BILL NO. 24-19 **ORDINANCE NO. ~~4674~~**

AN ORDINANCE APPROVING A SITE PLAN REVISION FOR PROPERTY AT 7200 N. BROADWAY.

WHEREAS, pursuant to Section 32-37 of Ordinance No. 2.292 being the Gladstone Zoning Ordinance, public notice was made of a request for site plan approval at 7200 N. Broadway; and

WHEREAS, public hearings have been held after the publishing of the required notices; and

WHEREAS, the City Council finds that the planned development does not materially injure the property and the uses of the properties immediately adjacent to the proposed development; and

WHEREAS, the City Council finds that the site plan presents a unified and organized arrangement of buildings and facilities which have a functional relationship to the property comprising the development; and

WHEREAS, the City Council finds it is in the best interest of the citizens of the City of Gladstone that the site plan submitted by the applicant be approved subject to the terms and conditions set forth herein;

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF GLADSTONE, MISSOURI, AS FOLLOWS:

SECTION 1. SITE PLAN APPROVAL.

The Site Plan for 7200 N. Broadway is hereby approved subject to the terms and conditions set forth herein;

1. Any and all disturbed areas shall be sodded.
2. All manicured grass and landscaped areas shall be irrigated and maintained in perpetuity.
3. Install a minimum of 20 new shrub plantings adjacent to N. Broadway.
4. Install a minimum of 10 new shrub plantings adjacent to NE 72nd Street.
5. All mechanical equipment on the roof shall be screened from public view by a parapet or approved screening similar in design to the rest of the structure. This must be a minimum of twelve (12) inches above the tallest piece of mechanical equipment.
6. A compliant monument sign shall be used to serve the development. The monument sign will need a minimum of 240 sq. ft. of area landscaping around the sign.
7. All exterior lighting on the site shall be LED and designed to reduce adverse impact on adjoining properties.
8. The dumpster shall be enclosed with materials consistent with the primary building. Specific colors and materials shall be submitted and approved as part of the building permit.
9. Trash service, store deliveries, and gasoline refilling (underground commercial gasoline tanks) shall occur between the hours of 7:00 a.m. to 10:00 p.m.
10. Tractor trailers, storage containers, and other commercial vehicles (including delivery trucks) shall not be parked or stored overnight on the premises.

11. No more than 50% of each glazed window area of the building shall have signage.
12. Hours of operation permitted are 24 hours seven days per week.
13. Install a commercial grade bike rack on-site.
14. Install new curb, gutter, and sidewalk along the property line adjacent to N. Broadway.
15. Preserve the northern wooded tree line as a buffer to the residential neighborhood located to the north along NW 72nd Terrace.
16. Complete a Post-Construction Maintenance Agreement for storm water facilities.
17. Install a fire hydrant within four-hundred (400) feet of any portion of the building.
18. Extend and loop the 8-inch water main along N. Broadway.
19. Given the project location and that the development extends to property located in Kansas City, Missouri, this development is subject to Kansas City, Missouri approving the improvements on their parcel.
20. The installation and construction of a left turn lane or right-in/right-out for the entrance on N. Broadway at the property owner's expense.

SECTION 2. SEVERABILITY CLAUSE. The provisions of this ordinance are severable and if any provision hereof is declared invalid, unconstitutional or unenforceable, such determination shall not affect the validity of the remainder of this ordinance.

INTRODUCED, READ, PASSED, AND ADOPTED BY THE COUNCIL OF THE CITY OF GLADSTONE, MISSOURI, THIS 10TH DAY OF JUNE 2024.

_____
Tina M. Spallo, Mayor

ATTEST:

_____
Kris Keller, City Clerk

First Reading: June 10, 2024 Second Reading: June 10, 2024

File # 24-00002

Request for Council Action

RES ☐ # City Clerk Only **BILL ☒ # 24-19** **ORD ☒ #** ~~4.674~~

Date: 6/4/2024 Department: Community Development

Meeting Date Requested: 6/10/2024

Public Hearing: Yes ☒ Date: 6/10/2024

Subject: 7200 N. Broadway – Gas Station & Convenience Store – Site Plan Revision

Background:

Update: City Staff has requested the following from the applicant after the Planning Commission meeting on Monday, May 20th:

- To have the traffic engineers present at the City Council meeting to answer any traffic related questions in more detail.
- Provide renderings of the west side of the store that will give a better visual of the drive thru and backside of the store.
- To be prepared to discuss and show the potential left turn lane installation and the right-in/right-out traffic mitigation options in some detail.

Narrative: The applicant is requesting site plan approval for the purpose of constructing a new 5,000 sq. ft. gas station and convenience store located at 7200 N. Broadway. This property is currently vacant and zoned CP-2 which is an appropriate zoning for the proposed use.

This project was proposed in 2023 and denied by the Gladstone City Council. The property owner has made adjustments to the site plan and those adjustments include the following:

- The access point on NW 72nd Street has been shifted west to lineup with the Post Office access point.
- The water quality pond has been moved from the northern side of the property to the western side of the property away from the residential homes located to the north. This basin will be located on the KCMO parcel.
- The wooded area on the northern side of the property will primarily remain untouched.

This project will also incorporate a drive thru lane and window as well as two (2) electric vehicle (EV) charging stations and a commercial bike rack. There will be ten (10) fuel pumps covered by a canopy to serve customers.

The primary exterior building materials used will be brick and stucco.

The landscaping plans show new landscape throughout the property using various trees and shrubs. All disturbed areas will be sodded and irrigated.

A traffic study was conducted by Priority Engineers, Inc. and they provided a summary of their findings.

- "Analysis of unsignalized intersections indicate that they operate with acceptable levels of service both before and after the construction of the proposed development. The signalized intersection at NW 72nd Street and N Broadway Street has an overall level of service that is acceptable both before and after construction of the proposed development. The proposed entrance locations have sufficient sight distance. A left turn lane is warranted for the entrance on N Broadway Street in the PM Peak Hour. Due to geometric constraints of this location, the left turn lane will need to be designed so that it does not interfere with the southbound left turn lane at the signalized intersection with NW 72nd Street. No other improvements are required as a result of this development."
- Given the conclusions and recommendations made by the traffic engineers, City Staff will be requiring the installation and construction of a left turn lane or right-in/right-out for the entrance on N. Broadway at the property owner's expense.

Budget Discussion: N/A

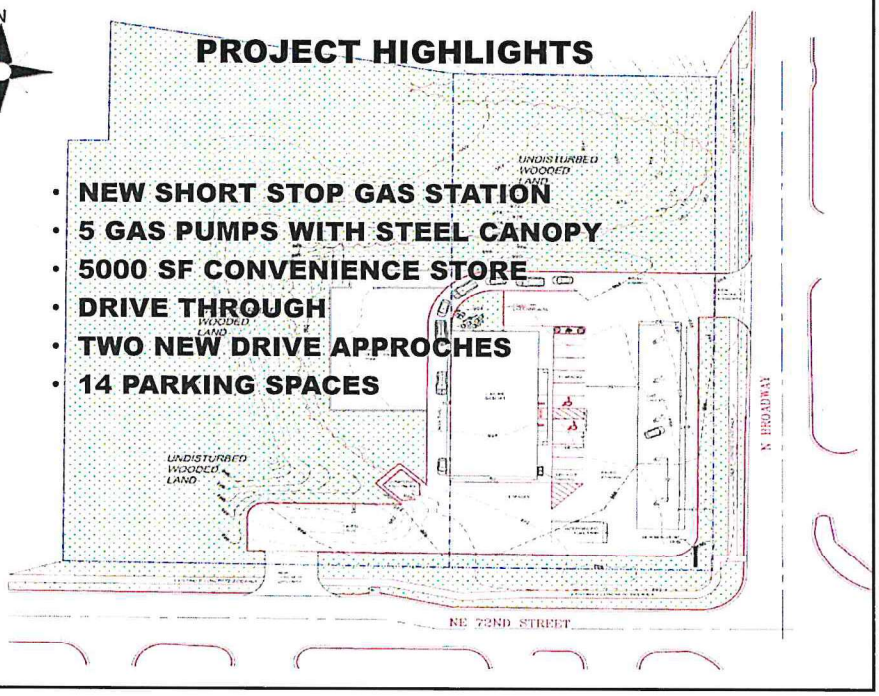
Public/Board/Staff Input:
Public: There were approximately 5-10 people in the audience who attended the Planning Commission hearing that are in opposition to the proposed project. These individuals live in the neighborhood of NW 72nd Terrace, which is north of the proposed project.
Board: The Planning Commission approved the project. (7 Yes – 1 No)

Provide Original Contracts, Leases, Agreements, etc. to: City Clerk and Vendor.

Austin Greer	JM	BB
Department Director/Administrator	City Attorney	City Manager

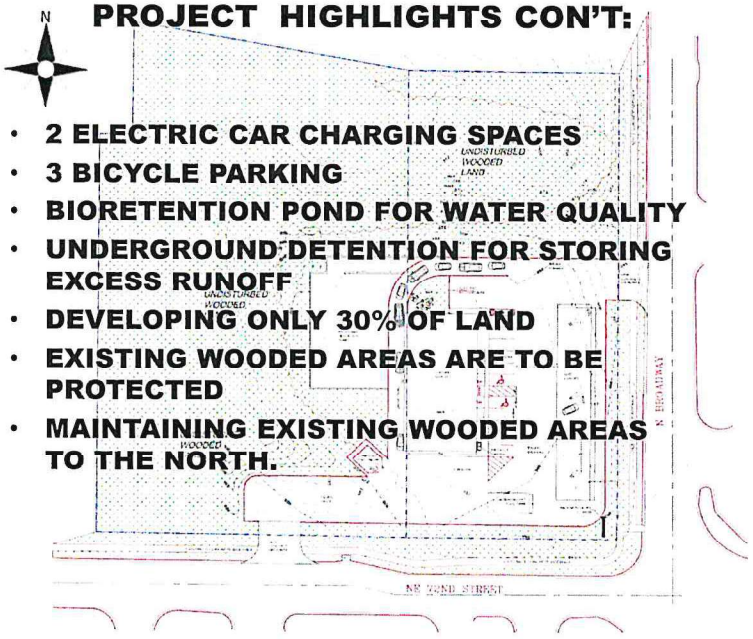
PROJECT HIGHLIGHTS

- NEW SHORT STOP GAS STATION
- 5 GAS PUMPS WITH STEEL CANOPY
- 5000 SF CONVENIENCE STORE
- DRIVE THROUGH
- TWO NEW DRIVE APPROCHES
- 14 PARKING SPACES

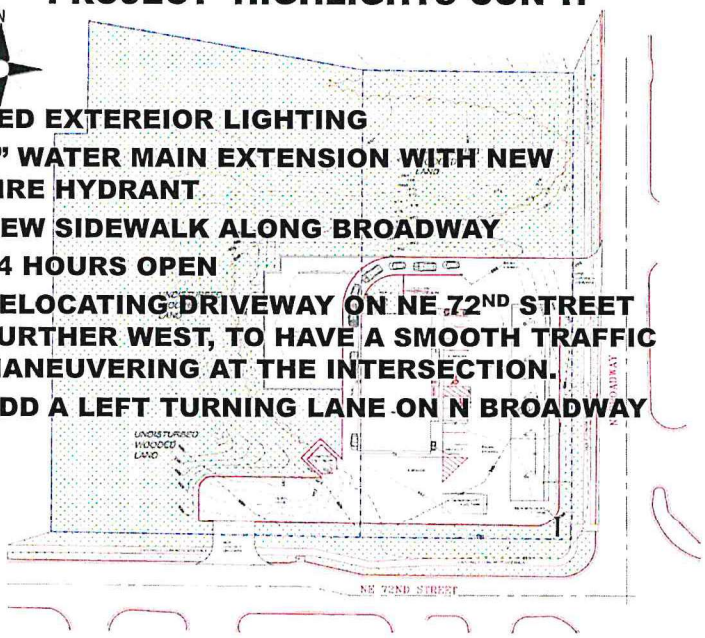


PROJECT HIGHLIGHTS CON'T:

- 2 ELECTRIC CAR CHARGING SPACES
- 3 BICYCLE PARKING
- BIORETENTION POND FOR WATER QUALITY
- UNDERGROUND DETENTION FOR STORING EXCESS RUNOFF
- DEVELOPING ONLY 30% OF LAND
- EXISTING WOODED AREAS ARE TO BE PROTECTED
- MAINTAINING EXISTING WOODED AREAS TO THE NORTH.

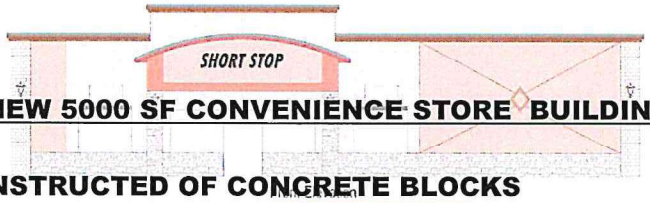


PROJECT HIGHLIGHTS CON'T:



- LED EXTEREIOR LIGHTING
- 8" WATER MAIN EXTENSION WITH NEW FIRE HYDRANT
- NEW SIDEWALK ALONG BROADWAY
- 24 HOURS OPEN
- RELOCATING DRIVEWAY ON NE 72ND STREET FURTHER WEST, TO HAVE A SMOOTH TRAFFIC MANEUVERING AT THE INTERSECTION.
- ADD A LEFT TURNING LANE ON N BROADWAY

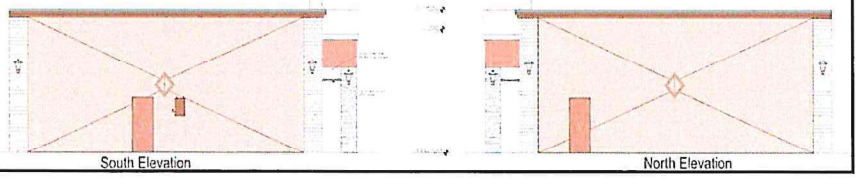
C-STORE BUILDING ELEVATIONS



NEW 5000 SF CONVENIENCE STORE BUILDING

- CONSTRUCTED OF CONCRETE BLOCKS
- METAL BAR JOIST ROOF SYSTEM
- BRICK AND STONE EXTERIOR
- CONCRETE STUCCO ON SIDE AND REAR
- HIGH PARAPET TO SCREEN MECHANICAL UNITS
- LESS THAN 50% GLAZING TO HAVE SIGNAGE
- MATCHING ENCLOSED TRASH DUMPSTER

West Elevation



South Elevation North Elevation

SITE PLAN RENDERING

BUILDING & CANOPY RENDERING

BUILDING & CANOPY RENDERING

LANDSCAPING HIGHLIGHTS:

- ONLY 30% AREA DEVELOPED
- 70% AREA MOSTLY HAVING MATURE TREES TO REMAIN
- MAINTAINING EXISTING WOODED AREAS. NOT DISTURBING ANYTHING TO THE NORTH.

LANDSCAPING HIGHLIGHTS CON'T:

- BUILT IN IRRIGATION SYSTEM
- PLANTING TREES AND SHRUBS ALONG BROADWAY AND 72ND STREET
- ALL DISTURBED AREAS SODDED
- PLANTING NEW VEGETATION TO THE WEST

PLANNING COMMISSION
GLADSTONE, MISSOURI
Gladstone Community Center
Monday, May 20th, 2024
7:00 pm

Item 1 on the Agenda: Roll Call.

Present: Kate Middleton
Bill Turnage
Jennifer McGee
Joseph Brancato
Cameron Nave Secretary
Robert Wilson
Steve Beamer Chair
Mike Ebenroth

Absent: Chase Cookson
Brenda Lowe, V-Chair
Kim Murch

Council & Staff Present:
Austin Greer, Assistant City Manager | Community Development Director
Alan Napoli, Community Development Administrator/Building Official
Angie Daugherty, Admin. Assistant
Jean B. Moore, Councilmember
Tina Spallo, Mayor

Item 2 on the Agenda: Pledge of Allegiance.

Chair Beamer led the group in reciting the Pledge of Allegiance to the United States of America.

Item 3 on the Agenda: Approval of the April 1st, 2024 Minutes. Chair Beamer asked if there was a motion to approve the minutes from the April 1st meeting.

Mr. Turnage moved to approve the minutes; Ms. McGee seconded. The minutes were approved, 8-0.

Item 4 on the Agenda: Consideration: On a Site Plan Revision on property located at 7200 N. Broadway.

Applicant: Gerald W. Menefee P.E.
Owner: Mohammad Hafiz
City Council consideration for this project is scheduled for Monday, June 10, 2024.

Mr. Greer read from the staff report:

The applicant is requesting site plan approval for the purpose of constructing a new 5,000 sq. ft. gas station and convenience store located at 7200 N. Broadway. This property is currently vacant and zoned CP-2 which is an appropriate zoning for the proposed use.

This project was proposed in 2023 and denied by the Gladstone City Council. The property owner has made adjustments to the site plan and those adjustments include the following:

- The access point on NW 72nd Street has been shifted west to lineup with the Post Office access point.
- The water quality pond has been moved from the northern side of the property to the western side of the property away from the residential homes located to the north. This basin will be located on the KCMO parcel.
- The wooded area on the northern side of the property will primarily remain untouched.

This project will also incorporate a drive thru lane and window as well as two (2) electric vehicle (EV) charging stations and a commercial bike rack. There will be ten (10) fuel pumps covered by a canopy to serve customers.

The primary exterior building materials used will be brick and stucco.

The landscaping plans show new landscape throughout the property using various trees and shrubs. All disturbed areas will be sodded and irrigated.

A traffic study was conducted by Priority Engineers, Inc. and they provided a summary of their findings.

- "Analysis of unsignalized intersections indicate that they operate with acceptable levels of service both before and after the construction of the proposed development. The signalized intersection at NW 72nd Street and N Broadway Street has an overall level of service that is acceptable both before and after construction of the proposed development. The proposed entrance locations have sufficient sight distance. A left turn lane is warranted for the entrance on N Broadway Street in the PM Peak Hour. Due to geometric constraints of this location, the left turn lane will need to be designed so that it does not interfere with the southbound left turn lane at the signalized intersection with NW 72nd Street. No other improvements are required as a result of this development."
- Given the conclusions and recommendations made by the traffic engineers, City Staff will be requiring the installation and construction of a left turn lane or right-in/right-out for the entrance on N. Broadway at the property owner's expense.
-

City Staff recommends that the following conditions be considered if the Planning Commission and City Council choose to approve this project request:

1. Any and all disturbed areas shall be sodded.
2. All manicured grass and landscaped areas shall be irrigated and maintained in perpetuity.
3. Install a minimum of 20 new shrub plantings adjacent to N. Broadway.
4. Install a minimum of 10 new shrub plantings adjacent to NE 72nd Street.
5. All mechanical equipment on the roof shall be screened from public view by a parapet or approved screening similar in design to the rest of the structure. This must be a minimum of twelve (12) inches above the tallest piece of mechanical equipment.

6. A compliant monument sign shall be used to serve the development. The monument sign will need a minimum of 240 sq. ft. of area landscaping around the sign.
7. All exterior lighting on the site shall be LED and designed to reduce adverse impact on adjoining properties.
8. The dumpster shall be enclosed with materials consistent with the primary building. Specific colors and materials shall be submitted and approved as part of the building permit.
9. Trash service, store deliveries, and gasoline refilling (underground commercial gasoline tanks) shall occur between the hours of 7:00 a.m. to 10:00 p.m.
10. Tractor trailers, storage containers, and other commercial vehicles (including delivery trucks) shall not be parked or stored overnight on the premises.
11. No more than 50% of each glazed window area of the building shall have signage.
12. Hours of operation permitted are 24 hours seven days per week.
13. Install a commercial grade bike rack on-site.
14. Install new curb, gutter, and sidewalk along the property line adjacent to N. Broadway.
15. Preserve the northern wooded tree line as a buffer to the residential neighborhood located to the north along NW 72nd Terrace.
16. Complete a Post-Construction Maintenance Agreement for stormwater facilities.
17. Install a fire hydrant within four-hundred (400) feet of any portion of the building.
18. Extend and loop the 8-inch water main along N. Broadway.
19. Given the project location and that the development extends to property located in Kansas City, Missouri, this development is subject to Kansas City, Missouri approving the improvements on their parcel.
20. The installation and construction of a left turn lane or right-in/right-out for the entrance on N. Broadway at the property owner's expense.

City Staff recommends that the request be **APPROVED** contingent upon the conditions listed above.

Mr. Menefee who is the applicant on the project presented a PowerPoint.

Mr. Menefee stated that this will be a convenience store with five gas pumps, a drive thru, 14 parking spaces, EV charging stations, exterior lighting along the north side, the water main extension and sidewalk, and open 24 hours. They will also add an access drive off of Broadway and NE 72nd St. Only 30% of the area will be developed and the other 70% has mature trees. They will have storage pipes on the northern edge of the site and those will be connected to the water retention pond on the west side of the structure. Thank you.

Ms. Middleton asked what part of this property is in Kansas City.

Mr. Menefee stated the western parcel that has the basin and west side of the driveway.

Mr. Turnage asked who will be in charge of redesigning the drive from Broadway.

Mr. Greer stated that private sector engineers hired by the property owner will likely design the project and submit the designs to city staff for review.

Ms. McGee asked where the retaining wall was going and how tall will it be.

Mr. Menefee stated the wall will be along the tree line and around 10 to 12 feet tall at the tallest point.

Mr. Wilson asked if he could explain the difference between the basin and a sand and oil separator pit.

Mr. Menefee stated it is based on the volume of the water that comes off the site. It is a large area and with a lot of rain fall this goes into the retention pond and the sand filtration is basically the same thing. The filter is made up of primarily tree bark and peat moss.

Mr. Brancato asked how the public is supposed to gain access to the drive thru and whether or not they will have to drive around the back of the building and face N. Broadway or NW 72nd Street. Also, will the drive thru be open for 24 hours as well?

Mr. Menefee stated he isn't sure about the hours that the drive thru will be open but assumes it will be dependent on customer demand. The drive thru comes in at the north side and goes south along the building facing NW 72nd St.

Mr. Beamer asked about approval from Kansas City. Do you all have a status on this?

Mr. Menefee stated they have not brought this project to Kansas City yet as we would like to get permission from the City of Gladstone first.

Mr. Beamer asked if this property has historically been vacant or have there been other approved plans on this site.

Mr. Greer stated yes, a Casey's gas station and a dentistry has been approved on this site historically but neither pursued the actual construction of the projects.

Mr. Beamer welcomed the audience to speak in favor or against the proposed project.

Mr. and Ms. Weatherford who reside at 403 NW 72nd Terrace stated that since there is a Casey's at one end of Broadway and a QuikTrip on the other so why do we need another gas station in the middle of residential? That area is full of residential homes. Will the sales from the Short Stop be mostly gas or alcohol? This is a very dangerous intersection and we are very concerned about traffic and wrecks. Are there plans to look at this intersection?

Ms. Josie Nabavian who resides at 400 NW 72nd Terrace asked what has changed from the last meeting? What is going to be the traffic pattern? There is a lot of traffic in that area. With the exit off of Broadway into the gas station, will this make a traffic delay?

Mr. Greer stated that a traffic study has been completed and the study indicates a left turn lane is warranted traveling northbound. Staff is requiring that the property owner add a left turn lane or a right-in/right-out to help mitigate traffic.

Mr. Tyson who resides at 308 NW 76th St. asked when you mention right-in and right-out will this be right lane going into the gas station parking lot and right turn only coming out of the parking lot on N. Broadway?

Mr. Greer stated yes sir.

Mr. Tyson stated that the city cannot control the traffic off of 76th St. or 72nd St.

Mr. Greer stated that the design of the right-in and right-out will be built high enough that most people will try not to drive over it.

Mr. Tyson brought up traffic control and that he doesn't think the police department does enough to stop people from speeding on Broadway. This property has been vacant for so long and I don't understand why they want to put a gas station there.

Ms. Vicki Marshall resides at 401 NW 72nd Terrace and her concern is that she feels like this project will be in her backyard. What if they have a gas leak from the tanks? When they first moved here they were told that it was zoned for an office building and that was in 1992.

Mr. Menefee stated that it is a requirement that they have a containment system that has a double wall tank that is surrounded by a plastic liner.

Ms. Taylor Sherrill who resides at 6305 N. Bales Avenue stated that this project from an environmental perspective does not seem to be compatible with the recent comprehensive plan and that this project does not fit the location.

MOTION: By Ms. Middleton, second by Mr. Ebenroth to consider a Site Plan Revision located at 7200 N Broadway.

Vote:	**Mr. Wilson**	**Yes**
	Mr. Brancato	**Yes**
	Mr. Turnage	**Yes**
	Ms. Middleton	**No**
	Chair Beamer	**Yes**
	Ms. McGee	**Yes**
	Mr. Nave	**Yes**
	Mr. Ebenroth	**Yes**

The motion carried. (7-1)

Item 5 on the Agenda: Communications from the City Council

Councilmember Jean Moore wanted to welcome everyone to the new space and Mr. Bob Wilson to the Planning Commission. She also thanked the residents for their participation tonight.

Item 6 on the Agenda: Communications from the City Staff

Mr. Greer welcomed Mr. Wilson to the Commission as well. With the storms that happened last night the city will be offering free brush disposable at Public Works today through Friday. City Hall will be closed next Monday for Memorial Day and Food, Art, and Drink will be at Linden Square on June 1st. Also, there will be no Planning Commission meeting on Monday, June 3rd.

Item 7 on the Agenda: Communications from the Planning Commission Members

Mr. Beamer welcomed Mr. Wilson to the Planning Commission and asked Mr. Wilson to tell them a little about himself.

Mr. Wilson stated that he is an architect by trade and is leading an architectural firm here in Kansas City. I was also on the Capital Improvements Committee and am very excited to join the Planning Commission and help the community.

Mr. Turnage wanted to thank the Public Works Department for sponsoring the beautification event.

Item 8 on the Agenda: Adjournment

Chair Beamer adjourned the meeting at 7:39 pm.

Respectfully submitted:

_____ Approved as submitted _____
Steve Beamer, Chair

_____ Approved as corrected _____
Angie Daugherty, Recording Secretary

DEVELOPMENT APPLICATION

CITY OF GLADSTONE
7010 N HOLMES STREET
GLADSTONE, MISSOURI 64118
PHONE: 436-4110 FAX: 436-2228

File #: _____
Application Date: **04/01/2024**
PC Date: _____
CC Date: _____

Application Type:

- ☐ (PH) Special Use Permit ($500)
- ☐ (PH) Zoning Change ($500)
- ☐ (PH) Site Plan Revision ($500)
- ☐ (PH) Right-of-Way Vacation ($200)
- ☐ (PH) Variance – BZA ($200)
- ☐ Final Plat/Replat ($75)

Address of Action: **400 NE 72ND STREET**

Legal Description: *Attach under separate cover if needed.* BEG SW COR LT 12 WILLOW CREEK E146, S340, SW21.21, W138, N TO POB

Proposed Change: CONSTRUCTION OF NEW GAS STATION WITH 5000 SF CONVENIENCE STORE AND 5 GAS DISPENSERS AND DRIVE THRU

Applicant/Property Owner Information:

☐ Applicant/Engineer GERALDW MENEFEE, P.E.
Company KAM DESIGN GROUP LLC
Address 9000 E BANNISTER ROAD, KANSAS CITY MO 64134
Phone 8167972065 Fax: _____ E-Mail: kamdesign@aol.com

☐ Property Owner (if different than applicant) MOHAMMAD HAFIZ
Company _____
Address 1121 SW BLAZINGSTAR CT., LEE'S SUMMIT MO 64081
Phone 816 7861622 Fax: _____ E-Mail: mhafiz103@yahoo.com

☐ Architect DARRYL W HAWKINS AIA
Company INNOVATIVE DESIGN & RENOVATION
Address 8011 PASEO SUITE 201, KANSAS CITY, MO 64131
Phone 8164052159 Fax: _____ E-Mail: arkitec35@aol.com

Please indicate in one box above which person is to be the contact.

Applicant's Signature Darryl W Hawkins Date 4/1/24

N BROADWAY
NEW 5' CONCRETE SIDEWALK
EXISTING 5' CONCRETE SIDEWALK
NEW MONUMENT SIGN
GAS CANOPY
UNDERGROUND FUEL TANK
BICYCLE PARKING
PAVED PARKING
11 SPACES
NEW CONCRETE DRIVEWAY
30'
140'
20'
24'
18'
986
990
994
992
988
984

Recorded in Clay County, Missouri
Date and Time: 08/12/2010 at 08:09:37 AM
Instrument Number: 2010027038
Book: M Page: 12
Instrument Type SURV
Page Count 1
Recording Fee $6500.5
Grantor 72ND & BROADWAY
Grantee 72ND & BROADWAY
Robert T Sevier, Recorder

SCALE
0' 30' 60'
1"=30' HORIZ.

PLAN LEGEND

SURVEY MARKERS
- FOUND SECTION CORNER (MONUMENTATION AS NOTED)
- FOUND PROPERTY CORNER (MONUMENTATION AS NOTED)
- SET 1/2" IRON BAR WITH PLASTIC CAP
- BENCHMARK

GAS
- GK GAS LINE MARKER

SANITARY
- SMH SANITARY MANHOLE

UTILITY LINES
- EEGH ELECTRIC, OVERHEAD

CONTOURS
- 100 INDEX CONTOURS
- 100 INTERMEDIATE CONTOURS

ELECTRIC
- GUY GUY ANCHOR
- LP LIGHT POLE
- PP POWER POLE

STORM
- CI CURB INLET
- STMH STORM MANHOLE

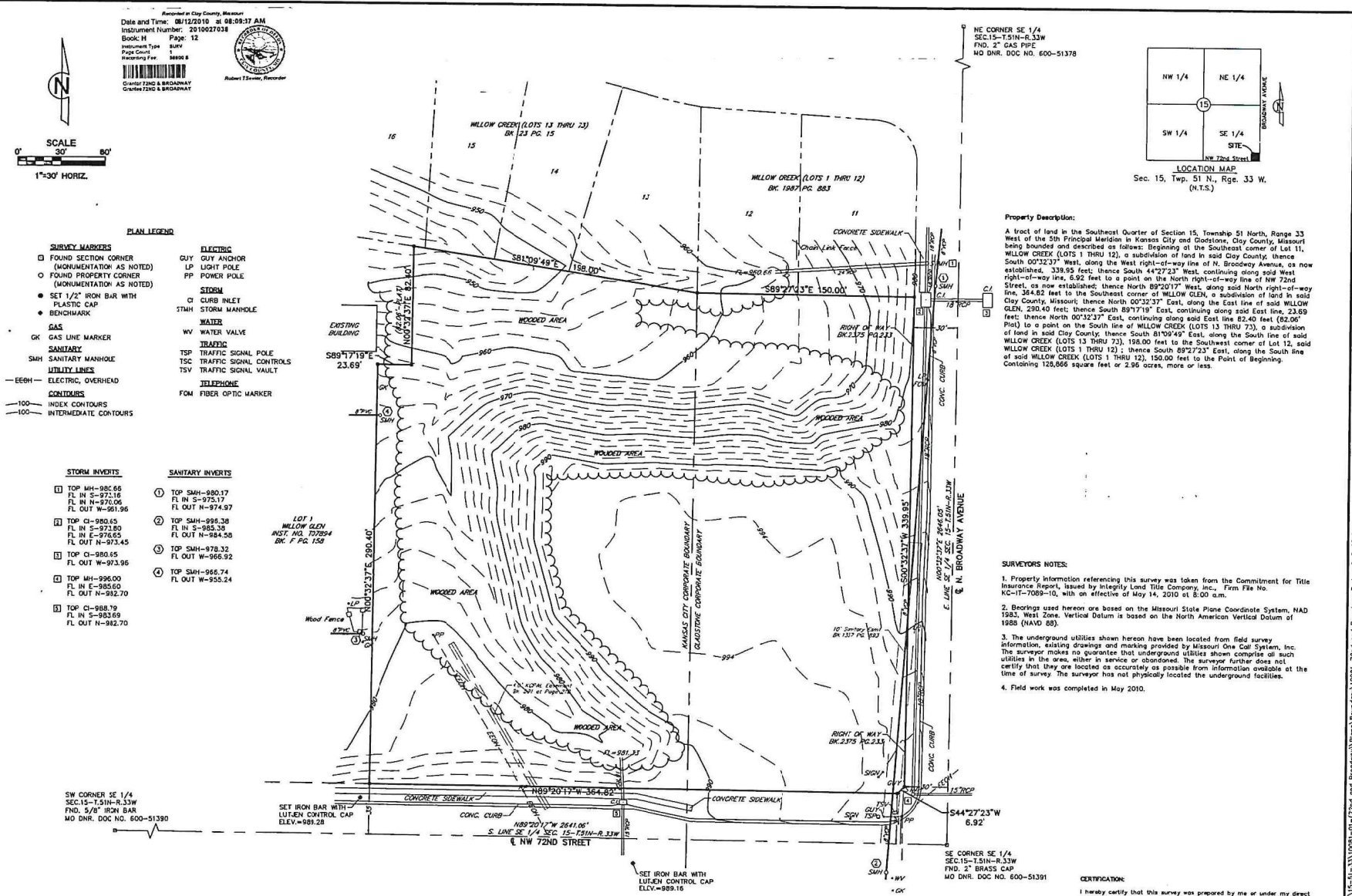
WATER
- WV WATER VALVE

TRAFFIC
- TSP TRAFFIC SIGNAL POLE
- TSC TRAFFIC SIGNAL CONTROLS
- TSV TRAFFIC SIGNAL VAULT

TELEPHONE
- FOM FIBER OPTIC MARKER

STORM INVERTS
1. TOP MH-986.66 FL IN S-972.16 FL IN N-976.06 FL OUT W-951.96
2. TOP CI-980.65 FL IN S-973.80 FL IN E-976.65 FL OUT N-973.45
3. TOP CI-980.65 FL OUT W-973.96
4. TOP MH-996.00 FL IN E-985.60 FL OUT N-982.70
5. TOP CI-988.79 FL IN S-983.69 FL OUT N-982.70

SANITARY INVERTS
1. TOP SMH-980.17 FL IN S-975.17 FL OUT N-974.97
2. TOP SMH-996.38 FL IN S-985.38 FL OUT N-984.58
3. TOP SMH-978.32 FL OUT W-966.92
4. TOP SMH-966.74 FL OUT W-955.24



LOCATION MAP
Sec. 15, Twp. 51 N., Rge. 33 W. (N.T.S.)

Property Description:

A tract of land in the Southeast Quarter of Section 15, Township 51 North, Range 33 West of the 5th Principal Meridian in Kansas City and Gladstone, Clay County, Missouri being bounded and described as follows: Beginning at the Southeast corner of Lot 11, WILLOW CREEK (LOTS 1 THRU 12), a subdivision of land in said Clay County; thence South 00°32'37" West, along the West right-of-way line of N. Broadway Avenue, as now established, 339.95 feet; thence South 44°27'23" West, continuing along said West right-of-way line, 6.92 feet to a point on the North right-of-way line of NW 72nd Street, as now established; thence North 89°20'17" West, along said North right-of-way line, 364.82 feet to the Southeast corner of WILLOW GLEN, a subdivision of land in said Clay County, Missouri; thence North 00°32'37" East, along the East line of said WILLOW GLEN, 290.40 feet; thence South 89°17'19" East, continuing along said East line, 23.69 feet; thence North 00°32'37" East, continuing along said East line 82.40 feet (82.06' Plat) to a point on the South line of WILLOW CREEK (LOTS 13 THRU 73), a subdivision of land in said Clay County, thence South 81°09'49" East, along the South line of said WILLOW CREEK (LOTS 13 THRU 73), 198.00 feet to the Southwest corner of Lot 12, said WILLOW CREEK (LOTS 1 THRU 12) ; thence South 89°27'03" East, along the South line of said WILLOW CREEK (LOTS 1 THRU 12), 150.00 feet to the Point of Beginning. Containing 126,866 square feet or 2.96 acres, more or less.

SURVEYORS NOTES:

1. Property information referencing this survey was taken from the Commitment for Title Insurance Report, issued by Integrity Land Title Company, Inc., Firm File No. KC-IT-7089-10, with an effective of May 14, 2010 at 8:00 a.m.

2. Bearings used hereon are based on the Missouri State Plane Coordinate System, NAD 1983, West Zone. Vertical Datum is based on the North American Vertical Datum of 1988 (NAVD 88).

3. The underground utilities shown hereon have been located from field survey information, existing drawings and marking provided by Missouri One Call System, Inc. The surveyor makes no guarantee that underground utilities shown comprise all such utilities in the area, either in service or abandoned. The surveyor further does not certify that they are located as accurately as possible from information available at the time of survey. The surveyor has not physically located the underground facilities.

4. Field work was completed in May 2010.

CERTIFICATION:

I hereby certify that this survey was prepared 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 Missouri and that this survey was performed in compliance with the requirements of the current Missouri Minimum Standards for Property Boundary Surveys.

JASON S. ROUDEBUSH PLS 2002014092
DATE: 6-2-10

BOUNDARY / TOPOGRAPHIC SURVEY

72ND AND BROADWAY
SEC. 15 – TWN. 51N – RNG. 33W
KANSAS CITY, CLAY COUNTY, MISSOURI

Date of Survey: 06-02-10

Surveyed By:	ZB / KB
Reviewed By:	BAL
Drafted By:	JR
Lutjen Project No.:	10081

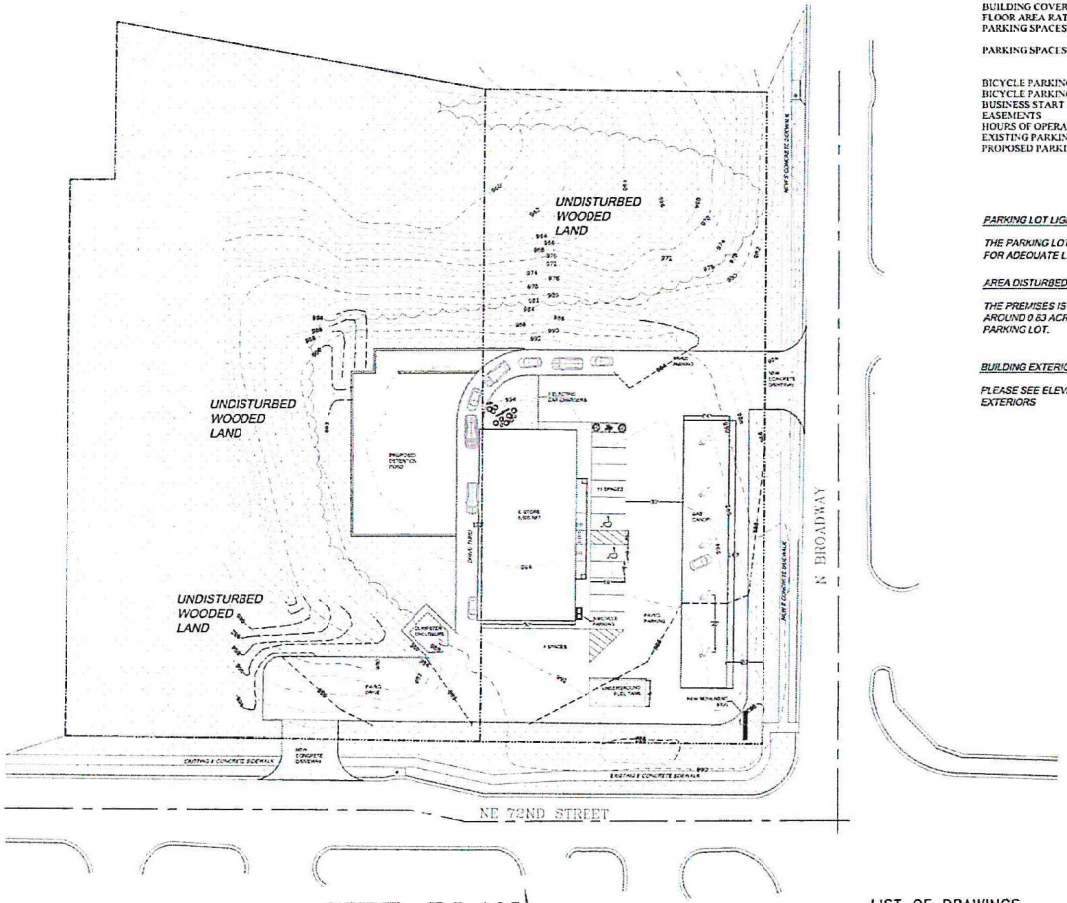
LUTJEN
1201 Burlington, #100
North Kansas City, MO 64116
816.587.4330
816.587.1393 fax
www.lutjen.com
surveying
planning
engineering
landscape architecture

Sheet No.: 1 of 1

Location: S:\Projects\MISSOURI\15-51-33\10081-01-(72nd and Broadway)\Plans\Boundary\10081-72nd and Broadway Bnd - 6-2-10.dwg

SHORT STOP GAS STATION
DEVELOPMENT APPLICATION
400 NE 72ND STREET, GLADSTONE, MISSOURI

LOCATION PLAN



SITE PLAN

30 15 0 30 60

LEGEND

- EXISTING/PROPOSED CONCRETE SURFACE
- GRASS COVER
- BUILDING OUTLINE
- PROPERTY LINE
- FIRE HYDRANT
- STREET CENTER LINE

APPLICATION INFORMATION

EXISTING ZONING	CP1 (GLADSTONE)
PROPOSED ZONING	CP1
TOTAL LAND	1.19 ACRES
LAND AREA FOR EXISTING & PROPOSED STREET RIGHT-OF-WAY	NONE
NET LAND AREA OR ACRES	1.19 ACRES
PROPOSED USE	M - GAS STATION WITH 5,000 SFT CONVENIENCE STORE
BUILDING HEIGHT	SINGLE STORY BUILDING 17 FEET C-STORE A
GROSS FLOOR AREA	5,000 SFT
BUILDING COVERAGE/ FLOOR AREA RATIO	0.10 %
PARKING SPACES REQUIRED	2.5 SPACES PER 1000 SFT OF RETAIL SPACE (13 SPACES)
PARKING SPACES PROVIDED	14 SPACES PLUS TWO ELECTRIC CAR CHARGERS INCLUDING 1 ACCESSIBLE SPACE
BICYCLE PARKING REQUIRED	2 SPACES
BICYCLE PARKING PROVIDED	3 SPACES WITH 2 LONG TERM SPACE
BUSINESS START DATE	SPRING 2024
EASEMENTS	NONE
HOURS OF OPERATION	24 HOURS
EXISTING PARKING LOT	CONCRETE/ASPHALT COVERED
PROPOSED PARKING LOT	CONCRETE PAVEMENT

PARKING LOT LIGHTING:

THE PARKING LOT SHALL HAVE 6 PARKING LIGHT POLES INSTALLED FOR ADEQUATE LIGHTING

AREA DISTURBED:

THE PREMISES IS CURRENTLY GREEN SPACE AND WE WILL DISTURB AROUND 0.83 ACRES TO PUT THE NEW BUILDING,CANOPY AND PARKING LOT.

BUILDING EXTERIOR:

PLEASE SEE ELEVATION PLANS THAT SHOW THE BUILDING EXTERIORS

LEGAL DESCRIPTION

BEG SW COR LT 12 WILLOW CREEK E146, S340, SW21.21, W131, N TO POB

BEG SE COR LT 13 WILLOW CRK, S TO NL NW 72ND ST, W210, N290.4, E231.69, N82.06, SELY TO POB

OWNERS:

MUHAMMAD ARIF HAFIZ
1121 SW BLAZINGSTAR COURT
LEES SUMMIT, MO 64081
(816) 786-1622

DESIGNED BY:

GERALD W MENEFEE, P.E.
KAM DESIGN GROUP LLC
9000 E BANNISTER ROAD, SUITE 100
KANSAS CITY, MO-64134
(816) 797-2065
kamdesign@aol.com

DEVELOPER
MPS CONTRACTING LLC
14926 BENSON STREET
OVERLAND PARK, KS 66221

LIST OF DRAWINGS

No.	Description	Date
	SUBMITTED FOR CWPB APPROVAL	03/30/2024

Design Group LLC
9000 E Bannister Road
Suite 100
Kansas City, Missouri 64134
(816) 797-2065

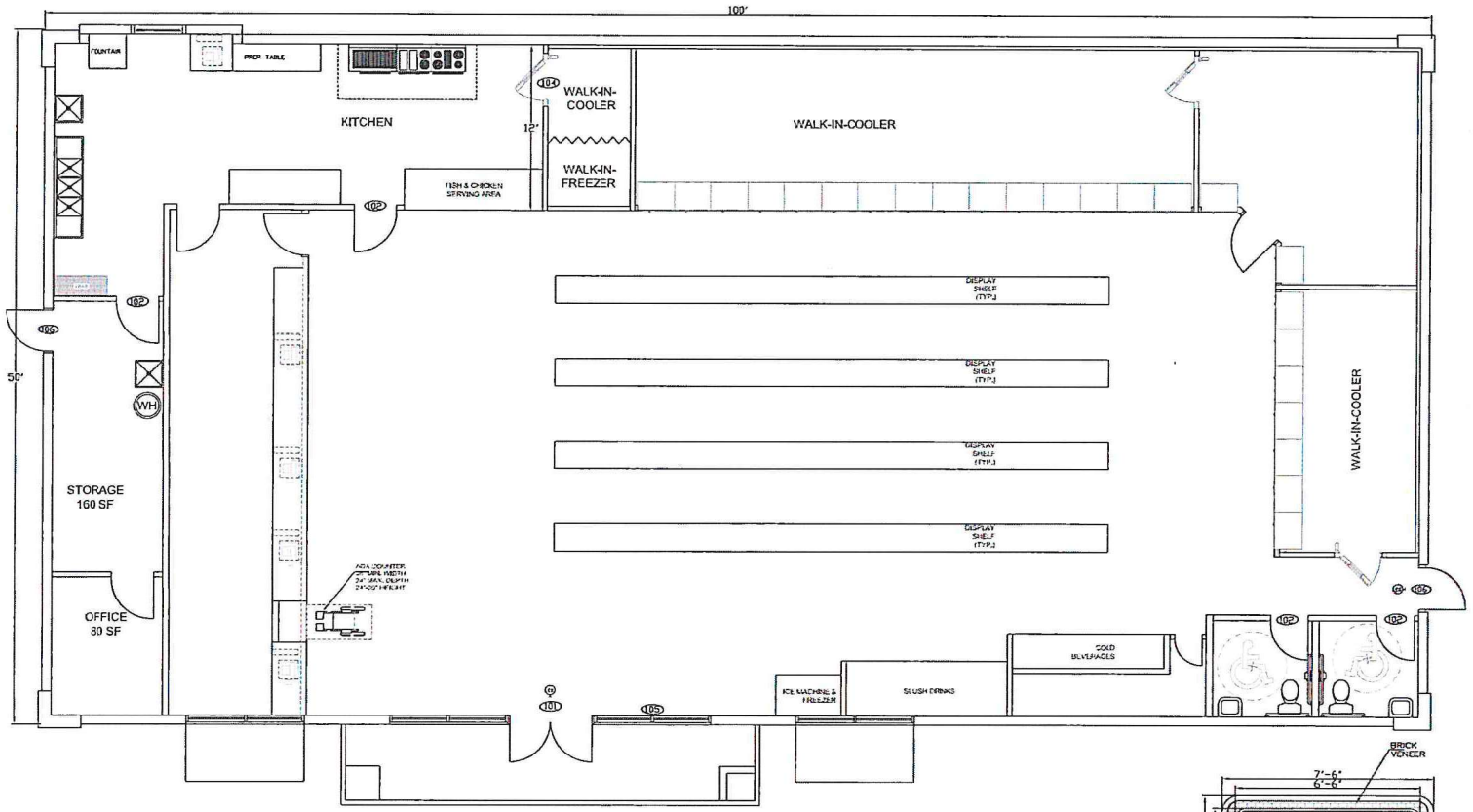
SHORT STOP GAS STATION
PROJECT

400 NE 72ND STREET
GLADSTONE, MISSOURI

SITE PLAN

Project number	2023-109
Drawn by	KRB
Checked by	GWM

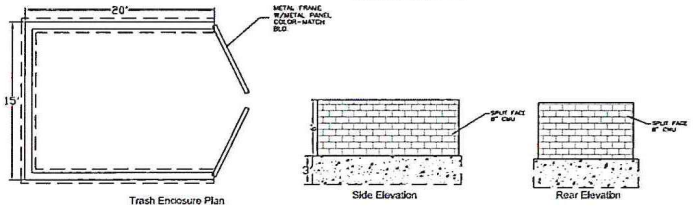
SHEET 1



Scale 1/4"= 1'

Floor Plan

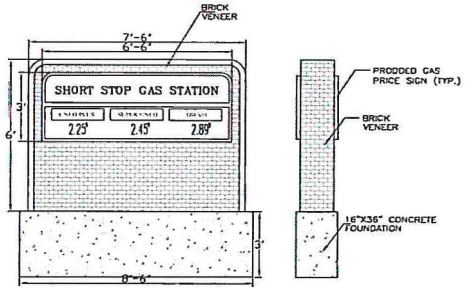
Scale 1/4"= 1'



Trash Enclosure Plan

Side Elevation

Rear Elevation



NEW MONUMENT SIGN

FLOOR PLAN & DETAILS

Project number	2023-109
Drawn by	KRB
Checked by	DWH

SHEET 2

SHORT STOP GAS STATION PROJECT

400 NE 72ND STREET,
GLADSTONE, MISSOURI

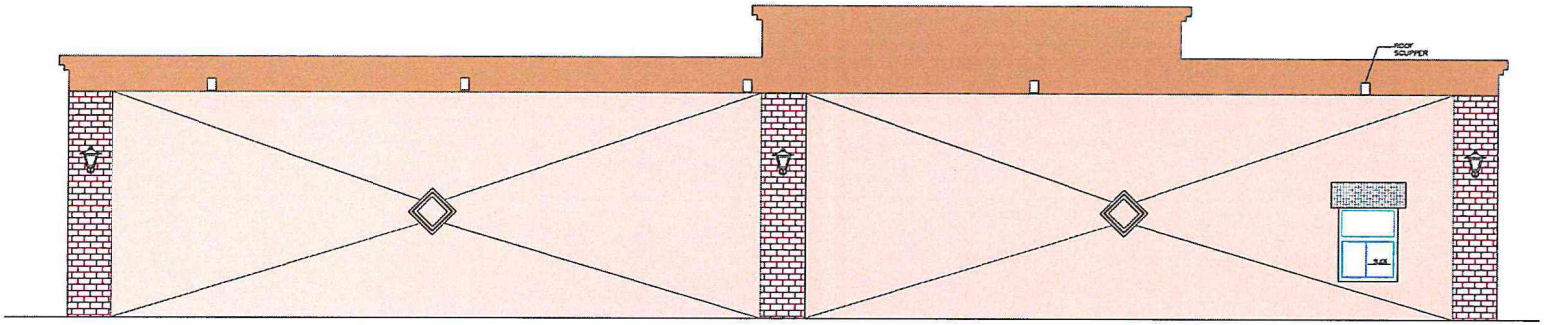
STATE OF MISSOURI — DARRYL KEITH LEWIS — ARCHITECT

05/10/2023

INNOVATIVE DESIGN & RENOVATION
8011 PASEO BLVD. UNIT #201
KANSAS CITY, MISSOURI 64131
(816) 797-2065
(816) 531-2221

No.	Description	Date
	SUBMITTED FOR CITY APPROVAL	05/17/2023

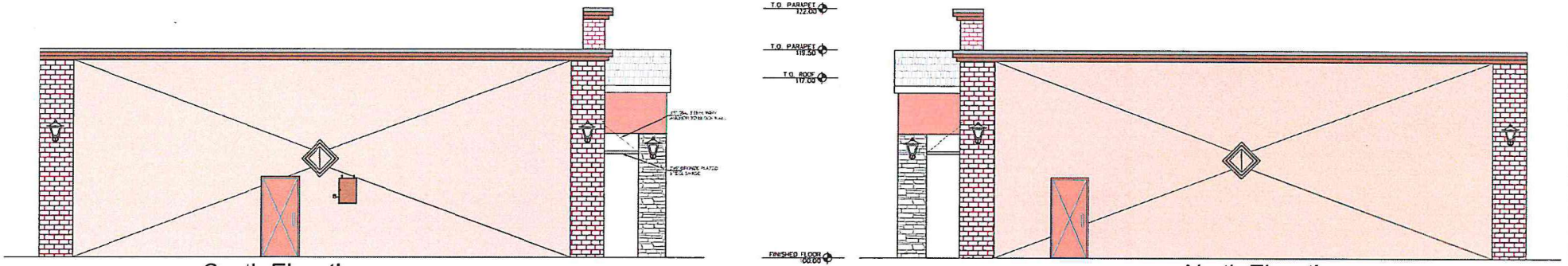
Front Elevation



West Elevation

EXTERIOR MATERIAL LEGEND:

- CONCRETE STUCCO COLOR - MATCH BRICK
- BURNT CLAY BRICK VENEER COLOR - ANTIQUE RED
- BURNT CLAY KING BRICK VENEER COLOR - ANTIQUE BLOOD RED
- CONCRETE STUCCO COLOR - GREY
- ALUMINUM STOREFRONT SYSTEM MANUFACTURER - KAWNEER OR APPROVED EQUAL FINISH - ANODIZED ALUMINUM, OR FLUROPOLOMER FINISH
- CEMENT STUCCO COLOR - HATTERAS (63149)
- WALL MOUNTED LIGHT MANUFACTURER - LUMINIS NAUTILUX NT 870 FIXTURE WITH 90 DEGREE CUT-OFF



South Elevation

North Elevation

ELEVATIONS SHEET

Project number	2023-109
Drawn by	KRB
Checked by	DWH

SHEET 3

SHORT STOP GAS STATION PROJECT

400 NE 72ND STREET,
GLADSTONE, MISSOURI

05/10/2023

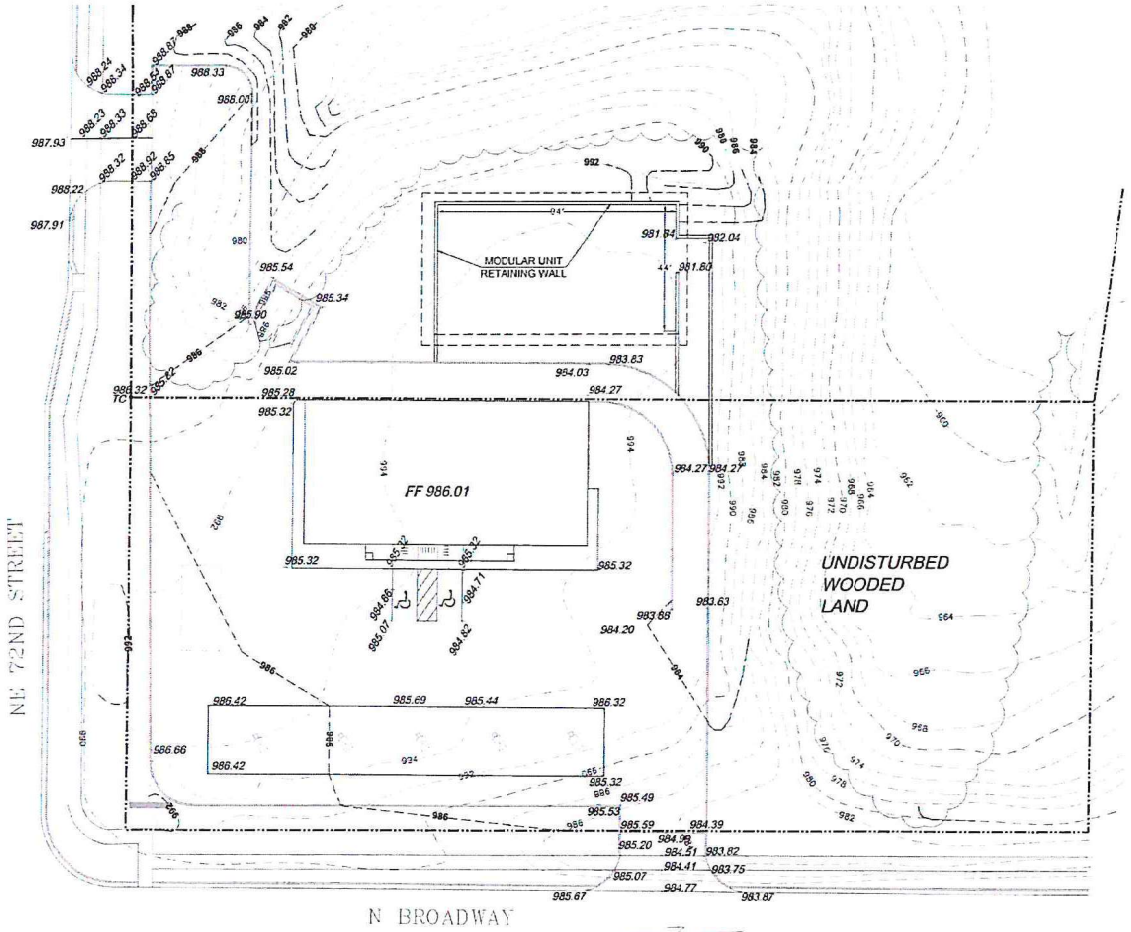
INNOVATIVE DESIGN & RENOVATION
8011 PASEO BLVD. UNIT #201
KANSAS CITY, MISSOURI 64131
(816) 797-2065
(816) 531-2221

No.	Description	Date
	SUBMITTED FOR CITY APPROVAL	05/17/2023

BUILDING RENDERING

BUILDING RENDERING Project number 2023-109 Drawn by KRB Checked by DWH SHEET 4	SHORT STOP GAS STATION PROJECT 400 NE 72ND STREET, GLADSTONE, MISSOURI		INNOVATIVE DESIGN & RENOVATION 8011 PASEO BLVD. UNIT #201 KANSAS CITY, MISSOURI 64131 (816) 797-2065 (816) 531-2221

No.	Description	Date
	SUBMITTED FOR CITY APPROVAL	05/10/2023



GRADING PLAN

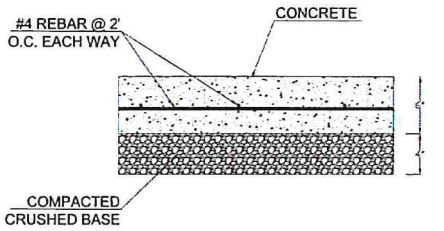
20 10 0 20 40

LEGEND

- BUILDING OUTLINE
- PROPERTY LINE
- 809.92 SPOT ELEVATIONS
- 809.92 / 809.42 TOP OF CURB ELEVATION / TOP OF PAVEMENT ELEVATION
- EXISTING CONTOUR
- PROPOSED CONTOUR

GENERAL NOTES:

1. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY OBSERVED DISCREPANCIES IN DIMENSIONS, DETAILING, OR OTHER ITEMS AS SHOWN ON THE PLANS OR SPECIFIED PRIOR TO PROCEEDING WITH WORK RELATED TO SAID DISCREPANCIES.
2. ALL WORK SHALL BE DONE IN ACCORDANCE WITH LOCAL CODES
3. CONTRACTOR SHALL INCLUDE ALL LABOR, MATERIAL, AND EQUIPMENT TO PROVIDE COMPLETE AND FUNCTIONING INSTALLATIONS. AND ALL MATERIAL AND EQUIPMENT SHALL BE NEW UNLESS OTHERWISE SPECIFIED.
4. ACCEPTANCE OF WORK SHALL BE SUBJECT TO OWNER'S REPRESENTATIVE APPROVAL OF WORK IN PLACE AS WELL AS SHOP DRAWINGS AND SAMPLE OF MATERIALS AND EQUIPMENT WHICH SHALL BE CHECKED BY CONTRACTOR BEFORE SUBMITTAL.
5. PROTECT ALL EXISTING UTILITIES ALONG THE SOUTH FOR FUTURE USE OF THE NEW BUILDING.
6. REMOVE ALL EXISTING PAVEMENT AND RESURFACE THE PARKING AREA WITH 6" CONCRETE PAVEMENT PLEASE FOLLOW THE DETAIL SHOWN ON THIS SHEET. THE TANK AREA SHALL BE PAVED WITH 8" CONCRETE PAVED WITH REINFORCEMENT.
7. INSTALL NEW DRIVEWAY ALONG THE WEST ACCESS ROAD. NEW DRIVE APPROACHES SHALL BE CONSTRUCTED PER KCMO STANDARD COMMERCIAL DRIVEWAY DRAWING. CONSTRUCT ADA COMPLIANCE ACCESSIBLE RAMPS ON EACH SIDE OF NEW DRIVEWAY.



CONCRETE PAVEMENT SECTION

NTS

No.	Description	Date
	SUBMITTED FOR OWNER APPROVAL	03/30/2024

KM Design Group LLC.
9000 E Bannister Road
Suite 100
Kansas City, Missouri 64134
(816) 797-2565

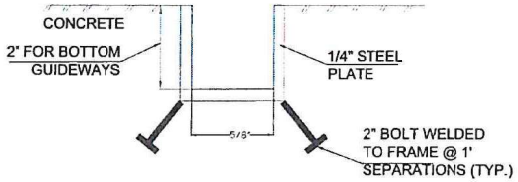
SHORT STOP GAS STATION PROJECT

400 NE 72ND STREET
GLADSTONE, MISSOURI

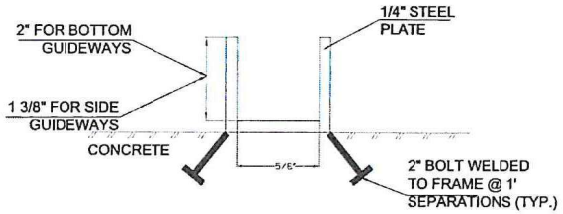
GRADING PLAN

Project number	2023-109
Drawn by	KRB
Checked by	GWM

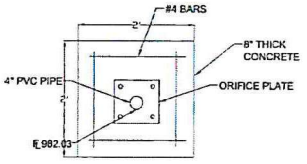
SHEET 5



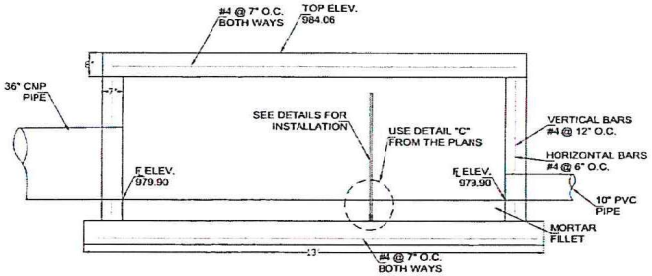
BOTTOM FRAME RESTRAINER FOR ORIFICE PLATE
NTS DETAIL "C"



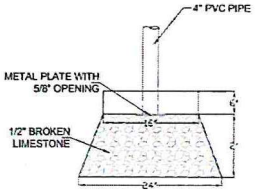
SIDE FRAME RESTRAINER FOR ORIFICE PLATE
NTS DETAIL "D"



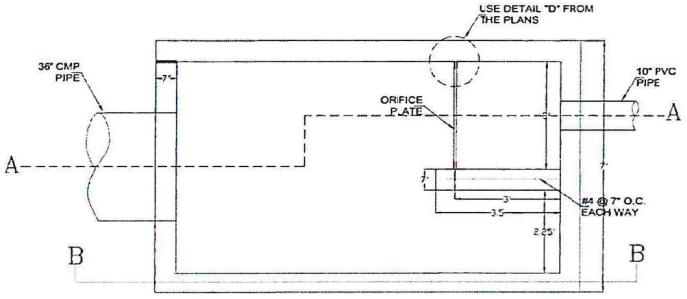
WATER QUALITY
PLATE DETAIL
NTS



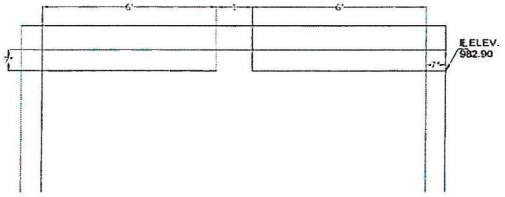
SECTION A–A



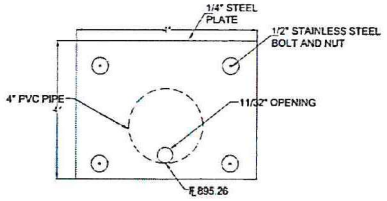
OUTFALL FOR WATER
QUALITY BASIN
NTS



STRUCTURE PLAN VIEW



SECTION B–B



WATER QUALITY DRAIN OUTLET DETAIL
NTS

No.	Description	Date
	SUBMITTED FOR CONSTRUCTION APPROVAL	07/10/2023

KAM Design Group, LLC.
9000 E Bannister Road
Suite 100
Kansas City, Missouri 64134
(816) 797-2065

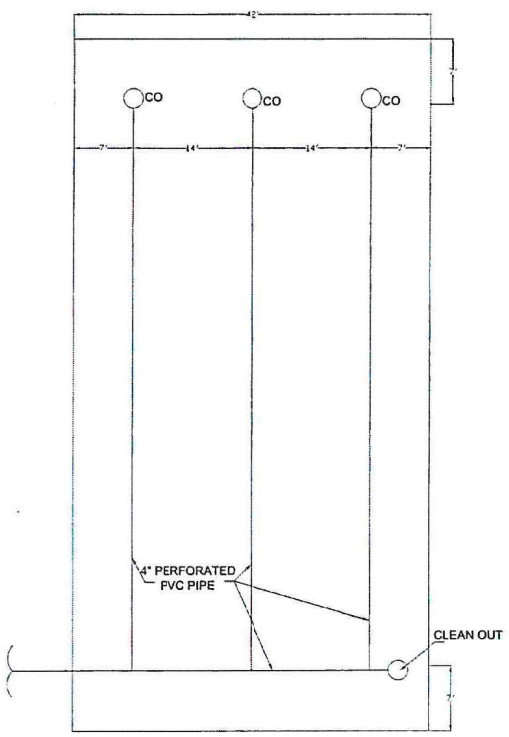
SHORT STOP GAS STATION
PROJECT

400 NE 72ND STREET
GLADSTONE, MISSOURI

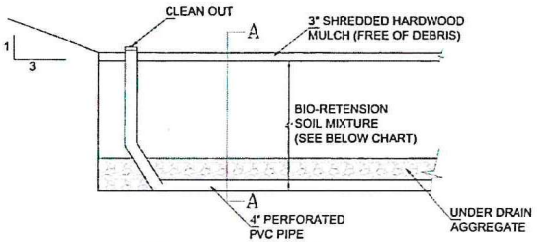
DETAILS SHEET

Project number	2023-109
Drawn by	KRB
Checked by	GWM

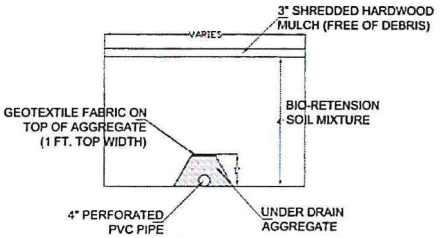
SHEET 6



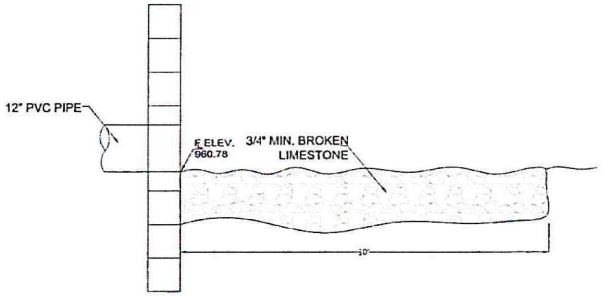
4" PVC PIPE PLAN FOR BIORETENSION BED
NTS



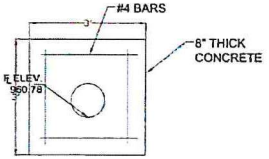
BIO-RETENSIOM BASIN TYPICAL X-SECTION
NTS



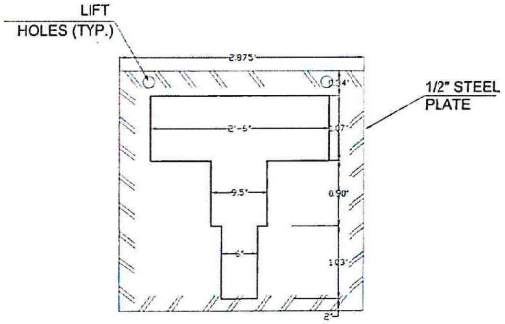
SECTION A-A



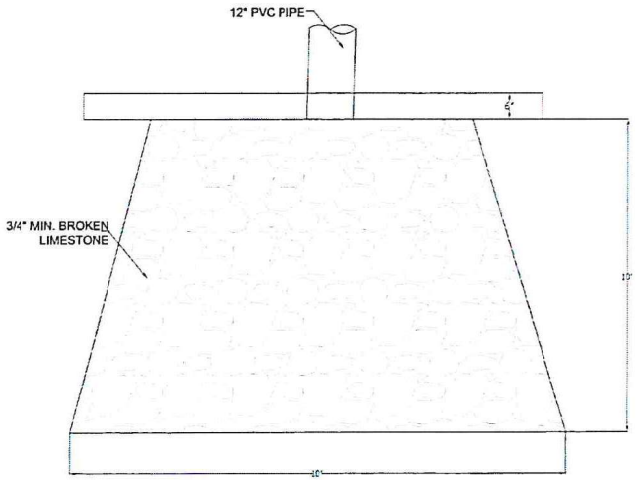
SECTION VIEW
NTS



DETENTION DISCHARGE PLATE DETAIL
NTS



ORIFICE PLATE FOR DETENTION OUTFLOW
NTS



OUTFALL FOR WATER QUALITY BASIN
NTS

BIO-RETENSION SOIL MIXTURE

COMPONENTS	RATIO BY VOLUME
FILTER SAND	70% (+/- 3%)
COCONUT COIR FIBER	20% (+/- 2%)
HIGH CARBON WOOD ASH	10% (+/- 1%)

No.	Description	Date
	SUBMITTED FOR OWNER APPROVAL	07/10/2023

Design Group LLC.
9200 E Bannister Road
Suite 100
Kansas City, Missouri 64134
(816) 797-2065

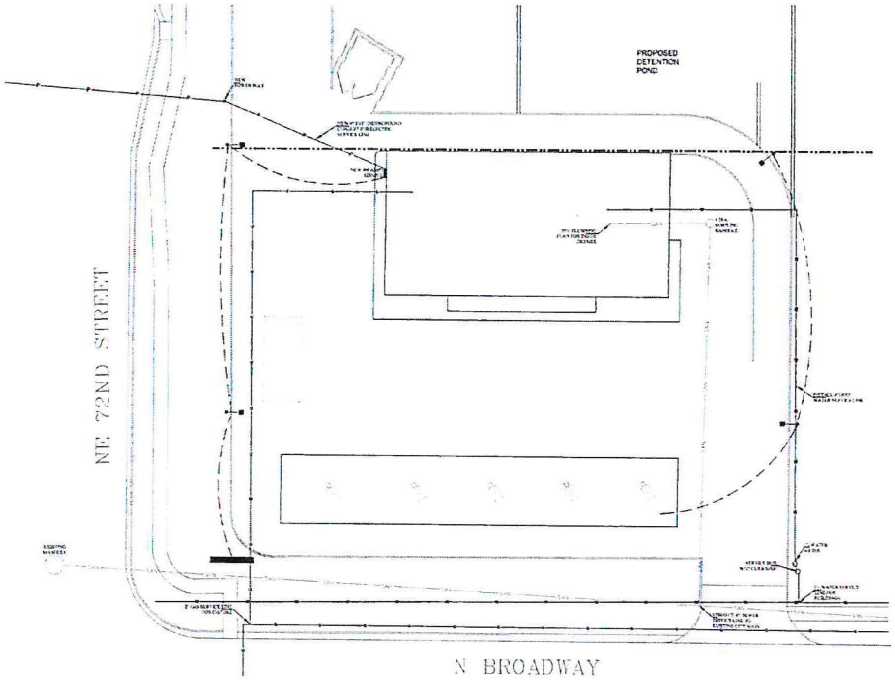
SHORT STOP GAS STATION
PROJECT

400 NE 72ND STREET
GLADSTONE, MISSOURI

DETAILS SHEET II

Project number	2023-109
Drawn by	KRB
Checked by	GWM

SHEET 7

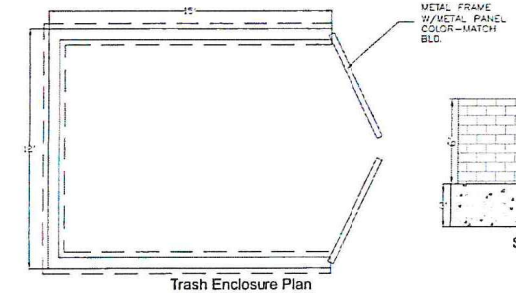


LEGEND

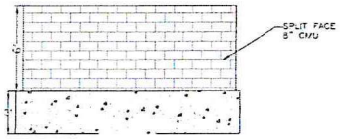
- BUILDING OUTLINE
- PROPERTY LINE
- WATER SERVICE LINE
- GAS SERVICE LINE
- SANITARY SERVICE LINE
- ELECTRICAL SERVICE LINE
- UNDERGROUND CONDUIT FOR LP'S

UTILITY PLAN

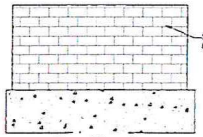
20 10 0 20 40



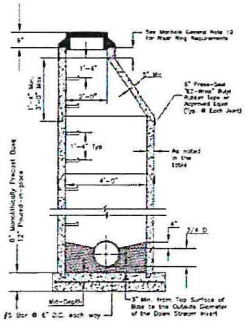
Trash Enclosure Plan



Side Elevation



Rear Elevation



MANHOLE GENERAL NOTES

1. All manhole rings shall be set on a mortar of two (2) rows of 3/4 to 1 inch pre-formed butyl joint sealer.
2. All manhole rings to be placed in pavement or in areas to be subsequently paved shall have "machined horizontal bearing surfaces" and shall comply with Class A25 as established in ASTM A-48.
3. The inside diameter of the manhole shall be 4'-0" for pipe diameters from 8" thru 24" and shall be 5'-0" for pipe diameters from 27" thru 36". In addition, the minor diameter (ID) of manholes up to 20 feet deep shall be 3'-6". ID shall be 5'-0" for depths up to 25 feet and ID shall be 6'-0" for depths exceeding 25 feet unless otherwise noted on the plans.
4. All manhole bases (pre-cast or poured-in-place) shall have No. 5 reinforcing bars places on 6" centers both ways.
5. All standard manhole rings and covers to be Dexter 1315-Jcs, Neenah NF-1536C019/3 (Grate) and NF-1536C019/3 (cover), or approved equal. All manhole rings and covers shown in plans to be as "watertight" to be Clay & Bailey Manufacturing Co. No. 2004N, Neenah R-1916-I-C or approved equal. An extra payment for furnishing "watertight" ring and cover as shown in plans will not be made, but shall be considered as subsidiary to the item, "Standard Manhole".
6. Standard manhole steps to be steel core, plastic coated steps (M.A. Ind, Inc. No. PS1- PF, PS2-PF, or approved equal).
7. Maximum grade adjustment allowable is 8". Minimum allowable thickness for precast concrete grade adjustment ring is 4".
8. Reinforcement in all precast sections shall equal or exceed ASTM C-478 specifications.
9. Butyl material to be used at all precast sections joints. O-rings may be used for joints below the cone section, but the cone section itself shall not have O-ring joints.
10. Riser Rings

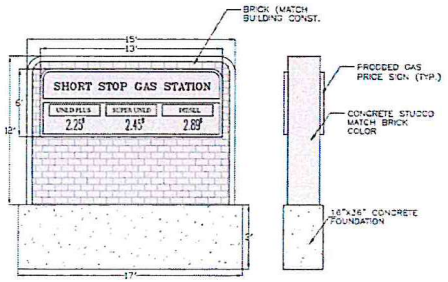
   A. Manholes in Pavement. The thickness of the recycled rubber riser rings shall not be less than one (1) inch nor greater than four (4) inches. If the required thickness of riser rings exceeds 4 inches, a 4-inch or 8-inch precast concrete riser ring must be installed between the rubber riser ring and the cone. Riser rings may be used up to a maximum of 12 inches. The minimum number of riser rings required to achieve the necessary adjustment shall be used. The rubber riser rings shall be tapered to match the slope of the existing or proposed pavement at the manhole. The joints between the cone, rubber riser rings, and casting shall be sealed with the manufacturer-supplied sealant.

   B. Manholes Not in Pavement. All manholes shall be provided with riser ring(s) underneath the casting as shown on typical details. A minimum of one (1) 4-inch riser ring shall be installed on top of the cone section. If a greater depth of adjustment rings is necessary, a combination of 4-inch and 8-inch riser rings may be used up to a maximum of 12 inches of riser rings. The minimum number of riser rings required to achieve the necessary adjustment shall be used. If precast concrete riser rings are used, the joints between the cone, riser ring(s), and casting shall be sealed with a double bead of preformed butyl rubber sealant. If recycled rubber riser rings are used, the joints between the cone, rubber riser rings, and casting shall be sealed with the manufacturer-supplied sealant.

   C. Brick end mortar adjustments will not be allowed.

4' DIA. STANDARD PRECAST MANHOLE
(ECCENTRIC CONE)

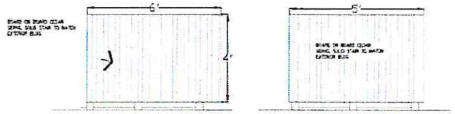
N.T.S.



NEW MONUMENT SIGN

SIGN NOTE:

THE CONTRACTOR SHALL APPLY SEPARATELY TO THE PERMIT DIVISION FOR SIGN PERMIT.



SIDE ELEVATION REAR ELEVATION

HVAC UNIT SCREENING DETAILS

NOTE:
THE HEIGHT OF THE SCREENING APPARATUS SHALL BE AT LEAST 12" HIGHER THAN ANY EQUIPMENT ON THE ROOF.

No.	Description	Date
	SUBMITTED FOR OWNER APPROVAL	03/27/2024

Design Group, LLC
9000 E. Bannister Road
Suite 100
Kansas City, Missouri 64134
(816) 297-2555

SHORT STOP GAS STATION
PROJECT

400 NE 72ND STREET
GLADSTONE, MISSOURI

UTILITY PLAN

Project number	2023-109
Drawn by	KRB
Checked by	GWM

SHEET 8

PLAN NOTES:

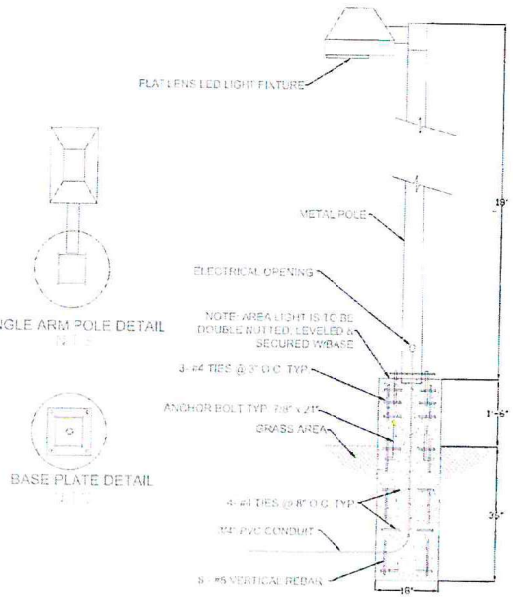
1. ROUTE 120V HOME RUN BELOW GRADE TO QUAZITE BOX SHOWN ON PLANS. ASSUMED VOLTAGE USED TO DETERMINE VOLTAGE DROP AND WIRE SIZES IS 120V, 1-PHASE.
2. PARKING LOT LIGHT WITH STEEL POLE LIGHT AND CONCRETE FOUNDATION. REFERENCE LIGHT FIXTURE SPECIFICATION THIS SHEET.
3. ASSUMED LOCATIONS OF CONDUIT ENTRY INTO BUILDING FOR SITE LIGHTING. REFER TO BUILDING ELECTRICAL ENGINEERING PLANS AND BUILDING ELECTRICAL ENGINEER FOR UPDATED LOCATIONS OF CONDUIT ROUTING INTO THE BUILDING.
4. LIGHTING CONTROLS AND CONNECTIONS, PROVISIONS FOR ELECTRICAL POWER, AND CONDUIT ROUTING INTO BUILDING ARE NOT INCLUDED WITHIN THE SCOPE OF THIS WORK. REFER TO BUILDING ELECTRICAL ENGINEER FOR MORE INFORMATION. NOTIFY ENGINEER IF ACTUAL LOCATION OF ELECTRICAL CONNECTION/CONTROL IS IN A SIGNIFICANTLY DIFFERENT AREA OF BUILDING.
5. PROVIDE QUAZITE BOX IN APPROXIMATE LOCATION FOR PULL POINT TO CONNECT WITH HOME RUNS FROM SITE LIGHTING.

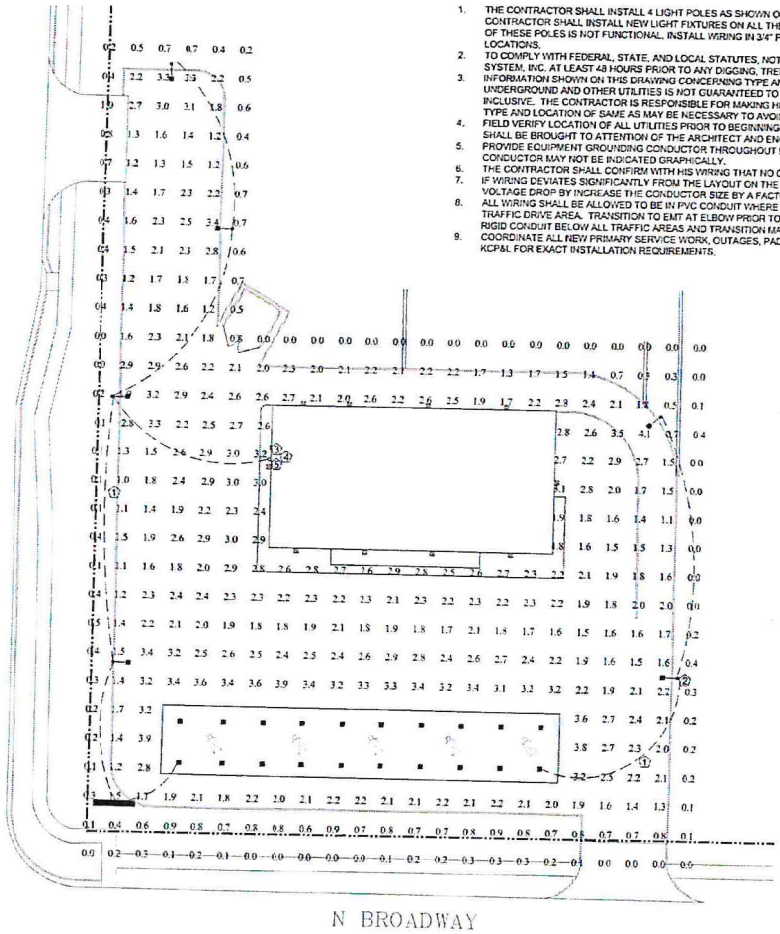
GENERAL NOTES:

1. THE CONTRACTOR SHALL INSTALL 4 LIGHT POLES AS SHOWN ON THIS SHEET. THE CONTRACTOR SHALL INSTALL NEW LIGHT FIXTURES ON ALL THESE POLES. IF WIRING TO ANY OF THESE POLES IS NOT FUNCTIONAL, INSTALL WIRING IN 3/4" PVC CONDUIT FOR POLE LOCATIONS.
2. TO COMPLY WITH FEDERAL, STATE, AND LOCAL STATUTES, NOTIFY MISSOURI ONE-CALL SYSTEM, INC. AT LEAST 48 HOURS PRIOR TO ANY DIGGING, TRENCHING, EXCAVATION, ETC.
3. INFORMATION SHOWN ON THIS DRAWING CONCERNING TYPE AND LOCATION OF UNDERGROUND AND OTHER UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATION AS TO TYPE AND LOCATION OF SAME AS MAY BE NECESSARY TO AVOID DAMAGE THERETO.
4. FIELD VERIFY LOCATION OF ALL UTILITIES PRIOR TO BEGINNING WORK. ANY INTERFERENCE SHALL BE BROUGHT TO ATTENTION OF THE ARCHITECT AND ENGINEER FOR DIRECTION.
5. PROVIDE EQUIPMENT GROUNDING CONDUCTOR THROUGHOUT EACH BRANCH CIRCUIT. CONDUCTOR MAY NOT BE INDICATED GRAPHICALLY.
6. THE CONTRACTOR SHALL CONFIRM WITH HIS WIRING THAT NO CIRCUIT EXCEEDS 3328 VA.
7. IF WIRING DEVIATES SIGNIFICANTLY FROM THE LAYOUT ON THE PLANS, ACCOUNT FOR MORE VOLTAGE DROP BY INCREASE THE CONDUCTOR SIZE BY A FACTOR OF ONE SIZE.
8. ALL WIRING SHALL BE ALLOWED TO BE IN PVC CONDUIT WHERE NOT LOCATED BELOW A TRAFFIC DRIVE AREA. TRANSITION TO EMT AT ELBOW PRIOR TO GOING ABOVE GRADE. USE RIGID CONDUIT BELOW ALL TRAFFIC AREAS AND TRANSITION MATERIALS ACCORDINGLY.
9. COORDINATE ALL NEW PRIMARY SERVICE WORK, OUTAGES, PAD REQUIREMENTS, ETC. WITH KCP&L FOR EXACT INSTALLATION REQUIREMENTS.

LIGHT FIXTURE SPECIFICATIONS:

MANUFACTURER	INNOVATIVE LIGHTING
LIGHT TYPE	LED LIGHT ENGINE
POWER	48 WATTS
TYPE	II
MODEL	EF2-U--28-3-N
INSTALLATION	POLE MOUNTED





LEGEND

- NEW LIGHT POLE
- CANOPY LIGHT
- WALL MOUNTED LIGHT
- UNDERGROUND ELECTRIC

SITE LIGHTING PHOTOMETRIC PLAN

20 10 0 20 40

No.	Description	Date
	SUBMITTED FOR PERMITS AS PERMITTED	05/07/2024

KAM Design Group LLC.
9200 E Bannister Road
Suite 100
Kansas City, Missouri 64134
(816) 797-2065

SHORT STOP GAS STATION PROJECT

400 NE 72ND STREET
GLADSTONE, MISSOURI

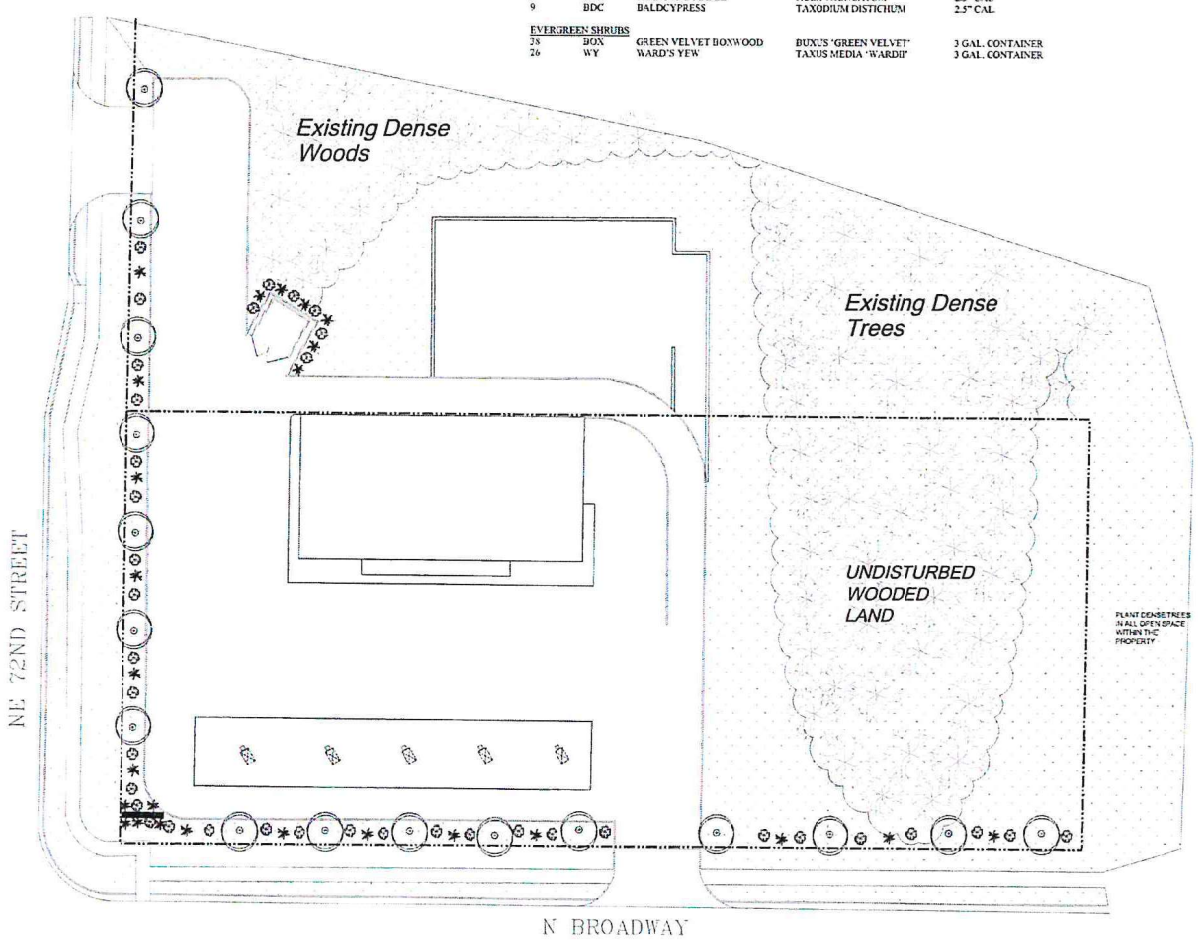
PARKING LOT PHOTOMETRIC PLAN

Project number	2023-109
Drawn by	KRB
Checked by	GWM

SHEET 9

PLANT LIST

NO.	SYMBOL	COMMON NAME	BOTANICAL NAME	SIZE
SHADE TREES				
5	SHM	SHANTUNG MAPLE	ACER TRUNCATUM	2.5" CAL
9	BDC	BALDCYPRESS	TAXODIUM DISTICHUM	2.5" CAL
EVERGREEN SHRUBS				
28	BOX	GREEN VELVET BOXWOOD	BUXUS 'GREEN VELVET'	3 GAL. CONTAINER
26	WY	WARD'S YEW	TAXUS MEDIA 'WARDII'	3 GAL. CONTAINER



LANDSCAPING NOTES:

1. ALL PLANT MATERIAL SHALL BE FIRST CLASS REPRESENTATIVES OF SPECIFIED SPECIES, VARIETY OR CULTIVAR, IN HEALTHY CONDITION WITH NORMAL WELL DEVELOPED BRANCHES AND ROOT PATTERNS. PLANT MATERIAL MUST BE FREE OF OBJECTIONABLE FEATURES. PLANTS SHALL COMPLY IN ALL APPLICABLE RESPECTS WITH PROPER MOST RECENT STANDARDS AS SET FORTH IN THE AMERICAN ASSOCIATION OF NURSERYMEN'S "AMERICAN STANDARD OF NURSERY STOCK", ANSI Z60.1. AND THE GLADSTONE NURSERY AND LANDSCAPE ASSOCIATION.
2. ORNAMENTALS AND SHRUBS SHALL BE CONTAINER GROWN AND WILL BE FREE OF DISEASE AND PESTS. ABSOLUTELY NO BARE ROOT MATERIALS. FERTILIZER OF 10-20-10: ONE PELLET OR 1-2 OZ. SHALL BE ADDED TO SOIL AT TIME OF PLANTING.
ALL SHRUB AND PLANT BEDS TO BE MULCHED WITH 3" DEPTH DARK HARDWOOD MULCH. AS AN ALTERNATE IN SHRUB BEDS, 2" DEEP SMOOTH RIVER ROCK OVER PERMEABLE WEED BARRIER FABRIC USED FOR WEED PREVENTION MAY BE INSTALLED INSTEAD OF HARDWOOD MULCH. HARDWOOD MULCH TO BE INSTALLED IN ALL ORNAMENTAL GRASS BEDS.
PLANTING BEDS ARE TO BE FREE OF WEEDS AND GRASS. TREAT BEDS WITH A PRE-EMERGENT HERBICIDE PRIOR TO PLANTING AND MULCH PLACEMENT. APPLY IN ACCORDANCE WITH STANDARD TRADE PRACTICE.
3. ALL TREES SHALL BE FERTILIZED WITH FERTILOME BRAND LIQUID ROOT STIMULATOR, 1.5 TABLESPOONS PER GAL. OF WATER, AS A SUBSTITUTE, 19-8-10 GRANULAR FERTILIZER, .75 LB. FOR 2" CAL. & 1.5 LBS. FOR 3" CAL., SHALL BE ADDED. INCORPORATE FERTILIZER INTO THE AMENDED PLANTING SOIL BEFORE PLANTING TREE. HOLE AREA FOR TREE TO BE TWICE (2x) THE DIAMETER OF THE ROOT BALL AND ROOT BALL SHALL BE MOUNDED. ALL TREES TO BE STAKED AND GUYED WITH A MINIMUM OF 3 POSTS AND PROTECTED W/ COVERING AT TREE W/ GUY WIRE.
4. ALL PLANT MATERIALS SHALL BE PROTECTED FROM THE DRYING ACTION OF THE SUN AND WIND AFTER BEING DUG, WHILE BEING TRANSPORTED, AND WHILE AWAITING PLANTING. BALLS OF PLANTS WHICH CANNOT BE PLANTED IMMEDIATELY SHALL BE PROTECTED FROM DRYING ACTION BY COVERING THEM WITH MOIST MULCH. PERIODICALLY, APPLY WATER TO MULCH-COVERED BALLS TO KEEP MOIST. IF PLANTING SHOULD OCCUR DURING GROWING SEASON, APPLY ANTI-DESICCANT TO LEAVES BEFORE TRANSPORT TO REDUCE THE LIKELIHOOD OF WINDBURN. REAPPLY ANTI- DESICCANT AFTER PLANTING TO REDUCE TRANSPIRATION.
5. AFTER PLANTING IS COMPLETED, REPAIR INJURIES TO ALL PLANTS AS REQUIRED. LIMIT AMOUNT OF PRUNING TO A MINIMUM TO REMOVE DEAD OR INJURED TWIGS AND BRANCHES. PRUNE IN SUCH A MANNER AS NOT TO CHANGE THE NATURAL HABIT OR SHAPE OF THE PLANT. MAKE CUTS FLUSH, LEAVING NO STUBS. CUTS OF ONE INCH OR MORE TO BE PAINTED WITH TREE PAINT. CENTRAL LEADERS SHALL NOT BE REMOVED.
6. THE INSTALLATION OF ALL PLANT MATERIAL SHALL BE IN COMPLIANCE WITH THE REQUIREMENTS OF THE CITY OF GLADSTONE, MO.
7. ALL LANDSCAPE AREAS TO BE FREE OF ALL BUILDING DEBRIS AND TRASH, BACK FILLED WITH CLEAN FILL SOIL AND TOP DRESSED WITH 6" OF TOPSOIL. TOPSOIL SHALL HAVE A pH RANGE OF 5.5 TO 7 AND A 4% ORGANIC MATERIAL MINIMUM, ASTM D5268.
8. ALL PLANT BED AREAS TO RECEIVE DAIRY COW MANURE SOIL CONDITIONER AT A RATE OF 4.5 CU. YDS. PER 1000 SF, AND ORGANIC COMPOST AT A RATE OF 4.5 CU. YDS. PER 1000 SF. TO DETERMINE THE AMOUNT OF PHOSPHOROUS AND POTASSIUM THE CONTRACTOR SHALL PERFORM A SOIL TEST AND ADD THOSE FERTILIZERS ACCORDING TO THE TEST RESULTS. AFTER APPLYING SOIL CONDITIONER AND FERTILIZER, THOROUGHLY TILL AREA TO A DEPTH OF 12". CONTRACTOR TO INSTALL A PERMEABLE LANDSCAPE WEED CONTROL FABRIC, 3 OZ. PER SQ. YD. MIN. IN ALL PLANT BEDS EXCEPT IN AREAS OF GROUND COVER, PERENNIAL OR ANNUAL PLANTINGS. PLANT BEDS TO BE "MOUNDED". ALL PLANT MATERIAL, PLANT BEDS, MULCH AND EDGING TO BE INSTALLED PER LANDSCAPE PLANS AND DETAILS. MYKE PRO MYCCHORIZAE GRANULES TO BE ADDED TO ALL PLANTINGS PER MANUFACTURERS RECOMMENDATIONS.
9. REESTABLISH FINISH GRADES TO WITHIN ALLOWABLE TOLERANCES ALLOWING 1-1/2" FOR SOD AND 3" FOR MULCH IN PLANT BEDS. HAND RAKE ALL AREAS TO SMOOTH EVEN SURFACES FREE OF DEBRIS, CLODS, ROCKS, AND VEGETATIVE MATTER GREATER THAN 1".
10. THE EXACT LOCATION OF ALL UTILITIES, STRUCTURES, AND UNDERGROUND UTILITIES SHALL BE DETERMINED AND VERIFIED ON SITE BY THE LANDSCAPE CONTRACTOR PRIOR TO INSTALLATION OF THE MATERIALS. DAMAGE TO EXISTING UTILITIES AND OR STRUCTURES SHALL BE REPLACED TO THEIR ORIGINAL CONDITION BY THE LANDSCAPE CONTRACTOR AT NO COST TO THE OWNER.
11. LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS AND REQ'D INSPECTIONS BY LEGAL AUTHORITIES. THE LANDSCAPE CONTRACTOR SHALL UNCONDITIONALLY GUARANTEE ALL PLANT MATERIAL FOR ONE CALENDAR YEAR.
12. ANY SUBSTITUTIONS OF DEVIATIONS SHALL BE REQUESTED IN WRITING BY THE CONTRACTOR FOR APPROVAL BY THE OWNER OR LANDSCAPE ARCHITECT.
13. THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN, OBTAINING AND INSTALLATION OF ALL IRRIGATION COMPONENTS, SLEEVING, PIPE, METERS, PERMITS, CONNECTION AND CONTROL SYSTEMS. DESIGN DRAWINGS OF THE PROPOSED IRRIGATION SYSTEM SHALL BE SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION.
14. EROSION CONTROL MAT TO BE NORTH AMERICAN SC 150-BN BIODEGRADABLE MAT OR EQUIVALENT.
15. ALL LAWN AREAS TO BE SODDED OR SEEDED WITH TURF TYPE TALL FESCUE BLEND IN LOCATIONS INDICATED ON PLANS. SEEDED LAWN TO BE HYDRO-SEEDED OR DRILLED. SOD AND SEED SHALL COMPLY WITH THE U.S. DEPT. OF AGRICULTURE RULES AND REGULATIONS UNDER THE FEDERAL SEED ACT AND EQUAL IN QUALITY TO STANDARDS FOR CERTIFIED SEED. LAWN SHALL BE TURF TYPE TALL FESCUE 3 WAY BLEND:

LAWN SEED MIX

TRI-STAR" QUICK TURF MIXTURE OR SIMILAR BLEND:

SEEDING RATE: 8 -10 LBS PER 1,000 SF

25% TITAN LTD FESCUE "TRI-STAR SEED COMPANY
25% FALCON IV TALL FESCUE SPRING HILL, KS 66083
25% 2ND MILLENNIUM TALL FESCUE 800-874-3368
25 % TURF PERENNIAL RYEGRASS

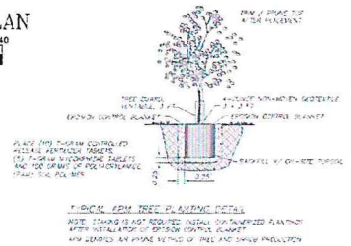
GENERAL NOTES:

1. THE LANDSCAPING AREA SHALL BE INSTALLED WITH BUILT IN IRRIGATION SYSTEM.
2. ANY DAMAGES TO CURB AND SIDEWALK IN PUBLIC RIGHT OF WAY SHALL BE REPAIRED PER CITY STANDARD DETAIL AND SPECIFICATIONS.
3. THE TRASH ENCLOSURE STRUCTURE SHALL BE CONSTRUCTED OF THE SAME MATERIAL AS FOR THE MAIN BUILDING.
4. THE GAS METER AREA SHALL BE SCREENED WITH SHRUBS. THE ELECTRICAL METER AND SWITCHGEAR SHALL BE SCREENED WITH ENCLOSURE MATCHING THE BUILDING EXTERIOR.
5. 12 TREES SHALL BE PLANTED ALONG THE PUBLIC RIGHT OF WAY.

LANDSCAPING PLAN

20 10 0 20 40

TYPICAL SHRUB PLANTING



1 INCH, KBM TREE PLANTING DETAIL

NOTE: STAKING IS NOT REQUIRED. INSTALL ON TREATED PLANTING WITH INSTALLATION OF EROSION CONTROL BLANKET. KBM REQUIRES AN ANNUAL METHOD OF PEST AND DISEASE PREVENTION

LEGEND

- NEW TREE
- NEW SHRUB PLANTINGS (LOW TREES)
- BUILDING OUTLINE
- PROPERTY LINE
- DENSE TREE LINE

No.	Description	Date
	SUBMITTED FOR OWNER'S APPROVAL	07/30/2024

KBM Design Group LLC.
9000 E. Bannister Road
Suite 100
Kansas City, Missouri 64134
(816) 797-2065

SHORT STOP GAS STATION PROJECT

400 NE 72ND STREET
GLADSTONE, MISSOURI

LANDSCAPING PLAN

Project number	2023-109
Drawn by	KRB
Checked by	GWM

SHEET 10

Property Owners Within 185' & Other Interested Parties

FROM: Community Development Department

DATE: May 2nd, 2024

SUBJECT: Gas Station & Convenience Store – Site Plan Revision

PUBLIC HEARING

All persons are hereby notified that the Gladstone Planning Commission will conduct a public hearing on Monday, May 20, 2024 at 7:00 PM in the Council Chamber of Gladstone City Hall on a request for a Site Plan Revision at 7200 N Broadway Ave. Legally described as 000000 NW 72ND ST BEG SW COR LT 12 WILLOW CREEK E146, S340, SW21.21, W138, N T O POB.

Applicant: Gerald W. Menefee P.E.

Owner: Mohammad Hafiz

Subsequently, at its regular meeting of June 10th, 2024, at 7:30 PM, the City Council will conduct a public hearing on the same request.

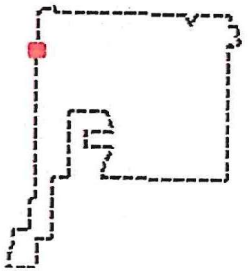
Project Summary: This project was proposed in 2023 and denied by the Gladstone City Council. The property owner has made adjustments to the site plan and is proposing to build a new gas station and convenience store on the vacant land located at 7200 N Broadway Avenue. The primary exterior building materials being used are brick and stucco. There will be two access points; one point on N Broadway Avenue and one point on NW 72nd Street. This property is zoned CP-2, Planned District, General Business and a gas station and convenience store is currently a permitted use for this commercial zoning.

Primary Adjustments to the Site Plan:

- The access point on NW 72nd Street has been shifted west to lineup with the Post Office access point.
- The water detention basin has been moved from the northern side of the property to the western side of the property away from the residential homes located to the north. This basin will be located on the KCMO parcel.
- The wooded area on the northern side of the property will primarily remain untouched.

If you have any questions or concerns, please contact Austin Greer, Community Development Director & Assistant City Manager at austing@gladstone.mo.us and/or 816-423-4102.

Gladstone, MO



Legend

- Stop Sign
- KCPL Lights
- Gladstone Lights
- School Point
- Bike Parking
- Bus Stop
- Point of Interest
- Church
- Apartment Point
- Street Centerline
- Edge Of Pavement
- Driveway
- City Limits
- Parcel
- House Number
- Building Footprint
- School Polygon
- City Park
- Villages
- Apartment Polygon

Notes

232.0 0 115.99 232.0 Feet

(minus street right-of-ways), the final City Council action has to have a minimum of four (4) positive votes for the request to be approved. The application cannot be approved if three (3) vote "yes" and two (2) "no". For further information regarding this handout, please call or come by the Community Development Department at 7010 N. Holmes, 423-4110.

☐City Code Variance Request: Board of Zoning Adjustment

REQUIREMENTS

Completed application
Owner's authorization signed (if applicable)
Legal description- County records
Information on the proposed change including pictures of the property, property surveys, written comments from impacted neighbors, etc.

DEPOSIT FEE

The $200 fee listed on the form and paid at the time of application is a deposit toward the costs the City of Gladstone incurs during the processing of your application. This fee goes toward the following costs:

Office fee $75.00
Certified mail notices to surrounding property owners within 185'- amount varies.*
Planning Commission Legal Notice- amount varies*

** Indicates fees for items required by State Law. The fee amount for certified mail will vary depending upon the number of property owners within 185 feet of your property. The Legal Notice fee will also vary generally depending upon the length of the legal description of your property.*

After the total costs are compiled for your application, you will be billed for any costs remaining over the initial $200 application deposit fee. If the costs accrued are under $200, you will be reimbursed for the difference.
As the money deposited for your application goes toward real costs paid by the City, there is no refund if your application is denied by the Board of Zoning Adjustment. If you withdraw your application before some of the costs are accrued by the City, you may be entitled to a refund.

Preliminary & Final Plat/Replat Submittals

REQUIREMENTS

Completed application
Owner's authorization signed (if applicable)
Legal description- County records
Digital copy of plans
(1) 11x17 paper copy
(3) 24x36 paper copies folded
(1) 24x36 Mylar Copy – Completion of the Plat

FEE

The $75 fee listed on the form and paid at the time of application goes toward the costs the City of Gladstone incurs during the processing of your application. As the fee for your application goes toward real costs paid by the City, there is no refund.
**At completion of the plat, please submit to Community Development (1) 24x36 Mylar copy.

OWNER'S AUTHORIZATION

I, Mohammad Hadiz, do hereby authorize _____
(Owner's name) (Applicant's name)
to apply for the following action on my property at _____
_____.

a. Rezone from to

b. Site Plan Revision ___

c. Special Use Permit ___

d. Variance ___

e. Plat/Replat ___

Date: 5/20/24 Owner's Signature: [signature]

NOTARIZATION

State of Kansas

County of Wyandotte

Subscribed and sworn before me this 20th day of May, 2024.

Notary's Signature:

[signature]

My Commission expires: 12-8-2027

KASANDRA WRIGHT
Notary Public, State of Kansas
My Appointment Expires
12-8-2027

Additional Required Documents

(check if needed)	Comments
Site Plan ___	
Traffic Study ___	
Landscaping Plans ___	
Stormwater (Pre – Post – BMP) ___	
Photometric Study ___	
Master Sign Plan ___	
Colored Elevation / Rendering ___	
Materials Board ___	

Gladstone Convenience Store

TRAFFIC IMPACT STUDY

May 20, 2024

Prepared For:
Mr. Muhammed Hafiz

Prepared By:
Priority Engineers, Inc.
PO Box 563
Garden City, MO 64747

May 20, 2024

Mr. Muhammed Hafiz

RE: Gladstone Convenience Store Traffic Impact Study – Gladstone, MO

Dear Mr. Hafiz:

In response to your request, Priority Engineers, Inc. has completed a traffic impact analysis for the above referenced project. The purpose of the analysis is to determine the potential traffic impacts associated with this development on the intersections and streets surrounding this site, primarily during the AM and PM peak hours. The following report documents our analysis and recommendations.

We appreciate the opportunity to work with you on this project. Please contact us with any questions or if you require additional information.

Sincerely,

PRIORITY ENGINEERS, INC.

Kristin L. Skinner, P.E., PTOE
President

Priority Engineers, Inc.
PO Box 563
Garden City, MO 64747
816.738.4400

Table of Contents

1) INTRODUCTION

The purpose of this study is to examine the potential traffic impacts associated with a proposed Gladstone Convenience Store development located within the municipal limits of Gladstone, in Clay County, Missouri. This proposed development will construct a convenience store located to the north and the west of the intersection of NW 72nd Street and N Broadway Street.

The study area is shown in Figure 1. The site layout is shown in Figure 2.

2) EXISTING CONDITIONS

The proposed Gladstone Convenience Store development is located on a parcel of undeveloped land located northwest of the intersection of N Broadway Street and NW 72nd Street. To the north and west of the proposed development there are existing residential developments. To the south of the proposed development is a USPS facility and to the east of the proposed development is the Gladstone Bowl bowling alley.

N Broadway Street, south of the intersection with NW 72nd Street has a cross-section of two lanes in each direction without separation and it has curb and gutter and an enclosed drainage system. This segment N Broadway Street has a posted speed limit of 35 MPH. North of the intersection with NW 72nd Street has a cross section that consists of one lane in each direction, and curb and gutter with an enclosed drainage system. The posted speed limit on this segment of N Broadway Street is 30 MPH. The Mid America Regional Council (MARC) has given N Broadway Street Street a functional classification of Minor Arterial south of NW 72nd Street and a functional classification of Minor Collector north of NW 72nd Street. The Gladstone Comprehensive Plan identifies N Broadway Street as an Arterial south of NW 72nd Street and as a Primary Collector to the north of NW 72nd Street.

NW 72nd Street, to the east, has a cross section with two through lanes in each direction. NW 72nd Street has curb and gutter and an enclosed drainage system. MARC has given NW 72nd Street a functional classification of Minor Arterial to the west. The Gladstone Comprehensive Plan identifies NW 72nd Street as an Arterial. NW 72nd Street has a posted speed limit of 35 MPH.

Peak Hour turning movement counts were collected for the following intersections:

- NE 72nd Street N Broadway Street
- NE 72nd Street and West Drive of the USPS facility
- N Broadway Street and Gladstone Bowl entrance

These counts were performed on January 17th of this year. The Peak Hour turning movement counts were performed from 7:00 to 9:00 AM and from 4:00 to 6:00 PM. The AM Peak Hour was found to be from 8:00 to 9:00 and the PM Peak Hour was found to be from 4:30 to 5:30 for the overall roadway network. The complete traffic counts are shown in Appendix II. The peak hour traffic volumes and existing lane configurations are shown in Figures 3-6.

3) PROPOSED DEVELOPMENT

The proposed development will build an approximately 5,000 SF convenience store with 10 vehicle fueling positions (VFP). The provided site plan shows a drive through window on the west side of convenience store. There will be two full access entrances into the development. The first proposed entrance is a full access entrance onto NE 72nd Street located opposite of the

west entrance into the USPS facility. Street. The second full access entrance will provide access onto N Broadway Street. This access will be located to the north of the existing Gladstone Bowl drive.

4) TRIP GENERATION

The vehicle trips generated by the proposed development were estimated using the Institute of Transportation Engineers' (ITE) Trip Generation, 11th Edition. Land Use 945, Convenience Store / Gas Station. Since this location has a drive-through window, both Land Use 935 (fast food restaurant with drive-through window and no indoor seating) and Land Use 934 (fast food restaurant with drive through window) were considered for a portion of the 5,000 SF store. It was determined that the trips generated by Land Use 945 is higher than Land Use 935 and it is slightly higher than Land Use 934, so the complete footprint of the store was considered using Land Use 945 for a more conservative trip generation estimate.

Land Use 945 has two subcategories in the ITE data set, and GFA of the Store (with independent variable of VFP and VFP (with independent variable of GFA). Selecting data from the VFP subcategory resulted in a more conservative trip generation and was selected for this study.

The estimated AM and PM peak hour traffic volumes associated with the full buildout of this development are shown in Table 1.

Table 1: ITE Trip Generation

Land Use	*Intensity*	*Daily*	*AM Peak Hour*			*PM Peak Hour*		
			Total	*In*	*Out*	*Total*	*In*	*Out*
Convenience Store/Gas Station (VFP 9-15)	5,000 SF	3353	283	141	142	273	136	137

Pass-by trips are made as intermediate stops on the way from an origin to a primary trip destination without a route diversion. For this site, pass-by trips will be those vehicles already traveling through the intersection of NW 72nd Street and N Broadway Street. Chapter 10 and Appendix E of the ITE *Trip Generation Handbook, 3rd Edition* were consulted in estimating these trips. Research indicates that on average 76 percent of AM Peak Period Hour and 75 percent of PM Peak Hour for land use 945 are pass-by in nature. The Trip Generation volumes anticipated by the development are shown in Table 2 below.

Table 2: ITE Trip Generation								
		ITE	AM Peak Hour			PM Peak Hour		
Land Use	***Intensity***	***Code***	***Total***	***In***	***Out***	***Total***	***In***	***Out***
Convenience Store/Gas Station (VFP 9-15)	5,000 SF	945	283	141	142	273	136	137
			-215	*-107*	*-108*	*-205*	*-102*	*-103*
Subtotal			283	141	142	273	136	137
Pass-By Trips			*-215*	*-107*	*-108*	*-205*	*-102*	*-103*
Total New Trips			**68**	**34**	**34**	**68**	**34**	**34**

5) TRIP DISTRIBUTION AND ASSIGNMENT

Trips generated by the Gladstone Convenience Store development were distributed based on existing traffic flows and a general analysis of the surrounding area. The trips were distributed onto the existing street system approximately as follows:

- 15 percent to and from the north via N Broadway Street
- 40 percent to and from the south via N Broadway Street
- 40 percent to and from the east via NW 72nd Street
- 5 percent to and from the west via NW 72nd Street

Pass-by trips were distributed based upon the existing traffic patterns near the study intersection of NW 72nd Street and N Broadway Street.

6) LEVEL OF SERVICE AND VOLUME/CAPACITY ANALYSES

Capacity analysis was used to quantify the impacts of the increased traffic on the intersections studied. The methodology outlined in the Highway Capacity Manual, 7th Edition was used as a basis to perform the analysis for this study. Capacity analysis defines the quality of traffic operation for an intersection using a grading system called Level of Service (LOS). The LOS is defined in terms of average vehicle delay. Levels of service A through F have been established with A representing the best and F the worst.

Table 3: Level of Service Definitions		
Level of Service	***Unsignalized Intersection***	***Signalized Intersection***
A	< 10 Seconds	< 10 Seconds
B	< 15 Seconds	< 20 Seconds
C	< 25 Seconds	< 35 Seconds
D	< 35 Seconds	< 55 Seconds
E	< 50 Seconds	< 80 Seconds
F	≥ 50 Seconds	≥ 80 Seconds

The study intersections were evaluated using Synchro based on part on Highway Capacity Manual methods. The analysis reports are included in Appendix II. Signal Timing Inputs were based upon data provided by City Staff.

Existing Conditions

The levels of service, lane configuration, and queue lengths for existing conditions are shown in Figures 5 and 6 in Appendix I.

During the AM and PM Peak Hours, the overall level of service for the signalized intersection at NW 72nd Street and North Broadway Street is a C in both the AM and PM Peak Hour.

At all STOP-controlled intersections within the study area, the minor movements operate with a level of service B or better during both AM and PM Peak Hours.

Existing + Proposed Development Conditions

The levels of service, lane configuration, and queue lengths for existing conditions are shown in Figures 9 and 10 in Appendix I.

The overall level of service remains a C in both Peak Hours for the signalized intersection with the addition of the traffic generated by the proposed development.

All STOP controlled intersections within the study area operate with a level of service C or better during both Peak Hours.

7) SIGHT DISTANCE

Intersection sight distance and stopping sight distance was measured at the proposed entrances into the development. Intersection sight distance represents the distance and time required for the driver to make the decision to turn and to complete the turn without slowing oncoming traffic. Stopping sight distance represents the amount of distance required for a driver to make an unexpected stopping maneuver based upon observing a 2' tall object in the roadway. At both locations, the AASHTO minimum sight distance for a 35 MPH design speed.

8) ACCESS MANAGEMENT

The proposed drive onto N Broadway Street is located between two existing intersections located on the east side of the street. The drive into Gladstone Bowl is approximately 110' from the intersection of NW 72nd Street and N Broadway Street. Typically, it would be recommended that proposed drive be aligned with an existing drive to minimize turning conflicts. It is not recommended that the drive be located at the Gladstone Bowl drive dure to the proximity of this drive to the signalized intersection. The proposed drive however is located approximately as far north as possible and has an approximate offset of 35' from the entrance further to the north. The next entrance to the north has a spacing of approximately 160' to the north from the Gladstone Bowl Entrance.

APWA section 5200 spacing requirements can not be met due to the close proximity of the existing entrances on the east side of N Broadway Street. The proposed drive, however, is located as far north as possible to minimize the impact of the entrance on the function of the intersection.

The entrances at both NW 72nd Street and N Broadway Street were evaluated for right and left turn lanes in accordance with the methodology associated with NCHRP Report 457 using the turn lane guidelines found in MoDOT EPG section 940.9.

At the entrance on NW 72nd Street, neither a left turn lane (EPG Section 940.9.1 left turn guidelines for roads less than or equal to 40 MPH) nor a right turn lane guideline (EPG 940.9.8 right turn lane guidance for two lane roads) is met.

At the entrance onto N Broadway Street a right turn lane is not recommended (EPG 940.9.8 right turn lane guidance for two lane roads), but a left turn lane is recommended when the 40% left turn trend line is selected as per EPG guidance. This is documented in Figure 11 of Appendix I.

9) RECOMMENDATIONS & CONCLUSIONS

This study documents the impact of the proposed Gladstone Convenience Store development on the adjacent roadway network during the AM and PM Peak Hour. Analysis of unsignalized intersections indicate that they operate with acceptable levels of service both before and after the construction of the proposed development. The signalized intersection at NW 72nd Street and N Broadway Street has and overall level of service that is acceptable both before and after construction of the proposed development.

The proposed entrance locations have sufficient sight distance.

A left turn lane is recommended according to MoDOT guidelines for the entrance on N Broadway Street in the PM Peak Hour. Due to the geometric constraints of this location, if such a turn lane were constructed, it would need to be designed so that it does not interfere with the southbound left turn lane at the signalized intersection with NW 72nd Street. The levels of service at this entrance without the left turn lane are a B or better with a design queue of less than one vehicle.

No other improvements are required as a result of this development.

APPENDIX I

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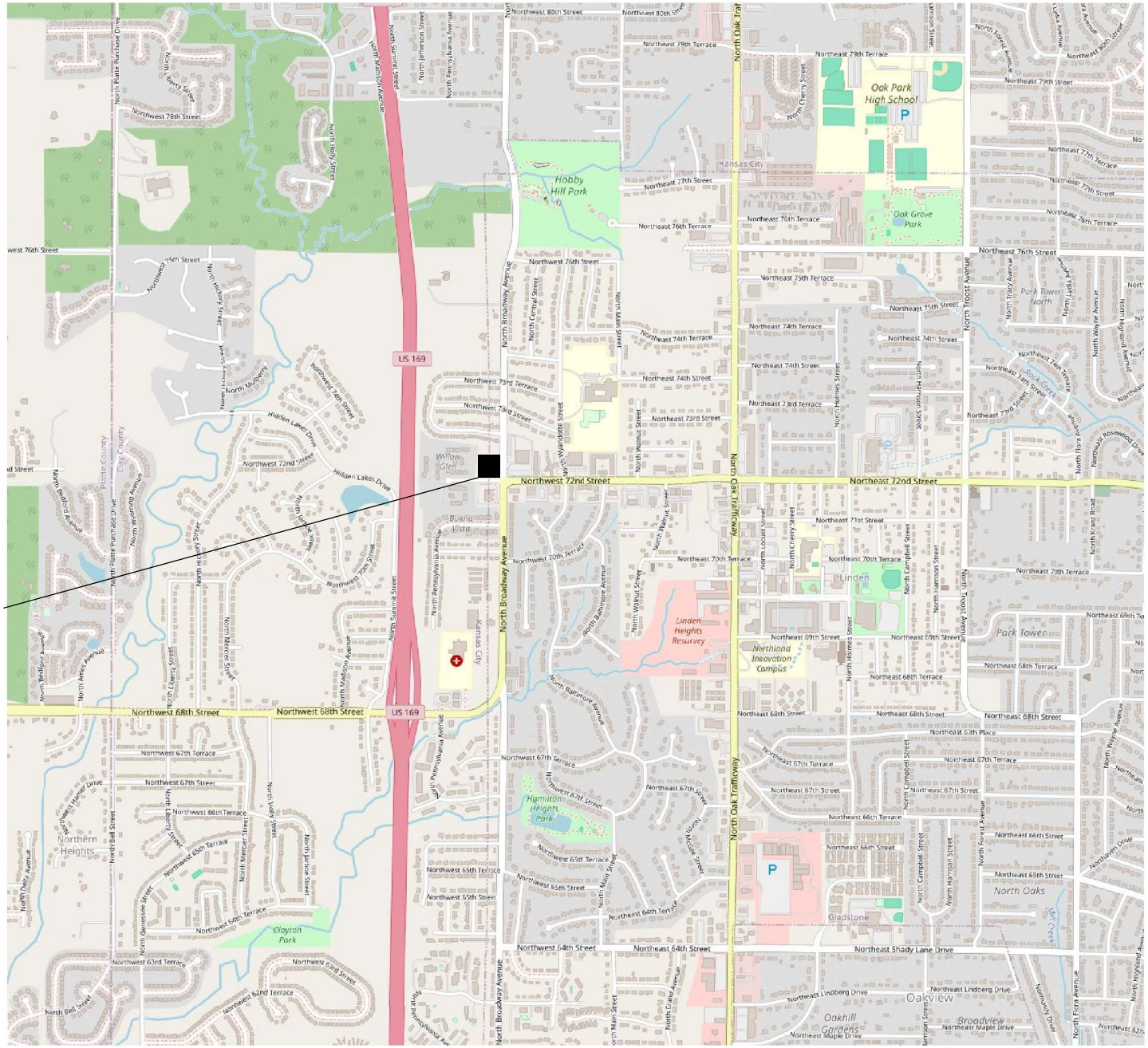

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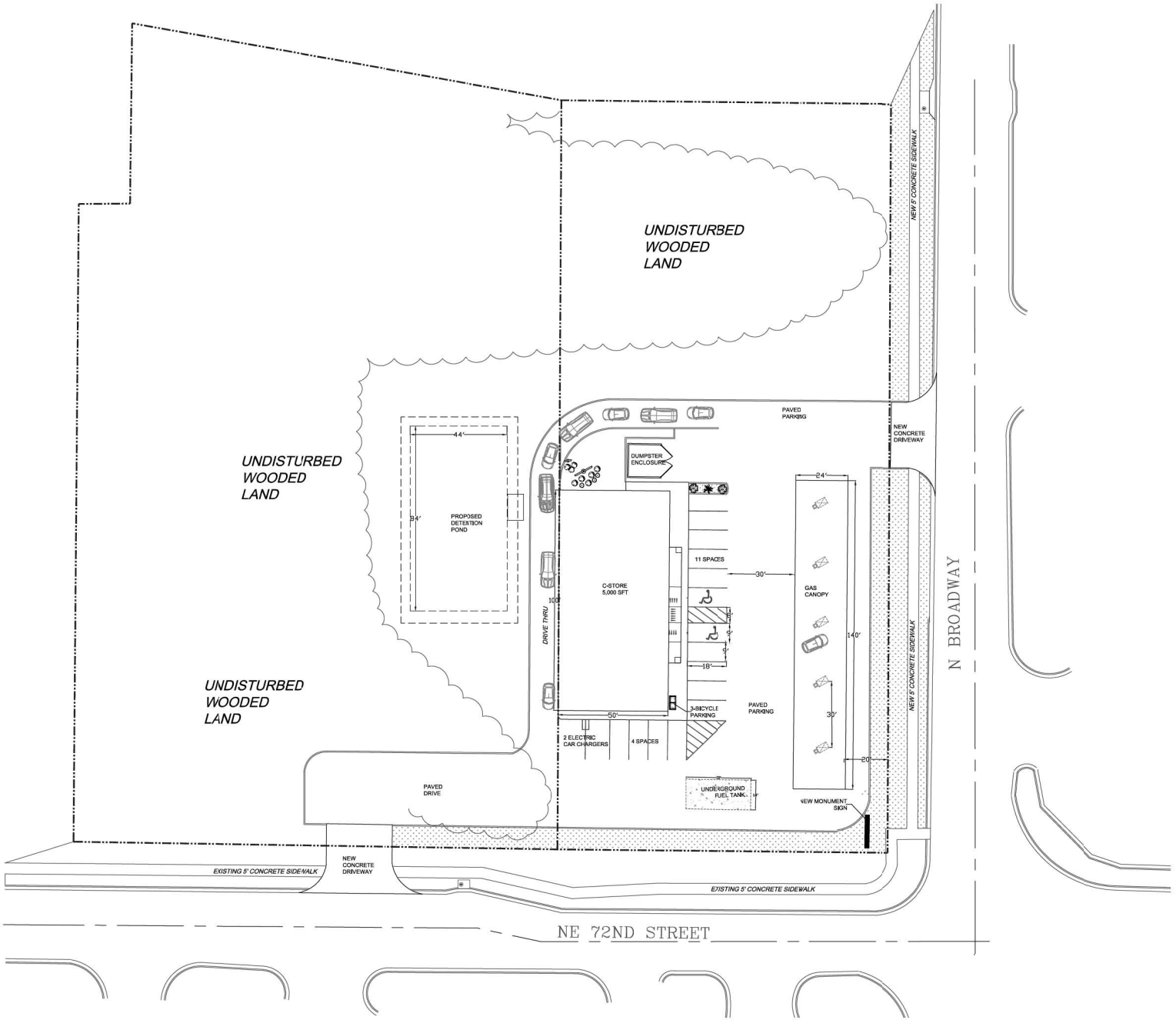
Project Location	Gladstone Convenience Store Gladstone, MO	No Scale Figure 1

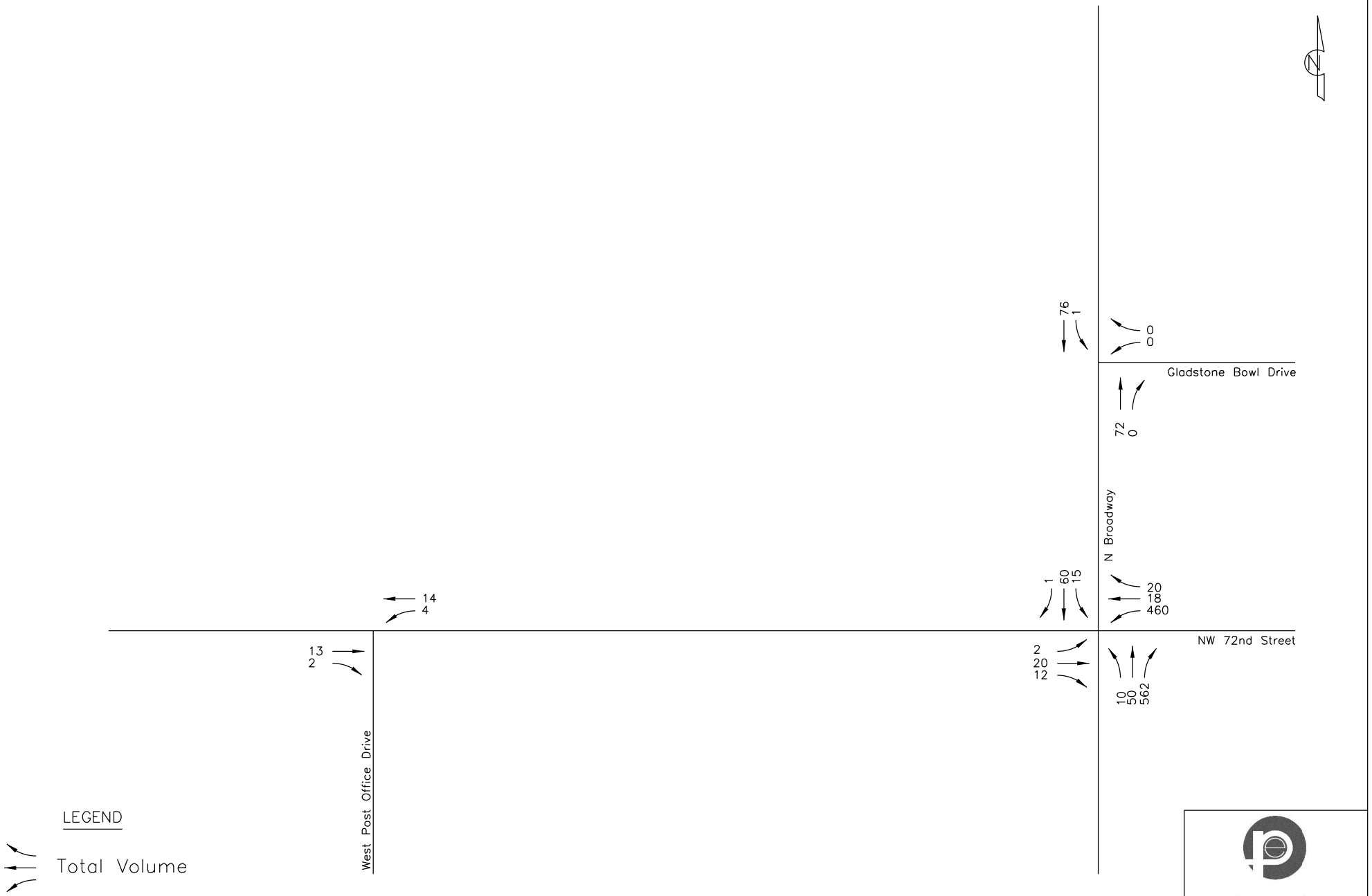
priority ENGINEERS
PO Box 563
Garden City, MO 64747
816.738.4400



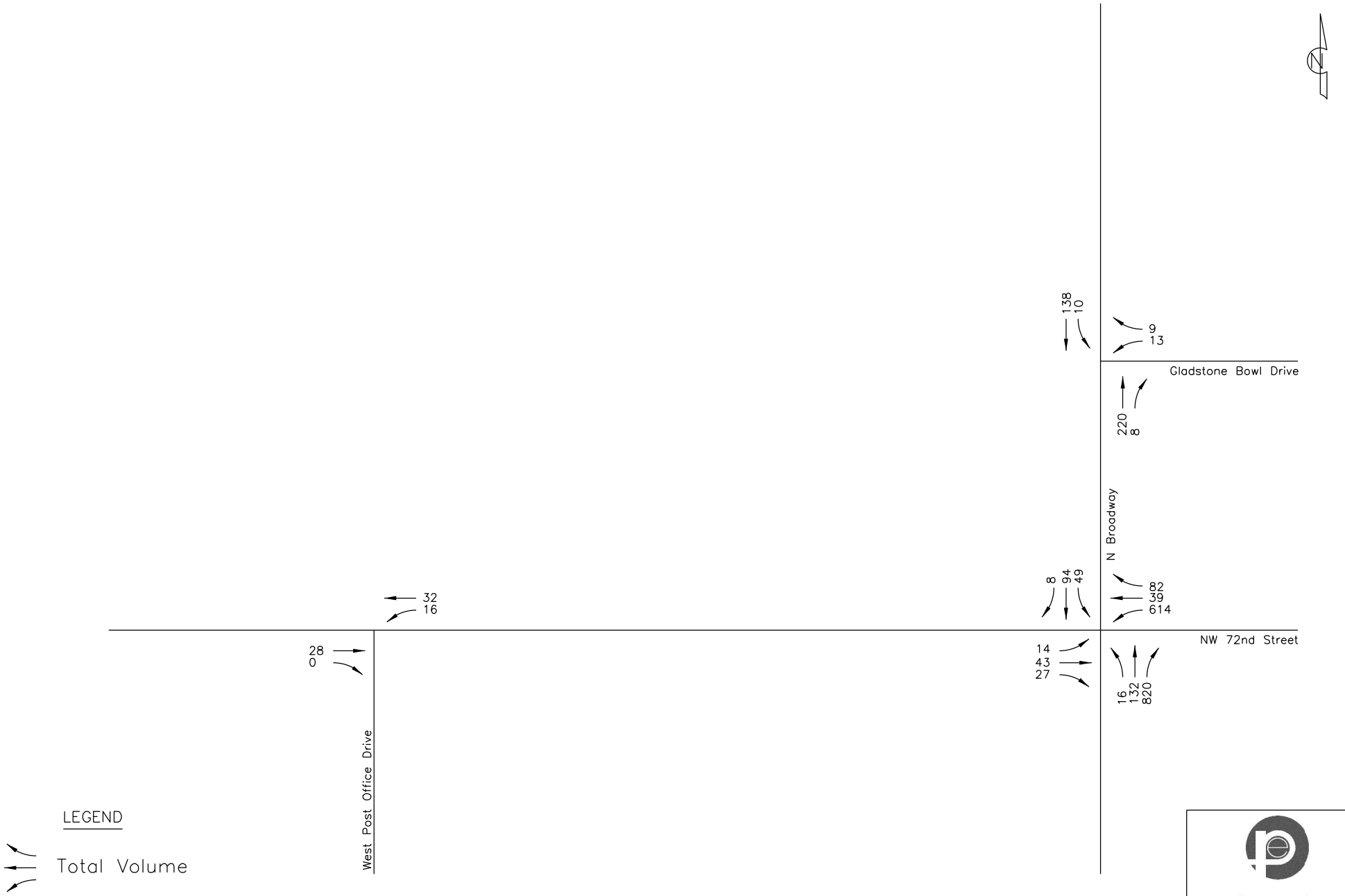
Design Group LLC.
9000 E Bannister Road
Suite 100
Kansas City, Missouri 64134
(816) 797-2065

Site Plan	Gladstone Convenience Store Gladstone, MO	No Scale Figure 2

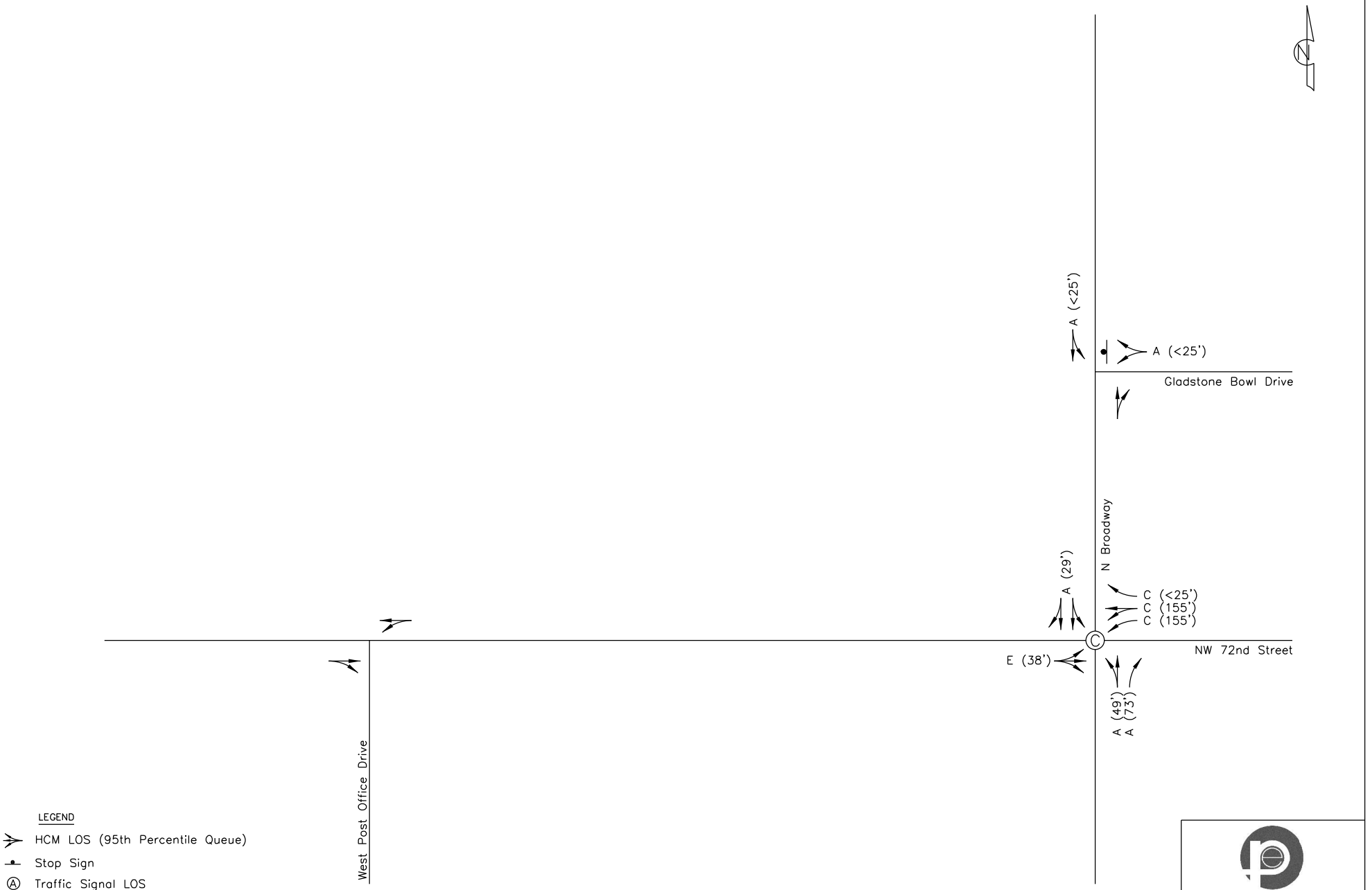
priority ENGINEERS
PO Box 563
Garden City, MO 64747
816.738.4400



Existing AM Peak Hour Traffic Volumes	Gladstone Convenience Store Gladstone, MO	No Scale Figure 3	priority ENGINEERS PO Box 563 Garden City, MO 64747 816.738.4400



Existing PM Peak Hour Traffic Volumes	Gladstone Convenience Store Gladstone, MO	No Scale Figure 4	priority ENGINEERS PO Box 563 Garden City, MO 64747 816.738.4400



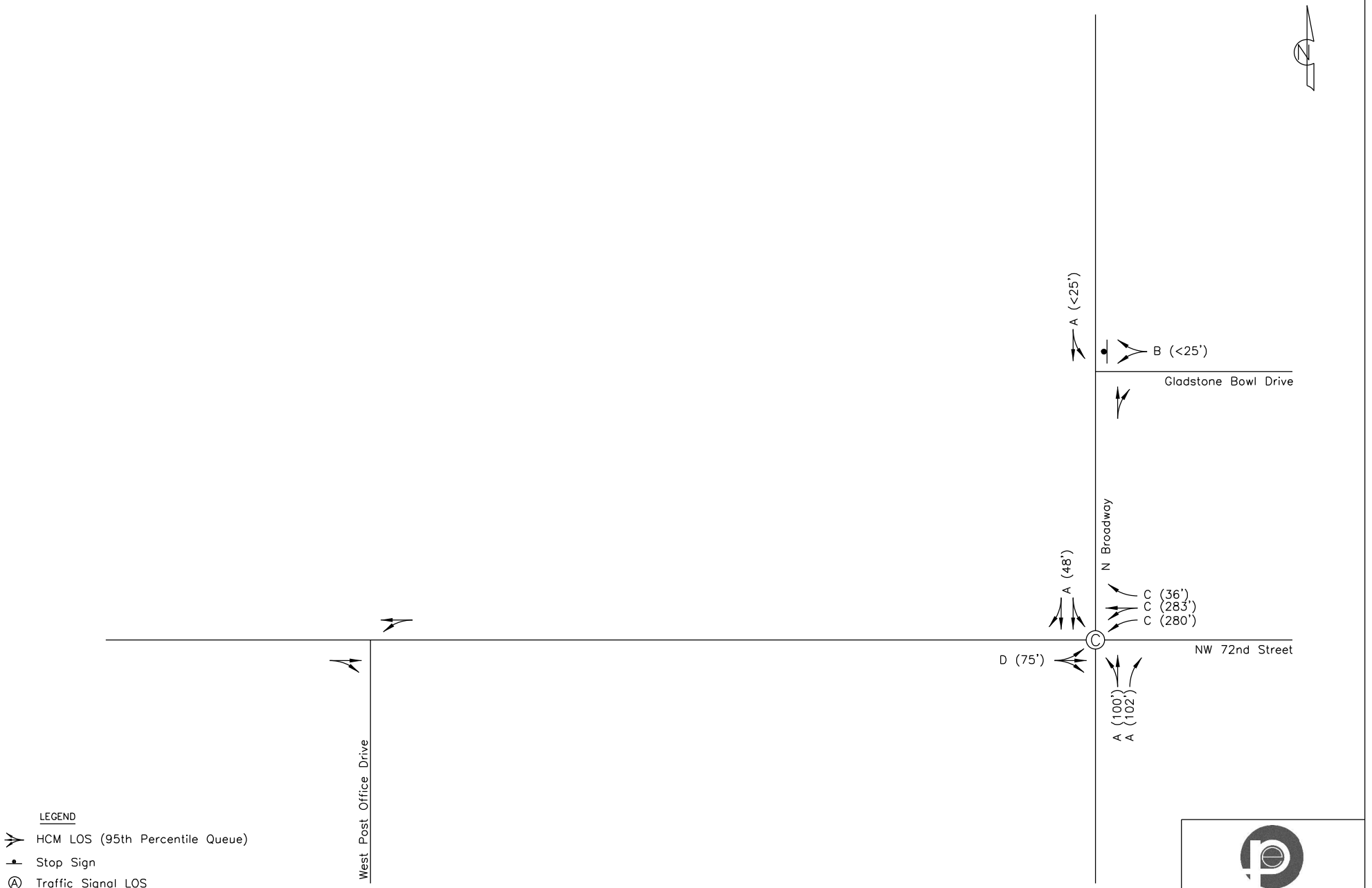
Existing AM Peak Hour
Lane Configuration &
Levels of Service

Gladstone Convenience Store
Gladstone, MO

No Scale

Figure 5

priority ENGINEERS
PO Box 563
Garden City, MO 64747
816.738.4400



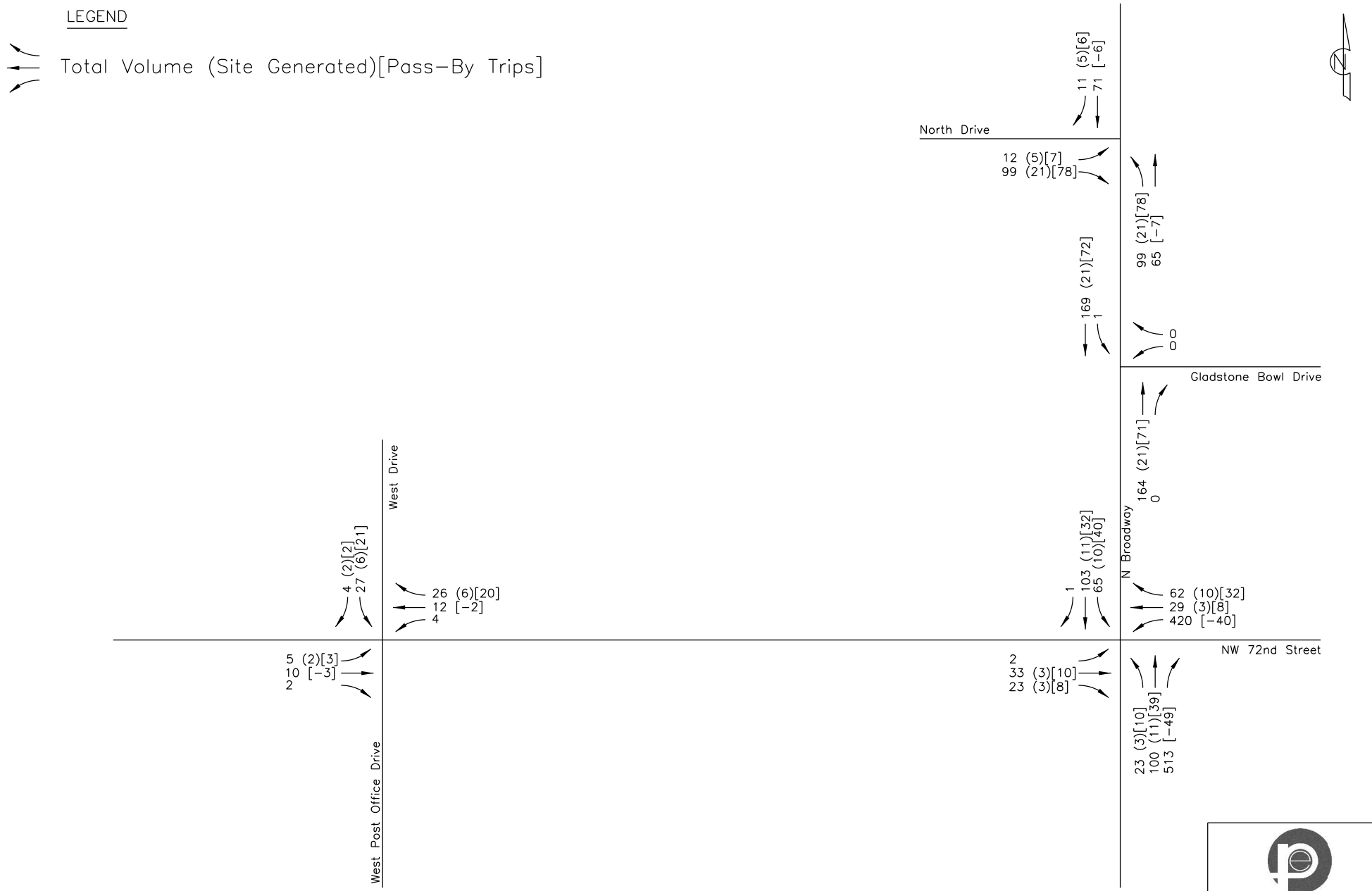
Existing PM Peak Hour
Lane Configuration &
Levels of Service

Gladstone Convenience Store
Gladstone, MO

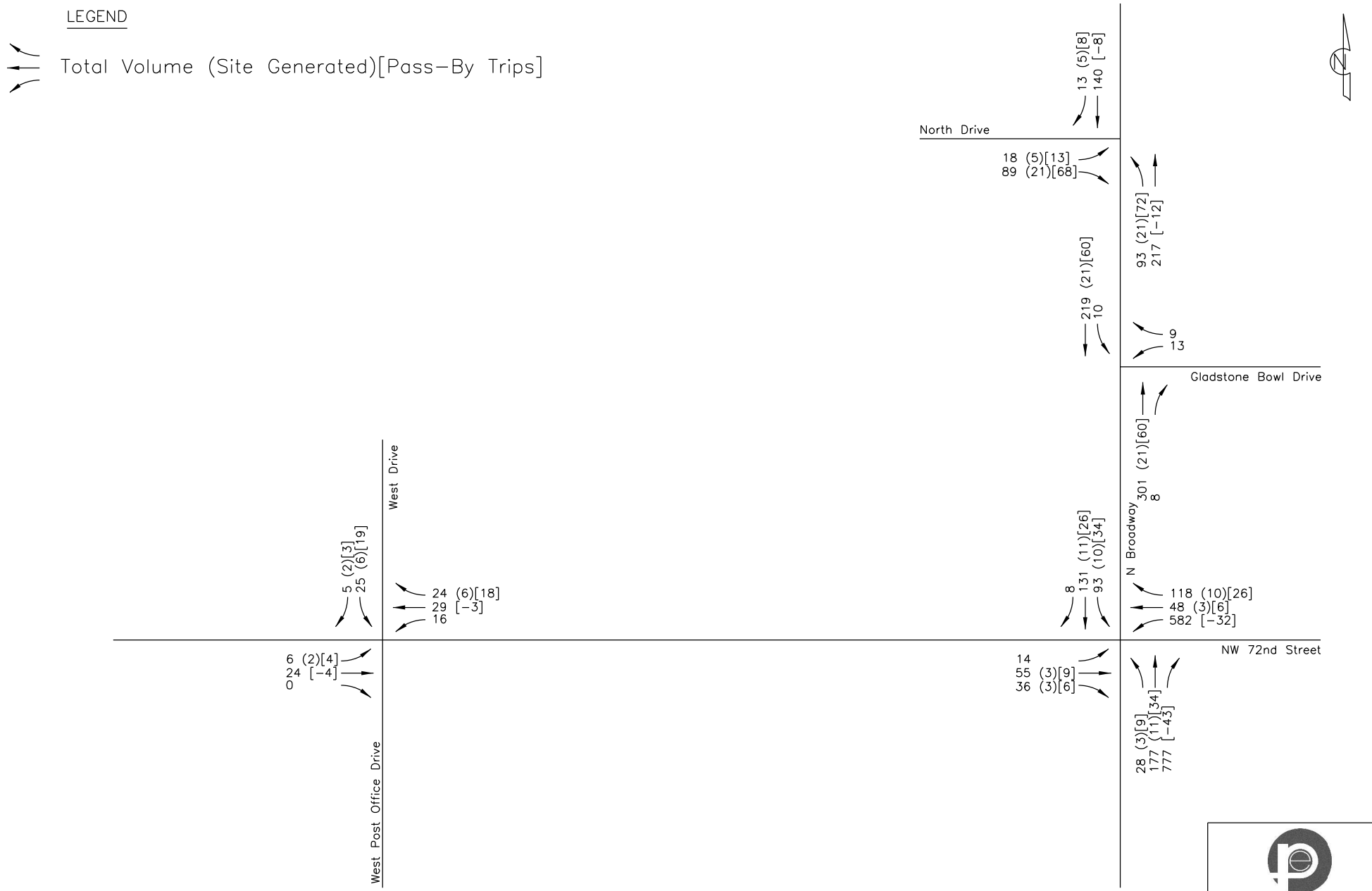
No Scale

Figure 6

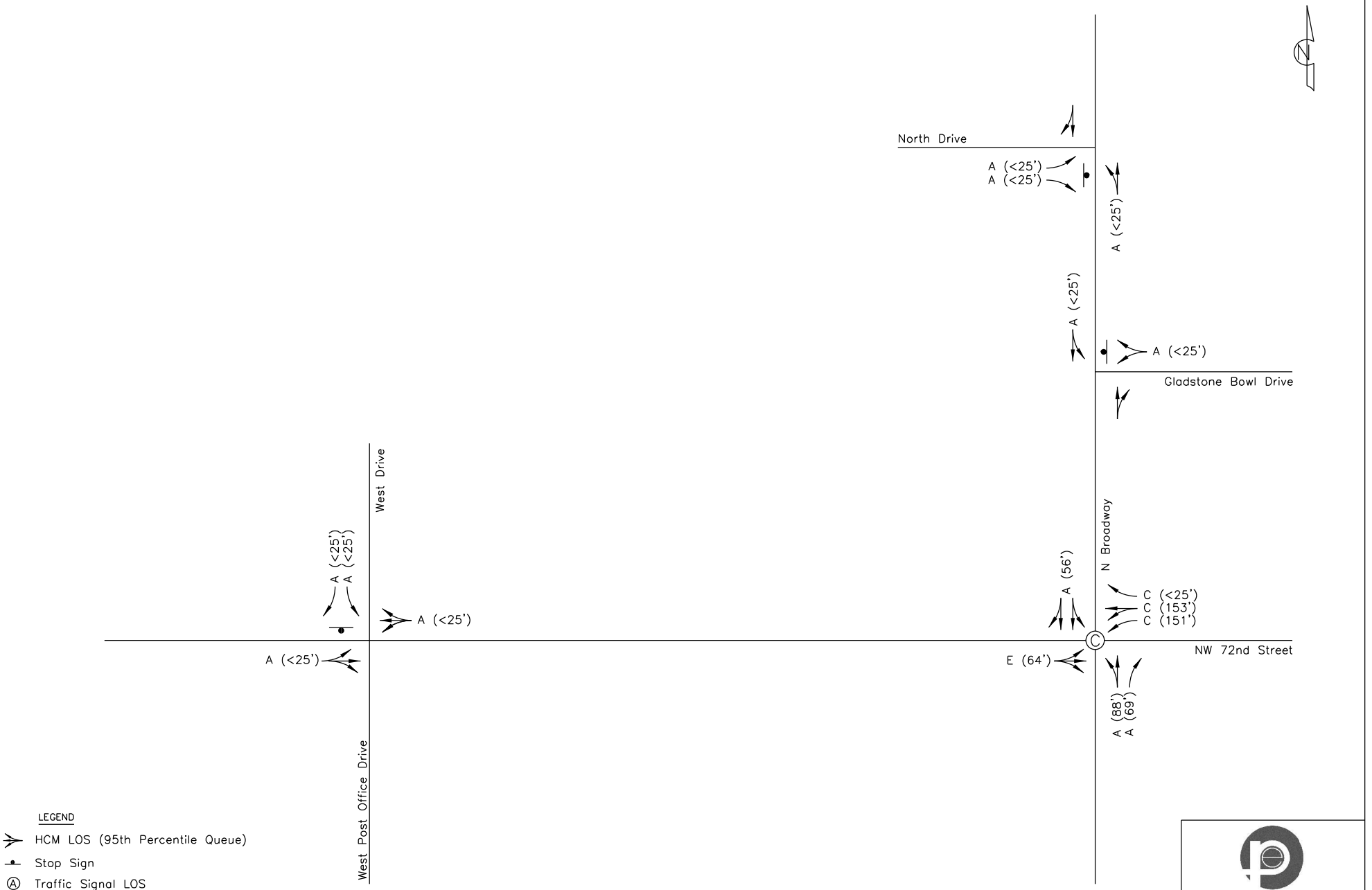
priority ENGINEERS
PO Box 563
Garden City, MO 64747
816.738.4400



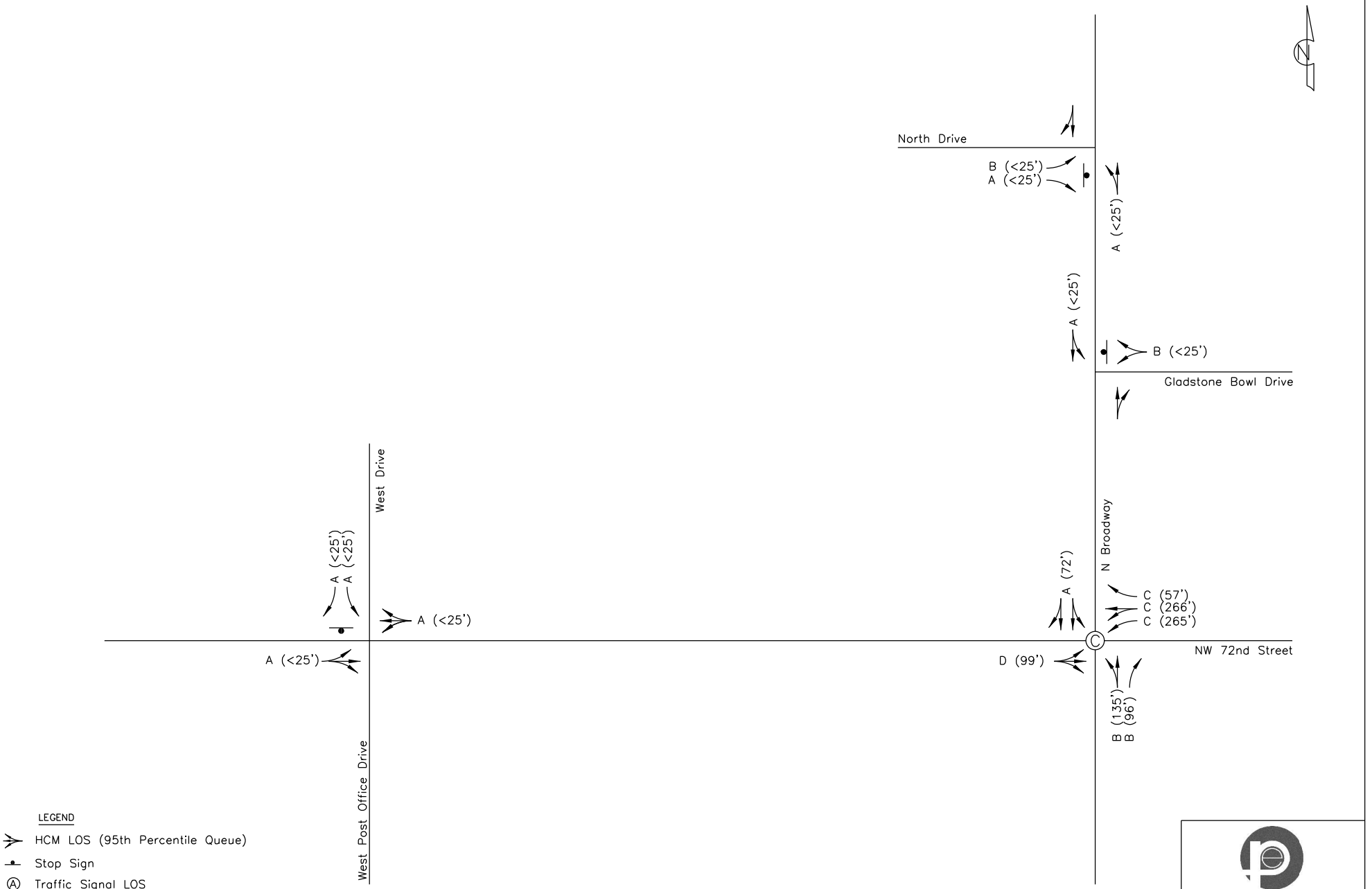
Existing + Proposed Development AM Peak Hour Traffic Volumes	Gladstone Convenience Store Gladstone, MO	No Scale Figure 7	priority ENGINEERS PO Box 563 Garden City, MO 64747 816.738.4400



Existing + Proposed Development PM Peak Hour Traffic Volumes	Gladstone Convenience Store Gladstone, MO	No Scale Figure 8	priority ENGINEERS PO Box 563 Garden City, MO 64747 816.738.4400

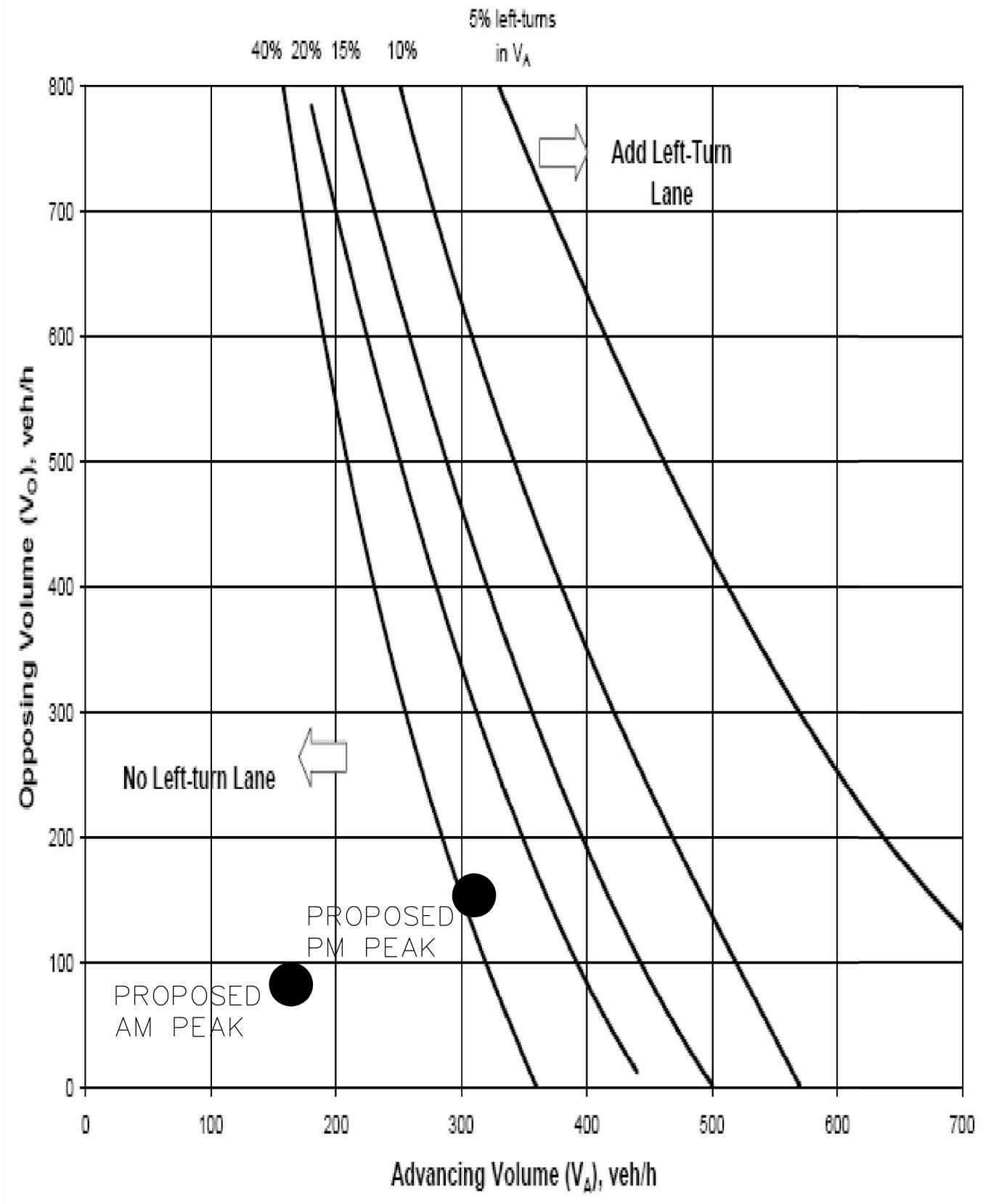


Existing + Proposed Development AM Peak Hour Lane Configuration & Levels of Service	Gladstone Convenience Store Gladstone, MO	No Scale Figure 9	priority ENGINEERS PO Box 563 Garden City, MO 64747 816.738.4400



Existing + Proposed Development PM Peak Hour Lane Configuration & Levels of Service	Gladstone Convenience Store Gladstone, MO	No Scale Figure 10

priority ENGINEERS
PO Box 563
Garden City, MO 64747
816.738.4400



Left Turn Lane Guidelines for Two–Lane Roads less than or equal to 40 mph (MoDOT EPG Figure 940.9.1)	Gladstone Convenience Store Gladstone, MO	No Scale Figure 11	priority ENGINEERS

APPENDIX II

Broadway & 72nd Street

	Southbound					Westbound					Northbound					Eastbound						
Start Time	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Totals	
7:00	6	22	0			69	4	7			1	7	62			1	4	4	0		187	
7:15	3	22	0			99	2	4			0	5	79			2	1	0	1		218	
7:30	4	19	0			127	0	3			0	11	125			0	3	2	0		294	
7:45	6	22	1			100	5	11			0	13	136			0	4	1	0		299	998 1187
8:00	7	23	0			110	2	4			3	11	109			1	3	2	0		275	1086 1275
8:15	3	17	0			127	4	3			0	7	167			0	3	1	0		332	1200 1381
8:30	3	14	0			128	5	6			3	16	115			0	3	5	1		299	1205 1393
8:45	2	6	1			95	7	7			4	16	171			1	11	4	0		325	1231 1408
Totals	15	60	1	0	0	460	18	20	0	0	10	50	562	0	0	2	20	12	1	0	1231	
Trucks		1				6					1		5				2			PHF=	0.93	
%		2%				1%					10%		1%				10%					

72nd Street & West Post Office Drive

	Southbound					Westbound					Northbound					Eastbound						
Start Time	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Totals	
7:00						2	2	0	0								5	0	2		11	
7:15						0	1	0	0								1	0	7		9	
7:30						0	0	0	1								4	0	1		6	
7:45						2	2	0	0								1	0	0		5	31
8:00						2	2	0	0								2	0	0		6	26
8:15						0	3	0	0								2	0	0		5	22
8:30						2	3	0	0								3	0	1		9	25
8:45						0	6	0	0								6	2	0		14	34
Totals	0	0	0	0	0	4	14	0	0	0	0	0	0	0	0	0	13	2	1	0	34	
Trucks							2										2			PHF=	0.61	
%							14%										15%					

Broadway & Gladstone Bowl Drive

	Southbound					Westbound					Northbound					Eastbound						
Start Time	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Totals	
7:00	0	25				0		0				15									40	
7:15	0	22				0		0				11									33	
7:30	0	20				0		0				14									34	
7:45	1	27				1		1				21									51	158
8:00	0	29				0		0				16									45	163
8:15	0	19				0		0				10									29	159
8:30	0	17				0		0				21									38	163
8:45	1	8				0		0				22									31	143
Totals	1	73	0	0	0	0	0	0	0	0	0	69	0	0	0	0	0	0	0	0	143	
Trucks												1								PHF=	0.79	
%												1%										

Broadway & 72nd Street

	Southbound					Westbound					Northbound					Eastbound							
Start Time	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Totals**		
16:00	18	18	3			127	12	15	0		4	28	166			2	10	4	0		**407**		
16:15	16	44	4			126	12	10	0		3	29	203			3	14	5	0		**469**		
16:30	7	32	2			123	14	13	1		5	28	212			4	11	9	0		**461**		
16:45	12	20	2			150	10	17	0		3	29	209			5	14	9	0		**480**	1817	2234
17:00	13	25	1			187	7	22	0		3	31	191			3	9	4	0		**496**	1906	2340
17:15	17	17	3			154	8	30	1		5	44	208			2	9	5	1		**504**	1941	2404
17:30	12	13	0			142	1	15	0		7	29	166			0	3	4	1		**393**	1873	2324
17:45	20	24	1			130	5	15	0		5	27	167			1	5	1	0		**401**	1794	2228
Totals	**49**	**94**	**8**	**0**	**0**	**614**	**39**	**82**	**2**	**0**	**16**	**132**	**820**	**0**	**0**	**14**	**43**	**27**	**1**	**0**	**1941**		
Trucks		3					4	1						7				1		PHF=	**0.96**		
Truck %		3%				1%	3%						1%					4%					

72nd Street & West Post Office Drive

	Southbound					Westbound					Northbound					Eastbound							
Start Time	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Totals**		
16:00						8	3		0								2		0		**13**		
16:15						4	7		0								5		0		**16**		
16:30						6	5		1								3		0		**15**		
16:45						4	9		0								8		0		**21**	65	
17:00						3	7		0								8		0		**18**	70	
17:15						3	11		1								9		0		**24**	78	
17:30						1	7		0								6		1		**15**	78	
17:45						0	7		0								3		0		**10**	67	
Totals	**0**	**0**	**0**	**0**	**0**	**16**	**32**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**28**	**0**	**0**	**0**	**78**		
Trucks							1										1			PHF=	**0.81**		
Truck %							3%										4%						

Broadway & Gladstone Bowl Drive

	Southbound					Westbound					Northbound					Eastbound							
Start Time	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Totals**		
16:00	0	34				2		4				42	1								**83**		
16:15	2	56				0		2				35	2								**97**		
16:30	2	36				2		2				44	0								**86**		
16:45	2	30				3		2				46	3								**86**	352	
17:00	3	34				4		0				52	2								**95**	364	
17:15	3	33				4		5				70	3								**118**	385	
17:30	6	26				0		0				40	2								**74**	373	
17:45	4	31				0		0				41	4								**80**	367	
Totals	**10**	**133**	**0**	**0**	**0**	**13**	**0**	**9**	**0**	**0**	**0**	**212**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**385**		
Trucks		2																		PHF=	**0.82**		
Truck %		2%																					

Lane Group	EBT	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	37	257	257	22	65	604	82
v/c Ratio	0.45	0.57	0.57	0.04	0.07	0.54	0.04
Control Delay (s/veh)	39.8	28.0	27.9	0.2	14.9	4.0	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	39.8	28.0	27.9	0.2	14.9	4.0	14.1
Queue Length 50th (ft)	11	108	108	0	16	0	10
Queue Length 95th (ft)	38	155	155	0	49	73	29
Internal Link Dist (ft)	204		604		384		28
Turn Bay Length (ft)				25			
Base Capacity (vph)	161	496	499	518	911	1105	1664
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.52	0.52	0.04	0.07	0.55	0.05

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	20	12	460	18	20	10	50	562	15	60	1
Future Volume (veh/h)	2	20	12	460	18	20	10	50	562	15	60	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1752	1870	1870	1870	1870	1752	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	2	22	13	509	0	22	11	54	0	16	65	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	10	2	2	2	2	10	2	2	2	2	2
Cap, veh/h	3	35	21	691	0	307	199	942		410	1672	26
Arrive On Green	0.04	0.04	0.04	0.19	0.00	0.19	0.61	0.61	0.00	0.61	0.61	0.61
Sat Flow, veh/h	89	977	577	3563	0	1585	234	1543	1585	564	2739	43
Grp Volume(v), veh/h	37	0	0	509	0	22	65	0	0	43	0	39
Grp Sat Flow(s),veh/h/ln	1643	0	0	1781	0	1585	1777	0	1585	1653	0	1694
Q Serve(g_s), s	1.7	0.0	0.0	10.1	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.7
Cycle Q Clear(g_c), s	1.7	0.0	0.0	10.1	0.0	0.9	1.1	0.0	0.0	0.7	0.0	0.7
Prop In Lane	0.05		0.35	1.00		1.00	0.17		1.00	0.37		0.03
Lane Grp Cap(c), veh/h	59	0	0	691	0	307	1141	0		1075	0	1034
V/C Ratio(X)	0.63	0.00	0.00	0.74	0.00	0.07	0.06	0.00		0.04	0.00	0.04
Avail Cap(c_a), veh/h	438	0	0	950	0	423	1141	0		1075	0	1034
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	35.7	0.0	0.0	28.4	0.0	24.7	5.9	0.0	0.0	5.8	0.0	5.8
Incr Delay (d2), s/veh	21.2	0.0	0.0	3.6	0.0	0.2	0.1	0.0	0.0	0.1	0.0	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.0	4.4	0.0	0.3	0.4	0.0	0.0	0.3	0.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	56.9	0.0	0.0	32.0	0.0	24.9	6.0	0.0	0.0	5.9	0.0	5.9
LnGrp LOS	E			C		C	A			A		A
Approach Vol, veh/h		37			531			65			82	
Approach Delay, s/veh		56.9			31.7			6.0			5.9	
Approach LOS		E			C			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	49.8	6.7	49.8	18.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	23.0	20.0	23.0	20.0
Max Q Clear Time (g_c+I1), s	3.1	3.7	2.7	12.1
Green Ext Time (p_c), s	0.4	0.2	0.6	2.5

Intersection Summary	
HCM 7th Control Delay, s/veh	27.7
HCM 7th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	72	0	1	76
Future Vol, veh/h	0	0	72	0	1	76
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	91	0	1	96

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	142	91	0	0	91	0
Stage 1	91	-	-	-	-	-
Stage 2	51	-	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219	-
Pot Cap-1 Maneuver	844	966	-	-	1503	-
Stage 1	932	-	-	-	-	-
Stage 2	966	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	843	966	-	-	1503	-
Mov Cap-2 Maneuver	843	-	-	-	-	-
Stage 1	932	-	-	-	-	-
Stage 2	965	-	-	-	-	-

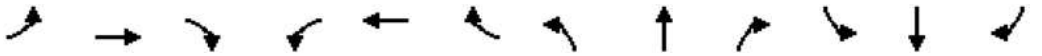
Approach	WB	NB	SB
HCM Control Delay, s/v	0	0	0.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	47	-
HCM Lane V/C Ratio	-	-	-	0.001	-
HCM Control Delay (s/veh)	-	-	0	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0	-

Lane Group	EBT	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	88	339	342	85	155	854	157
v/c Ratio	0.72	0.70	0.70	0.16	0.21	0.74	0.13
Control Delay (s/veh)	51.3	33.4	33.4	7.8	18.9	6.7	16.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	51.3	33.4	33.4	7.8	18.9	6.7	16.9
Queue Length 50th (ft)	26	134	135	4	53	0	25
Queue Length 95th (ft)	#75	#280	#283	36	100	102	48
Internal Link Dist (ft)	204		604		384		28
Turn Bay Length (ft)				25			
Base Capacity (vph)	171	501	504	523	736	1151	1206
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.68	0.68	0.16	0.21	0.74	0.13

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	43	27	614	39	82	16	132	820	49	94	8
Future Volume (veh/h)	14	43	27	614	39	82	16	132	820	49	94	8
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1841	1870	1856	1870	1870	1870	1870	1870	1856	1870
Adj Flow Rate, veh/h	15	45	28	669	0	85	17	138	0	51	98	8
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	4	2	3	2	2	2	2	2	3	2
Cap, veh/h	21	63	39	836	0	372	120	905		546	1101	94
Arrive On Green	0.07	0.07	0.07	0.23	0.00	0.23	0.54	0.54	0.00	0.54	0.54	0.54
Sat Flow, veh/h	299	897	558	3563	0	1585	124	1690	1585	874	2055	175
Grp Volume(v), veh/h	88	0	0	669	0	85	155	0	0	81	0	76
Grp Sat Flow(s),veh/h/ln	1755	0	0	1781	0	1585	1814	0	1585	1447	0	1657
Q Serve(g_s), s	3.7	0.0	0.0	13.3	0.0	3.3	0.0	0.0	0.0	0.0	0.0	1.7
Cycle Q Clear(g_c), s	3.7	0.0	0.0	13.3	0.0	3.3	3.1	0.0	0.0	1.6	0.0	1.7
Prop In Lane	0.17		0.32	1.00		1.00	0.11		1.00	0.63		0.11
Lane Grp Cap(c), veh/h	122	0	0	836	0	372	1025	0		854	0	888
V/C Ratio(X)	0.72	0.00	0.00	0.80	0.00	0.23	0.15	0.00		0.10	0.00	0.09
Avail Cap(c_a), veh/h	468	0	0	950	0	423	1025	0		854	0	888
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.2	0.0	0.0	27.0	0.0	23.2	8.8	0.0	0.0	8.5	0.0	8.5
Incr Delay (d2), s/veh	15.6	0.0	0.0	5.5	0.0	0.7	0.3	0.0	0.0	0.2	0.0	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	0.0	5.9	0.0	1.2	1.2	0.0	0.0	0.6	0.0	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	49.7	0.0	0.0	32.6	0.0	23.9	9.1	0.0	0.0	8.7	0.0	8.7
LnGrp LOS	D			C		C	A			A		A
Approach Vol, veh/h		88			754			155			157	
Approach Delay, s/veh		49.7			31.6			9.1			8.7	
Approach LOS		D			C			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	44.2	9.2	44.2	21.6
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	23.0	20.0	23.0	20.0
Max Q Clear Time (g_c+I1), s	5.1	5.7	3.7	15.3
Green Ext Time (p_c), s	1.3	0.5	1.4	2.3

Intersection Summary	
HCM 7th Control Delay, s/veh	26.9
HCM 7th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	13	9	220	8	10	138
Future Vol, veh/h	13	9	220	8	10	138
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	11	268	10	12	168

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	382	273	0	0	278	0
Stage 1	273	-	-	-	-	-
Stage 2	109	-	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219	-
Pot Cap-1 Maneuver	607	765	-	-	1283	-
Stage 1	772	-	-	-	-	-
Stage 2	904	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	601	765	-	-	1283	-
Mov Cap-2 Maneuver	601	-	-	-	-	-
Stage 1	772	-	-	-	-	-
Stage 2	896	-	-	-	-	-

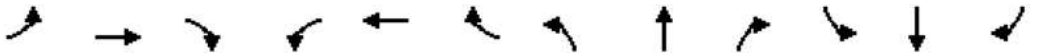
Approach	WB	NB	SB
HCM Control Delay, s/v	10.7	0	0.59
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	659	243	-
HCM Lane V/C Ratio	-	-	0.041	0.01	-
HCM Control Delay (s/veh)	-	-	10.7	7.8	0.1
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Lane Group	EBT	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	62	240	243	67	133	552	182
v/c Ratio	0.64	0.55	0.56	0.14	0.15	0.51	0.12
Control Delay (s/veh)	50.7	28.3	28.3	5.2	15.0	3.9	13.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	50.7	28.3	28.3	5.2	15.0	3.9	13.8
Queue Length 50th (ft)	16	102	103	0	35	0	24
Queue Length 95th (ft)	#64	151	153	22	88	69	56
Internal Link Dist (ft)	204		604		384		28
Turn Bay Length (ft)				25			
Base Capacity (vph)	165	488	492	511	880	1078	1488
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.49	0.49	0.13	0.15	0.51	0.12

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	33	23	420	29	62	23	100	513	65	103	1
Future Volume (veh/h)	2	33	23	420	29	62	23	100	513	65	103	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1752	1870	1870	1870	1870	1752	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	2	35	25	474	0	67	25	108	0	70	111	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	10	2	2	2	2	10	2	2	2	2	2
Cap, veh/h	3	46	33	665	0	296	215	897		712	1239	12
Arrive On Green	0.05	0.05	0.05	0.19	0.00	0.19	0.60	0.60	0.00	0.60	0.60	0.60
Sat Flow, veh/h	53	921	658	3563	0	1585	262	1487	1585	1042	2054	19
Grp Volume(v), veh/h	62	0	0	474	0	67	133	0	0	93	0	89
Grp Sat Flow(s),veh/h/ln	1631	0	0	1781	0	1585	1750	0	1585	1416	0	1699
Q Serve(g_s), s	2.8	0.0	0.0	9.4	0.0	2.7	0.0	0.0	0.0	0.0	0.0	1.6
Cycle Q Clear(g_c), s	2.8	0.0	0.0	9.4	0.0	2.7	2.3	0.0	0.0	1.6	0.0	1.6
Prop In Lane	0.03		0.40	1.00		1.00	0.19		1.00	0.75		0.01
Lane Grp Cap(c), veh/h	81	0	0	665	0	296	1113	0		938	0	1025
V/C Ratio(X)	0.76	0.00	0.00	0.71	0.00	0.23	0.12	0.00		0.10	0.00	0.09
Avail Cap(c_a), veh/h	435	0	0	950	0	423	1113	0		938	0	1025
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	35.2	0.0	0.0	28.6	0.0	25.9	6.4	0.0	0.0	6.2	0.0	6.2
Incr Delay (d2), s/veh	26.3	0.0	0.0	3.0	0.0	0.8	0.2	0.0	0.0	0.2	0.0	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.0	0.0	4.1	0.0	1.0	0.8	0.0	0.0	0.6	0.0	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	61.5	0.0	0.0	31.6	0.0	26.7	6.6	0.0	0.0	6.4	0.0	6.4
LnGrp LOS	E			C		C	A			A		A
Approach Vol, veh/h		62			541			133			182	
Approach Delay, s/veh		61.5			31.0			6.6			6.4	
Approach LOS		E			C			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	49.3	7.7	49.3	18.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	23.0	20.0	23.0	20.0
Max Q Clear Time (g_c+I1), s	4.3	4.8	3.6	11.4
Green Ext Time (p_c), s	1.1	0.3	1.7	2.6

Intersection Summary	
HCM 7th Control Delay, s/veh	24.7
HCM 7th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	164	0	1	169
Future Vol, veh/h	0	0	164	0	1	169
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	208	0	1	214

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	317	208	0	0	208	0
Stage 1	208	-	-	-	-	-
Stage 2	109	-	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219	-
Pot Cap-1 Maneuver	663	832	-	-	1362	-
Stage 1	826	-	-	-	-	-
Stage 2	903	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	663	832	-	-	1362	-
Mov Cap-2 Maneuver	663	-	-	-	-	-
Stage 1	826	-	-	-	-	-
Stage 2	903	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	0	0	0.05
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	21	-
HCM Lane V/C Ratio	-	-	-	0.001	-
HCM Control Delay (s/veh)	-	-	0	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	10	2	4	12	26	0	0	0	27	0	4
Future Vol, veh/h	5	10	2	4	12	26	0	0	0	27	0	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	61	61	61	61	92	61	92	61	92	92	92
Heavy Vehicles, %	2	15	2	2	14	2	2	2	2	2	2	2
Mvmt Flow	5	16	3	7	20	28	0	0	0	29	0	4

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	48	0	0	20	0	0			74	77	34
Stage 1	-	-	-	-	-	-			47	47	-
Stage 2	-	-	-	-	-	-			27	31	-
Critical Hdwy	4.12	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	1559	-	-	1597	-	-			929	813	1039
Stage 1	-	-	-	-	-	-			976	856	-
Stage 2	-	-	-	-	-	-			995	870	-
Platoon blocked, %		-	-		-	-					
Mov Cap-1 Maneuver	1559	-	-	1597	-	-			922	0	1039
Mov Cap-2 Maneuver	-	-	-	-	-	-			922	0	-
Stage 1	-	-	-	-	-	-			972	0	-
Stage 2	-	-	-	-	-	-			991	0	-

Approach	EB	WB	SB
HCM Control Delay, s/v	1.58	0.87	8.96
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	377	-	-	194	-	-	922	1039
HCM Lane V/C Ratio	0.003	-	-	0.004	-	-	0.032	0.004
HCM Control Delay (s/veh)	7.3	0	-	7.3	0	-	9	8.5
HCM Lane LOS	A	A	-	A	A	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-	-	0.1	0

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	99	99	65	71	11
Future Vol, veh/h	12	99	99	65	71	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	108	108	71	77	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	369	83	89	0	-	0
Stage 1	83	-	-	-	-	-
Stage 2	286	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	631	976	1506	-	-	-
Stage 1	940	-	-	-	-	-
Stage 2	763	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	584	976	1506	-	-	-
Mov Cap-2 Maneuver	584	-	-	-	-	-
Stage 1	870	-	-	-	-	-
Stage 2	763	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	9.38	4.57	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1087	-	584	976	-	-
HCM Lane V/C Ratio	0.071	-	0.022	0.11	-	-
HCM Control Delay (s/veh)	7.6	0	11.3	9.1	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.4	-	-

Lane Group	EBT	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	110	327	329	123	213	809	241
v/c Ratio	0.77	0.70	0.70	0.25	0.29	0.72	0.21
Control Delay (s/veh)	53.8	33.8	33.6	11.2	20.0	6.2	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	53.8	33.8	33.6	11.2	20.0	6.2	18.0
Queue Length 50th (ft)	33	129	130	16	77	0	43
Queue Length 95th (ft)	#99	#265	#266	57	135	96	72
Internal Link Dist (ft)	204		604		384		28
Turn Bay Length (ft)				25			
Base Capacity (vph)	187	488	492	511	712	1123	1104
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.67	0.67	0.24	0.30	0.72	0.22

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	55	36	582	48	118	28	177	777	93	131	8
Future Volume (veh/h)	14	55	36	582	48	118	28	177	777	93	131	8
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1841	1870	1856	1870	1870	1870	1870	1870	1856	1870
Adj Flow Rate, veh/h	15	57	38	642	0	123	29	184	0	97	136	8
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	4	2	3	2	2	2	2	2	3	2
Cap, veh/h	21	79	53	820	0	365	141	847		631	964	58
Arrive On Green	0.09	0.09	0.09	0.23	0.00	0.23	0.52	0.52	0.00	0.52	0.52	0.52
Sat Flow, veh/h	239	907	604	3563	0	1585	166	1622	1585	1043	1846	112
Grp Volume(v), veh/h	110	0	0	642	0	123	213	0	0	122	0	119
Grp Sat Flow(s),veh/h/ln	1750	0	0	1781	0	1585	1787	0	1585	1333	0	1668
Q Serve(g_s), s	4.6	0.0	0.0	12.7	0.0	4.9	0.0	0.0	0.0	0.0	0.0	2.8
Cycle Q Clear(g_c), s	4.6	0.0	0.0	12.7	0.0	4.9	4.6	0.0	0.0	2.7	0.0	2.8
Prop In Lane	0.14		0.35	1.00		1.00	0.14		1.00	0.80		0.07
Lane Grp Cap(c), veh/h	153	0	0	820	0	365	988	0		783	0	872
V/C Ratio(X)	0.72	0.00	0.00	0.78	0.00	0.34	0.22	0.00		0.16	0.00	0.14
Avail Cap(c_a), veh/h	467	0	0	950	0	423	988	0		783	0	872
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.3	0.0	0.0	27.1	0.0	24.1	9.7	0.0	0.0	9.2	0.0	9.2
Incr Delay (d2), s/veh	12.7	0.0	0.0	4.9	0.0	1.2	0.5	0.0	0.0	0.4	0.0	0.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	0.0	5.6	0.0	1.8	1.8	0.0	0.0	1.0	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	46.0	0.0	0.0	32.0	0.0	25.2	10.2	0.0	0.0	9.6	0.0	9.5
LnGrp LOS	D			C		C	B			A		A
Approach Vol, veh/h		110			765			213			241	
Approach Delay, s/veh		46.0			30.9			10.2			9.6	
Approach LOS		D			C			B			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		43.2		10.6		43.2		21.3				
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s		23.0		20.0		23.0		20.0				
Max Q Clear Time (g_c+I1), s		6.6		6.6		4.8		14.7				
Green Ext Time (p_c), s		1.8		0.7		2.3		2.6				

Intersection Summary												
HCM 7th Control Delay, s/veh			25.0									
HCM 7th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	13	9	301	8	10	219
Future Vol, veh/h	13	9	301	8	10	219
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	11	367	10	12	267

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	530	372	0	0	377	0
Stage 1	372	-	-	-	-	-
Stage 2	158	-	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219	-
Pot Cap-1 Maneuver	494	673	-	-	1180	-
Stage 1	696	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	489	673	-	-	1180	-
Mov Cap-2 Maneuver	489	-	-	-	-	-
Stage 1	696	-	-	-	-	-
Stage 2	846	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	11.87	0	0.43
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	551	157	-
HCM Lane V/C Ratio	-	-	0.049	0.01	-
HCM Control Delay (s/veh)	-	-	11.9	8.1	0.1
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	24	0	16	29	24	0	0	0	25	0	5
Future Vol, veh/h	6	24	0	16	29	24	0	0	0	25	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	81	81	81	81	92	81	92	81	92	92	92
Heavy Vehicles, %	2	4	2	2	3	2	2	2	2	2	2	2
Mvmt Flow	7	30	0	20	36	26	0	0	0	27	0	5

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	62	0	0	30	0	0			131	131	49
Stage 1	-	-	-	-	-	-			88	88	-
Stage 2	-	-	-	-	-	-			43	43	-
Critical Hdwy	4.12	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	1541	-	-	1583	-	-			863	760	1020
Stage 1	-	-	-	-	-	-			935	822	-
Stage 2	-	-	-	-	-	-			980	859	-
Platoon blocked, %		-	-		-	-					
Mov Cap-1 Maneuver	1541	-	-	1583	-	-			848	0	1020
Mov Cap-2 Maneuver	-	-	-	-	-	-			848	0	-
Stage 1	-	-	-	-	-	-			931	0	-
Stage 2	-	-	-	-	-	-			967	0	-

Approach	EB	WB	SB
HCM Control Delay, s/v	1.33	1.77	9.25
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	325	-	-	402	-	-	848	1020
HCM Lane V/C Ratio	0.004	-	-	0.012	-	-	0.032	0.005
HCM Control Delay (s/veh)	7.3	0	-	7.3	0	-	9.4	8.5
HCM Lane LOS	A	A	-	A	A	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-	-	0.1	0

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	18	89	93	217	140	13
Future Vol, veh/h	18	89	93	217	140	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	97	101	236	152	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	597	159	166	0	-	0
Stage 1	159	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	466	886	1412	-	-	-
Stage 1	869	-	-	-	-	-
Stage 2	650	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	427	886	1412	-	-	-
Mov Cap-2 Maneuver	427	-	-	-	-	-
Stage 1	798	-	-	-	-	-
Stage 2	650	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	10.28	2.32	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	540	-	427	886	-	-
HCM Lane V/C Ratio	0.072	-	0.046	0.109	-	-
HCM Control Delay (s/veh)	7.7	0	13.8	9.6	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.4	-	-

Drainage Report
For
400 NW 72nd Street
Gladstone, Missouri

April 01, 2024

By:
Gerald W. Menefee, PE
KAM Design LLC
9000 Bannister Road
Kansas City, Missouri 64134

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Table of Contents

Section 1
General

The proposed site for a new convenience store with gasoline pumps is just northwest corner of the intersection of N Broadway and NW 72nd Street in Gladstone, Missouri. The tract of land is currently covered by grassland. The developed portion of the site is expected to cover approximately the south two thirds of the site.

Section 2
Methodology

HydroCAD 10.00 was utilized for the drainage calculations developed for this project. The Water Quality solution was developed utilizing Manual of Best Management Practices for Stormwater Quality, October 2012 edition.

Section 3
Existing Drainage Patterns

From the peak elevation of the site located near the southeast corner of the site, there are three basins radiating out from it. Reference Maps Section. Basins E1 generally exhibits flow toward the west side of the property; Basin E2 drains to the east part of the property; while Basin E3 drains toward the west side of the site. Table 1 shows the amounts of existing runoff from each of the basins for the 1-year, 10-year and 100-year storms are as follows:

Table 1
Existing Site Runoff

Storm Year	Basin E1 (cfs)	Basin E2 (cfs)	Basin E3 (cfs)	Total Site (cfs)
1	0.66	0.03	1.53	2.22
10	2.04	0.08	4.62	6.74
100	3.65	0.15	8.24	12.04

Proposed Drainage Patterns Section 4

The proposed drainage patterns are consolidated into six basins. Reference the Maps Section. The north or 1P Basin allows for runoff to flow toward the north edge of the property and thence to the Bioretention Bed located to its immediate north. Basins 2P and 3P are much smaller basins

draining to the west. The Basin 4P Generally drains that portion of the east property. The P5 Basin is the water quality Bioretention Area and land immediately around. It drains excess runoff to the sites underground detention system. The area surrounding P5 is comprised of P6 land which is uncontrolled drainage to the west side of the property. A summary of the proposed runoff expected from the site for the 1-year, 10-year and 100-year storms are noted in Table 2. The calculated detention depth and storage are noted in Table 3 as follows:

Table 2
Proposed Site Runoff

Storm Year	Basin 1P (cfs)	Basin 1P And 5P w/ Detention (cfs)	Basin 2P (cfs)	Basin 3P (cfs)	Basin 4P (cfs)	Basin 5P (cfs)	Basin 6P (cfs)	Total Site w/ Detention (cfs)
1	4.33	1.70	0.01	0.01	0.27	0.23	0.23	2.06
10	8.53	5.20	0.03	0.03	0.82	0.70	0.61	5.38
100	12.83	8,78	0.06	0.06	1.45	1.23	1.23	10.81

Table 3
Detention Depth and Storage

Storm Year	Detained Depth (ft)	Detained Volume (ac-ft)
1	1.02	0.064
10	1.71	0.126
100	5.98	0.177

Table 4
Final Detention Volume Minus the WQv Volume

	Calculated Detention Volume	WQv Volume Stored	Final Detention Volume
Acre-Feet Volumes	0.211 ac-ft	0.081 ac-ft	0.13 ac- ft
Linear Feet of Pipe	1300.00 Lf	499.00 Lf	801.00 Lf

As a part of this analysis, it was assumed that the outflow pipe of the detention basin would consist of a 12-inch diameter PVC pipe. As can be seen in the Tables 1 that at all storm levels

the 12-inch PVC pipe provides an adequate release of water so that the discharge in the post developed situation results in the sites runoff being less than the existing runoff.

As for an emergency spillover, it shall be incorporated as a part of the discharge of the 12-inch PVC pipe. The pipe can handle the excess flow by allowing the water in the inlet structure to exceed the height of the orifice plate and travel down through the 12-inch discharge pipe.

The total detention utilized for the site incorporates a reduction in volume. See Table 4. This reduction is predicated on the assumption that the runoff stored in the Bioretention area is effectively detained water and therefore extra volume was left in the detention system pipes.

Section 5
Water Quality

Water quality goals for the site will be achieved through the use Bioretention Area. The area is located to immediate north of drainage basin P1. Runoff water will fill the Area with runoff to a depth of 1 foot. Once this volume is achieved, excess water over the maximum depth of the subsurface storage area flows in an into an inlet structure located at the southwest portion of the Area corner of the property and then into the detention piping.

Water in the Bioretention Area is to drain down the through a 3- inch cover of hardwood wood chips and thence through a 4-foot-thick layer of porous soil. Runoff will be removed from the Area utilizing a system of perforated 4-inch PVC pipes to allow water to leave and travel to a point of daylight. The Area is constructed to allow for the minimum drawdown of one foot per day.

Section 6
Summary

The proposed new improvements on will increase impervious cover necessitating the need for a detention facility to control the additional runoff generated. Since there is insufficient area to construct a detention pond on the surface, it was determined that a subsurface pipe system should be constructed on the north side of the developed portion of the site. A bio retention pond is too be constructed just before the runoff is directed to the detention system in order to allow for the treatment of the first flush of rain water.

Section 7
Conclusions and Recommendations

Based upon review of the site involving existing and proposed conditions, conclusions and recommendations are provided as follows:

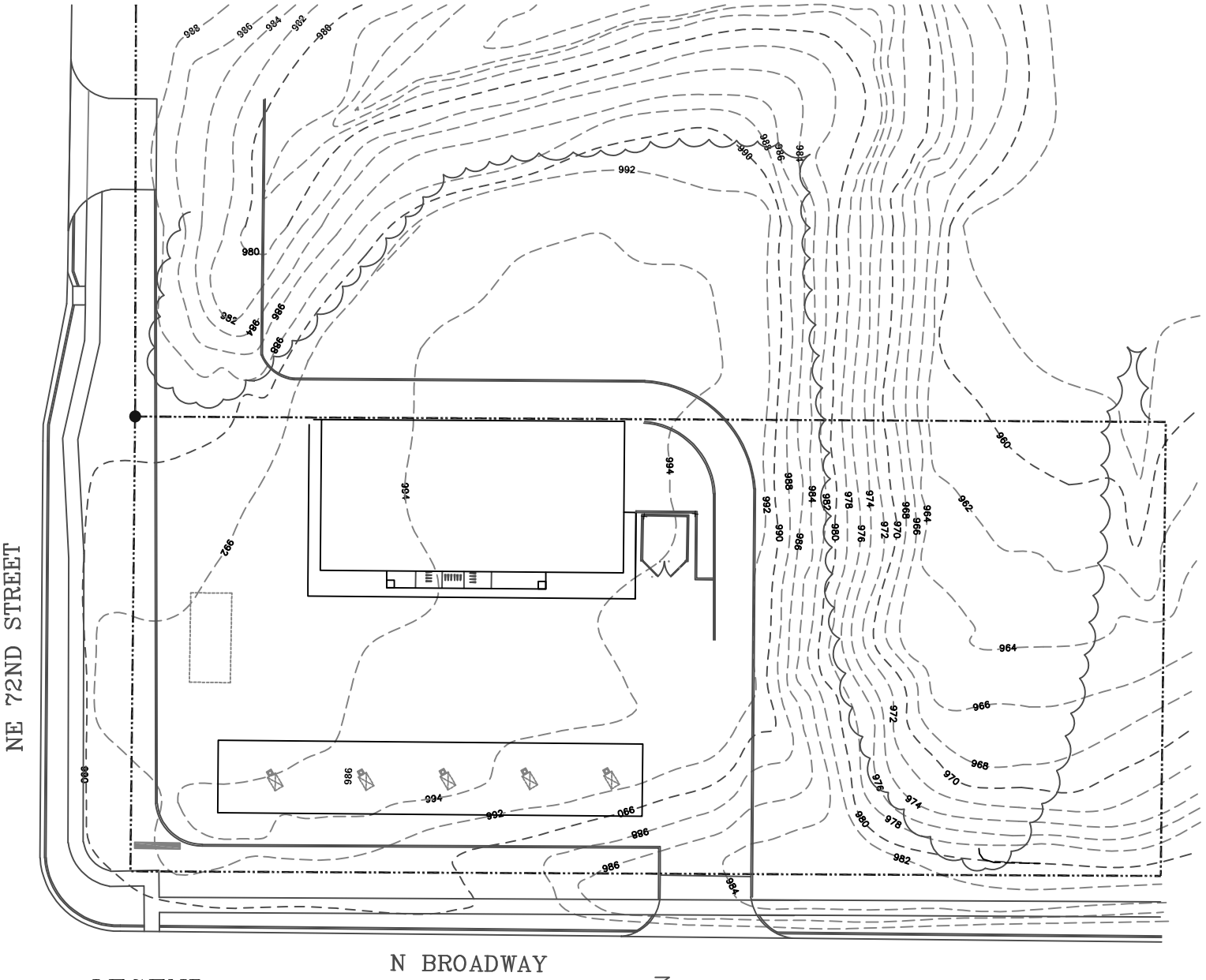
1. Installation of the Bioretention Area will increase the quality of water exiting the site by filtering water leaving the proposed parking areas.
2. Detention will be provided to mitigate the increasing runoff due to the additional impervious cover added to the site.
3. The detention volume was reduced by the storage volume of the water quality storage. Since not doing this would result in the site being penalized by the extra water stored in the water quality structure.
4. Over flow runoff will be incorporated within the discharge piping of the detention control structure.

Section 8

Drainage Area Maps

SHORT STOP GAS STATION

400 N 72ND STREET, GLADSTONE, MISSOURI



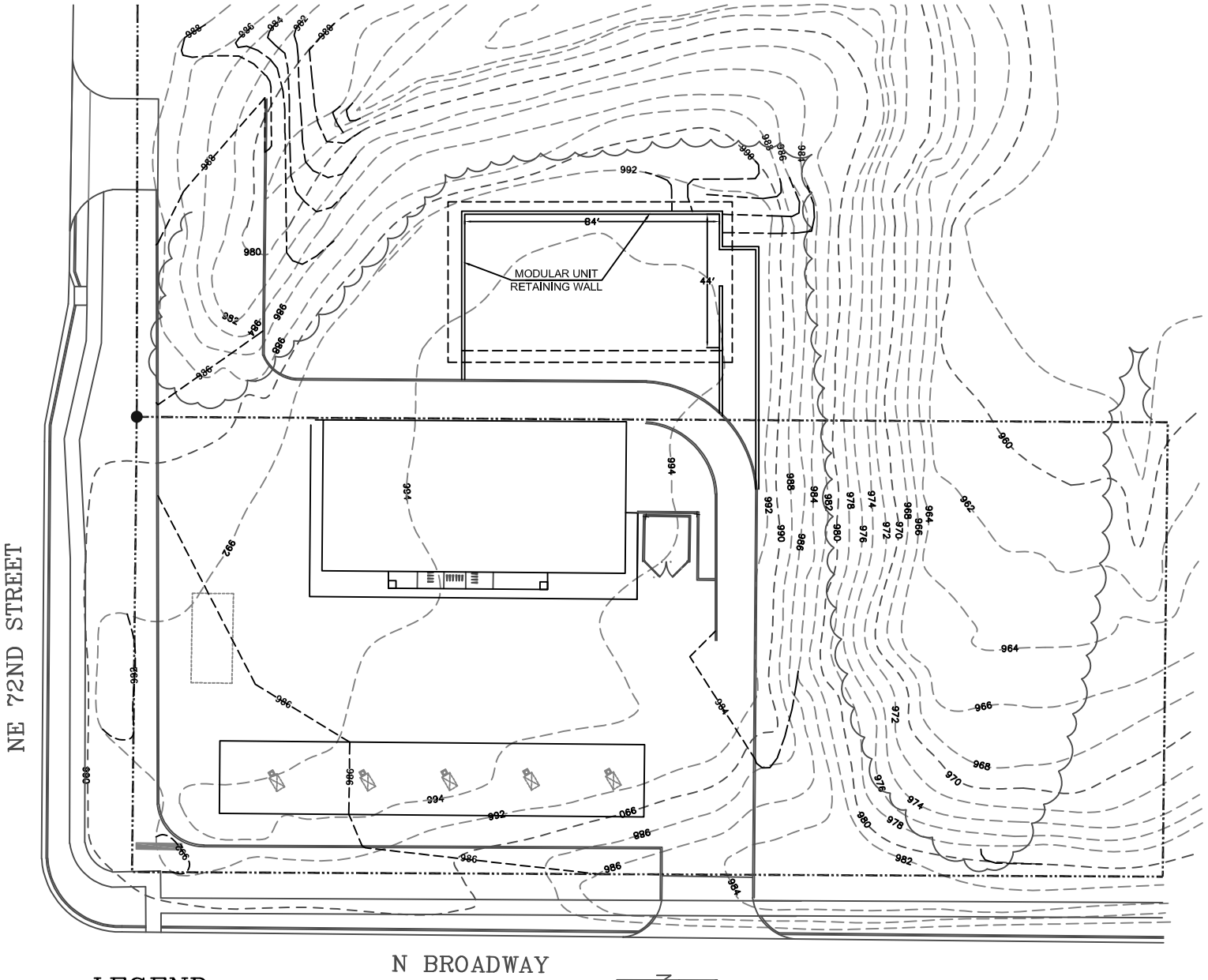
EXISTING DRAINAGE AREA MAP

SCALE 1' = 50'

Design Group LLC.
9264 Blue Ridge Blvd.
Suite A
Kansas City, Missouri 64138
(816) 797–2065

SHORT STOP GAS STATION

400 N 72ND STREET, GLADSTONE, MISSOURI



LEGEND

EXISTING CONTOURS

PROPOSED CONTOURS

N

PROPOSED DRAINAGE AREA MAP

SCALE 1' = 50'

Design Group LLC.

9264 Blue Ridge Blvd.
Suite A
Kansas City, Missouri 64138
(816) 797–2065

Section 9

Supporting Calculations

Exhibit 1
Water Quality Equations

WQv = P*Rv*A/12

P = 1.37
I = 68 %
Rv = 0.05+0.009*I = 0.05+0.009*68 =
A = 0.87

= 1.37*0.62*0.87/12 = 0.062 a-ft = 2665.87 cf

Refer to Bioretention Worksheet that follows:

Design Procedure Form: Bioretention
Main Worksheet

Designer: GERALD MENERBE
Checked By: GERALD MENERBE
Company: KAM DESIGN LLC
Date: 2/21/23
Project: SHORE STOP - 695 STATION
Location: 400 NW 72ND STREET

I. Water Quality Volume		
Step 1) Tributary area to bioretention area, A_T (ac)	A_T (ac) =	1.207
Step 2) Calculate WQv using methodology in Section 6	WQv (cu-ft) =	0.91
IIa. Pretreatment		
Step 1) Specify type of inflow to Bioretention facility: Type 1 = sheet flow Type 2 = concentrated or channelized	Inflow type =	TYPE 2
Step 2) Pretreatment		
Step 3) Proceed to Part IIb, IIc, or IId for design guidance on different pretreatment options		
IIb. Vegetated Pretreatment Strip		
Step 1) Type of land cover of contributing area: Type 1 = Impervious (i.e., parking lot) Type 2 = Pervious (i.e., residential lawn)	Land cover type =	TYPE 1
Step 2) Maximum inflow approach length, $L_{approach}$ (ft)	$L_{approach}$ (ft) =	30
Step 3) Average slope of pretreatment strip, S_{fs} (%) (Maximum slope of 6%)	S_{fs} (%) =	2%
Step 4) Vegetated pretreatment strip minimum length, L_{fs} (ft), from Table 8.2	L_{fs} (ft) =	30
IIc. Vegetated Pretreatment Channel		
Step 1) Percent imperviousness of contributing area, % imp	% imp =	68
Step 2) Average slope of vegetated channel, S_{vc} (%) (Maximum slope of 6%)	S_{vc} (%) =	2%
Step 3) Vegetated pretreatment channel minimum length, L_{vc} (ft), from Table 8.3	L_{vc} (ft) =	30
IId. Other Pretreatment Devices		
Other methods of pretreatment may be utilized upstream of a bioretention facility to settle out suspended solids and reduce runoff velocity. Several proprietary devices are available that will achieve these results. Most such devices install below ground and accept inflow from a piped stormwater management system or from surface sheet flow via drop inlets. These devices should be selected and sized based on site-specific conditions for each project.		

Design Procedure Form: Bioretention
Main Worksheet

Designer: GERALD MENEFEE
Checked By: GERALD MENEFEE
Company: KAM DESIGN LLC
Date: 7/21/23
Project: SHORT STOP GAS STATION
Location: 400 NW 72ND STREET

III. Planting Soil Bed and Ponding Area

Step 1) Planting bed soil depth, d_f (ft) (d_f should be between 2.5 feet and 4 feet).	d_f (ft) = 4
Step 2) Coefficient of permeability for planting soil bed, k (ft/day) (k should be at least 1 ft/ day)	k (ft/ day) = 1
Step 3) Maximum ponding depth, h_{max} (ft) (h_{max} should be between 0.25 ft and 1.0 ft).	h_{max} (ft) = 1
Step 4) Average height of water above bioretention bed, havg (ft) $h_{avg} = h_{max}/2$	h_{avg} (ft) = 0.5
Step 5) Time required for WQv to filter through the planting soil bed, t_f (days) (t_f of 1 to 3 days is recommended)	t_f (days) = 1
Step 6) Required filter bed surface area, A_f (ft^2) $A_f = (WQv*d_f)/[k*t_f*(h_{avg}+df)]$	A_f (ft^2) = 2370
Step 7) Approximate filter bed length, L_f (ft), assuming a length to width ratio of 2:1 (L_f should be at least 40 ft)	L_f (ft) = 84
Step 8) Approximate filter bed width, W_f (ft), assuming a length to width ratio of 2:1 (W_f should be at least 15 feet, and optimally half of L_f)	W_f (ft) = 42
Step 9) Required Ponding Area, A_p (sf) $Ap = WQv/h_{max}$	Ap (ft^2) = 2666.00

Design Procedure Form: Bioretention
Main Worksheet

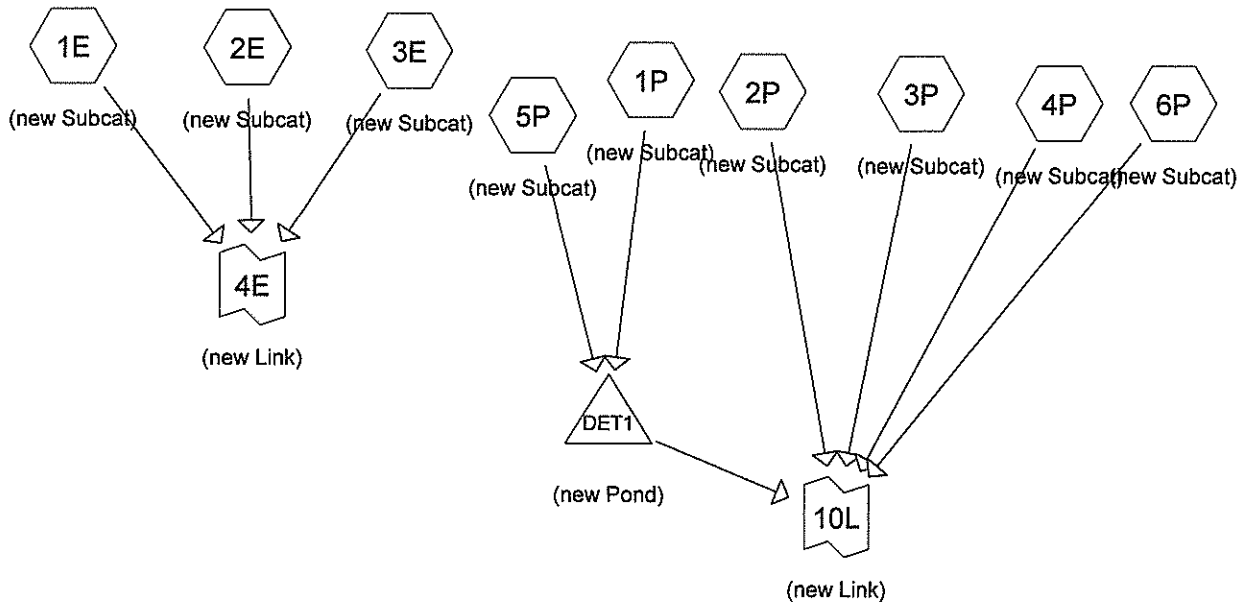
Designer: GERALD MENEFEE
Checked By: GERALD MENEFEE
Company: KAW DESIGN LLC
Date: 7/21/23
Project: SHORT STOP GAS STATION
Location: 400 NW 72ND STREET

IV. Underdrain		
Step 1) Underdrain pipe diameter, D_U (in) (D_U should be at least 4 inches)	D_U (in) =	4
Step 2) Depth of gravel blanket, Z_{gravel} (in.) (Z_{gravel} should be at least 8 inches, and at least 2 inches greater than D_U)	Z_{gravel} (in) =	12"
Step 3) Set underdrain perforation diameters to 0.375 inches.	D_{perf} (in) =	0.375
Step 4) Longitudinal center-to-center underdrain perforation spacing, S_{perf} (in)	S_{perf} (in) =	14
Step 5) Number of perforations per row (around circumference of underdrain), n_{perf} (n_{perf} should be at least 4)	n_{perf} =	4
Step 6) Underdrain collector spacing (approximately 20') SU (ft)	S_U (ft) =	14
Step 7) Pipe grade, Gpipe (%), for main pipe and transverse collector pipes (G_{pipe} should be at least 0.5%)	G_{pipe} (%) =	0
Step 8) Providing at least one cleanout per pipe run? (Yes or No)		YES
Step 9) Determine design head (ho) on orifice, ho = (df + hmax)/2	ho (ft) =	2.5
Step 10) Determine Average flow rate, Qavg = WQv/144,000	Qavg (cfs) =	0.019
Step 11) Determine orifice area Ao = Qavg/(0.6*(2*g*ho)^0.5)	Ao (ft^2) =	0.0025
	Ao (in^2) =	0.36

V. Overflow

The bioretention overflow shall be designed to safely pass runoff flows from events up to and including the 1 percent event unless the facility is designed with a bypass around the facility for larger storm events. If the 1-percent event is to pass through the facility, the maximum velocity shall be kept below 3 feet per second to avoid erosion of the soil matrix. If facilities are designed with a bypass, it shall be designed to safely pass runoff flows from events up to and including the 1 percent event. The overflow shall be designed as a vegetated or stabilized channel of a yard inlet catch basin. Vegetated or stabilized channels shall be designed using one of the methods presented in APWA Section 5603 and shall conform to the design criteria presented in APWA Section 5607. Methods presented in APWA Section 5604 shall be used for inlet design.

Exhibit 2
1-Year Storm Calculations



Subcat Reach Pond Link

Routing Diagram for 400 NW 72 Street
Prepared by HP, Printed 7/21/2023

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.354	74	>75% Grass cover, Good, HSG C (1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P)
0.874	98	Paved parking, HSG C (1P)
3.228	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
3.228	HSG C	1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P
0.000	HSG D	
0.000	Other	
3.228		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	2.354	0.000	0.000	2.354	>75% Grass cover, Good	1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P
0.000	0.000	0.874	0.000	0.000	0.874	Paved parking	1P
0.000	**0.000**	**3.228**	**0.000**	**0.000**	**3.228**	**TOTAL AREA**	

Time span=2.00-30.00 hrs, dt=0.05 hrs, 561 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: (new Subcat) Runoff Area=0.544 ac 0.00% Impervious Runoff Depth=0.85"
Flow Length=81' Slope=0.0247 '/' Tc=10.6 min CN=74 Runoff=0.66 cfs 0.038 af

Subcatchment 1P: (new Subcat) Runoff Area=1.145 ac 76.33% Impervious Runoff Depth=2.07"
Flow Length=249' Tc=2.8 min CN=92 Runoff=4.33 cfs 0.197 af

Subcatchment 2E: (new Subcat) Runoff Area=0.017 ac 0.00% Impervious Runoff Depth=0.85"
Flow Length=30' Slope=0.0732 '/' Tc=3.1 min CN=74 Runoff=0.03 cfs 0.001 af

Subcatchment 2P: (new Subcat) Runoff Area=0.007 ac 0.00% Impervious Runoff Depth=0.85"
Flow Length=33' Slope=0.0758 '/' Tc=3.3 min CN=74 Runoff=0.01 cfs 0.000 af

Subcatchment 3E: (new Subcat) Runoff Area=1.053 ac 0.00% Impervious Runoff Depth=0.85"
Flow Length=237' Tc=5.8 min CN=74 Runoff=1.53 cfs 0.074 af

Subcatchment 3P: (new Subcat) Runoff Area=0.007 ac 0.00% Impervious Runoff Depth=0.85"
Flow Length=43' Slope=0.5116 '/' Tc=1.9 min CN=74 Runoff=0.01 cfs 0.000 af

Subcatchment 4P: (new Subcat) Runoff Area=0.167 ac 0.00% Impervious Runoff Depth=0.85"
Flow Length=83' Tc=2.6 min CN=74 Runoff=0.27 cfs 0.012 af

Subcatchment 5P: (new Subcat) Runoff Area=0.142 ac 0.00% Impervious Runoff Depth=0.85"
Flow Length=13' Slope=0.0176 '/' Tc=2.8 min CN=74 Runoff=0.23 cfs 0.010 af

Subcatchment 6P: (new Subcat) Runoff Area=0.146 ac 0.00% Impervious Runoff Depth=0.85"
Flow Length=222' Tc=7.5 min CN=74 Runoff=0.20 cfs 0.010 af

Pond DET1: (new Pond) Peak Elev=983.05' Storage=0.064 af Inflow=4.56 cfs 0.207 af
Outflow=1.70 cfs 0.207 af

Link 4E: (new Link) Inflow=2.13 cfs 0.114 af
Primary=2.13 cfs 0.114 af

Link 10L: (new Link) Inflow=2.06 cfs 0.230 af
Primary=2.06 cfs 0.230 af

Total Runoff Area = 3.228 ac Runoff Volume = 0.344 af Average Runoff Depth = 1.28"
72.92% Pervious = 2.354 ac 27.08% Impervious = 0.874 ac

Summary for Subcatchment 1E: (new Subcat)

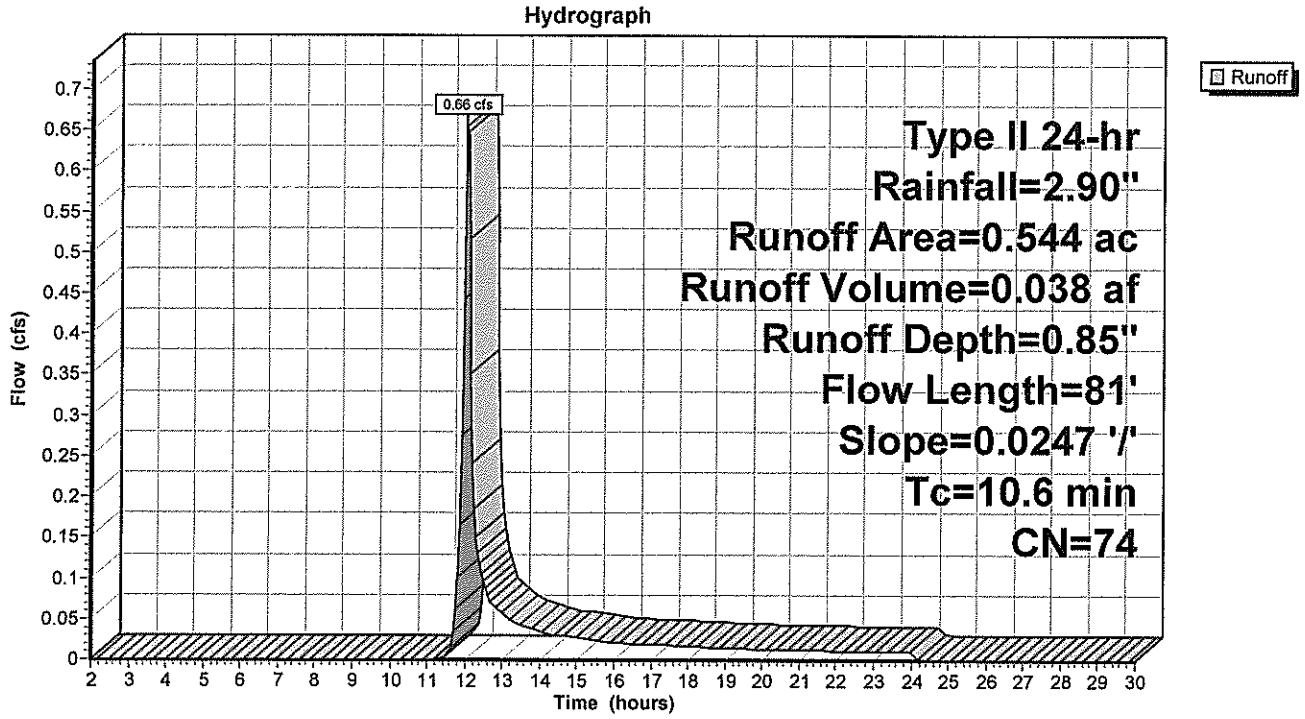
Runoff = 0.66 cfs @ 12.04 hrs, Volume= 0.038 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
0.544	74	>75% Grass cover, Good, HSG C
0.544		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	81	0.0247	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 1E: (new Subcat)



Summary for Subcatchment 1P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

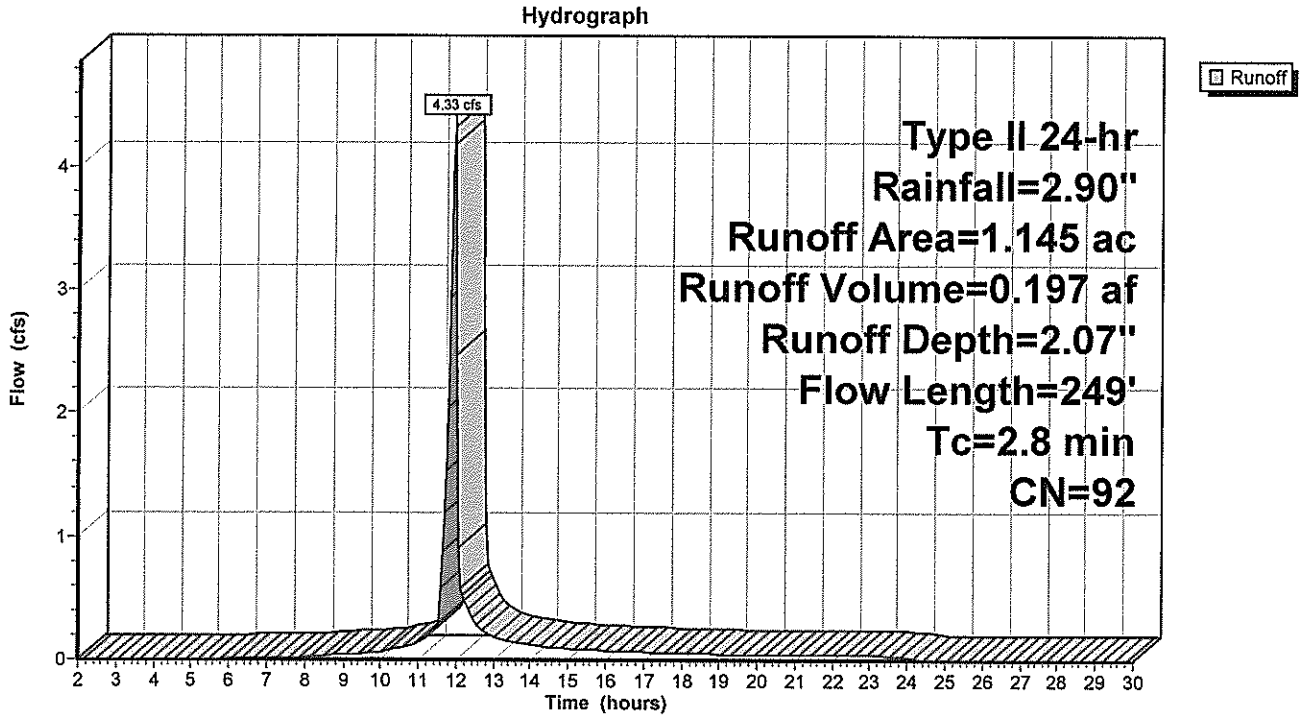
Runoff = 4.33 cfs @ 11.93 hrs, Volume= 0.197 af, Depth= 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
0.271	74	>75% Grass cover, Good, HSG C
0.874	98	Paved parking, HSG C
1.145	92	Weighted Average
0.271		23.67% Pervious Area
0.874		76.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0065	0.92		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
1.0	149	0.0151	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.8	249	Total			

Subcatchment 1P: (new Subcat)



Summary for Subcatchment 2E: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

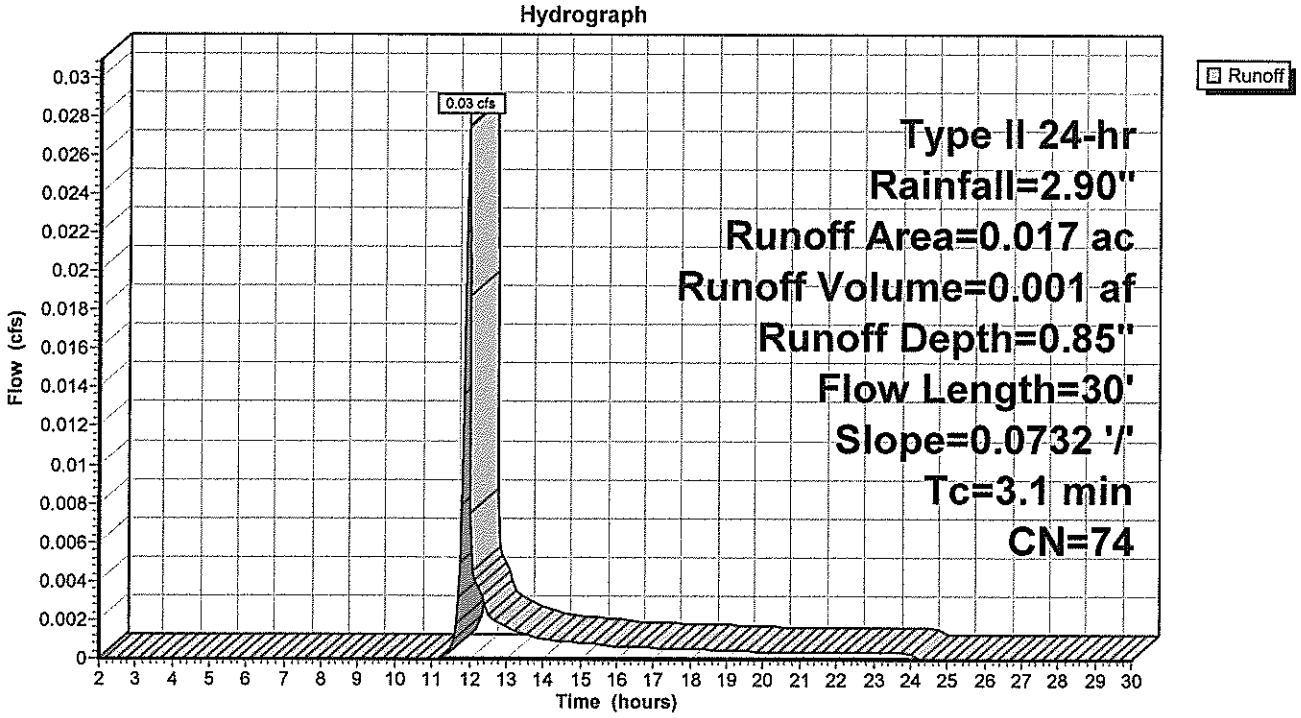
Runoff = 0.03 cfs @ 11.94 hrs, Volume= 0.001 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
0.017	74	>75% Grass cover, Good, HSG C
0.017		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	30	0.0732	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 2E: (new Subcat)



Summary for Subcatchment 2P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

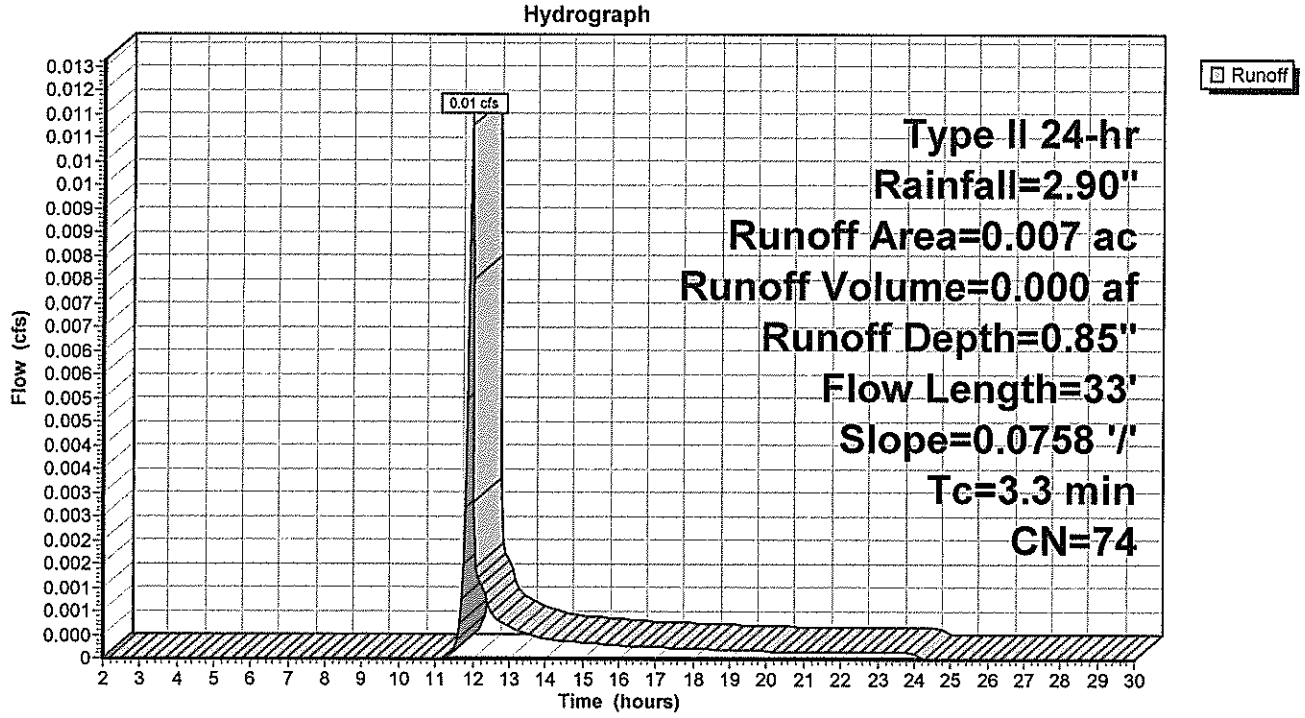
Runoff = 0.01 cfs @ 11.95 hrs, Volume= 0.000 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
0.007	74	>75% Grass cover, Good, HSG C
0.007		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	33	0.0758	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 2P: (new Subcat)



Summary for Subcatchment 3E: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

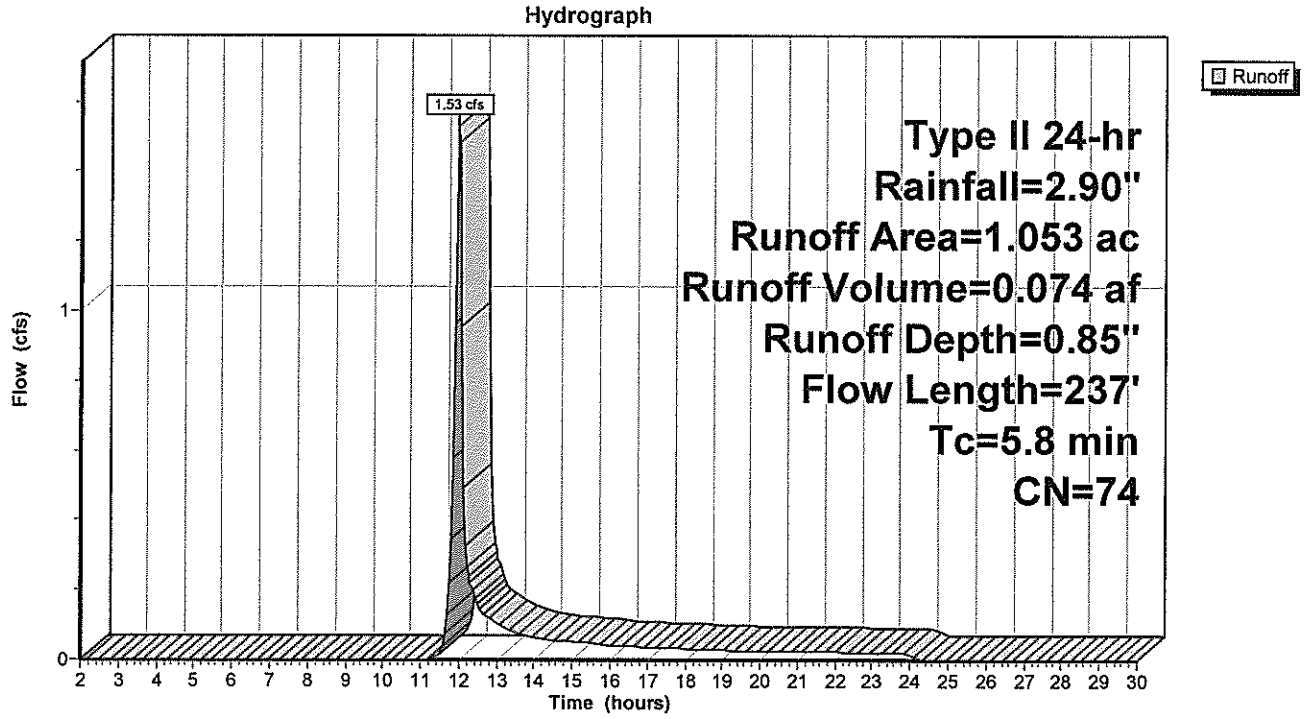
Runoff = 1.53 cfs @ 11.98 hrs, Volume= 0.074 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
1.053	74	>75% Grass cover, Good, HSG C
1.053		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	100	0.2000	0.31		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.4	137	0.1339	5.49		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.8	237	Total			

Subcatchment 3E: (new Subcat)



Summary for Subcatchment 3P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

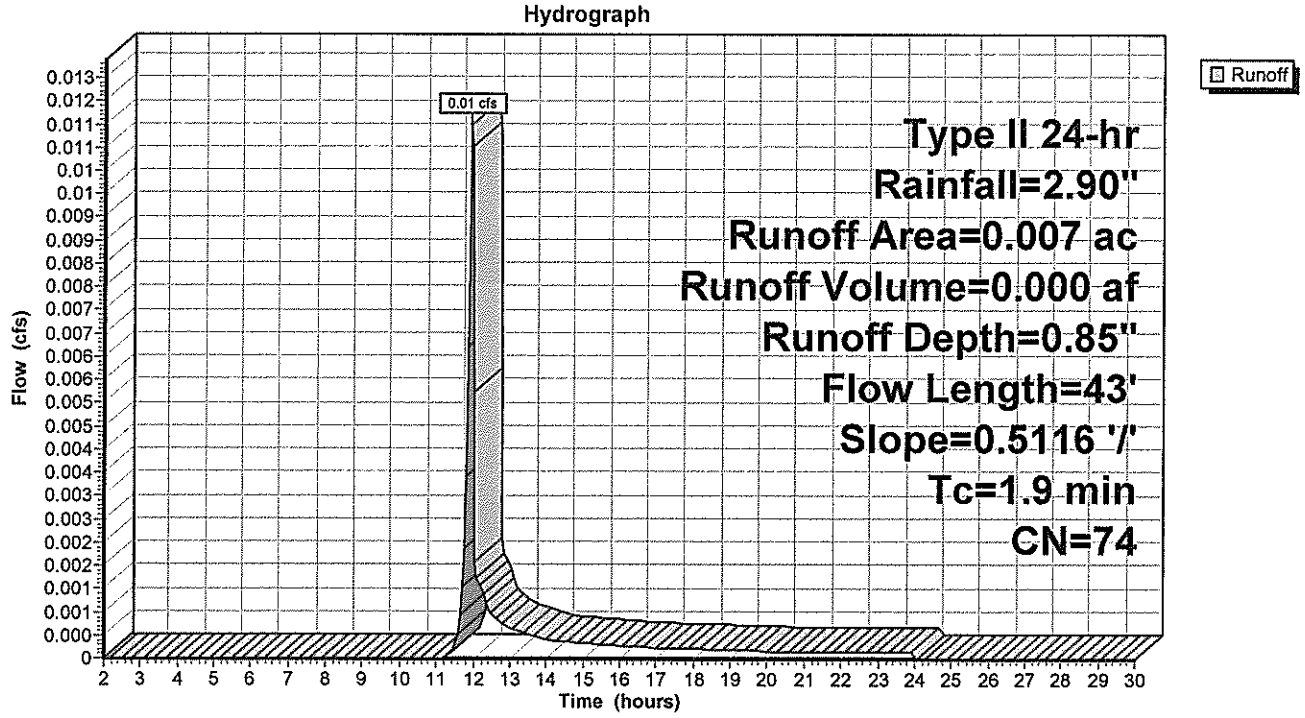
Runoff = 0.01 cfs @ 11.93 hrs, Volume= 0.000 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
0.007	74	>75% Grass cover, Good, HSG C
0.007		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	43	0.5116	0.38		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 3P: (new Subcat)



Summary for Subcatchment 4P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

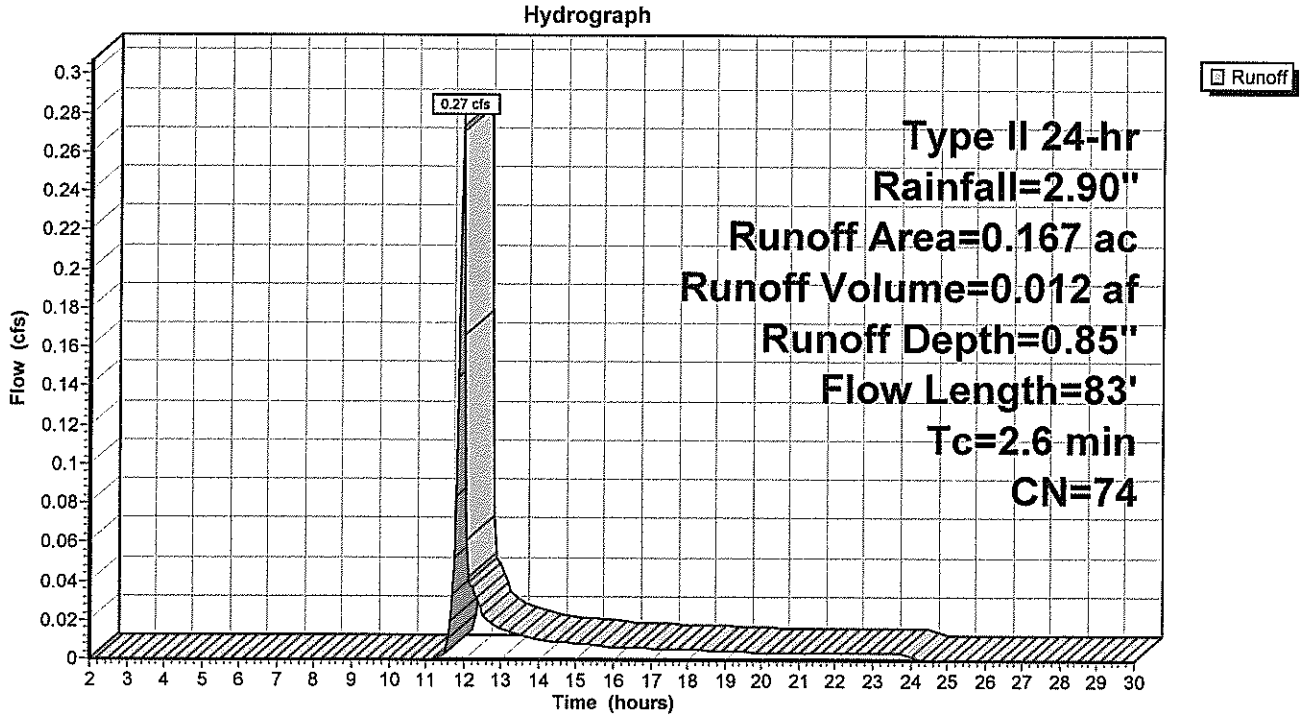
Runoff = 0.27 cfs @ 11.94 hrs, Volume= 0.012 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
0.167	74	>75% Grass cover, Good, HSG C
0.167		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	30	0.1453	0.21		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.2	53	0.0967	5.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.6	83	Total			

Subcatchment 4P: (new Subcat)



Summary for Subcatchment 5P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

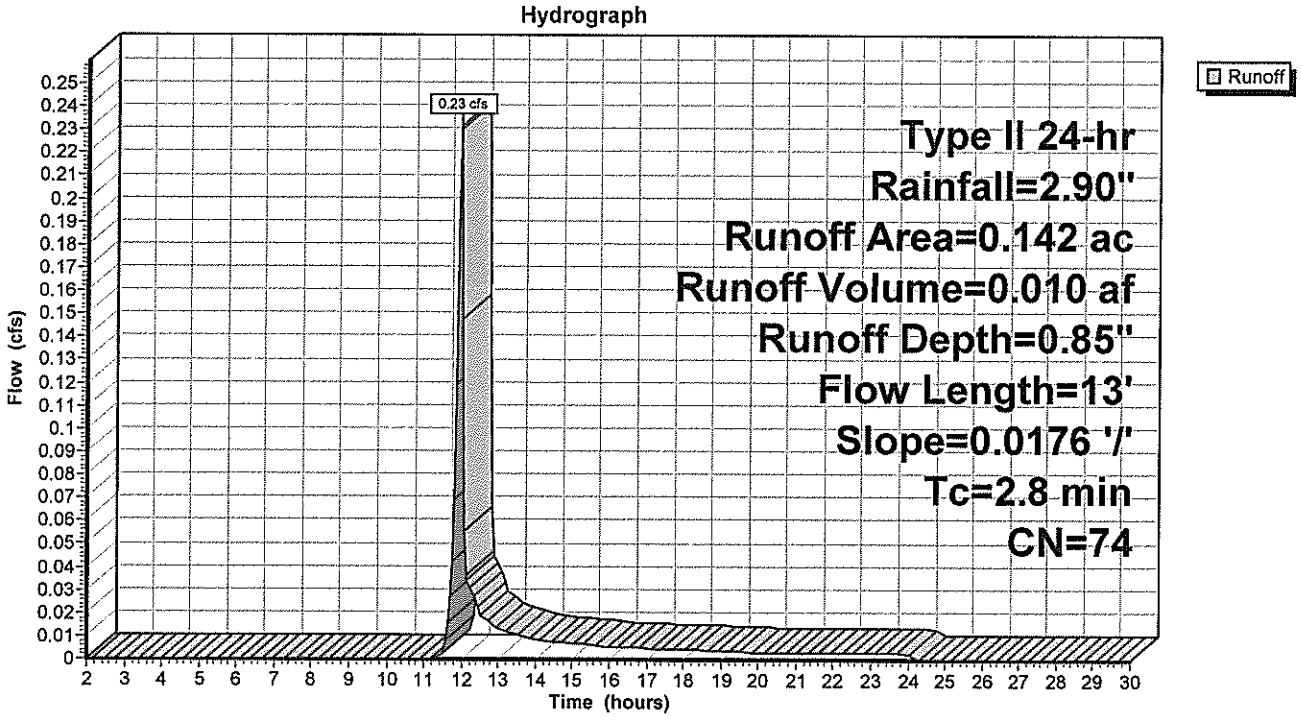
Runoff = 0.23 cfs @ 11.94 hrs, Volume= 0.010 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
0.142	74	>75% Grass cover, Good, HSG C
0.142		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	13	0.0176	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 5P: (new Subcat)



Summary for Subcatchment 6P: (new Subcat)

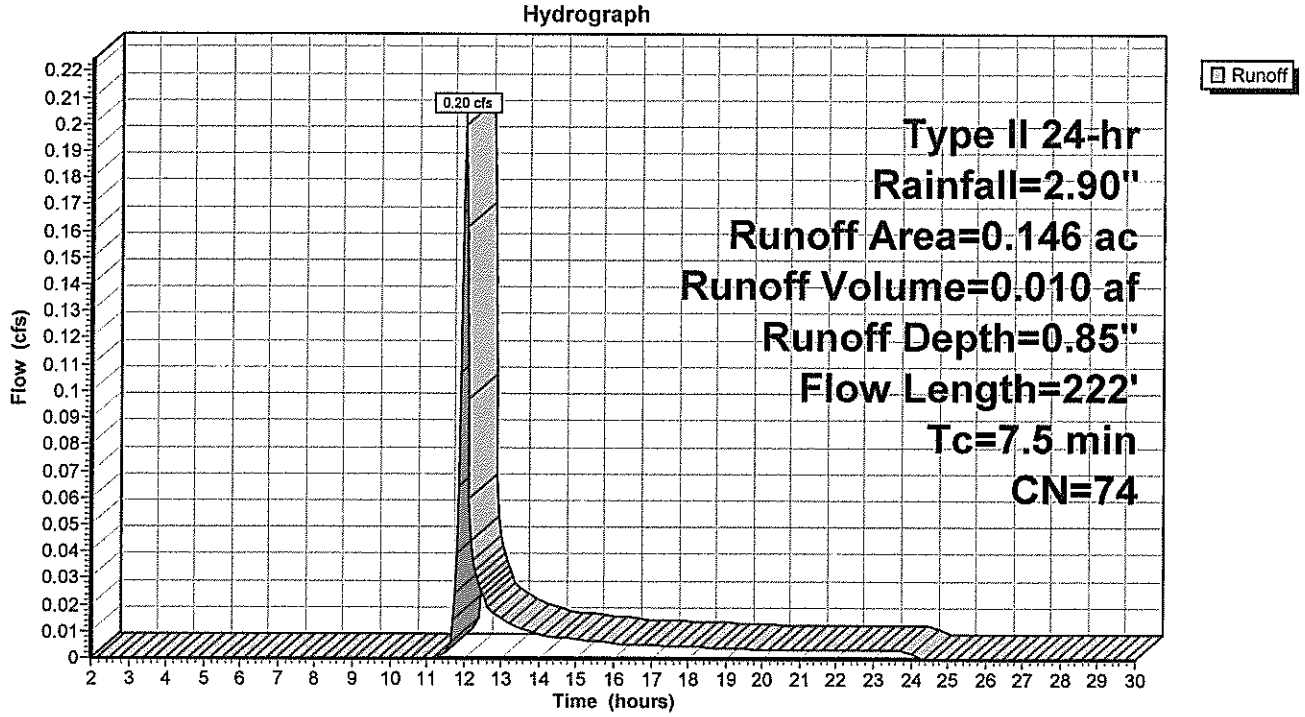
Runoff = 0.20 cfs @ 12.00 hrs, Volume= 0.010 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
0.146	74	>75% Grass cover, Good, HSG C
0.146		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	60	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.6	162	0.0775	4.18		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
7.5	222	Total			

Subcatchment 6P: (new Subcat)



Summary for Pond DET1: (new Pond)

Inflow Area = 1.287 ac, 67.91% Impervious, Inflow Depth = 1.93"
Inflow = 4.56 cfs @ 11.93 hrs, Volume= 0.207 af
Outflow = 1.70 cfs @ 12.03 hrs, Volume= 0.207 af, Atten= 63%, Lag= 6.0 min
Primary = 1.70 cfs @ 12.03 hrs, Volume= 0.207 af

Routing by Stor-Ind method, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 983.05' @ 12.03 hrs Surf.Area= 0.085 ac Storage= 0.064 af

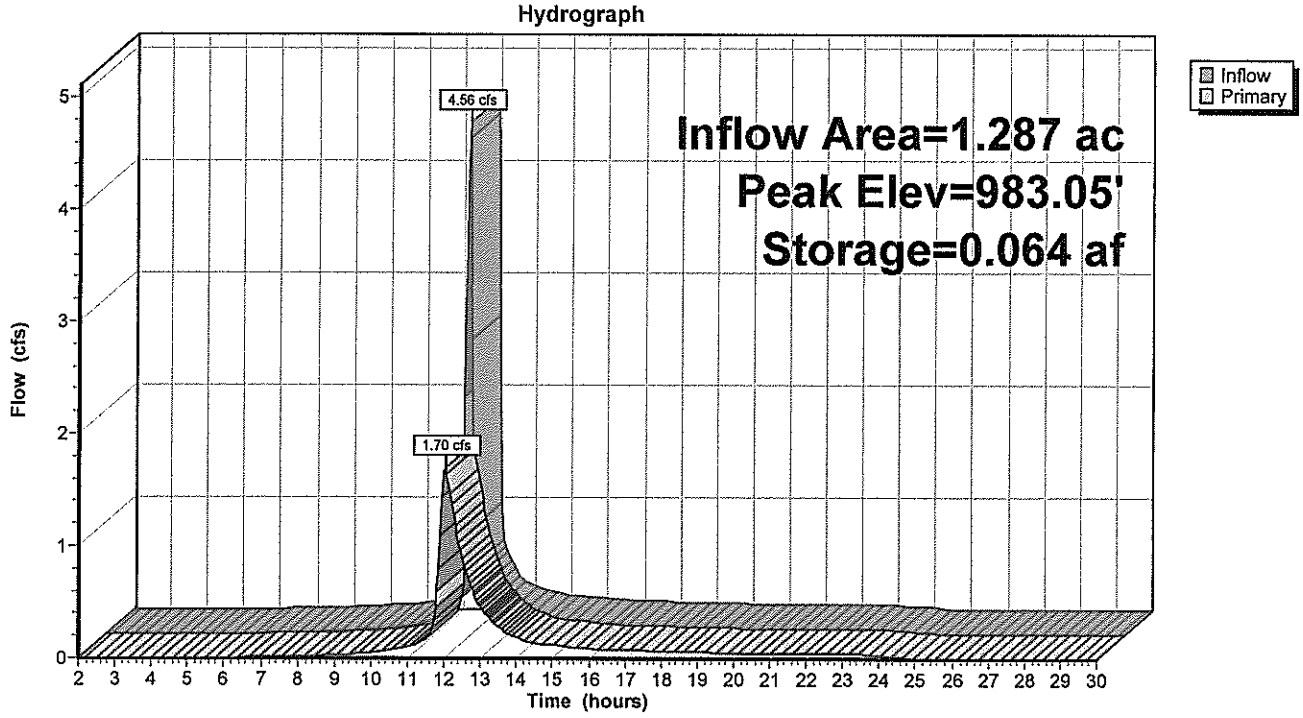
Plug-Flow detention time= 29.3 min calculated for 0.207 af (100% of inflow)
Center-of-Mass det. time= 29.1 min (827.6 - 798.5)

Volume	Invert	Avail.Storage	Storage Description
#1	982.03'	0.211 af	**36.0" Round Pipe Storage** L= 1,300.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	982.03'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.03 1.03 1.93 1.93 3.00 Width (feet) 0.50 0.50 0.79 0.79 2.50 2.50

Primary OutFlow Max=1.68 cfs @ 12.03 hrs HW=983.05' (Free Discharge)
↑**1=Custom Weir/Orifice** (Weir Controls 1.68 cfs @ 3.31 fps)

Pond DET1: (new Pond)

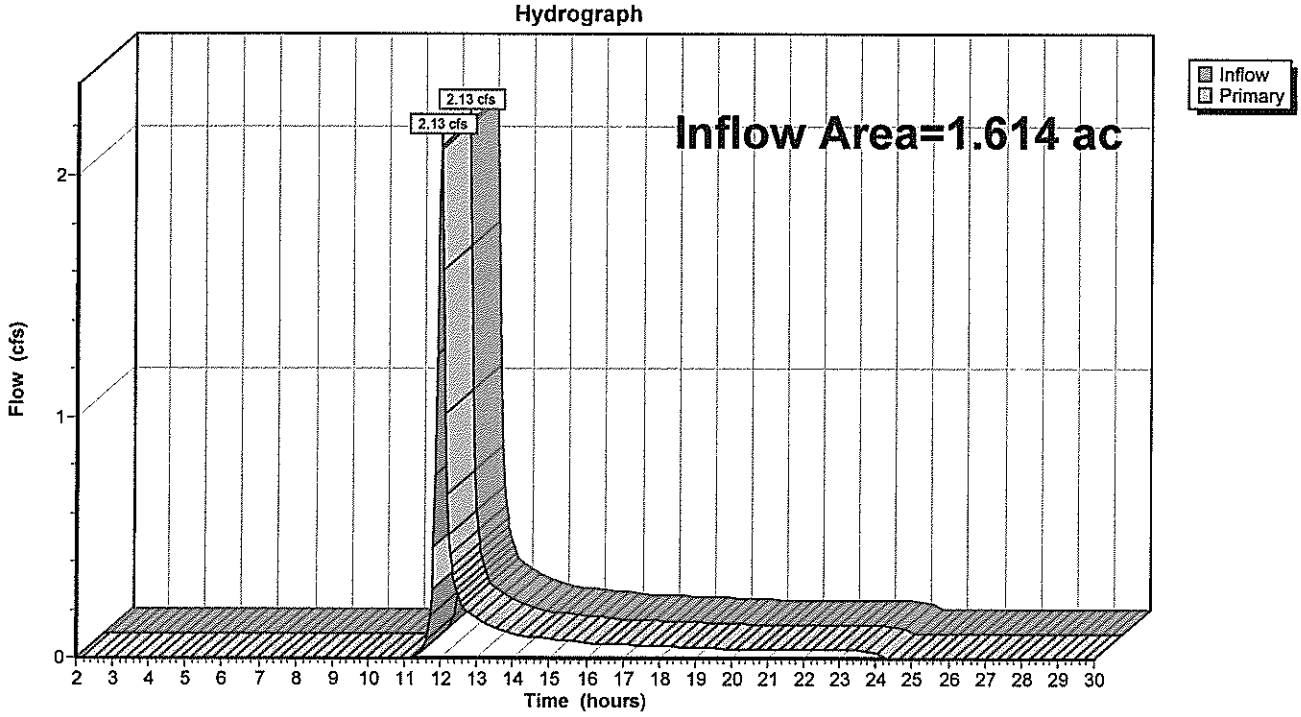


Summary for Link 4E: (new Link)

Inflow Area = 1.614 ac, 0.00% Impervious, Inflow Depth = 0.85"
Inflow = 2.13 cfs @ 11.99 hrs, Volume= 0.114 af
Primary = 2.13 cfs @ 11.99 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs

Link 4E: (new Link)



Summary for Link 10L: (new Link)

Inflow Area = 1.614 ac, 54.15% Impervious, Inflow Depth = 1.71"
Inflow = 2.06 cfs @ 12.00 hrs, Volume= 0.230 af
Primary = 2.06 cfs @ 12.00 hrs, Volume= 0.230 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs

Link 10L: (new Link)

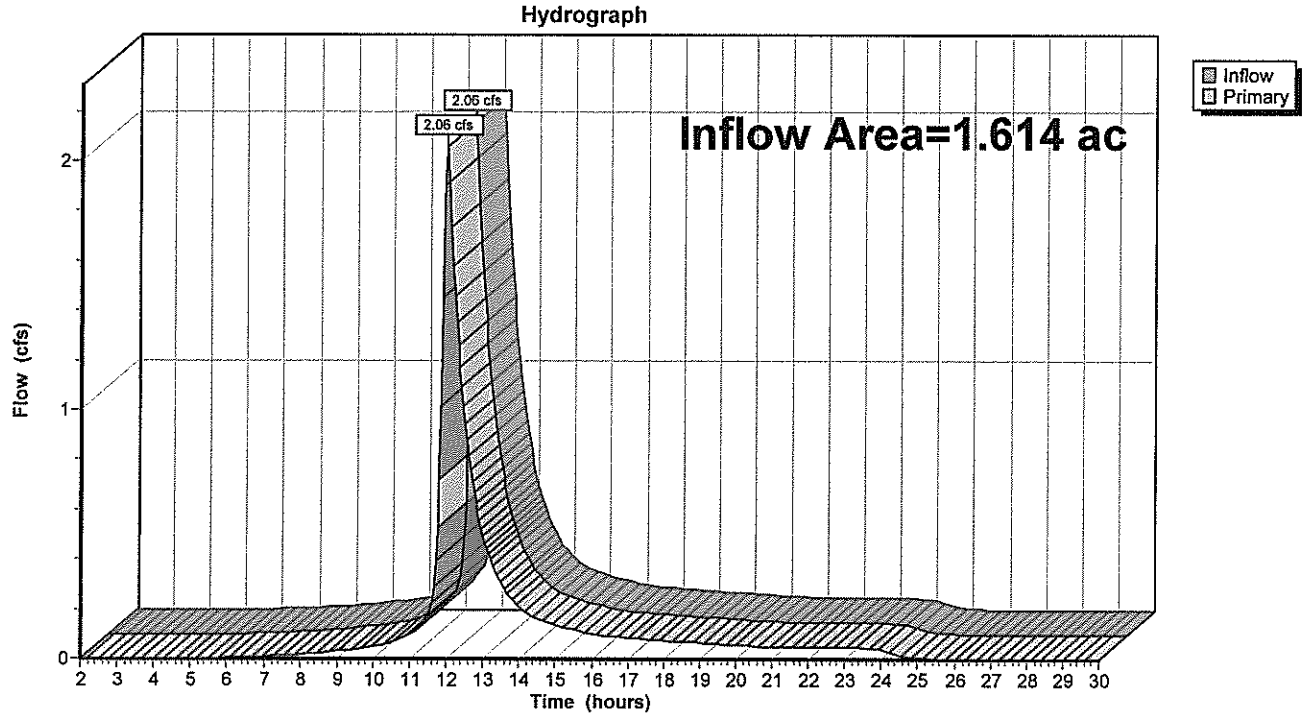
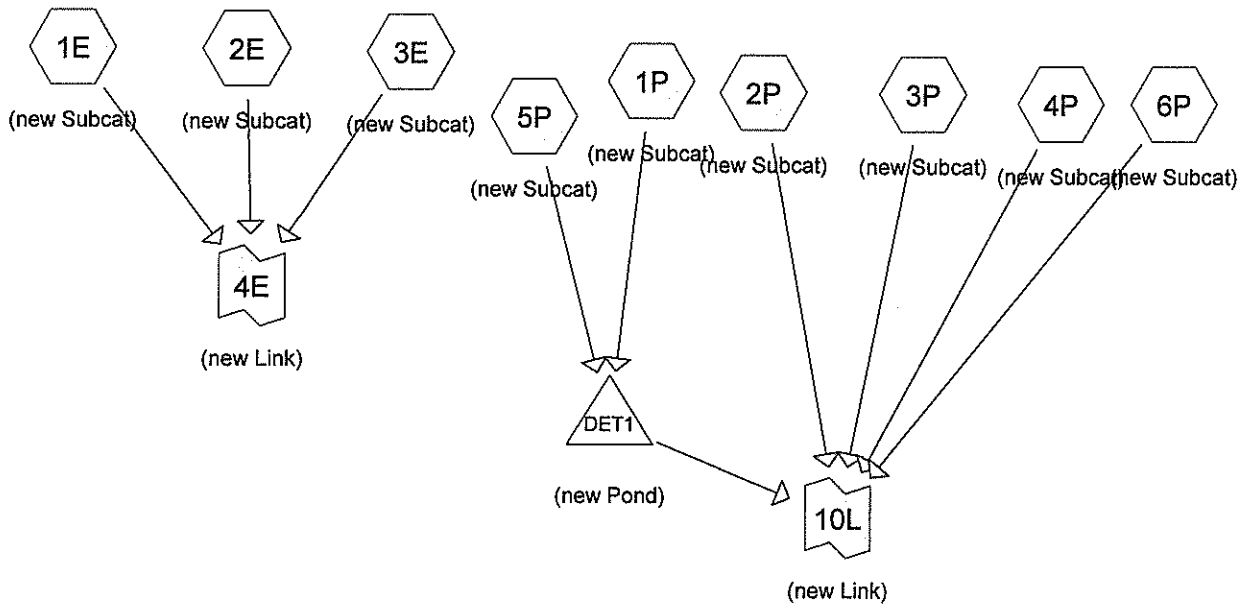


Exhibit 3
10-year Storm Calculations



Subcat Reach Pond Link

Routing Diagram for 400 NW 72 Street
Prepared by HP, Printed 7/20/2023

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.354	74	>75% Grass cover, Good, HSG C (1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P)
0.874	98	Paved parking, HSG C (1P)
3.228	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
3.228	HSG C	1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P
0.000	HSG D	
0.000	Other	
3.228		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	2.354	0.000	0.000	2.354	>75% Grass cover, Good	1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P
0.000	0.000	0.874	0.000	0.000	0.874	Paved parking	1P
0.000	**0.000**	**3.228**	**0.000**	**0.000**	**3.228**	**TOTAL AREA**	

Time span=2.00-30.00 hrs, dt=0.05 hrs, 561 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: (new Subcat) Runoff Area=0.544 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=81' Slope=0.0247 '/' Tc=10.6 min CN=74 Runoff=2.04 cfs 0.114 af

Subcatchment 1P: (new Subcat) Runoff Area=1.145 ac 76.33% Impervious Runoff Depth=4.28"
Flow Length=249' Tc=2.8 min CN=92 Runoff=8.53 cfs 0.409 af

Subcatchment 2E: (new Subcat) Runoff Area=0.017 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=30' Slope=0.0732 '/' Tc=3.1 min CN=74 Runoff=0.08 cfs 0.004 af

Subcatchment 2P: (new Subcat) Runoff Area=0.007 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=33' Slope=0.0758 '/' Tc=3.3 min CN=74 Runoff=0.03 cfs 0.001 af

Subcatchment 3E: (new Subcat) Runoff Area=1.053 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=237' Tc=5.8 min CN=74 Runoff=4.62 cfs 0.222 af

Subcatchment 3P: (new Subcat) Runoff Area=0.007 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=43' Slope=0.5116 '/' Tc=1.9 min CN=74 Runoff=0.03 cfs 0.001 af

Subcatchment 4P: (new Subcat) Runoff Area=0.167 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=83' Tc=2.6 min CN=74 Runoff=0.82 cfs 0.035 af

Subcatchment 5P: (new Subcat) Runoff Area=0.142 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=13' Slope=0.0176 '/' Tc=2.8 min CN=74 Runoff=0.70 cfs 0.030 af

Subcatchment 6P: (new Subcat) Runoff Area=0.146 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=222' Tc=7.5 min CN=74 Runoff=0.61 cfs 0.031 af

Pond DET1: (new Pond) Peak Elev=983.76' Storage=0.126 af Inflow=9.22 cfs 0.439 af
Outflow=4.30 cfs 0.439 af

Link 4E: (new Link) Inflow=6.54 cfs 0.340 af
Primary=6.54 cfs 0.340 af

Link 10L: (new Link) Inflow=5.38 cfs 0.508 af
Primary=5.38 cfs 0.508 af

Total Runoff Area = 3.228 ac Runoff Volume = 0.847 af Average Runoff Depth = 3.15"
72.92% Pervious = 2.354 ac 27.08% Impervious = 0.874 ac

Summary for Subcatchment 1E: (new Subcat)

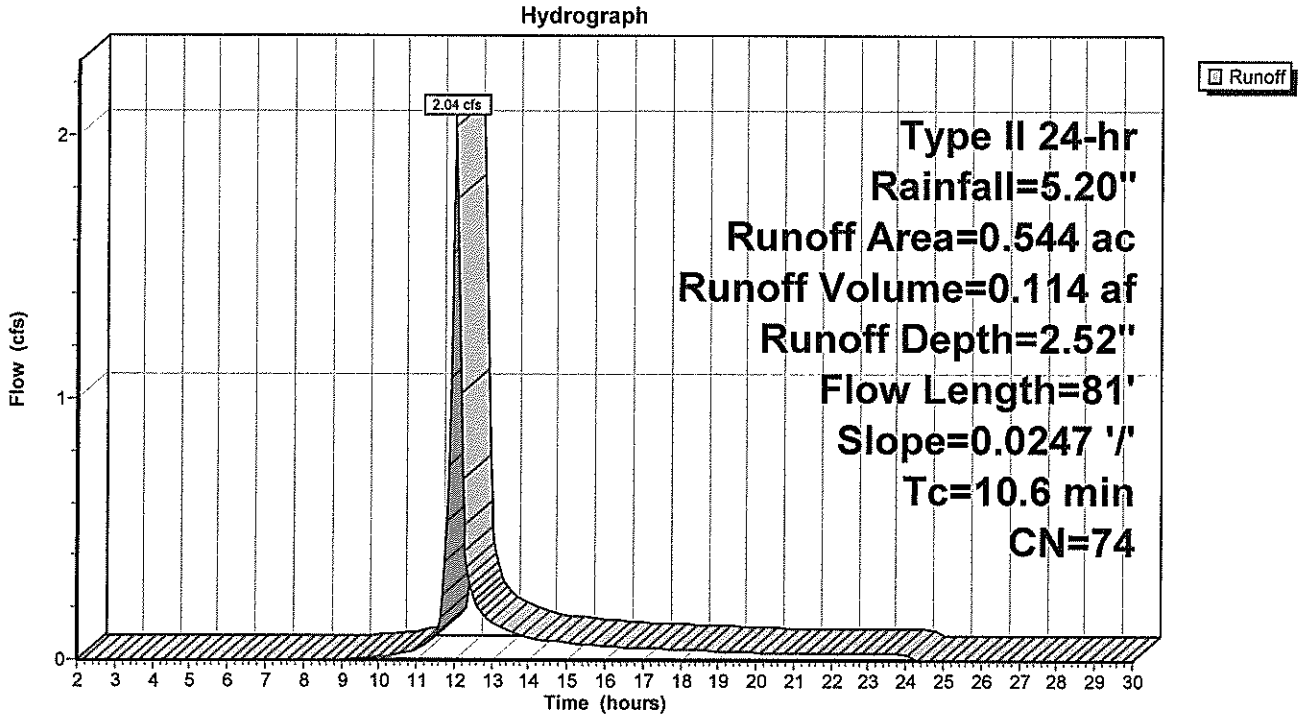
Runoff = 2.04 cfs @ 12.03 hrs, Volume= 0.114 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
0.544	74	>75% Grass cover, Good, HSG C
0.544		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	81	0.0247	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 1E: (new Subcat)



Summary for Subcatchment 1P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

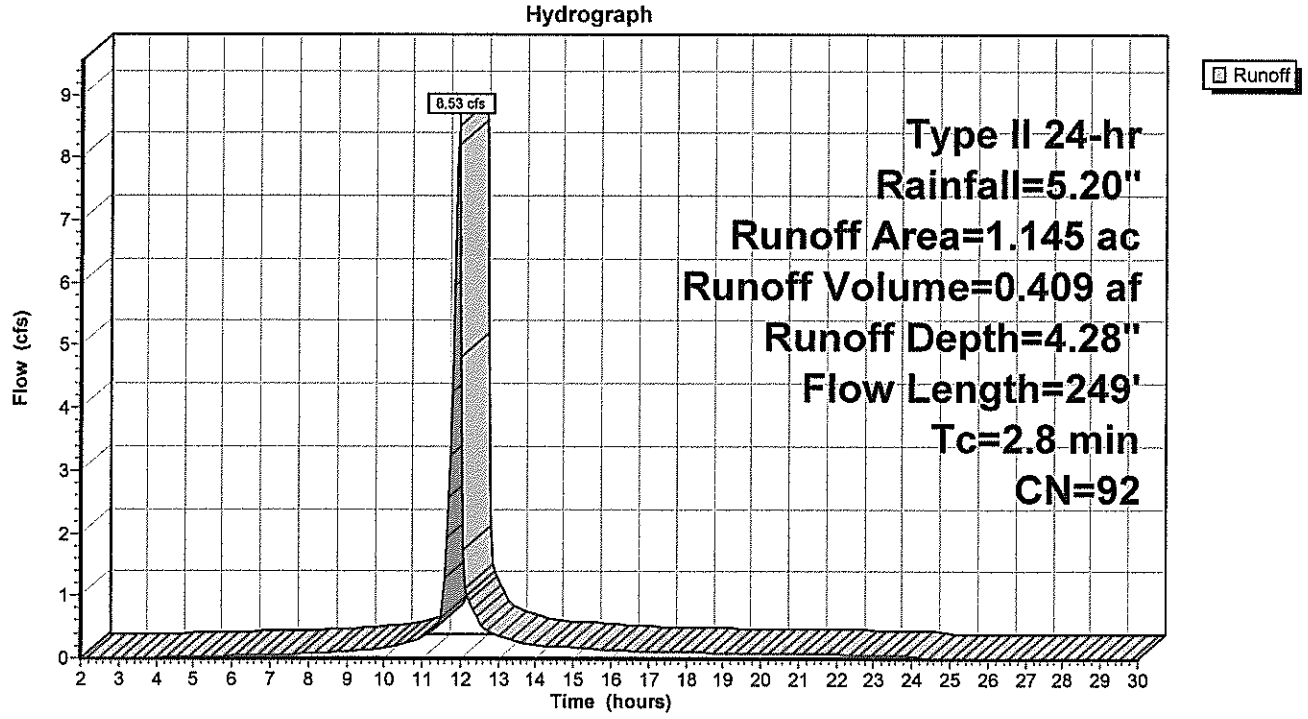
Runoff = 8.53 cfs @ 11.93 hrs, Volume= 0.409 af, Depth= 4.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
0.271	74	>75% Grass cover, Good, HSG C
0.874	98	Paved parking, HSG C
1.145	92	Weighted Average
0.271		23.67% Pervious Area
0.874		76.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0065	0.92		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
1.0	149	0.0151	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.8	249	Total			

Subcatchment 1P: (new Subcat)



Summary for Subcatchment 2E: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

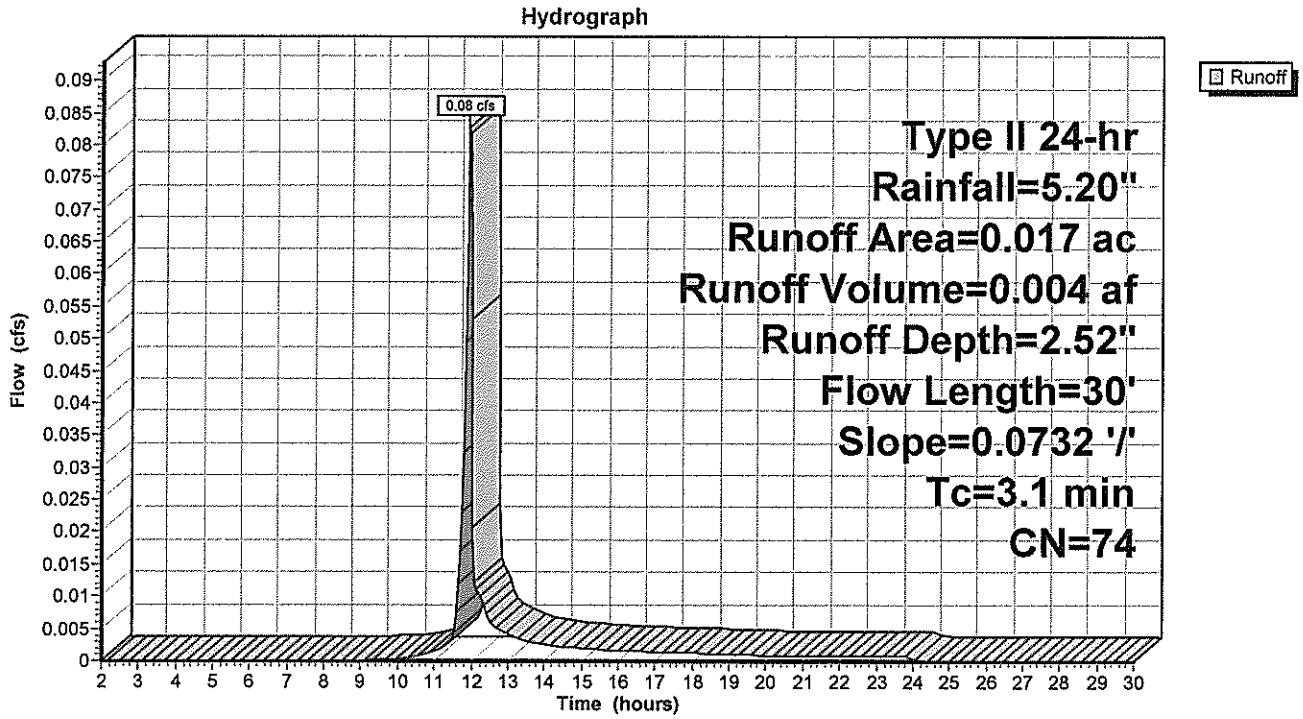
Runoff = 0.08 cfs @ 11.94 hrs, Volume= 0.004 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
0.017	74	>75% Grass cover, Good, HSG C
0.017		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	30	0.0732	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 2E: (new Subcat)



Summary for Subcatchment 2P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

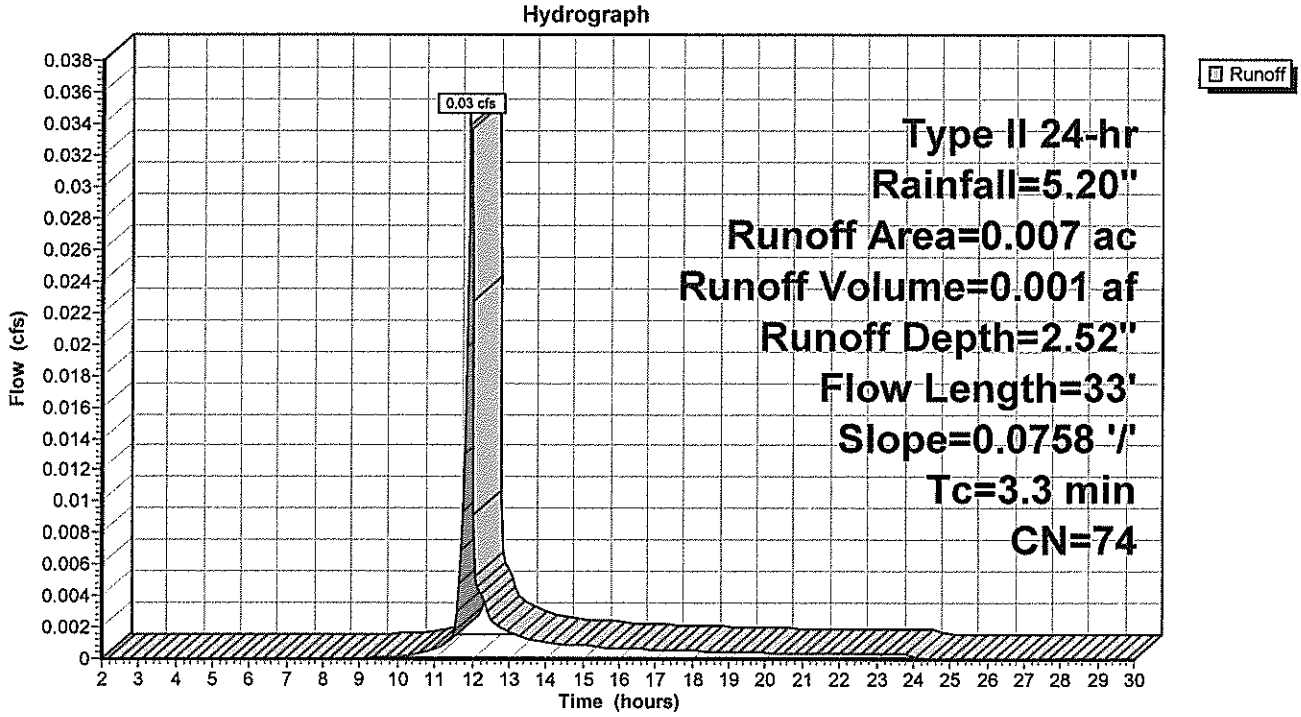
Runoff = 0.03 cfs @ 11.94 hrs, Volume= 0.001 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
0.007	74	>75% Grass cover, Good, HSG C
0.007		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	33	0.0758	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 2P: (new Subcat)



Summary for Subcatchment 3E: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

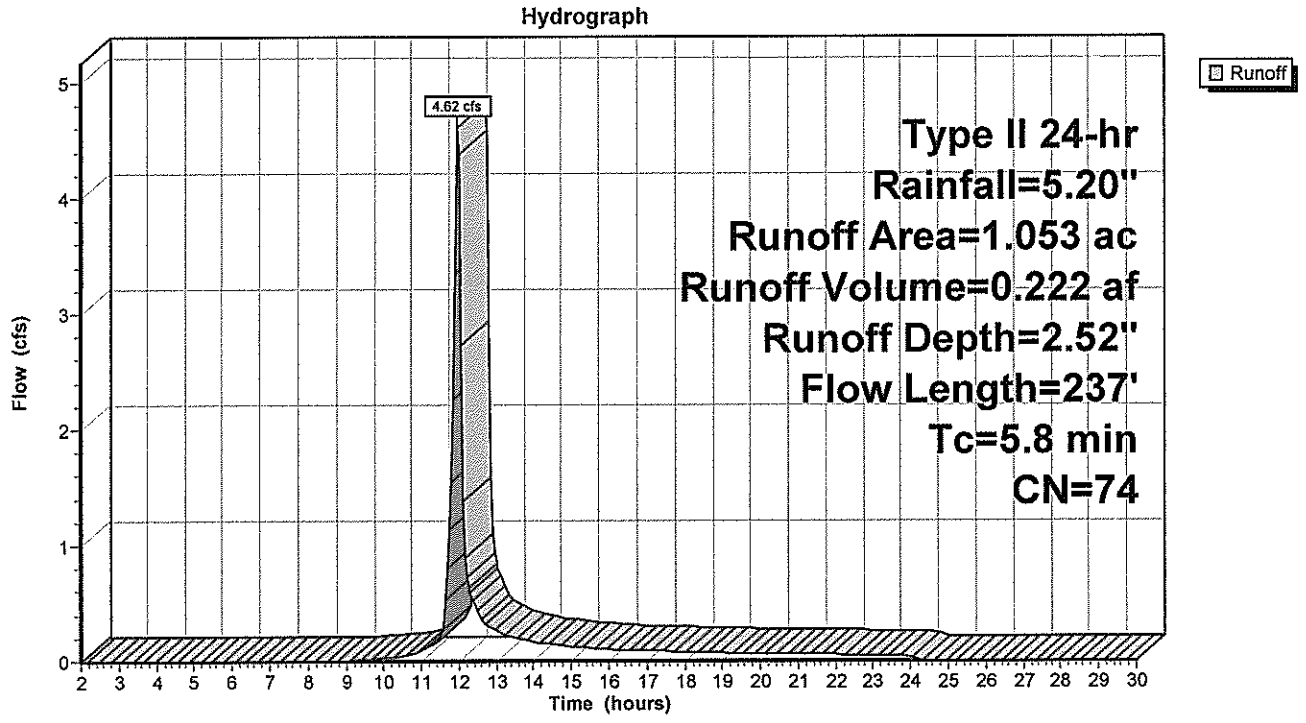
Runoff = 4.62 cfs @ 11.97 hrs, Volume= 0.222 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
1.053	74	>75% Grass cover, Good, HSG C
1.053		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	100	0.2000	0.31		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.4	137	0.1339	5.49		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.8	237	Total			

Subcatchment 3E: (new Subcat)



Summary for Subcatchment 3P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

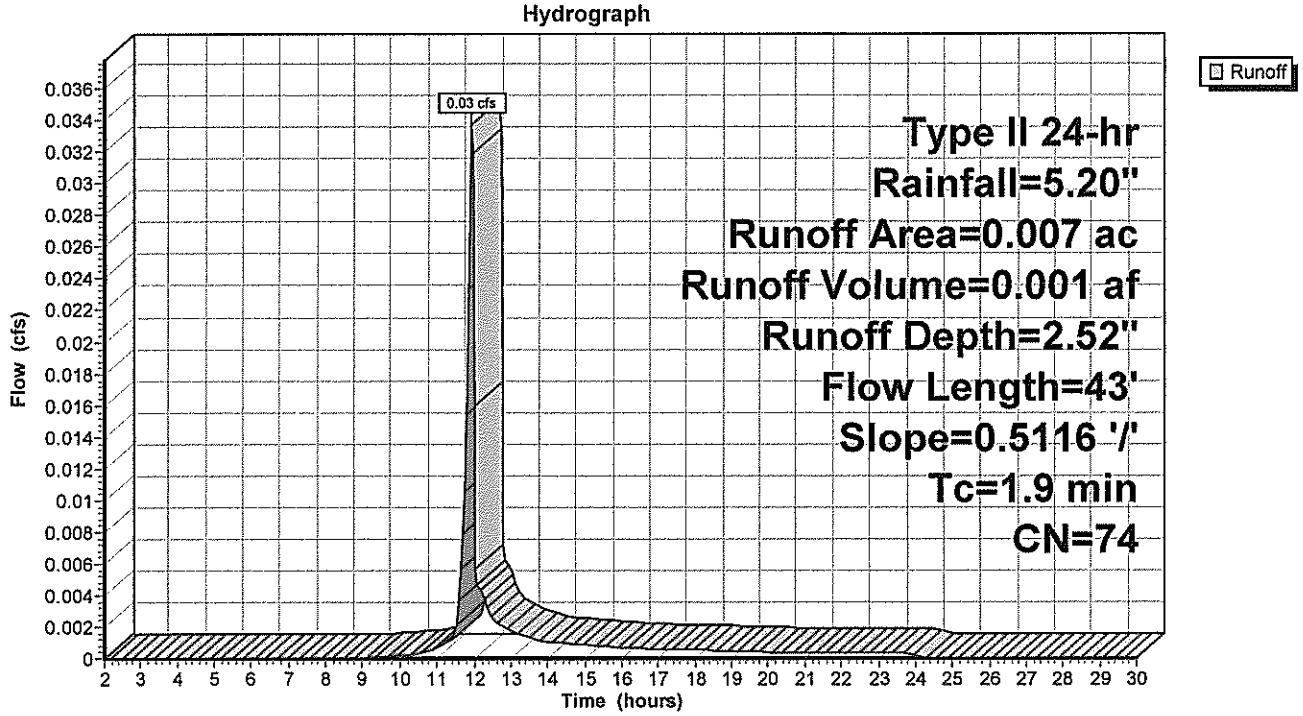
Runoff = 0.03 cfs @ 11.92 hrs, Volume= 0.001 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
0.007	74	>75% Grass cover, Good, HSG C
0.007		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	43	0.5116	0.38		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 3P: (new Subcat)



Summary for Subcatchment 4P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

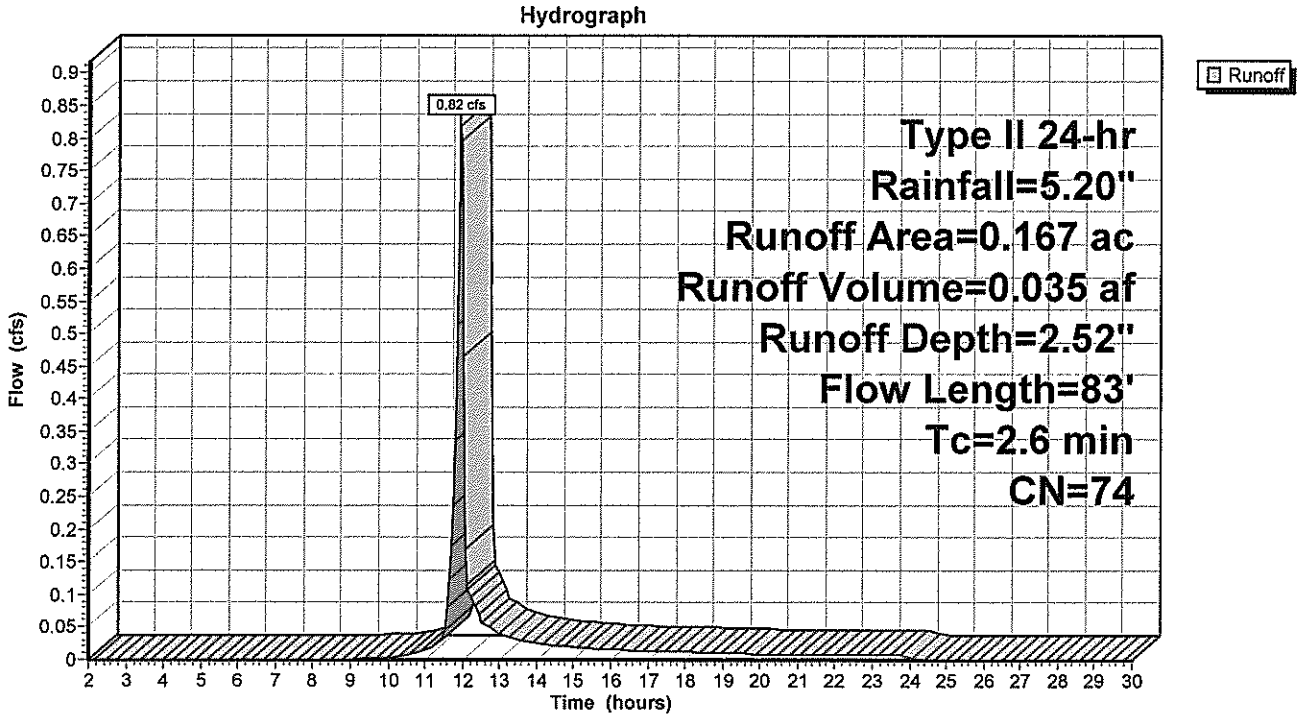
Runoff = 0.82 cfs @ 11.93 hrs, Volume= 0.035 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
0.167	74	>75% Grass cover, Good, HSG C
0.167		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	30	0.1453	0.21		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.2	53	0.0967	5.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.6	83	Total			

Subcatchment 4P: (new Subcat)



Summary for Subcatchment 5P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

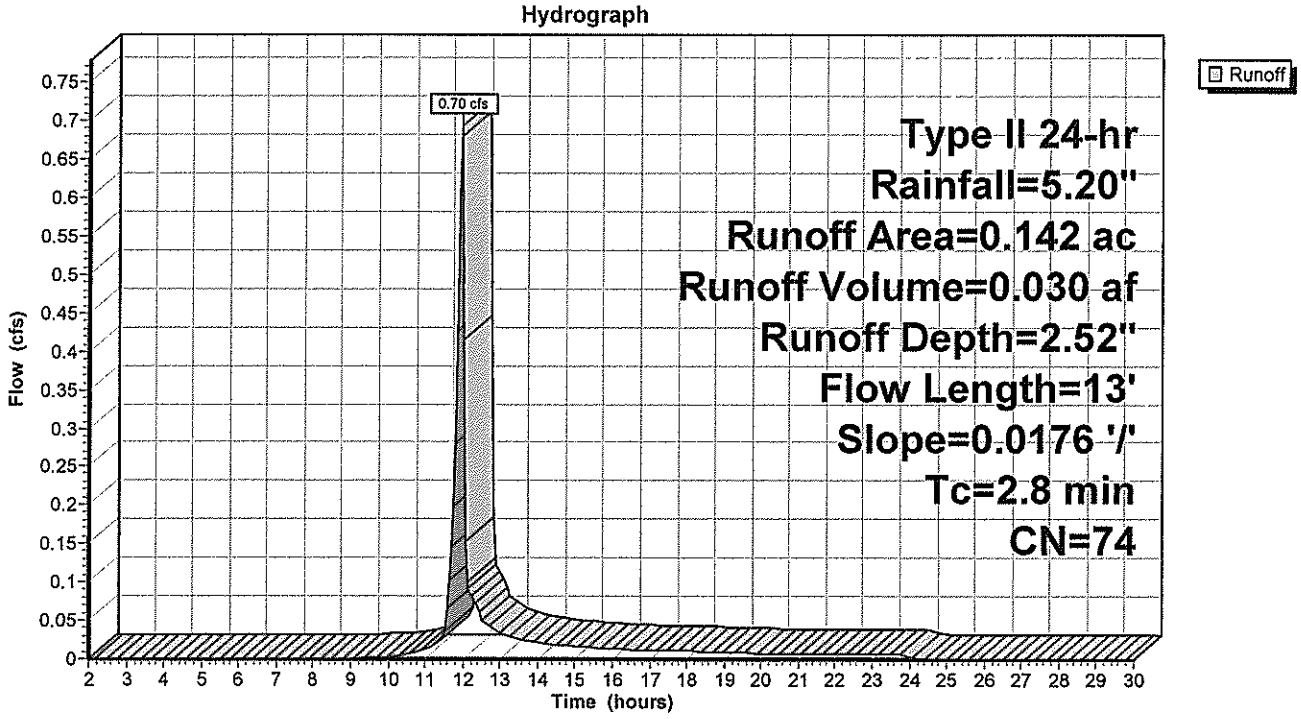
Runoff = 0.70 cfs @ 11.94 hrs, Volume= 0.030 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
0.142	74	>75% Grass cover, Good, HSG C
0.142		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	13	0.0176	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 5P: (new Subcat)



Summary for Subcatchment 6P: (new Subcat)

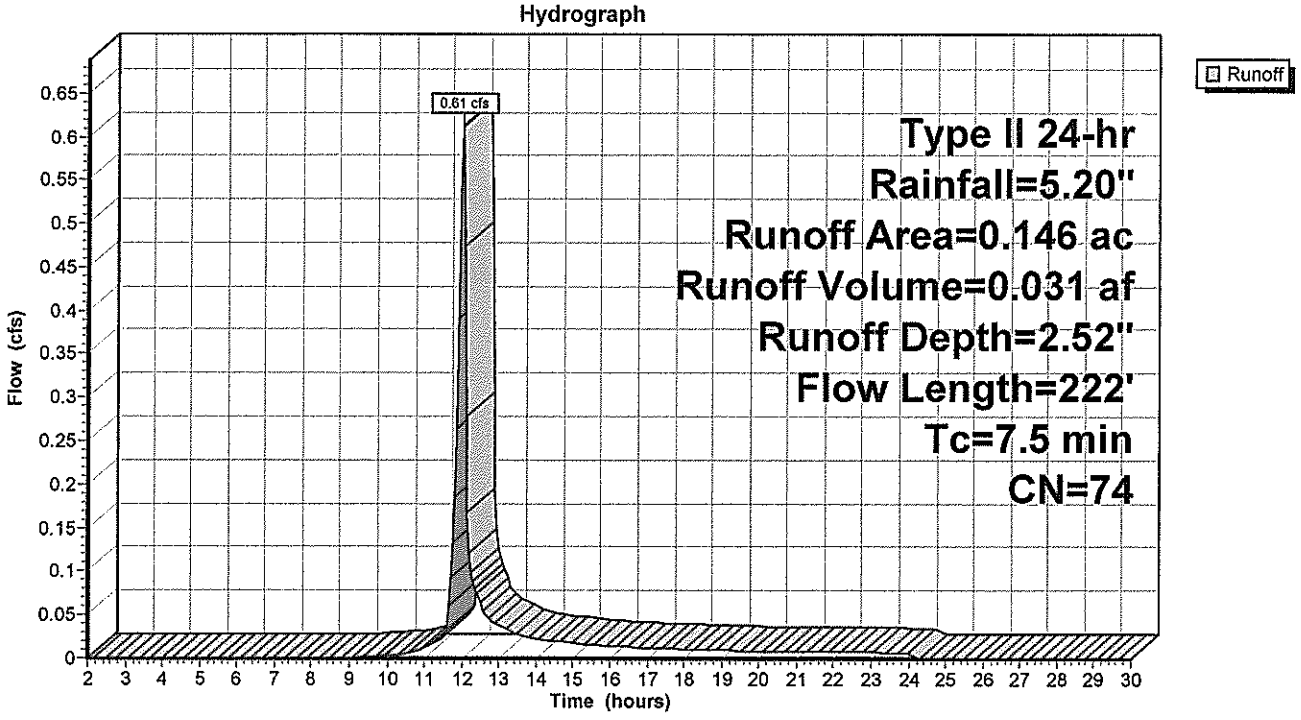
Runoff = 0.61 cfs @ 11.99 hrs, Volume= 0.031 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
0.146	74	>75% Grass cover, Good, HSG C
0.146		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	60	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.6	162	0.0775	4.18		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
7.5	222	Total			

Subcatchment 6P: (new Subcat)



Summary for Pond DET1: (new Pond)

Inflow Area = 1.287 ac, 67.91% Impervious, Inflow Depth = 4.09"
Inflow = 9.22 cfs @ 11.93 hrs, Volume= 0.439 af
Outflow = 4.30 cfs @ 12.02 hrs, Volume= 0.439 af, Atten= 53%, Lag= 5.2 min
Primary = 4.30 cfs @ 12.02 hrs, Volume= 0.439 af

Routing by Stor-Ind method, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 983.76' @ 12.02 hrs Surf.Area= 0.088 ac Storage= 0.126 af

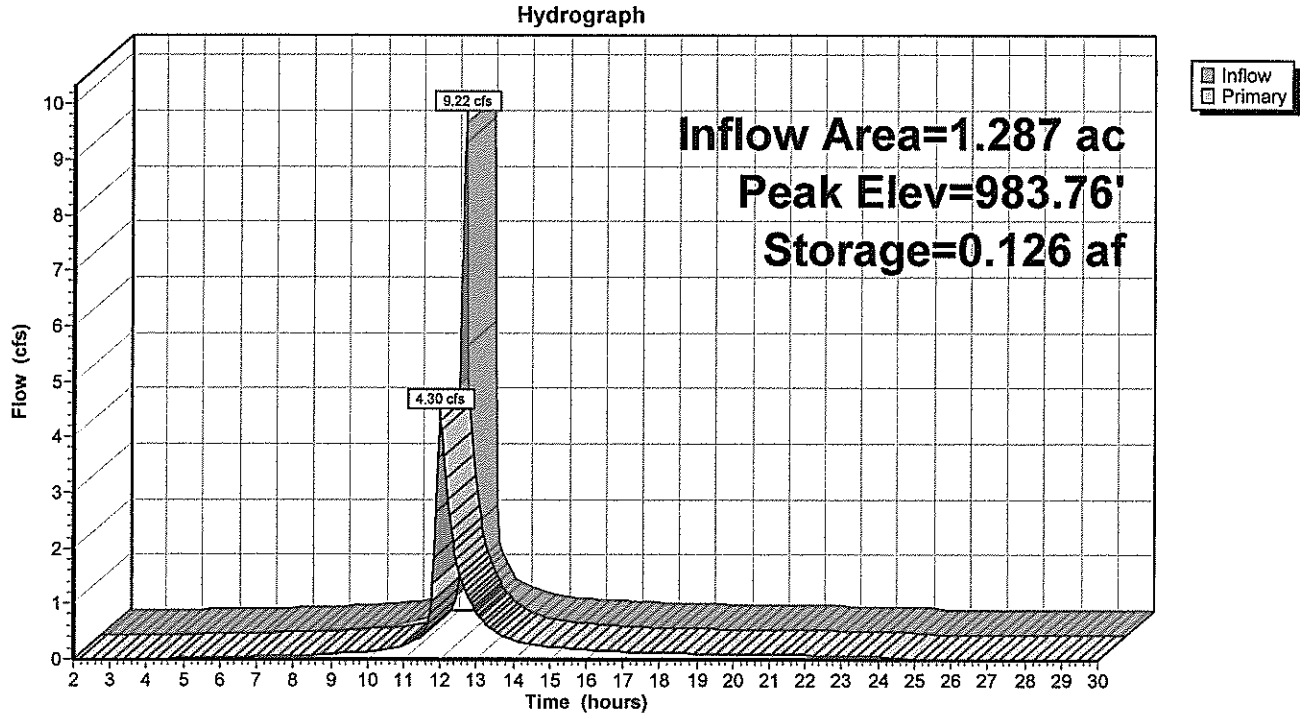
Plug-Flow detention time= 27.3 min calculated for 0.438 af (100% of inflow)
Center-of-Mass det. time= 27.4 min (806.2 - 778.8)

Volume	Invert	Avail.Storage	Storage Description
#1	982.03'	0.211 af	**36.0" Round Pipe Storage** L= 1,300.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	982.03'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.03 1.03 1.93 1.93 3.00 Width (feet) 0.50 0.50 0.79 0.79 2.50 2.50

Primary OutFlow Max=4.21 cfs @ 12.02 hrs HW=983.74' (Free Discharge)
↑—**1=Custom Weir/Orifice** (Weir Controls 4.21 cfs @ 3.99 fps)

Pond DET1: (new Pond)

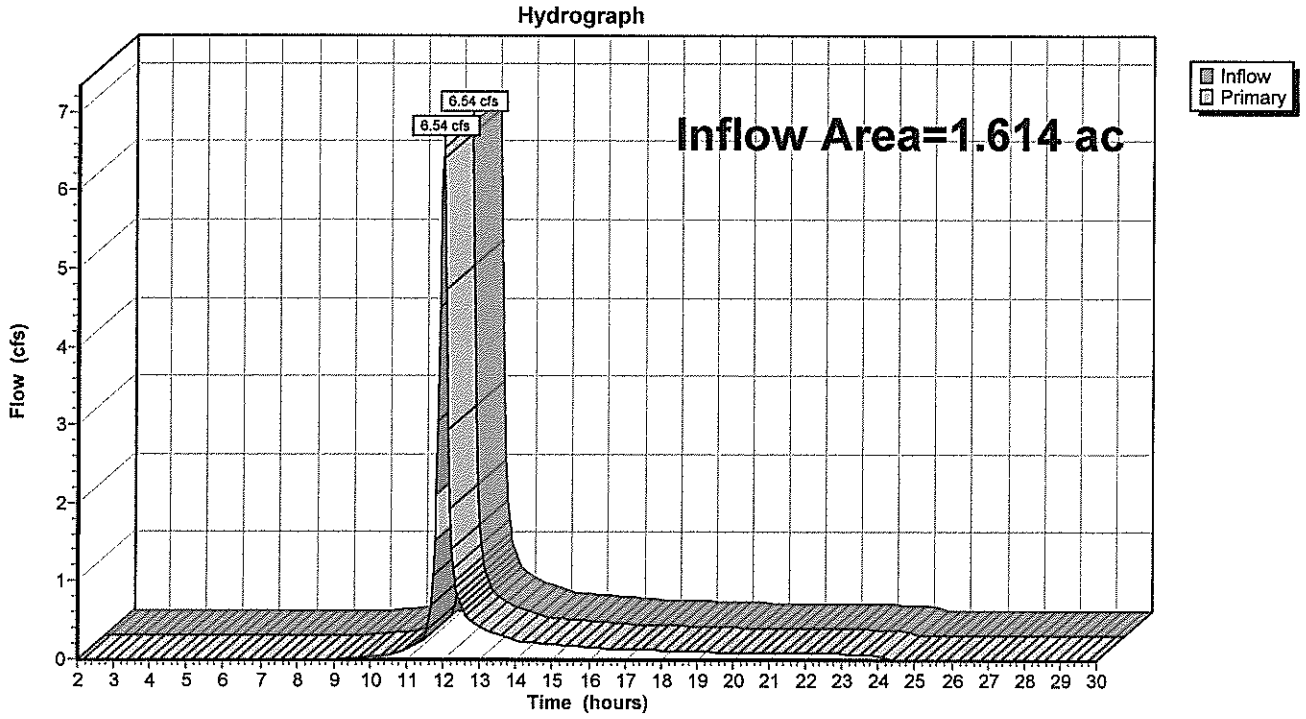


Summary for Link 4E: (new Link)

Inflow Area = 1.614 ac, 0.00% Impervious, Inflow Depth = 2.52"
Inflow = 6.54 cfs @ 11.98 hrs, Volume= 0.340 af
Primary = 6.54 cfs @ 11.98 hrs, Volume= 0.340 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs

Link 4E: (new Link)



Summary for Link 10L: (new Link)

Inflow Area = 1.614 ac, 54.15% Impervious, Inflow Depth = 3.77"
Inflow = 5.38 cfs @ 11.99 hrs, Volume= 0.508 af
Primary = 5.38 cfs @ 11.99 hrs, Volume= 0.508 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs

Link 10L: (new Link)

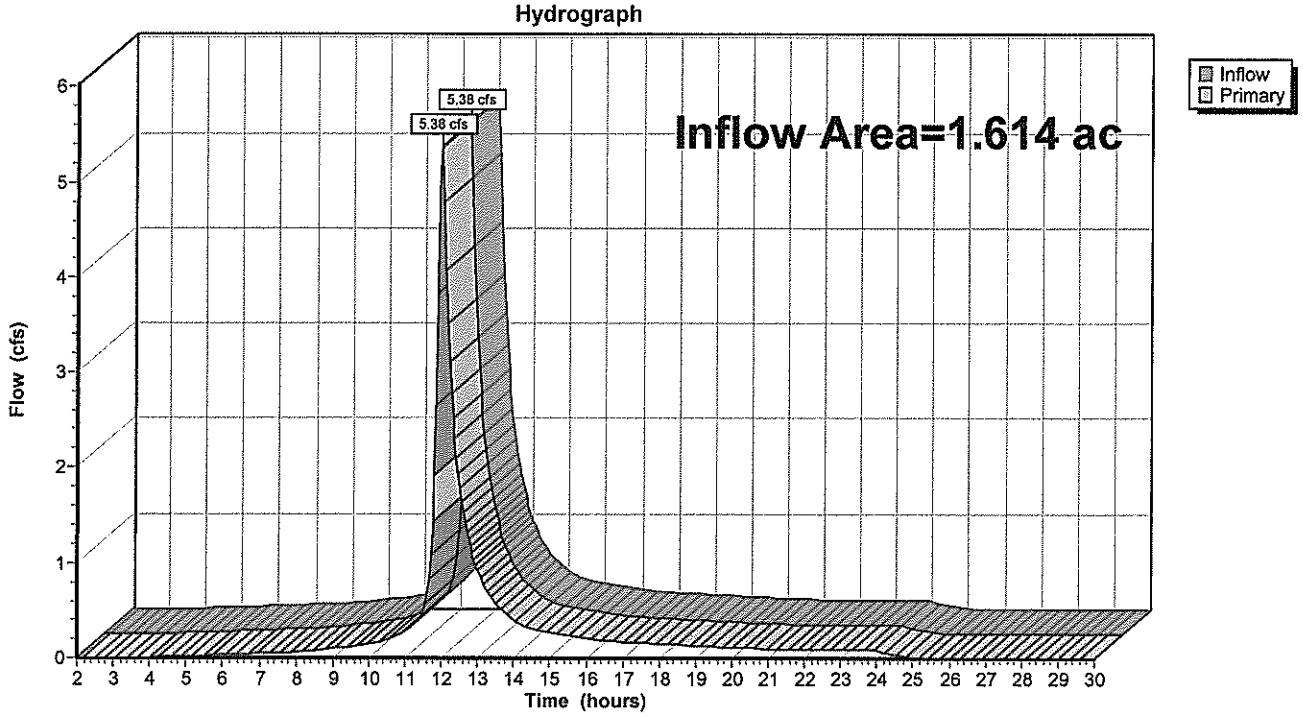
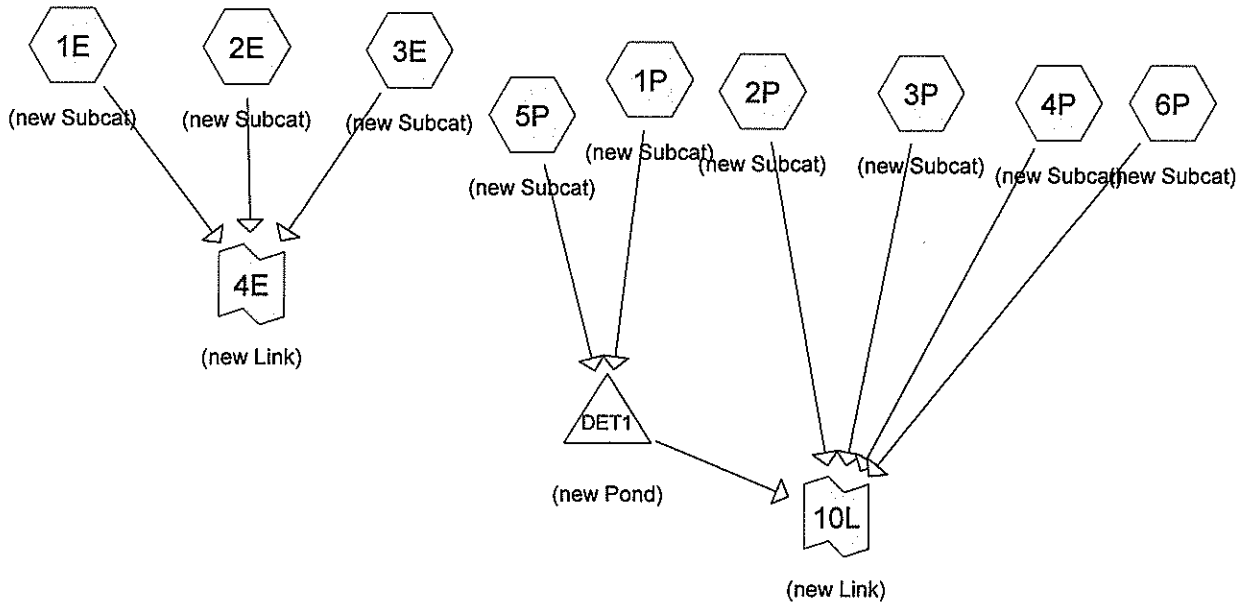


Exhibit 4
100-year Storm Calculations



Subcat Reach Pond Link

Routing Diagram for 400 NW 72 Street
Prepared by HP, Printed 7/20/2023

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.354	74	>75% Grass cover, Good, HSG C (1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P)
0.874	98	Paved parking, HSG C (1P)
3.228	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
3.228	HSG C	1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P
0.000	HSG D	
0.000	Other	
3.228		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	2.354	0.000	0.000	2.354	>75% Grass cover, Good	1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P
0.000	0.000	0.874	0.000	0.000	0.874	Paved parking	1P
0.000	**0.000**	**3.228**	**0.000**	**0.000**	**3.228**	**TOTAL AREA**	

Time span=2.00-30.00 hrs, dt=0.05 hrs, 561 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: (new Subcat) Runoff Area=0.544 ac 0.00% Impervious Runoff Depth=4.57"
Flow Length=81' Slope=0.0247 '/' Tc=10.6 min CN=74 Runoff=3.65 cfs 0.207 af

Subcatchment 1P: (new Subcat) Runoff Area=1.145 ac 76.33% Impervious Runoff Depth=6.65"
Flow Length=249' Tc=2.8 min CN=92 Runoff=12.83 cfs 0.634 af

Subcatchment 2E: (new Subcat) Runoff Area=0.017 ac 0.00% Impervious Runoff Depth=4.57"
Flow Length=30' Slope=0.0732 '/' Tc=3.1 min CN=74 Runoff=0.15 cfs 0.006 af

Subcatchment 2P: (new Subcat) Runoff Area=0.007 ac 0.00% Impervious Runoff Depth=4.57"
Flow Length=33' Slope=0.0758 '/' Tc=3.3 min CN=74 Runoff=0.06 cfs 0.003 af

Subcatchment 3E: (new Subcat) Runoff Area=1.053 ac 0.00% Impervious Runoff Depth=4.57"
Flow Length=237' Tc=5.8 min CN=74 Runoff=8.24 cfs 0.401 af

Subcatchment 3P: (new Subcat) Runoff Area=0.007 ac 0.00% Impervious Runoff Depth=4.57"
Flow Length=43' Slope=0.5116 '/' Tc=1.9 min CN=74 Runoff=0.06 cfs 0.003 af

Subcatchment 4P: (new Subcat) Runoff Area=0.167 ac 0.00% Impervious Runoff Depth=4.57"
Flow Length=83' Tc=2.6 min CN=74 Runoff=1.45 cfs 0.064 af

Subcatchment 5P: (new Subcat) Runoff Area=0.142 ac 0.00% Impervious Runoff Depth=4.57"
Flow Length=13' Slope=0.0176 '/' Tc=2.8 min CN=74 Runoff=1.23 cfs 0.054 af

Subcatchment 6P: (new Subcat) Runoff Area=0.146 ac 0.00% Impervious Runoff Depth=4.57"
Flow Length=222' Tc=7.5 min CN=74 Runoff=1.10 cfs 0.056 af

Pond DET1: (new Pond) Peak Elev=984.37' Storage=0.177 af Inflow=14.06 cfs 0.688 af
Outflow=8.78 cfs 0.688 af

Link 4E: (new Link) Inflow=11.69 cfs 0.615 af
Primary=11.69 cfs 0.615 af

Link 10L: (new Link) Inflow=10.81 cfs 0.813 af
Primary=10.81 cfs 0.813 af

Total Runoff Area = 3.228 ac Runoff Volume = 1.427 af Average Runoff Depth = 5.31"
72.92% Pervious = 2.354 ac 27.08% Impervious = 0.874 ac

Summary for Subcatchment 1E: (new Subcat)

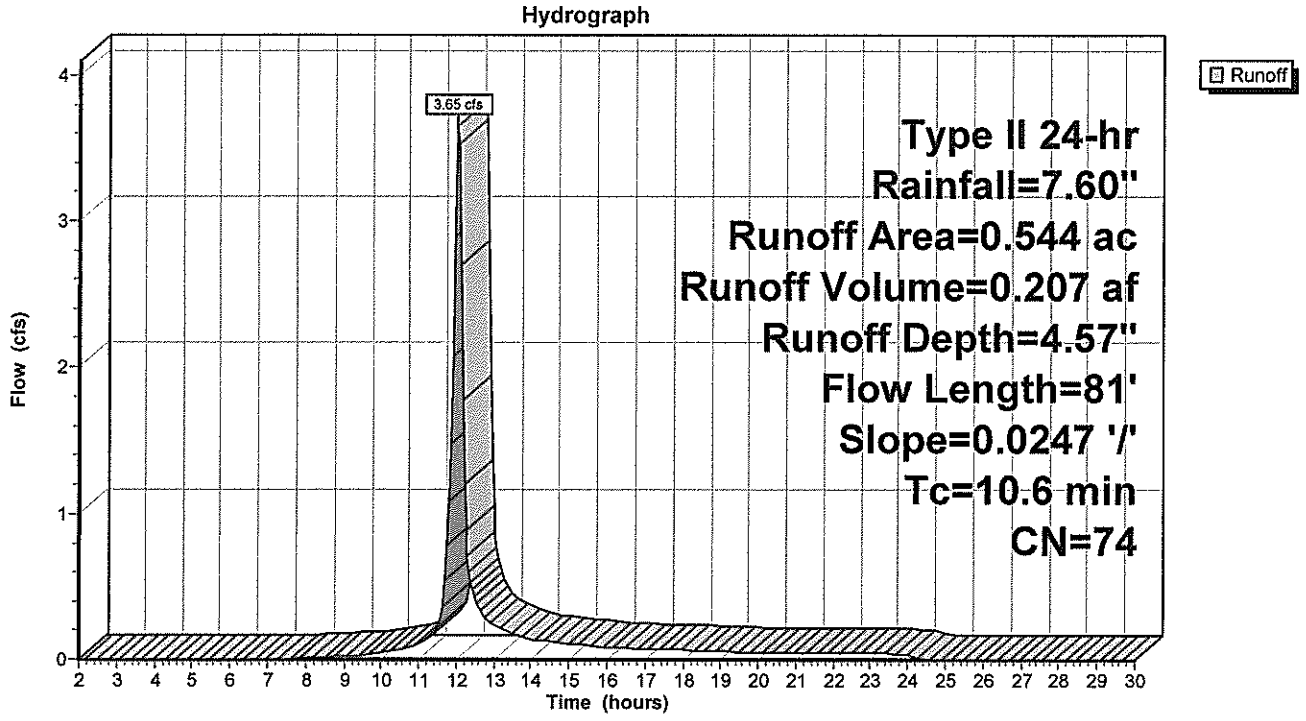
Runoff = 3.65 cfs @ 12.02 hrs, Volume= 0.207 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
0.544	74	>75% Grass cover, Good, HSG C
0.544		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	81	0.0247	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 1E: (new Subcat)



Summary for Subcatchment 1P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

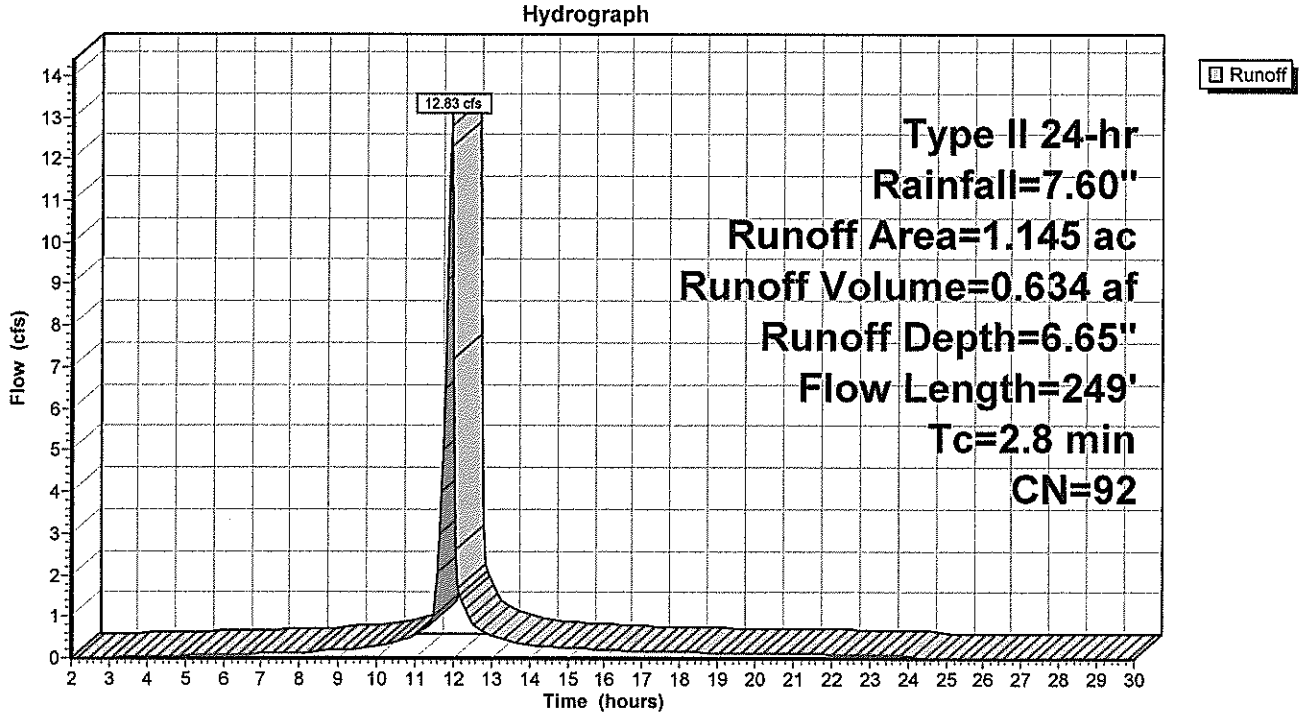
Runoff = 12.83 cfs @ 11.93 hrs, Volume= 0.634 af, Depth= 6.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
0.271	74	>75% Grass cover, Good, HSG C
0.874	98	Paved parking, HSG C
1.145	92	Weighted Average
0.271		23.67% Pervious Area
0.874		76.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0065	0.92		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
1.0	149	0.0151	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.8	249	Total			

Subcatchment 1P: (new Subcat)



Summary for Subcatchment 2E: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

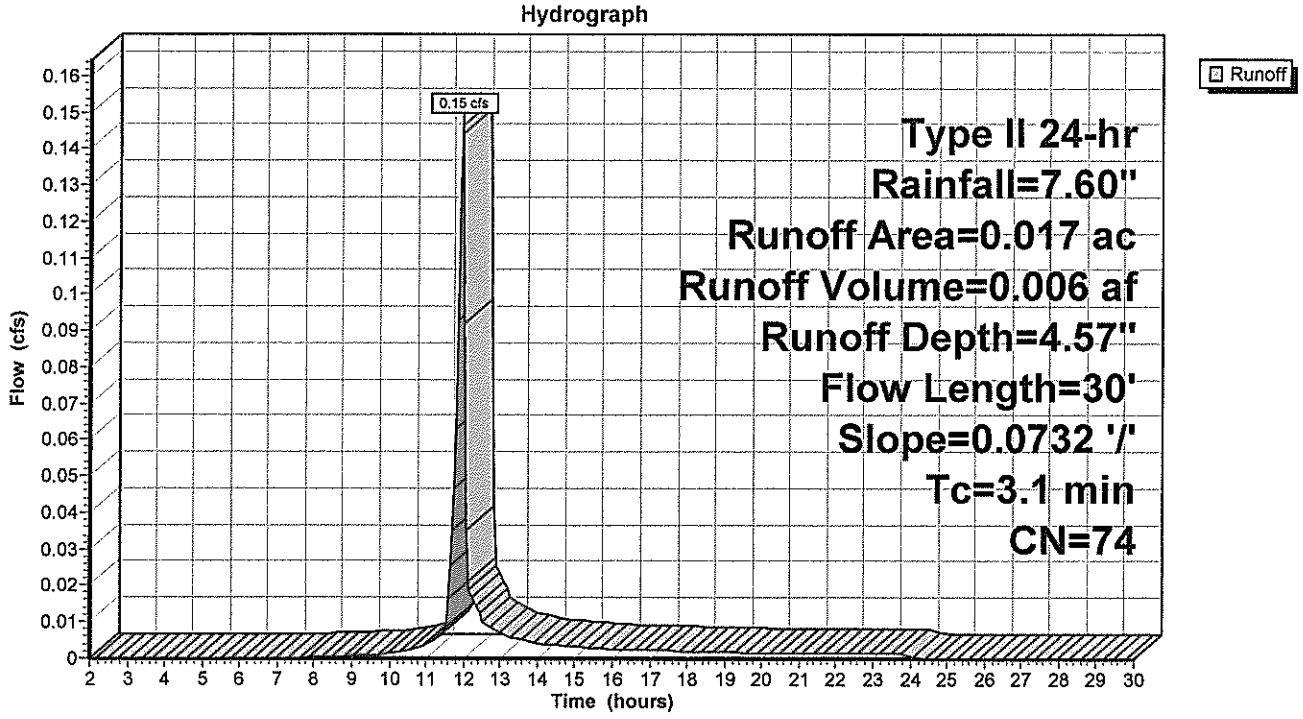
Runoff = 0.15 cfs @ 11.94 hrs, Volume= 0.006 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
0.017	74	>75% Grass cover, Good, HSG C
0.017		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	30	0.0732	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 2E: (new Subcat)



Summary for Subcatchment 2P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

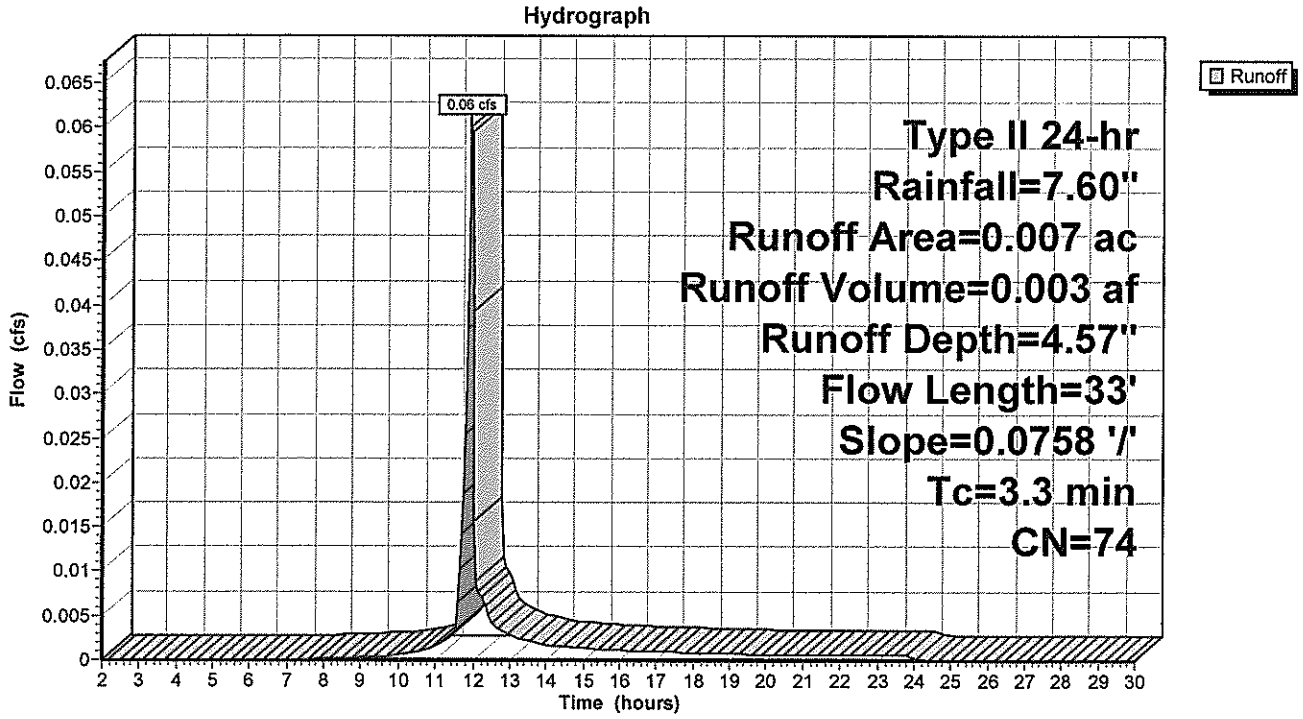
Runoff = 0.06 cfs @ 11.94 hrs, Volume= 0.003 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
0.007	74	>75% Grass cover, Good, HSG C
0.007		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	33	0.0758	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 2P: (new Subcat)



Summary for Subcatchment 3E: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

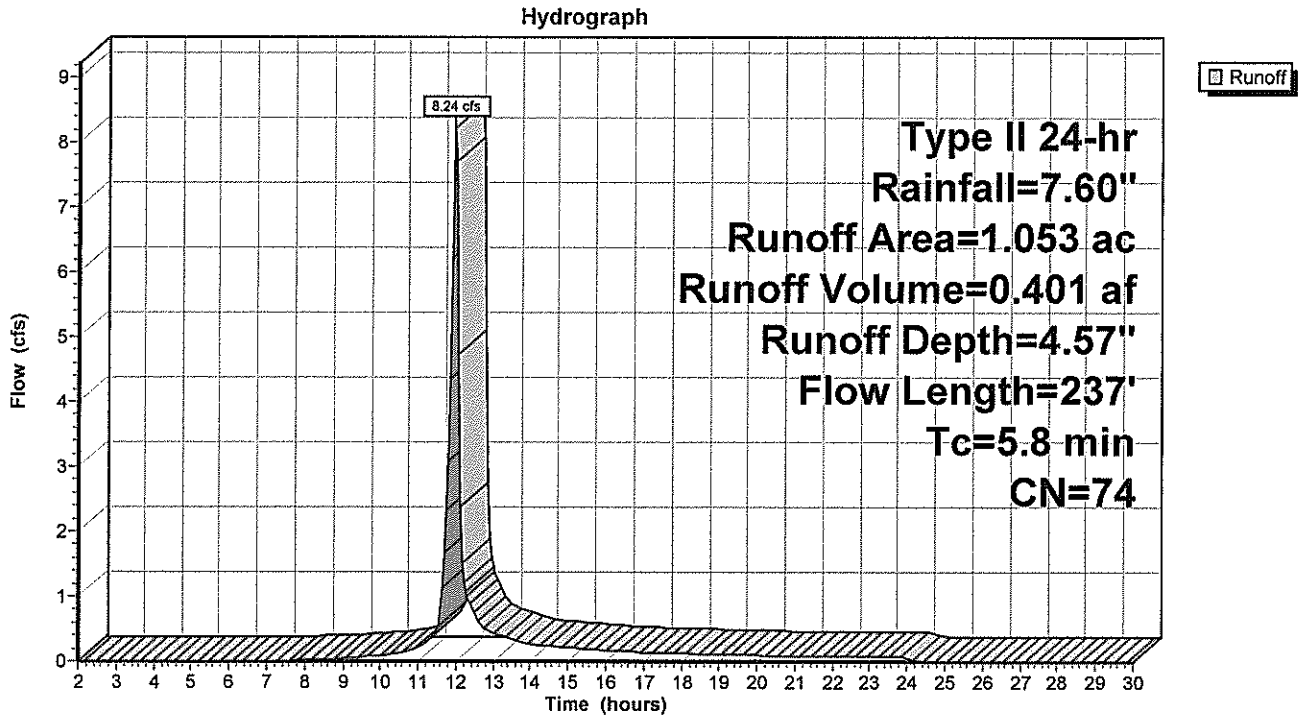
Runoff = 8.24 cfs @ 11.97 hrs, Volume= 0.401 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
1.053	74	>75% Grass cover, Good, HSG C
1.053		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	100	0.2000	0.31		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.4	137	0.1339	5.49		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.8	237	Total			

Subcatchment 3E: (new Subcat)



Summary for Subcatchment 3P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

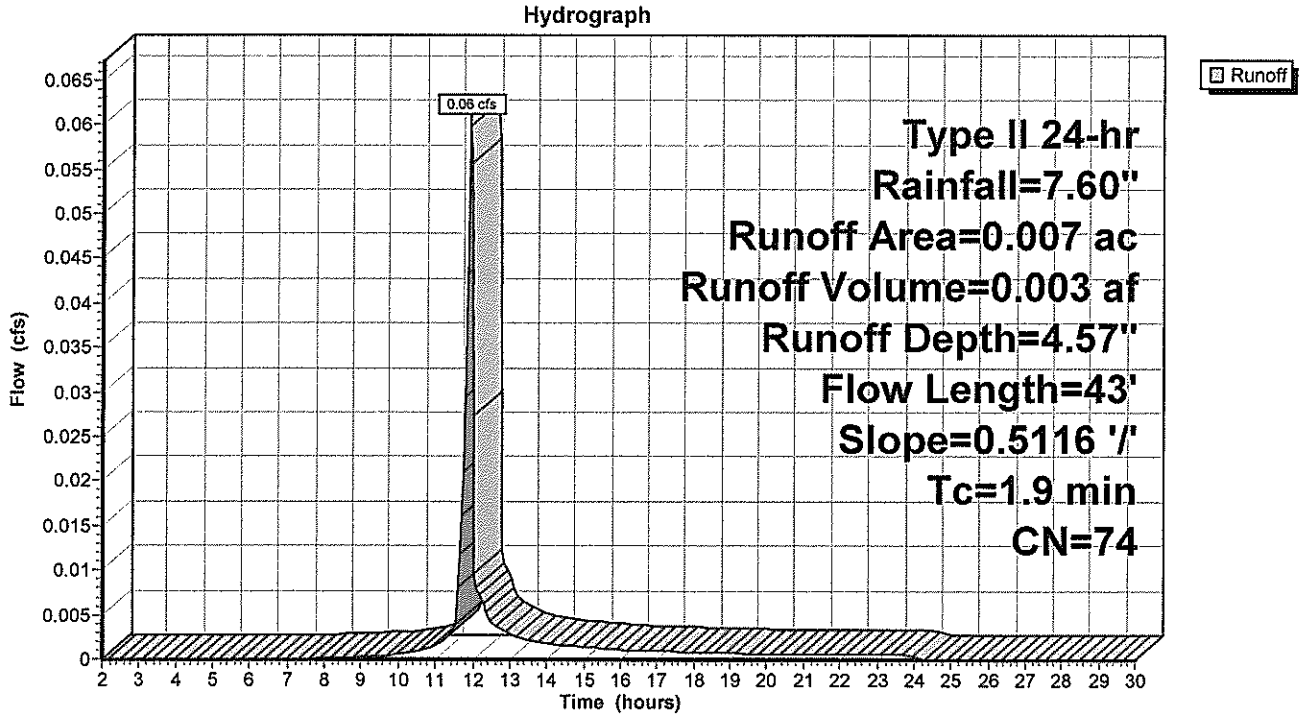
Runoff = 0.06 cfs @ 11.92 hrs, Volume= 0.003 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
0.007	74	>75% Grass cover, Good, HSG C
0.007		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	43	0.5116	0.38		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 3P: (new Subcat)



Summary for Subcatchment 4P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

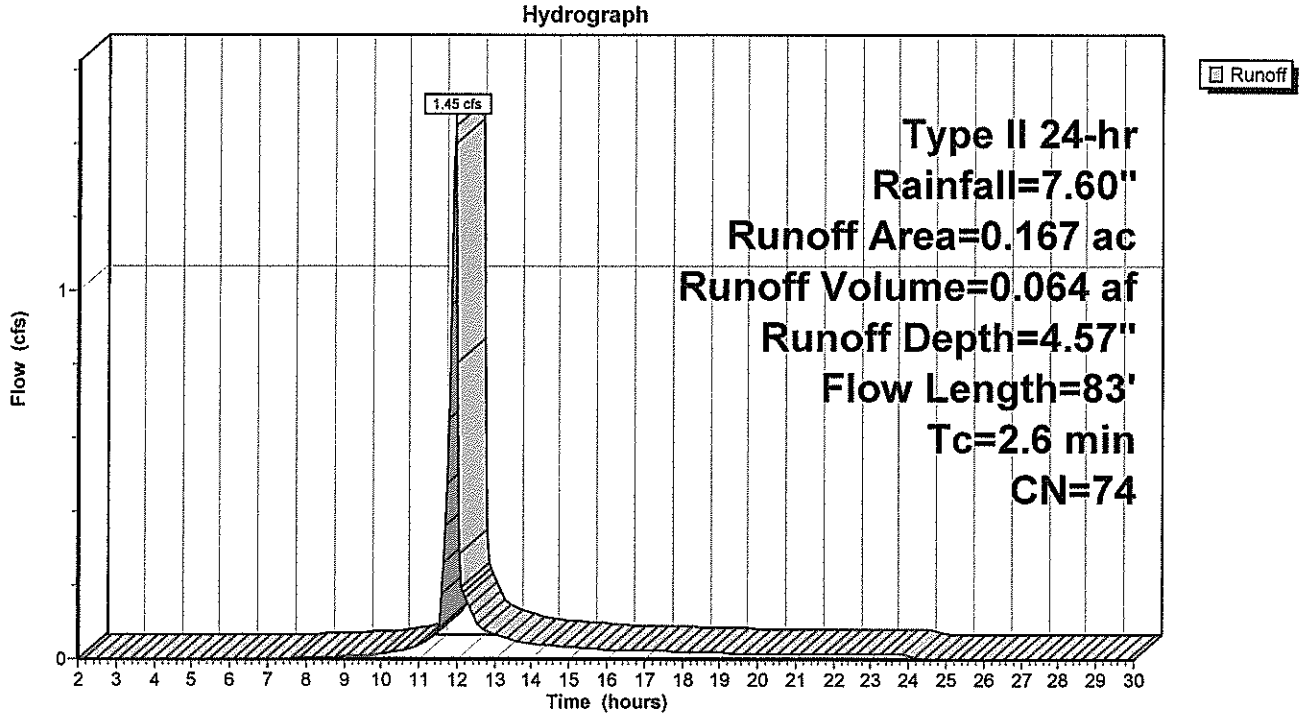
Runoff = 1.45 cfs @ 11.93 hrs, Volume= 0.064 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
0.167	74	>75% Grass cover, Good, HSG C
0.167		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	30	0.1453	0.21		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.2	53	0.0967	5.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.6	83	Total			

Subcatchment 4P: (new Subcat)



Summary for Subcatchment 5P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

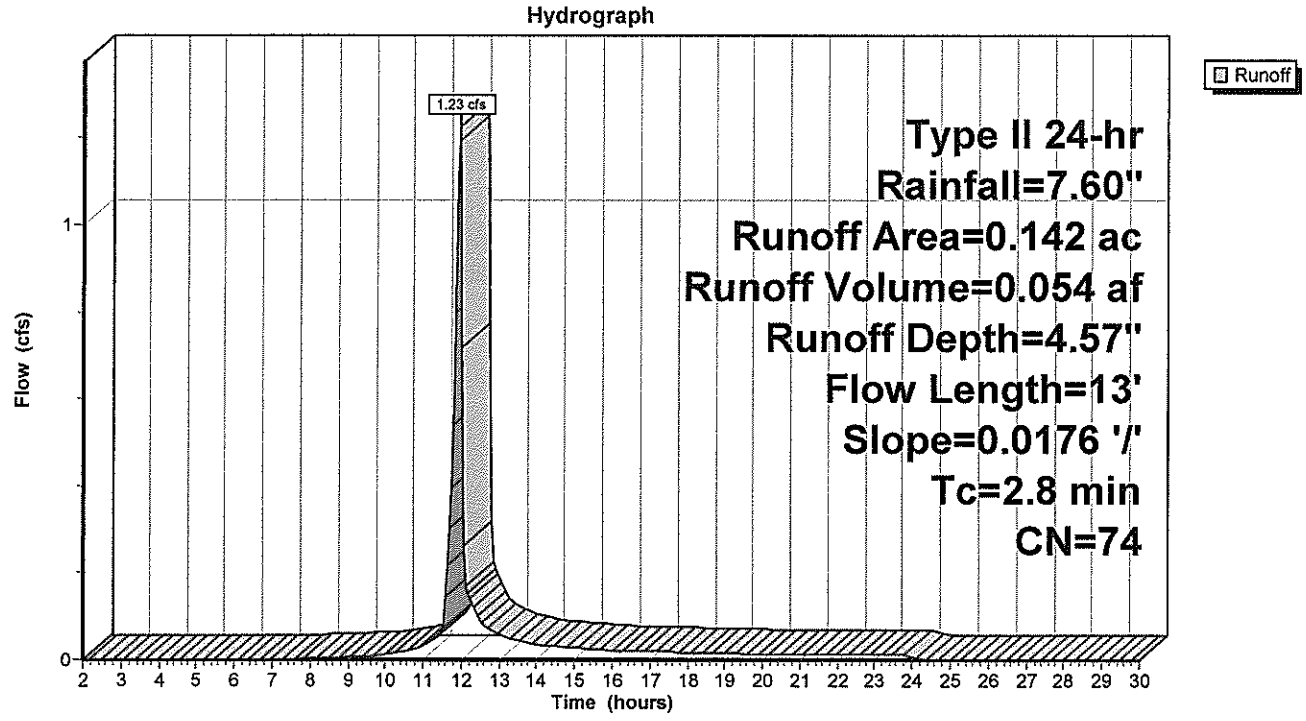
Runoff = 1.23 cfs @ 11.93 hrs, Volume= 0.054 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
0.142	74	>75% Grass cover, Good, HSG C
0.142		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	13	0.0176	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 5P: (new Subcat)



Summary for Subcatchment 6P: (new Subcat)

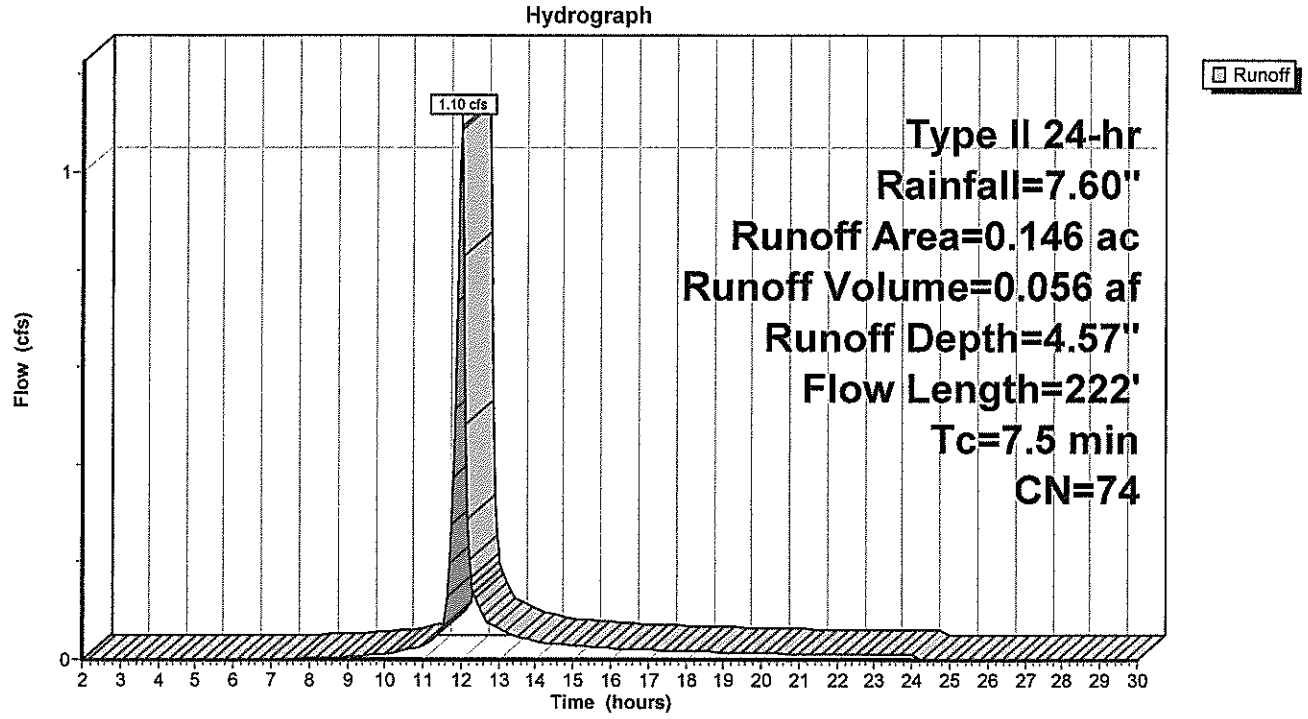
Runoff = 1.10 cfs @ 11.99 hrs, Volume= 0.056 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
0.146	74	>75% Grass cover, Good, HSG C
0.146		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	60	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.6	162	0.0775	4.18		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
7.5	222	Total			

Subcatchment 6P: (new Subcat)



Summary for Pond DET1: (new Pond)

Inflow Area = 1.287 ac, 67.91% Impervious, Inflow Depth = 6.42"
Inflow = 14.06 cfs @ 11.93 hrs, Volume= 0.688 af
Outflow = 8.78 cfs @ 12.00 hrs, Volume= 0.688 af, Atten= 38%, Lag= 4.3 min
Primary = 8.78 cfs @ 12.00 hrs, Volume= 0.688 af

Routing by Stor-Ind method, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 984.37' @ 12.00 hrs Surf.Area= 0.074 ac Storage= 0.177 af

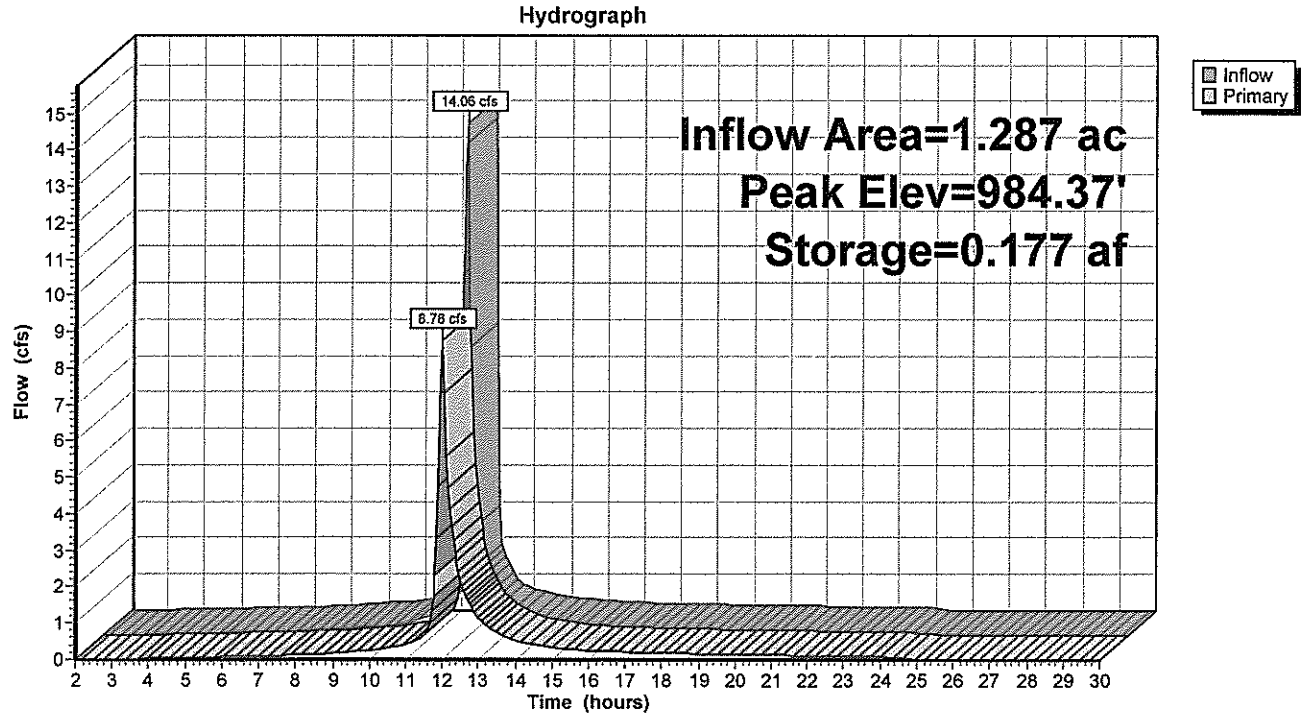
Plug-Flow detention time= 25.7 min calculated for 0.688 af (100% of inflow)
Center-of-Mass det. time= 25.5 min (793.2 - 767.7)

Volume	Invert	Avail.Storage	Storage Description
#1	982.03'	0.211 af	**36.0" Round Pipe Storage** L= 1,300.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	982.03'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.03 1.03 1.93 1.93 3.00 Width (feet) 0.50 0.50 0.79 0.79 2.50 2.50

Primary OutFlow Max=8.78 cfs @ 12.00 hrs HW=984.37' (Free Discharge)
↑—**1=Custom Weir/Orifice** (Weir Controls 8.78 cfs @ 3.89 fps)

Pond DET1: (new Pond)

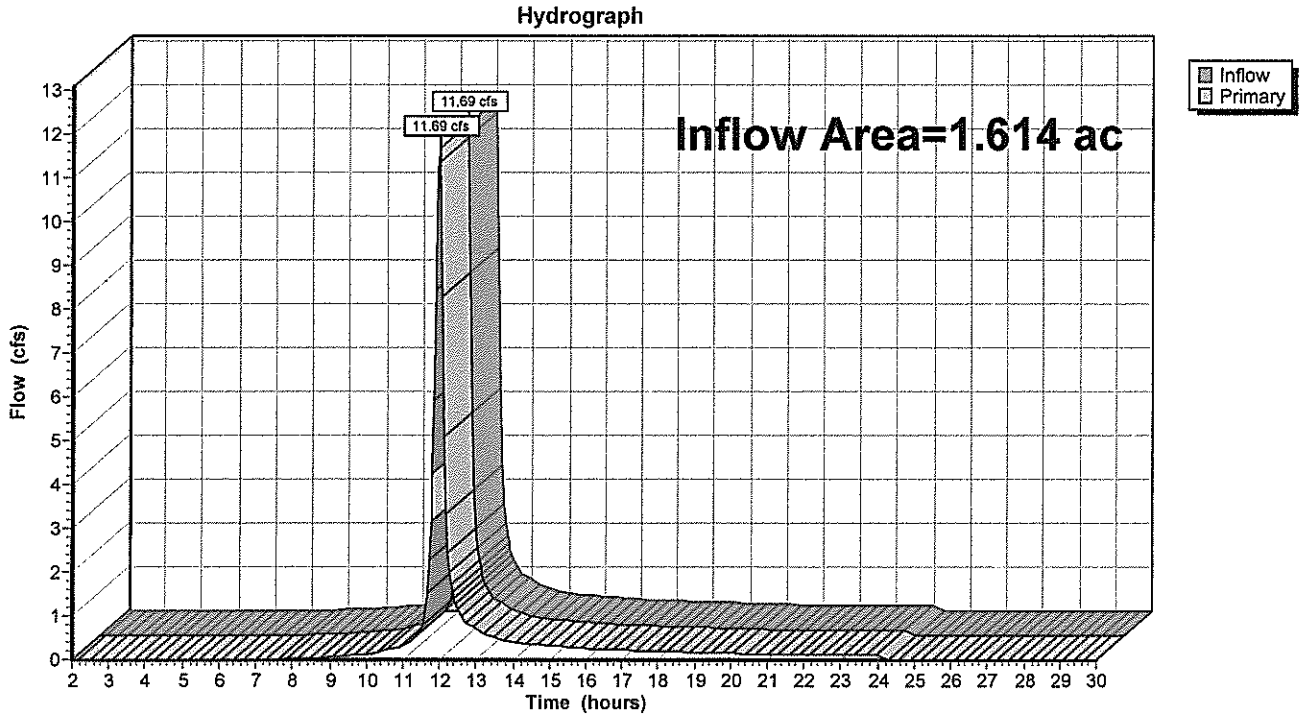


Summary for Link 4E: (new Link)

Inflow Area = 1.614 ac, 0.00% Impervious, Inflow Depth = 4.57"
Inflow = 11.69 cfs @ 11.98 hrs, Volume= 0.615 af
Primary = 11.69 cfs @ 11.98 hrs, Volume= 0.615 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs

Link 4E: (new Link)

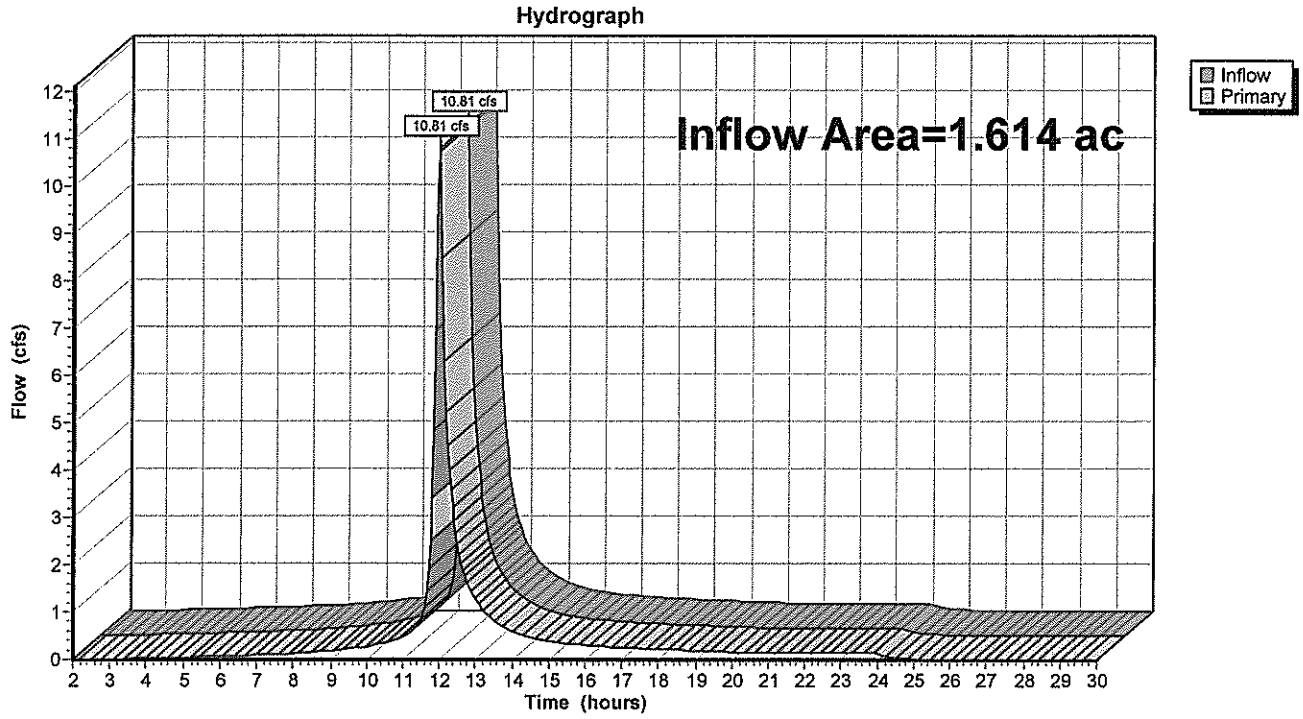


Summary for Link 10L: (new Link)

Inflow Area = 1.614 ac, 54.15% Impervious, Inflow Depth = 6.04"
Inflow = 10.81 cfs @ 11.99 hrs, Volume= 0.813 af
Primary = 10.81 cfs @ 11.99 hrs, Volume= 0.813 af, Atten= 0%, Lag= 0.0 min

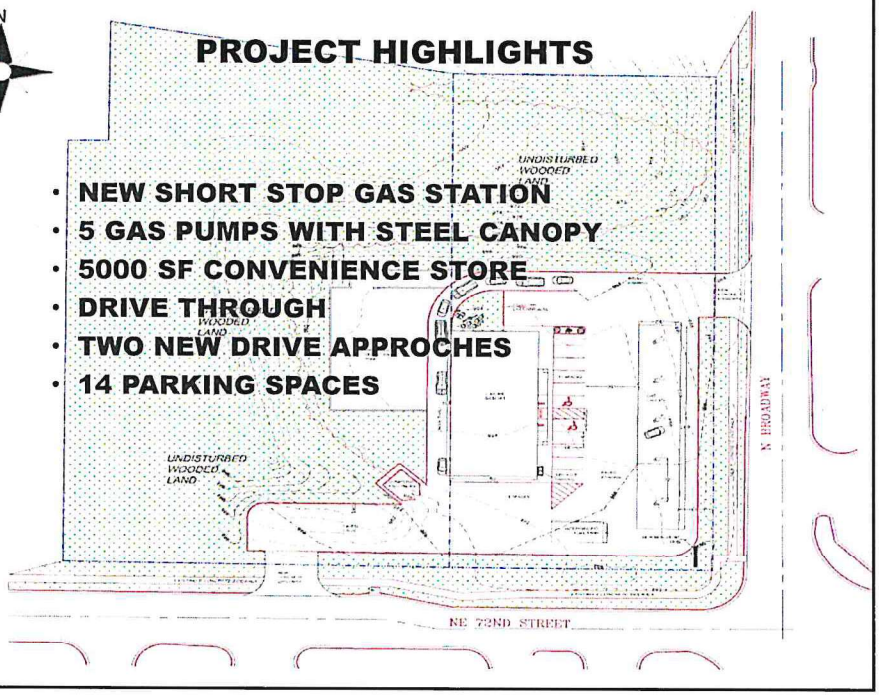
Primary outflow = Inflow, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs

Link 10L: (new Link)



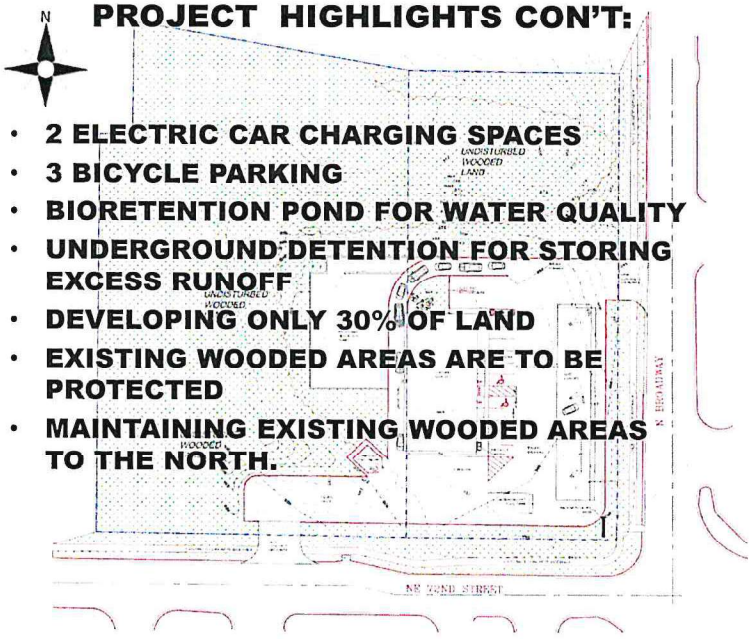
PROJECT HIGHLIGHTS

- NEW SHORT STOP GAS STATION
- 5 GAS PUMPS WITH STEEL CANOPY
- 5000 SF CONVENIENCE STORE
- DRIVE THROUGH
- TWO NEW DRIVE APPROCHES
- 14 PARKING SPACES

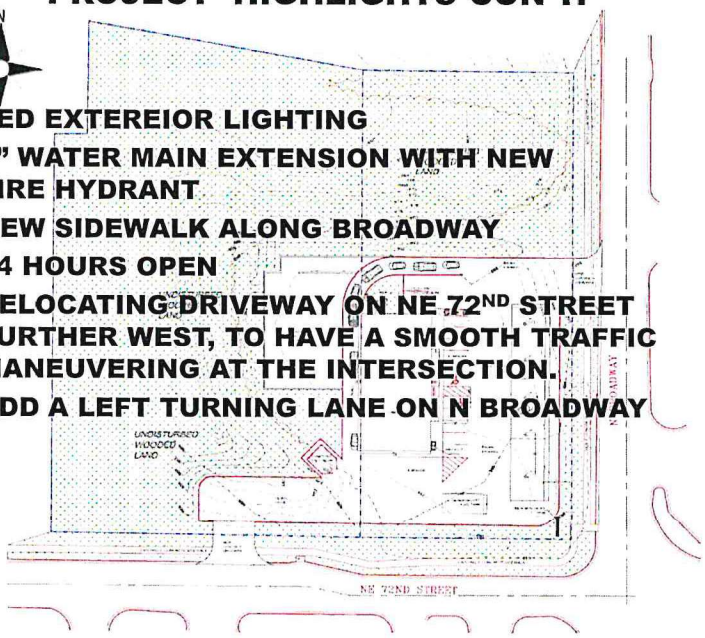


PROJECT HIGHLIGHTS CON'T:

- 2 ELECTRIC CAR CHARGING SPACES
- 3 BICYCLE PARKING
- BIORETENTION POND FOR WATER QUALITY
- UNDERGROUND DETENTION FOR STORING EXCESS RUNOFF
- DEVELOPING ONLY 30% OF LAND
- EXISTING WOODED AREAS ARE TO BE PROTECTED
- MAINTAINING EXISTING WOODED AREAS TO THE NORTH.

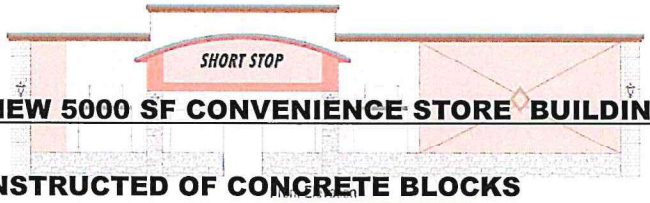


PROJECT HIGHLIGHTS CON'T:



- LED EXTEREIOR LIGHTING
- 8" WATER MAIN EXTENSION WITH NEW FIRE HYDRANT
- NEW SIDEWALK ALONG BROADWAY
- 24 HOURS OPEN
- RELOCATING DRIVEWAY ON NE 72ND STREET FURTHER WEST, TO HAVE A SMOOTH TRAFFIC MANEUVERING AT THE INTERSECTION.
- ADD A LEFT TURNING LANE ON N BROADWAY

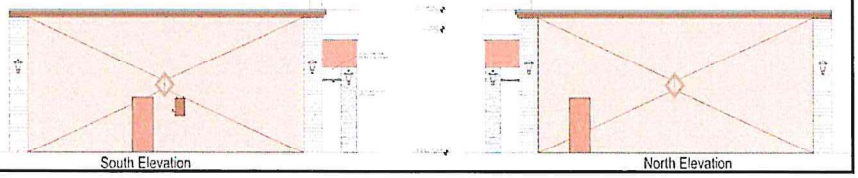
C-STORE BUILDING ELEVATIONS



NEW 5000 SF CONVENIENCE STORE BUILDING

- CONSTRUCTED OF CONCRETE BLOCKS
- METAL BAR JOIST ROOF SYSTEM
- BRICK AND STONE EXTERIOR
- CONCRETE STUCCO ON SIDE AND REAR
- HIGH PARAPET TO SCREEN MECHANICAL UNITS
- LESS THAN 50% GLAZING TO HAVE SIGNAGE
- MATCHING ENCLOSED TRASH DUMPSTER

West Elevation



South Elevation North Elevation

SITE PLAN RENDERING

BUILDING & CANOPY RENDERING

BUILDING & CANOPY RENDERING

LANDSCAPING HIGHLIGHTS:

- ONLY 30% AREA DEVELOPED
- 70% AREA MOSTLY HAVING MATURE TREES TO REMAIN
- MAINTAINING EXISTING WOODED AREAS. NOT DISTURBING ANYTHING TO THE NORTH.

LANDSCAPING HIGHLIGHTS CON'T:

- BUILT IN IRRIGATION SYSTEM
- PLANTING TREES AND SHRUBS ALONG BROADWAY AND 72ND STREET
- ALL DISTURBED AREAS SODDED
- PLANTING NEW VEGETATION TO THE WEST

PLANNING COMMISSION
GLADSTONE, MISSOURI
Gladstone Community Center
Monday, May 20th, 2024
7:00 pm

Item 1 on the Agenda: Roll Call.

Present: Kate Middleton
Bill Turnage
Jennifer McGee
Joseph Brancato
Cameron Nave Secretary
Robert Wilson
Steve Beamer Chair
Mike Ebenroth

Absent: Chase Cookson
Brenda Lowe, V-Chair
Kim Murch

Council & Staff Present:
Austin Greer, Assistant City Manager | Community Development Director
Alan Napoli, Community Development Administrator/Building Official
Angie Daugherty, Admin. Assistant
Jean B. Moore, Councilmember
Tina Spallo, Mayor

Item 2 on the Agenda: Pledge of Allegiance.

Chair Beamer led the group in reciting the Pledge of Allegiance to the United States of America.

Item 3 on the Agenda: Approval of the April 1st, 2024 Minutes. Chair Beamer asked if there was a motion to approve the minutes from the April 1st meeting.

Mr. Turnage moved to approve the minutes; Ms. McGee seconded. The minutes were approved, 8-0.

Item 4 on the Agenda: Consideration: On a Site Plan Revision on property located at 7200 N. Broadway.

Applicant: Gerald W. Menefee P.E.
Owner: Mohammad Hafiz
City Council consideration for this project is scheduled for Monday, June 10, 2024.

Mr. Greer read from the staff report:

The applicant is requesting site plan approval for the purpose of constructing a new 5,000 sq. ft. gas station and convenience store located at 7200 N. Broadway. This property is currently vacant and zoned CP-2 which is an appropriate zoning for the proposed use.

This project was proposed in 2023 and denied by the Gladstone City Council. The property owner has made adjustments to the site plan and those adjustments include the following:

- The access point on NW 72nd Street has been shifted west to lineup with the Post Office access point.
- The water quality pond has been moved from the northern side of the property to the western side of the property away from the residential homes located to the north. This basin will be located on the KCMO parcel.
- The wooded area on the northern side of the property will primarily remain untouched.

This project will also incorporate a drive thru lane and window as well as two (2) electric vehicle (EV) charging stations and a commercial bike rack. There will be ten (10) fuel pumps covered by a canopy to serve customers.

The primary exterior building materials used will be brick and stucco.

The landscaping plans show new landscape throughout the property using various trees and shrubs. All disturbed areas will be sodded and irrigated.

A traffic study was conducted by Priority Engineers, Inc. and they provided a summary of their findings.

- "Analysis of unsignalized intersections indicate that they operate with acceptable levels of service both before and after the construction of the proposed development. The signalized intersection at NW 72nd Street and N Broadway Street has an overall level of service that is acceptable both before and after construction of the proposed development. The proposed entrance locations have sufficient sight distance. A left turn lane is warranted for the entrance on N Broadway Street in the PM Peak Hour. Due to geometric constraints of this location, the left turn lane will need to be designed so that it does not interfere with the southbound left turn lane at the signalized intersection with NW 72nd Street. No other improvements are required as a result of this development."
- Given the conclusions and recommendations made by the traffic engineers, City Staff will be requiring the installation and construction of a left turn lane or right-in/right-out for the entrance on N. Broadway at the property owner's expense.
-

City Staff recommends that the following conditions be considered if the Planning Commission and City Council choose to approve this project request:

1. Any and all disturbed areas shall be sodded.
2. All manicured grass and landscaped areas shall be irrigated and maintained in perpetuity.
3. Install a minimum of 20 new shrub plantings adjacent to N. Broadway.
4. Install a minimum of 10 new shrub plantings adjacent to NE 72nd Street.
5. All mechanical equipment on the roof shall be screened from public view by a parapet or approved screening similar in design to the rest of the structure. This must be a minimum of twelve (12) inches above the tallest piece of mechanical equipment.

6. A compliant monument sign shall be used to serve the development. The monument sign will need a minimum of 240 sq. ft. of area landscaping around the sign.
7. All exterior lighting on the site shall be LED and designed to reduce adverse impact on adjoining properties.
8. The dumpster shall be enclosed with materials consistent with the primary building. Specific colors and materials shall be submitted and approved as part of the building permit.
9. Trash service, store deliveries, and gasoline refilling (underground commercial gasoline tanks) shall occur between the hours of 7:00 a.m. to 10:00 p.m.
10. Tractor trailers, storage containers, and other commercial vehicles (including delivery trucks) shall not be parked or stored overnight on the premises.
11. No more than 50% of each glazed window area of the building shall have signage.
12. Hours of operation permitted are 24 hours seven days per week.
13. Install a commercial grade bike rack on-site.
14. Install new curb, gutter, and sidewalk along the property line adjacent to N. Broadway.
15. Preserve the northern wooded tree line as a buffer to the residential neighborhood located to the north along NW 72nd Terrace.
16. Complete a Post-Construction Maintenance Agreement for stormwater facilities.
17. Install a fire hydrant within four-hundred (400) feet of any portion of the building.
18. Extend and loop the 8-inch water main along N. Broadway.
19. Given the project location and that the development extends to property located in Kansas City, Missouri, this development is subject to Kansas City, Missouri approving the improvements on their parcel.
20. The installation and construction of a left turn lane or right-in/right-out for the entrance on N. Broadway at the property owner's expense.

City Staff recommends that the request be **APPROVED** contingent upon the conditions listed above.

Mr. Menefee who is the applicant on the project presented a PowerPoint.

Mr. Menefee stated that this will be a convenience store with five gas pumps, a drive thru, 14 parking spaces, EV charging stations, exterior lighting along the north side, the water main extension and sidewalk, and open 24 hours. They will also add an access drive off of Broadway and NE 72nd St. Only 30% of the area will be developed and the other 70% has mature trees. They will have storage pipes on the northern edge of the site and those will be connected to the water retention pond on the west side of the structure. Thank you.

Ms. Middleton asked what part of this property is in Kansas City.

Mr. Menefee stated the western parcel that has the basin and west side of the driveway.

Mr. Turnage asked who will be in charge of redesigning the drive from Broadway.

Mr. Greer stated that private sector engineers hired by the property owner will likely design the project and submit the designs to city staff for review.

Ms. McGee asked where the retaining wall was going and how tall will it be.

Mr. Menefee stated the wall will be along the tree line and around 10 to 12 feet tall at the tallest point.

Mr. Wilson asked if he could explain the difference between the basin and a sand and oil separator pit.

Mr. Menefee stated it is based on the volume of the water that comes off the site. It is a large area and with a lot of rain fall this goes into the retention pond and the sand filtration is basically the same thing. The filter is made up of primarily tree bark and peat moss.

Mr. Brancato asked how the public is supposed to gain access to the drive thru and whether or not they will have to drive around the back of the building and face N. Broadway or NW 72nd Street. Also, will the drive thru be open for 24 hours as well?

Mr. Menefee stated he isn't sure about the hours that the drive thru will be open but assumes it will be dependent on customer demand. The drive thru comes in at the north side and goes south along the building facing NW 72nd St.

Mr. Beamer asked about approval from Kansas City. Do you all have a status on this?

Mr. Menefee stated they have not brought this project to Kansas City yet as we would like to get permission from the City of Gladstone first.

Mr. Beamer asked if this property has historically been vacant or have there been other approved plans on this site.

Mr. Greer stated yes, a Casey's gas station and a dentistry has been approved on this site historically but neither pursued the actual construction of the projects.

Mr. Beamer welcomed the audience to speak in favor or against the proposed project.

Mr. and Ms. Weatherford who reside at 403 NW 72nd Terrace stated that since there is a Casey's at one end of Broadway and a QuikTrip on the other so why do we need another gas station in the middle of residential? That area is full of residential homes. Will the sales from the Short Stop be mostly gas or alcohol? This is a very dangerous intersection and we are very concerned about traffic and wrecks. Are there plans to look at this intersection?

Ms. Josie Nabavian who resides at 400 NW 72nd Terrace asked what has changed from the last meeting? What is going to be the traffic pattern? There is a lot of traffic in that area. With the exit off of Broadway into the gas station, will this make a traffic delay?

Mr. Greer stated that a traffic study has been completed and the study indicates a left turn lane is warranted traveling northbound. Staff is requiring that the property owner add a left turn lane or a right-in/right-out to help mitigate traffic.

Mr. Tyson who resides at 308 NW 76th St. asked when you mention right-in and right-out will this be right lane going into the gas station parking lot and right turn only coming out of the parking lot on N. Broadway?

Mr. Greer stated yes sir.

Mr. Tyson stated that the city cannot control the traffic off of 76th St. or 72nd St.

Mr. Greer stated that the design of the right-in and right-out will be built high enough that most people will try not to drive over it.

Mr. Tyson brought up traffic control and that he doesn't think the police department does enough to stop people from speeding on Broadway. This property has been vacant for so long and I don't understand why they want to put a gas station there.

Ms. Vicki Marshall resides at 401 NW 72nd Terrace and her concern is that she feels like this project will be in her backyard. What if they have a gas leak from the tanks? When they first moved here they were told that it was zoned for an office building and that was in 1992.

Mr. Menefee stated that it is a requirement that they have a containment system that has a double wall tank that is surrounded by a plastic liner.

Ms. Taylor Sherrill who resides at 6305 N. Bales Avenue stated that this project from an environmental perspective does not seem to be compatible with the recent comprehensive plan and that this project does not fit the location.

MOTION: By Ms. Middleton, second by Mr. Ebenroth to consider a Site Plan Revision located at 7200 N Broadway.

Vote:	**Mr. Wilson**	**Yes**
	Mr. Brancato	**Yes**
	Mr. Turnage	**Yes**
	Ms. Middleton	**No**
	Chair Beamer	**Yes**
	Ms. McGee	**Yes**
	Mr. Nave	**Yes**
	Mr. Ebenroth	**Yes**

The motion carried. (7-1)

Item 5 on the Agenda: Communications from the City Council

Councilmember Jean Moore wanted to welcome everyone to the new space and Mr. Bob Wilson to the Planning Commission. She also thanked the residents for their participation tonight.

Item 6 on the Agenda: Communications from the City Staff

Mr. Greer welcomed Mr. Wilson to the Commission as well. With the storms that happened last night the city will be offering free brush disposable at Public Works today through Friday. City Hall will be closed next Monday for Memorial Day and Food, Art, and Drink will be at Linden Square on June 1st. Also, there will be no Planning Commission meeting on Monday, June 3rd.

Item 7 on the Agenda: Communications from the Planning Commission Members

Mr. Beamer welcomed Mr. Wilson to the Planning Commission and asked Mr. Wilson to tell them a little about himself.

Mr. Wilson stated that he is an architect by trade and is leading an architectural firm here in Kansas City. I was also on the Capital Improvements Committee and am very excited to join the Planning Commission and help the community.

Mr. Turnage wanted to thank the Public Works Department for sponsoring the beautification event.

Item 8 on the Agenda: Adjournment

Chair Beamer adjourned the meeting at 7:39 pm.

Respectfully submitted:

_____ Approved as submitted _____
Steve Beamer, Chair

_____ Approved as corrected _____
Angie Daugherty, Recording Secretary

DEVELOPMENT APPLICATION

CITY OF GLADSTONE
7010 N HOLMES STREET
GLADSTONE, MISSOURI 64118
PHONE: 436-4110 FAX: 436-2228

File #: _____
Application Date: **04/01/2024**
PC Date: _____
CC Date: _____

Application Type:

- ☐ (PH) Special Use Permit ($500)
- ☐ (PH) Zoning Change ($500)
- ☐ (PH) Site Plan Revision ($500)
- ☐ (PH) Right-of-Way Vacation ($200)
- ☐ (PH) Variance – BZA ($200)
- ☐ Final Plat/Replat ($75)

Address of Action: **400 NE 72ND STREET**

Legal Description: *Attach under separate cover if needed.* BEG SW COR LT 12 WILLOW CREEK E146, S340, SW21.21, W138, N TO POB

Proposed Change: CONSTRUCTION OF NEW GAS STATION WITH 5000 SF CONVENIENCE STORE AND 5 GAS DISPENSERS AND DRIVE THRU

Applicant/Property Owner Information:

☐ Applicant/Engineer GERALDW MENEFEE, P.E.
Company KAM DESIGN GROUP LLC
Address 9000 E BANNISTER ROAD, KANSAS CITY MO 64134
Phone 8167972065 Fax: _____ E-Mail: kamdesign@aol.com

☐ Property Owner (if different than applicant) MOHAMMAD HAFIZ
Company _____
Address 1121 SW BLAZINGSTAR CT., LEE'S SUMMIT MO 64081
Phone 816 7861622 Fax: _____ E-Mail: mhafiz103@yahoo.com

☐ Architect DARRYL W HAWKINS AIA
Company INNOVATIVE DESIGN & RENOVATION
Address 8011 PASEO SUITE 201, KANSAS CITY, MO 64131
Phone 8164052159 Fax: _____ E-Mail: arkitec35@aol.com

Please indicate in one box above which person is to be the contact.

Applicant's Signature Darryl W Hawkins Date 4/1/24

984
NEW
CONCRETE
DRIVEWAY
PAVED
PARKING
24'
988
990
986
11 SPACES
30'
GAS
CANOPY
992
994
140'
18'
BICYCLE
ARKING
PAVED
PARKING
30'
20'
UNDERGROUND
FUEL TANK
NEW MONUMENT
SIGN
992
990
EXISTING 5' CONCRETE SIDEWALK
NEW 5' CONCRETE SIDEWALK
N BROADWAY

ET

Recorded in Clay County, Missouri
Date and Time: 08/12/2010 at 08:09:37 AM
Instrument Number: 2010027038
Book: M Page: 12
Instrument Type SURV
Page Count 1
Recording Fee $6500.5
Grantor 72ND & BROADWAY
Grantee 72ND & BROADWAY
Robert T Sevier, Recorder

SCALE
0' 30' 60'
1"=30' HORIZ.

PLAN LEGEND

SURVEY MARKERS
- FOUND SECTION CORNER (MONUMENTATION AS NOTED)
- FOUND PROPERTY CORNER (MONUMENTATION AS NOTED)
- SET 1/2" IRON BAR WITH PLASTIC CAP
- BENCHMARK

GAS
- GK GAS LINE MARKER

SANITARY
- SMH SANITARY MANHOLE

UTILITY LINES
- EEGH ELECTRIC, OVERHEAD

CONTOURS
- 100 INDEX CONTOURS
- 100 INTERMEDIATE CONTOURS

ELECTRIC
- GUY GUY ANCHOR
- LP LIGHT POLE
- PP POWER POLE

STORM
- CI CURB INLET
- STMH STORM MANHOLE

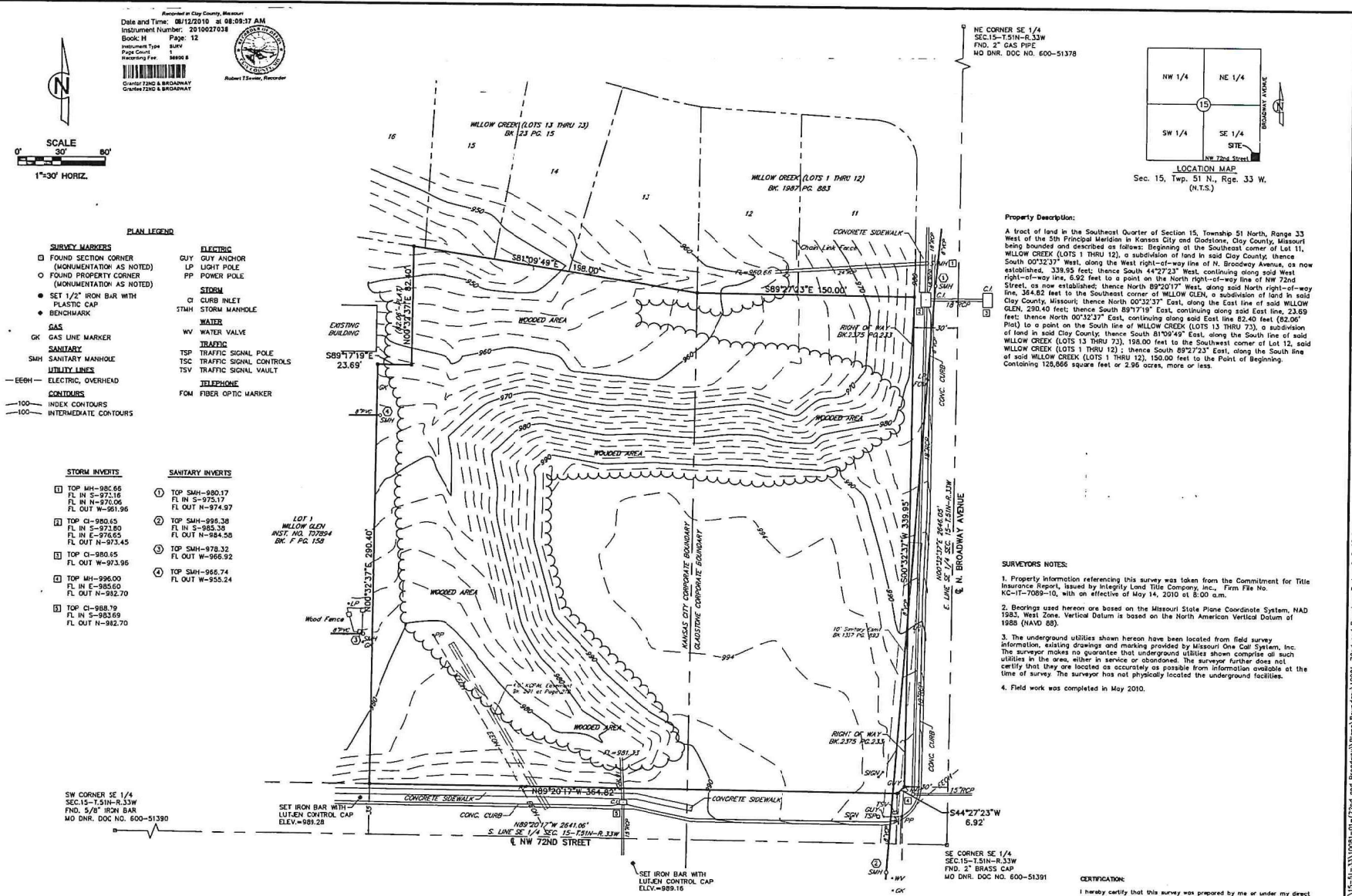
WATER
- WV WATER VALVE

TRAFFIC
- TSP TRAFFIC SIGNAL POLE
- TSC TRAFFIC SIGNAL CONTROLS
- TSV TRAFFIC SIGNAL VAULT

TELEPHONE
- FOM FIBER OPTIC MARKER

STORM INVERTS
1. TOP MH-986.66 FL IN S-972.16 FL IN N-976.06 FL OUT W-951.96
2. TOP CI-980.65 FL IN S-973.80 FL IN E-976.65 FL OUT N-973.45
3. TOP CI-980.65 FL OUT W-973.96
4. TOP MH-996.00 FL IN E-985.60 FL OUT N-982.70
5. TOP CI-988.79 FL IN S-983.69 FL OUT N-982.70

SANITARY INVERTS
1. TOP SMH-980.17 FL IN S-975.17 FL OUT N-974.97
2. TOP SMH-996.38 FL IN S-985.38 FL OUT N-984.58
3. TOP SMH-978.32 FL OUT W-966.92
4. TOP SMH-966.74 FL OUT W-955.24



LOCATION MAP
Sec. 15, Twp. 51 N., Rge. 33 W. (N.T.S.)

Property Description:

A tract of land in the Southeast Quarter of Section 15, Township 51 North, Range 33 West of the 5th Principal Meridian in Kansas City and Gladstone, Clay County, Missouri being bounded and described as follows: Beginning at the Southeast corner of Lot 11, WILLOW CREEK (LOTS 1 THRU 12), a subdivision of land in said Clay County; thence South 00°32'37" West, along the West right-of-way line of N. Broadway Avenue, as now established, 339.95 feet; thence South 44°27'23" West, continuing along said West right-of-way line, 6.92 feet to a point on the North right-of-way line of NW 72nd Street, as now established; thence North 89°20'17" West, along said North right-of-way line, 364.82 feet to the Southeast corner of WILLOW GLEN, a subdivision of land in said Clay County, Missouri; thence North 00°32'37" East, along the East line of said WILLOW GLEN, 290.40 feet; thence South 89°17'19" East, continuing along said East line, 23.69 feet; thence North 00°32'37" East, continuing along said East line 82.40 feet (82.06' Plat) to a point on the South line of WILLOW CREEK (LOTS 13 THRU 73), a subdivision of land in said Clay County, thence South 81°09'49" East, along the South line of said WILLOW CREEK (LOTS 13 THRU 73), 198.00 feet to the Southwest corner of Lot 12, said WILLOW CREEK (LOTS 1 THRU 12) ; thence South 89°27'03" East, along the South line of said WILLOW CREEK (LOTS 1 THRU 12), 150.00 feet to the Point of Beginning. Containing 126,866 square feet or 2.96 acres, more or less.

SURVEYORS NOTES:

1. Property information referencing this survey was taken from the Commitment for Title Insurance Report, issued by Integrity Land Title Company, Inc., Firm File No. KC-IT-7089-10, with an effective of May 14, 2010 at 8:00 a.m.

2. Bearings used hereon are based on the Missouri State Plane Coordinate System, NAD 1983, West Zone. Vertical Datum is based on the North American Vertical Datum of 1988 (NAVD 88).

3. The underground utilities shown hereon have been located from field survey information, existing drawings and marking provided by Missouri One Call System, Inc. The surveyor makes no guarantee that underground utilities shown comprise all such utilities in the area, either in service or abandoned. The surveyor further does not certify that they are located as accurately as possible from information available at the time of survey. The surveyor has not physically located the underground facilities.

4. Field work was completed in May 2010.

CERTIFICATION:

I hereby certify that this survey was prepared 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 Missouri and that this survey was performed in compliance with the requirements of the current Missouri Minimum Standards for Property Boundary Surveys.

JASON S. ROUDEBUSH PLS 2002014092
DATE: 6-2-10

BOUNDARY / TOPOGRAPHIC SURVEY

72ND AND BROADWAY
SEC. 15 – TWN. 51N – RNG. 33W
KANSAS CITY, CLAY COUNTY, MISSOURI

Date of Survey: 06-02-10

Surveyed By:	ZB / KB
Reviewed By:	BAL
Drafted By:	JR
Lutjen Project No.:	10081

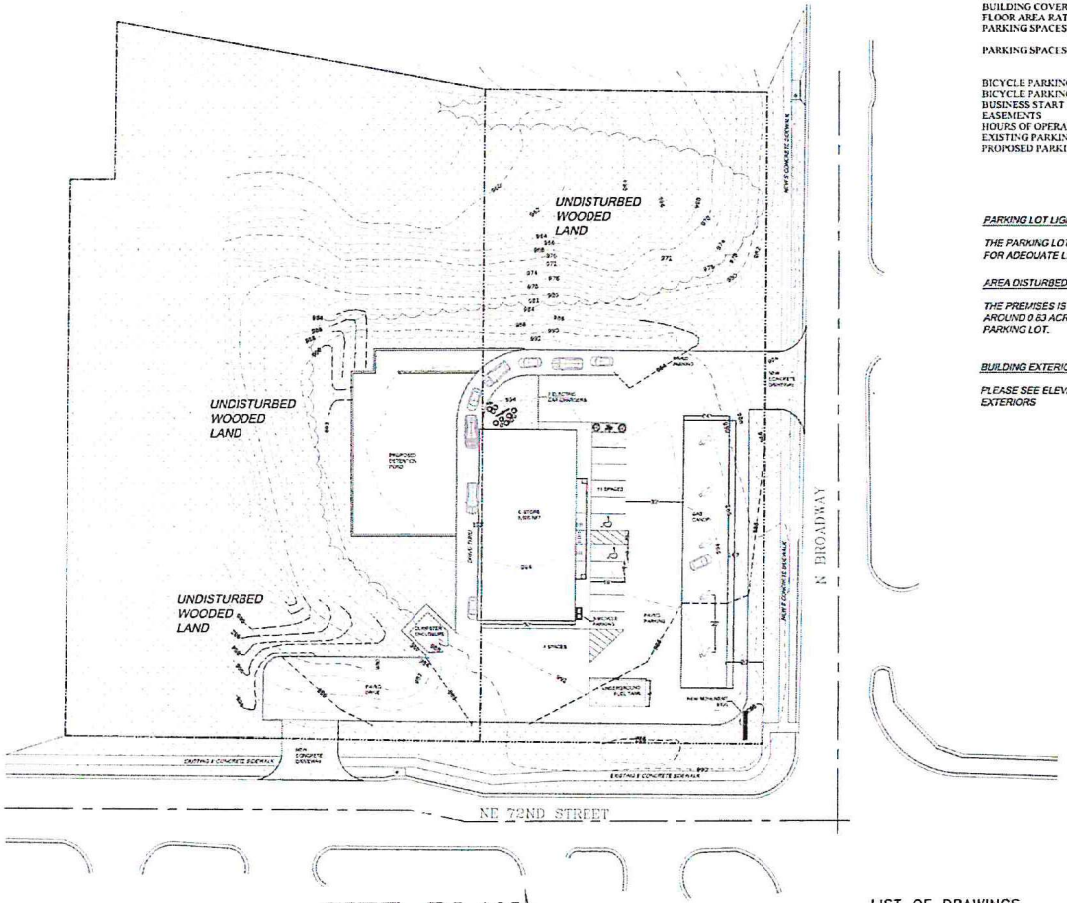
LUTJEN
1201 Burlington, #100
North Kansas City, MO 64116
816.587.4330
816.587.1393 fax
www.lutjen.com
surveying
planning
engineering
landscape architecture

Sheet No.: 1 of 1

Location: S:\Projects\MISSOURI\15-51-33\10081-01-(72nd and Broadway)\Plans\Boundary\10081-72nd and Broadway Bnd - 6-2-10.dwg

SHORT STOP GAS STATION
DEVELOPMENT APPLICATION
400 NE 72ND STREET, GLADSTONE, MISSOURI

LOCATION PLAN



SITE PLAN

30 15 0 30 60

LEGEND

- EXISTING/PROPOSED CONCRETE SURFACE
- GRASS COVER
- BUILDING OUTLINE
- PROPERTY LINE
- FIRE HYDRANT
- STREET CENTER LINE

APPLICATION INFORMATION

EXISTING ZONING	CP1 (GLADSTONE)
PROPOSED ZONING	CP1
TOTAL LAND	1.19 ACRES
LAND AREA FOR EXISTING & PROPOSED STREET RIGHT-OF-WAY	NONE
NET LAND AREA OR ACRES	1.19 ACRES
PROPOSED USE	M - GAS STATION WITH 5,000 SFT CONVENIENCE STORE
BUILDING HEIGHT	SINGLE STORY BUILDING 17 FEET C-STORE A
GROSS FLOOR AREA	5,000 SFT
BUILDING COVERAGE/ FLOOR AREA RATIO	0.10 %
PARKING SPACES REQUIRED	2.5 SPACES PER 1000 SFT OF RETAIL SPACE (13 SPACES)
PARKING SPACES PROVIDED	14 SPACES PLUS TWO ELECTRIC CAR CHARGERS INCLUDING 1 ACCESSIBLE SPACE
BICYCLE PARKING REQUIRED	2 SPACES
BICYCLE PARKING PROVIDED	3 SPACES WITH 2 LONG TERM SPACE
BUSINESS START DATE	SPRING 2024
EASEMENTS	NONE
HOURS OF OPERATION	24 HOURS
EXISTING PARKING LOT	CONCRETE/ASPHALT COVERED
PROPOSED PARKING LOT	CONCRETE PAVEMENT

PARKING LOT LIGHTING:

THE PARKING LOT SHALL HAVE 6 PARKING LIGHT POLES INSTALLED FOR ADEQUATE LIGHTING

AREA DISTURBED:

THE PREMISES IS CURRENTLY GREEN SPACE AND WE WILL DISTURB AROUND 0.83 ACRES TO PUT THE NEW BUILDING,CANOPY AND PARKING LOT.

BUILDING EXTERIOR:

PLEASE SEE ELEVATION PLANS THAT SHOW THE BUILDING EXTERIORS

LEGAL DESCRIPTION

BEG SW COR LT 12 WILLOW CREEK E146, S340, SW21.21, W131, N TO POB

BEG SE COR LT 13 WILLOW CRK, S TO NL NW 72ND ST, W210, N290.4, E231.69, N82.06, SELY TO POB

OWNERS:

MUHAMMAD ARIF HAFIZ
1121 SW BLAZINGSTAR COURT
LEES SUMMIT, MO 64081
(816) 786-1622

DESIGNED BY:

GERALD W MENEFEE, P.E.
KAM DESIGN GROUP LLC
9000 E BANNISTER ROAD, SUITE 100
KANSAS CITY, MO-64134
(816) 797-2065
kamdesign@aol.com

DEVELOPER
MPS CONTRACTING LLC
14926 BENSON STREET
OVERLAND PARK, KS 66221

LIST OF DRAWINGS

No.	Description	Date
	SUBMITTED FOR CWPB APPROVAL	03/30/2024

Design Group LLC
9000 E Bannister Road
Suite 100
Kansas City, Missouri 64134
(816) 797-2065

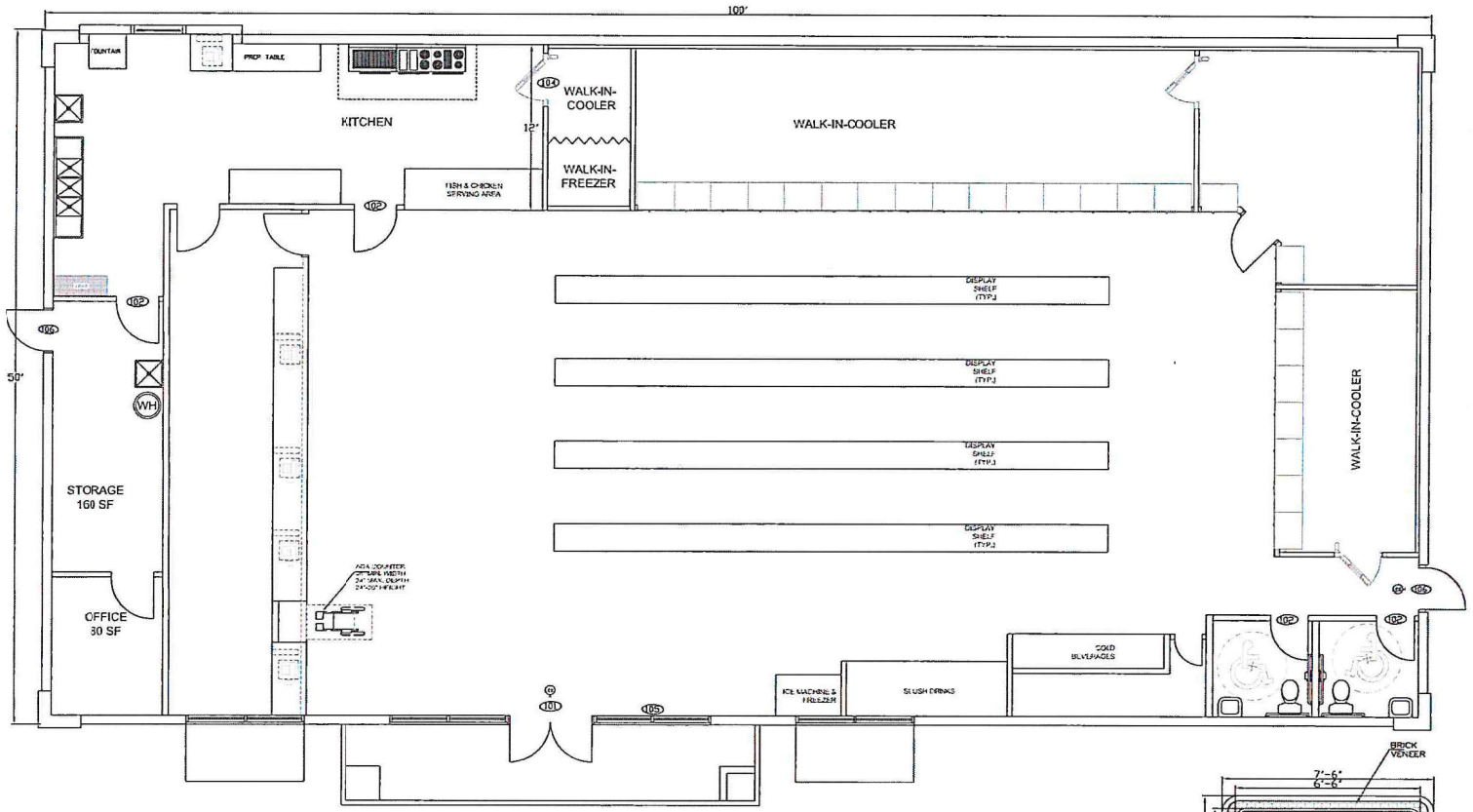
SHORT STOP GAS STATION
PROJECT

400 NE 72ND STREET
GLADSTONE, MISSOURI

SITE PLAN

Project number	2023-109
Drawn by	KRB
Checked by	GWM

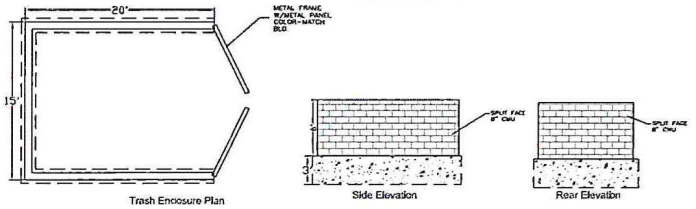
SHEET 1



Scale 1/4"= 1'

Floor Plan

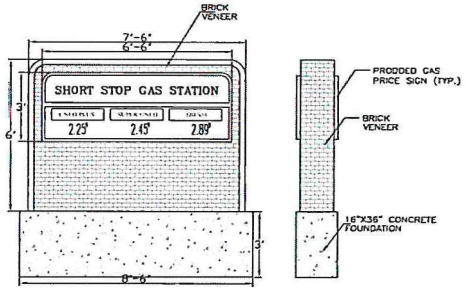
Scale 1/4"= 1'



Trash Enclosure Plan

Side Elevation

Rear Elevation



NEW MONUMENT SIGN

FLOOR PLAN & DETAILS

Project number	2023-109
Drawn by	KRB
Checked by	DWH

SHEET 2

SHORT STOP GAS STATION PROJECT

400 NE 72ND STREET,
GLADSTONE, MISSOURI

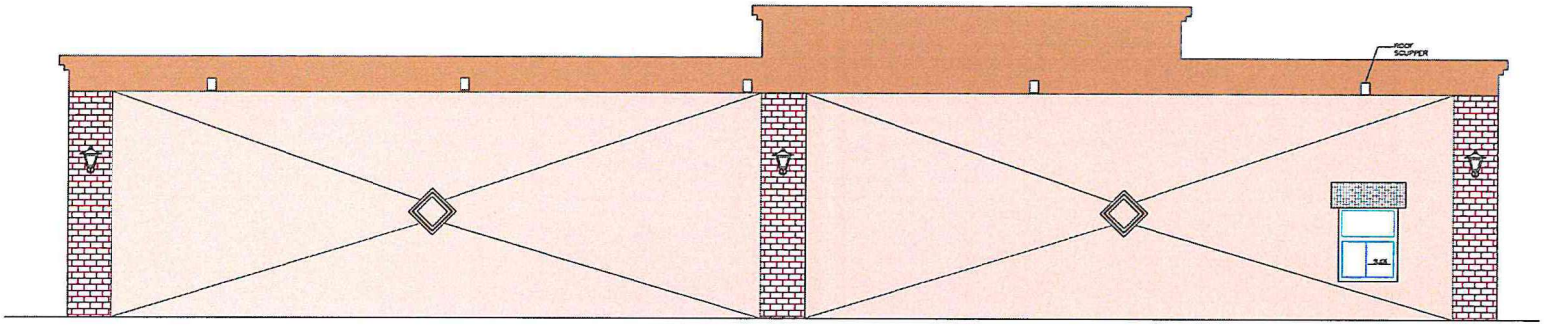
STATE OF MISSOURI — DARRYL KEITH LEWIS — ARCHITECT

05/10/2023

INNOVATIVE DESIGN & RENOVATION
8011 PASEO BLVD. UNIT #201
KANSAS CITY, MISSOURI 64131
(816) 797-2065
(816) 531-2221

No.	Description	Date
	SUBMITTED FOR CITY APPROVAL	05/17/2023

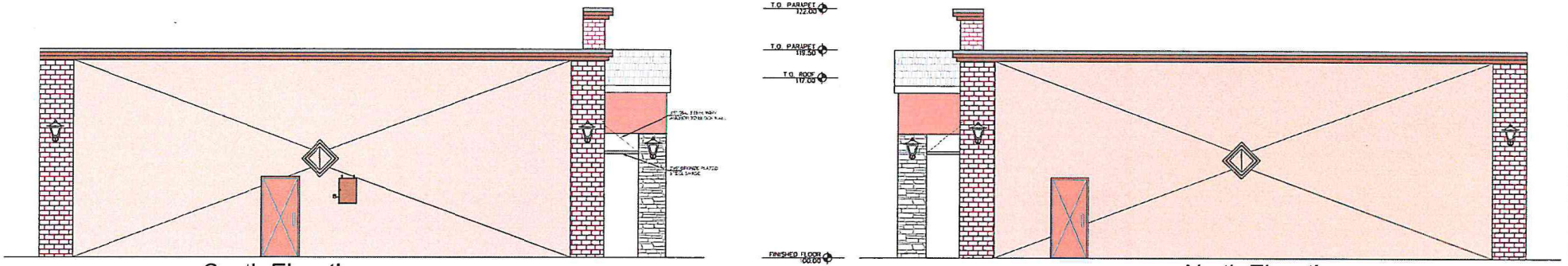
Front Elevation



West Elevation

EXTERIOR MATERIAL LEGEND:

- CONCRETE STUCCO COLOR - MATCH BRICK
- BURNT CLAY BRICK VENEER COLOR - ANTIQUE RED
- BURNT CLAY KING BRICK VENEER COLOR - ANTIQUE BLOOD RED
- CONCRETE STUCCO COLOR - GREY
- ALUMINUM STOREFRONT SYSTEM MANUFACTURER - KAWNEER OR APPROVED EQUAL FINISH - ANODIZED ALUMINUM, OR FLUROPOLOMER FINISH
- CEMENT STUCCO COLOR - HATTERAS (63149)
- WALL MOUNTED LIGHT MANUFACTURER - LUMINIS NAUTILUX NT 870 FIXTURE WITH 90 DEGREE CUT-OFF



South Elevation

North Elevation

ELEVATIONS SHEET

Project number	2023-109
Drawn by	KRB
Checked by	DWH

SHEET 3

SHORT STOP GAS STATION PROJECT

400 NE 72ND STREET,
GLADSTONE, MISSOURI

05/10/2023

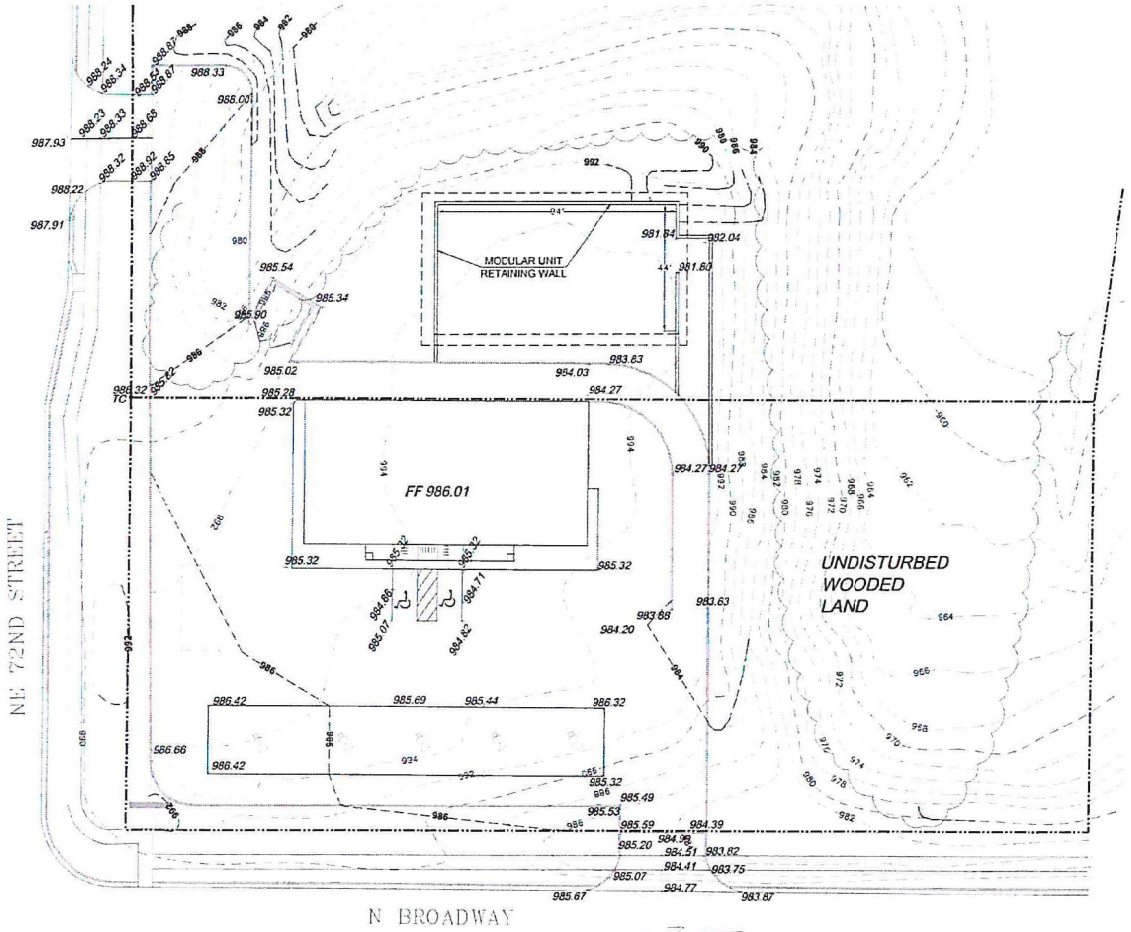
INNOVATIVE DESIGN & RENOVATION
8011 PASEO BLVD. UNIT #201
KANSAS CITY, MISSOURI 64131
(816) 797-2065
(816) 531-2221

No.	Description	Date
	SUBMITTED FOR CITY APPROVAL	05/17/2023

BUILDING RENDERING

BUILDING RENDERING Project number 2023-109 Drawn by KRB Checked by DWH SHEET 4	SHORT STOP GAS STATION PROJECT 400 NE 72ND STREET, GLADSTONE, MISSOURI		INNOVATIVE DESIGN & RENOVATION 8011 PASEO BLVD. UNIT #201 KANSAS CITY, MISSOURI 64131 (816) 797-2065 (816) 531-2221

No.	Description	Date
	SUBMITTED FOR CITY APPROVAL	05/10/2023



GRADING PLAN

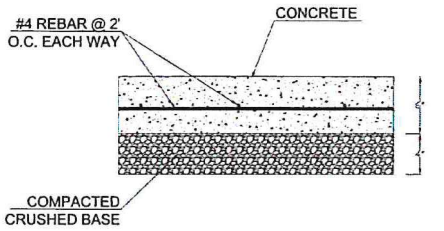
20 10 0 20 40

LEGEND

- BUILDING OUTLINE
- PROPERTY LINE
- 809.92 SPOT ELEVATIONS
- 809.92 / 809.42 TOP OF CURB ELEVATION / TOP OF PAVEMENT ELEVATION
- EXISTING CONTOUR
- PROPOSED CONTOUR

GENERAL NOTES:

1. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY OBSERVED DISCREPANCIES IN DIMENSIONS, DETAILING, OR OTHER ITEMS AS SHOWN ON THE PLANS OR SPECIFIED PRIOR TO PROCEEDING WITH WORK RELATED TO SAID DISCREPANCIES.
2. ALL WORK SHALL BE DONE IN ACCORDANCE WITH LOCAL CODES
3. CONTRACTOR SHALL INCLUDE ALL LABOR, MATERIAL, AND EQUIPMENT TO PROVIDE COMPLETE AND FUNCTIONING INSTALLATIONS. AND ALL MATERIAL AND EQUIPMENT SHALL BE NEW UNLESS OTHERWISE SPECIFIED.
4. ACCEPTANCE OF WORK SHALL BE SUBJECT TO OWNER'S REPRESENTATIVE APPROVAL OF WORK IN PLACE AS WELL AS SHOP DRAWINGS AND SAMPLE OF MATERIALS AND EQUIPMENT WHICH SHALL BE CHECKED BY CONTRACTOR BEFORE SUBMITTAL.
5. PROTECT ALL EXISTING UTILITIES ALONG THE SOUTH FOR FUTURE USE OF THE NEW BUILDING.
6. REMOVE ALL EXISTING PAVEMENT AND RESURFACE THE PARKING AREA WITH 6" CONCRETE PAVEMENT PLEASE FOLLOW THE DETAIL SHOWN ON THIS SHEET. THE TANK AREA SHALL BE PAVED WITH 8" CONCRETE PAVED WITH REINFORCEMENT.
7. INSTALL NEW DRIVEWAY ALONG THE WEST ACCESS ROAD. NEW DRIVE APPROACHES SHALL BE CONSTRUCTED PER KCMO STANDARD COMMERCIAL DRIVEWAY DRAWING. CONSTRUCT ADA COMPLIANCE ACCESSIBLE RAMPS ON EACH SIDE OF NEW DRIVEWAY.



CONCRETE PAVEMENT SECTION

NTS

No.	Description	Date
	SUBMITTED FOR OWNER APPROVAL	03/30/2024

KM Design Group LLC.
9000 E Bannister Road
Suite 100
Kansas City, Missouri 64134
(816) 797-2565

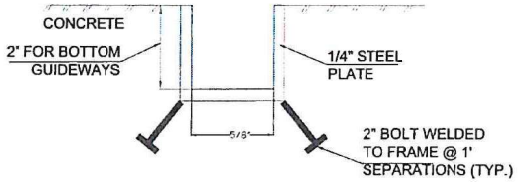
SHORT STOP GAS STATION PROJECT

400 NE 72ND STREET
GLADSTONE, MISSOURI

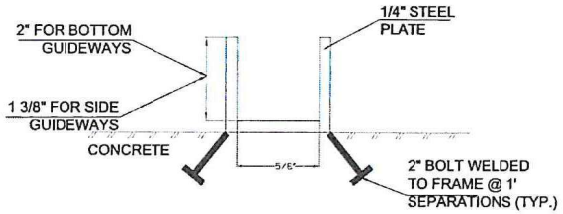
GRADING PLAN

Project number	2023-109
Drawn by	KRB
Checked by	GWM

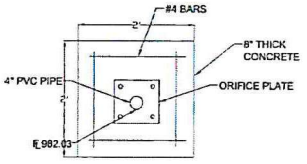
SHEET 5



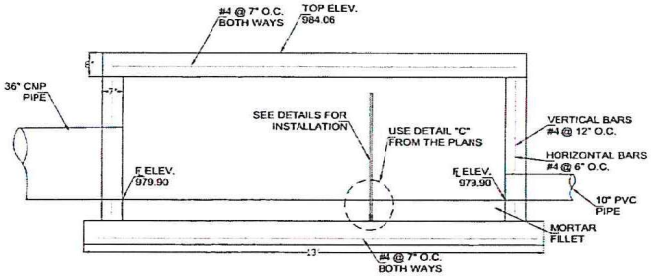
BOTTOM FRAME RESTRAINER FOR ORIFICE PLATE
NTS DETAIL "C"



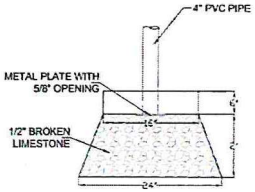
SIDE FRAME RESTRAINER FOR ORIFICE PLATE
NTS DETAIL "D"



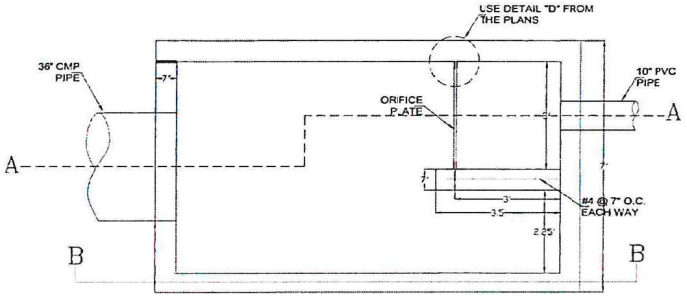
WATER QUALITY
PLATE DETAIL
NTS



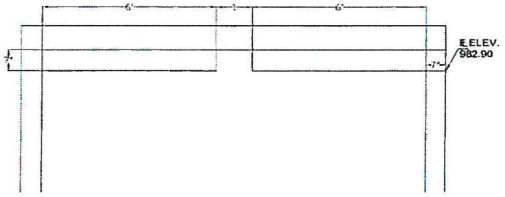
SECTION A–A



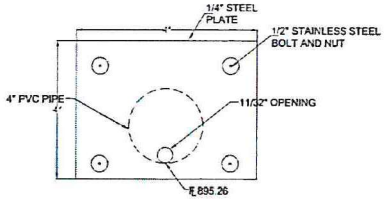
OUTFALL FOR WATER
QUALITY BASIN
NTS



STRUCTURE PLAN VIEW



SECTION B–B



WATER QUALITY DRAIN OUTLET DETAIL
NTS

No.	Description	Date
	SUBMITTED FOR CONSTRUCTION APPROVAL	07/10/2023

KAM Design Group, LLC.
9000 E Bannister Road
Suite 100
Kansas City, Missouri 64134
(816) 797-2065

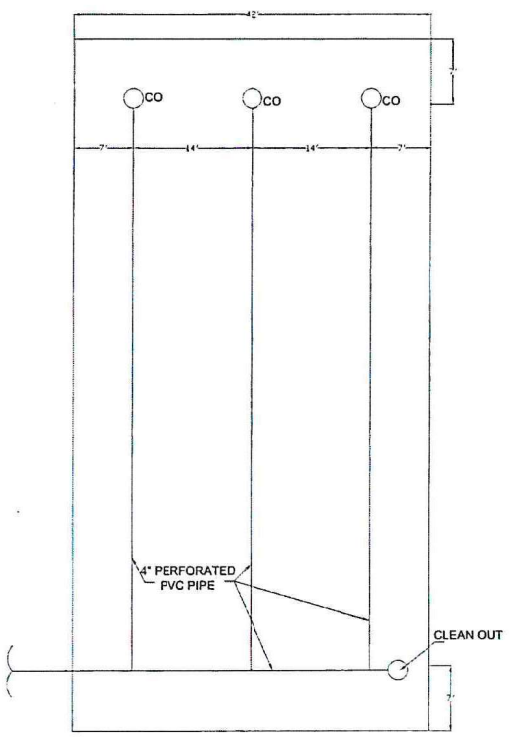
SHORT STOP GAS STATION
PROJECT

400 NE 72ND STREET
GLADSTONE, MISSOURI

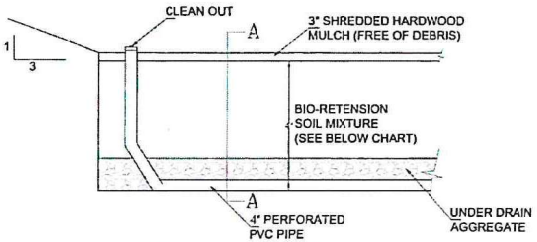
DETAILS SHEET

Project number	2023-109
Drawn by	KRB
Checked by	GWM

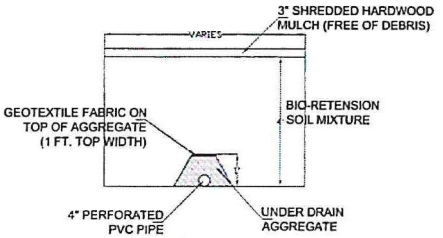
SHEET 6



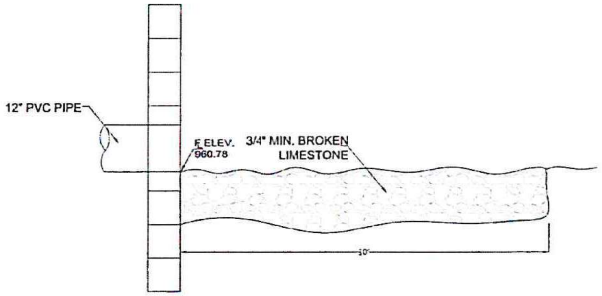
4" PVC PIPE PLAN FOR BIORETENSION BED
NTS



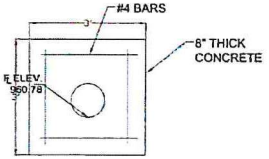
BIO-RETENSIOM BASIN TYPICAL X-SECTION
NTS



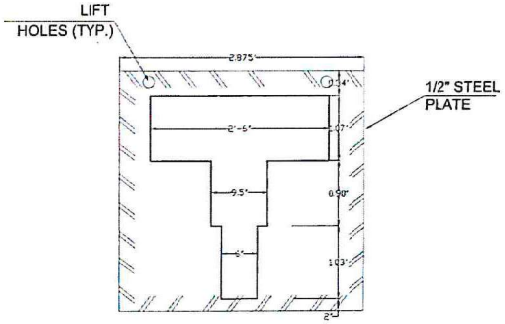
SECTION A-A



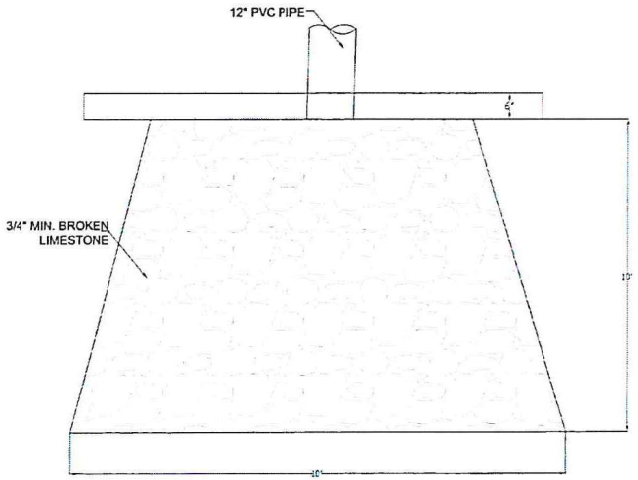
SECTION VIEW
NTS



DETENTION DISCHARGE PLATE DETAIL
NTS



ORIFICE PLATE FOR DETENTION OUTFLOW
NTS



OUTFALL FOR WATER QUALITY BASIN
NTS

BIO-RETENSION SOIL MIXTURE

COMPONENTS	RATIO BY VOLUME
FILTER SAND	70% (+/- 3%)
COCONUT COIR FIBER	20% (+/- 2%)
HIGH CARBON WOOD ASH	10% (+/- 1%)

No.	Description	Date
	SUBMITTED FOR OWNER APPROVAL	07/10/2023

Design Group LLC.
9200 E Bannister Road
Suite 100
Kansas City, Missouri 64134
(816) 797-2065

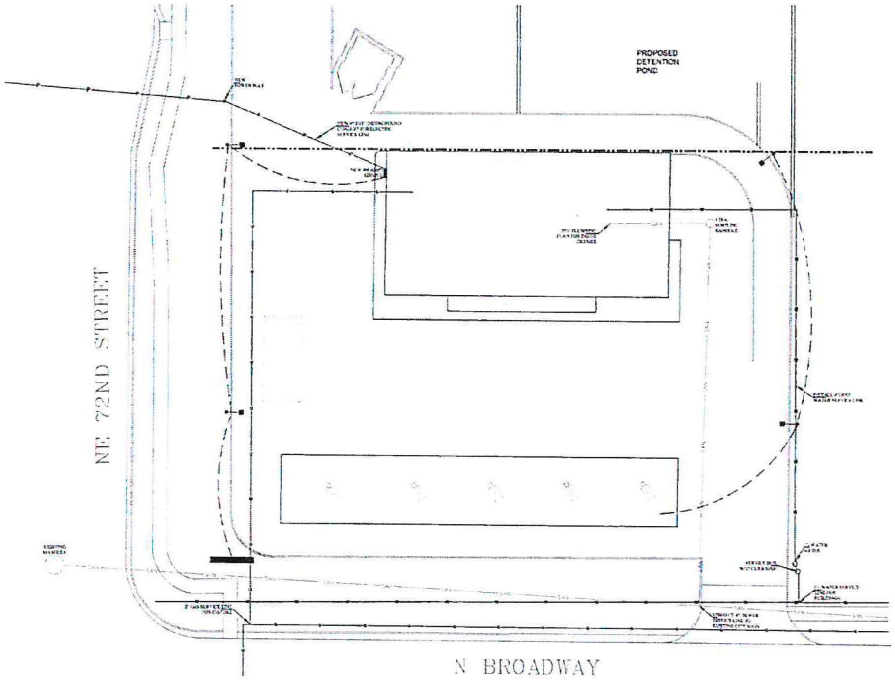
SHORT STOP GAS STATION
PROJECT

400 NE 72ND STREET
GLADSTONE, MISSOURI

DETAILS SHEET II

Project number	2023-109
Drawn by	KRB
Checked by	GWM

SHEET 7

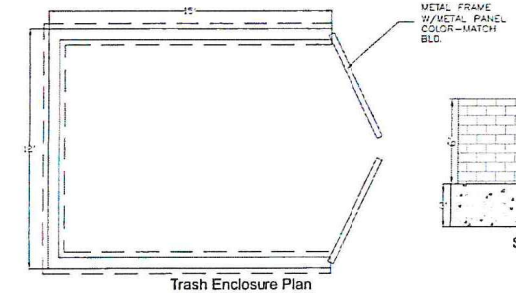


LEGEND

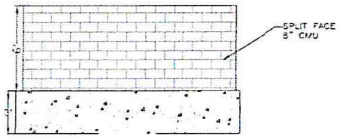
- BUILDING OUTLINE
- PROPERTY LINE
- WATER SERVICE LINE
- GAS SERVICE LINE
- SANITARY SERVICE LINE
- ELECTRICAL SERVICE LINE
- UNDERGROUND CONDUIT FOR LP'S

UTILITY PLAN

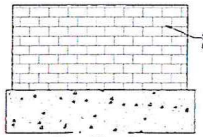
20 10 0 20 40



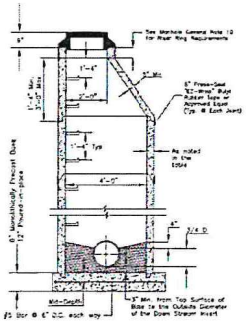
Trash Enclosure Plan



Side Elevation



Rear Elevation



MANHOLE GENERAL NOTES

1. All manhole rings shall be set on a mortar of two (2) rows of 3/4 to 1 inch pre-formed butyl joint sealer.
2. All manhole rings to be placed in pavement or in areas to be subsequently paved shall have "machined horizontal bearing surfaces" and shall comply with Class A25 as established in ASTM A-48.
3. The inside diameter of the manhole shall be 4'-0" for pipe diameters from 8" thru 24" and shall be 5'-0" for pipe diameters from 27" thru 36". In addition, the minor diameter (ID) of manholes up to 20 feet deep shall be 3'-6". ID shall be 5'-0" for depths up to 25 feet and ID shall be 6'-0" for depths exceeding 25 feet unless otherwise noted on the plans.
4. All manhole bases (pre-cast or poured-in-place) shall have No. 5 reinforcing bars places on 6" centers both ways.
5. All standard manhole rings and covers to be Dexter 1315-Jcs, Neenah NF-1536C019/3 (Grate) and NF-1536C019/3 (cover), or approved equal. All manhole rings and covers shown in plans to be as "watertight" to be Clay & Bailey Manufacturing Co. No. 2004N, Neenah R-1916-I-C or approved equal. An extra payment for furnishing "watertight" ring and cover as shown in plans will not be made, but shall be considered as subsidiary to the item, "Standard Manhole".
6. Standard manhole steps to be steel core, plastic coated steps (M.A. Ind, Inc. No. PS1- PF, PS2-PF, or approved equal).
7. Maximum grade adjustment allowable is 8". Minimum allowable thickness for precast concrete grade adjustment ring is 4".
8. Reinforcement in all precast sections shall equal or exceed ASTM C-478 specifications.
9. Butyl material to be used at all precast sections joints. O-rings may be used for joints below the cone section, but the cone section itself shall not have O-ring joints.
10. Riser Rings

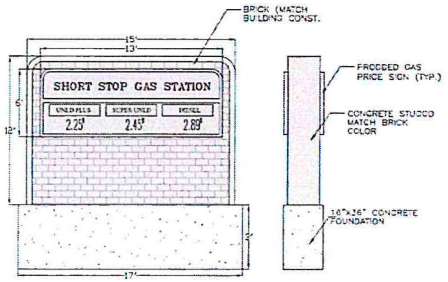
   A. Manholes in Pavement. The thickness of the recycled rubber riser rings shall not be less than one (1) inch nor greater than four (4) inches. If the required thickness of riser rings exceeds 4 inches, a 4-inch or 8-inch precast concrete riser ring must be installed between the rubber riser ring and the cone. Riser rings may be used up to a maximum of 12 inches. The minimum number of riser rings required to achieve the necessary adjustment shall be used. The rubber riser rings shall be tapered to match the slope of the existing or proposed pavement at the manhole. The joints between the cone, rubber riser rings, and casting shall be sealed with the manufacturer-supplied sealant.

   B. Manholes Not in Pavement. All manholes shall be provided with riser ring(s) underneath the casting as shown on typical details. A minimum of one (1) 4-inch riser ring shall be installed on top of the cone section. If a greater depth of adjustment rings is necessary, a combination of 4-inch and 8-inch riser rings may be used up to a maximum of 12 inches of riser rings. The minimum number of riser rings required to achieve the necessary adjustment shall be used. If precast concrete riser rings are used, the joints between the cone, riser ring(s), and casting shall be sealed with a double bead of preformed butyl rubber sealant. If recycled rubber riser rings are used, the joints between the cone, rubber riser rings, and casting shall be sealed with the manufacturer-supplied sealant.

   C. Brick end mortar adjustments will not be allowed.

4' DIA. STANDARD PRECAST MANHOLE
(ECCENTRIC CONE)

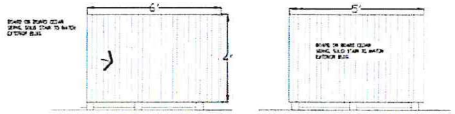
N.T.S.



NEW MONUMENT SIGN

SIGN NOTE:

THE CONTRACTOR SHALL APPLY SEPARATELY TO THE PERMIT DIVISION FOR SIGN PERMIT.



SIDE ELEVATION REAR ELEVATION

HVAC UNIT SCREENING DETAILS

NOTE:
THE HEIGHT OF THE SCREENING APPARATUS SHALL BE AT LEAST 12" HIGHER THAN ANY EQUIPMENT ON THE ROOF.

No.	Description	Date
	SUBMITTED FOR OWNER APPROVAL	03/27/2024

Design Group, LLC
9000 E. Bannister Road
Suite 100
Kansas City, Missouri 64134
(816) 297-2555

SHORT STOP GAS STATION
PROJECT

400 NE 72ND STREET
GLADSTONE, MISSOURI

UTILITY PLAN

Project number	2023-109
Drawn by	KRB
Checked by	GWM

SHEET 8

PLAN NOTES:

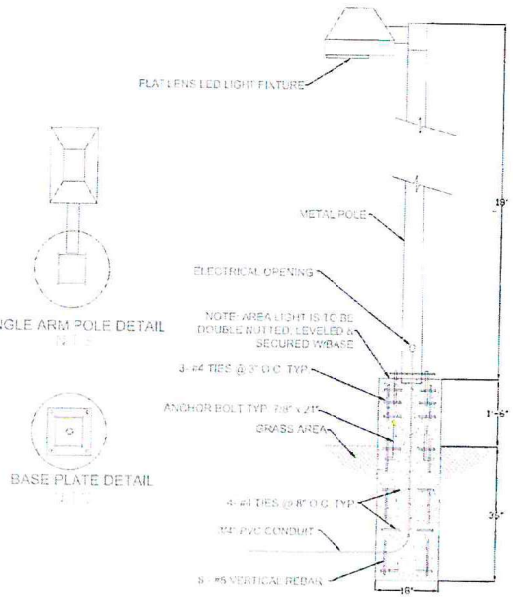
1. ROUTE 120V HOME RUN BELOW GRADE TO QUAZITE BOX SHOWN ON PLANS. ASSUMED VOLTAGE USED TO DETERMINE VOLTAGE DROP AND WIRE SIZES IS 120V, 1-PHASE.
2. PARKING LOT LIGHT WITH STEEL POLE LIGHT AND CONCRETE FOUNDATION. REFERENCE LIGHT FIXTURE SPECIFICATION THIS SHEET.
3. ASSUMED LOCATIONS OF CONDUIT ENTRY INTO BUILDING FOR SITE LIGHTING. REFER TO BUILDING ELECTRICAL ENGINEERING PLANS AND BUILDING ELECTRICAL ENGINEER FOR UPDATED LOCATIONS OF CONDUIT ROUTING INTO THE BUILDING.
4. LIGHTING CONTROLS AND CONNECTIONS, PROVISIONS FOR ELECTRICAL POWER, AND CONDUIT ROUTING INTO BUILDING ARE NOT INCLUDED WITHIN THE SCOPE OF THIS WORK. REFER TO BUILDING ELECTRICAL ENGINEER FOR MORE INFORMATION. NOTIFY ENGINEER IF ACTUAL LOCATION OF ELECTRICAL CONNECTION/CONTROL IS IN A SIGNIFICANTLY DIFFERENT AREA OF BUILDING.
5. PROVIDE QUAZITE BOX IN APPROXIMATE LOCATION FOR PULL POINT TO CONNECT WITH HOME RUNS FROM SITE LIGHTING.

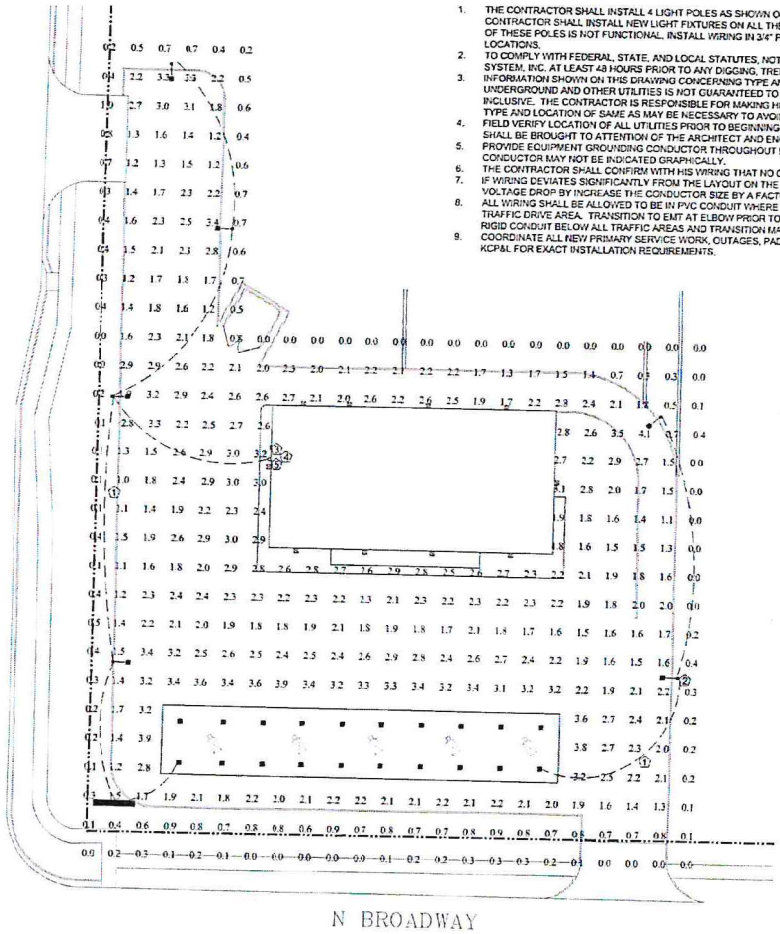
GENERAL NOTES:

1. THE CONTRACTOR SHALL INSTALL 4 LIGHT POLES AS SHOWN ON THIS SHEET. THE CONTRACTOR SHALL INSTALL NEW LIGHT FIXTURES ON ALL THESE POLES. IF WIRING TO ANY OF THESE POLES IS NOT FUNCTIONAL, INSTALL WIRING IN 3/4" PVC CONDUIT FOR POLE LOCATIONS.
2. TO COMPLY WITH FEDERAL, STATE, AND LOCAL STATUTES, NOTIFY MISSOURI ONE-CALL SYSTEM, INC. AT LEAST 48 HOURS PRIOR TO ANY DIGGING, TRENCHING, EXCAVATION, ETC.
3. INFORMATION SHOWN ON THIS DRAWING CONCERNING TYPE AND LOCATION OF UNDERGROUND AND OTHER UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATION AS TO TYPE AND LOCATION OF SAME AS MAY BE NECESSARY TO AVOID DAMAGE THERETO.
4. FIELD VERIFY LOCATION OF ALL UTILITIES PRIOR TO BEGINNING WORK. ANY INTERFERENCE SHALL BE BROUGHT TO ATTENTION OF THE ARCHITECT AND ENGINEER FOR DIRECTION.
5. PROVIDE EQUIPMENT GROUNDING CONDUCTOR THROUGHOUT EACH BRANCH CIRCUIT. CONDUCTOR MAY NOT BE INDICATED GRAPHICALLY.
6. THE CONTRACTOR SHALL CONFIRM WITH HIS WIRING THAT NO CIRCUIT EXCEEDS 3328 VA.
7. IF WIRING DEVIATES SIGNIFICANTLY FROM THE LAYOUT ON THE PLANS, ACCOUNT FOR MORE VOLTAGE DROP BY INCREASE THE CONDUCTOR SIZE BY A FACTOR OF ONE SIZE.
8. ALL WIRING SHALL BE ALLOWED TO BE IN PVC CONDUIT WHERE NOT LOCATED BELOW A TRAFFIC DRIVE AREA. TRANSITION TO EMT AT ELBOW PRIOR TO GOING ABOVE GRADE. USE RIGID CONDUIT BELOW ALL TRAFFIC AREAS AND TRANSITION MATERIALS ACCORDINGLY.
9. COORDINATE ALL NEW PRIMARY SERVICE WORK, OUTAGES, PAD REQUIREMENTS, ETC. WITH KCP&L FOR EXACT INSTALLATION REQUIREMENTS.

LIGHT FIXTURE SPECIFICATIONS:

MANUFACTURER	INNOVATIVE LIGHTING
LIGHT TYPE	LED LIGHT ENGINE
POWER	48 WATTS
TYPE	II
MODEL	EF2-U--28-3-N
INSTALLATION	POLE MOUNTED





LEGEND

- NEW LIGHT POLE
- CANOPY LIGHT
- WALL MOUNTED LIGHT
- UNDERGROUND ELECTRIC

SITE LIGHTING PHOTOMETRIC PLAN

20 10 0 20 40

No.	Description	Date
	SUBMITTED FOR PERMITS AS PERMITTED	05/07/2024

KAM Design Group LLC.
9200 E Bannister Road
Suite 100
Kansas City, Missouri 64134
(816) 797-2065

SHORT STOP GAS STATION PROJECT

400 NE 72ND STREET
GLADSTONE, MISSOURI

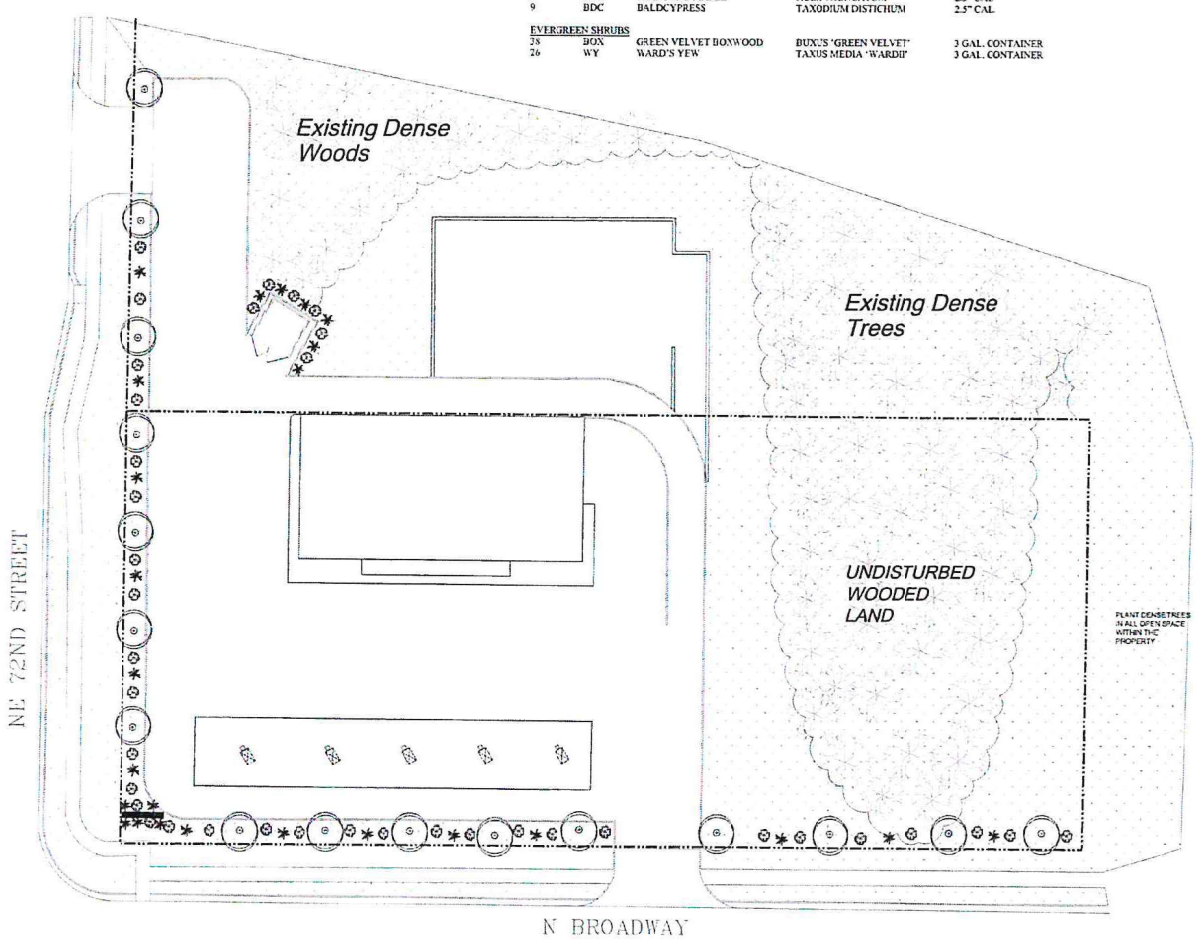
PARKING LOT PHOTOMETRIC PLAN

Project number	2023-109
Drawn by	KRB
Checked by	GWM

SHEET 9

PLANT LIST

NO.	SYMBOL	COMMON NAME	BOTANICAL NAME	SIZE
SHADE TREES				
5	SHM	SHANTUNG MAPLE	ACER TRUNCATUM	2.5" CAL
9	BDC	BALDCYPRESS	TAXODIUM DISTICHUM	2.5" CAL
EVERGREEN SHRUBS				
28	BOX	GREEN VELVET BOXWOOD	BUXUS 'GREEN VELVET'	3 GAL. CONTAINER
26	WY	WARD'S YEW	TAXUS MEDIA 'WARDII'	3 GAL. CONTAINER



LANDSCAPING NOTES:

1. ALL PLANT MATERIAL SHALL BE FIRST CLASS REPRESENTATIVES OF SPECIFIED SPECIES, VARIETY OR CULTIVAR, IN HEALTHY CONDITION WITH NORMAL WELL DEVELOPED BRANCHES AND ROOT PATTERNS. PLANT MATERIAL MUST BE FREE OF OBJECTIONABLE FEATURES. PLANTS SHALL COMPLY IN ALL APPLICABLE RESPECTS WITH PROPER MOST RECENT STANDARDS AS SET FORTH IN THE AMERICAN ASSOCIATION OF NURSERYMEN'S "AMERICAN STANDARD OF NURSERY STOCK", ANSI Z60.1. AND THE GLADSTONE NURSERY AND LANDSCAPE ASSOCIATION.
2. ORNAMENTALS AND SHRUBS SHALL BE CONTAINER GROWN AND WILL BE FREE OF DISEASE AND PESTS. ABSOLUTELY NO BARE ROOT MATERIALS. FERTILIZER OF 10-20-10: ONE PELLET OR 1-2 OZ. SHALL BE ADDED TO SOIL AT TIME OF PLANTING.
ALL SHRUB AND PLANT BEDS TO BE MULCHED WITH 3" DEPTH DARK HARDWOOD MULCH. AS AN ALTERNATE IN SHRUB BEDS, 2" DEEP SMOOTH RIVER ROCK OVER PERMEABLE WEED BARRIER FABRIC USED FOR WEED PREVENTION MAY BE INSTALLED INSTEAD OF HARDWOOD MULCH. HARDWOOD MULCH TO BE INSTALLED IN ALL ORNAMENTAL GRASS BEDS.
PLANTING BEDS ARE TO BE FREE OF WEEDS AND GRASS. TREAT BEDS WITH A PRE-EMERGENT HERBICIDE PRIOR TO PLANTING AND MULCH PLACEMENT. APPLY IN ACCORDANCE WITH STANDARD TRADE PRACTICE.
3. ALL TREES SHALL BE FERTILIZED WITH FERTILOME BRAND LIQUID ROOT STIMULATOR, 1.5 TABLESPOONS PER GAL. OF WATER, AS A SUBSTITUTE, 19-8-10 GRANULAR FERTILIZER, .75 LB. FOR 2" CAL. & 1.5 LBS. FOR 3" CAL., SHALL BE ADDED. INCORPORATE FERTILIZER INTO THE AMENDED PLANTING SOIL BEFORE PLANTING TREE. HOLE AREA FOR TREE TO BE TWICE (2x) THE DIAMETER OF THE ROOT BALL AND ROOT BALL SHALL BE MOUNDED. ALL TREES TO BE STAKED AND GUYED WITH A MINIMUM OF 3 POSTS AND PROTECTED W/ COVERING AT TREE W/ GUY WIRE.
4. ALL PLANT MATERIALS SHALL BE PROTECTED FROM THE DRYING ACTION OF THE SUN AND WIND AFTER BEING DUG, WHILE BEING TRANSPORTED, AND WHILE AWAITING PLANTING. BALLS OF PLANTS WHICH CANNOT BE PLANTED IMMEDIATELY SHALL BE PROTECTED FROM DRYING ACTION BY COVERING THEM WITH MOIST MULCH. PERIODICALLY, APPLY WATER TO MULCH-COVERED BALLS TO KEEP MOIST. IF PLANTING SHOULD OCCUR DURING GROWING SEASON, APPLY ANTI-DESICCANT TO LEAVES BEFORE TRANSPORT TO REDUCE THE LIKELIHOOD OF WINDBURN. REAPPLY ANTI- DESICCANT AFTER PLANTING TO REDUCE TRANSPIRATION.
5. AFTER PLANTING IS COMPLETED, REPAIR INJURIES TO ALL PLANTS AS REQUIRED. LIMIT AMOUNT OF PRUNING TO A MINIMUM TO REMOVE DEAD OR INJURED TWIGS AND BRANCHES. PRUNE IN SUCH A MANNER AS NOT TO CHANGE THE NATURAL HABIT OR SHAPE OF THE PLANT. MAKE CUTS FLUSH, LEAVING NO STUBS. CUTS OF ONE INCH OR MORE TO BE PAINTED WITH TREE PAINT. CENTRAL LEADERS SHALL NOT BE REMOVED.
6. THE INSTALLATION OF ALL PLANT MATERIAL SHALL BE IN COMPLIANCE WITH THE REQUIREMENTS OF THE CITY OF GLADSTONE, MO.
7. ALL LANDSCAPE AREAS TO BE FREE OF ALL BUILDING DEBRIS AND TRASH, BACK FILLED WITH CLEAN FILL SOIL AND TOP DRESSED WITH 6" OF TOPSOIL. TOPSOIL SHALL HAVE A pH RANGE OF 5.5 TO 7 AND A 4% ORGANIC MATERIAL MINIMUM, ASTM D5268.
8. ALL PLANT BED AREAS TO RECEIVE DAIRY COW MANURE SOIL CONDITIONER AT A RATE OF 4.5 CU. YDS. PER 1000 SF, AND ORGANIC COMPOST AT A RATE OF 4.5 CU. YDS. PER 1000 SF. TO DETERMINE THE AMOUNT OF PHOSPHOROUS AND POTASSIUM THE CONTRACTOR SHALL PERFORM A SOIL TEST AND ADD THOSE FERTILIZERS ACCORDING TO THE TEST RESULTS. AFTER APPLYING SOIL CONDITIONER AND FERTILIZER, THOROUGHLY TILL AREA TO A DEPTH OF 12". CONTRACTOR TO INSTALL A PERMEABLE LANDSCAPE WEED CONTROL FABRIC, 3 OZ. PER SQ. YD. MIN. IN ALL PLANT BEDS EXCEPT IN AREAS OF GROUND COVER, PERENNIAL OR ANNUAL PLANTINGS. PLANT BEDS TO BE "MOUNDED". ALL PLANT MATERIAL, PLANT BEDS, MULCH AND EDGING TO BE INSTALLED PER LANDSCAPE PLANS AND DETAILS. MYKE PRO MYCCHORIZAE GRANULES TO BE ADDED TO ALL PLANTINGS PER MANUFACTURERS RECOMMENDATIONS.
9. REESTABLISH FINISH GRADES TO WITHIN ALLOWABLE TOLERANCES ALLOWING 1-1/2" FOR SOD AND 3" FOR MULCH IN PLANT BEDS. HAND RAKE ALL AREAS TO SMOOTH EVEN SURFACES FREE OF DEBRIS, CLODS, ROCKS, AND VEGETATIVE MATTER GREATER THAN 1".
10. THE EXACT LOCATION OF ALL UTILITIES, STRUCTURES, AND UNDERGROUND UTILITIES SHALL BE DETERMINED AND VERIFIED ON SITE BY THE LANDSCAPE CONTRACTOR PRIOR TO INSTALLATION OF THE MATERIALS. DAMAGE TO EXISTING UTILITIES AND OR STRUCTURES SHALL BE REPLACED TO THEIR ORIGINAL CONDITION BY THE LANDSCAPE CONTRACTOR AT NO COST TO THE OWNER.
11. LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS AND REQ'D INSPECTIONS BY LEGAL AUTHORITIES. THE LANDSCAPE CONTRACTOR SHALL UNCONDITIONALLY GUARANTEE ALL PLANT MATERIAL FOR ONE CALENDAR YEAR.
12. ANY SUBSTITUTIONS OF DEVIATIONS SHALL BE REQUESTED IN WRITING BY THE CONTRACTOR FOR APPROVAL BY THE OWNER OR LANDSCAPE ARCHITECT.
13. THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN, OBTAINING AND INSTALLATION OF ALL IRRIGATION COMPONENTS, SLEEVING, PIPE, METERS, PERMITS, CONNECTION AND CONTROL SYSTEMS. DESIGN DRAWINGS OF THE PROPOSED IRRIGATION SYSTEM SHALL BE SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION.
14. EROSION CONTROL MAT TO BE NORTH AMERICAN SC 150-BN BIODEGRADABLE MAT OR EQUIVALENT.
15. ALL LAWN AREAS TO BE SODDED OR SEEDED WITH TURF TYPE TALL FESCUE BLEND IN LOCATIONS INDICATED ON PLANS. SEEDED LAWN TO BE HYDRO-SEEDED OR DRILLED. SOD AND SEED SHALL COMPLY WITH THE U.S. DEPT. OF AGRICULTURE RULES AND REGULATIONS UNDER THE FEDERAL SEED ACT AND EQUAL IN QUALITY TO STANDARDS FOR CERTIFIED SEED. LAWN SHALL BE TURF TYPE TALL FESCUE 3 WAY BLEND:

LAWN SEED MIX

TRI-STAR" QUICK TURF MIXTURE OR SIMILAR BLEND:

SEEDING RATE: 8 -10 LBS PER 1,000 SF

25% TITAN LTD FESCUE "TRI-STAR SEED COMPANY
25% FALCON IV TALL FESCUE SPRING HILL, KS 66083
25% 2ND MILLENNIUM TALL FESCUE 800-874-3368
25 % TURF PERENNIAL RYEGRASS

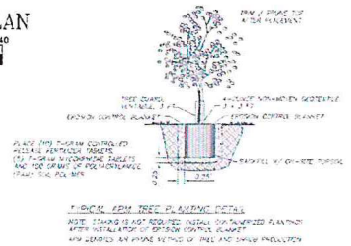
GENERAL NOTES:

1. THE LANDSCAPING AREA SHALL BE INSTALLED WITH BUILT IN IRRIGATION SYSTEM.
2. ANY DAMAGES TO CURB AND SIDEWALK IN PUBLIC RIGHT OF WAY SHALL BE REPAIRED PER CITY STANDARD DETAIL AND SPECIFICATIONS.
3. THE TRASH ENCLOSURE STRUCTURE SHALL BE CONSTRUCTED OF THE SAME MATERIAL AS FOR THE MAIN BUILDING.
4. THE GAS METER AREA SHALL BE SCREENED WITH SHRUBS. THE ELECTRICAL METER AND SWITCHGEAR SHALL BE SCREENED WITH ENCLOSURE MATCHING THE BUILDING EXTERIOR.
5. 12 TREES SHALL BE PLANTED ALONG THE PUBLIC RIGHT OF WAY.

LANDSCAPING PLAN

20 10 0 20 40

TYPICAL SHRUB PLANTING



1 INCH, KBM TREE PLANTING DETAIL

NOTE: STAKING IS NOT REQUIRED. INSTALL ON TREATED PLANTING WITH INSTALLATION OF EROSION CONTROL BLANKET. KBM REQUIRES AN ANNUAL METHOD OF PEST AND DISEASE PREVENTION

LEGEND

- NEW TREE
- NEW SHRUB PLANTINGS (LOW TREES)
- BUILDING OUTLINE
- PROPERTY LINE
- DENSE TREE LINE

No.	Description	Date
	SUBMITTED FOR OWNER'S APPROVAL	07/30/2024

KBM Design Group LLC.
9000 E. Bannister Road
Suite 100
Kansas City, Missouri 64134
(816) 797-2065

SHORT STOP GAS STATION PROJECT

400 NE 72ND STREET
GLADSTONE, MISSOURI

LANDSCAPING PLAN

Project number	2023-109
Drawn by	KRB
Checked by	GWM

SHEET 10

Property Owners Within 185' & Other Interested Parties

FROM: Community Development Department

DATE: May 2nd, 2024

SUBJECT: Gas Station & Convenience Store – Site Plan Revision

PUBLIC HEARING

All persons are hereby notified that the Gladstone Planning Commission will conduct a public hearing on Monday, May 20, 2024 at 7:00 PM in the Council Chamber of Gladstone City Hall on a request for a Site Plan Revision at 7200 N Broadway Ave. Legally described as 000000 NW 72ND ST BEG SW COR LT 12 WILLOW CREEK E146, S340, SW21.21, W138, N T O POB.

Applicant: Gerald W. Menefee P.E.

Owner: Mohammad Hafiz

Subsequently, at its regular meeting of June 10th, 2024, at 7:30 PM, the City Council will conduct a public hearing on the same request.

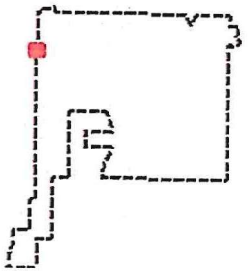
Project Summary: This project was proposed in 2023 and denied by the Gladstone City Council. The property owner has made adjustments to the site plan and is proposing to build a new gas station and convenience store on the vacant land located at 7200 N Broadway Avenue. The primary exterior building materials being used are brick and stucco. There will be two access points; one point on N Broadway Avenue and one point on NW 72nd Street. This property is zoned CP-2, Planned District, General Business and a gas station and convenience store is currently a permitted use for this commercial zoning.

Primary Adjustments to the Site Plan:

- The access point on NW 72nd Street has been shifted west to lineup with the Post Office access point.
- The water detention basin has been moved from the northern side of the property to the western side of the property away from the residential homes located to the north. This basin will be located on the KCMO parcel.
- The wooded area on the northern side of the property will primarily remain untouched.

If you have any questions or concerns, please contact Austin Greer, Community Development Director & Assistant City Manager at austing@gladstone.mo.us and/or 816-423-4102.

Gladstone, MO



Legend

- Stop Sign
- KCPL Lights
- Gladstone Lights
- School Point
- Bike Parking
- Bus Stop
- Point of Interest
- Church
- Apartment Point
- Street Centerline
- Edge Of Pavement
- Driveway
- City Limits
- Parcel
- House Number
- Building Footprint
- School Polygon
- City Park
- Villages
- Apartment Polygon

Notes

232.0 0 115.99 232.0 Feet

(minus street right-of-ways), the final City Council action has to have a minimum of four (4) positive votes for the request to be approved. The application cannot be approved if three (3) vote "yes" and two (2) "no". For further information regarding this handout, please call or come by the Community Development Department at 7010 N. Holmes, 423-4110.

☐City Code Variance Request: Board of Zoning Adjustment

REQUIREMENTS

Completed application
Owner's authorization signed (if applicable)
Legal description- County records
Information on the proposed change including pictures of the property, property surveys, written comments from impacted neighbors, etc.

DEPOSIT FEE

The $200 fee listed on the form and paid at the time of application is a deposit toward the costs the City of Gladstone incurs during the processing of your application. This fee goes toward the following costs:

Office fee $75.00
Certified mail notices to surrounding property owners within 185'- amount varies.*
Planning Commission Legal Notice- amount varies*

** Indicates fees for items required by State Law. The fee amount for certified mail will vary depending upon the number of property owners within 185 feet of your property. The Legal Notice fee will also vary generally depending upon the length of the legal description of your property.*

After the total costs are compiled for your application, you will be billed for any costs remaining over the initial $200 application deposit fee. If the costs accrued are under $200, you will be reimbursed for the difference.
As the money deposited for your application goes toward real costs paid by the City, there is no refund if your application is denied by the Board of Zoning Adjustment. If you withdraw your application before some of the costs are accrued by the City, you may be entitled to a refund.

Preliminary & Final Plat/Replat Submittals

REQUIREMENTS

Completed application
Owner's authorization signed (if applicable)
Legal description- County records
Digital copy of plans
(1) 11x17 paper copy
(3) 24x36 paper copies folded
(1) 24x36 Mylar Copy – Completion of the Plat

FEE

The $75 fee listed on the form and paid at the time of application goes toward the costs the City of Gladstone incurs during the processing of your application. As the fee for your application goes toward real costs paid by the City, there is no refund.
**At completion of the plat, please submit to Community Development (1) 24x36 Mylar copy.

OWNER'S AUTHORIZATION

I, Mohammad Hadiz, do hereby authorize _____
(Owner's name) (Applicant's name)
to apply for the following action on my property at _____
_____.

a. Rezone from to

b. Site Plan Revision ___

c. Special Use Permit ___

d. Variance ___

e. Plat/Replat ___

Date: 5/20/24 Owner's Signature: [signature]

NOTARIZATION

State of Kansas

County of Wyandotte

Subscribed and sworn before me this 20th day of May, 2024.

Notary's Signature:

[signature]

My Commission expires: 12-8-2027

KASANDRA WRIGHT
Notary Public, State of Kansas
My Appointment Expires
12-8-2027

Additional Required Documents

(check if needed)	Comments
Site Plan ___	
Traffic Study ___	
Landscaping Plans ___	
Stormwater (Pre – Post – BMP) ___	
Photometric Study ___	
Master Sign Plan ___	
Colored Elevation / Rendering ___	
Materials Board ___	

Gladstone Convenience Store

TRAFFIC IMPACT STUDY

May 20, 2024

Prepared For:
Mr. Muhammed Hafiz

Prepared By:
Priority Engineers, Inc.
PO Box 563
Garden City, MO 64747

May 20, 2024

Mr. Muhammed Hafiz

RE: Gladstone Convenience Store Traffic Impact Study – Gladstone, MO

Dear Mr. Hafiz:

In response to your request, Priority Engineers, Inc. has completed a traffic impact analysis for the above referenced project. The purpose of the analysis is to determine the potential traffic impacts associated with this development on the intersections and streets surrounding this site, primarily during the AM and PM peak hours. The following report documents our analysis and recommendations.

We appreciate the opportunity to work with you on this project. Please contact us with any questions or if you require additional information.

Sincerely,

PRIORITY ENGINEERS, INC.

Kristin L. Skinner, P.E., PTOE
President

Priority Engineers, Inc.
PO Box 563
Garden City, MO 64747
816.738.4400

Table of Contents

1) INTRODUCTION

The purpose of this study is to examine the potential traffic impacts associated with a proposed Gladstone Convenience Store development located within the municipal limits of Gladstone, in Clay County, Missouri. This proposed development will construct a convenience store located to the north and the west of the intersection of NW 72nd Street and N Broadway Street.

The study area is shown in Figure 1. The site layout is shown in Figure 2.

2) EXISTING CONDITIONS

The proposed Gladstone Convenience Store development is located on a parcel of undeveloped land located northwest of the intersection of N Broadway Street and NW 72nd Street. To the north and west of the proposed development there are existing residential developments. To the south of the proposed development is a USPS facility and to the east of the proposed development is the Gladstone Bowl bowling alley.

N Broadway Street, south of the intersection with NW 72nd Street has a cross-section of two lanes in each direction without separation and it has curb and gutter and an enclosed drainage system. This segment N Broadway Street has a posted speed limit of 35 MPH. North of the intersection with NW 72nd Street has a cross section that consists of one lane in each direction, and curb and gutter with an enclosed drainage system. The posted speed limit on this segment of N Broadway Street is 30 MPH. The Mid America Regional Council (MARC) has given N Broadway Street Street a functional classification of Minor Arterial south of NW 72nd Street and a functional classification of Minor Collector north of NW 72nd Street. The Gladstone Comprehensive Plan identifies N Broadway Street as an Arterial south of NW 72nd Street and as a Primary Collector to the north of NW 72nd Street.

NW 72nd Street, to the east, has a cross section with two through lanes in each direction. NW 72nd Street has curb and gutter and an enclosed drainage system. MARC has given NW 72nd Street a functional classification of Minor Arterial to the west. The Gladstone Comprehensive Plan identifies NW 72nd Street as an Arterial. NW 72nd Street has a posted speed limit of 35 MPH.

Peak Hour turning movement counts were collected for the following intersections:

- NE 72nd Street N Broadway Street
- NE 72nd Street and West Drive of the USPS facility
- N Broadway Street and Gladstone Bowl entrance

These counts were performed on January 17th of this year. The Peak Hour turning movement counts were performed from 7:00 to 9:00 AM and from 4:00 to 6:00 PM. The AM Peak Hour was found to be from 8:00 to 9:00 and the PM Peak Hour was found to be from 4:30 to 5:30 for the overall roadway network. The complete traffic counts are shown in Appendix II. The peak hour traffic volumes and existing lane configurations are shown in Figures 3-6.

3) PROPOSED DEVELOPMENT

The proposed development will build an approximately 5,000 SF convenience store with 10 vehicle fueling positions (VFP). The provided site plan shows a drive through window on the west side of convenience store. There will be two full access entrances into the development. The first proposed entrance is a full access entrance onto NE 72nd Street located opposite of the

west entrance into the USPS facility. Street. The second full access entrance will provide access onto N Broadway Street. This access will be located to the north of the existing Gladstone Bowl drive.

4) TRIP GENERATION

The vehicle trips generated by the proposed development were estimated using the Institute of Transportation Engineers' (ITE) Trip Generation, 11th Edition. Land Use 945, Convenience Store / Gas Station. Since this location has a drive-through window, both Land Use 935 (fast food restaurant with drive-through window and no indoor seating) and Land Use 934 (fast food restaurant with drive through window) were considered for a portion of the 5,000 SF store. It was determined that the trips generated by Land Use 945 is higher than Land Use 935 and it is slightly higher than Land Use 934, so the complete footprint of the store was considered using Land Use 945 for a more conservative trip generation estimate.

Land Use 945 has two subcategories in the ITE data set, and GFA of the Store (with independent variable of VFP and VFP (with independent variable of GFA). Selecting data from the VFP subcategory resulted in a more conservative trip generation and was selected for this study.

The estimated AM and PM peak hour traffic volumes associated with the full buildout of this development are shown in Table 1.

Table 1: ITE Trip Generation

Land Use	*Intensity*	*Daily*	*AM Peak Hour*			*PM Peak Hour*		
			Total	*In*	*Out*	*Total*	*In*	*Out*
Convenience Store/Gas Station (VFP 9-15)	5,000 SF	3353	283	141	142	273	136	137

Pass-by trips are made as intermediate stops on the way from an origin to a primary trip destination without a route diversion. For this site, pass-by trips will be those vehicles already traveling through the intersection of NW 72nd Street and N Broadway Street. Chapter 10 and Appendix E of the ITE *Trip Generation Handbook, 3rd Edition* were consulted in estimating these trips. Research indicates that on average 76 percent of AM Peak Period Hour and 75 percent of PM Peak Hour for land use 945 are pass-by in nature. The Trip Generation volumes anticipated by the development are shown in Table 2 below.

Table 2: ITE Trip Generation								
		ITE	AM Peak Hour			PM Peak Hour		
Land Use	***Intensity***	***Code***	***Total***	***In***	***Out***	***Total***	***In***	***Out***
Convenience Store/Gas Station (VFP 9-15)	5,000 SF	945	283	141	142	273	136	137
			-215	*-107*	*-108*	*-205*	*-102*	*-103*
Subtotal			283	141	142	273	136	137
Pass-By Trips			*-215*	*-107*	*-108*	*-205*	*-102*	*-103*
Total New Trips			**68**	**34**	**34**	**68**	**34**	**34**

5) TRIP DISTRIBUTION AND ASSIGNMENT

Trips generated by the Gladstone Convenience Store development were distributed based on existing traffic flows and a general analysis of the surrounding area. The trips were distributed onto the existing street system approximately as follows:

- 15 percent to and from the north via N Broadway Street
- 40 percent to and from the south via N Broadway Street
- 40 percent to and from the east via NW 72nd Street
- 5 percent to and from the west via NW 72nd Street

Pass-by trips were distributed based upon the existing traffic patterns near the study intersection of NW 72nd Street and N Broadway Street.

6) LEVEL OF SERVICE AND VOLUME/CAPACITY ANALYSES

Capacity analysis was used to quantify the impacts of the increased traffic on the intersections studied. The methodology outlined in the Highway Capacity Manual, 7th Edition was used as a basis to perform the analysis for this study. Capacity analysis defines the quality of traffic operation for an intersection using a grading system called Level of Service (LOS). The LOS is defined in terms of average vehicle delay. Levels of service A through F have been established with A representing the best and F the worst.

Table 3: Level of Service Definitions		
Level of Service	***Unsignalized Intersection***	***Signalized Intersection***
A	< 10 Seconds	< 10 Seconds
B	< 15 Seconds	< 20 Seconds
C	< 25 Seconds	< 35 Seconds
D	< 35 Seconds	< 55 Seconds
E	< 50 Seconds	< 80 Seconds
F	≥ 50 Seconds	≥ 80 Seconds

The study intersections were evaluated using Synchro based on part on Highway Capacity Manual methods. The analysis reports are included in Appendix II. Signal Timing Inputs were based upon data provided by City Staff.

Existing Conditions

The levels of service, lane configuration, and queue lengths for existing conditions are shown in Figures 5 and 6 in Appendix I.

During the AM and PM Peak Hours, the overall level of service for the signalized intersection at NW 72nd Street and North Broadway Street is a C in both the AM and PM Peak Hour.

At all STOP-controlled intersections within the study area, the minor movements operate with a level of service B or better during both AM and PM Peak Hours.

Existing + Proposed Development Conditions

The levels of service, lane configuration, and queue lengths for existing conditions are shown in Figures 9 and 10 in Appendix I.

The overall level of service remains a C in both Peak Hours for the signalized intersection with the addition of the traffic generated by the proposed development.

All STOP controlled intersections within the study area operate with a level of service C or better during both Peak Hours.

7) SIGHT DISTANCE

Intersection sight distance and stopping sight distance was measured at the proposed entrances into the development. Intersection sight distance represents the distance and time required for the driver to make the decision to turn and to complete the turn without slowing oncoming traffic. Stopping sight distance represents the amount of distance required for a driver to make an unexpected stopping maneuver based upon observing a 2' tall object in the roadway. At both locations, the AASHTO minimum sight distance for a 35 MPH design speed.

8) ACCESS MANAGEMENT

The proposed drive onto N Broadway Street is located between two existing intersections located on the east side of the street. The drive into Gladstone Bowl is approximately 110' from the intersection of NW 72nd Street and N Broadway Street. Typically, it would be recommended that proposed drive be aligned with an existing drive to minimize turning conflicts. It is not recommended that the drive be located at the Gladstone Bowl drive dure to the proximity of this drive to the signalized intersection. The proposed drive however is located approximately as far north as possible and has an approximate offset of 35' from the entrance further to the north. The next entrance to the north has a spacing of approximately 160' to the north from the Gladstone Bowl Entrance.

APWA section 5200 spacing requirements can not be met due to the close proximity of the existing entrances on the east side of N Broadway Street. The proposed drive, however, is located as far north as possible to minimize the impact of the entrance on the function of the intersection.

The entrances at both NW 72nd Street and N Broadway Street were evaluated for right and left turn lanes in accordance with the methodology associated with NCHRP Report 457 using the turn lane guidelines found in MoDOT EPG section 940.9.

At the entrance on NW 72nd Street, neither a left turn lane (EPG Section 940.9.1 left turn guidelines for roads less than or equal to 40 MPH) nor a right turn lane guideline (EPG 940.9.8 right turn lane guidance for two lane roads) is met.

At the entrance onto N Broadway Street a right turn lane is not recommended (EPG 940.9.8 right turn lane guidance for two lane roads), but a left turn lane is recommended when the 40% left turn trend line is selected as per EPG guidance. This is documented in Figure 11 of Appendix I.

9) RECOMMENDATIONS & CONCLUSIONS

This study documents the impact of the proposed Gladstone Convenience Store development on the adjacent roadway network during the AM and PM Peak Hour. Analysis of unsignalized intersections indicate that they operate with acceptable levels of service both before and after the construction of the proposed development. The signalized intersection at NW 72nd Street and N Broadway Street has and overall level of service that is acceptable both before and after construction of the proposed development.

The proposed entrance locations have sufficient sight distance.

A left turn lane is recommended according to MoDOT guidelines for the entrance on N Broadway Street in the PM Peak Hour. Due to the geometric constraints of this location, if such a turn lane were constructed, it would need to be designed so that it does not interfere with the southbound left turn lane at the signalized intersection with NW 72nd Street. The levels of service at this entrance without the left turn lane are a B or better with a design queue of less than one vehicle.

No other improvements are required as a result of this development.

APPENDIX I

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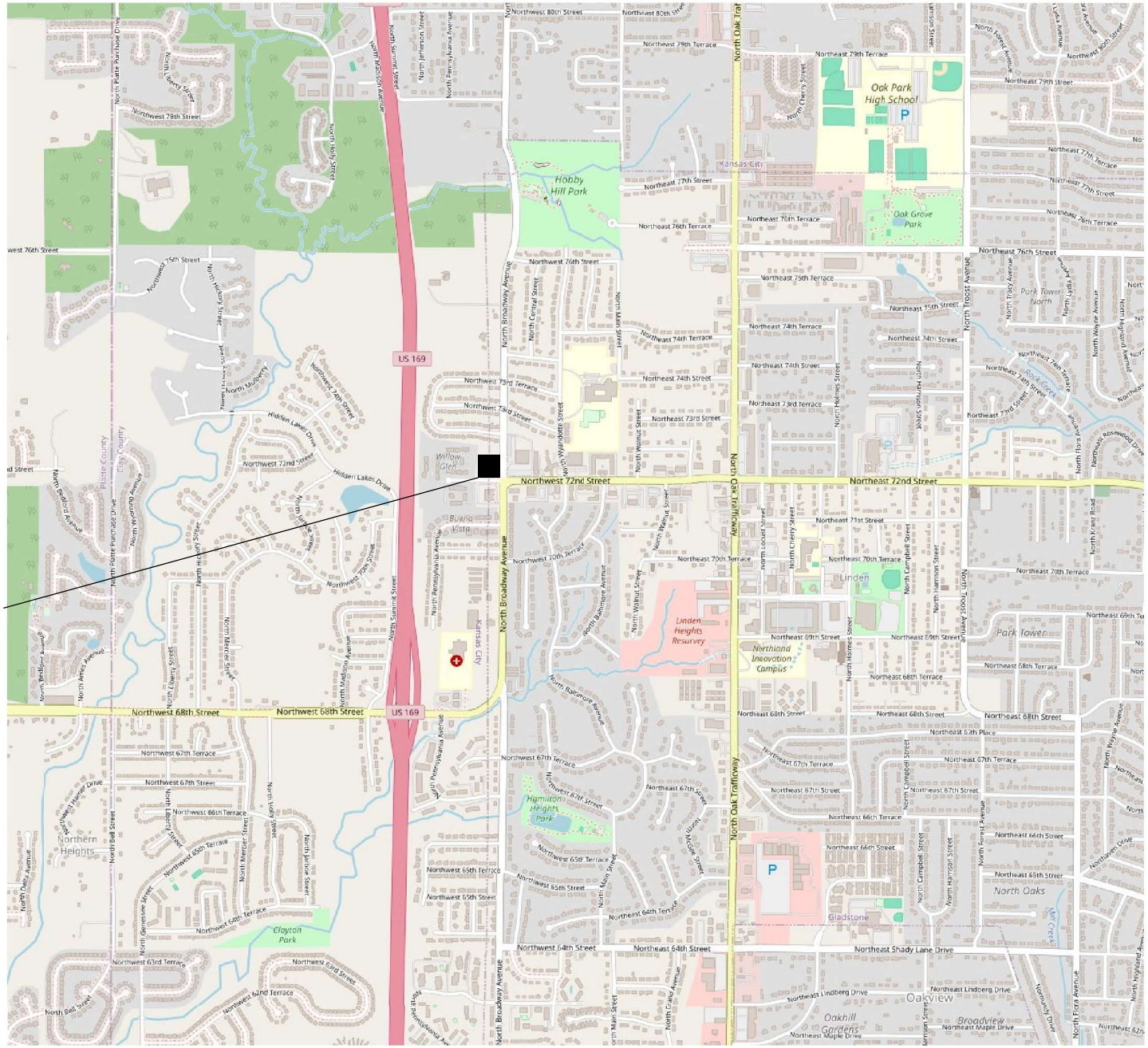
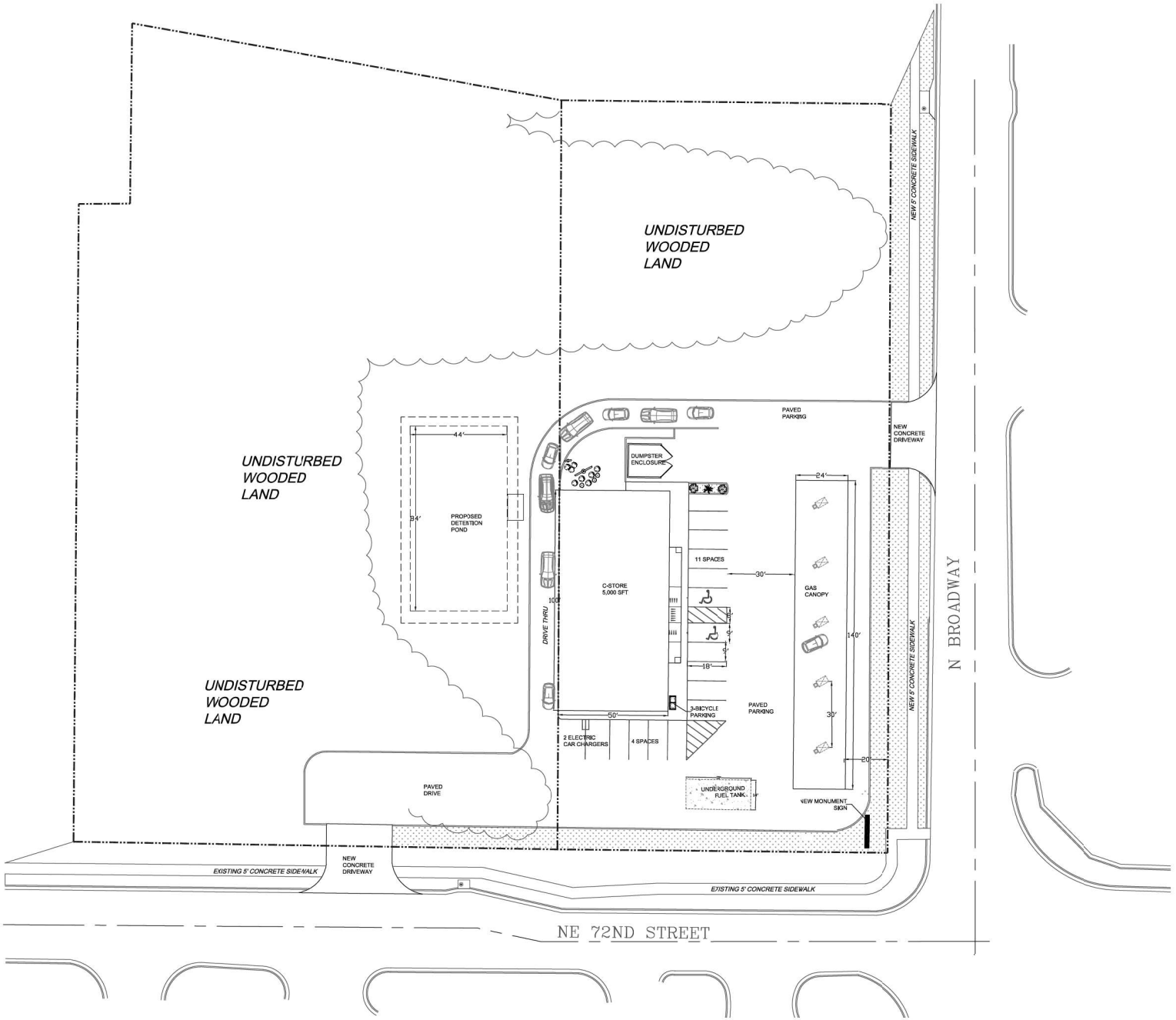


Copyright Openstreetmap Contributors

Project Location	Gladstone Convenience Store Gladstone, MO	No Scale Figure 1

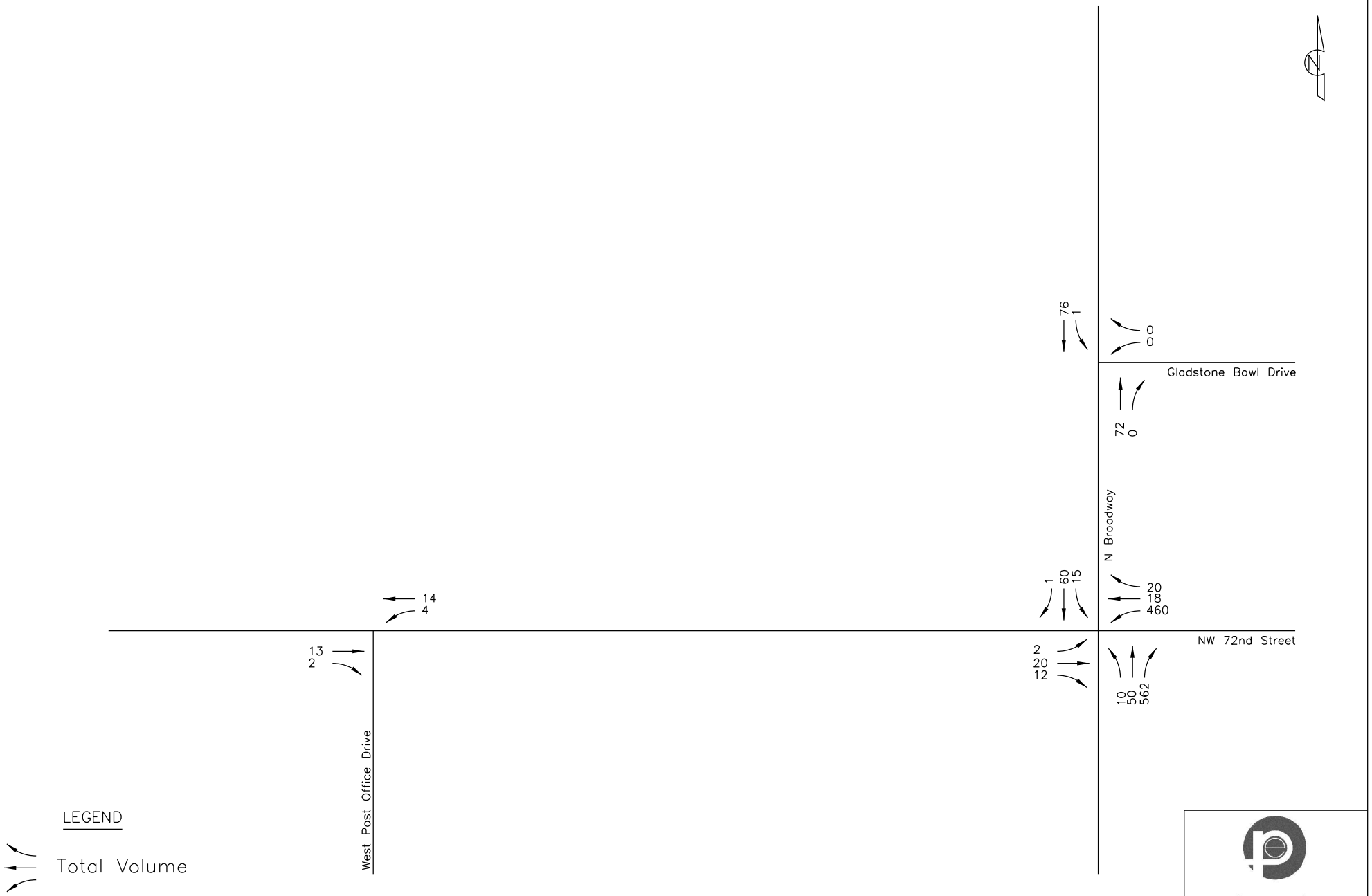
priority ENGINEERS
PO Box 563
Garden City, MO 64747
816.738.4400



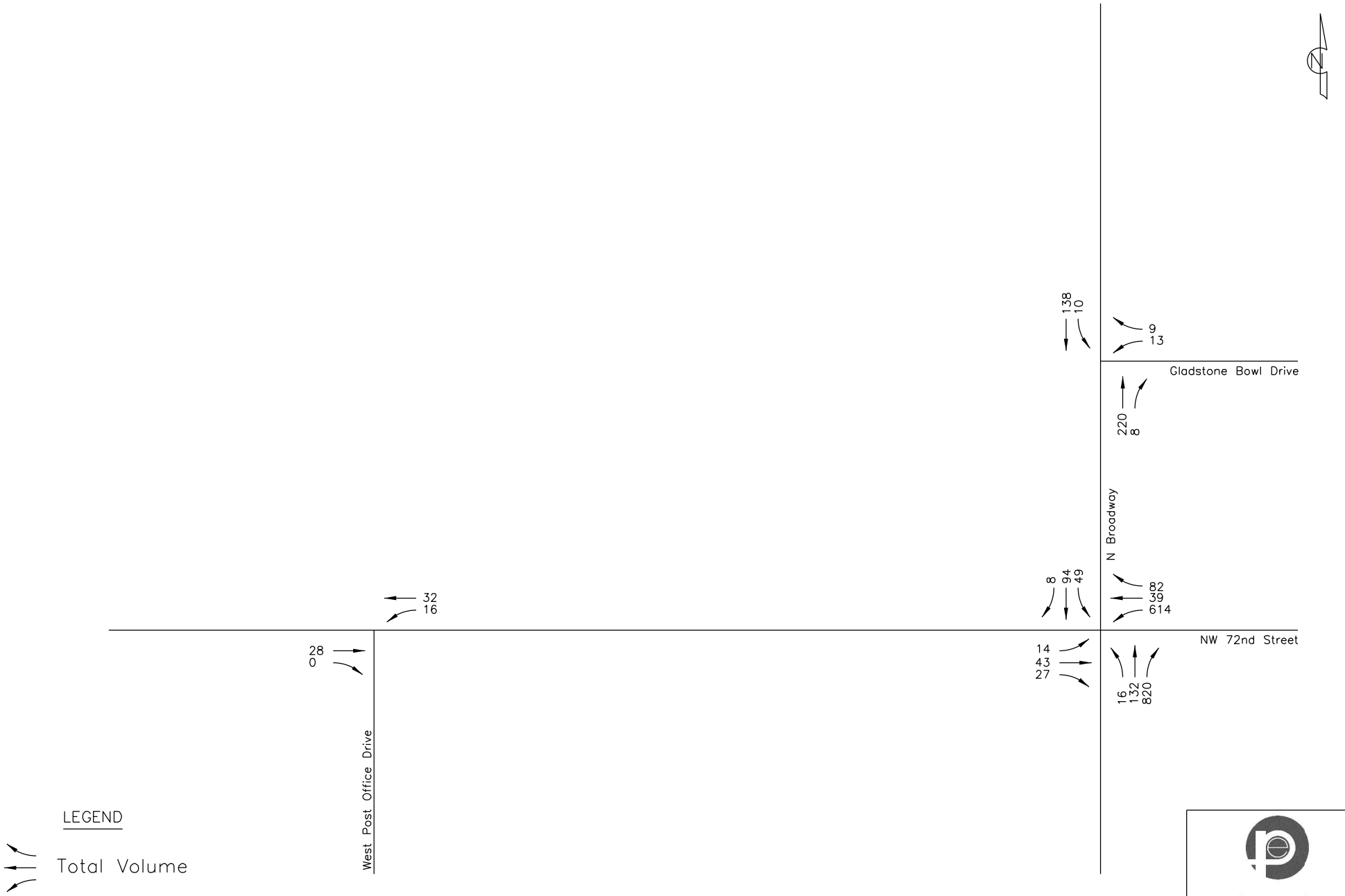
Design Group LLC.
9000 E Bannister Road
Suite 100
Kansas City, Missouri 64134
(816) 797-2065

Site Plan	Gladstone Convenience Store Gladstone, MO	No Scale Figure 2

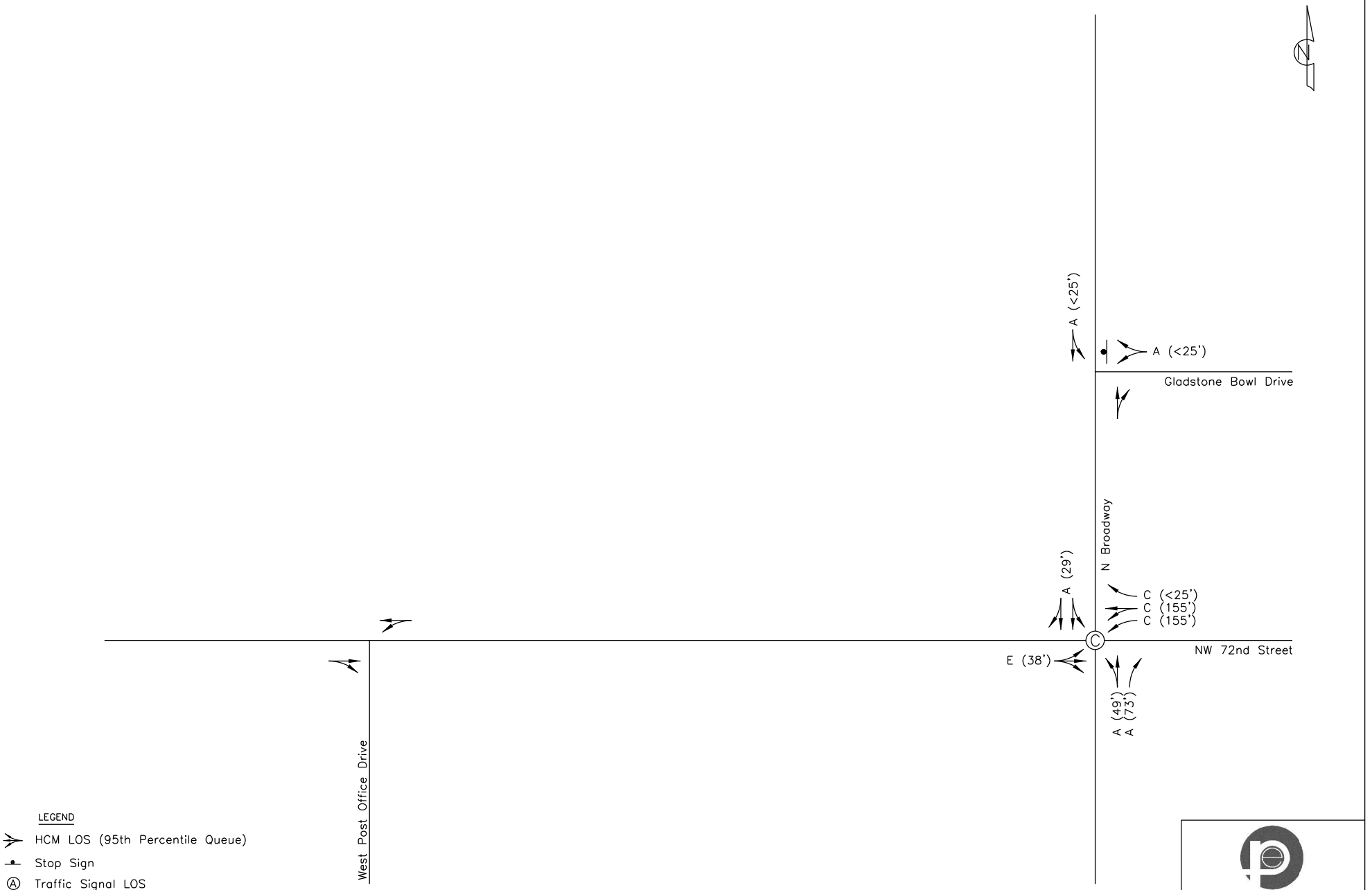
priority ENGINEERS
PO Box 563
Garden City, MO 64747
816.738.4400



Existing AM Peak Hour Traffic Volumes	Gladstone Convenience Store Gladstone, MO	No Scale Figure 3	priority ENGINEERS PO Box 563 Garden City, MO 64747 816.738.4400



Existing PM Peak Hour Traffic Volumes	Gladstone Convenience Store Gladstone, MO	No Scale Figure 4	priority ENGINEERS PO Box 563 Garden City, MO 64747 816.738.4400



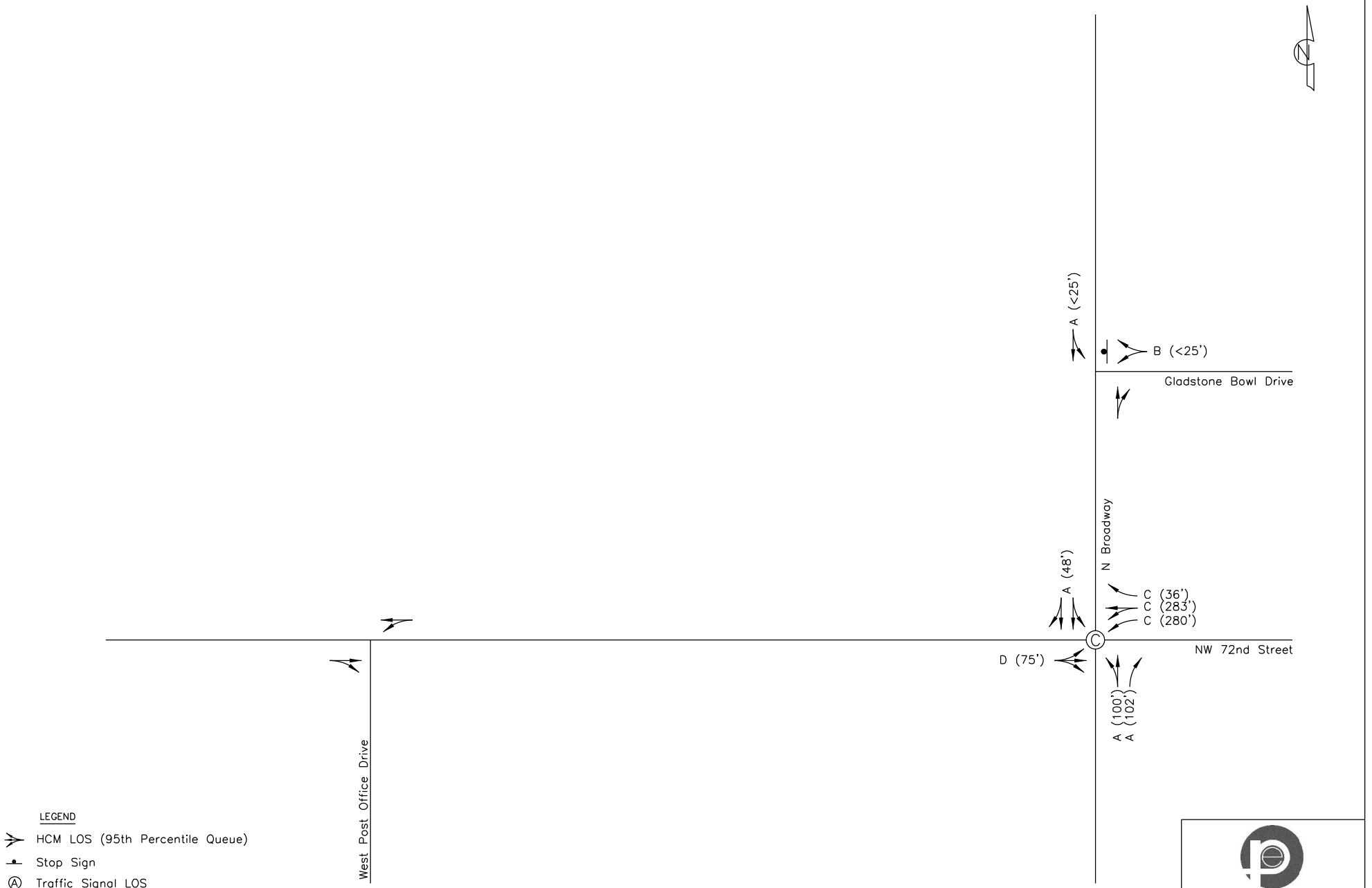
Existing AM Peak Hour
Lane Configuration &
Levels of Service

Gladstone Convenience Store
Gladstone, MO

No Scale

Figure 5

priority ENGINEERS
PO Box 563
Garden City, MO 64747
816.738.4400



Existing PM Peak Hour
Lane Configuration &
Levels of Service

Gladstone Convenience Store
Gladstone, MO

No Scale

Figure 6

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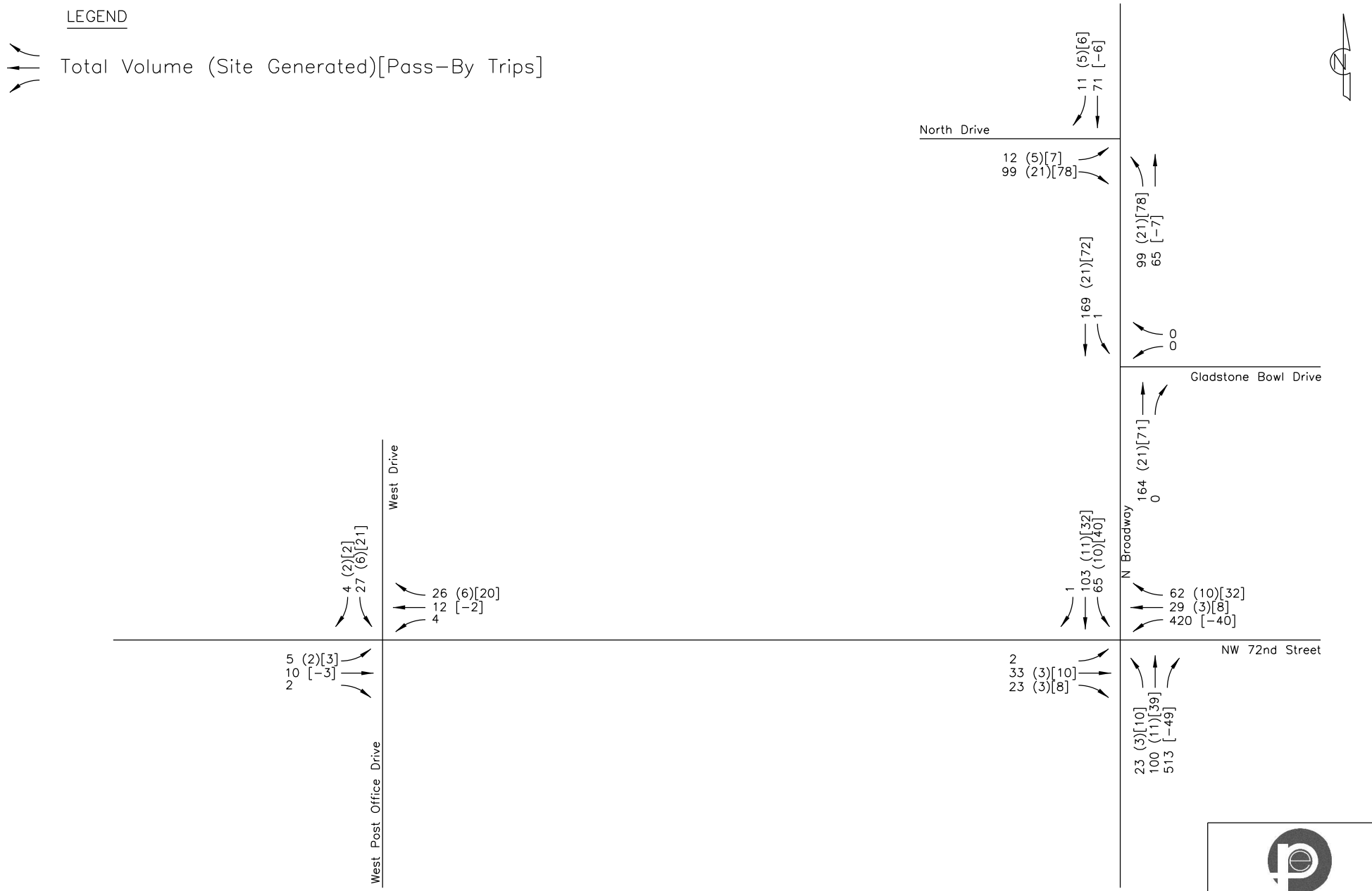
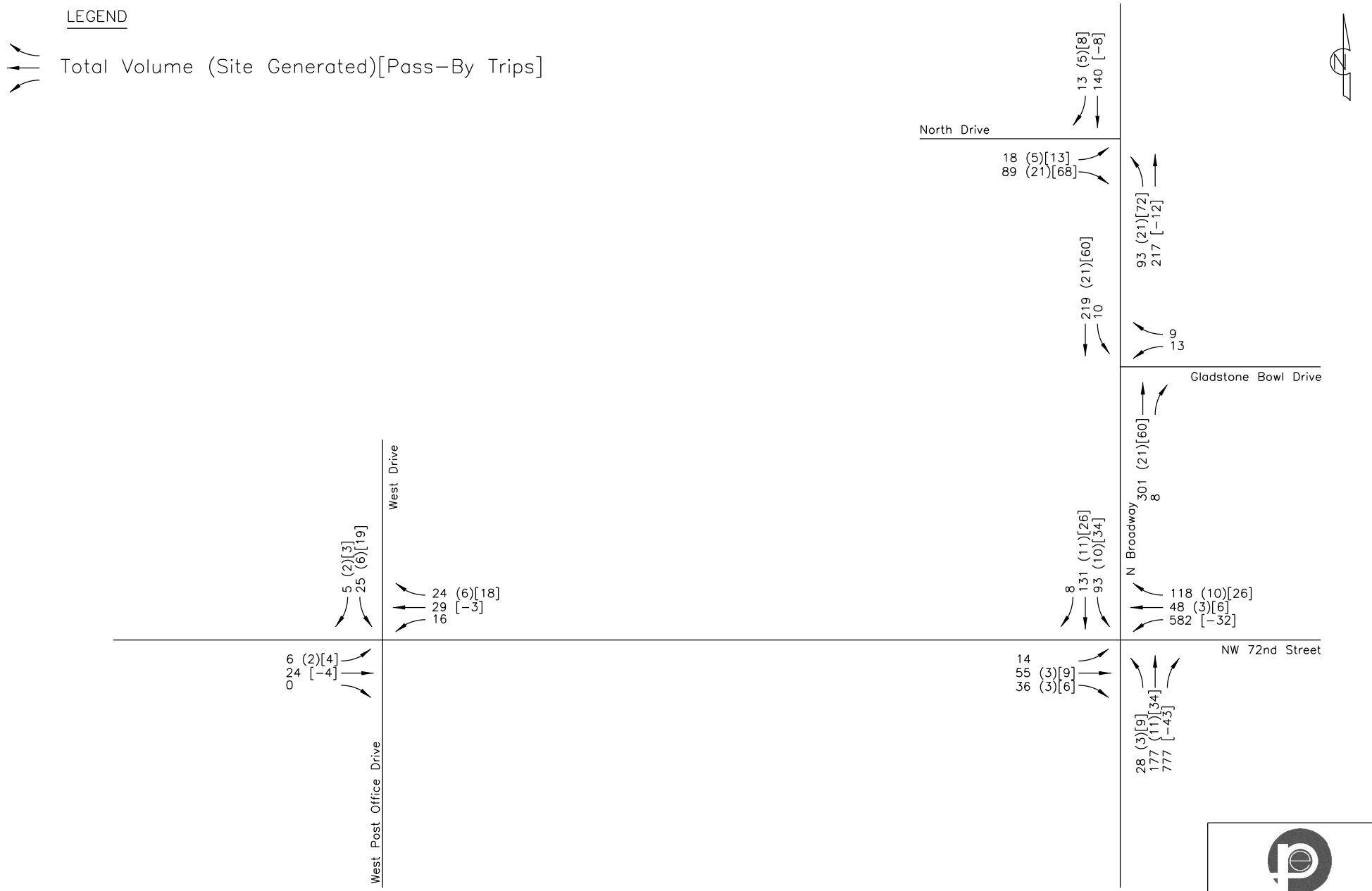
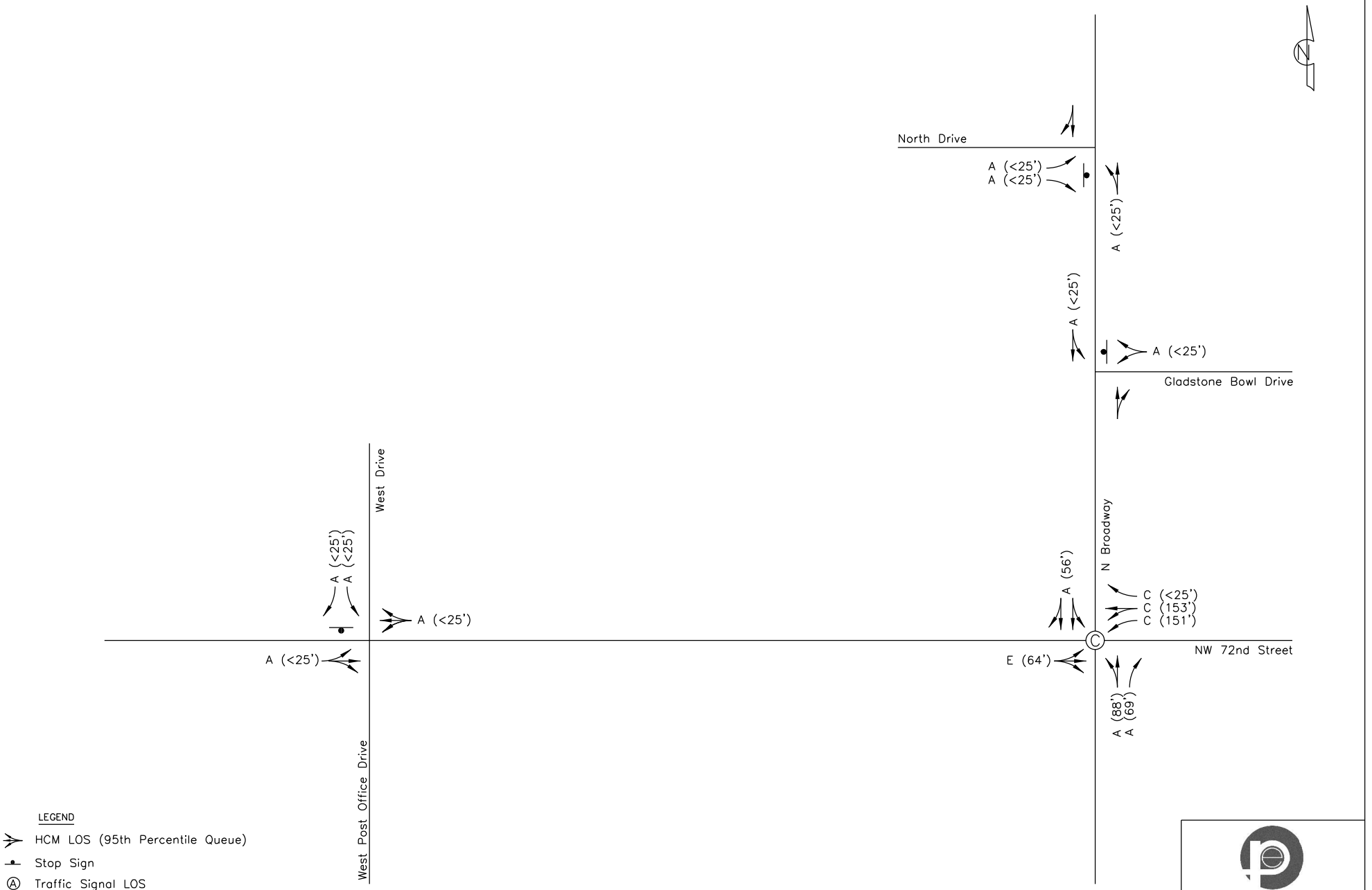
PO Box 563
Garden City, MO 64747
816.738.4400



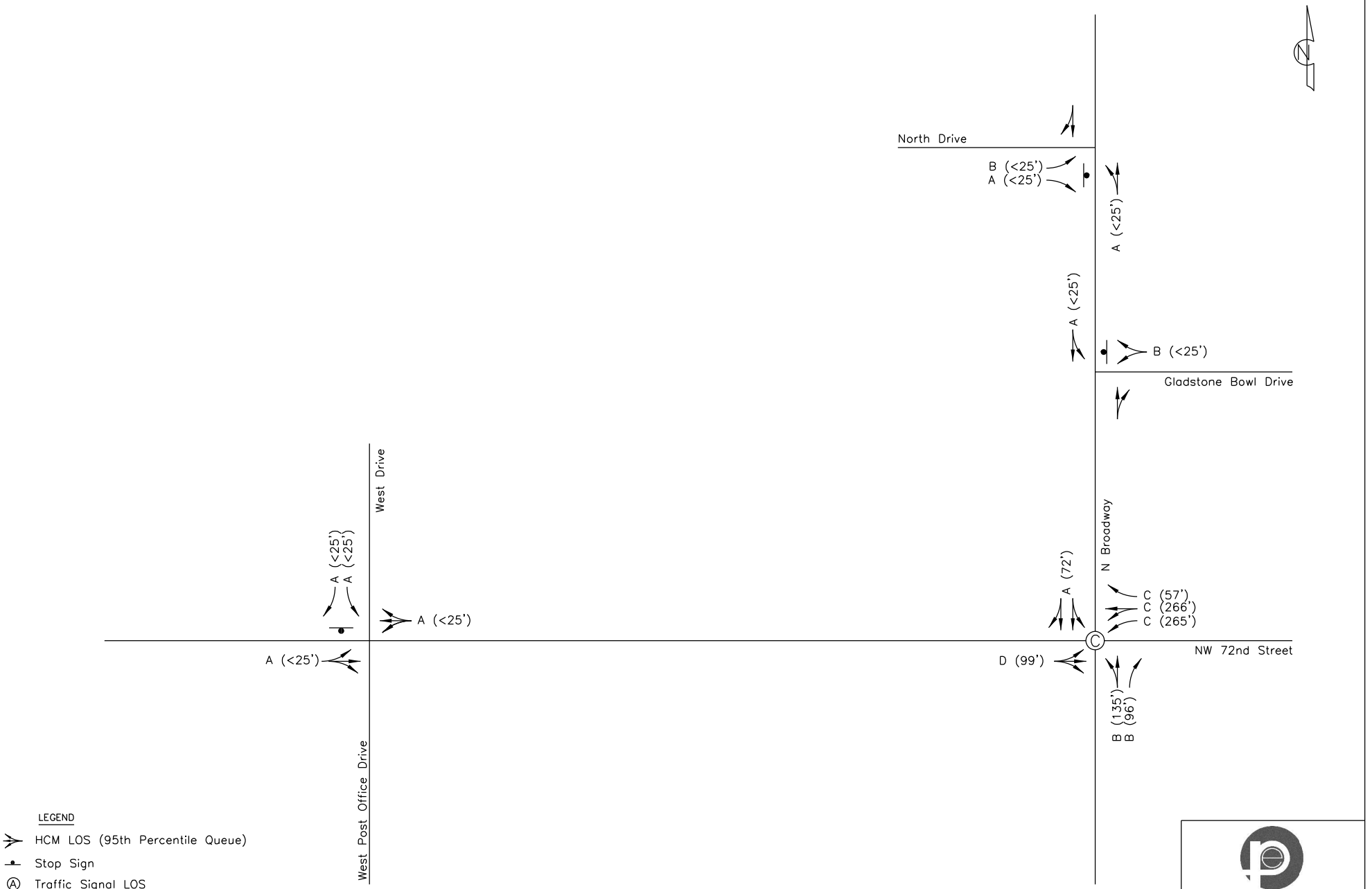
Existing + Proposed Development AM Peak Hour Traffic Volumes	Gladstone Convenience Store Gladstone, MO	No Scale Figure 7	priority ENGINEERS PO Box 563 Garden City, MO 64747 816.738.4400



Existing + Proposed Development PM Peak Hour Traffic Volumes	Gladstone Convenience Store Gladstone, MO	No Scale Figure 8	priority ENGINEERS PO Box 563 Garden City, MO 64747 816.738.4400

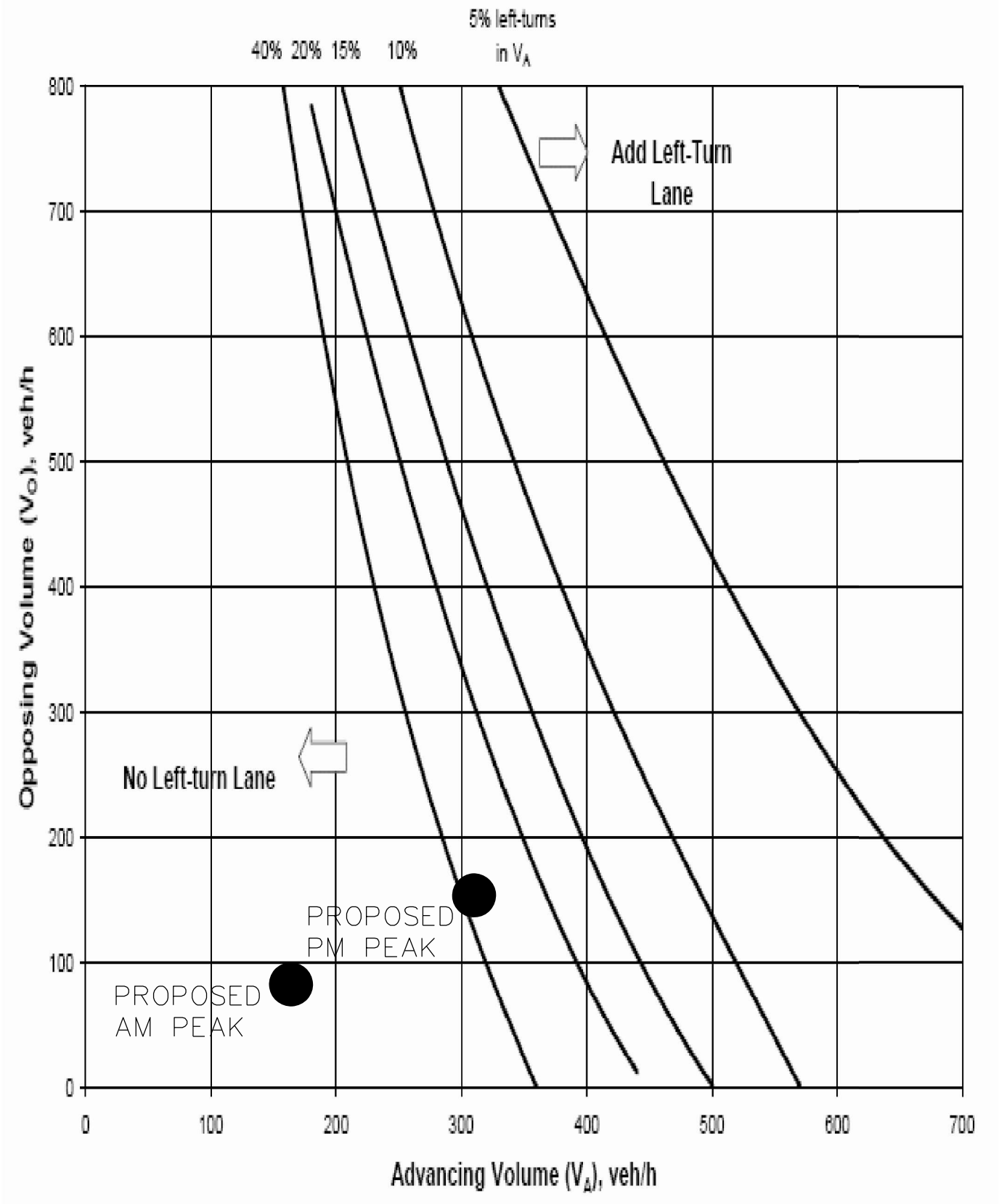


Existing + Proposed Development AM Peak Hour Lane Configuration & Levels of Service	Gladstone Convenience Store Gladstone, MO	No Scale Figure 9	priority ENGINEERS PO Box 563 Garden City, MO 64747 816.738.4400



Existing + Proposed Development PM Peak Hour Lane Configuration & Levels of Service	Gladstone Convenience Store Gladstone, MO	No Scale Figure 10

priority ENGINEERS
PO Box 563
Garden City, MO 64747
816.738.4400



Left Turn Lane Guidelines for Two–Lane Roads less than or equal to 40 mph (MoDOT EPG Figure 940.9.1)	Gladstone Convenience Store Gladstone, MO	No Scale Figure 11	priority ENGINEERS

APPENDIX II

Broadway & 72nd Street

	Southbound					Westbound					Northbound					Eastbound						
Start Time	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Totals	
7:00	6	22	0			69	4	7			1	7	62			1	4	4	0		187	
7:15	3	22	0			99	2	4			0	5	79			2	1	0	1		218	
7:30	4	19	0			127	0	3			0	11	125			0	3	2	0		294	
7:45	6	22	1			100	5	11			0	13	136			0	4	1	0		299	998 1187
8:00	7	23	0			110	2	4			3	11	109			1	3	2	0		275	1086 1275
8:15	3	17	0			127	4	3			0	7	167			0	3	1	0		332	1200 1381
8:30	3	14	0			128	5	6			3	16	115			0	3	5	1		299	1205 1393
8:45	2	6	1			95	7	7			4	16	171			1	11	4	0		325	1231 1408
Totals	15	60	1	0	0	460	18	20	0	0	10	50	562	0	0	2	20	12	1	0	1231	
Trucks		1				6					1		5				2			PHF=	0.93	
%		2%				1%					10%		1%				10%					

72nd Street & West Post Office Drive

	Southbound					Westbound					Northbound					Eastbound						
Start Time	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Totals	
7:00						2	2	0	0								5	0	2		11	
7:15						0	1	0	0								1	0	7		9	
7:30						0	0	0	1								4	0	1		6	
7:45						2	2	0	0								1	0	0		5	31
8:00						2	2	0	0								2	0	0		6	26
8:15						0	3	0	0								2	0	0		5	22
8:30						2	3	0	0								3	0	1		9	25
8:45						0	6	0	0								6	2	0		14	34
Totals	0	0	0	0	0	4	14	0	0	0	0	0	0	0	0	0	13	2	1	0	34	
Trucks							2										2			PHF=	0.61	
%							14%										15%					

Broadway & Gladstone Bowl Drive

	Southbound					Westbound					Northbound					Eastbound						
Start Time	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Left	Through	Right	Ped	Bike	Totals	
7:00	0	25				0		0				15									40	
7:15	0	22				0		0				11									33	
7:30	0	20				0		0				14									34	
7:45	1	27				1		1				21									51	158
8:00	0	29				0		0				16									45	163
8:15	0	19				0		0				10									29	159
8:30	0	17				0		0				21									38	163
8:45	1	8				0		0				22									31	143
Totals	1	73	0	0	0	0	0	0	0	0	0	69	0	0	0	0	0	0	0	0	143	
Trucks												1								PHF=	0.79	
%												1%										

Broadway & 72nd Street

	Southbound					Westbound					Northbound					Eastbound							
Start Time	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Totals**		
16:00	18	18	3			127	12	15	0		4	28	166			2	10	4	0		**407**		
16:15	16	44	4			126	12	10	0		3	29	203			3	14	5	0		**469**		
16:30	7	32	2			123	14	13	1		5	28	212			4	11	9	0		**461**		
16:45	12	20	2			150	10	17	0		3	29	209			5	14	9	0		**480**	1817	2234
17:00	13	25	1			187	7	22	0		3	31	191			3	9	4	0		**496**	1906	2340
17:15	17	17	3			154	8	30	1		5	44	208			2	9	5	1		**504**	1941	2404
17:30	12	13	0			142	1	15	0		7	29	166			0	3	4	1		**393**	1873	2324
17:45	20	24	1			130	5	15	0		5	27	167			1	5	1	0		**401**	1794	2228
Totals	**49**	**94**	**8**	**0**	**0**	**614**	**39**	**82**	**2**	**0**	**16**	**132**	**820**	**0**	**0**	**14**	**43**	**27**	**1**	**0**	**1941**		
Trucks		3					4	1						7				1		PHF=	**0.96**		
Truck %		3%				1%	3%						1%					4%					

72nd Street & West Post Office Drive

	Southbound					Westbound					Northbound					Eastbound							
Start Time	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Totals**		
16:00						8	3		0								2		0		**13**		
16:15						4	7		0								5		0		**16**		
16:30						6	5		1								3		0		**15**		
16:45						4	9		0								8		0		**21**	65	
17:00						3	7		0								8		0		**18**	70	
17:15						3	11		1								9		0		**24**	78	
17:30						1	7		0								6		1		**15**	78	
17:45						0	7		0								3		0		**10**	67	
Totals	**0**	**0**	**0**	**0**	**0**	**16**	**32**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**28**	**0**	**0**	**0**	**78**		
Trucks							1										1			PHF=	**0.81**		
Truck %							3%										4%						

Broadway & Gladstone Bowl Drive

	Southbound					Westbound					Northbound					Eastbound							
Start Time	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Left**	**Through**	**Right**	**Ped**	**Bike**	**Totals**		
16:00	0	34				2		4				42	1								**83**		
16:15	2	56				0		2				35	2								**97**		
16:30	2	36				2		2				44	0								**86**		
16:45	2	30				3		2				46	3								**86**	352	
17:00	3	34				4		0				52	2								**95**	364	
17:15	3	33				4		5				70	3								**118**	385	
17:30	6	26				0		0				40	2								**74**	373	
17:45	4	31				0		0				41	4								**80**	367	
Totals	**10**	**133**	**0**	**0**	**0**	**13**	**0**	**9**	**0**	**0**	**0**	**212**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**385**		
Trucks		2																		PHF=	**0.82**		
Truck %		2%																					

Lane Group	EBT	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	37	257	257	22	65	604	82
v/c Ratio	0.45	0.57	0.57	0.04	0.07	0.54	0.04
Control Delay (s/veh)	39.8	28.0	27.9	0.2	14.9	4.0	14.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	39.8	28.0	27.9	0.2	14.9	4.0	14.1
Queue Length 50th (ft)	11	108	108	0	16	0	10
Queue Length 95th (ft)	38	155	155	0	49	73	29
Internal Link Dist (ft)	204		604		384		28
Turn Bay Length (ft)				25			
Base Capacity (vph)	161	496	499	518	911	1105	1664
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.52	0.52	0.04	0.07	0.55	0.05

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	20	12	460	18	20	10	50	562	15	60	1
Future Volume (veh/h)	2	20	12	460	18	20	10	50	562	15	60	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1752	1870	1870	1870	1870	1752	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	2	22	13	509	0	22	11	54	0	16	65	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	10	2	2	2	2	10	2	2	2	2	2
Cap, veh/h	3	35	21	691	0	307	199	942		410	1672	26
Arrive On Green	0.04	0.04	0.04	0.19	0.00	0.19	0.61	0.61	0.00	0.61	0.61	0.61
Sat Flow, veh/h	89	977	577	3563	0	1585	234	1543	1585	564	2739	43
Grp Volume(v), veh/h	37	0	0	509	0	22	65	0	0	43	0	39
Grp Sat Flow(s),veh/h/ln	1643	0	0	1781	0	1585	1777	0	1585	1653	0	1694
Q Serve(g_s), s	1.7	0.0	0.0	10.1	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.7
Cycle Q Clear(g_c), s	1.7	0.0	0.0	10.1	0.0	0.9	1.1	0.0	0.0	0.7	0.0	0.7
Prop In Lane	0.05		0.35	1.00		1.00	0.17		1.00	0.37		0.03
Lane Grp Cap(c), veh/h	59	0	0	691	0	307	1141	0		1075	0	1034
V/C Ratio(X)	0.63	0.00	0.00	0.74	0.00	0.07	0.06	0.00		0.04	0.00	0.04
Avail Cap(c_a), veh/h	438	0	0	950	0	423	1141	0		1075	0	1034
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	35.7	0.0	0.0	28.4	0.0	24.7	5.9	0.0	0.0	5.8	0.0	5.8
Incr Delay (d2), s/veh	21.2	0.0	0.0	3.6	0.0	0.2	0.1	0.0	0.0	0.1	0.0	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.0	4.4	0.0	0.3	0.4	0.0	0.0	0.3	0.0	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	56.9	0.0	0.0	32.0	0.0	24.9	6.0	0.0	0.0	5.9	0.0	5.9
LnGrp LOS	E			C		C	A			A		A
Approach Vol, veh/h		37			531			65			82	
Approach Delay, s/veh		56.9			31.7			6.0			5.9	
Approach LOS		E			C			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	49.8	6.7	49.8	18.5
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	23.0	20.0	23.0	20.0
Max Q Clear Time (g_c+I1), s	3.1	3.7	2.7	12.1
Green Ext Time (p_c), s	0.4	0.2	0.6	2.5

Intersection Summary	
HCM 7th Control Delay, s/veh	27.7
HCM 7th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	72	0	1	76
Future Vol, veh/h	0	0	72	0	1	76
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	91	0	1	96

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	142	91	0	0	91	0
Stage 1	91	-	-	-	-	-
Stage 2	51	-	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219	-
Pot Cap-1 Maneuver	844	966	-	-	1503	-
Stage 1	932	-	-	-	-	-
Stage 2	966	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	843	966	-	-	1503	-
Mov Cap-2 Maneuver	843	-	-	-	-	-
Stage 1	932	-	-	-	-	-
Stage 2	965	-	-	-	-	-

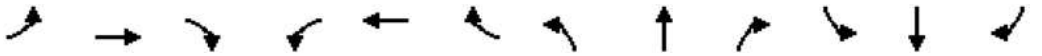
Approach	WB	NB	SB
HCM Control Delay, s/v	0	0	0.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	47	-
HCM Lane V/C Ratio	-	-	-	0.001	-
HCM Control Delay (s/veh)	-	-	0	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0	-

Lane Group	EBT	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	88	339	342	85	155	854	157
v/c Ratio	0.72	0.70	0.70	0.16	0.21	0.74	0.13
Control Delay (s/veh)	51.3	33.4	33.4	7.8	18.9	6.7	16.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	51.3	33.4	33.4	7.8	18.9	6.7	16.9
Queue Length 50th (ft)	26	134	135	4	53	0	25
Queue Length 95th (ft)	#75	#280	#283	36	100	102	48
Internal Link Dist (ft)	204		604		384		28
Turn Bay Length (ft)				25			
Base Capacity (vph)	171	501	504	523	736	1151	1206
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.68	0.68	0.16	0.21	0.74	0.13

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	43	27	614	39	82	16	132	820	49	94	8
Future Volume (veh/h)	14	43	27	614	39	82	16	132	820	49	94	8
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1841	1870	1856	1870	1870	1870	1870	1870	1856	1870
Adj Flow Rate, veh/h	15	45	28	669	0	85	17	138	0	51	98	8
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	4	2	3	2	2	2	2	2	3	2
Cap, veh/h	21	63	39	836	0	372	120	905		546	1101	94
Arrive On Green	0.07	0.07	0.07	0.23	0.00	0.23	0.54	0.54	0.00	0.54	0.54	0.54
Sat Flow, veh/h	299	897	558	3563	0	1585	124	1690	1585	874	2055	175
Grp Volume(v), veh/h	88	0	0	669	0	85	155	0	0	81	0	76
Grp Sat Flow(s),veh/h/ln	1755	0	0	1781	0	1585	1814	0	1585	1447	0	1657
Q Serve(g_s), s	3.7	0.0	0.0	13.3	0.0	3.3	0.0	0.0	0.0	0.0	0.0	1.7
Cycle Q Clear(g_c), s	3.7	0.0	0.0	13.3	0.0	3.3	3.1	0.0	0.0	1.6	0.0	1.7
Prop In Lane	0.17		0.32	1.00		1.00	0.11		1.00	0.63		0.11
Lane Grp Cap(c), veh/h	122	0	0	836	0	372	1025	0		854	0	888
V/C Ratio(X)	0.72	0.00	0.00	0.80	0.00	0.23	0.15	0.00		0.10	0.00	0.09
Avail Cap(c_a), veh/h	468	0	0	950	0	423	1025	0		854	0	888
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	34.2	0.0	0.0	27.0	0.0	23.2	8.8	0.0	0.0	8.5	0.0	8.5
Incr Delay (d2), s/veh	15.6	0.0	0.0	5.5	0.0	0.7	0.3	0.0	0.0	0.2	0.0	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	0.0	5.9	0.0	1.2	1.2	0.0	0.0	0.6	0.0	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	49.7	0.0	0.0	32.6	0.0	23.9	9.1	0.0	0.0	8.7	0.0	8.7
LnGrp LOS	D			C		C	A			A		A
Approach Vol, veh/h		88			754			155			157	
Approach Delay, s/veh		49.7			31.6			9.1			8.7	
Approach LOS		D			C			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	44.2	9.2	44.2	21.6
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	23.0	20.0	23.0	20.0
Max Q Clear Time (g_c+I1), s	5.1	5.7	3.7	15.3
Green Ext Time (p_c), s	1.3	0.5	1.4	2.3

Intersection Summary	
HCM 7th Control Delay, s/veh	26.9
HCM 7th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	13	9	220	8	10	138
Future Vol, veh/h	13	9	220	8	10	138
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	11	268	10	12	168

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	382	273	0	0	278	0
Stage 1	273	-	-	-	-	-
Stage 2	109	-	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219	-
Pot Cap-1 Maneuver	607	765	-	-	1283	-
Stage 1	772	-	-	-	-	-
Stage 2	904	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	601	765	-	-	1283	-
Mov Cap-2 Maneuver	601	-	-	-	-	-
Stage 1	772	-	-	-	-	-
Stage 2	896	-	-	-	-	-

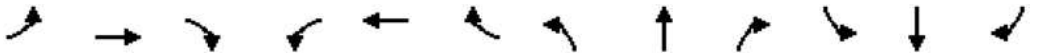
Approach	WB	NB	SB
HCM Control Delay, s/v	10.7	0	0.59
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	659	243	-
HCM Lane V/C Ratio	-	-	0.041	0.01	-
HCM Control Delay (s/veh)	-	-	10.7	7.8	0.1
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Lane Group	EBT	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	62	240	243	67	133	552	182
v/c Ratio	0.64	0.55	0.56	0.14	0.15	0.51	0.12
Control Delay (s/veh)	50.7	28.3	28.3	5.2	15.0	3.9	13.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	50.7	28.3	28.3	5.2	15.0	3.9	13.8
Queue Length 50th (ft)	16	102	103	0	35	0	24
Queue Length 95th (ft)	#64	151	153	22	88	69	56
Internal Link Dist (ft)	204		604		384		28
Turn Bay Length (ft)				25			
Base Capacity (vph)	165	488	492	511	880	1078	1488
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.49	0.49	0.13	0.15	0.51	0.12

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	33	23	420	29	62	23	100	513	65	103	1
Future Volume (veh/h)	2	33	23	420	29	62	23	100	513	65	103	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1752	1870	1870	1870	1870	1752	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	2	35	25	474	0	67	25	108	0	70	111	1
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	10	2	2	2	2	10	2	2	2	2	2
Cap, veh/h	3	46	33	665	0	296	215	897		712	1239	12
Arrive On Green	0.05	0.05	0.05	0.19	0.00	0.19	0.60	0.60	0.00	0.60	0.60	0.60
Sat Flow, veh/h	53	921	658	3563	0	1585	262	1487	1585	1042	2054	19
Grp Volume(v), veh/h	62	0	0	474	0	67	133	0	0	93	0	89
Grp Sat Flow(s),veh/h/ln	1631	0	0	1781	0	1585	1750	0	1585	1416	0	1699
Q Serve(g_s), s	2.8	0.0	0.0	9.4	0.0	2.7	0.0	0.0	0.0	0.0	0.0	1.6
Cycle Q Clear(g_c), s	2.8	0.0	0.0	9.4	0.0	2.7	2.3	0.0	0.0	1.6	0.0	1.6
Prop In Lane	0.03		0.40	1.00		1.00	0.19		1.00	0.75		0.01
Lane Grp Cap(c), veh/h	81	0	0	665	0	296	1113	0		938	0	1025
V/C Ratio(X)	0.76	0.00	0.00	0.71	0.00	0.23	0.12	0.00		0.10	0.00	0.09
Avail Cap(c_a), veh/h	435	0	0	950	0	423	1113	0		938	0	1025
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	35.2	0.0	0.0	28.6	0.0	25.9	6.4	0.0	0.0	6.2	0.0	6.2
Incr Delay (d2), s/veh	26.3	0.0	0.0	3.0	0.0	0.8	0.2	0.0	0.0	0.2	0.0	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	0.0	0.0	4.1	0.0	1.0	0.8	0.0	0.0	0.6	0.0	0.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	61.5	0.0	0.0	31.6	0.0	26.7	6.6	0.0	0.0	6.4	0.0	6.4
LnGrp LOS	E			C		C	A			A		A
Approach Vol, veh/h		62			541			133			182	
Approach Delay, s/veh		61.5			31.0			6.6			6.4	
Approach LOS		E			C			A			A	

Timer - Assigned Phs	2	4	6	8
Phs Duration (G+Y+Rc), s	49.3	7.7	49.3	18.0
Change Period (Y+Rc), s	4.0	4.0	4.0	4.0
Max Green Setting (Gmax), s	23.0	20.0	23.0	20.0
Max Q Clear Time (g_c+I1), s	4.3	4.8	3.6	11.4
Green Ext Time (p_c), s	1.1	0.3	1.7	2.6

Intersection Summary	
HCM 7th Control Delay, s/veh	24.7
HCM 7th LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	164	0	1	169
Future Vol, veh/h	0	0	164	0	1	169
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	208	0	1	214

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	317	208	0	0	208	0
Stage 1	208	-	-	-	-	-
Stage 2	109	-	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219	-
Pot Cap-1 Maneuver	663	832	-	-	1362	-
Stage 1	826	-	-	-	-	-
Stage 2	903	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	663	832	-	-	1362	-
Mov Cap-2 Maneuver	663	-	-	-	-	-
Stage 1	826	-	-	-	-	-
Stage 2	903	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	0	0	0.05
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	21	-
HCM Lane V/C Ratio	-	-	-	0.001	-
HCM Control Delay (s/veh)	-	-	0	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0	-

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	10	2	4	12	26	0	0	0	27	0	4
Future Vol, veh/h	5	10	2	4	12	26	0	0	0	27	0	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	61	61	61	61	92	61	92	61	92	92	92
Heavy Vehicles, %	2	15	2	2	14	2	2	2	2	2	2	2
Mvmt Flow	5	16	3	7	20	28	0	0	0	29	0	4

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	48	0	0	20	0	0			74	77	34
Stage 1	-	-	-	-	-	-			47	47	-
Stage 2	-	-	-	-	-	-			27	31	-
Critical Hdwy	4.12	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	1559	-	-	1597	-	-			929	813	1039
Stage 1	-	-	-	-	-	-			976	856	-
Stage 2	-	-	-	-	-	-			995	870	-
Platoon blocked, %		-	-		-	-					
Mov Cap-1 Maneuver	1559	-	-	1597	-	-			922	0	1039
Mov Cap-2 Maneuver	-	-	-	-	-	-			922	0	-
Stage 1	-	-	-	-	-	-			972	0	-
Stage 2	-	-	-	-	-	-			991	0	-

Approach	EB	WB	SB
HCM Control Delay, s/v	1.58	0.87	8.96
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	377	-	-	194	-	-	922	1039
HCM Lane V/C Ratio	0.003	-	-	0.004	-	-	0.032	0.004
HCM Control Delay (s/veh)	7.3	0	-	7.3	0	-	9	8.5
HCM Lane LOS	A	A	-	A	A	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-	-	0.1	0

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	12	99	99	65	71	11
Future Vol, veh/h	12	99	99	65	71	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	108	108	71	77	12

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	369	83	89	0	-	0
Stage 1	83	-	-	-	-	-
Stage 2	286	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	631	976	1506	-	-	-
Stage 1	940	-	-	-	-	-
Stage 2	763	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	584	976	1506	-	-	-
Mov Cap-2 Maneuver	584	-	-	-	-	-
Stage 1	870	-	-	-	-	-
Stage 2	763	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	9.38	4.57	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1087	-	584	976	-	-
HCM Lane V/C Ratio	0.071	-	0.022	0.11	-	-
HCM Control Delay (s/veh)	7.6	0	11.3	9.1	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.4	-	-

Lane Group	EBT	WBL	WBT	WBR	NBT	NBR	SBT
Lane Group Flow (vph)	110	327	329	123	213	809	241
v/c Ratio	0.77	0.70	0.70	0.25	0.29	0.72	0.21
Control Delay (s/veh)	53.8	33.8	33.6	11.2	20.0	6.2	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	53.8	33.8	33.6	11.2	20.0	6.2	18.0
Queue Length 50th (ft)	33	129	130	16	77	0	43
Queue Length 95th (ft)	#99	#265	#266	57	135	96	72
Internal Link Dist (ft)	204		604		384		28
Turn Bay Length (ft)				25			
Base Capacity (vph)	187	488	492	511	712	1123	1104
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.67	0.67	0.24	0.30	0.72	0.22

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	55	36	582	48	118	28	177	777	93	131	8
Future Volume (veh/h)	14	55	36	582	48	118	28	177	777	93	131	8
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1841	1870	1856	1870	1870	1870	1870	1870	1856	1870
Adj Flow Rate, veh/h	15	57	38	642	0	123	29	184	0	97	136	8
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	4	2	3	2	2	2	2	2	3	2
Cap, veh/h	21	79	53	820	0	365	141	847		631	964	58
Arrive On Green	0.09	0.09	0.09	0.23	0.00	0.23	0.52	0.52	0.00	0.52	0.52	0.52
Sat Flow, veh/h	239	907	604	3563	0	1585	166	1622	1585	1043	1846	112
Grp Volume(v), veh/h	110	0	0	642	0	123	213	0	0	122	0	119
Grp Sat Flow(s),veh/h/ln	1750	0	0	1781	0	1585	1787	0	1585	1333	0	1668
Q Serve(g_s), s	4.6	0.0	0.0	12.7	0.0	4.9	0.0	0.0	0.0	0.0	0.0	2.8
Cycle Q Clear(g_c), s	4.6	0.0	0.0	12.7	0.0	4.9	4.6	0.0	0.0	2.7	0.0	2.8
Prop In Lane	0.14		0.35	1.00		1.00	0.14		1.00	0.80		0.07
Lane Grp Cap(c), veh/h	153	0	0	820	0	365	988	0		783	0	872
V/C Ratio(X)	0.72	0.00	0.00	0.78	0.00	0.34	0.22	0.00		0.16	0.00	0.14
Avail Cap(c_a), veh/h	467	0	0	950	0	423	988	0		783	0	872
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.3	0.0	0.0	27.1	0.0	24.1	9.7	0.0	0.0	9.2	0.0	9.2
Incr Delay (d2), s/veh	12.7	0.0	0.0	4.9	0.0	1.2	0.5	0.0	0.0	0.4	0.0	0.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	0.0	5.6	0.0	1.8	1.8	0.0	0.0	1.0	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	46.0	0.0	0.0	32.0	0.0	25.2	10.2	0.0	0.0	9.6	0.0	9.5
LnGrp LOS	D			C		C	B			A		A
Approach Vol, veh/h		110			765			213			241	
Approach Delay, s/veh		46.0			30.9			10.2			9.6	
Approach LOS		D			C			B			A	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		43.2		10.6		43.2		21.3				
Change Period (Y+Rc), s		4.0		4.0		4.0		4.0				
Max Green Setting (Gmax), s		23.0		20.0		23.0		20.0				
Max Q Clear Time (g_c+I1), s		6.6		6.6		4.8		14.7				
Green Ext Time (p_c), s		1.8		0.7		2.3		2.6				

Intersection Summary												
HCM 7th Control Delay, s/veh			25.0									
HCM 7th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	13	9	301	8	10	219
Future Vol, veh/h	13	9	301	8	10	219
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	50	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	16	11	367	10	12	267

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	530	372	0	0	377	0
Stage 1	372	-	-	-	-	-
Stage 2	158	-	-	-	-	-
Critical Hdwy	6.63	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.83	-	-	-	-	-
Follow-up Hdwy	3.519	3.319	-	-	2.219	-
Pot Cap-1 Maneuver	494	673	-	-	1180	-
Stage 1	696	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	489	673	-	-	1180	-
Mov Cap-2 Maneuver	489	-	-	-	-	-
Stage 1	696	-	-	-	-	-
Stage 2	846	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	11.87	0	0.43
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	551	157	-
HCM Lane V/C Ratio	-	-	0.049	0.01	-
HCM Control Delay (s/veh)	-	-	11.9	8.1	0.1
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	24	0	16	29	24	0	0	0	25	0	5
Future Vol, veh/h	6	24	0	16	29	24	0	0	0	25	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	81	81	81	81	92	81	92	81	92	92	92
Heavy Vehicles, %	2	4	2	2	3	2	2	2	2	2	2	2
Mvmt Flow	7	30	0	20	36	26	0	0	0	27	0	5

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	62	0	0	30	0	0			131	131	49
Stage 1	-	-	-	-	-	-			88	88	-
Stage 2	-	-	-	-	-	-			43	43	-
Critical Hdwy	4.12	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	1541	-	-	1583	-	-			863	760	1020
Stage 1	-	-	-	-	-	-			935	822	-
Stage 2	-	-	-	-	-	-			980	859	-
Platoon blocked, %		-	-		-	-					
Mov Cap-1 Maneuver	1541	-	-	1583	-	-			848	0	1020
Mov Cap-2 Maneuver	-	-	-	-	-	-			848	0	-
Stage 1	-	-	-	-	-	-			931	0	-
Stage 2	-	-	-	-	-	-			967	0	-

Approach	EB	WB	SB
HCM Control Delay, s/v	1.33	1.77	9.25
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	325	-	-	402	-	-	848	1020
HCM Lane V/C Ratio	0.004	-	-	0.012	-	-	0.032	0.005
HCM Control Delay (s/veh)	7.3	0	-	7.3	0	-	9.4	8.5
HCM Lane LOS	A	A	-	A	A	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-	-	0.1	0

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	18	89	93	217	140	13
Future Vol, veh/h	18	89	93	217	140	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	97	101	236	152	14

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	597	159	166	0	-	0
Stage 1	159	-	-	-	-	-
Stage 2	438	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	466	886	1412	-	-	-
Stage 1	869	-	-	-	-	-
Stage 2	650	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	427	886	1412	-	-	-
Mov Cap-2 Maneuver	427	-	-	-	-	-
Stage 1	798	-	-	-	-	-
Stage 2	650	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s/v	10.28	2.32	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	540	-	427	886	-	-
HCM Lane V/C Ratio	0.072	-	0.046	0.109	-	-
HCM Control Delay (s/veh)	7.7	0	13.8	9.6	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.4	-	-

Drainage Report
For
400 NW 72nd Street
Gladstone, Missouri

April 01, 2024

By:
Gerald W. Menefee, PE
KAM Design LLC
9000 Bannister Road
Kansas City, Missouri 64134

menefeegerald@gmail.com

Table of Contents

Section 1
General

The proposed site for a new convenience store with gasoline pumps is just northwest corner of the intersection of N Broadway and NW 72nd Street in Gladstone, Missouri. The tract of land is currently covered by grassland. The developed portion of the site is expected to cover approximately the south two thirds of the site.

Section 2
Methodology

HydroCAD 10.00 was utilized for the drainage calculations developed for this project. The Water Quality solution was developed utilizing Manual of Best Management Practices for Stormwater Quality, October 2012 edition.

Section 3
Existing Drainage Patterns

From the peak elevation of the site located near the southeast corner of the site, there are three basins radiating out from it. Reference Maps Section. Basins E1 generally exhibits flow toward the west side of the property; Basin E2 drains to the east part of the property; while Basin E3 drains toward the west side of the site. Table 1 shows the amounts of existing runoff from each of the basins for the 1-year, 10-year and 100-year storms are as follows:

Table 1
Existing Site Runoff

Storm Year	Basin E1 (cfs)	Basin E2 (cfs)	Basin E3 (cfs)	Total Site (cfs)
1	0.66	0.03	1.53	2.22
10	2.04	0.08	4.62	6.74
100	3.65	0.15	8.24	12.04

Proposed Drainage Patterns Section 4

The proposed drainage patterns are consolidated into six basins. Reference the Maps Section. The north or 1P Basin allows for runoff to flow toward the north edge of the property and thence to the Bioretention Bed located to its immediate north. Basins 2P and 3P are much smaller basins

draining to the west. The Basin 4P Generally drains that portion of the east property. The P5 Basin is the water quality Bioretention Area and land immediately around. It drains excess runoff to the sites underground detention system. The area surrounding P5 is comprised of P6 land which is uncontrolled drainage to the west side of the property. A summary of the proposed runoff expected from the site for the 1-year, 10-year and 100-year storms are noted in Table 2. The calculated detention depth and storage are noted in Table 3 as follows:

Table 2
Proposed Site Runoff

Storm Year	Basin 1P (cfs)	Basin 1P And 5P w/ Detention (cfs)	Basin 2P (cfs)	Basin 3P (cfs)	Basin 4P (cfs)	Basin 5P (cfs)	Basin 6P (cfs)	Total Site w/ Detention (cfs)
1	4.33	1.70	0.01	0.01	0.27	0.23	0.23	2.06
10	8.53	5.20	0.03	0.03	0.82	0.70	0.61	5.38
100	12.83	8,78	0.06	0.06	1.45	1.23	1.23	10.81

Table 3
Detention Depth and Storage

Storm Year	Detained Depth (ft)	Detained Volume (ac-ft)
1	1.02	0.064
10	1.71	0.126
100	5.98	0.177

Table 4
Final Detention Volume Minus the WQv Volume

	Calculated Detention Volume	WQv Volume Stored	Final Detention Volume
Acre-Feet Volumes	0.211 ac-ft	0.081 ac-ft	0.13 ac- ft
Linear Feet of Pipe	1300.00 Lf	499.00 Lf	801.00 Lf

As a part of this analysis, it was assumed that the outflow pipe of the detention basin would consist of a 12-inch diameter PVC pipe. As can be seen in the Tables 1 that at all storm levels

the 12-inch PVC pipe provides an adequate release of water so that the discharge in the post developed situation results in the sites runoff being less than the existing runoff.

As for an emergency spillover, it shall be incorporated as a part of the discharge of the 12-inch PVC pipe. The pipe can handle the excess flow by allowing the water in the inlet structure to exceed the height of the orifice plate and travel down through the 12-inch discharge pipe.

The total detention utilized for the site incorporates a reduction in volume. See Table 4. This reduction is predicated on the assumption that the runoff stored in the Bioretention area is effectively detained water and therefore extra volume was left in the detention system pipes.

Section 5
Water Quality

Water quality goals for the site will be achieved through the use Bioretention Area. The area is located to immediate north of drainage basin P1. Runoff water will fill the Area with runoff to a depth of 1 foot. Once this volume is achieved, excess water over the maximum depth of the subsurface storage area flows in an into an inlet structure located at the southwest portion of the Area corner of the property and then into the detention piping.

Water in the Bioretention Area is to drain down the through a 3- inch cover of hardwood wood chips and thence through a 4-foot-thick layer of porous soil. Runoff will be removed from the Area utilizing a system of perforated 4-inch PVC pipes to allow water to leave and travel to a point of daylight. The Area is constructed to allow for the minimum drawdown of one foot per day.

Section 6
Summary

The proposed new improvements on will increase impervious cover necessitating the need for a detention facility to control the additional runoff generated. Since there is insufficient area to construct a detention pond on the surface, it was determined that a subsurface pipe system should be constructed on the north side of the developed portion of the site. A bio retention pond is too be constructed just before the runoff is directed to the detention system in order to allow for the treatment of the first flush of rain water.

Section 7
Conclusions and Recommendations

Based upon review of the site involving existing and proposed conditions, conclusions and recommendations are provided as follows:

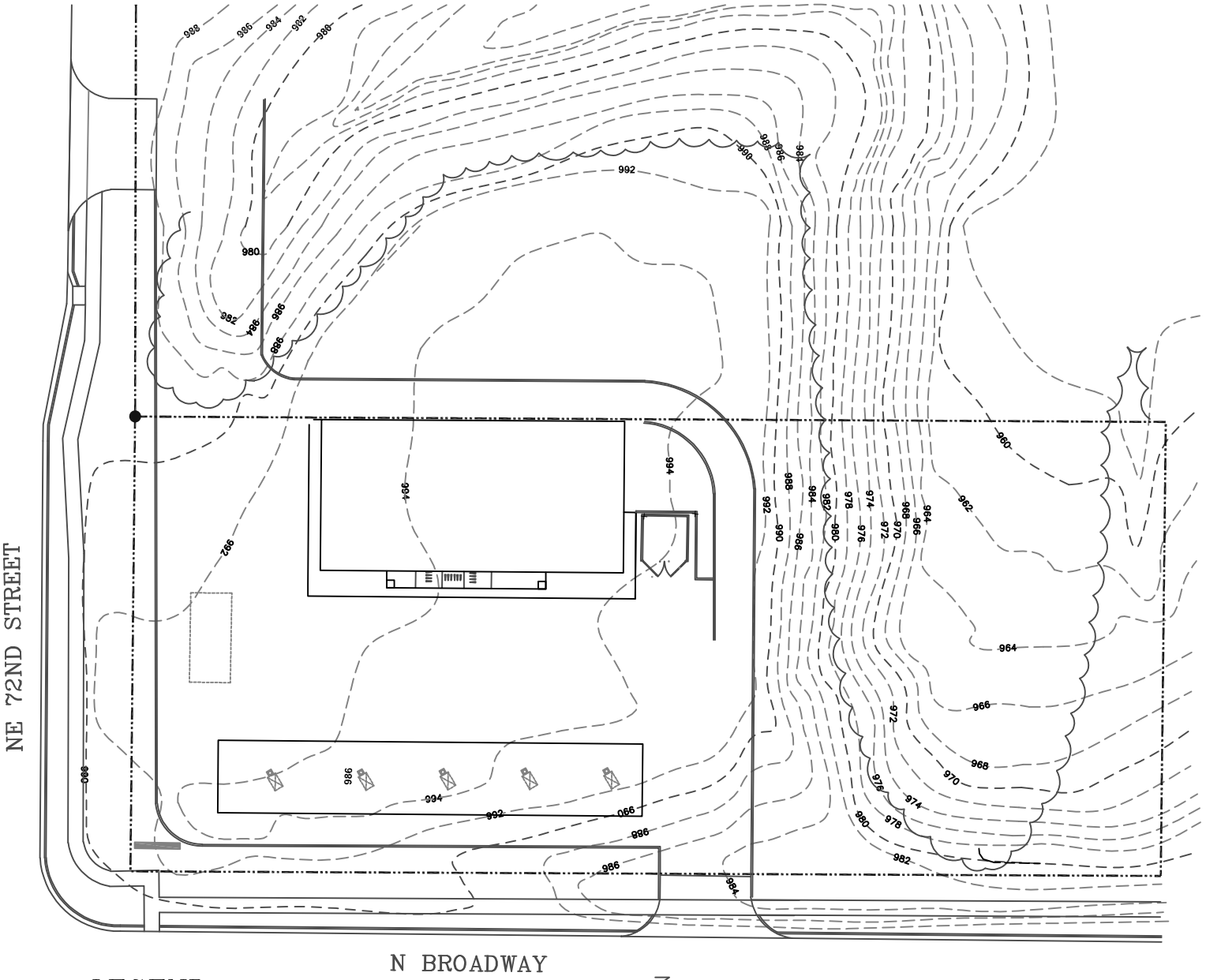
1. Installation of the Bioretention Area will increase the quality of water exiting the site by filtering water leaving the proposed parking areas.
2. Detention will be provided to mitigate the increasing runoff due to the additional impervious cover added to the site.
3. The detention volume was reduced by the storage volume of the water quality storage. Since not doing this would result in the site being penalized by the extra water stored in the water quality structure.
4. Over flow runoff will be incorporated within the discharge piping of the detention control structure.

Section 8

Drainage Area Maps

SHORT STOP GAS STATION

400 N 72ND STREET, GLADSTONE, MISSOURI



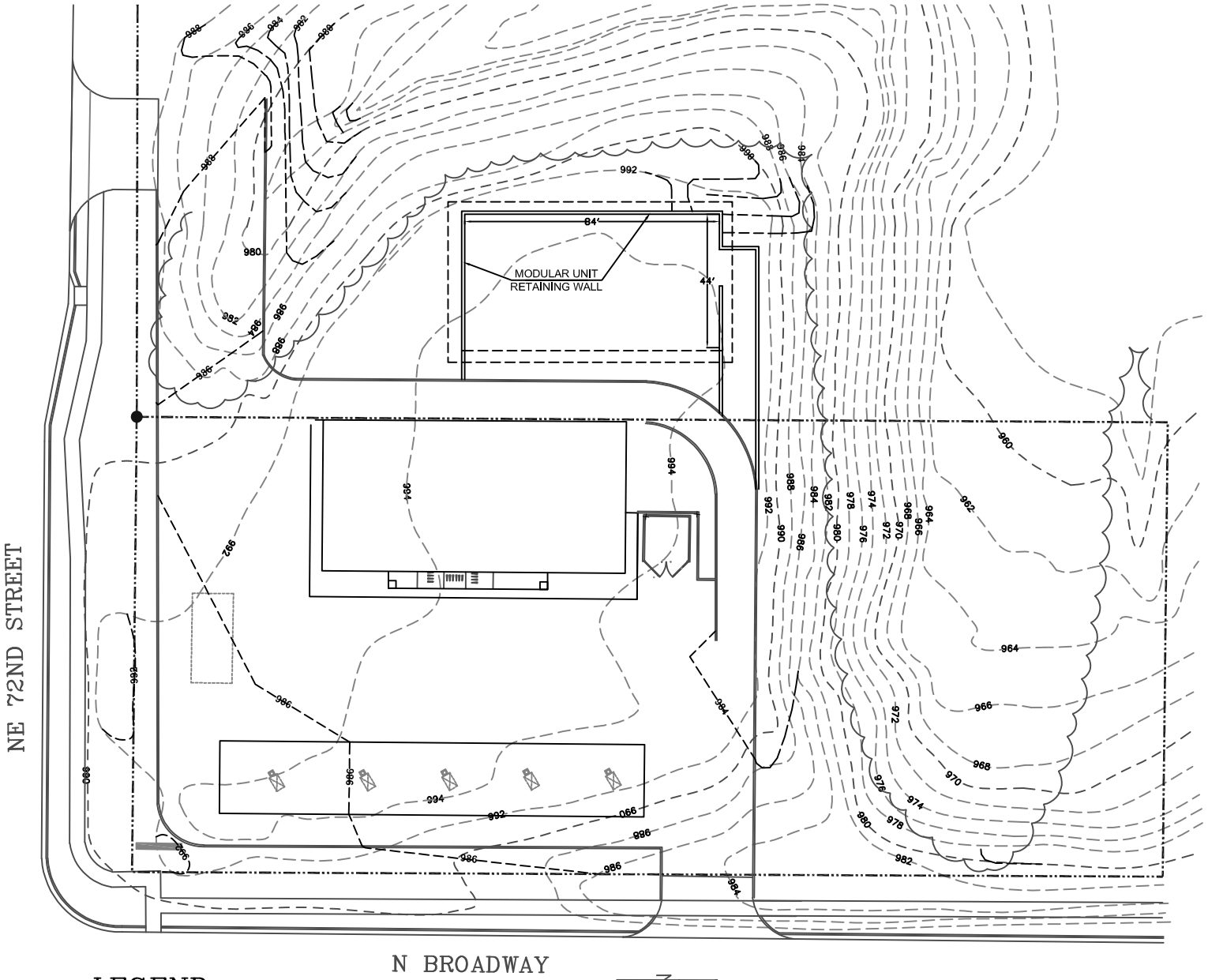
EXISTING DRAINAGE AREA MAP

SCALE 1' = 50'

Design Group LLC.
9264 Blue Ridge Blvd.
Suite A
Kansas City, Missouri 64138
(816) 797–2065

SHORT STOP GAS STATION

400 N 72ND STREET, GLADSTONE, MISSOURI



LEGEND

EXISTING CONTOURS

PROPOSED CONTOURS

N

PROPOSED DRAINAGE AREA MAP

SCALE 1' = 50'

Design Group LLC.

9264 Blue Ridge Blvd.
Suite A
Kansas City, Missouri 64138
(816) 797–2065

Section 9

Supporting Calculations

Exhibit 1
Water Quality Equations

WQv = P*Rv*A/12

P = 1.37
I = 68 %
Rv = 0.05+0.009*I = 0.05+0.009*68 =
A = 0.87

= 1.37*0.62*0.87/12 = 0.062 a-ft = 2665.87 cf

Refer to Bioretention Worksheet that follows:

Design Procedure Form: Bioretention
Main Worksheet

Designer: GERALD MENERBE
Checked By: GERALD MENERBE
Company: KAM DESIGN LLC
Date: 2/21/23
Project: SHORE STOP - 695 STATION
Location: 400 NW 72ND STREET

I. Water Quality Volume		
Step 1) Tributary area to bioretention area, A_T (ac)	A_T (ac) =	1.207
Step 2) Calculate WQv using methodology in Section 6	WQv (cu-ft) =	0.91
IIa. Pretreatment		
Step 1) Specify type of inflow to Bioretention facility: Type 1 = sheet flow Type 2 = concentrated or channelized	Inflow type =	TYPE 2
Step 2) Pretreatment		
Step 3) Proceed to Part IIb, IIc, or IId for design guidance on different pretreatment options		
IIb. Vegetated Pretreatment Strip		
Step 1) Type of land cover of contributing area: Type 1 = Impervious (i.e., parking lot) Type 2 = Pervious (i.e., residential lawn)	Land cover type =	TYPE 1
Step 2) Maximum inflow approach length, $L_{approach}$ (ft)	$L_{approach}$ (ft) =	30
Step 3) Average slope of pretreatment strip, S_{fs} (%) (Maximum slope of 6%)	S_{fs} (%) =	2%
Step 4) Vegetated pretreatment strip minimum length, L_{fs} (ft), from Table 8.2	L_{fs} (ft) =	30
IIc. Vegetated Pretreatment Channel		
Step 1) Percent imperviousness of contributing area, % imp	% imp =	68
Step 2) Average slope of vegetated channel, S_{vc} (%) (Maximum slope of 6%)	S_{vc} (%) =	2%
Step 3) Vegetated pretreatment channel minimum length, L_{vc} (ft), from Table 8.3	L_{vc} (ft) =	30
IId. Other Pretreatment Devices		
Other methods of pretreatment may be utilized upstream of a bioretention facility to settle out suspended solids and reduce runoff velocity. Several proprietary devices are available that will achieve these results. Most such devices install below ground and accept inflow from a piped stormwater management system or from surface sheet flow via drop inlets. These devices should be selected and sized based on site-specific conditions for each project.		

Design Procedure Form: Bioretention
Main Worksheet

Designer: GERALD MENEFEE
Checked By: GERALD MENEFEE
Company: KAM DESIGN LLC
Date: 7/21/23
Project: SHORT STOP GAS STATION
Location: 400 NW 72ND STREET

III. Planting Soil Bed and Ponding Area

Step 1) Planting bed soil depth, d_f (ft) (d_f should be between 2.5 feet and 4 feet).	d_f (ft) = 4
Step 2) Coefficient of permeability for planting soil bed, k (ft/day) (k should be at least 1 ft/ day)	k (ft/ day) = 1
Step 3) Maximum ponding depth, h_{max} (ft) (h_{max} should be between 0.25 ft and 1.0 ft).	h_{max} (ft) = 1
Step 4) Average height of water above bioretention bed, havg (ft) $h_{avg} = h_{max}/2$	h_{avg} (ft) = 0.5
Step 5) Time required for WQv to filter through the planting soil bed, t_f (days) (t_f of 1 to 3 days is recommended)	t_f (days) = 1
Step 6) Required filter bed surface area, A_f (ft^2) $A_f = (WQv*d_f)/[k*t_f*(h_{avg}+df)]$	A_f (ft^2) = 2370
Step 7) Approximate filter bed length, L_f (ft), assuming a length to width ratio of 2:1 (L_f should be at least 40 ft)	L_f (ft) = 84
Step 8) Approximate filter bed width, W_f (ft), assuming a length to width ratio of 2:1 (W_f should be at least 15 feet, and optimally half of L_f)	W_f (ft) = 42
Step 9) Required Ponding Area, A_p (sf) $Ap = WQv/h_{max}$	Ap (ft^2) = 2666.00

Design Procedure Form: Bioretention
Main Worksheet

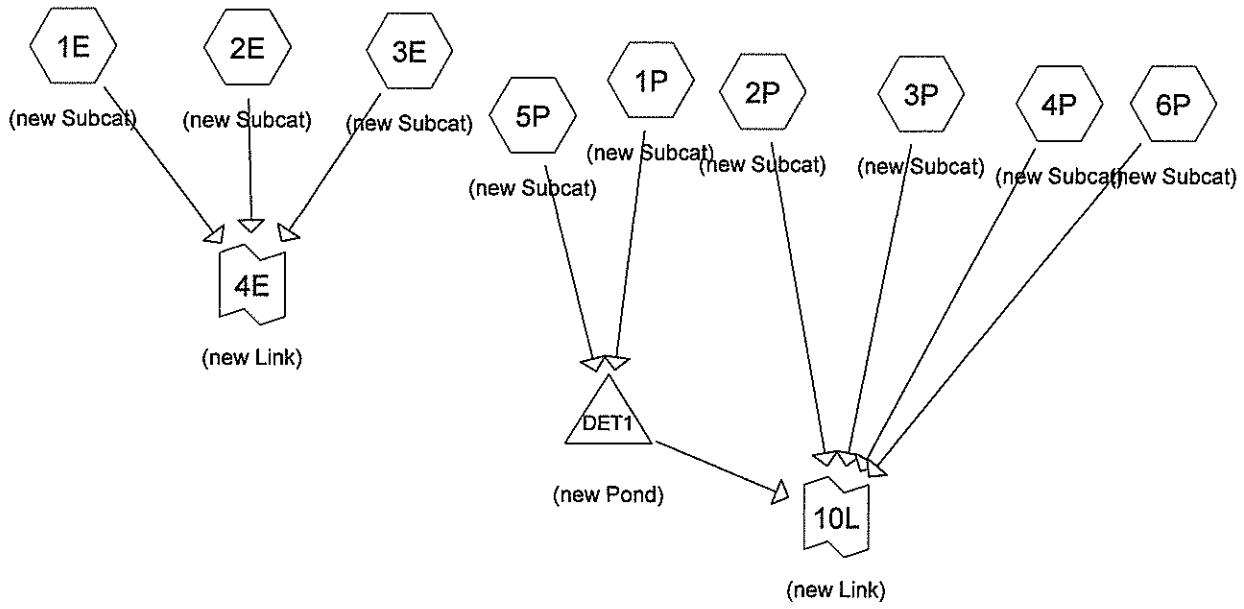
Designer: GERALD MENEFEE
Checked By: GERALD MENEFEE
Company: KAM DESIGN LLC
Date: 7/21/23
Project: SHORT STOP GAS STATION
Location: 400 NW 72ND STREET

IV. Underdrain		
Step 1) Underdrain pipe diameter, D_U (in) (D_U should be at least 4 inches)	D_U (in) =	4
Step 2) Depth of gravel blanket, Z_{gravel} (in.) (Z_{gravel} should be at least 8 inches, and at least 2 inches greater than D_U)	Z_{gravel} (in) =	12"
Step 3) Set underdrain perforation diameters to 0.375 inches.	D_{perf} (in) =	0.375
Step 4) Longitudinal center-to-center underdrain perforation spacing, S_{perf} (in)	S_{perf} (in) =	14
Step 5) Number of perforations per row (around circumference of underdrain), n_{perf} (n_{perf} should be at least 4)	n_{perf} =	4
Step 6) Underdrain collector spacing (approximately 20') SU (ft)	S_U (ft) =	14
Step 7) Pipe grade, Gpipe (%), for main pipe and transverse collector pipes (G_{pipe} should be at least 0.5%)	G_{pipe} (%) =	0
Step 8) Providing at least one cleanout per pipe run? (Yes or No)		YES
Step 9) Determine design head (ho) on orifice, ho = (df + hmax)/2	ho (ft) =	2.5
Step 10) Determine Average flow rate, Qavg = WQv/144,000	Qavg (cfs) =	0.019
Step 11) Determine orifice area Ao = Qavg/(0.6*(2*g*ho)^0.5)	Ao (ft^2) =	0.0025
	Ao (in^2) =	0.36

V. Overflow

The bioretention overflow shall be designed to safely pass runoff flows from events up to and including the 1 percent event unless the facility is designed with a bypass around the facility for larger storm events. If the 1-percent event is to pass through the facility, the maximum velocity shall be kept below 3 feet per second to avoid erosion of the soil matrix. If facilities are designed with a bypass, it shall be designed to safely pass runoff flows from events up to and including the 1 percent event. The overflow shall be designed as a vegetated or stabilized channel of a yard inlet catch basin. Vegetated or stabilized channels shall be designed using one of the methods presented in APWA Section 5603 and shall conform to the design criteria presented in APWA Section 5607. Methods presented in APWA Section 5604 shall be used for inlet design.

Exhibit 2
1-Year Storm Calculations



Subcat Reach Pond Link

Routing Diagram for 400 NW 72 Street
Prepared by HP, Printed 7/21/2023

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.354	74	>75% Grass cover, Good, HSG C (1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P)
0.874	98	Paved parking, HSG C (1P)
3.228	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
3.228	HSG C	1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P
0.000	HSG D	
0.000	Other	
3.228		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	2.354	0.000	0.000	2.354	>75% Grass cover, Good	1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P
0.000	0.000	0.874	0.000	0.000	0.874	Paved parking	1P
0.000	**0.000**	**3.228**	**0.000**	**0.000**	**3.228**	**TOTAL AREA**	

Time span=2.00-30.00 hrs, dt=0.05 hrs, 561 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: (new Subcat) Runoff Area=0.544 ac 0.00% Impervious Runoff Depth=0.85"
Flow Length=81' Slope=0.0247 '/' Tc=10.6 min CN=74 Runoff=0.66 cfs 0.038 af

Subcatchment 1P: (new Subcat) Runoff Area=1.145 ac 76.33% Impervious Runoff Depth=2.07"
Flow Length=249' Tc=2.8 min CN=92 Runoff=4.33 cfs 0.197 af

Subcatchment 2E: (new Subcat) Runoff Area=0.017 ac 0.00% Impervious Runoff Depth=0.85"
Flow Length=30' Slope=0.0732 '/' Tc=3.1 min CN=74 Runoff=0.03 cfs 0.001 af

Subcatchment 2P: (new Subcat) Runoff Area=0.007 ac 0.00% Impervious Runoff Depth=0.85"
Flow Length=33' Slope=0.0758 '/' Tc=3.3 min CN=74 Runoff=0.01 cfs 0.000 af

Subcatchment 3E: (new Subcat) Runoff Area=1.053 ac 0.00% Impervious Runoff Depth=0.85"
Flow Length=237' Tc=5.8 min CN=74 Runoff=1.53 cfs 0.074 af

Subcatchment 3P: (new Subcat) Runoff Area=0.007 ac 0.00% Impervious Runoff Depth=0.85"
Flow Length=43' Slope=0.5116 '/' Tc=1.9 min CN=74 Runoff=0.01 cfs 0.000 af

Subcatchment 4P: (new Subcat) Runoff Area=0.167 ac 0.00% Impervious Runoff Depth=0.85"
Flow Length=83' Tc=2.6 min CN=74 Runoff=0.27 cfs 0.012 af

Subcatchment 5P: (new Subcat) Runoff Area=0.142 ac 0.00% Impervious Runoff Depth=0.85"
Flow Length=13' Slope=0.0176 '/' Tc=2.8 min CN=74 Runoff=0.23 cfs 0.010 af

Subcatchment 6P: (new Subcat) Runoff Area=0.146 ac 0.00% Impervious Runoff Depth=0.85"
Flow Length=222' Tc=7.5 min CN=74 Runoff=0.20 cfs 0.010 af

Pond DET1: (new Pond) Peak Elev=983.05' Storage=0.064 af Inflow=4.56 cfs 0.207 af
Outflow=1.70 cfs 0.207 af

Link 4E: (new Link) Inflow=2.13 cfs 0.114 af
Primary=2.13 cfs 0.114 af

Link 10L: (new Link) Inflow=2.06 cfs 0.230 af
Primary=2.06 cfs 0.230 af

Total Runoff Area = 3.228 ac Runoff Volume = 0.344 af Average Runoff Depth = 1.28"
72.92% Pervious = 2.354 ac 27.08% Impervious = 0.874 ac

Summary for Subcatchment 1E: (new Subcat)

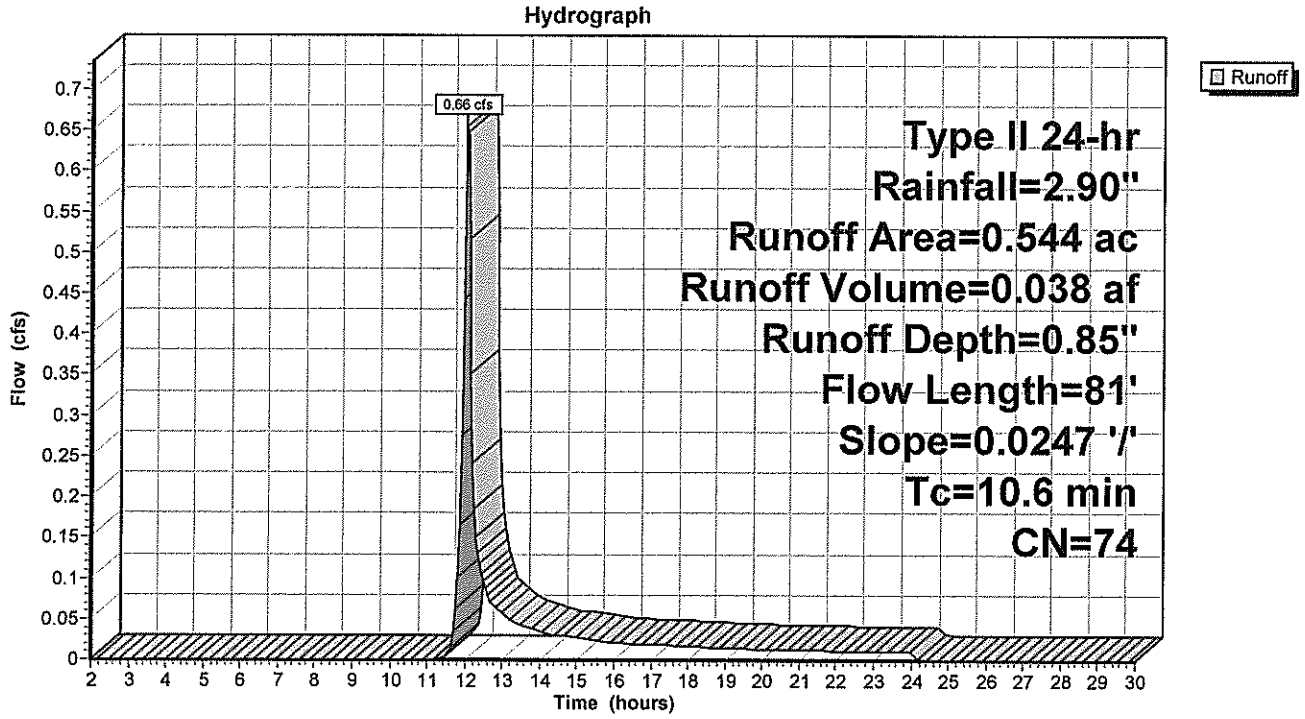
Runoff = 0.66 cfs @ 12.04 hrs, Volume= 0.038 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
0.544	74	>75% Grass cover, Good, HSG C
0.544		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	81	0.0247	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 1E: (new Subcat)



Summary for Subcatchment 1P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

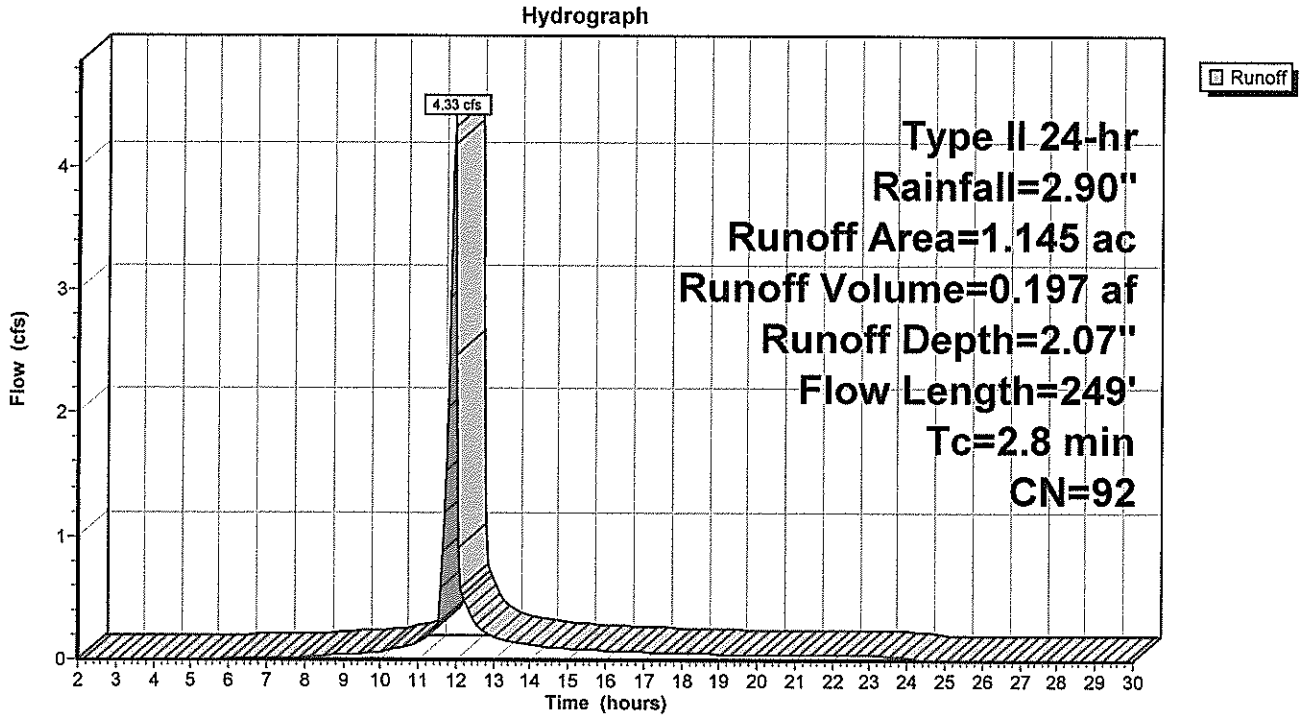
Runoff = 4.33 cfs @ 11.93 hrs, Volume= 0.197 af, Depth= 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
0.271	74	>75% Grass cover, Good, HSG C
0.874	98	Paved parking, HSG C
1.145	92	Weighted Average
0.271		23.67% Pervious Area
0.874		76.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0065	0.92		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
1.0	149	0.0151	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.8	249	Total			

Subcatchment 1P: (new Subcat)



Summary for Subcatchment 2E: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

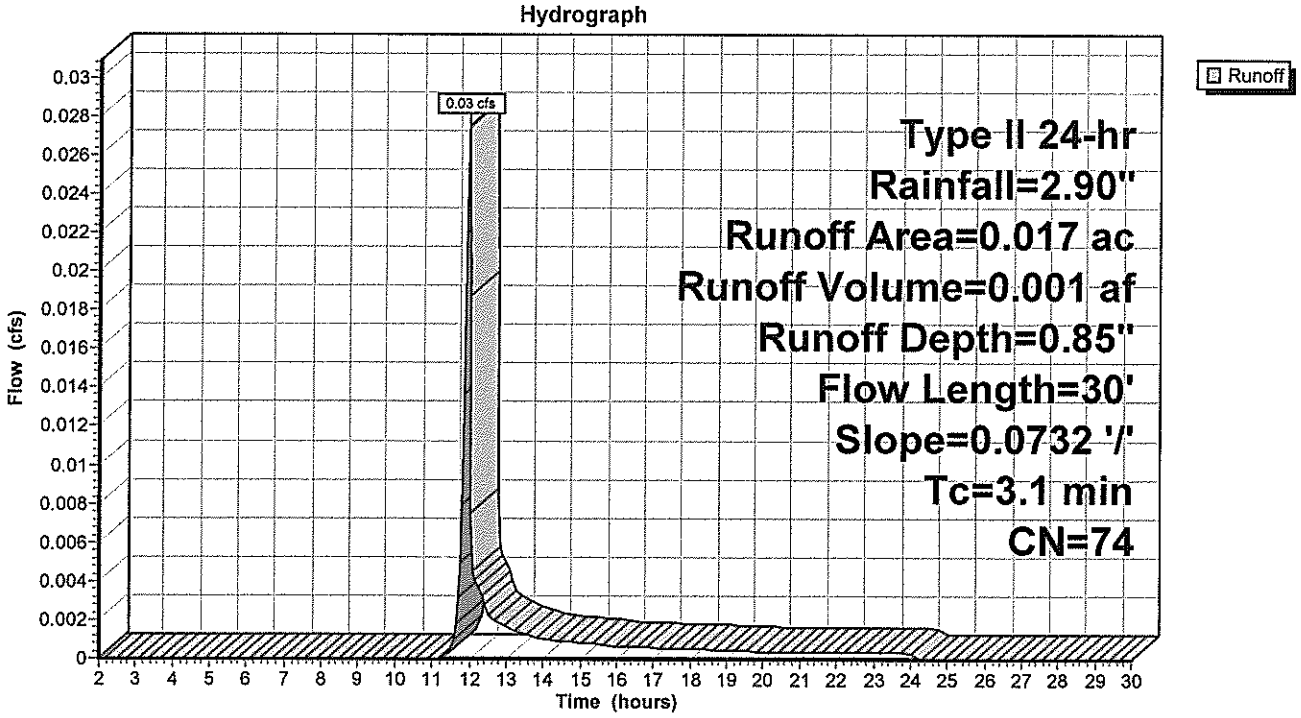
Runoff = 0.03 cfs @ 11.94 hrs, Volume= 0.001 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
0.017	74	>75% Grass cover, Good, HSG C
0.017		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	30	0.0732	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 2E: (new Subcat)



Summary for Subcatchment 2P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

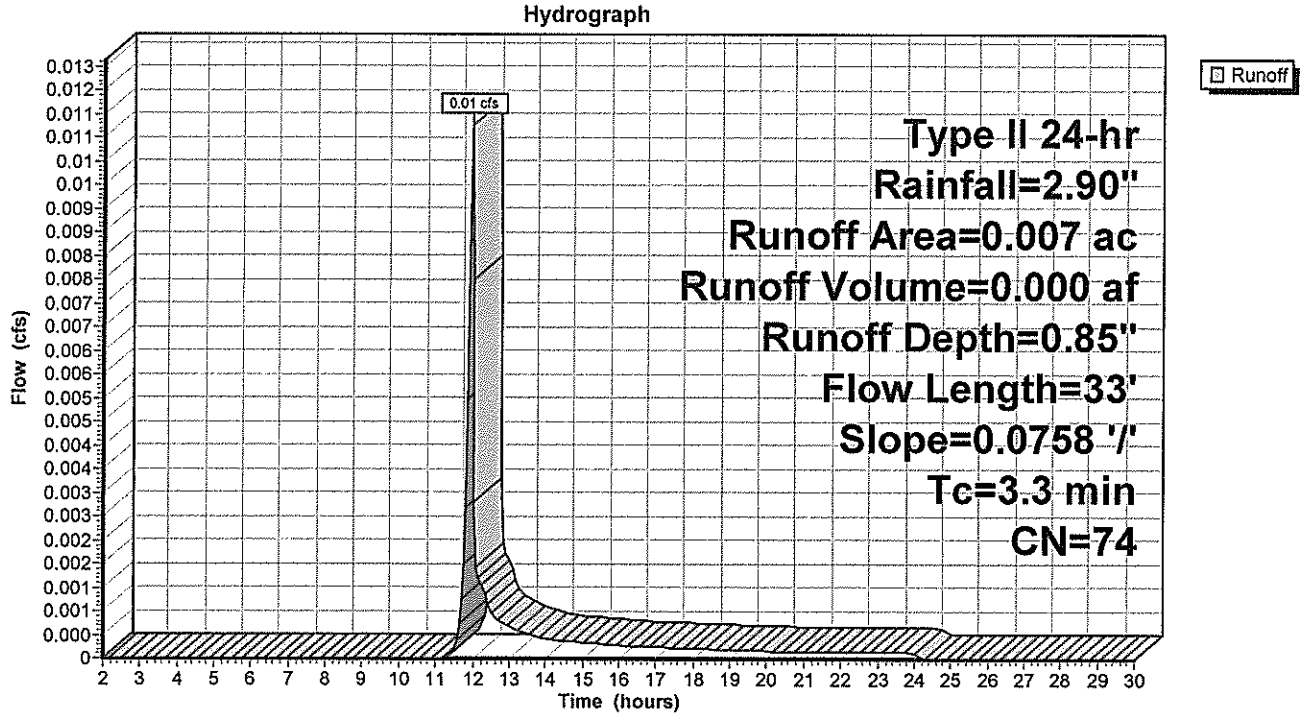
Runoff = 0.01 cfs @ 11.95 hrs, Volume= 0.000 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
0.007	74	>75% Grass cover, Good, HSG C
0.007		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	33	0.0758	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 2P: (new Subcat)



Summary for Subcatchment 3E: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

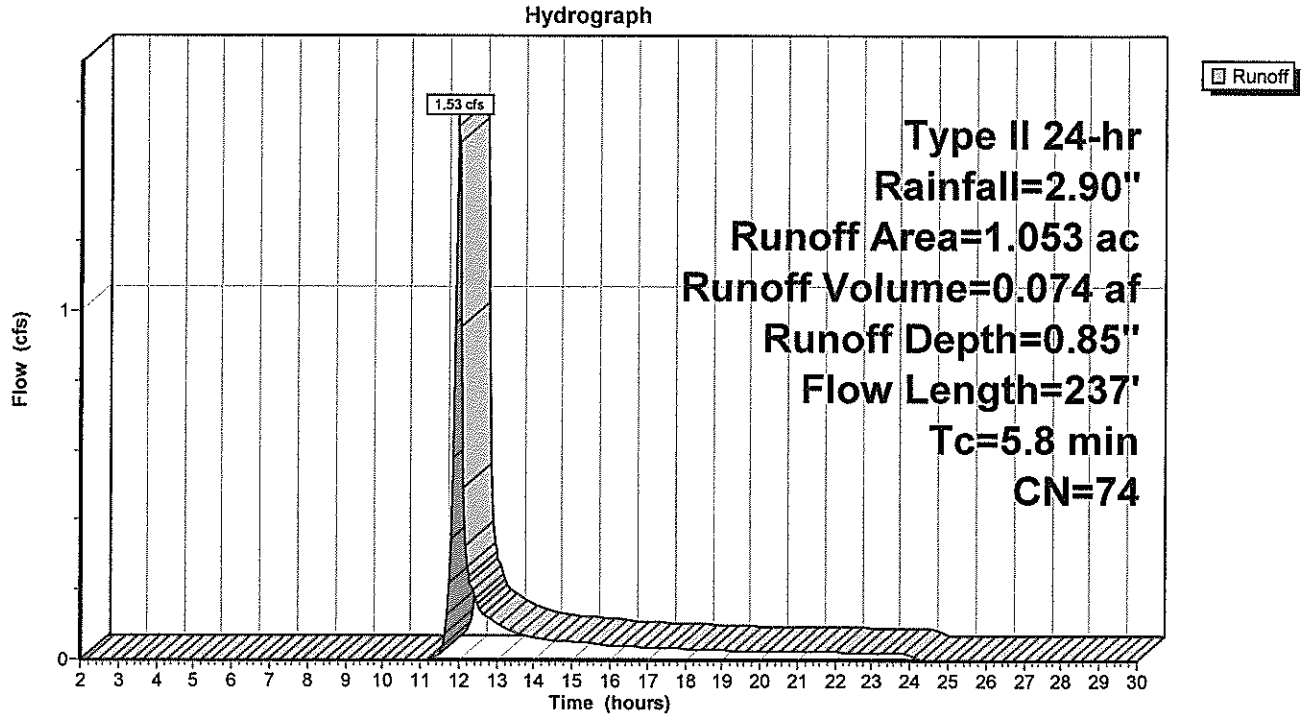
Runoff = 1.53 cfs @ 11.98 hrs, Volume= 0.074 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
1.053	74	>75% Grass cover, Good, HSG C
1.053		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	100	0.2000	0.31		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.4	137	0.1339	5.49		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.8	237	Total			

Subcatchment 3E: (new Subcat)



Summary for Subcatchment 3P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

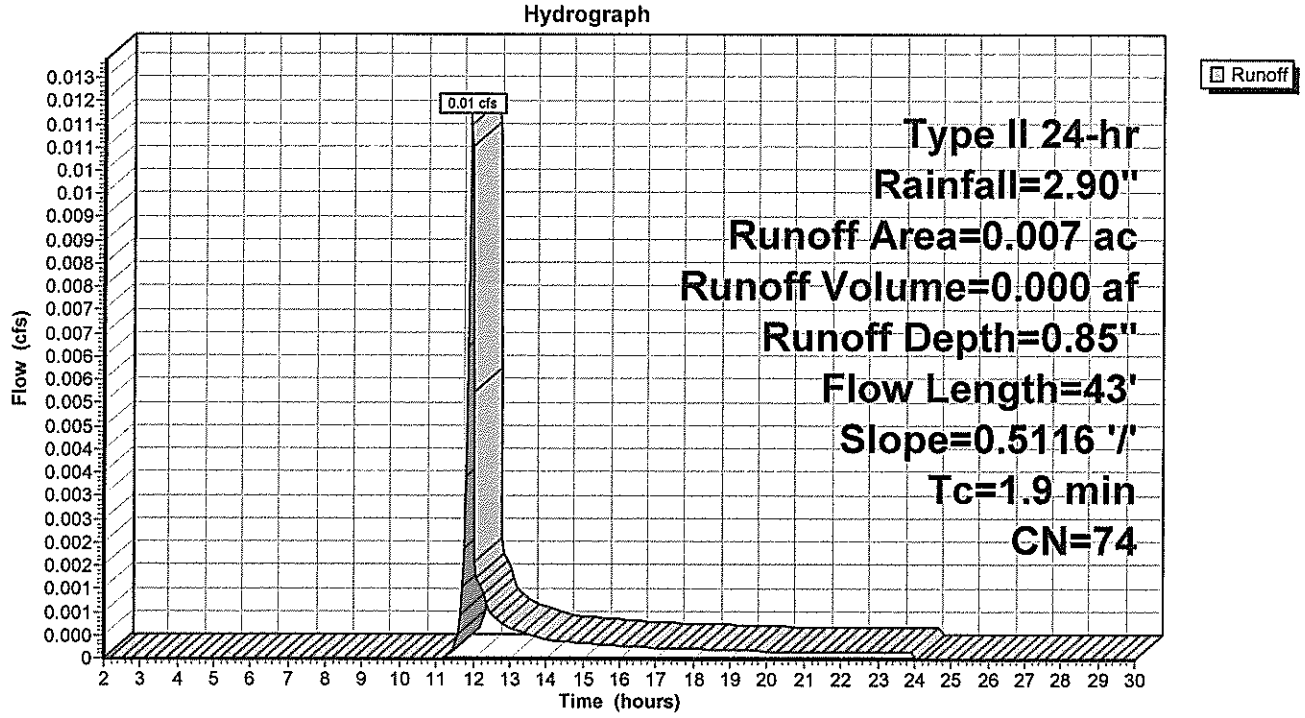
Runoff = 0.01 cfs @ 11.93 hrs, Volume= 0.000 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
0.007	74	>75% Grass cover, Good, HSG C
0.007		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	43	0.5116	0.38		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 3P: (new Subcat)



Summary for Subcatchment 4P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

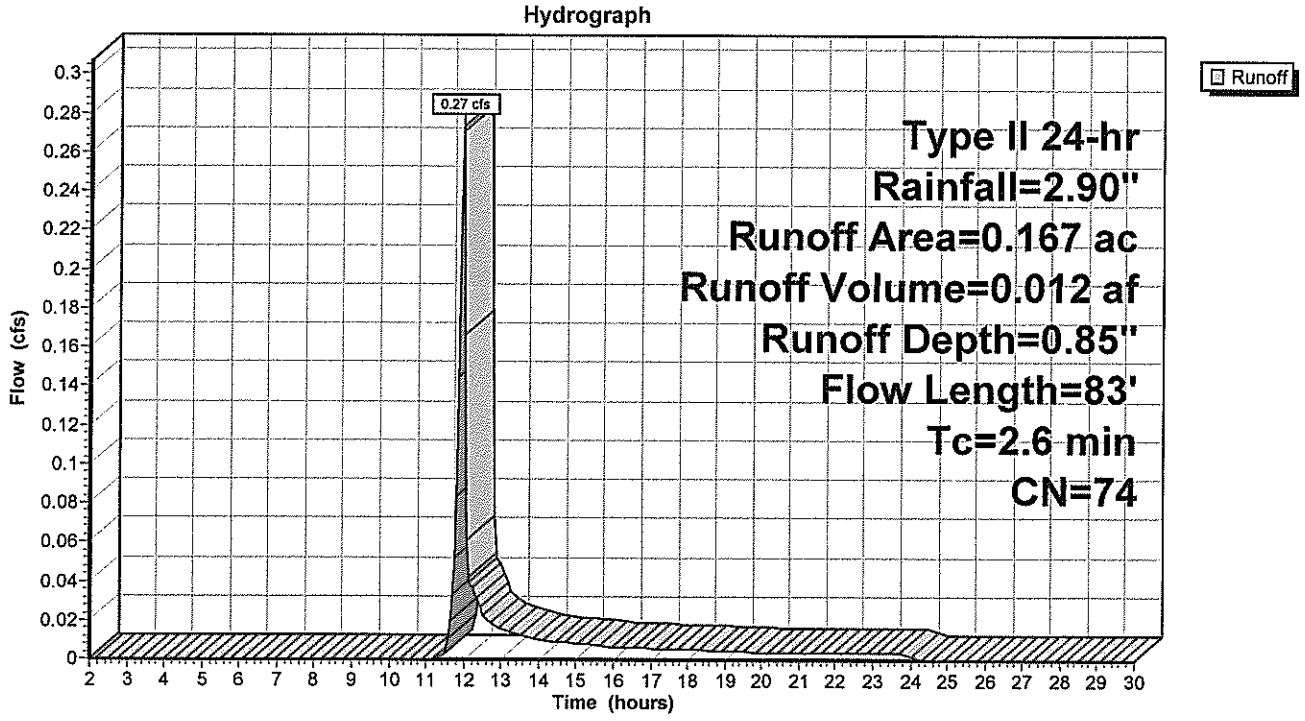
Runoff = 0.27 cfs @ 11.94 hrs, Volume= 0.012 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
0.167	74	>75% Grass cover, Good, HSG C
0.167		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	30	0.1453	0.21		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.2	53	0.0967	5.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.6	83	Total			

Subcatchment 4P: (new Subcat)



Summary for Subcatchment 5P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

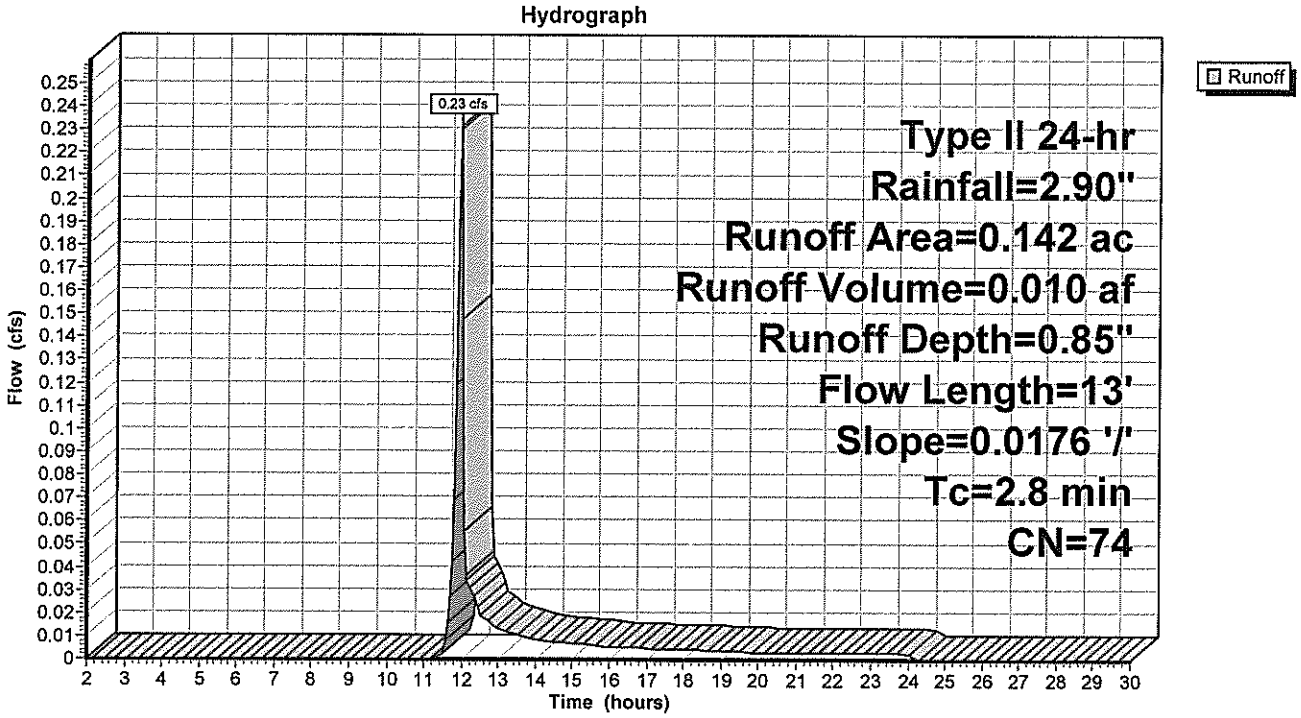
Runoff = 0.23 cfs @ 11.94 hrs, Volume= 0.010 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
0.142	74	>75% Grass cover, Good, HSG C
0.142		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	13	0.0176	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 5P: (new Subcat)



Summary for Subcatchment 6P: (new Subcat)

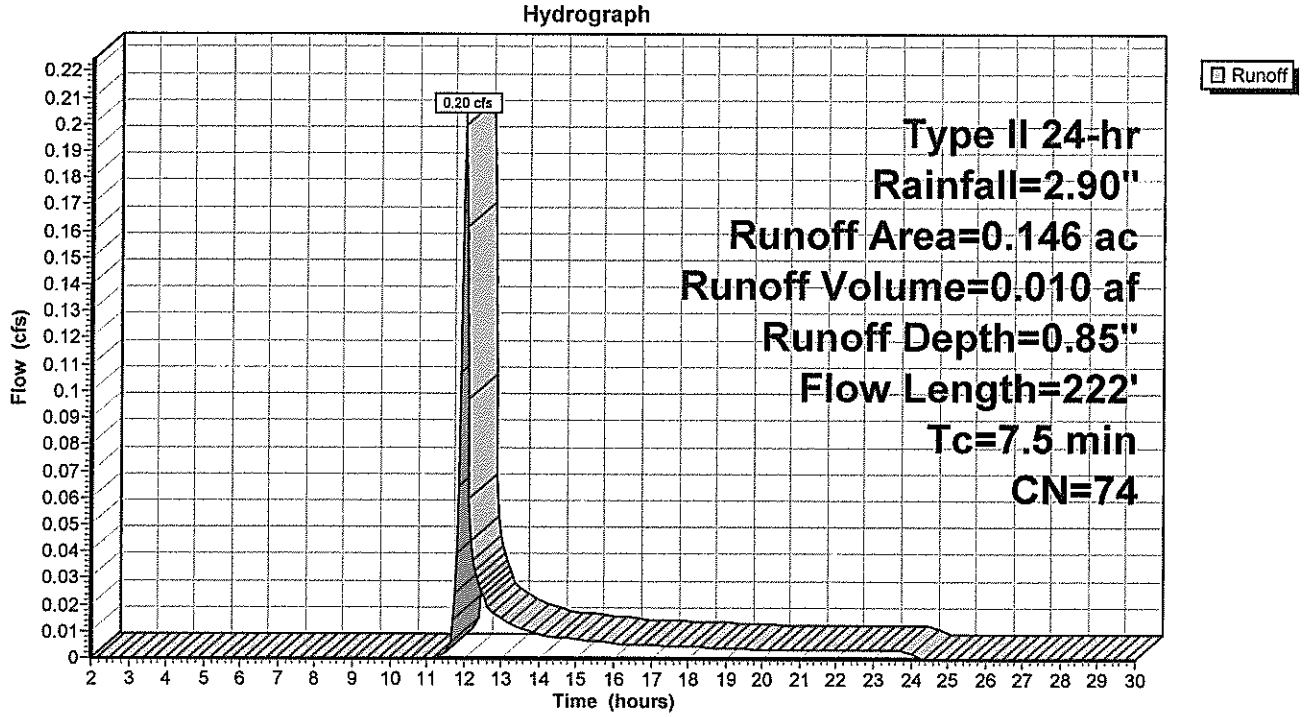
Runoff = 0.20 cfs @ 12.00 hrs, Volume= 0.010 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=2.90"

Area (ac)	CN	Description
0.146	74	>75% Grass cover, Good, HSG C
0.146		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	60	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.6	162	0.0775	4.18		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
7.5	222	Total			

Subcatchment 6P: (new Subcat)



Summary for Pond DET1: (new Pond)

Inflow Area = 1.287 ac, 67.91% Impervious, Inflow Depth = 1.93"
Inflow = 4.56 cfs @ 11.93 hrs, Volume= 0.207 af
Outflow = 1.70 cfs @ 12.03 hrs, Volume= 0.207 af, Atten= 63%, Lag= 6.0 min
Primary = 1.70 cfs @ 12.03 hrs, Volume= 0.207 af

Routing by Stor-Ind method, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 983.05' @ 12.03 hrs Surf.Area= 0.085 ac Storage= 0.064 af

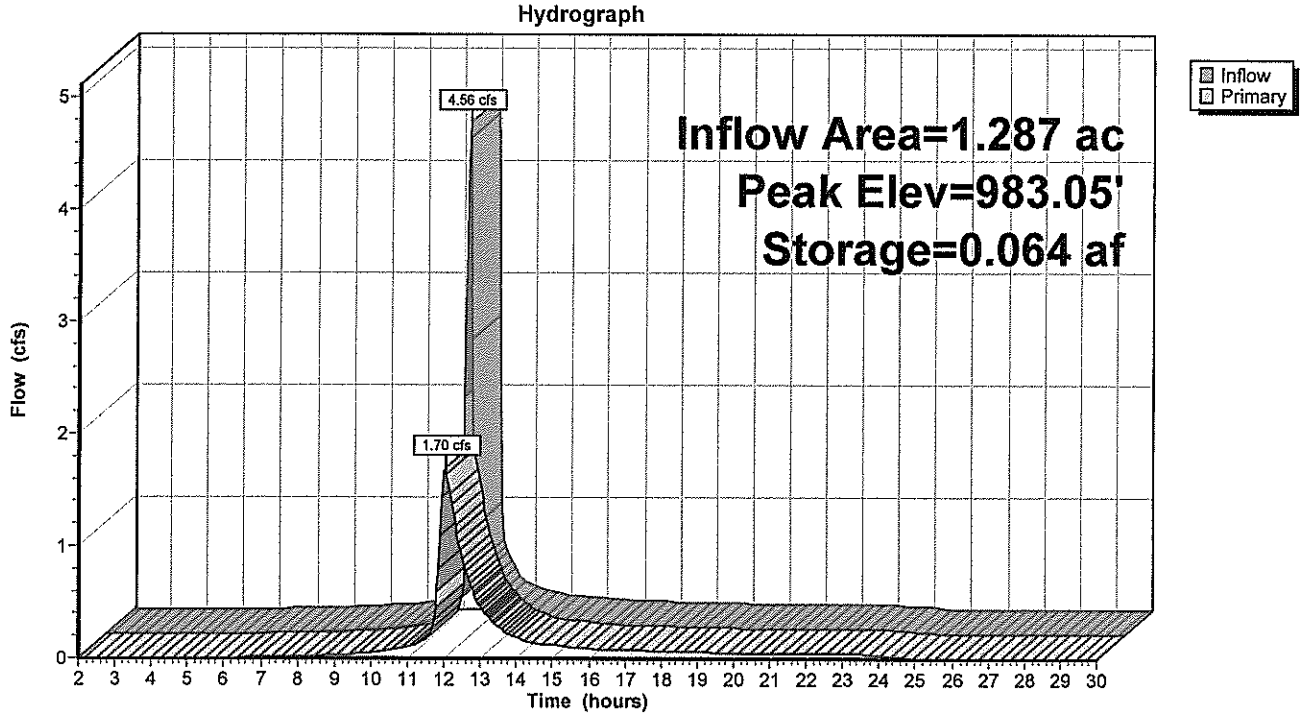
Plug-Flow detention time= 29.3 min calculated for 0.207 af (100% of inflow)
Center-of-Mass det. time= 29.1 min (827.6 - 798.5)

Volume	Invert	Avail.Storage	Storage Description
#1	982.03'	0.211 af	**36.0" Round Pipe Storage** L= 1,300.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	982.03'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.03 1.03 1.93 1.93 3.00 Width (feet) 0.50 0.50 0.79 0.79 2.50 2.50

Primary OutFlow Max=1.68 cfs @ 12.03 hrs HW=983.05' (Free Discharge)
↑**1=Custom Weir/Orifice** (Weir Controls 1.68 cfs @ 3.31 fps)

Pond DET1: (new Pond)

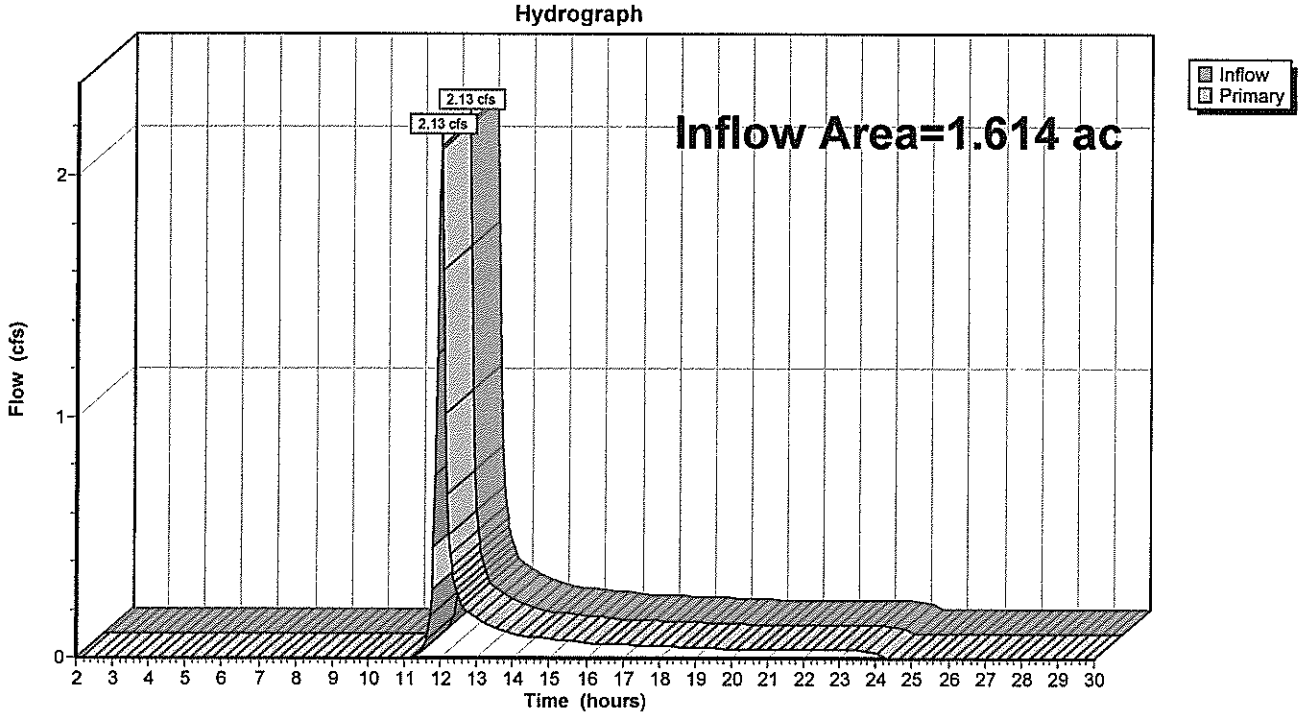


Summary for Link 4E: (new Link)

Inflow Area = 1.614 ac, 0.00% Impervious, Inflow Depth = 0.85"
Inflow = 2.13 cfs @ 11.99 hrs, Volume= 0.114 af
Primary = 2.13 cfs @ 11.99 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs

Link 4E: (new Link)



Summary for Link 10L: (new Link)

Inflow Area = 1.614 ac, 54.15% Impervious, Inflow Depth = 1.71"
Inflow = 2.06 cfs @ 12.00 hrs, Volume= 0.230 af
Primary = 2.06 cfs @ 12.00 hrs, Volume= 0.230 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs

Link 10L: (new Link)

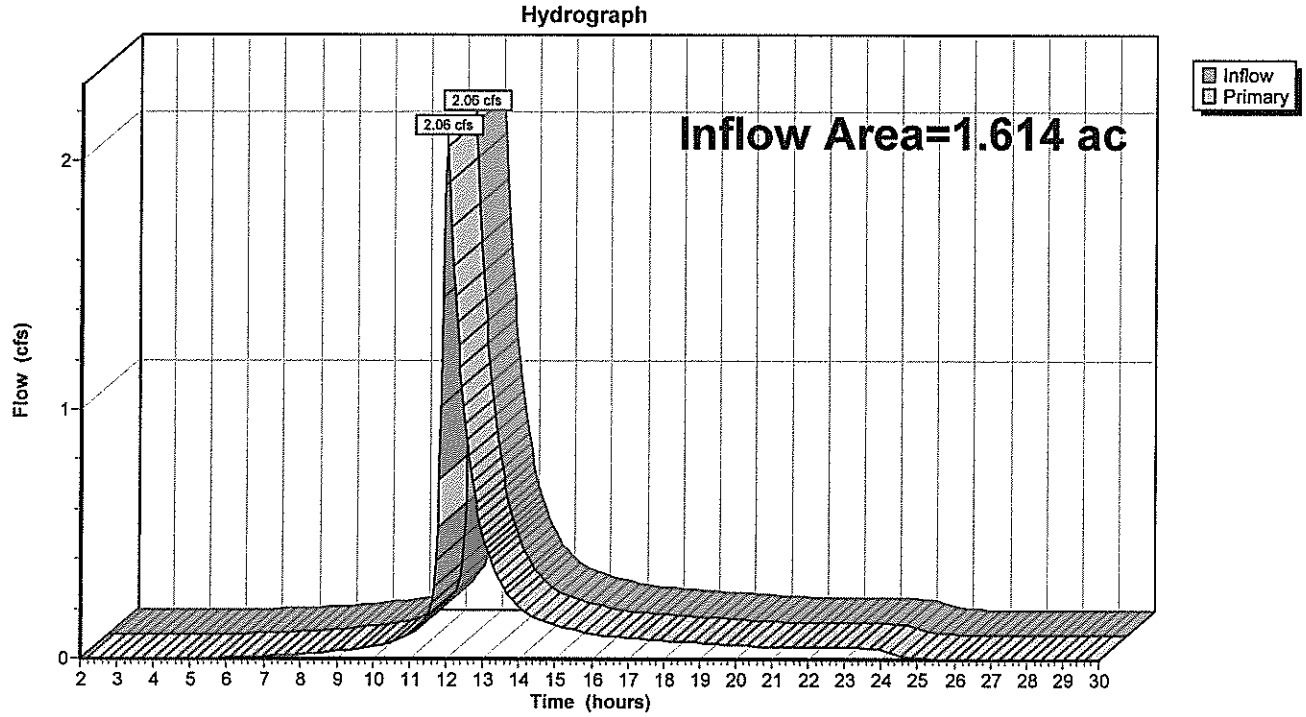
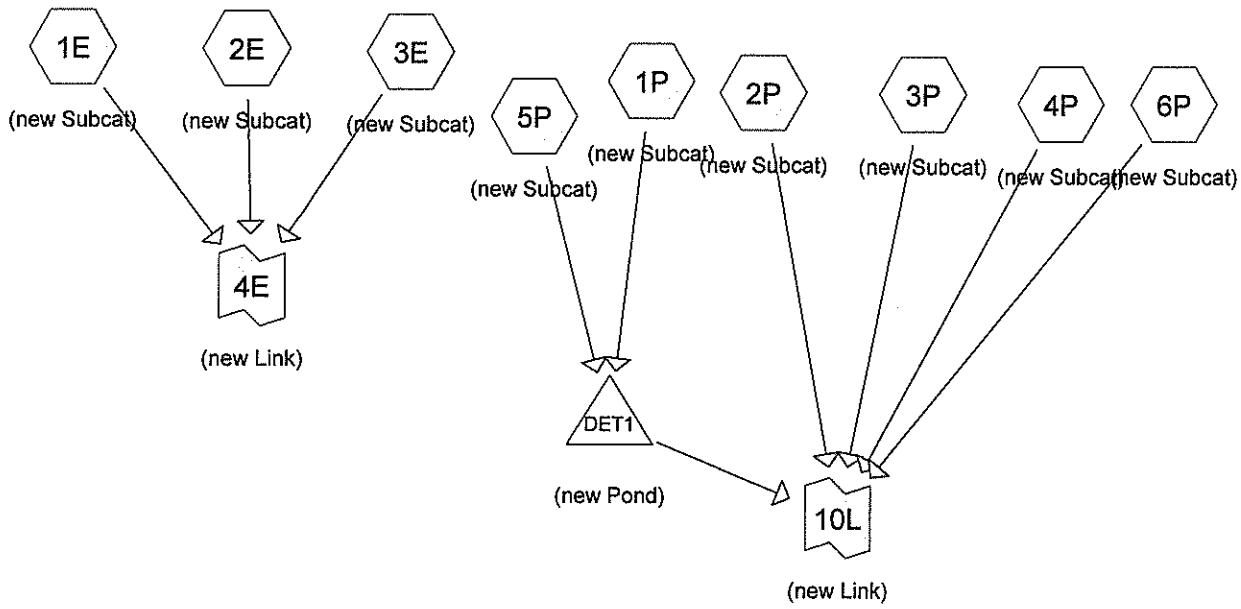


Exhibit 3
10-year Storm Calculations



Subcat Reach Pond Link

Routing Diagram for 400 NW 72 Street
Prepared by HP, Printed 7/20/2023

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.354	74	>75% Grass cover, Good, HSG C (1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P)
0.874	98	Paved parking, HSG C (1P)
3.228	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
3.228	HSG C	1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P
0.000	HSG D	
0.000	Other	
3.228		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	2.354	0.000	0.000	2.354	>75% Grass cover, Good	1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P
0.000	0.000	0.874	0.000	0.000	0.874	Paved parking	1P
0.000	**0.000**	**3.228**	**0.000**	**0.000**	**3.228**	**TOTAL AREA**	

Time span=2.00-30.00 hrs, dt=0.05 hrs, 561 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: (new Subcat) Runoff Area=0.544 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=81' Slope=0.0247 '/' Tc=10.6 min CN=74 Runoff=2.04 cfs 0.114 af

Subcatchment 1P: (new Subcat) Runoff Area=1.145 ac 76.33% Impervious Runoff Depth=4.28"
Flow Length=249' Tc=2.8 min CN=92 Runoff=8.53 cfs 0.409 af

Subcatchment 2E: (new Subcat) Runoff Area=0.017 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=30' Slope=0.0732 '/' Tc=3.1 min CN=74 Runoff=0.08 cfs 0.004 af

Subcatchment 2P: (new Subcat) Runoff Area=0.007 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=33' Slope=0.0758 '/' Tc=3.3 min CN=74 Runoff=0.03 cfs 0.001 af

Subcatchment 3E: (new Subcat) Runoff Area=1.053 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=237' Tc=5.8 min CN=74 Runoff=4.62 cfs 0.222 af

Subcatchment 3P: (new Subcat) Runoff Area=0.007 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=43' Slope=0.5116 '/' Tc=1.9 min CN=74 Runoff=0.03 cfs 0.001 af

Subcatchment 4P: (new Subcat) Runoff Area=0.167 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=83' Tc=2.6 min CN=74 Runoff=0.82 cfs 0.035 af

Subcatchment 5P: (new Subcat) Runoff Area=0.142 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=13' Slope=0.0176 '/' Tc=2.8 min CN=74 Runoff=0.70 cfs 0.030 af

Subcatchment 6P: (new Subcat) Runoff Area=0.146 ac 0.00% Impervious Runoff Depth=2.52"
Flow Length=222' Tc=7.5 min CN=74 Runoff=0.61 cfs 0.031 af

Pond DET1: (new Pond) Peak Elev=983.76' Storage=0.126 af Inflow=9.22 cfs 0.439 af
Outflow=4.30 cfs 0.439 af

Link 4E: (new Link) Inflow=6.54 cfs 0.340 af
Primary=6.54 cfs 0.340 af

Link 10L: (new Link) Inflow=5.38 cfs 0.508 af
Primary=5.38 cfs 0.508 af

Total Runoff Area = 3.228 ac Runoff Volume = 0.847 af Average Runoff Depth = 3.15"
72.92% Pervious = 2.354 ac 27.08% Impervious = 0.874 ac

Summary for Subcatchment 1E: (new Subcat)

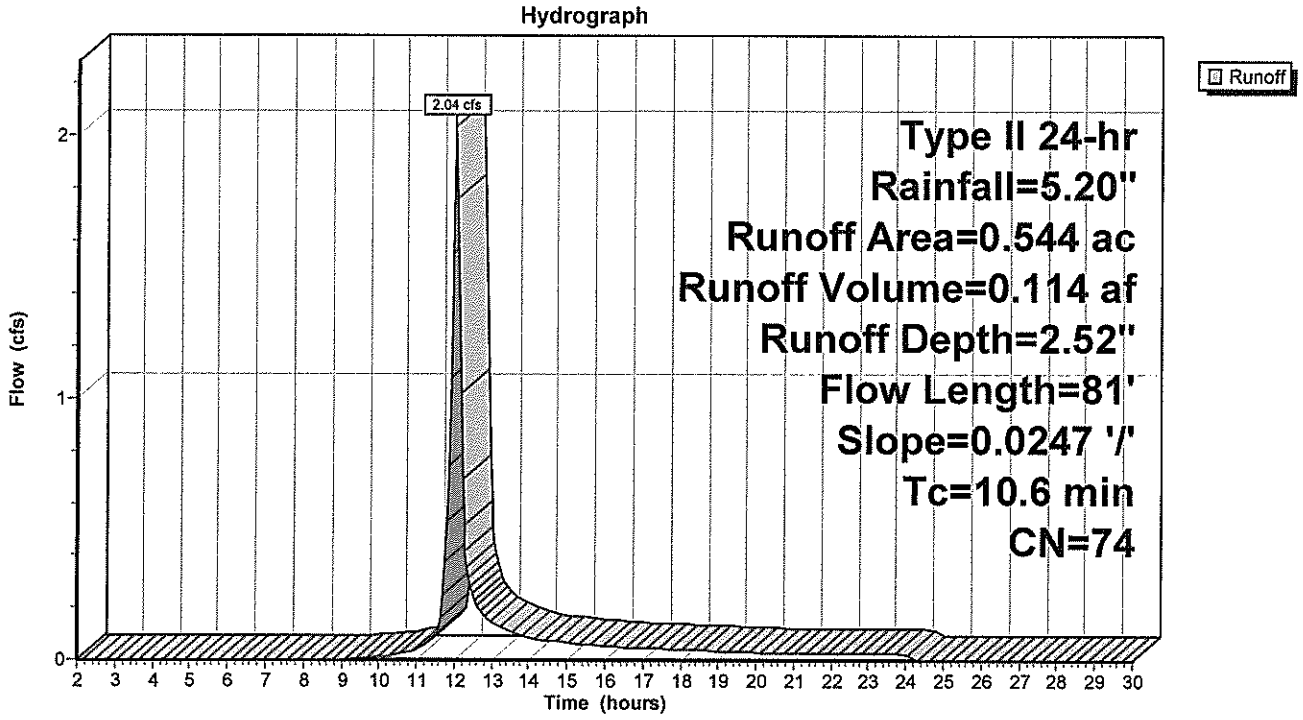
Runoff = 2.04 cfs @ 12.03 hrs, Volume= 0.114 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
0.544	74	>75% Grass cover, Good, HSG C
0.544		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	81	0.0247	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 1E: (new Subcat)



Summary for Subcatchment 1P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

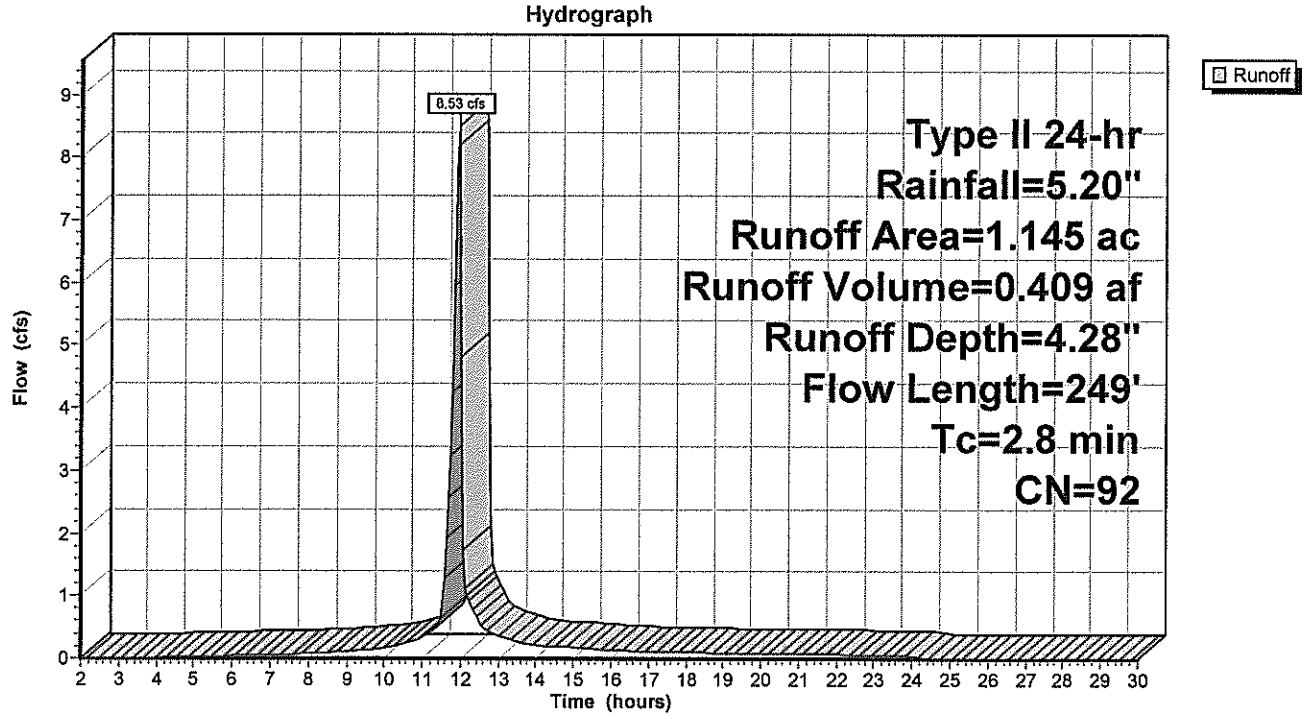
Runoff = 8.53 cfs @ 11.93 hrs, Volume= 0.409 af, Depth= 4.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
0.271	74	>75% Grass cover, Good, HSG C
0.874	98	Paved parking, HSG C
1.145	92	Weighted Average
0.271		23.67% Pervious Area
0.874		76.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0065	0.92		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
1.0	149	0.0151	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.8	249	Total			

Subcatchment 1P: (new Subcat)



Summary for Subcatchment 2E: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

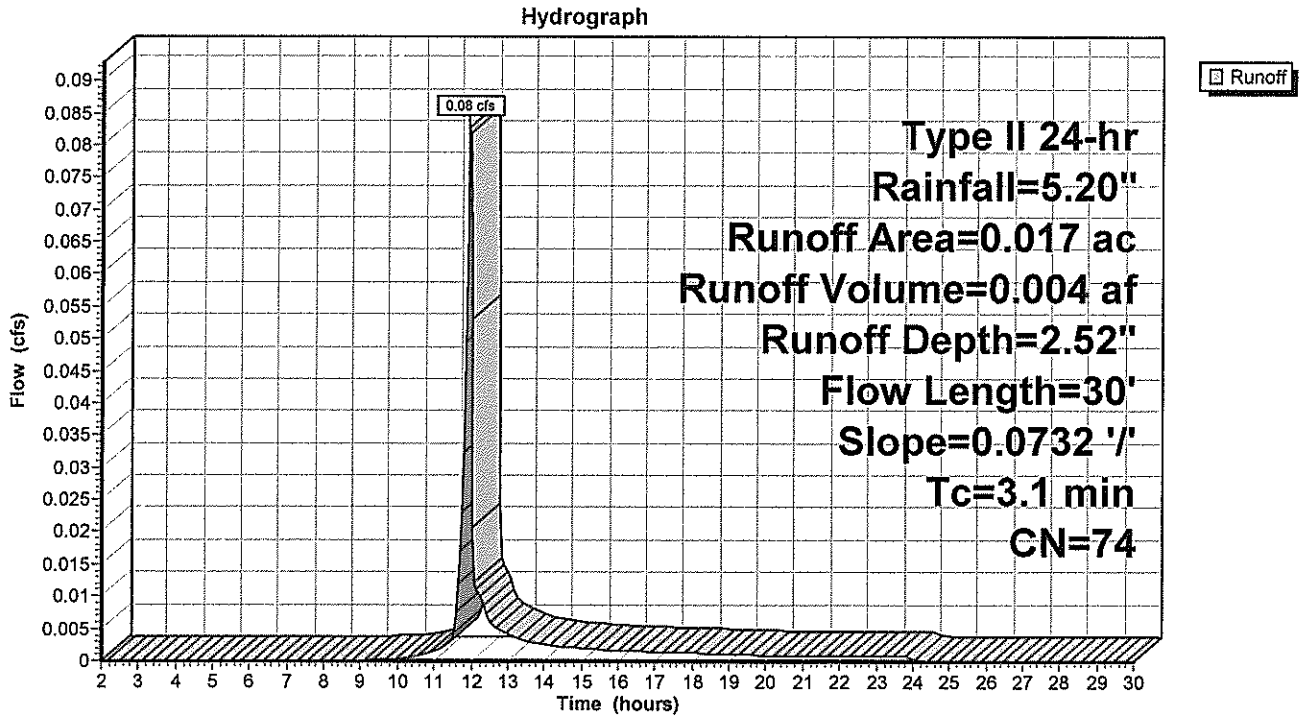
Runoff = 0.08 cfs @ 11.94 hrs, Volume= 0.004 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
0.017	74	>75% Grass cover, Good, HSG C
0.017		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	30	0.0732	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 2E: (new Subcat)



Summary for Subcatchment 2P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

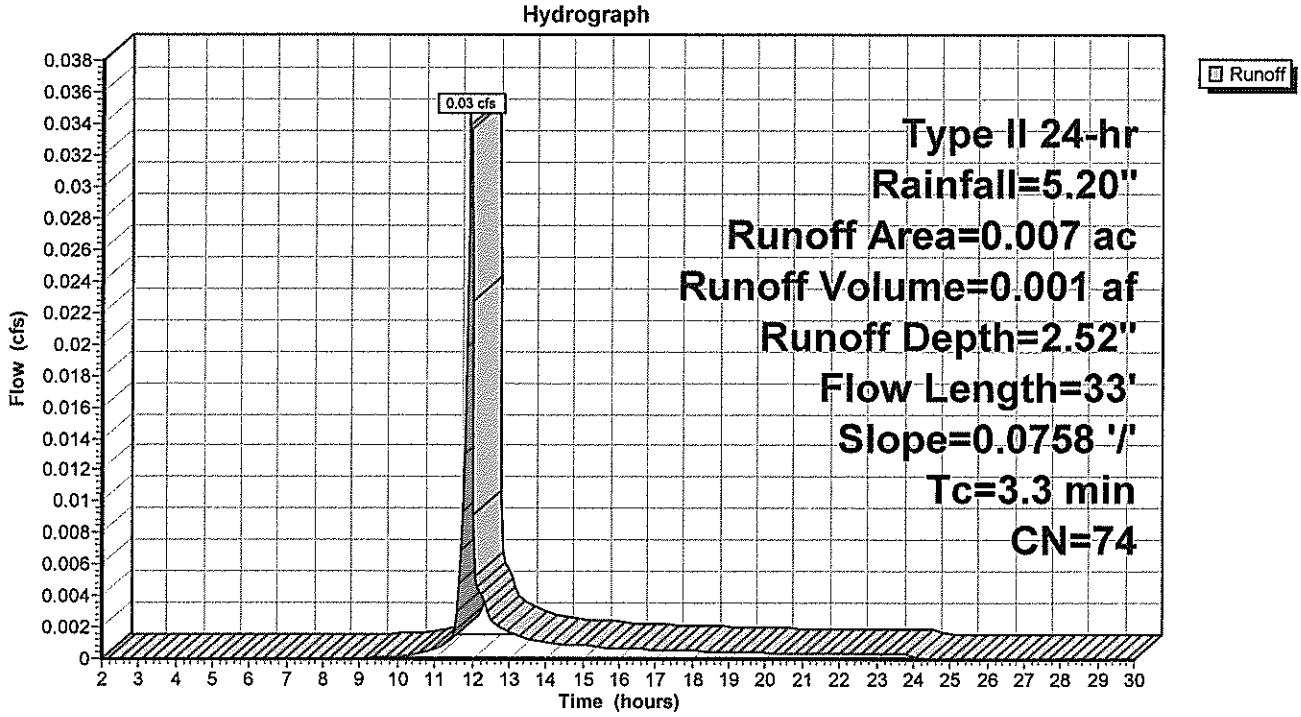
Runoff = 0.03 cfs @ 11.94 hrs, Volume= 0.001 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
0.007	74	>75% Grass cover, Good, HSG C
0.007		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	33	0.0758	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 2P: (new Subcat)



Summary for Subcatchment 3E: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

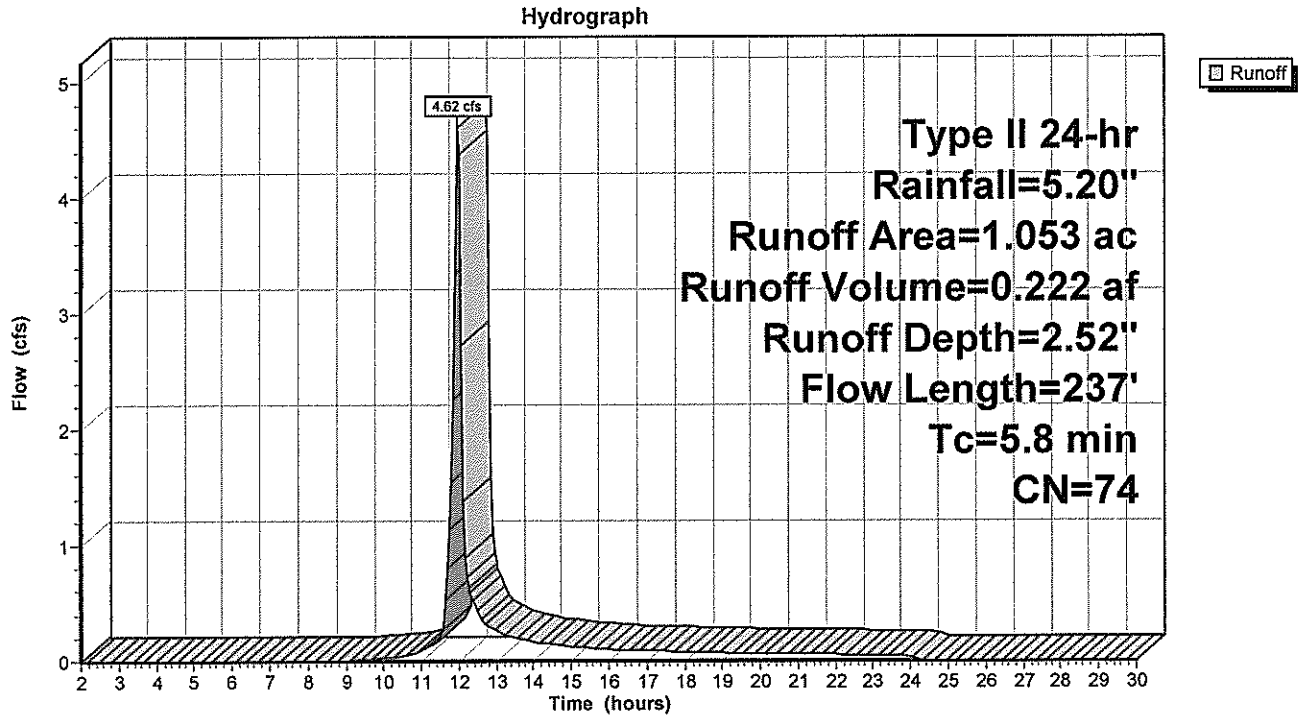
Runoff = 4.62 cfs @ 11.97 hrs, Volume= 0.222 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
1.053	74	>75% Grass cover, Good, HSG C
1.053		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	100	0.2000	0.31		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.4	137	0.1339	5.49		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.8	237	Total			

Subcatchment 3E: (new Subcat)



Summary for Subcatchment 3P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

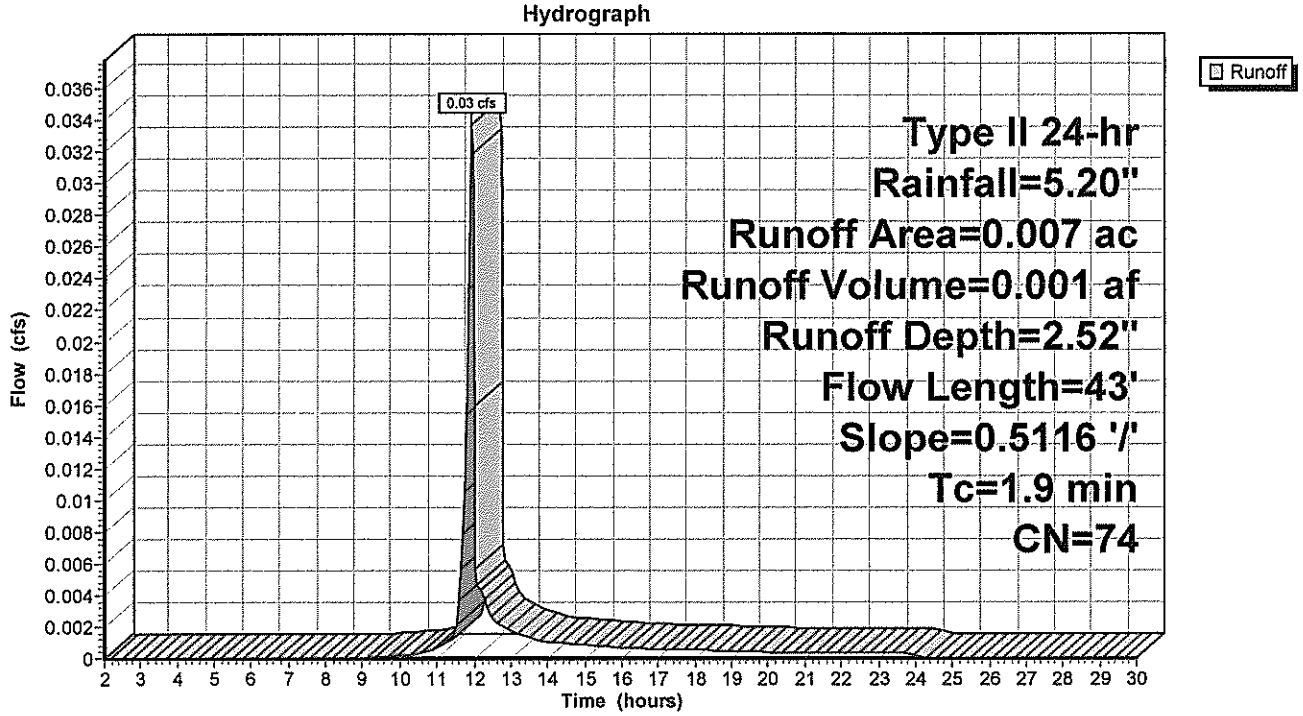
Runoff = 0.03 cfs @ 11.92 hrs, Volume= 0.001 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
0.007	74	>75% Grass cover, Good, HSG C
0.007		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	43	0.5116	0.38		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 3P: (new Subcat)



Summary for Subcatchment 4P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

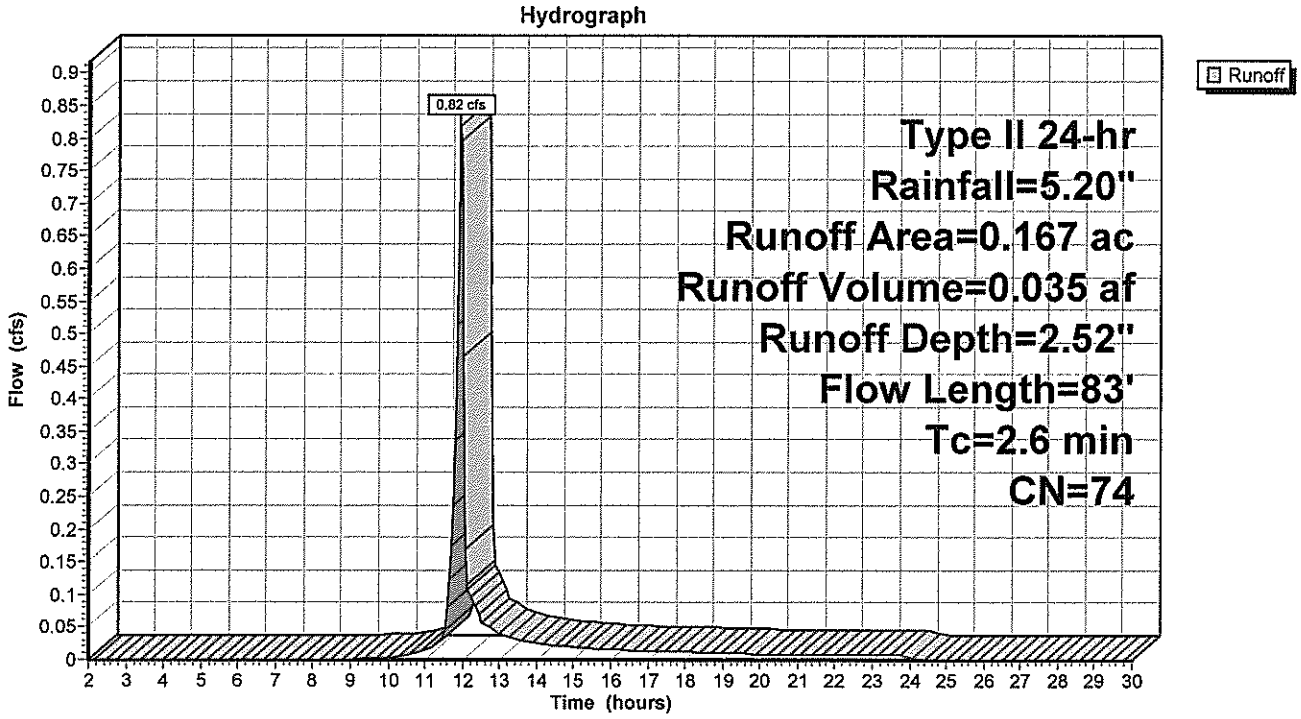
Runoff = 0.82 cfs @ 11.93 hrs, Volume= 0.035 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
0.167	74	>75% Grass cover, Good, HSG C
0.167		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	30	0.1453	0.21		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.2	53	0.0967	5.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.6	83	Total			

Subcatchment 4P: (new Subcat)



Summary for Subcatchment 5P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

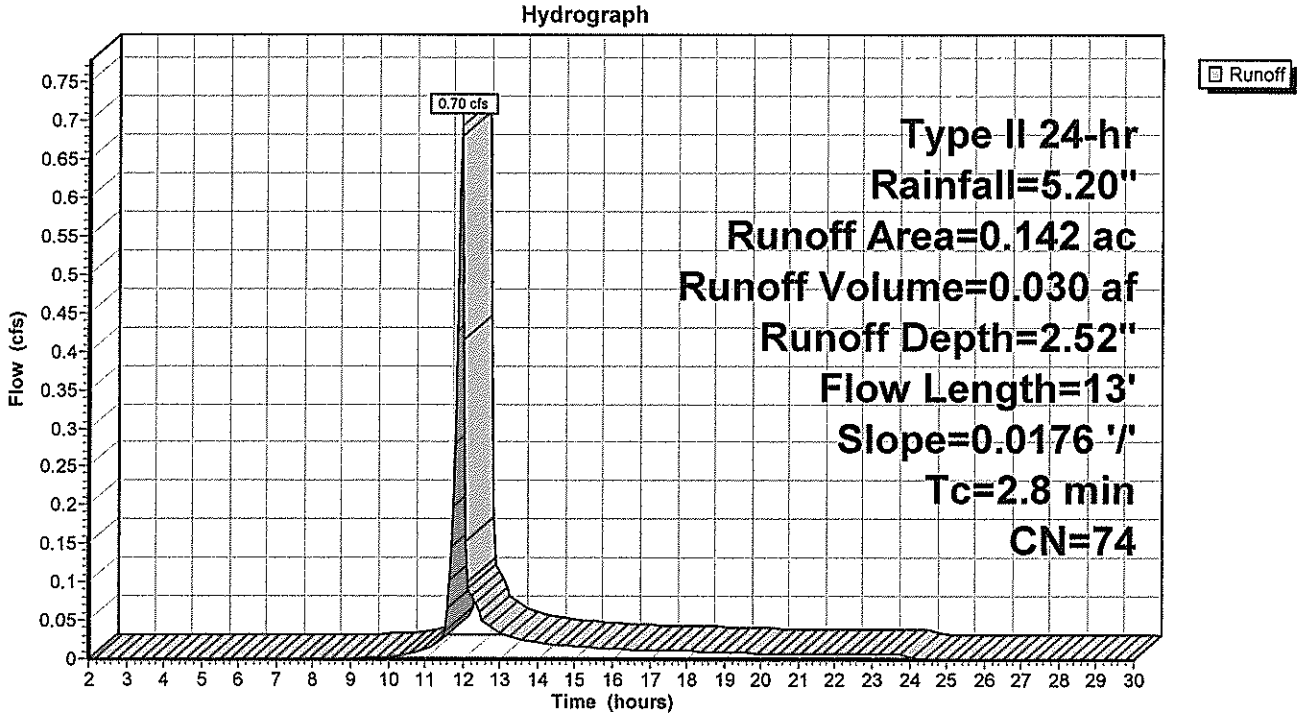
Runoff = 0.70 cfs @ 11.94 hrs, Volume= 0.030 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
0.142	74	>75% Grass cover, Good, HSG C
0.142		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	13	0.0176	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 5P: (new Subcat)



Summary for Subcatchment 6P: (new Subcat)

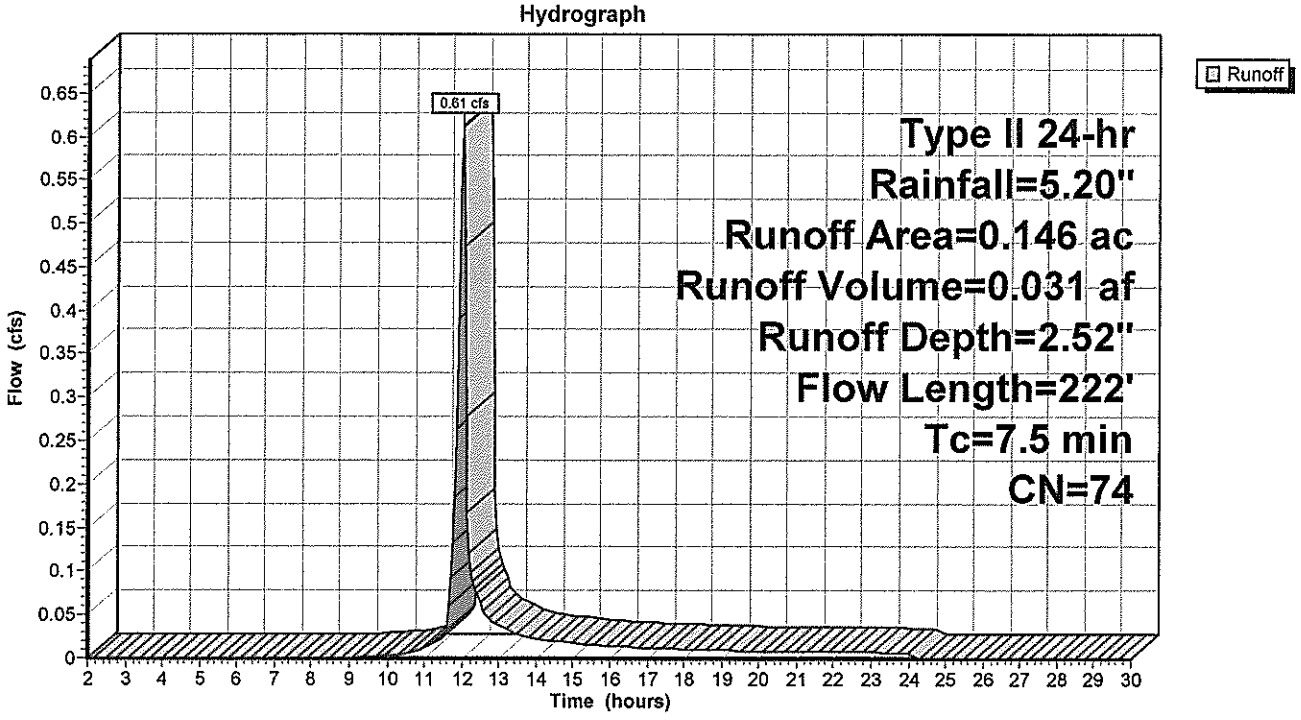
Runoff = 0.61 cfs @ 11.99 hrs, Volume= 0.031 af, Depth= 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=5.20"

Area (ac)	CN	Description
0.146	74	>75% Grass cover, Good, HSG C
0.146		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	60	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.6	162	0.0775	4.18		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
7.5	222	Total			

Subcatchment 6P: (new Subcat)



Summary for Pond DET1: (new Pond)

Inflow Area = 1.287 ac, 67.91% Impervious, Inflow Depth = 4.09"
Inflow = 9.22 cfs @ 11.93 hrs, Volume= 0.439 af
Outflow = 4.30 cfs @ 12.02 hrs, Volume= 0.439 af, Atten= 53%, Lag= 5.2 min
Primary = 4.30 cfs @ 12.02 hrs, Volume= 0.439 af

Routing by Stor-Ind method, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 983.76' @ 12.02 hrs Surf.Area= 0.088 ac Storage= 0.126 af

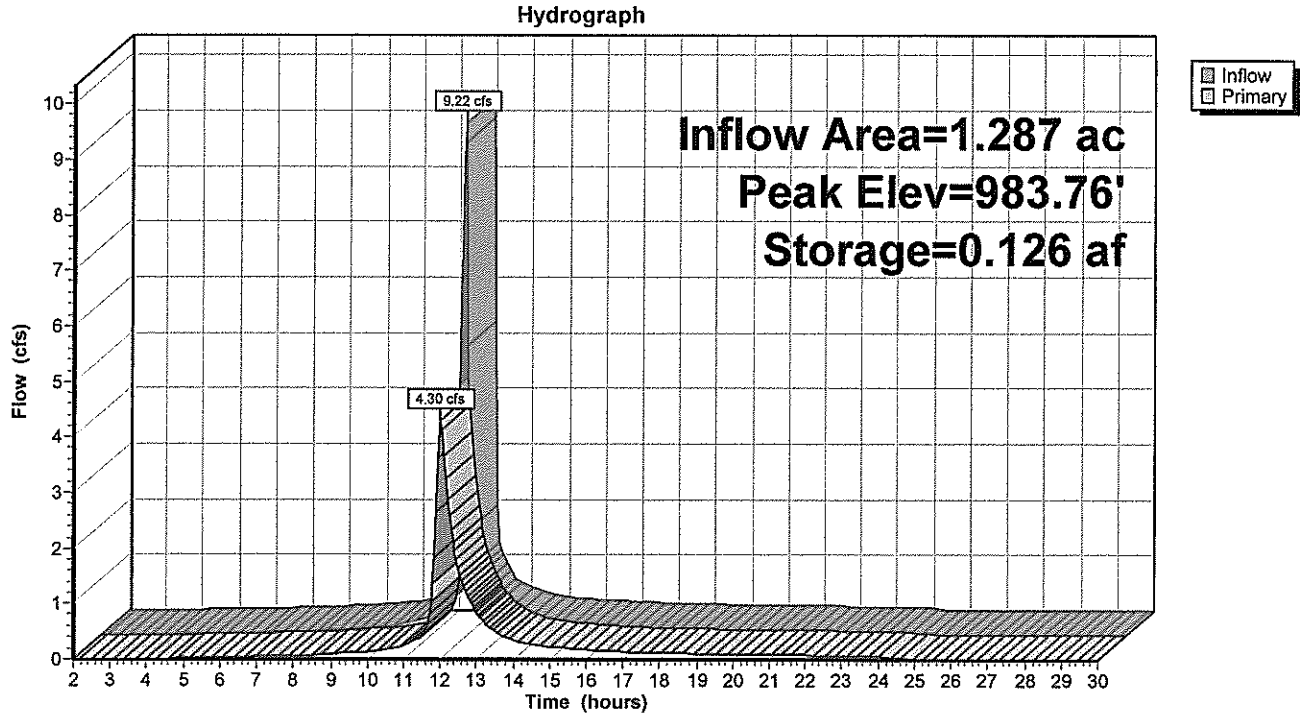
Plug-Flow detention time= 27.3 min calculated for 0.438 af (100% of inflow)
Center-of-Mass det. time= 27.4 min (806.2 - 778.8)

Volume	Invert	Avail.Storage	Storage Description
#1	982.03'	0.211 af	**36.0" Round Pipe Storage** L= 1,300.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	982.03'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.03 1.03 1.93 1.93 3.00 Width (feet) 0.50 0.50 0.79 0.79 2.50 2.50

Primary OutFlow Max=4.21 cfs @ 12.02 hrs HW=983.74' (Free Discharge)
↑—**1=Custom Weir/Orifice** (Weir Controls 4.21 cfs @ 3.99 fps)

Pond DET1: (new Pond)

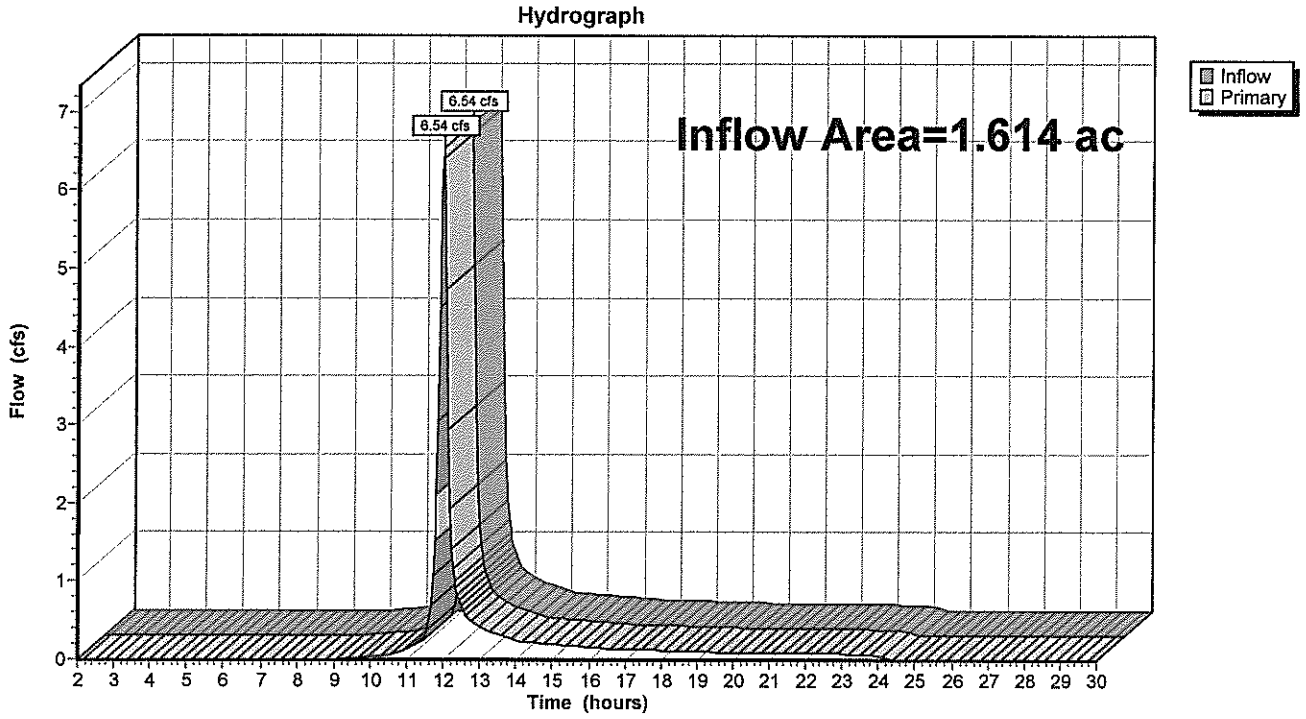


Summary for Link 4E: (new Link)

Inflow Area = 1.614 ac, 0.00% Impervious, Inflow Depth = 2.52"
Inflow = 6.54 cfs @ 11.98 hrs, Volume= 0.340 af
Primary = 6.54 cfs @ 11.98 hrs, Volume= 0.340 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs

Link 4E: (new Link)



Summary for Link 10L: (new Link)

Inflow Area = 1.614 ac, 54.15% Impervious, Inflow Depth = 3.77"
Inflow = 5.38 cfs @ 11.99 hrs, Volume= 0.508 af
Primary = 5.38 cfs @ 11.99 hrs, Volume= 0.508 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs

Link 10L: (new Link)

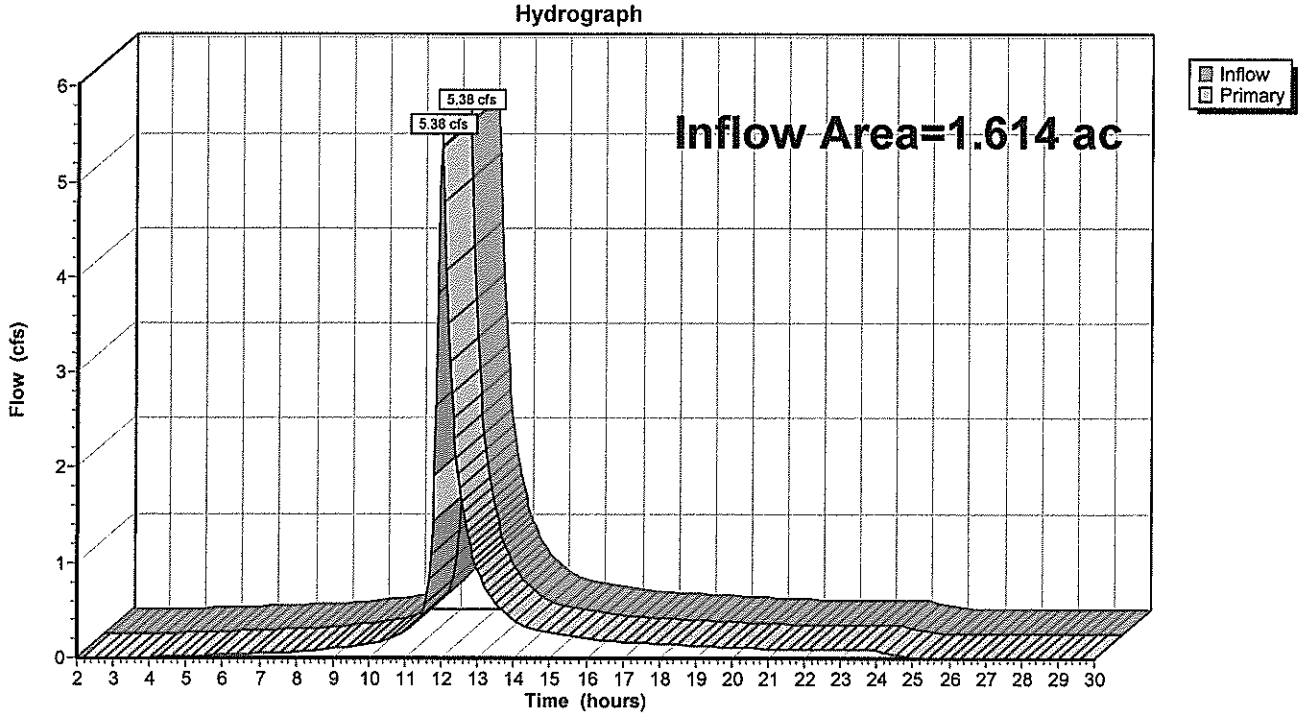
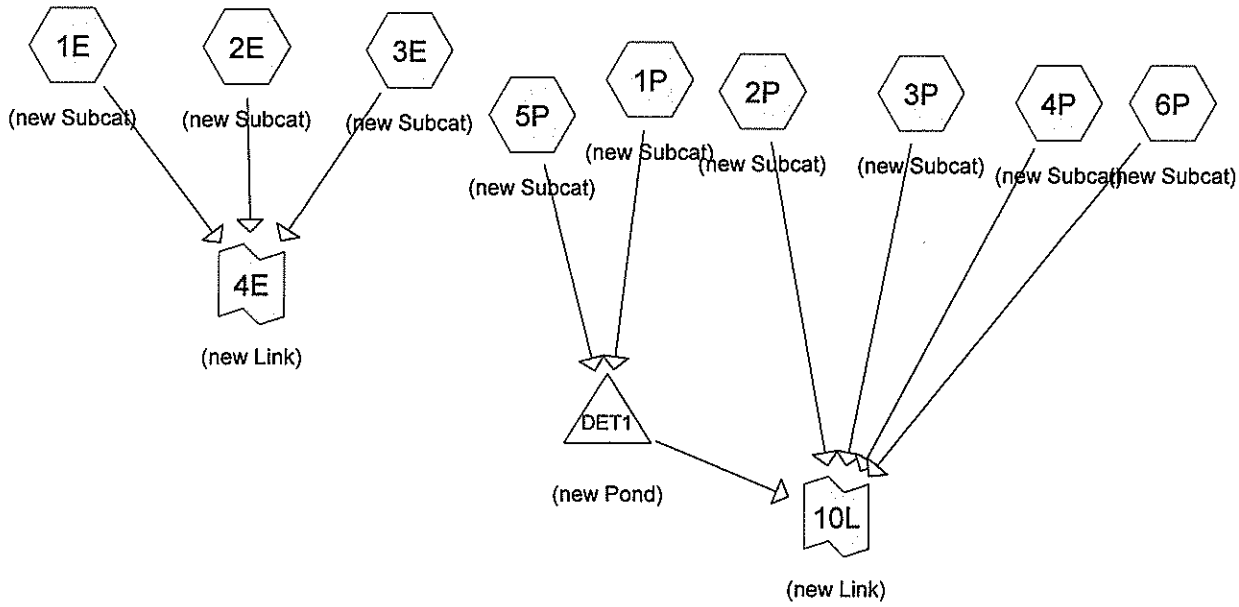


Exhibit 4
100-year Storm Calculations



Subcat Reach Pond Link

Routing Diagram for 400 NW 72 Street
Prepared by HP, Printed 7/20/2023

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.354	74	>75% Grass cover, Good, HSG C (1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P)
0.874	98	Paved parking, HSG C (1P)
3.228	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
3.228	HSG C	1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P
0.000	HSG D	
0.000	Other	
3.228		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	2.354	0.000	0.000	2.354	>75% Grass cover, Good	1E, 1P, 2E, 2P, 3E, 3P, 4P, 5P, 6P
0.000	0.000	0.874	0.000	0.000	0.874	Paved parking	1P
0.000	**0.000**	**3.228**	**0.000**	**0.000**	**3.228**	**TOTAL AREA**	

Time span=2.00-30.00 hrs, dt=0.05 hrs, 561 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1E: (new Subcat) Runoff Area=0.544 ac 0.00% Impervious Runoff Depth=4.57"
Flow Length=81' Slope=0.0247 '/' Tc=10.6 min CN=74 Runoff=3.65 cfs 0.207 af

Subcatchment 1P: (new Subcat) Runoff Area=1.145 ac 76.33% Impervious Runoff Depth=6.65"
Flow Length=249' Tc=2.8 min CN=92 Runoff=12.83 cfs 0.634 af

Subcatchment 2E: (new Subcat) Runoff Area=0.017 ac 0.00% Impervious Runoff Depth=4.57"
Flow Length=30' Slope=0.0732 '/' Tc=3.1 min CN=74 Runoff=0.15 cfs 0.006 af

Subcatchment 2P: (new Subcat) Runoff Area=0.007 ac 0.00% Impervious Runoff Depth=4.57"
Flow Length=33' Slope=0.0758 '/' Tc=3.3 min CN=74 Runoff=0.06 cfs 0.003 af

Subcatchment 3E: (new Subcat) Runoff Area=1.053 ac 0.00% Impervious Runoff Depth=4.57"
Flow Length=237' Tc=5.8 min CN=74 Runoff=8.24 cfs 0.401 af

Subcatchment 3P: (new Subcat) Runoff Area=0.007 ac 0.00% Impervious Runoff Depth=4.57"
Flow Length=43' Slope=0.5116 '/' Tc=1.9 min CN=74 Runoff=0.06 cfs 0.003 af

Subcatchment 4P: (new Subcat) Runoff Area=0.167 ac 0.00% Impervious Runoff Depth=4.57"
Flow Length=83' Tc=2.6 min CN=74 Runoff=1.45 cfs 0.064 af

Subcatchment 5P: (new Subcat) Runoff Area=0.142 ac 0.00% Impervious Runoff Depth=4.57"
Flow Length=13' Slope=0.0176 '/' Tc=2.8 min CN=74 Runoff=1.23 cfs 0.054 af

Subcatchment 6P: (new Subcat) Runoff Area=0.146 ac 0.00% Impervious Runoff Depth=4.57"
Flow Length=222' Tc=7.5 min CN=74 Runoff=1.10 cfs 0.056 af

Pond DET1: (new Pond) Peak Elev=984.37' Storage=0.177 af Inflow=14.06 cfs 0.688 af
Outflow=8.78 cfs 0.688 af

Link 4E: (new Link) Inflow=11.69 cfs 0.615 af
Primary=11.69 cfs 0.615 af

Link 10L: (new Link) Inflow=10.81 cfs 0.813 af
Primary=10.81 cfs 0.813 af

Total Runoff Area = 3.228 ac Runoff Volume = 1.427 af Average Runoff Depth = 5.31"
72.92% Pervious = 2.354 ac 27.08% Impervious = 0.874 ac

Summary for Subcatchment 1E: (new Subcat)

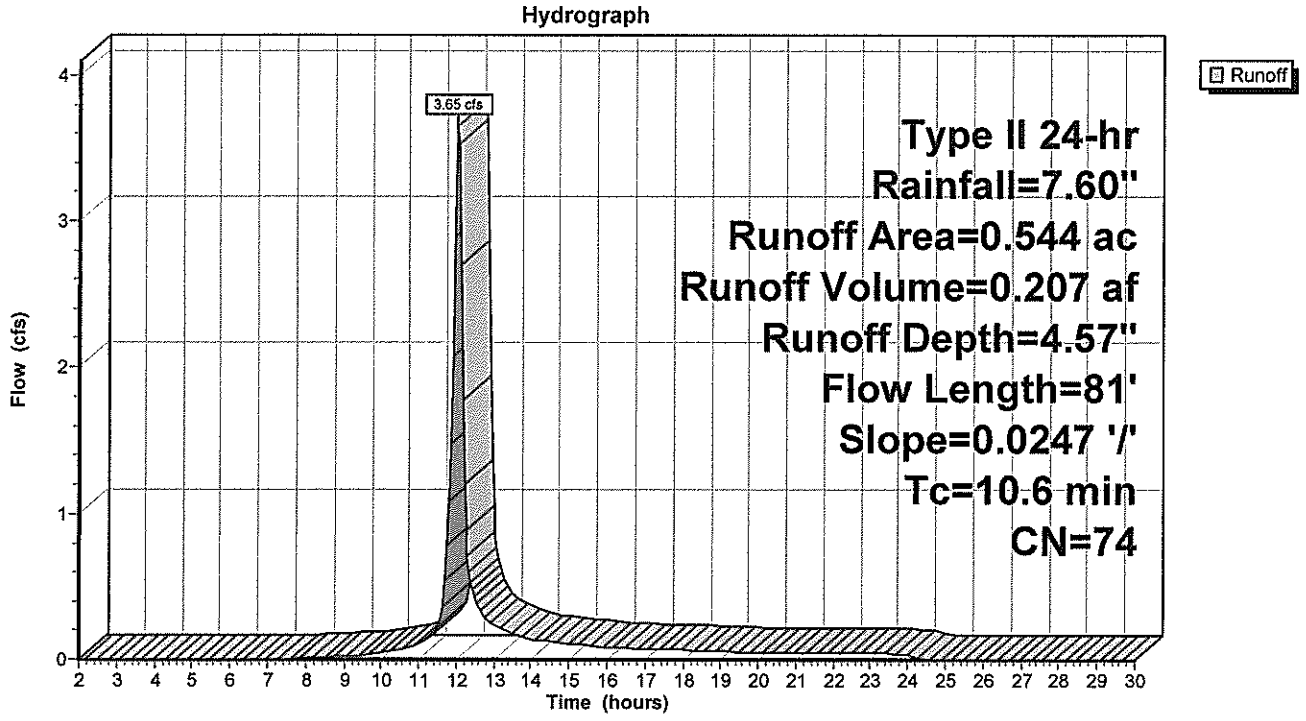
Runoff = 3.65 cfs @ 12.02 hrs, Volume= 0.207 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
0.544	74	>75% Grass cover, Good, HSG C
0.544		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	81	0.0247	0.13		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 1E: (new Subcat)



Summary for Subcatchment 1P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

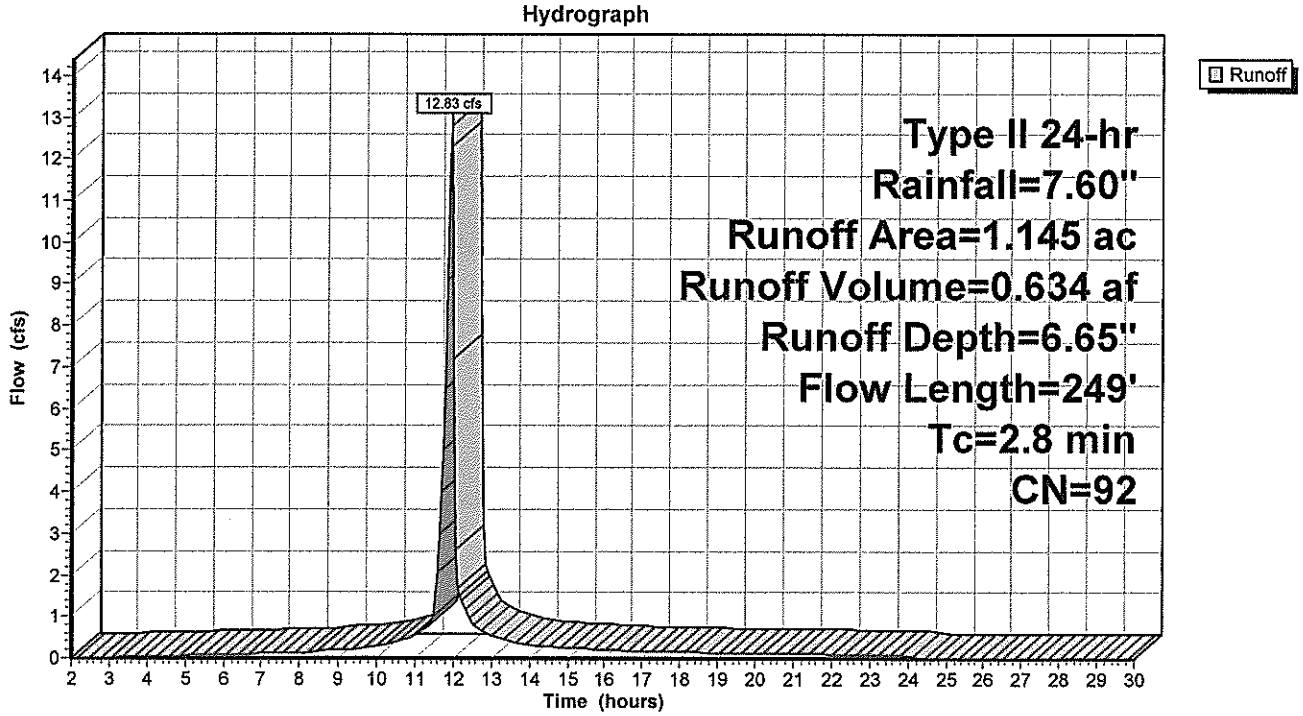
Runoff = 12.83 cfs @ 11.93 hrs, Volume= 0.634 af, Depth= 6.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
0.271	74	>75% Grass cover, Good, HSG C
0.874	98	Paved parking, HSG C
1.145	92	Weighted Average
0.271		23.67% Pervious Area
0.874		76.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0065	0.92		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.50"
1.0	149	0.0151	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.8	249	Total			

Subcatchment 1P: (new Subcat)



Summary for Subcatchment 2E: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

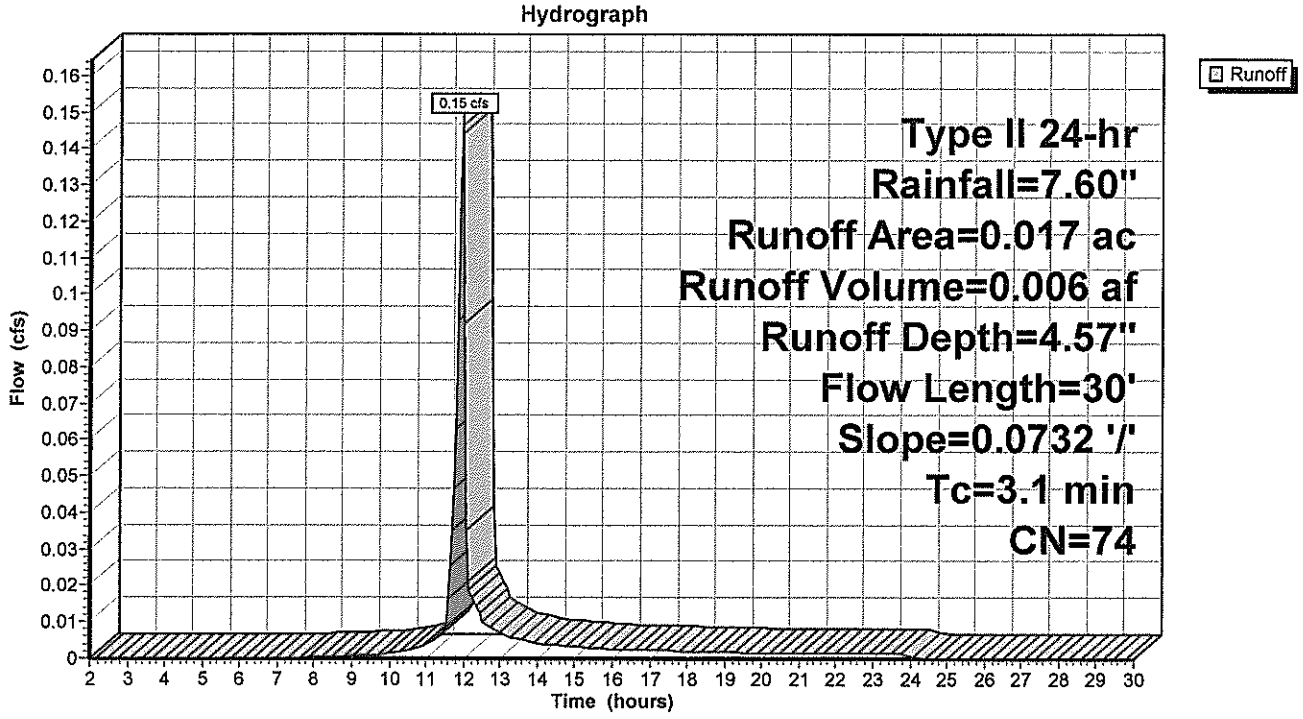
Runoff = 0.15 cfs @ 11.94 hrs, Volume= 0.006 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
0.017	74	>75% Grass cover, Good, HSG C
0.017		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	30	0.0732	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 2E: (new Subcat)



Summary for Subcatchment 2P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

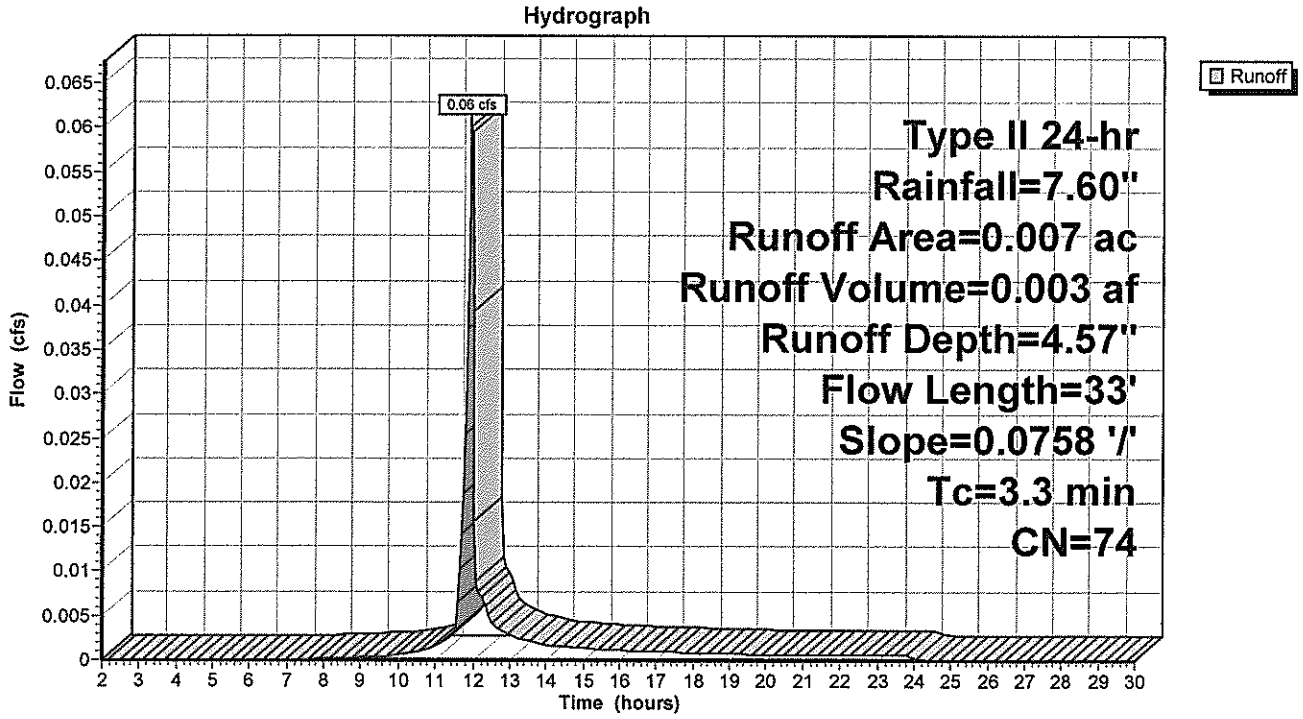
Runoff = 0.06 cfs @ 11.94 hrs, Volume= 0.003 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
0.007	74	>75% Grass cover, Good, HSG C
0.007		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	33	0.0758	0.17		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 2P: (new Subcat)



Summary for Subcatchment 3E: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

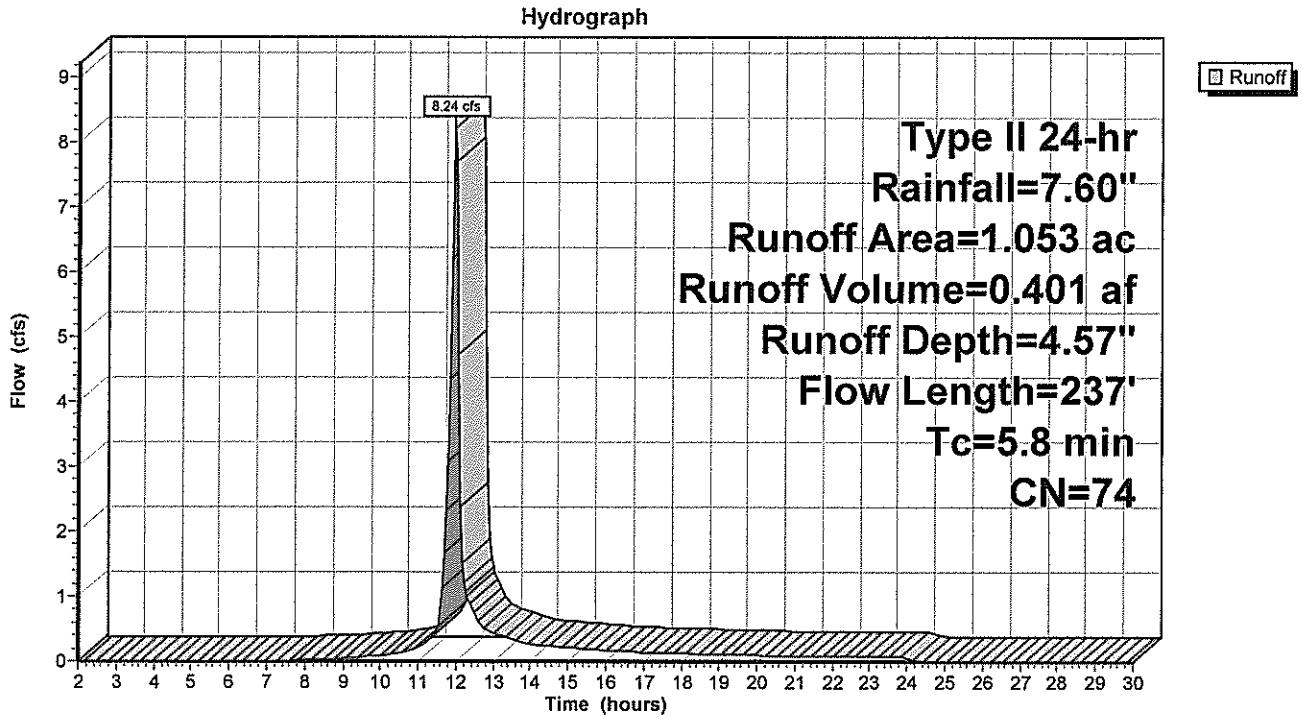
Runoff = 8.24 cfs @ 11.97 hrs, Volume= 0.401 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
1.053	74	>75% Grass cover, Good, HSG C
1.053		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.4	100	0.2000	0.31		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.4	137	0.1339	5.49		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
5.8	237	Total			

Subcatchment 3E: (new Subcat)



Summary for Subcatchment 3P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

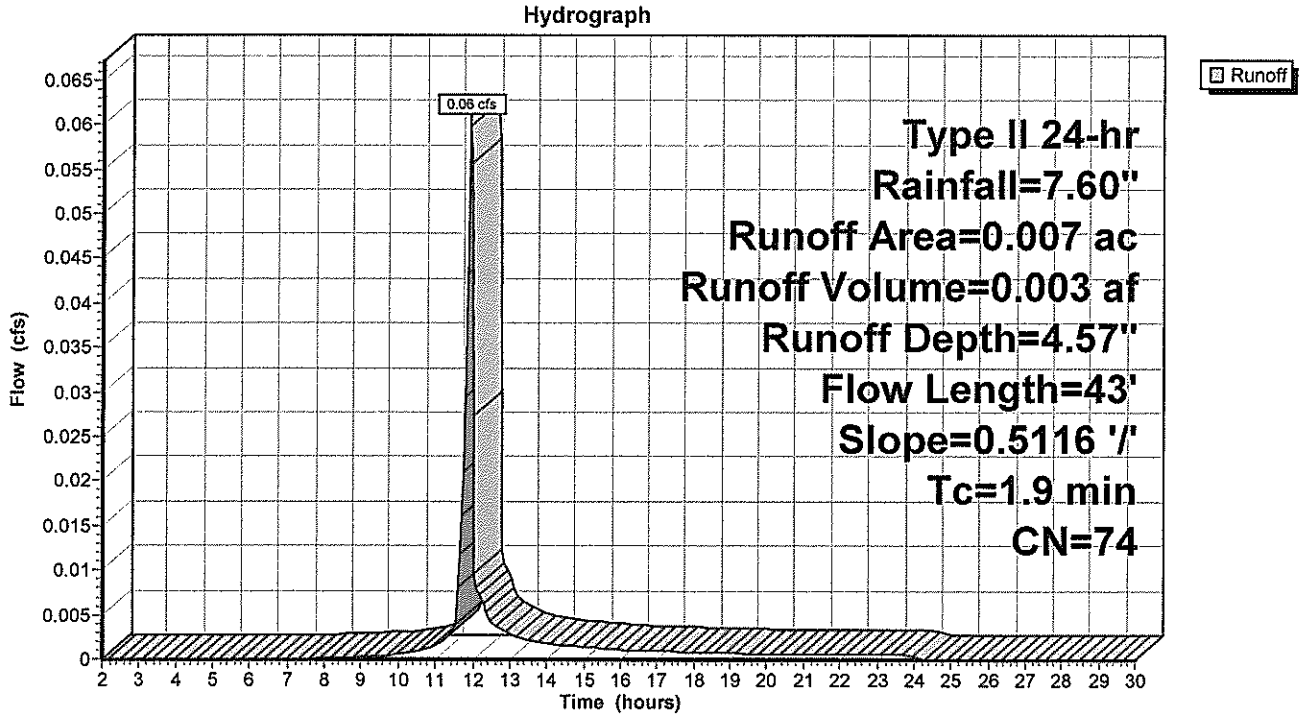
Runoff = 0.06 cfs @ 11.92 hrs, Volume= 0.003 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
0.007	74	>75% Grass cover, Good, HSG C
0.007		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	43	0.5116	0.38		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 3P: (new Subcat)



Summary for Subcatchment 4P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

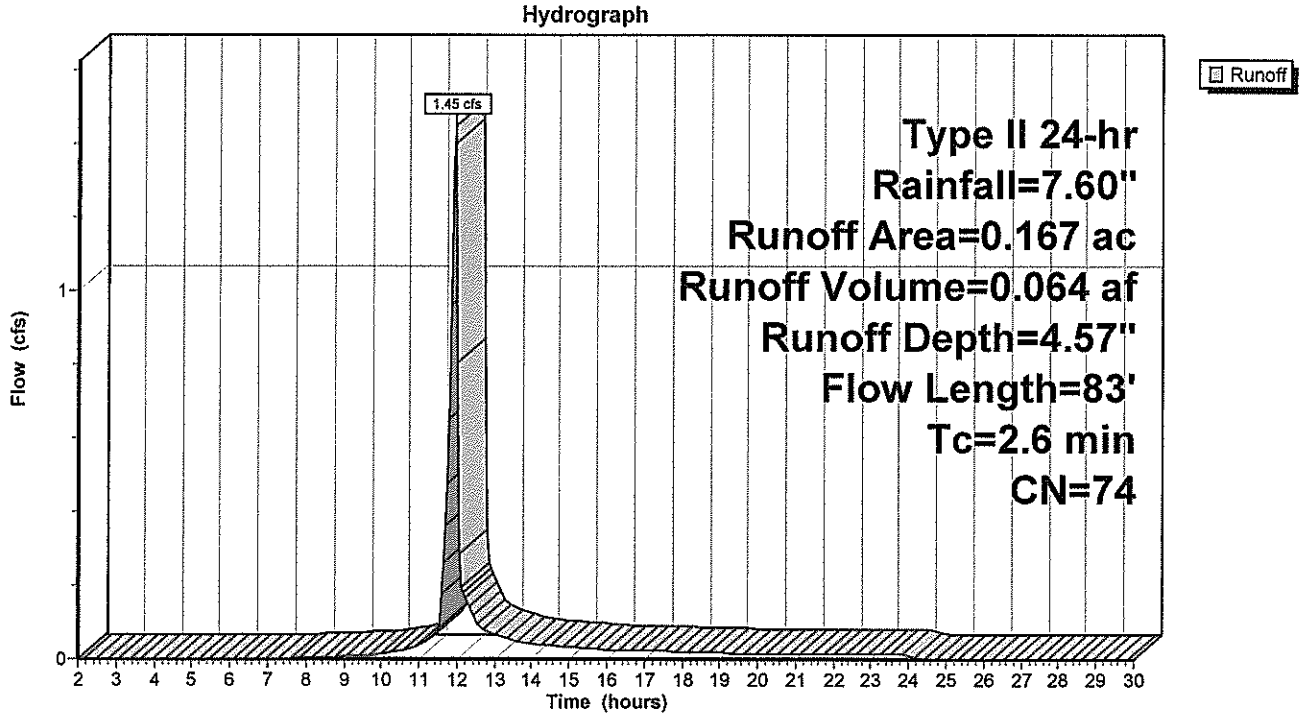
Runoff = 1.45 cfs @ 11.93 hrs, Volume= 0.064 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
0.167	74	>75% Grass cover, Good, HSG C
0.167		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	30	0.1453	0.21		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.2	53	0.0967	5.01		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.6	83	Total			

Subcatchment 4P: (new Subcat)



Summary for Subcatchment 5P: (new Subcat)

[49] Hint: Tc<2dt may require smaller dt

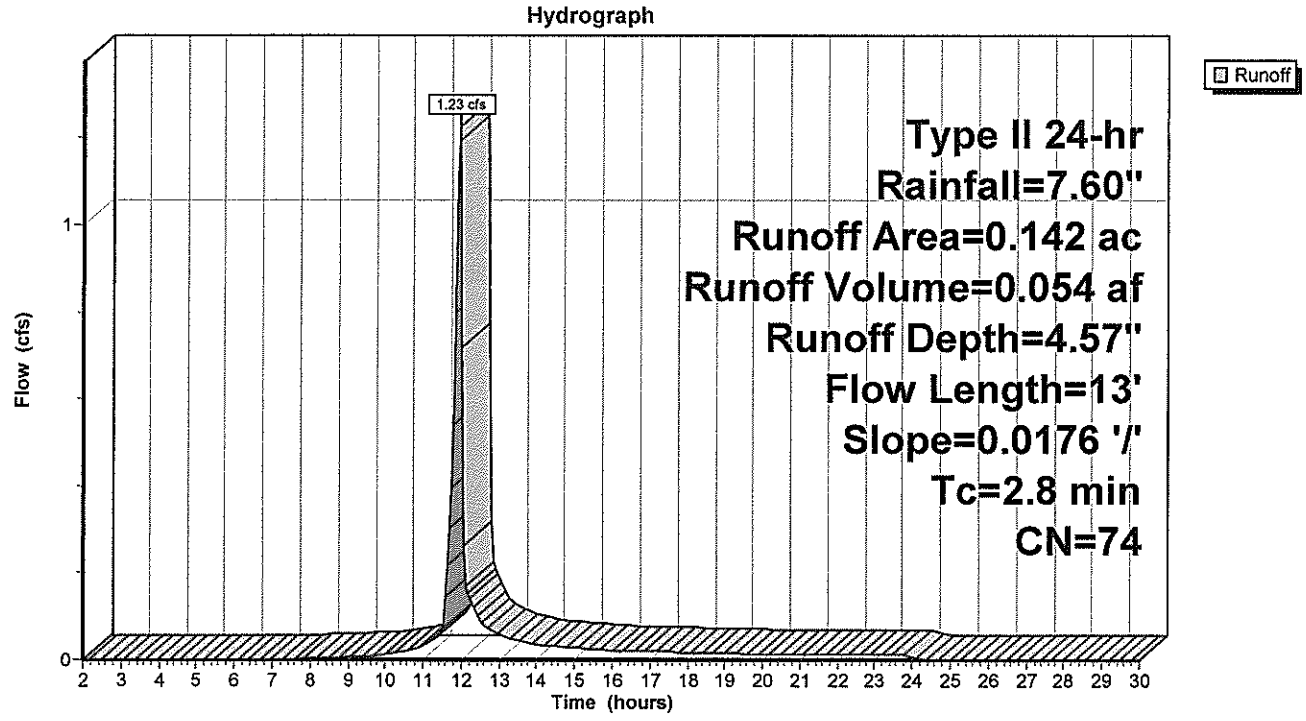
Runoff = 1.23 cfs @ 11.93 hrs, Volume= 0.054 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
0.142	74	>75% Grass cover, Good, HSG C
0.142		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	13	0.0176	0.08		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"

Subcatchment 5P: (new Subcat)



Summary for Subcatchment 6P: (new Subcat)

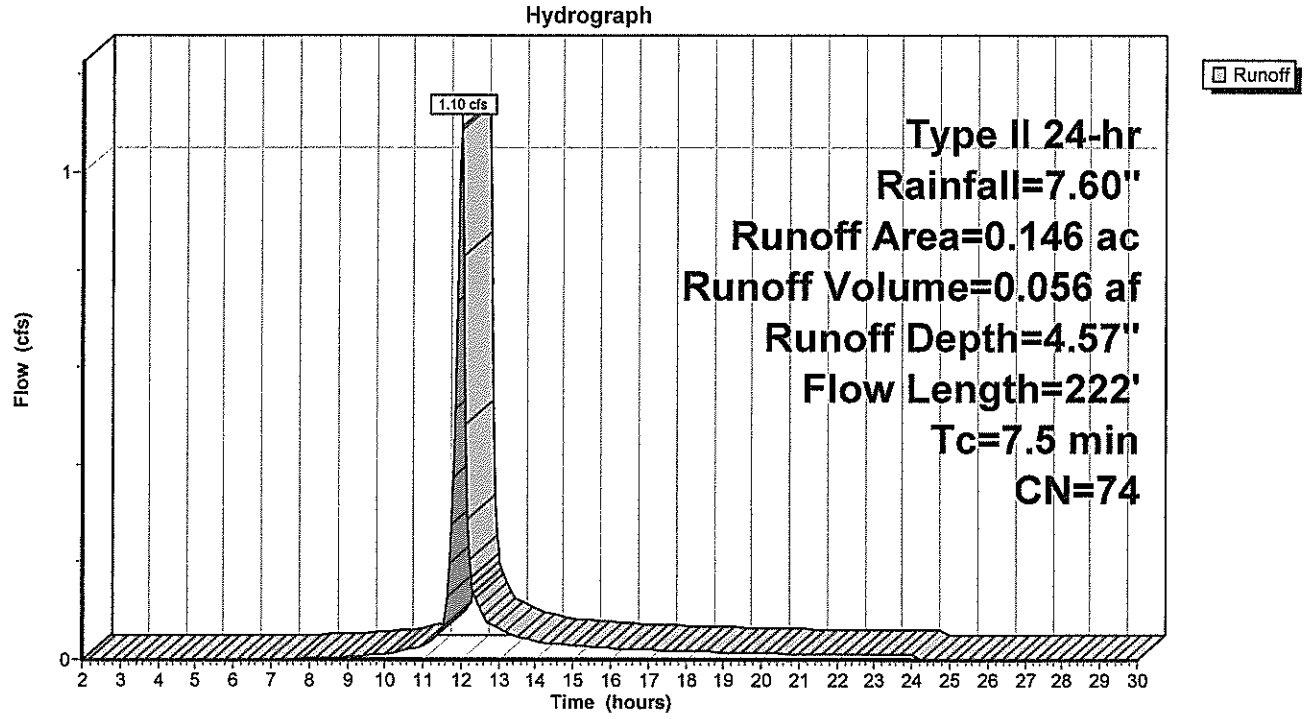
Runoff = 1.10 cfs @ 11.99 hrs, Volume= 0.056 af, Depth= 4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr Rainfall=7.60"

Area (ac)	CN	Description
0.146	74	>75% Grass cover, Good, HSG C
0.146		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	60	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.50"
0.6	162	0.0775	4.18		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
7.5	222	Total			

Subcatchment 6P: (new Subcat)



Summary for Pond DET1: (new Pond)

Inflow Area = 1.287 ac, 67.91% Impervious, Inflow Depth = 6.42"
Inflow = 14.06 cfs @ 11.93 hrs, Volume= 0.688 af
Outflow = 8.78 cfs @ 12.00 hrs, Volume= 0.688 af, Atten= 38%, Lag= 4.3 min
Primary = 8.78 cfs @ 12.00 hrs, Volume= 0.688 af

Routing by Stor-Ind method, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 984.37' @ 12.00 hrs Surf.Area= 0.074 ac Storage= 0.177 af

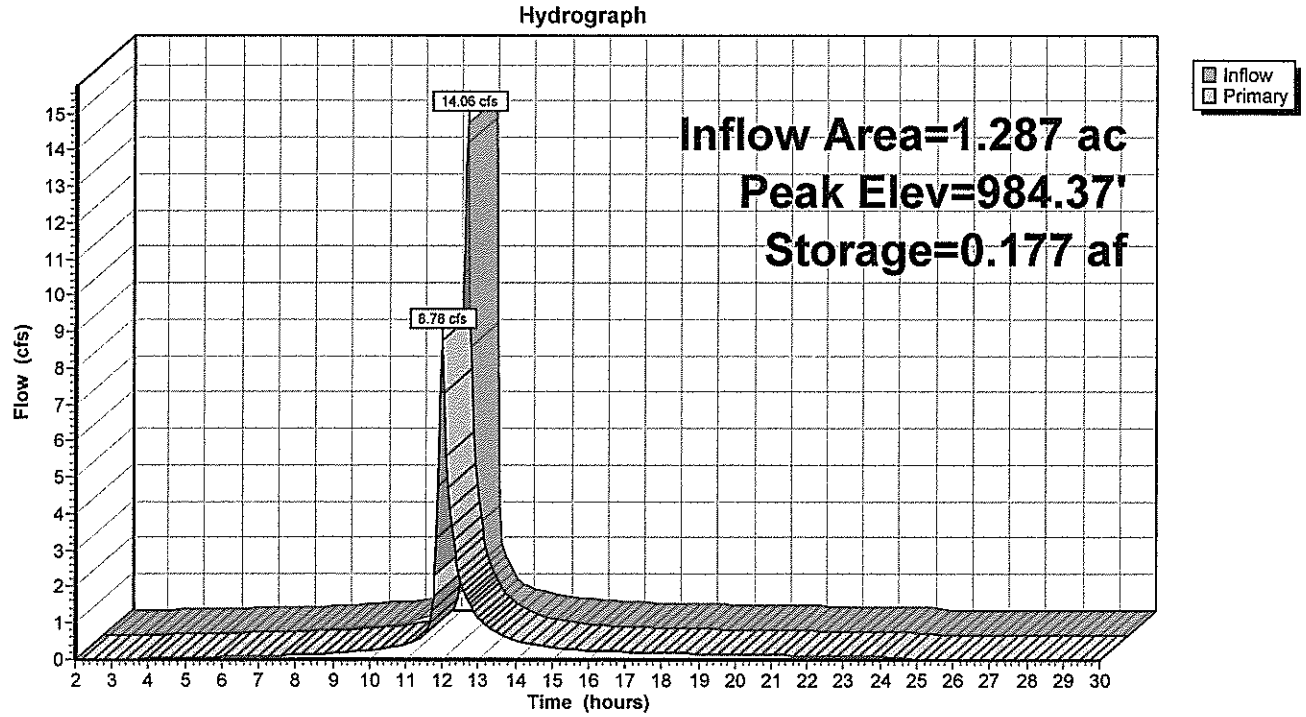
Plug-Flow detention time= 25.7 min calculated for 0.688 af (100% of inflow)
Center-of-Mass det. time= 25.5 min (793.2 - 767.7)

Volume	Invert	Avail.Storage	Storage Description
#1	982.03'	0.211 af	**36.0" Round Pipe Storage** L= 1,300.0'

Device	Routing	Invert	Outlet Devices
#1	Primary	982.03'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.03 1.03 1.93 1.93 3.00 Width (feet) 0.50 0.50 0.79 0.79 2.50 2.50

Primary OutFlow Max=8.78 cfs @ 12.00 hrs HW=984.37' (Free Discharge)
↑—**1=Custom Weir/Orifice** (Weir Controls 8.78 cfs @ 3.89 fps)

Pond DET1: (new Pond)

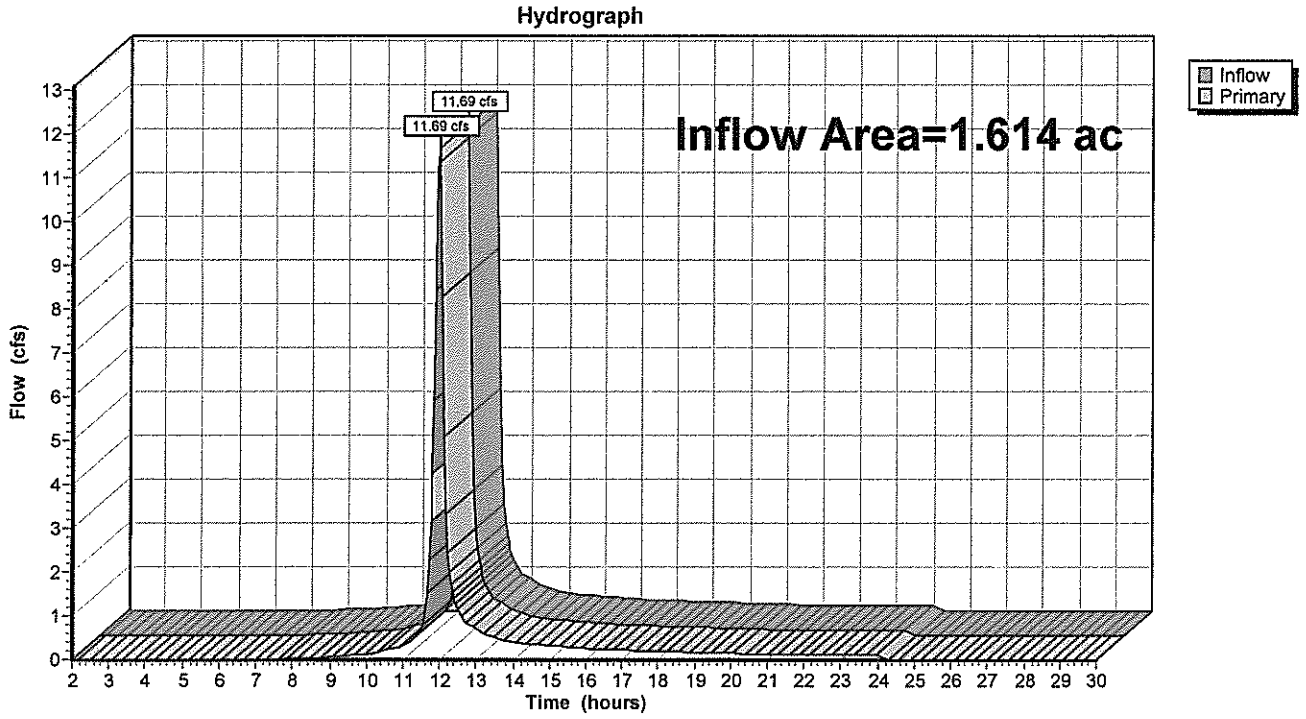


Summary for Link 4E: (new Link)

Inflow Area = 1.614 ac, 0.00% Impervious, Inflow Depth = 4.57"
Inflow = 11.69 cfs @ 11.98 hrs, Volume= 0.615 af
Primary = 11.69 cfs @ 11.98 hrs, Volume= 0.615 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs

Link 4E: (new Link)



Summary for Link 10L: (new Link)

Inflow Area = 1.614 ac, 54.15% Impervious, Inflow Depth = 6.04"
Inflow = 10.81 cfs @ 11.99 hrs, Volume= 0.813 af
Primary = 10.81 cfs @ 11.99 hrs, Volume= 0.813 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-30.00 hrs, dt= 0.05 hrs

Link 10L: (new Link)