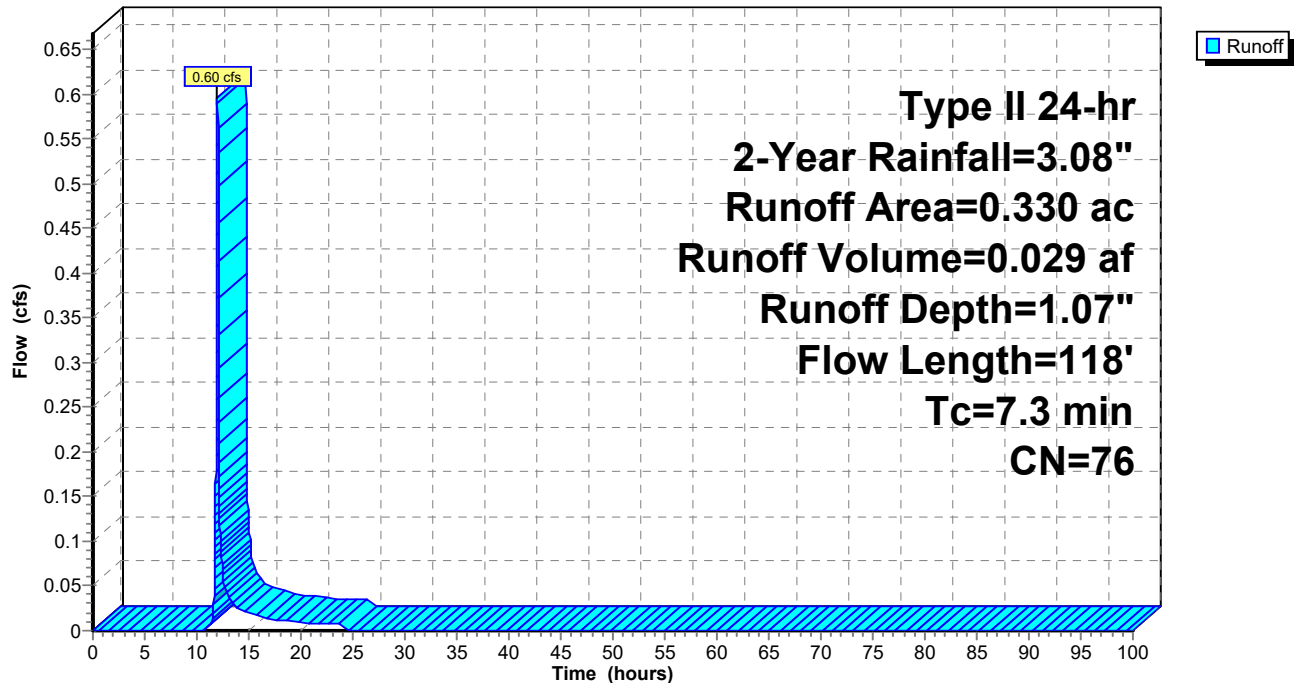
| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.130     | 98 | Paved parking, HSG C          |
| 0.200     | 61 | >75% Grass cover, Good, HSG B |
| 0.330     | 76 | Weighted Average              |
| 0.200     |    | 60.61% Pervious Area          |
| 0.130     |    | 39.39% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                       |
|----------|---------------|---------------|-------------------|----------------|-----------------------------------------------------------------------------------|
| 7.1      | 65            | 0.0200        | 0.15              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.04"                             |
| 0.2      | 53            | 0.0100        | 5.26              | 6.46           | <b>Pipe Channel,</b><br>15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'<br>n= 0.013 |
| 7.3      | 118           | Total         |                   |                |                                                                                   |

**Subcatchment P-SE: Proposed Drainage**

Hydrograph



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Type II 24-hr 2-Year Rainfall=3.08"

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Page 41

**Summary for Subcatchment P-W: Proposed West**

Runoff = 5.71 cfs @ 11.98 hrs, Volume= 0.276 af, Depth= 1.73"  
 Routed to Pond 4P : West Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 2-Year Rainfall=3.08"

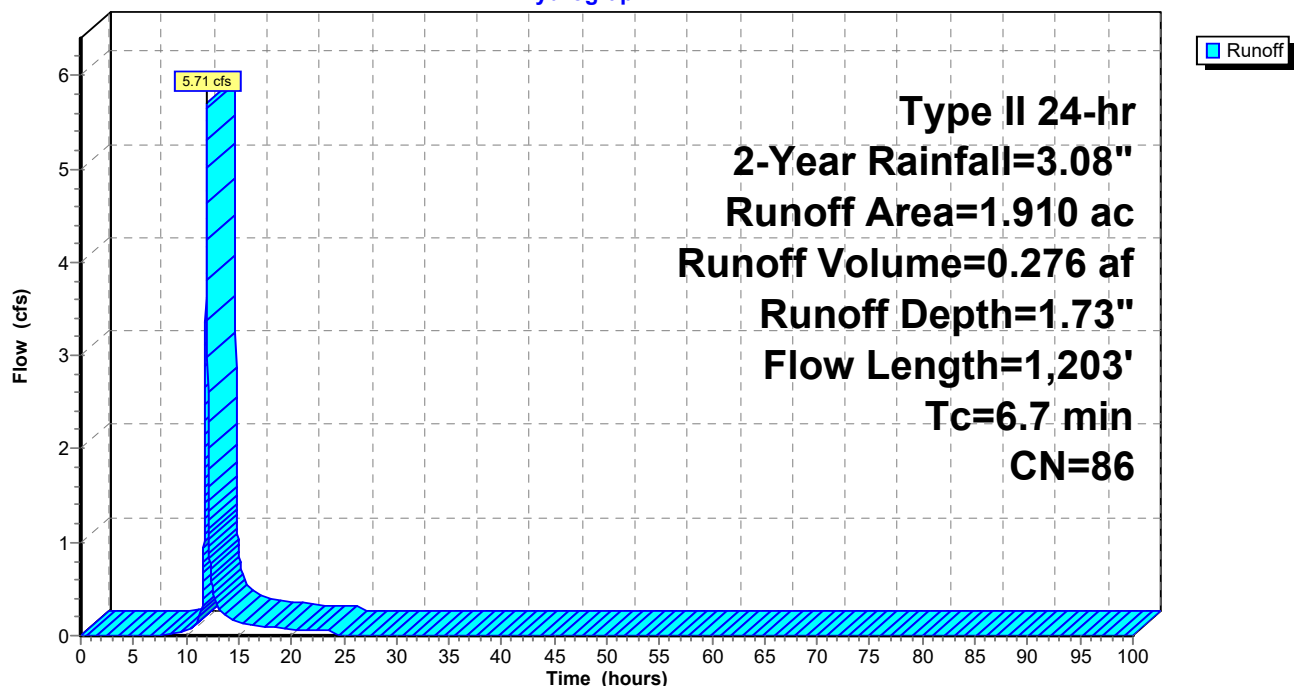
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 1.290   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.620     | 61 | >75% Grass cover, Good, HSG B       |
| 1.910     | 86 | Weighted Average                    |
| 0.620     |    | 32.46% Pervious Area                |
| 1.290     |    | 67.54% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                                   |
|----------|---------------|---------------|-------------------|----------------|-----------------------------------------------------------------------------------------------|
| 2.2      | 100           | 0.0050        | 0.77              |                | <b>Sheet Flow, SHEET (PAVED)</b><br>Smooth surfaces n= 0.011 P2= 3.04"                        |
| 3.6      | 725           | 0.0280        | 3.40              |                | <b>Shallow Concentrated Flow, SHALLOW (PAVED)</b><br>Paved Kv= 20.3 fps                       |
| 0.9      | 378           | 0.0150        | 7.28              | 12.87          | <b>Pipe Channel, Storm Sewer</b><br>18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38'<br>n= 0.013 |
| 6.7      | 1,203         | Total         |                   |                |                                                                                               |

**Subcatchment P-W: Proposed West**

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 2-Year Rainfall=3.08"

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Page 42

**Summary for Pond 1P: SE Basin**

Inflow Area = 0.330 ac, 39.39% Impervious, Inflow Depth = 1.07" for 2-Year event  
 Inflow = 0.60 cfs @ 11.99 hrs, Volume= 0.029 af  
 Outflow = 0.03 cfs @ 13.28 hrs, Volume= 0.020 af, Atten= 94%, Lag= 77.3 min  
 Primary = 0.03 cfs @ 13.28 hrs, Volume= 0.020 af  
 Routed to Pond 2P : South Basin Orifice

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 917.62' @ 13.28 hrs Surf.Area= 1,848 sf Storage= 652 cf

Plug-Flow detention time= 357.5 min calculated for 0.020 af (67% of inflow)  
 Center-of-Mass det. time= 239.8 min ( 1,095.5 - 855.7 )

| Volume | Invert  | Avail.Storage | Storage Description                                        |
|--------|---------|---------------|------------------------------------------------------------|
| #1     | 916.91' | 8,715 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 916.91              | 0                    | 0                         | 0                         |
| 918.00              | 2,856                | 1,557                     | 1,557                     |
| 919.00              | 3,551                | 3,204                     | 4,760                     |
| 920.00              | 4,358                | 3,955                     | 8,715                     |

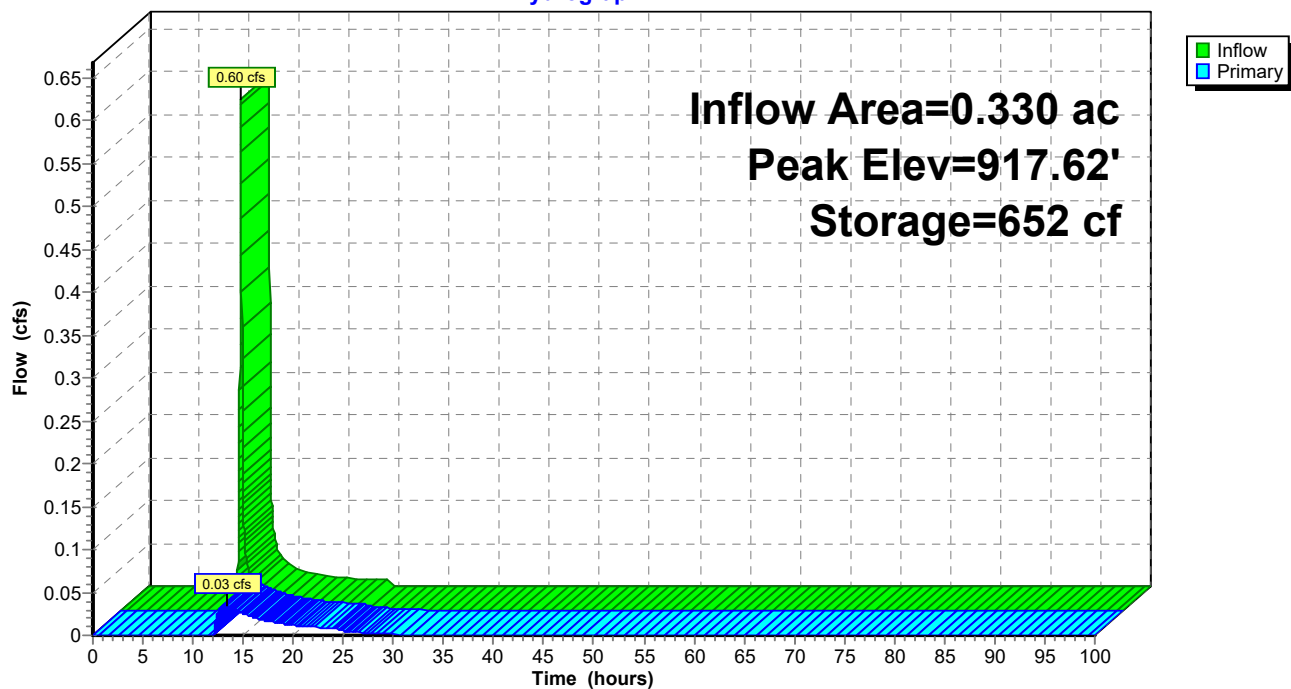
| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                             |
|--------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 916.26' | <b>4.0" Round Culvert X 3.00</b> L= 30.2' Ke= 0.500<br>Inlet / Outlet Invert= 916.26' / 915.96' S= 0.0099 '/' Cc= 0.900<br>n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.09 sf |
| #2     | Device 1 | 917.48' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                                 |
| #3     | Device 1 | 918.00' | <b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b><br>Head (feet) 0.00 0.45 0.45 0.95<br>Width (feet) 0.50 0.50 3.00 3.00                                                                      |

**Primary OutFlow** Max=0.03 cfs @ 13.28 hrs HW=917.62' (Free Discharge)

1=Culvert (Passes 0.03 cfs of 1.02 cfs potential flow)  
 2=Orifice/Grate (Orifice Controls 0.03 cfs @ 1.25 fps)  
 3=Custom Weir/Orifice ( Controls 0.00 cfs)

# Pond 1P: SE Basin

## Hydrograph





**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 2-Year Rainfall=3.08"

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Page 44

**Summary for Pond 2P: South Basin Orifice**

Inflow Area = 0.810 ac, 29.63% Impervious, Inflow Depth = 0.71" for 2-Year event  
 Inflow = 0.46 cfs @ 12.05 hrs, Volume= 0.048 af  
 Outflow = 0.07 cfs @ 13.55 hrs, Volume= 0.039 af, Atten= 85%, Lag= 90.2 min  
 Primary = 0.07 cfs @ 13.55 hrs, Volume= 0.039 af  
 Routed to Link 12L : Combined Flow South

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 912.52' @ 13.55 hrs Surf.Area= 1,003 sf Storage= 606 cf

Plug-Flow detention time= 243.6 min calculated for 0.039 af (80% of inflow)  
 Center-of-Mass det. time= 129.9 min ( 1,100.3 - 970.4 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                        |
|---------------------|----------------------|---------------------------|------------------------------------------------------------|
| #1                  | 911.50'              | 5,431 cf                  | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                                  |
| 911.50              | 0                    | 0                         | 0                                                          |
| 912.00              | 682                  | 171                       | 171                                                        |
| 913.00              | 1,303                | 993                       | 1,163                                                      |
| 914.00              | 2,092                | 1,698                     | 2,861                                                      |
| 915.00              | 3,048                | 2,570                     | 5,431                                                      |

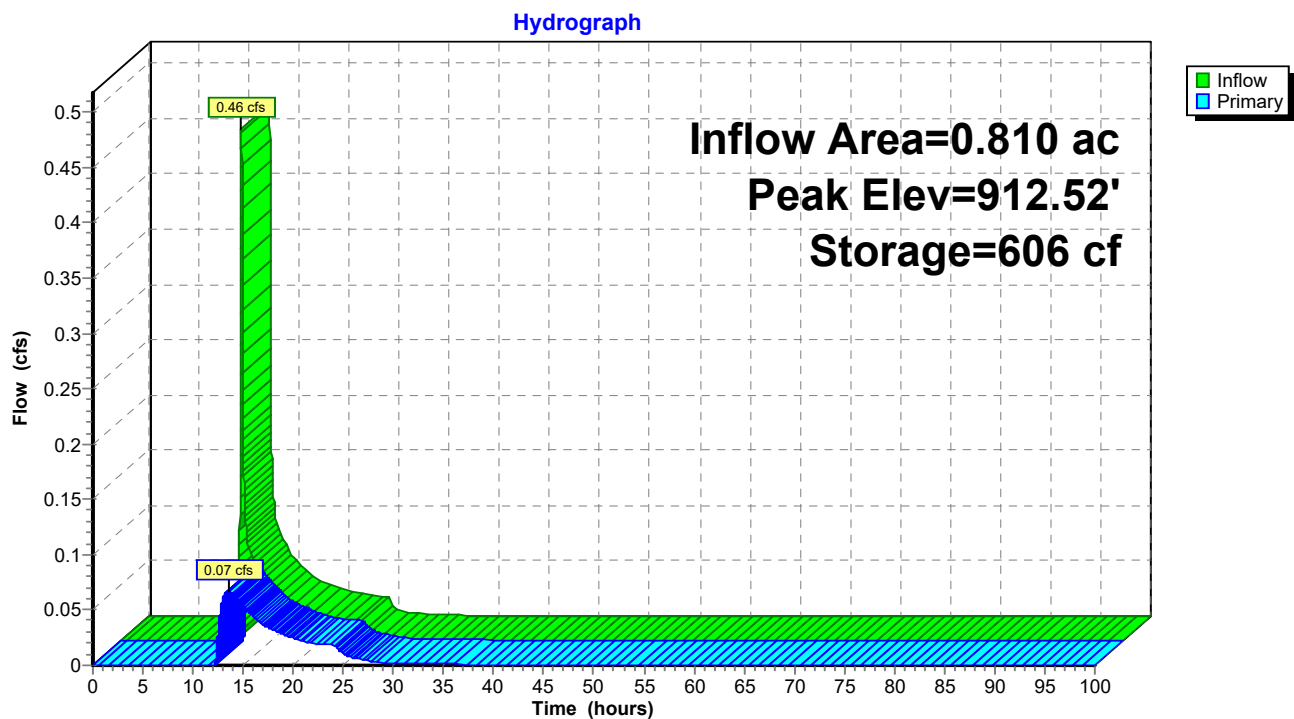
  

| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                 |
|--------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 911.34' | <b>6.0" Round Culvert</b><br>L= 68.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 911.34' / 909.31' S= 0.0299 '/' Cc= 0.900<br>n= 0.013, Flow Area= 0.20 sf |
| #2     | Device 1 | 912.31' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                     |
| #3     | Device 1 | 913.00' | <b>10.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                    |

**Primary OutFlow** Max=0.07 cfs @ 13.55 hrs HW=912.52' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.07 cfs of 0.91 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.07 cfs @ 1.55 fps)
- ↑ **3=Orifice/Grate** ( Controls 0.00 cfs)

# Pond 2P: South Basin Orifice



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Type II 24-hr 2-Year Rainfall=3.08"

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Page 46

**Summary for Pond 3P: North Basin Orifice**

Inflow Area = 0.980 ac, 75.51% Impervious, Inflow Depth = 1.97" for 2-Year event  
 Inflow = 3.13 cfs @ 11.99 hrs, Volume= 0.161 af  
 Outflow = 0.14 cfs @ 13.35 hrs, Volume= 0.093 af, Atten= 95%, Lag= 81.1 min  
 Primary = 0.14 cfs @ 13.35 hrs, Volume= 0.093 af  
 Routed to Link 13L : Combined Flow North

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 921.37' @ 13.35 hrs Surf.Area= 3,447 sf Storage= 4,316 cf

Plug-Flow detention time= 368.9 min calculated for 0.093 af (57% of inflow)  
 Center-of-Mass det. time= 259.0 min ( 1,070.5 - 811.5 )

| Volume | Invert  | Avail.Storage | Storage Description                                                                                                                                                                                                                                        |
|--------|---------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1A    | 919.40' | 6,149 cf      | <b>20.08'W x 171.65'L x 6.75'H Field A</b><br>23,269 cf Overall - 7,897 cf Embedded = 15,373 cf x 40.0% Voids                                                                                                                                              |
| #2A    | 920.15' | 7,897 cf      | <b>ADS_StormTech MC-7200 +Cap</b> x 44 Inside #1<br>Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf<br>Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap<br>44 Chambers in 2 Rows<br>Cap Storage= 39.5 cf x 2 x 2 rows = 158.0 cf |
|        |         | 14,046 cf     | Total Available Storage                                                                                                                                                                                                                                    |

Storage Group A created with Chamber Wizard

| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                   |
|--------|----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 918.30' | <b>12.0" Round Culvert</b><br>L= 104.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 918.30' / 910.25' S= 0.0774 '/' Cc= 0.900<br>n= 0.013, Flow Area= 0.79 sf |
| #2     | Device 1 | 920.87' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                       |
| #3     | Device 1 | 924.15' | <b>12.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                      |

**Primary OutFlow** Max=0.14 cfs @ 13.35 hrs HW=921.37' (Free Discharge)

1=Culvert (Passes 0.14 cfs of 6.06 cfs potential flow)  
 2=Orifice/Grate (Orifice Controls 0.14 cfs @ 2.95 fps)  
 3=Orifice/Grate ( Controls 0.00 cfs)

## 23-047 Proposed Site Conditions\_5-7-24

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Type II 24-hr 2-Year Rainfall=3.08"

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Page 47

### Pond 3P: North Basin Orifice - Chamber Wizard Field A

**Chamber Model = ADS\_StormTechMC-7200+Cap (ADS StormTech®MC-7200 with cap volume)**

Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf

Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap

Cap Storage= 39.5 cf x 2 x 2 rows = 158.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

22 Chambers/Row x 6.59' Long +2.73' Cap Length x 2 = 150.48' Row Length +127.0" End Stone x 2 = 171.65' Base Length

2 Rows x 100.0" Wide + 9.0" Spacing x 1 + 16.0" Side Stone x 2 = 20.08' Base Width

9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

44 Chambers x 175.9 cf + 39.5 cf Cap Volume x 2 x 2 Rows = 7,896.5 cf Chamber Storage

23,269.3 cf Field - 7,896.5 cf Chambers = 15,372.8 cf Stone x 40.0% Voids = 6,149.1 cf Stone Storage

Chamber Storage + Stone Storage = 14,045.6 cf = 0.322 af

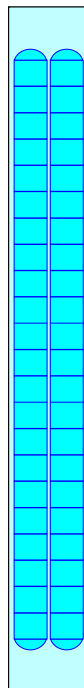
Overall Storage Efficiency = 60.4%

Overall System Size = 171.65' x 20.08' x 6.75'

44 Chambers

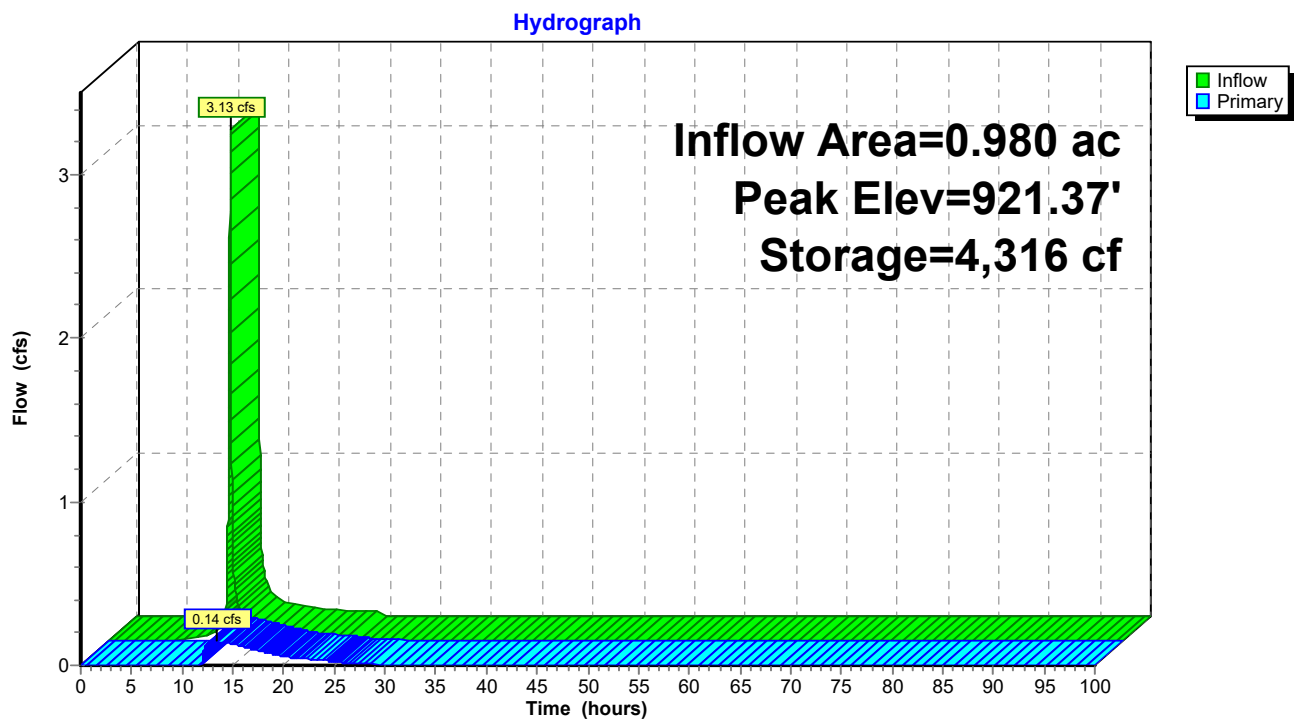
861.8 cy Field

569.4 cy Stone





### Pond 3P: North Basin Orifice



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 2-Year Rainfall=3.08"

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Page 49

**Summary for Pond 4P: West Basin Orifice**

Inflow Area = 1.910 ac, 67.54% Impervious, Inflow Depth = 1.73" for 2-Year event  
 Inflow = 5.71 cfs @ 11.98 hrs, Volume= 0.276 af  
 Outflow = 0.25 cfs @ 13.43 hrs, Volume= 0.204 af, Atten= 96%, Lag= 87.0 min  
 Primary = 0.25 cfs @ 13.43 hrs, Volume= 0.204 af  
 Routed to Pond 5P : Level Spreader

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 910.38' @ 13.43 hrs Surf.Area= 3,771 sf Storage= 7,009 cf

Plug-Flow detention time= 356.3 min calculated for 0.204 af (74% of inflow)  
 Center-of-Mass det. time= 260.3 min ( 1,082.0 - 821.8 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                        |
|---------------------|----------------------|---------------------------|------------------------------------------------------------|
| #1                  | 907.00'              | 28,862 cf                 | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                                  |
| 907.00              | 0                    | 0                         | 0                                                          |
| 908.00              | 1,584                | 792                       | 792                                                        |
| 909.00              | 2,402                | 1,993                     | 2,785                                                      |
| 910.00              | 3,364                | 2,883                     | 5,668                                                      |
| 911.00              | 4,448                | 3,906                     | 9,574                                                      |
| 912.00              | 5,668                | 5,058                     | 14,632                                                     |
| 913.00              | 7,027                | 6,348                     | 20,980                                                     |
| 914.00              | 8,738                | 7,883                     | 28,862                                                     |

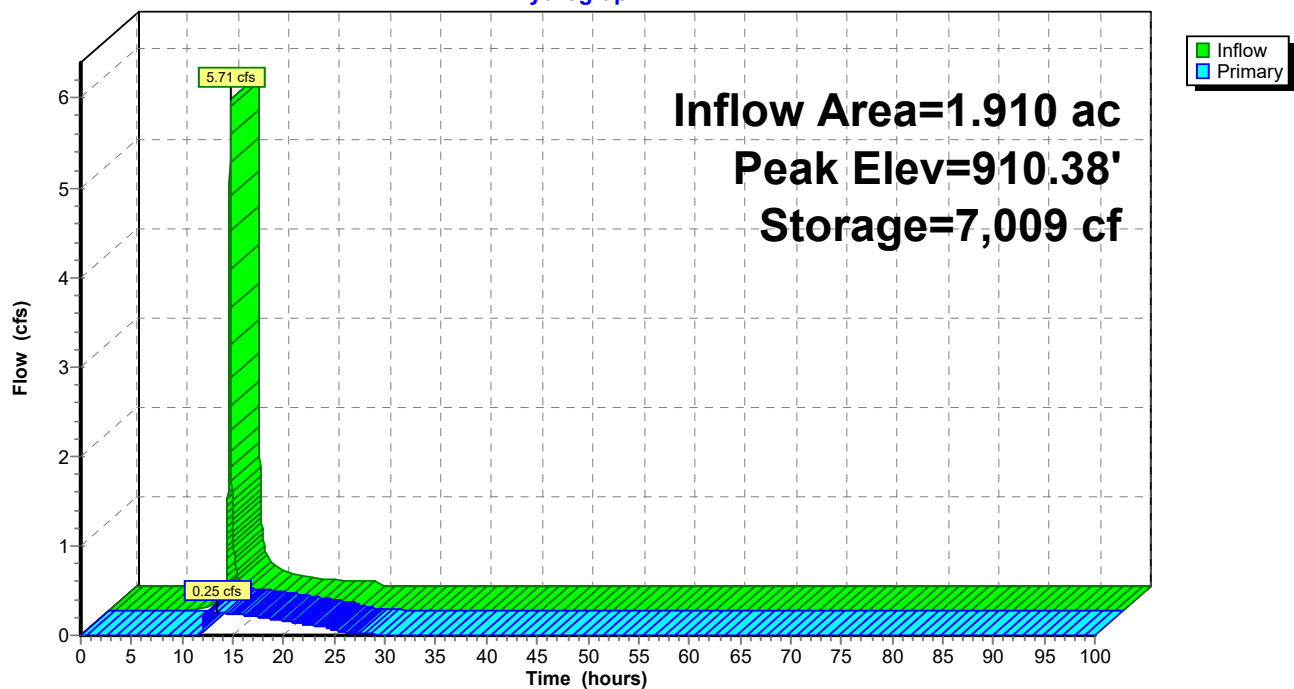
| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                  |
|--------|----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 908.00' | <b>15.0" Round Culvert</b><br>L= 32.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 908.00' / 904.00' S= 0.1250 '/' Cc= 0.900<br>n= 0.013, Flow Area= 1.23 sf |
| #2     | Device 1 | 909.14' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                      |
| #3     | Device 1 | 910.50' | <b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b><br>Head (feet) 0.00 1.25 1.25 1.75<br>Width (feet) 1.00 1.00 1.00 1.00                                                           |

**Primary OutFlow** Max=0.25 cfs @ 13.43 hrs HW=910.38' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.25 cfs of 7.82 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.25 cfs @ 5.07 fps)
- ↑ **3=Custom Weir/Orifice** ( Controls 0.00 cfs)

### Pond 4P: West Basin Orifice

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 2-Year Rainfall=3.08"

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Page 51

**Summary for Pond 5P: Level Spreader**

[79] Warning: Submerged Pond 4P Primary device # 1 OUTLET by 0.02'

Inflow Area = 1.910 ac, 67.54% Impervious, Inflow Depth = 1.28" for 2-Year event  
 Inflow = 0.25 cfs @ 13.43 hrs, Volume= 0.204 af  
 Outflow = 0.25 cfs @ 13.43 hrs, Volume= 0.204 af, Atten= 0%, Lag= 0.1 min  
 Primary = 0.25 cfs @ 13.43 hrs, Volume= 0.204 af  
 Routed to Link 11L : Combined Flow West

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Peak Elev= 904.02' @ 13.43 hrs Surf.Area= 88 sf Storage= 1 cf

Plug-Flow detention time= 0.1 min calculated for 0.204 af (100% of inflow)

Center-of-Mass det. time= 0.1 min ( 1,082.1 - 1,082.0 )

| Volume | Invert  | Avail.Storage | Storage Description                                        |
|--------|---------|---------------|------------------------------------------------------------|
| #1     | 904.00' | 1,255 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 904.00              | 72                   | 0                         | 0                         |
| 905.00              | 961                  | 517                       | 517                       |
| 906.00              | 515                  | 738                       | 1,255                     |

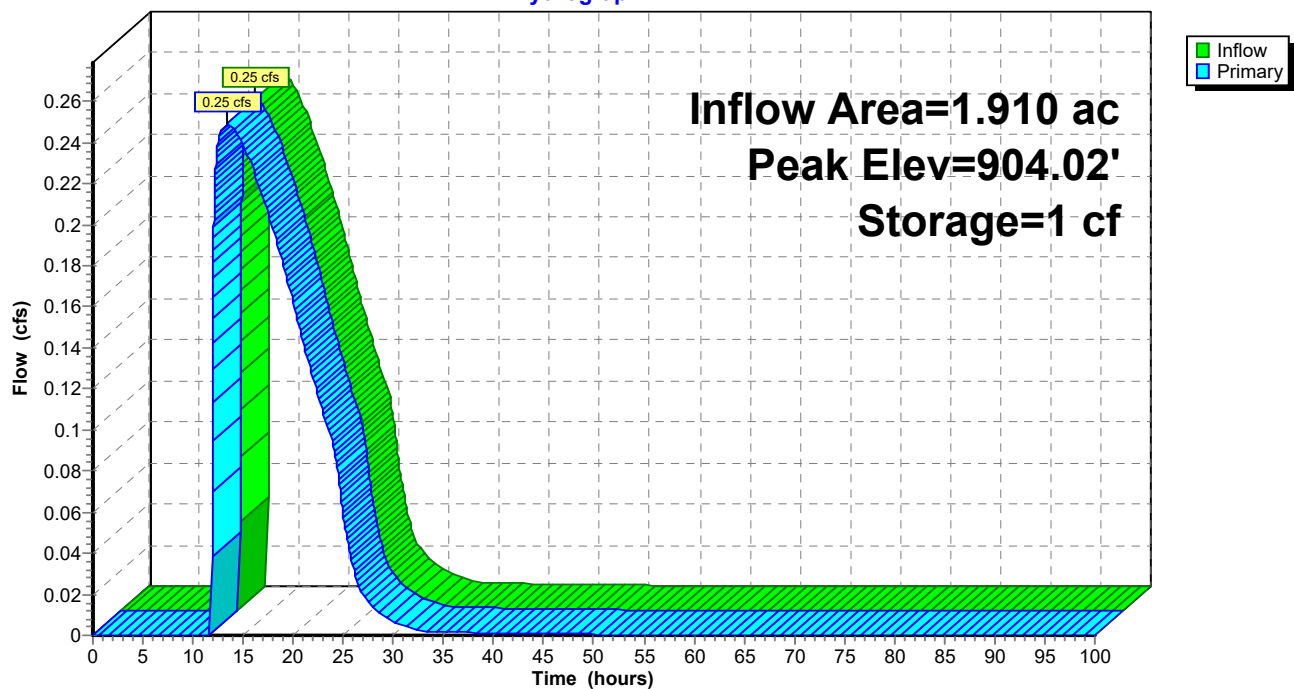
| Device | Routing | Invert  | Outlet Devices                                                        |
|--------|---------|---------|-----------------------------------------------------------------------|
| #1     | Primary | 904.00' | <b>30.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s) |

**Primary OutFlow** Max=0.24 cfs @ 13.43 hrs HW=904.02' TW=902.00' (Fixed TW Elev= 902.00')↑**1=Sharp-Crested Rectangular Weir**(Weir Controls 0.24 cfs @ 0.44 fps)



# Pond 5P: Level Spreader

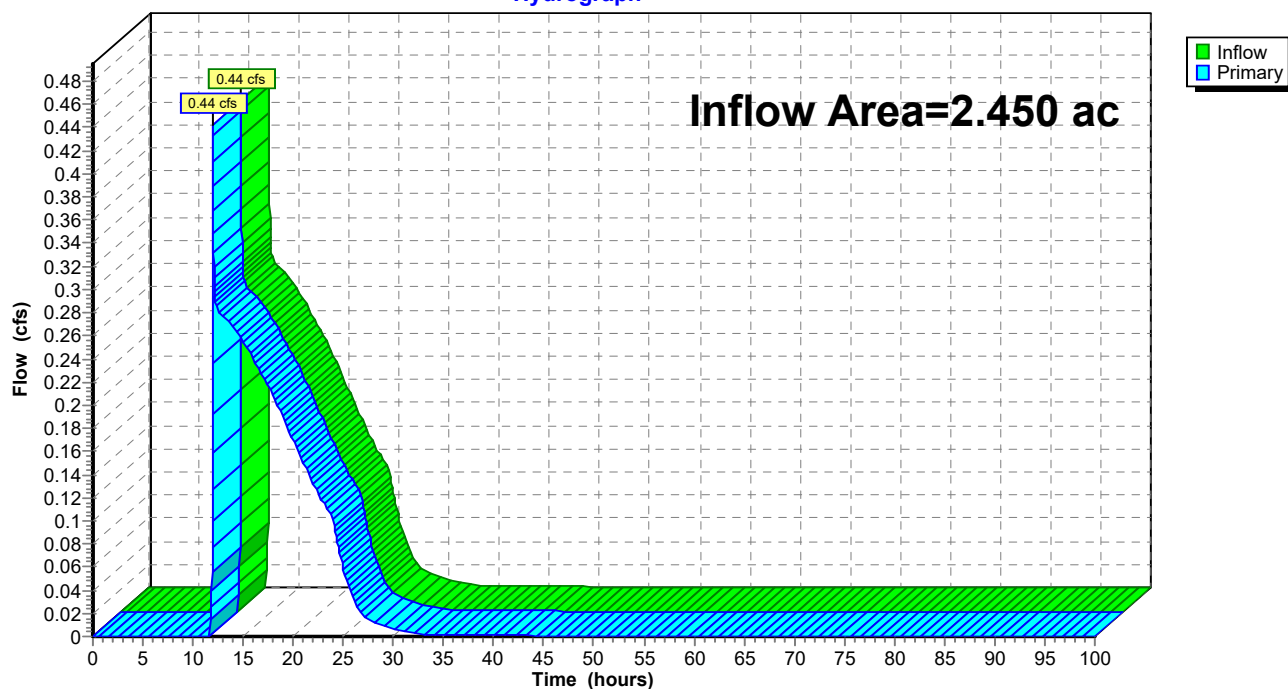
Hydrograph



**Summary for Link 11L: Combined Flow West**

Inflow Area = 2.450 ac, 52.65% Impervious, Inflow Depth = 1.08" for 2-Year event  
Inflow = 0.44 cfs @ 12.00 hrs, Volume= 0.221 af  
Primary = 0.44 cfs @ 12.00 hrs, Volume= 0.221 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 15L

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

**Link 11L: Combined Flow West****Hydrograph**

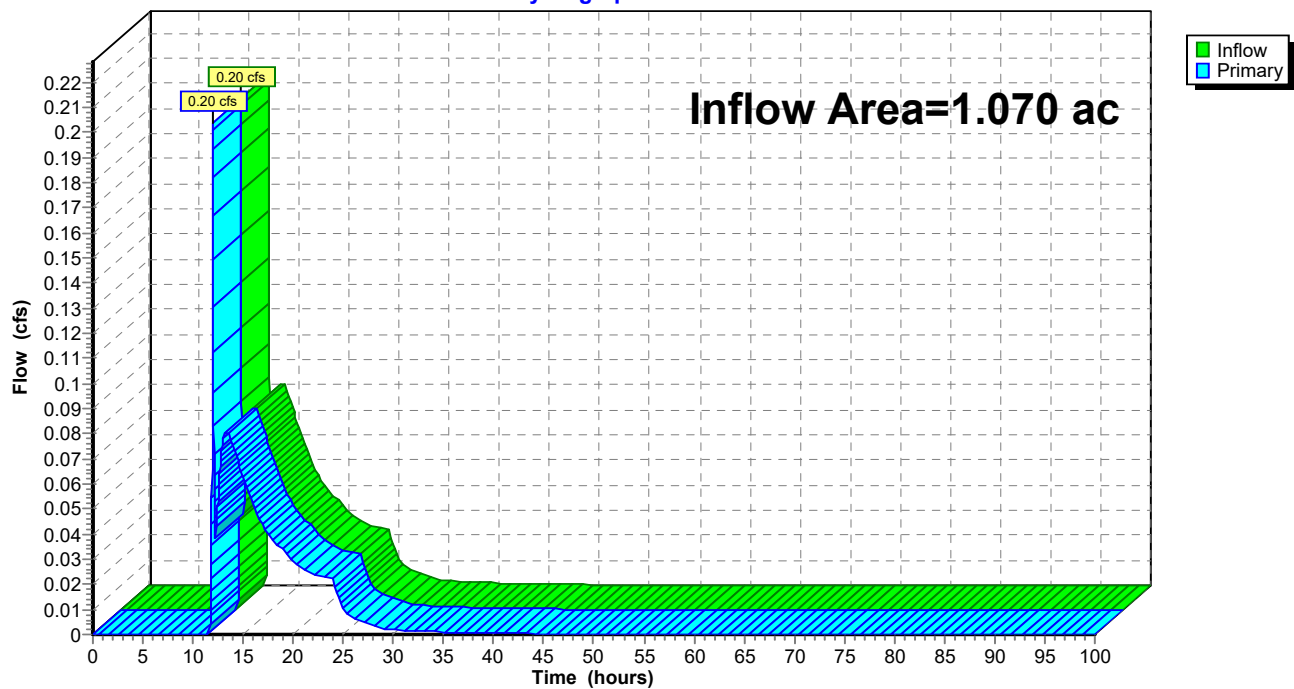
### Summary for Link 12L: Combined Flow South

Inflow Area = 1.070 ac, 24.30% Impervious, Inflow Depth = 0.55" for 2-Year event  
 Inflow = 0.20 cfs @ 11.98 hrs, Volume= 0.049 af  
 Primary = 0.20 cfs @ 11.98 hrs, Volume= 0.049 af, Atten= 0%, Lag= 0.0 min  
 Routed to nonexistent node 15L

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

### Link 12L: Combined Flow South

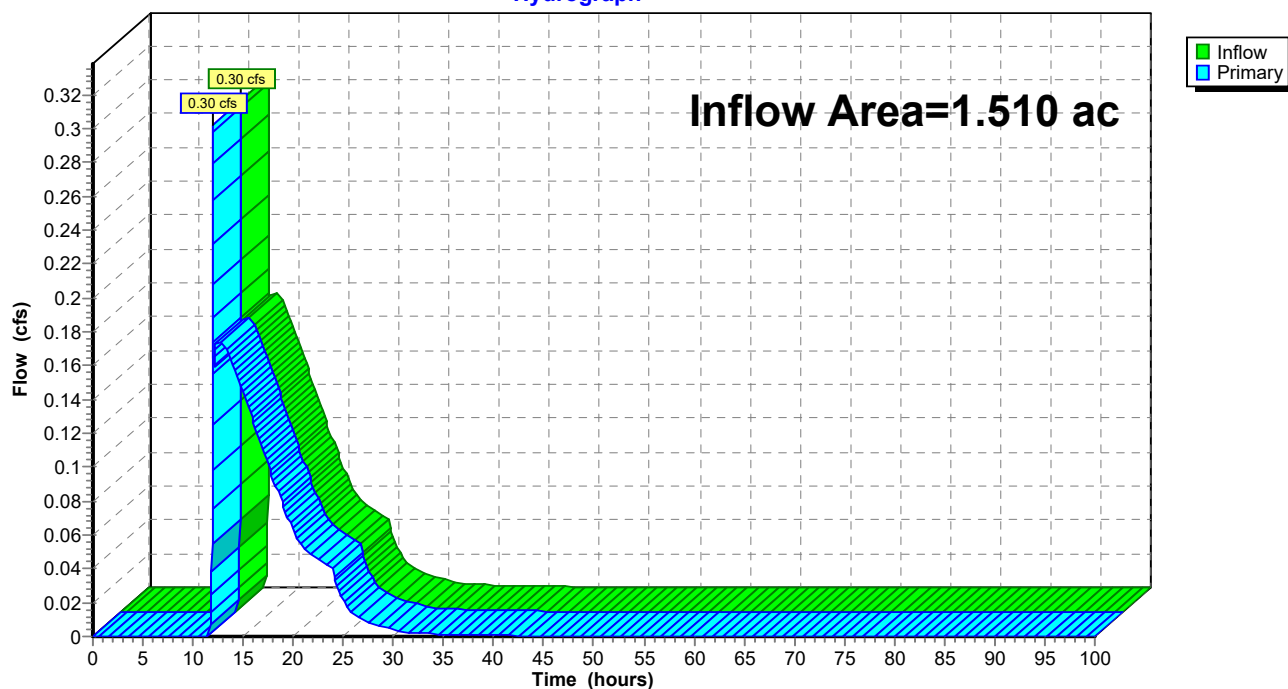
Hydrograph



**Summary for Link 13L: Comnined Flow North**

Inflow Area = 1.510 ac, 49.01% Impervious, Inflow Depth > 0.87" for 2-Year event  
Inflow = 0.30 cfs @ 11.99 hrs, Volume= 0.110 af  
Primary = 0.30 cfs @ 11.99 hrs, Volume= 0.110 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 15L

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

**Link 13L: Comnined Flow North****Hydrograph**



**23-047 Proposed Site Conditions\_5-7-24***Type II 24-hr 5-Year Rainfall=3.81"*

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Page 56

Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

|                                            |                                                                                                                           |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment7S: UndetainedWest</b>      | Runoff Area=0.540 ac 0.00% Impervious Runoff Depth=0.72"<br>Tc=5.0 min CN=61 Runoff=0.65 cfs 0.032 af                     |
| <b>Subcatchment8S: UndetainedNorth</b>     | Runoff Area=0.530 ac 0.00% Impervious Runoff Depth=0.72"<br>Tc=5.0 min CN=61 Runoff=0.64 cfs 0.032 af                     |
| <b>Subcatchment9S: UndetainedSoutheast</b> | Runoff Area=0.170 ac 11.76% Impervious Runoff Depth=0.92"<br>Tc=5.0 min CN=65 Runoff=0.28 cfs 0.013 af                    |
| <b>Subcatchment10S: UndetainedSouth</b>    | Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=0.72"<br>Tc=5.0 min CN=61 Runoff=0.11 cfs 0.005 af                     |
| <b>SubcatchmentP-N: Proposed North</b>     | Runoff Area=0.980 ac 75.51% Impervious Runoff Depth=2.65"<br>Flow Length=321' Tc=8.1 min CN=89 Runoff=4.14 cfs 0.216 af   |
| <b>SubcatchmentP-S: Proposed South</b>     | Runoff Area=0.480 ac 22.92% Impervious Runoff Depth=1.14"<br>Flow Length=237' Tc=11.1 min CN=69 Runoff=0.78 cfs 0.046 af  |
| <b>SubcatchmentP-SE: Proposed Drainage</b> | Runoff Area=0.330 ac 39.39% Impervious Runoff Depth=1.59"<br>Flow Length=118' Tc=7.3 min CN=76 Runoff=0.90 cfs 0.044 af   |
| <b>SubcatchmentP-W: Proposed West</b>      | Runoff Area=1.910 ac 67.54% Impervious Runoff Depth=2.37"<br>Flow Length=1,203' Tc=6.7 min CN=86 Runoff=7.75 cfs 0.378 af |
| <b>Pond 1P: SE Basin</b>                   | Peak Elev=917.73' Storage=891 cf Inflow=0.90 cfs 0.044 af<br>Outflow=0.09 cfs 0.034 af                                    |
| <b>Pond 2P: South Basin Orifice</b>        | Peak Elev=912.81' Storage=927 cf Inflow=0.83 cfs 0.080 af<br>Outflow=0.14 cfs 0.070 af                                    |
| <b>Pond 3P: North Basin Orifice</b>        | Peak Elev=921.90' Storage=5,706 cf Inflow=4.14 cfs 0.216 af<br>Outflow=0.23 cfs 0.147 af                                  |
| <b>Pond 4P: West Basin Orifice</b>         | Peak Elev=910.81' Storage=8,765 cf Inflow=7.75 cfs 0.378 af<br>Outflow=0.87 cfs 0.306 af                                  |
| <b>Pond 5P: Level Spreader</b>             | Peak Elev=904.04' Storage=4 cf Inflow=0.87 cfs 0.306 af<br>Outflow=0.87 cfs 0.306 af                                      |
| <b>Link 11L: Combined Flow West</b>        | Inflow=0.97 cfs 0.338 af<br>Primary=0.97 cfs 0.338 af                                                                     |
| <b>Link 12L: Combined Flow South</b>       | Inflow=0.39 cfs 0.089 af<br>Primary=0.39 cfs 0.089 af                                                                     |
| <b>Link 13L: Combined Flow North</b>       | Inflow=0.71 cfs 0.179 af<br>Primary=0.71 cfs 0.179 af                                                                     |

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Page 57

**Total Runoff Area = 5.030 ac   Runoff Volume = 0.766 af   Average Runoff Depth = 1.83"**  
**54.47% Pervious = 2.740 ac   45.53% Impervious = 2.290 ac**

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Type II 24-hr 5-Year Rainfall=3.81"

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Page 58

### Summary for Subcatchment 7S: Undetained West

Runoff = 0.65 cfs @ 11.98 hrs, Volume= 0.032 af, Depth= 0.72"  
Routed to Link 11L : Combined Flow West

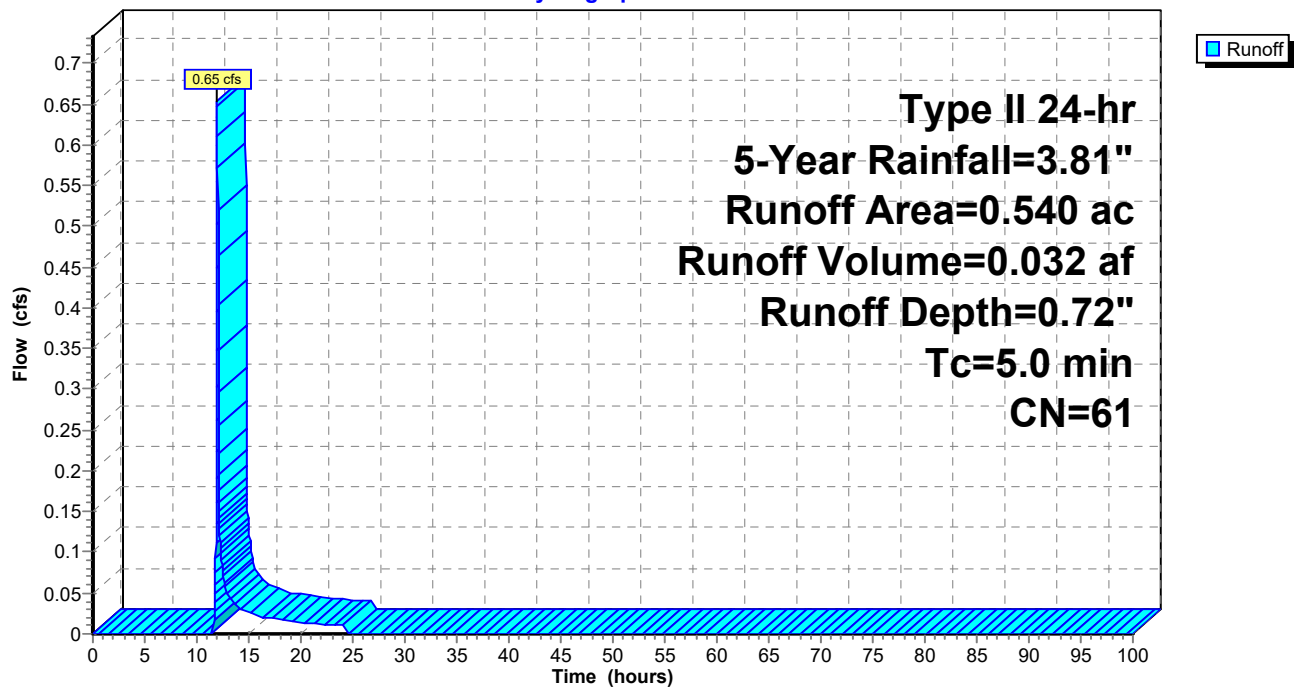
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 5-Year Rainfall=3.81"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.540   | 61 | >75% Grass cover, Good, HSG B |
| 0.540     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

### Subcatchment 7S: Undetained West

Hydrograph



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Page 59

**Summary for Subcatchment 8S: Undetained North**

Runoff = 0.64 cfs @ 11.98 hrs, Volume= 0.032 af, Depth= 0.72"  
Routed to Link 13L : Comnined Flow North

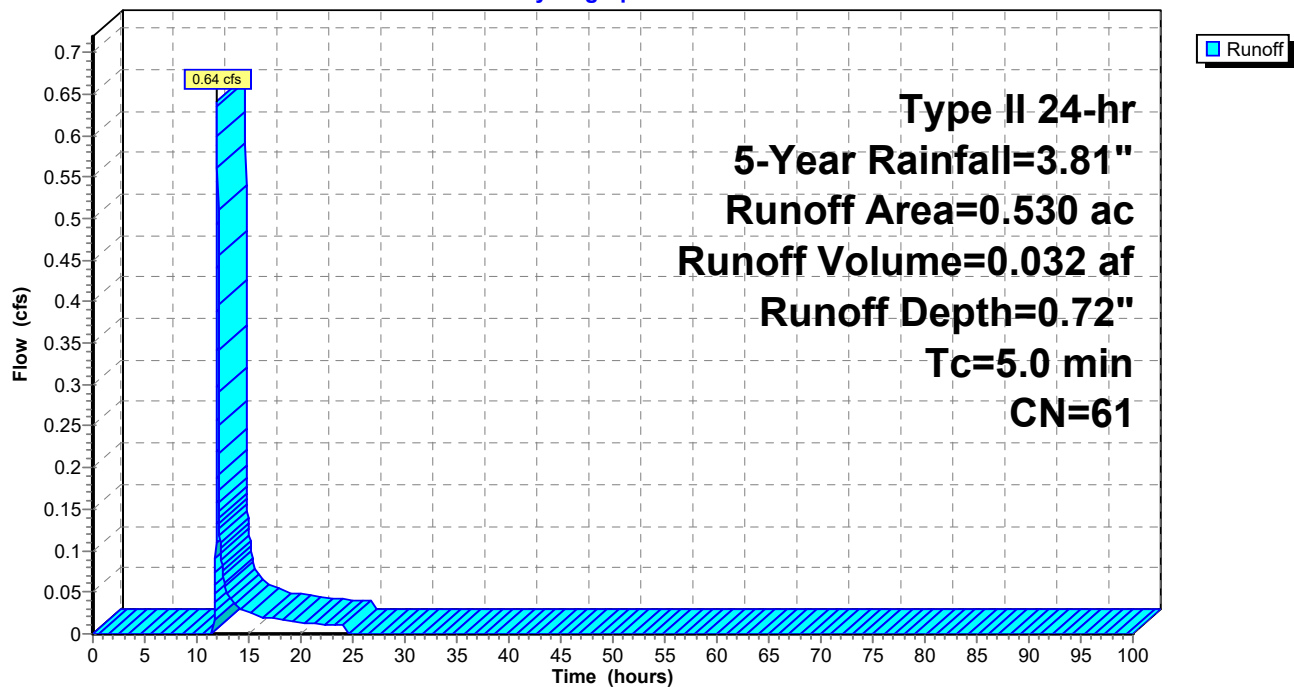
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 5-Year Rainfall=3.81"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.530   | 61 | >75% Grass cover, Good, HSG B |
| 0.530     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 8S: Undetained North**

Hydrograph





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Type II 24-hr 5-Year Rainfall=3.81"

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Page 60

### Summary for Subcatchment 9S: Undetained Southeast

Runoff = 0.28 cfs @ 11.97 hrs, Volume= 0.013 af, Depth= 0.92"  
Routed to Link 12L : Combined Flow South

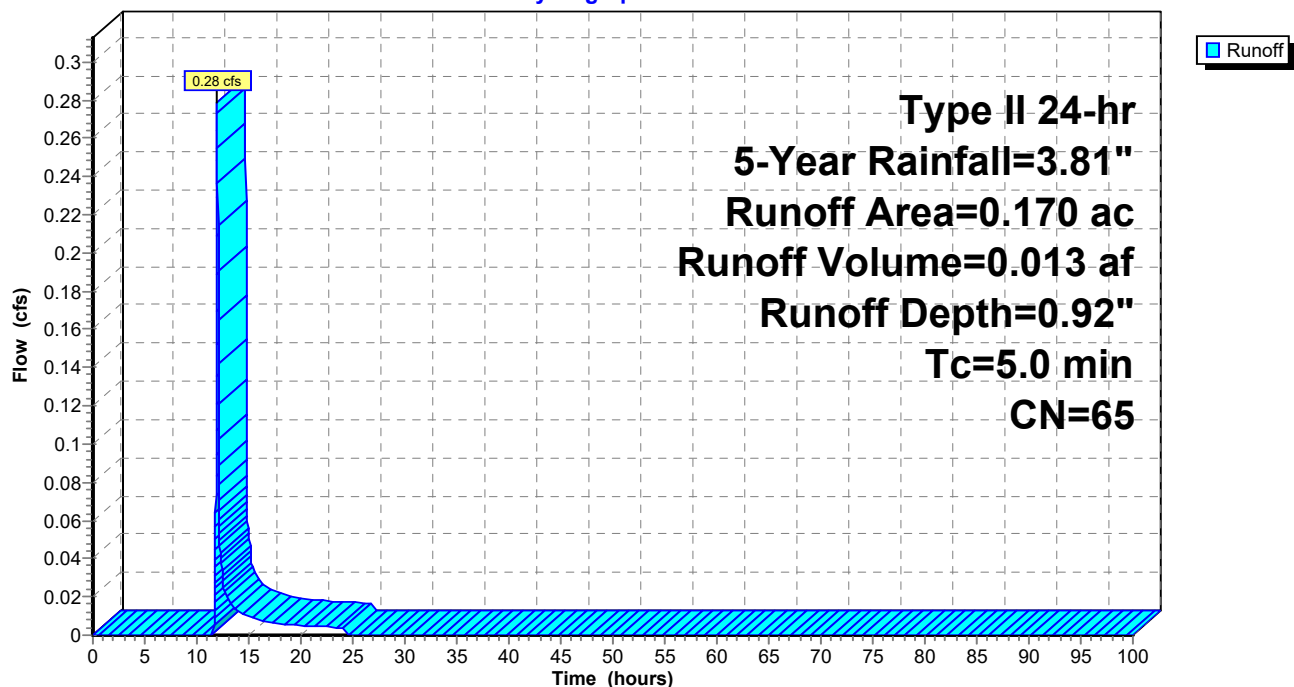
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 5-Year Rainfall=3.81"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.150   | 61 | >75% Grass cover, Good, HSG B |
| * 0.020   | 98 | Pavement                      |
| 0.170     | 65 | Weighted Average              |
| 0.150     |    | 88.24% Pervious Area          |
| 0.020     |    | 11.76% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

### Subcatchment 9S: Undetained Southeast

Hydrograph



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Type II 24-hr 5-Year Rainfall=3.81"

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Page 61

**Summary for Subcatchment 10S: Undetained South**

Runoff = 0.11 cfs @ 11.98 hrs, Volume= 0.005 af, Depth= 0.72"  
Routed to Link 12L : Combined Flow South

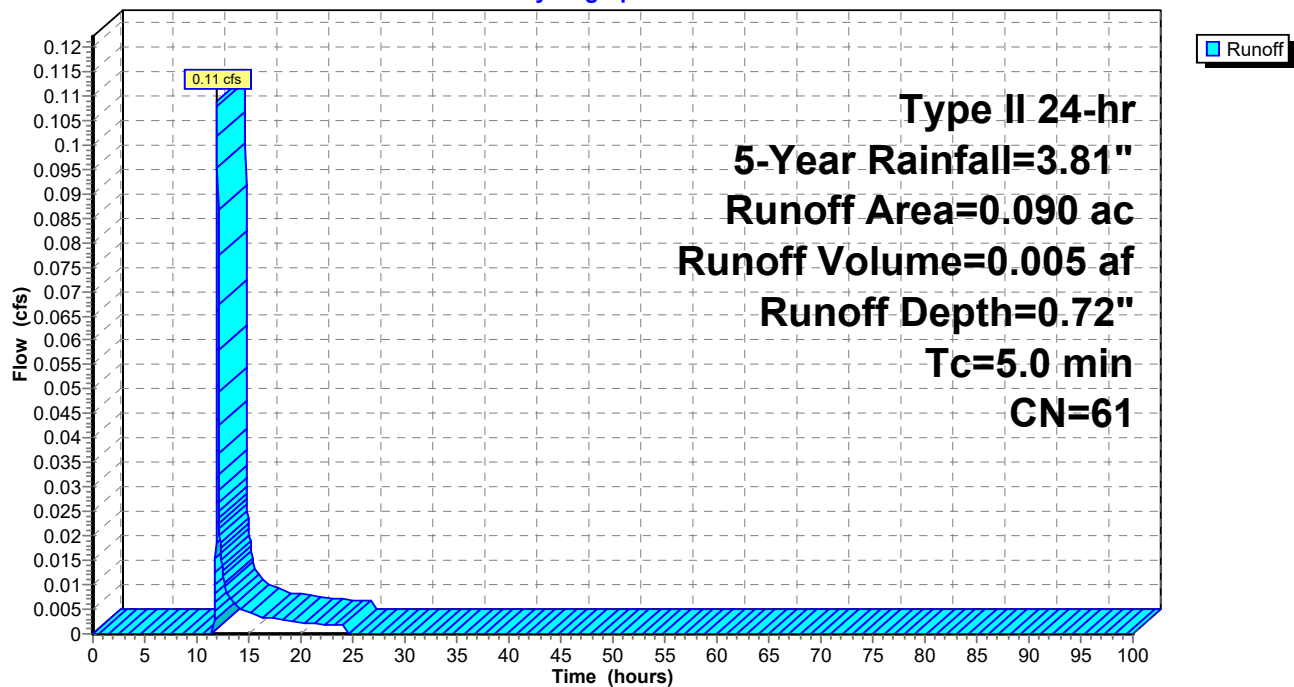
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 5-Year Rainfall=3.81"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.090   | 61 | >75% Grass cover, Good, HSG B |
| 0.090     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 10S: Undetained South**

Hydrograph



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Type II 24-hr 5-Year Rainfall=3.81"

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Page 62

**Summary for Subcatchment P-N: Proposed North**

Runoff = 4.14 cfs @ 11.99 hrs, Volume= 0.216 af, Depth= 2.65"  
Routed to Pond 3P : North Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 5-Year Rainfall=3.81"

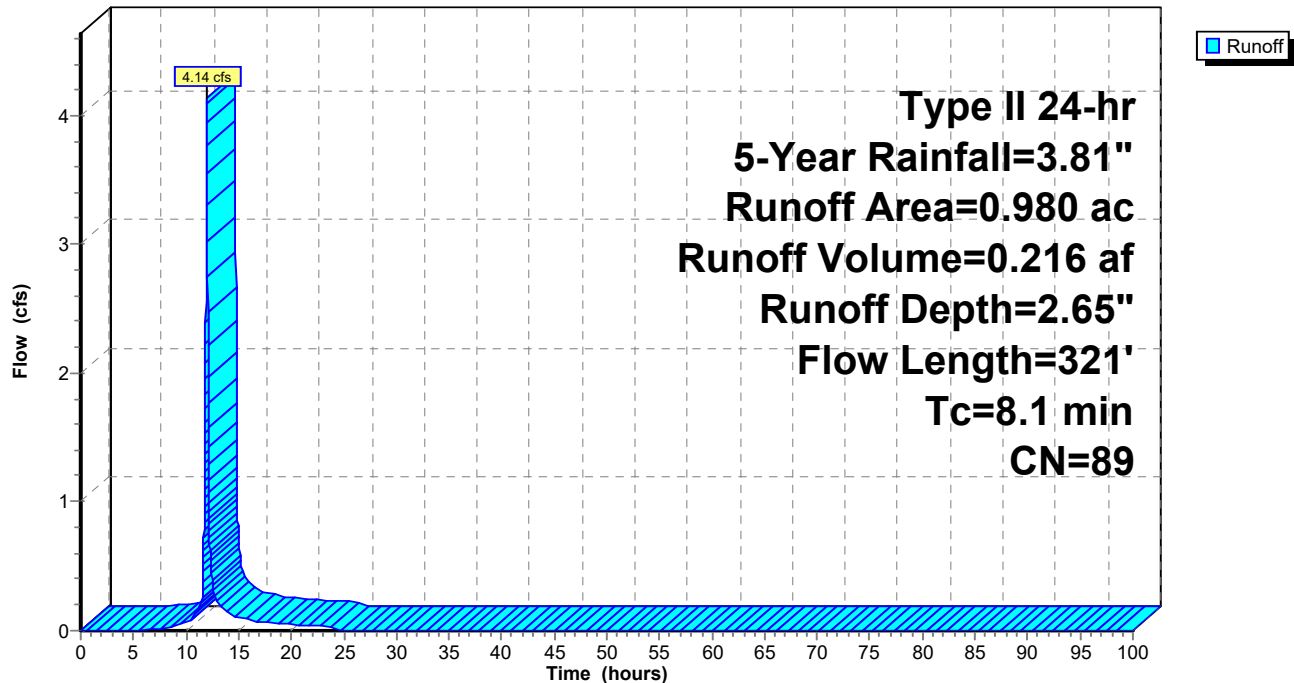
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 0.740   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.240     | 61 | >75% Grass cover, Good, HSG B       |
| 0.980     | 89 | Weighted Average                    |
| 0.240     |    | 24.49% Pervious Area                |
| 0.740     |    | 75.51% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                            |
|----------|---------------|---------------|-------------------|----------------|----------------------------------------------------------------------------------------|
| 7.5      | 91            | 0.0350        | 0.20              |                | <b>Sheet Flow, SHEET (GRASS)</b><br>Grass: Short n= 0.150 P2= 3.04"                    |
| 0.6      | 230           | 0.0150        | 6.45              | 7.91           | <b>Pipe Channel, PIPE</b><br>15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'<br>n= 0.013 |
| 8.1      | 321           | Total         |                   |                |                                                                                        |

**Subcatchment P-N: Proposed North**

Hydrograph



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Type II 24-hr 5-Year Rainfall=3.81"

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Page 63

**Summary for Subcatchment P-S: Proposed South**

Runoff = 0.78 cfs @ 12.04 hrs, Volume= 0.046 af, Depth= 1.14"  
Routed to Pond 2P : South Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 5-Year Rainfall=3.81"

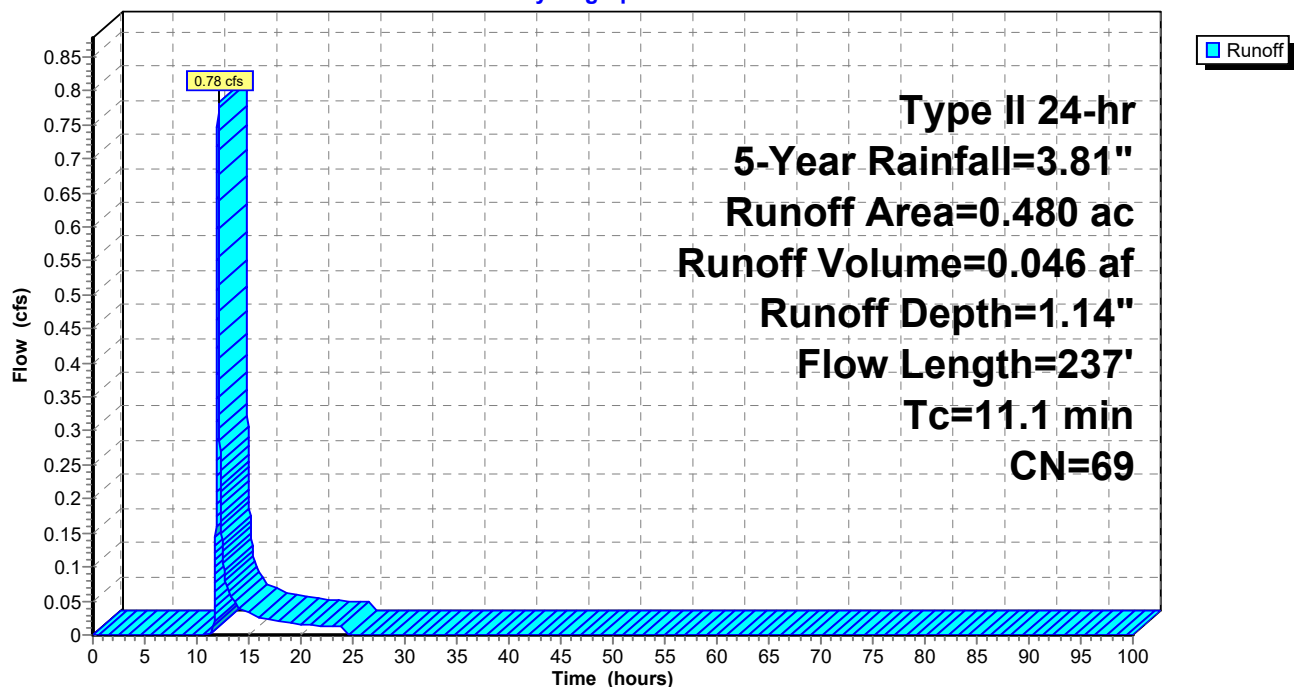
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 0.110   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.370     | 61 | >75% Grass cover, Good, HSG B       |
| 0.480     | 69 | Weighted Average                    |
| 0.370     |    | 77.08% Pervious Area                |
| 0.110     |    | 22.92% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                        |
|----------|---------------|---------------|-------------------|----------------|------------------------------------------------------------------------------------|
| 10.1     | 100           | 0.0200        | 0.17              |                | <b>Sheet Flow, SHEET (GRASS)</b><br>Grass: Short n= 0.150 P2= 3.04"                |
| 0.9      | 112           | 0.0200        | 2.12              |                | <b>Shallow Concentrated Flow, SHALLOW (GRASS)</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.1      | 25            | 0.2500        | 7.50              |                | <b>Shallow Concentrated Flow, SHALLOW (GRASS)</b><br>Grassed Waterway Kv= 15.0 fps |
| 11.1     | 237           | Total         |                   |                |                                                                                    |

**Subcatchment P-S: Proposed South**

Hydrograph





**23-047 Proposed Site Conditions\_5-7-24**

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Type II 24-hr 5-Year Rainfall=3.81"

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Page 64

**Summary for Subcatchment P-SE: Proposed Drainage**

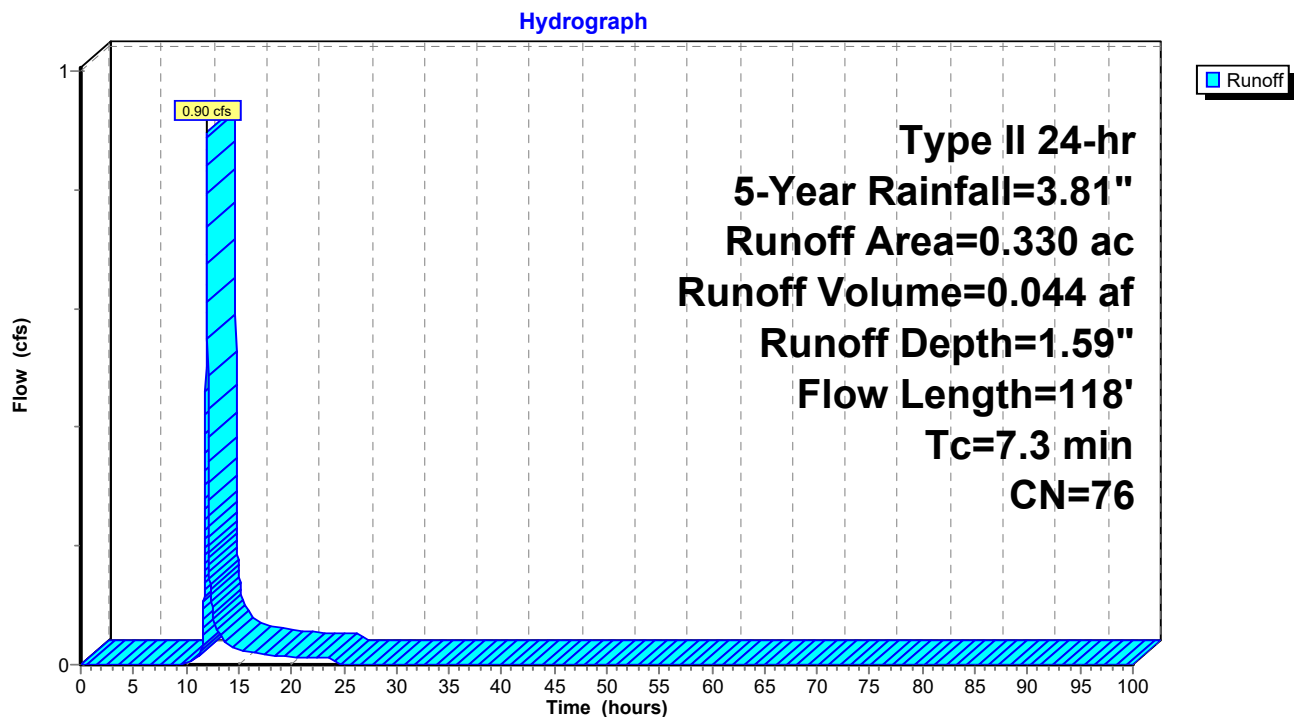
Runoff = 0.90 cfs @ 11.99 hrs, Volume= 0.044 af, Depth= 1.59"  
 Routed to Pond 1P : SE Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 5-Year Rainfall=3.81"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.130     | 98 | Paved parking, HSG C          |
| 0.200     | 61 | >75% Grass cover, Good, HSG B |
| 0.330     | 76 | Weighted Average              |
| 0.200     |    | 60.61% Pervious Area          |
| 0.130     |    | 39.39% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                       |
|----------|---------------|---------------|-------------------|----------------|-----------------------------------------------------------------------------------|
| 7.1      | 65            | 0.0200        | 0.15              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.04"                             |
| 0.2      | 53            | 0.0100        | 5.26              | 6.46           | <b>Pipe Channel,</b><br>15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'<br>n= 0.013 |
| 7.3      | 118           | Total         |                   |                |                                                                                   |

**Subcatchment P-SE: Proposed Drainage**

**23-047 Proposed Site Conditions\_5-7-24**

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Type II 24-hr 5-Year Rainfall=3.81"

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Page 65

**Summary for Subcatchment P-W: Proposed West**

Runoff = 7.75 cfs @ 11.98 hrs, Volume= 0.378 af, Depth= 2.37"  
Routed to Pond 4P : West Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 5-Year Rainfall=3.81"

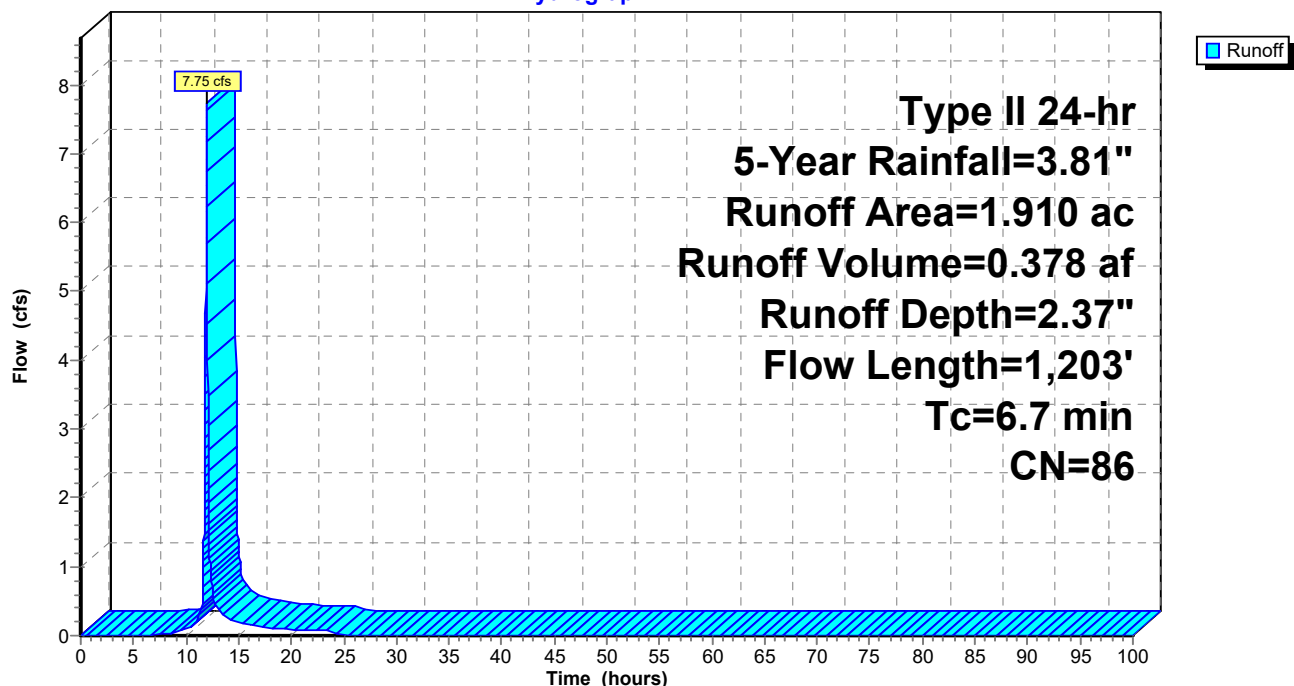
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 1.290   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.620     | 61 | >75% Grass cover, Good, HSG B       |
| 1.910     | 86 | Weighted Average                    |
| 0.620     |    | 32.46% Pervious Area                |
| 1.290     |    | 67.54% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                                   |
|----------|---------------|---------------|-------------------|----------------|-----------------------------------------------------------------------------------------------|
| 2.2      | 100           | 0.0050        | 0.77              |                | <b>Sheet Flow, SHEET (PAVED)</b><br>Smooth surfaces n= 0.011 P2= 3.04"                        |
| 3.6      | 725           | 0.0280        | 3.40              |                | <b>Shallow Concentrated Flow, SHALLOW (PAVED)</b><br>Paved Kv= 20.3 fps                       |
| 0.9      | 378           | 0.0150        | 7.28              | 12.87          | <b>Pipe Channel, Storm Sewer</b><br>18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38'<br>n= 0.013 |
| 6.7      | 1,203         | Total         |                   |                |                                                                                               |

**Subcatchment P-W: Proposed West**

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 5-Year Rainfall=3.81"

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Page 66

**Summary for Pond 1P: SE Basin**

Inflow Area = 0.330 ac, 39.39% Impervious, Inflow Depth = 1.59" for 5-Year event  
 Inflow = 0.90 cfs @ 11.99 hrs, Volume= 0.044 af  
 Outflow = 0.09 cfs @ 12.54 hrs, Volume= 0.034 af, Atten= 91%, Lag= 32.8 min  
 Primary = 0.09 cfs @ 12.54 hrs, Volume= 0.034 af  
 Routed to Pond 2P : South Basin Orifice

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 917.73' @ 12.54 hrs Surf.Area= 2,161 sf Storage= 891 cf

Plug-Flow detention time= 263.7 min calculated for 0.034 af (78% of inflow)  
 Center-of-Mass det. time= 171.8 min ( 1,015.6 - 843.7 )

| Volume | Invert  | Avail.Storage | Storage Description                                        |
|--------|---------|---------------|------------------------------------------------------------|
| #1     | 916.91' | 8,715 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 916.91              | 0                    | 0                         | 0                         |
| 918.00              | 2,856                | 1,557                     | 1,557                     |
| 919.00              | 3,551                | 3,204                     | 4,760                     |
| 920.00              | 4,358                | 3,955                     | 8,715                     |

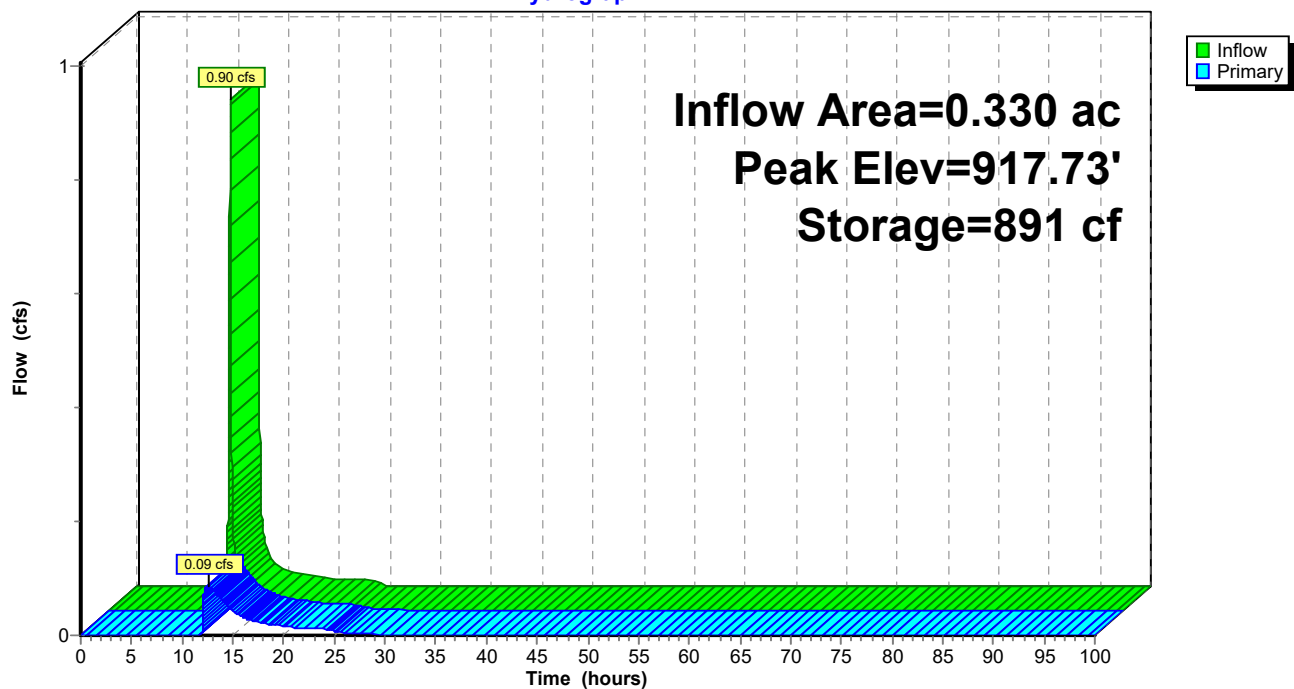
| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                             |
|--------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 916.26' | <b>4.0" Round Culvert X 3.00</b> L= 30.2' Ke= 0.500<br>Inlet / Outlet Invert= 916.26' / 915.96' S= 0.0099 '/' Cc= 0.900<br>n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.09 sf |
| #2     | Device 1 | 917.48' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                                 |
| #3     | Device 1 | 918.00' | <b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b><br>Head (feet) 0.00 0.45 0.45 0.95<br>Width (feet) 0.50 0.50 3.00 3.00                                                                      |

**Primary OutFlow** Max=0.09 cfs @ 12.54 hrs HW=917.73' (Free Discharge)

1=Culvert (Passes 0.09 cfs of 1.07 cfs potential flow)  
 2=Orifice/Grate (Orifice Controls 0.09 cfs @ 1.73 fps)  
 3=Custom Weir/Orifice ( Controls 0.00 cfs)

# Pond 1P: SE Basin

## Hydrograph





**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 5-Year Rainfall=3.81"

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Page 68

**Summary for Pond 2P: South Basin Orifice**

Inflow Area = 0.810 ac, 29.63% Impervious, Inflow Depth = 1.18" for 5-Year event  
 Inflow = 0.83 cfs @ 12.05 hrs, Volume= 0.080 af  
 Outflow = 0.14 cfs @ 13.06 hrs, Volume= 0.070 af, Atten= 82%, Lag= 60.8 min  
 Primary = 0.14 cfs @ 13.06 hrs, Volume= 0.070 af  
 Routed to Link 12L : Combined Flow South

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 912.81' @ 13.06 hrs Surf.Area= 1,185 sf Storage= 927 cf

Plug-Flow detention time= 164.6 min calculated for 0.070 af (88% of inflow)  
 Center-of-Mass det. time= 90.8 min ( 1,021.8 - 931.0 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                        |
|---------------------|----------------------|---------------------------|------------------------------------------------------------|
| #1                  | 911.50'              | 5,431 cf                  | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                                  |
| 911.50              | 0                    | 0                         | 0                                                          |
| 912.00              | 682                  | 171                       | 171                                                        |
| 913.00              | 1,303                | 993                       | 1,163                                                      |
| 914.00              | 2,092                | 1,698                     | 2,861                                                      |
| 915.00              | 3,048                | 2,570                     | 5,431                                                      |

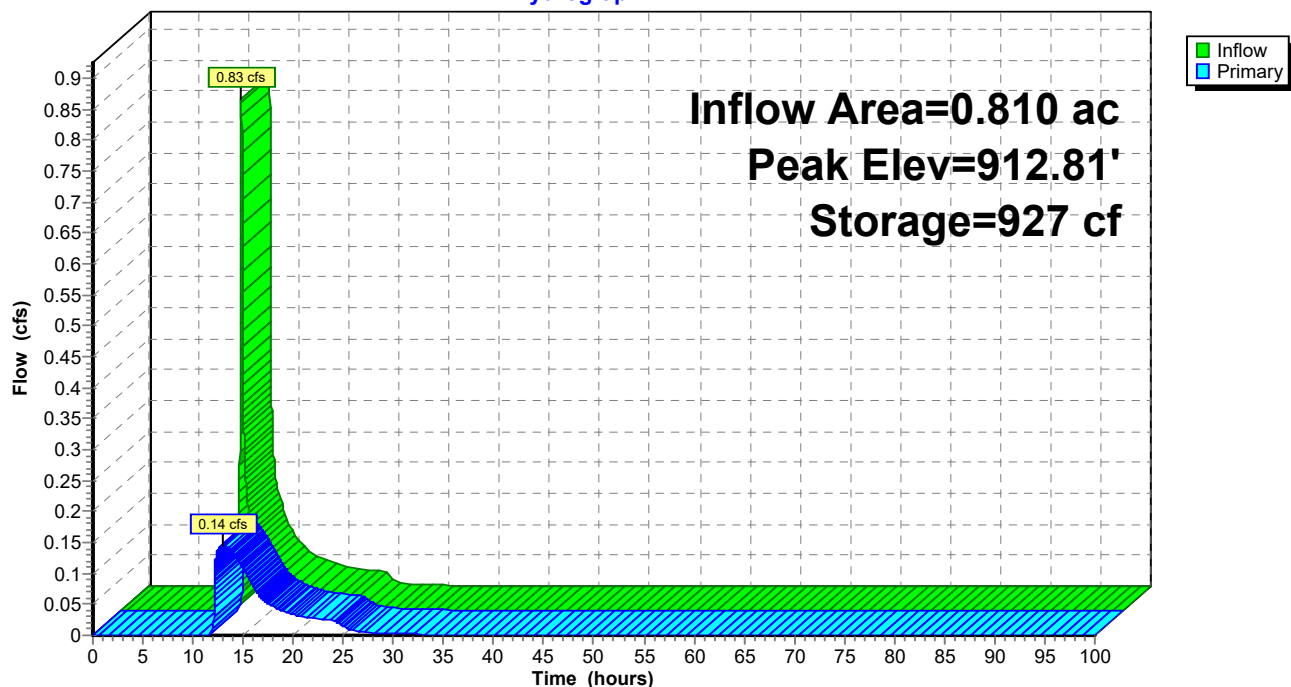
| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                 |
|--------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 911.34' | <b>6.0" Round Culvert</b><br>L= 68.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 911.34' / 909.31' S= 0.0299 '/' Cc= 0.900<br>n= 0.013, Flow Area= 0.20 sf |
| #2     | Device 1 | 912.31' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                     |
| #3     | Device 1 | 913.00' | <b>10.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                    |

**Primary OutFlow** Max=0.14 cfs @ 13.06 hrs HW=912.81' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.14 cfs of 1.04 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.14 cfs @ 2.95 fps)
- ↑ **3=Orifice/Grate** ( Controls 0.00 cfs)

# Pond 2P: South Basin Orifice

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 5-Year Rainfall=3.81"

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Page 70

**Summary for Pond 3P: North Basin Orifice**

Inflow Area = 0.980 ac, 75.51% Impervious, Inflow Depth = 2.65" for 5-Year event  
 Inflow = 4.14 cfs @ 11.99 hrs, Volume= 0.216 af  
 Outflow = 0.23 cfs @ 13.02 hrs, Volume= 0.147 af, Atten= 95%, Lag= 61.5 min  
 Primary = 0.23 cfs @ 13.02 hrs, Volume= 0.147 af  
 Routed to Link 13L : Combined Flow North

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 921.90' @ 13.02 hrs Surf.Area= 3,447 sf Storage= 5,706 cf

Plug-Flow detention time= 343.8 min calculated for 0.147 af (68% of inflow)  
 Center-of-Mass det. time= 244.6 min ( 1,047.7 - 803.1 )

| Volume | Invert  | Avail.Storage | Storage Description                                                                                                                                                                                                                                        |
|--------|---------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1A    | 919.40' | 6,149 cf      | <b>20.08'W x 171.65'L x 6.75'H Field A</b><br>23,269 cf Overall - 7,897 cf Embedded = 15,373 cf x 40.0% Voids                                                                                                                                              |
| #2A    | 920.15' | 7,897 cf      | <b>ADS_StormTech MC-7200 +Cap</b> x 44 Inside #1<br>Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf<br>Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap<br>44 Chambers in 2 Rows<br>Cap Storage= 39.5 cf x 2 x 2 rows = 158.0 cf |
|        |         | 14,046 cf     | Total Available Storage                                                                                                                                                                                                                                    |

Storage Group A created with Chamber Wizard

| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                   |
|--------|----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 918.30' | <b>12.0" Round Culvert</b><br>L= 104.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 918.30' / 910.25' S= 0.0774 '/' Cc= 0.900<br>n= 0.013, Flow Area= 0.79 sf |
| #2     | Device 1 | 920.87' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                       |
| #3     | Device 1 | 924.15' | <b>12.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                      |

Primary OutFlow Max=0.23 cfs @ 13.02 hrs HW=921.90' (Free Discharge)

1=Culvert (Passes 0.23 cfs of 6.66 cfs potential flow)  
 2=Orifice/Grate (Orifice Controls 0.23 cfs @ 4.59 fps)  
 3=Orifice/Grate ( Controls 0.00 cfs)

## 23-047 Proposed Site Conditions\_5-7-24

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Type II 24-hr 5-Year Rainfall=3.81"

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Page 71

### Pond 3P: North Basin Orifice - Chamber Wizard Field A

**Chamber Model = ADS\_StormTechMC-7200+Cap (ADS StormTech®MC-7200 with cap volume)**

Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf

Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap

Cap Storage= 39.5 cf x 2 x 2 rows = 158.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

22 Chambers/Row x 6.59' Long +2.73' Cap Length x 2 = 150.48' Row Length +127.0" End Stone x 2 = 171.65' Base Length

2 Rows x 100.0" Wide + 9.0" Spacing x 1 + 16.0" Side Stone x 2 = 20.08' Base Width

9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

44 Chambers x 175.9 cf + 39.5 cf Cap Volume x 2 x 2 Rows = 7,896.5 cf Chamber Storage

23,269.3 cf Field - 7,896.5 cf Chambers = 15,372.8 cf Stone x 40.0% Voids = 6,149.1 cf Stone Storage

Chamber Storage + Stone Storage = 14,045.6 cf = 0.322 af

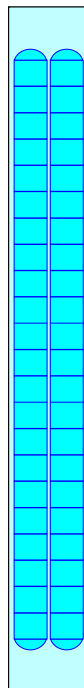
Overall Storage Efficiency = 60.4%

Overall System Size = 171.65' x 20.08' x 6.75'

44 Chambers

861.8 cy Field

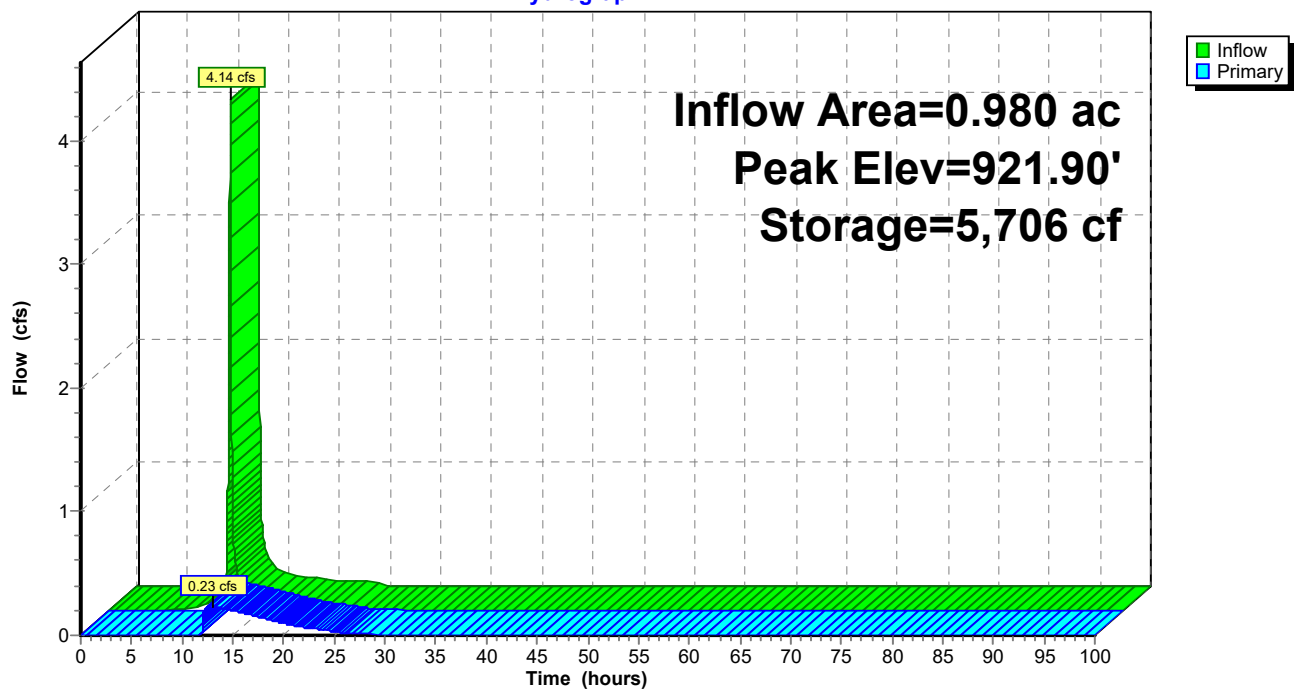
569.4 cy Stone





### Pond 3P: North Basin Orifice

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 5-Year Rainfall=3.81"

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Page 73

**Summary for Pond 4P: West Basin Orifice**

Inflow Area = 1.910 ac, 67.54% Impervious, Inflow Depth = 2.37" for 5-Year event  
 Inflow = 7.75 cfs @ 11.98 hrs, Volume= 0.378 af  
 Outflow = 0.87 cfs @ 12.36 hrs, Volume= 0.306 af, Atten= 89%, Lag= 22.8 min  
 Primary = 0.87 cfs @ 12.36 hrs, Volume= 0.306 af  
 Routed to Pond 5P : Level Spreader

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 910.81' @ 12.36 hrs Surf.Area= 4,246 sf Storage= 8,765 cf

Plug-Flow detention time= 310.7 min calculated for 0.306 af (81% of inflow)  
 Center-of-Mass det. time= 231.4 min ( 1,044.1 - 812.7 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                        |
|---------------------|----------------------|---------------------------|------------------------------------------------------------|
| #1                  | 907.00'              | 28,862 cf                 | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                                  |
| 907.00              | 0                    | 0                         | 0                                                          |
| 908.00              | 1,584                | 792                       | 792                                                        |
| 909.00              | 2,402                | 1,993                     | 2,785                                                      |
| 910.00              | 3,364                | 2,883                     | 5,668                                                      |
| 911.00              | 4,448                | 3,906                     | 9,574                                                      |
| 912.00              | 5,668                | 5,058                     | 14,632                                                     |
| 913.00              | 7,027                | 6,348                     | 20,980                                                     |
| 914.00              | 8,738                | 7,883                     | 28,862                                                     |

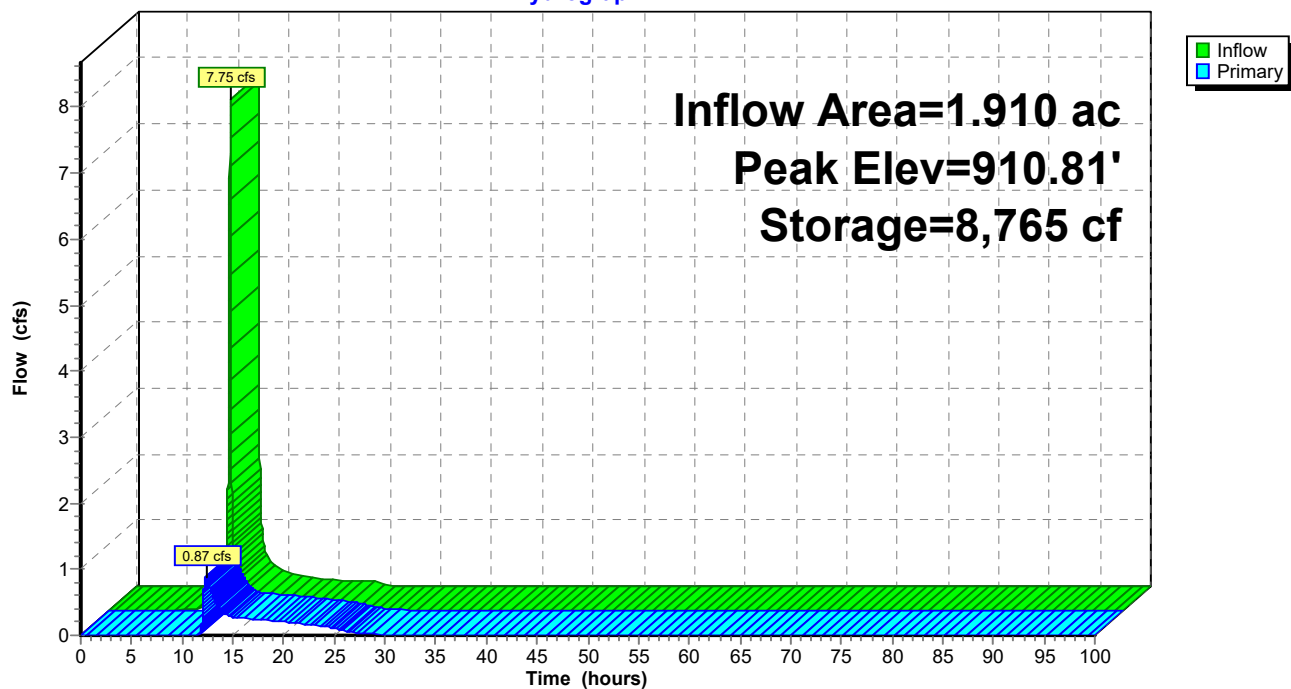
| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                  |
|--------|----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 908.00' | <b>15.0" Round Culvert</b><br>L= 32.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 908.00' / 904.00' S= 0.1250 ' S Cc= 0.900<br>n= 0.013, Flow Area= 1.23 sf |
| #2     | Device 1 | 909.14' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                      |
| #3     | Device 1 | 910.50' | <b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b><br>Head (feet) 0.00 1.25 1.25 1.75<br>Width (feet) 1.00 1.00 1.00 1.00                                                           |

**Primary OutFlow** Max=0.87 cfs @ 12.36 hrs HW=910.81' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.87 cfs of 8.74 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.29 cfs @ 5.99 fps)
- ↑ **3=Custom Weir/Orifice** (Weir Controls 0.58 cfs @ 1.83 fps)

# Pond 4P: West Basin Orifice

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 5-Year Rainfall=3.81"

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Page 75

**Summary for Pond 5P: Level Spreader**

[79] Warning: Submerged Pond 4P Primary device # 1 OUTLET by 0.04'

Inflow Area = 1.910 ac, 67.54% Impervious, Inflow Depth = 1.92" for 5-Year event  
 Inflow = 0.87 cfs @ 12.36 hrs, Volume= 0.306 af  
 Outflow = 0.87 cfs @ 12.36 hrs, Volume= 0.306 af, Atten= 0%, Lag= 0.1 min  
 Primary = 0.87 cfs @ 12.36 hrs, Volume= 0.306 af  
 Routed to Link 11L : Combined Flow West

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Peak Elev= 904.04' @ 12.36 hrs Surf.Area= 110 sf Storage= 4 cf

Plug-Flow detention time= 0.1 min calculated for 0.306 af (100% of inflow)

Center-of-Mass det. time= 0.1 min ( 1,044.2 - 1,044.1 )

| Volume | Invert  | Avail.Storage | Storage Description                                        |
|--------|---------|---------------|------------------------------------------------------------|
| #1     | 904.00' | 1,255 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 904.00              | 72                   | 0                         | 0                         |
| 905.00              | 961                  | 517                       | 517                       |
| 906.00              | 515                  | 738                       | 1,255                     |

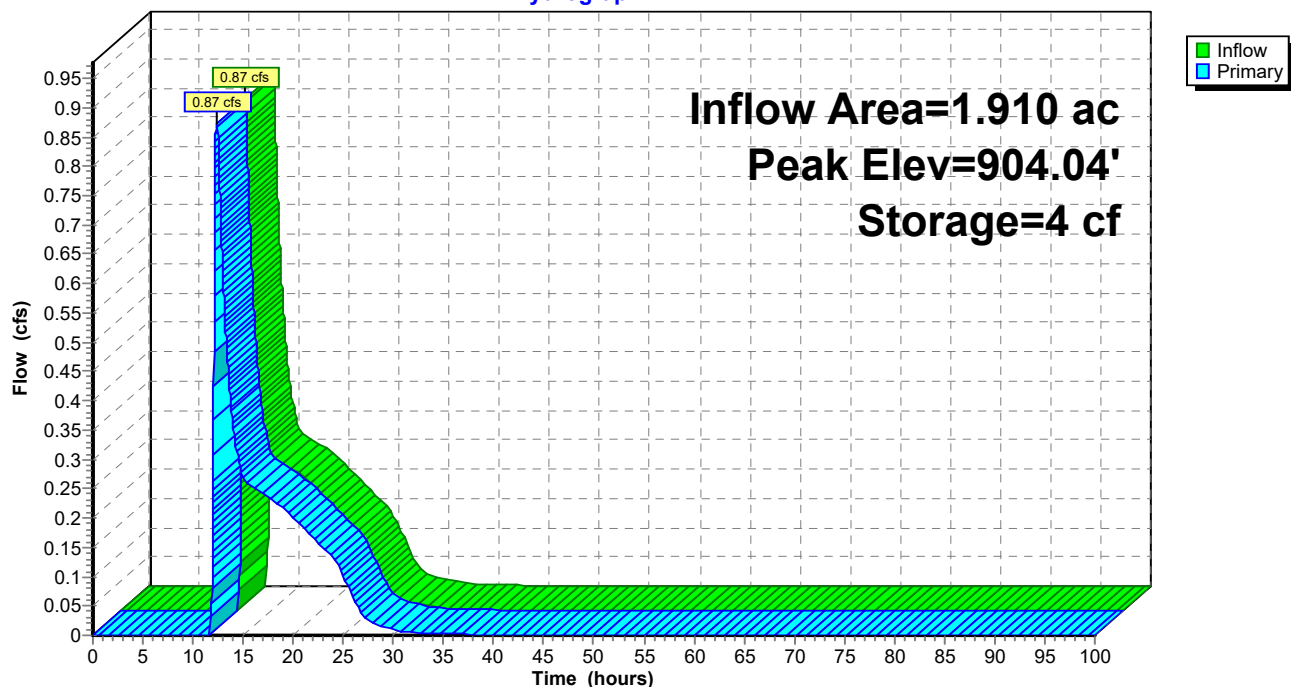
| Device | Routing | Invert  | Outlet Devices                                                        |
|--------|---------|---------|-----------------------------------------------------------------------|
| #1     | Primary | 904.00' | <b>30.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s) |

**Primary OutFlow** Max=0.86 cfs @ 12.36 hrs HW=904.04' TW=902.00' (Fixed TW Elev= 902.00')↑**1=Sharp-Crested Rectangular Weir**(Weir Controls 0.86 cfs @ 0.68 fps)



# Pond 5P: Level Spreader

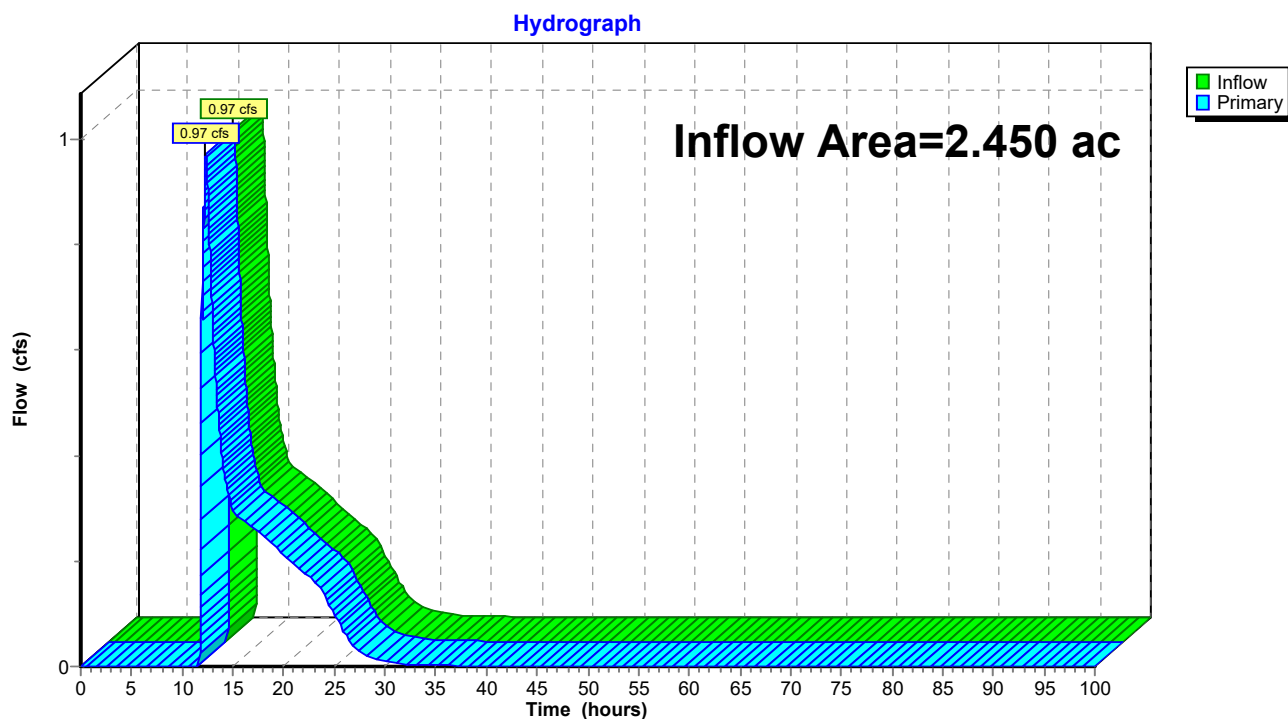
Hydrograph



**Summary for Link 11L: Combined Flow West**

Inflow Area = 2.450 ac, 52.65% Impervious, Inflow Depth = 1.66" for 5-Year event  
Inflow = 0.97 cfs @ 12.33 hrs, Volume= 0.338 af  
Primary = 0.97 cfs @ 12.33 hrs, Volume= 0.338 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 15L

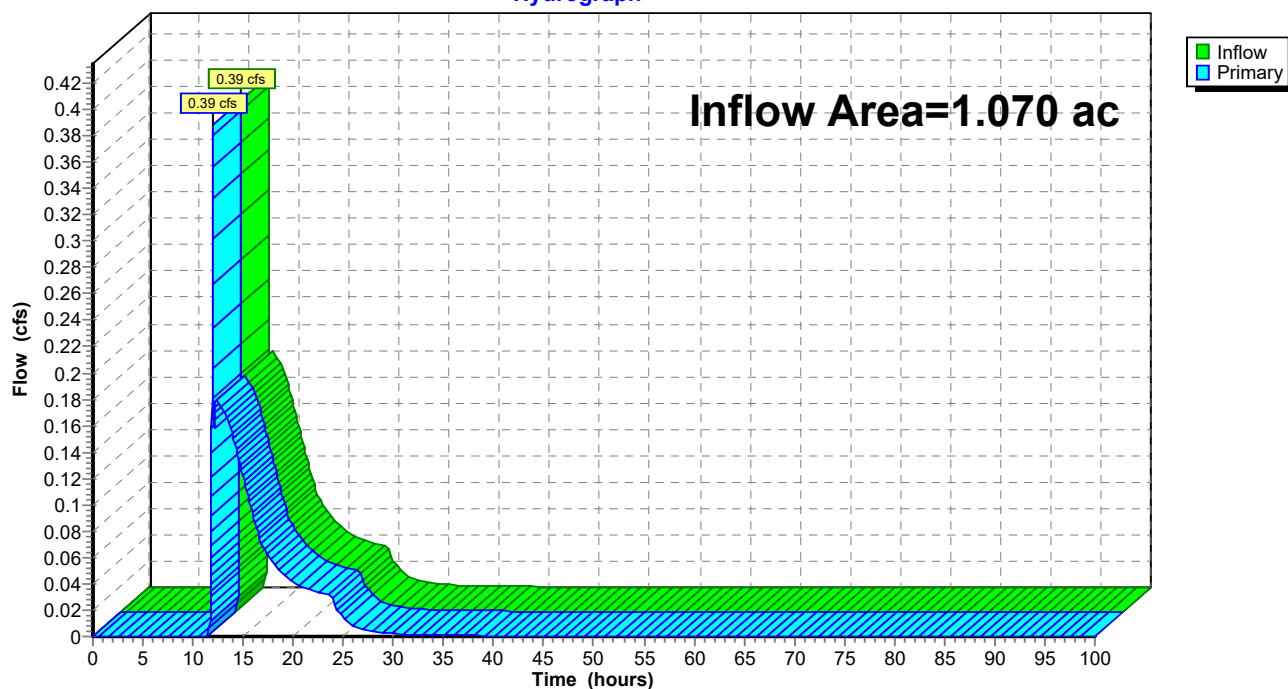
Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

**Link 11L: Combined Flow West**

**Summary for Link 12L: Combined Flow South**

Inflow Area = 1.070 ac, 24.30% Impervious, Inflow Depth = 1.00" for 5-Year event  
Inflow = 0.39 cfs @ 11.97 hrs, Volume= 0.089 af  
Primary = 0.39 cfs @ 11.97 hrs, Volume= 0.089 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 15L

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

**Link 12L: Combined Flow South****Hydrograph**

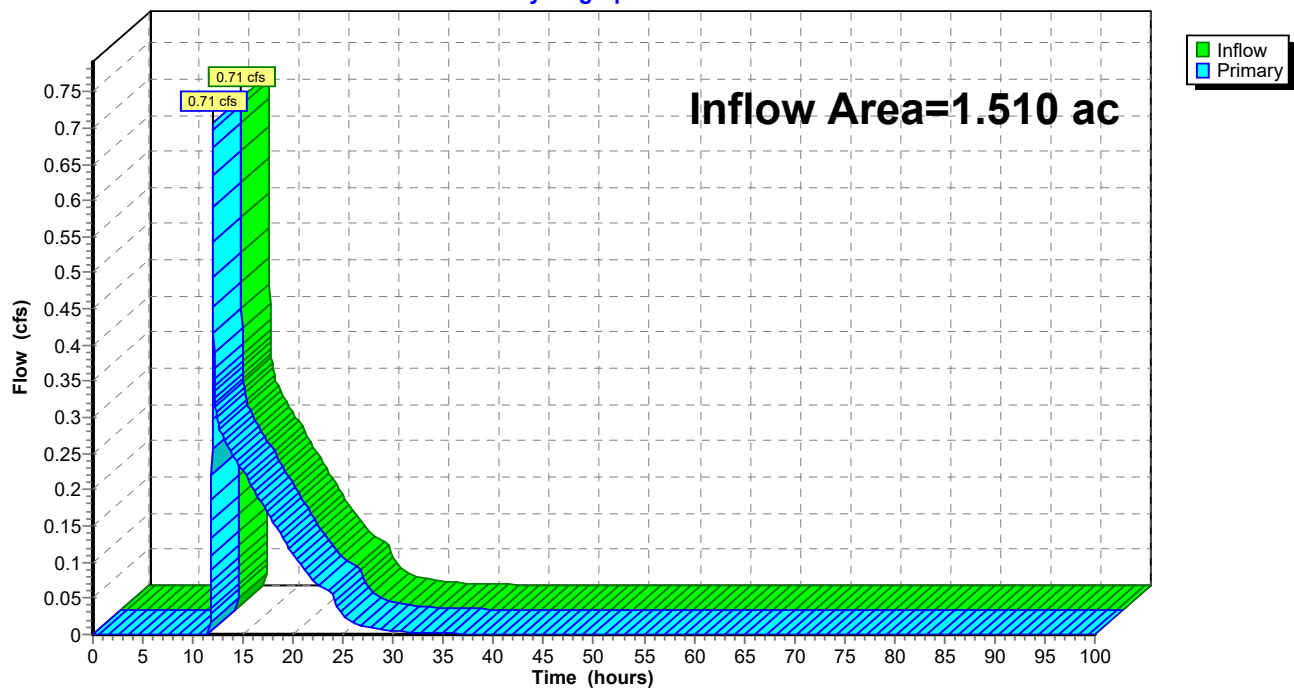
### Summary for Link 13L: Comnined Flow North

Inflow Area = 1.510 ac, 49.01% Impervious, Inflow Depth = 1.42" for 5-Year event  
 Inflow = 0.71 cfs @ 11.99 hrs, Volume= 0.179 af  
 Primary = 0.71 cfs @ 11.99 hrs, Volume= 0.179 af, Atten= 0%, Lag= 0.0 min  
 Routed to nonexistent node 15L

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

### Link 13L: Comnined Flow North

Hydrograph





**23-047 Proposed Site Conditions\_5-7-24***Type II 24-hr 10-Year Rainfall=4.46"*

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Page 80

Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

|                                            |                                                                                                                           |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment7S: UndetainedWest</b>      | Runoff Area=0.540 ac 0.00% Impervious Runoff Depth=1.06"<br>Tc=5.0 min CN=61 Runoff=1.02 cfs 0.048 af                     |
| <b>Subcatchment8S: UndetainedNorth</b>     | Runoff Area=0.530 ac 0.00% Impervious Runoff Depth=1.06"<br>Tc=5.0 min CN=61 Runoff=1.00 cfs 0.047 af                     |
| <b>Subcatchment9S: UndetainedSoutheast</b> | Runoff Area=0.170 ac 11.76% Impervious Runoff Depth=1.31"<br>Tc=5.0 min CN=65 Runoff=0.41 cfs 0.018 af                    |
| <b>Subcatchment10S: UndetainedSouth</b>    | Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=1.06"<br>Tc=5.0 min CN=61 Runoff=0.17 cfs 0.008 af                     |
| <b>SubcatchmentP-N: Proposed North</b>     | Runoff Area=0.980 ac 75.51% Impervious Runoff Depth=3.26"<br>Flow Length=321' Tc=8.1 min CN=89 Runoff=5.04 cfs 0.266 af   |
| <b>SubcatchmentP-S: Proposed South</b>     | Runoff Area=0.480 ac 22.92% Impervious Runoff Depth=1.57"<br>Flow Length=237' Tc=11.1 min CN=69 Runoff=1.10 cfs 0.063 af  |
| <b>SubcatchmentP-SE: Proposed Drainage</b> | Runoff Area=0.330 ac 39.39% Impervious Runoff Depth=2.10"<br>Flow Length=118' Tc=7.3 min CN=76 Runoff=1.18 cfs 0.058 af   |
| <b>SubcatchmentP-W: Proposed West</b>      | Runoff Area=1.910 ac 67.54% Impervious Runoff Depth=2.97"<br>Flow Length=1,203' Tc=6.7 min CN=86 Runoff=9.57 cfs 0.472 af |
| <b>Pond 1P: SE Basin</b>                   | Peak Elev=917.86' Storage=1,189 cf Inflow=1.18 cfs 0.058 af<br>Outflow=0.12 cfs 0.048 af                                  |
| <b>Pond 2P: South Basin Orifice</b>        | Peak Elev=913.09' Storage=1,286 cf Inflow=1.19 cfs 0.111 af<br>Outflow=0.23 cfs 0.101 af                                  |
| <b>Pond 3P: North Basin Orifice</b>        | Peak Elev=922.44' Storage=7,066 cf Inflow=5.04 cfs 0.266 af<br>Outflow=0.28 cfs 0.197 af                                  |
| <b>Pond 4P: West Basin Orifice</b>         | Peak Elev=911.16' Storage=10,322 cf Inflow=9.57 cfs 0.472 af<br>Outflow=2.10 cfs 0.400 af                                 |
| <b>Pond 5P: Level Spreader</b>             | Peak Elev=904.08' Storage=8 cf Inflow=2.10 cfs 0.400 af<br>Outflow=2.10 cfs 0.400 af                                      |
| <b>Link 11L: Combined Flow West</b>        | Inflow=2.30 cfs 0.448 af<br>Primary=2.30 cfs 0.448 af                                                                     |
| <b>Link 12L: Combined Flow South</b>       | Inflow=0.58 cfs 0.128 af<br>Primary=0.58 cfs 0.128 af                                                                     |
| <b>Link 13L: Comnined Flow North</b>       | Inflow=1.14 cfs 0.244 af<br>Primary=1.14 cfs 0.244 af                                                                     |

**23-047 Proposed Site Conditions\_5-7-24***Type II 24-hr 10-Year Rainfall=4.46"*

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Page 81

**Total Runoff Area = 5.030 ac   Runoff Volume = 0.980 af   Average Runoff Depth = 2.34"**  
**54.47% Pervious = 2.740 ac   45.53% Impervious = 2.290 ac**

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Type II 24-hr 10-Year Rainfall=4.46"

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Page 82

**Summary for Subcatchment 7S: Undetained West**

Runoff = 1.02 cfs @ 11.97 hrs, Volume= 0.048 af, Depth= 1.06"  
Routed to Link 11L : Combined Flow West

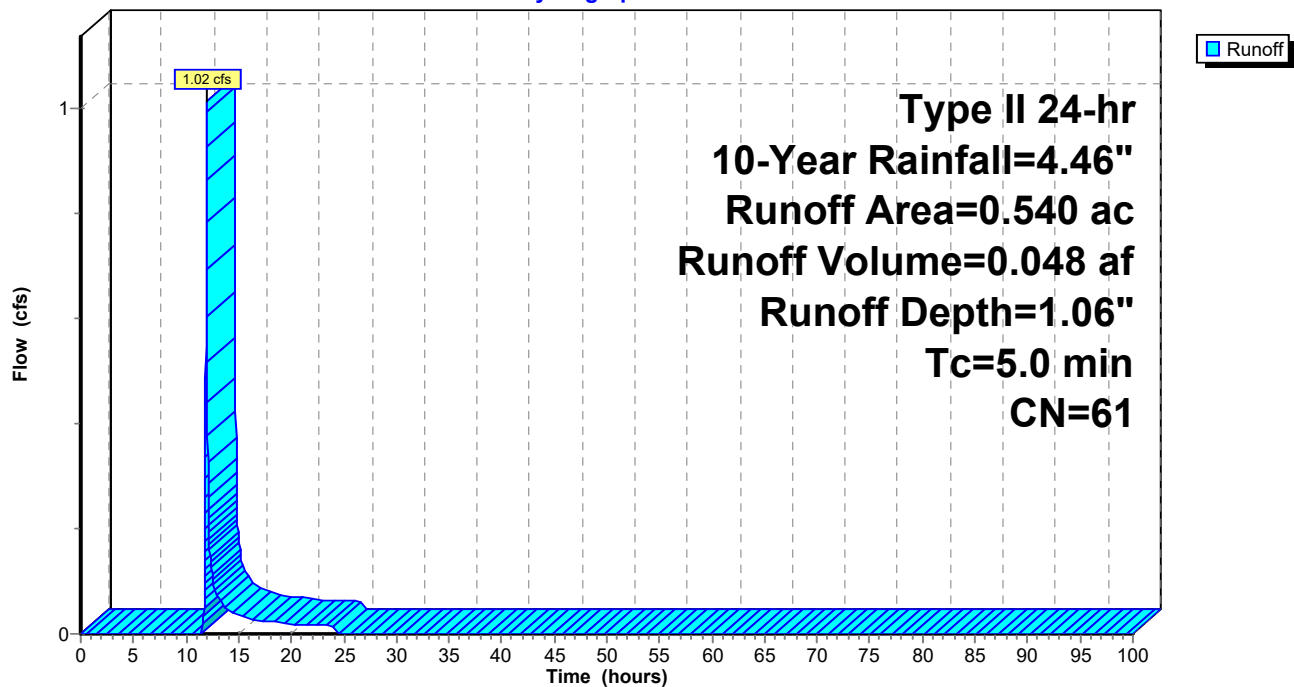
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 10-Year Rainfall=4.46"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.540   | 61 | >75% Grass cover, Good, HSG B |
| 0.540     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 7S: Undetained West**

Hydrograph



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Page 83

**Summary for Subcatchment 8S: Undetained North**

Runoff = 1.00 cfs @ 11.97 hrs, Volume= 0.047 af, Depth= 1.06"  
Routed to Link 13L : Comnined Flow North

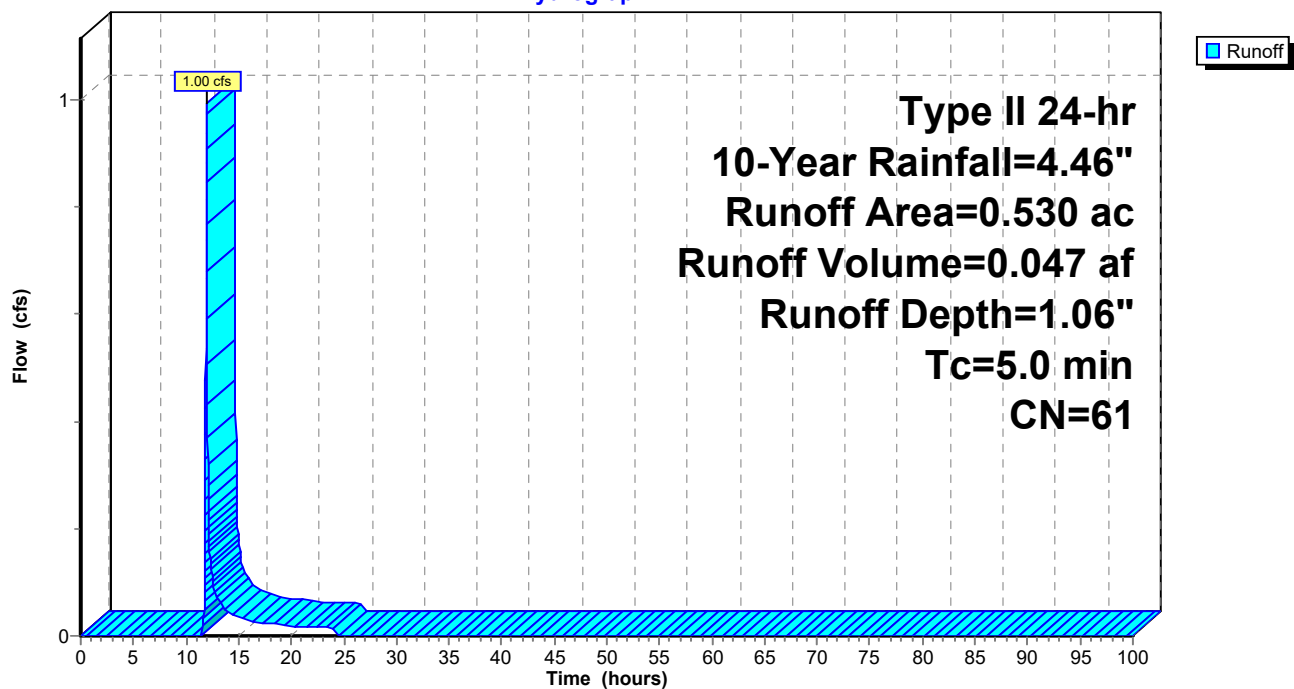
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 10-Year Rainfall=4.46"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.530   | 61 | >75% Grass cover, Good, HSG B |
| 0.530     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 8S: Undetained North**

Hydrograph





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Type II 24-hr 10-Year Rainfall=4.46"

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Page 84

### Summary for Subcatchment 9S: Undetained Southeast

Runoff = 0.41 cfs @ 11.97 hrs, Volume= 0.018 af, Depth= 1.31"  
Routed to Link 12L : Combined Flow South

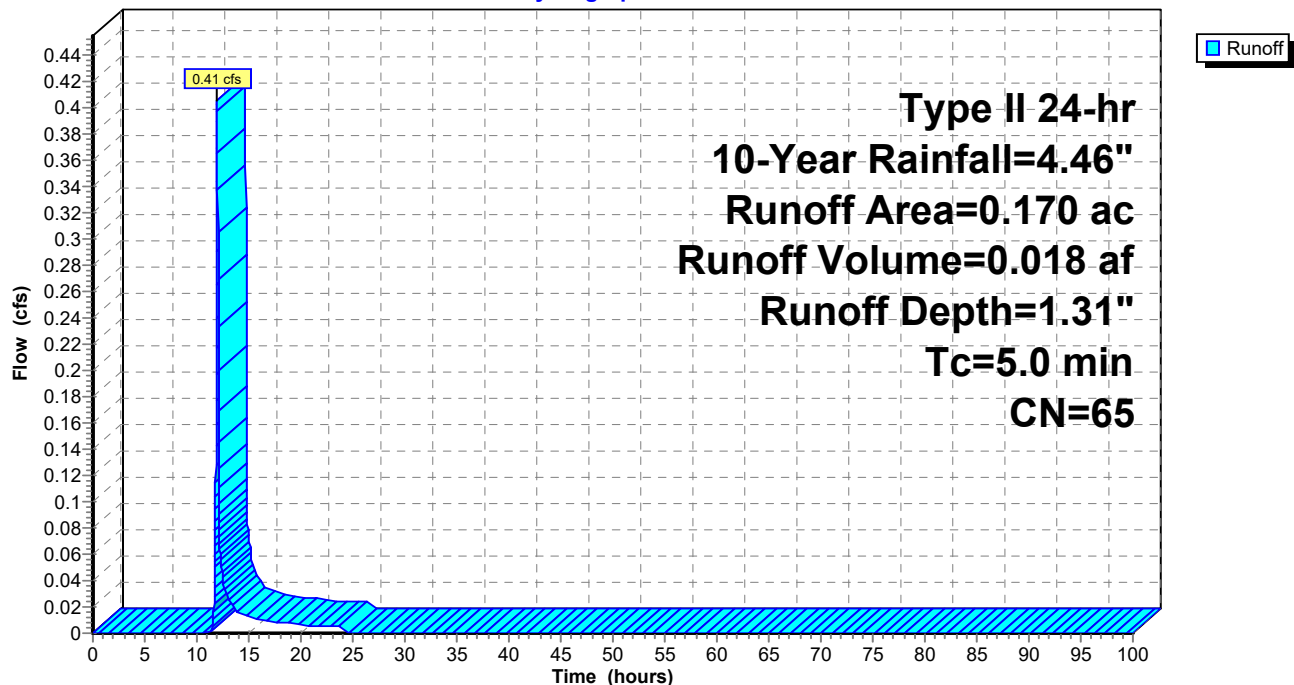
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 10-Year Rainfall=4.46"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.150   | 61 | >75% Grass cover, Good, HSG B |
| * 0.020   | 98 | Pavement                      |
| 0.170     | 65 | Weighted Average              |
| 0.150     |    | 88.24% Pervious Area          |
| 0.020     |    | 11.76% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

### Subcatchment 9S: Undetained Southeast

Hydrograph



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Type II 24-hr 10-Year Rainfall=4.46"

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Page 85

**Summary for Subcatchment 10S: Undetained South**

Runoff = 0.17 cfs @ 11.97 hrs, Volume= 0.008 af, Depth= 1.06"  
Routed to Link 12L : Combined Flow South

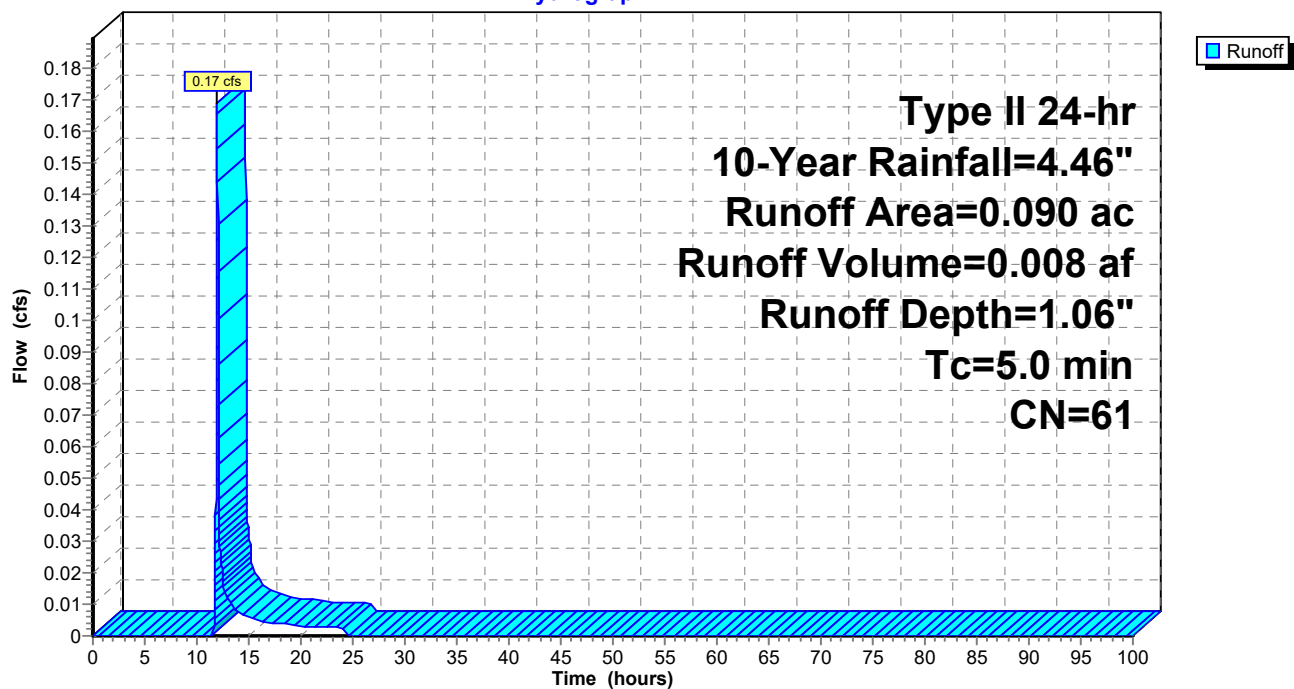
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 10-Year Rainfall=4.46"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.090   | 61 | >75% Grass cover, Good, HSG B |
| 0.090     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 10S: Undetained South**

Hydrograph



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Type II 24-hr 10-Year Rainfall=4.46"

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Page 86

**Summary for Subcatchment P-N: Proposed North**

Runoff = 5.04 cfs @ 11.99 hrs, Volume= 0.266 af, Depth= 3.26"  
 Routed to Pond 3P : North Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 10-Year Rainfall=4.46"

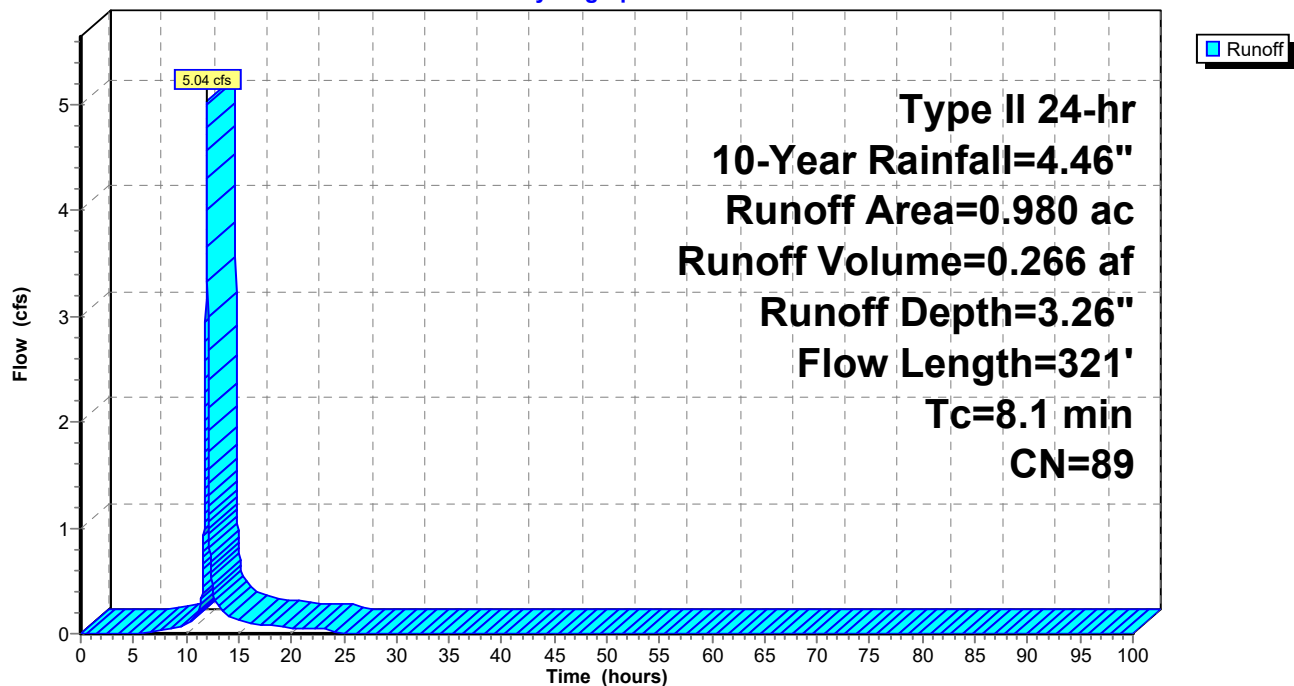
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 0.740   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.240     | 61 | >75% Grass cover, Good, HSG B       |
| 0.980     | 89 | Weighted Average                    |
| 0.240     |    | 24.49% Pervious Area                |
| 0.740     |    | 75.51% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                            |
|----------|---------------|---------------|-------------------|----------------|----------------------------------------------------------------------------------------|
| 7.5      | 91            | 0.0350        | 0.20              |                | <b>Sheet Flow, SHEET (GRASS)</b><br>Grass: Short n= 0.150 P2= 3.04"                    |
| 0.6      | 230           | 0.0150        | 6.45              | 7.91           | <b>Pipe Channel, PIPE</b><br>15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'<br>n= 0.013 |
| 8.1      | 321           | Total         |                   |                |                                                                                        |

**Subcatchment P-N: Proposed North**

Hydrograph



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Type II 24-hr 10-Year Rainfall=4.46"

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Page 87

**Summary for Subcatchment P-S: Proposed South**

Runoff = 1.10 cfs @ 12.04 hrs, Volume= 0.063 af, Depth= 1.57"  
 Routed to Pond 2P : South Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 10-Year Rainfall=4.46"

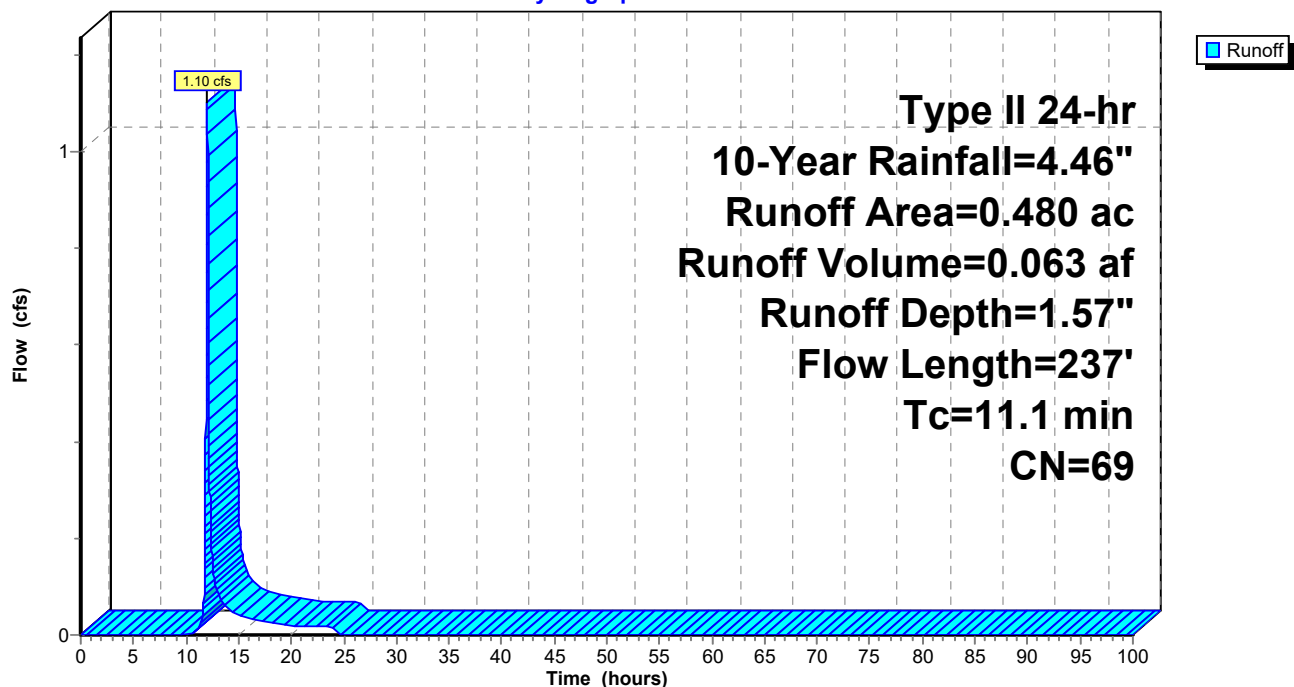
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 0.110   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.370     | 61 | >75% Grass cover, Good, HSG B       |
| 0.480     | 69 | Weighted Average                    |
| 0.370     |    | 77.08% Pervious Area                |
| 0.110     |    | 22.92% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                        |
|----------|---------------|---------------|-------------------|----------------|------------------------------------------------------------------------------------|
| 10.1     | 100           | 0.0200        | 0.17              |                | <b>Sheet Flow, SHEET (GRASS)</b><br>Grass: Short n= 0.150 P2= 3.04"                |
| 0.9      | 112           | 0.0200        | 2.12              |                | <b>Shallow Concentrated Flow, SHALLOW (GRASS)</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.1      | 25            | 0.2500        | 7.50              |                | <b>Shallow Concentrated Flow, SHALLOW (GRASS)</b><br>Grassed Waterway Kv= 15.0 fps |
| 11.1     | 237           | Total         |                   |                |                                                                                    |

**Subcatchment P-S: Proposed South**

Hydrograph





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Type II 24-hr 10-Year Rainfall=4.46"

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Page 88

**Summary for Subcatchment P-SE: Proposed Drainage**

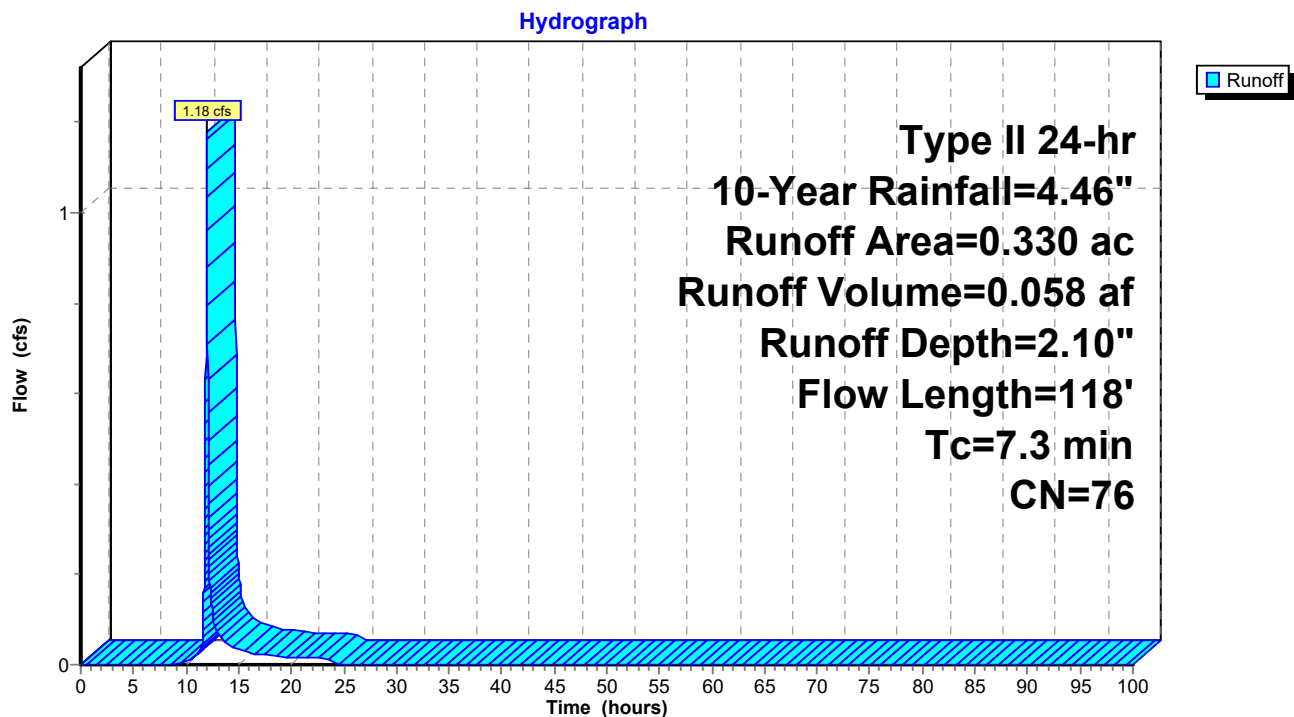
Runoff = 1.18 cfs @ 11.99 hrs, Volume= 0.058 af, Depth= 2.10"  
 Routed to Pond 1P : SE Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 10-Year Rainfall=4.46"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.130     | 98 | Paved parking, HSG C          |
| 0.200     | 61 | >75% Grass cover, Good, HSG B |
| 0.330     | 76 | Weighted Average              |
| 0.200     |    | 60.61% Pervious Area          |
| 0.130     |    | 39.39% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                       |
|----------|---------------|---------------|-------------------|----------------|-----------------------------------------------------------------------------------|
| 7.1      | 65            | 0.0200        | 0.15              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.04"                             |
| 0.2      | 53            | 0.0100        | 5.26              | 6.46           | <b>Pipe Channel,</b><br>15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'<br>n= 0.013 |
| 7.3      | 118           | Total         |                   |                |                                                                                   |

**Subcatchment P-SE: Proposed Drainage**

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Type II 24-hr 10-Year Rainfall=4.46"

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Page 89

**Summary for Subcatchment P-W: Proposed West**

Runoff = 9.57 cfs @ 11.98 hrs, Volume= 0.472 af, Depth= 2.97"  
 Routed to Pond 4P : West Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 10-Year Rainfall=4.46"

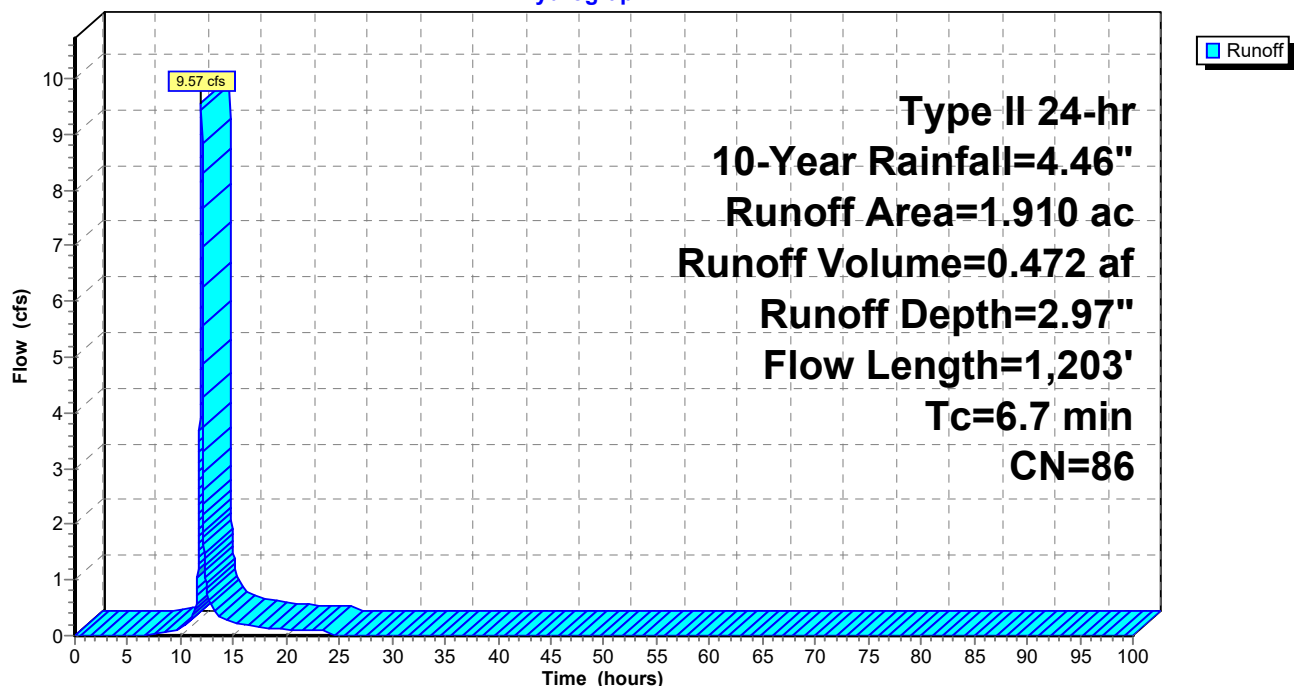
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 1.290   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.620     | 61 | >75% Grass cover, Good, HSG B       |
| 1.910     | 86 | Weighted Average                    |
| 0.620     |    | 32.46% Pervious Area                |
| 1.290     |    | 67.54% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                                   |
|----------|---------------|---------------|-------------------|----------------|-----------------------------------------------------------------------------------------------|
| 2.2      | 100           | 0.0050        | 0.77              |                | <b>Sheet Flow, SHEET (PAVED)</b><br>Smooth surfaces n= 0.011 P2= 3.04"                        |
| 3.6      | 725           | 0.0280        | 3.40              |                | <b>Shallow Concentrated Flow, SHALLOW (PAVED)</b><br>Paved Kv= 20.3 fps                       |
| 0.9      | 378           | 0.0150        | 7.28              | 12.87          | <b>Pipe Channel, Storm Sewer</b><br>18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38'<br>n= 0.013 |
| 6.7      | 1,203         | Total         |                   |                |                                                                                               |

**Subcatchment P-W: Proposed West**

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 10-Year Rainfall=4.46"

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Page 90

**Summary for Pond 1P: SE Basin**

Inflow Area = 0.330 ac, 39.39% Impervious, Inflow Depth = 2.10" for 10-Year event  
 Inflow = 1.18 cfs @ 11.99 hrs, Volume= 0.058 af  
 Outflow = 0.12 cfs @ 12.49 hrs, Volume= 0.048 af, Atten= 90%, Lag= 29.8 min  
 Primary = 0.12 cfs @ 12.49 hrs, Volume= 0.048 af  
 Routed to Pond 2P : South Basin Orifice

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 917.86' @ 12.49 hrs Surf.Area= 2,497 sf Storage= 1,189 cf

Plug-Flow detention time= 227.6 min calculated for 0.048 af (83% of inflow)  
 Center-of-Mass det. time= 151.5 min ( 987.3 - 835.8 )

| Volume | Invert  | Avail.Storage | Storage Description                                        |
|--------|---------|---------------|------------------------------------------------------------|
| #1     | 916.91' | 8,715 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 916.91              | 0                    | 0                         | 0                         |
| 918.00              | 2,856                | 1,557                     | 1,557                     |
| 919.00              | 3,551                | 3,204                     | 4,760                     |
| 920.00              | 4,358                | 3,955                     | 8,715                     |

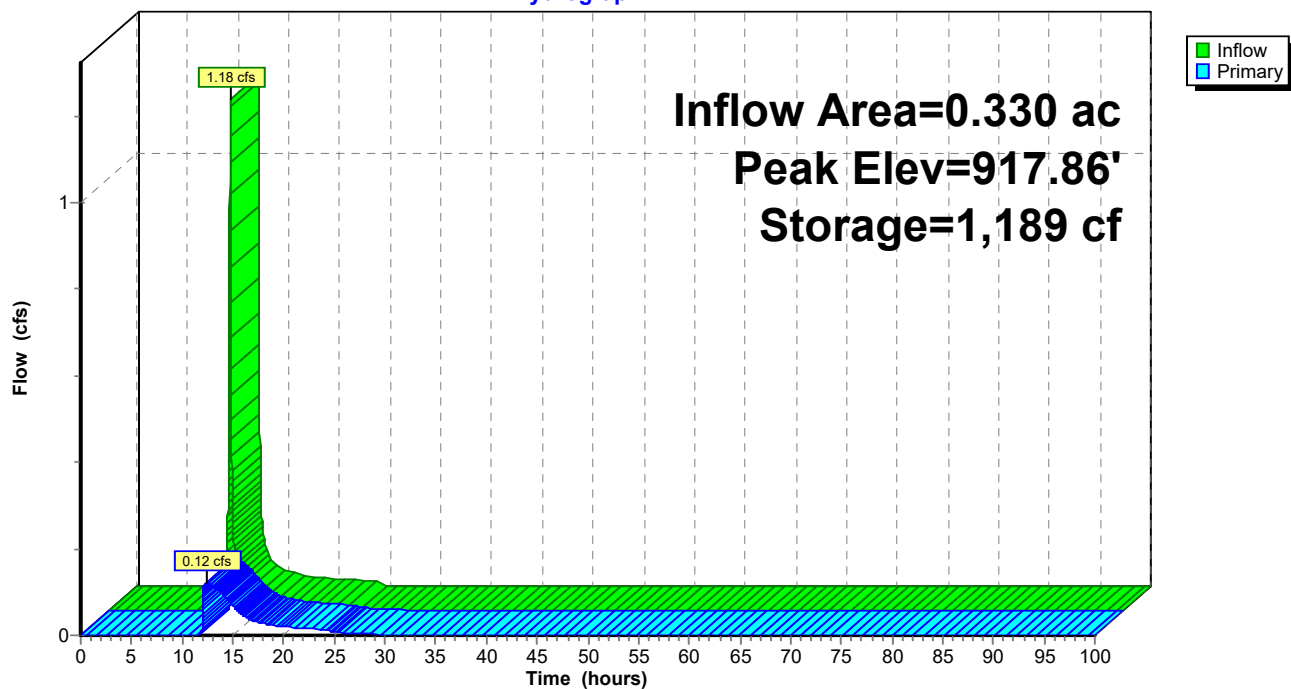
| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                             |
|--------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 916.26' | <b>4.0" Round Culvert X 3.00</b> L= 30.2' Ke= 0.500<br>Inlet / Outlet Invert= 916.26' / 915.96' S= 0.0099 '/' Cc= 0.900<br>n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.09 sf |
| #2     | Device 1 | 917.48' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                                 |
| #3     | Device 1 | 918.00' | <b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b><br>Head (feet) 0.00 0.45 0.45 0.95<br>Width (feet) 0.50 0.50 3.00 3.00                                                                      |

**Primary OutFlow** Max=0.12 cfs @ 12.49 hrs HW=917.86' (Free Discharge)

1=Culvert (Passes 0.12 cfs of 1.11 cfs potential flow)  
 2=Orifice/Grate (Orifice Controls 0.12 cfs @ 2.44 fps)  
 3=Custom Weir/Orifice ( Controls 0.00 cfs)

# Pond 1P: SE Basin

## Hydrograph





**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 10-Year Rainfall=4.46"

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Page 92

**Summary for Pond 2P: South Basin Orifice**

Inflow Area = 0.810 ac, 29.63% Impervious, Inflow Depth = 1.64" for 10-Year event  
 Inflow = 1.19 cfs @ 12.04 hrs, Volume= 0.111 af  
 Outflow = 0.23 cfs @ 12.72 hrs, Volume= 0.101 af, Atten= 81%, Lag= 40.8 min  
 Primary = 0.23 cfs @ 12.72 hrs, Volume= 0.101 af  
 Routed to Link 12L : Combined Flow South

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 913.09' @ 12.72 hrs Surf.Area= 1,376 sf Storage= 1,286 cf

Plug-Flow detention time= 138.8 min calculated for 0.101 af (91% of inflow)  
 Center-of-Mass det. time= 84.1 min ( 998.0 - 914.0 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                        |
|---------------------|----------------------|---------------------------|------------------------------------------------------------|
| #1                  | 911.50'              | 5,431 cf                  | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                                  |
| 911.50              | 0                    | 0                         | 0                                                          |
| 912.00              | 682                  | 171                       | 171                                                        |
| 913.00              | 1,303                | 993                       | 1,163                                                      |
| 914.00              | 2,092                | 1,698                     | 2,861                                                      |
| 915.00              | 3,048                | 2,570                     | 5,431                                                      |

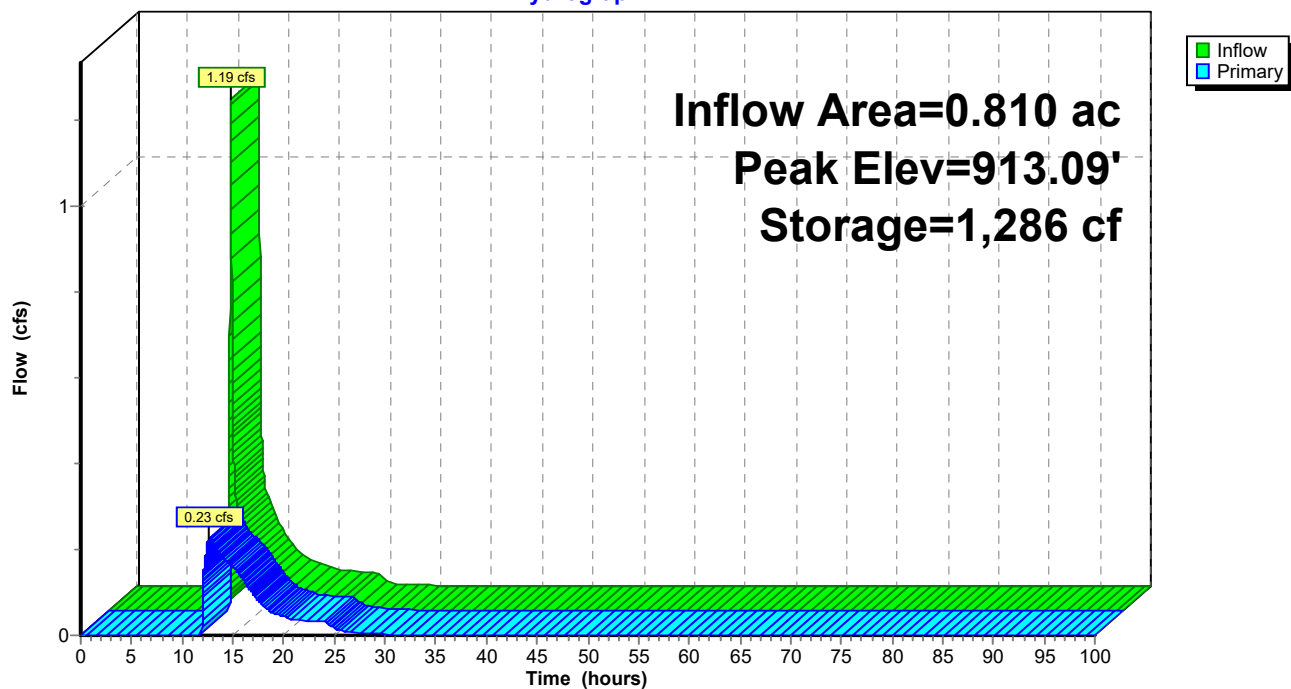
| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                 |
|--------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 911.34' | <b>6.0" Round Culvert</b><br>L= 68.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 911.34' / 909.31' S= 0.0299 '/' Cc= 0.900<br>n= 0.013, Flow Area= 0.20 sf |
| #2     | Device 1 | 912.31' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                     |
| #3     | Device 1 | 913.00' | <b>10.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                    |

**Primary OutFlow** Max=0.23 cfs @ 12.72 hrs HW=913.09' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.23 cfs of 1.09 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.19 cfs @ 3.90 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.03 cfs @ 1.03 fps)

# Pond 2P: South Basin Orifice

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 10-Year Rainfall=4.46"

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Page 94

**Summary for Pond 3P: North Basin Orifice**

Inflow Area = 0.980 ac, 75.51% Impervious, Inflow Depth = 3.26" for 10-Year event  
 Inflow = 5.04 cfs @ 11.99 hrs, Volume= 0.266 af  
 Outflow = 0.28 cfs @ 12.95 hrs, Volume= 0.197 af, Atten= 94%, Lag= 57.5 min  
 Primary = 0.28 cfs @ 12.95 hrs, Volume= 0.197 af  
 Routed to Link 13L : Combined Flow North

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 922.44' @ 12.95 hrs Surf.Area= 3,447 sf Storage= 7,066 cf

Plug-Flow detention time= 345.0 min calculated for 0.197 af (74% of inflow)  
 Center-of-Mass det. time= 253.8 min ( 1,051.1 - 797.3 )

| Volume | Invert  | Avail.Storage | Storage Description                                                                                                                                                                                                                                        |
|--------|---------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1A    | 919.40' | 6,149 cf      | <b>20.08'W x 171.65'L x 6.75'H Field A</b><br>23,269 cf Overall - 7,897 cf Embedded = 15,373 cf x 40.0% Voids                                                                                                                                              |
| #2A    | 920.15' | 7,897 cf      | <b>ADS_StormTech MC-7200 +Cap</b> x 44 Inside #1<br>Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf<br>Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap<br>44 Chambers in 2 Rows<br>Cap Storage= 39.5 cf x 2 x 2 rows = 158.0 cf |
|        |         | 14,046 cf     | Total Available Storage                                                                                                                                                                                                                                    |

Storage Group A created with Chamber Wizard

| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                   |
|--------|----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 918.30' | <b>12.0" Round Culvert</b><br>L= 104.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 918.30' / 910.25' S= 0.0774 '/' Cc= 0.900<br>n= 0.013, Flow Area= 0.79 sf |
| #2     | Device 1 | 920.87' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                       |
| #3     | Device 1 | 924.15' | <b>12.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                      |

**Primary OutFlow** Max=0.28 cfs @ 12.95 hrs HW=922.44' (Free Discharge)

1=Culvert (Passes 0.28 cfs of 7.22 cfs potential flow)  
 2=Orifice/Grate (Orifice Controls 0.28 cfs @ 5.79 fps)  
 3=Orifice/Grate ( Controls 0.00 cfs)

## 23-047 Proposed Site Conditions\_5-7-24

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Type II 24-hr 10-Year Rainfall=4.46"

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Page 95

### Pond 3P: North Basin Orifice - Chamber Wizard Field A

**Chamber Model = ADS\_StormTechMC-7200 +Cap (ADS StormTech®MC-7200 with cap volume)**

Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf

Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap

Cap Storage= 39.5 cf x 2 x 2 rows = 158.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

22 Chambers/Row x 6.59' Long +2.73' Cap Length x 2 = 150.48' Row Length +127.0" End Stone x 2 = 171.65' Base Length

2 Rows x 100.0" Wide + 9.0" Spacing x 1 + 16.0" Side Stone x 2 = 20.08' Base Width

9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

44 Chambers x 175.9 cf + 39.5 cf Cap Volume x 2 x 2 Rows = 7,896.5 cf Chamber Storage

23,269.3 cf Field - 7,896.5 cf Chambers = 15,372.8 cf Stone x 40.0% Voids = 6,149.1 cf Stone Storage

Chamber Storage + Stone Storage = 14,045.6 cf = 0.322 af

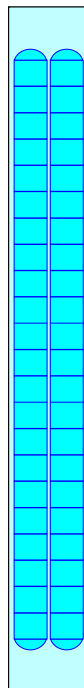
Overall Storage Efficiency = 60.4%

Overall System Size = 171.65' x 20.08' x 6.75'

44 Chambers

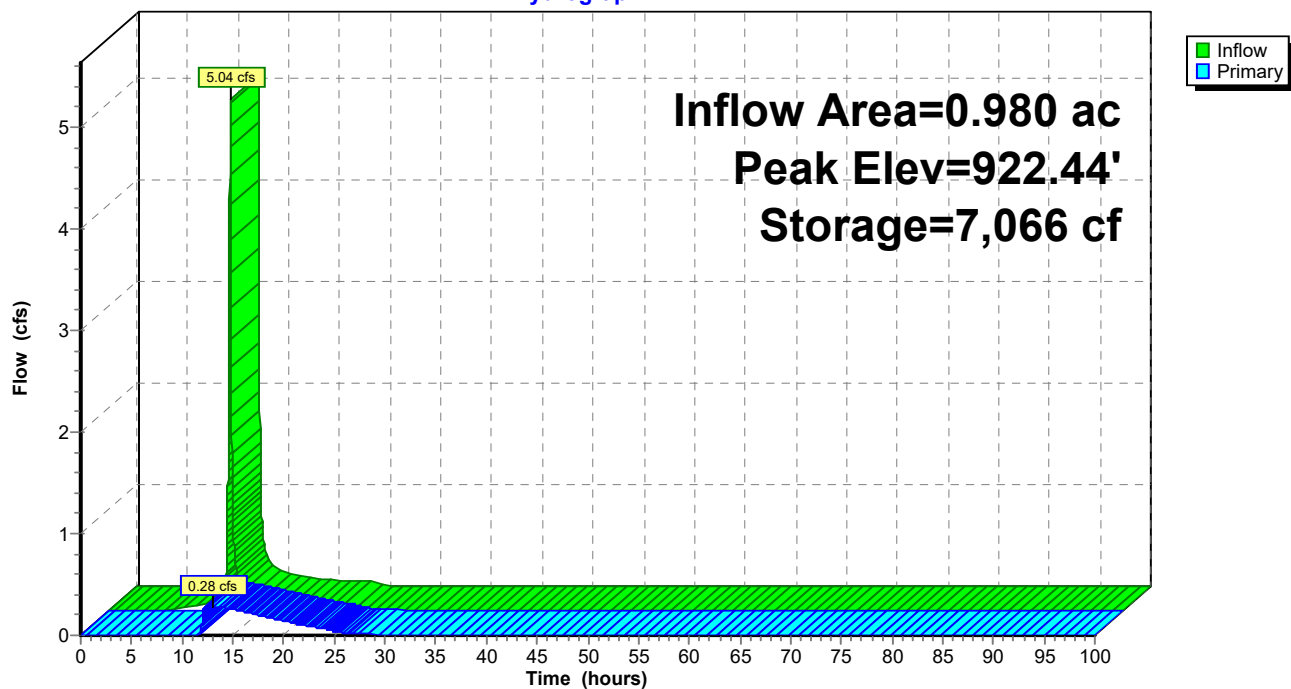
861.8 cy Field

569.4 cy Stone



### Pond 3P: North Basin Orifice

Hydrograph





**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 10-Year Rainfall=4.46"

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Page 97

**Summary for Pond 4P: West Basin Orifice**

Inflow Area = 1.910 ac, 67.54% Impervious, Inflow Depth = 2.97" for 10-Year event  
 Inflow = 9.57 cfs @ 11.98 hrs, Volume= 0.472 af  
 Outflow = 2.10 cfs @ 12.14 hrs, Volume= 0.400 af, Atten= 78%, Lag= 9.9 min  
 Primary = 2.10 cfs @ 12.14 hrs, Volume= 0.400 af  
 Routed to Pond 5P : Level Spreader

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 911.16' @ 12.14 hrs Surf.Area= 4,649 sf Storage= 10,322 cf

Plug-Flow detention time= 269.0 min calculated for 0.400 af (85% of inflow)  
 Center-of-Mass det. time= 199.9 min ( 1,006.4 - 806.4 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                        |
|---------------------|----------------------|---------------------------|------------------------------------------------------------|
| #1                  | 907.00'              | 28,862 cf                 | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                                  |
| 907.00              | 0                    | 0                         | 0                                                          |
| 908.00              | 1,584                | 792                       | 792                                                        |
| 909.00              | 2,402                | 1,993                     | 2,785                                                      |
| 910.00              | 3,364                | 2,883                     | 5,668                                                      |
| 911.00              | 4,448                | 3,906                     | 9,574                                                      |
| 912.00              | 5,668                | 5,058                     | 14,632                                                     |
| 913.00              | 7,027                | 6,348                     | 20,980                                                     |
| 914.00              | 8,738                | 7,883                     | 28,862                                                     |

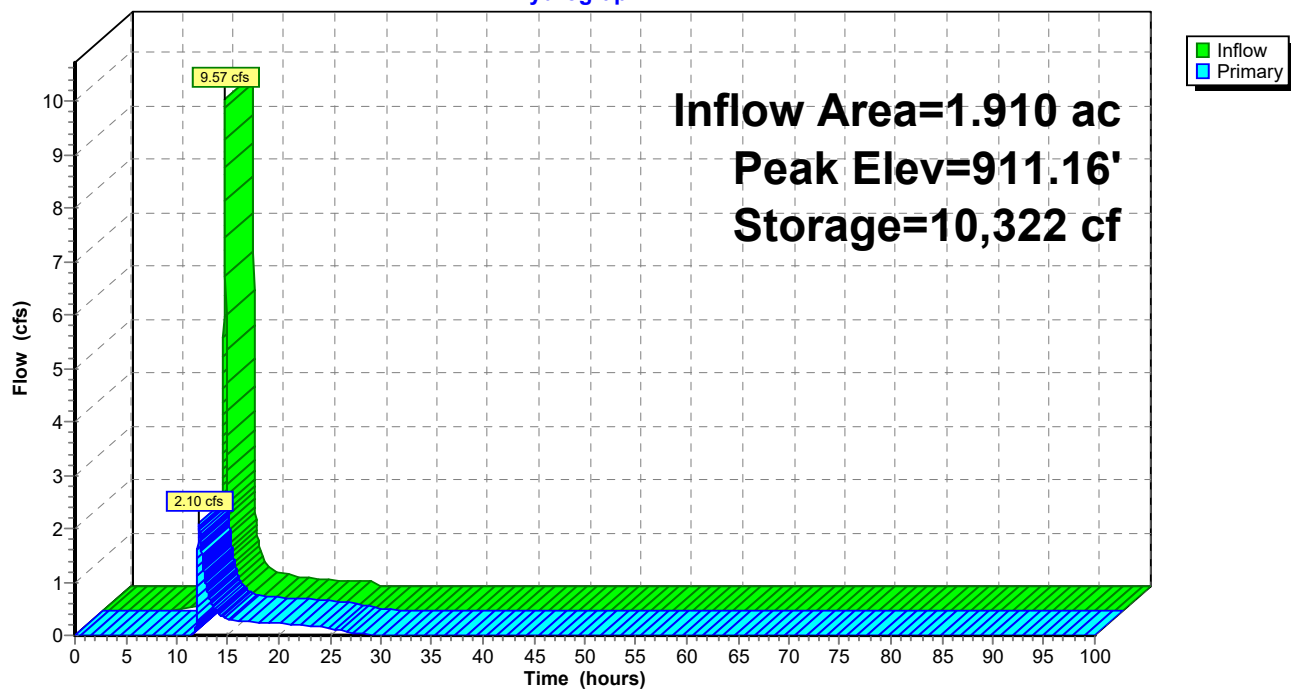
| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                            |
|--------|----------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 908.00' | <b>15.0" Round Culvert</b><br>L= 32.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 908.00' / 904.00' S= 0.1250 ' S= 0.1250 ' Cc= 0.900<br>n= 0.013, Flow Area= 1.23 sf |
| #2     | Device 1 | 909.14' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                                |
| #3     | Device 1 | 910.50' | <b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b><br>Head (feet) 0.00 1.25 1.25 1.75<br>Width (feet) 1.00 1.00 1.00 1.00                                                                     |

**Primary OutFlow** Max=2.10 cfs @ 12.14 hrs HW=911.16' (Free Discharge)

- ↑ **1=Culvert** (Passes 2.10 cfs of 9.42 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.33 cfs @ 6.64 fps)
- ↑ **3=Custom Weir/Orifice** (Weir Controls 1.77 cfs @ 2.67 fps)

# Pond 4P: West Basin Orifice

Hydrograph



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Page 99

**Summary for Pond 5P: Level Spreader**

[79] Warning: Submerged Pond 4P Primary device # 1 OUTLET by 0.08'

Inflow Area = 1.910 ac, 67.54% Impervious, Inflow Depth = 2.51" for 10-Year event  
 Inflow = 2.10 cfs @ 12.14 hrs, Volume= 0.400 af  
 Outflow = 2.10 cfs @ 12.15 hrs, Volume= 0.400 af, Atten= 0%, Lag= 0.1 min  
 Primary = 2.10 cfs @ 12.15 hrs, Volume= 0.400 af  
 Routed to Link 11L : Combined Flow West

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Peak Elev= 904.08' @ 12.15 hrs Surf.Area= 140 sf Storage= 8 cf

Plug-Flow detention time= 0.1 min calculated for 0.400 af (100% of inflow)

Center-of-Mass det. time= 0.1 min ( 1,006.4 - 1,006.4 )

| Volume | Invert  | Avail.Storage | Storage Description                                        |
|--------|---------|---------------|------------------------------------------------------------|
| #1     | 904.00' | 1,255 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |

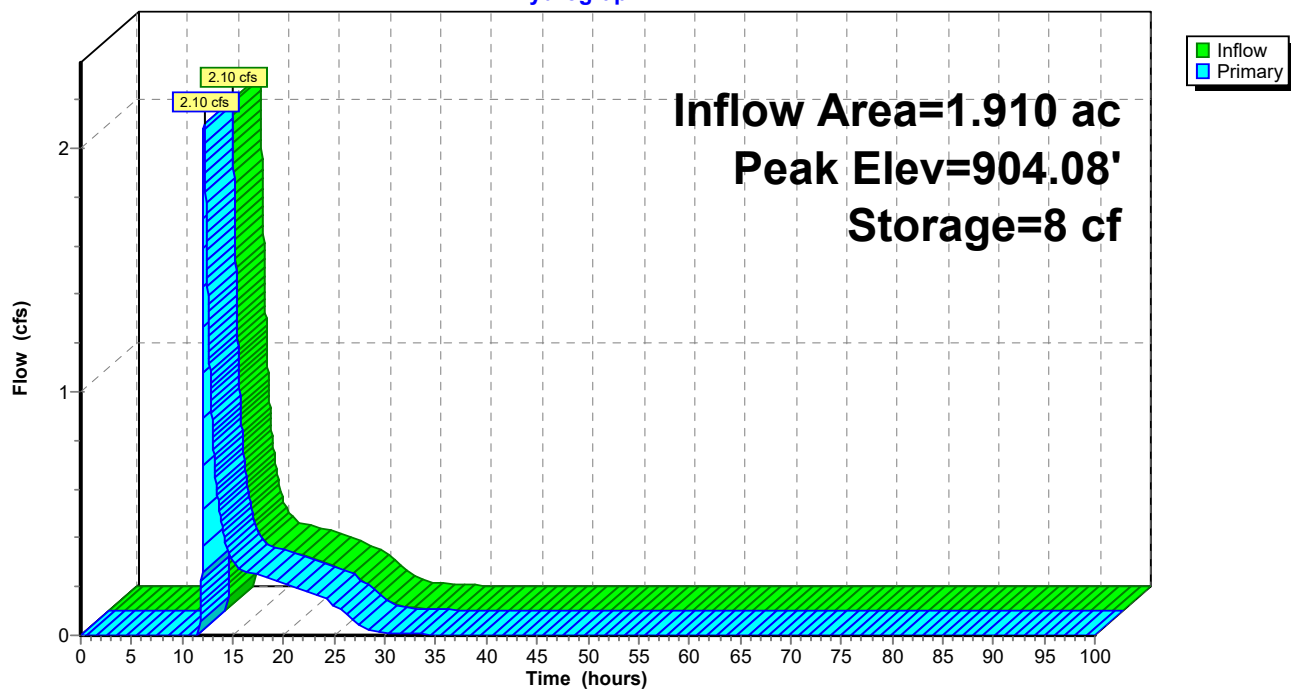
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 904.00              | 72                   | 0                         | 0                         |
| 905.00              | 961                  | 517                       | 517                       |
| 906.00              | 515                  | 738                       | 1,255                     |

| Device | Routing | Invert  | Outlet Devices                                                        |
|--------|---------|---------|-----------------------------------------------------------------------|
| #1     | Primary | 904.00' | <b>30.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s) |

**Primary OutFlow** Max=2.09 cfs @ 12.15 hrs HW=904.08' TW=902.00' (Fixed TW Elev= 902.00')↑**1=Sharp-Crested Rectangular Weir**(Weir Controls 2.09 cfs @ 0.91 fps)

# Pond 5P: Level Spreader

Hydrograph

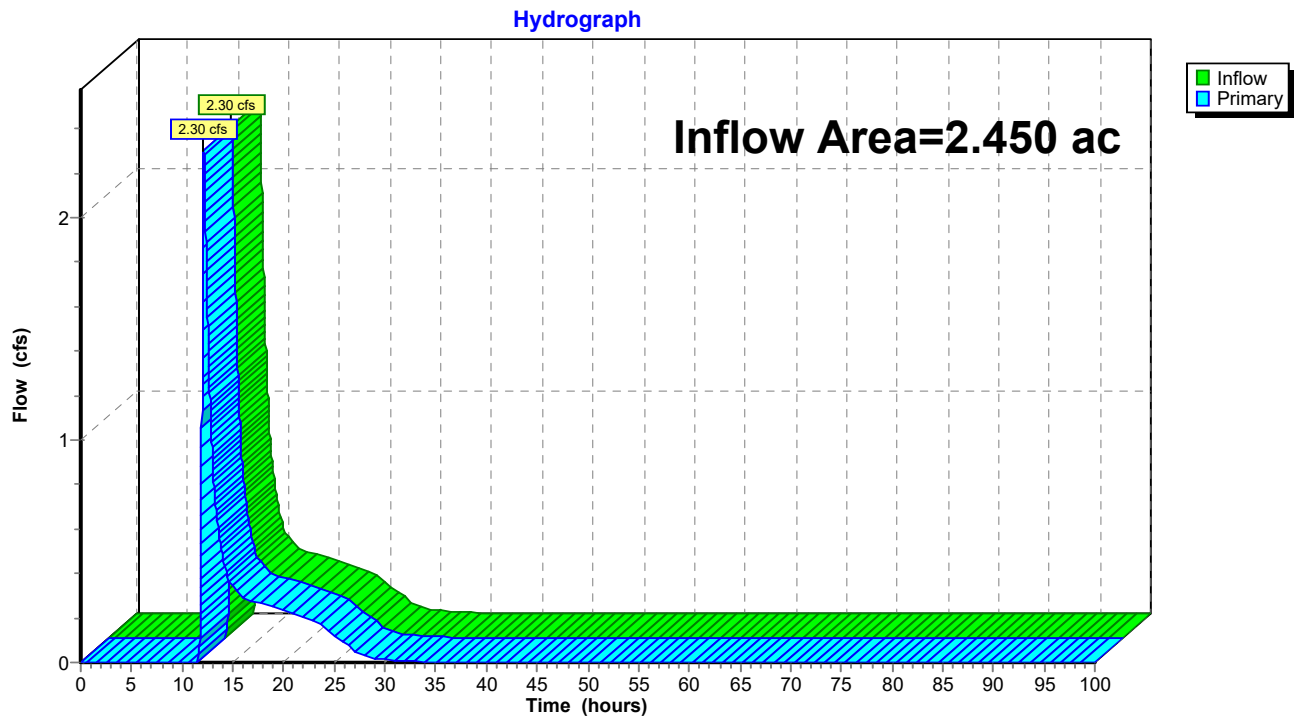


### Summary for Link 11L: Combined Flow West

Inflow Area = 2.450 ac, 52.65% Impervious, Inflow Depth = 2.19" for 10-Year event  
 Inflow = 2.30 cfs @ 12.13 hrs, Volume= 0.448 af  
 Primary = 2.30 cfs @ 12.13 hrs, Volume= 0.448 af, Atten= 0%, Lag= 0.0 min  
 Routed to nonexistent node 15L

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

### Link 11L: Combined Flow West





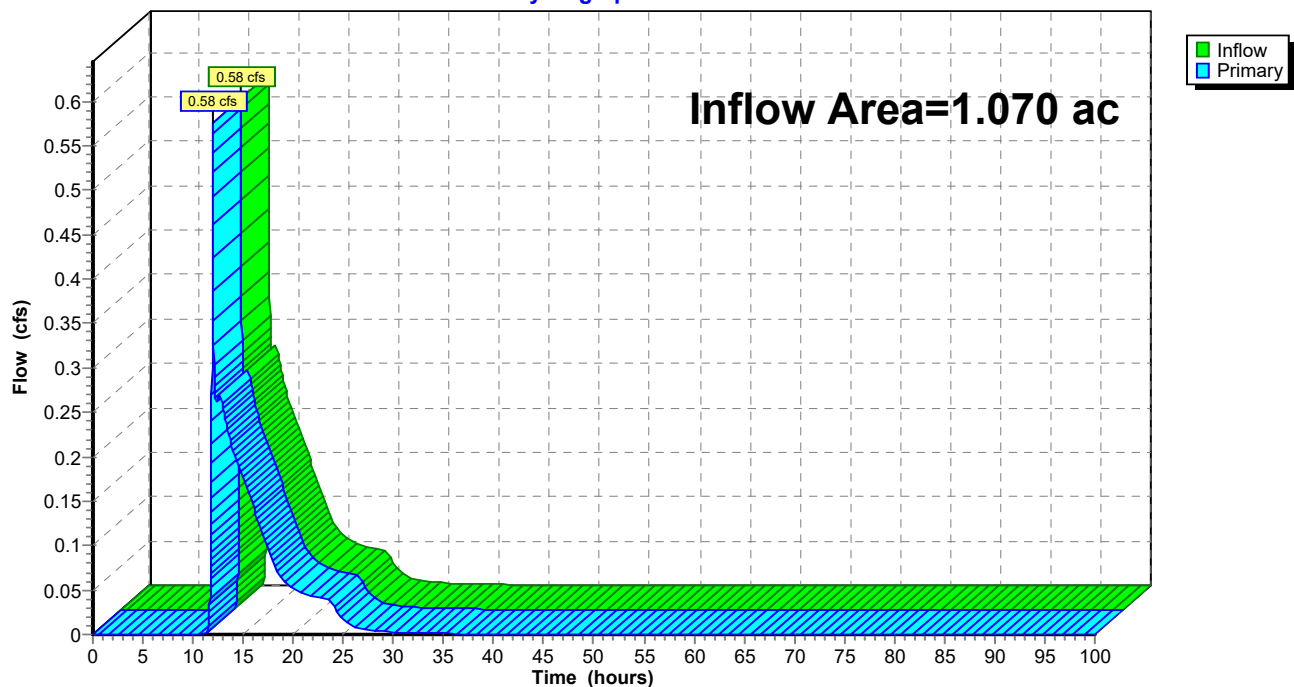
### Summary for Link 12L: Combined Flow South

Inflow Area = 1.070 ac, 24.30% Impervious, Inflow Depth = 1.43" for 10-Year event  
 Inflow = 0.58 cfs @ 11.97 hrs, Volume= 0.128 af  
 Primary = 0.58 cfs @ 11.97 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min  
 Routed to nonexistent node 15L

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

### Link 12L: Combined Flow South

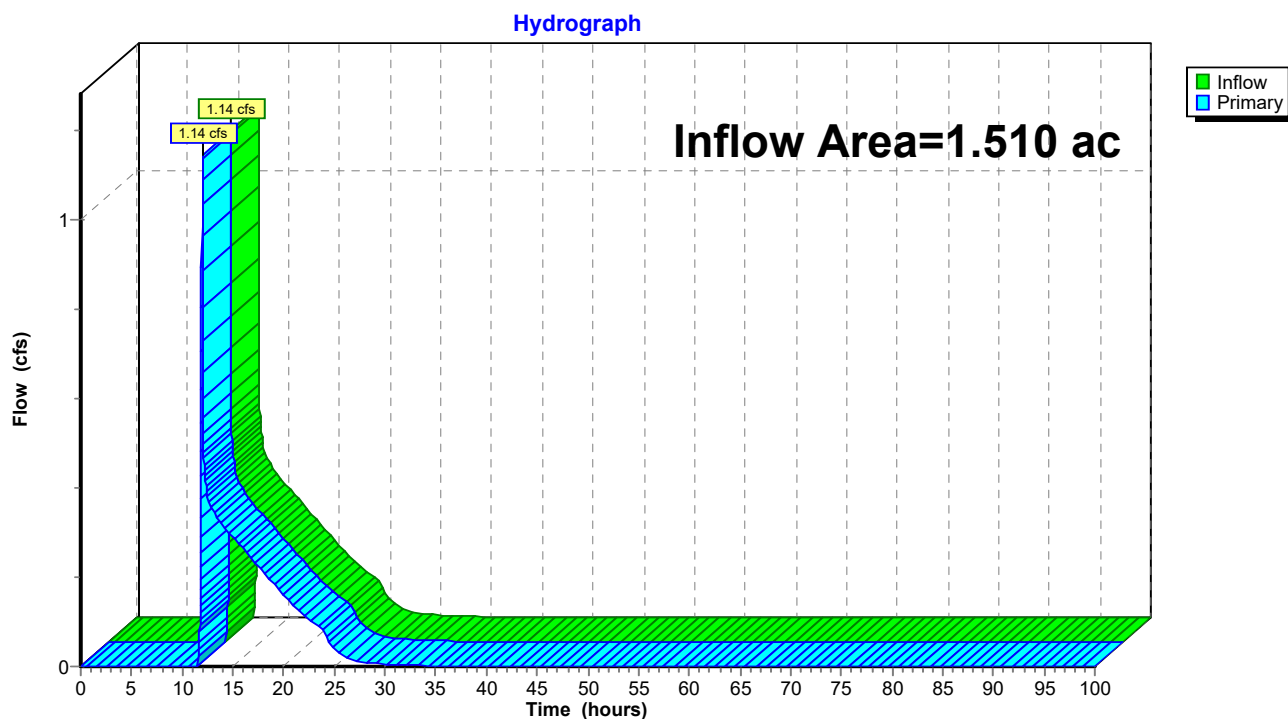
Hydrograph



**Summary for Link 13L: Comnined Flow North**

Inflow Area = 1.510 ac, 49.01% Impervious, Inflow Depth = 1.94" for 10-Year event  
Inflow = 1.14 cfs @ 11.98 hrs, Volume= 0.244 af  
Primary = 1.14 cfs @ 11.98 hrs, Volume= 0.244 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 15L

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

**Link 13L: Comnined Flow North**

**23-047 Proposed Site Conditions\_5-7-24***Type II 24-hr 25-Year Rainfall=5.44"*

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Page 104

Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

|                                            |                                                                                                                            |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment7S: UndetainedWest</b>      | Runoff Area=0.540 ac 0.00% Impervious Runoff Depth=1.64"<br>Tc=5.0 min CN=61 Runoff=1.63 cfs 0.074 af                      |
| <b>Subcatchment8S: UndetainedNorth</b>     | Runoff Area=0.530 ac 0.00% Impervious Runoff Depth=1.64"<br>Tc=5.0 min CN=61 Runoff=1.60 cfs 0.072 af                      |
| <b>Subcatchment9S: UndetainedSoutheast</b> | Runoff Area=0.170 ac 11.76% Impervious Runoff Depth=1.95"<br>Tc=5.0 min CN=65 Runoff=0.62 cfs 0.028 af                     |
| <b>Subcatchment10S: UndetainedSouth</b>    | Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=1.64"<br>Tc=5.0 min CN=61 Runoff=0.27 cfs 0.012 af                      |
| <b>SubcatchmentP-N: Proposed North</b>     | Runoff Area=0.980 ac 75.51% Impervious Runoff Depth=4.19"<br>Flow Length=321' Tc=8.1 min CN=89 Runoff=6.39 cfs 0.343 af    |
| <b>SubcatchmentP-S: Proposed South</b>     | Runoff Area=0.480 ac 22.92% Impervious Runoff Depth=2.28"<br>Flow Length=237' Tc=11.1 min CN=69 Runoff=1.62 cfs 0.091 af   |
| <b>SubcatchmentP-SE: Proposed Drainage</b> | Runoff Area=0.330 ac 39.39% Impervious Runoff Depth=2.90"<br>Flow Length=118' Tc=7.3 min CN=76 Runoff=1.63 cfs 0.080 af    |
| <b>SubcatchmentP-W: Proposed West</b>      | Runoff Area=1.910 ac 67.54% Impervious Runoff Depth=3.88"<br>Flow Length=1,203' Tc=6.7 min CN=86 Runoff=12.34 cfs 0.617 af |
| <b>Pond 1P: SE Basin</b>                   | Peak Elev=918.05' Storage=1,695 cf Inflow=1.63 cfs 0.080 af<br>Outflow=0.18 cfs 0.070 af                                   |
| <b>Pond 2P: South Basin Orifice</b>        | Peak Elev=913.32' Storage=1,623 cf Inflow=1.75 cfs 0.161 af<br>Outflow=0.60 cfs 0.152 af                                   |
| <b>Pond 3P: North Basin Orifice</b>        | Peak Elev=923.33' Storage=9,204 cf Inflow=6.39 cfs 0.343 af<br>Outflow=0.36 cfs 0.274 af                                   |
| <b>Pond 4P: West Basin Orifice</b>         | Peak Elev=911.64' Storage=12,690 cf Inflow=12.34 cfs 0.617 af<br>Outflow=4.37 cfs 0.546 af                                 |
| <b>Pond 5P: Level Spreader</b>             | Peak Elev=904.13' Storage=16 cf Inflow=4.37 cfs 0.546 af<br>Outflow=4.37 cfs 0.546 af                                      |
| <b>Link 11L: Combined Flow West</b>        | Inflow=4.86 cfs 0.619 af<br>Primary=4.86 cfs 0.619 af                                                                      |
| <b>Link 12L: Combined Flow South</b>       | Inflow=0.99 cfs 0.192 af<br>Primary=0.99 cfs 0.192 af                                                                      |
| <b>Link 13L: Combined Flow North</b>       | Inflow=1.82 cfs 0.346 af<br>Primary=1.82 cfs 0.346 af                                                                      |

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Page 105

**Total Runoff Area = 5.030 ac   Runoff Volume = 1.317 af   Average Runoff Depth = 3.14"**  
**54.47% Pervious = 2.740 ac   45.53% Impervious = 2.290 ac**

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Type II 24-hr 25-Year Rainfall=5.44"

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Page 106

**Summary for Subcatchment 7S: Undetained West**

Runoff = 1.63 cfs @ 11.97 hrs, Volume= 0.074 af, Depth= 1.64"  
Routed to Link 11L : Combined Flow West

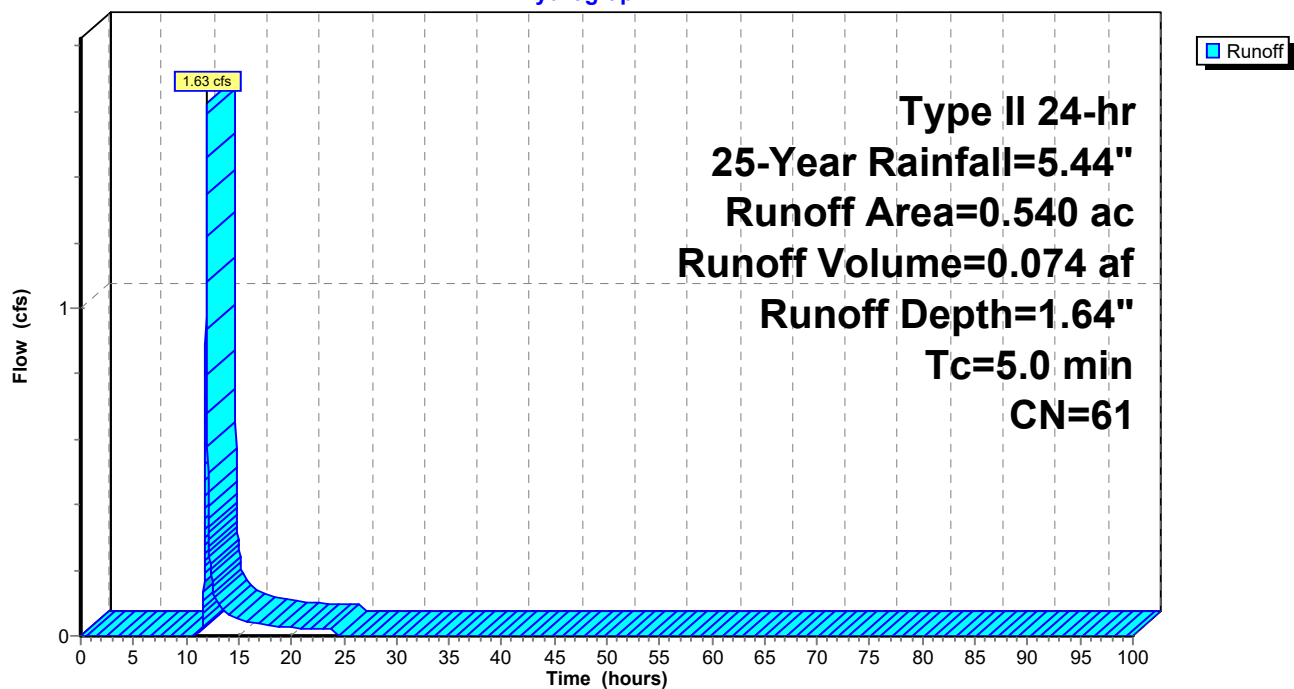
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 25-Year Rainfall=5.44"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.540   | 61 | >75% Grass cover, Good, HSG B |
| 0.540     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 7S: Undetained West**

Hydrograph





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Type II 24-hr 25-Year Rainfall=5.44"

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Page 107

**Summary for Subcatchment 8S: Undetained North**

Runoff = 1.60 cfs @ 11.97 hrs, Volume= 0.072 af, Depth= 1.64"  
Routed to Link 13L : Comnined Flow North

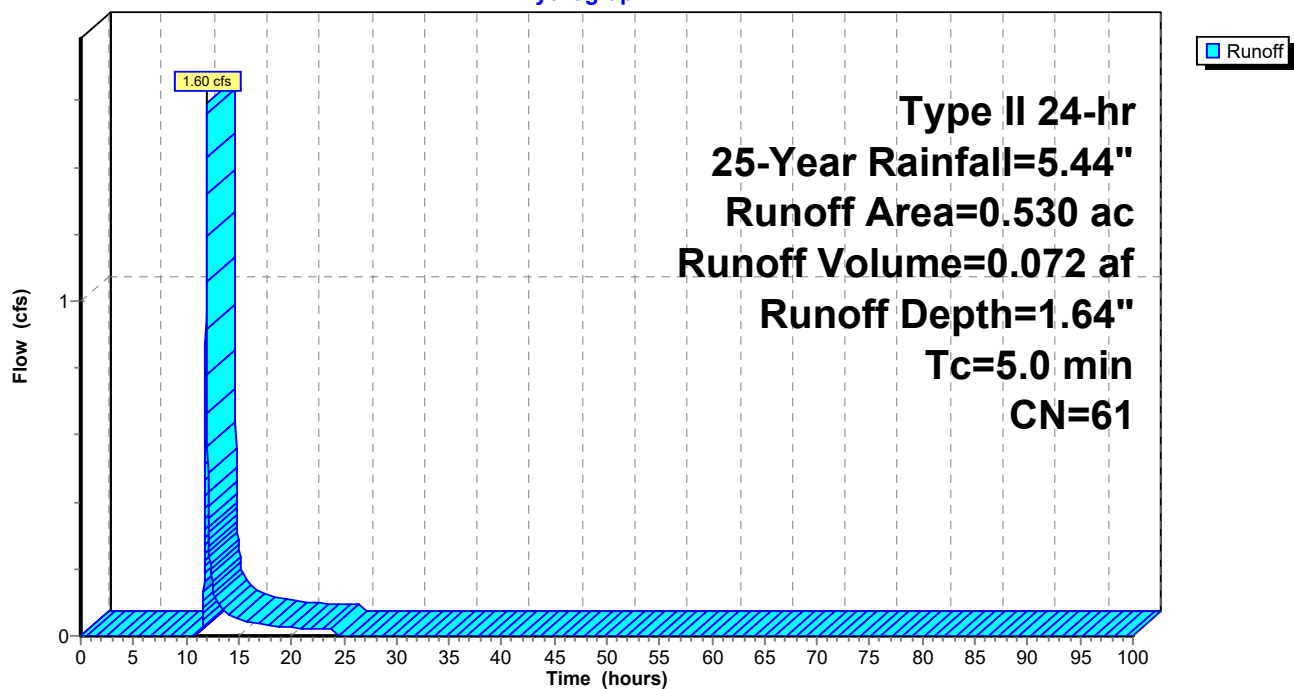
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 25-Year Rainfall=5.44"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.530   | 61 | >75% Grass cover, Good, HSG B |
| 0.530     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 8S: Undetained North**

Hydrograph



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Type II 24-hr 25-Year Rainfall=5.44"

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Page 108

### Summary for Subcatchment 9S: Undetained Southeast

Runoff = 0.62 cfs @ 11.97 hrs, Volume= 0.028 af, Depth= 1.95"  
Routed to Link 12L : Combined Flow South

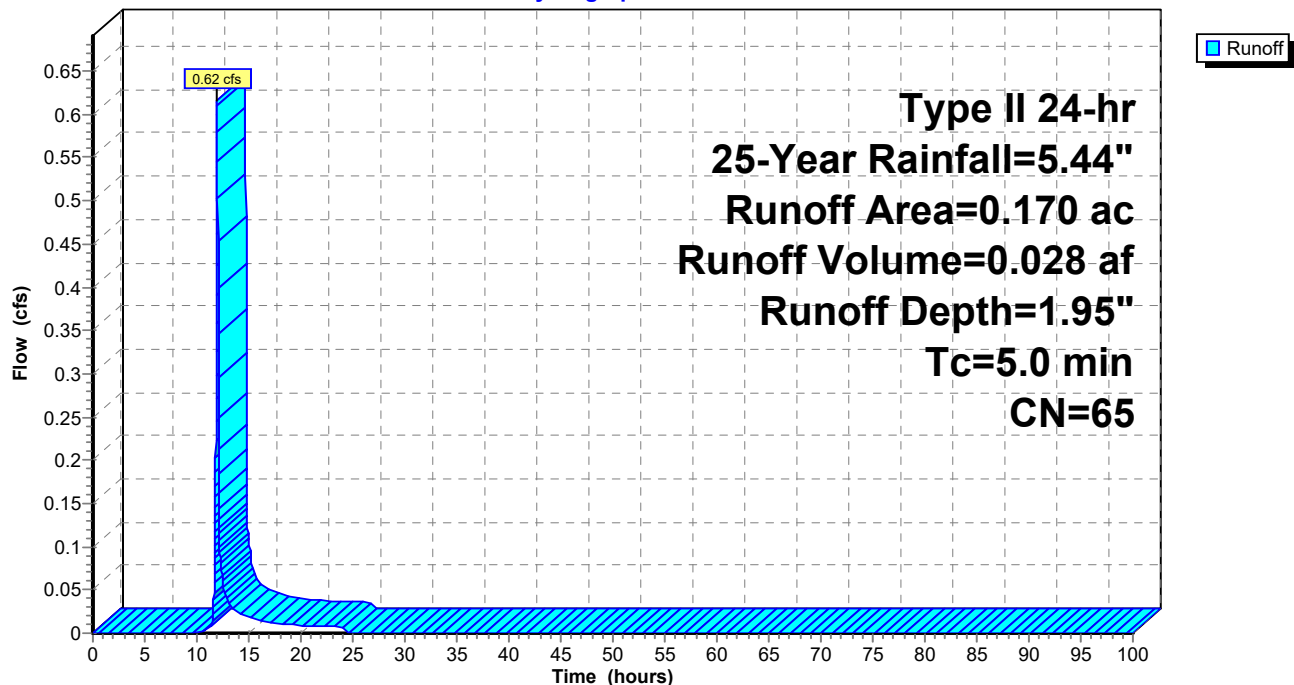
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 25-Year Rainfall=5.44"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.150   | 61 | >75% Grass cover, Good, HSG B |
| * 0.020   | 98 | Pavement                      |
| 0.170     | 65 | Weighted Average              |
| 0.150     |    | 88.24% Pervious Area          |
| 0.020     |    | 11.76% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

### Subcatchment 9S: Undetained Southeast

Hydrograph



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Type II 24-hr 25-Year Rainfall=5.44"

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Page 109

**Summary for Subcatchment 10S: Undetained South**

Runoff = 0.27 cfs @ 11.97 hrs, Volume= 0.012 af, Depth= 1.64"  
Routed to Link 12L : Combined Flow South

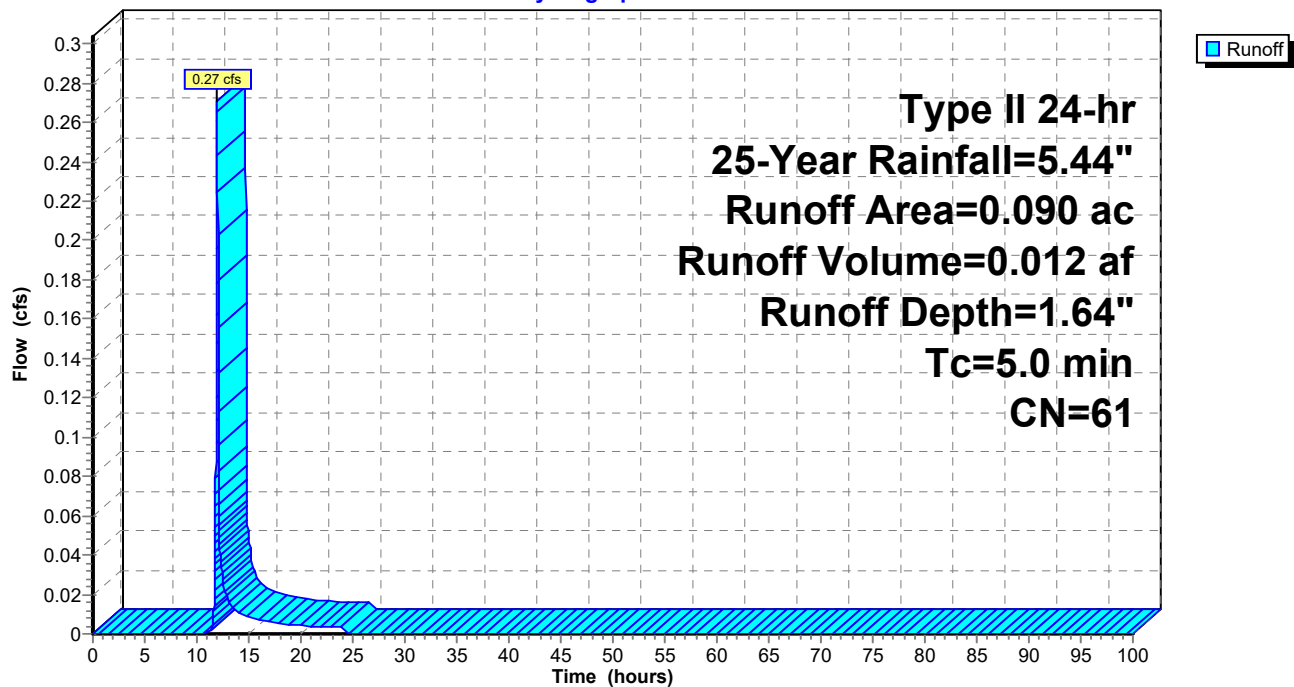
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 25-Year Rainfall=5.44"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.090   | 61 | >75% Grass cover, Good, HSG B |
| 0.090     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 10S: Undetained South**

Hydrograph



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Type II 24-hr 25-Year Rainfall=5.44"

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Page 110

**Summary for Subcatchment P-N: Proposed North**

Runoff = 6.39 cfs @ 11.99 hrs, Volume= 0.343 af, Depth= 4.19"  
 Routed to Pond 3P : North Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 25-Year Rainfall=5.44"

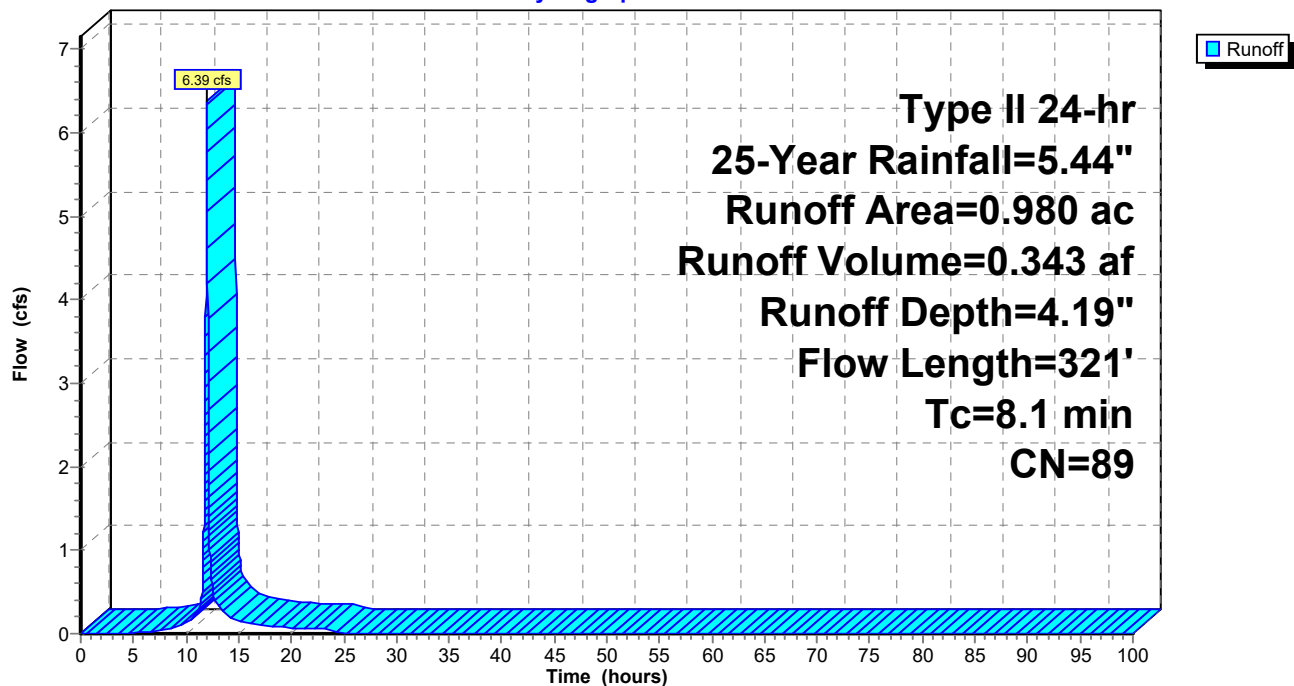
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 0.740   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.240     | 61 | >75% Grass cover, Good, HSG B       |
| 0.980     | 89 | Weighted Average                    |
| 0.240     |    | 24.49% Pervious Area                |
| 0.740     |    | 75.51% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                            |
|----------|---------------|---------------|-------------------|----------------|----------------------------------------------------------------------------------------|
| 7.5      | 91            | 0.0350        | 0.20              |                | <b>Sheet Flow, SHEET (GRASS)</b><br>Grass: Short n= 0.150 P2= 3.04"                    |
| 0.6      | 230           | 0.0150        | 6.45              | 7.91           | <b>Pipe Channel, PIPE</b><br>15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'<br>n= 0.013 |
| 8.1      | 321           | Total         |                   |                |                                                                                        |

**Subcatchment P-N: Proposed North**

Hydrograph



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Type II 24-hr 25-Year Rainfall=5.44"

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Page 111

**Summary for Subcatchment P-S: Proposed South**

Runoff = 1.62 cfs @ 12.03 hrs, Volume= 0.091 af, Depth= 2.28"  
Routed to Pond 2P : South Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 25-Year Rainfall=5.44"

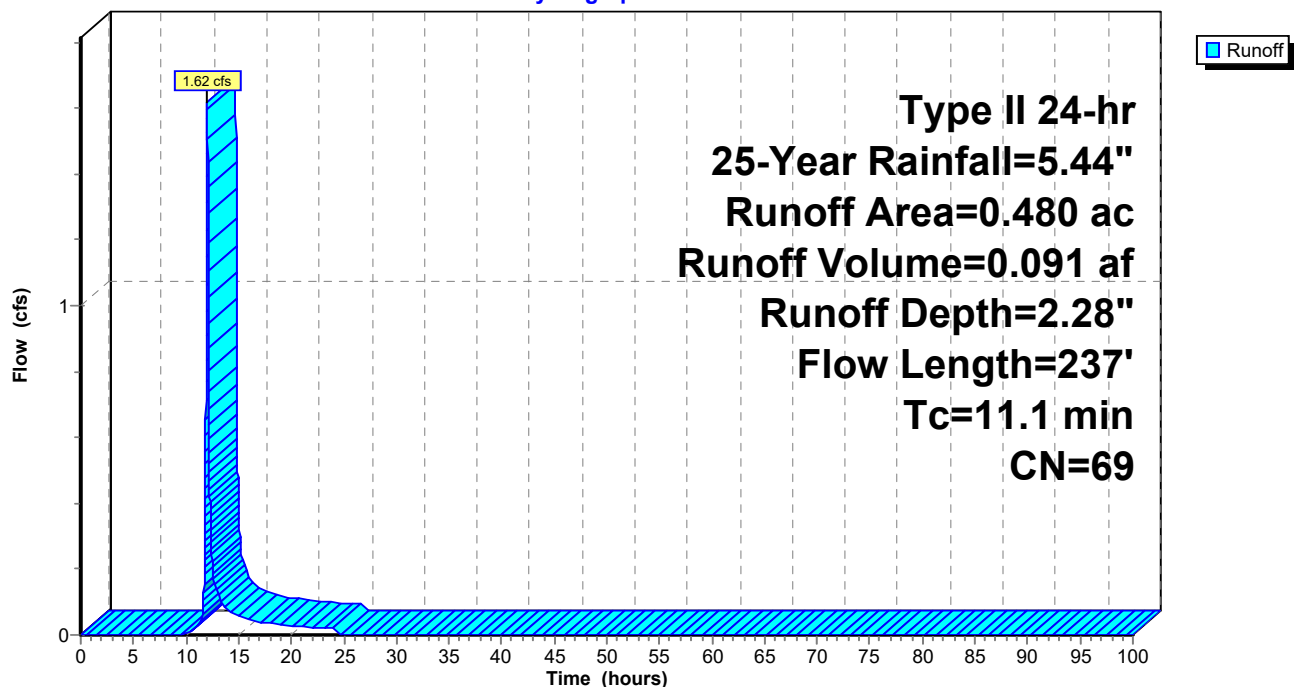
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 0.110   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.370     | 61 | >75% Grass cover, Good, HSG B       |
| 0.480     | 69 | Weighted Average                    |
| 0.370     |    | 77.08% Pervious Area                |
| 0.110     |    | 22.92% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                        |
|----------|---------------|---------------|-------------------|----------------|------------------------------------------------------------------------------------|
| 10.1     | 100           | 0.0200        | 0.17              |                | <b>Sheet Flow, SHEET (GRASS)</b><br>Grass: Short n= 0.150 P2= 3.04"                |
| 0.9      | 112           | 0.0200        | 2.12              |                | <b>Shallow Concentrated Flow, SHALLOW (GRASS)</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.1      | 25            | 0.2500        | 7.50              |                | <b>Shallow Concentrated Flow, SHALLOW (GRASS)</b><br>Grassed Waterway Kv= 15.0 fps |
| 11.1     | 237           | Total         |                   |                |                                                                                    |

**Subcatchment P-S: Proposed South**

Hydrograph





**23-047 Proposed Site Conditions\_5-7-24**

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Type II 24-hr 25-Year Rainfall=5.44"

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Page 112

**Summary for Subcatchment P-SE: Proposed Drainage**

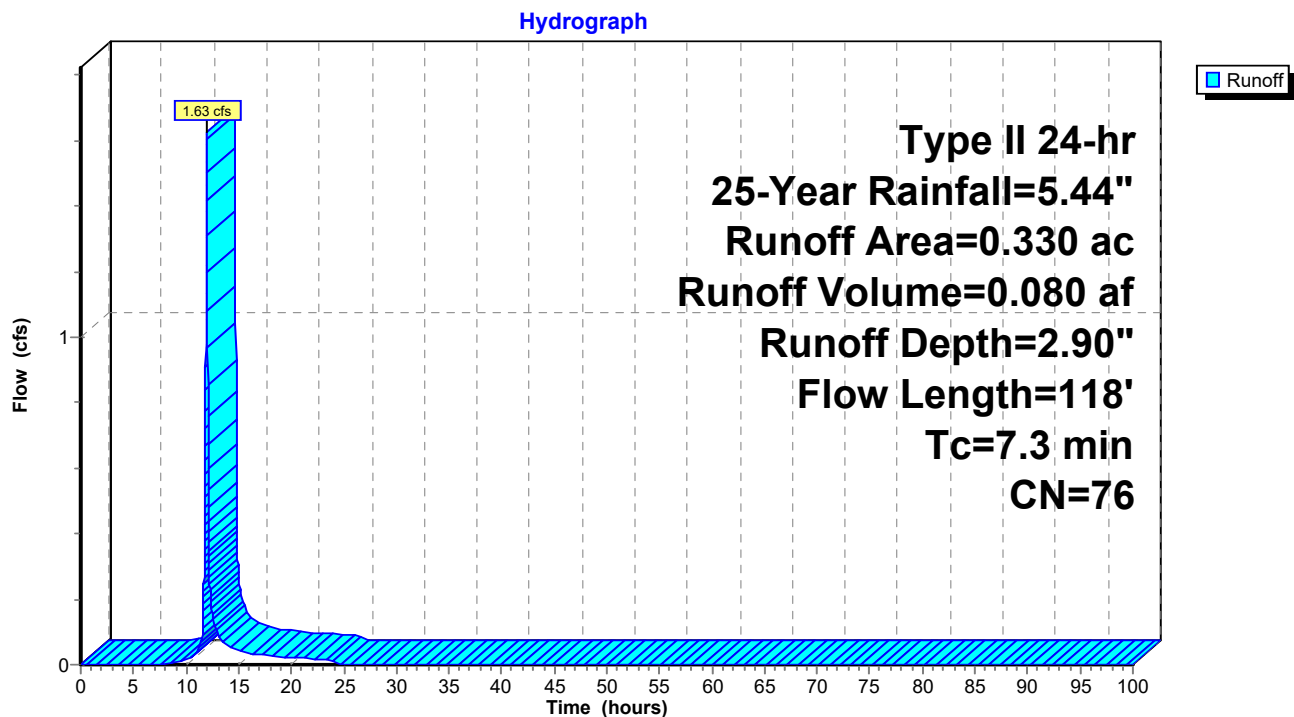
Runoff = 1.63 cfs @ 11.99 hrs, Volume= 0.080 af, Depth= 2.90"  
Routed to Pond 1P : SE Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 25-Year Rainfall=5.44"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.130     | 98 | Paved parking, HSG C          |
| 0.200     | 61 | >75% Grass cover, Good, HSG B |
| 0.330     | 76 | Weighted Average              |
| 0.200     |    | 60.61% Pervious Area          |
| 0.130     |    | 39.39% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                       |
|----------|---------------|---------------|-------------------|----------------|-----------------------------------------------------------------------------------|
| 7.1      | 65            | 0.0200        | 0.15              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.04"                             |
| 0.2      | 53            | 0.0100        | 5.26              | 6.46           | <b>Pipe Channel,</b><br>15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'<br>n= 0.013 |
| 7.3      | 118           | Total         |                   |                |                                                                                   |

**Subcatchment P-SE: Proposed Drainage**

**23-047 Proposed Site Conditions\_5-7-24**

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Type II 24-hr 25-Year Rainfall=5.44"

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Page 113

**Summary for Subcatchment P-W: Proposed West**

Runoff = 12.34 cfs @ 11.98 hrs, Volume= 0.617 af, Depth= 3.88"  
 Routed to Pond 4P : West Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 25-Year Rainfall=5.44"

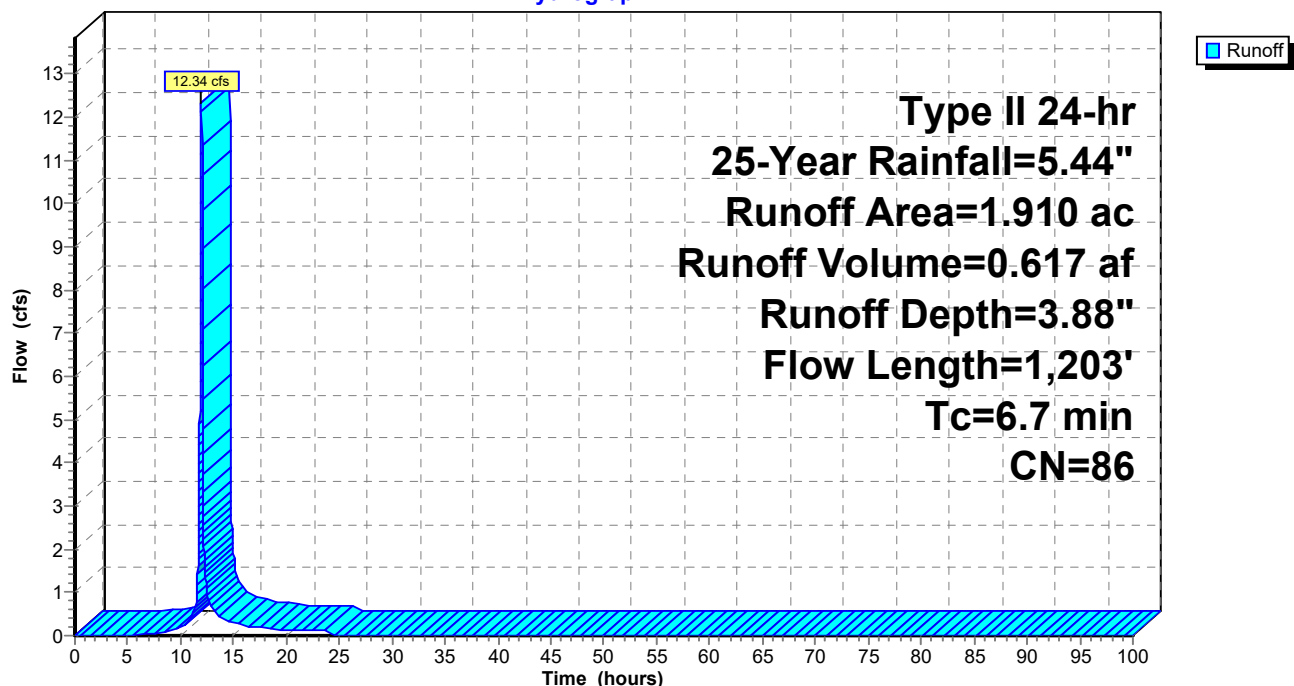
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 1.290   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.620     | 61 | >75% Grass cover, Good, HSG B       |
| 1.910     | 86 | Weighted Average                    |
| 0.620     |    | 32.46% Pervious Area                |
| 1.290     |    | 67.54% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                                   |
|----------|---------------|---------------|-------------------|----------------|-----------------------------------------------------------------------------------------------|
| 2.2      | 100           | 0.0050        | 0.77              |                | <b>Sheet Flow, SHEET (PAVED)</b><br>Smooth surfaces n= 0.011 P2= 3.04"                        |
| 3.6      | 725           | 0.0280        | 3.40              |                | <b>Shallow Concentrated Flow, SHALLOW (PAVED)</b><br>Paved Kv= 20.3 fps                       |
| 0.9      | 378           | 0.0150        | 7.28              | 12.87          | <b>Pipe Channel, Storm Sewer</b><br>18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38'<br>n= 0.013 |
| 6.7      | 1,203         | Total         |                   |                |                                                                                               |

**Subcatchment P-W: Proposed West**

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 25-Year Rainfall=5.44"

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Page 114

**Summary for Pond 1P: SE Basin**

Inflow Area = 0.330 ac, 39.39% Impervious, Inflow Depth = 2.90" for 25-Year event  
 Inflow = 1.63 cfs @ 11.99 hrs, Volume= 0.080 af  
 Outflow = 0.18 cfs @ 12.43 hrs, Volume= 0.070 af, Atten= 89%, Lag= 26.8 min  
 Primary = 0.18 cfs @ 12.43 hrs, Volume= 0.070 af  
 Routed to Pond 2P : South Basin Orifice

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 918.05' @ 12.43 hrs Surf.Area= 2,890 sf Storage= 1,695 cf

Plug-Flow detention time= 203.8 min calculated for 0.070 af (88% of inflow)  
 Center-of-Mass det. time= 144.4 min ( 970.9 - 826.5 )

| Volume | Invert  | Avail.Storage | Storage Description                                        |
|--------|---------|---------------|------------------------------------------------------------|
| #1     | 916.91' | 8,715 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 916.91              | 0                    | 0                         | 0                         |
| 918.00              | 2,856                | 1,557                     | 1,557                     |
| 919.00              | 3,551                | 3,204                     | 4,760                     |
| 920.00              | 4,358                | 3,955                     | 8,715                     |

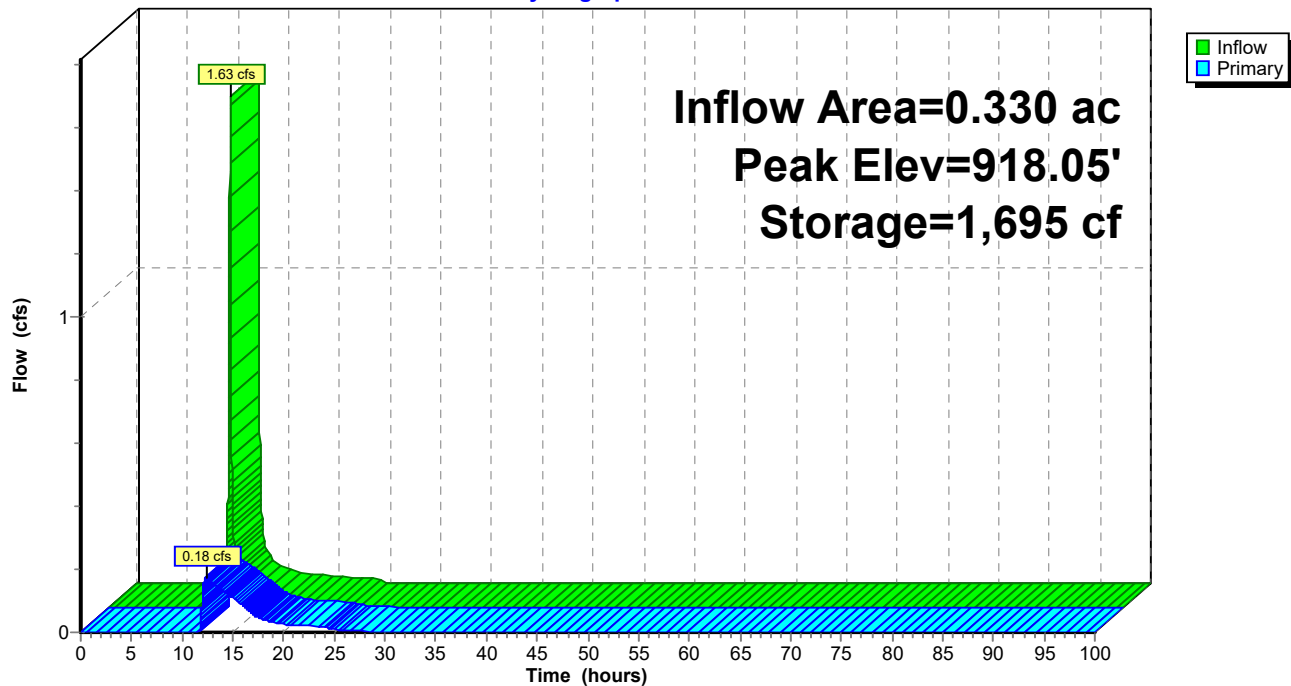
| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                             |
|--------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 916.26' | <b>4.0" Round Culvert X 3.00</b> L= 30.2' Ke= 0.500<br>Inlet / Outlet Invert= 916.26' / 915.96' S= 0.0099 '/' Cc= 0.900<br>n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.09 sf |
| #2     | Device 1 | 917.48' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                                 |
| #3     | Device 1 | 918.00' | <b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b><br>Head (feet) 0.00 0.45 0.45 0.95<br>Width (feet) 0.50 0.50 3.00 3.00                                                                      |

**Primary OutFlow** Max=0.17 cfs @ 12.43 hrs HW=918.05' (Free Discharge)

1=Culvert (Passes 0.17 cfs of 1.18 cfs potential flow)  
 2=Orifice/Grate (Orifice Controls 0.16 cfs @ 3.21 fps)  
 3=Custom Weir/Orifice (Weir Controls 0.02 cfs @ 0.72 fps)

# Pond 1P: SE Basin

## Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 25-Year Rainfall=5.44"

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Page 116

**Summary for Pond 2P: South Basin Orifice**

Inflow Area = 0.810 ac, 29.63% Impervious, Inflow Depth = 2.39" for 25-Year event  
 Inflow = 1.75 cfs @ 12.03 hrs, Volume= 0.161 af  
 Outflow = 0.60 cfs @ 12.26 hrs, Volume= 0.152 af, Atten= 66%, Lag= 13.4 min  
 Primary = 0.60 cfs @ 12.26 hrs, Volume= 0.152 af  
 Routed to Link 12L : Combined Flow South

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 913.32' @ 12.26 hrs Surf.Area= 1,557 sf Storage= 1,623 cf

Plug-Flow detention time= 109.5 min calculated for 0.152 af (94% of inflow)  
 Center-of-Mass det. time= 70.7 min ( 971.5 - 900.8 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                        |
|---------------------|----------------------|---------------------------|------------------------------------------------------------|
| #1                  | 911.50'              | 5,431 cf                  | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                                  |
| 911.50              | 0                    | 0                         | 0                                                          |
| 912.00              | 682                  | 171                       | 171                                                        |
| 913.00              | 1,303                | 993                       | 1,163                                                      |
| 914.00              | 2,092                | 1,698                     | 2,861                                                      |
| 915.00              | 3,048                | 2,570                     | 5,431                                                      |

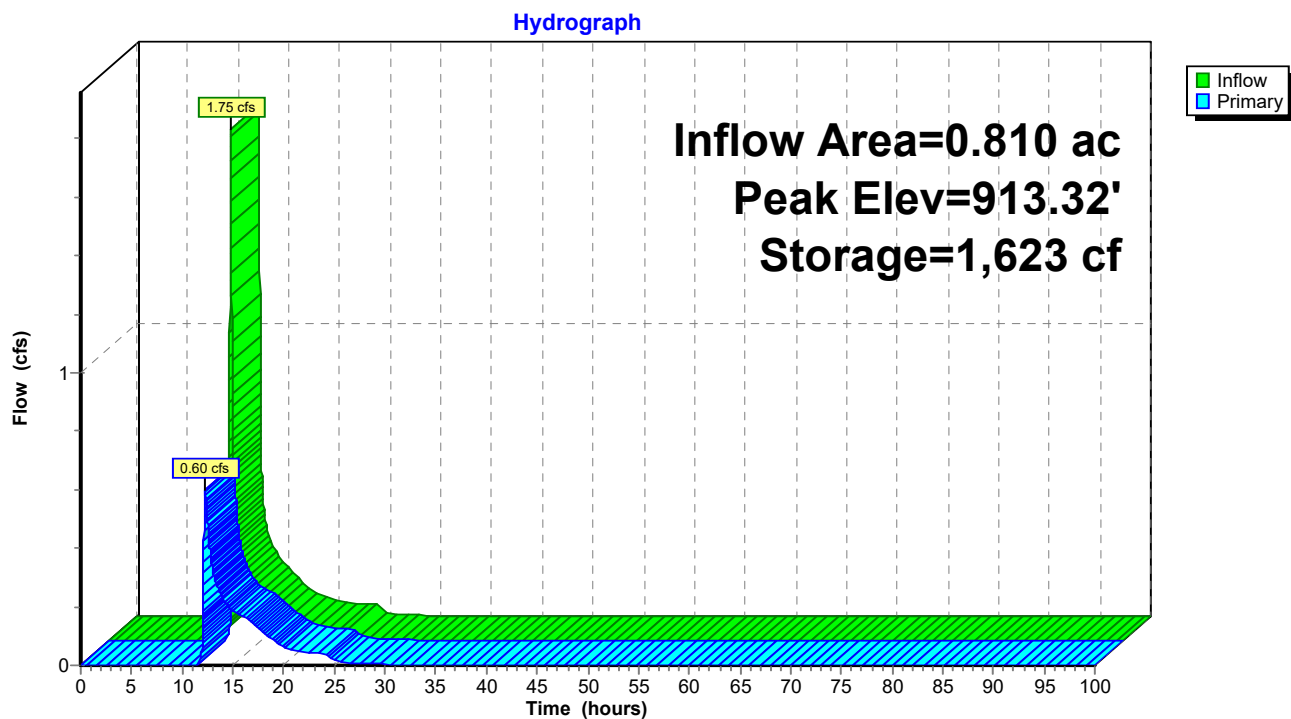
| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                 |
|--------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 911.34' | <b>6.0" Round Culvert</b><br>L= 68.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 911.34' / 909.31' S= 0.0299 '/' Cc= 0.900<br>n= 0.013, Flow Area= 0.20 sf |
| #2     | Device 1 | 912.31' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                     |
| #3     | Device 1 | 913.00' | <b>10.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                    |

**Primary OutFlow** Max=0.60 cfs @ 12.26 hrs HW=913.32' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.60 cfs of 1.13 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.22 cfs @ 4.53 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.37 cfs @ 1.93 fps)



# Pond 2P: South Basin Orifice



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 25-Year Rainfall=5.44"

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Page 118

**Summary for Pond 3P: North Basin Orifice**

Inflow Area = 0.980 ac, 75.51% Impervious, Inflow Depth = 4.19" for 25-Year event  
 Inflow = 6.39 cfs @ 11.99 hrs, Volume= 0.343 af  
 Outflow = 0.36 cfs @ 12.93 hrs, Volume= 0.274 af, Atten= 94%, Lag= 56.0 min  
 Primary = 0.36 cfs @ 12.93 hrs, Volume= 0.274 af  
 Routed to Link 13L : Combined Flow North

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 923.33' @ 12.93 hrs Surf.Area= 3,447 sf Storage= 9,204 cf

Plug-Flow detention time= 357.3 min calculated for 0.274 af (80% of inflow)  
 Center-of-Mass det. time= 277.1 min ( 1,067.3 - 790.2 )

| Volume | Invert  | Avail.Storage | Storage Description                                                                                                                                                                                                                                        |
|--------|---------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1A    | 919.40' | 6,149 cf      | <b>20.08'W x 171.65'L x 6.75'H Field A</b><br>23,269 cf Overall - 7,897 cf Embedded = 15,373 cf x 40.0% Voids                                                                                                                                              |
| #2A    | 920.15' | 7,897 cf      | <b>ADS_StormTech MC-7200 +Cap</b> x 44 Inside #1<br>Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf<br>Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap<br>44 Chambers in 2 Rows<br>Cap Storage= 39.5 cf x 2 x 2 rows = 158.0 cf |
|        |         | 14,046 cf     | Total Available Storage                                                                                                                                                                                                                                    |

Storage Group A created with Chamber Wizard

| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                   |
|--------|----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 918.30' | <b>12.0" Round Culvert</b><br>L= 104.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 918.30' / 910.25' S= 0.0774 ' / Cc= 0.900<br>n= 0.013, Flow Area= 0.79 sf |
| #2     | Device 1 | 920.87' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                       |
| #3     | Device 1 | 924.15' | <b>12.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                      |

**Primary OutFlow** Max=0.36 cfs @ 12.93 hrs HW=923.33' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.36 cfs of 8.05 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.36 cfs @ 7.36 fps)
- ↑ **3=Orifice/Grate** ( Controls 0.00 cfs)

## 23-047 Proposed Site Conditions\_5-7-24

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Type II 24-hr 25-Year Rainfall=5.44"

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Page 119

### Pond 3P: North Basin Orifice - Chamber Wizard Field A

**Chamber Model = ADS\_StormTechMC-7200+Cap (ADS StormTech®MC-7200 with cap volume)**

Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf

Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap

Cap Storage= 39.5 cf x 2 x 2 rows = 158.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

22 Chambers/Row x 6.59' Long +2.73' Cap Length x 2 = 150.48' Row Length +127.0" End Stone x 2 = 171.65' Base Length

2 Rows x 100.0" Wide + 9.0" Spacing x 1 + 16.0" Side Stone x 2 = 20.08' Base Width

9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

44 Chambers x 175.9 cf + 39.5 cf Cap Volume x 2 x 2 Rows = 7,896.5 cf Chamber Storage

23,269.3 cf Field - 7,896.5 cf Chambers = 15,372.8 cf Stone x 40.0% Voids = 6,149.1 cf Stone Storage

Chamber Storage + Stone Storage = 14,045.6 cf = 0.322 af

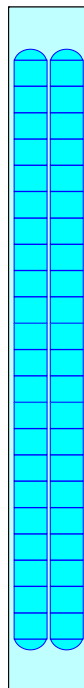
Overall Storage Efficiency = 60.4%

Overall System Size = 171.65' x 20.08' x 6.75'

44 Chambers

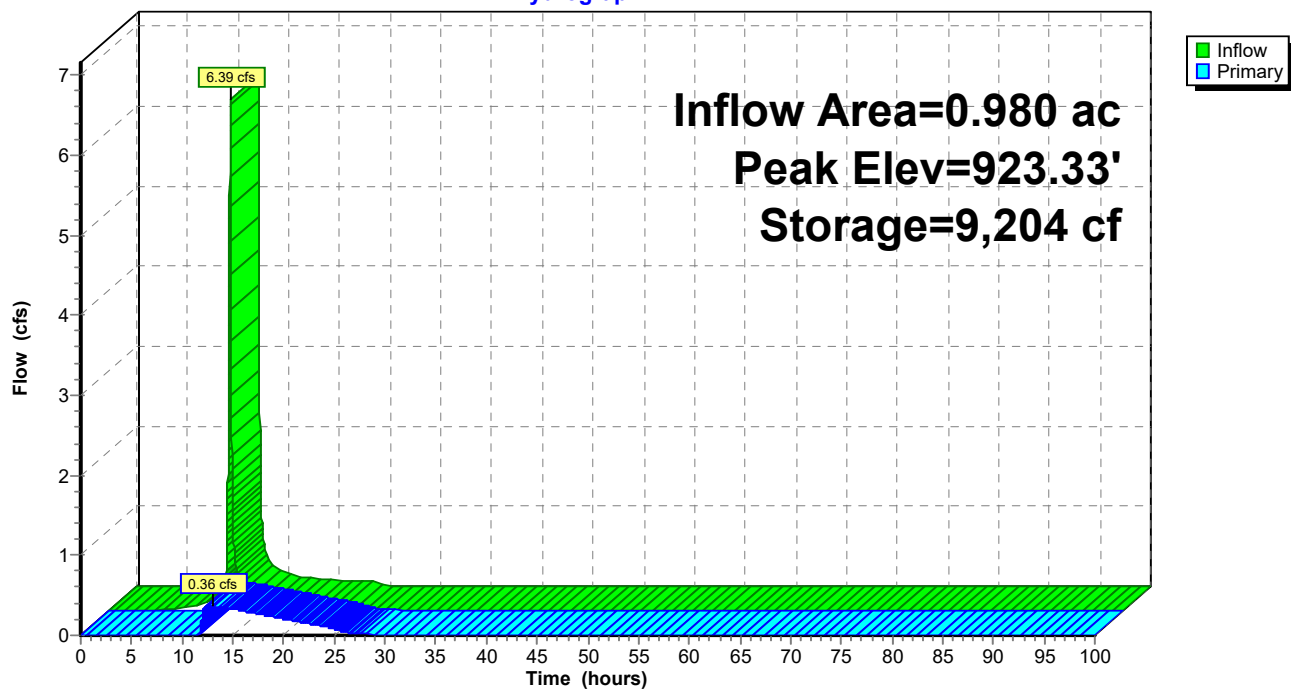
861.8 cy Field

569.4 cy Stone



# Pond 3P: North Basin Orifice

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 25-Year Rainfall=5.44"

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Page 121

**Summary for Pond 4P: West Basin Orifice**

Inflow Area = 1.910 ac, 67.54% Impervious, Inflow Depth = 3.88" for 25-Year event  
 Inflow = 12.34 cfs @ 11.98 hrs, Volume= 0.617 af  
 Outflow = 4.37 cfs @ 12.10 hrs, Volume= 0.546 af, Atten= 65%, Lag= 7.2 min  
 Primary = 4.37 cfs @ 12.10 hrs, Volume= 0.546 af  
 Routed to Pond 5P : Level Spreader

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 911.64' @ 12.10 hrs Surf.Area= 5,233 sf Storage= 12,690 cf

Plug-Flow detention time= 228.2 min calculated for 0.546 af (88% of inflow)  
 Center-of-Mass det. time= 170.9 min ( 969.7 - 798.8 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                        |
|---------------------|----------------------|---------------------------|------------------------------------------------------------|
| #1                  | 907.00'              | 28,862 cf                 | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                                  |
| 907.00              | 0                    | 0                         | 0                                                          |
| 908.00              | 1,584                | 792                       | 792                                                        |
| 909.00              | 2,402                | 1,993                     | 2,785                                                      |
| 910.00              | 3,364                | 2,883                     | 5,668                                                      |
| 911.00              | 4,448                | 3,906                     | 9,574                                                      |
| 912.00              | 5,668                | 5,058                     | 14,632                                                     |
| 913.00              | 7,027                | 6,348                     | 20,980                                                     |
| 914.00              | 8,738                | 7,883                     | 28,862                                                     |

| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                  |
|--------|----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 908.00' | <b>15.0" Round Culvert</b><br>L= 32.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 908.00' / 904.00' S= 0.1250 '/' Cc= 0.900<br>n= 0.013, Flow Area= 1.23 sf |
| #2     | Device 1 | 909.14' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                      |
| #3     | Device 1 | 910.50' | <b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b><br>Head (feet) 0.00 1.25 1.25 1.75<br>Width (feet) 1.00 1.00 1.00 1.00                                                           |

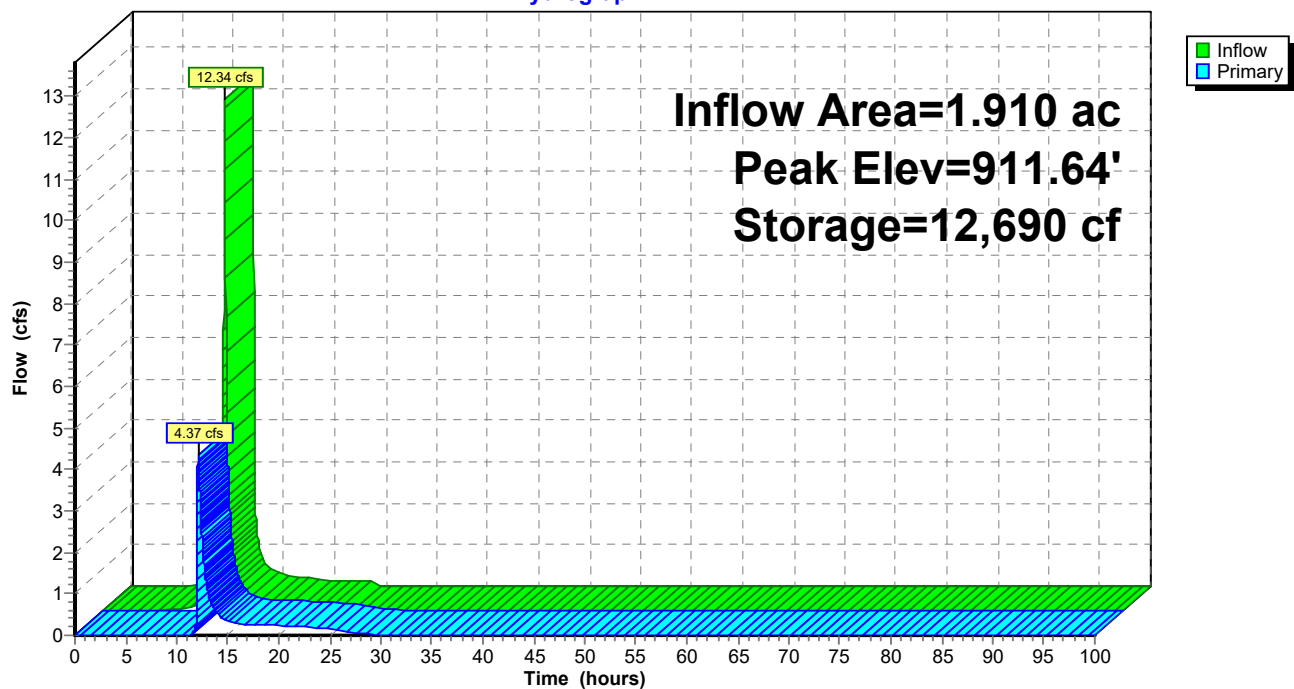
**Primary OutFlow** Max=4.37 cfs @ 12.10 hrs HW=911.64' (Free Discharge)

- ↑ **1=Culvert** (Passes 4.37 cfs of 10.27 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.36 cfs @ 7.43 fps)
- ↑ **3=Custom Weir/Orifice** (Weir Controls 4.00 cfs @ 3.50 fps)



# Pond 4P: West Basin Orifice

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 25-Year Rainfall=5.44"

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Page 123

**Summary for Pond 5P: Level Spreader**

[79] Warning: Submerged Pond 4P Primary device # 1 OUTLET by 0.13'

Inflow Area = 1.910 ac, 67.54% Impervious, Inflow Depth = 3.43" for 25-Year event  
 Inflow = 4.37 cfs @ 12.10 hrs, Volume= 0.546 af  
 Outflow = 4.37 cfs @ 12.10 hrs, Volume= 0.546 af, Atten= 0%, Lag= 0.1 min  
 Primary = 4.37 cfs @ 12.10 hrs, Volume= 0.546 af  
 Routed to Link 11L : Combined Flow West

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Peak Elev= 904.13' @ 12.10 hrs Surf.Area= 184 sf Storage= 16 cf

Plug-Flow detention time= 0.1 min calculated for 0.546 af (100% of inflow)

Center-of-Mass det. time= 0.1 min ( 969.8 - 969.7 )

| Volume | Invert  | Avail.Storage | Storage Description                                        |
|--------|---------|---------------|------------------------------------------------------------|
| #1     | 904.00' | 1,255 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |

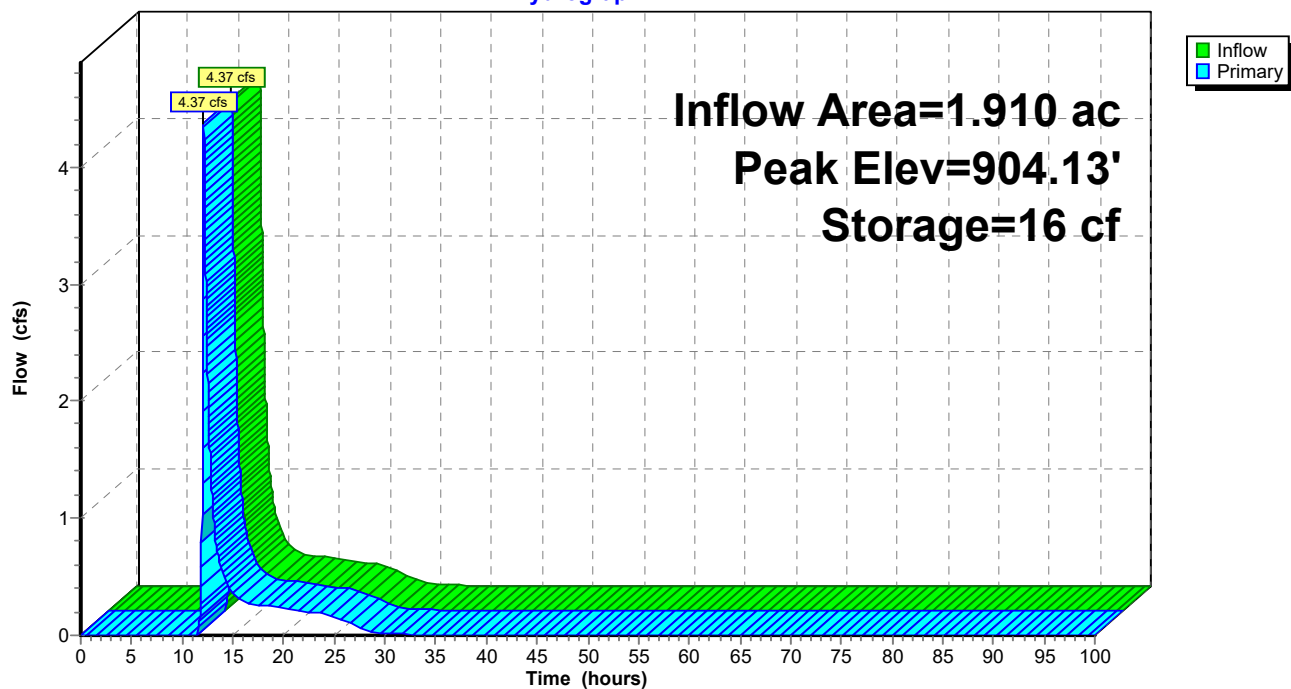
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 904.00              | 72                   | 0                         | 0                         |
| 905.00              | 961                  | 517                       | 517                       |
| 906.00              | 515                  | 738                       | 1,255                     |

| Device | Routing | Invert  | Outlet Devices                                                        |
|--------|---------|---------|-----------------------------------------------------------------------|
| #1     | Primary | 904.00' | <b>30.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s) |

**Primary OutFlow** Max=4.36 cfs @ 12.10 hrs HW=904.13' TW=902.00' (Fixed TW Elev= 902.00')↑**1=Sharp-Crested Rectangular Weir**(Weir Controls 4.36 cfs @ 1.16 fps)

# Pond 5P: Level Spreader

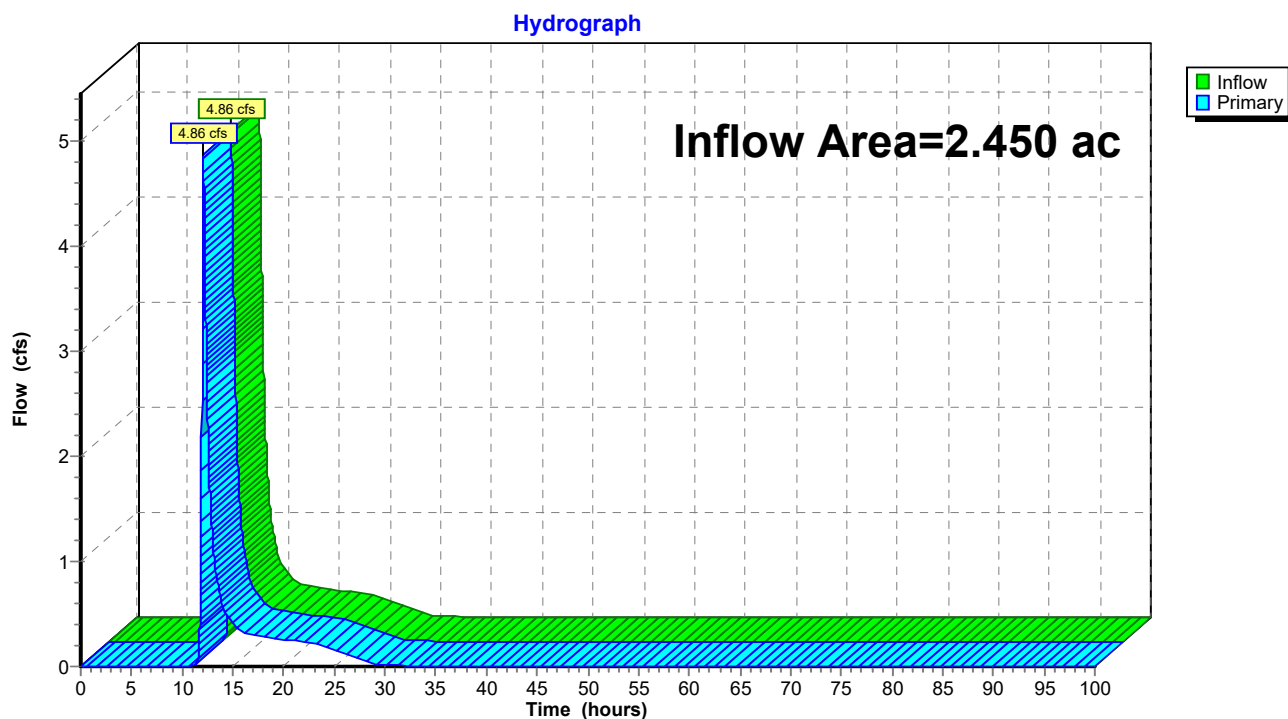
Hydrograph



**Summary for Link 11L: Combined Flow West**

Inflow Area = 2.450 ac, 52.65% Impervious, Inflow Depth = 3.03" for 25-Year event  
Inflow = 4.86 cfs @ 12.06 hrs, Volume= 0.619 af  
Primary = 4.86 cfs @ 12.06 hrs, Volume= 0.619 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 15L

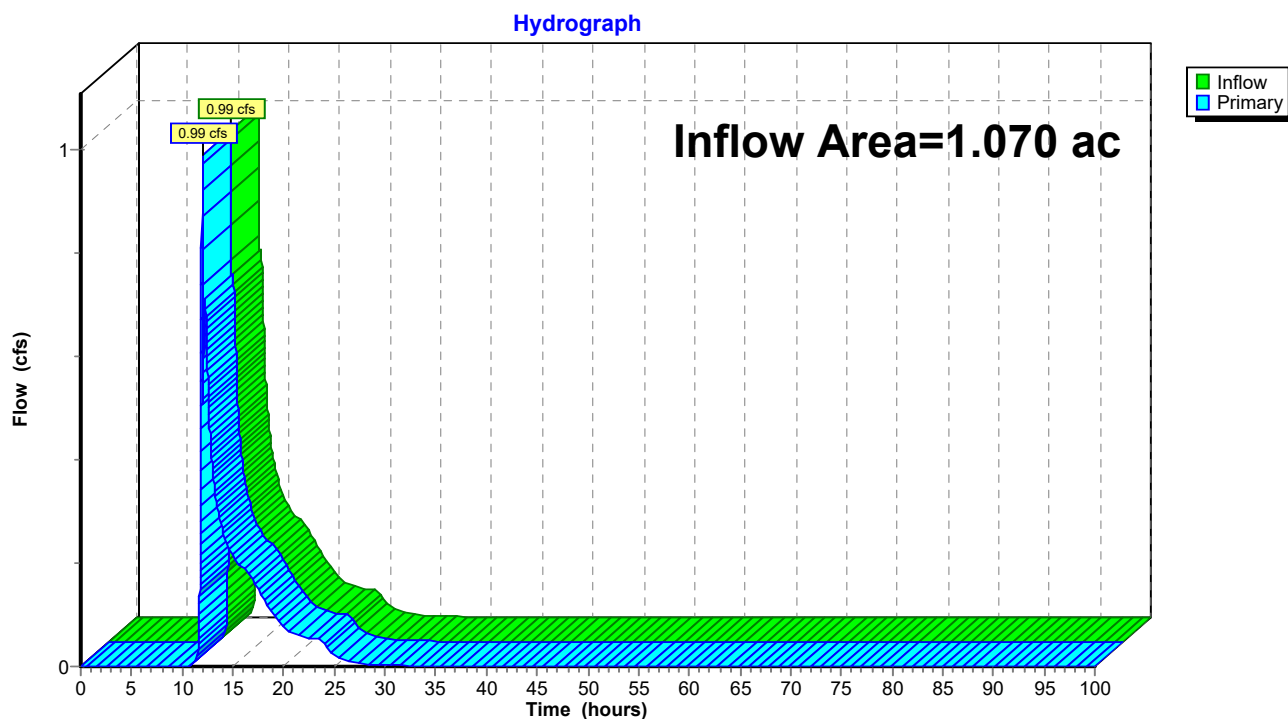
Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

**Link 11L: Combined Flow West**

**Summary for Link 12L: Combined Flow South**

Inflow Area = 1.070 ac, 24.30% Impervious, Inflow Depth = 2.15" for 25-Year event  
Inflow = 0.99 cfs @ 11.97 hrs, Volume= 0.192 af  
Primary = 0.99 cfs @ 11.97 hrs, Volume= 0.192 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 15L

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

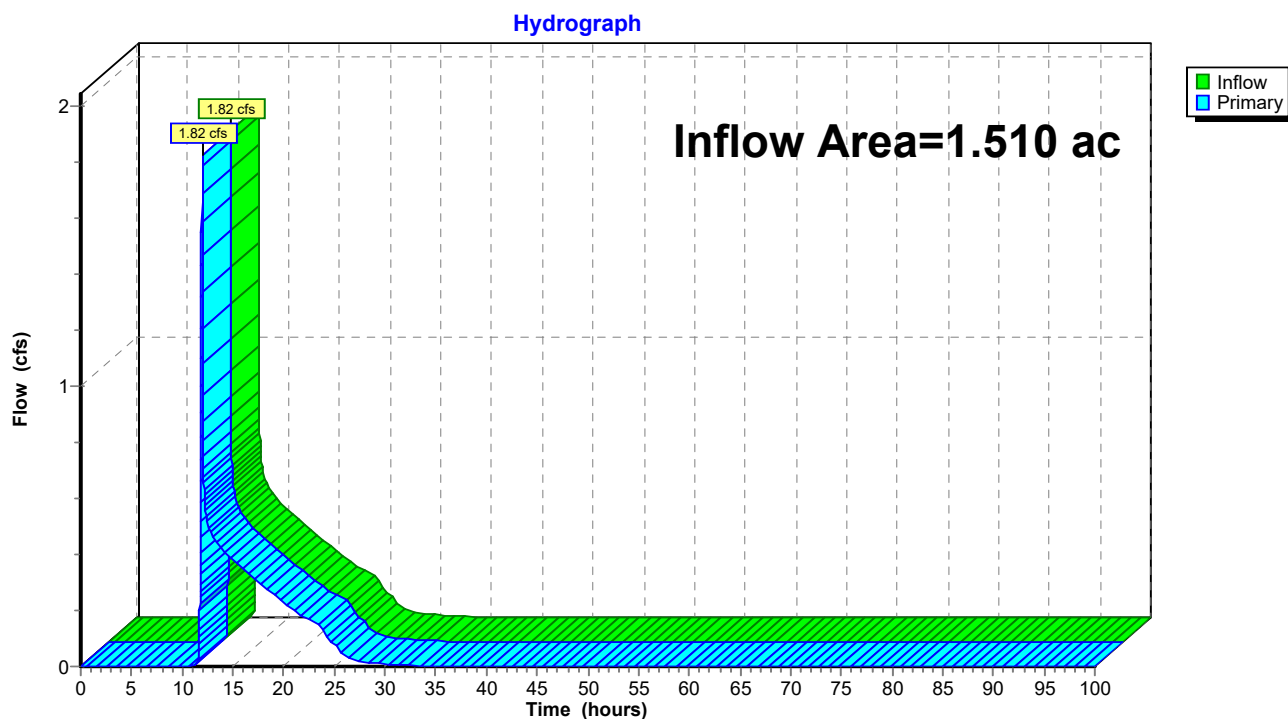
**Link 12L: Combined Flow South**



**Summary for Link 13L: Comnined Flow North**

Inflow Area = 1.510 ac, 49.01% Impervious, Inflow Depth = 2.75" for 25-Year event  
Inflow = 1.82 cfs @ 11.97 hrs, Volume= 0.346 af  
Primary = 1.82 cfs @ 11.97 hrs, Volume= 0.346 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 15L

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

**Link 13L: Comnined Flow North**

**23-047 Proposed Site Conditions\_5-7-24***Type II 24-hr 50-Year Rainfall=6.26"*

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Page 128

Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

|                                            |                                                                                                                            |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment7S: UndetainedWest</b>      | Runoff Area=0.540 ac 0.00% Impervious Runoff Depth=2.18"<br>Tc=5.0 min CN=61 Runoff=2.19 cfs 0.098 af                      |
| <b>Subcatchment8S: UndetainedNorth</b>     | Runoff Area=0.530 ac 0.00% Impervious Runoff Depth=2.18"<br>Tc=5.0 min CN=61 Runoff=2.14 cfs 0.096 af                      |
| <b>Subcatchment9S: UndetainedSoutheast</b> | Runoff Area=0.170 ac 11.76% Impervious Runoff Depth=2.54"<br>Tc=5.0 min CN=65 Runoff=0.81 cfs 0.036 af                     |
| <b>Subcatchment10S: UndetainedSouth</b>    | Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=2.18"<br>Tc=5.0 min CN=61 Runoff=0.36 cfs 0.016 af                      |
| <b>SubcatchmentP-N: Proposed North</b>     | Runoff Area=0.980 ac 75.51% Impervious Runoff Depth=4.99"<br>Flow Length=321' Tc=8.1 min CN=89 Runoff=7.52 cfs 0.407 af    |
| <b>SubcatchmentP-S: Proposed South</b>     | Runoff Area=0.480 ac 22.92% Impervious Runoff Depth=2.92"<br>Flow Length=237' Tc=11.1 min CN=69 Runoff=2.08 cfs 0.117 af   |
| <b>SubcatchmentP-SE: Proposed Drainage</b> | Runoff Area=0.330 ac 39.39% Impervious Runoff Depth=3.61"<br>Flow Length=118' Tc=7.3 min CN=76 Runoff=2.01 cfs 0.099 af    |
| <b>SubcatchmentP-W: Proposed West</b>      | Runoff Area=1.910 ac 67.54% Impervious Runoff Depth=4.66"<br>Flow Length=1,203' Tc=6.7 min CN=86 Runoff=14.65 cfs 0.741 af |
| <b>Pond 1P: SE Basin</b>                   | Peak Elev=918.17' Storage=2,067 cf Inflow=2.01 cfs 0.099 af<br>Outflow=0.30 cfs 0.089 af                                   |
| <b>Pond 2P: South Basin Orifice</b>        | Peak Elev=913.52' Storage=1,939 cf Inflow=2.26 cfs 0.206 af<br>Outflow=1.11 cfs 0.197 af                                   |
| <b>Pond 3P: North Basin Orifice</b>        | Peak Elev=924.17' Storage=11,026 cf Inflow=7.52 cfs 0.407 af<br>Outflow=0.43 cfs 0.339 af                                  |
| <b>Pond 4P: West Basin Orifice</b>         | Peak Elev=911.97' Storage=14,488 cf Inflow=14.65 cfs 0.741 af<br>Outflow=6.25 cfs 0.669 af                                 |
| <b>Pond 5P: Level Spreader</b>             | Peak Elev=904.16' Storage=23 cf Inflow=6.25 cfs 0.669 af<br>Outflow=6.25 cfs 0.669 af                                      |
| <b>Link 11L: Combined Flow West</b>        | Inflow=7.11 cfs 0.768 af<br>Primary=7.11 cfs 0.768 af                                                                      |
| <b>Link 12L: Combined Flow South</b>       | Inflow=1.33 cfs 0.249 af<br>Primary=1.33 cfs 0.249 af                                                                      |
| <b>Link 13L: Comnined Flow North</b>       | Inflow=2.42 cfs 0.435 af<br>Primary=2.42 cfs 0.435 af                                                                      |

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Page 129

**Total Runoff Area = 5.030 ac   Runoff Volume = 1.611 af   Average Runoff Depth = 3.84"**  
**54.47% Pervious = 2.740 ac   45.53% Impervious = 2.290 ac**

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Type II 24-hr 50-Year Rainfall=6.26"

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Page 130

Summary for Subcatchment 7S: Undetained West

Runoff = 2.19 cfs @ 11.97 hrs, Volume= 0.098 af, Depth= 2.18"  
Routed to Link 11L : Combined Flow West

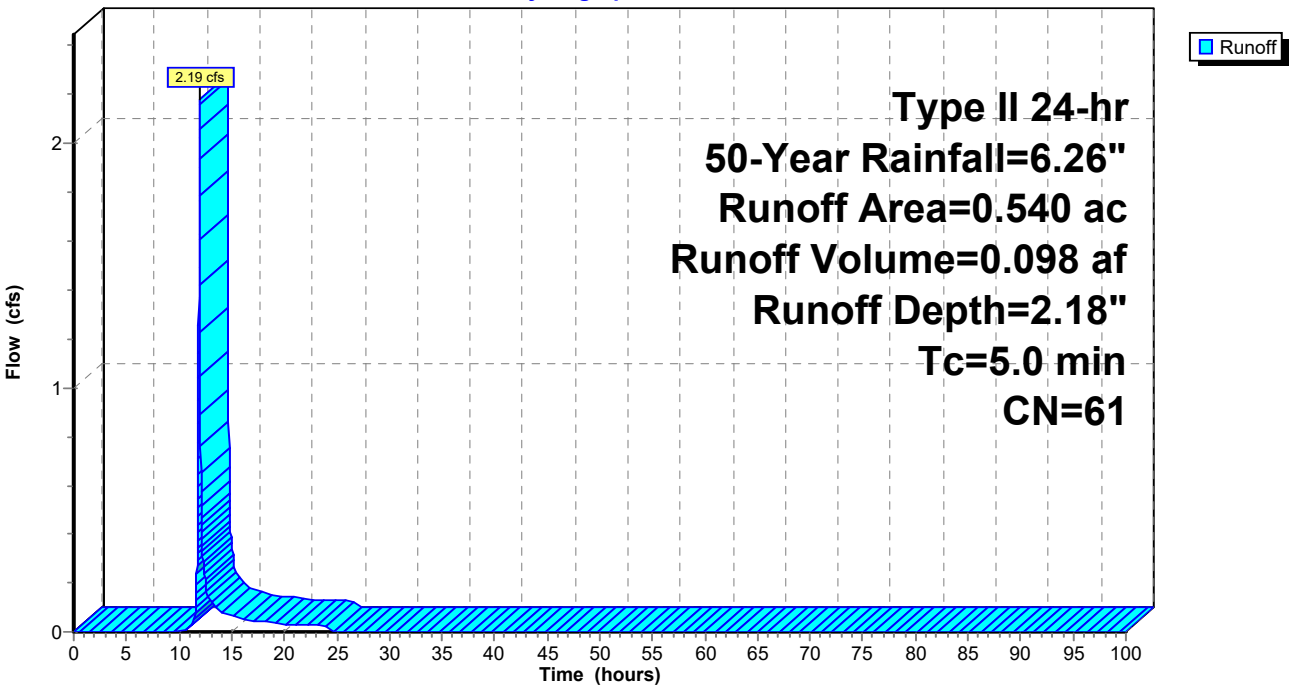
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 50-Year Rainfall=6.26"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.540   | 61 | >75% Grass cover, Good, HSG B |
| 0.540     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

Subcatchment 7S: Undetained West

Hydrograph



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Page 131

**Summary for Subcatchment 8S: Undetained North**

Runoff = 2.14 cfs @ 11.97 hrs, Volume= 0.096 af, Depth= 2.18"  
Routed to Link 13L : Comnined Flow North

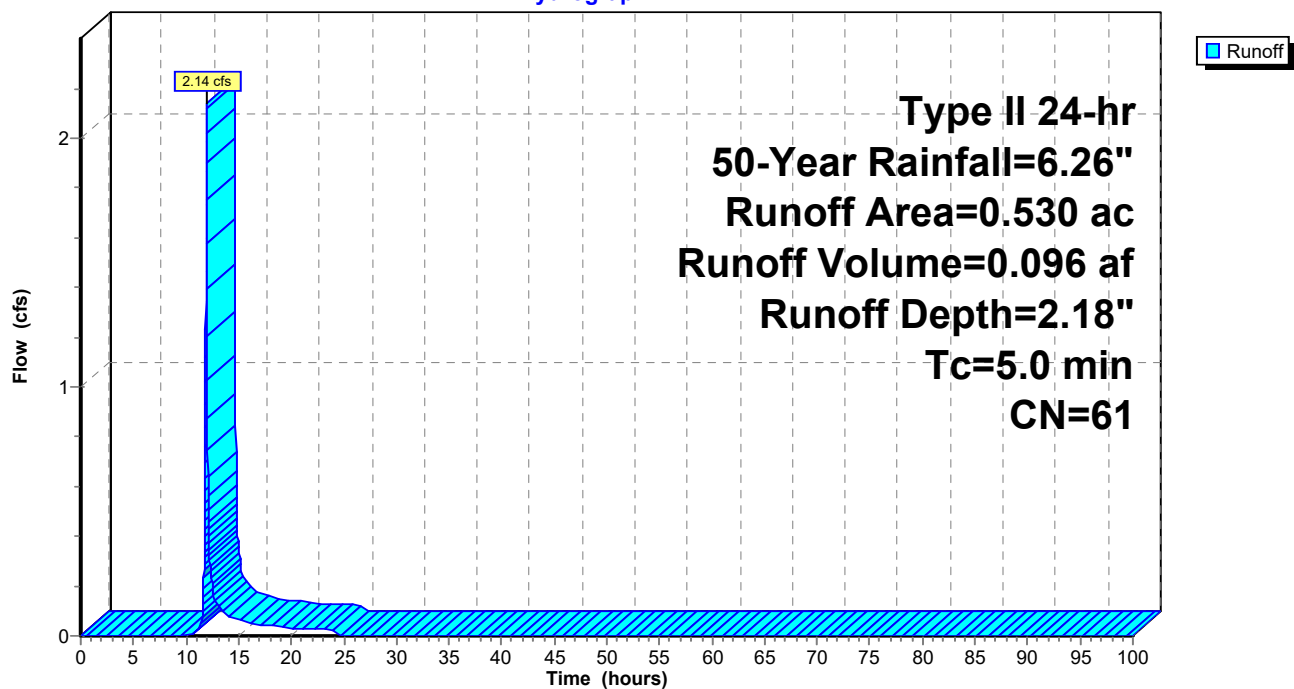
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 50-Year Rainfall=6.26"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.530   | 61 | >75% Grass cover, Good, HSG B |
| 0.530     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 8S: Undetained North**

Hydrograph





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Type II 24-hr 50-Year Rainfall=6.26"

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Page 132

**Summary for Subcatchment 9S: Undetained Southeast**

Runoff = 0.81 cfs @ 11.96 hrs, Volume= 0.036 af, Depth= 2.54"  
Routed to Link 12L : Combined Flow South

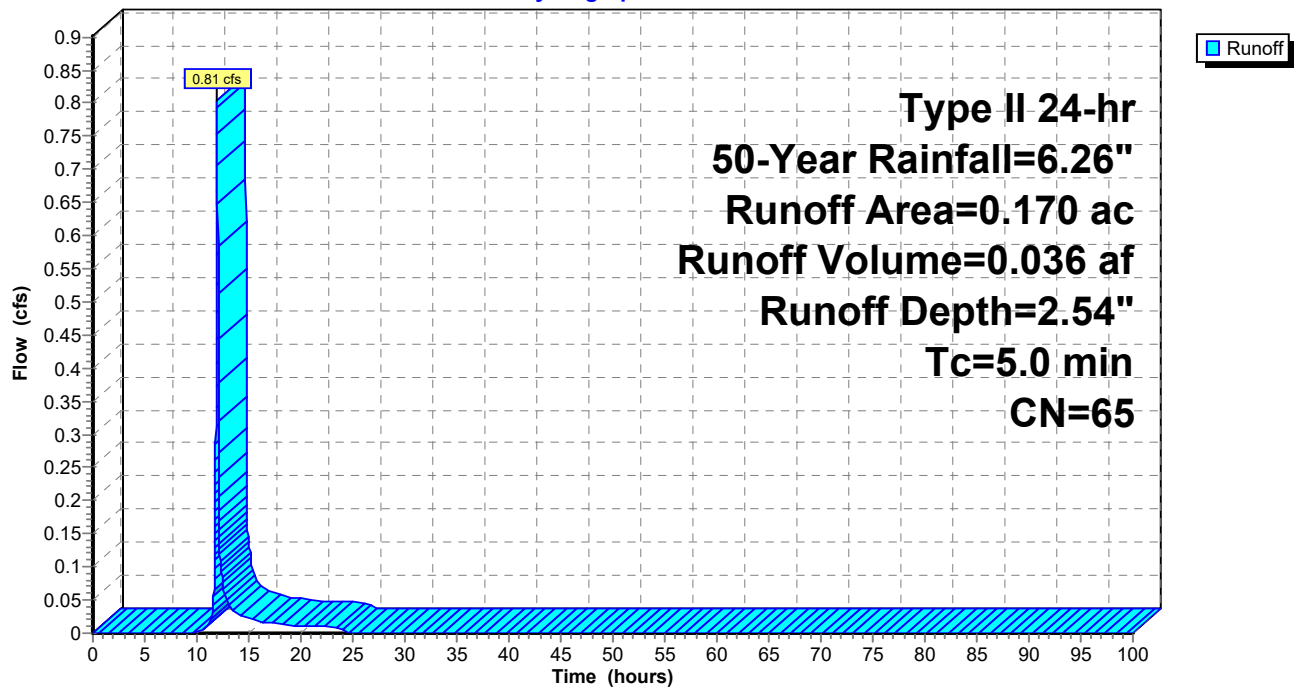
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 50-Year Rainfall=6.26"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.150   | 61 | >75% Grass cover, Good, HSG B |
| * 0.020   | 98 | Pavement                      |
| 0.170     | 65 | Weighted Average              |
| 0.150     |    | 88.24% Pervious Area          |
| 0.020     |    | 11.76% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 9S: Undetained Southeast**

Hydrograph



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Type II 24-hr 50-Year Rainfall=6.26"

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Page 133

**Summary for Subcatchment 10S: Undetained South**

Runoff = 0.36 cfs @ 11.97 hrs, Volume= 0.016 af, Depth= 2.18"  
Routed to Link 12L : Combined Flow South

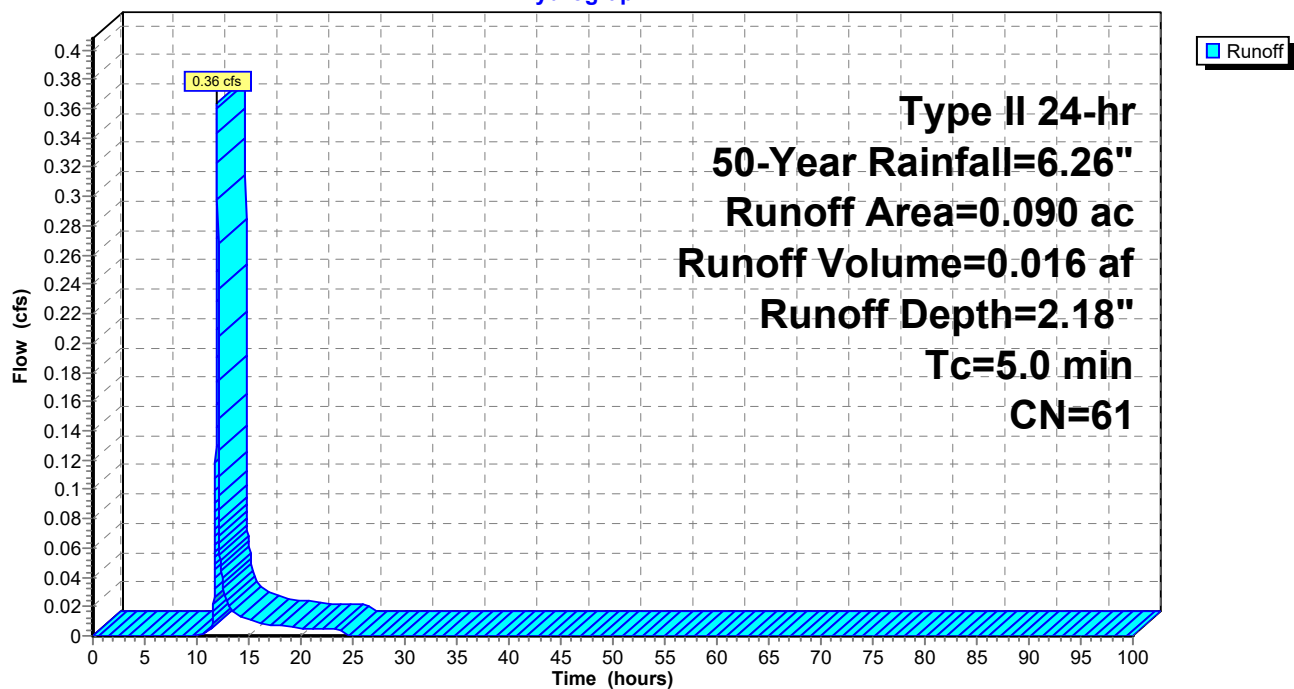
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 50-Year Rainfall=6.26"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.090   | 61 | >75% Grass cover, Good, HSG B |
| 0.090     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 10S: Undetained South**

Hydrograph



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Type II 24-hr 50-Year Rainfall=6.26"

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Page 134

**Summary for Subcatchment P-N: Proposed North**

Runoff = 7.52 cfs @ 11.99 hrs, Volume= 0.407 af, Depth= 4.99"  
 Routed to Pond 3P : North Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 50-Year Rainfall=6.26"

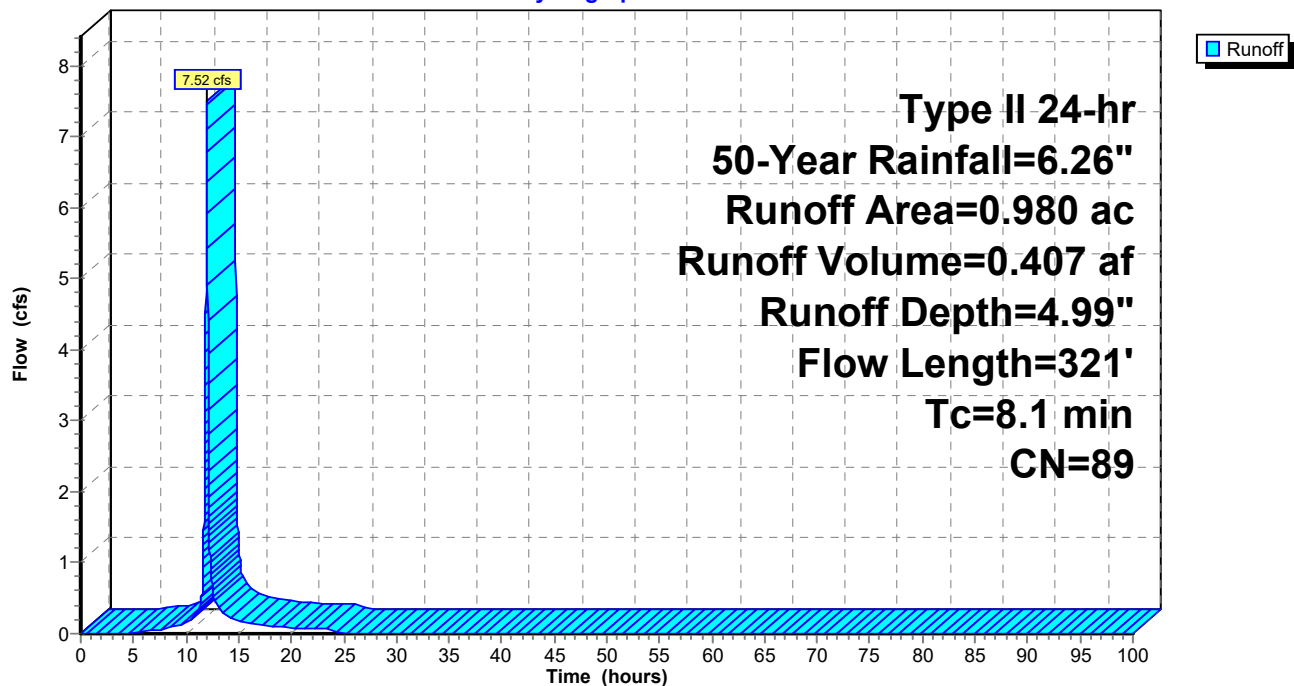
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 0.740   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.240     | 61 | >75% Grass cover, Good, HSG B       |
| 0.980     | 89 | Weighted Average                    |
| 0.240     |    | 24.49% Pervious Area                |
| 0.740     |    | 75.51% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                            |
|----------|---------------|---------------|-------------------|----------------|----------------------------------------------------------------------------------------|
| 7.5      | 91            | 0.0350        | 0.20              |                | <b>Sheet Flow, SHEET (GRASS)</b><br>Grass: Short n= 0.150 P2= 3.04"                    |
| 0.6      | 230           | 0.0150        | 6.45              | 7.91           | <b>Pipe Channel, PIPE</b><br>15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'<br>n= 0.013 |
| 8.1      | 321           | Total         |                   |                |                                                                                        |

**Subcatchment P-N: Proposed North**

Hydrograph



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Type II 24-hr 50-Year Rainfall=6.26"

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Page 135

**Summary for Subcatchment P-S: Proposed South**

Runoff = 2.08 cfs @ 12.03 hrs, Volume= 0.117 af, Depth= 2.92"  
Routed to Pond 2P : South Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 50-Year Rainfall=6.26"

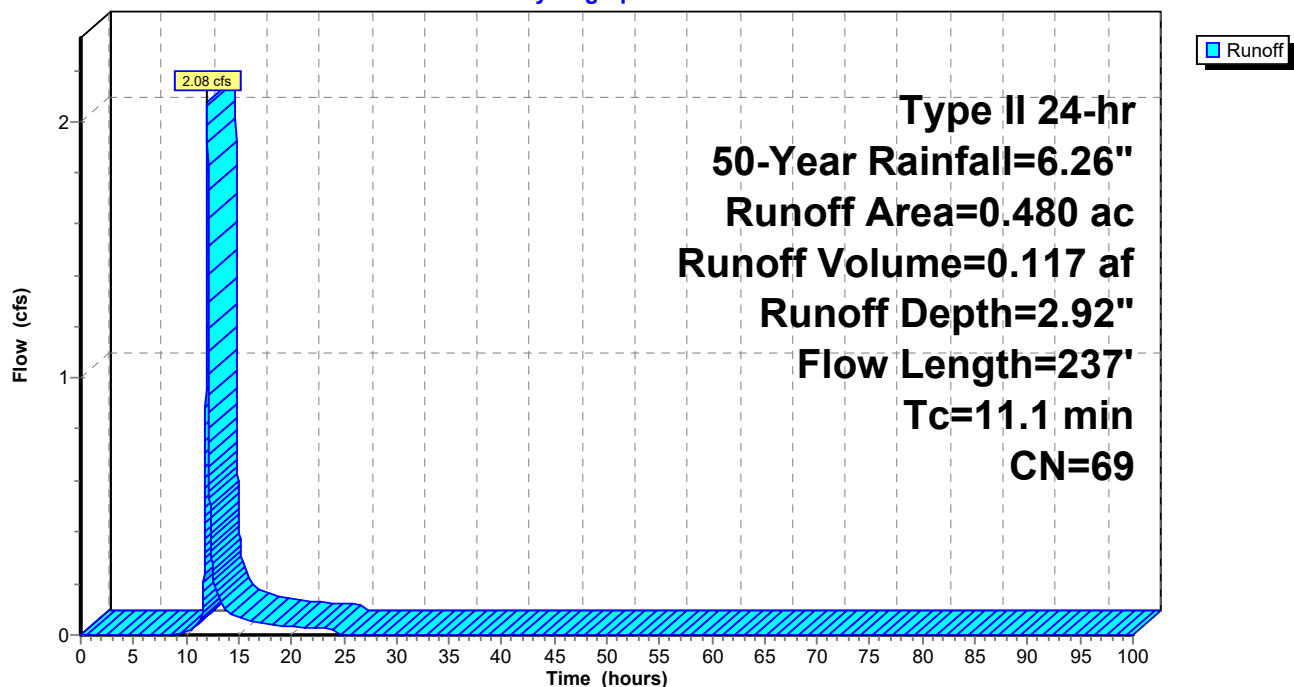
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 0.110   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.370     | 61 | >75% Grass cover, Good, HSG B       |
| 0.480     | 69 | Weighted Average                    |
| 0.370     |    | 77.08% Pervious Area                |
| 0.110     |    | 22.92% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                        |
|----------|---------------|---------------|-------------------|----------------|------------------------------------------------------------------------------------|
| 10.1     | 100           | 0.0200        | 0.17              |                | <b>Sheet Flow, SHEET (GRASS)</b><br>Grass: Short n= 0.150 P2= 3.04"                |
| 0.9      | 112           | 0.0200        | 2.12              |                | <b>Shallow Concentrated Flow, SHALLOW (GRASS)</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.1      | 25            | 0.2500        | 7.50              |                | <b>Shallow Concentrated Flow, SHALLOW (GRASS)</b><br>Grassed Waterway Kv= 15.0 fps |
| 11.1     | 237           | Total         |                   |                |                                                                                    |

**Subcatchment P-S: Proposed South**

Hydrograph



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Type II 24-hr 50-Year Rainfall=6.26"

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Page 136

**Summary for Subcatchment P-SE: Proposed Drainage**

Runoff = 2.01 cfs @ 11.99 hrs, Volume= 0.099 af, Depth= 3.61"  
 Routed to Pond 1P : SE Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 50-Year Rainfall=6.26"

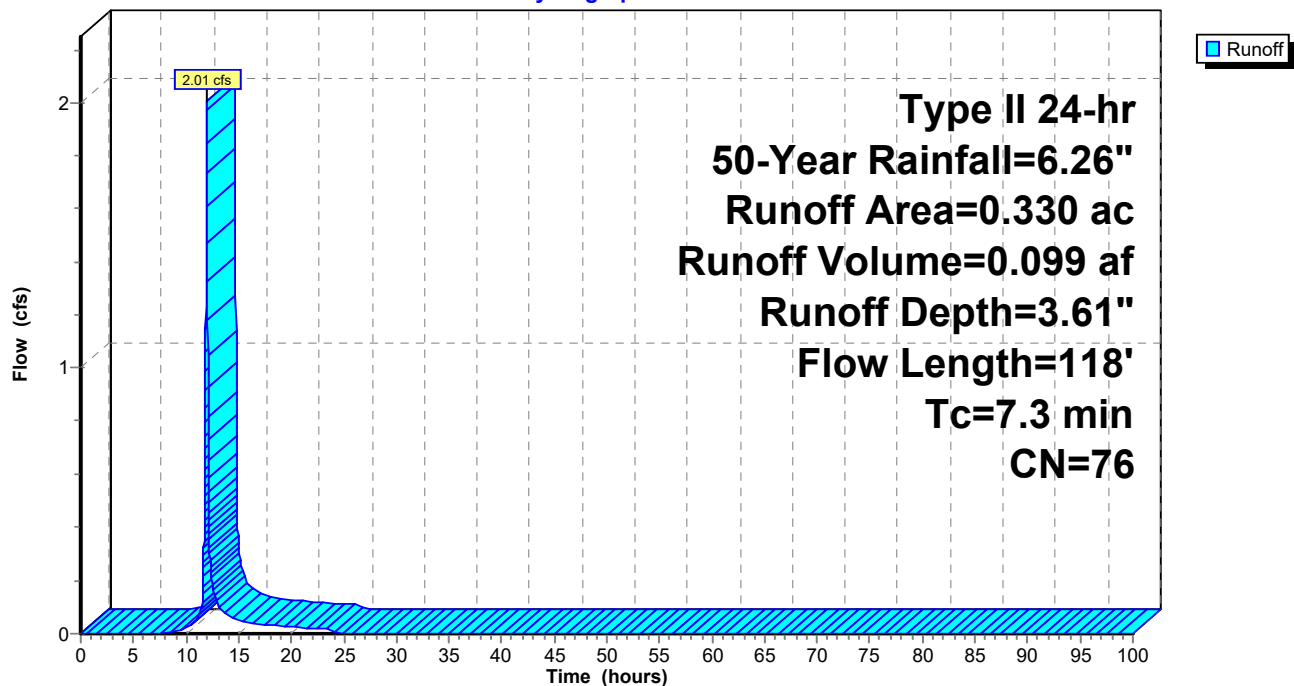
| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.130     | 98 | Paved parking, HSG C          |
| 0.200     | 61 | >75% Grass cover, Good, HSG B |
| 0.330     | 76 | Weighted Average              |
| 0.200     |    | 60.61% Pervious Area          |
| 0.130     |    | 39.39% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                       |
|----------|---------------|---------------|-------------------|----------------|-----------------------------------------------------------------------------------|
| 7.1      | 65            | 0.0200        | 0.15              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.04"                             |
| 0.2      | 53            | 0.0100        | 5.26              | 6.46           | <b>Pipe Channel,</b><br>15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'<br>n= 0.013 |
| 7.3      | 118           | Total         |                   |                |                                                                                   |

**Subcatchment P-SE: Proposed Drainage**

Hydrograph





**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 50-Year Rainfall=6.26"

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Page 137

**Summary for Subcatchment P-W: Proposed West**

[47] Hint: Peak is 114% of capacity of segment #3

Runoff = 14.65 cfs @ 11.98 hrs, Volume= 0.741 af, Depth= 4.66"  
 Routed to Pond 4P : West Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 50-Year Rainfall=6.26"

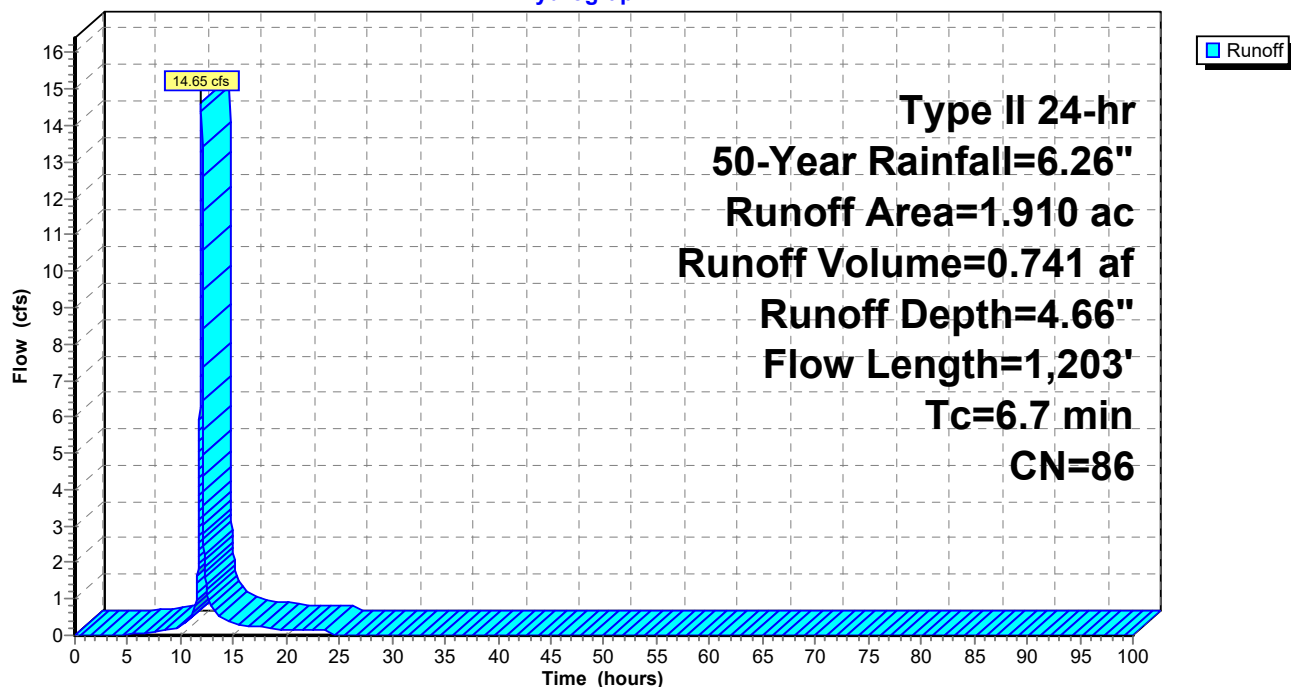
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 1.290   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.620     | 61 | >75% Grass cover, Good, HSG B       |
| 1.910     | 86 | Weighted Average                    |
| 0.620     |    | 32.46% Pervious Area                |
| 1.290     |    | 67.54% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                                   |
|----------|---------------|---------------|-------------------|----------------|-----------------------------------------------------------------------------------------------|
| 2.2      | 100           | 0.0050        | 0.77              |                | <b>Sheet Flow, SHEET (PAVED)</b><br>Smooth surfaces n= 0.011 P2= 3.04"                        |
| 3.6      | 725           | 0.0280        | 3.40              |                | <b>Shallow Concentrated Flow, SHALLOW (PAVED)</b><br>Paved Kv= 20.3 fps                       |
| 0.9      | 378           | 0.0150        | 7.28              | 12.87          | <b>Pipe Channel, Storm Sewer</b><br>18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38'<br>n= 0.013 |
| 6.7      | 1,203         | Total         |                   |                |                                                                                               |

# Subcatchment P-W: Proposed West

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 50-Year Rainfall=6.26"

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Page 139

**Summary for Pond 1P: SE Basin**

Inflow Area = 0.330 ac, 39.39% Impervious, Inflow Depth = 3.61" for 50-Year event  
 Inflow = 2.01 cfs @ 11.99 hrs, Volume= 0.099 af  
 Outflow = 0.30 cfs @ 12.25 hrs, Volume= 0.089 af, Atten= 85%, Lag= 16.0 min  
 Primary = 0.30 cfs @ 12.25 hrs, Volume= 0.089 af  
 Routed to Pond 2P : South Basin Orifice

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 918.17' @ 12.25 hrs Surf.Area= 2,978 sf Storage= 2,067 cf

Plug-Flow detention time= 184.4 min calculated for 0.089 af (90% of inflow)  
 Center-of-Mass det. time= 134.3 min ( 954.6 - 820.3 )

| Volume | Invert  | Avail.Storage | Storage Description                                        |
|--------|---------|---------------|------------------------------------------------------------|
| #1     | 916.91' | 8,715 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 916.91              | 0                    | 0                         | 0                         |
| 918.00              | 2,856                | 1,557                     | 1,557                     |
| 919.00              | 3,551                | 3,204                     | 4,760                     |
| 920.00              | 4,358                | 3,955                     | 8,715                     |

| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                             |
|--------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 916.26' | <b>4.0" Round Culvert X 3.00</b> L= 30.2' Ke= 0.500<br>Inlet / Outlet Invert= 916.26' / 915.96' S= 0.0099 '/' Cc= 0.900<br>n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.09 sf |
| #2     | Device 1 | 917.48' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                                 |
| #3     | Device 1 | 918.00' | <b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b><br>Head (feet) 0.00 0.45 0.45 0.95<br>Width (feet) 0.50 0.50 3.00 3.00                                                                      |

**Primary OutFlow** Max=0.30 cfs @ 12.25 hrs HW=918.17' (Free Discharge)

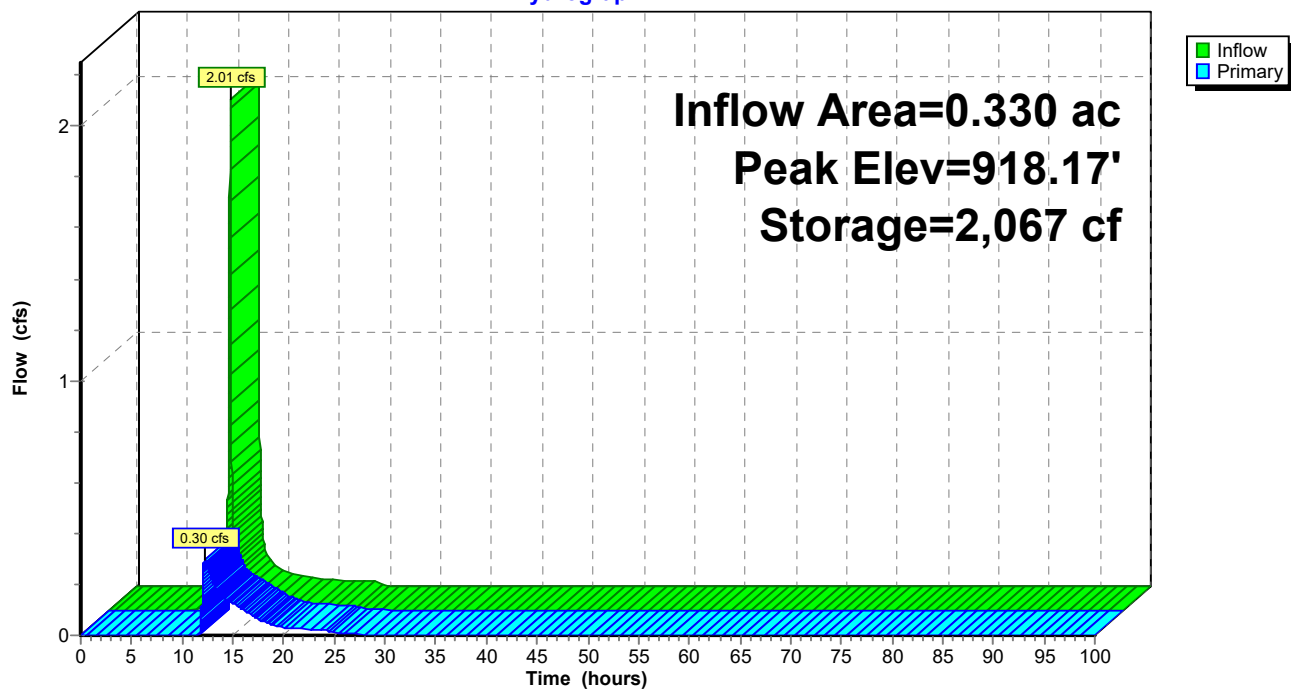
1=Culvert (Passes 0.30 cfs of 1.22 cfs potential flow)

2=Orifice/Grate (Orifice Controls 0.18 cfs @ 3.64 fps)

3=Custom Weir/Orifice (Weir Controls 0.12 cfs @ 1.37 fps)

# Pond 1P: SE Basin

## Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 50-Year Rainfall=6.26"

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Page 141

**Summary for Pond 2P: South Basin Orifice**

Inflow Area = 0.810 ac, 29.63% Impervious, Inflow Depth = 3.05" for 50-Year event  
 Inflow = 2.26 cfs @ 12.04 hrs, Volume= 0.206 af  
 Outflow = 1.11 cfs @ 12.19 hrs, Volume= 0.197 af, Atten= 51%, Lag= 9.0 min  
 Primary = 1.11 cfs @ 12.19 hrs, Volume= 0.197 af  
 Routed to Link 12L : Combined Flow South

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 913.52' @ 12.19 hrs Surf.Area= 1,710 sf Storage= 1,939 cf

Plug-Flow detention time= 93.0 min calculated for 0.197 af (95% of inflow)  
 Center-of-Mass det. time= 61.9 min ( 951.6 - 889.7 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                        |
|---------------------|----------------------|---------------------------|------------------------------------------------------------|
| #1                  | 911.50'              | 5,431 cf                  | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                                  |
| 911.50              | 0                    | 0                         | 0                                                          |
| 912.00              | 682                  | 171                       | 171                                                        |
| 913.00              | 1,303                | 993                       | 1,163                                                      |
| 914.00              | 2,092                | 1,698                     | 2,861                                                      |
| 915.00              | 3,048                | 2,570                     | 5,431                                                      |

| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                 |
|--------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 911.34' | <b>6.0" Round Culvert</b><br>L= 68.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 911.34' / 909.31' S= 0.0299 '/' Cc= 0.900<br>n= 0.013, Flow Area= 0.20 sf |
| #2     | Device 1 | 912.31' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                     |
| #3     | Device 1 | 913.00' | <b>10.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                    |

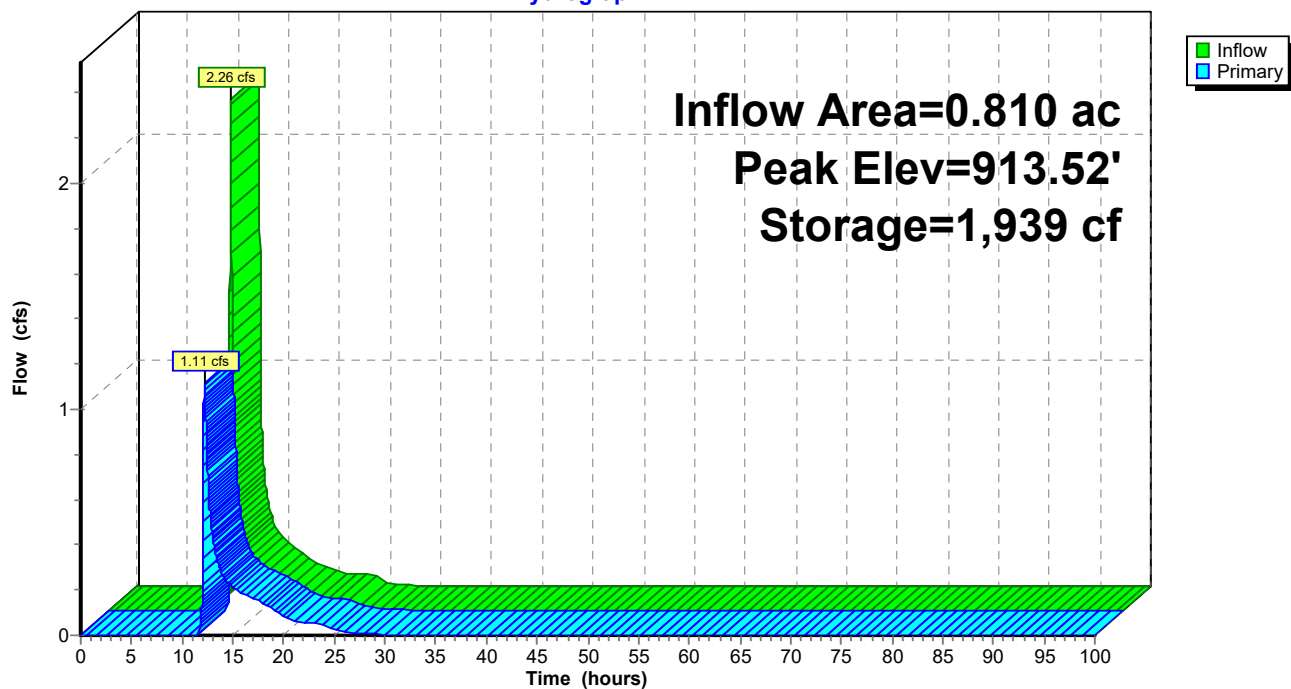
**Primary OutFlow** Max=1.11 cfs @ 12.19 hrs HW=913.52' (Free Discharge)

- ↑ **1=Culvert** (Passes 1.11 cfs of 1.16 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.25 cfs @ 5.00 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.87 cfs @ 2.44 fps)



# Pond 2P: South Basin Orifice

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 50-Year Rainfall=6.26"

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Page 143

**Summary for Pond 3P: North Basin Orifice**

Inflow Area = 0.980 ac, 75.51% Impervious, Inflow Depth = 4.99" for 50-Year event  
 Inflow = 7.52 cfs @ 11.99 hrs, Volume= 0.407 af  
 Outflow = 0.43 cfs @ 12.91 hrs, Volume= 0.339 af, Atten= 94%, Lag= 55.2 min  
 Primary = 0.43 cfs @ 12.91 hrs, Volume= 0.339 af  
 Routed to Link 13L : Combined Flow North

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 924.17' @ 12.91 hrs Surf.Area= 3,447 sf Storage= 11,026 cf

Plug-Flow detention time= 369.5 min calculated for 0.339 af (83% of inflow)  
 Center-of-Mass det. time= 296.8 min ( 1,082.3 - 785.4 )

| Volume | Invert  | Avail.Storage | Storage Description                                                                                                                                                                                                                                        |
|--------|---------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1A    | 919.40' | 6,149 cf      | <b>20.08'W x 171.65'L x 6.75'H Field A</b><br>23,269 cf Overall - 7,897 cf Embedded = 15,373 cf x 40.0% Voids                                                                                                                                              |
| #2A    | 920.15' | 7,897 cf      | <b>ADS_StormTech MC-7200 +Cap</b> x 44 Inside #1<br>Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf<br>Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap<br>44 Chambers in 2 Rows<br>Cap Storage= 39.5 cf x 2 x 2 rows = 158.0 cf |
|        |         | 14,046 cf     | Total Available Storage                                                                                                                                                                                                                                    |

Storage Group A created with Chamber Wizard

| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                             |
|--------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 918.30' | <b>12.0" Round Culvert</b><br>L= 104.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 918.30' / 910.25' S= 0.0774 ' S= 0.0774 ' Cc= 0.900<br>n= 0.013, Flow Area= 0.79 sf |
| #2     | Device 1 | 920.87' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                                 |
| #3     | Device 1 | 924.15' | <b>12.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                                |

**Primary OutFlow** Max=0.42 cfs @ 12.91 hrs HW=924.17' (Free Discharge)

1=Culvert (Passes 0.42 cfs of 8.76 cfs potential flow)  
 2=Orifice/Grate (Orifice Controls 0.42 cfs @ 8.58 fps)  
 3=Orifice/Grate (Orifice Controls 0.00 cfs @ 0.50 fps)

## 23-047 Proposed Site Conditions\_5-7-24

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Type II 24-hr 50-Year Rainfall=6.26"

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Page 144

### Pond 3P: North Basin Orifice - Chamber Wizard Field A

**Chamber Model = ADS\_StormTechMC-7200 +Cap (ADS StormTech®MC-7200 with cap volume)**

Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf

Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap

Cap Storage= 39.5 cf x 2 x 2 rows = 158.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

22 Chambers/Row x 6.59' Long +2.73' Cap Length x 2 = 150.48' Row Length +127.0" End Stone x 2 = 171.65' Base Length

2 Rows x 100.0" Wide + 9.0" Spacing x 1 + 16.0" Side Stone x 2 = 20.08' Base Width

9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

44 Chambers x 175.9 cf + 39.5 cf Cap Volume x 2 x 2 Rows = 7,896.5 cf Chamber Storage

23,269.3 cf Field - 7,896.5 cf Chambers = 15,372.8 cf Stone x 40.0% Voids = 6,149.1 cf Stone Storage

Chamber Storage + Stone Storage = 14,045.6 cf = 0.322 af

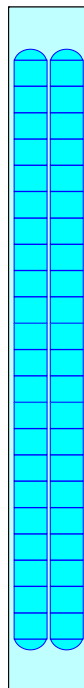
Overall Storage Efficiency = 60.4%

Overall System Size = 171.65' x 20.08' x 6.75'

44 Chambers

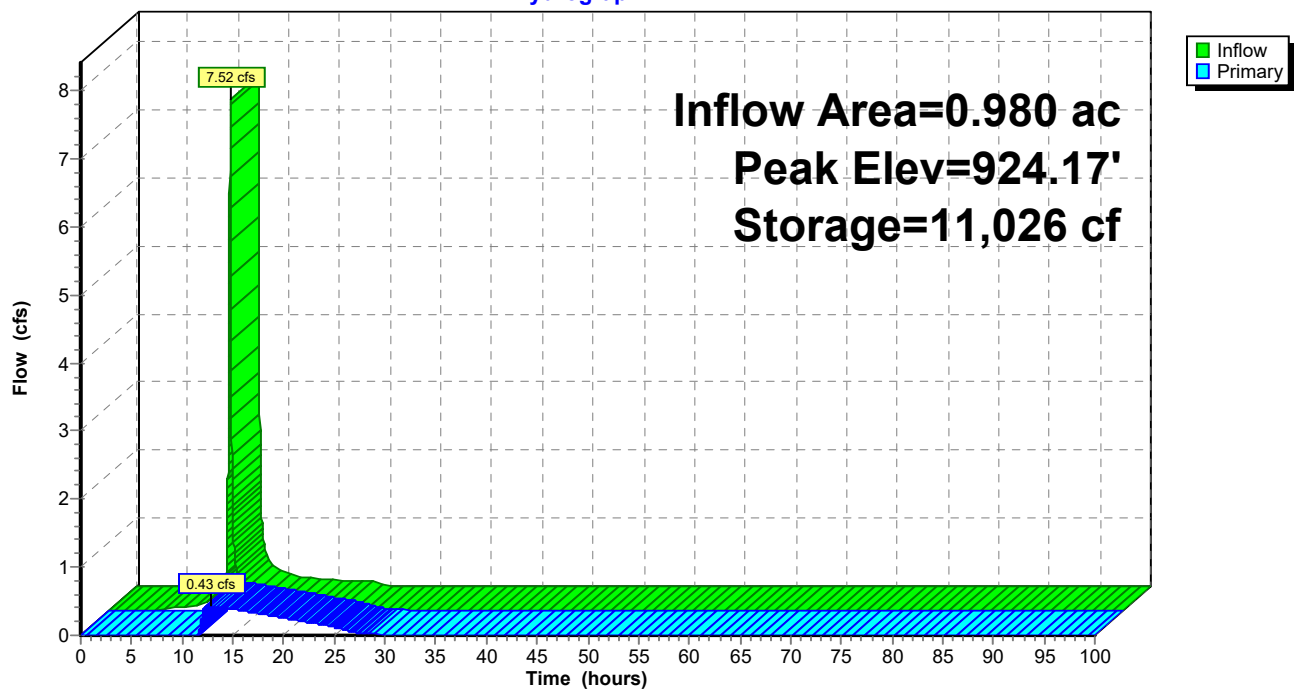
861.8 cy Field

569.4 cy Stone



### Pond 3P: North Basin Orifice

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 50-Year Rainfall=6.26"

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Page 146

**Summary for Pond 4P: West Basin Orifice**

Inflow Area = 1.910 ac, 67.54% Impervious, Inflow Depth = 4.66" for 50-Year event  
 Inflow = 14.65 cfs @ 11.98 hrs, Volume= 0.741 af  
 Outflow = 6.25 cfs @ 12.08 hrs, Volume= 0.669 af, Atten= 57%, Lag= 6.3 min  
 Primary = 6.25 cfs @ 12.08 hrs, Volume= 0.669 af  
 Routed to Pond 5P : Level Spreader

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 911.97' @ 12.08 hrs Surf.Area= 5,637 sf Storage= 14,488 cf

Plug-Flow detention time= 205.2 min calculated for 0.669 af (90% of inflow)  
 Center-of-Mass det. time= 155.2 min ( 948.8 - 793.7 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                        |
|---------------------|----------------------|---------------------------|------------------------------------------------------------|
| #1                  | 907.00'              | 28,862 cf                 | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                                  |
| 907.00              | 0                    | 0                         | 0                                                          |
| 908.00              | 1,584                | 792                       | 792                                                        |
| 909.00              | 2,402                | 1,993                     | 2,785                                                      |
| 910.00              | 3,364                | 2,883                     | 5,668                                                      |
| 911.00              | 4,448                | 3,906                     | 9,574                                                      |
| 912.00              | 5,668                | 5,058                     | 14,632                                                     |
| 913.00              | 7,027                | 6,348                     | 20,980                                                     |
| 914.00              | 8,738                | 7,883                     | 28,862                                                     |

| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                  |
|--------|----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 908.00' | <b>15.0" Round Culvert</b><br>L= 32.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 908.00' / 904.00' S= 0.1250 '/' Cc= 0.900<br>n= 0.013, Flow Area= 1.23 sf |
| #2     | Device 1 | 909.14' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                      |
| #3     | Device 1 | 910.50' | <b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b><br>Head (feet) 0.00 1.25 1.25 1.75<br>Width (feet) 1.00 1.00 1.00 1.00                                                           |

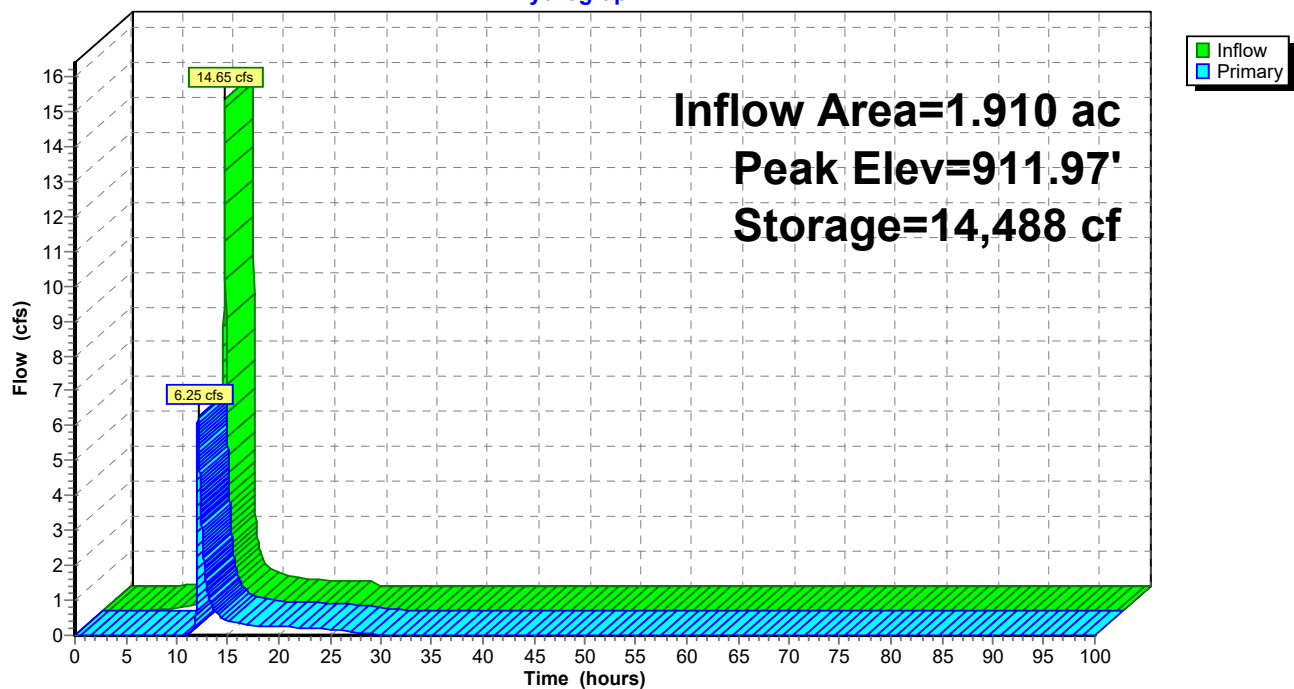
**Primary OutFlow** Max=6.25 cfs @ 12.08 hrs HW=911.97' (Free Discharge)

- ↑ **1=Culvert** (Passes 6.25 cfs of 10.81 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.39 cfs @ 7.92 fps)
- ↑ **3=Custom Weir/Orifice** (Weir Controls 5.86 cfs @ 3.98 fps)



### Pond 4P: West Basin Orifice

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 50-Year Rainfall=6.26"

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Page 148

**Summary for Pond 5P: Level Spreader**

[79] Warning: Submerged Pond 4P Primary device # 1 OUTLET by 0.16'

Inflow Area = 1.910 ac, 67.54% Impervious, Inflow Depth = 4.21" for 50-Year event  
 Inflow = 6.25 cfs @ 12.08 hrs, Volume= 0.669 af  
 Outflow = 6.25 cfs @ 12.08 hrs, Volume= 0.669 af, Atten= 0%, Lag= 0.1 min  
 Primary = 6.25 cfs @ 12.08 hrs, Volume= 0.669 af  
 Routed to Link 11L : Combined Flow West

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Peak Elev= 904.16' @ 12.08 hrs Surf.Area= 214 sf Storage= 23 cf

Plug-Flow detention time= 0.1 min calculated for 0.669 af (100% of inflow)

Center-of-Mass det. time= 0.1 min ( 948.9 - 948.8 )

| Volume | Invert  | Avail.Storage | Storage Description                                        |
|--------|---------|---------------|------------------------------------------------------------|
| #1     | 904.00' | 1,255 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |

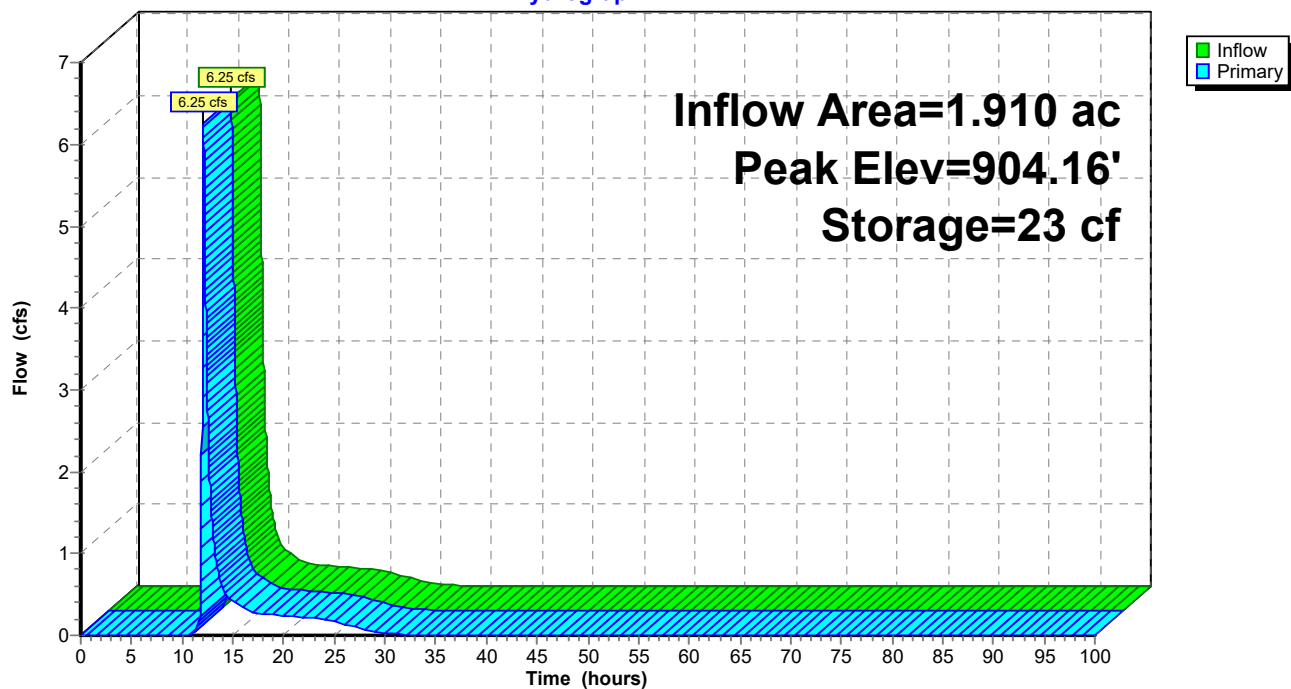
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 904.00              | 72                   | 0                         | 0                         |
| 905.00              | 961                  | 517                       | 517                       |
| 906.00              | 515                  | 738                       | 1,255                     |

| Device | Routing | Invert  | Outlet Devices                                                        |
|--------|---------|---------|-----------------------------------------------------------------------|
| #1     | Primary | 904.00' | <b>30.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s) |

**Primary OutFlow** Max=6.25 cfs @ 12.08 hrs HW=904.16' TW=902.00' (Fixed TW Elev= 902.00')↑**1=Sharp-Crested Rectangular Weir**(Weir Controls 6.25 cfs @ 1.31 fps)

# Pond 5P: Level Spreader

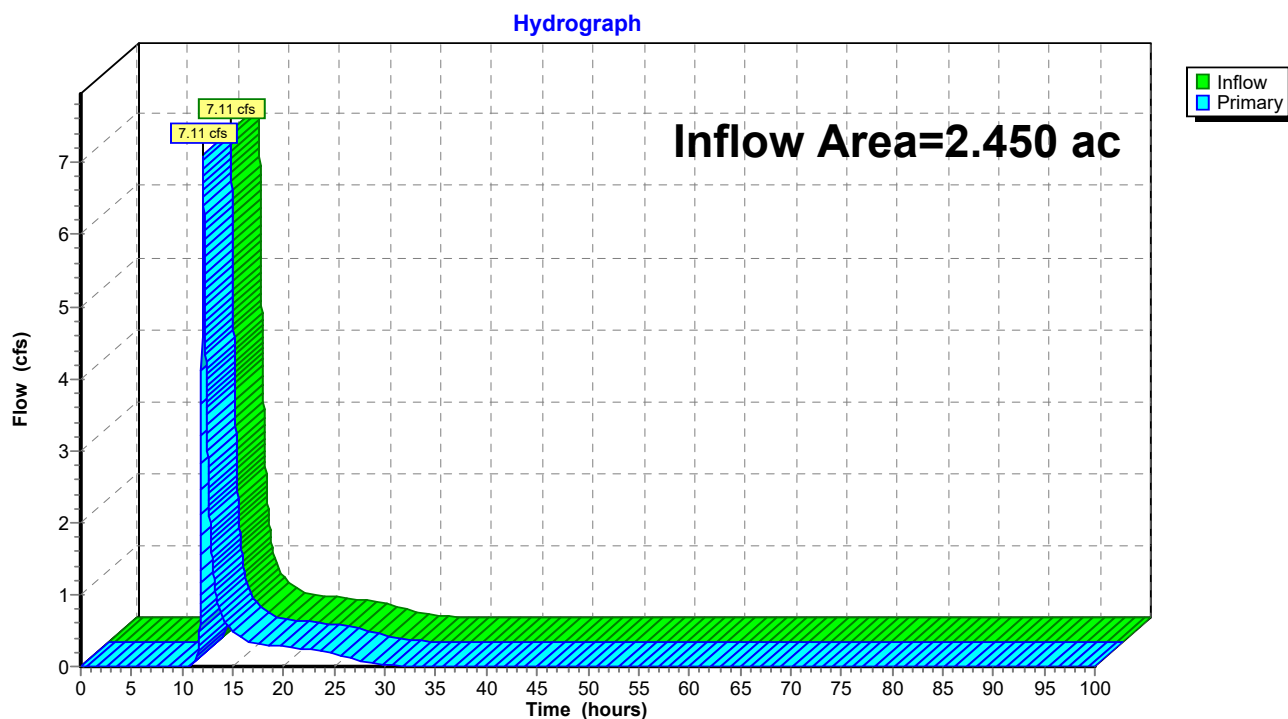
Hydrograph



**Summary for Link 11L: Combined Flow West**

Inflow Area = 2.450 ac, 52.65% Impervious, Inflow Depth = 3.76" for 50-Year event  
Inflow = 7.11 cfs @ 12.04 hrs, Volume= 0.768 af  
Primary = 7.11 cfs @ 12.04 hrs, Volume= 0.768 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 15L

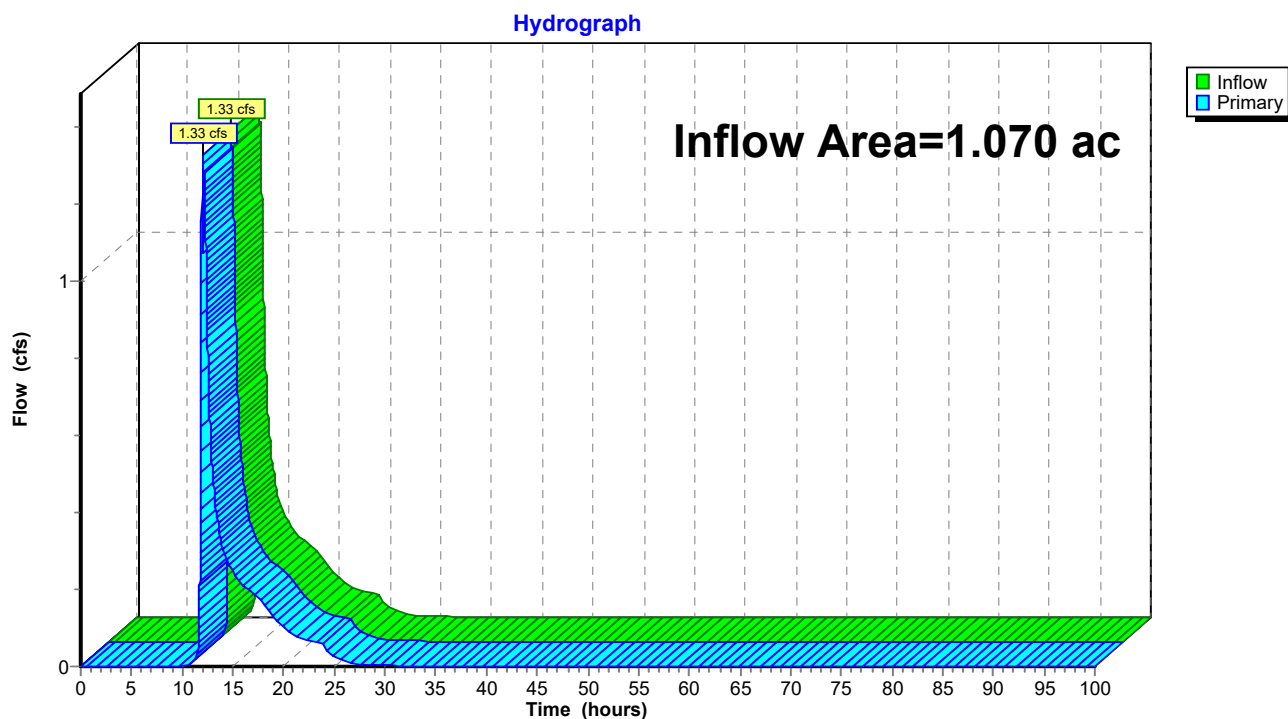
Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

**Link 11L: Combined Flow West**

**Summary for Link 12L: Combined Flow South**

Inflow Area = 1.070 ac, 24.30% Impervious, Inflow Depth = 2.79" for 50-Year event  
Inflow = 1.33 cfs @ 11.97 hrs, Volume= 0.249 af  
Primary = 1.33 cfs @ 11.97 hrs, Volume= 0.249 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 15L

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

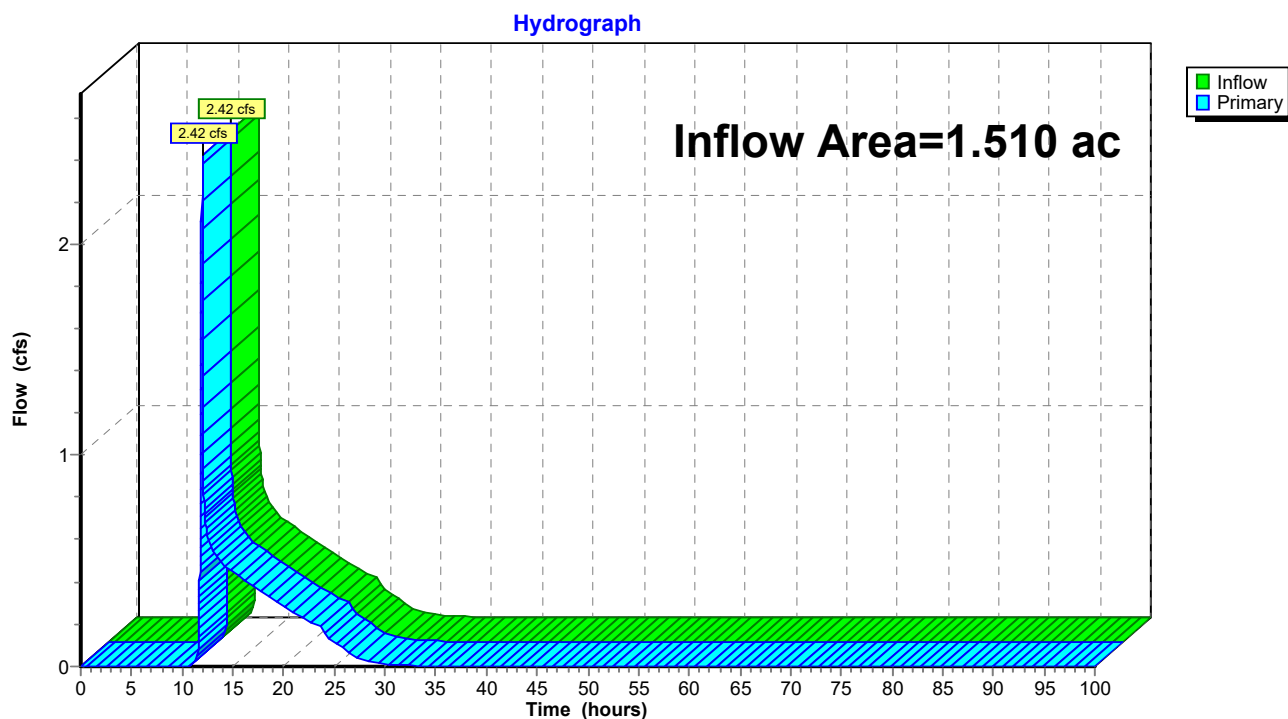
**Link 12L: Combined Flow South**



**Summary for Link 13L: Comnined Flow North**

Inflow Area = 1.510 ac, 49.01% Impervious, Inflow Depth = 3.46" for 50-Year event  
Inflow = 2.42 cfs @ 11.97 hrs, Volume= 0.435 af  
Primary = 2.42 cfs @ 11.97 hrs, Volume= 0.435 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 15L

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

**Link 13L: Comnined Flow North**

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Page 153

Time span=0.00-100.00 hrs, dt=0.01 hrs, 10001 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

|                                            |                                                                                                                            |
|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <b>Subcatchment7S: UndetainedWest</b>      | Runoff Area=0.540 ac 0.00% Impervious Runoff Depth=2.79"<br>Tc=5.0 min CN=61 Runoff=2.80 cfs 0.125 af                      |
| <b>Subcatchment8S: UndetainedNorth</b>     | Runoff Area=0.530 ac 0.00% Impervious Runoff Depth=2.79"<br>Tc=5.0 min CN=61 Runoff=2.75 cfs 0.123 af                      |
| <b>Subcatchment9S: UndetainedSoutheast</b> | Runoff Area=0.170 ac 11.76% Impervious Runoff Depth=3.20"<br>Tc=5.0 min CN=65 Runoff=1.01 cfs 0.045 af                     |
| <b>Subcatchment10S: UndetainedSouth</b>    | Runoff Area=0.090 ac 0.00% Impervious Runoff Depth=2.79"<br>Tc=5.0 min CN=61 Runoff=0.47 cfs 0.021 af                      |
| <b>SubcatchmentP-N: Proposed North</b>     | Runoff Area=0.980 ac 75.51% Impervious Runoff Depth=5.83"<br>Flow Length=321' Tc=8.1 min CN=89 Runoff=8.69 cfs 0.476 af    |
| <b>SubcatchmentP-S: Proposed South</b>     | Runoff Area=0.480 ac 22.92% Impervious Runoff Depth=3.61"<br>Flow Length=237' Tc=11.1 min CN=69 Runoff=2.57 cfs 0.145 af   |
| <b>SubcatchmentP-SE: Proposed Drainage</b> | Runoff Area=0.330 ac 39.39% Impervious Runoff Depth=4.36"<br>Flow Length=118' Tc=7.3 min CN=76 Runoff=2.41 cfs 0.120 af    |
| <b>SubcatchmentP-W: Proposed West</b>      | Runoff Area=1.910 ac 67.54% Impervious Runoff Depth=5.48"<br>Flow Length=1,203' Tc=6.7 min CN=86 Runoff=17.07 cfs 0.872 af |
| <b>Pond 1P: SE Basin</b>                   | Peak Elev=918.30' Storage=2,457 cf Inflow=2.41 cfs 0.120 af<br>Outflow=0.47 cfs 0.110 af                                   |
| <b>Pond 2P: South Basin Orifice</b>        | Peak Elev=913.81' Storage=2,475 cf Inflow=2.90 cfs 0.255 af<br>Outflow=1.20 cfs 0.245 af                                   |
| <b>Pond 3P: North Basin Orifice</b>        | Peak Elev=924.65' Storage=11,911 cf Inflow=8.69 cfs 0.476 af<br>Outflow=1.38 cfs 0.407 af                                  |
| <b>Pond 4P: West Basin Orifice</b>         | Peak Elev=912.27' Storage=16,219 cf Inflow=17.07 cfs 0.872 af<br>Outflow=8.11 cfs 0.801 af                                 |
| <b>Pond 5P: Level Spreader</b>             | Peak Elev=904.19' Storage=30 cf Inflow=8.11 cfs 0.801 af<br>Outflow=8.11 cfs 0.801 af                                      |
| <b>Link 11L: Combined Flow West</b>        | Inflow=9.42 cfs 0.926 af<br>Primary=9.42 cfs 0.926 af                                                                      |
| <b>Link 12L: Combined Flow South</b>       | Inflow=1.85 cfs 0.311 af<br>Primary=1.85 cfs 0.311 af                                                                      |
| <b>Link 13L: Comnined Flow North</b>       | Inflow=3.07 cfs 0.530 af<br>Primary=3.07 cfs 0.530 af                                                                      |

**23-047 Proposed Site Conditions\_5-7-24***Type II 24-hr 100-Year Rainfall=7.12"*

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Page 154

**Total Runoff Area = 5.030 ac   Runoff Volume = 1.928 af   Average Runoff Depth = 4.60"**  
**54.47% Pervious = 2.740 ac   45.53% Impervious = 2.290 ac**

Summary for Subcatchment 7S: Undetained West

Runoff = 2.80 cfs @ 11.97 hrs, Volume= 0.125 af, Depth= 2.79"  
Routed to Link 11L : Combined Flow West

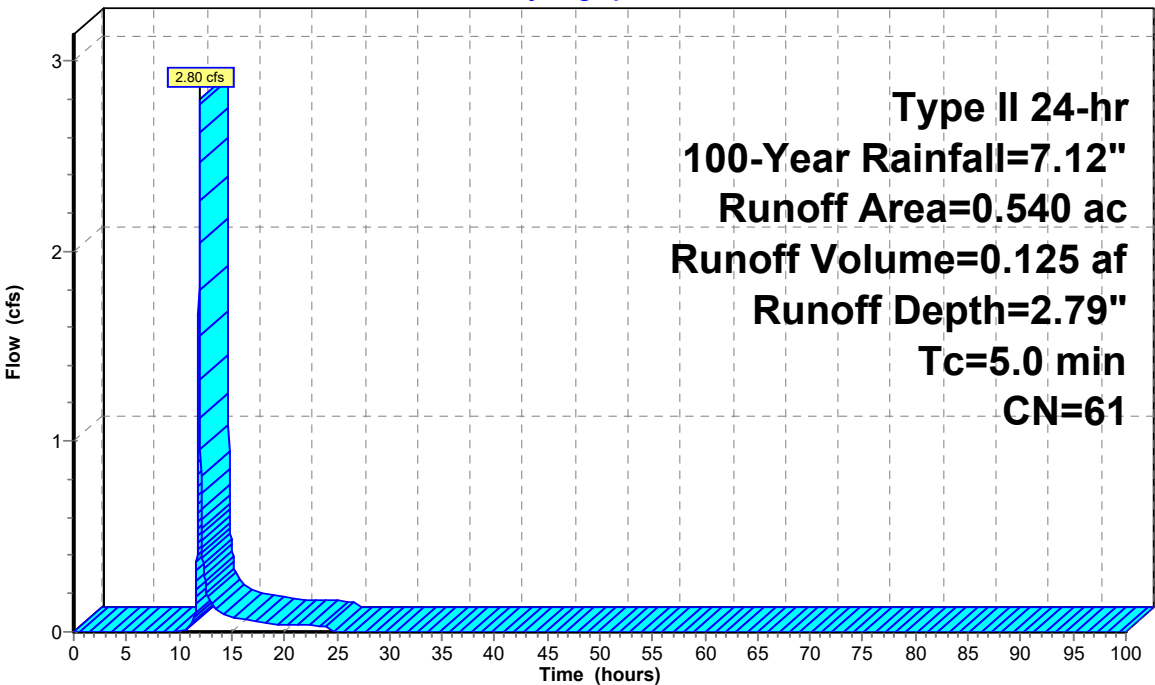
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 100-Year Rainfall=7.12"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.540   | 61 | >75% Grass cover, Good, HSG B |
| 0.540     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

Subcatchment 7S: Undetained West

Hydrograph



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Type II 24-hr 100-Year Rainfall=7.12"

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Page 156

**Summary for Subcatchment 8S: Undetained North**

Runoff = 2.75 cfs @ 11.97 hrs, Volume= 0.123 af, Depth= 2.79"  
Routed to Link 13L : Comnined Flow North

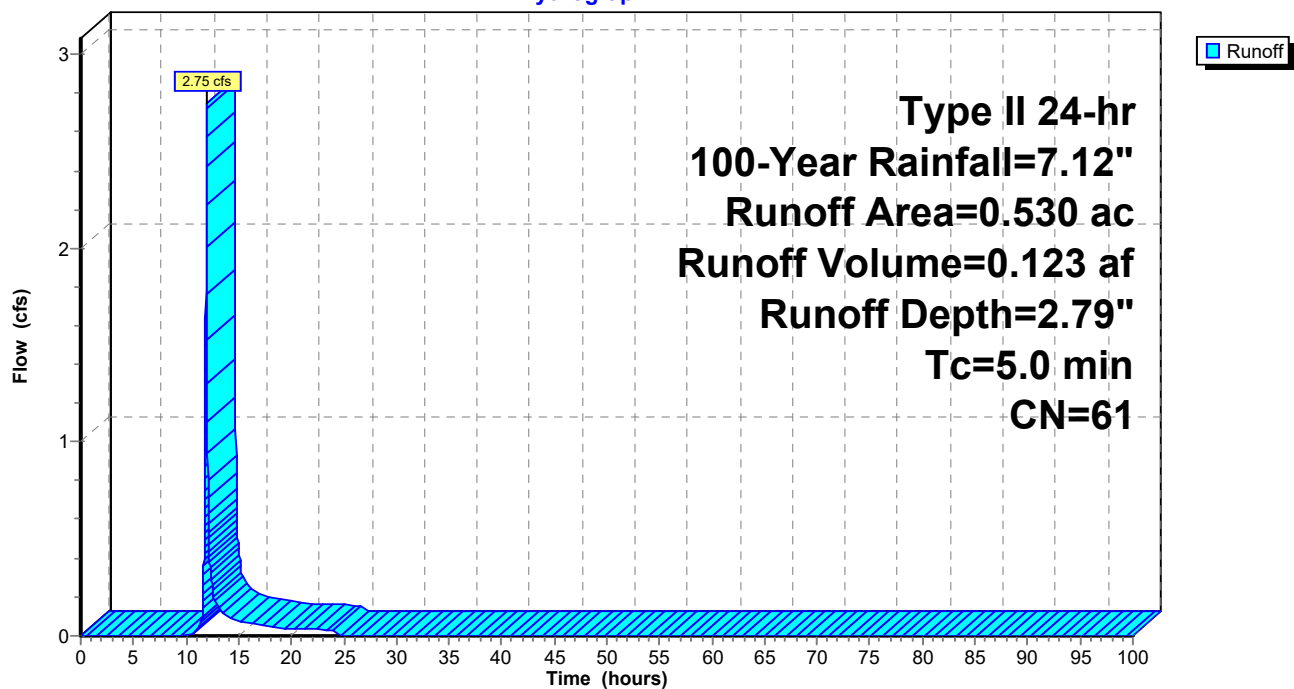
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 100-Year Rainfall=7.12"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.530   | 61 | >75% Grass cover, Good, HSG B |
| 0.530     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 8S: Undetained North**

Hydrograph





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Type II 24-hr 100-Year Rainfall=7.12"

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Page 157

**Summary for Subcatchment 9S: Undetained Southeast**

Runoff = 1.01 cfs @ 11.96 hrs, Volume= 0.045 af, Depth= 3.20"  
Routed to Link 12L : Combined Flow South

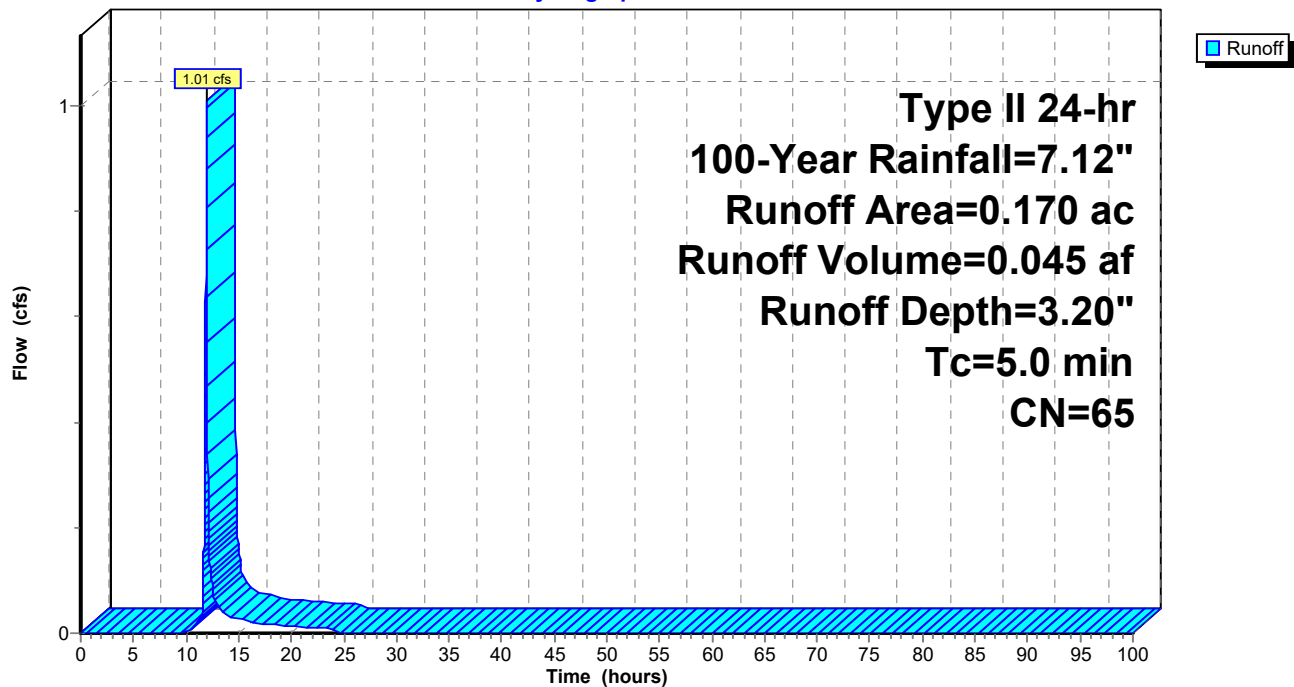
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 100-Year Rainfall=7.12"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.150   | 61 | >75% Grass cover, Good, HSG B |
| * 0.020   | 98 | Pavement                      |
| 0.170     | 65 | Weighted Average              |
| 0.150     |    | 88.24% Pervious Area          |
| 0.020     |    | 11.76% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 9S: Undetained Southeast**

Hydrograph



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Type II 24-hr 100-Year Rainfall=7.12"

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Page 158

**Summary for Subcatchment 10S: Undetained South**

Runoff = 0.47 cfs @ 11.97 hrs, Volume= 0.021 af, Depth= 2.79"  
Routed to Link 12L : Combined Flow South

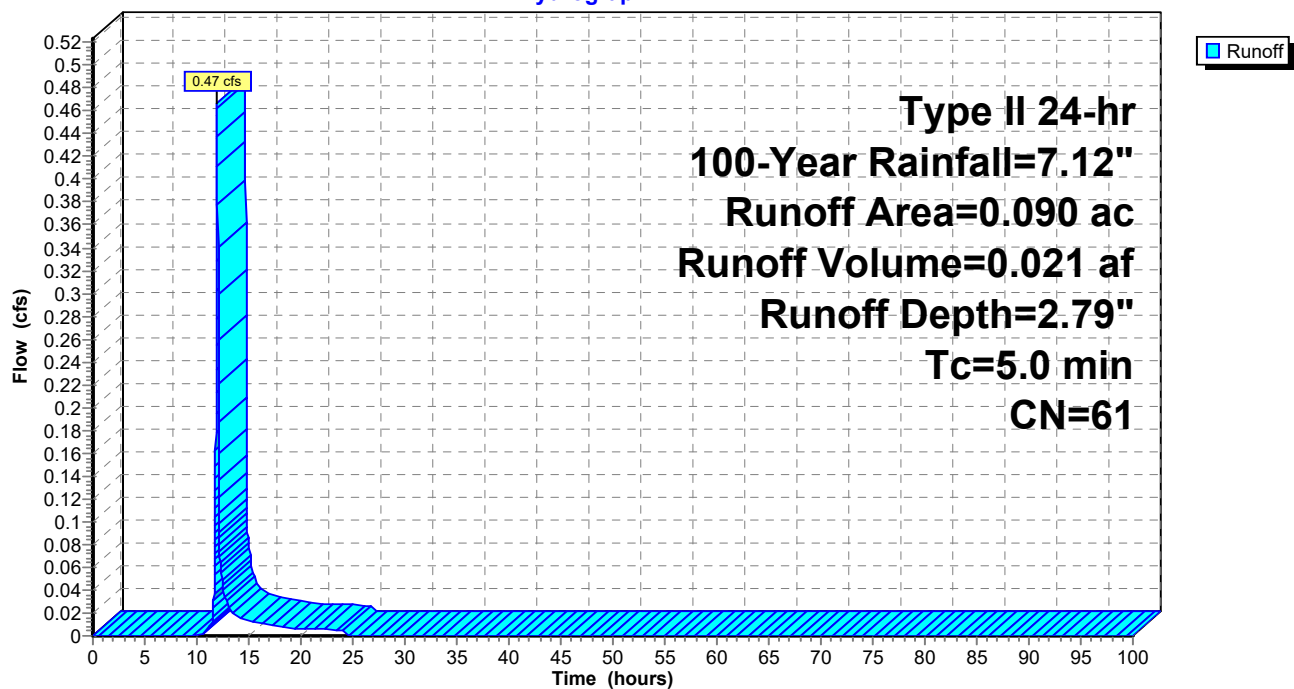
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 100-Year Rainfall=7.12"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| * 0.090   | 61 | >75% Grass cover, Good, HSG B |
| 0.090     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description   |
|----------|---------------|---------------|-------------------|----------------|---------------|
| 5.0      |               |               |                   |                | Direct Entry, |

**Subcatchment 10S: Undetained South**

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 100-Year Rainfall=7.12"

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Page 159

**Summary for Subcatchment P-N: Proposed North**

[47] Hint: Peak is 110% of capacity of segment #2

Runoff = 8.69 cfs @ 11.99 hrs, Volume= 0.476 af, Depth= 5.83"  
 Routed to Pond 3P : North Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 100-Year Rainfall=7.12"

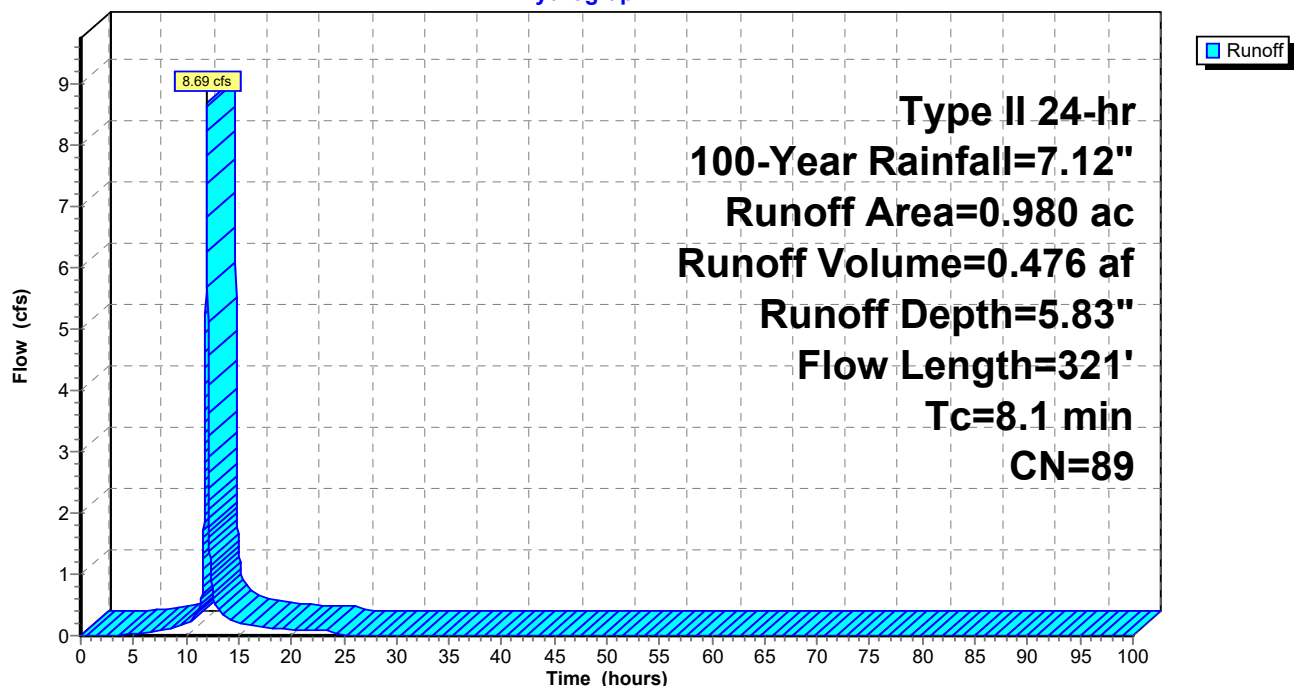
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 0.740   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.240     | 61 | >75% Grass cover, Good, HSG B       |
| 0.980     | 89 | Weighted Average                    |
| 0.240     |    | 24.49% Pervious Area                |
| 0.740     |    | 75.51% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                            |
|----------|---------------|---------------|-------------------|----------------|----------------------------------------------------------------------------------------|
| 7.5      | 91            | 0.0350        | 0.20              |                | <b>Sheet Flow, SHEET (GRASS)</b><br>Grass: Short n= 0.150 P2= 3.04"                    |
| 0.6      | 230           | 0.0150        | 6.45              | 7.91           | <b>Pipe Channel, PIPE</b><br>15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'<br>n= 0.013 |
| 8.1      | 321           | Total         |                   |                |                                                                                        |

**Subcatchment P-N: Proposed North**

Hydrograph



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Type II 24-hr 100-Year Rainfall=7.12"

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Page 160

**Summary for Subcatchment P-S: Proposed South**

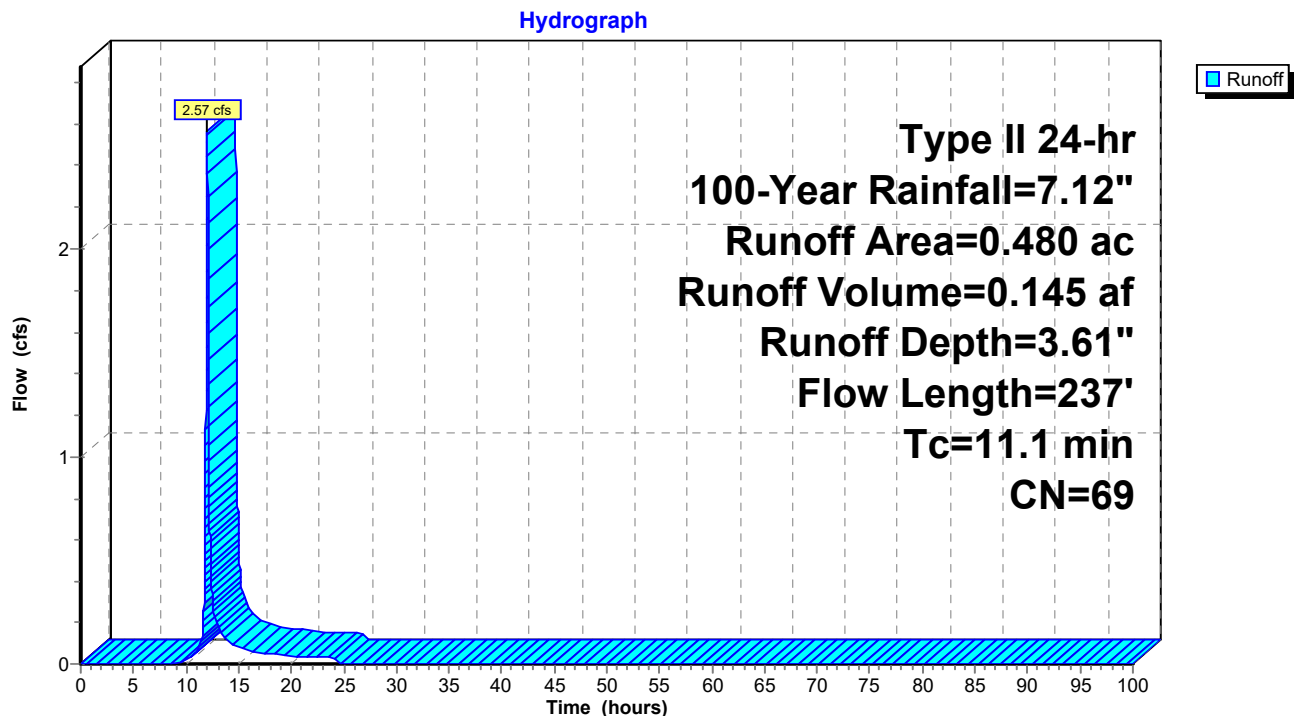
Runoff = 2.57 cfs @ 12.03 hrs, Volume= 0.145 af, Depth= 3.61"  
Routed to Pond 2P : South Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
Type II 24-hr 100-Year Rainfall=7.12"

| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 0.110   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.370     | 61 | >75% Grass cover, Good, HSG B       |
| 0.480     | 69 | Weighted Average                    |
| 0.370     |    | 77.08% Pervious Area                |
| 0.110     |    | 22.92% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                        |
|----------|---------------|---------------|-------------------|----------------|------------------------------------------------------------------------------------|
| 10.1     | 100           | 0.0200        | 0.17              |                | <b>Sheet Flow, SHEET (GRASS)</b><br>Grass: Short n= 0.150 P2= 3.04"                |
| 0.9      | 112           | 0.0200        | 2.12              |                | <b>Shallow Concentrated Flow, SHALLOW (GRASS)</b><br>Grassed Waterway Kv= 15.0 fps |
| 0.1      | 25            | 0.2500        | 7.50              |                | <b>Shallow Concentrated Flow, SHALLOW (GRASS)</b><br>Grassed Waterway Kv= 15.0 fps |
| 11.1     | 237           | Total         |                   |                |                                                                                    |

**Subcatchment P-S: Proposed South**

**23-047 Proposed Site Conditions\_5-7-24**

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Type II 24-hr 100-Year Rainfall=7.12"

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Page 161

**Summary for Subcatchment P-SE: Proposed Drainage**

Runoff = 2.41 cfs @ 11.99 hrs, Volume= 0.120 af, Depth= 4.36"  
 Routed to Pond 1P : SE Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 100-Year Rainfall=7.12"

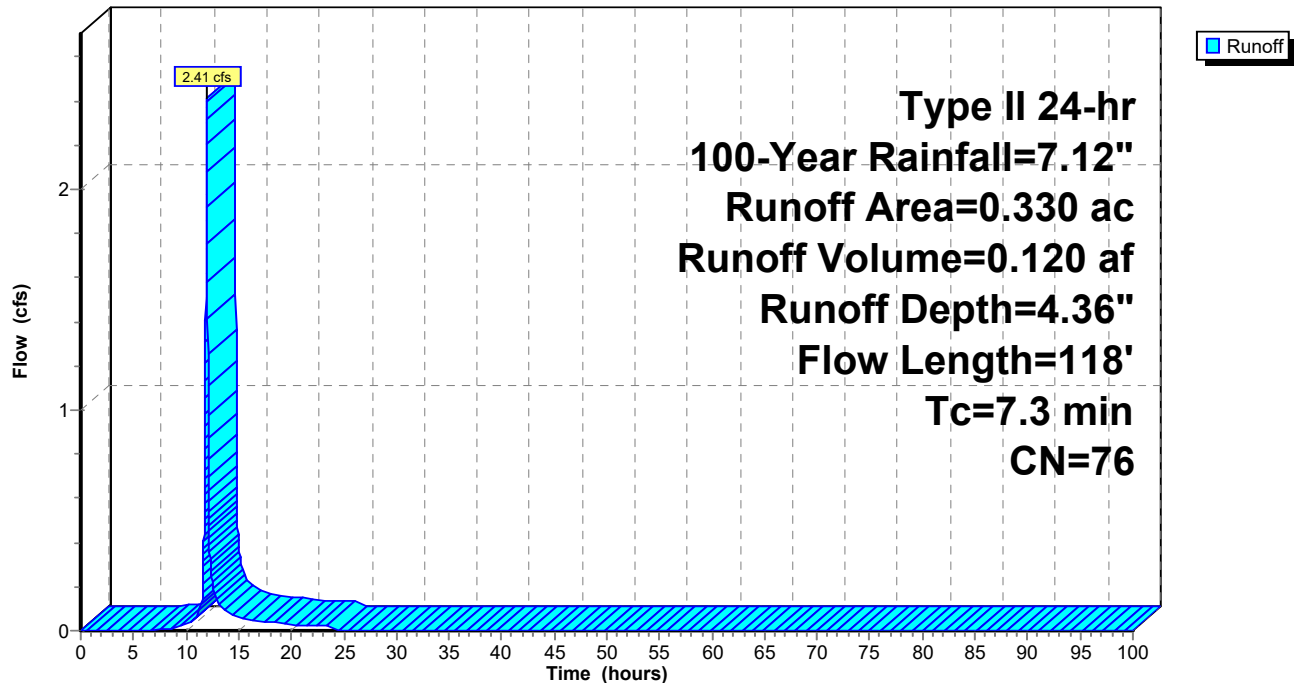
| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.130     | 98 | Paved parking, HSG C          |
| 0.200     | 61 | >75% Grass cover, Good, HSG B |
| 0.330     | 76 | Weighted Average              |
| 0.200     |    | 60.61% Pervious Area          |
| 0.130     |    | 39.39% Impervious Area        |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                       |
|----------|---------------|---------------|-------------------|----------------|-----------------------------------------------------------------------------------|
| 7.1      | 65            | 0.0200        | 0.15              |                | <b>Sheet Flow,</b><br>Grass: Short n= 0.150 P2= 3.04"                             |
| 0.2      | 53            | 0.0100        | 5.26              | 6.46           | <b>Pipe Channel,</b><br>15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'<br>n= 0.013 |
| 7.3      | 118           | Total         |                   |                |                                                                                   |

**Subcatchment P-SE: Proposed Drainage**

Hydrograph





**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 100-Year Rainfall=7.12"

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Page 162

**Summary for Subcatchment P-W: Proposed West**

[47] Hint: Peak is 133% of capacity of segment #3

Runoff = 17.07 cfs @ 11.98 hrs, Volume= 0.872 af, Depth= 5.48"  
 Routed to Pond 4P : West Basin Orifice

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Type II 24-hr 100-Year Rainfall=7.12"

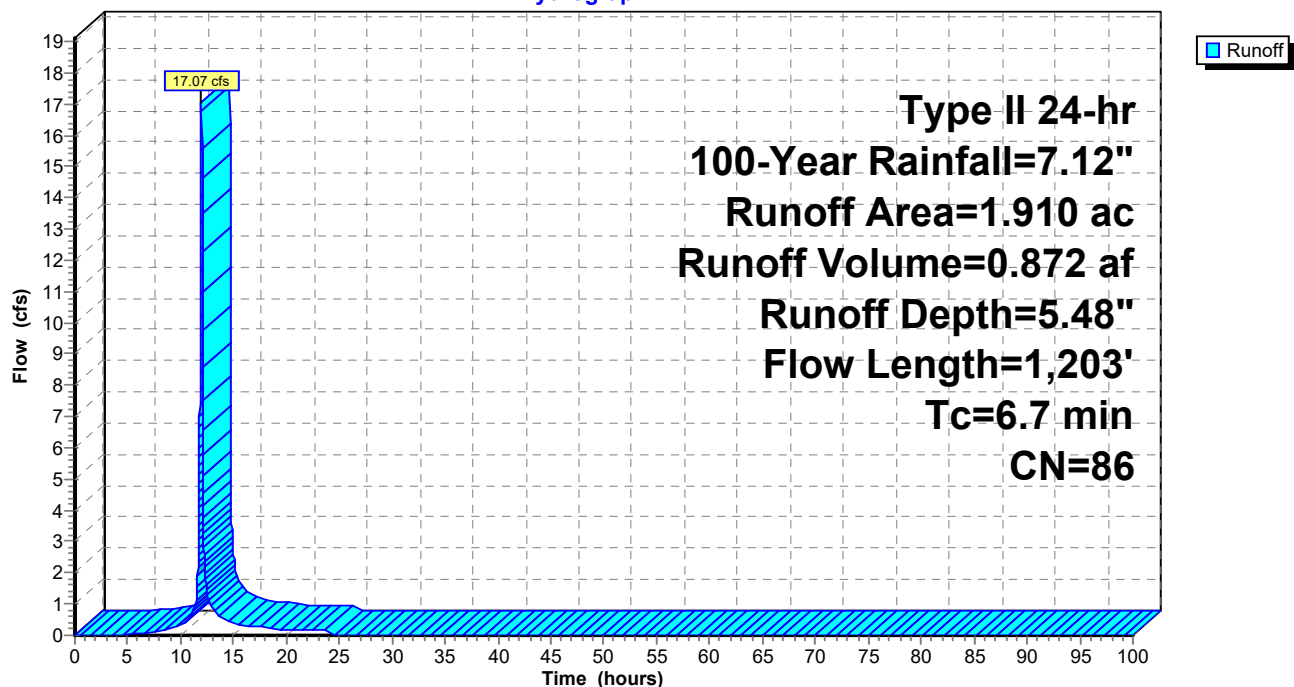
| Area (ac) | CN | Description                         |
|-----------|----|-------------------------------------|
| * 1.290   | 98 | Paved roads w/curbs & sewers, HSG C |
| 0.620     | 61 | >75% Grass cover, Good, HSG B       |
| 1.910     | 86 | Weighted Average                    |
| 0.620     |    | 32.46% Pervious Area                |
| 1.290     |    | 67.54% Impervious Area              |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                                                   |
|----------|---------------|---------------|-------------------|----------------|-----------------------------------------------------------------------------------------------|
| 2.2      | 100           | 0.0050        | 0.77              |                | <b>Sheet Flow, SHEET (PAVED)</b><br>Smooth surfaces n= 0.011 P2= 3.04"                        |
| 3.6      | 725           | 0.0280        | 3.40              |                | <b>Shallow Concentrated Flow, SHALLOW (PAVED)</b><br>Paved Kv= 20.3 fps                       |
| 0.9      | 378           | 0.0150        | 7.28              | 12.87          | <b>Pipe Channel, Storm Sewer</b><br>18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38'<br>n= 0.013 |
| 6.7      | 1,203         | Total         |                   |                |                                                                                               |

# Subcatchment P-W: Proposed West

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 100-Year Rainfall=7.12"

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Page 164

**Summary for Pond 1P: SE Basin**

Inflow Area = 0.330 ac, 39.39% Impervious, Inflow Depth = 4.36" for 100-Year event  
 Inflow = 2.41 cfs @ 11.99 hrs, Volume= 0.120 af  
 Outflow = 0.47 cfs @ 12.18 hrs, Volume= 0.110 af, Atten= 80%, Lag= 11.7 min  
 Primary = 0.47 cfs @ 12.18 hrs, Volume= 0.110 af  
 Routed to Pond 2P : South Basin Orifice

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 918.30' @ 12.18 hrs Surf.Area= 3,067 sf Storage= 2,457 cf

Plug-Flow detention time= 167.7 min calculated for 0.110 af (92% of inflow)  
 Center-of-Mass det. time= 124.3 min ( 939.2 - 814.8 )

| Volume | Invert  | Avail.Storage | Storage Description                                        |
|--------|---------|---------------|------------------------------------------------------------|
| #1     | 916.91' | 8,715 cf      | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |

| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet) |
|---------------------|----------------------|---------------------------|---------------------------|
| 916.91              | 0                    | 0                         | 0                         |
| 918.00              | 2,856                | 1,557                     | 1,557                     |
| 919.00              | 3,551                | 3,204                     | 4,760                     |
| 920.00              | 4,358                | 3,955                     | 8,715                     |

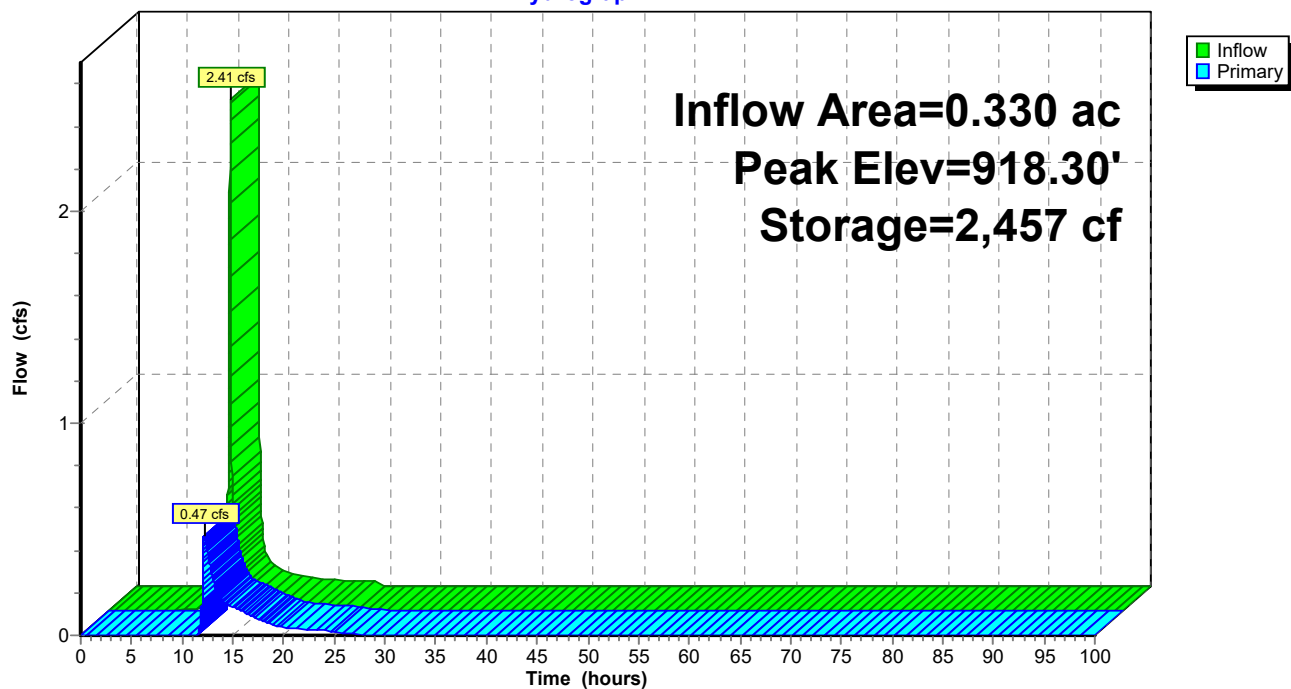
| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                             |
|--------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 916.26' | <b>4.0" Round Culvert X 3.00</b> L= 30.2' Ke= 0.500<br>Inlet / Outlet Invert= 916.26' / 915.96' S= 0.0099 '/' Cc= 0.900<br>n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.09 sf |
| #2     | Device 1 | 917.48' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                                 |
| #3     | Device 1 | 918.00' | <b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b><br>Head (feet) 0.00 0.45 0.45 0.95<br>Width (feet) 0.50 0.50 3.00 3.00                                                                      |

**Primary OutFlow** Max=0.47 cfs @ 12.18 hrs HW=918.30' (Free Discharge)

1=Culvert (Passes 0.47 cfs of 1.26 cfs potential flow)  
 2=Orifice/Grate (Orifice Controls 0.20 cfs @ 4.03 fps)  
 3=Custom Weir/Orifice (Weir Controls 0.27 cfs @ 1.81 fps)

# Pond 1P: SE Basin

## Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 100-Year Rainfall=7.12"

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Page 166

**Summary for Pond 2P: South Basin Orifice**

Inflow Area = 0.810 ac, 29.63% Impervious, Inflow Depth = 3.77" for 100-Year event  
 Inflow = 2.90 cfs @ 12.04 hrs, Volume= 0.255 af  
 Outflow = 1.20 cfs @ 12.24 hrs, Volume= 0.245 af, Atten= 59%, Lag= 11.8 min  
 Primary = 1.20 cfs @ 12.24 hrs, Volume= 0.245 af  
 Routed to Link 12L : Combined Flow South

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 913.81' @ 12.24 hrs Surf.Area= 1,941 sf Storage= 2,475 cf

Plug-Flow detention time= 82.4 min calculated for 0.245 af (96% of inflow)  
 Center-of-Mass det. time= 56.4 min ( 935.8 - 879.4 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                        |
|---------------------|----------------------|---------------------------|------------------------------------------------------------|
| #1                  | 911.50'              | 5,431 cf                  | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                                  |
| 911.50              | 0                    | 0                         | 0                                                          |
| 912.00              | 682                  | 171                       | 171                                                        |
| 913.00              | 1,303                | 993                       | 1,163                                                      |
| 914.00              | 2,092                | 1,698                     | 2,861                                                      |
| 915.00              | 3,048                | 2,570                     | 5,431                                                      |

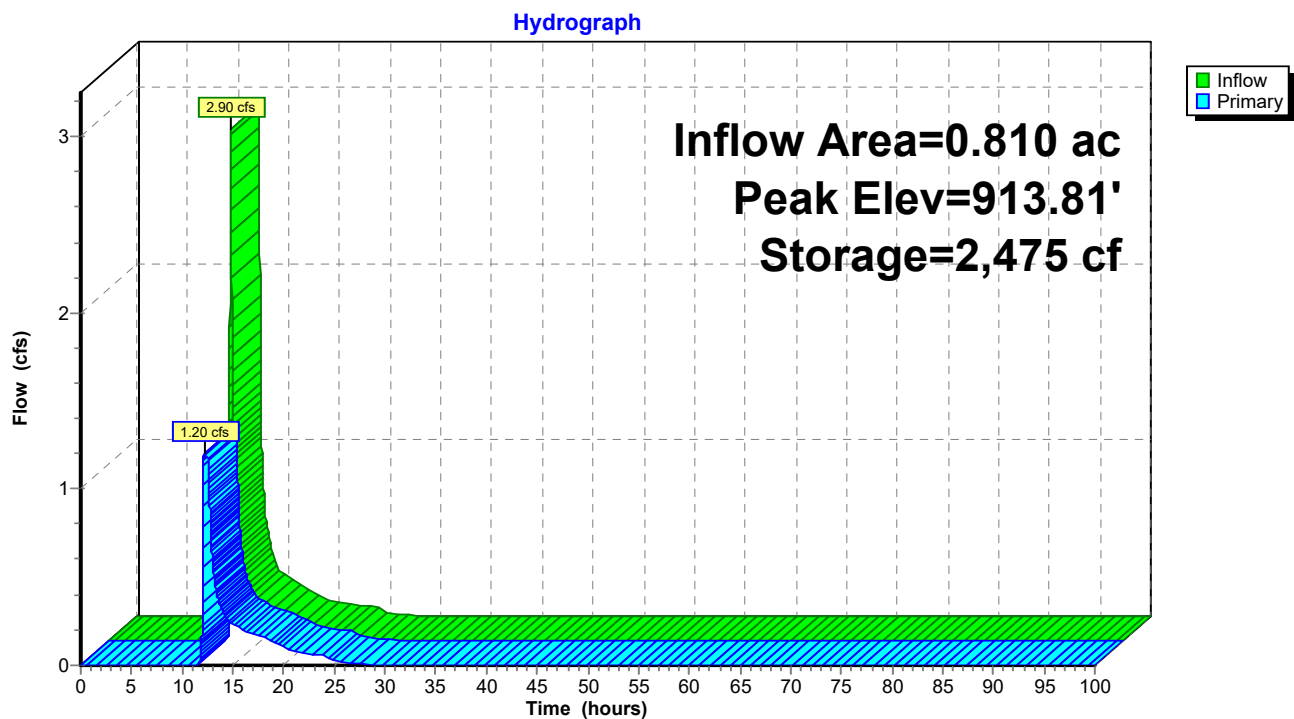
  

| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                 |
|--------|----------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 911.34' | <b>6.0" Round Culvert</b><br>L= 68.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 911.34' / 909.31' S= 0.0299 '/' Cc= 0.900<br>n= 0.013, Flow Area= 0.20 sf |
| #2     | Device 1 | 912.31' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                     |
| #3     | Device 1 | 913.00' | <b>10.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                    |

**Primary OutFlow** Max=1.20 cfs @ 12.24 hrs HW=913.81' (Free Discharge)

- 1=Culvert (Barrel Controls 1.20 cfs @ 6.12 fps)
- 2=Orifice/Grate (Passes < 0.28 cfs potential flow)
- 3=Orifice/Grate (Passes < 1.66 cfs potential flow)

# Pond 2P: South Basin Orifice





**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 100-Year Rainfall=7.12"

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Page 168

**Summary for Pond 3P: North Basin Orifice**

Inflow Area = 0.980 ac, 75.51% Impervious, Inflow Depth = 5.83" for 100-Year event  
 Inflow = 8.69 cfs @ 11.99 hrs, Volume= 0.476 af  
 Outflow = 1.38 cfs @ 12.24 hrs, Volume= 0.407 af, Atten= 84%, Lag= 15.0 min  
 Primary = 1.38 cfs @ 12.24 hrs, Volume= 0.407 af  
 Routed to Link 13L : Combined Flow North

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 924.65' @ 12.24 hrs Surf.Area= 3,447 sf Storage= 11,911 cf

Plug-Flow detention time= 338.7 min calculated for 0.407 af (86% of inflow)  
 Center-of-Mass det. time= 273.1 min ( 1,054.3 - 781.3 )

| Volume | Invert  | Avail.Storage | Storage Description                                                                                                                                                                                                                                        |
|--------|---------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1A    | 919.40' | 6,149 cf      | <b>20.08'W x 171.65'L x 6.75'H Field A</b><br>23,269 cf Overall - 7,897 cf Embedded = 15,373 cf x 40.0% Voids                                                                                                                                              |
| #2A    | 920.15' | 7,897 cf      | <b>ADS_StormTech MC-7200 +Cap</b> x 44 Inside #1<br>Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf<br>Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap<br>44 Chambers in 2 Rows<br>Cap Storage= 39.5 cf x 2 x 2 rows = 158.0 cf |
|        |         | 14,046 cf     | Total Available Storage                                                                                                                                                                                                                                    |

Storage Group A created with Chamber Wizard

| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                   |
|--------|----------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 918.30' | <b>12.0" Round Culvert</b><br>L= 104.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 918.30' / 910.25' S= 0.0774 '/' Cc= 0.900<br>n= 0.013, Flow Area= 0.79 sf |
| #2     | Device 1 | 920.87' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                       |
| #3     | Device 1 | 924.15' | <b>12.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                      |

**Primary OutFlow** Max=1.38 cfs @ 12.24 hrs HW=924.64' (Free Discharge)

↑ **1=Culvert** (Passes 1.38 cfs of 9.14 cfs potential flow)  
 ↑ **2=Orifice/Grate** (Orifice Controls 0.45 cfs @ 9.20 fps)  
 ↑ **3=Orifice/Grate** (Orifice Controls 0.93 cfs @ 2.40 fps)

## 23-047 Proposed Site Conditions\_5-7-24

Type II 24-hr 100-Year Rainfall=7.12"

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Page 169

### Pond 3P: North Basin Orifice - Chamber Wizard Field A

**Chamber Model = ADS\_StormTechMC-7200 +Cap (ADS StormTech®MC-7200 with cap volume)**

Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf

Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap

Cap Storage= 39.5 cf x 2 x 2 rows = 158.0 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

22 Chambers/Row x 6.59' Long +2.73' Cap Length x 2 = 150.48' Row Length +127.0" End Stone x 2 = 171.65' Base Length

2 Rows x 100.0" Wide + 9.0" Spacing x 1 + 16.0" Side Stone x 2 = 20.08' Base Width

9.0" Stone Base + 60.0" Chamber Height + 12.0" Stone Cover = 6.75' Field Height

44 Chambers x 175.9 cf + 39.5 cf Cap Volume x 2 x 2 Rows = 7,896.5 cf Chamber Storage

23,269.3 cf Field - 7,896.5 cf Chambers = 15,372.8 cf Stone x 40.0% Voids = 6,149.1 cf Stone Storage

Chamber Storage + Stone Storage = 14,045.6 cf = 0.322 af

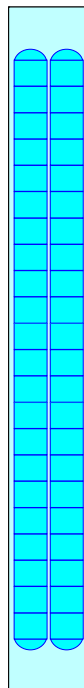
Overall Storage Efficiency = 60.4%

Overall System Size = 171.65' x 20.08' x 6.75'

44 Chambers

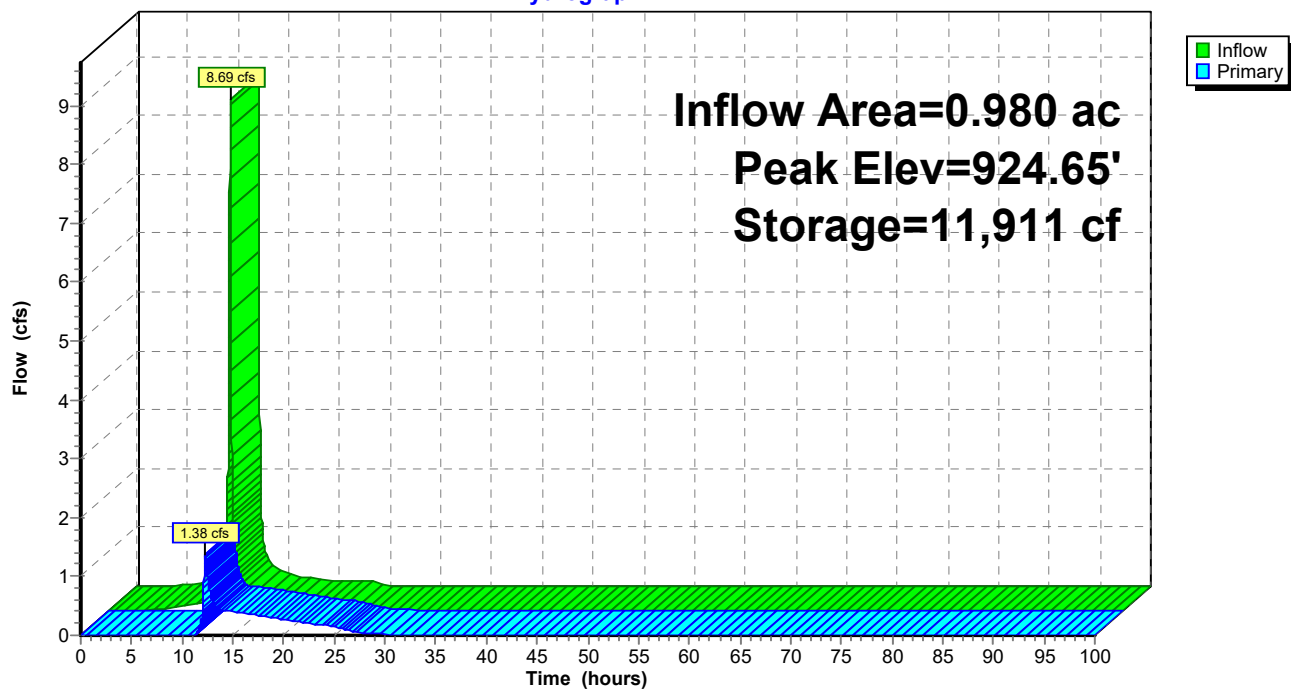
861.8 cy Field

569.4 cy Stone



### Pond 3P: North Basin Orifice

Hydrograph



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 100-Year Rainfall=7.12"

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Page 171

**Summary for Pond 4P: West Basin Orifice**

[95] Warning: Outlet Device #3 rise exceeded

Inflow Area = 1.910 ac, 67.54% Impervious, Inflow Depth = 5.48" for 100-Year event  
 Inflow = 17.07 cfs @ 11.98 hrs, Volume= 0.872 af  
 Outflow = 8.11 cfs @ 12.07 hrs, Volume= 0.801 af, Atten= 52%, Lag= 5.8 min  
 Primary = 8.11 cfs @ 12.07 hrs, Volume= 0.801 af  
 Routed to Pond 5P : Level Spreader

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs  
 Peak Elev= 912.27' @ 12.07 hrs Surf.Area= 6,037 sf Storage= 16,219 cf

Plug-Flow detention time= 186.7 min calculated for 0.800 af (92% of inflow)  
 Center-of-Mass det. time= 142.9 min ( 932.0 - 789.1 )

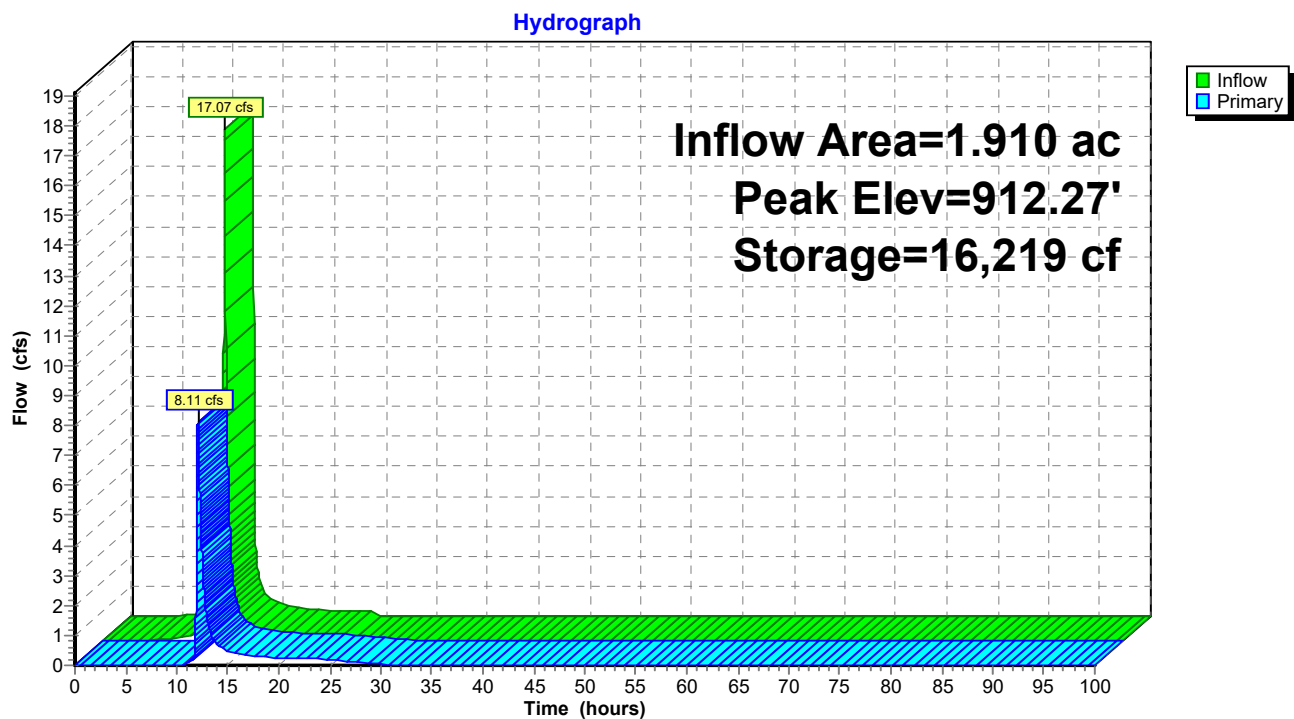
| Volume              | Invert               | Avail.Storage             | Storage Description                                        |
|---------------------|----------------------|---------------------------|------------------------------------------------------------|
| #1                  | 907.00'              | 28,862 cf                 | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                                  |
| 907.00              | 0                    | 0                         | 0                                                          |
| 908.00              | 1,584                | 792                       | 792                                                        |
| 909.00              | 2,402                | 1,993                     | 2,785                                                      |
| 910.00              | 3,364                | 2,883                     | 5,668                                                      |
| 911.00              | 4,448                | 3,906                     | 9,574                                                      |
| 912.00              | 5,668                | 5,058                     | 14,632                                                     |
| 913.00              | 7,027                | 6,348                     | 20,980                                                     |
| 914.00              | 8,738                | 7,883                     | 28,862                                                     |

| Device | Routing  | Invert  | Outlet Devices                                                                                                                                                                  |
|--------|----------|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| #1     | Primary  | 908.00' | <b>15.0" Round Culvert</b><br>L= 32.0' RCP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 908.00' / 904.00' S= 0.1250 '/' Cc= 0.900<br>n= 0.013, Flow Area= 1.23 sf |
| #2     | Device 1 | 909.14' | <b>3.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads                                                                                                      |
| #3     | Device 1 | 910.50' | <b>Custom Weir/Orifice, Cv= 2.62 (C= 3.28)</b><br>Head (feet) 0.00 1.25 1.25 1.75<br>Width (feet) 1.00 1.00 1.00 1.00                                                           |

**Primary OutFlow** Max=8.11 cfs @ 12.07 hrs HW=912.27' (Free Discharge)

- ↑ **1=Culvert** (Passes 8.11 cfs of 11.28 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.41 cfs @ 8.35 fps)
- ↑ **3=Custom Weir/Orifice** (Orifice Controls 7.70 cfs @ 4.40 fps)

### Pond 4P: West Basin Orifice



**23-047 Proposed Site Conditions\_5-7-24**

Type II 24-hr 100-Year Rainfall=7.12"

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Page 173

**Summary for Pond 5P: Level Spreader**

[79] Warning: Submerged Pond 4P Primary device # 1 OUTLET by 0.19'

Inflow Area = 1.910 ac, 67.54% Impervious, Inflow Depth = 5.03" for 100-Year event  
 Inflow = 8.11 cfs @ 12.07 hrs, Volume= 0.801 af  
 Outflow = 8.11 cfs @ 12.08 hrs, Volume= 0.801 af, Atten= 0%, Lag= 0.1 min  
 Primary = 8.11 cfs @ 12.08 hrs, Volume= 0.801 af  
 Routed to Link 11L : Combined Flow West

Routing by Stor-Ind method, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

Peak Elev= 904.19' @ 12.08 hrs Surf.Area= 241 sf Storage= 30 cf

Plug-Flow detention time= 0.1 min calculated for 0.801 af (100% of inflow)

Center-of-Mass det. time= 0.1 min ( 932.1 - 932.0 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                        |
|---------------------|----------------------|---------------------------|------------------------------------------------------------|
| #1                  | 904.00'              | 1,255 cf                  | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                                  |
| 904.00              | 72                   | 0                         | 0                                                          |
| 905.00              | 961                  | 517                       | 517                                                        |
| 906.00              | 515                  | 738                       | 1,255                                                      |

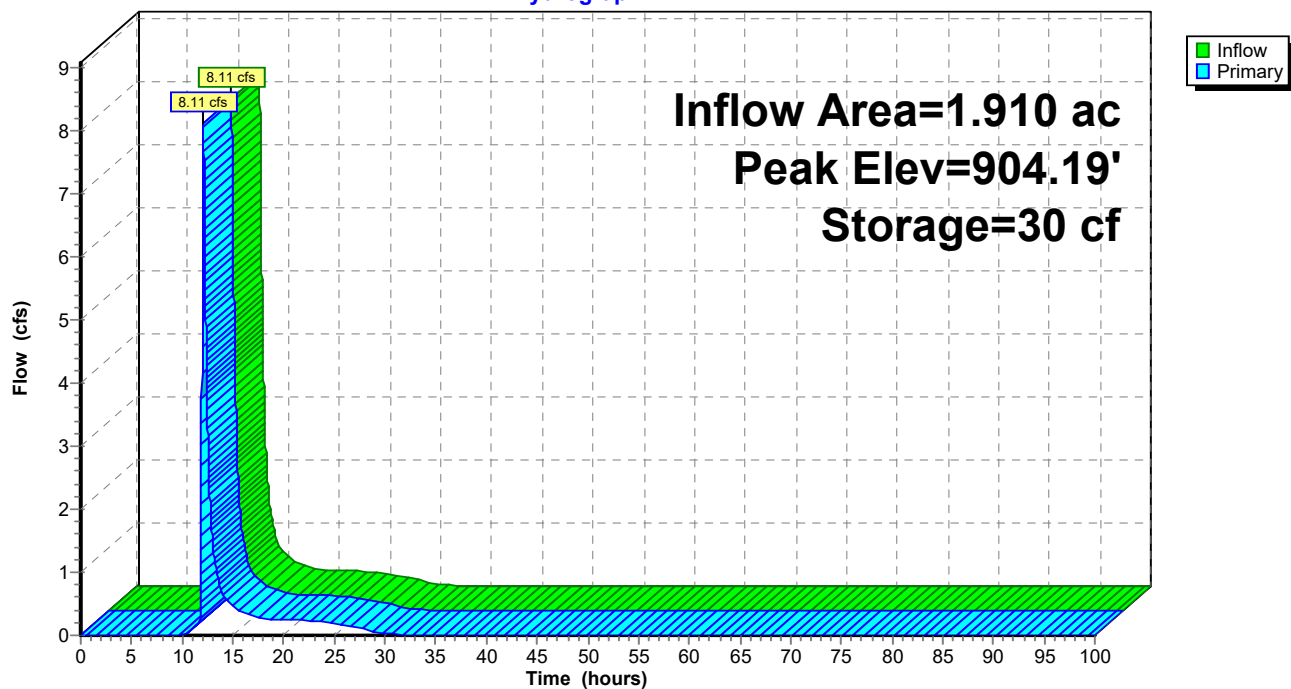
| Device | Routing | Invert  | Outlet Devices                                                        |
|--------|---------|---------|-----------------------------------------------------------------------|
| #1     | Primary | 904.00' | <b>30.0' long Sharp-Crested Rectangular Weir</b> 2 End Contraction(s) |

**Primary OutFlow** Max=8.10 cfs @ 12.08 hrs HW=904.19' TW=902.00' (Fixed TW Elev= 902.00')↑**1=Sharp-Crested Rectangular Weir**(Weir Controls 8.10 cfs @ 1.42 fps)



# Pond 5P: Level Spreader

Hydrograph

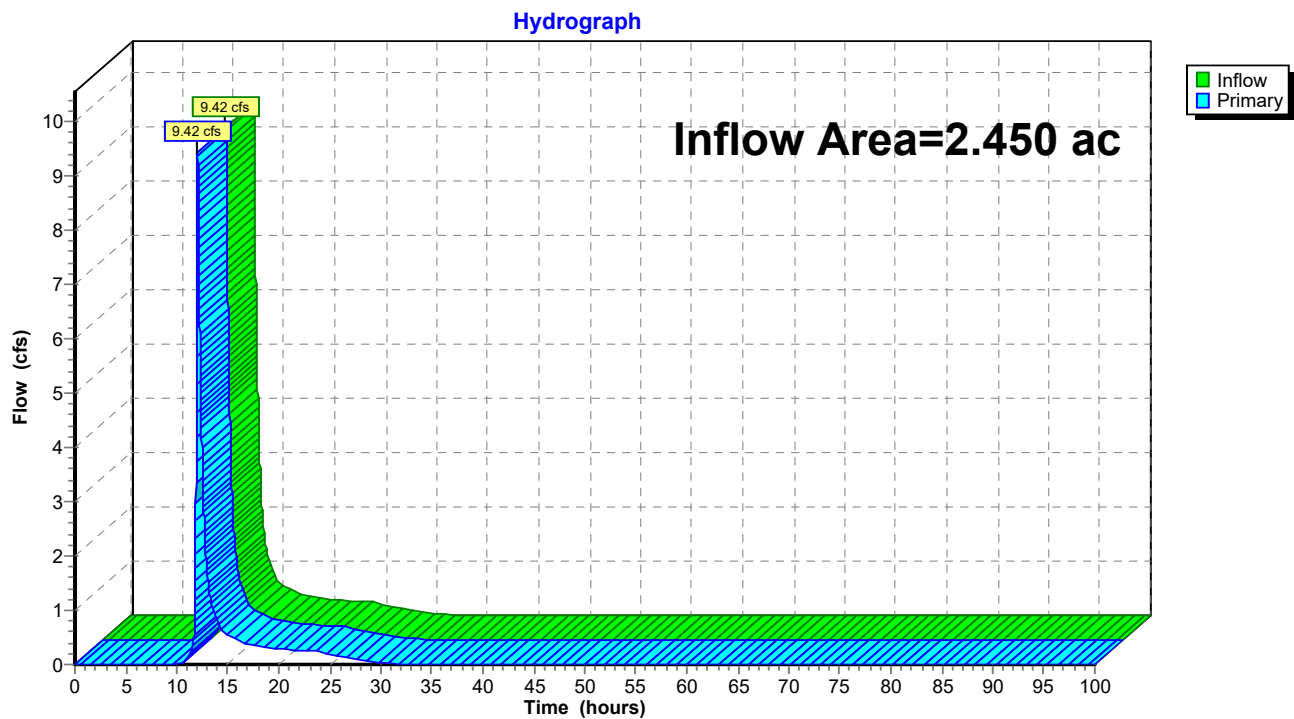


### Summary for Link 11L: Combined Flow West

Inflow Area = 2.450 ac, 52.65% Impervious, Inflow Depth = 4.54" for 100-Year event  
 Inflow = 9.42 cfs @ 12.03 hrs, Volume= 0.926 af  
 Primary = 9.42 cfs @ 12.03 hrs, Volume= 0.926 af, Atten= 0%, Lag= 0.0 min  
 Routed to nonexistent node 15L

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

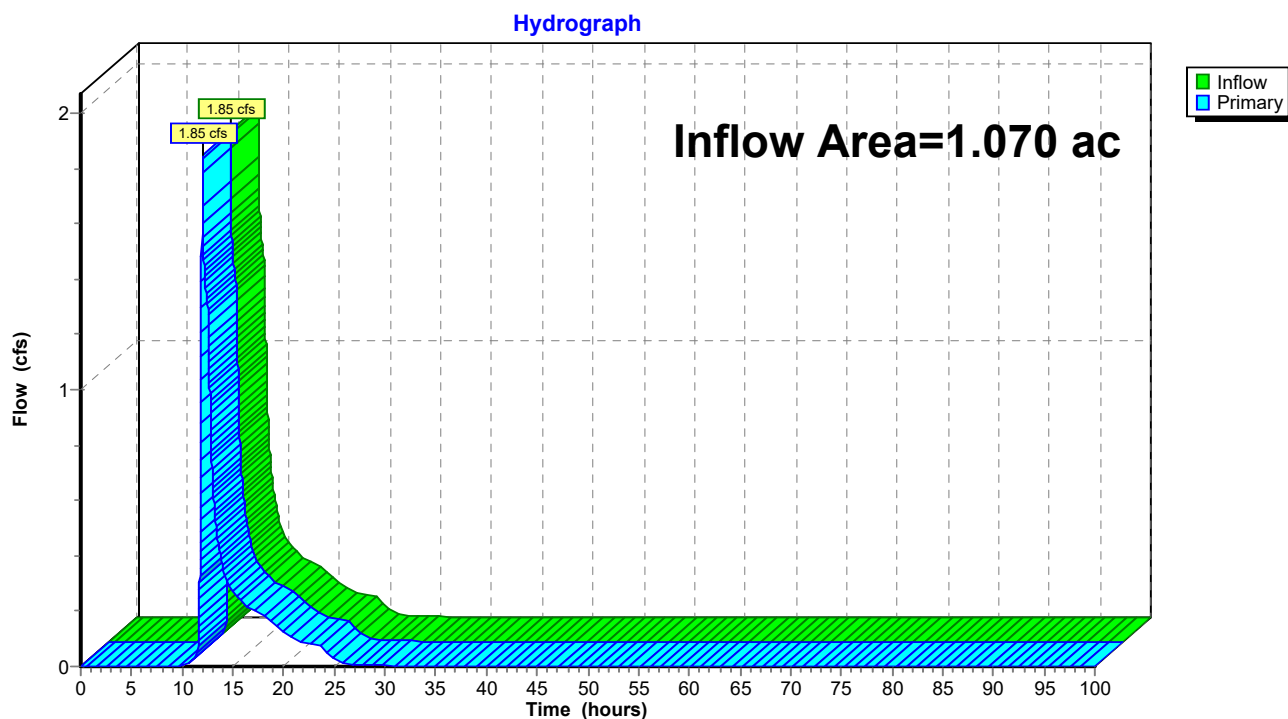
### Link 11L: Combined Flow West



**Summary for Link 12L: Combined Flow South**

Inflow Area = 1.070 ac, 24.30% Impervious, Inflow Depth = 3.49" for 100-Year event  
Inflow = 1.85 cfs @ 12.01 hrs, Volume= 0.311 af  
Primary = 1.85 cfs @ 12.01 hrs, Volume= 0.311 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 15L

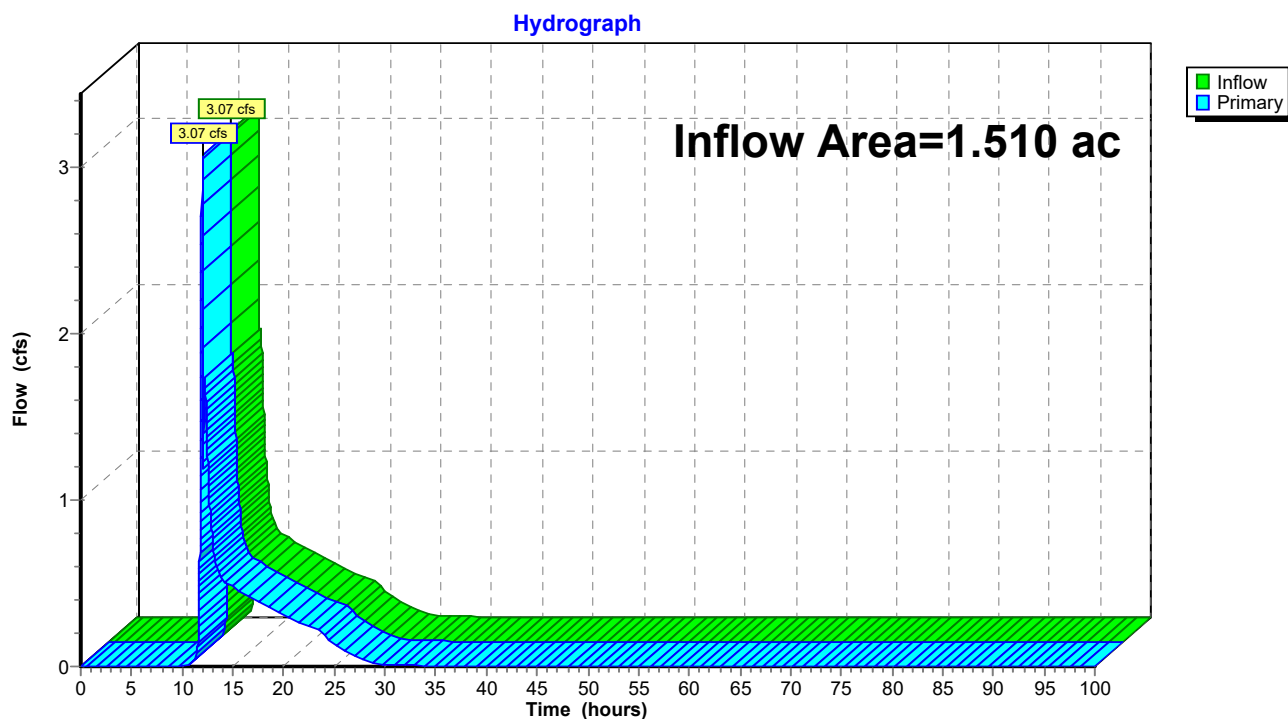
Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

**Link 12L: Combined Flow South**

**Summary for Link 13L: Comnined Flow North**

Inflow Area = 1.510 ac, 49.01% Impervious, Inflow Depth = 4.21" for 100-Year event  
Inflow = 3.07 cfs @ 11.97 hrs, Volume= 0.530 af  
Primary = 3.07 cfs @ 11.97 hrs, Volume= 0.530 af, Atten= 0%, Lag= 0.0 min  
Routed to nonexistent node 15L

Primary outflow = Inflow, Time Span= 0.00-100.00 hrs, dt= 0.01 hrs

**Link 13L: Comnined Flow North**

## Appendix G: Water Quality Calculations

Water recharge volume requirements have been met for the underground and all above ground detention areas. Therefore water quality is not needed. See Appendix H for recharge volume calculations.

The Rev is being met on this site, therefore the WQv is also considered to be met per ISWMM 3.01-2 pg 3.

## Appendix H: Water Quality, Recharge Calculations

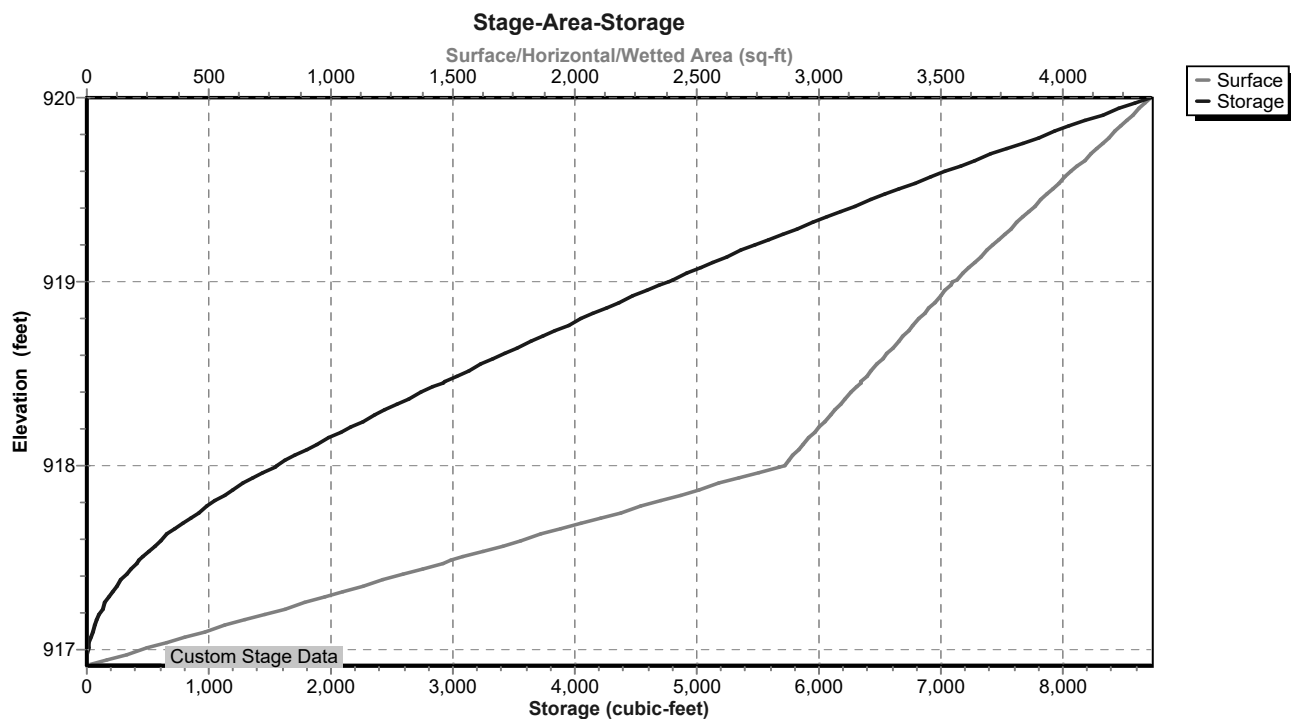
| Recharge Volume (Rev)                                                                    |                     |                      |                     |                     |                 |                   |                       |                   |                  |                 |                |
|------------------------------------------------------------------------------------------|---------------------|----------------------|---------------------|---------------------|-----------------|-------------------|-----------------------|-------------------|------------------|-----------------|----------------|
| $\text{Rev} = 0.95 \times A \times D / 12$ (Equation 3.01-2-1)                           |                     |                      |                     |                     |                 |                   |                       |                   |                  |                 |                |
| 0.95 = Runoff Coefficient<br>A = Impervious surface area (sf)<br>D = Recharge Depth (in) |                     |                      |                     |                     |                 |                   |                       |                   |                  |                 |                |
| Design Data                                                                              |                     |                      |                     |                     |                 |                   |                       |                   |                  |                 |                |
| See Example Table 3.01-2-1A                                                              |                     |                      |                     |                     |                 |                   |                       |                   |                  |                 |                |
| BMP                                                                                      | Treatment Area (ac) | Impervious Area (sf) | Site Impervious (%) | Recharge Depth (in) | Rev to BMP (cf) | Upstream Rev (cf) | Total Rev to BMP (cf) | Rev Retained (cf) | Rev Retained (%) | Rev Bypass (cf) | Downstream BMP |
| North                                                                                    | 0.98                | 32,234               | 75.51%              | 1                   | 2,552           | 0                 | 2,552                 | 2,552             | 100              | 0               |                |
| South                                                                                    | 0.48                | 4,792                | 22.92%              | 1                   | 379             | 0                 | 379                   | 379               | 100              | 0               |                |
| Southeast                                                                                | 0.33                | 5,663                | 39.40%              | 1                   | 448             | 0                 | 448                   | 448               | 100              | 0               |                |
| West                                                                                     | 1.91                | 56,192               | 67.54%              | 1                   | 4,449           | 0                 | 4,449                 | 4,449             | 100              | 0               |                |
| Total                                                                                    | 3.70                | 98,881               | 61.35%              |                     |                 |                   |                       |                   |                  |                 |                |

| 23-047 Recharge Calculations |        |                     |      |         |
|------------------------------|--------|---------------------|------|---------|
| North Detention              |        |                     |      |         |
| Recharge needed              | 2552   | Stone Storage       |      | 1378.80 |
| Stone Cover                  | 12"    | Storage Area needed |      | 1173.20 |
| Void Ratio                   | 0.4    | Height of Outlet    |      | 0.46    |
| Stone Area (sf)              | 3447   | Elevation of Outlet |      | 920.87  |
| Storage Area (sf)            | 2509   |                     |      |         |
| South Detention              |        |                     |      |         |
| Recharge needed              | 379    | Contour             | 912  | 913     |
|                              |        | Area (cuft)         | 114  | 976     |
| Elevation of Outlet          | 912.31 |                     |      |         |
| Southeast Detention          |        |                     |      |         |
| Recharge needed              | 448    | Contour             | 917  | 918     |
|                              |        | Area (cuft)         | 0    | 952     |
| Elevation of Outlet          | 917.48 |                     |      |         |
| West Detention               |        |                     |      |         |
| Recharge needed              | 4449   | Contour             | 909  | 910     |
|                              |        | Area (cuft)         | 3986 | 7350    |
| Elevation of Outlet          | 909.14 |                     |      |         |

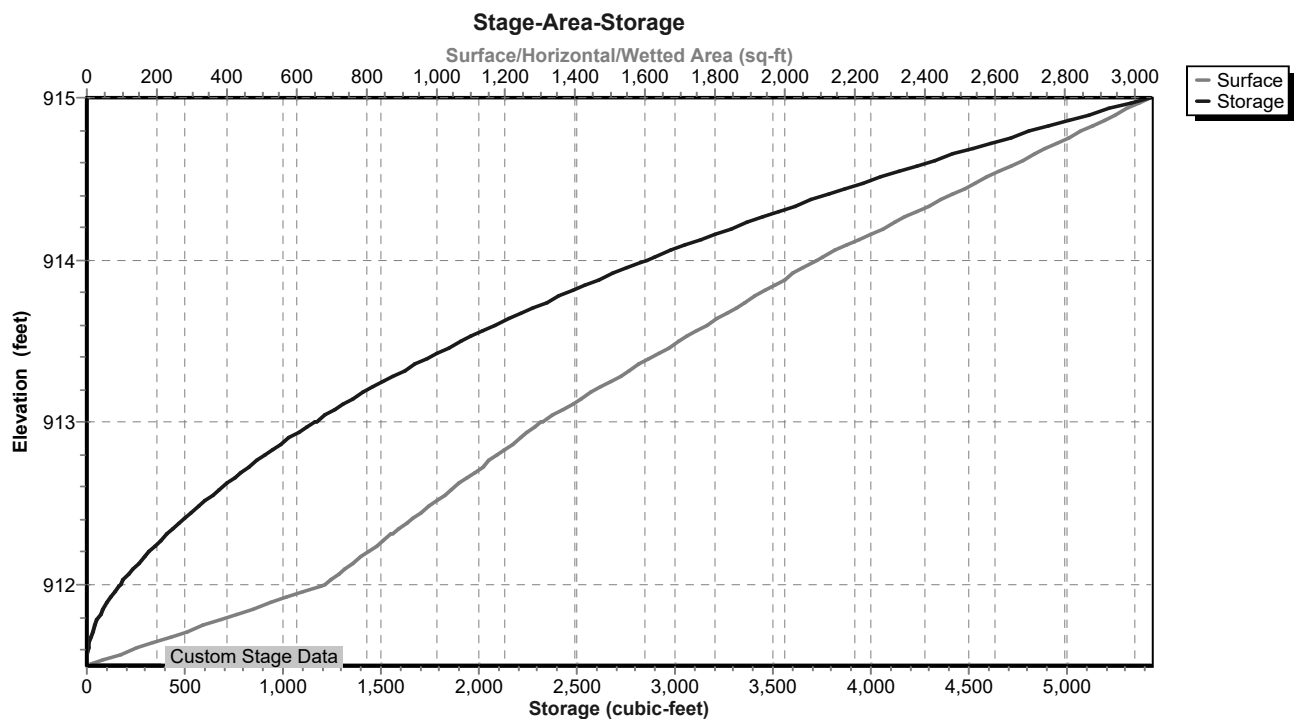


## Appendix I: Stage Storage Table

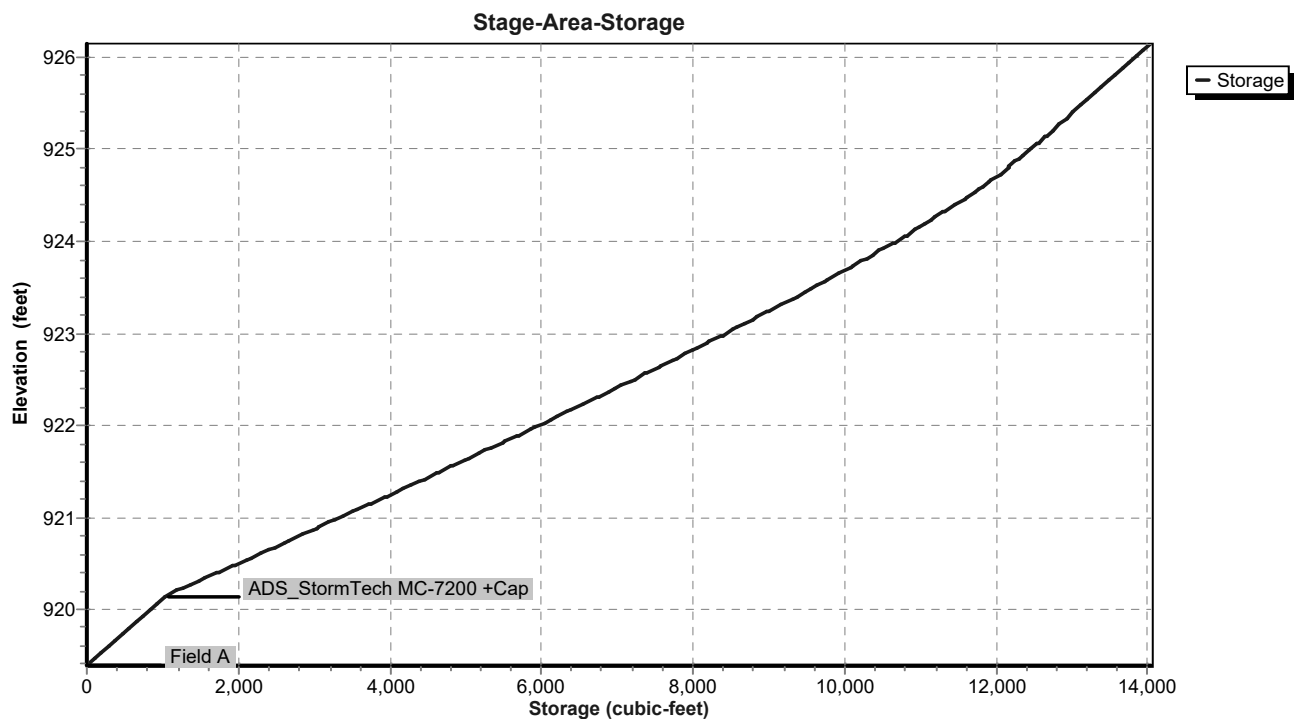
# Pond 1P: SE Basin



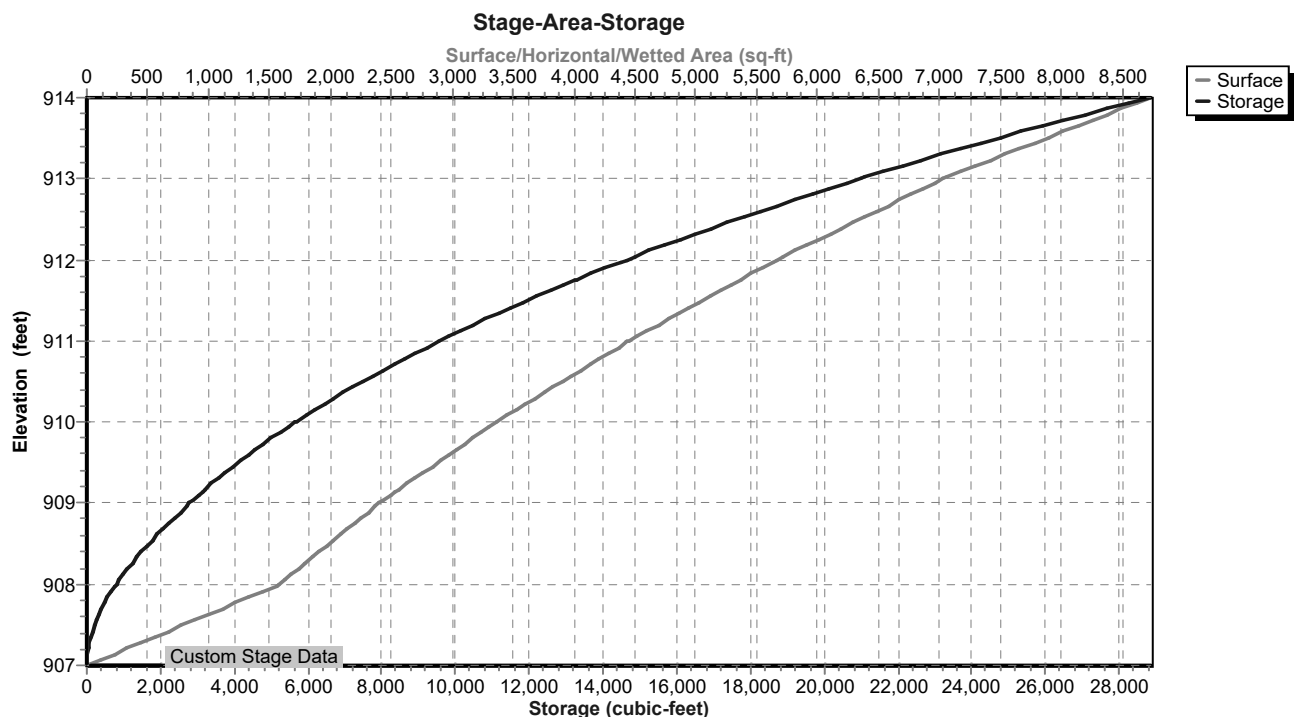
## Pond 2P: South Basin Orifice



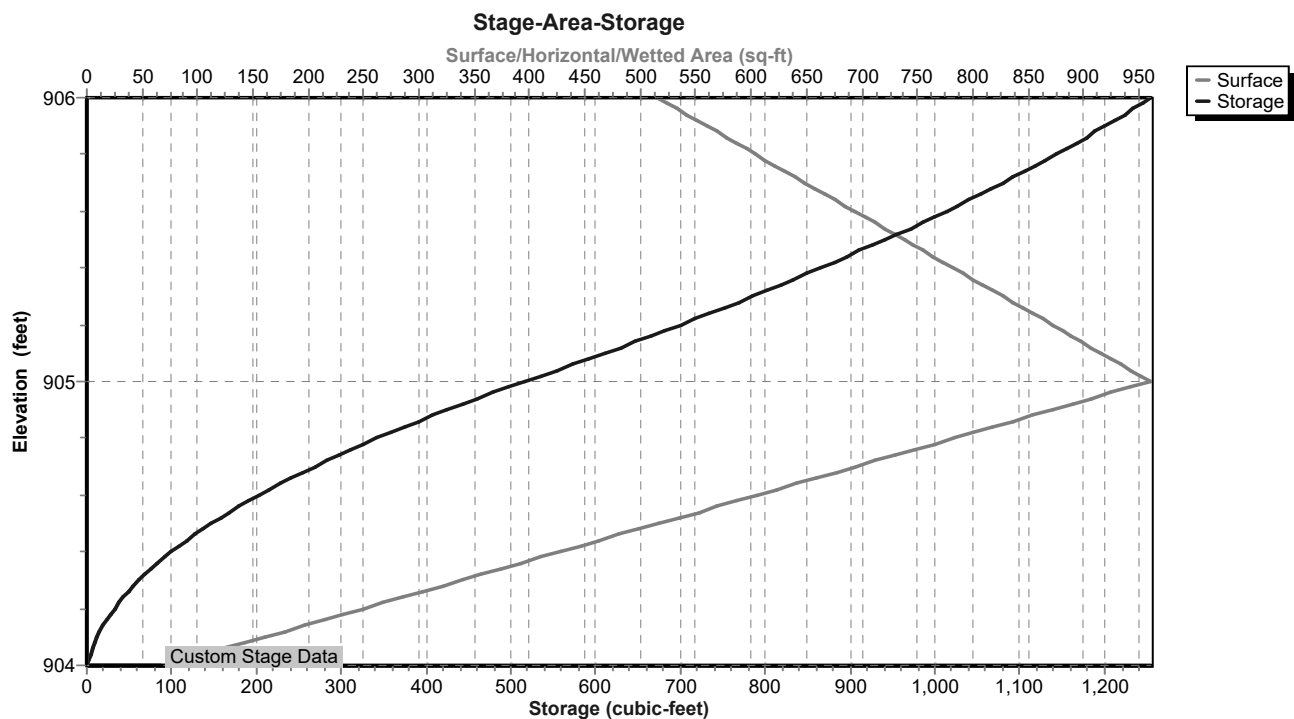
### Pond 3P: North Basin Orifice



# Pond 4P: West Basin Orifice



## Pond 5P: Level Spreader

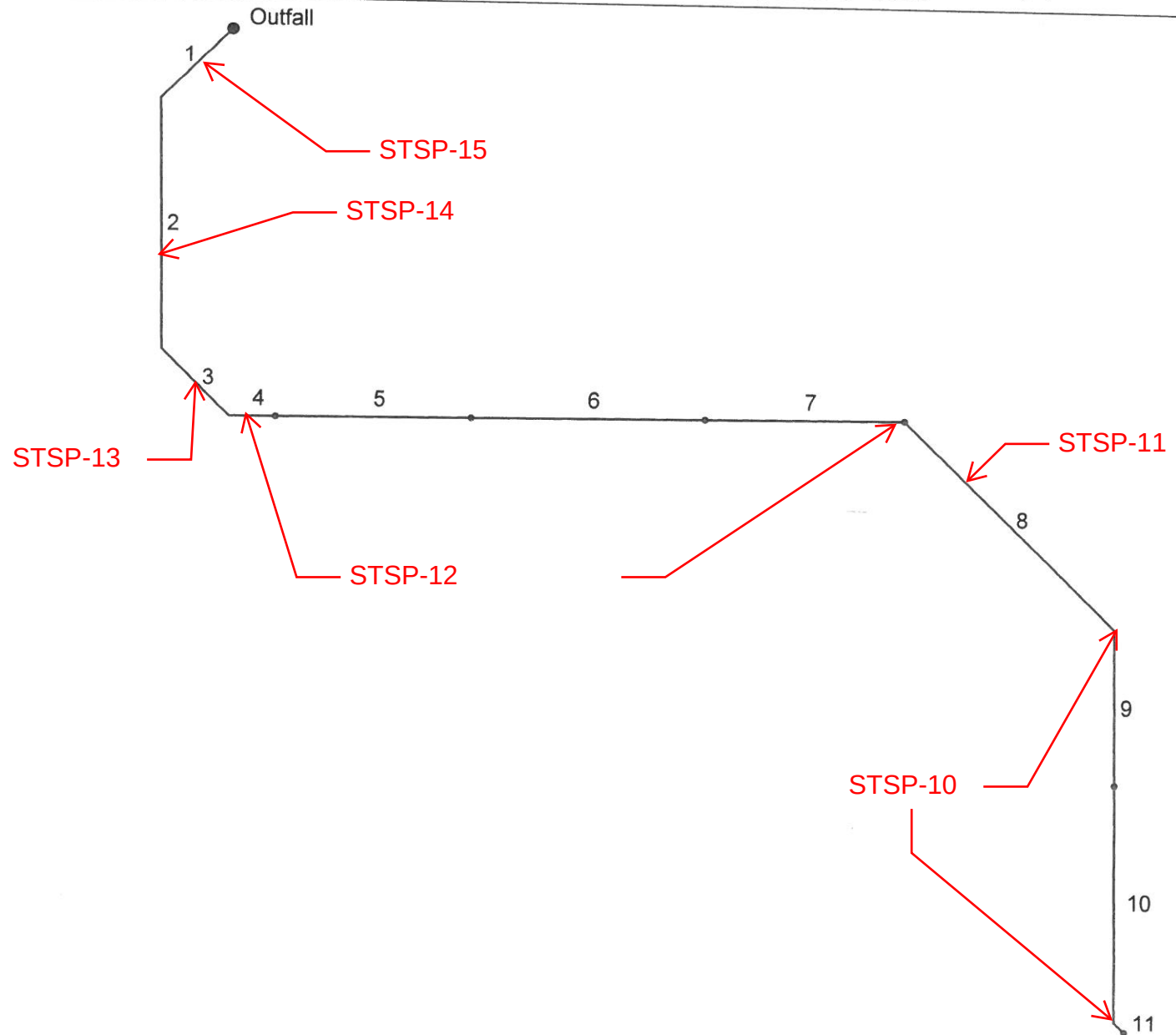




## Appendix J: Storm Sewer Calculations

# Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan

542



Project File: 23-047-RD.stm

Number of lines: 11

Date: 2/29/2024

Storm Sewers v2023.00

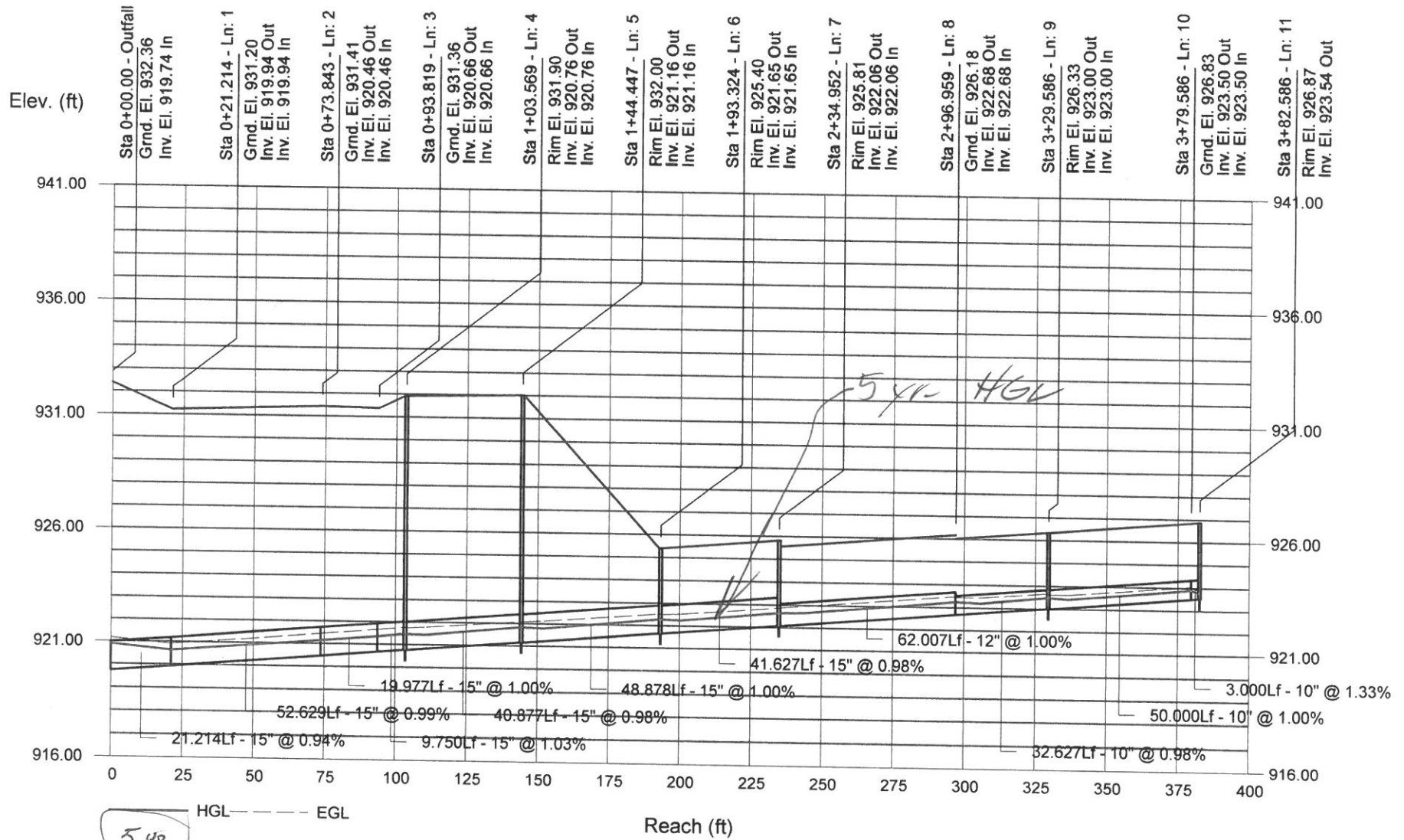
# Storm Sewer Tabulation

5yr

| Station                                                                                                 |            | Len<br>(ft) | Drng Area    |               | Rnoff<br>coeff<br>(C) | Area x C |       | Tc             |               | Rain<br>(l) | Total<br>flow<br>(cfs) | Cap<br>full<br>(cfs) | Vel<br>(ft/s) | Pipe         |              | Invert Elev         |            | HGL Elev   |            | Grnd / Rim Elev     |            | Line ID |
|---------------------------------------------------------------------------------------------------------|------------|-------------|--------------|---------------|-----------------------|----------|-------|----------------|---------------|-------------|------------------------|----------------------|---------------|--------------|--------------|---------------------|------------|------------|------------|---------------------|------------|---------|
| Line                                                                                                    | To<br>Line |             | Incr<br>(ac) | Total<br>(ac) |                       | Incr     | Total | Inlet<br>(min) | Syst<br>(min) |             |                        |                      |               | Size<br>(in) | Slope<br>(%) | Dn<br>(ft)          | Up<br>(ft) | Dn<br>(ft) | Up<br>(ft) | Dn<br>(ft)          | Up<br>(ft) |         |
| 1                                                                                                       | End        | 21.214      | 0.00         | 0.52          | 0.98                  | 0.00     | 0.51  | 5.0            | 7.9           | 5.8         | 2.95                   | 6.27                 | 3.37          | 15           | 0.94         | 919.74              | 919.94     | 920.90     | 920.63     | 932.36              | 931.20     |         |
| 2                                                                                                       | 1          | 52.629      | 0.00         | 0.52          | 0.98                  | 0.00     | 0.51  | 5.0            | 7.6           | 5.9         | 3.01                   | 6.42                 | 4.30          | 15           | 0.99         | 919.94              | 920.46     | 920.63     | 921.16     | 931.20              | 931.41     |         |
| 3                                                                                                       | 2          | 19.977      | 0.00         | 0.52          | 0.98                  | 0.00     | 0.51  | 5.0            | 7.5           | 5.9         | 3.03                   | 6.46                 | 4.30          | 15           | 1.00         | 920.46              | 920.66     | 921.16     | 921.36     | 931.41              | 931.41     |         |
| 4                                                                                                       | 3          | 9.750       | 0.06         | 0.52          | 0.98                  | 0.06     | 0.51  | 5.0            | 7.4           | 6.0         | 3.04                   | 6.54                 | 4.30          | 15           | 1.03         | 920.66              | 920.76     | 921.36     | 921.46     | 931.41              | 931.36     |         |
| 5                                                                                                       | 4          | 40.877      | 0.06         | 0.46          | 0.98                  | 0.06     | 0.45  | 5.0            | 7.1           | 6.1         | 2.73                   | 6.39                 | 4.00          | 15           | 0.98         | 920.76              | 921.16     | 921.46     | 921.82     | 931.36              | 931.90     |         |
| 6                                                                                                       | 5          | 48.878      | 0.06         | 0.40          | 0.98                  | 0.06     | 0.39  | 5.0            | 6.7           | 6.2         | 2.43                   | 6.47                 | 3.83          | 15           | 1.00         | 920.76              | 921.16     | 921.46     | 921.82     | 931.90              | 932.00     |         |
| 7                                                                                                       | 6          | 41.627      | 0.06         | 0.34          | 0.98                  | 0.06     | 0.33  | 5.0            | 6.3           | 6.3         | 2.11                   | 6.41                 | 3.63          | 15           | 0.98         | 921.16              | 921.65     | 921.82     | 922.27     | 932.00              | 0.00       |         |
| 8                                                                                                       | 7          | 62.007      | 0.10         | 0.28          | 0.98                  | 0.10     | 0.27  | 5.0            | 5.9           | 6.5         | 1.79                   | 3.56                 | 3.84          | 12           | 1.00         | 922.06              | 922.68     | 922.64     | 922.77     | 0.00                | 0.00       |         |
| 9                                                                                                       | 8          | 32.627      | 0.06         | 0.18          | 0.98                  | 0.06     | 0.18  | 5.0            | 5.6           | 6.6         | 1.17                   | 2.17                 | 3.26          | 10           | 0.98         | 922.68              | 923.00     | 923.25     | 923.48     | 0.00                | 0.00       |         |
| 10                                                                                                      | 9          | 50.000      | 0.06         | 0.12          | 0.98                  | 0.06     | 0.12  | 5.0            | 5.1           | 6.9         | 0.81                   | 2.19                 | 2.82          | 10           | 1.00         | 923.00              | 923.50     | 923.48     | 923.90     | 0.00                | 0.00       |         |
| 11                                                                                                      | 10         | 3.000       | 0.06         | 0.06          | 0.98                  | 0.06     | 0.06  | 5.0            | 5.0           | 6.9         | 0.41                   | 2.53                 | 2.07          | 10           | 1.33         | 923.50              | 923.54     | 923.90     | 923.82     | 0.00                | 0.00       |         |
| Project File: 23-047-RD.stm                                                                             |            |             |              |               |                       |          |       |                |               |             |                        |                      |               |              |              | Number of lines: 11 |            |            |            | Run Date: 2/29/2024 |            |         |
| NOTES:Intensity = 35.47 / (Inlet time + 5.30) ^ 0.70; Return period =Yrs. 5 ; c = cir e = ellip b = box |            |             |              |               |                       |          |       |                |               |             |                        |                      |               |              |              |                     |            |            |            |                     |            |         |

# Storm Sewer Profile

Proj. file: 23-047-RD.stm

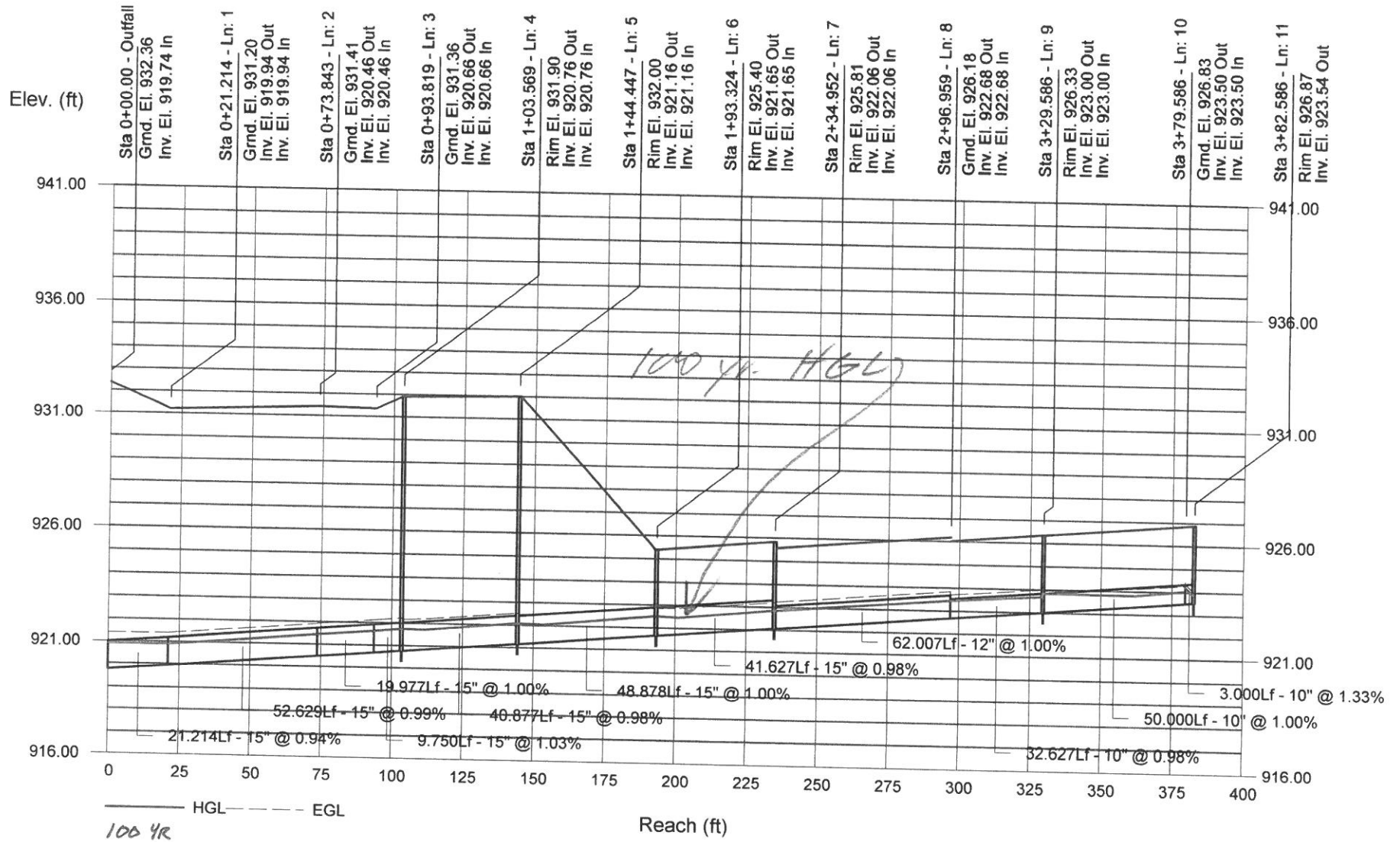


# Storm Sewer Tabulation 100 x 1

| Station                                                                                                     |            | Len<br>(ft) | Drng Area    |               | Rnoff<br>coeff<br>(C) | Area x C |       | Tc             |               | Rain<br>(l) | Total<br>flow<br>(cfs) | Cap<br>full<br>(cfs) | Vel<br>(ft/s) | Pipe         |              | Invert Elev         |            | HGL Elev   |            | Grnd / Rim Elev     |            | Line ID |
|-------------------------------------------------------------------------------------------------------------|------------|-------------|--------------|---------------|-----------------------|----------|-------|----------------|---------------|-------------|------------------------|----------------------|---------------|--------------|--------------|---------------------|------------|------------|------------|---------------------|------------|---------|
| Line                                                                                                        | To<br>Line |             | Incr<br>(ac) | Total<br>(ac) |                       | Incr     | Total | Inlet<br>(min) | Syst<br>(min) |             |                        |                      |               | Size<br>(in) | Slope<br>(%) | Dn<br>(ft)          | Up<br>(ft) | Dn<br>(ft) | Up<br>(ft) | Dn<br>(ft)          | Up<br>(ft) |         |
| 1                                                                                                           | End        | 21.214      | 0.00         | 0.52          | 0.98                  | 0.00     | 0.51  | 5.0            | 6.6           | 11.1        | 5.65                   | 6.27                 | 5.17          | 15           | 0.94         | 919.74              | 919.94     | 920.90     | 920.90     | 932.36              | 931.20     |         |
| 2                                                                                                           | 1          | 52.629      | 0.00         | 0.52          | 0.98                  | 0.00     | 0.51  | 5.0            | 6.4           | 11.2        | 5.72                   | 6.42                 | 5.63          | 15           | 0.99         | 919.94              | 920.46     | 920.90     | 921.43     | 931.20              | 931.41     |         |
| 3                                                                                                           | 2          | 19.977      | 0.00         | 0.52          | 0.98                  | 0.00     | 0.51  | 5.0            | 6.4           | 11.3        | 5.74                   | 6.46                 | 5.63          | 15           | 1.00         | 920.46              | 920.66     | 921.43     | 921.63     | 931.41              | 931.36     |         |
| 4                                                                                                           | 3          | 9.750       | 0.06         | 0.52          | 0.98                  | 0.06     | 0.51  | 5.0            | 6.3           | 11.3        | 5.76                   | 6.54                 | 5.63          | 15           | 1.03         | 920.66              | 920.76     | 921.63     | 921.73     | 931.36              | 931.90     |         |
| 5                                                                                                           | 4          | 40.877      | 0.06         | 0.46          | 0.98                  | 0.06     | 0.45  | 5.0            | 6.2           | 11.4        | 5.15                   | 6.39                 | 5.18          | 15           | 0.98         | 920.76              | 921.16     | 921.73     | 922.08     | 931.90              | 932.00     |         |
| 6                                                                                                           | 5          | 48.878      | 0.06         | 0.40          | 0.98                  | 0.06     | 0.39  | 5.0            | 6.0           | 11.6        | 4.54                   | 6.47                 | 4.86          | 15           | 1.00         | 921.16              | 921.65     | 922.08     | 922.51     | 932.00              | 0.00       |         |
| 7                                                                                                           | 6          | 41.627      | 0.06         | 0.34          | 0.98                  | 0.06     | 0.33  | 5.0            | 5.7           | 11.8        | 3.92                   | 6.41                 | 4.53          | 15           | 0.98         | 921.65              | 922.06     | 922.51     | 922.86     | 0.00                | 0.00       |         |
| 8                                                                                                           | 7          | 62.007      | 0.10         | 0.28          | 0.98                  | 0.10     | 0.27  | 5.0            | 5.5           | 12.0        | 3.28                   | 3.56                 | 4.95          | 12           | 1.00         | 922.06              | 922.68     | 922.86     | 923.45     | 0.00                | 0.00       |         |
| 9                                                                                                           | 8          | 32.627      | 0.06         | 0.18          | 0.98                  | 0.06     | 0.18  | 5.0            | 5.3           | 12.1        | 2.13                   | 2.17                 | 4.22          | 10           | 0.98         | 922.68              | 923.00     | 923.45     | 923.69     | 0.00                | 0.00       |         |
| 10                                                                                                          | 9          | 50.000      | 0.06         | 0.12          | 0.98                  | 0.06     | 0.12  | 5.0            | 5.0           | 12.4        | 1.45                   | 2.19                 | 3.27          | 10           | 1.00         | 923.00              | 923.50     | 923.84     | 924.04     | 0.00                | 0.00       |         |
| 11                                                                                                          | 10         | 3.000       | 0.06         | 0.06          | 0.98                  | 0.06     | 0.06  | 5.0            | 5.0           | 12.4        | 0.73                   | 2.53                 | 2.26          | 10           | 1.33         | 923.50              | 923.54     | 924.21     | 923.92     | 0.00                | 0.00       |         |
| Project File: 23-047-RD.stm                                                                                 |            |             |              |               |                       |          |       |                |               |             |                        |                      |               |              |              | Number of lines: 11 |            |            |            | Run Date: 2/29/2024 |            |         |
| NOTES: Intensity = 45.52 / (Inlet time + 3.30) ^ 0.62; Return period = Yrs. 100 ; c = cir e = ellip b = box |            |             |              |               |                       |          |       |                |               |             |                        |                      |               |              |              |                     |            |            |            |                     |            |         |

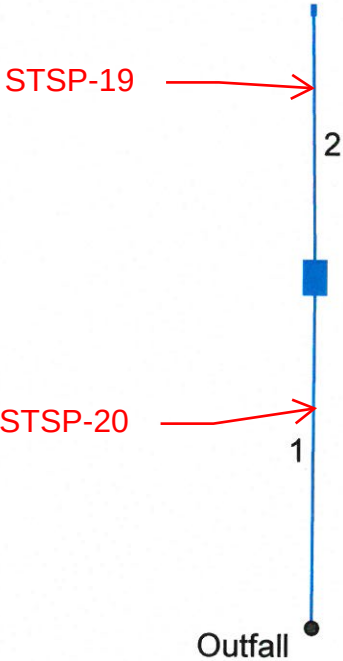
# Storm Sewer Profile

Proj. file: 23-047-RD.stm





# Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



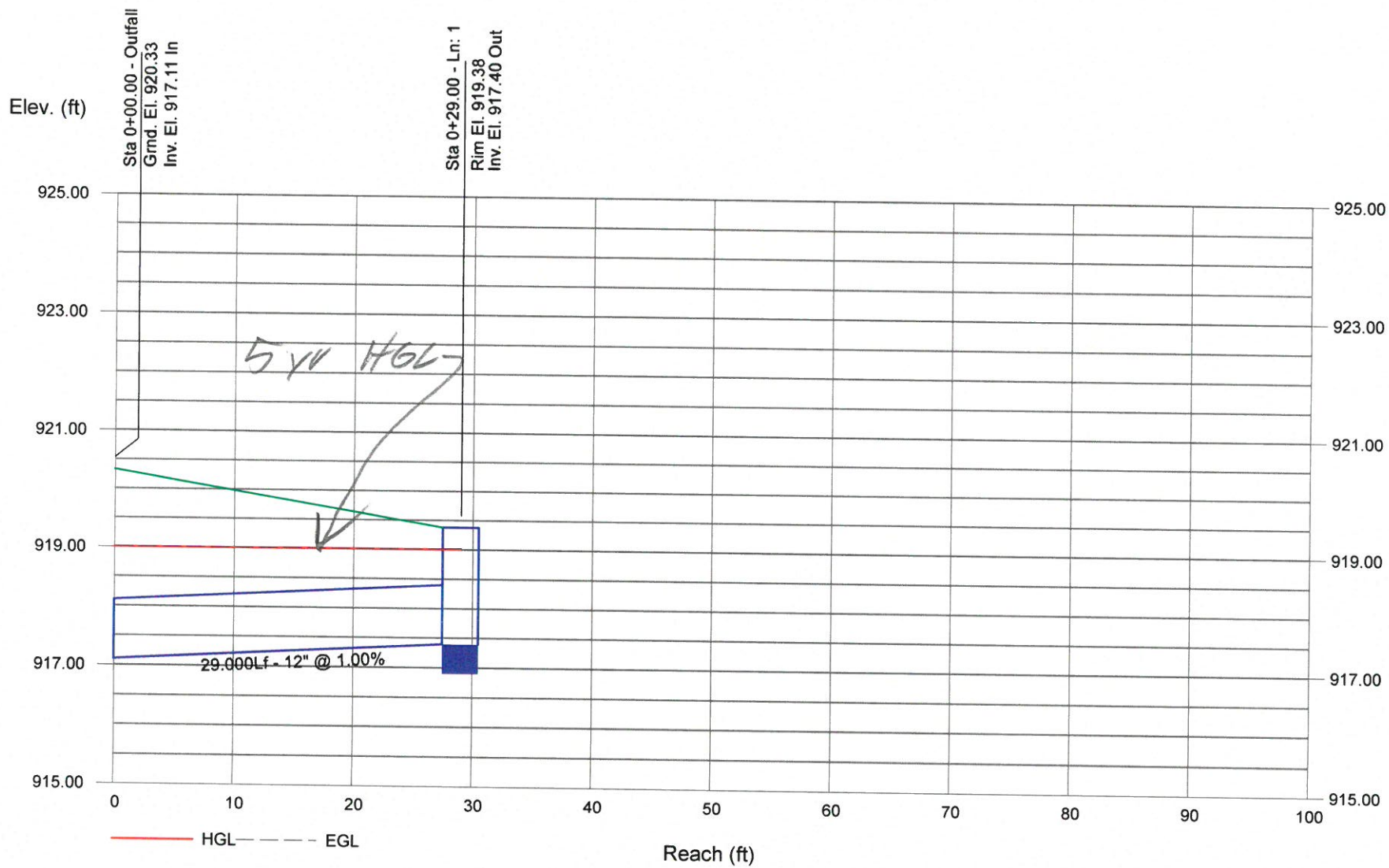
# Storm Sewer Tabulation

5 yr.

| Station                                                                                                   |            | Len<br>(ft)      | Drng Area    |               | Rnoff<br>coeff<br>(C) | Area x C     |              | Tc             |               | Rain<br>(l)<br>(in/hr) | Total<br>flow<br>(cfs) | Cap<br>full<br>(cfs) | Vel<br>(ft/s) | Pipe         |              | Invert Elev        |                  | HGL Elev         |                  | Grnd / Rim Elev    |                  | Line ID |
|-----------------------------------------------------------------------------------------------------------|------------|------------------|--------------|---------------|-----------------------|--------------|--------------|----------------|---------------|------------------------|------------------------|----------------------|---------------|--------------|--------------|--------------------|------------------|------------------|------------------|--------------------|------------------|---------|
| Line                                                                                                      | To<br>Line |                  | Incr<br>(ac) | Total<br>(ac) |                       | Incr         | Total        | Inlet<br>(min) | Syst<br>(min) |                        |                        |                      |               | Size<br>(in) | Slope<br>(%) | Dn<br>(ft)         | Up<br>(ft)       | Dn<br>(ft)       | Up<br>(ft)       | Dn<br>(ft)         | Up<br>(ft)       |         |
| 1<br>2                                                                                                    | End<br>1   | 29.000<br>22.000 | 0.00<br>0.09 | 0.09<br>0.09  | 0.00<br>0.98          | 0.00<br>0.09 | 0.09<br>0.09 | 5.0<br>5.0     | 5.5<br>5.0    | 6.7<br>6.9             | 0.59<br>0.61           | 3.56<br>2.01         | 0.75<br>0.78  | 12<br>12     | 1.00<br>1.00 | 917.11<br>917.55   | 917.40<br>917.77 | 919.00<br>919.01 | 919.01<br>919.03 | 920.33<br>919.38   | 919.38<br>919.25 |         |
| Project File: 23-047-SE.stm                                                                               |            |                  |              |               |                       |              |              |                |               |                        |                        |                      |               |              |              | Number of lines: 2 |                  |                  |                  | Run Date: 3/5/2024 |                  |         |
| NOTES: Intensity = 35.47 / (Inlet time + 5.30) ^ 0.70; Return period = Yrs. 5 ; c = cir e = ellip b = box |            |                  |              |               |                       |              |              |                |               |                        |                        |                      |               |              |              |                    |                  |                  |                  |                    |                  |         |

# Storm Sewer Profile *5yr*

Proj. file: 23-047-SE.stm

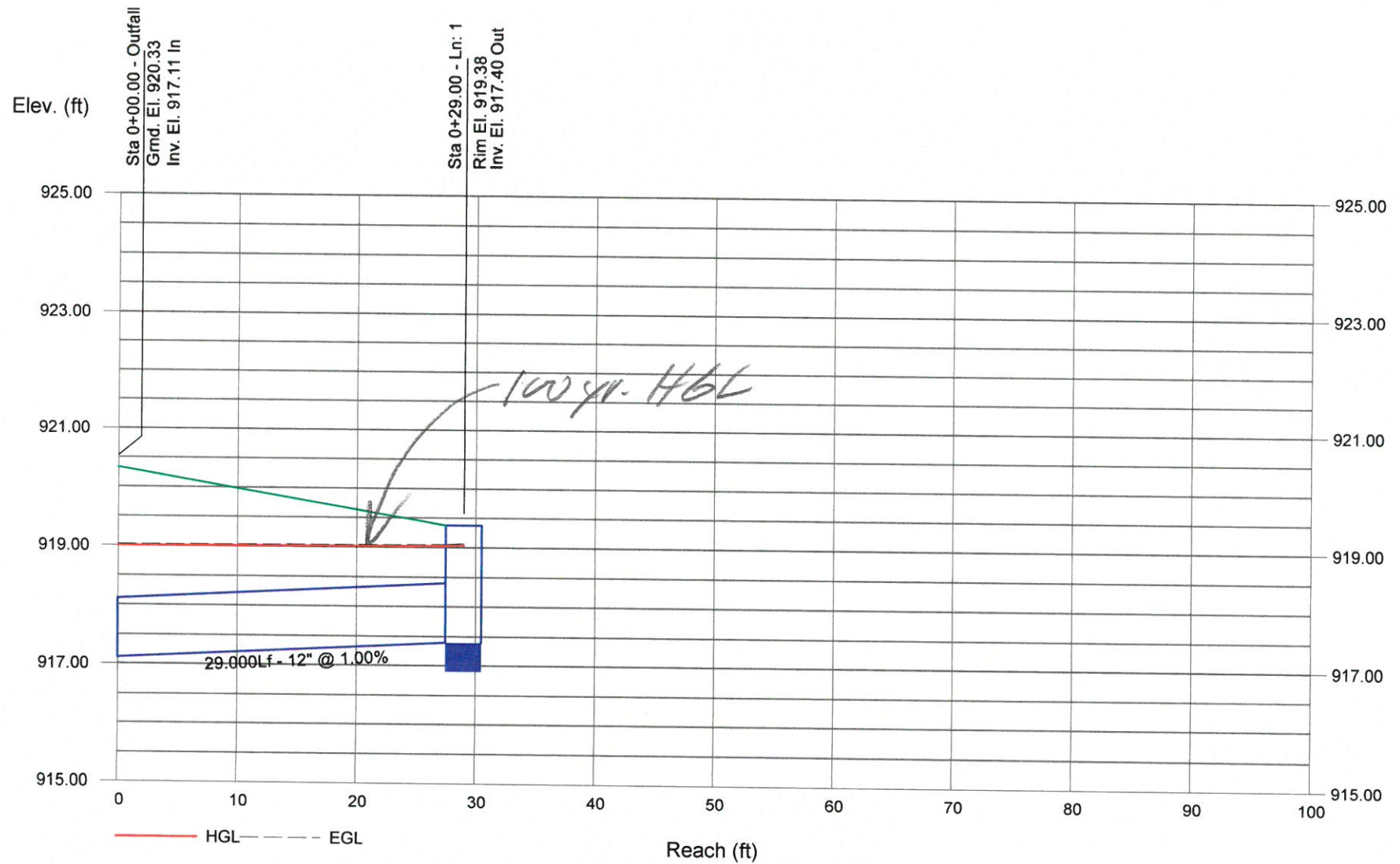


# Storm Sewer Tabulation 10041

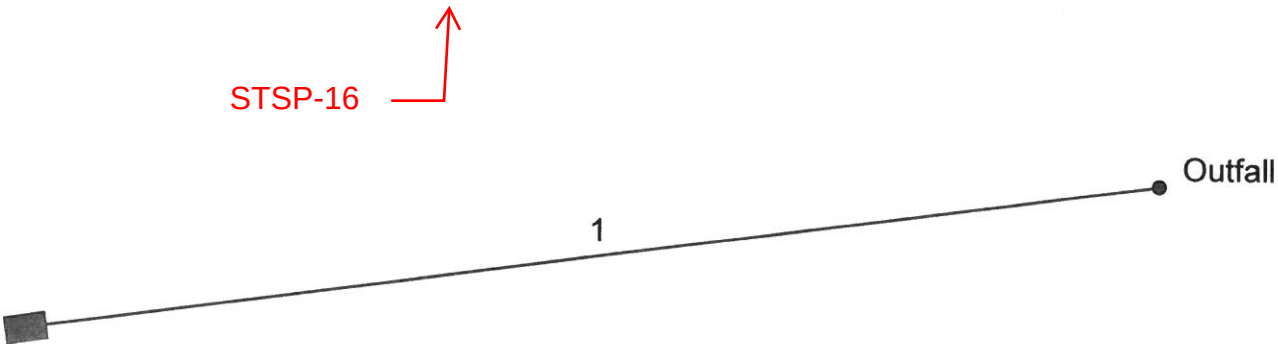
| Station                                                                                                     |            | Len<br>(ft)      | Drng Area    |               | Rnoff<br>coeff<br>(C) | Area x C     |              | Tc             |               | Rain<br>(l)<br>(in/hr) | Total<br>flow<br>(cfs) | Cap<br>full<br>(cfs) | Vel<br>(ft/s) | Pipe         |              | Invert Elev        |                  | HGL Elev           |                  | Grnd / Rim Elev  |                  | Line ID |
|-------------------------------------------------------------------------------------------------------------|------------|------------------|--------------|---------------|-----------------------|--------------|--------------|----------------|---------------|------------------------|------------------------|----------------------|---------------|--------------|--------------|--------------------|------------------|--------------------|------------------|------------------|------------------|---------|
| Line                                                                                                        | To<br>Line |                  | Incr<br>(ac) | Total<br>(ac) |                       | Incr         | Total        | Inlet<br>(min) | Syst<br>(min) |                        |                        |                      |               | Size<br>(in) | Slope<br>(%) | Dn<br>(ft)         | Up<br>(ft)       | Dn<br>(ft)         | Up<br>(ft)       | Dn<br>(ft)       | Up<br>(ft)       |         |
| 1<br>2                                                                                                      | End<br>1   | 29.000<br>22.000 | 0.00<br>0.09 | 0.09<br>0.09  | 0.00<br>0.98          | 0.00<br>0.09 | 0.09<br>0.09 | 5.0<br>5.0     | 5.3<br>5.0    | 12.2<br>12.4           | 1.07<br>1.09           | 3.56<br>2.01         | 1.36<br>1.39  | 12<br>12     | 1.00<br>1.00 | 917.11<br>917.55   | 917.40<br>917.77 | 919.00<br>919.04   | 919.03<br>919.11 | 920.33<br>919.38 | 919.38<br>919.25 |         |
| Project File: 23-047-SE.stm                                                                                 |            |                  |              |               |                       |              |              |                |               |                        |                        |                      |               |              |              | Number of lines: 2 |                  | Run Date: 3/5/2024 |                  |                  |                  |         |
| NOTES: Intensity = 45.52 / (Inlet time + 3.30) ^ 0.62; Return period = Yrs. 100 ; c = cir e = ellip b = box |            |                  |              |               |                       |              |              |                |               |                        |                        |                      |               |              |              |                    |                  |                    |                  |                  |                  |         |

# Storm Sewer Profile

Proj. file: 23-047-SE.stm



Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



|                             |                    |                |
|-----------------------------|--------------------|----------------|
| Project File: 23-047-NW.stm | Number of lines: 1 | Date: 3/5/2024 |
|-----------------------------|--------------------|----------------|



# Storm Sewer Tabulation

| Station |            | Len<br>(ft) | Drng Area    |               | Rnoff<br>coeff<br>(C) | Area x C |       | Tc             |               | Rain<br>(l) | Total<br>flow<br>(cfs) | Cap<br>full<br>(cfs) | Vel<br>(ft/s) | Pipe         |              | Invert Elev |            | HGL Elev   |            | Grnd / Rim Elev |            | Line ID |
|---------|------------|-------------|--------------|---------------|-----------------------|----------|-------|----------------|---------------|-------------|------------------------|----------------------|---------------|--------------|--------------|-------------|------------|------------|------------|-----------------|------------|---------|
| Line    | To<br>Line |             | Incr<br>(ac) | Total<br>(ac) |                       | Incr     | Total | Inlet<br>(min) | Syst<br>(min) |             |                        |                      |               | Size<br>(in) | Slope<br>(%) | Dn<br>(ft)  | Up<br>(ft) | Dn<br>(ft) | Up<br>(ft) | Dn<br>(ft)      | Up<br>(ft) |         |
| 1       | End        | 81.000      | 0.17         | 0.17          | 0.98                  | 0.17     | 0.17  | 5.0            | 5.0           | 6.9         | 1.15                   | 6.17                 | 2.40          | 12           | 3.00         | 922.96      | 925.39     | 923.96     | 925.84     | 931.20          | 929.40     |         |

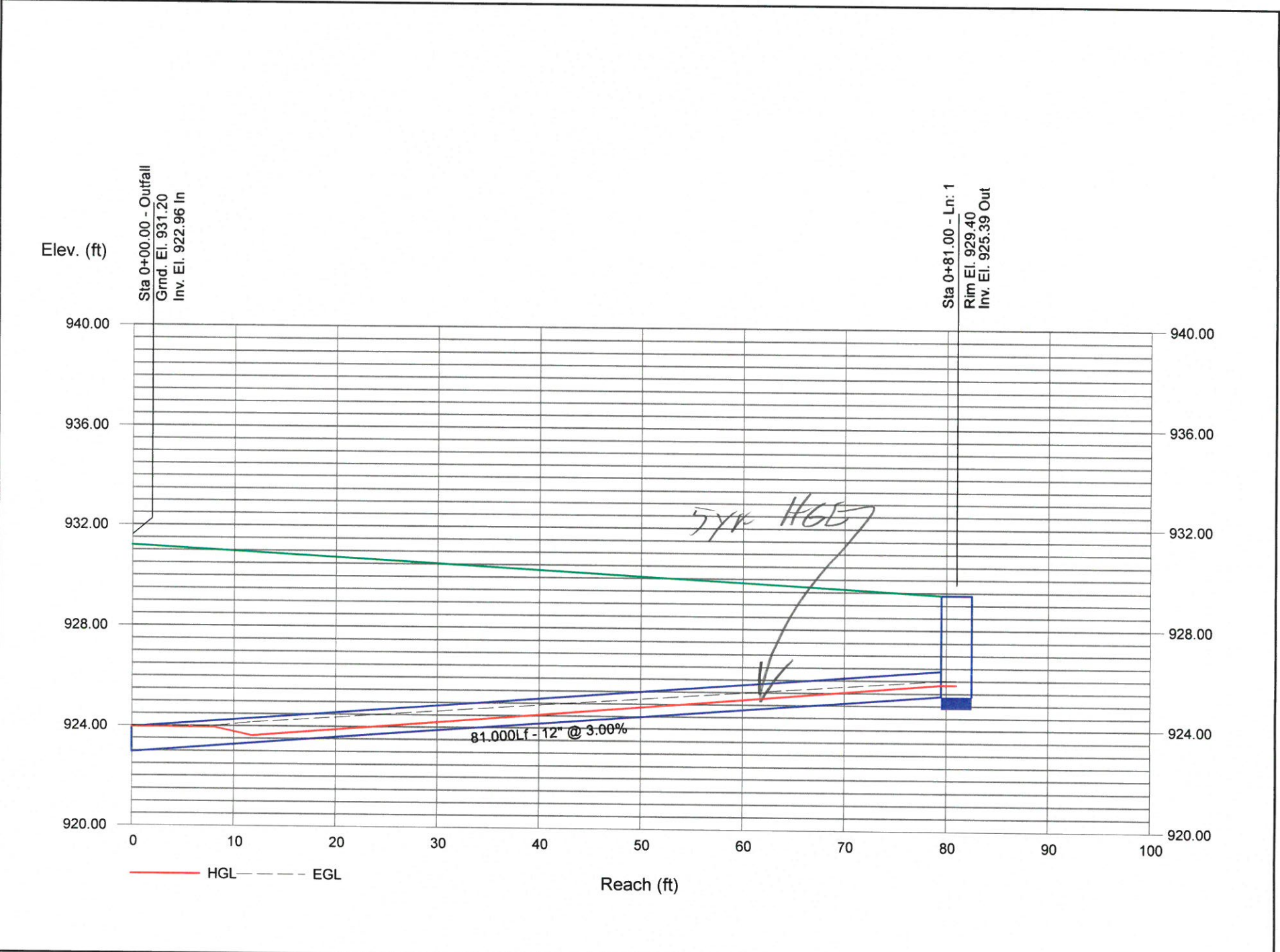
Project File: 23-047-NW.stm

Number of lines: 1

Run Date: 3/5/2024

NOTES: Intensity = 35.47 / (Inlet time + 5.30) ^ 0.70; Return period = Yrs. 5 ; c = cir e = ellip b = box

Storm Sewer Profile

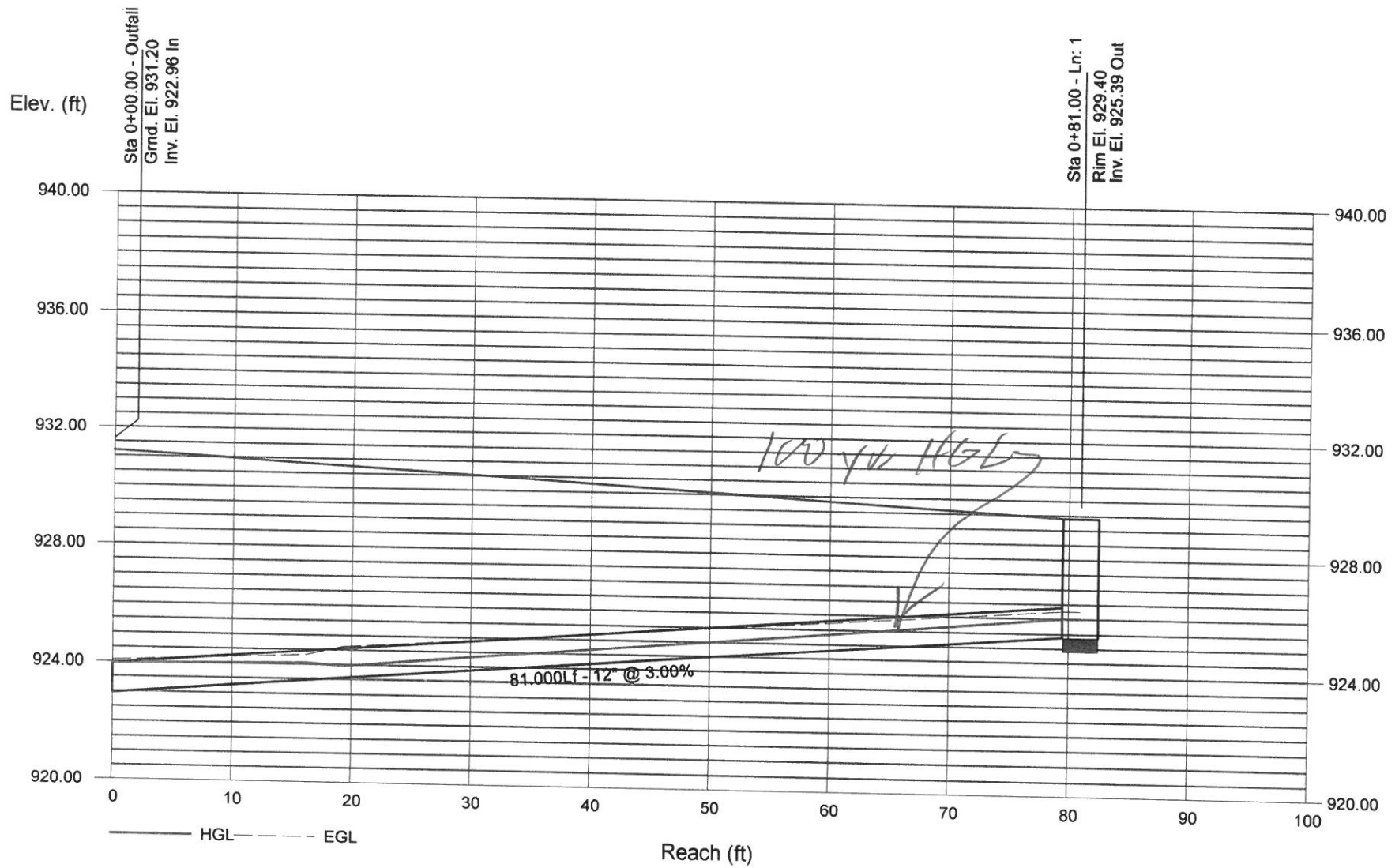


# Storm Sewer Tabulation *100%*

| Station                                                                                                   |            | Len<br><br>(ft) | Drng Area        |                   | Rnoff<br>coeff<br><br>(C) | Area x C          |                    | Tc                 |                   | Rain<br>(I)<br><br>(in/hr) | Total<br>flow<br><br>(cfs) | Cap<br>full<br><br>(cfs) | Vel<br><br>(ft/s) | Pipe             |                  | Invert Elev        |                | HGL Elev       |                | Grnd / Rim Elev    |                | Line ID |
|-----------------------------------------------------------------------------------------------------------|------------|-----------------|------------------|-------------------|---------------------------|-------------------|--------------------|--------------------|-------------------|----------------------------|----------------------------|--------------------------|-------------------|------------------|------------------|--------------------|----------------|----------------|----------------|--------------------|----------------|---------|
| Line                                                                                                      | To<br>Line |                 | Incr<br><br>(ac) | Total<br><br>(ac) |                           | Incr<br><br>(min) | Total<br><br>(min) | Inlet<br><br>(min) | Syst<br><br>(min) |                            |                            |                          |                   | Size<br><br>(in) | Slope<br><br>(%) | Dn<br><br>(ft)     | Up<br><br>(ft) | Dn<br><br>(ft) | Up<br><br>(ft) | Dn<br><br>(ft)     | Up<br><br>(ft) |         |
| 1                                                                                                         | End        | 81.000          | 0.17             | 0.17              | 0.98                      | 0.17              | 0.17               | 5.0                | 5.0               | 12.4                       | 2.06                       | 6.17                     | 3.36              | 12               | 3.00             | 922.96             | 925.39         | 923.96         | 926.00         | 931.20             | 929.40         |         |
| Project File: 23-047-NW.stm                                                                               |            |                 |                  |                   |                           |                   |                    |                    |                   |                            |                            |                          |                   |                  |                  | Number of lines: 1 |                |                |                | Run Date: 3/5/2024 |                |         |
| NOTES:Intensity = 45.52 / (Inlet time + 3.30) ^ 0.62; Return period =Yrs. 100 ; c = cir e = ellip b = box |            |                 |                  |                   |                           |                   |                    |                    |                   |                            |                            |                          |                   |                  |                  |                    |                |                |                |                    |                |         |

# Storm Sewer Profile

Proj. file: 23-047-NW.stm



# Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



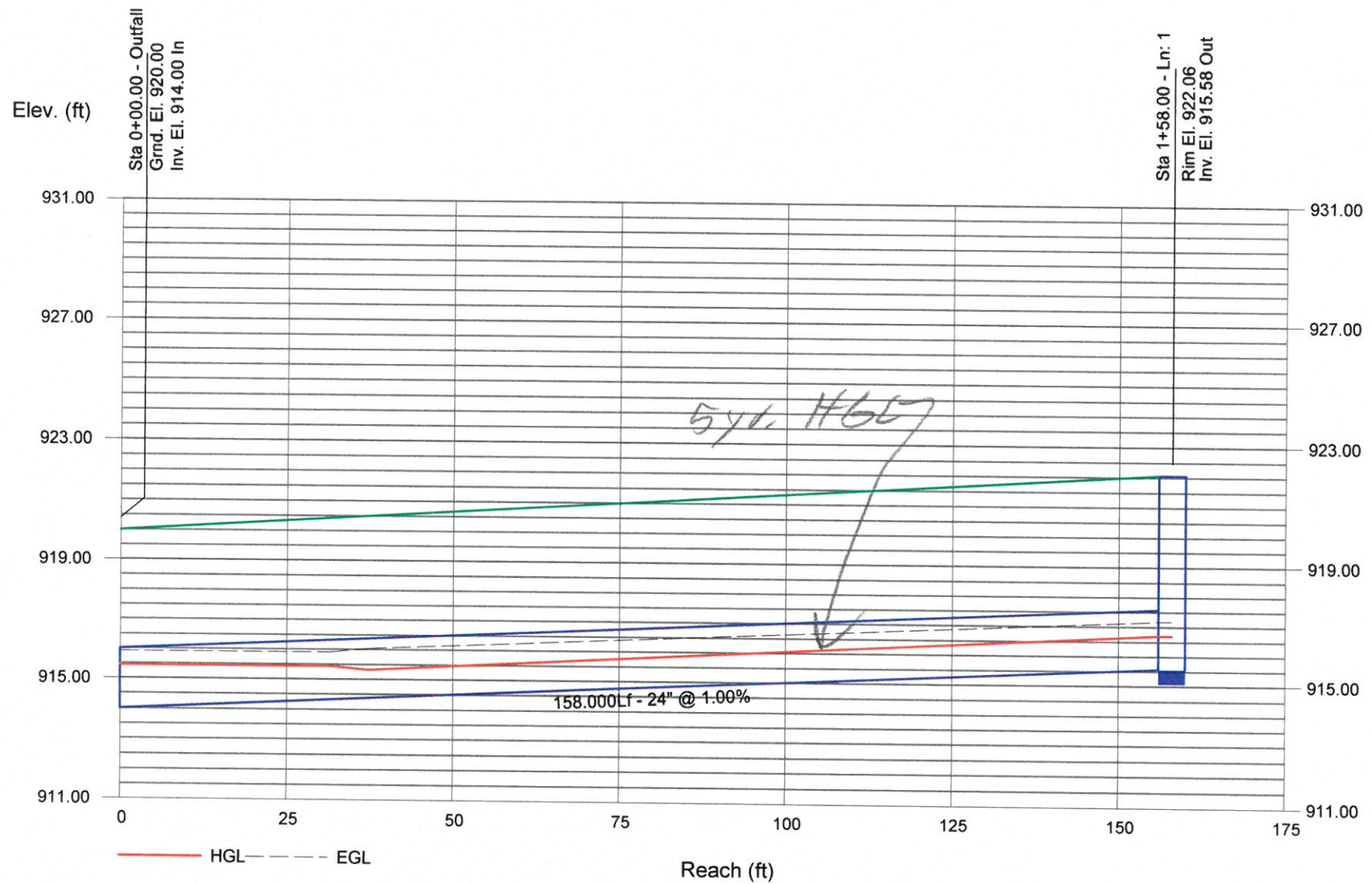
# Storm Sewer Tabulation *5yr*

| Station                                                                                                  |            | Len<br>(ft) | Drng Area<br>(ac) |       | Rnoff<br>coeff<br>(C) | Area x C |       | Tc             |               | Rain<br>(l)<br>(in/hr) | Total<br>flow<br>(cfs) | Cap<br>full<br>(cfs) | Vel<br>(ft/s) | Pipe         |              | Invert Elev        |            | HGL Elev   |            | Grnd / Rim Elev    |            | Line ID |
|----------------------------------------------------------------------------------------------------------|------------|-------------|-------------------|-------|-----------------------|----------|-------|----------------|---------------|------------------------|------------------------|----------------------|---------------|--------------|--------------|--------------------|------------|------------|------------|--------------------|------------|---------|
| Line                                                                                                     | To<br>Line |             | Incr              | Total |                       | Incr     | Total | Inlet<br>(min) | Syst<br>(min) |                        |                        |                      |               | Size<br>(in) | Slope<br>(%) | Dn<br>(ft)         | Up<br>(ft) | Dn<br>(ft) | Up<br>(ft) | Dn<br>(ft)         | Up<br>(ft) |         |
| 1                                                                                                        | End        | 158.000     | 0.66              | 1.52  | 0.98                  | 0.65     | 1.49  | 5.0            | 5.4           | 6.7                    | 10.00                  | 22.62                | 4.78          | 24           | 1.00         | 914.00             | 915.58     | 915.45     | 916.71     | 920.00             | 922.06     |         |
| 2                                                                                                        | 1          | 85.000      | 0.86              | 0.86  | 0.98                  | 0.84     | 0.84  | 5.0            | 5.0           | 6.9                    | 5.82                   | 10.50                | 5.23          | 18           | 1.00         | 915.83             | 916.68     | 916.71     | 917.61     | 922.06             | 920.68     |         |
| Project File: 23-047-S.stm                                                                               |            |             |                   |       |                       |          |       |                |               |                        |                        |                      |               |              |              | Number of lines: 2 |            |            |            | Run Date: 3/5/2024 |            |         |
| NOTES: Intensity = 35.47 / (Inlet time + 5.30) ^ 0.70; Return period =Yrs. 5 ; c = cir e = ellip b = box |            |             |                   |       |                       |          |       |                |               |                        |                        |                      |               |              |              |                    |            |            |            |                    |            |         |



# Storm Sewer Profile

Proj. file: 23-047-S.stm

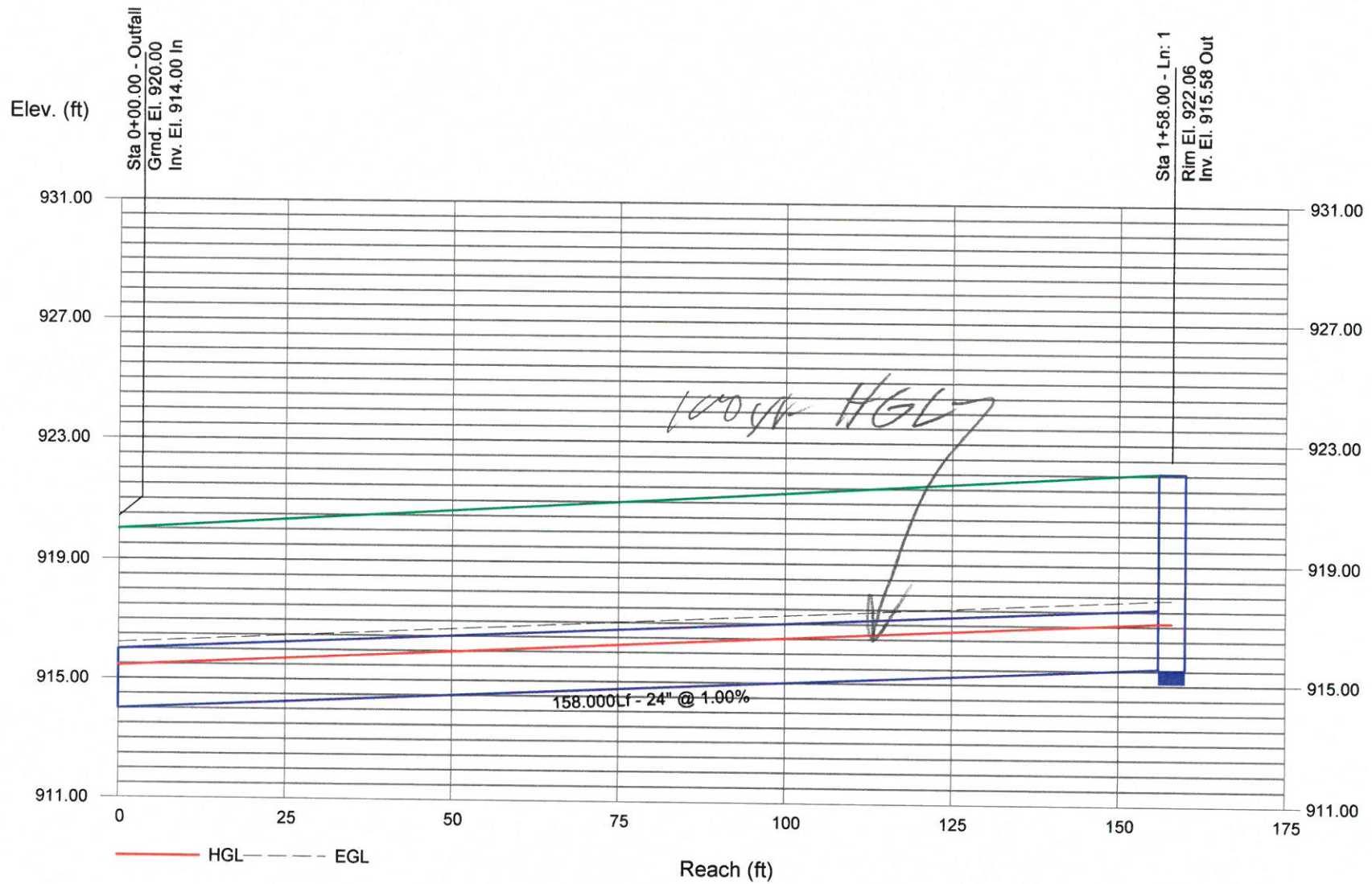


# Storm Sewer Tabulation *100 yr.*

| Station                                                                                                    |            | Len<br><br>(ft) | Drng Area        |                   | Rnoff<br>coeff<br><br>(C) | Area x C          |                    | Tc                 |                   | Rain<br>(l)<br><br>(in/hr) | Total<br>flow<br><br>(cfs) | Cap<br>full<br><br>(cfs) | Vel<br><br>(ft/s) | Pipe             |                  | Invert Elev        |                | HGL Elev       |                | Grnd / Rim Elev    |                | Line ID |
|------------------------------------------------------------------------------------------------------------|------------|-----------------|------------------|-------------------|---------------------------|-------------------|--------------------|--------------------|-------------------|----------------------------|----------------------------|--------------------------|-------------------|------------------|------------------|--------------------|----------------|----------------|----------------|--------------------|----------------|---------|
| Line                                                                                                       | To<br>Line |                 | Incr<br><br>(ac) | Total<br><br>(ac) |                           | Incr<br><br>(min) | Total<br><br>(min) | Inlet<br><br>(min) | Syst<br><br>(min) |                            |                            |                          |                   | Size<br><br>(in) | Slope<br><br>(%) | Dn<br><br>(ft)     | Up<br><br>(ft) | Dn<br><br>(ft) | Up<br><br>(ft) | Dn<br><br>(ft)     | Up<br><br>(ft) |         |
| 1                                                                                                          | End        | 158.000         | 0.66             | 1.52              | 0.98                      | 0.65              | 1.49               | 5.0                | 5.2               | 12.2                       | 18.13                      | 22.62                    | 7.23              | 24               | 1.00             | 914.00             | 915.58         | 915.45         | 917.11         | 920.00             | 922.06         |         |
| 2                                                                                                          | 1          | 85.000          | 0.86             | 0.86              | 0.98                      | 0.84              | 0.84               | 5.0                | 5.0               | 12.4                       | 10.44                      | 10.50                    | 6.58              | 18               | 1.00             | 915.83             | 916.68         | 917.11         | 917.92         | 922.06             | 920.68         |         |
| Project File: 23-047-S.stm                                                                                 |            |                 |                  |                   |                           |                   |                    |                    |                   |                            |                            |                          |                   |                  |                  | Number of lines: 2 |                |                |                | Run Date: 3/5/2024 |                |         |
| NOTES: Intensity = 45.52 / (Inlet time + 3.30) ^ 0.62; Return period =Yrs. 100 ; c = cir e = ellip b = box |            |                 |                  |                   |                           |                   |                    |                    |                   |                            |                            |                          |                   |                  |                  |                    |                |                |                |                    |                |         |

# Storm Sewer Profile

Proj. file: 23-047-S.stm



## Appendix K: Site Plans

Caliber Development – Windsor Heights

Prepared by:

Kimberley L. Rouse Engineering

Prepared for:

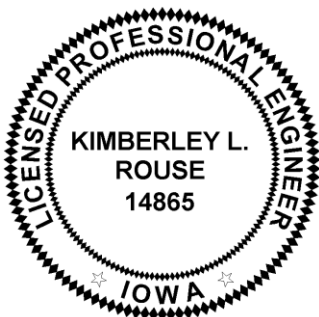
Windsor 63, LLC

Submitted to:

City of Windsor Heights

Iowa Department of Transportation

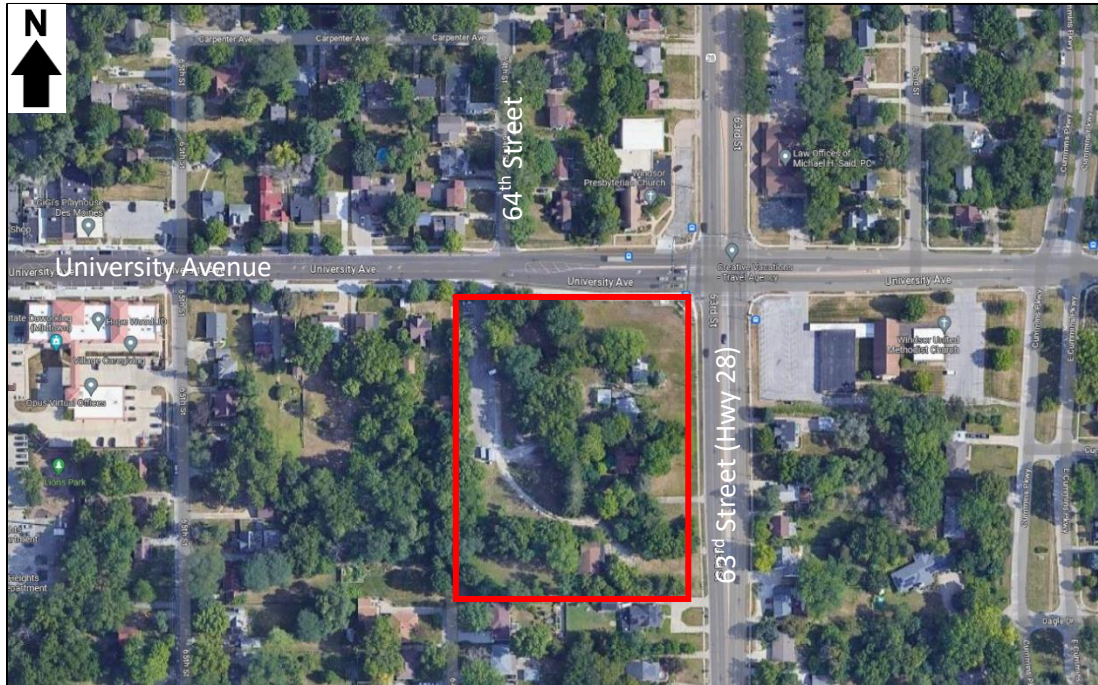
March 2024

|                                                                                     |                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa. |
|                                                                                     | Date: _____                                                                                                                                                                                         |
|                                                                                     | _____<br>KIMBERLEY L. ROUSE, P.E.                                                                                                                                                                   |
|                                                                                     | License No. 14865                                                                                                                                                                                   |
|                                                                                     | My renewal date is <b>December 31, 2024</b>                                                                                                                                                         |
|                                                                                     | Pages or sheets covered by this seal:<br>_____<br>_____                                                                                                                                             |



## Introduction

This letter discusses the traffic generation resulting from the construction of the proposed Caliber Development. The proposed development is located in the southwest corner of the intersection of University Avenue and 63<sup>rd</sup> Street (Hwy 28). Currently there are two proposed entrances into the site. One is off of 63<sup>rd</sup> Street (Hwy 28), and the other is off of University Avenue and is aligned with 64<sup>th</sup> Street to the north. **Figure 1** shows the proposed site location.



**Figure 1 – Proposed Site Location**

## Existing Conditions

The site is south of University Avenue approximately 0.5 miles north of Interstate 235. The posted speed limit is 35 mph on 63<sup>rd</sup> Street (Hwy 28) and 30 mph on University Avenue at the proposed site. 63<sup>rd</sup> Street is a 4-lane roadway with a left-turn lane at University Avenue. University Avenue is a 3-lane roadway adjacent to the site with left-turn lanes at the 63<sup>rd</sup> Street (Hwy 28) intersection. University Avenue transitions to a 3-lane roadway to the east of 63<sup>rd</sup> Street (Hwy 28).



## Trip Generation

The proposed development on the site is a 103 unit, 4 story apartment building. Trip generation rates recommended in the *Institute of Transportation Engineers' (ITE) Trip Generation, 11<sup>th</sup> Edition*, were used to develop estimates of trips to and from the site based on the proposed land use. **Table 1** shows the daily, AM peak hour, and PM peak hour trip generation for the proposed Caliber Development.

**Table 1 – Trip Generation**

| Trip Generaion |            |                 |        |         |          |         |      |
|----------------|------------|-----------------|--------|---------|----------|---------|------|
| Land Use Code  | Use        | Total SF/Units/ | Factor | Percent | Entering | Percent | Exit |
|                |            |                 | Daily  |         |          |         |      |
| 221            | Apartments | 103.00          | 4.54   | 50%     | 234      | 50%     | 234  |
|                |            |                 | AM     |         |          |         |      |
| 221            | Apartments | 103.00          | 0.37   | 23%     | 9        | 77%     | 29   |
|                |            |                 | PM     |         |          |         |      |
| 221            | Apartments | 103.00          | 0.39   | 61%     | 25       | 39%     | 16   |

## Trip Distribution and Assignments

Currently there are two proposed entrances into the site. One is aligned with 64<sup>th</sup> Street to the north and is proposed to be a full access. The other entrance is approximately 350 feet south of University Avenue on 63<sup>rd</sup> Street (Hwy 28) and is currently being proposed to be a right-in/right-out. Traffic counts for the intersection of University Avenue and 63<sup>rd</sup> Street (Hwy 28) were taken from the Iowa Department of Transportation (IDOT) website for the years 2004-2016. Updated traffic counts were also taken from the traffic letter submitted to the IDOT in March of 2021 for the site. A growth rate of 0.5%/year was assumed for the counts in the traffic letter when growing the traffic counts to 2023 projected volumes. **Figures 2 and 3** show the 2023 projected volumes for the intersection of University Ave and 63<sup>rd</sup> Street (Hwy 28) during the AM and PM peak hours.

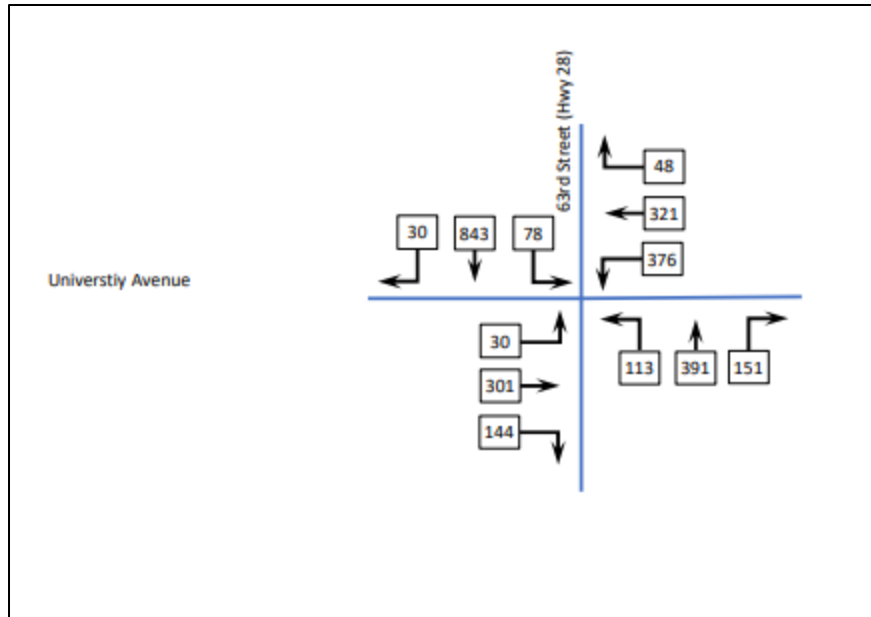


Figure 2 – Projected Traffic Volumes 2023 AM Peak

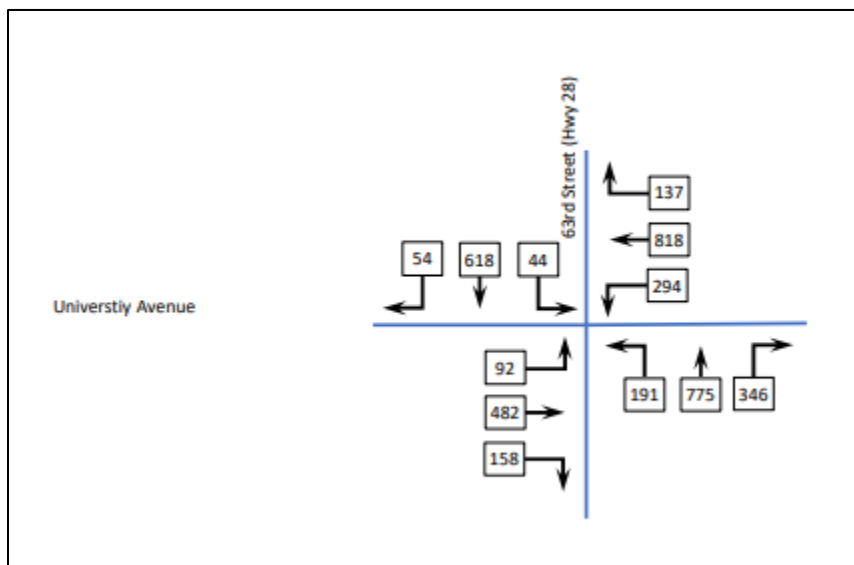
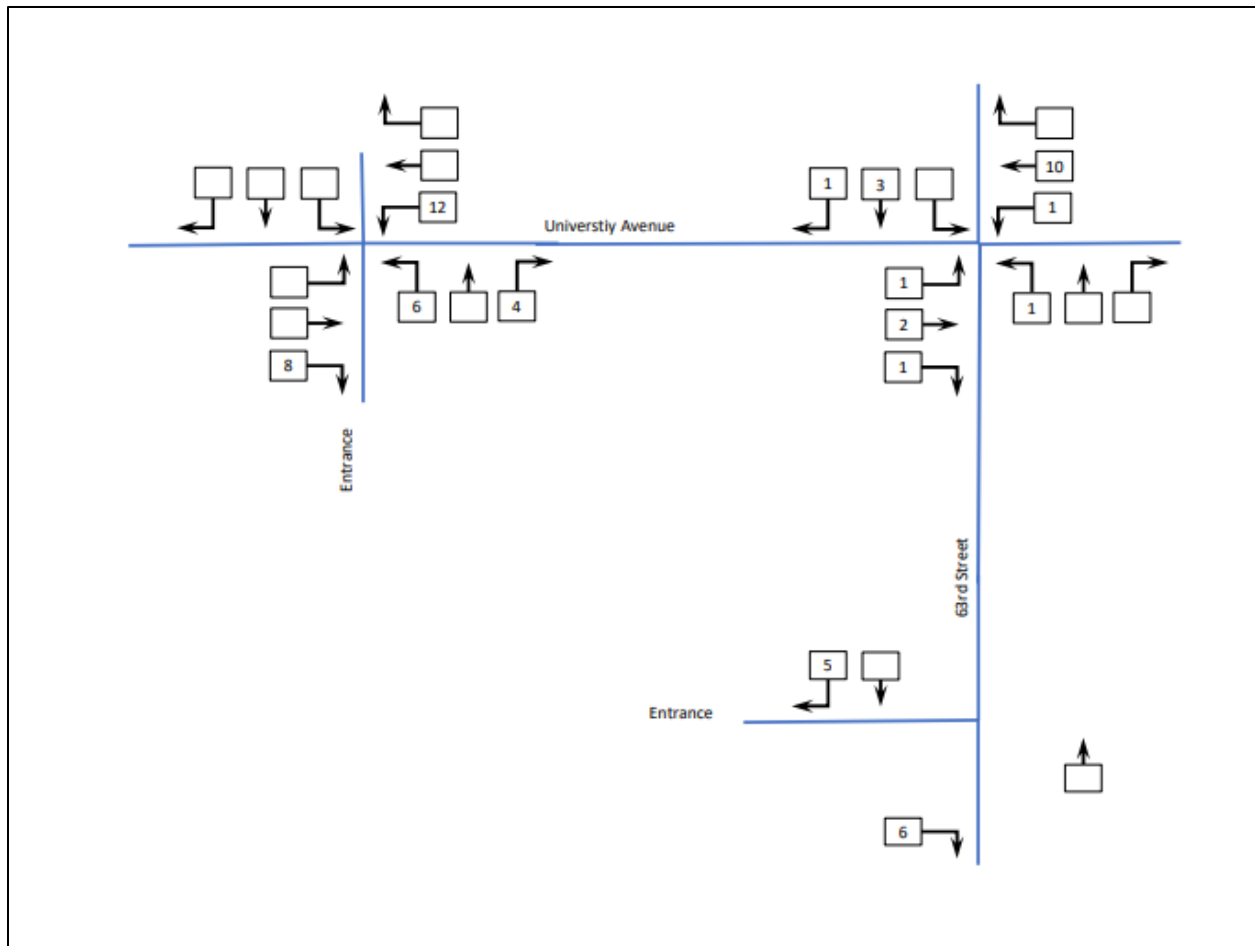


Figure 3 – Projected Traffic Volumes 2023 PM Peak

Using the existing AADT split of traffic on University Avenue it was assumed that 41% of the trips generated will travel to the west and 59% to the east, 45% to the south and 55% to the north during the PM Peak. Because it is the worst-case scenario, **Figure 4** shows the trips generated by the site during the PM peak. **Figure 5** shows the trips generated for the site plus background traffic.



**Figure 4 – PM Peak Trips Generated by the Proposed Development**

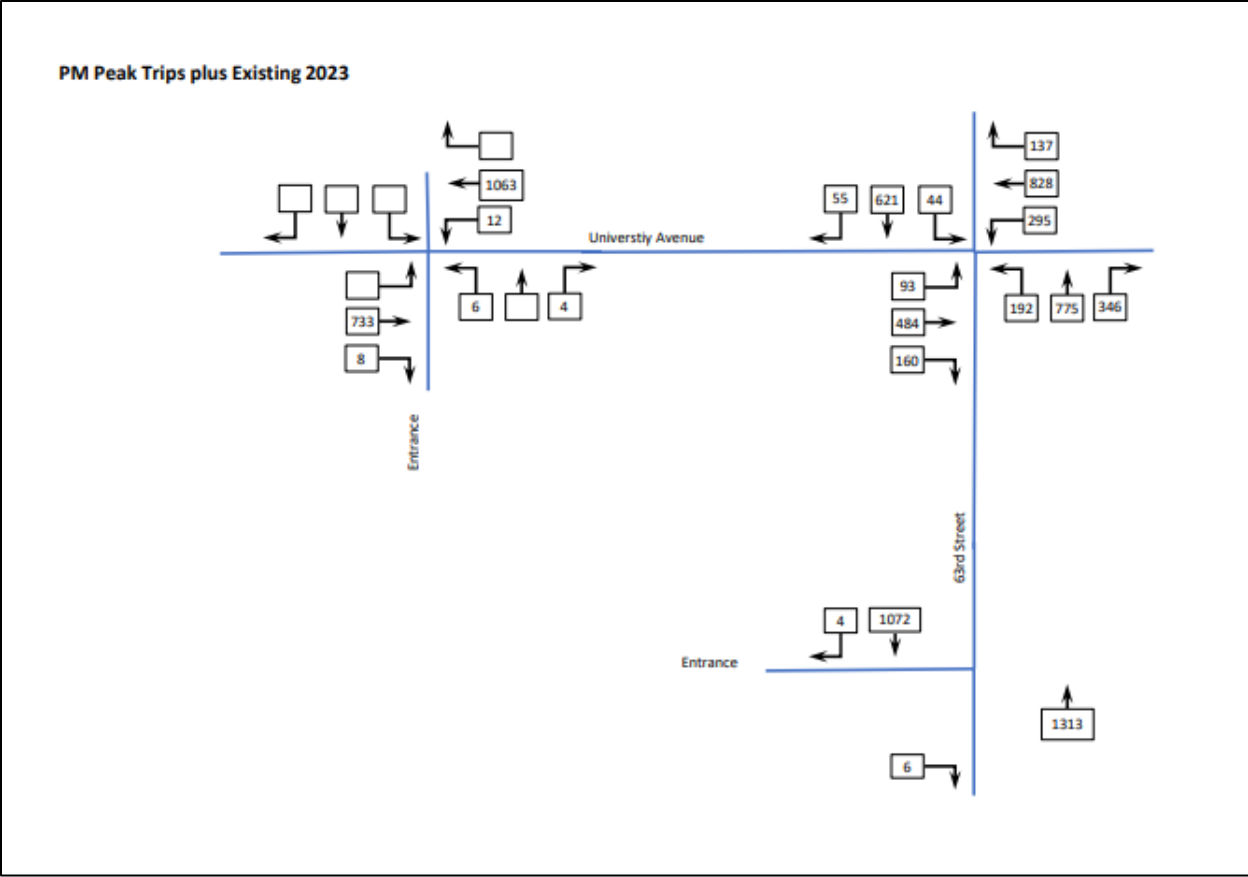


Figure 5 – PM Peak Proposed Site Trips Plus 2023 Traffic (right-in/right-out)

## Intersection Analysis

An AM and PM peak traffic analysis was completed using *Synchro and Simtraffic, Version 8*, software and the Highway Capacity Manual 2010 methodology for the intersection of University Avenue and 63<sup>rd</sup> Street (Hwy 28) for level of service (LOS). The two entrances into the site were also evaluated.

Level of service at intersections is primarily a function of peak hour turning movement volumes, intersection lane configuration, and traffic control. For intersection analysis, the Highway Capacity Manual (HCM) defines LOS in terms of the average control delay at the intersection in seconds per vehicle. The results of an HCM analysis are typically presented in the form of a letter grade (A-F) that provides a qualitative estimate of the operational efficiency or effectiveness of the corridor. Much like an academic report card, LOS A represents the best range of operating conditions (i.e., motorists experiencing little delay or congestion) and LOS F represents the worst (i.e., extreme delay or severe congestion). **Table 2** shows the LOS for both the intersection and the entrances from the Synchro output.

**Table 2 – Level of Service**

| Intersection                                         | Overall  | East Bound | West Bound | North Bound | South Bound |
|------------------------------------------------------|----------|------------|------------|-------------|-------------|
| <b>Existing PM Peak</b>                              |          |            |            |             |             |
| University Avenue and 63rd Street (Hwy 28)           | E/57.3 s | D/48.7 s   | E/67.6 s   | E/60.8 s    | D/41.6 s    |
| 95% Queue in feet                                    |          | 498        | 807        | 545         | 300         |
| <b>PM Peak with Development (right-in/right-out)</b> |          |            |            |             |             |
| University Avenue and 63rd Street (Hwy 28)           | E/58.4 s | D/49.3 s   | E/70.6 s   | E/60.9 s    | D/42.0 s    |
| 95% Queue in feet                                    |          | 502        | 821        | 545         | 302         |
| University Avenue and 64th Street/Entrance           | A        | A          | A          | F           |             |
| 95% Queue in feet                                    |          |            | 25         |             |             |
| 63rd Street (Hwy 28) and Entrance                    | A        | A          |            | A           | A           |
|                                                      |          |            |            |             |             |
|                                                      |          |            |            |             |             |

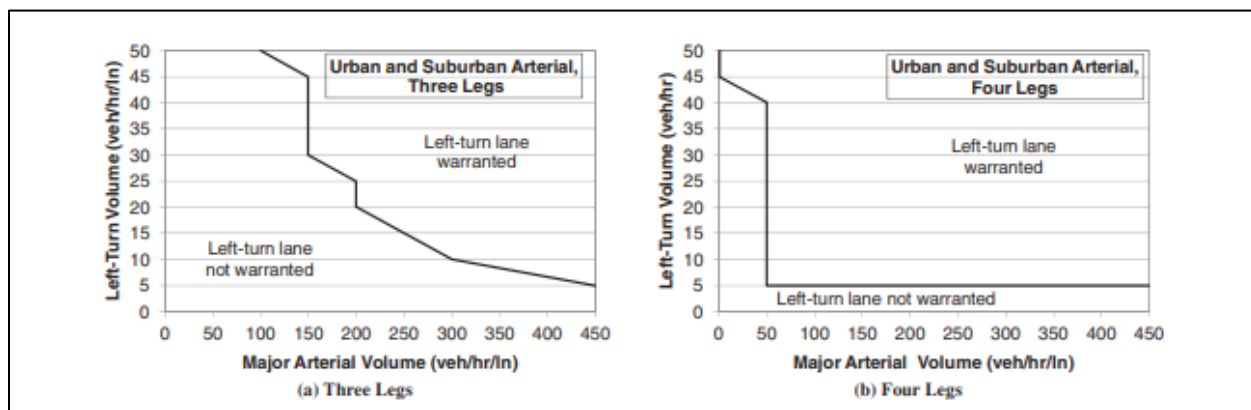
## Turn Lane Warrants

“NCHRP Report 745: Left-Turn Accommodations at Unsignalized Intersections” was used to evaluate the need for left turning bays at the entrances on University Avenue. The PM peak was evaluated because it

was the worst-case scenario for the entrances for left-turns. **Table 3 and Figure 6** show that a left-turn lane would likely be warranted at the entrance on University Avenue.

**Table 3 – Recommended Left Turn Warrants for Urban and Suburban Arterials**

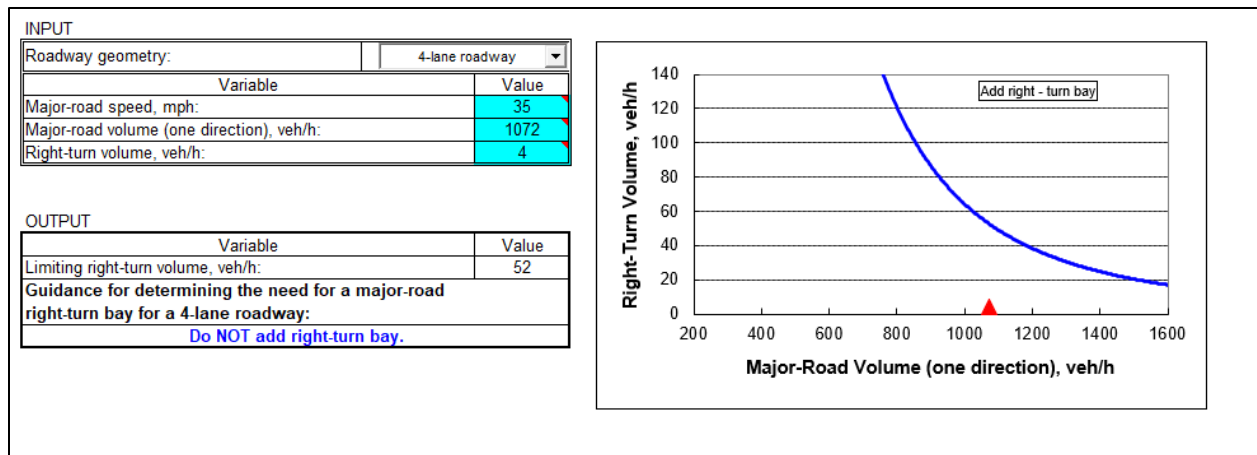
| Left-Turn Lane Peak-Hour Volume (veh/hr) | Three-Leg Intersection, Major Urban and Suburban Arterial Volume (veh/hr/ln) That Warrants a Left-Turn Lane | Four-Leg Intersection, Major Urban and Suburban Arterial Volume (veh/hr/ln) That Warrants a Left-Turn Lane |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| 5                                        | 450                                                                                                         | 50                                                                                                         |
| 10                                       | 300                                                                                                         | 50                                                                                                         |
| 15                                       | 250                                                                                                         | 50                                                                                                         |
| 20                                       | 200                                                                                                         | 50                                                                                                         |
| 25                                       | 200                                                                                                         | 50                                                                                                         |
| 30                                       | 150                                                                                                         | 50                                                                                                         |
| 35                                       | 150                                                                                                         | 50                                                                                                         |
| 40                                       | 150                                                                                                         | 50                                                                                                         |
| 45                                       | 150                                                                                                         | < 50                                                                                                       |
| 50 or More                               | 100                                                                                                         | < 50                                                                                                       |



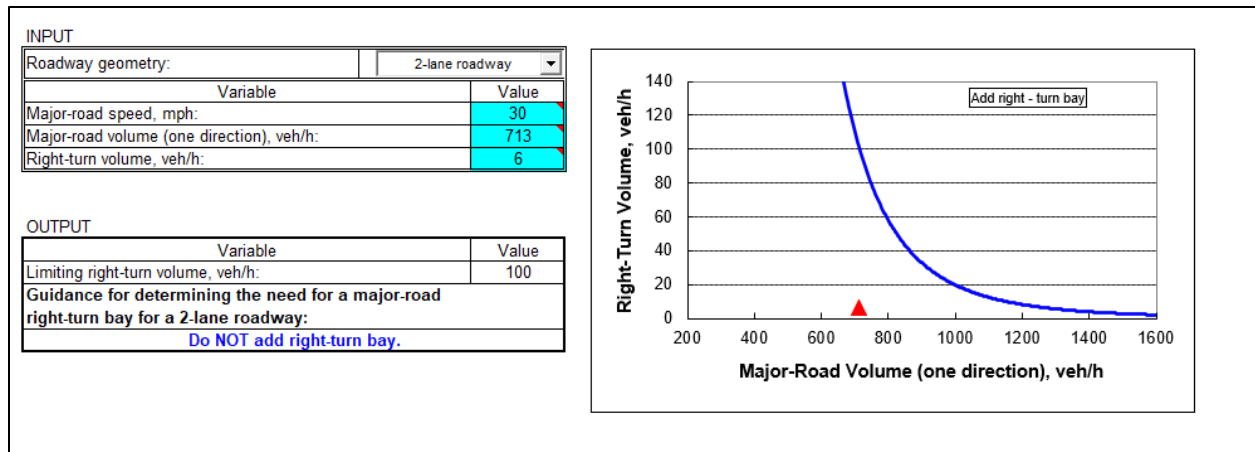
**Figure 6 – Recommended Left Turn Warrants for Urban and Suburban Arterials**

“NCHRP Report 457: Evaluating Intersection Improvements: An Engineering Study Guide”, figure 2-6 was used to evaluate the need for right turning bays at the two entrances into the site. Only the PM peak was evaluated for turn lanes because it was the worst-case scenario for the right turning traffic. **Figures 7 and 8** show that right-turn lanes are likely not warranted at either entrance into the site.





**Figure 7 – Guideline for Determining the Need for a Major Road Right Turn Bay – 63<sup>rd</sup> Street Entrance**



**Figure 8 – Guideline for Determining the Need for a Major Road Right Turn Bay – University Ave Entrance**

### University Avenue Access

The entrance into the site on University Avenue is proposed to be aligned with 64<sup>th</sup> Street to the north. The measured site distance is approximately 340' to the west. According to Chapter 5L-4 in the Iowa SUDAS Design Manual table 5L-4.03, the desirable sight distance for the proposed access is 335' from left turn stop and 290' from right turn stop and crossing maneuver. According to SUDAS there should be adequate sight distance for entering and exiting vehicles at the proposed location.

The Iowa Department of Transportation Design Manual – Chapter 6D-1 Sight Distance was also used to calculate the horizontal intersection sight distance required for an intersection. The criteria taken into consideration for the calculation is the time gap and the design speed. The time gap variable represents the time a stopped driver will accept to accelerate and complete the turning maneuver. For passenger cars the assumed value is 8.0 seconds for a left turn, 7.0 seconds for a right turn and 7.0 seconds for a crossing maneuver. The intersection sight distance along a major road is calculated to be 352.8 feet for westbound left turning traffic. For vehicles exiting the site the calculated sight distance is 308.7 feet.

Limiting the number of driveways in the functional area of an intersection improves the safety of the roadway. The functional area, according to the American Association of State Highway and Transportation Officials' (AASHTO) A Policy on Geometric Design of Highways and Streets defines the upstream functional area of an intersection as a variable distance, influenced by: 1) distance traveled during perception-reaction time, 2) deceleration distance while the driver maneuvers to a stop, and 3) the amount of queuing at the intersection. The functional area of an intersection varies by roadway speed and the type of control at the intersection. For example, the upstream functional area for a signalized intersection with approach speeds of 30 mph is 395 feet. The proposed driveway into the site does fall within the functional area of the 63<sup>rd</sup> Street intersection.

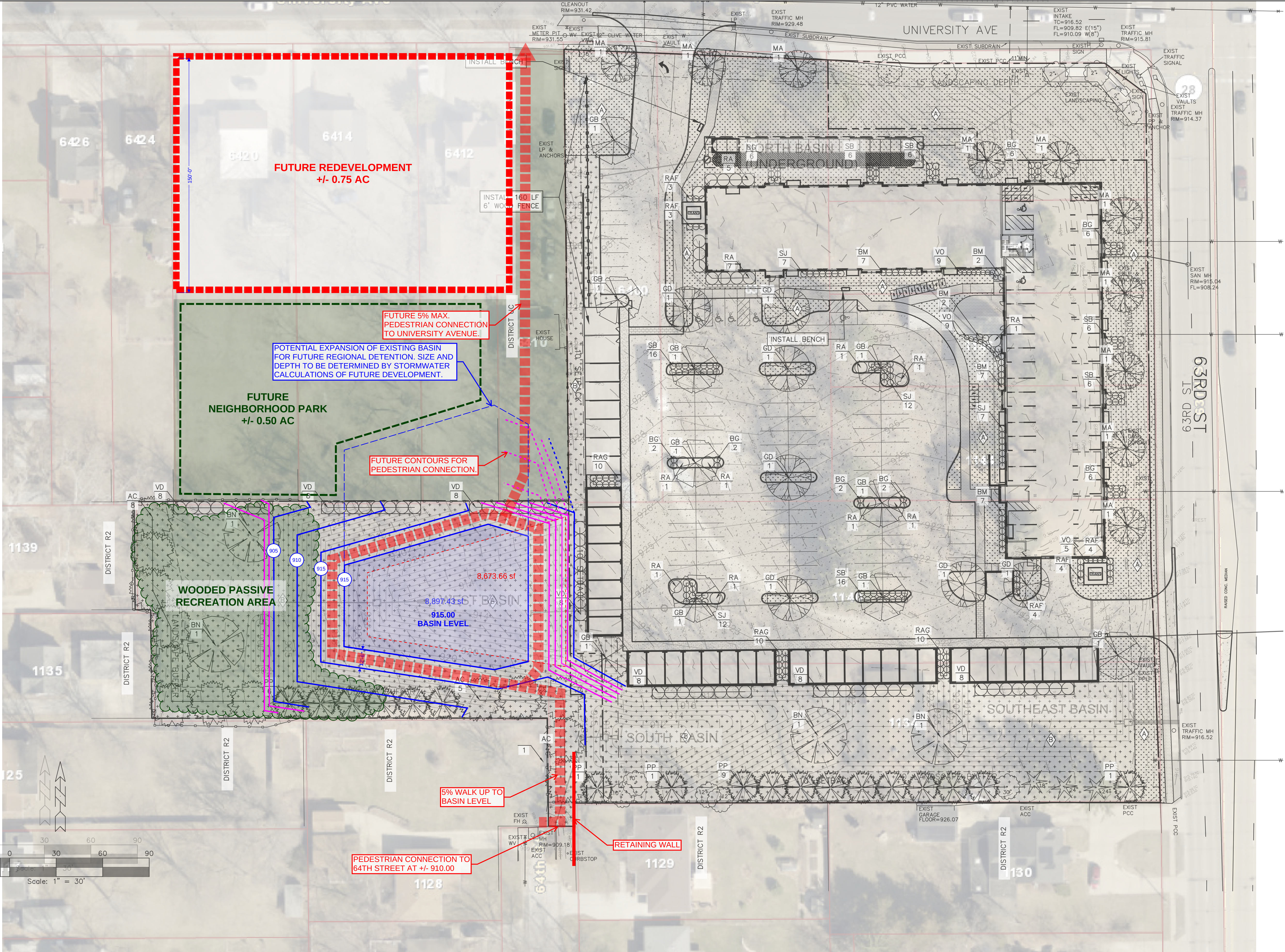
There are limited options for full access into the site from University Avenue, it is recommended that the entrance is aligned with 64<sup>th</sup> Street to the north as is currently being proposed. This will help to limit the number of conflict points in the functional area. A left-turn lane would likely be warranted at this entrance.

## **Conclusion**

After the review of the trips generated by the proposed Caliber development it was determined that the apartment complex will have little impact on University Avenue, 63<sup>rd</sup> Street (Hwy 28) or the intersection of University Avenue and 63<sup>rd</sup> Street (Hwy 28) as it pertains to added traffic volume.

Right-turn lanes will likely not be warranted for the site. A left-turn lane will likely be warranted at the entrance on University Avenue.









## MEMORANDUM

**Date:** April 23, 2024  
**To:** Clapsaddle-Garber Associates, Inc.  
**From:** Justin Ernst, PE  
Trey Rouse  
**Subject:** Site Plan: The Windsor Apartments (63rd Street and University Avenue)  
4th Comment Letter

### General Comments

1. All permits related to the project will be held and released concurrently at the approval of the following:
  - a. Approval of signs and utility from Safe Building.  
*Acknowledged.*
  - b. Revision of site plan application in accordance with the comment letter and all corresponding comments from each City Department.  
*Acknowledged.*
  - c. Professional Signatures on Final Site Plan including Licensed Surveyor (Chapter 170.10)  
*Acknowledged.*
  - d. City Council approval of site plan.  
*Acknowledged.*

### Storm Water General Comments

1. Please document how the Rev calculated in Appendix H is infiltrated within the above-ground basins. For example, the Rev West is calculated as 860 CF. The storage volume at elevation 914.00 is 774 CF according to the model output but the 3" orifice is set at 913.56. How does this basin infiltrate the total Rev? Similarly, please document that the available storage at elevation 920.16 within the underground chambers is equal to or greater than the Rev North in Appendix H.  
*Rv volume calculations are provided in the storm report.*
2. The WQv North in Appendix G should be 5,796 CF and the WQv West should be 3,164 CF. Please correct.  
*The Rv is being met on this site, therefore the WQv is also considered to be met per ISWMM 3.01-2 pg 3.*
3. Provide specifications for the proposed hydrodynamic separator.  
*This has been removed from the plans.*
4. How is the WQv North forced to go through the isolator row? According to the plan sheets, it looks like the inlet pipes to both chambers have the same invert elevation.  
*The Rv is being met on this site, therefore the WQv is also considered to be met per ISWMM 3.01-2 pg 3.*
5. Label proposed contours on Post Development Drainage Map.  
*Contours are labeled.*
6. Provide seeding/planting information in the proposed undetained areas to justify a CN of 61.  
*Per Table C3-S5-2 of the ISWMM, HSG Type B in Good Condition has a CN value of 61. These areas will be sodded and shall be in good condition. Refer to Landscape Plan for planting information. CN calcs are provided in appendices.*

7. Route the SE Basin outflow through the S Basin within the model and update WSELs/release rates accordingly.

SE basin now flows west to S basin and model has been updated.

8. Provide the release rates for water
9. Include a soil management plan in the report.

All release rates are tabulated within the report.

The Web Soil Survey Report is included.

#### Storm Water Plan Sheet Comments

10. Add bioretention cell components (aggregate layer depth, amended soil depth, amended soil specs, etc.) to the plans.
11. Label emergency overflow elevations and dimensions within the plans.
12. Ensure the 100-yr WSELs in the plans match the stormwater report.
13. Adjust the backslope of the West Basin embankment to 4:1 or flatter.
14. Add rip rap at the FES within the level spreader downstream of the West Basin.
15. Per grading plan, the southeast basin's emergency overflow appears directed to 63<sup>rd</sup> Street.
16. Place TRM on bottom and outflow sides on the level spreader.
17. Show details of the outlet onto 64<sup>th</sup> Street. (ie. FES, etc.)

WQv is not required. No Bioretention on site.

Emergency overflows are dimensioned on plans.

Data matched plans

Backslopes are not required to be 4:1. These slopes are 3:1 due to the limited space to fit the basin.

All outlets and inlets now have riprap

That is correct.

RE: Erosion Control Plan.

This has been removed from the plans. Outlet is now directed west.

#### Stormwater Other Comments

18. Adjust western water basin design to accommodate a walkway per 3/27/24 email and map or provide explanation for any alternative design. A walkway connection along the southern section of the pond is the highest priority.
19. Revise stormwater agreement to remove easement portions being dedicated to the city.

A walkway is now implemented at the Wester Basin.

#### Police Comments

1. No further comments.

#### Fire Comments

1. No further comments.

#### Des Moines Water Works Comments

1. No further comments.

#### Urbandale Windsor Heights Sanitary District Comments

1. No further comments.

#### Des Moines Metropolitan Wastewater Reclamation Authority Comments

1. No comments received.

#### Building Comments

1. No further comments.

### Engineering Comments

1. Complete Stormwater Maintenance Agreement and submit per instructions. Final agreement once final property ownership is determined.  
*Acknowledged.*
2. Provided trail easement to be filed once site plan is approved.  
*Acknowledged. Will provide when Site Plan is approved.*
3. Provide DOT approval of driveway.  
*Acknowledged. Will provide when received.*
4. Finalize easements once final property ownership is determined.  
*Acknowledged.*

### Planning Comments

#### Parkland Dedication:

1. Fulfill Parkland Dedication requirement determined by City Council as either a physical dedication or monetary value substitute as determined by Section 172.15 of the Zoning Code.
  - a. Will be considered a condition of approval.
2. Remove dead or diseased trees in parkland dedication area prior to dedication as per the April 1<sup>st</sup> City Council Parkland Dedication discussion.
3. Place native plantings in the parkland dedication area and establish those plantings before dedication as per the April 1<sup>st</sup> City Council Parkland Dedication discussion.

#### Bike Parking:

4. Indoor Long-Term Bike Parking and Car parking in garage don't work with the current design as people won't be able to get out of their cars. Please Address.

### Landscaping Comments

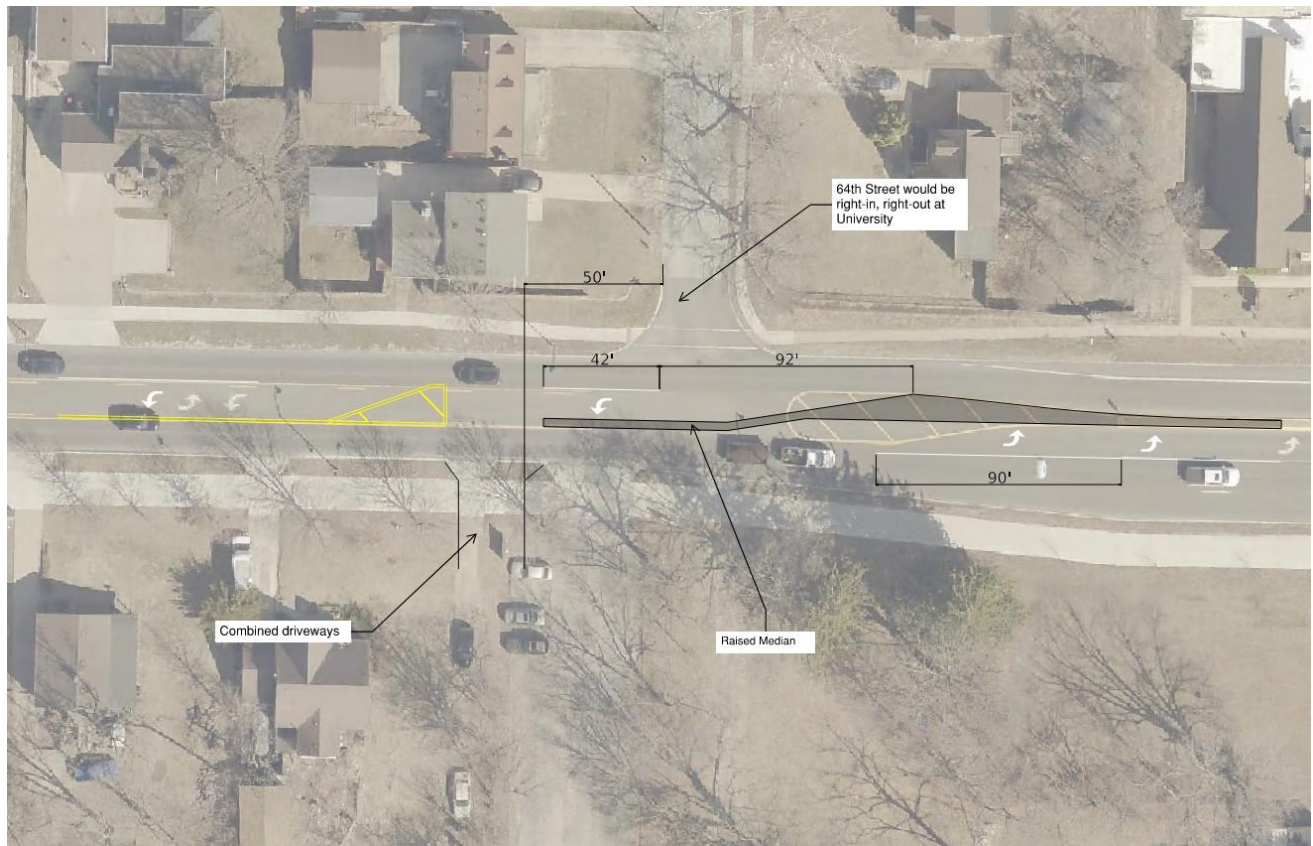
#### Photometric Plan:

1. Show foot candle data at building entrances and pathways to said entrances from the parking lot and other public spaces.

### Traffic General Comments

1. University Avenue Access (page 9)
  - a. As shown on the 4/15/24 site plan, the proposed driveway aligned with 64<sup>th</sup> Street on University is within the functional area of the intersection of 63<sup>rd</sup>/University. Queues are anticipated to block this driveway in the peak hours. Per the report, the delay for residents leaving the apartment is LOS F. Creating a westbound left turn lane on University for the apartments will limit the ability to extend the eastbound left turn lane at 63<sup>rd</sup> street which is already a heavy movement.
    - i. It is encouraged that the developer work with adjacent property owners to move the full access driveway further west away from the intersection of 63<sup>rd</sup> Street.
    - ii. One idea for the driveway moved further west follows:





- iii. If the above is not an option, the developer should make the driveway right-in, right-out only by placing a median across the intersection with 64<sup>th</sup> Street.

#### Traffic Other Comments

2. If Council chooses to allow the full access, City Administration recommends it be a temporary full access and a condition on the site plan approval. A temporary full-access shall be allowed on to University Ave as shown in the site plan. Said access shall be limited to a duration of five years from the date an occupancy certificate is issued for any structure built, after which time the city council must review the access to determine if the temporary full-access may continue or otherwise terminated and converted to a right-in-right-out only access. Temporary full access may also be terminated prior to five years as directed by the Council if they so determine said access has contributed to additional traffic conflicts or if roadway improvements are determined necessary. When temporary full-access is terminated, any action needed to discourage use as a full-access shall be a cost of the developer.