



SEC
Symons Engineering Consultants, Inc.

12805 S.E. Foster Road
Portland, OR 97236
(503) 760-1353
Fax 762-1962

MEMO

TO: Melissa Ahrens **DATE:** September 9, 2019
FIRM: Clackamas County
150 Beaver Creek Rd
Oregon City, OR 97045
FROM: Dan Symons
PROJECT: Washman 82nd & Lindy **PROJECT No:** 17-44 / Z-0353-19-D

RECEIVED
SEP 9 2019

Clackamas County
Planning & Zoning Division

In response to your incompleteness letter dated 8/13/19, we offer the following response.

- 1) An authorization letter signed by Frank Rogers, owner of tax lots 12600, 12700 & 13400, has been provided that gives David Tarlow at Washman, LLC authority to sign as the property owner for any and all applications moving forward through permit approval. David Tarlow at Washman is listed as applicant for all parcels. Symons Engineering will continue to be listed as the additional contact. A new Design Review application has been provided to replace the original application.
- 2) A Land Use Application has been completed and provided.
- 3) Our Existing Conditions Plan is drawn to 1" = 20' scale which is not less than 1" = 50' scale 1102.02.G requires. We feel the Existing Conditions Plan addresses the pertinent and applicable information listed under 1102.02.G and thus no additional information is provided.
- 4) Although we have never been required to submit building sections for a Design Review application in the past, a new sheet (A3) with building sections has been provided.
- 5) We have never been required to submit an Irrigation Plan for a Design Review application in the past. The Landscape Architect did include a note on the Planting Plan that states: "A planting design for the WES facility and an irrigation design for the entire site will be submitted for permit." We feel this is adequate enough information for Design Review and thus no Irrigation Plan will be provided at this time. After speaking with Anthony Reiderer, he confirmed that an Irrigation Plan will be a Condition tied to the building permit.

NOTICE

Your application will be considered Void if, on the 181st day after the date the application was first submitted, you have been mailed this notice and have not provided the information requested in Options 1 – 3 above. In this case, no further action will be taken on your application.

Applicant or authorized representative, please check one of the following and return this notice to: Clackamas County Planning Division; 150 Beaver Creek Road, Oregon City, Oregon, 97045

- I am submitting the required information (attached); or.
- I am submitting some of the information requested (attached) and no other information will be submitted; or
- I will not be submitting the requested information. Please accept the application as submitted for review and decision.


Signed _____
Larry Shirts
Print Name _____

9/9/19
Date _____

ROGERS LAND CO., LLC
4933 Azalea Drive
Grants Pass, Oregon 97526

Clackamas County Planning and Zoning Division
Department of Transportation and Development
Development Service Building
150 Beavercreek Road
Oregon City, Oregon 97045

RECEIVED

SEP 9 2019

Clackamas County
Planning & Zoning Division

RE: Land Use Applications
8864 SE 82nd Avenue
Portland, Oregon 97216

To Whom it May Concern:

"I, Frank Rogers, Managing Member of Rogers Land Co. LLC, owner of parcels #R00046355 and #R00046364 hereby duly authorize David Tarlow of Washman, LLC to make land use and building permit applications as my representative on my behalf.

Signature Frank L. Rogers Date 09-06-19 "

If you have any questions, please call Frank Rogers at 541-441-1220.

Sincerely:


Frank L. Rogers
Managing Member



RECEIVED

SEP 9 2019

Clackamas County
Planning & Zoning Division

CLACKAMAS COUNTY PLANNING AND ZONING DIVISION
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
DEVELOPMENT SERVICES BUILDING
150 BEAVERCREEK ROAD | OREGON CITY, OR 97045
503-742-4500 | ZONINGINFO@CLACKAMAS.US

Application for Design Review

May 2018

*****A Pre-Application Conference is required prior to filing this application.*****

Date Received: _____ File No.: _____
Staff Member: _____ Design Review Fee: \$ _____
Zone: _____ .384% of Construction Cost: \$ _____
Comp. Plan: _____ (\$650.00 Minimum / \$36,835.00 Maximum Fee)
Development No.: _____ Project No.: _____

Name of Applicant: Washman, LLC
Mailing Address: PO Box 4124 Portland, OR 97218
Phone: 971-803-7631 Email: davidt@washmanusa.com

What is proposed?:

New 7,367sf Carwash w/ 29 vacuum stations. One canopy to cover eastern vacuum stations

Proposed title: Washman 82nd + Lindy Sq. ft. of each structure: Bldg = 7,367; Canopy = 4,763

Estimated completion date: 7/2020 Estimated cost of constr (labor & materials): \$1,500,000

Site Address: 8864 SE 82nd Ave, Happy Valley, OR 97086

Total Land Area : 1.26 Acres

Legal Description: T 1S R 2E Section: 28BB Tax Lot(s): 12600, 12700, 13300, 13400

Adjacent Properties Under Same Ownership: T 1S R 2E Section 28BB Tax Lot(s) 12500

Other persons (if any) to be mailed notices regarding this application:

Name	Address	Relationship
<u>Symons Engineering</u>	<u>12805 SE Foster Rd, Portland, OR 97236</u>	<u>Engineer</u>
<u>Peter Fry</u>	<u>303 NW Uptown Terrace #1B, Portland, OR 97210</u>	<u>Planner</u>

I hereby certify the statements contained herein, along with the evidence submitted, are in all respects true and correct to the best of my knowledge.

MARK V. HANNA
Property Owner's Name (Print)
Mark V. Hanna 9/6/19
Property Owner's Signature Date

David B. Tancow
Applicant's Name (Print)
David B. Tancow 9/16/19
Applicant's Signature Date
Agent For Rogers Land Co., LLC



RECEIVED

SEP 9 2019

CLACKAMAS COUNTY PLANNING AND ZONING DIVISION
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
DEVELOPMENT SERVICES BUILDING
150 BEAVERCREEK ROAD | OREGON CITY, OR 97045
503-742-4500 | ZONINGINFO@CLACKAMAS.US

Clackamas County
Planning & Zoning Division

Land Use Application

For Staff Use Only
Date received:
Application type:
Zone:
Violation #:
Staff initials:
File number:
Fee:
CPO/Hamlet:

Applicant information:
What is proposed? New 7367sf Carwash w/ 29 vacuum stations. One canopy to cover eastern vacuum stations
Name of applicant: David Tarlow - Washman, LLC
Mailing address: PO Box 4124
City: Portland State: OR Zip: 97218
Applicant is (select one): [X] Property owner [] Contract purchaser [X] Agent of the property owner or contract purchaser
Name of contact person (if other than applicant): Dan Symons - Symons Engineering
Mailing address of contact person: 12805 SE Foster Rd, Portland, OR 97236

Applicant #: Wk 971-803-7631 Cell: Email: davidt@washmanusa.com
Contact person #: Wk: 503-760-1353 Cell: Email: dansesymonsengineering.com
Other persons (if any) to be mailed notices regarding this application:

Table with 4 columns: Name, Address, Zip, Relationship. Entry: Peter Fry, 303 NW Uptown Terrace #1B, Portland, OR 97210, Planner

Name Address Zip Relationship
SITE ADDRESS: 88164 SE 82nd Ave, Happy Valley, OR 97086

TAX LOT #: T 1S R 2E Section 28BB Tax Lot(s) 12600, 12700, 13300, 13400
Adjacent properties under same ownership: T 1S R 2E Section 28BB Total land area: 1.26 Acres
Tax lot(s) 12500

I hereby certify that the statements contained herein, along with the evidence submitted, are in all respects true and correct to the best of my knowledge.
MARK V. HANNA 9/6/19 [Signature]
Property owner or contract purchaser's name Date Owner or contract purchaser's signature
DAVID B. TARLOW 9/6/19 [Signature]
Applicant's name Date Applicant's signature
Agent For Rogers Land Co., LLC



Planning & Zoning
 Development Services Building
 150 Beaver Creek Road | Oregon City, OR | 97045
 Phone: (503) 742-4500 | Fax: (503) 742-4550
 E-mail: zoninginfo@co.clackamas.or.us
 Web: <http://www.clackamas.us/transportation/planning/>

LAND USE APPLICATION
DEEMED COMPLETE

ORIGINAL DATE SUBMITTED: 08/02/2019
 FILE NUMBER: Z0353-19-D
 APPLICATION TYPE: DESIGN REVIEW

The Planning and Zoning Division staff deemed this application complete for the purposes of Oregon Revised Statutes (ORS) 215.427 on: 9/9/19

Melissa Ahrens
 Signature

Senior Planner
 Title

Melissa Ahrens
 Print Name

Comments: _____

Check one:

The subject property is located inside an urban growth boundary. The 120-day deadline for final action on the application pursuant to ORS 215.427(1) is:

The subject property is not located inside an urban growth boundary. The 150-day deadline for final action on the application pursuant to ORS 215.427(1) is:



**Clackamas County Planning and Zoning Division
Department of Transportation and Development**

Development Services Building
150 Beaver Creek Road | Oregon City, OR 97045

503-742-4500 | zoninginfo@clackamas.us
www.clackamas.us/planning

NOTICE OF INCOMPLETE APPLICATION

ORIGINAL DATE SUBMITTED: August 2, 2019
FILE NUMBER: Z0353-19-D
APPLICATION TYPE: Design Review
STAFF CONTACT: Melissa Ahrens
DATE OF THIS NOTICE: August 13th, 2019
180 DAYS AFTER DATE SUBMITTED: January 29, 2020
Date of CERTIFIED MAILING:

MAILED TO :

Dan Symons
Symons Engineering
12805 SE Foster Rd
Portland, Oregon

MISSING INFORMATION REQUIRED FOR A COMPLETE APPLICATION:

After reviewing the materials submitted in support of this Design Review application, the following elements appear to be absent from the application. These items are drawn directly from ZDO Sections 1307.07 "Application Submittal and Completeness Review" and 1102.02 "Submittal Requirements" which outlines the required elements for a Design Review application to be complete.

- 1) The application was signed by a party acting as the agent of the property owner. This is acceptable only if it is accompanied with a letter duly authorizing that party to submit the application on their behalf. [1307.07(A)(3)]
- 2) The application includes the Design Review supplemental application but not the general land use application. [1307.07(C)(1)(a)]
- 3) An existing conditions map is provided, but the provided map is not at either the appropriate scale and does not contain many of the required elements of this section. [1102.02(G)]
- 4) Architectural drawings are provided but do not include the required building sections. [1102.02(J)(2)]

- 5) A landscape plan is included but does not include an irrigation system. [1102.02(K)(4)].

Please keep in mind that, though the items listed in ZDO sections 1307.07 and 1102.02 are necessary for an application to meet the minimum requirements to be deemed 'complete', the onus is on the applicant to provide sufficient evidence that staff can make defensible findings on all pertinent ZDO criteria. As such, staff may seek further information through the review process.

IMPORTANT

Your application will be deemed complete, if, within 180 days of the date the application was first submitted, the Planning Division receives one of the following:

1. **All of the missing information; or**
2. **Some of the missing information and written notice from you (the applicant) that no other information will be provided; or**
3. **Written notice from you (the applicant) that none of the missing information will be provided.**

If any one of these options is chosen within 180 days of the date of the initial submittal, approval or denial of your application will be subject to the relevant criteria in effect on the date the application was first submitted.

NOTICE

Your application will be considered Void if, on the 181st day after the date the application was first submitted, you have been mailed this notice and have not provided the information requested in Options 1 – 3 above. In this case, no further action will be taken on your application.

Applicant or authorized representative, please check one of the following and return this notice to: Clackamas County Planning Division; 150 Beaver Creek Road, Oregon City, Oregon, 97045

- I am submitting the required information (attached); or.
- I am submitting some of the information requested (attached) and no other information will be submitted; or
- I will not be submitting the requested information. Please accept the application as submitted for review and decision.

Signed

Date

Print Name



#5760
19 pd 8-02-19

CLACKAMAS COUNTY PLANNING AND ZONING DIVISION
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
DEVELOPMENT SERVICES BUILDING
150 BEAVERCREEK ROAD | OREGON CITY, OR 97045
503-742-4500 | ZONINGINFO@CLACKAMAS.US

Application for Design Review

May 2018

ZPA0001219

***** A Pre-Application Conference is required prior to filing this application. *****

Date Received: 8/2/19 File No.: 20353-19-D
 Staff Member: _____ Design Review Fee: \$ 5760⁰⁰
 Zone: CC .384% of Construction Cost: \$ _____
 Comp. Plan: _____ (\$650.00 Minimum / \$36,835.00 Maximum Fee)
 Development No.: _____ Project No.: _____

Name of Applicant: Symons Engineering
 Mailing Address: 12805 SE Foster Rd
 Phone: 503-760-1353 Email: dans@symonsengineering.com

What is proposed?:
A new 7,367 sf Car wash with 27 vacuum stations. (2) canopies to cover vacuum stations 4763-East Canopy
4455-West Canopy
 Proposed title: Washman 82nd + Lindy Sq. ft. of each structure: 7,367 - Bldg; 4,455 - West Canopy
 Estimated completion date: 7/2020 Estimated cost of constr (labor & materials): \$ 1,500,000⁰⁰
 Site Address: 8864 SE 82nd Ave, Happy Valley, OR 97086
 Total Land Area: 1.26 Acres

Legal Description: T 1S R 2E Section: 28B3 Tax Lot(s): 12600, 12700, 13300, 13400
 Adjacent Properties Under Same Ownership: T 1S R 2E Section 28B3 Tax Lot(s) 12500

Other persons (if any) to be mailed notices regarding this application:

<u>Washman, LLC</u>	<u>PO Box 4124, Portland, OR 97218</u>	<u>Tenant</u>
Name	Address	Relationship
<u>Peter Fry</u>	<u>303 NW 12th Ave Terrace #1B</u>	<u>Planner</u>
Name	Address	Relationship
	<u>Portland, OR 97210</u>	

I hereby certify the statements contained herein, along with the evidence submitted, are in all respects true and correct to the best of my knowledge.

Rogers Land Co
Frank L. Rogers
 Property Owner's Name (Print)
Frank L. Rogers 7-22-19
 Property Owner's Signature Date

Dan Symons
 Applicant's Name (Print)
Dan Symons 8/2/19
 Applicant's Signature Date

August 1, 2019

DESIGN REVIEW

GENERAL INFORMATION

Applicants / Owner:

Frank Rogers
Rogers Land Co. LLC
4933 Azalea Dr.
Grants Pass, OR 97526

Tenant:

Mark Hanna
David B. Tarlow, CFO
Washman Car Washes
P.O. Box 4124
Portland, Oregon 97208

Engineer:

Dan Symons
Symons Engineering
12805 SE Foster Road
Portland, Oregon 97236

Planning Consultant:

Peter Finley Fry AICP
303 NW Uptown Terrace, 1B
Portland, Oregon 97210

Location: 8864 SE 82nd Ave.

Tax Lots: **SID** 12E28BB 12600, 12700, and 13300, 13400

Size: 55,127 square foot lot.

Comprehensive Plan Designation/Zoning:

CC Corridor Commercial COR

Preapplication Conference: ZPAC0164-17

**303 NW Uptown Terrace #1B
Portland, Oregon USA 97210
peter@finleyfry.com**

PROPOSAL

The applicant proposes to develop the site as a professional carwash. The carwash shall utilize modern designs including recycled water and a central vacuum system. The site’s primary access will be off of S.E. Lindy. The car wash significantly improves the environmental condition of the area by allowing vehicles to be washed in a controlled system. All pollutants are contained and disposed of within the system that reuses the water. These pollutants would normally be disposed of in drainage systems throughout the area. The site will have a gated, entrance controlled, emergency egress and maintenance access only on S.E. Cornwell.

APPLICABLE CRITERIA

- 510 CORRIDOR COMMERCIAL
- 1005 SITE AND BUILDING DESIGN
- 1006 UTILITIES, STREET LIGHTS, WATER SUPPLY, SEWAGE DISPOSAL, SURFACE WATER MANAGEMENT, AND EROSION CONTROL
- 1007 ROADS AND CONNECTIVITY
- 1009 LANDSCAPING
- 1010 SIGNS
- 1015 PARKING AND LOADING
- 1021 SOLID WASTE AND RECYCLABLE MATERIAL COLLECTION
- 1102 DESIGN REVIEW

510 CORRIDOR COMMERCIAL (CC)

510.03 USES PERMITTED

Table 510-1: Permitted Uses in the Urban Commercial and Mixed-Use Zoning Districts

Use	NC	C-2	RCC	RTL	CC	C-3	PMU1	SCMU	OA2,3	OC	RCO
Services, Commercial— Car Washes	S	S	X	C	P	P	P	X	X	X	X

FINDING:

The site review is to develop a car wash that is a permitted use in the CC.

1005 SITE AND BUILDING DESIGN

1005.03 GENERAL SITE DESIGN STANDARDS

The following site design standards apply:

- A. Where feasible, cluster buildings within single and adjacent developments for efficient sharing of walkways, on-site vehicular circulation, connections to adjoining sites, parking, loading, transit-related facilities, plazas, recreation areas, and similar amenities.

FINDING:

The site only includes a single structure.

- B. Where feasible, design the site so that so that the longest building elevations can be oriented within 20 degrees of true south in order to maximize the south-facing dimensions.

FINDING:

The north south orientation of the existing lot forces the structure into a north south orientation

- C. Minimum setbacks may be reduced by up to 50 percent as needed to allow improved solar access when solar panels or other active or passive solar use is incorporated into the building plan.

FINDING:

No minimum setbacks are requested to be reduced.

- D. A continuous, interconnected on-site walkway system meeting the following standards shall be provided.
 - 1. Walkways shall directly connect each building public entrance accessible to the public to the nearest sidewalk or pedestrian pathway, and to all adjacent streets, including streets that dead-end at the development or to which the development is not oriented.
 - 2. Walkways shall connect each building to outdoor activity areas including parking lots, transit stops, children's play areas and plazas.
 - 3. Walkways shall be illuminated. Separate lighting shall not be required if existing lighting adequately illuminates the walkway.
 - 4. Walkways shall be constructed with a well-drained, hard-surfaced material or porous pavement and shall be at least five feet in unobstructed width.
 - 5. Standards for walkways through vehicular areas:
 - a. Walkways crossing driveways, parking areas and loading areas shall be constructed to be clearly identifiable to motorists through the use of different paving material, raised elevation, warning signs or other similar methods.
 - b. Where walkways are adjacent to driveways, they shall be separated by a raised curb, bollards, landscaping or other physical barrier.
 - c. Inside the Portland Metropolitan Urban Growth Boundary (UGB), if the distance between the building public entrance and street is 75 feet or greater and located adjacent to a driveway or in a parking lot, the walkway shall be raised, with curbs, a minimum four-foot-wide landscape strip and shade trees planted a maximum of 30 feet on center.
 - d. The exclusive use of a painted crossing zone to make walkways identifiable to motorists may be used only for portions of walkways which are shorter than 30 feet and located across driveways, parking lots, or loading areas.

- e. Walkways bordering parking spaces shall be at least seven feet wide or a minimum of five feet wide when concrete bumpers, bollards, curbing, landscaping, or other similar improvements are provided which prevent parked vehicles or opening doors from obstructing the walkway.
- 6. The interconnected onsite walkway system shall connect to walkways in adjacent developments, or stub to the adjacent property line if the adjacent land is vacant or is developed without walkways.
 - a. Walkway stubs shall be located in consideration of topography and eventual redevelopment of the adjacent property.
 - b. Notwithstanding the remainder of Subsection 1005.03(D)(6), walkway linkages to adjacent development shall not be required within industrial developments, to industrial developments, or to vacant industrially zoned land.

FINDING:

The car wash consists of three functions: car wash, vacuum, and employee circulation. The car wash structure is a machine that is not accessible to the public to ensure the public's safety. The vacuum areas are developed to create safe spaces for people to exit and vacuum their cars. The site has a safe and identified pedestrian system for the employees to move around the various functions. Customers will also use the employee pathways during rare occurrences when a unique situation warrants.

- E. Inside the UGB, except for industrial developments, a minimum of 50 percent of the street frontage of the development site shall have buildings located at the minimum front yard depth line.
 - 1. If the minimum front yard depth standard is less than 20 feet, the front yard depth may be increased to 20 feet provided pedestrian amenities are developed within the yard.
 - 2. Primary building entrances for buildings used to comply with Subsection 1005.03(E), shall:
 - a. Face the street;
 - b. Be located at an angle facing both the street and a parking lot; or
 - c. Be located to the side of the building, provided that the walkway connecting to the street is a minimum of eight feet wide and is developed with landscaping and pedestrian amenities.
 - 3. If a development has frontage on more than one street, Subsection 1005.03(E) must be met on only one frontage, as follows:
 - a. If one of the streets is a major transit street, the standard shall be met on that street.
 - b. If neither or both are a major transit street, then the standard shall be met on the street with the higher functional classification.
 - c. If neither 1005.03(E)(3)(a) or (b) applies, then the standard shall be met on the longest frontage

FINDING:

The car wash structure is oriented north south along SE 82nd creating a building line that is almost 70% of the lot line. The area between the structure and 82nd avenue is landscaped including water treatment facilities.

1005.04 BUILDING DESIGN

- A. The following standards apply to building facades visible from a public or private street or accessway and to all building façades where the primary entrance is located.
1. Building facades shall be developed with architectural relief, variety and visual interest and shall avoid the effect of a single, long or massive wall with no relation to human size. Examples of elements that subdivide the wall: change in plane, texture, masonry pattern or color, or windows.
 2. Building facades shall have particular architectural emphasis at entrances and along sidewalks and walkways.
 3. Provide visual interest through use of articulation, placement and design of windows and entrances, building trim, detailing, ornamentation, planters or modulating building masses.
 4. Utilize human scale, and proportion and rhythm in the design and placement of architectural features.
 5. Use architectural features which are consistent with the proposed use of the building, level and exposure to public view, exposure to natural elements, and ease of maintenance.
 6. When uses between ground-level spaces and upper stories differ, provide differentiation through use of bays or balconies for upper stories, and awnings, canopies, trim and other similar treatments for lower levels.

FINDING:

The building facades facing public streets demonstrate architectural relief by sloping rooflines, variation of colors to the metal cladding, and long expansive windows. Entrances are emphasized by the use of metal awnings. Visual interest is achieved by the variation of metal panel colors and sizes, daylight panels, and long expansive windows that give view to the various stages of the carwash process.

- B. Requirements for building entries:
1. Public entries shall be clearly defined, highly visible and sheltered with an overhang or other architectural feature, with a depth of at least four feet.
 2. Commercial, mixed-use and institutional buildings sited to comply with 1005.03(E) shall have public entries that face streets and are open to the public during all business hours.

FINDING:

The structure is not a retail building. Entrances are not intended to be available to the public except the entrance into the car wash itself for the vehicles.

- C. The street-facing façade of commercial, mixed-use and institutional buildings sited to comply with 1005.03(E) shall meet the following requirements:
1. Facades of buildings shall have transparent windows, display windows, entry areas, or arcades occupying a minimum of 60 percent of the first-floor linear frontage.
 2. Transparent windows shall occupy a minimum of 40 percent of the first-floor linear frontage. Such windows shall be designed and placed for viewing access by pedestrians.
 3. For large-format retail buildings greater than 50,000 square feet, features to enhance the pedestrian environment, other than transparent window, may be approved through design review. Such items may include, but are not limited to display cases, art, architectural features, wall articulation, landscaping, or seating, provided they are attractive to pedestrians, are built to human scale, and provide safety through informal surveillance.

FINDING:

The length of the building along 82nd Ave frontage is 210'. The total linear feet of the transparent windows along this frontage is 126' which equals 60% of the length of the building.

- D. Requirements for roof design:
1. For buildings with pitched roofs:
 - a. Eaves shall overhang at least 24 inches.
 - b. Roof vents shall be placed on the roof plane opposite the primary street.
 2. For buildings, other than industrial buildings, with flat roofs or without visible roof surfaces, a cornice or other architectural treatment shall be used to provide visual interest at the top of the building.

FINDING:

The 1:12 pitched roof at the ends of the tunnel has eave overhangs exceeding 24" and the flat portion of roof will have painted band at the top of the parapet.

- E. Requirements for exterior building materials:
1. Use architectural style, concepts, colors, materials and other features that are compatible with the neighborhood's intended visual identity.
 2. Building materials shall be durable and consistent with the proposed use of the building, level and exposure to public view, exposure to natural elements, and ease of maintenance.
 3. Walls shall be surfaced with brick, tile, masonry, stucco, stone or synthetic equivalent, pre-cast masonry, gypsum reinforced fiber concrete, wood lap siding, architecturally treated concrete, glass, wood, or a combination of these or other high-image materials.
 4. Notwithstanding Subsection 1005.04(E)(3) metal may be approved as an exterior building material through design review pursuant to Section 1102 for specific high-

image surfaces, canopies, awnings, doors, screening of roof mounted fixtures, or other architectural features.

FINDING:

Wall surfaces will mainly consist of high quality 4mm thick pre-finished flush metal panels with vibrant colors. The middle section of the west façade will have aluminum cladding with a wood grain finish having the look of real wood but more durability than wood. The top portion of the entry and exit of the tunnel will have translucent panels to facilitate the benefit of natural lighting in the tunnel. The east side of the building will be constructed of ground faced CMU blocks with portions of the façade cladded with metal panels.

G. Requirements to increase safety and surveillance:

1. Locate buildings and windows to maximize potential for surveillance of entryways, walkways, parking, recreation and laundry areas.
2. Provide adequate lighting for entryways, walkways, parking, recreation and laundry areas.
3. Locate parking and automobile circulation areas to permit easy police patrol.
4. Design landscaping to allow for surveillance opportunities.
5. Locate mail boxes where they are easily visible and accessible.
6. Limit fences, walls and, except for trees, landscaping between a parking lot and a street to a maximum of 30 inches in height.
7. Locate play areas for clear parental monitoring.

FINDING:

Safety and surveillance of the site will be addressed by the use of site lighting and minimal height landscaping to maximize surveillance opportunities.

H. Solar access requirements:

1. Except for uses with greater cooling needs than heating needs, such as many retail uses, concentrate window areas on the south side of buildings (within 20 degrees of due south) where there is good southern exposure.
2. Provide overhangs, balconies, or other shading devices to prevent excessive summer heat gains.
3. Use architectural features, shape of buildings, fences, natural landforms, berms, and vegetation to catch and direct summer breezes for natural cooling, and minimize effects of winter winds.

FINDING:

The carwash portion of the building will not be heated or cooled and therefore reduces the impact of solar access. The remaining structure will be conditioned but the number of fenestrations is minimal and excessive summer heat gains are not concerning.

- I. Requirements for compatibility with the intent of the design type or with the surrounding area. For purposes of Subsection 1005.04(I), design types are Centers, Station Communities or Corridor Streets as identified on Comprehensive Plan Map IV-8, Urban Growth Concept; X-CRC-1, Clackamas Regional Center Area Design Plan, Regional Center, Corridors and Station Community; X-SC-1, Sunnyside Corridor Community Plan, Community Plan Area and Corridor Design Type Location; or X-MC-1, McLoughlin Corridor Design Plan, Design Plan Area. The intent of these design types is stated in Chapter 4 or 10 of the Comprehensive Plan.
 1. Use shapes, colors, materials, textures, lines, and other architectural design features that enhance the design type area and complement the surrounding area and development.
 2. Use colors, materials and scale, as appropriate, to visually connect building exteriors to adjoining civic/public spaces such as gateways, parks, plazas and transit stations.
 3. Use building orientation and physical design, including setbacks and modulations, to ensure a development is compatible with other activities onsite, nearby properties, intended uses and the intent of the design type.
 4. Orient loading and delivery areas and other major service activity areas of the proposed project away from existing dwellings. Loading areas shall be located to the side or rear of buildings unless topography, natural features, rail service, or other requirements of this Ordinance dictate front-yard loading bays.
 5. In industrial zoning districts, site areas used for vehicular operations, outdoor storage, and outdoor processing to minimize the impacts on adjacent dissimilar uses.
 6. Inside the Portland Metropolitan Urban Growth Boundary, use colors, materials and architectural designs to visually reduce the impact of large buildings.
 7. In unincorporated communities, design structures to reflect and enhance the local character and to be in scale with surrounding development.
 8. In rural and natural resource areas, use materials, colors and shapes that imitate or complement those in the surrounding areas, such as those used in typical farm structures.
 9. In open space or scenic areas, use natural color tones, lines and materials which blend with the natural features of the site or site background.

FINDING:

The surrounding area and development does not have many buildings that emphasize architectural design. The proposed carwash building will significantly enhance and beautify the image of buildings within the surrounding area. There are no adjacent public spaces that require visual connection to the building. The building meets the minimum setback from 82nd Ave. Loading areas are located to the rear of the building. The variation in building colors and materials will visually reduce the impact of a long building.

J. Requirements for screening mechanical equipment:

1. Rooftop mechanical equipment, except for solar energy systems, shall be screened from view by the use of parapet walls or a sight-obscuring enclosure around the equipment. The screen shall be constructed of one of the primary materials used on the primary facades, and shall be an integral part of the building's architectural design.
2. Ground mounted mechanical equipment shall be located away from the intersection of two public streets, to the extent practicable, and shall be screened by ornamental fences, screening enclosures, or landscaping that blocks at least 80% of the view.
3. Wall mounted mechanical equipment shall not be placed on the front of a building or on a façade that faces a street. Wall mounted mechanical equipment that extends six inches or more from the outer building wall shall be screened from view from the streets; from residential, public, and institutional properties; and from public areas of the site or adjacent sites through one of the screening techniques used in 1005.04(J)(1) or (2).

FINDING:

All rooftop mechanical equipment will be on the east side of the building not visible from SE 82nd Ave and screened by sight-obscuring enclosures compatible with the building materials used.

1005.05 OUTDOOR LIGHTING

FINDING:

All required exterior lighting under the vacuum canopies is integral with vacuum arches. Site lighting accomplished with wall packs on the building and (8) site light poles mounted at 15' which is less than the height of the tallest structure. All fixtures will be directed or shielded to avoid offsite or upward glare.

1005.06 ADDITIONAL REQUIREMENTS

Development shall comply with a minimum of one of the following techniques per 20,000 square feet of site area. Regardless of site size, a minimum of one and a maximum of five techniques are required. Partial site area numbers shall be rounded.

1. Use passive solar heating or cooling techniques to reduce energy consumption.

FINDING:

Skylights are used extensively throughout the carwash tunnel and over each bay of the vacuum canopies to provide natural lighting. The requirements of this additional measure are met.

2. Provide additional landscaping area at least 10 percent above the requirements for the site pursuant to Table 1009-1. For example, if the minimum area requirement is 20 percent, then 22

percent shall be provided. Credit shall be given for green roofs or other areas of vegetation that exceed the minimum area requirements.

FINDING:

Landscape percentage is proposed at 23%.

3. Collect rainwater from roofs and/or other impervious surfaces and use it for irrigation.

FINDING:

The vegetated infiltration basins comprise of the majority of the landscape onsite. Rainwater from all impervious surfaces is collected and used to water the vegetation in the four infiltrations basins proposed. The requirements of this additional measure are met.

4. Apply other techniques for onsite storm water treatment identified by the surface water management regulatory authority.

FINDING:

Landscaped infiltration basins have been sized to greatly exceed the minimum flow attenuation requirements of the 2-25 year storm events by disposing of all runoff onsite through the 100 year storm event. The project presents zero surface water impact. The requirements of this additional measure are met.

5. Provide no more than the minimum number of surface parking spaces set out in Table 1015-2, all of which shall be no greater than the minimum dimensions allowed in Subsection 1015.04(B)(2).

FINDING:

The minimum required parking is the maximum number of employees at peak shift which is 4 employees, Four employee parking spaces are provided which represents the minimum, the requirements of this additional measure are met.

1005.07 MODIFICATIONS

Modification of any standard identified in Subsections 1005.03 and 1005.04 may be approved as part of design review if the proposed modification will result in a development that achieves the purposes stated in Subsection 1005.01 as well or better than the requirement listed.

FINDING:

No modifications are required.

1005.08 CLACKAMAS REGIONAL CENTER AREA DESIGN STANDARDS

Subsection 1005.08 applies in the Clackamas Regional Center Area, including the Regional Center and the Fuller Road Station Community, as identified on Comprehensive Plan Map X-CRC-1, Clackamas

Regional Center Area Design Plan Regional Center, Corridors, and Station Community. Where these standards conflict with other provisions in Section 1000, Subsection 1005.08 shall take precedence.

- A. Clackamas Regional Center Area Design Plan: Development is subject to the Clackamas Regional Center Area Design Plan in Chapter 10 of the Comprehensive Plan.
- B. Urban Design Elements: New development is subject to the urban design elements shown on Comprehensive Plan Map X-CRC-3, Clackamas Regional Center Area Design Plan Urban Design Elements. The urban design elements are described in the Clackamas Regional Center Area Design Plan in Chapter 10 of the Comprehensive Plan.
 - 1. Urban design elements provided in a development may be used to reduce gross site area for calculating minimum density requirements in Subsection 1012.08, and to meet minimum landscaping requirements in Section 1009, Landscaping.

FINDING:

No reduction requested.

- 2. For phased development approved through a master plan, requirements for the urban design elements may be roughly proportional to the amount of the master planned approved development being developed in any one phase.

FINDING:

No phasing proposed.

- C. Parking Structure Orientation: Entrances for ground-level retail uses in parking structures located within 20 feet of a street shall be oriented to a street.

FINDING:

Not applicable, the proposed project does not contain a parking structure.

- D. Corner Lot Buildings:

- 1. A corner lot is a lot, parcel, tax lot, or land area created by a lease agreement at the intersection of two streets.

FINDING:

The proposed project spans a full block creating 2 corner lot conditions.

- 2. Buildings on street corners shall have corner entrances or other architectural features to enhance the pedestrian environment at the intersection.

FINDING:

The proposed project is an automatic carwash and is not pedestrian oriented development. It is not intended to facilitate pedestrian customer access to the corner of the building nor should it as such pedestrian movement would create a safety hazard with the flow of vehicles from the carwash building.

3. Development on lots at a Gateway intersection as shown on Comprehensive Plan Map X-CRC-3, and Comprehensive Plan Figure X-CRC-7, Clackamas Regional Center Area Design Plan Gateway Intersection (Boulevard and Main Street), shall be designed to accommodate future Gateway improvements.

FINDING:

The site is not located at Boulevard and main Street.

4. **Building Setbacks from Private Streets:** Where a setback from a private street, as defined in Subsection 1005.08(G), is required by the standards of the applicable zoning district, the setback shall be measured from the back edge of the sidewalk.

FINDING:

Not applicable, building is only setback from public streets.

E. **Parking Structures:** If a parking structure, including understructure parking, abuts a street, appropriate features shall be provided to create a transition between the parking structure, or the entrance to understructure parking, and the abutting street. Examples of appropriate features include, but are not limited to, landscape planters and trellises, awnings, canopies, building ornamentation, and art. As used in Subsection 1005.08(F), a parking structure "abuts a street" if no other building is sited between the parking structure and the street.

FINDING:

Not applicable, the proposed project does not contain a parking structure.

F. **Private Streets:** Private streets used to meet the structure orientation and/or yard depth standards shall include:

4. Sidewalks or raised walking surfaces on both sides;
5. Curbs;
6. Street trees, pursuant to Subsection 1007.08; and '
7. Pedestrian-scale lighting.
8. Private streets may also provide on-street parking and at-grade loading zones, as applicable.

FINDING:

Not applicable, building is only setback from public streets.

G. **Internal Streets:**

9. Internal streets may be required to connect to adjacent properties to increase connectivity and provide grid patterns that allow for future development.
10. Internal streets shall be designed to allow for future development when applicable.

11. Development shall provide, when applicable, direct street and pedestrian connections between developments and schools, parks, open space, shopping areas, employment areas, and transit stops.

FINDING:

Not applicable, no internal streets are proposed.

H. New development shall not be sited such that it precludes the construction of the new walkways, or eliminates the existing walkways, that are shown on Comprehensive Plan Map X-CRC-7a, Clackamas Regional Center Area Design Plan Walkway Network, or identified in the Clackamas Regional Center Pedestrian/Bicycle Plan adopted by reference in Appendix A of the Comprehensive Plan, unless an alternative walkway location that provides a similar connection is established. An alternative walkway location shall not be deemed “similar” to a planned or existing location unless:

12. It provides comparably safe, direct, and convenient pedestrian access to significant destinations, such as transit facilities, major employers, multifamily dwelling complexes, and retail and service establishments; and
13. It fulfills a comparable function in terms of filling gaps in the pedestrian circulation system planned for the Clackamas Regional Center Area.

FINDING:

The safest route from the public sidewalk to the employee entrance is proposed to SE Lindy. This development is not connected for pedestrians in the Clackamas Regional Center Area beyond that achieved by sidewalk improvements on the three project frontages.

1005.09 REGIONAL CENTER DESIGN STANDARDS

Subsection 1005.09 applies in the Regional Center, as identified on Comprehensive Plan Map X-CRC-1, Clackamas Regional Center Area Design Plan Regional Center, Corridors, and Station Community. Where these standards conflict with other provisions in Section 1000, Subsection 1005.09 shall take precedence.

- A. Freestanding parking structures located within 20 feet of pedestrian facilities, including public or private streets, pedestrian ways, greenways, a transit station or shelter, or plaza, shall provide a quality pedestrian environment on the façade facing the pedestrian facility. Techniques to use may include:

FINDING:

Not applicable, the proposed project does not contain a parking structure.

- B. New buildings shall have at least one public entrance oriented to a street. Private streets used to meet this standard shall include the elements identified in Subsection 1005.08(G).

FINDING:

The safest route from the public sidewalk to the employee entrance is proposed to SE Lindy.

- C. Pedestrian amenities are required between the building and the front lot line. The following guidelines apply to pedestrian amenities used to meet this requirement:
1. Pedestrian areas include plazas, courtyards, outdoor seating areas for restaurants, pocket parks, and atriums when there is direct access for pedestrians. Pedestrian areas in front of buildings should be visible from the street.
 2. Pedestrian areas must include landscape planters and at least two of the following amenities for every 100 square feet of pedestrian area: lawn areas with trees and seating; awnings or other weather protection; kiosks; outdoor eating areas with seating; water features with seating; and drinking fountains.

FINDING:

An automatic carwash is not a pedestrian oriented development; no amenities are proposed beyond the landscape and landscaped stormwater facilities between the building and the front lot line

- D. In the RCHDR District, pedestrian amenities are required in the front yard setback area, except landscaping for privacy may also be provided as an option in the setback area for residential buildings.

FINDING:

Not applicable, the site is not located in this District.

- E. Internal streets and driveways are prohibited between buildings and the street to which building entrances are oriented.

FINDING:

Not applicable, no internal streets are proposed.

1006 UTILITIES, STREET LIGHTS, WATER SUPPLY, SEWAGE DISPOSAL, SURFACE WATER MANAGEMENT, AND EROSION CONTROL

1006.01 GENERAL STANDARDS

- A. The location, design, installation, and maintenance of all utility lines and facilities shall be carried out with minimum feasible disturbance of soil and site consistent with the rules and regulations of the surface water management regulatory authority.
- B. All development that has a need for electricity, natural gas, and communications services shall install them pursuant to the requirements of the utility district or company serving the development. Except where otherwise prohibited by the utility district or company, all such facilities shall be installed underground.
- C. Coordinated installation of necessary water, sanitary sewer, and surface water management and conveyance facilities is required.

- D. Easements shall be provided along lot lines as deemed necessary by the County, special districts, and utility companies. Easements for special purpose uses shall be of a width deemed appropriate by the responsible agency.

1006.02 STREET LIGHTS

FINDING:

Street lights exist on the SE 82nd and SE Lindy Avenue frontages and will be relocated as required for frontage improvements.

1006.03 WATER SUPPLY

FINDING:

Clackamas River Water District has furnished a Statement of Feasibility indicating adequate water supply is available.

1006.04 SANITARY SEWER SERVICE

FINDING:

Water Environment Services stated in their pre-app notes that there is adequate system capacity and sewer laterals exist on both SE Lindy and SE Cornwell frontages.

1006.06 SURFACE WATER MANAGEMENT AND EROSION CONTROL

FINDING:

The project proposes to utilize (4) onsite retention facilities sized to effectively dispose of all the runoff from the 100-year event, no impacts to surface waters are proposed. The existing site is paved and only minor grading is proposed, standard urban erosion control measures will be sufficient to prevent sediment laden water from leaving the site.

1006.07 PRELIMINARY STATEMENTS OF FEASIBILITY EXCEPTIONS

- A. A land use application shall be deemed complete and may be approved without the submittal of one or more of the preliminary statements of feasibility required by Subsections 1006.03, 1006.04, and 1006.06 if the applicant demonstrates that a good faith attempt has been made to obtain the statement(s). At a minimum, demonstration of a good faith attempt shall require the applicant to submit the following:
1. A statement signed by the applicant indicating that the service provider or surface water management authority has not responded to a request for a preliminary statement of feasibility or has refused to issue one. When the refusal to issue a preliminary statement of feasibility is based upon a finding that adequate service cannot be provided, such refusal shall not qualify for an exception under this subsection; and

2. A copy of a letter delivered to the service provider or surface water management authority clearly requesting a preliminary statement of feasibility. The letter shall be dated no less than 30 days prior to the submittal of the land use application.
- B. In the absence of evidence in the record to the contrary, it shall be presumed that the failure of a service provider or surface water management authority to respond to a request for a preliminary statement of feasibility constitutes a finding of adequacy of service. This presumption shall be for the purposes of land use application approval only and does not guarantee that service can be provided.

FINDING:

No statement of feasibility exceptions requested.

1007 ROADS AND CONNECTIVITY

FINDING:

The development does not require the creation of a new road. Frontage improvements are required on all (3) public road frontages in accordance with Clackamas County and ODOT requirements. The applicant conducted a Traffic Analysis that concluded that all impacted intersections will continue to function at an appropriate level. The applicant's decision to focus the public access to the site on SE Lindy was due primarily to the fact the Lindy is an traffic light controlled intersection on SE 82nd and the zoning is Corridor commercial. The access to Cornwell is limited and gated.

The Transportation Impact Study found:

- "1. The subject 55,127 square-foot property is located east of SE 82nd Avenue (OR 213), north of SE Lindy Street, and south of SE Cornwell Avenue, and has access to all adjacent roadways. With the proposed Washman development, primary access will be to SE Lindy Street and secondary, gated emergency/limited use access will be to SE Cornwell Avenue. All access to SE 82nd Avenue will be eliminated.
2. The SE 82nd Avenue/SE Johnson Creek Boulevard intersection crash rate is greater than the 1.0 crashes/mev threshold and the 90th percentile crash rate of the reference population. Detailed crash data review finds 74% are rear-end crashes which are common at signalized intersections, and particularly those operating near/at capacity. As such, it is recommended large scale agency-initiated corridor safety improvements be considered, noting smaller improvements will likely not improve safety.
3. All study intersections are anticipated to operate at an acceptable agency mobility standard in the Post-Development scenario and capacity improvements are not necessary. Further, the subject development has de minimus transportation system impacts.

4. Queue lengths all study intersections during the PM peak hour are at, or slightly exceed, storage capacity indicating the SE 82nd Avenue corridor is nearing saturated/capacity conditions.
5. No improvements are recommended except to ensure the appropriate loop detection is installed on the east leg of the SE 82nd Avenue/SE Lindy Street intersection.”

1007.04 PEDESTRIAN AND BICYCLE FACILITIES

FINDING:

Twenty-one feet (21') of right-of-way dedication along SE 82nd Avenue provides for the addition of a bike lane and part of the frontage improvements. Employee bicycle parking will be provided inside the building. No customer bicycle parking is proposed as customers arrive with their cars to wash their cars.

1007.05 TRANSIT AMENITIES

All residential, commercial, institutional, and industrial developments on existing and planned transit routes shall be reviewed by Tri-Met or other appropriate transit provider to ensure appropriate design and integration of transit amenities into the development. The design shall not be limited to streets, but shall ensure that pedestrian/bikeway facilities and other transit-supportive features such as shelters, bus pull-outs, park-and-ride spaces, and signing will be provided. The designs shall comply with Tri-Met standards and specifications.

FINDING:

The applicant supports the location of a bus stop and school bus stop on the right of way frontage of the site.

1007.06 STREET TREES

FINDING:

Street trees are proposed on SE 82nd and SE Lindy frontages as required by Department of Transportation and Development. Street trees along SE 82nd require an exception by ODOT. No street trees are proposed along SE Cornwell as there is not sufficient room between the clear vision triangle at the intersection.

1007.07 TRANSPORTATION FACILITIES CONCURRENCY

FINDING:

Adequate volume-to-capacity ratios for existing public transportation facilities has been demonstrated in the Transportation Analysis prepared by Clemow & Associates.

1009 LANDSCAPING

FINDING:

A variety of all new, hardy, low maintenance landscape areas is proposed. No significant landscape plants exist.

1009.02 MINIMUM AREA STANDARDS

- A. Table 1009-1, Minimum Landscaped Area, establishes the minimum percentage of the area of the subject property that shall be landscaped.
1. The minimum landscaped area shall be calculated after subtracting any public dedications from the area of the subject property.
 2. Landscaping in adjacent rights-of-way shall not count toward compliance with the minimum landscaped area.
 3. Requirements for surface parking and loading area landscaping, screening and buffering, scenic roads landscaping, landscaping strips, and recreational areas and facilities set forth in Section 1009 apply regardless of whether compliance with those requirements results in landscaping a greater percentage of the subject property than is required by Table

Table 1009-1: Minimum Landscaped Area

Zoning District	Minimum Landscaped Area
CC, PMU, RCC, RCO, RTL	10 percent

FINDING:

The development is proposing 23% landscape area.

1009.03 SURFACE PARKING AND LOADING AREA LANDSCAPING

FINDING:

The development is proposing (4) parking spaces to serve employee needs and (1) loading area to facilitate the delivery of supplies.

1009.04 SCREENING AND BUFFERING

- A. Screening shall be used to eliminate or reduce the visual impacts of the following:
1. Service areas and facilities, such as loading areas and receptacles for solid waste or recyclable materials;
 2. Storage areas;
 3. Ground-mounted rainwater collection facilities with a storage capacity of more than 100 gallons;
 4. Parking lots within or adjacent to an Urban Low Density Residential, VR-5/7, VR-4/5, RA-1, RA-2, RR, RRRF-5, FF-10, FU-10, or HR District; and
 5. Any other area or use, as required by this Ordinance.
- B. Screening shall be accomplished by the use of sight-obscuring evergreen plantings, vegetated earth berms, masonry walls, sight-obscuring fences, proper siting of disruptive elements, building placement, or other design techniques.

- C. Screening shall be required to substantially block any view of material or equipment from any point located on a street or accessway adjacent to the subject property. Screening from walkways is required only for receptacles for solid waste or recyclable materials. A sight-obscuring fence at least six feet in height and up to a maximum of 10 feet in height shall be required around the material or equipment.
- D. Buffering shall be used to mitigate adverse visual impacts, dust, noise, or pollution, and to provide for compatibility between dissimilar adjoining uses. Special consideration shall be given to buffering between residential uses and commercial or industrial uses, and in visually sensitive areas.
- E. Buffering shall be accomplished by one of the following:
 - 1. A landscaping strip with a minimum width of 15 feet and planted with:
 - a. A minimum of one row of deciduous and evergreen trees staggered and spaced a maximum of 30 feet apart;
 - b. A perennial, evergreen planting with sufficient foliage to obscure vision and which will grow to form a continuous hedge a minimum of six feet in height within two years of planting; and
 - c. Low-growing evergreen shrubs and evergreen ground cover covering the balance of the area;
 - 2. A berm with a minimum width of ten feet, a maximum slope of 40 percent on the side away from the area screened from view, and planted with:
 - a. A perennial, evergreen planting with sufficient foliage to obscure vision and which will grow to form a continuous hedge within two years of planting. The minimum combined height of the berm and planting shall be six feet; and
 - b. Low-growing evergreen shrubs and evergreen ground cover covering the balance of the area;
 - 3. A landscaping strip with a minimum width of five feet and including:
 - a. A masonry wall or sight-obscuring fence a minimum of six feet in height. The wall or fence is to be placed along the interior side of the landscaping strip;
 - b. Evergreen vines, evergreen trees, or evergreen shrubs, any of which shall be spaced not more than five feet apart; and
 - c. Low-growing evergreen shrubs and evergreen ground cover covering the balance of the area; or
 - 4. Another method that provides an adequate buffer considering the nature of the impacts to be mitigated.
- F. Required walkways shall be accommodated, even if such accommodation necessitates a gap in required screening or buffering.

FINDING:

Screening and buffering are proposed along the residential use to the east by means of masonry wall, tight board cedar fence and landscape. Masonry is also proposed for the trash enclosure. The applicant conducted a Noise Impact Study that concluded that the facility would not have any sound trespassing the lot line on the east side. The result is

a result of the applicant proposing state of the art vacuum systems that run out of a single noise mitigated unit.

The Noise Evaluation concluded:

“The proposed Washman facility at 8864 SE 82nd Avenue, Happy Valley, Oregon has been designed to reduce sound levels at adjacent residential properties that would result from operation of the facility. With the proposed design, sound levels are expected to be below the daytime noise standards applicable to the site and identified in OAR Chapter 340, Division 035. The facility is expected to comply with Oregon State Noise Standards.

The concrete wall planned along the east property boundary will benefit the residential areas by reducing sound from existing traffic sources as well as reducing effects from the car wash.”

1009.06 LANDSCAPING STRIPS

- C. In all other zoning districts, except SCMU, a landscaping strip a minimum of five feet wide shall be provided abutting front lot lines. (See Subsection 1005.10(L) for additional SCMU landscaping requirements.)

FINDING:

Proposed landscape strip exceeds 5' minimum width requirement.

1009.07 FENCES AND WALLS

- A. Fences and walls shall be of a material, color, and design complementary to the development.

FINDING:

Six foot high masonry walls and cedar fences are proposed and provide transition between residential and commercial uses.

1009.09 EROSION CONTROL

- A. Graded areas shall be re-vegetated with suitable plants to ensure erosion control.
- B. Netting shall be provided, where necessary, on sloped areas while ground cover is being established.

FINDING:

All graded surfaces will receive either permanent hardscape or permanent landscape to ensure erosion control. There are no sloped areas onsite, erosion risk in minimal.

1009.10 PLANTING AND MAINTENANCE

FINDING:

Landscape installation shall be in accordance with American Standard for Nursery Stock.

1010 SIGNS

1010.01 PURPOSE

The provisions of Section 1010 are intended to maintain a safe and pleasing environment for the people of Clackamas County by regulating the size, height, number, location, type, structure, design, lighting, and maintenance of signs.

FINDING:

No prohibited signs are proposed.

1010.05 DESIGN REVIEW

The size, materials, design, color, lighting, and location of signs and supporting structures for all permanent signs greater than 60 square feet in area, shall be subject to design review pursuant to Section 1102 and the following criteria:

- A. Design: Signs shall be designed to be compatible with other development on the site, other nearby signs, other elements of street and site furniture, and adjacent structures. Compatibility shall be determined by the relationships of the elements of form, proportion, scale, color, materials, surface treatment, overall sign size, and the size and style of lettering.
- B. Scale: The scale of the sign, letter size, and design shall be appropriate for roadway or walkway visibility.

FINDING:

There are no signs proposed that are greater than 60 square feet, therefore Design Review for signage is not required.

1010.09 COMMERCIAL SIGNS IN COMMERCIAL AND INDUSTRIAL DISTRICTS

FINDING: One monument sign is proposed that complies with the Commercial Freestanding Sign requirements. All four Building Commercial Signs proposed are to be internally illuminated. The sign faces total 137 square feet. Building signs are incorporated into the design of the building.

1010.10 ONSITE TRAFFIC CONTROL AND IDENTIFICATION SIGNS

FINDING:

Onsite vehicle circulation signage typical for routing vehicles into, through, and out of carwash facilities will be located in perimeter setback areas as well as in the adjacent site area.

1010.12 FLAGS

FINDING:

No flags are proposed.

1010.14 CHANGEABLE COPY SIGNS

FINDING:

No electronic changeable copy signs are proposed.

1015 PARKING AND LOADING

1015.02 MOTOR VEHICLE PARKING AREA STANDARDS

FINDING:

Four (4) employee parking spaces complying with this section are proposed onsite.

1015.03 BICYCLE PARKING STANDARDS

FINDING:

One (1) employee bicycle parking space is provided inside the building.

1015.04 OFF-STREET LOADING STANDARDS

FINDING:

One (1) 10'x30' off-street loading area is proposed.

1021 SOLID WASTE AND RECYCLABLE MATERIAL COLLECTION

FINDING:

One (1) 20' x 11'-4" trash enclosure is proposed in compliance with this section.

1102 DESIGN REVIEW

FINDING:

The proposed car wash meets or exceeds all the requirements of the Clackamas County Development Code. The applicant has applied for and is being processed through a publically noticed land use process to ensure that the applicable criteria are being met.



PRELIMINARY STATEMENT OF FEASIBILITY

To be completed by the applicant:

Applicant's Name: Symons Engineering
Property Legal Description: T 1 S, R 2E, Section 2833, Tax Lot(s) 12600, 12700, 13400 + 12500
Site Address: 8220 SE Cornwell St Project Engineer: ¹³³⁰⁰ Dan Symons
Project Title/Description of Proposed Development: Washman Carwash /
Comprehensive Plan Change + Zone Change to TL 12500

To be completed by the service provider or surface water management authority:

Check all that apply:

- Sanitary sewer capacity in the wastewater treatment system and the sanitary sewage collection system is available to serve the development or can be made available through improvements completed by the developer or the system owner.
- Adequate surface water treatment and conveyance is available to serve the development or can be made available through improvements completed by the developer or the system owner.
- Water service is available in levels appropriate for the development, and adequate water system capacity is available in source, supply, treatment, transmission, storage and distribution or such levels and capacity can be made available through improvements completed by the developer or the system owner. This statement applies does not apply to fire flows.*

*If water service is adequate with the exception of fire flows, the applicant shall submit a statement from the fire district serving the subject property that states that an alternate method of fire protection, such as an on-site water source or a sprinkler system, is acceptable.

- This statement is issued subject to conditions of approval set forth in the attached.
- Adequate sanitary sewer service, surface water management, water service cannot be provided.

Erik Carter
Signature of Authorized Representative

7/6/18
Date

DEVELOPMENT REVIEW SPECIALIST
Title

WES
Name of Service Provider or Surface Water Management Authority

Completion of this statement does not reserve capacity for the development and does not alter an applicant's obligation to comply with the service provider's or surface water management authority's regulations. Completion of this statement does not obligate the service provider or surface water management authority to finance or construct improvements necessary to provide adequate service for the proposed development. Completion of this statement does not guarantee that land use approval for the proposed development will be granted.

150 Beaver Creek Road, Oregon City, Oregon, 97045 - Phone: 503-742-4500; Fax 503-742-4550

17-44



PRELIMINARY STATEMENT OF FEASIBILITY

To be completed by the applicant:

Applicant's Name: Symons Engineering
 Property Legal Description: T 1 S, R 2E, Section 2833, Tax Lot(s) 12600, 12700, 13400 + 12500
 Site Address: 8220 SE Cornwell St Project Engineer: Dan Symons
 Project Title/Description of Proposed Development: Washman Carwash /
Comprehensive Plan Change + Zone Change to TL 12500

To be completed by the service provider or surface water management authority:

Check all that apply:

- Sanitary sewer capacity in the wastewater treatment system and the sanitary sewage collection system is available to serve the development or can be made available through improvements completed by the developer or the system owner.
- Adequate surface water treatment and conveyance is available to serve the development or can be made available through improvements completed by the developer or the system owner.
- Water service is available in levels appropriate for the development, and adequate water system capacity is available in source, supply, treatment, transmission, storage and distribution or such levels and capacity can be made available through improvements completed by the developer or the system owner. This statement applies does not apply to fire flows.*

*If water service is adequate with the exception of fire flows, the applicant shall submit a statement from the fire district serving the subject property that states that an alternate method of fire protection, such as an on-site water source or a sprinkler system, is acceptable.

This statement is issued subject to conditions of approval set forth in the attached.

- Adequate sanitary sewer service, surface water management, water service cannot be provided.

Betty Johnson
 Signature of Authorized Representative
 Engineering Associate
 Title

June 6, 2018
 Date
 Clackamas River Water
 Name of Service Provider or Surface
 Water Management Authority

Completion of this statement does not reserve capacity for the development and does not alter an applicant's obligation to comply with the service provider's or surface water management authority's regulations. Completion of this statement does not obligate the service provider or surface water management authority to finance or construct improvements necessary to provide adequate service for the proposed development. Completion of this statement does not guarantee that land use approval for the proposed development will be granted.

150 Beavercreek Road, Oregon City, Oregon, 97045 – Phone: 503-742-4500; Fax 503-742-4550



Clackamas River Water

Attachment County Preliminary Statement of Feasibility

To: Dan Symons, Symons Engineering

From: Betty Johnson

Date: June 6, 2018

Re: 8220 SE 82nd Ave, Happy Valley, 97086

● Comments:

- A. CRW reserves the right to require a water main replacement if a development or redevelopment does not meet current water system standards or would demand more capacity for consumption or fire suppression than existing water mains could adequately supply. CRW shall have the sole authority for making the determination of existing mainline capacity and the demand for capacity to the development or redevelopment. The cost of any mainline replacement required to serve the development or redevelopment shall be borne entirely by the Applicant.
- B. *“Water service will be provided only from pipes or mains located within public street, alleys or rights-of-way, or within easements furnished to CRW, and to property or premises with frontage to such mains.... Each dwelling or building will be provided with its own water service connection and meter ...No person shall furnish water to other buildings or premises without the written approval of the Board, which may be granted in the sole discretion of the Board, and then only under the specific terms of an agreement approved by CRW”*
- C. Fire hydrant number and distribution shall be in accordance with the Oregon Fire Code C105.1
- D. Placement of fire hydrant systems shall be in accordance with the Oregon Fire Code 507.5.1
- E. Unless Noted on plans or specified otherwise, all construction and backflow devices are to be in accordance with the most recent version of Clackamas River Water standards and the Oregon Administration Rules (OAR), Chapter 333.
- F. All water facilities design, construction, testing and maintenance, where applicable, shall conform to the latest adopted revision of the Oregon state Health Division Administrative Rules chapter 333 on Public water System except where provisions outlined in the Clackamas River Water rules and regulations.
- G. For design of District’s water system improvements, hydraulic system must be analyzed using the worst- case scenario envisioned in the district’s current Water System Facilities Plan. The water system analysis shall be conducted using a simultaneous demand for the

F:\1B County & City Design Review\Pre-App, Design Review & Land Use Applications\8880 SE 82nd Ave\8220 SE 82nd Ave - Statement of Feasibility Conditions(6-6-18).docx

maximum (peak) day demand or peak hour non-fire demand, whichever is greater, and the fire demand.

- H. Any substantial deviation from the approved construction plans must have prior approval of the Water District.
- I. Easements for water facilities shall be provided along property lines and designated on the final plat, as deemed necessary by the Water District.
- J. Resale of water purchased from the Water District will not be permitted. No user shall resell or permit resale of water directly to any person, or for any use.
- K. An approved water system capable of supplying required fire flow for fire protection shall be provided to all premises upon which buildings are to be constructed.
- L. If water service is adequate with the exception of fire flows, the applicant shall submit a statement to Clackamas River Water from the fire district serving the subject property that states that if and /or what alternate method of fire protection is acceptable.
- M. The Engineer of record shall provide a "pressure available" chart on the water system plan sheet of the construction plans; this sheet shall indicate the calculated pressures theoretically available to each lot during static and peak demands.
- N. Upon plan review there may be additional requirements as set forth by the Water District.

**Final Noise Evaluation
Proposed SE 82nd Avenue
Self-Serve Car Wash**

Prepared for:

Washman USA

Prepared by:

Moore Noise, LLC

PO Box 14373

Portland, OR 97293

July 11, 2019

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- C Supporting Calculations

SUMMARY

Washman USA is planning to develop a new car wash facility at 8864 SE 82nd Avenue in Happy Valley, Oregon. The results of the noise analysis performed for the planned car wash facility show that noise levels resulting from the proposed project, as designed, will comply with the State of Oregon *Noise Control Regulations* (OAR 340-035).

PROJECT DESCRIPTION

The car wash facility will be a self-serve design with vacuum stations and a drive through wash building. The car wash is expected to operate during daytime hours within the 7 a.m. to 10 p.m. period. The wash building will be aligned along the western side of the property adjacent to SE 82nd Avenue. A Preliminary Site Plan is shown in Appendix A.

Several design elements will reduce noise levels at this facility relative to older car wash facilities, and standard designs. The car wash building will be masonry construction and will house all major on-site noise sources within the building, including the vacuum compressor for the outdoor vacuum stations and all active car wash components. The southern portion of the car wash building will extend 30 feet beyond sound emitting mechanical components to block sound transmission to the east. This will reduce sound levels potentially affecting the residential properties east of the site. In addition, a concrete masonry wall will be constructed along the east property boundary which will further reduce sound levels (including from existing traffic sources) at adjacent residences and their outdoor use areas.

The primary sound sources associated with the facility will be water pumps, water movement, mechanical wash equipment, central vacuum system compressors, vacuum stations, and an audio instruction system (speaker).

LAND USE AND TOPOGRAPHY

The area surrounding the proposed facility is zoned and used for commercial and residential purposes. Properties fronting on SE 82nd Avenue are zoned, and have historically been used, for commercial activities. Properties immediately to the east of the proposed site are zoned and used for residential purposes.

The topography of the site and surrounding area is level. Appendix B contains an aerial view of the proposed site and surrounding areas.

NOISE BACKGROUND INFORMATION

Noise is generally defined as unwanted sound, and it is a fluctuating pressure wave. Noise is measured in terms of sound pressure level and is expressed in decibels (dB). The number of fluctuation cycles or pressure waves per second of a particular sound is the frequency of the sound. The human ear is less sensitive to higher and lower

frequencies than it is to mid-range frequencies. Sound level meters used to measure environmental noise incorporate a filtering system that discriminates against higher and lower frequencies in a manner similar to the human ear to produce noise measurements that approximate the normal human perception of noise. Measurements made using this filtering system are termed "A-weighted decibels" (dBA). Sound levels produced by common noise sources are shown in Table 1.

Table 1			
Sound Levels of Common Noise Sources and Environments			
Thresholds/ Noise Sources	Sound Level (dBA)	Subjective Evaluations	Possible Effects on Humans
Human threshold of pain Carrier jet takeoff (50 ft)	140	Deafening	Continuous Exposure Can Cause Hearing Damage
Siren (100 ft) Jackhammer, power drill	130		
Loud rock band Auto horn (3 ft)	120		
Busy video arcade Baby crying	110		
Lawn mower (3 ft) Noisy motorcycle (50 ft)	100	Very Loud	
Heavy truck at 40 mph (50 ft) Shouted conversation	90	Loud	
Kitchen garbage disposal (3 ft) Busy urban street, daytime	80		
Normal automobile at 65 mph (25 ft) Vacuum cleaner (3 ft)	70	Moderate	Speech Interference
Large air conditioning unit (20 ft) Normal conversation (3 ft)	60		
Quiet residential area Light auto traffic (100 ft)	50	Faint	Sleep Interference
Library Quiet home	40		
Soft whisper (15 ft)	30	Very Faint	
Broadcasting studio	20		
Threshold of human hearing	0-10		
Note that both subjective evaluations and physiological responses are continuous without true threshold boundaries. Consequently, there are overlaps among categories of response that depend on the sensitivity of the noise receivers.			

Noise levels decrease with distance from a noise source. Subjectively, a 10-dBA change in noise level is perceived by most people to be approximately a twofold change in loudness (e.g., an increase from 50 dBA to 60 dBA causes the loudness to double). Three dBA is generally the minimum change in outdoor sound levels that can be perceived by a person with normal hearing.

REGULATIONS

The State of Oregon *Noise Control Regulations* (OAR 340-035) govern allowable sound levels from industrial and commercial noise sources. Under the regulations, the Washman car wash would be considered a new industrial or commercial noise source since the installation or construction of the facility was commenced after January 1, 1975. The proposed car wash site on SE 82nd Avenue is considered a previously used industrial or commercial site because it has historically been zoned, and used, for commercial facilities and operations during the 20-year period prior to the currently proposed use.

The noise regulations limit allowable statistical sound levels (L_{xx}), discrete frequency sounds, and impulsive sounds. The L_{xx} is a statistical noise level descriptor, and the xx is a percentage of the measurement time, usually a 1-hour measurement. The statistical noise descriptors used in the Oregon regulations are the L_1 , L_{10} , and L_{50} and are defined as:

L_1 : The sound level exceeded 1 percent of the time. This is a measure of the loudest sound levels during the measurement period. Example: During a 1-hour measurement, an L_1 of 90 dBA means the sound level was 90 dBA or louder for 0.6 minutes, or 36 seconds.

L_{10} : The sound level exceeded 10 percent of the time. This is a measure of the louder sound levels during the measurement period. Example: During a 1-hour measurement, an L_{10} of 85 dBA means the sound level was 85 dBA or louder for 6 minutes.

L_{50} : The sound level exceeded 50 percent of the time. Example: During a 1-hour measurement, an L_{50} of 50 dBA means the sound level was 50 dBA or louder for 30 minutes.

Table 2 lists the allowable noise levels from OAR 340-035 for new industrial or commercial noise sources. The daytime period is 7:00 a.m. to 10:00 p.m. and the nighttime period is 10:00 p.m. to 7:00 a.m. The noise limits apply at noise sensitive properties, which are defined in OAR 340-035-0015(38) as properties normally used for sleeping or normally used as schools, churches, hospitals, or public libraries. The noise standards apply 25 feet towards the noise source, from that point on the noise sensitive building nearest the source, or at that point on the noise sensitive property line nearest the noise source, whichever point is further from the noise source. The standards will apply along the property line of the adjacent apartments/condos, and at 25 feet towards the noise source from the house southeast of the proposed site.

Noise from construction sites is exempted from the OAR 340-35 noise regulations under OAR 340-35-0035(5)(g). Construction of the proposed car wash would be exempt under the Noise Control Regulations.

Table 2 New Industrial and Commercial Noise Source Standards		
Statistical Descriptor	Daytime Level (dBA)	Nighttime Level (dBA)
L ₅₀	55	50
L ₁₀	60	55
L ₁	75	60

The Clackamas County Code includes *Title 6.05 Noise Control*. Sounds caused by industrial, commercial, timber-harvesting, or utility organizations or workers during their normal operations are excepted under the Clackamas County Noise Control Code. Construction operations are also excepted between the hours of 6 a.m. and 10 p.m. Both construction and operation of the proposed car wash are exceptions from the Clackamas County Noise Control Code so long as construction operations are limited to the 6 a.m. to 10 p.m. period.

EXISTING CONDITIONS

Existing ambient noise measurements were taken at the proposed car wash site. Existing noise levels in the area are affected primarily by traffic on SE 82nd Avenue and SE Johnson Creek Boulevard. Other sounds sources include typical urban noises such as aircraft, human voices, vehicles, property maintenance activities, and animals. Minimum, maximum, and average daytime sound levels measured at the proposed site are listed in Table 3.

The measurement location was approximately 40 feet west of the east property line in an area partially shielded from SE 82nd Avenue and fully shielded from SE Johnson Creek Boulevard. Existing buildings on the proposed site provide partial sound shielding to the residential units directly east of the site. Sound level measurements occurred on the 4th of July and traffic volumes on SE 82nd Avenue and SE Johnson Creek Boulevard appeared lower than normal. Because the proposed facility will not operate at night, only daytime sound level measurements were performed for existing conditions. Note that existing ambient sound levels exceeded DEQ industrial and commercial standards for L₁₀ and L₅₀ at minimum, average, and maximum measured levels. Maximum existing ambient sound levels exceeded DEQ industrial and commercial standards for L₁ levels.

Table 3			
Existing Daytime 30-Minute Noise Levels			
Near the East Side of the Proposed Site (dBA)			
	L₁	L₁₀	L₅₀
Minimum	67	64	58
Average	71	64	60
Maximum	79	65	61
DEQ Standards	75	60	55

Noise measurements made July 4th, 2019

NOISE ANALYSIS METHODOLOGY

To estimate noise levels at the adjacent residences that would result from operation of the proposed Washman car wash, measurements were taken at two Washman locations that have equipment similar to the equipment that will be used at the proposed facility on SE 82nd Avenue. Measurements were taken adjacent to the blower equipment and wash building entrance at the Washman facility located at 6869 N Lombard Street, Portland, Oregon. Measurements were taken at the vacuum stations located at 24161 SE Stark Street, Gresham, Oregon. The vacuum station equipment at this location is identical to the planned equipment to be installed at SE 82nd Avenue, except the central vacuum compressor will be located within the wash building to reduce sound levels at SE 82nd Avenue.

The measurements were used in calculations that considered the modified configuration of the proposed wash building and vacuum stations at the proposed SE 82nd Avenue site relative to the measurement sites to evaluate the resulting noise levels. Conservative assumptions were used regarding the source sound levels, and the insertion loss (sound shielding) from the extended wash building exit tunnel. These assumptions included using the measured L₁₀ blower levels for L₅₀ effects calculations to account for busier operating periods. The resulting calculated sound levels are equivalent to assuming the blowers operate continuously instead of intermittently. Actual operations are intermittent.

RESULTS

Noise sensitive properties of concern for the proposed Washman facility at 8864 SE 82nd Avenue are the residential properties immediately to the east of the proposed facility. Properties directly to the north, south, and west of the site are in commercial uses and are not considered noise sensitive. L₅₀ sound levels will be affected by all on-site sound sources. L₁ and L₁₀ sound levels will be affected by higher level, short duration on-site sound sources such as alarm buzzers inside of the wash building, and the speaker at the wash building entrance. Table 4 shows the calculated sound levels at the compliance location (east property line outside of the concrete wall of the proposed site for the apartments, and 25 feet towards the noise source for the single residence to the

southeast) for the expected on-site sound sources. Supporting calculations for Table 4 are included in Appendix C. The highest overall (L₅₀) levels are predicted at the single residence located to the southeast of the site.

Table 4 Calculated Daytime Noise Levels at Properties Adjacent to the Proposed Site (dBA)			
	L₁	L₁₀	L₅₀
Existing Average	71	64	60
Proposed Facility – apartments east of site	Less than 70	50	48
Proposed Facility – house SE of site	Less than 70	54	50
DEQ Standards	75	60	55

Note: The DEQ standards apply only to the proposed facility sound.

CONCLUSION

The proposed Washman facility at 8864 SE 82nd Avenue, Happy Valley, Oregon has been designed to reduce sound levels at adjacent residential properties that would result from operation of the facility. With the proposed design, sound levels are expected to be below the daytime noise standards applicable to the site and identified in OAR Chapter 340, Division 035. The facility is expected to comply with Oregon State Noise Standards. The concrete wall planned along the east property boundary will benefit the residential areas by reducing sound from existing traffic sources as well as reducing effects from the car wash.

REFERENCES

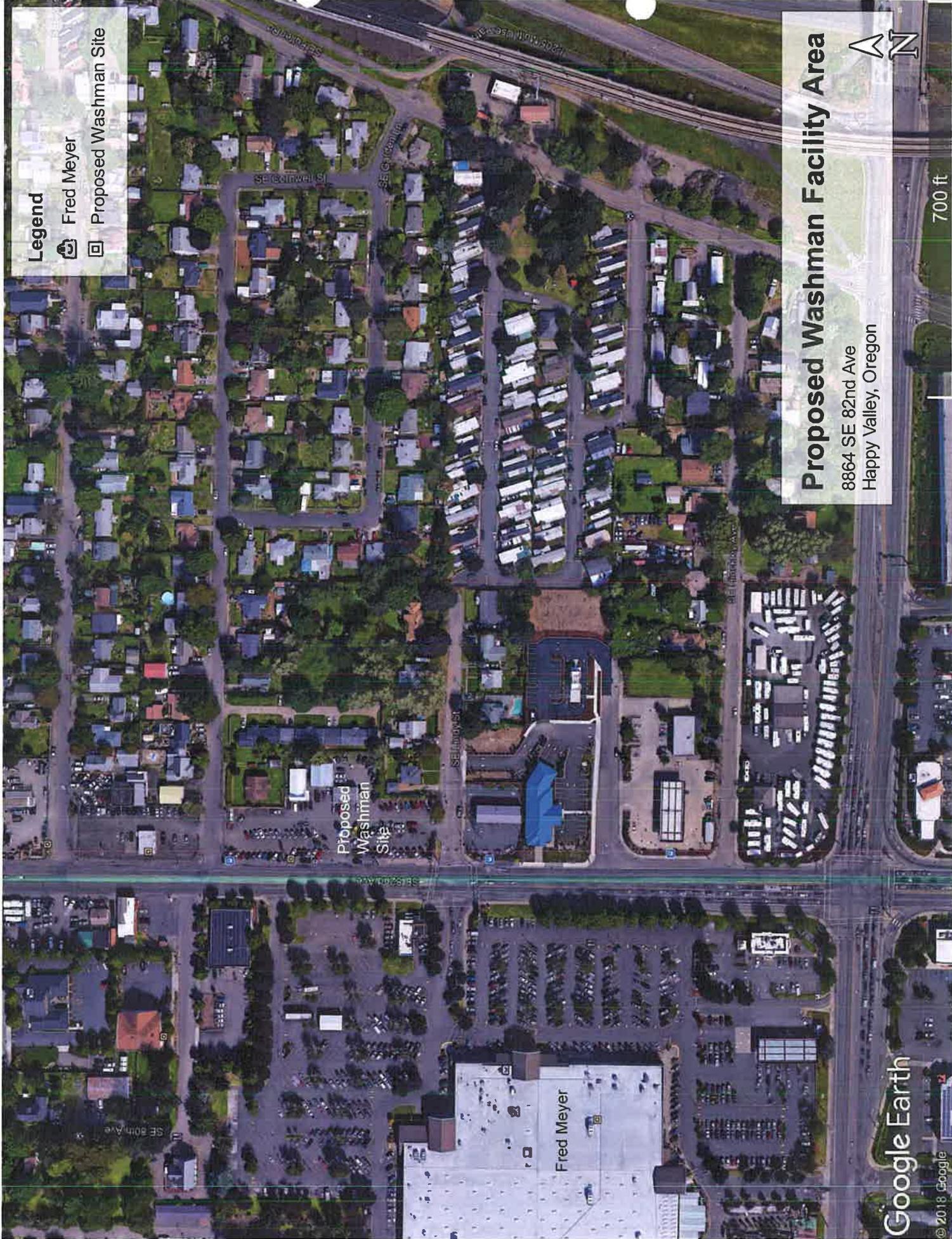
Oregon Administrative Rules. “Noise Control Regulations.” OAR 340-35, Salem, OR.

Appendix A

Preliminary Site Plan

Appendix B

Aerial View of Site



Legend

-  Fred Meyer
-  Proposed Washman Site

Proposed Washman Facility Area

8864 SE 82nd Ave
Happy Valley, Oregon



700 ft

Appendix C

Supporting Calculations

Washman - New Self-Serve Carwash Site
8864 SE 82nd Avenue
Happy Valley, OR

Noise Source	Base SPL at 3' (dBA)	Line of Sight Reference	Insertion Loss (dBA)	Distance to Property Line	SPL at PL no IL	SPL at PL with IL	Descriptor
South End Tunnel (blower)	96.4	A	22	140	63.0	41.0	L50
South End Tunnel (blower)	96.4	E	12	180	60.8	48.8	L50
South End Tunnel (alarm)	98.5	A	22	140	65.1	43.1	L10
South End Tunnel (alarm)	98.5	E	12	180	62.9	50.9	L10
East Line Vacuum Drops (13 @ 65 dBA)	76	B	5	55	50.9	45.9	L50
East Line Vacuum Drops (13 @ 65 dBA)	76	B'	7	100	45.5	38.5	L51
West Line Vacuum Drops (13 @ 65 dBA)	76	C	5	120	44.1	39.1	L50
North End Tunnel (speaker)	78	D	5	140	44.6	39.6	L10
North End Tunnel (mechanical)	73	D	5	140	39.6	34.6	L50
North End Tunnel (speaker)	78	F	5	55	52.7	47.7	L10
North End Tunnel (mechanical)	73	F	5	55	47.7	42.7	L50

Insertion Loss Estimates Used:

15 dBA for sources in tunnel with 30 foot or more shielding

7.7 dBA for CMU wall - calculated using SPM9613 Model

5 dBA if line of sight broken by less than 5 feet

Overall Sound Level at Locations:	L10	L50
Northeast of Site (single house)	51	48
East of Site (Apartments/Condos)	50	48
Southeast of Site (single house)	54	50

Raw Measurement Data

Field Notes:

From 4/30 measurements at Lombard Facility- SPL levels:

73 - 74	dBA, basic mechanical/water in tunnel dryer end
93 - 97	dBA, reverberant dryer in tunnel - use data from 7/4 to estimate maximum at 45 feet from exit in straight line dryer end
82	basic mechanical/water at entrance end
67 - 70	overall entrance end
70 - 73	speaker at entrance end of tunnel during operation
78	

From operator, peak hours tend to be 11 am to 1 pm, and after 3 pm

New equipment at this location in 2015 - the same system as proposed at SE 82nd for the wash tunnel.

From 5/1 measurements at 242 and Stark - SPL levels:

65	vacuum station only at approximately 3 feet - this will be similar to individual vacuum stations at proposed facility.
----	--

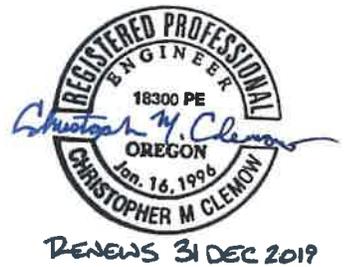
Weather on 4/30 and 5/1 was warm, sunny, calm.

Measurements conducted using a Norsonic 140 sound level meter, serial number 1404747, calibrator Norsonic 1251, serial number 33052

From 7/4 measurements at Lombard Facility - statistical levels (45 vehicles thorough wash 2 pm to 4 pm):

	L1	L10	L50
Average 2 pm to 4:30 pm	98.5	96.4	71.0
Range	98.3 - 98.6	95.0 - 97.4	70.0 - 72.2

Measurements were made inside of tunnel. Measurements conducted using a Larson Davis 831 sound level meter, serial number 10830, calibrator Larson Davis CAL200, serial number 16871



**WASHMAN CARWASH
SE 82ND AVENUE /
SE LINDY STREET**

**TRANSPORTATION
IMPACT STUDY**

To
Clackamas County

For
Washman, LLC

Prepared
July 31, 2019

Clackamas County File Number
ZPAC0042-19

C&A Project Number
20180601.00

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I. EXECUTIVE SUMMARY

The following summarizes the analysis and findings contained in this Transportation Impact Study (TIS).

1. The subject 55,127 square-foot property is located east of SE 82nd Avenue (OR 213), north of SE Lindy Street, and south of SE Cornwell Avenue, and has access to all adjacent roadways. With the proposed Washman development, primary access will be to SE Lindy Street and secondary, gated emergency/limited use access will be to SE Cornwell Avenue. All access to SE 82nd Avenue will be eliminated.
2. The SE 82nd Avenue/SE Johnson Creek Boulevard intersection crash rate is greater than the 1.0 crashes/mev threshold and the 90th percentile crash rate of the reference population. Detailed crash data review finds 74% are rear-end crashes which are common at signalized intersections, and particularly those operating near/at capacity. As such, it is recommended large scale agency-initiated corridor safety improvements be considered, noting smaller improvements will likely not improve safety.
3. All study intersections are anticipated to operate at an acceptable agency mobility standard in the Post-Development scenario and capacity improvements are not necessary. Further, the subject development has *de minimus* transportation system impacts.
4. Queue lengths all study intersections during the PM peak hour are at, or slightly exceed, storage capacity indicating the SE 82nd Avenue corridor is nearing saturated/capacity conditions.
5. No improvements are recommended except to ensure the appropriate loop detection is installed on the east leg of the SE 82nd Avenue/SE Lindy Street intersection.

II. INTRODUCTION

Property Description and Proposed Land Use Actions

The subject property is located east of SE 82nd Avenue (OR 213), north of SE Lindy Street, and south of SE Cornwell Avenue. The property is described as tax lots 12600, 12700, 13300, and 13400 on Clackamas County Assessor's Map 1S2E28BB. The four tax lots total 55,127 square feet and are zoned Clackamas County Corridor Commercial (CC). The site location and study area are illustrated in the attached Figure 1 in Appendix A.

In total, the four tax lots have access to all adjacent roadways. With the proposed Washman development, primary access will be to SE Lindy Street and secondary, gated emergency/limited use access will be to SE Cornwell Avenue. All access to SE 82nd Avenue will be eliminated. It is further noted Cornwall access use will be limited to approximately one delivery vehicle per day and the occasional disqualified vehicle (less than 1%) exiting from the car wash.

The property is currently developed with a used car lot and a single-family residence. The proposed carwash development replaces both of these uses. The proposed site plan is illustrated in the attached site plan in Appendix A.

Transportation Analysis Scope of Work

To specifically determine the transportation impact study (TIS) scope of work, a June 11, 2019 Transportation Impact Study (TIS) – Preliminary Analysis and Proposed Scope of Work letter was prepared and submitted to Clackamas County staff for review and approval. The letter and the County email response are attached in Appendix B for reference.

Transportation Analysis Description

The proposed Washman development is an allowed use in the Corridor Commercial (CC) zone. As such, the TIS addresses the following:

- Clackamas County Zoning and Development Ordinance (ZDO) criteria, and
- Oregon Department of Transportation (ODOT) criteria.

Additionally, the proposed development is located within the Clackamas County Regional Center (CRC) area. As identified in Clackamas County Roadway Standards Section 295.7 – *Clackamas Regional Center (CRC) Area Analysis Period*,

- a. *ZDO Section 1007 and Comprehensive Plan Chapter 10 require special analysis periods within the Clackamas Regional Center Area.*
- b. *Within the CRC area, a weekday PM peak two-hour analysis is required. The first hour of analysis shall be based upon the peak hour of the subject intersections. If the mobility standard is met for the first hour, no further analysis is required. If the mobility standard is not met in the first hour, a second hour of analysis is required. The second hour of analysis shall be based upon the "shoulder" ½ hours before and after the peak hour.*
- c. *Within the CRC area, a weekday midday hour analysis is required.*

As further identified in Clackamas County Roadway Standards Section 295.13.1 – *Count Hours*,

The count hours stated in Table 2-19 shall be collected in the analysis unless the TIS scope specifies otherwise.

Table 2-19. Traffic Count Hours by Area

Outside Clackamas Regional Center Area	
<i>Weekday AM Peak Hour</i>	<i>6:30 AM to 8:30 PM</i>
<i>Weekday PM Peak Hour</i>	<i>4 PM to 6 PM</i>
Within Clackamas Regional Center Area	
<i>Weekday Midday Peak Hour</i>	<i>11 AM to 2 PM</i>
<i>Weekday PM Peak Hour</i>	<i>3:30 PM to 6:30 PM</i>

As identified in the following sections of this TIS, the car wash generates a small number of PM peak hour trips, resulting in small intersection volume increases. It is further noted, Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 10th Edition data is not available for the Midday peak hour; therefore, it is recommended the same PM peak hour data be used for Midday period. Based on this and scope of work discussions with County staff, this TIS only contemplates a PM peak hour analysis.

Study Area

Based on development trip generation and distribution described later in this analysis, the following project area intersections are evaluated and are illustrated in the attached Figure 2 in Appendix A.

TABLE 1 – STUDY INTERSECTIONS		
Intersection	PM Development Trips	Trip Volume Increase
SE 82 nd Avenue/SE Lindy Street	58	2%
SE 82 nd Avenue/SE Johnson Creek Boulevard	28	1%

Analysis Scenarios

As identified in Clackamas County Roadway Standards Section 295.19.3.b – *Analysis Periods and Scope*,

The analysis shall include the following study scenarios at a minimum or as directed by staff:

1. *Existing Traffic (Analysis based upon “current” traffic counts)*
2. *Background Traffic at a reasonable full build-out year (Existing Traffic + Growth + In Process Traffic)*
3. *Total Traffic at a reasonable full build-out year (Background Traffic + Site Generated Traffic)*

The proposed development will be constructed in 1 phase and fully operational by 2020. As such, based on County requirements, the following analysis scenarios include:

- 2019 Existing Conditions
- 2020 Pre-Development
- 2020 Post-Development

III. EXISTING CONDITIONS

Existing Site Conditions

The subject property is located east of SE 82nd Avenue (OR 213), north of SE Lindy Street, and south of SE Cornwell Avenue. The property is described as tax lots 12600, 12700, 13300, and 13400 on Clackamas County Assessor’s Map 1S2E28BB and total 55,127 square feet in size. The study area is illustrated in the attached Figure 1.

In total, the four tax lots have access to all adjacent roadways. With the proposed Washman development, primary access will be to SE Lindy Street and secondary, gated emergency/limited use access will be to SE Cornwell Avenue. All access to SE 82nd Avenue will be eliminated.

The property is currently developed with a used car lot and a single-family residence. The proposed carwash development replaces both of these uses. The proposed site plan is illustrated in the attached site plan in Appendix A.

Roadway Facilities

The following table summarizes existing roadway classifications and characteristics in the study area.

TABLE 2 – EXISTING ROADWAY CHARACTERISTICS						
Roadway	Functional Classification	Lanes	Posted Speed (MPH)	Sidewalks	Bicycle Lanes	On-Street Parking
SE 82 nd Avenue (OR 213)	Principal Arterial – Clackamas County Other Principal Arterial - ODOT	5	35	No	No	No
SE Johnson Creek Boulevard	Major Arterial	3	35	Yes	Yes	No
SE Lindy Street	Local Roadway	2	25	South Side	No	Yes

Safety Analysis

When evaluating intersection safety, consideration is given to the total number and types of crashes occurring and the number of vehicles entering the intersection. This leads to the concept known as “crash rate,” typically expressed in terms of the number of crashes occurring per one million vehicles entering the intersection (crashes/mev). Intersections having crash rates less than 1.0 crashes/mev are considered relatively safe, and intersections having crash rates higher than 1.0 crashes/mev may be considered for operational corrections. A critical crash rate analysis is then performed by comparing the subject intersection to the published statewide 90th percentile intersection crash rates at comparable/reference intersections. Crash rates close to or exceeding the 90th percentile rates require further analysis.

Crash data for the study area intersections were obtained from the Oregon Department of Transportation (ODOT) for a five-year period from January 1, 2012 through December 31, 2016. The following table presents the study intersection crash rates and critical crash analysis. All crash data and crash rate calculations are provided in Appendix C.

TABLE 3 – INTERSECTION CRASH RATES										
Intersection	2012	2013	2014	2015	2016	Total	Observed Crash Rate (crashes/mev)	Reference Population		
								Description ¹	90 th ile Crash Rate	Over or Under?
SE 82 nd Avenue / SE Lindy Street	3	5	1	2	7	18	0.359	Urban 4SG	0.860	Under
SE 82 nd Avenue / SE Johnson Creek Boulevard	20	12	20	18	26	96	1.147	Urban 4SG	0.860	Over

¹4SG (Four-Leg Signalized)

The observed crash rate at the SE 82nd Avenue/SE Lindy Street intersection is less than the 1.0 crashes/mev threshold and the 90th percentile crash rate of the reference population. As such, the intersection is considered relatively safe and no further evaluation of safety deficiencies is necessary.

The observed crash rate at the SE 82nd Avenue/SE Johnson Creek Boulevard intersection is greater than the 1.0 crashes/mev threshold and the 90th percentile crash rate of the reference population. As such, further analysis is recommended to determine if safety improvements are necessary.

Further review of the detailed SE 82nd Avenue/SE Johnson Creek Boulevard intersection crash data finds that 71 Of the 96 crashes (74%) are rear-end crashes. The remaining crash types include angle, sideswipe, turning and backing. This section of SE 82nd Avenue (OR 213) is also in the top 10% of Safety Priority Index System locations for ODOT Region 1. Overall, rear-end crashes are common at signalized intersections, and particularly those operating near/at capacity. As such, it is recommended large scale agency-initiated corridor safety improvements be considered, noting smaller improvements will likely not improve safety.

Base Year Traffic Volumes

Mid-week PM peak hour intersection turning movement traffic counts were obtained in May 2018 and meet ODOT guidelines of being three years old or less.

2018 Base Year traffic volumes are adjusted to the 30th highest hour (30HV) consistent with procedures identified in the ODOT Analysis Procedures Manual Version 2 Chapter 5. Noting there are no permanent automatic traffic recorder (ATR) stations nearby on SE 82nd Avenue (OR 213), the ATR characteristic table method was used to calculate a seasonal adjustment factor of 1.03 which was applied to the base year traffic volumes. Seasonal adjustment calculations are included in Appendix D.

2018 Base Year 30HV Traffic Volumes are illustrated in the attached Figure 2. Traffic counts are included in Appendix D.

IV. DEVELOPMENT TRIP GENERATION

As identified in Clackamas County Roadway Standards Section 295.14 – *Trip Generation*,

- a. *Trip generation shall be based upon the latest edition of ITE’s Trip Generation Manual and Trip Generation Handbook.*
- b. *The traffic impact study shall include an estimate of site-generated trips, pass-by trips, diverted-linked trips, and internal capture trips during each study period.*
- c. *If a trip generation rate similar to the proposed use is not available within Trip Generation Manual, then the procedures of the Trip Generation Handbook regarding obtaining local rates shall generally be required unless local trip data is unavailable for the proposed use or as approved by Engineering.*
- d. *Trip generation shall be based upon an average weekday unless otherwise specified by Engineering.*

Trip generation for the proposed car wash is estimated using data from the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 10th Edition and is summarized in the following table.

TABLE 4 – SPECIFIC DEVELOPMENT TRIP GENERATION					
Land Use	ITE Code	Size	PM Peak Hour Trip Generation		
			Enter	Exit	Total
Total Trips – Automated Car Wash	948	1 Tunnel	39	39	78
Pass-By Trips (25% Enter / 25% Exit) ¹			(10)	(10)	(20)
Primary (Net New) Trips			29	29	58

¹ Pass-By trip percentage estimated based on data from: on ITE *Trip Generation Handbook*, 3rd Edition, Owner-provided data, and published data from car wash transportation impact analyses.

As identified in the table above, the proposed development is anticipated to generate 58 primary PM peak hour trips.

Trip Distribution and Traffic Assignment

As identified in Clackamas County Roadway Standards Section 295.15 – *Trip Distribution*,

- a. *For smaller projects, trip distribution may be based upon existing traffic conditions, engineering judgment, and previous traffic studies.*
- b. *For larger projects, the transportation modeling methodologies of NCHRP 255 should be used as a general guideline.*
- c. *In both cases, prior to trip distribution, it is strongly recommended that the method of trip distribution be confirmed with Engineering.*

As identified in the *Trip Generation* section of this analysis, development trip generation is 58 primary PM peak hour trips. This is considered a ‘smaller project’; therefore, trip distribution is based on existing traffic conditions and engineering judgment and is illustrated in the attached Figure 2 in Appendix A.

V. FUTURE CONDITIONS

As identified in Clackamas County Roadway Standards Section 295.12 – *Growth Rates and In-Process Traffic*,

- a. *For short term analysis of five years or less, growth rates shall not typically be less than 2% per year unless verifiable evidence is submitted or known which indicates that the local growth rate is less than 2% per year.*
- b. *For long term analysis of six years or more, simple growth rates shall not be used. The applicant shall obtain data per Section 295.6 for use in their analysis.*
- c. *In process traffic, or developments that have been approved yet are not yet occupied, shall be included in addition to growth projections only when modeling data per Section 295.6 is not utilized.*

Background Growth

No additional information was provided by Clackamas County staff in response to the June 11, 2019 TIS Proposed Scope of Work. As such, background traffic growth is assumed to be 2% per year.

2019 Existing (30HV) Traffic Volumes

2019 Existing 30HV traffic volumes are the sum of the 2018 Base Year 30HV traffic volumes and one year of background traffic growth and are illustrated in the attached Figure 2 in Appendix A.

In-Process Development

Per Clackamas County staff request, in-process traffic volumes from the SE Luther Road Multi-Family Development (Clackamas County File Number Z0625-18) were included. In-process traffic volumes are illustrated in Figure 3 and the excerpted page from the Luther Road Development TIS are attached in Appendix E for reference.

2020 Pre-Development Traffic Volumes

2020 Pre-Development traffic volumes are the sum of the 2018 Base Year 30HV traffic volumes, two years of background traffic growth, and in-process trips and are illustrated in the attached Figure 2 in Appendix A.

2020 Post-Development Traffic Volumes

2020 Post-Development traffic volumes are the sum of the 2020 Pre-Development traffic volumes and subject development traffic volumes and are illustrated in the attached Figure 3 in Appendix A.

VI. INTERSECTION ANALYSIS

Analysis Scope

The following project area intersections are evaluated:

- SE 82nd Avenue/SE Lindy Street
- SE 82nd Avenue/SE Johnson Creek Boulevard

Analysis Description

Intersection operation characteristics are generally defined by two mobility standards: volume-to-capacity (v/c) ratio and level-of-service (LOS). At signalized intersections, the v/c ratio is a measurement of an intersection's ability to accommodate the critical movements, while LOS is based on the average control delay per vehicle for the entire intersection. At unsignalized intersections, the v/c ratio and LOS are calculated for intersection approach movements yielding right-of-way.

Based on Clackamas County Comprehensive Plan Section 5.S – *System Performance Policies*, the motor vehicle capacity evaluation standard for OR 213 (SE 82nd Avenue), a roadway under ODOT jurisdiction in the Clackamas Regional Center Area is a v/c ratio ≤ 0.99 during both the 1st and 2nd PM peak hours and a v/c ratio ≤ 0.90 during the mid-day one-hour peak.

Operations Analysis

Unsignalized (stop-controlled) intersection operations analyses were performed in accordance with the Transportation Research Board's *Highway Capacity Manual 2010* (HCM 2010) methodologies using Trafficware's *Synchro* software (Version 9). Signalized intersection operations analysis was performed implementing *HCM 2000* methodologies.

The proposed development will be constructed in 1 phase and fully operational by 2020. As such, based on County requirements, the following analysis scenarios include:

- 2019 Existing Conditions
- 2020 Pre-Development
- 2020 Post-Development

The following table summarizes weekday PM peak hour analysis results. Data output sheets from all operations calculations are included in Appendix F.

TABLE 5 – INTERSECTION OPERATIONS ANALYSIS – PM PEAK HOUR				
Intersection	Critical Movement Lane Group	v/c Ratio		
		2019 30HV Existing	2020 Pre-Development	2020 Post-Development
SE 82nd Avenue/SE Lindy Street	Intersection	0.59	0.66	0.66
SE 82nd Avenue/SE Johnson Creek Boulevard	Intersection	0.85	0.89	0.90

As identified in the table above, all study intersections are anticipated to operate at an acceptable agency mobility standard in the Post-Development scenario and capacity improvements are not necessary. Further, the subject development has *de minimus* transportation system impacts.

Queuing Analysis

Queuing analysis was performed to evaluate queue storage adequacy. 95th percentile queues were estimated using Trafficware's *SimTraffic* software (Version 9) and ODOT *Analysis Procedure Manual* methodologies. Available storage is rounded to the nearest 5 feet, and queue demand is rounded to the next highest 25 feet, the average length of a queued vehicle.

The following table summarizes PM peak hour queuing analysis results. Assumed mitigation is identified in the *Operations Analysis* section of this report. Data output sheets from all queuing calculations are included in Appendix G.

TABLE 6 – INTERSECTION QUEUING ANALYSIS – PM PEAK HOUR					
Intersection	Critical Movement Lane Group	Available Storage (Feet) ¹	95 th Percentile Queue (Feet)		
			2019 30HV	2020 Pre-Development	2020 Post-Development
SE 82nd Avenue/SE Lindy Street	NB L	175	150	175	150
	NB T/R	200	150	175	175
	SB L	175	75	75	150
	SB T/R	250+	225	225	225
	EB L	125	175	175	175
	EB T/R	125	125	125	125
	WB L/T/R	100	50	50	75
SE 82nd Avenue/SE Johnson Creek Boulevard	NB L	350	425	450	500
	NB T	500	475	575	650
	NB R	225	50	100	125
	SB L	350	125	125	125
	SB T	400	125	125	125
	SB R	225	100	75	75
	EB L	150	250	275	275
	EB T	250	375	375	400
	EBR	275	75	75	75
	WB L	210	350	375	375
WB T/R	950	700	900	900	

¹ Storage is measured to the upstream intersection for continuous lanes between intersections and to the end of full-width storage for turn lanes.

As identified in the table above, queue lengths all study intersections during the PM peak hour are at, or slightly exceed, storage capacity indicating the corridor is nearing saturated/capacity conditions.

Queuing Analysis Discussion

SE 82nd Avenue/SE Lindy Street – Development traffic increases primarily on the east intersection leg which is compensated by the signal controller shifting a small amount of green time from SE 82nd Avenue to SE Lindy Street. Overall, the intersection has acceptable queuing operations and no specific mitigation is recommended, other to ensure the appropriate loop detection is installed on the east intersection leg.

SE 82nd Avenue/SE Johnson Creek Boulevard – Development traffic increases at this intersection are *de minimus* and queue fluctuations result from the dynamic nature of the *SimTraffic* software and because the intersection is operating near capacity. Overall, development impacts are *de minimus* with respect to queuing and no specific mitigation is recommended.

VII. CONCLUSION

The following summary and recommendations are based on materials contained in this analysis.

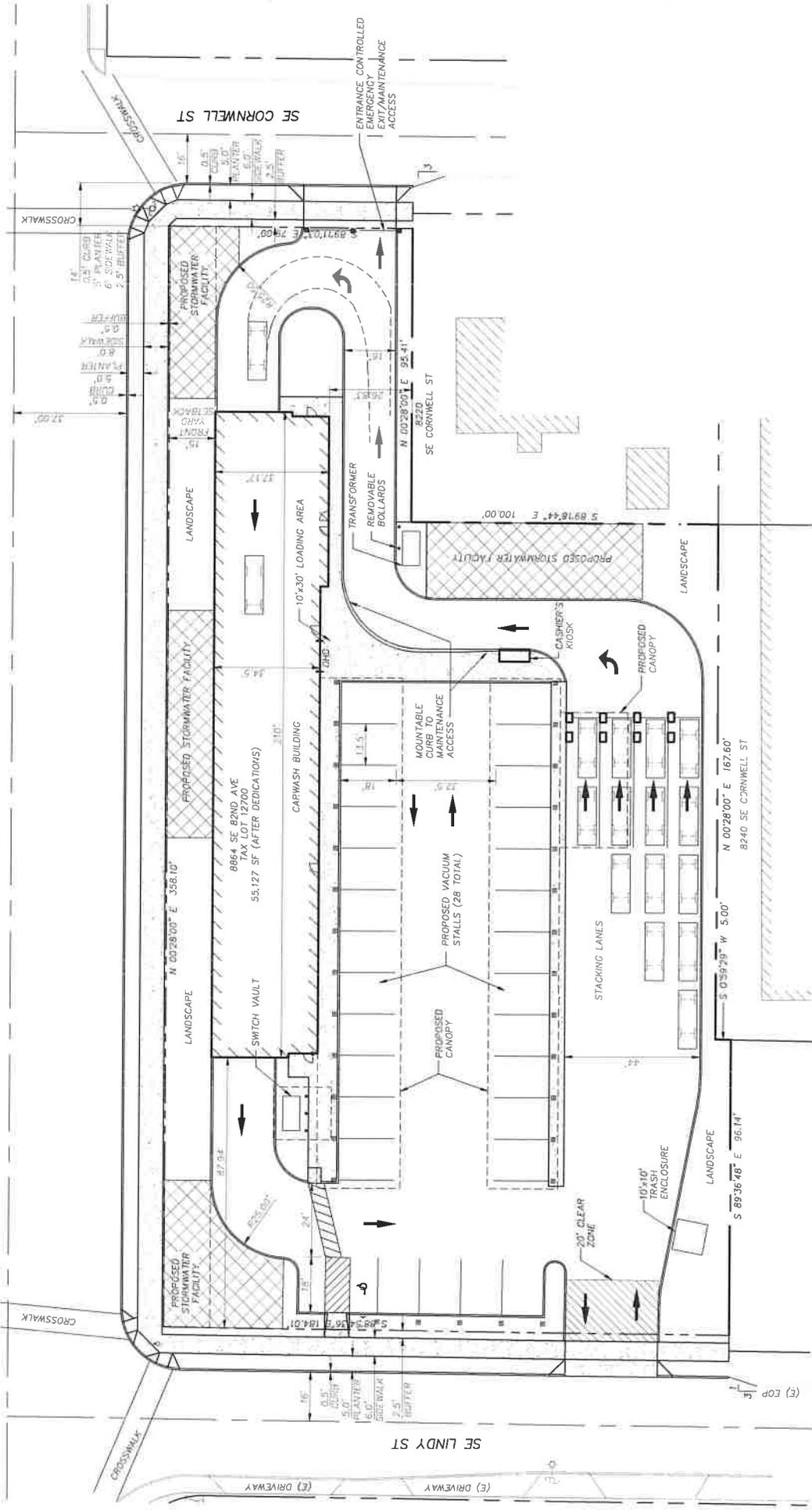
1. The subject property is located east of SE 82nd Avenue (OR 213), north of SE Lindy Street, and south of SE Cornwell Avenue. The property is described as tax lots 12600, 12700, 13300, and 13400 on Clackamas County Assessor's Map 1S2E28BB and total 55,127 square feet in size.
2. In total, the four tax lots have access to all adjacent roadways. With the proposed Washman development, primary access will be to SE Lindy Street and secondary, gated emergency/limited use access will be to SE Cornwell Avenue. All access to SE 82nd Avenue will be eliminated.
3. The observed crash rate at the SE 82nd Avenue/SE Lindy Street intersection is less than the 1.0 crashes/mev threshold and the 90th percentile crash rate of the reference population. As such, the intersection is considered relatively safe and no further evaluation of safety deficiencies is necessary.
4. The observed crash rate at the SE 82nd Avenue/SE Johnson Creek Boulevard intersection is greater than the 1.0 crashes/mev threshold and the 90th percentile crash rate of the reference population. Detailed crash data review finds 74% are rear-end crashes which are common at signalized intersections, and particularly those operating near/at capacity. As such, it is recommended large scale agency-initiated corridor safety improvements be considered, noting smaller improvements will likely not improve safety.
5. The proposed development is anticipated to generate 58 primary PM peak hour trips.
6. Background traffic growth is assumed to be 2% per year and SE Luther Road Multi-Family Development (Clackamas County File Number Z0625-18) traffic volumes were included as in-process.
7. All study intersections are anticipated to operate at an acceptable agency mobility standard in the Post-Development scenario and capacity improvements are not necessary. Further, the subject development has *de minimus* transportation system impacts.
8. Queue lengths all study intersections during the PM peak hour are at, or slightly exceed, storage capacity indicating the SE 82nd Avenue corridor is nearing saturated/capacity conditions.
9. No improvements are recommended at the SE 82nd Avenue/SE Lindy Street intersection except to ensure the appropriate loop detection is installed on the east intersection leg.
10. Development impacts are *de minimus* at the SE 82nd Avenue/SE Johnson Creek Boulevard intersection and no specific mitigation is recommended.

VIII. APPENDICES

- A. Figures**
- B. Scoping Materials**
- C. Crash Data**
- D. Traffic Count Summaries**
- E. In-Process Traffic**
- F. Operation Analyses**
- G. Queuing Analyses**

Appendix A





**PRELIMINARY
SITE PLAN**



SE LINDY ST

SE CORNWELL ST

8864 SE 82ND AVE
TAX LOT 12700
55,127 SF (AFTER DEDICATIONS)

PROPOSED VACUUM STALLS (28 TOTAL)

10'x30' LOADING AREA

CARWASH BUILDING

CASHIER'S KIOSK

PROPOSED CANOPY

STACKING LANES

10'x10' TRASH ENCLOSURE

20' CLEAR ZONE

PROPOSED STORMWATER FACILITY

LANDSCAPE



1582 Feters Loop
 Eugene, Oregon 97402
 541-579-8315
 cclemow@clemow-associates.com

SITE LOCATION

Washman Car Wash
 SE 82nd Avenue/SE Lindy Street - Clackamas County, Oregon

C& A Project No. 20180601.00

FIGURE

1



	New Development Trips	Pass-By Trips	2020 Post-Development Volumes																																																																																	
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FUTURE INTERSECTION VOLUMES - PM Peak Hour

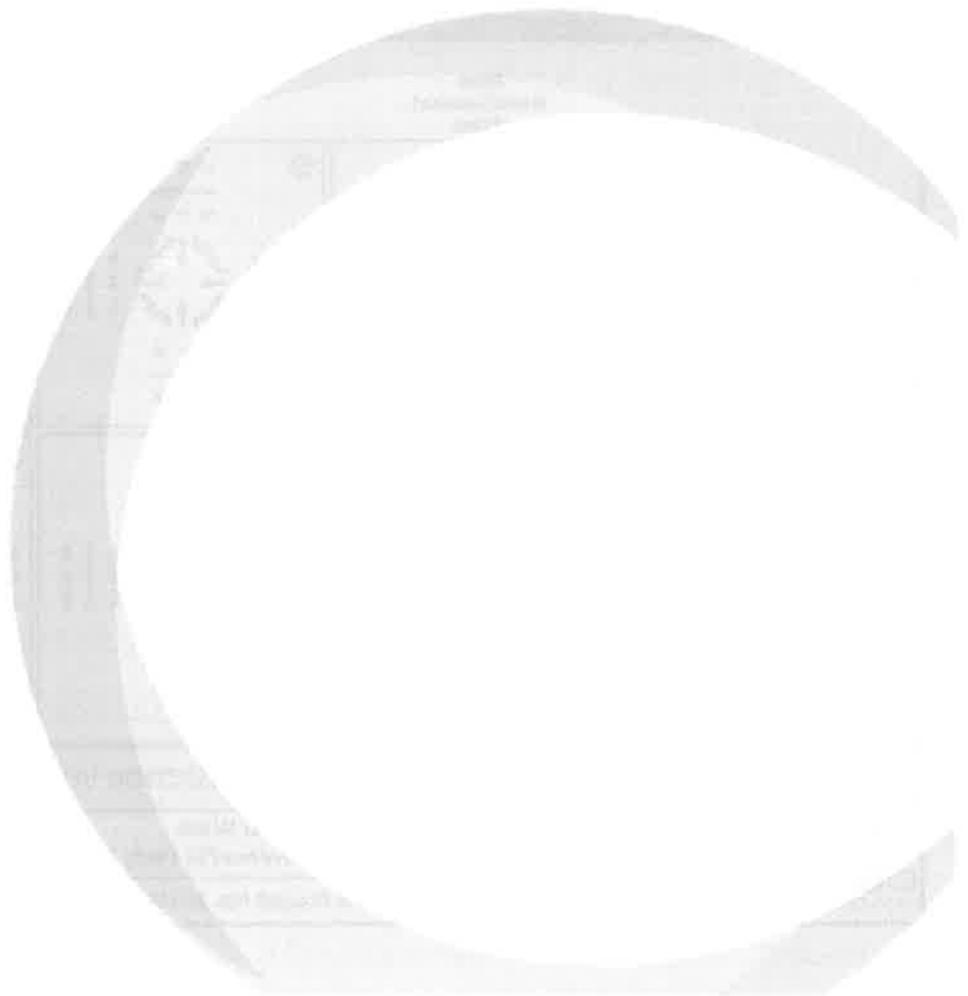
Washman Car Wash
 SE 82nd Avenue/SE Lindy Street - Clackamas County, Oregon

C& A Project No. 20180601.00

FIGURE

3

Appendix B





June 11, 2019

Clackamas County Planning and Zoning Division
Department of Transportation and Development
Attention: Ken Kent
150 Beaver Creek Road
Oregon City, Oregon 97045

Re: Washman Car Wash – SE 82nd Avenue/SE Lindy Street – Clackamas County, Oregon
Transportation Impact Study (TIS) – Preliminary Analysis and Proposed Scope of Work

Clackamas County File Number ZPAC0042-19
C&A Project Number 20180601.00

Dear Mr. Kent,

This Transportation Impact Study (TIS) scoping letter supports the proposed Washman car wash and addresses Clackamas County Zoning and Development Ordinance (ZDO) and Clackamas County Roadway Standards requirements. The following items are specifically addressed:

1. Property Description and Proposed Land Use Actions
2. Study Parameters
3. Trip Generation
4. Trip Distribution and Traffic Assignment
5. Growth Rates and In-Process Traffic
6. Analysis Periods
7. Transportation Facilities Evaluation
8. Summary

1. PROPERTY DESCRIPTION AND PROPOSED LAND USE ACTIONS

The subject property is located east of SE 82nd Avenue, north of SE Lindy Street, and south of SE Cornwell Avenue. The proposed development is 73,980 square feet in size and is described as tax lots 12600, 12700, 13300, and 13400 on Clackamas County Assessor's Map 1S2E28BB. The four tax lots total 63,982 square feet and are zoned Clackamas County Corridor Commercial (CC). The site location and study area are illustrated in the attached Figure 1.

In total, the four tax lots have access to all adjacent roadways. With the proposed Washman development, the primary development access will be to SE Lindy Street, there will be an emergency gated access to SE Cornwell Avenue, and all access to SE 82nd Avenue will be eliminated.

The property is currently developed with a used car lot and a single-family residence. The proposed carwash development replaces both of these uses.

The proposed Washman development is an allowed use in the Corridor Commercial (CC) zone. As such, the TIA needs to address Clackamas County Zoning and Development Ordinance (ZDO) criteria and Oregon Department of Transportation (ODOT) criteria.

2. STUDY PARAMETERS

The proposed development is located within the Clackamas County Regional Center (CRC) area.

As identified in Clackamas County Roadway Standards Section 295.7 – *Clackamas Regional Center (CRC) Area Analysis Period*,

- a. *ZDO Section 1007 and Comprehensive Plan Chapter 10 require special analysis periods within the Clackamas Regional Center Area.*
- b. *Within the CRC area, a weekday PM peak two-hour analysis is required. The first hour of analysis shall be based upon the peak hour of the subject intersections. If the mobility standard is met for the first hour, no further analysis is required. If the mobility standard is not met in the first hour, a second hour of analysis is required. The second hour of analysis shall be based upon the “shoulder” ½ hours before and after the peak hour.*
- c. *Within the CRC area, a weekday midday hour analysis is required.*

As further identified in Clackamas County Roadway Standards Section 295.13.1 – *Count Hours*,

The count hours stated in Table 2-19 shall be collected in the analysis unless the TIS scope specifies otherwise.

Table 2-19. Traffic Count Hours by Area

Outside Clackamas Regional Center Area	
<i>Weekday AM Peak Hour</i>	<i>6:30 AM to 8:30 PM</i>
<i>Weekday PM Peak Hour</i>	<i>4 PM to 6 PM</i>
Within Clackamas Regional Center Area	
<i>Weekday Midday Peak Hour</i>	<i>11 AM to 2 PM</i>
<i>Weekday PM Peak Hour</i>	<i>3:30 PM to 6:30 PM</i>

As identified in the following *Trip Generation and Trip Distribution and Traffic Assignment* sections of this letter, the proposed development generates a small number of PM peak hour development trips and there are small intersection trip volume increases. It is further noted, car wash ITE trip generation data is not available for the Midday peak hour; therefore, it is recommended the same PM peak hour data be used. Consequently, it is proposed only the PM peak hour analysis be performed.

3. TRIP GENERATION

As identified in Clackamas County Roadway Standards Section 295.14 – *Trip Generation*,

- a. *Trip generation shall be based upon the latest edition of ITE’s Trip Generation Manual and Trip Generation Handbook.*
- b. *The traffic impact study shall include an estimate of site-generated trips, pass-by trips, diverted-linked trips, and internal capture trips during each study period.*
- c. *If a trip generation rate similar to the proposed use is not available within Trip Generation Manual, then the procedures of the Trip Generation Handbook regarding obtaining local rates shall generally be required unless local trip data is unavailable for the proposed use or as approved by Engineering.*
- d. *Trip generation shall be based upon an average weekday unless otherwise specified by Engineering.*

Trip generation for the proposed car wash is estimated using data from the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 10th Edition and is summarized in the following table.

TABLE 1 – SPECIFIC DEVELOPMENT TRIP GENERATION					
Land Use	ITE Code	Size	PM Peak Hour Trip Generation		
			Enter	Exit	Total
Total Trips – Automated Car Wash	948	1 Tunnel	39	39	78
<i>Pass-By Trips (25% Enter / 25% Exit) ¹</i>			<i>(10)</i>	<i>(10)</i>	<i>(20)</i>
Primary (Net New) Trips			29	29	58

¹ Pass-By trip percentage estimated based on data from: on ITE *Trip Generation Handbook*, 3rd Edition, Owner-provided data, and published data from car wash transportation analyses.

As identified in the table above, the proposed development is anticipated to generate 58 primary PM peak hour trips.

4. TRIP DISTRIBUTION AND TRAFFIC ASSIGNMENT

As identified in Clackamas County Roadway Standards Section 295.15 – *Trip Distribution*,

- a. *For smaller projects, trip distribution may be based upon existing traffic conditions, engineering judgment, and previous traffic studies.*
- b. *For larger projects, the transportation modeling methodologies of NCHRP 255 should be used as a general guideline.*
- c. *In both cases, prior to trip distribution, it is strongly recommended that the method of trip distribution be confirmed with Engineering.*

As identified in the *Trip Generation* section of this letter, development trip generation is 58 primary PM peak hour trips. This is considered a ‘smaller project’; therefore, trip distribution is based on existing traffic conditions and engineering judgment. The attached Figure 2 depicts the proposed development trip distribution and traffic assignment for the PM peak period.

Based on development trip generation, trip distribution and traffic assignment described in this letter, the following intersections are considered for analysis:

TABLE 2 – POTENTIAL STUDY INTERSECTIONS		
Intersection	PM Development Trips	Trip Volume Increase
SE 82 nd Avenue/SE Lindy Street	58	2%
SE 82 nd Avenue/SE Johnson Creek Boulevard	28	1%

As identified in the previous table, the proposed development generates a small number of PM peak hour development trips and there are small intersection trip volume increases. It is further noted, car wash ITE trip generation data is not available for the Midday peak hour; therefore, it is recommended the same PM peak hour data be used. Consequently, it is proposed only the PM peak hour analysis be performed.

5. GROWTH RATES AND IN-PROCESS TRAFFIC

As identified in Clackamas County Roadway Standards Section 295.12 – *Growth Rates and In Process Traffic*,

- a. *For short term analysis of five years or less, growth rates shall not typically be less than 2% per year unless verifiable evidence is submitted or known which indicates that the local growth rate is less than 2% per year.*
- b. *For long term analysis of six years or more, simple growth rates shall not be used. The applicant shall obtain data per Section 295.6 for use in their analysis.*
- c. *In process traffic, or developments that have been approved yet are not yet occupied, shall be included in addition to growth projections only when modeling data per Section 295.6 is not utilized.*

To address these requirements, it is requested the County provide information on the future traffic background conditions anticipated for the study area, including:

- Background traffic growth assumptions for the near-term (2020) post-development analysis year, if different than 2%.
- Information/data for any in-process (approved/funded but not-yet-constructed) developments/improvements.

6. ANALYSIS PERIODS

As identified in Clackamas County Roadway Standards Section 295.19.3.b – *Analysis Periods and Scope*,

The analysis shall include the following study scenarios at a minimum or as directed by staff:

1. *Existing Traffic (Analysis based upon “current” traffic counts)*
2. *Background Traffic at a reasonable full build-out year (Existing Traffic + Growth + In Process Traffic)*
3. *Total Traffic at a reasonable full build-out year (Background Traffic + Site Generated Traffic)*

The proposed development will be constructed in 1 phase and fully operational by 2020. As such, based on County requirements, the following analysis scenarios are proposed:

- 2019 Existing Conditions
- 2020 Pre-Development
- 2020 Post-Development

7. TRANSPORTATION FACILITIES EVALUATION

Consistent with County requirements, the transportation analysis will include:

- Intersection Capacity Analysis
- Crash Analysis
- Queueing and Storage Analysis

All analyses will be prepared consistent with City requirements and standard engineering practice. Additionally, if the county requires a discussion of Safety Priority Index System (SPIS) rankings, it is requested the County provide the necessary SPIS data.

8. SUMMARY

It is respectfully requested Clackamas County review the proposed TIA scope of work and provide necessary information to facilitate preparation of the final TIA.

Sincerely,

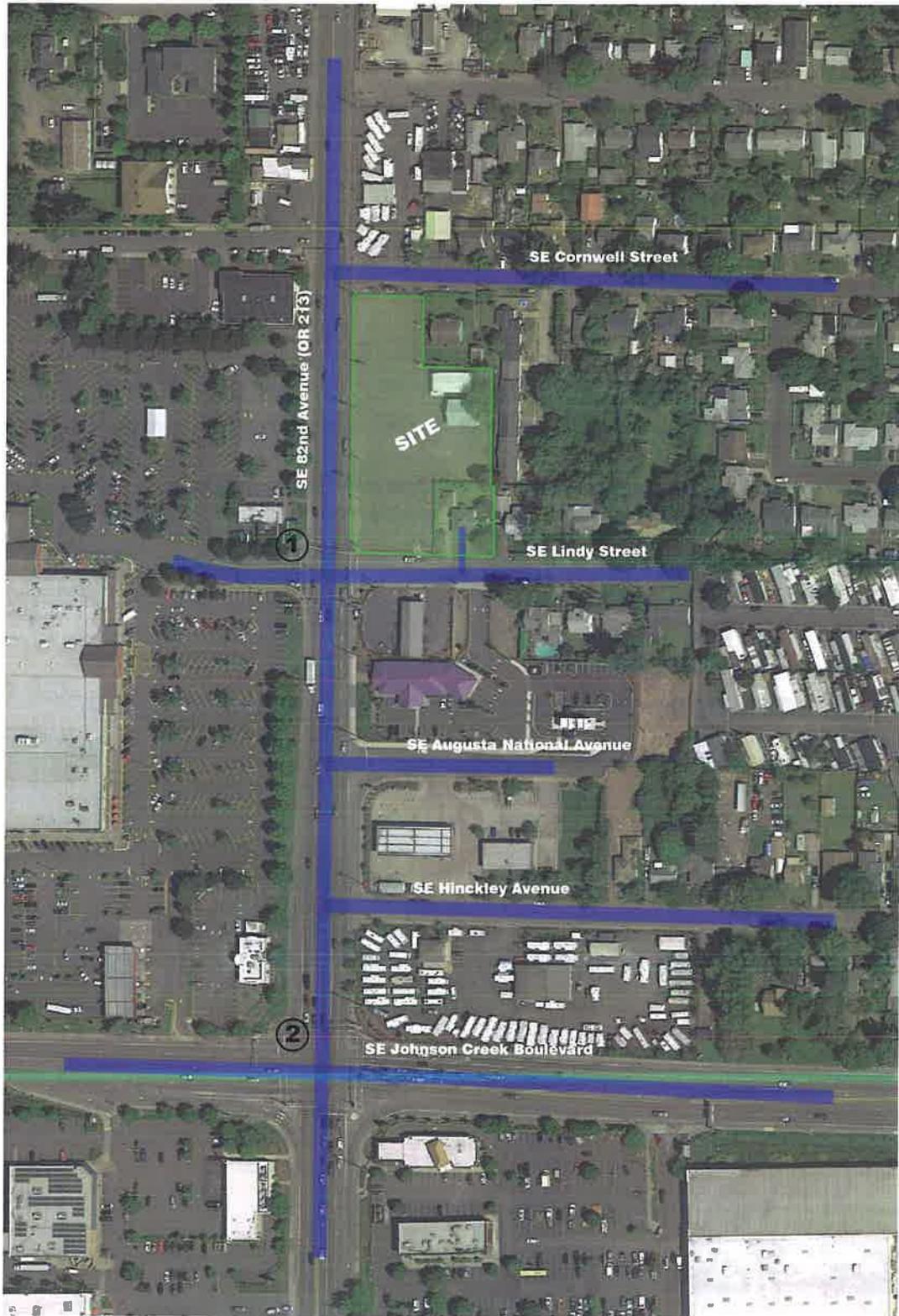


Christopher M. Clemow, PE, PTOE
Transportation Engineer

Attachments: Figure 1 – Study Area
Figure 2 – Trip Distribution and Traffic Assignment



RENEWS 31 DEC 2019



1582 Feters Loop
 Eugene, Oregon 97402
 541-579-8315
 clemow@clemow-associates.com

SITE LOCATION

Washman Car Wash
 SE 82nd Avenue/SE Lindy Street - Clackamas County, Oregon
 C& A Project No. 20180601.00

FIGURE

1



Pre-Development Volumes	Primary Trips	Pass-By Trips	Post-Development Volumes																																																																																										
<p>①</p> <table border="1"> <tr><td>73</td><td>976</td><td>12</td></tr> <tr><td>R</td><td>T</td><td>L</td></tr> </table> <table border="1"> <tr><td>192</td><td>L</td><td>17</td></tr> <tr><td>2</td><td>T</td><td>5</td></tr> <tr><td>184</td><td>R</td><td>14</td></tr> </table> <table border="1"> <tr><td>100</td><td>1188</td><td>11</td></tr> <tr><td>L</td><td>T</td><td>R</td></tr> </table> <p>PHF = 0.97</p>	73	976	12	R	T	L	192	L	17	2	T	5	184	R	14	100	1188	11	L	T	R	<p>①</p> <table border="1"> <tr><td>0</td><td>0</td><td>12</td></tr> <tr><td>0%</td><td>0%</td><td>40%</td></tr> </table> <table border="1"> <tr><td>0</td><td>0</td><td>55%</td><td>16</td></tr> <tr><td>1</td><td>5%</td><td>5%</td><td>1</td></tr> <tr><td>0</td><td>0%</td><td>40%</td><td>12</td></tr> </table> <table border="1"> <tr><td>0</td><td>0%</td><td>16</td></tr> <tr><td>0</td><td>0%</td><td>155%</td></tr> </table>	0	0	12	0%	0%	40%	0	0	55%	16	1	5%	5%	1	0	0%	40%	12	0	0%	16	0	0%	155%	<p>①</p> <table border="1"> <tr><td>0</td><td>4</td><td>4</td></tr> <tr><td>R</td><td>T</td><td>L</td></tr> </table> <table border="1"> <tr><td>0</td><td>L</td><td>6</td></tr> <tr><td>0</td><td>T</td><td>0</td></tr> <tr><td>0</td><td>R</td><td>4</td></tr> </table> <table border="1"> <tr><td>0</td><td>L</td><td>6</td></tr> <tr><td>0</td><td>T</td><td>0</td></tr> <tr><td>0</td><td>R</td><td>4</td></tr> </table>	0	4	4	R	T	L	0	L	6	0	T	0	0	R	4	0	L	6	0	T	0	0	R	4	<p>①</p> <table border="1"> <tr><td>73</td><td>972</td><td>28</td></tr> <tr><td>R</td><td>T</td><td>L</td></tr> </table> <table border="1"> <tr><td>192</td><td>L</td><td>39</td></tr> <tr><td>3</td><td>T</td><td>6</td></tr> <tr><td>184</td><td>R</td><td>30</td></tr> </table> <table border="1"> <tr><td>100</td><td>1182</td><td>33</td></tr> <tr><td>L</td><td>T</td><td>R</td></tr> </table> <p>PHF = 0.97</p>	73	972	28	R	T	L	192	L	39	3	T	6	184	R	30	100	1182	33	L	T	R
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INTERSECTION VOLUMES - PM Peak Hour

Washman Car Wash
 SE 82nd Avenue/SE Lindy Street - Clackamas County, Oregon

C & A Project No. 20180601.00

FIGURE

2



Chris Clemow <clemow@clermow-associates.com>

RE: Washman Car Wash Site - ZPAC0042-19 - Transportation Analysis Scope of Work

1 message

Snuffin, Christian <CSnuffin@clackamas.us>

Fri, Jul 12, 2019 at 1:43 PM

To: "Kent, Ken" <KenKen@clackamas.us>, Chris Clemow <clemow@clermow-associates.com>

I apologize for not responding sooner. I have reviewed the proposed scope for the subject TIA, and I concur with the methodology.

Because 82nd Ave (OR 213) is a state highway, this TIA is subject to ODOT review.

In process trips should include the multifamily development on Luther Rd at 79th (Z0625-18).

Please let me know if there are any questions.

Christian Snuffin, PE, PTOE | Senior Traffic Engineer

Transportation Safety | Clackamas County Department of Transportation and Development

150 Beaver Creek Road | Oregon City, OR 97045 | ☎ 503-742-4716

The Clackamas County Department of Transportation and Development is dedicated to providing excellent customer service. Please help us to serve you better by giving us your feedback. We appreciate your comments and will use them to evaluate and improve the quality of our public service.

From: Kent, Ken

Sent: Wednesday, July 10, 2019 8:33 AM

To: Snuffin, Christian <CSnuffin@clackamas.us>

Subject: FW: Washman Car Wash Site - ZPAC0042-19 - Transportation Analysis Scope of Work

Christian,

Chris Clemow is asking about our review of the scope of work for the Washman Carwash. Can you review his scope and let me know if you have any comments?

Thanks,

Ken

From: Kent, Ken

Sent: Tuesday, June 11, 2019 1:00 PM

To: Snuffin, Christian <CSnuffin@clackamas.us>

Subject: FW: Washman Car Wash Site - ZPAC0042-19 - Transportation Analysis Scope of Work

Christian,

Can you review the attached scope of work for the proposed Washman car wash on 82nd Ave. between SE Lindy and SE Cornwell. I'm going to be out of the office starting tomorrow afternoon through July 4th, so if you could send any comments directly to Chris Clemow, it would be appreciated.

Thanks,

Ken

Kenneth Kent

Senior Planner, Development Engineering

503-742-4673

Engineering Division

Development Service Building, 150 Beavercreek Road, Oregon City, OR 97045



My Work Schedule: Monday through Thursday

Office hours: Mon-Thr 7:30am-4:30pm, Fri 8am-3pm

2nd and 3rd floor permit lobbies open Mon-Thr from 8am-4pm; Fri 8am-3pm

From: Chris Clemow [mailto:cclemow@clemow-associates.com]

Sent: Tuesday, June 11, 2019 12:20 PM

To: Kent, Ken <KenKen@clackamas.us>

Cc: Larry Shirts <larrys@symonsengineering.com>; Dan Symons <dans@symonsengineering.com>; Peter Fry <peter@finleyfry.com>

Subject: Washman Car Wash Site - ZPAC0042-19 - Transportation Analysis Scope of Work

Ken,

Attached is the proposed transportation analysis scope of work for the Washman car wash. Please review and respond with comments so we are able to complete the analysis.

Thank you,

Chris

Christopher M. Clemow PE, PTOE

Transportation Engineer

cclemow@clemow-associates.com

541-579-8315

PORTLAND | EUGENE | BEND

Appendix C



OR 213 SE 82nd Ave & SE LindySt
 January 1, 2012 through December 31, 2016

COLLISION TYPE	FATAL CRASHES		NON-FATAL CRASHES		PROPERTY DAMAGE ONLY	TOTAL CRASHES	TOTAL PEOPLE KILLED	TOTAL PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION RELATED	OFF-ROAD
	FATAL CRASHES	NON-FATAL CRASHES	FATAL CRASHES	NON-FATAL CRASHES											
YEAR: 2016															
REAR-END	0	2	0	0	0	2	0	2	0	2	0	2	0	2	0
SIDESWIPE - MEETING	0	0	1	1	0	1	0	0	0	0	1	1	0	1	0
SIDESWIPE - OVERTAKING	0	0	1	1	0	1	0	0	0	1	0	1	0	1	0
TURNING MOVEMENTS	0	2	1	3	0	3	0	3	0	2	1	3	0	3	0
2016 TOTAL	0	4	3	5	0	7	0	5	0	5	2	7	0	7	0
YEAR: 2015															
REAR-END	0	1	0	0	0	1	0	2	0	1	0	1	0	1	0
TURNING MOVEMENTS	0	0	1	1	0	1	0	0	0	1	1	0	1	1	0
2015 TOTAL	0	1	1	2	0	2	0	2	0	1	1	1	1	2	0
YEAR: 2014															
TURNING MOVEMENTS	0	1	0	1	0	1	0	1	0	0	1	0	1	1	0
2014 TOTAL	0	1	0	1	0	1	0	1	0	0	1	0	1	1	0
YEAR: 2013															
ANGLE	0	1	0	0	0	1	0	1	0	1	0	1	0	1	0
PEDESTRIAN	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
REAR-END	0	1	1	2	0	2	0	2	0	2	0	2	0	2	0
TURNING MOVEMENTS	0	0	1	1	0	1	0	0	0	1	0	1	0	1	0
2013 TOTAL	0	3	2	5	0	5	0	4	0	5	0	5	0	5	0
YEAR: 2012															
REAR-END	0	2	0	0	0	2	0	2	0	2	0	2	0	2	0
TURNING MOVEMENTS	0	0	1	1	0	1	0	0	0	1	0	1	0	1	0
2012 TOTAL	0	2	1	3	0	2	0	2	0	3	0	3	0	3	0
FINAL TOTAL	0	11	7	18	0	14	0	14	0	14	4	16	2	18	0

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
 TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
 CRASH SUMMARIES BY YEAR BY COLLISION TYPE

OR 213 SE 82nd Ave & SE Johnson Creek Blvd
 January 1, 2012 through December 31, 2016

COLLISION TYPE	FATAL CRASHES		NON-PROPERTY DAMAGE ONLY		TOTAL CRASHES		PEOPLE INJURED		TRUCKS		DRY SURF		WET SURF		DAY	DARK	INTER-SECTION RELATED	OFF-ROAD
	FATAL CRASHES	FATAL CRASHES	FATAL CRASHES	PROPERTY DAMAGE ONLY	CRASHES	KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	INTER-SECTION	RELATED						
YEAR: 2016																		
BACKING	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	1	0	0
FIXED / OTHER OBJECT	0	1	0	0	1	0	3	0	0	0	1	1	1	0	1	0	0	1
REAR-END	0	10	9	9	19	0	16	0	0	0	11	8	14	5	19	0	0	0
SIDESWIPE - MEETING	0	0	1	1	1	0	0	0	0	0	1	1	1	0	1	0	0	0
SIDESWIPE - OVERTAKING	0	0	1	1	1	0	0	0	0	0	1	0	1	0	1	0	0	0
TURNING MOVEMENTS	0	2	1	1	3	0	4	0	0	0	3	0	2	1	3	0	0	0
2016 TOTAL	0	13	13	13	26	0	23	0	0	0	16	10	19	7	26	0	0	1
YEAR: 2015																		
ANGLE	0	2	0	0	2	0	4	0	0	0	2	0	1	1	1	1	0	0
REAR-END	0	7	5	5	12	0	12	0	0	0	8	3	9	3	12	0	0	0
TURNING MOVEMENTS	0	2	2	2	4	0	5	0	0	0	2	1	2	2	4	0	0	0
2015 TOTAL	0	11	7	7	18	0	21	0	0	0	12	4	12	6	18	0	0	0
YEAR: 2014																		
ANGLE	0	1	0	0	1	0	1	0	0	0	1	0	1	0	1	0	0	0
REAR-END	0	11	5	5	16	0	16	1	1	1	15	1	12	4	16	0	0	0
SIDESWIPE - OVERTAKING	0	0	1	1	1	0	0	0	0	0	1	0	1	0	1	0	0	0
TURNING MOVEMENTS	0	2	0	0	2	0	2	0	0	0	1	1	1	1	2	0	0	0
2014 TOTAL	0	14	6	6	20	0	19	1	1	1	18	2	15	5	20	0	0	0
YEAR: 2013																		
ANGLE	0	0	1	1	1	0	0	0	0	0	0	1	1	0	1	0	0	0
BACKING	0	1	0	0	1	0	1	0	0	0	1	0	1	0	1	0	0	0
REAR-END	0	7	3	3	10	0	14	0	0	0	8	2	9	1	10	0	0	0
2013 TOTAL	0	8	4	4	12	0	15	0	0	0	9	3	11	1	12	0	0	0
YEAR: 2012																		
ANGLE	0	1	1	1	2	0	1	0	0	0	1	1	2	0	2	0	0	0
REAR-END	0	12	2	2	14	0	14	0	0	0	6	5	10	3	14	0	0	0
SIDESWIPE - MEETING	0	0	1	1	1	0	0	0	0	0	1	0	0	1	1	0	0	0
TURNING MOVEMENTS	0	3	0	0	3	0	5	0	0	0	2	1	2	1	3	0	0	0
2012 TOTAL	0	16	4	4	20	0	20	0	0	0	10	7	14	5	20	0	0	0
FINAL TOTAL	0	62	34	34	96	0	98	1	1	1	65	26	71	24	96	0	0	1

Disclaimer: A higher number of crashes may be reported as of 2011 compared to prior years. This does not reflect an increase in annual crashes. The higher numbers result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics.

Appendix D

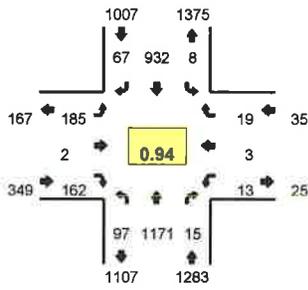


Type of peak hour being reported: Intersection Peak

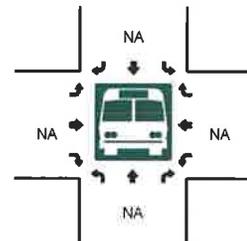
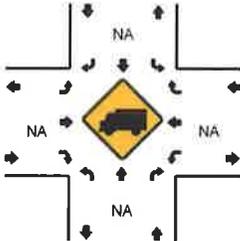
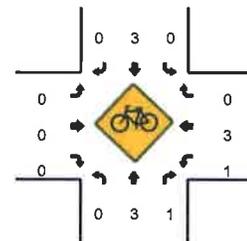
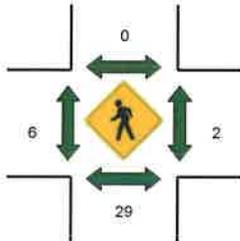
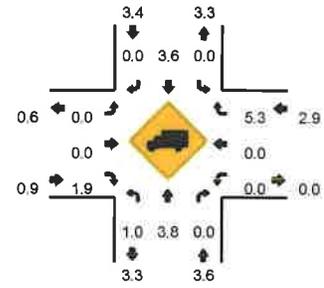
Method for determining peak hour: Total Entering Volume

LOCATION: SE 82nd Ave -- SE Lindy St
CITY/STATE: Portland, OR

QC JOB #: 14716504
DATE: Thu, May 24 2018



Peak-Hour: 4:25 PM -- 5:25 PM
Peak 15-Min: 5:10 PM -- 5:25 PM



5-Min Count Period Beginning At	SE 82nd Ave (Northbound)				SE 82nd Ave (Southbound)				SE Lindy St (Eastbound)				SE Lindy St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	8	86	2	0	0	90	6	0	11	0	11	0	0	0	0	0	214	
4:05 PM	4	95	2	0	1	69	7	0	11	0	6	0	1	0	1	0	197	
4:10 PM	9	114	0	0	0	63	6	0	13	0	8	0	1	0	2	0	216	
4:15 PM	8	87	1	0	0	69	7	0	13	0	11	0	1	0	0	0	197	
4:20 PM	6	87	0	0	3	91	1	0	4	0	13	0	1	0	1	0	207	
4:25 PM	9	114	0	0	0	74	5	0	25	0	16	0	0	0	0	0	243	
4:30 PM	4	89	1	0	0	80	5	0	13	0	9	0	1	0	2	0	204	
4:35 PM	7	93	1	0	0	86	9	0	11	0	8	0	0	0	3	0	216	
4:40 PM	11	115	0	0	0	74	4	0	20	0	9	0	3	0	1	0	237	
4:45 PM	11	80	4	0	0	69	6	0	15	0	14	0	3	0	0	0	202	
4:50 PM	3	99	0	0	0	79	6	0	20	0	11	0	0	0	0	0	218	
4:55 PM	13	95	0	0	2	73	5	0	10	0	8	0	0	0	2	0	208	2561
5:00 PM	7	108	1	0	2	82	5	0	14	0	14	0	0	0	2	0	235	2582
5:05 PM	5	79	0	0	0	70	3	0	15	1	19	0	1	2	1	0	196	2581
5:10 PM	12	93	5	0	1	82	8	0	10	0	25	0	2	1	4	0	241	2606
5:15 PM	7	106	2	0	2	72	7	0	19	0	14	0	3	0	1	0	233	2642
5:20 PM	8	100	1	0	1	91	6	0	13	1	15	0	0	0	3	0	239	2674
5:25 PM	8	85	0	0	0	95	1	0	17	0	9	0	0	1	1	0	217	2648
5:30 PM	9	95	0	0	2	72	6	0	21	0	14	0	5	0	1	0	225	2669
5:35 PM	9	99	0	0	0	62	6	0	14	0	12	0	1	0	2	0	205	2656
5:40 PM	8	88	1	1	1	56	3	0	14	0	27	0	0	0	1	0	200	2619
5:45 PM	6	86	1	0	0	101	10	0	13	0	8	0	0	1	0	0	226	2643
5:50 PM	5	92	0	0	2	78	9	0	20	0	12	0	0	0	0	0	218	2643
5:55 PM	12	111	0	0	1	77	8	0	15	0	8	0	1	0	0	0	233	2668
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	108	1196	32	0	16	980	76	0	168	4	216	0	20	4	32	0	2852	
Heavy Trucks	0	40	0	0	0	32	0	0	0	0	4	0	0	0	0	0	76	
Pedestrians	0	16	0	0	0	0	0	0	0	4	0	0	0	4	0	0	24	
Bicycles	0	0	1	0	0	1	0	0	0	0	0	0	0	2	0	0	4	
Railroad																		
Stopped Buses																		

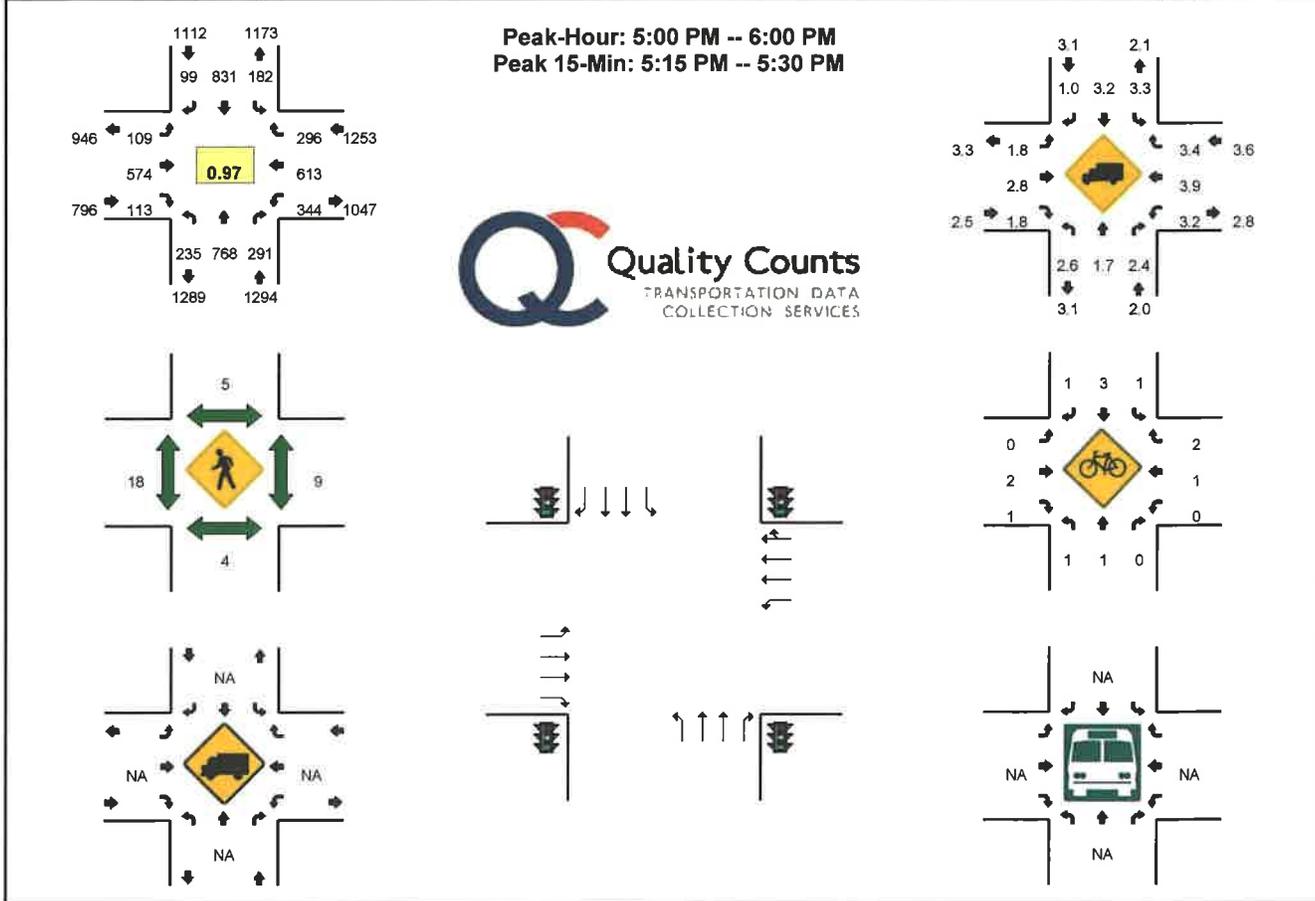
Comments:

Type of peak hour being reported: Intersection Peak

Method for determining peak hour: Total Entering Volume

LOCATION: SE 82nd Ave -- SE Johnson Creek Blvd
 CITY/STATE: Portland, OR

QC JOB #: 14716510
 DATE: Thu, May 24 2018



5-Min Count Period Beginning At	SE 82nd Ave (Northbound)				SE 82nd Ave (Southbound)				SE Johnson Creek Blvd (Eastbound)				SE Johnson Creek Blvd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	29	41	13	0	24	57	9	0	9	50	14	0	23	37	35	0	341	
4:05 PM	18	81	26	0	16	67	7	0	8	47	8	0	26	39	19	0	362	
4:10 PM	20	83	30	0	8	47	8	0	11	42	4	0	18	45	17	0	333	
4:15 PM	22	61	20	0	12	58	7	0	7	62	11	0	38	58	27	0	383	
4:20 PM	25	53	23	0	25	68	6	0	14	33	5	0	21	40	27	0	340	
4:25 PM	17	84	14	0	14	81	11	0	8	34	9	0	29	44	26	0	371	
4:30 PM	15	55	21	0	13	56	5	0	9	70	9	0	29	55	27	0	364	
4:35 PM	19	78	25	0	17	59	8	0	13	45	4	0	36	35	17	0	356	
4:40 PM	21	94	18	0	18	62	12	0	9	41	13	0	16	42	20	0	366	
4:45 PM	14	55	17	0	14	68	3	0	8	74	8	0	36	66	31	0	394	
4:50 PM	24	60	15	0	26	52	10	0	13	55	12	0	29	45	23	0	364	
4:55 PM	19	69	19	0	18	59	9	0	8	38	8	0	21	45	27	0	340	4314
5:00 PM	19	75	27	0	18	64	7	0	10	51	11	0	18	49	20	0	369	4342
5:05 PM	16	42	15	0	9	60	7	0	10	71	5	0	30	56	32	0	353	4333
5:10 PM	24	63	31	0	19	75	11	0	9	32	8	0	23	40	30	0	365	4365
5:15 PM	21	92	18	1	8	92	9	0	9	40	10	0	30	43	25	0	398	4380
5:20 PM	19	57	23	0	17	64	4	0	9	49	12	0	30	68	23	0	375	4415
5:25 PM	18	54	21	0	22	71	11	0	16	49	8	0	35	48	20	0	373	4417
5:30 PM	20	77	22	0	14	70	11	0	5	34	9	0	26	47	23	0	358	4411
5:35 PM	21	72	17	0	0	71	7	0	6	48	9	0	32	67	26	0	376	4431
5:40 PM	17	40	36	0	16	55	7	0	9	60	10	0	38	63	23	0	374	4439
5:45 PM	24	51	34	0	21	74	8	0	9	41	14	0	35	42	19	0	372	4417
5:50 PM	11	86	24	0	24	80	6	0	10	35	11	0	22	41	23	0	373	4426
5:55 PM	24	59	23	0	14	55	11	0	7	64	6	0	25	49	32	0	369	4455

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	232	812	248	4	188	908	96	0	136	552	120	0	380	636	272	0	4584
Heavy Trucks	12	20	8		8	24	4		4	16	4		12	28	12		152
Pedestrians	0	0			0	0			0	20			0	12			32
Bicycles	0	0	0		0	2	1		0	2	0		0	0	1		6
Railroad																	
Stopped Buses																	

Comments:

ATR CHARACTERISTIC TABLE (Printed: 6/18/2019)

2018 SEASONAL TRAFFIC TREND	AREA TYPE	# OF LANES	WEEKLY TRAFFIC TREND	2018 AADT	OHP CLASSIFICATION	ATR NUMBER	COUNTY	HIGHWAY ROUTE, NAME, & LOCATION	MP	STATE HWY NUMBER	K ₅₀ ¹
COM	URBANIZED	4	WEEKDAY	27600	STATEWIDE HWY	20-028	LANE	OR569, BELTLINE HIGHWAY, 0.42 MILE SOUTH OF BARGER DRIVE INTERCHANGE	5.20	69	0.096
COM	URBANIZED	4	WEEKDAY	33400	STATEWIDE HWY	26-003	MULTNOMAH	US26, MT. HOOD HIGHWAY, 0.18 MILE SOUTHEAST OF S.E. POWELL VALLEY ROAD	14.36	26	0.088
COM	URBANIZED	4	WEEKDAY	25900	STATEWIDE HWY	30-008	UMATILLA	US385, PENDLETON-JOHN DAY HIGHWAY, 0.09 MILE SOUTH OF OLD OREGON TRAIL	1.77	28	0.097
COM	URBANIZED	4	WEEKDAY	35200	STATEWIDE HWY	34-009	WASHINGTON	OR8, TUALATIN VALLEY HIGHWAY, 0.28 MILE WEST OF N.W. 334TH AVENUE	14.84	29	0.090

30 HV Using ATR Characteristic Table Method (APM V2 5.5.2)

West Beltline

ATR 20-028

OR569, BELTLINE HIGHWAY, 0.42 MILE SOUTH OF BARGER DRIVE INTERCHANGE

Year	June (Peak Month) ADT				May (Count Month) ADT				Notes:
	Volume	% of AADT	Annual Change Previous Year	2013 to 2017	Volume	% of AADT	Annual Change Previous Year	2013 to 2017	
2013	28,097	111	—		27,094	107	—		
2014	28,641	112	1.94%		27,543	108	1.66%		
2015	30,434	113	6.26%	2.69%	28,262	106	2.61%	3.02%	
2016	31,288	114	2.81%		29,968	109	6.04%		
2017	31,241	113	-0.15%		30,515	110	1.83%		

Average % of AADT **112.667** **108** High and low %s eliminated. Average % is remaining 3 years.
 Seasonal Adjustment = June / May **1.04**

Gresham

ATR 26-003

US26, MT. HOOD HIGHWAY, 0.18 MILE SOUTHEAST OF S.E. POWELL VALLEY ROAD

Year	August (Peak Month) ADT				May (Count Month) ADT				Notes:
	Volume	% of AADT	Annual Change Previous Year	2013 to 2017	Volume	% of AADT	Annual Change Previous Year	2013 to 2017	
2013	33,184	109	—		30,398	100	—		
2014	32,828	107	-1.07%		31,449	103	3.46%		
2015	33,641	105	2.48%	1.63%	32,306	101	2.73%	3.59%	
2016	35,000	106	4.04%		33,762	102	4.51%		
2017	35,407	108	1.16%		35,002	107	3.67%		

Average % of AADT **107** **102** High and low %s eliminated. Average % is remaining 3 years.
 Seasonal Adjustment = August / June **1.05**

S. Pendleton

ATR 30-008

US395, PENDLETON-JOHN DAY HIGHWAY, 0.09 MILE SOUTH OF OLD OREGON TRAIL

Year	June (Peak Month) ADT				May (Count Month) ADT				Notes:
	Volume	% of AADT	Annual Change Previous Year	2013 to 2017	Volume	% of AADT	Annual Change Previous Year	2013 to 2017	
2013	25,965	115	—		24,500	108	—		
2014	26,765	114	3.08%		26,209	112	6.98%		
2015	27,424	114	2.46%	2.38%	26,918	112	2.71%	3.89%	
2016	28,000	114	2.10%		27,600	112	2.53%		
2017	28,530	112	1.89%		28,536	112	3.39%		

Average % of AADT **114** **112** High and low %s eliminated. Average % is remaining 3 years.
 Seasonal Adjustment = August / June **1.02**

Cornelius

ATR 34-009

OR8, TUALATIN VALLEY HIGHWAY, 0.28 MILE WEST OF N.W. 334TH AVENUE

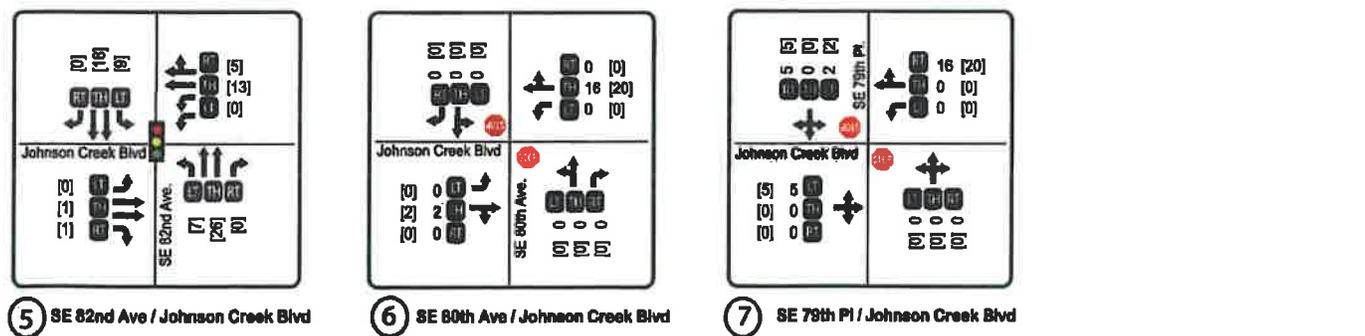
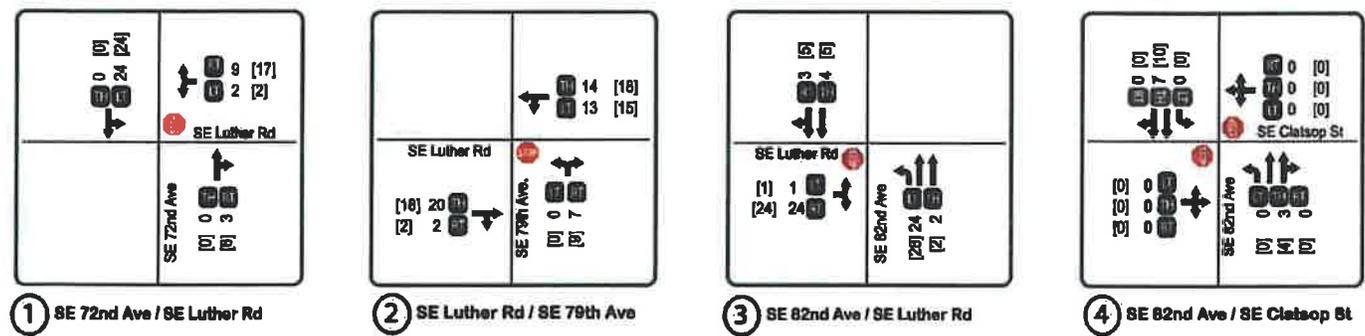
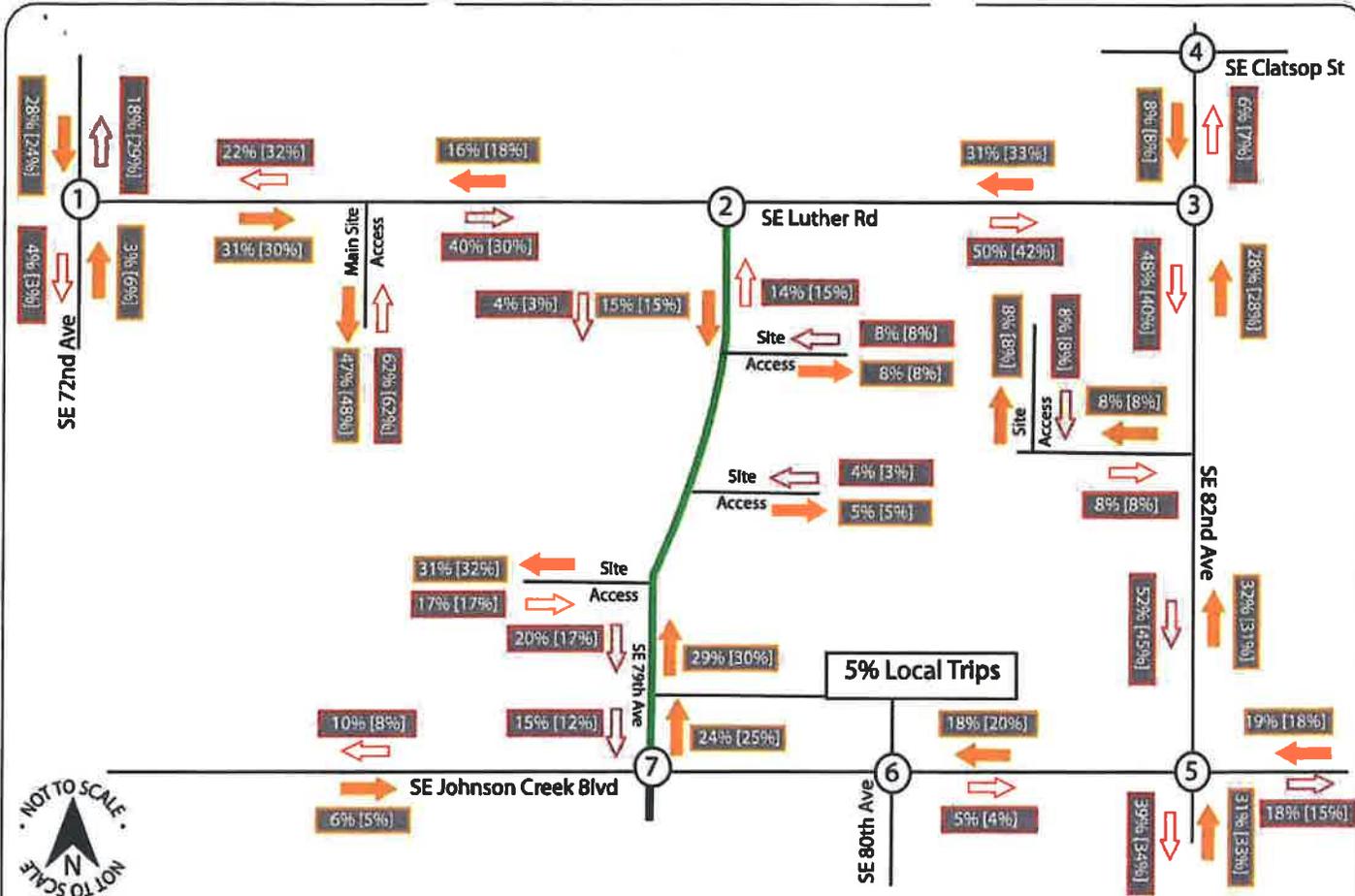
Year	June (Peak Month) ADT				May (Count Month) ADT				Notes:
	Volume	% of AADT	Annual Change Previous Year	2013 to 2017	Volume	% of AADT	Annual Change Previous Year	2013 to 2017	
2013	35,192	107	—		34,549	105	—		
2014	33,934	105	-3.57%		33,609	104	-2.72%		
2015	35,430	104	4.41%	1.70%	35,006	103	4.16%	2.00%	
2016	37,066	106	4.62%		37,042	106	5.82%		
2017	37,651	107	1.58%		37,392	106	0.94%		

Average % of AADT **106** **105** High and low %s eliminated. Average % is remaining 3 years.
 Seasonal Adjustment = August / June **1.01**

Average Seasonal Adjustment - All ATRs **1.03**

Appendix E





- = Vehicles Exiting Site
- = Vehicles Entering Site
- = Proposed New Road Segment
- = Lane Configuration
- = Left / Through / Right
- = Intersection

Figure 4:
Trip Distribution and Assignment
 SE Luther Rd Multi-Family Mixed Used Development

Appendix F



HCM Signalized Intersection Capacity Analysis

1: SE 82nd Avenue & SE Lindy Street

07/29/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	2	186	13	5	16	101	1200	11	12	985	73
Future Volume (vph)	195	2	186	13	5	16	101	1200	11	12	985	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.85			0.94		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1586			1712		1770	3535		1770	3503	
Flt Permitted	0.73	1.00			0.88		0.19	1.00		0.19	1.00	
Satd. Flow (perm)	1369	1586			1538		348	3535		347	3503	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	201	2	192	13	5	16	104	1237	11	12	1015	75
RTOR Reduction (vph)	0	125	0	0	13	0	0	0	0	0	5	0
Lane Group Flow (vph)	201	69	0	0	21	0	104	1248	0	12	1085	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	17.9	17.9			17.9		64.1	59.0		55.4	54.3	
Effective Green, g (s)	17.9	17.9			17.9		64.1	59.0		55.4	54.3	
Actuated g/C Ratio	0.20	0.20			0.20		0.71	0.66		0.62	0.60	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.5	2.5			2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	272	315			305		339	2317		230	2113	
v/s Ratio Prot		0.04					c0.02	c0.35		0.00	0.31	
v/s Ratio Perm	c0.15				0.01		0.20			0.03		
v/c Ratio	0.74	0.22			0.07		0.31	0.54		0.05	0.51	
Uniform Delay, d1	33.9	30.2			29.3		5.9	8.3		7.2	10.3	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.5	0.3			0.1		0.4	0.9		0.1	0.9	
Delay (s)	43.4	30.5			29.4		6.3	9.2		7.2	11.2	
Level of Service	D	C			C		A	A		A	B	
Approach Delay (s)		37.0			29.4			8.9			11.1	
Approach LOS		D			C			A			B	

Intersection Summary

HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: SE 82nd Avenue & SE Johnson Creek Boulevard

07/29/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Traffic Volume (vph)	114	603	118	361	644	311	246	807	306	191	873	104
Future Volume (vph)	114	603	118	361	644	311	246	807	306	191	873	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	3433	3366		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	3433	3366		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	118	622	122	372	664	321	254	832	315	197	900	107
RTOR Reduction (vph)	0	0	98	0	50	0	0	0	206	0	0	73
Lane Group Flow (vph)	118	622	24	372	935	0	254	832	109	197	900	34
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8						6			2
Actuated Green, G (s)	10.6	23.6	23.6	22.9	35.9		19.7	41.6	41.6	15.9	37.8	37.8
Effective Green, g (s)	10.6	23.6	23.6	22.9	35.9		19.7	41.6	41.6	15.9	37.8	37.8
Actuated g/C Ratio	0.09	0.20	0.20	0.19	0.30		0.16	0.35	0.35	0.13	0.31	0.31
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	156	696	311	655	1006		290	1226	548	234	1114	498
v/s Ratio Prot	c0.07	0.18		0.11	c0.28		c0.14	c0.24		0.11	c0.25	
v/s Ratio Perm			0.02						0.07			0.02
v/c Ratio	0.76	0.89	0.08	0.57	0.93		0.88	0.68	0.20	0.84	0.81	0.07
Uniform Delay, d1	53.4	47.0	39.3	44.1	40.8		49.0	33.5	27.5	50.8	37.8	28.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	17.9	13.9	0.1	0.9	14.2		24.1	3.0	0.8	22.7	6.3	0.3
Delay (s)	71.3	60.8	39.4	45.0	55.1		73.0	36.5	28.3	73.5	44.1	29.0
Level of Service	E	E	D	D	E		E	D	C	E	D	C
Approach Delay (s)		59.2			52.3			41.3			47.6	
Approach LOS		E			D			D			D	

Intersection Summary

HCM 2000 Control Delay	49.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	85.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

4:

07/29/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Future Volume (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)												
Lane Util. Factor												
Fr _t												
Fl _t Protected												
Satd. Flow (prot)												
Fl _t Permitted												
Satd. Flow (perm)												
Peak-hour factor, PHF	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Adj. Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Turn Type												
Protected Phases												
Permitted Phases												
Actuated Green, G (s)												
Effective Green, g (s)												
Actuated g/C Ratio												
Clearance Time (s)												
Lane Grp Cap (vph)												
v/s Ratio Prot												
v/s Ratio Perm												
v/c Ratio												
Uniform Delay, d ₁												
Progression Factor												
Incremental Delay, d ₂												
Delay (s)												
Level of Service												
Approach Delay (s)		0.0			0.0			0.0			0.0	
Approach LOS		A			A			A			A	
Intersection Summary												
HCM 2000 Control Delay			0.0									
HCM 2000 Volume to Capacity ratio			0.00									
Actuated Cycle Length (s)			3.0								0.0	
Intersection Capacity Utilization			0.0%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

1: SE 82nd Avenue & SE Lindy Street

07/29/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↕		↖	↗		↖	↗	
Traffic Volume (vph)	199	2	190	13	5	16	103	1255	11	12	1032	74
Future Volume (vph)	199	2	190	13	5	16	103	1255	11	12	1032	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Fr _t	1.00	0.85			0.94		1.00	1.00		1.00	0.99	
Fl _t Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1586			1712		1770	3535		1770	3504	
Fl _t Permitted	0.73	1.00			0.88		0.14	1.00		0.15	1.00	
Satd. Flow (perm)	1369	1586			1539		252	3535		287	3504	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	205	2	196	13	5	16	106	1294	11	12	1064	76
RTOR Reduction (vph)	0	115	0	0	12	0	0	0	0	0	6	0
Lane Group Flow (vph)	205	83	0	0	22	0	106	1305	0	12	1134	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	14.4	14.4			14.4		39.1	34.6		30.7	30.2	
Effective Green, g (s)	14.4	14.4			14.4		39.1	34.6		30.7	30.2	
Actuated g/C Ratio	0.23	0.23			0.23		0.64	0.56		0.50	0.49	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.5	2.5			2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	320	371			360		281	1988		155	1720	
v/s Ratio Prot		0.05					c0.03	c0.37		0.00	0.32	
v/s Ratio Perm	c0.15				0.01		0.21			0.04		
v/c Ratio	0.64	0.22			0.06		0.38	0.66		0.08	0.66	
Uniform Delay, d ₁	21.2	19.0			18.3		6.9	9.3		8.3	11.8	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d ₂	3.8	0.2			0.1		0.6	0.7		0.2	0.8	
Delay (s)	25.1	19.3			18.3		7.5	10.0		8.5	12.6	
Level of Service	C	B			B		A	B		A	B	
Approach Delay (s)		22.2			18.3			9.8			12.6	
Approach LOS		C			B			A			B	

Intersection Summary

HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	61.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: SE 82nd Avenue & SE Johnson Creek Boulevard

07/29/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	616	121	368	670	322	258	849	312	204	908	106
Future Volume (vph)	116	616	121	368	670	322	258	849	312	204	908	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Fr't	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	3433	3367		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	3433	3367		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	120	635	125	379	691	332	266	875	322	210	936	109
RTOR Reduction (vph)	0	0	98	0	48	0	0	0	192	0	0	77
Lane Group Flow (vph)	120	635	27	379	975	0	266	875	130	210	936	32
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8						6			2
Actuated Green, G (s)	9.7	24.3	24.3	20.5	35.1		19.7	37.1	37.1	16.1	33.5	33.5
Effective Green, g (s)	9.7	24.3	24.3	20.5	35.1		19.7	37.1	37.1	16.1	33.5	33.5
Actuated g/C Ratio	0.09	0.21	0.21	0.18	0.31		0.17	0.33	0.33	0.14	0.29	0.29
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	150	754	337	617	1036		305	1151	515	249	1039	465
v/s Ratio Prot	c0.07	0.18		0.11	c0.29		c0.15	c0.25		0.12	c0.26	
v/s Ratio Perm			0.02						0.08			0.02
v/c Ratio	0.80	0.84	0.08	0.61	0.94		0.87	0.76	0.25	0.84	0.90	0.07
Uniform Delay, d1	51.2	43.0	35.9	43.1	38.4		45.9	34.5	28.3	47.7	38.7	29.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	24.8	8.3	0.1	1.6	15.8		22.7	2.9	0.2	21.8	10.7	0.0
Delay (s)	76.0	51.4	36.0	44.7	54.2		68.6	37.3	28.5	69.5	49.3	29.1
Level of Service	E	D	D	D	D		E	D	C	E	D	C
Approach Delay (s)		52.5			51.6			41.1			50.9	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay			48.5	HCM 2000 Level of Service				D				
HCM 2000 Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			114.0	Sum of lost time (s)				16.0				
Intersection Capacity Utilization			88.0%	ICU Level of Service				E				
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
 1: SE 82nd Avenue & SE Lindy Street

07/29/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗			↕		↖	↗		↖	↗	
Traffic Volume (vph)	199	3	190	29	6	38	103	1249	33	28	1028	74
Future Volume (vph)	199	3	190	29	6	38	103	1249	33	28	1028	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Flt	1.00	0.85			0.93		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1588			1698		1770	3526		1770	3504	
Flt Permitted	0.80	1.00			0.85		0.14	1.00		0.14	1.00	
Satd. Flow (perm)	1489	1588			1466		253	3526		260	3504	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	205	3	196	30	6	39	106	1288	34	29	1060	76
RTOR Reduction (vph)	0	114	0	0	30	0	0	2	0	0	6	0
Lane Group Flow (vph)	205	85	0	0	45	0	106	1320	0	29	1130	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4			6			2		
Actuated Green, G (s)	14.6	14.6			14.6		38.5	33.6		31.1	29.9	
Effective Green, g (s)	14.6	14.6			14.6		38.5	33.6		31.1	29.9	
Actuated g/C Ratio	0.24	0.24			0.24		0.63	0.55		0.51	0.49	
Clearance Time (s)	4.0	4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	2.5	2.5			2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	354	377			348		279	1929		161	1706	
v/s Ratio Prot		0.05					c0.03	c0.37		0.00	0.32	
v/s Ratio Perm	c0.14				0.03		0.21			0.09		
v/c Ratio	0.58	0.22			0.13		0.38	0.68		0.18	0.66	
Uniform Delay, d1	20.7	18.8			18.4		7.0	10.1		8.4	11.9	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	0.2			0.1		0.6	0.9		0.4	0.9	
Delay (s)	22.6	19.1			18.5		7.7	11.0		8.8	12.8	
Level of Service	C	B			B		A	B		A	B	
Approach Delay (s)		20.8			18.5			10.7			12.7	
Approach LOS		C			B			B			B	

Intersection Summary

HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	61.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

2: SE 82nd Avenue & SE Johnson Creek Boulevard

07/29/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	117	616	121	368	670	327	258	859	312	205	918	107
Future Volume (vph)	117	616	121	368	670	327	258	859	312	205	918	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	3433	3365		1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	3433	3365		1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	121	635	125	379	691	337	266	886	322	211	946	110
RTOR Reduction (vph)	0	0	99	0	49	0	0	0	196	0	0	77
Lane Group Flow (vph)	121	635	26	379	979	0	266	886	126	211	946	33
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8						6			2
Actuated Green, G (s)	9.1	23.9	23.9	20.3	35.1		19.2	36.8	36.8	16.4	34.0	34.0
Effective Green, g (s)	9.1	23.9	23.9	20.3	35.1		19.2	36.8	36.8	16.4	34.0	34.0
Actuated g/C Ratio	0.08	0.21	0.21	0.18	0.31		0.17	0.32	0.32	0.14	0.30	0.30
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.5	2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	142	745	333	614	1041		299	1148	513	255	1061	474
v/s Ratio Prot	c0.07	0.18		0.11	c0.29		c0.15	c0.25		0.12	c0.27	
v/s Ratio Perm			0.02						0.08			0.02
v/c Ratio	0.85	0.85	0.08	0.62	0.94		0.89	0.77	0.25	0.83	0.89	0.07
Uniform Delay, d1	51.5	43.1	35.9	43.0	38.1		46.1	34.5	28.1	47.1	37.9	28.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.7	9.2	0.1	1.6	15.6		25.7	3.1	0.2	18.9	9.6	0.0
Delay (s)	87.2	52.2	36.0	44.5	53.7		71.8	37.7	28.3	66.1	47.5	28.4
Level of Service	F	D	D	D	D		E	D	C	E	D	C
Approach Delay (s)		54.7			51.3			41.8			49.0	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	48.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	113.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	88.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Appendix G



Queuing and Blocking Report
Baseline

07/29/2019

Intersection: 1: SE 82nd Avenue & SE Lindy Street

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	170	158	60	136	154	156	78	214	211
Average Queue (ft)	95	64	22	75	131	114	13	167	118
95th Queue (ft)	162	118	55	146	159	168	57	230	207
Link Distance (ft)	158	158	429						
Upstream Blk Time (%)	1	0							
Queuing Penalty (veh)	0	0							
Storage Bay Dist (ft)				100			100		
Storage Blk Time (%)				1	17			19	
Queuing Penalty (veh)				3	17			2	

Intersection: 2: SE 82nd Avenue & SE Johnson Creek Boulevard

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	TR	L	T	T	R
Maximum Queue (ft)	250	416	403	70	238	300	741	766	411	544	444	134
Average Queue (ft)	130	260	222	5	140	240	406	447	261	310	254	4
95th Queue (ft)	259	382	343	71	236	353	693	704	412	479	372	44
Link Distance (ft)		818	818				914	914		676	676	
Upstream Blk Time (%)							1	1		0		
Queuing Penalty (veh)							0	0		0		
Storage Bay Dist (ft)	150			250	200	200			350			350
Storage Blk Time (%)	7	37	3		0	5	33		6	3	1	
Queuing Penalty (veh)	22	42	3		1	15	118		24	6	2	

Intersection: 2: SE 82nd Avenue & SE Johnson Creek Boulevard

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	111	106	124	101
Average Queue (ft)	96	101	101	30
95th Queue (ft)	113	106	115	85
Link Distance (ft)				
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)	150			160
Storage Blk Time (%)			0	
Queuing Penalty (veh)			0	

Zone Summary

Zone wide Queuing Penalty: 257

Queuing and Blocking Report
Baseline

07/29/2019

Intersection: 1: SE 82nd Avenue & SE Lindy Street

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	179	152	60	140	171	164	136	204	206
Average Queue (ft)	100	65	27	76	134	114	14	175	130
95th Queue (ft)	165	121	60	146	157	173	71	228	221
Link Distance (ft)	158	158	429						
Upstream Blk Time (%)	2	0							
Queuing Penalty (veh)	0	0							
Storage Bay Dist (ft)				100			100		
Storage Blk Time (%)				1	19		0	19	
Queuing Penalty (veh)				9	20		0	2	

Intersection: 2: SE 82nd Avenue & SE Johnson Creek Boulevard

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	TR	L	T	T	R
Maximum Queue (ft)	250	485	445	208	249	300	841	861	448	641	602	212
Average Queue (ft)	168	304	259	10	141	260	534	551	326	402	332	11
95th Queue (ft)	297	486	438	103	243	364	896	872	505	688	605	110
Link Distance (ft)		818	818				914	914		676	676	
Upstream Blk Time (%)							2	2		6	0	
Queuing Penalty (veh)							0	0		0	0	
Storage Bay Dist (ft)	150			250	200	200			350			350
Storage Blk Time (%)	25	39	6		1	6	44		26	2	1	
Queuing Penalty (veh)	78	46	8		4	19	160		110	5	2	

Intersection: 2: SE 82nd Avenue & SE Johnson Creek Boulevard

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	120	115	118	100
Average Queue (ft)	99	102	102	32
95th Queue (ft)	114	108	114	84
Link Distance (ft)				
Upstream Blk Time (%)	0		0	
Queuing Penalty (veh)	0		0	
Storage Bay Dist (ft)	150			160
Storage Blk Time (%)	0	0	0	
Queuing Penalty (veh)	2	0	0	

Zone Summary

Zone wide Queuing Penalty: 465

Queuing and Blocking Report
Baseline

07/29/2019

Intersection: 1: SE 82nd Avenue & SE Lindy Street

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LTR	L	T	TR	L	T	TR
Maximum Queue (ft)	185	179	93	139	163	145	197	211	200
Average Queue (ft)	99	68	46	78	135	125	41	176	131
95th Queue (ft)	169	129	83	149	158	159	141	233	218
Link Distance (ft)	158	158	429						
Upstream Blk Time (%)	3	1							
Queuing Penalty (veh)	0	0							
Storage Bay Dist (ft)				100			100		
Storage Blk Time (%)				1	20		0	20	
Queuing Penalty (veh)				4	21		0	6	

Intersection: 2: SE 82nd Avenue & SE Johnson Creek Boulevard

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	TR	L	T	T	R
Maximum Queue (ft)	250	441	413	162	250	300	936	912	431	582	546	216
Average Queue (ft)	171	263	219	6	161	262	540	552	326	382	312	18
95th Queue (ft)	277	391	344	74	255	361	881	852	494	650	568	124
Link Distance (ft)		818	818				914	914		676	676	
Upstream Blk Time (%)							3	1		8	0	
Queuing Penalty (veh)							0	0		0	0	
Storage Bay Dist (ft)	150			250	200	200			350			350
Storage Blk Time (%)	22	38	4		2	9	43		23	2	1	
Queuing Penalty (veh)	69	44	5		5	29	157		97	5	5	

Intersection: 2: SE 82nd Avenue & SE Johnson Creek Boulevard

Movement	SB	SB	SB	SB
Directions Served	L	T	T	R
Maximum Queue (ft)	135	112	110	97
Average Queue (ft)	101	101	101	31
95th Queue (ft)	116	106	108	78
Link Distance (ft)				
Upstream Blk Time (%)	0			
Queuing Penalty (veh)	0			
Storage Bay Dist (ft)	150			160
Storage Blk Time (%)	1			
Queuing Penalty (veh)	4			

Zone Summary

Zone wide Queuing Penalty: 450



SEC
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12805 S.E. Foster Road
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STORMWATER REPORT
for
WASHMAN, LLC
PORTLAND OREGON

August, 2019

Prepared For:
Washman, LLC
PO Box 4124
Portland OR 97208

Site Location:
8864 SE 82ND AVE
Happy Valley, OR 97086



RENEWS 6/30/20

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0.0 PROJECT INFORMATION

0.1 OWNER/LESSOR:

Frank Rogers
Rogers Land Co. LLC
4933 Azalea Dr.
Grants Pass, OR 97526
541.441.1220

0.2 LESSEE/OPERATOR:

Washman, LLC
PO Box 4124
Portland OR 97208

0.3 REVIEWING AGENCY:

Clackamas County
Water Environment Services
150 Beaver Creek Rd.
Oregon City, OR 97045
503.742.4567

0.4 PROJECT ENGINEER:

Dan Symons, P.E.
Symons Engineering Consultants
12805 SE Foster Rd
Portland, OR 97236
503.760.1353

1.0 PROJECT OVERVIEW AND DESCRIPTION

The intent of this report is to demonstrate stormwater design for collection, water quality treatment, detention, and conveyance for this project and to comply with the goals of Clackamas County Service District #1 Stormwater Standards.

1.1 PROJECT DESCRIPTION

Proposed is a 34'-6"x180' drive-through car wash with 27 total vacuum stalls on the parcels with the following tax lot numbers 12E28BB; 12600, 12700, 13300, and 13400.

The development includes:

- removal of (5) existing buildings on-site
- removal of existing driveways along SE 82nd Ave
- frontage improvements, as required, along SE 82nd Ave in the ODOT ROW
- frontage improvements, as required, along SE Lindy and SE Cornwell with WES-maintained stormwater runoff facilities (infiltration swales)
- on-site operator-maintained stormwater runoff treatment facilities (vegetated infiltration planters)
- all additional landscaping improvements in compliance with zoning code

1.2 EXISTING CONDITIONS

This site consists of approximately 1.47 acres of a reasonably flat lot with a strip of vegetation running north to south on the east edge of the property, three small office and storage buildings in the center of the site, and an existing residence with detached garage at the SE corner of the project.

Mostly flat and asphalt covered, the site does not currently provide any surface water treatment or reflect any useful information on historical flows. On-site paving, curbing, and the lack of any other stormwater treatment systems simply concentrate overland flows to the ODOT ROW on SE 82nd Ave.

2.0 METHODOLOGY

First, the site was evaluated as separate basins where flows were able to be collected and treated to design standards.

Second, the separate basins of the site were modeled to indicate the treatment requirements for retention, water quality treatment, and flow control.

These facilities were sized to the largest amount practicable given site design constraints.

Two types of facilities were recommended:

- a series of vegetated infiltration planters to control for the impervious surfaces of the private, post-development, on-site conditions
- two separate stormwater infiltration swales to control for impervious surfaces in the public, post-development, off-site conditions.

Finally, HydroCAD models were evaluated to determine for the minimum sized facility required for the design criteria of handling all runoff from the 25-year, 24-hour stormwater event. This allowed us to confirm the design exceeded these requirements.

2.1 DRAINAGE AND CONVEYANCE

Fortunately, the site retains reasonably high sub-surface infiltration rates. Runoff from historic conditions on the site would be infiltrated for all but the very largest storms. Similarly, the designed stormwater facilities will infiltrate all but the largest storms as proposed.

2.2 INFILTRATION TESTING RESULTS

Infiltration testing performed on the site confirmed adequate infiltration for our design purposes (see Appendix D). Onsite infiltration from stormwater facilities will be limited only by the infiltration rates of the media placed in the stormwater management facilities. Direct infiltration to deeper subsurface layers at a higher infiltration rate may be available once surface runoff is pre-treated for water quality in the proposed stormwater facilities.

2.3 PROPOSED STORMWATER SYSTEMS

2.3.1 ON-SITE

Vegetated infiltration planters located on-site collect all pavement runoff for water quality treatment and disposal. Runoff from roofs is collected and added to these same vegetated infiltration planters.

The planters are sized to provide on-site infiltration, water quality treatment, and flow control through the 25-yr design storm. Runoff remains onsite through the 100-YR design storm.

Flows in excess of the onsite storage and infiltration rates for Basins A1, A2, and A3 overflow via the sidewalk to the catchments along SE 82nd. Overflow from Basin B results in curb directed street flow to SE Cornwell.

2.3.2 CLACKAMAS COUNTY ROW

Frontage improvements add impervious area to SE Lindy and SE Cornwell.

Stormwater infiltration swales are planned for the Clackamas County ROW. These swales provide treatment for both the existing and the added impervious areas and will intercept and treat flows previously directed to SE 82nd Ave. These swales are designed to contain and infiltrate all runoff through to a 25-year design storm.

Existing conditions of the site transport the runoff from 3,019 sq ft of Lindy frontage into the ODOT ROW at SE 82nd Ave. An impervious area of 1,013 sq ft will be created by additional Lindy frontage improvements planned for in our development. The runoff volumes created by these impervious surfaces will be treated and then infiltrated by the designed swale.

Existing conditions of the site transport the runoff from 1285 sq ft of Cornwell into the ODOT ROW at SE 82nd Ave. An impervious area of 475 sq ft will be created by additional Lindy frontage improvements planned for in our development. The runoff volumes created by these impervious surfaces will be treated and then infiltrated by the designed swale.

2.3.3 ODOT ROW

Frontage improvements add impervious area to SE 82nd Ave.

The WES approved infiltration swales located in the Clackamas County ROW will intercept, treat, and dispose of flows previously headed to the catch basins along SE 82nd Ave. Water quality treatment and flow control is provided for this runoff in the Clackamas County ROW to mitigate for the additional impervious areas added directly to the ODOT ROW.

New or redeveloped impervious surfaces caused by the frontage improvements along SE 82nd Ave add 1791 sq ft (near Lindy) and 177 sq ft (near Cornwell). The total impervious surface area directed to the ODOT ROW is reduced by 2,336 sq ft.

WES/Lindy flow to ODOT/82nd:

Current Impervious	3019 sq ft
Post-Dev Impervious	1791 sq ft

WES/Cornwell flow to ODOT/82nd:

Current Impervious	1285 sq ft
Post-Dev Impervious	177 sq ft

WES to ODOT Impervious Surface Area Reduction:

2336 sq ft

Storm laterals on SE 82nd Ave. are to be extended to newly positioned inlet control basins at the northwest and southwest corners of the project area.

3.0 ANALYSIS

3.1 DESIGN ASSUMPTIONS

Flow control is required to be provided at the following levels:

- Complete infiltration of the first half-inch of rainfall as minimum onsite retention
- Water quality treatment for surface runoff in contact with paved surfaces
- 2-year post-development runoff restricted to ½ the 2-year pre-development rate
- 25-year post-development runoff restricted to the 25-year pre-development rate
- Conveyance of the 100-year design storm

24-Hour Precipitation for Recurrence Intervals from CCSD #1 Stormwater – CH. 5

Recurrence Interval (years)	24-hour rainfall (inches)
Infiltration	0.5
Water Quality Event	1.0
2	2.6
25	4.0
100	4.8

Constraints: Hydrologic Soil Group: B with the water table depths of 6' or deeper.

3.2 HYDROCAD RESULTS

Assuming a historical ideal of a mix of woods and grasses in good condition, over Hydrologic B soils, and using a curve number of 58 the total site runoff - the 2-year and 25-year design storm are modeled with runoffs of 0.020 cfs and 0.071 cfs, respectively. (Appendix B – Onsite Historical)

The flow control requirements of the proposed stormwater facilities are met as there is no post-development runoff given through the 25-year design storm.

The historic and post-development comparison:

	Historic Runoff		Post-Developed Runoff				
	Onsite	Basin A1	Basin A2	Basin A3	Basin B	Swale 1	Swale 2
2-Year	0.02	0.044	0.024	0	0	0	0
25-Year	0.071	0.051	0.045	0	0	0	0
100-Year	0.207	0.057	0.052	0	0	0	0

Runoff from from Basin A1 drains as secondary flow to Basin A2 where it is treated and then discarded through infiltration. No other on-site basins show any overflow through the 100-yr design storm.

Swale 1 and 2 do not show any overflow for the 100-Year design storm. However, if runoff should exceed the capacity of these infiltration planters and swales, then overflow is directed by grade and curbing to the catch basins on SE 82nd Ave.

3.3 WES-BMP SIZING TOOL (FOR INFORMATION ONLY)

The WES BMP Sizing Tool was used to confirm the sizing for the vegetated infiltration planters located on-site and for the swales in the Clackamas County ROW for comparison purposes. These swales are sized to treat existing impervious surfaces, new impervious surfaces caused by development of the property, and to intercept surface water flows before they reach the ODOT ROW. These facilities were oversized, by design, to treat more than just the proposed post-development condition in mitigation for the impervious area added to the ODOT ROW.

3.4 DOWNSTREAM ANALYSIS

On-site stormwater facilities are sized to provide on-site water quality treatment and flow control through the 25-yr design storm. By meeting this standard, a downstream analysis is not required. (Design Review Pre-Application Conference - 5/8/2019)

4.0 ENGINEERING CONCLUSIONS

4.1 RETENTION

Much of the site is already paved or otherwise impervious. With development, the stormwater management facilities and landscaping provided will connect surface flows the subsurface strata and provide for higher rates of infiltration. Infiltration rates used for the design of the stormwater facilities were limited to 2.0 inches/hour as this reflects the movement through the planted media in the stormwater facilities. Subsurface infiltration to native fill was measured at a greater rate.

4.2 WATER QUALITY

Water quality treatment is accomplished first by attenuation, particulate settlement in still basins, and then filtration through the variety of vegetation and planting media available and required in Appendix A of CCSD #1 Stormwater Standards. Onsite infiltration is available to the remaining runoff once water quality treatment has been provided.

4.3 FLOW CONTROL

Flow Control is accomplished by:

- 1) collecting flows into their appropriately sized stormwater facilities with careful grading for overland flow and well-considered piped connections for disconnected stormwater basins,
- 2) providing a stormwater facility for surface water retention while water quality is controlled for in the vegetated planting media, and
- 3) infiltration removes the treated water from the facility and prevents offsite flow.

The system uses the curbing and grading of frontage improvements to convey any overflow from the stormwater swales in the Clackamas County ROW to the ODOT stormwater catch inlets on SE 82nd Ave.

4.4 FACILITY MAINTENANCE

Vegetated infiltration planters located on site will be maintained by the property owner. Stormwater swales in the Clackamas County Public ROW will be maintained by WES.

See Appendix E for the Private O&M Plan.

4.5 DOWNSTREAM CAPACITY / CONVEYANCE

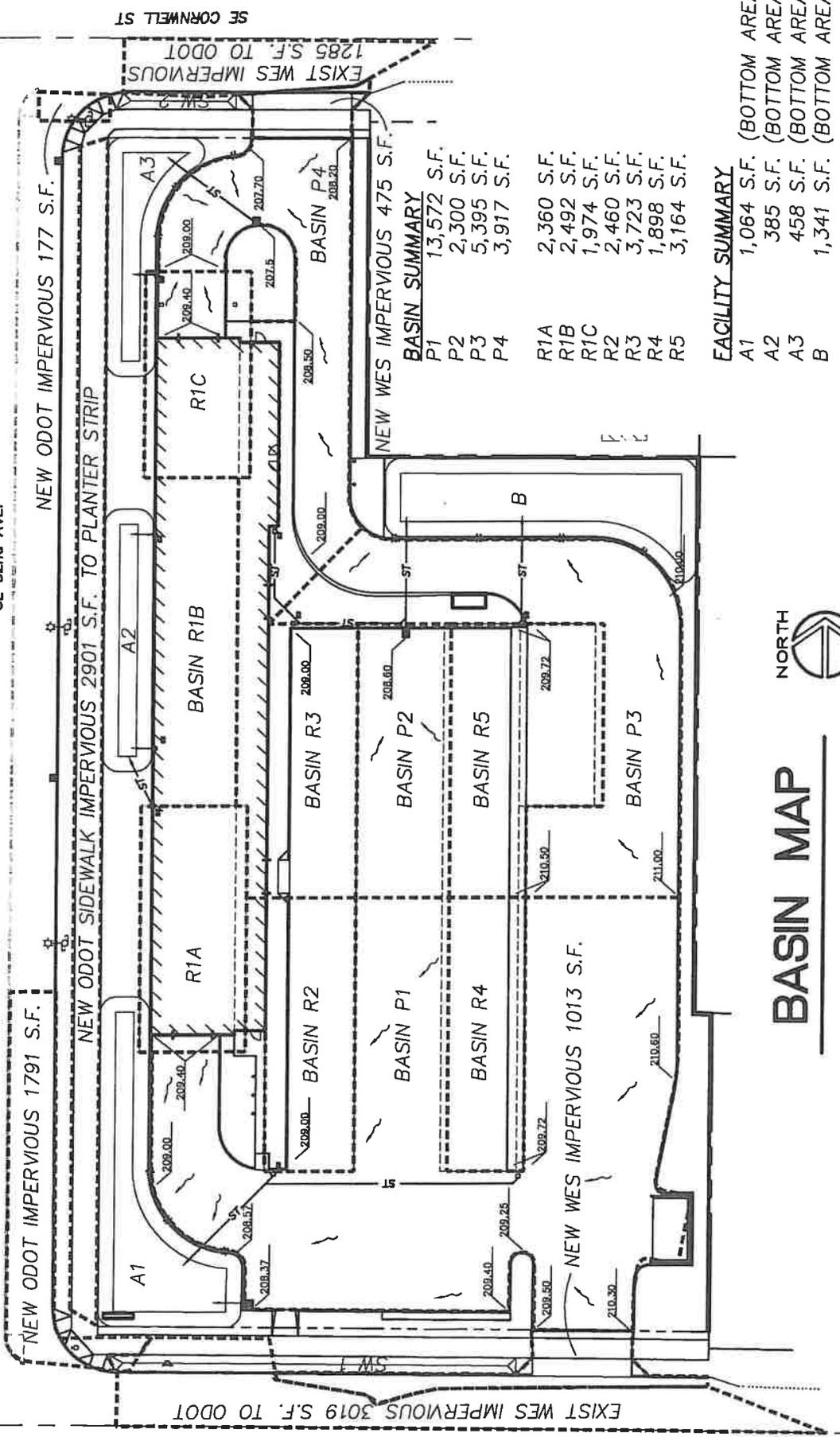
Adverse effects to the downstream capacity of the system are not anticipated. Stormwater runoff volumes are reduced by the overall reduction of impervious surfaces upstream. Existing conditions show the site is currently 78% impervious and will be only 66% impervious post-development.

	Total Site Area	Impervious – Exist Cond	Impervious - Post Dev
(sq ft)	64033	49933	42147
% Impervious		77.98%	65.82%

APPENDIX A

BASIN MAP

SE 82nd AVE.



NEW ODOT IMPERVIOUS 1791 S.F.
 NEW ODOT SIDEWALK IMPERVIOUS 2901 S.F. TO PLANTER STRIP
 NEW ODOT IMPERVIOUS 177 S.F.

EXIST WES IMPERVIOUS 3019 S.F. TO ODOT
 SE LINDY ST

EXIST WES IMPERVIOUS 1285 S.F. TO ODOT
 SE CORNWELL ST

NEW WES IMPERVIOUS 475 S.F.

BASIN SUMMARY

P1	13,572 S.F.
P2	2,300 S.F.
P3	5,395 S.F.
P4	3,917 S.F.

R1A	2,360 S.F.
R1B	2,492 S.F.
R1C	1,974 S.F.
R2	2,460 S.F.
R3	3,723 S.F.
R4	1,898 S.F.
R5	3,164 S.F.

FACILITY SUMMARY

A1	1,064 S.F. (BOTTOM AREA)
A2	385 S.F. (BOTTOM AREA)
A3	458 S.F. (BOTTOM AREA)
B	1,341 S.F. (BOTTOM AREA)

SW1	595 S.F. (OFFSITE)
SW2	172 S.F. (OFFSITE)



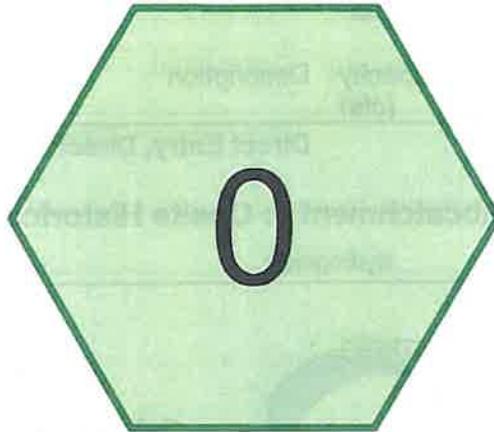
BASIN MAP

OFFSITE SUMMARY

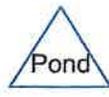
EXISTING WES AREA DRAINING TO ODOT: 3109+1285 = 4,304 S.F.
 (MITIGATES NEW ODOT IMPERVIOUS AREA)
 NEW ODOT IMPERVIOUS AREA: 1791+177 = 1,968 S.F.
 S.E. LINDY NEW & MITIGATION AREAS TO SW1: 3019+1013 = 4,032 S.F.
 S.E. CORNWELL NEW & MITIGATION AREAS TO SW2: 1285+475 = 1,760 S.F.
 (NOTE: ALL NEW SIDEWALKS ASSUMED TO DRAIN TO PLANTER STRIP)

APPENDIX B

HydroCAD Output



Onsite Historical



Summary for Subcatchment 0: Onsite Historical

Runoff = 0.020 cfs @ 19.85 hrs, Volume= 0.019 af, Depth= 0.16"

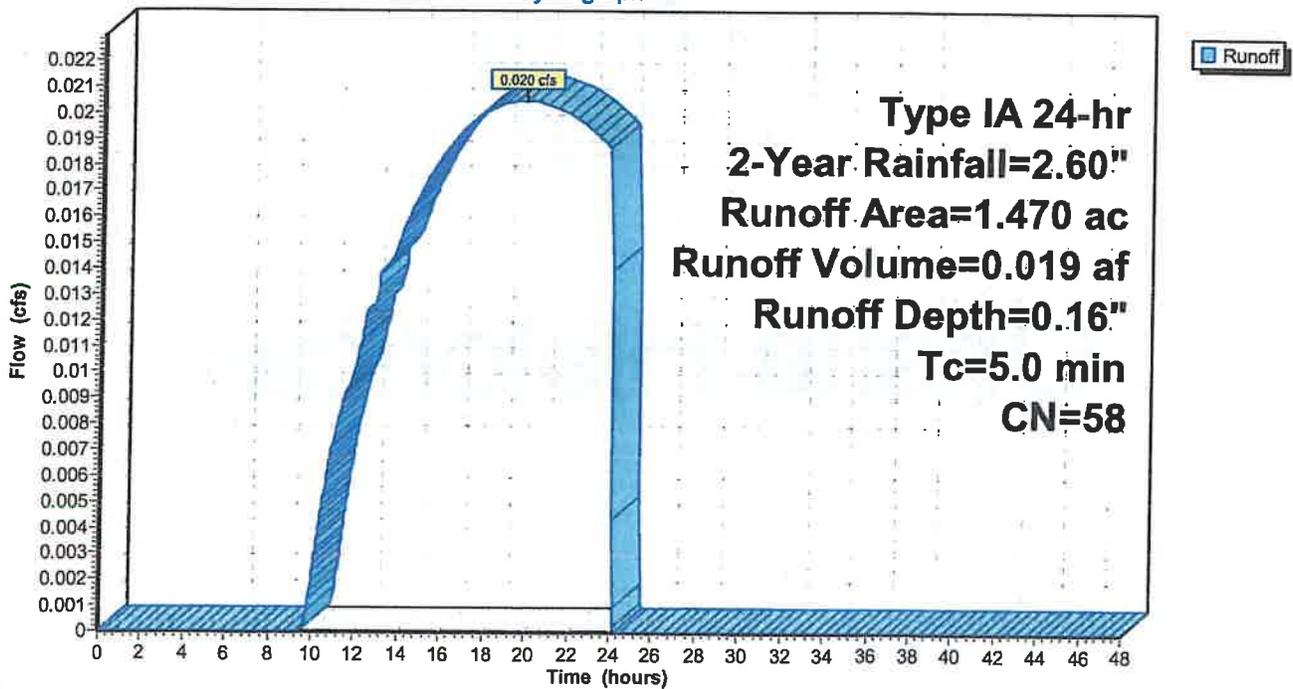
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-Year Rainfall=2.60"

Area (ac)	CN	Description
1.470	58	Woods/grass comb., Good, HSG B
1.470		100.00% Pervious Area

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

Subcatchment 0: Onsite Historical

Hydrograph



Summary for Subcatchment 0: Onsite Historical

Runoff = 0.071 cfs @ 8.05 hrs, Volume= 0.081 af, Depth= 0.66"

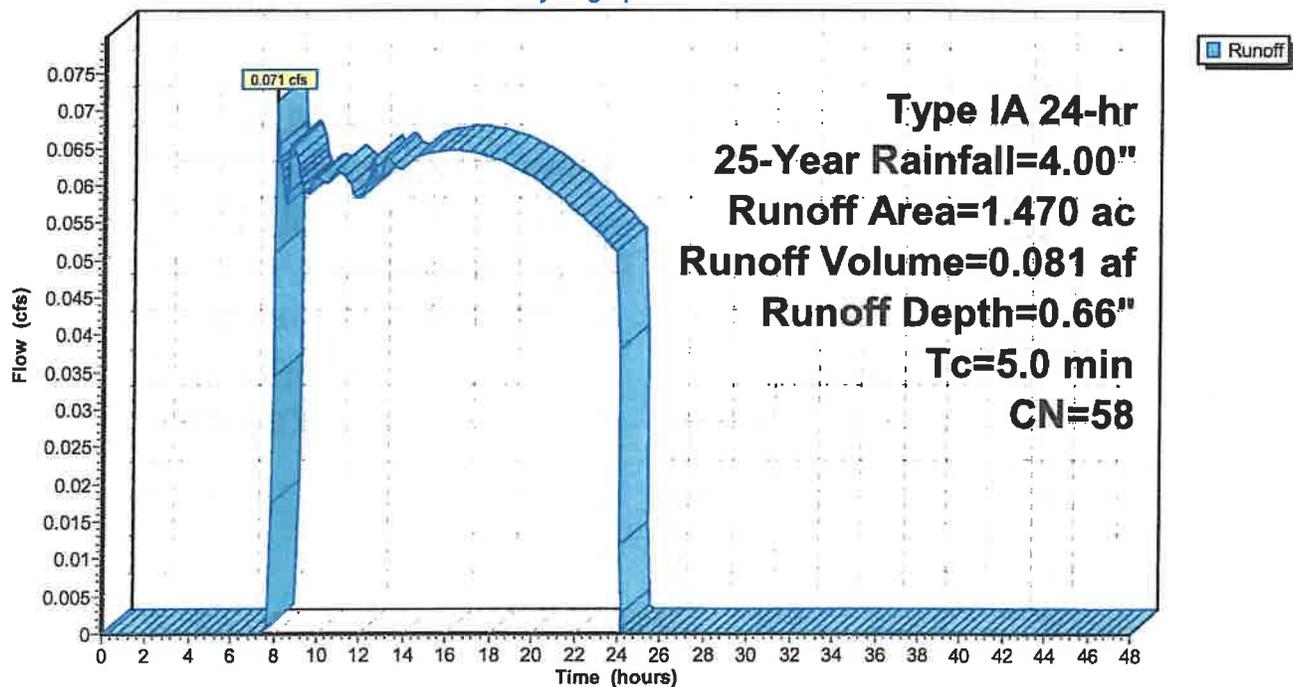
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Type IA 24-hr 25-Year Rainfall=4.00"

Area (ac)	CN	Description
1.470	58	Woods/grass comb., Good, HSG B
1.470		100.00% Pervious Area

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

Subcatchment 0: Onsite Historical

Hydrograph



Summary for Subcatchment 0: Onsite Historical

Runoff = 0.207 cfs @ 8.01 hrs, Volume= 0.130 af, Depth= 1.06"

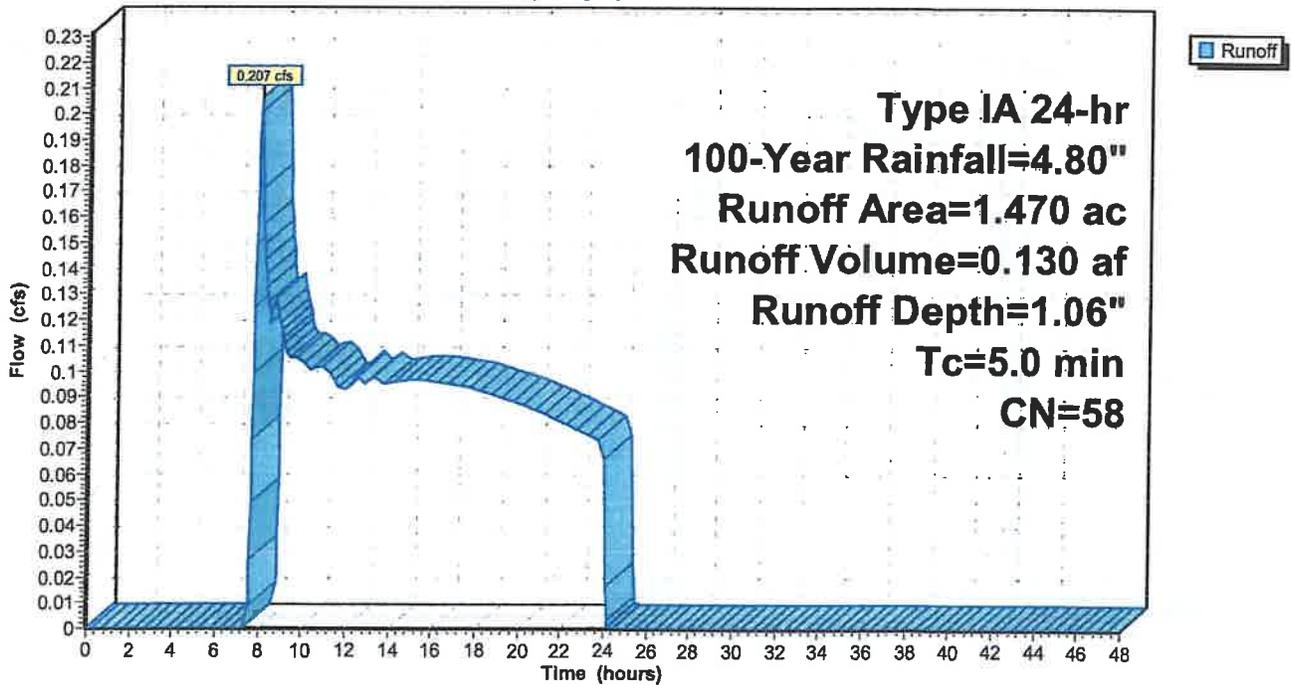
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Type IA 24-hr 100-Year Rainfall=4.80"

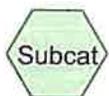
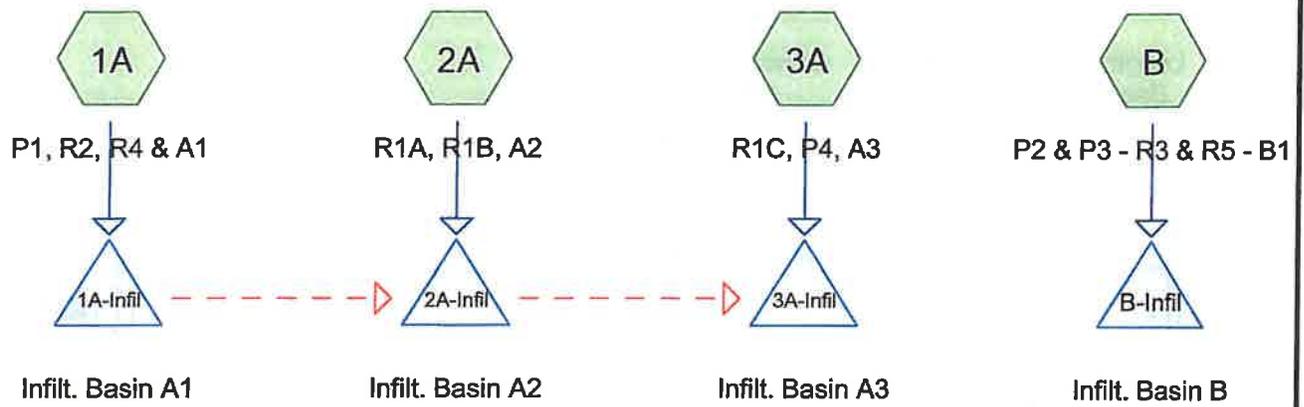
Area (ac)	CN	Description
1.470	58	Woods/grass comb., Good, HSG B
1.470		100.00% Pervious Area

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

Subcatchment 0: Onsite Historical

Hydrograph

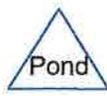




Subcat



Reach



Pond



Link

Washman Lindy Infiltration Basins Rev 4

Type IA 24-hr 2-Year Rainfall=2.60"

Prepared by Microsoft

Printed 7/22/2019

HydroCAD® 10.00-12 s/n 04326 © 2014 HydroCAD Software Solutions LLC

Page 2

Summary for Subcatchment 1A: P1, R2, R4 & A1

Runoff = 0.262 cfs @ 7.88 hrs, Volume= 0.083 af, Depth= 2.16"

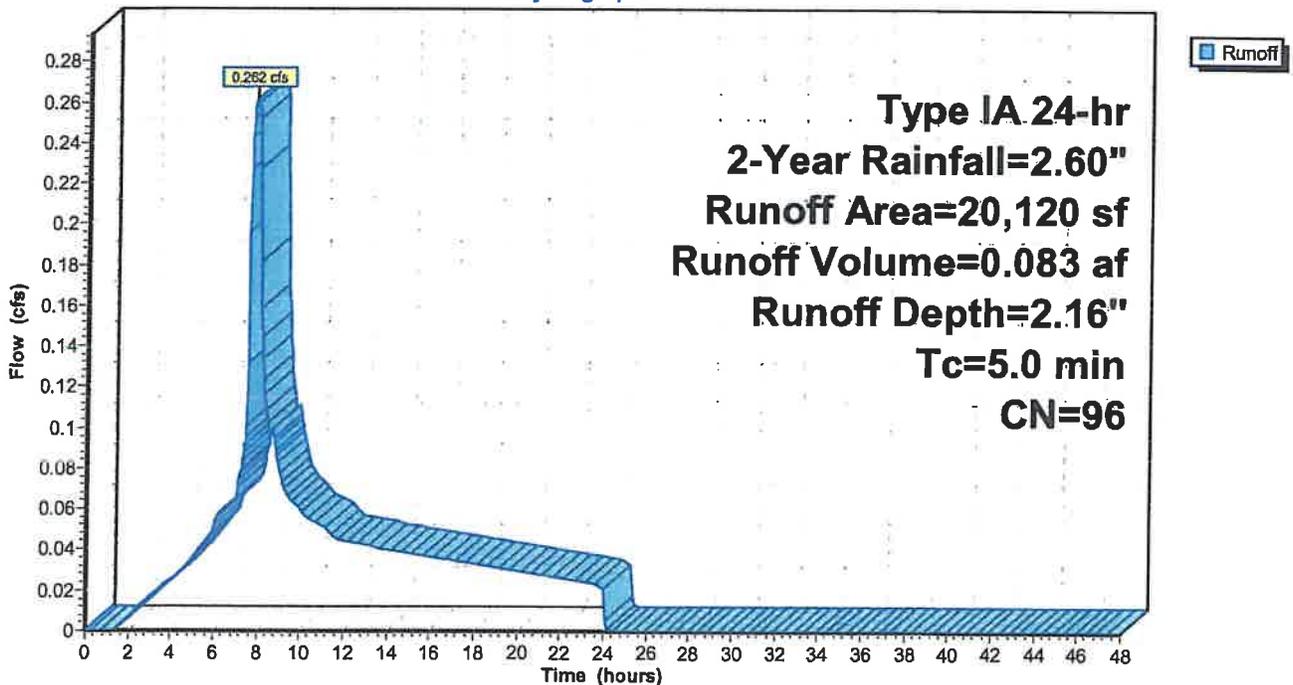
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-Year Rainfall=2.60"

Area (sf)	CN	Description
13,572	98	Paved parking, HSG B
2,460	98	Roofs, HSG B
1,898	98	Roofs, HSG B
2,190	79	<50% Grass cover, Poor, HSG B
20,120	96	Weighted Average
2,190		10.88% Pervious Area
17,930		89.12% Impervious Area

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

Subcatchment 1A: P1, R2, R4 & A1

Hydrograph



Summary for Pond 1A-Infil: Infil. Basin A1

Inflow Area = 0.462 ac, 89.12% Impervious, Inflow Depth = 2.16" for 2-Year event
 Inflow = 0.262 cfs @ 7.88 hrs, Volume= 0.083 af
 Outflow = 0.044 cfs @ 11.74 hrs, Volume= 0.081 af, Atten= 83%, Lag= 232.2 min
 Discarded = 0.037 cfs @ 11.74 hrs, Volume= 0.077 af
 Secondary = 0.007 cfs @ 11.74 hrs, Volume= 0.004 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 207.33' @ 11.74 hrs Surf.Area= 1,820 sf Storage= 1,471 cf

Plug-Flow detention time= 555.8 min calculated for 0.081 af (97% of inflow)
 Center-of-Mass det. time= 536.7 min (1,235.9 - 699.3)

Volume	Invert	Avail.Storage	Storage Description			
#1	206.30'	3,517 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
206.30	1,065	235.9	0	0	1,065	
206.80	1,426	245.5	621	621	1,452	
207.30	1,801	254.9	805	1,425	1,847	
207.80	2,190	264.3	996	2,422	2,256	
208.30	2,190	264.3	1,095	3,517	2,388	

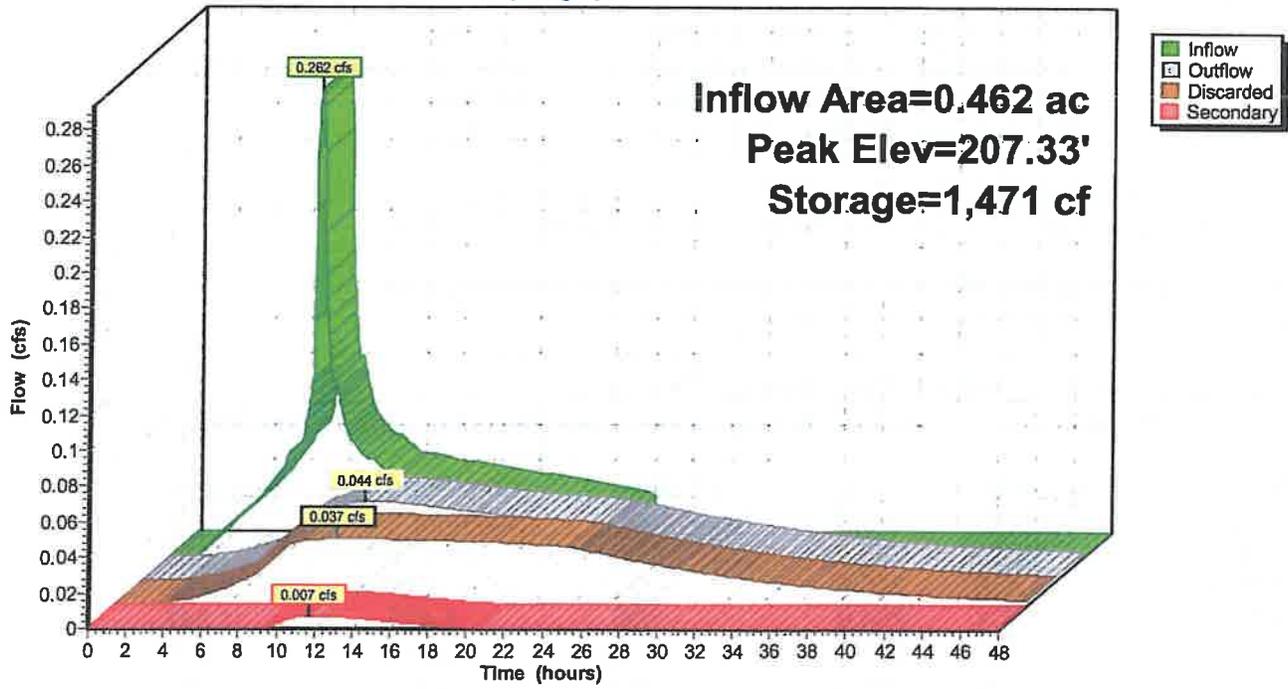
Device	Routing	Invert	Outlet Devices
#1	Discarded	206.30'	2.000 in/hr Exfiltration over Wetted area above 206.30' Excluded Wetted area = 1,065 sf
#2	Secondary	207.25'	1.5" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.037 cfs @ 11.74 hrs HW=207.33' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.037 cfs)

Secondary OutFlow Max=0.007 cfs @ 11.74 hrs HW=207.33' (Free Discharge)
 ↳2=Orifice/Grate (Orifice Controls 0.007 cfs @ 0.93 fps)

Pond 1A-Infil: Infil. Basin A1

Hydrograph



Summary for Subcatchment 2A: R1A, R1B, A2

Runoff = 0.071 cfs @ 7.89 hrs, Volume= 0.022 af, Depth= 1.97"

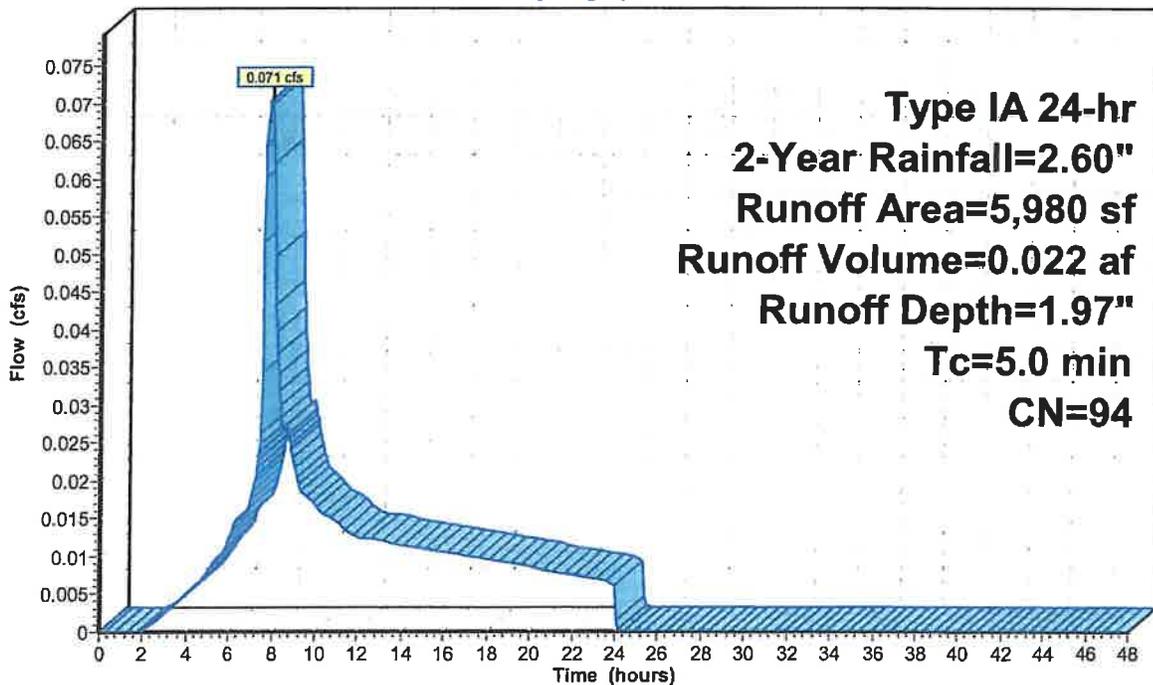
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-Year Rainfall=2.60"

Area (sf)	CN	Description
2,492	98	Roofs, HSG B
1,128	79	<50% Grass cover, Poor, HSG B
2,360	98	Roofs, HSG B
5,980	94	Weighted Average
1,128		18.86% Pervious Area
4,852		81.14% Impervious Area

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

Subcatchment 2A: R1A, R1B, A2

Hydrograph



Runoff

**Type IA 24-hr
2-Year Rainfall=2.60"
Runoff Area=5,980 sf
Runoff Volume=0.022 af
Runoff Depth=1.97"
Tc=5.0 min
CN=94**

Summary for Pond 2A-Infil: Infil. Basin A2

Inflow Area = 0.137 ac, 81.14% Impervious, Inflow Depth = 2.29" for 2-Year event
 Inflow = 0.071 cfs @ 7.89 hrs, Volume= 0.026 af
 Outflow = 0.024 cfs @ 8.92 hrs, Volume= 0.026 af, Atten= 66%, Lag= 61.5 min
 Discarded = 0.024 cfs @ 8.92 hrs, Volume= 0.026 af
 Secondary = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 206.27' @ 8.92 hrs Surf.Area= 503 sf Storage= 118 cf

Plug-Flow detention time= 39.1 min calculated for 0.026 af (100% of inflow)
 Center-of-Mass det. time= 39.1 min (776.6 - 737.6)

Volume	Invert	Avail.Storage	Storage Description			
#1	206.00'	1,115 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
206.00	385	151.0	0	0	385	
206.50	619	160.4	249	249	631	
207.00	866	169.8	370	618	891	
207.50	1,128	179.3	497	1,115	1,169	

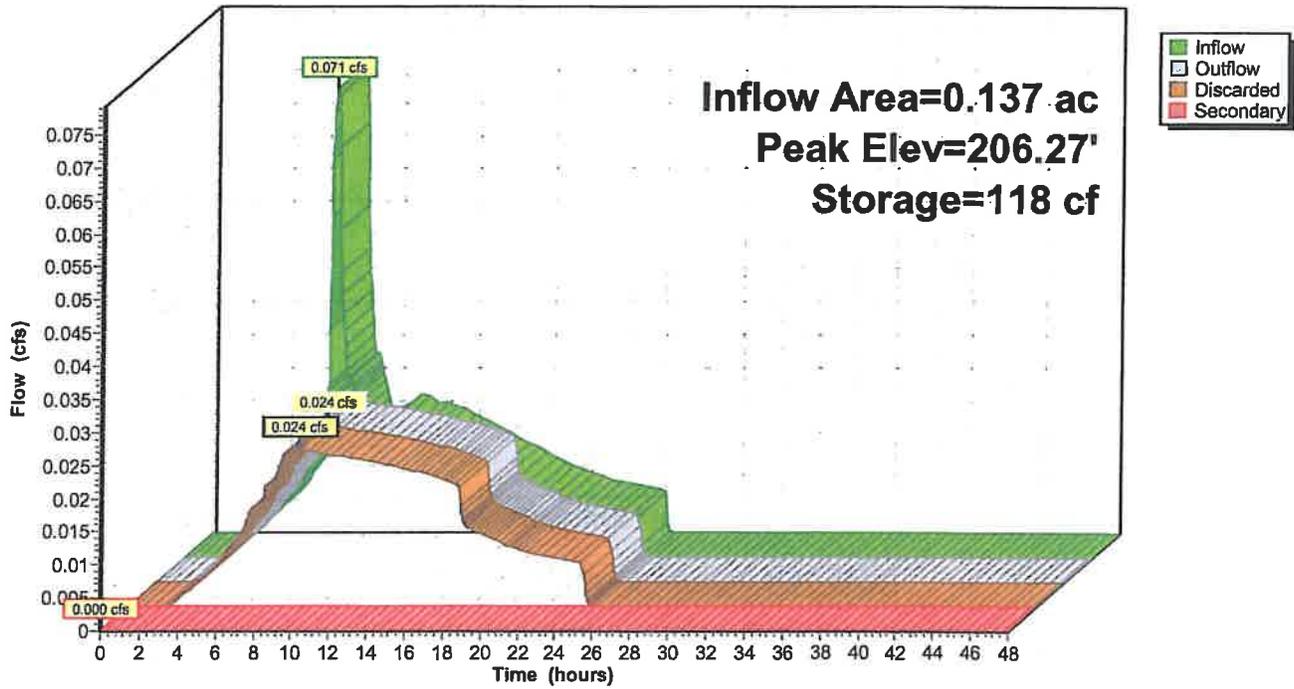
Device	Routing	Invert	Outlet Devices
#1	Discarded	206.00'	2.000 in/hr Exfiltration over Wetted area above 205.00' Excluded Wetted area = 0 sf
#2	Secondary	207.25'	1.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.024 cfs @ 8.92 hrs HW=206.27' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.024 cfs)

Secondary OutFlow Max=0.000 cfs @ 0.00 hrs HW=206.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.000 cfs)

Pond 2A-Infil: Infil. Basin A2

Hydrograph



Summary for Subcatchment 3A: R1C, P4, A3

Runoff = 0.088 cfs @ 7.88 hrs, Volume= 0.028 af, Depth= 2.06"

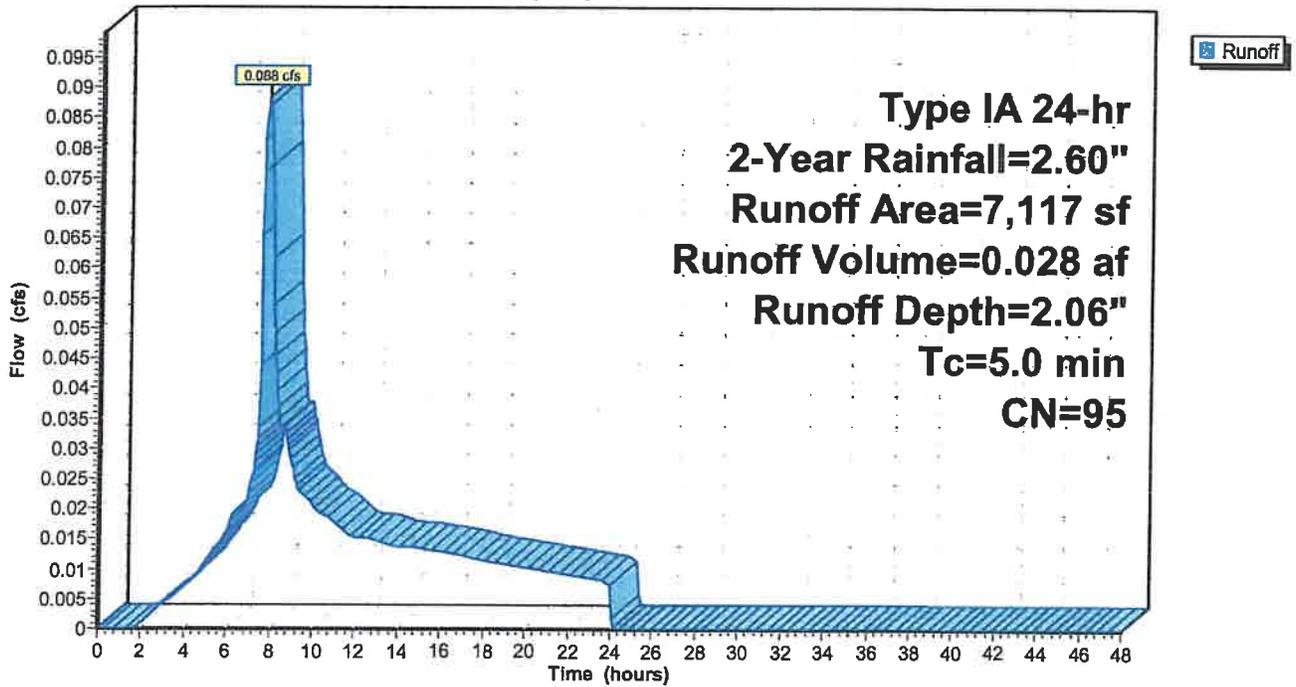
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-Year Rainfall=2.60"

Area (sf)	CN	Description
1,974	98	Roofs, HSG B
3,917	98	Paved parking, HSG B
1,226	79	<50% Grass cover, Poor, HSG B
7,117	95	Weighted Average
1,226		17.23% Pervious Area
5,891		82.77% Impervious Area

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

Subcatchment 3A: R1C, P4, A3

Hydrograph



Summary for Pond 3A-Infil: Infil. Basin A3

Inflow Area = 0.163 ac, 82.77% Impervious, Inflow Depth = 2.06" for 2-Year event
 Inflow = 0.088 cfs @ 7.88 hrs, Volume= 0.028 af
 Outflow = 0.014 cfs @ 13.75 hrs, Volume= 0.025 af, Atten= 84%, Lag= 352.2 min
 Discarded = 0.014 cfs @ 13.75 hrs, Volume= 0.025 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 206.32' @ 13.75 hrs Surf.Area= 857 sf Storage= 534 cf

Plug-Flow detention time= 574.3 min calculated for 0.025 af (88% of inflow)
 Center-of-Mass det. time= 497.9 min (1,209.4 - 711.5)

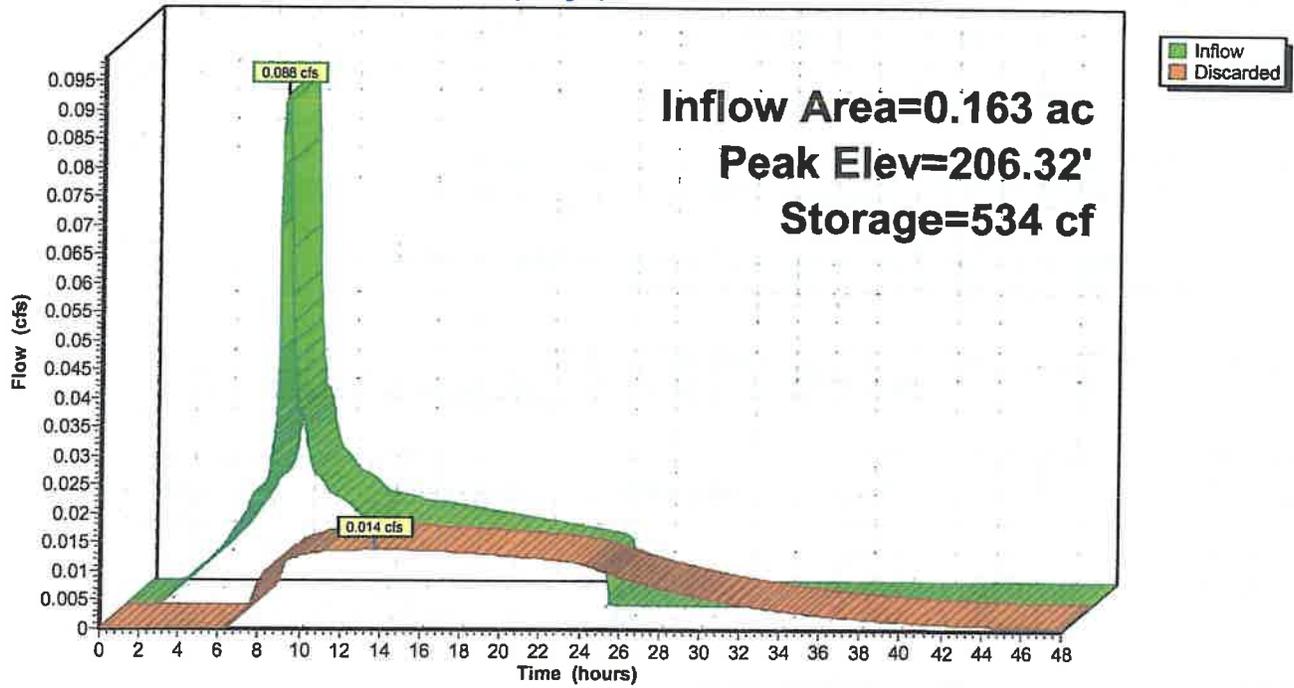
Volume	Invert	Avail.Storage	Storage Description			
#1	205.50'	1,244 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
205.50	459	156.4	0	0	459	
206.00	700	165.8	288	288	713	
206.50	956	175.3	412	700	985	
207.00	1,226	184.7	544	1,244	1,269	

Device	Routing	Invert	Outlet Devices
#1	Discarded	205.75'	2.000 in/hr Exfiltration over Wetted area above 205.75' Excluded Wetted area = 584 sf

Discarded OutFlow Max=0.014 cfs @ 13.75 hrs HW=206.32' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.014 cfs)

Pond 3A-Infil: Infil. Basin A3

Hydrograph



Summary for Subcatchment B: P2 & P3 - R3 & R5 - B1

Runoff = 0.211 cfs @ 7.88 hrs, Volume= 0.067 af, Depth= 2.06"

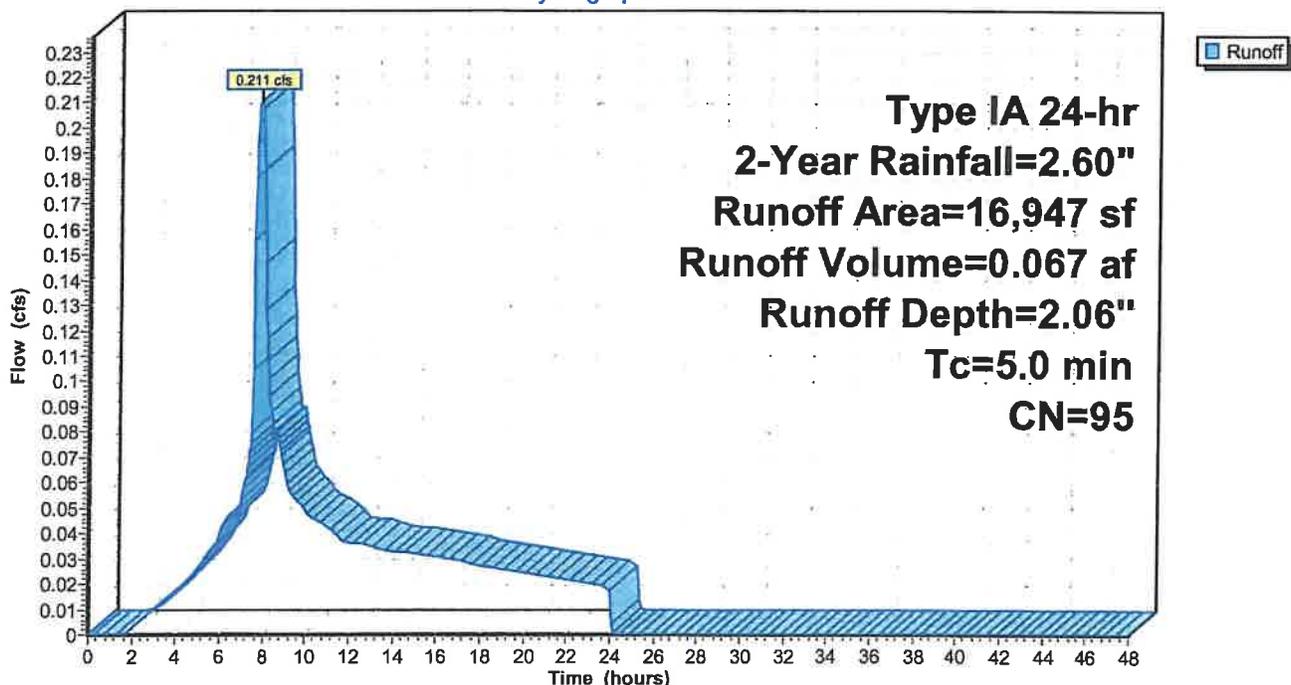
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Type IA 24-hr 2-Year Rainfall=2.60"

Area (sf)	CN	Description
2,300	98	Paved parking, HSG B
5,395	98	Paved parking, HSG B
3,723	98	Roofs, HSG B
3,164	98	Roofs, HSG B
2,365	79	<50% Grass cover, Poor, HSG B
16,947	95	Weighted Average
2,365		13.96% Pervious Area
14,582		86.04% Impervious Area

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

Subcatchment B: P2 & P3 - R3 & R5 - B1

Hydrograph



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Type IA 24-hr 2-Year Rainfall=2.60"

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Summary for Pond B-Infil: Infil. Basin B

Inflow Area = 0.389 ac, 86.04% Impervious, Inflow Depth = 2.06" for 2-Year event
 Inflow = 0.211 cfs @ 7.88 hrs, Volume= 0.067 af
 Outflow = 0.028 cfs @ 17.87 hrs, Volume= 0.062 af, Atten= 87%, Lag= 599.0 min
 Discarded = 0.028 cfs @ 17.87 hrs, Volume= 0.062 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 207.87' @ 17.87 hrs Surf.Area= 1,909 sf Storage= 1,400 cf

Plug-Flow detention time= 700.7 min calculated for 0.062 af (93% of inflow)
 Center-of-Mass det. time= 650.5 min (1,362.0 - 711.5)

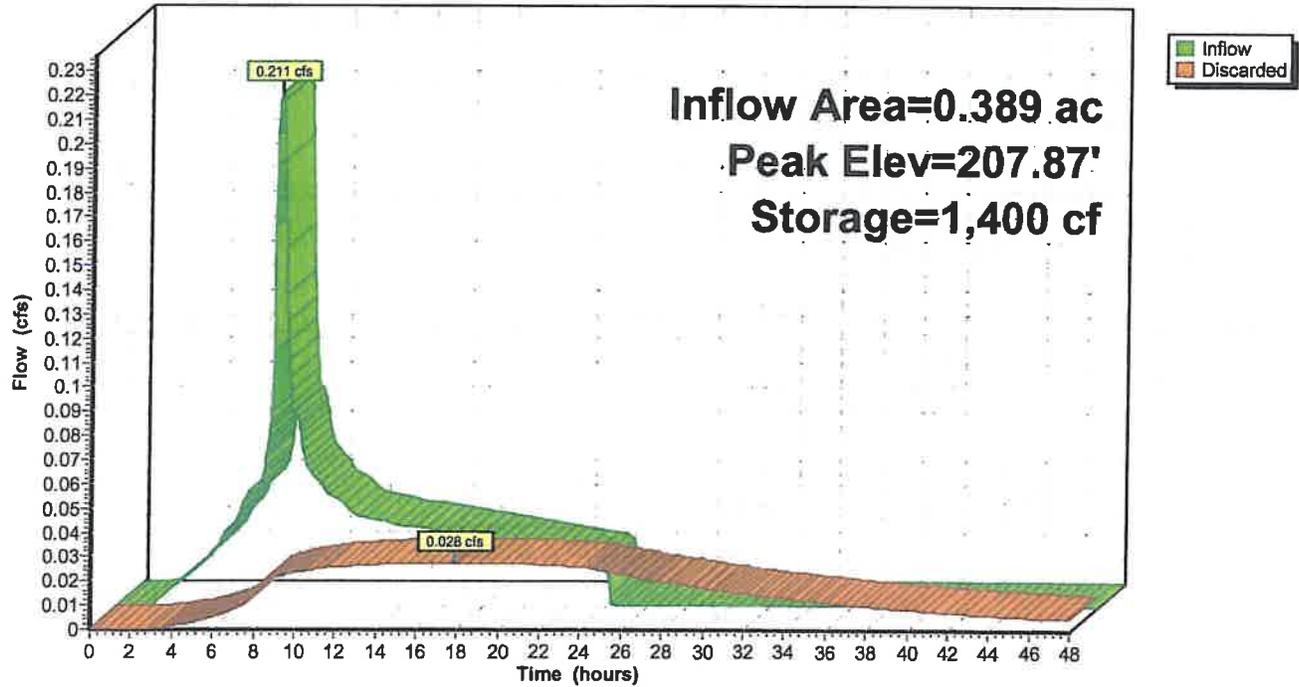
Volume	Invert	Avail.Storage	Storage Description		
#1	207.00'	3,931 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
207.00	1,324	217.7	0	0	1,324
207.50	1,657	226.5	744	744	1,654
208.00	2,004	235.9	914	1,658	2,019
208.50	2,365	245.3	1,091	2,749	2,399
209.00	2,365	245.3	1,183	3,931	2,521

Device	Routing	Invert	Outlet Devices
#1	Discarded	207.00'	2.000 in/hr Exfiltration over Wetted area above 207.00' Excluded Wetted area = 1,324 sf

Discarded OutFlow Max=0.028 cfs @ 17.87 hrs HW=207.87' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.028 cfs)

Pond B-Infil: Infil. Basin B

Hydrograph



Summary for Subcatchment 1A: P1, R2, R4 & A1

Runoff = 0.425 cfs @ 7.86 hrs, Volume= 0.136 af, Depth= 3.54"

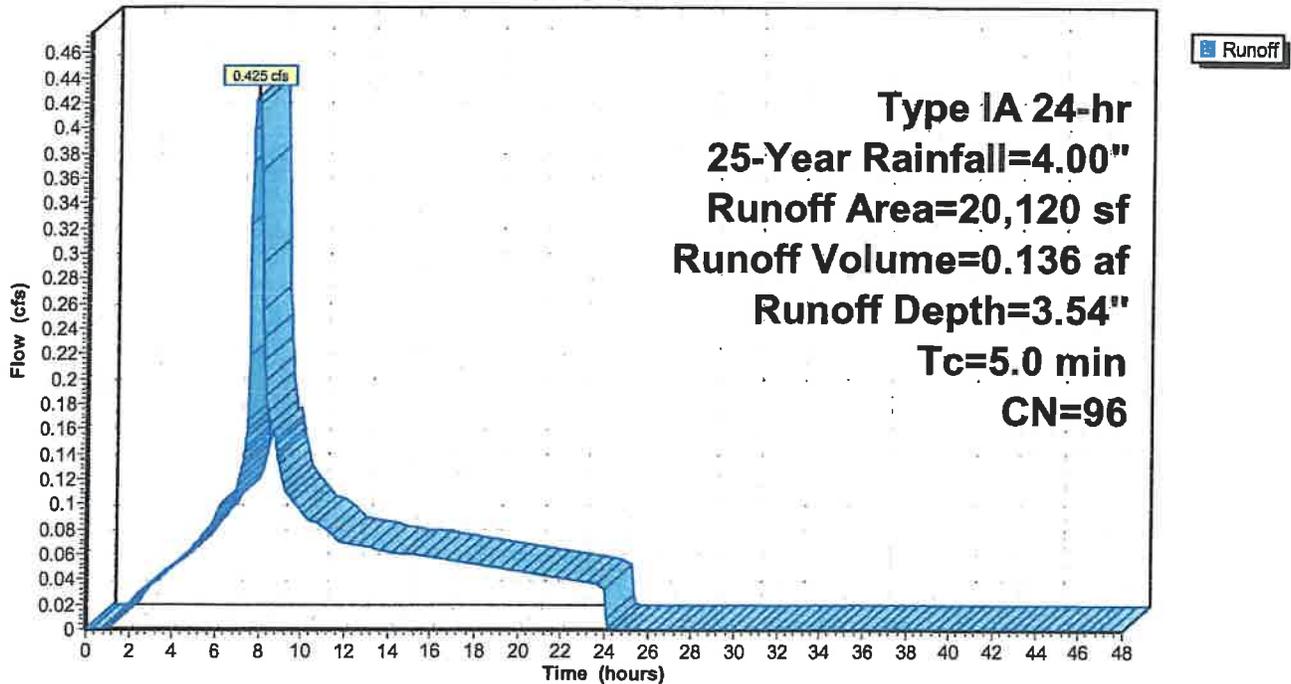
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Type IA 24-hr 25-Year Rainfall=4.00"

Area (sf)	CN	Description
13,572	98	Paved parking, HSG B
2,460	98	Roofs, HSG B
1,898	98	Roofs, HSG B
2,190	79	<50% Grass cover, Poor, HSG B
20,120	96	Weighted Average
2,190		10.88% Pervious Area
17,930		89.12% Impervious Area

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

Subcatchment 1A: P1, R2, R4 & A1

Hydrograph



Summary for Pond 1A-Infil: Infil. Basin A1

Inflow Area = 0.462 ac, 89.12% Impervious, Inflow Depth = 3.54" for 25-Year event
 Inflow = 0.425 cfs @ 7.86 hrs, Volume= 0.136 af
 Outflow = 0.088 cfs @ 10.28 hrs, Volume= 0.134 af, Atten= 79%, Lag= 145.2 min
 Discarded = 0.051 cfs @ 10.28 hrs, Volume= 0.098 af
 Secondary = 0.037 cfs @ 10.28 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 207.70' @ 10.28 hrs Surf.Area= 2,105 sf Storage= 2,196 cf

Plug-Flow detention time= 450.1 min calculated for 0.133 af (98% of inflow)
 Center-of-Mass det. time= 436.5 min (1,117.0 - 680.5)

Volume	Invert	Avail.Storage	Storage Description			
#1	206.30'	3,517 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
206.30	1,065	235.9	0	0	1,065	
206.80	1,426	245.5	621	621	1,452	
207.30	1,801	254.9	805	1,425	1,847	
207.80	2,190	264.3	996	2,422	2,256	
208.30	2,190	264.3	1,095	3,517	2,388	

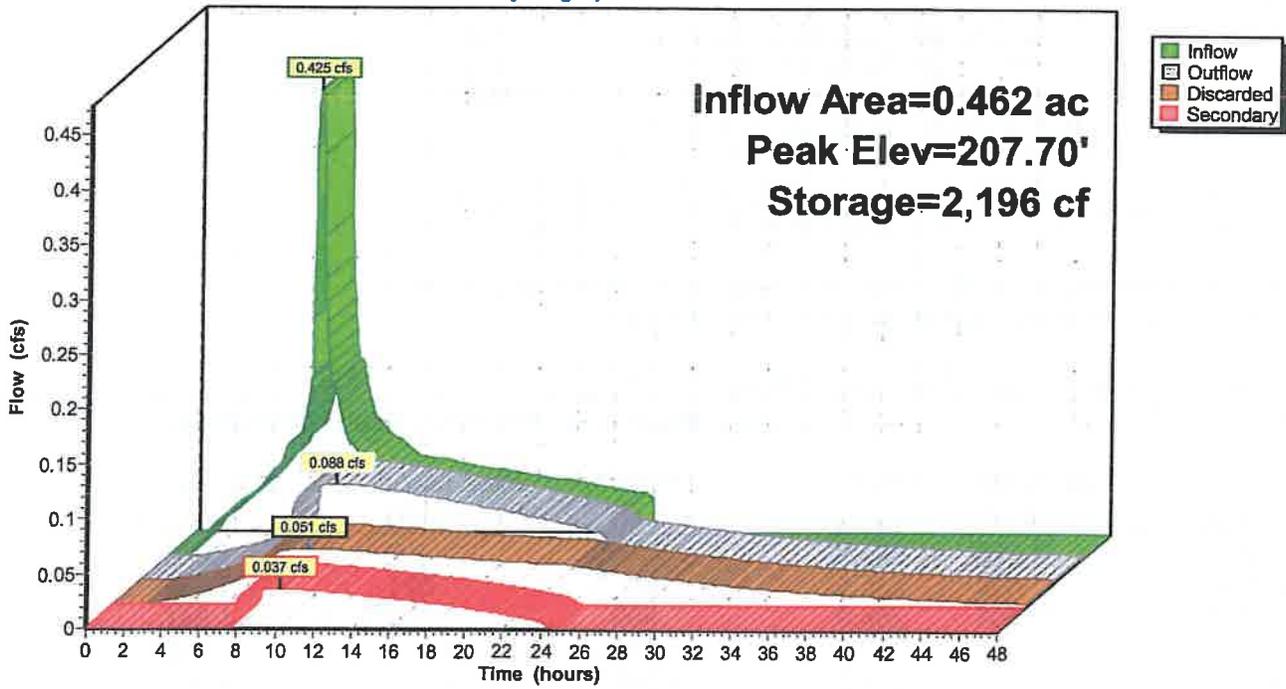
Device	Routing	Invert	Outlet Devices
#1	Discarded	206.30'	2.000 in/hr Exfiltration over Wetted area above 206.30' Excluded Wetted area = 1,065 sf
#2	Secondary	207.25'	1.5" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.051 cfs @ 10.28 hrs HW=207.70' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.051 cfs)

Secondary OutFlow Max=0.037 cfs @ 10.28 hrs HW=207.70' (Free Discharge)
 ↳2=Orifice/Grate (Orifice Controls 0.037 cfs @ 2.98 fps)

Pond 1A-Infil: Infil. Basin A1

Hydrograph



Summary for Subcatchment 2A: R1A, R1B, A2

Runoff = 0.120 cfs @ 7.87 hrs, Volume= 0.038 af, Depth= 3.32"

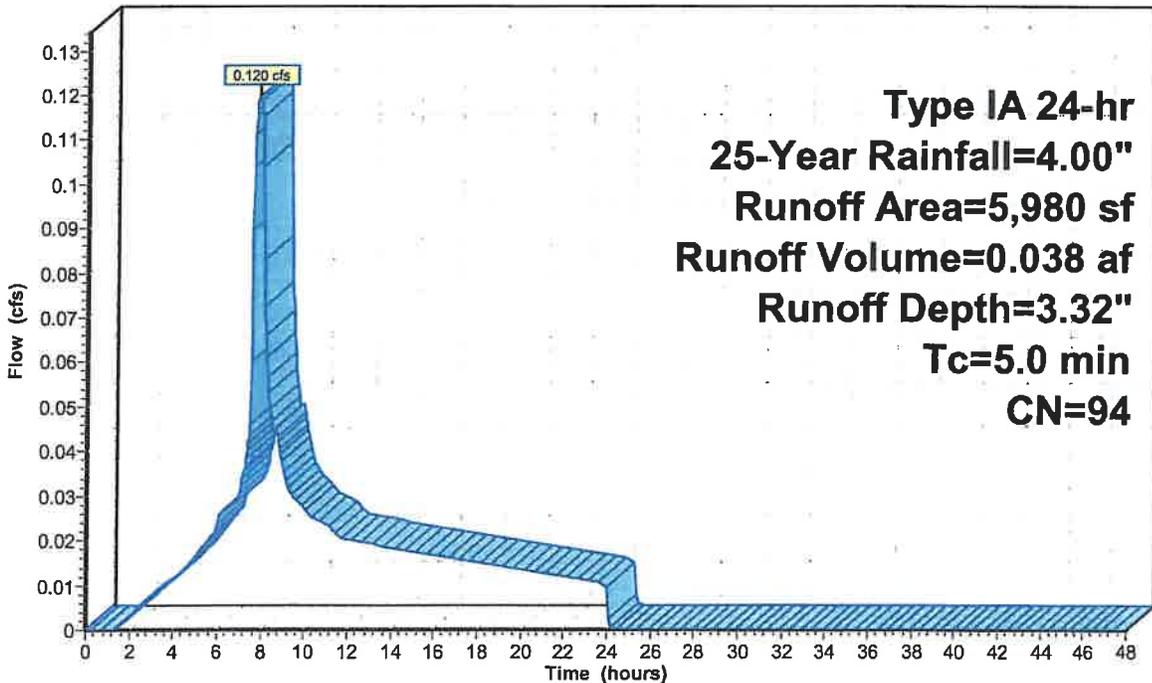
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-Year Rainfall=4.00"

Area (sf)	CN	Description
2,492	98	Roofs, HSG B
1,128	79	<50% Grass cover, Poor, HSG B
2,360	98	Roofs, HSG B
5,980	94	Weighted Average
1,128		18.86% Pervious Area
4,852		81.14% Impervious Area

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

Subcatchment 2A: R1A, R1B, A2

Hydrograph



Runoff

**Type IA 24-hr
25-Year Rainfall=4.00"
Runoff Area=5,980 sf
Runoff Volume=0.038 af
Runoff Depth=3.32"
Tc=5.0 min
CN=94**

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Type IA 24-hr 25-Year Rainfall=4.00"

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Summary for Pond 2A-Infil: Infil. Basin A2

Inflow Area = 0.137 ac, 81.14% Impervious, Inflow Depth = 6.44" for 25-Year event
 Inflow = 0.138 cfs @ 7.97 hrs, Volume= 0.074 af
 Outflow = 0.045 cfs @ 16.16 hrs, Volume= 0.074 af, Atten= 67%, Lag= 491.5 min
 Discarded = 0.045 cfs @ 16.16 hrs, Volume= 0.074 af
 Secondary = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 207.15' @ 16.16 hrs Surf.Area= 940 sf Storage= 752 cf

Plug-Flow detention time= 213.2 min calculated for 0.074 af (100% of inflow)
 Center-of-Mass det. time= 213.3 min (999.4 - 786.1)

Volume	Invert	Avail.Storage	Storage Description			
#1	206.00'	1,115 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
206.00	385	151.0	0	0	385	
206.50	619	160.4	249	249	631	
207.00	866	169.8	370	618	891	
207.50	1,128	179.3	497	1,115	1,169	

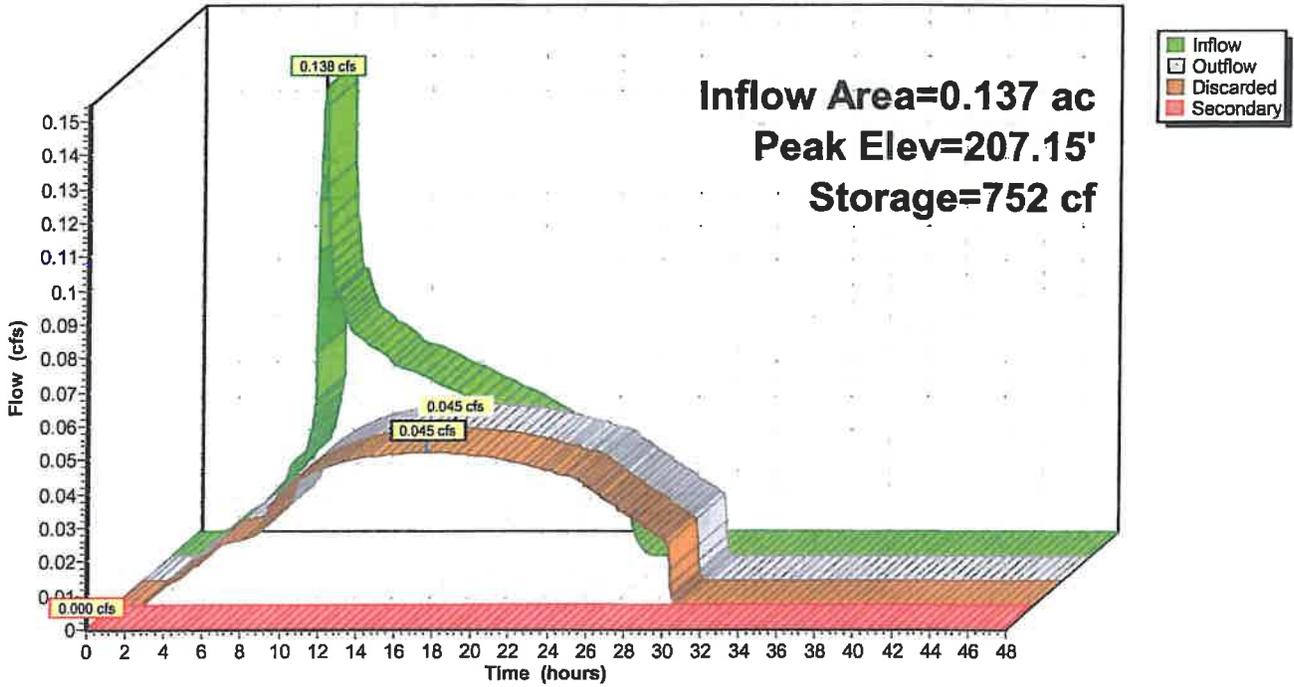
Device	Routing	Invert	Outlet Devices
#1	Discarded	206.00'	2.000 in/hr Exfiltration over Wetted area above 205.00' Excluded Wetted area = 0 sf
#2	Secondary	207.25'	1.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.045 cfs @ 16.16 hrs HW=207.15' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.045 cfs)

Secondary OutFlow Max=0.000 cfs @ 0.00 hrs HW=206.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.000 cfs)

Pond 2A-Infil: Infil. Basin A2

Hydrograph



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Type IA 24-hr 25-Year Rainfall=4.00"

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Summary for Subcatchment 3A: R1C, P4, A3

Runoff = 0.147 cfs @ 7.87 hrs, Volume= 0.047 af, Depth= 3.43"

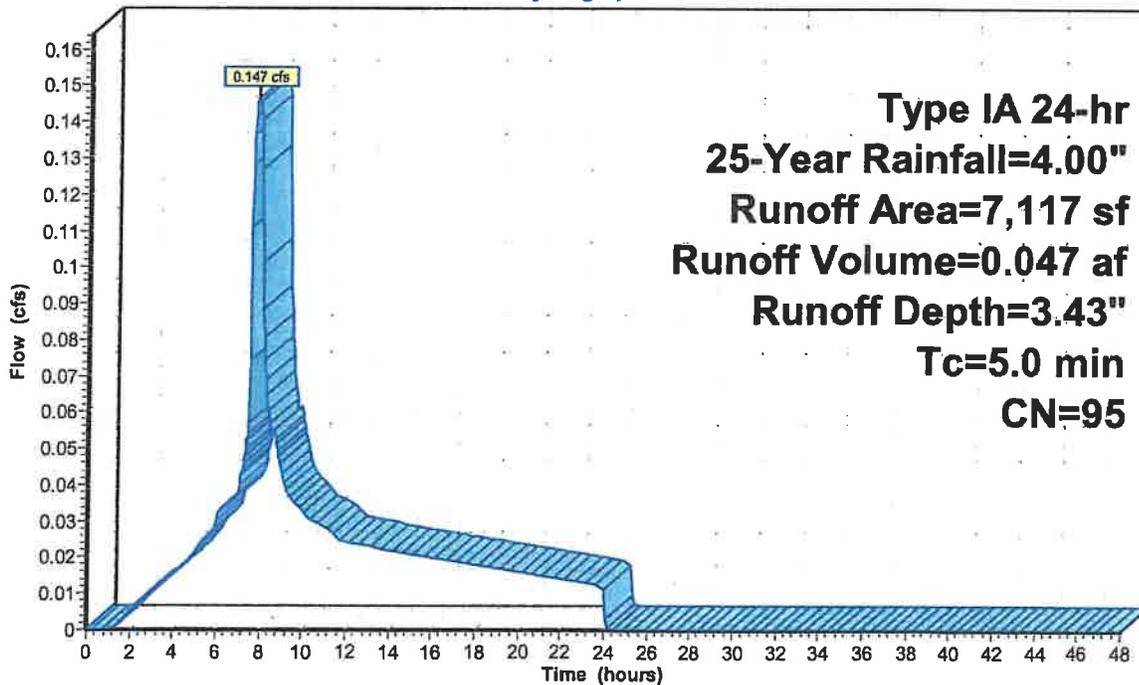
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Type IA 24-hr 25-Year Rainfall=4.00"

Area (sf)	CN	Description
1,974	98	Roofs, HSG B
3,917	98	Paved parking, HSG B
1,226	79	<50% Grass cover, Poor, HSG B
7,117	95	Weighted Average
1,226		17.23% Pervious Area
5,891		82.77% Impervious Area

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

Subcatchment 3A: R1C, P4, A3

Hydrograph



Summary for Pond 3A-Infil: Infil. Basin A3

Inflow Area = 0.163 ac, 82.77% Impervious, Inflow Depth = 3.43" for 25-Year event
 Inflow = 0.147 cfs @ 7.87 hrs, Volume= 0.047 af
 Outflow = 0.023 cfs @ 13.32 hrs, Volume= 0.043 af, Atten= 84%, Lag= 327.3 min
 Discarded = 0.023 cfs @ 13.32 hrs, Volume= 0.043 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 206.68' @ 13.32 hrs Surf.Area= 1,047 sf Storage= 875 cf

Plug-Flow detention time= 568.0 min calculated for 0.043 af (92% of inflow)
 Center-of-Mass det. time= 516.1 min (1,206.2 - 690.1)

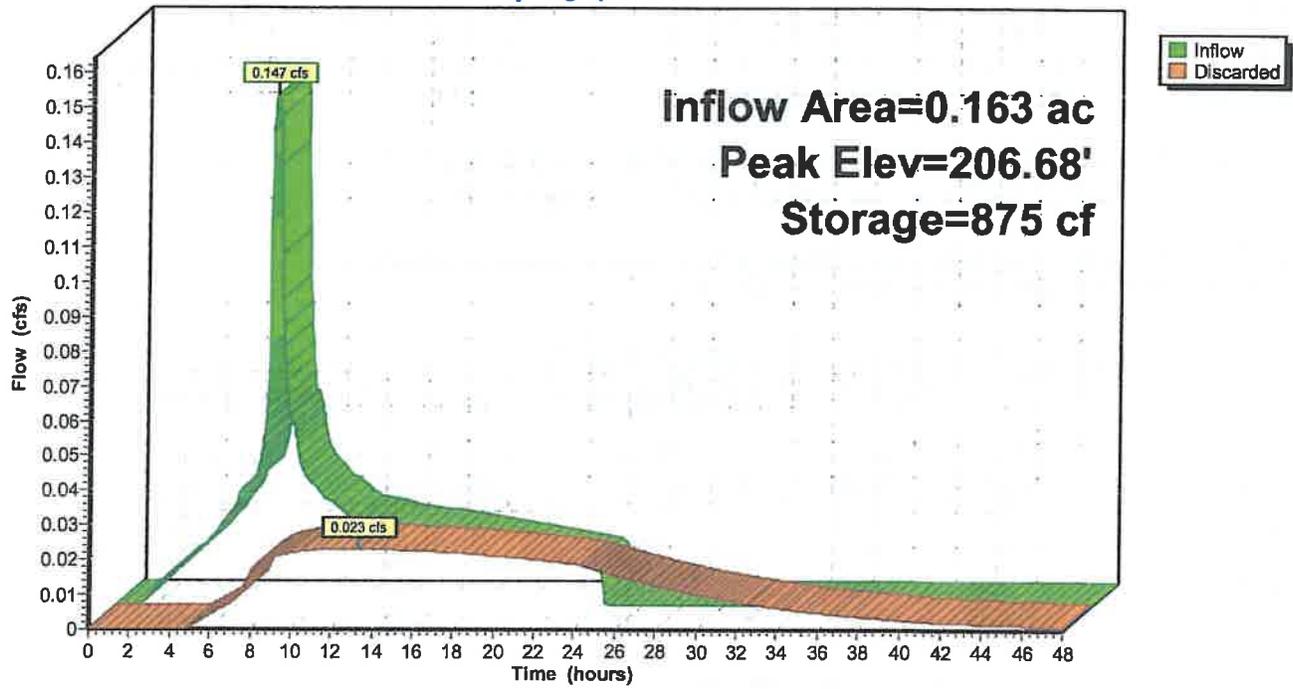
Volume	Invert	Avail.Storage	Storage Description			
#1	205.50'	1,244 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
205.50	459	156.4	0	0	459	
206.00	700	165.8	288	288	713	
206.50	956	175.3	412	700	985	
207.00	1,226	184.7	544	1,244	1,269	

Device	Routing	Invert	Outlet Devices
#1	Discarded	205.75'	2.000 in/hr Exfiltration over Wetted area above 205.75' Excluded Wetted area = 584 sf

Discarded OutFlow Max=0.023 cfs @ 13.32 hrs HW=206.68' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.023 cfs)

Pond 3A-Infil: Infil. Basin A3

Hydrograph



Summary for Subcatchment B: P2 & P3 - R3 & R5 - B1

Runoff = 0.349 cfs @ 7.87 hrs, Volume= 0.111 af, Depth= 3.43"

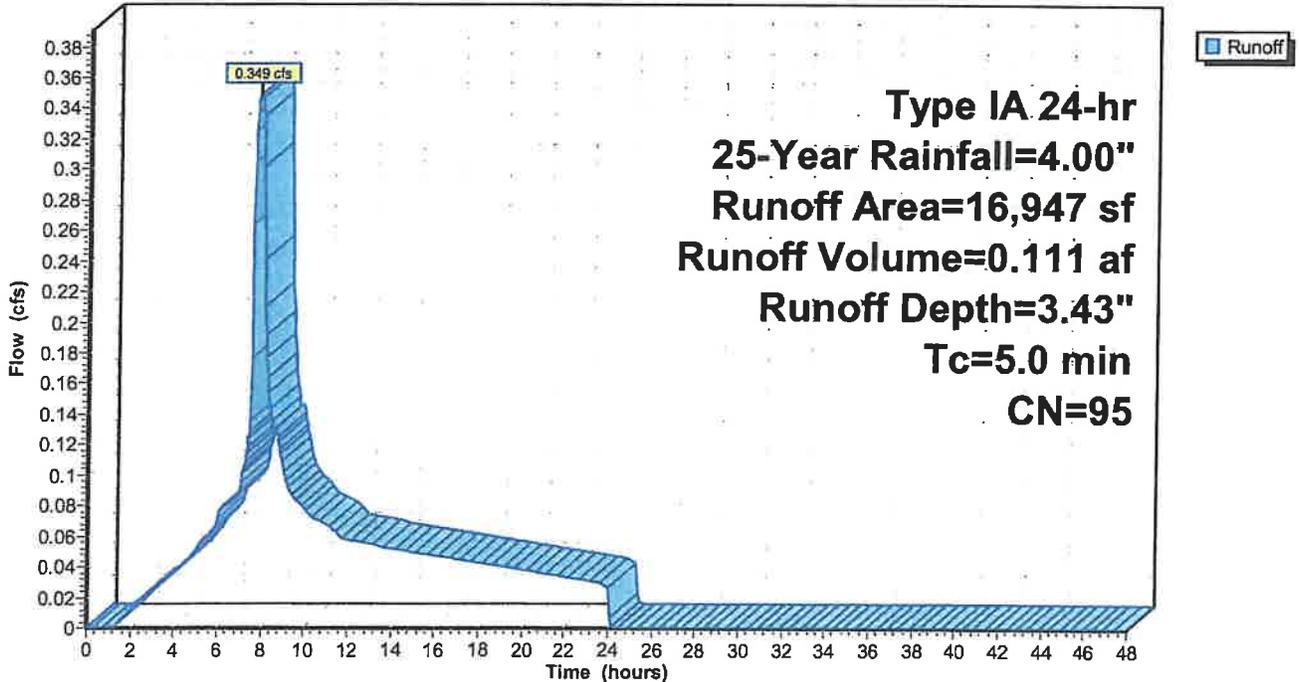
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-Year Rainfall=4.00"

Area (sf)	CN	Description
2,300	98	Paved parking, HSG B
5,395	98	Paved parking, HSG B
3,723	98	Roofs, HSG B
3,164	98	Roofs, HSG B
2,365	79	<50% Grass cover, Poor, HSG B
16,947	95	Weighted Average
2,365		13.96% Pervious Area
14,582		86.04% Impervious Area

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

Subcatchment B: P2 & P3 - R3 & R5 - B1

Hydrograph



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Type IA 24-hr 25-Year Rainfall=4.00"

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Summary for Pond B-Infil: Infil. Basin B

Inflow Area = 0.389 ac, 86.04% Impervious, Inflow Depth = 3.43" for 25-Year event
 Inflow = 0.349 cfs @ 7.87 hrs, Volume= 0.111 af
 Outflow = 0.044 cfs @ 17.56 hrs, Volume= 0.102 af, Atten= 87%, Lag= 581.6 min
 Discarded = 0.044 cfs @ 17.56 hrs, Volume= 0.102 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 208.34' @ 17.56 hrs Surf.Area= 2,249 sf Storage= 2,388 cf

Plug-Flow detention time= 732.5 min calculated for 0.102 af (92% of inflow)
 Center-of-Mass det. time= 675.5 min (1,365.6 - 690.1)

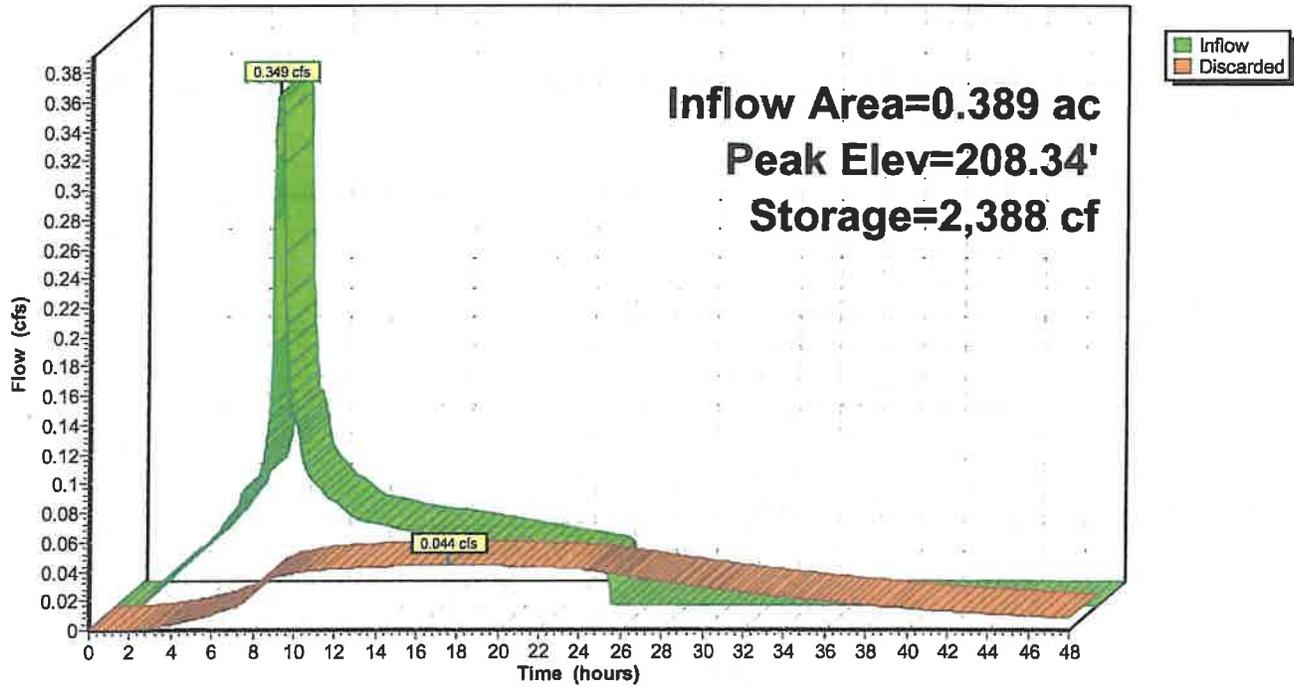
Volume	Invert	Avail.Storage	Storage Description		
#1	207.00'	3,931 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
207.00	1,324	217.7	0	0	1,324
207.50	1,657	226.5	744	744	1,654
208.00	2,004	235.9	914	1,658	2,019
208.50	2,365	245.3	1,091	2,749	2,399
209.00	2,365	245.3	1,183	3,931	2,521

Device	Routing	Invert	Outlet Devices
#1	Discarded	207.00'	2.000 in/hr Exfiltration over Wetted area above 207.00' Excluded Wetted area = 1,324 sf

Discarded OutFlow Max=0.044 cfs @ 17.56 hrs HW=208.34' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.044 cfs)

Pond B-Infil: Infil. Basin B

Hydrograph



Summary for Subcatchment 1A: P1, R2, R4 & A1

Runoff = 0.517 cfs @ 7.86 hrs, Volume= 0.167 af, Depth= 4.33"

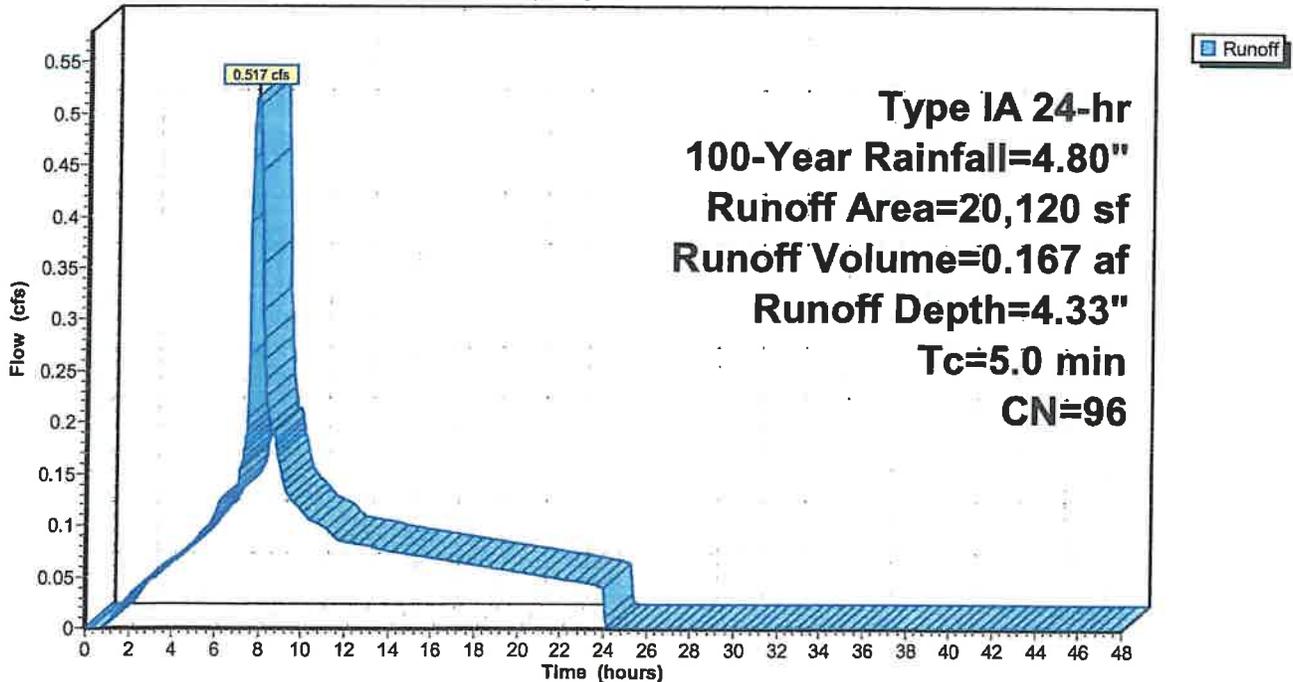
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Type IA 24-hr 100-Year Rainfall=4.80"

Area (sf)	CN	Description
13,572	98	Paved parking, HSG B
2,460	98	Roofs, HSG B
1,898	98	Roofs, HSG B
2,190	79	<50% Grass cover, Poor, HSG B
20,120	96	Weighted Average
2,190		10.88% Pervious Area
17,930		89.12% Impervious Area

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

Subcatchment 1A: P1, R2, R4 & A1

Hydrograph



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Type IA 24-hr 100-Year Rainfall=4.80"

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Summary for Pond 1A-Infil: Infil. Basin A1

Inflow Area = 0.462 ac, 89.12% Impervious, Inflow Depth = 4.33" for 100-Year event
 Inflow = 0.517 cfs @ 7.86 hrs, Volume= 0.167 af
 Outflow = 0.103 cfs @ 10.69 hrs, Volume= 0.164 af, Atten= 80%, Lag= 170.0 min
 Discarded = 0.057 cfs @ 10.69 hrs, Volume= 0.112 af
 Secondary = 0.047 cfs @ 10.69 hrs, Volume= 0.052 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 207.93' @ 10.69 hrs Surf.Area= 2,190 sf Storage= 2,716 cf

Plug-Flow detention time= 441.0 min calculated for 0.164 af (98% of inflow)
 Center-of-Mass det. time= 427.4 min (1,101.4 - 674.0)

Volume	Invert	Avail.Storage	Storage Description			
#1	206.30'	3,517 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
206.30	1,065	235.9	0	0	1,065	
206.80	1,426	245.5	621	621	1,452	
207.30	1,801	254.9	805	1,425	1,847	
207.80	2,190	264.3	996	2,422	2,256	
208.30	2,190	264.3	1,095	3,517	2,388	

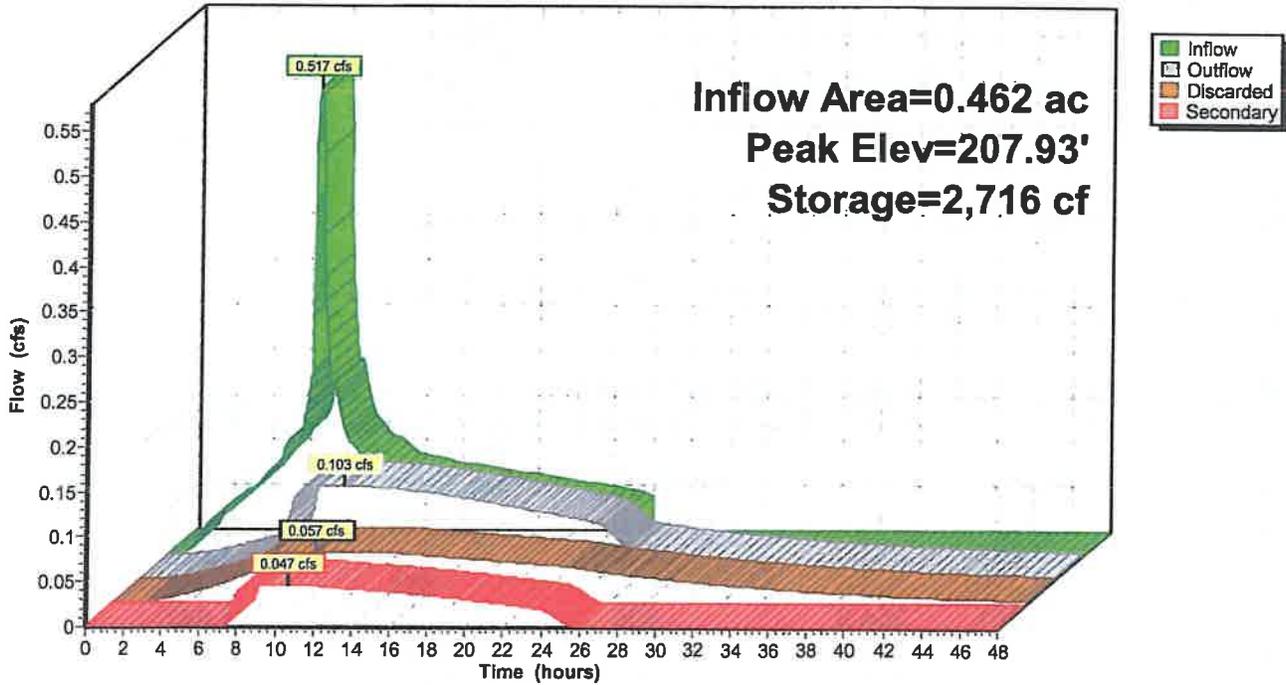
Device	Routing	Invert	Outlet Devices
#1	Discarded	206.30'	2.000 in/hr Exfiltration over Wetted area above 206.30' Excluded Wetted area = 1,065 sf
#2	Secondary	207.25'	1.5" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.057 cfs @ 10.69 hrs HW=207.93' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.057 cfs)

Secondary OutFlow Max=0.047 cfs @ 10.69 hrs HW=207.93' (Free Discharge)
 ↑2=Orifice/Grate (Orifice Controls 0.047 cfs @ 3.80 fps)

Pond 1A-Infil: Infil. Basin A1

Hydrograph



Summary for Subcatchment 2A: R1A, R1B, A2

Runoff = 0.148 cfs @ 7.87 hrs, Volume= 0.047 af, Depth= 4.11"

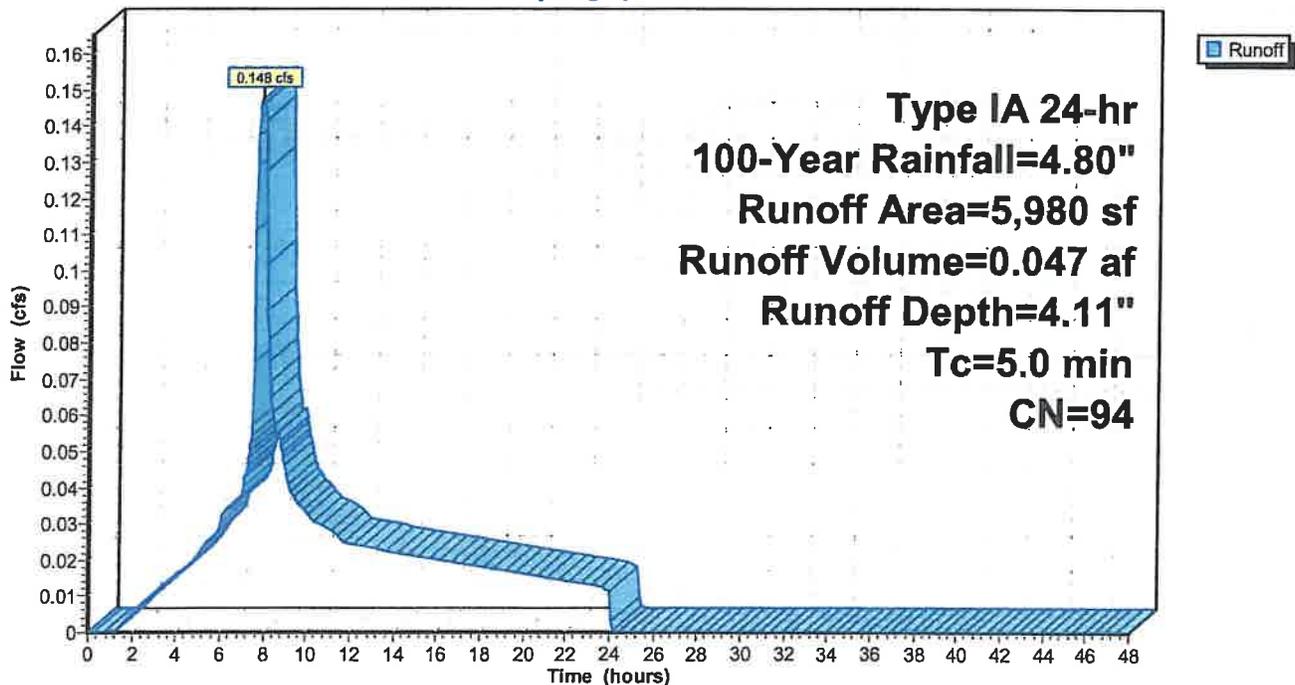
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-Year Rainfall=4.80"

Area (sf)	CN	Description
2,492	98	Roofs, HSG B
1,128	79	<50% Grass cover, Poor, HSG B
2,360	98	Roofs, HSG B
5,980	94	Weighted Average
1,128		18.86% Pervious Area
4,852		81.14% Impervious Area

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

Subcatchment 2A: R1A, R1B, A2

Hydrograph



Summary for Pond 2A-Infil: Infil. Basin A2

Inflow Area = 0.137 ac, 81.14% Impervious, Inflow Depth = 8.67" for 100-Year event
 Inflow = 0.179 cfs @ 7.93 hrs, Volume= 0.099 af
 Outflow = 0.061 cfs @ 15.65 hrs, Volume= 0.099 af, Atten= 66%, Lag= 463.0 min
 Discarded = 0.052 cfs @ 15.65 hrs, Volume= 0.093 af
 Secondary = 0.009 cfs @ 15.65 hrs, Volume= 0.006 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 207.41' @ 15.65 hrs Surf.Area= 1,078 sf Storage= 1,016 cf

Plug-Flow detention time= 240.3 min calculated for 0.099 af (100% of inflow)
 Center-of-Mass det. time= 240.5 min (1,049.7 - 809.3)

Volume	Invert	Avail.Storage	Storage Description		
#1	206.00'	1,115 cf	Custom Stage Data (Irregular) Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
206.00	385	151.0	0	0	385
206.50	619	160.4	249	249	631
207.00	866	169.8	370	618	891
207.50	1,128	179.3	497	1,115	1,169

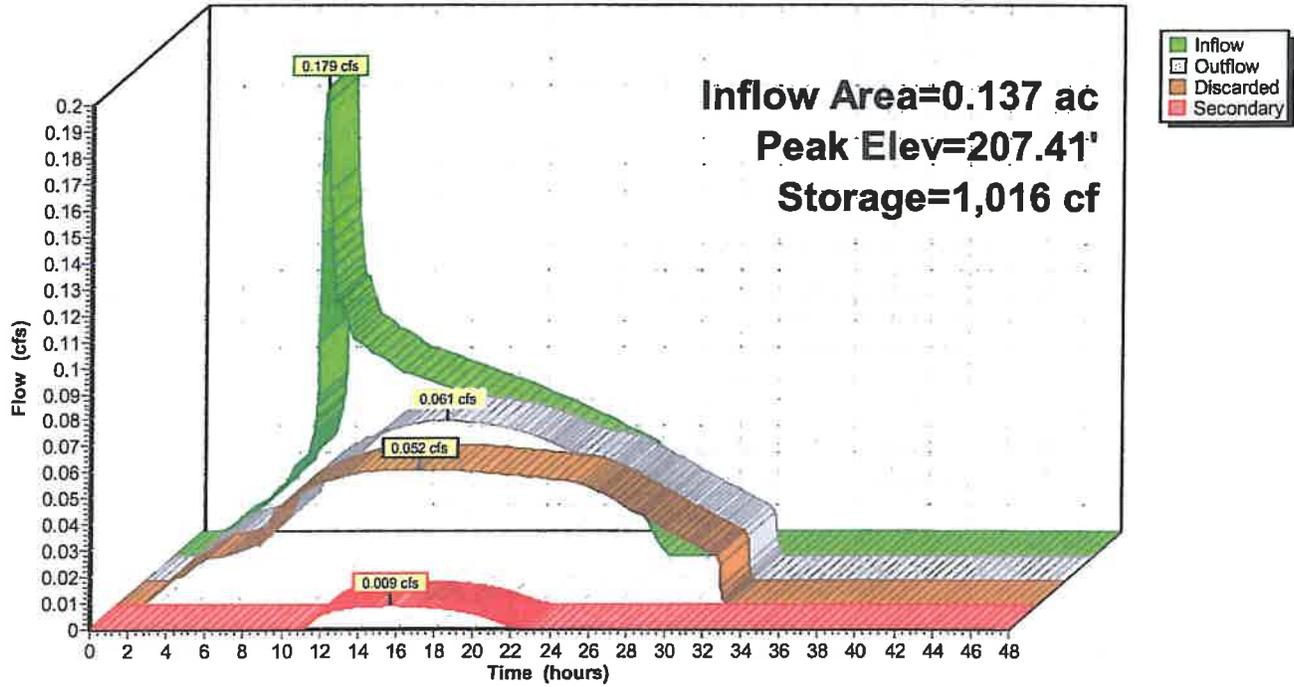
Device	Routing	Invert	Outlet Devices
#1	Discarded	206.00'	2.000 in/hr Exfiltration over Wetted area above 205.00' Excluded Wetted area = 0 sf
#2	Secondary	207.25'	1.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.052 cfs @ 15.65 hrs HW=207.41' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.052 cfs)

Secondary OutFlow Max=0.009 cfs @ 15.65 hrs HW=207.41' (Free Discharge)
 ↑2=Orifice/Grate (Orifice Controls 0.009 cfs @ 1.66 fps)

Pond 2A-Infil: Infil. Basin A2

Hydrograph



Summary for Subcatchment 3A: R1C, P4, A3

Runoff = 0.180 cfs @ 7.87 hrs, Volume= 0.057 af, Depth= 4.22"

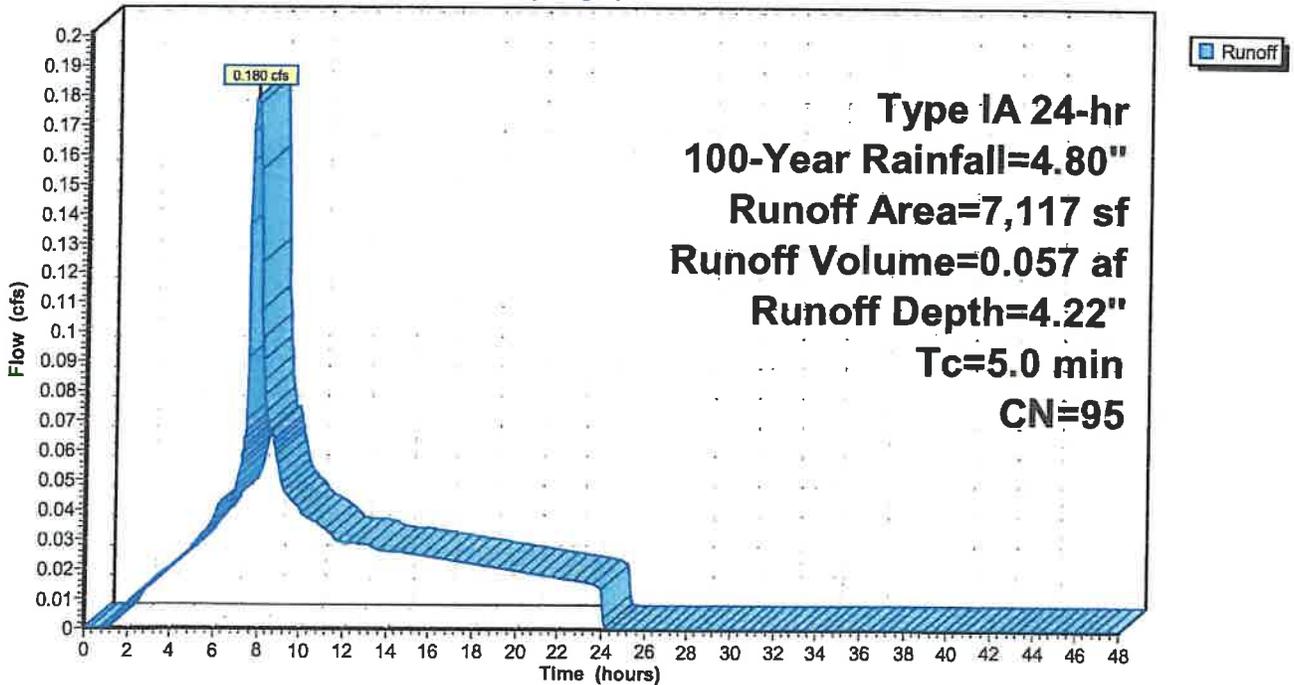
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-Year Rainfall=4.80"

Area (sf)	CN	Description
1,974	98	Roofs, HSG B
3,917	98	Paved parking, HSG B
1,226	79	<50% Grass cover, Poor, HSG B
7,117	95	Weighted Average
1,226		17.23% Pervious Area
5,891		82.77% Impervious Area

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

Subcatchment 3A: R1C, P4, A3

Hydrograph



Summary for Pond 3A-Infil: Infil. Basin A3

Inflow Area = 0.163 ac, 82.77% Impervious, Inflow Depth = 4.67" for 100-Year event
 Inflow = 0.180 cfs @ 7.87 hrs, Volume= 0.064 af
 Outflow = 0.030 cfs @ 17.90 hrs, Volume= 0.060 af, Atten= 83%, Lag= 602.2 min
 Discarded = 0.030 cfs @ 17.90 hrs, Volume= 0.060 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 206.95' @ 17.90 hrs Surf.Area= 1,195 sf Storage= 1,178 cf

Plug-Flow detention time= 576.0 min calculated for 0.060 af (94% of inflow)
 Center-of-Mass det. time= 534.2 min (1,245.6 - 711.3)

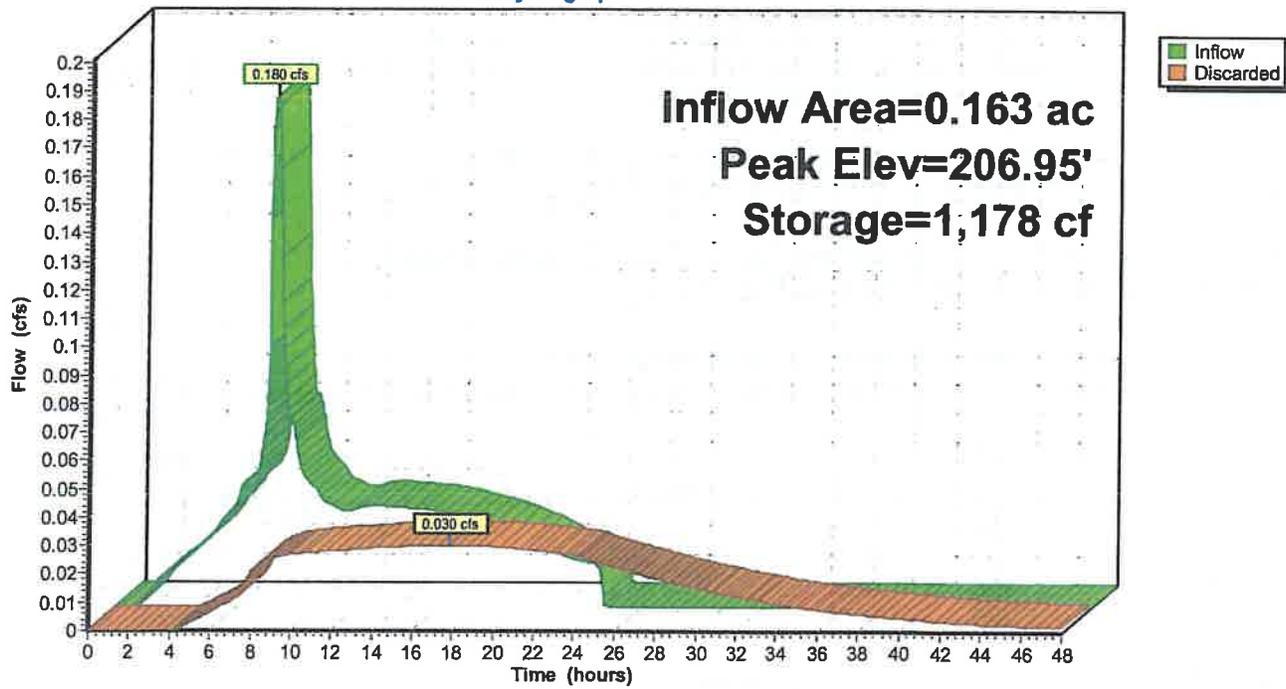
Volume	Invert	Avail.Storage	Storage Description			
#1	205.50'	1,244 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
205.50	459	156.4	0	0	459	
206.00	700	165.8	288	288	713	
206.50	956	175.3	412	700	985	
207.00	1,226	184.7	544	1,244	1,269	

Device	Routing	Invert	Outlet Devices
#1	Discarded	205.75'	2.000 in/hr Exfiltration over Wetted area above 205.75' Excluded Wetted area = 584 sf

Discarded OutFlow Max=0.030 cfs @ 17.90 hrs HW=206.95' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.030 cfs)

Pond 3A-Infil: Infil. Basin A3

Hydrograph



Summary for Subcatchment B: P2 & P3 - R3 & R5 - B1

Runoff = 0.427 cfs @ 7.87 hrs, Volume= 0.137 af, Depth= 4.22"

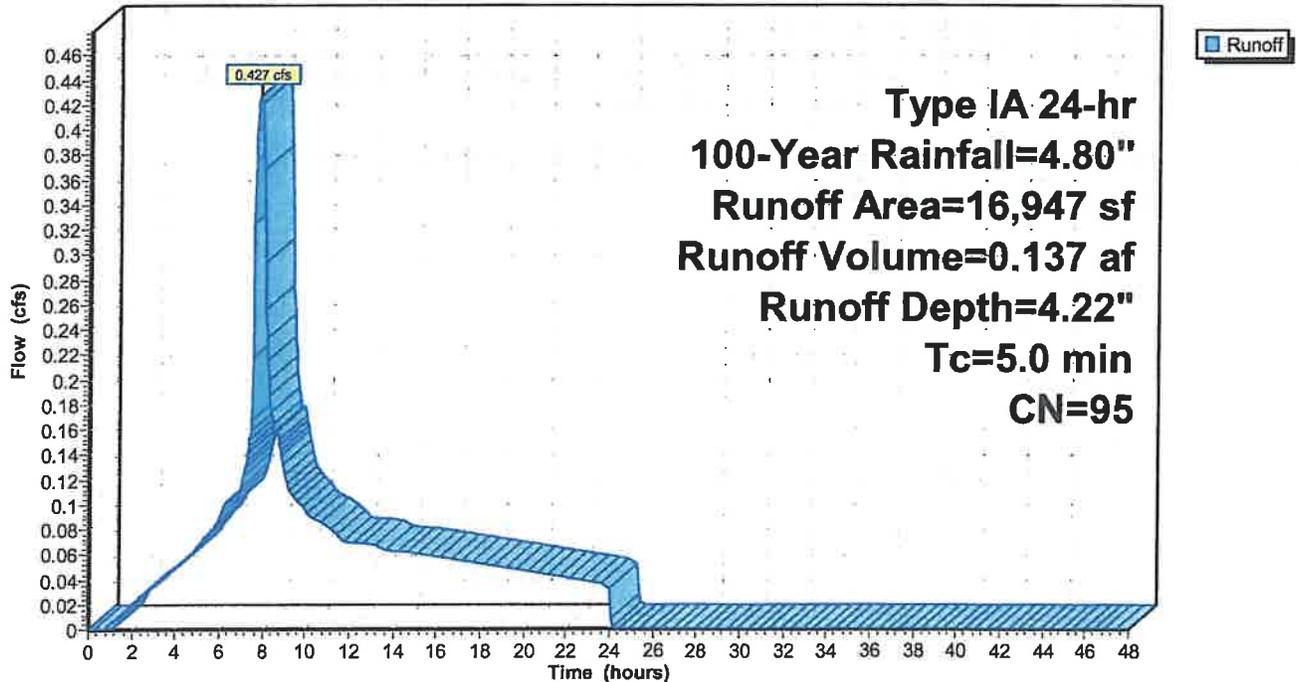
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100-Year Rainfall=4.80"

Area (sf)	CN	Description
2,300	98	Paved parking, HSG B
5,395	98	Paved parking, HSG B
3,723	98	Roofs, HSG B
3,164	98	Roofs, HSG B
2,365	79	<50% Grass cover, Poor, HSG B
16,947	95	Weighted Average
2,365		13.96% Pervious Area
14,582		86.04% Impervious Area

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

Subcatchment B: P2 & P3 - R3 & R5 - B1

Hydrograph



Summary for Pond B-Infil: Infil. Basin B

Inflow Area = 0.389 ac, 86.04% Impervious, Inflow Depth = 4.22" for 100-Year event
 Inflow = 0.427 cfs @ 7.87 hrs, Volume= 0.137 af
 Outflow = 0.051 cfs @ 18.38 hrs, Volume= 0.125 af, Atten= 88%, Lag= 631.0 min
 Discarded = 0.051 cfs @ 18.38 hrs, Volume= 0.125 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 208.61' @ 18.38 hrs Surf.Area= 2,365 sf Storage= 3,014 cf

Plug-Flow detention time= 760.9 min calculated for 0.125 af (91% of inflow)
 Center-of-Mass det. time= 699.0 min (1,381.5 - 682.5)

Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	3,931 cf	Custom Stage Data (Irregular) Listed below (Recalc)

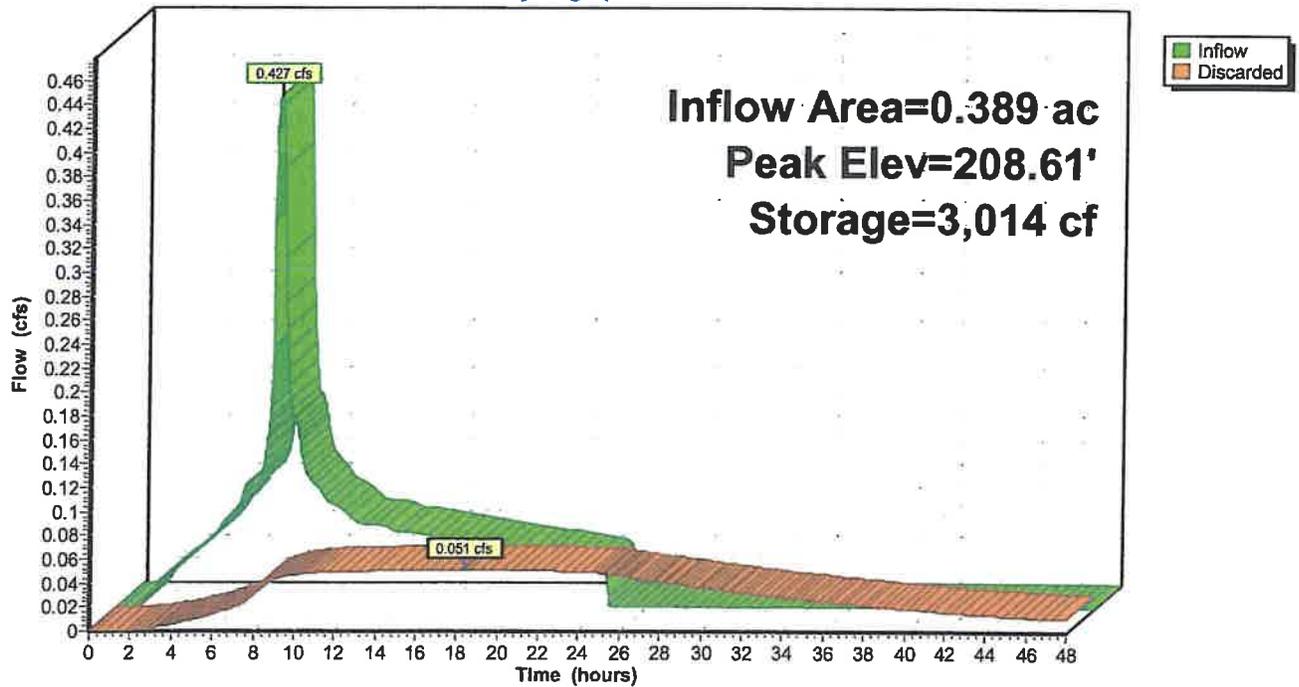
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
207.00	1,324	217.7	0	0	1,324
207.50	1,657	226.5	744	744	1,654
208.00	2,004	235.9	914	1,658	2,019
208.50	2,365	245.3	1,091	2,749	2,399
209.00	2,365	245.3	1,183	3,931	2,521

Device	Routing	Invert	Outlet Devices
#1	Discarded	207.00'	2.000 in/hr Exfiltration over Wetted area above 207.00' Excluded Wetted area = 1,324 sf

Discarded OutFlow Max=0.051 cfs @ 18.38 hrs HW=208.61' (Free Discharge)
 ↑ 1=Exfiltration (Exfiltration Controls 0.051 cfs)

Pond B-Infil: Infil. Basin B

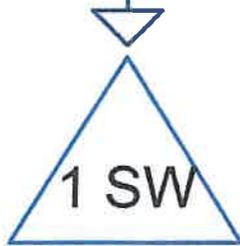
Hydrograph





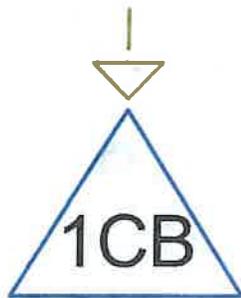
1 Lindy

WES-Lindy



1 SW

Swale 1



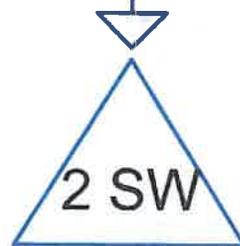
1CB

C 82/Lindy CB



2 Cornwell

WES-Cornwell



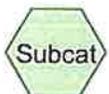
2 SW

Swale 2



2CB

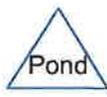
C 82/Cornwell CB



Subcat



Reach



Pond



Link

Summary for Subcatchment 1 Lindy: WES-Lindy

Runoff = 0.056 cfs @ 7.86 hrs, Volume= 0.018 af, Depth= 2.37"

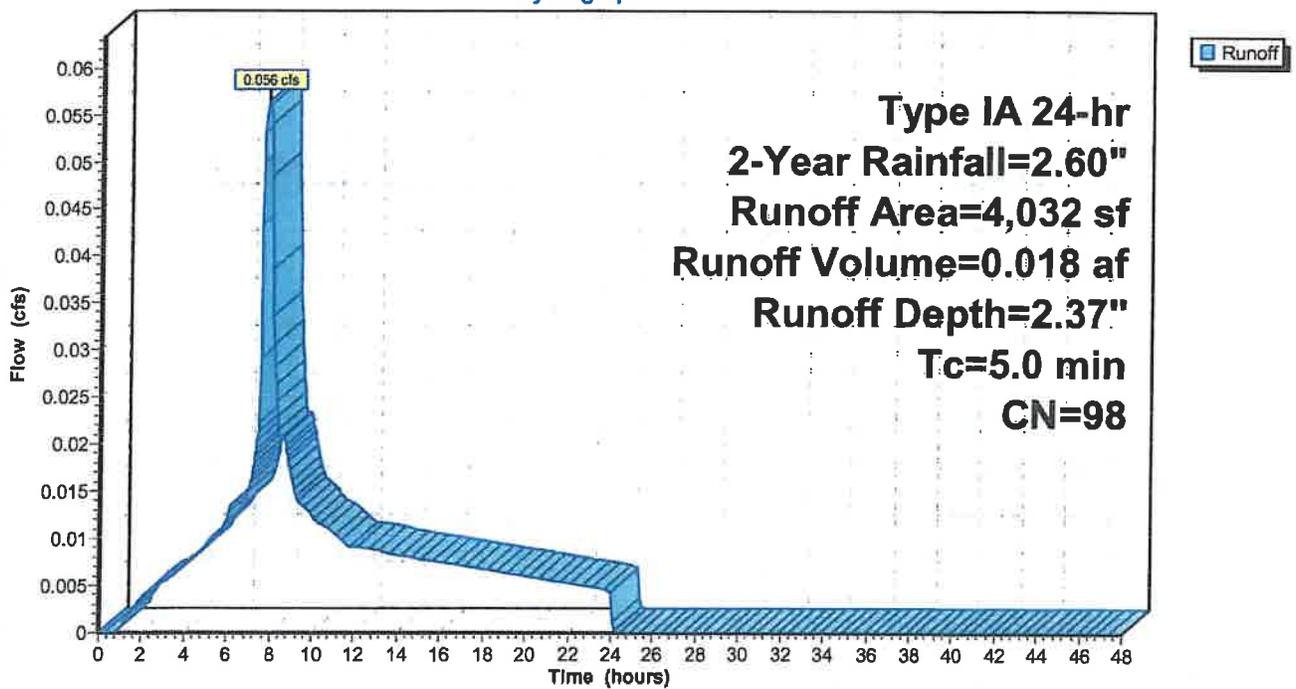
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Type IA 24-hr 2-Year Rainfall=2.60"

Area (sf)	CN	Description
3,019	98	Paved parking, HSG B
1,013	98	Paved parking, HSG B
4,032	98	Weighted Average
4,032		100.00% Impervious Area

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

Subcatchment 1 Lindy: WES-Lindy

Hydrograph



Summary for Pond 1 SW: Swale 1

Inflow Area = 0.093 ac, 100.00% Impervious, Inflow Depth = 2.37" for 2-Year event
 Inflow = 0.056 cfs @ 7.86 hrs, Volume= 0.018 af
 Outflow = 0.020 cfs @ 8.72 hrs, Volume= 0.018 af, Atten= 64%, Lag= 51.4 min
 Discarded = 0.020 cfs @ 8.72 hrs, Volume= 0.018 af
 Tertiary = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 207.62' @ 8.72 hrs Surf.Area= 438 sf Storage= 133 cf

Plug-Flow detention time= 65.6 min calculated for 0.018 af (100% of inflow)
 Center-of-Mass det. time= 65.5 min (736.2 - 670.7)

Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	817 cf	115.00'L x 1.50'H Prismatic Z=3.0

Device	Routing	Invert	Outlet Devices
#1	Discarded	207.00'	2.000 in/hr Exfiltration over Surface area above 207.00' Excluded Surface area = 0 sf
#2	Tertiary	208.50'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.020 cfs @ 8.72 hrs HW=207.62' (Free Discharge)

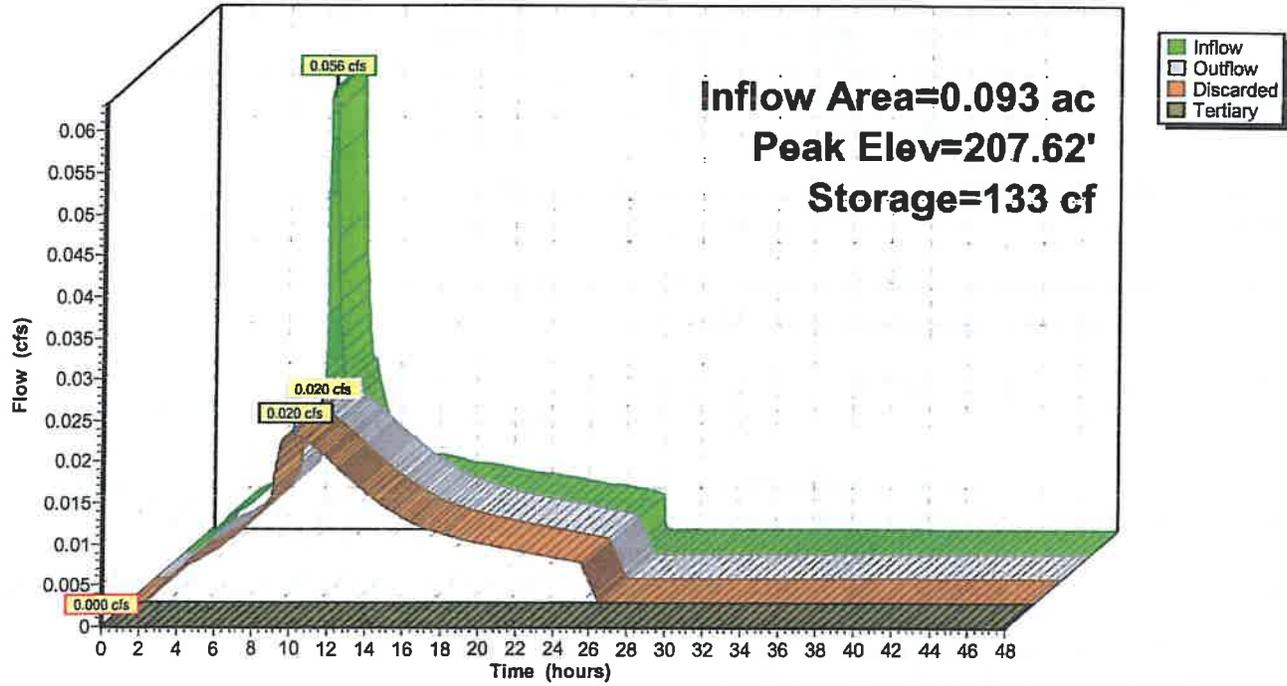
↑1=Exfiltration (Exfiltration Controls 0.020 cfs)

Tertiary OutFlow Max=0.000 cfs @ 0.00 hrs HW=207.00' (Free Discharge)

↑2=Orifice/Grate (Controls 0.000 cfs)

Pond 1 SW: Swale 1

Hydrograph



Summary for Pond 1CB: C 82/Lindy CB

Inflow = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

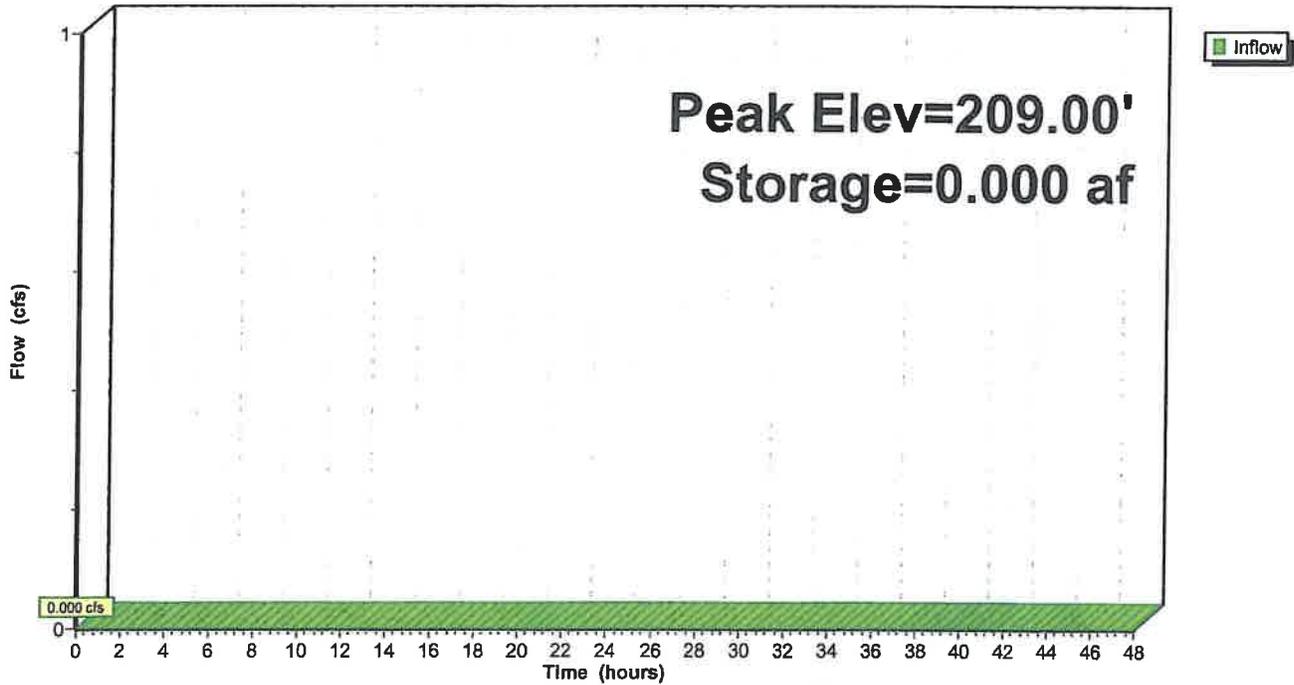
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 209.00' @ 0.00 hrs Surf.Area= 0.023 ac Storage= 0.000 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	209.00'	0.138 af	20.00'W x 50.00'L x 6.00'H Prismatic

Pond 1CB: C 82/Lindy CB

Hydrograph



Summary for Subcatchment 2 Cornwell: WES-Cornwell

Runoff = 0.025 cfs @ 7.86 hrs, Volume= 0.008 af, Depth= 2.37"

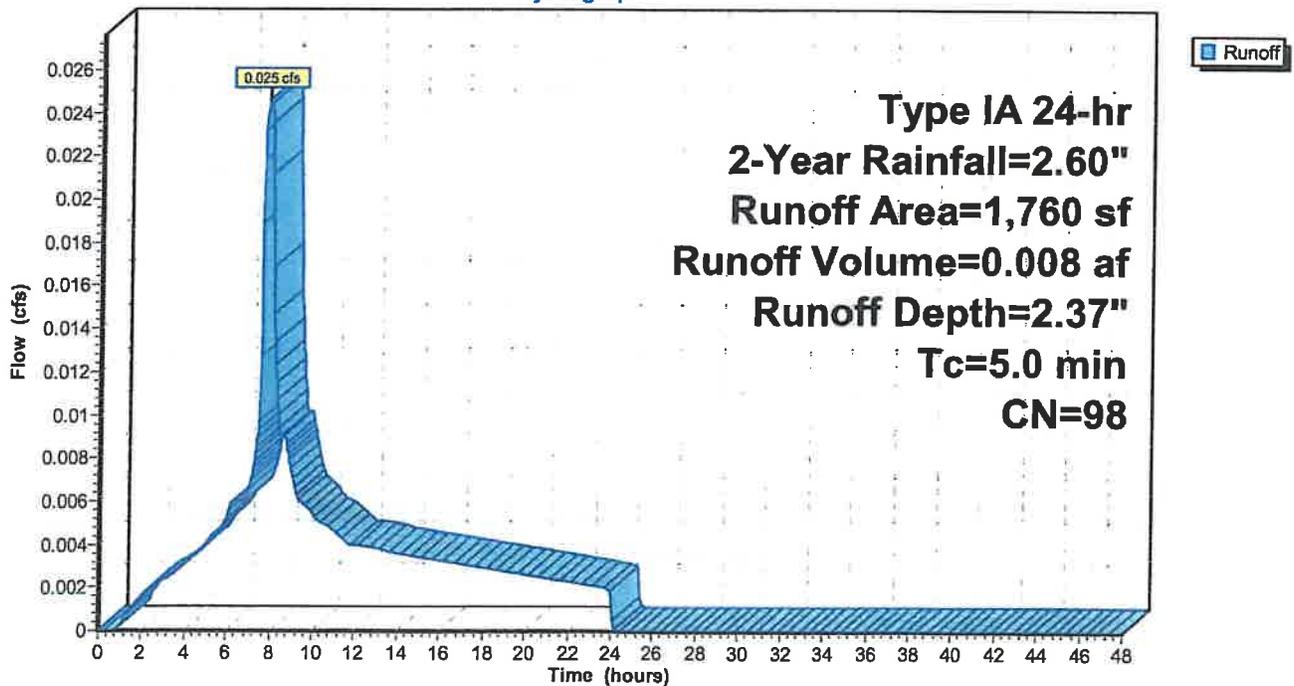
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2-Year Rainfall=2.60"

Area (sf)	CN	Description
1,285	98	Paved parking, HSG B
475	98	Paved parking, HSG B
1,760	98	Weighted Average
1,760		100.00% Impervious Area

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

Subcatchment 2 Cornwell: WES-Cornwell

Hydrograph



Summary for Pond 2 SW: Swale 2

Inflow Area = 0.040 ac, 100.00% Impervious, Inflow Depth = 2.37" for 2-Year event
 Inflow = 0.025 cfs @ 7.86 hrs, Volume= 0.008 af
 Outflow = 0.008 cfs @ 8.83 hrs, Volume= 0.008 af, Atten= 67%, Lag= 58.4 min
 Discarded = 0.008 cfs @ 8.83 hrs, Volume= 0.008 af
 Tertiary = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 207.81' @ 8.83 hrs Surf.Area= 169 sf Storage= 65 cf

Plug-Flow detention time= 85.1 min calculated for 0.008 af (100% of inflow)
 Center-of-Mass det. time= 85.1 min (755.8 - 670.7)

Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	243 cf	30.00'L x 1.50'H Prismatic Z=3.0

Device	Routing	Invert	Outlet Devices
#1	Discarded	207.00'	2.000 in/hr Exfiltration over Wetted area above 207.00' Excluded Wetted area = 0 sf
#2	Tertiary	208.50'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.008 cfs @ 8.83 hrs HW=207.81' (Free Discharge)

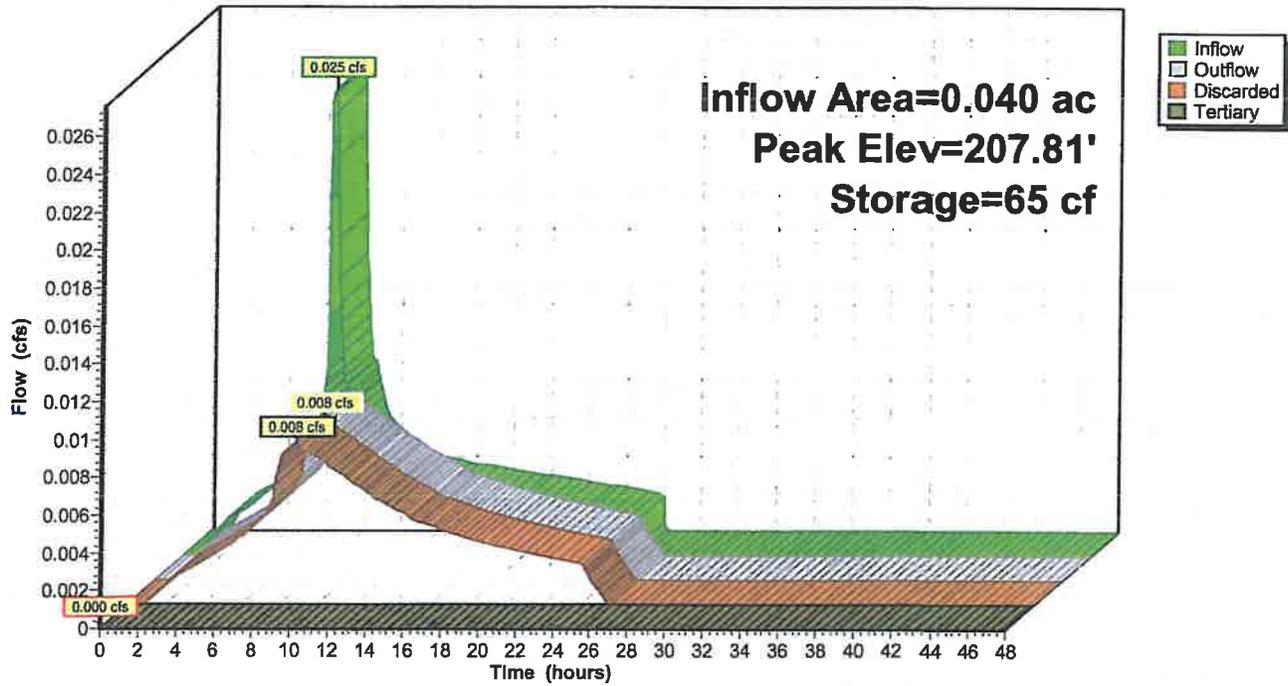
↑1=Exfiltration (Exfiltration Controls 0.008 cfs)

Tertiary OutFlow Max=0.000 cfs @ 0.00 hrs HW=207.00' (Free Discharge)

↑2=Orifice/Grate (Controls 0.000 cfs)

Pond 2 SW: Swale 2

Hydrograph



Summary for Pond 2CB: C 82/Cornwell CB

Inflow = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

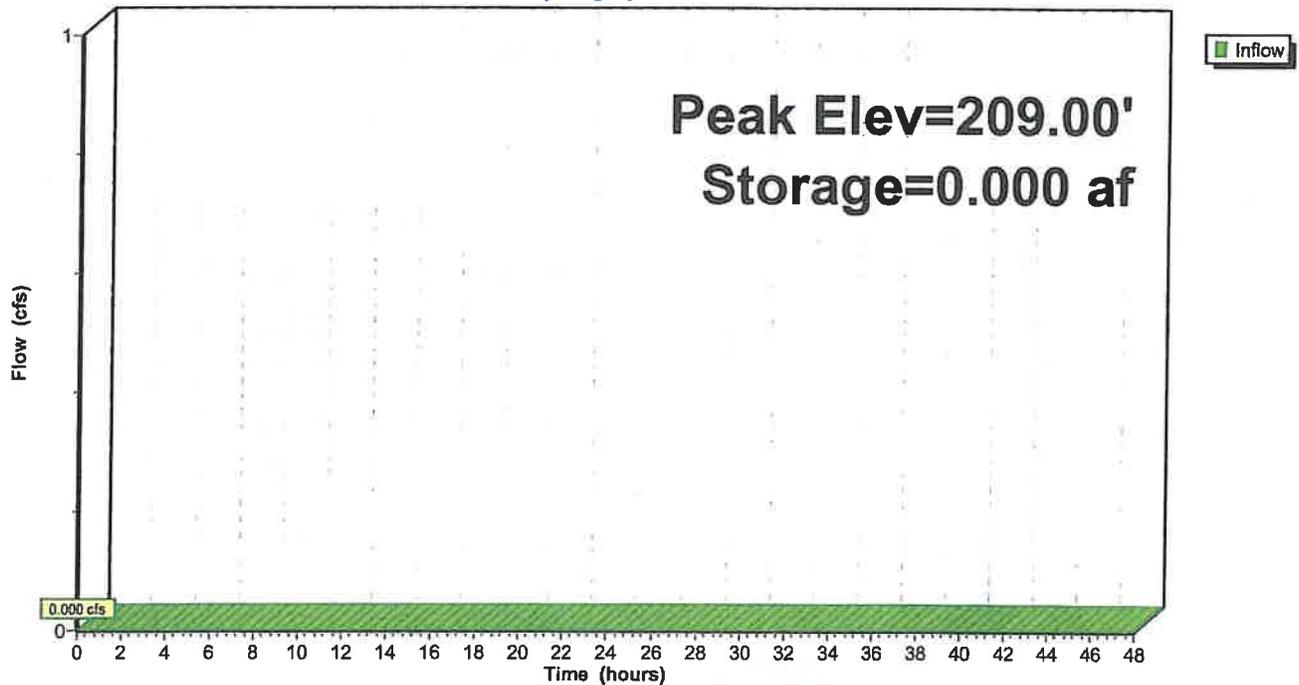
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 209.00' @ 0.00 hrs Surf.Area= 0.023 ac Storage= 0.000 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	209.00'	0.138 af	20.00'W x 50.00'L x 6.00'H Prismaoid

Pond 2CB: C 82/Cornwell CB

Hydrograph



Washman Lindy ROW Swales

Prepared by Microsoft

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Type IA 24-hr 25-Year Rainfall=4.00"

Printed 7/11/2019

Page 10

Summary for Subcatchment 1 Lindy: WES-Lindy

Runoff = 0.088 cfs @ 7.86 hrs, Volume= 0.029 af, Depth= 3.77"

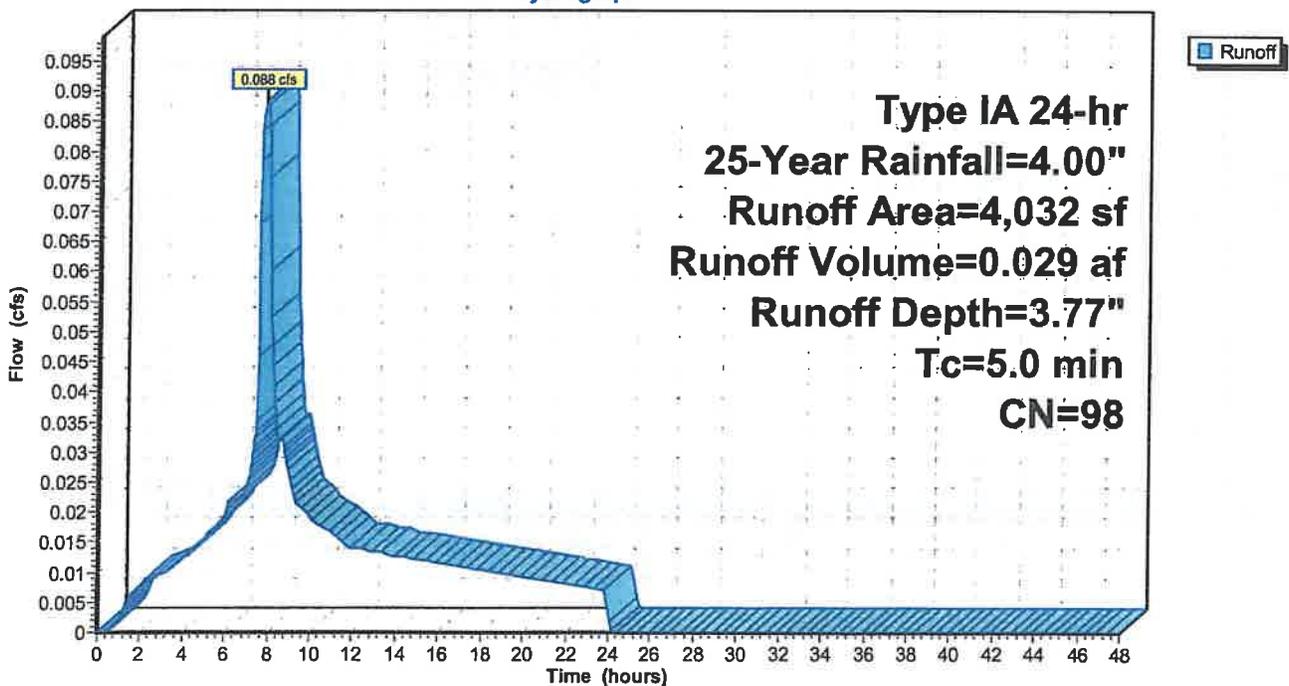
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25-Year Rainfall=4.00"

Area (sf)	CN	Description
3,019	98	Paved parking, HSG B
1,013	98	Paved parking, HSG B
4,032	98	Weighted Average
4,032		100.00% Impervious Area

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

Subcatchment 1 Lindy: WES-Lindy

Hydrograph



Summary for Pond 1 SW: Swale 1

Inflow Area = 0.093 ac, 100.00% Impervious, Inflow Depth = 3.77" for 25-Year event
 Inflow = 0.088 cfs @ 7.86 hrs, Volume= 0.029 af
 Outflow = 0.028 cfs @ 8.91 hrs, Volume= 0.029 af, Atten= 68%, Lag= 63.3 min
 Discarded = 0.028 cfs @ 8.91 hrs, Volume= 0.029 af
 Tertiary = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 207.84' @ 8.91 hrs Surf.Area= 604 sf Storage= 250 cf

Plug-Flow detention time= 96.2 min calculated for 0.029 af (100% of inflow)
 Center-of-Mass det. time= 96.1 min (755.0 - 658.9)

Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	817 cf	115.00'L x 1.50'H Prismatic Z=3.0

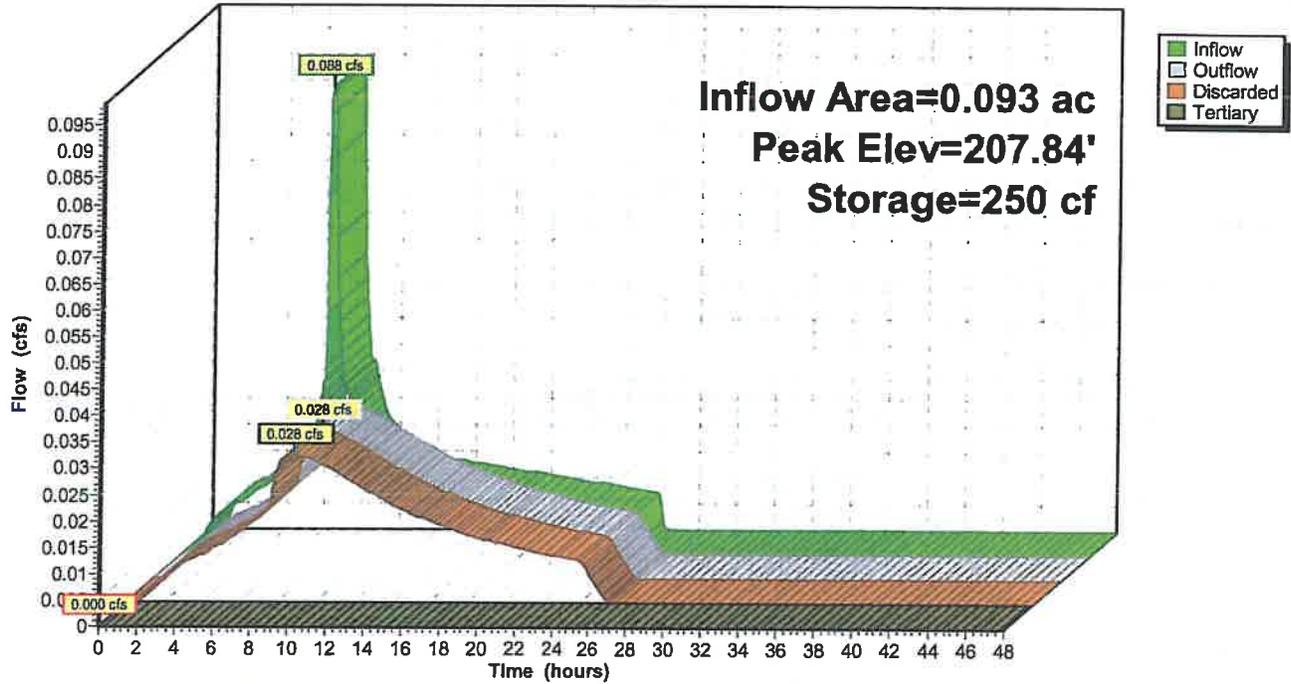
Device	Routing	Invert	Outlet Devices
#1	Discarded	207.00'	2.000 in/hr Exfiltration over Surface area above 207.00' Excluded Surface area = 0 sf
#2	Tertiary	208.50'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.028 cfs @ 8.91 hrs HW=207.84' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.028 cfs)

Tertiary OutFlow Max=0.000 cfs @ 0.00 hrs HW=207.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.000 cfs)

Pond 1 SW: Swale 1

Hydrograph



Summary for Pond 1CB: C 82/Lindy CB

Inflow = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

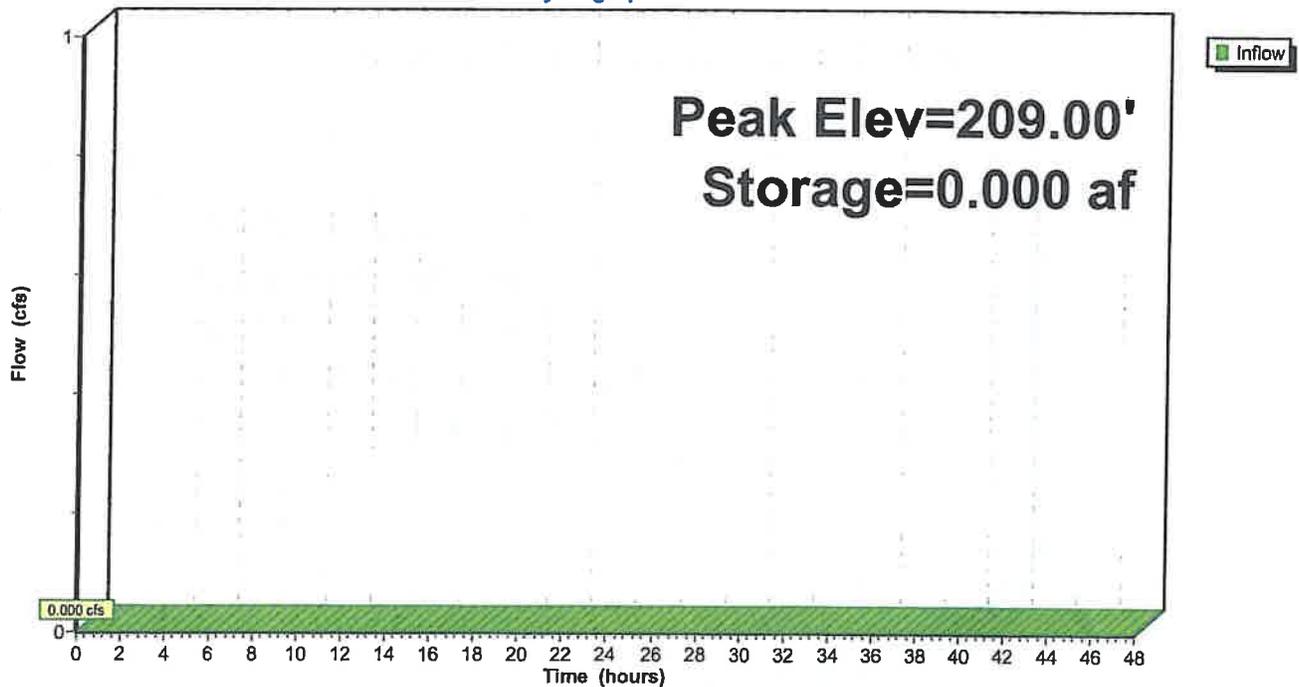
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 209.00' @ 0.00 hrs Surf.Area= 0.023 ac Storage= 0.000 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Table with 4 columns: Volume, Invert, Avail.Storage, Storage Description. Row #1: 209.00', 0.138 af, 20.00'W x 50.00'L x 6.00'H Prismaoid

Pond 1CB: C 82/Lindy CB

Hydrograph



Summary for Subcatchment 2 Cornwell: WES-Cornwell

Runoff = 0.039 cfs @ 7.86 hrs, Volume= 0.013 af, Depth= 3.77"

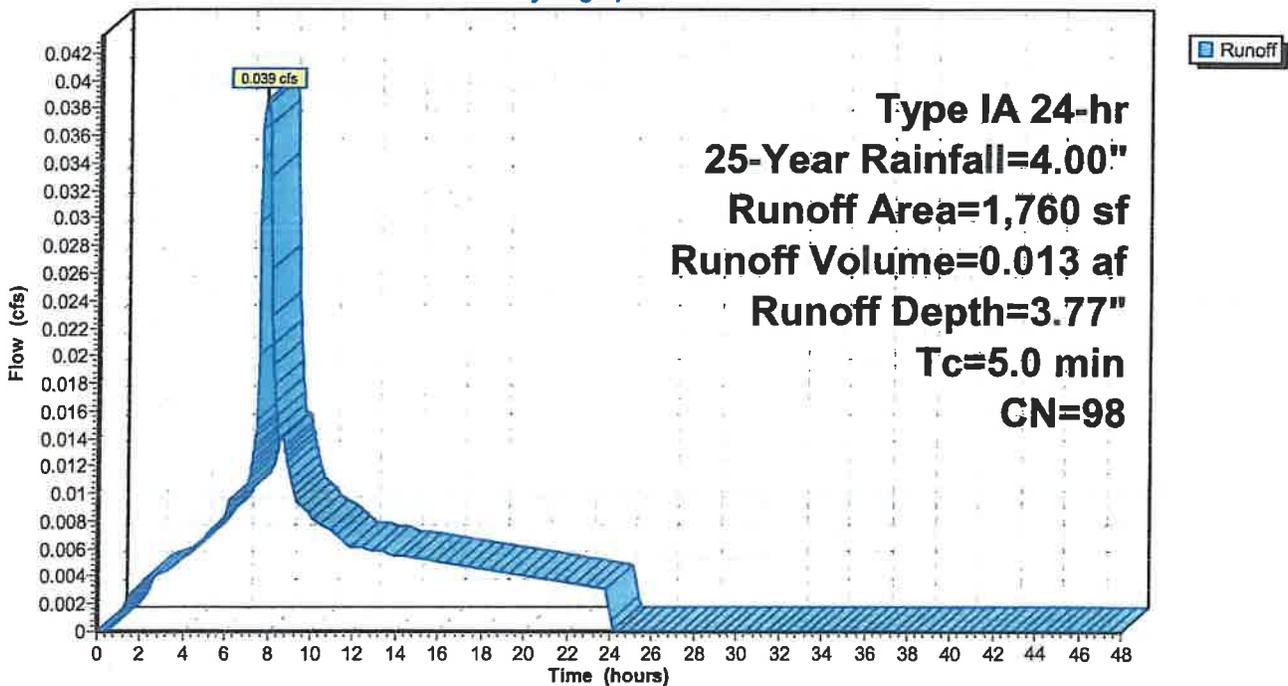
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Type IA 24-hr 25-Year Rainfall=4.00"

Area (sf)	CN	Description
1,285	98	Paved parking, HSG B
475	98	Paved parking, HSG B
1,760	98	Weighted Average
1,760		100.00% Impervious Area

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

Subcatchment 2 Cornwell: WES-Cornwell

Hydrograph



Summary for Pond 2 SW: Swale 2

Inflow Area = 0.040 ac, 100.00% Impervious, Inflow Depth = 3.77" for 25-Year event
 Inflow = 0.039 cfs @ 7.86 hrs, Volume= 0.013 af
 Outflow = 0.012 cfs @ 9.01 hrs, Volume= 0.013 af, Atten= 70%, Lag= 69.1 min
 Discarded = 0.012 cfs @ 9.01 hrs, Volume= 0.013 af
 Tertiary = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 208.08' @ 9.01 hrs Surf.Area= 236 sf Storage= 120 cf

Plug-Flow detention time= 119.9 min calculated for 0.013 af (100% of inflow)
 Center-of-Mass det. time= 119.9 min (778.8 - 658.9)

Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	243 cf	30.00'L x 1.50'H Prismatic Z=3.0

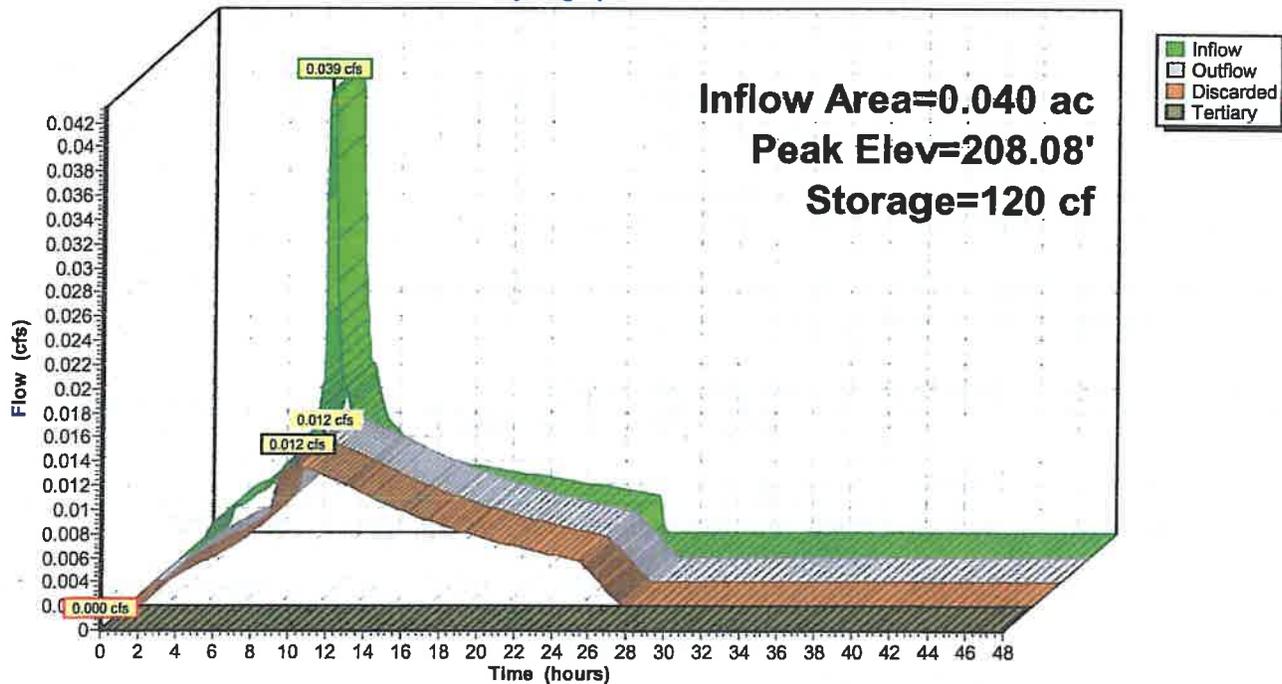
Device	Routing	Invert	Outlet Devices
#1	Discarded	207.00'	2.000 in/hr Exfiltration over Wetted area above 207.00' Excluded Wetted area = 0 sf
#2	Tertiary	208.50'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.012 cfs @ 9.01 hrs HW=208.08' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.012 cfs)

Tertiary OutFlow Max=0.000 cfs @ 0.00 hrs HW=207.00' (Free Discharge)
 ↳2=Orifice/Grate (Controls 0.000 cfs)

Pond 2 SW: Swale 2

Hydrograph



Summary for Pond 2CB: C 82/Cornwell CB

Inflow = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af
 Outflow = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

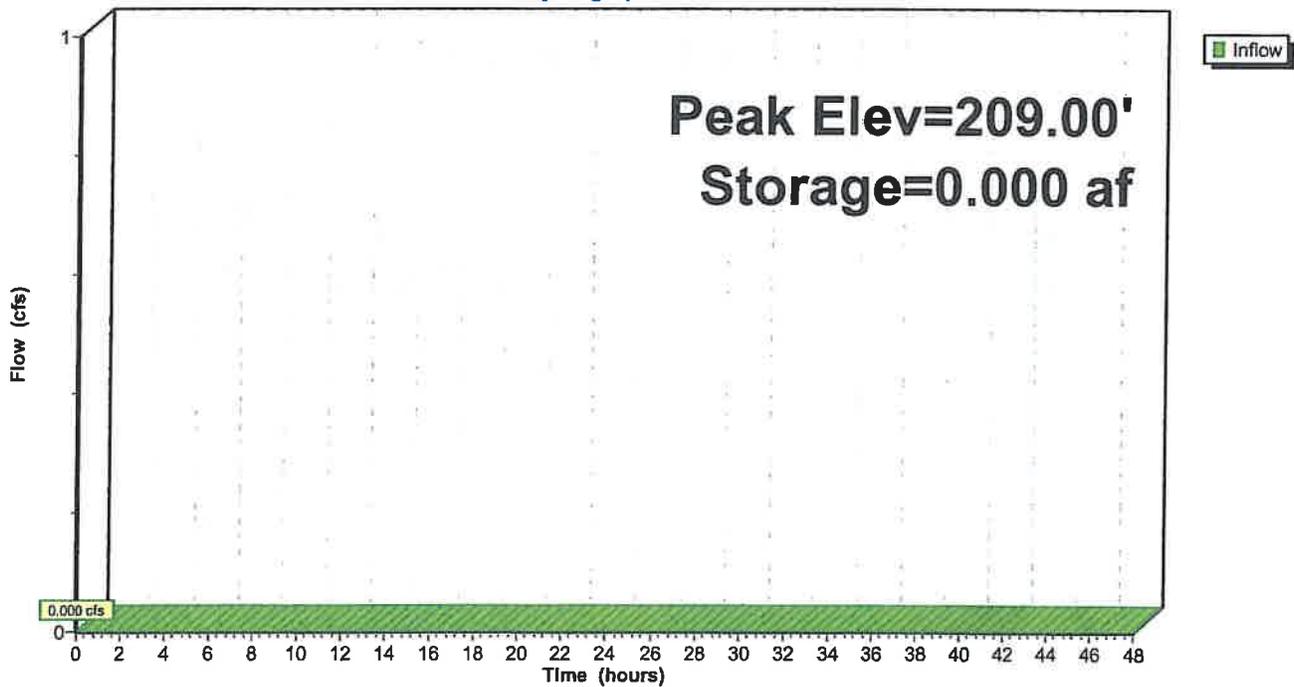
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 209.00' @ 0.00 hrs Surf.Area= 0.023 ac Storage= 0.000 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	209.00'	0.138 af	20.00'W x 50.00'L x 6.00'H Prismatic

Pond 2CB: C 82/Cornwell CB

Hydrograph



Summary for Subcatchment 1 Lindy: WES-Lindy

Runoff = 0.107 cfs @ 7.85 hrs, Volume= 0.035 af, Depth= 4.56"

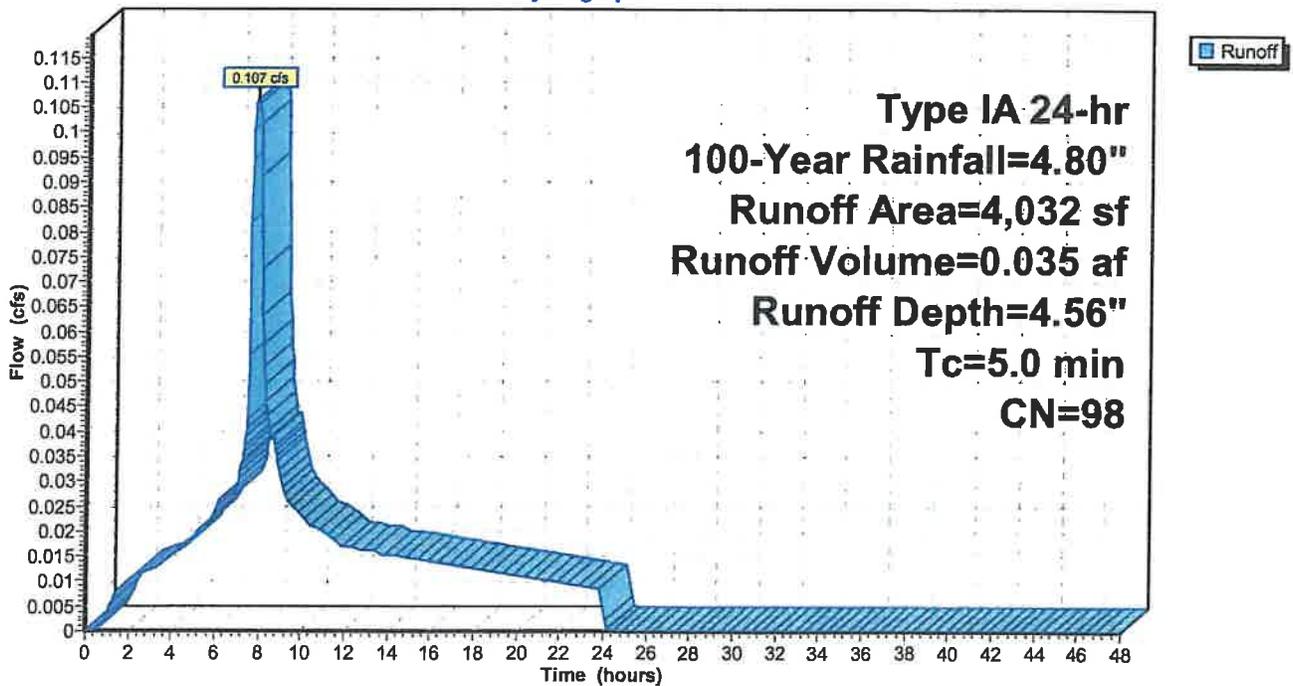
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Type IA 24-hr 100-Year Rainfall=4.80"

Area (sf)	CN	Description
3,019	98	Paved parking, HSG B
1,013	98	Paved parking, HSG B
4,032	98	Weighted Average
4,032		100.00% Impervious Area

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

Subcatchment 1 Lindy: WES-Lindy

Hydrograph



Summary for Pond 1 SW: Swale 1

Inflow Area = 0.093 ac, 100.00% Impervious, Inflow Depth = 4.56" for 100-Year event
 Inflow = 0.107 cfs @ 7.85 hrs, Volume= 0.035 af
 Outflow = 0.032 cfs @ 9.00 hrs, Volume= 0.035 af, Atten= 70%, Lag= 68.5 min
 Discarded = 0.032 cfs @ 9.00 hrs, Volume= 0.035 af
 Tertiary = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 207.95' @ 9.00 hrs Surf.Area= 690 sf Storage= 323 cf

Plug-Flow detention time= 112.4 min calculated for 0.035 af (100% of inflow)
 Center-of-Mass det. time= 112.4 min (767.3 - 654.9)

Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	817 cf	115.00'L x 1.50'H Prismatic Z=3.0

Device	Routing	Invert	Outlet Devices
#1	Discarded	207.00'	2.000 in/hr Exfiltration over Surface area above 207.00' Excluded Surface area = 0 sf
#2	Tertiary	208.50'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.032 cfs @ 9.00 hrs HW=207.95' (Free Discharge)

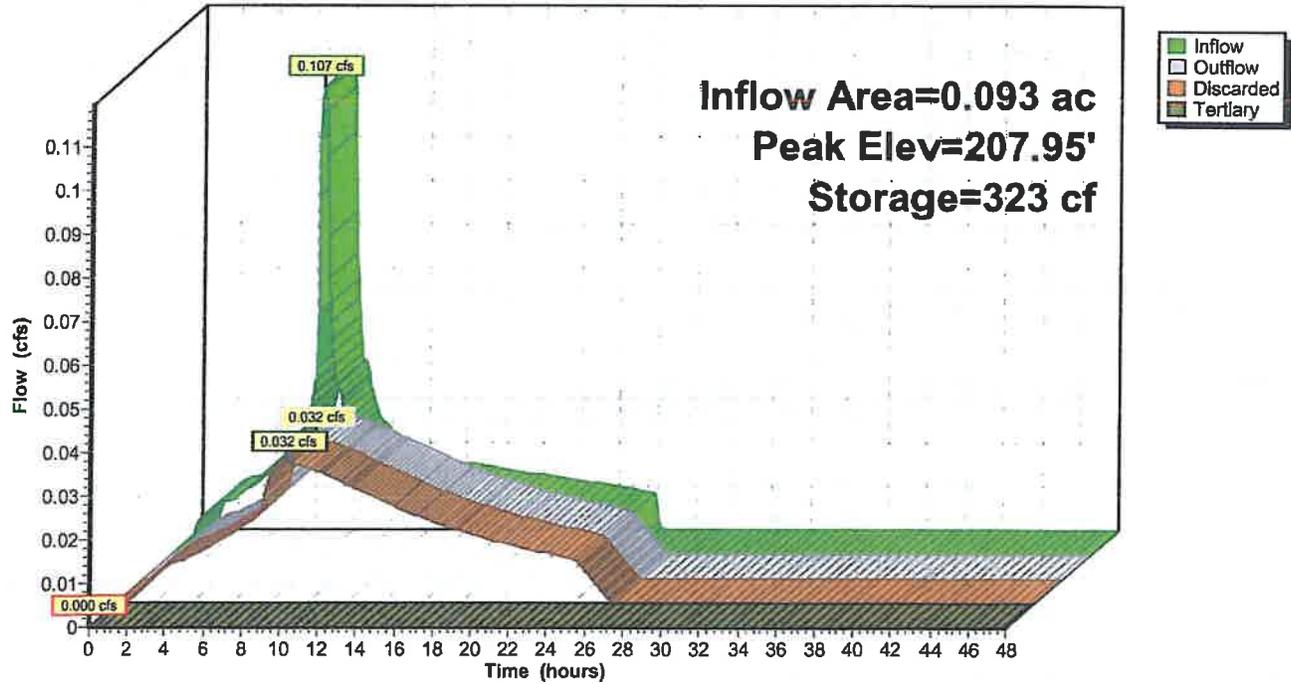
↳1=Exfiltration (Exfiltration Controls 0.032 cfs)

Tertiary OutFlow Max=0.000 cfs @ 0.00 hrs HW=207.00' (Free Discharge)

↳2=Orifice/Grate (Controls 0.000 cfs)

Pond 1 SW: Swale 1

Hydrograph



Summary for Pond 1CB: C 82/Lindy CB

Inflow = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

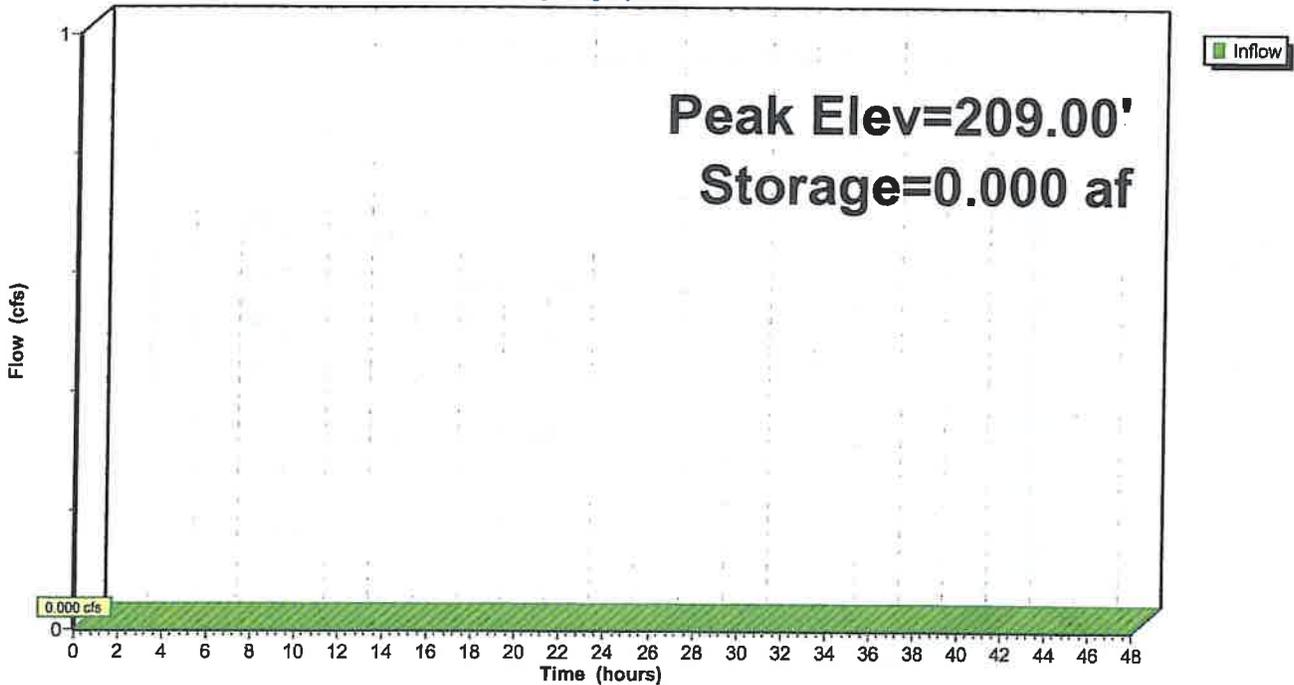
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 209.00' @ 0.00 hrs Surf.Area= 0.023 ac Storage= 0.000 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Table with 4 columns: Volume, Invert, Avail.Storage, Storage Description. Row #1: 209.00', 0.138 af, 20.00'W x 50.00'L x 6.00'H Prismatic

Pond 1CB: C 82/Lindy CB

Hydrograph



Summary for Subcatchment 2 Cornwell: WES-Cornwell

Runoff = 0.047 cfs @ 7.85 hrs, Volume= 0.015 af, Depth= 4.56"

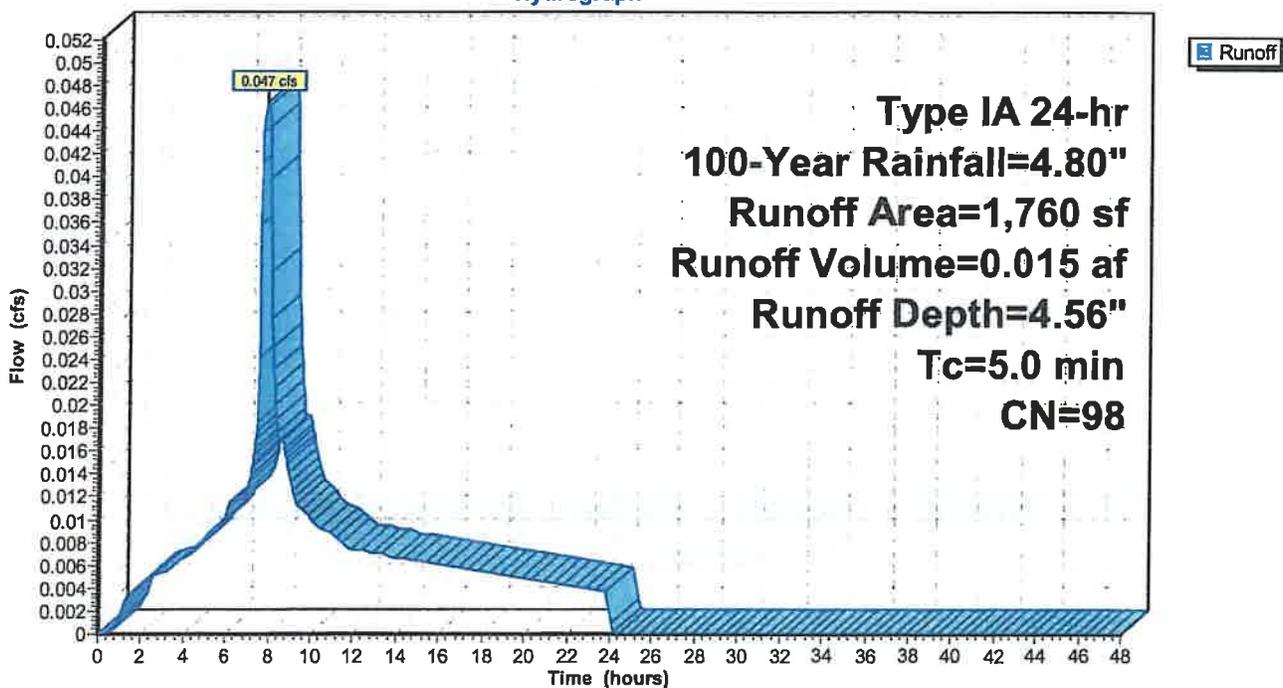
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Type IA 24-hr 100-Year Rainfall=4.80"

Area (sf)	CN	Description
1,285	98	Paved parking, HSG B
475	98	Paved parking, HSG B
1,760	98	Weighted Average
1,760		100.00% Impervious Area

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

Subcatchment 2 Cornwell: WES-Cornwell

Hydrograph



Summary for Pond 2 SW: Swale 2

Inflow Area = 0.040 ac, 100.00% Impervious, Inflow Depth = 4.56" for 100-Year event
 Inflow = 0.047 cfs @ 7.85 hrs, Volume= 0.015 af
 Outflow = 0.013 cfs @ 9.08 hrs, Volume= 0.015 af, Atten= 72%, Lag= 73.3 min
 Discarded = 0.013 cfs @ 9.08 hrs, Volume= 0.015 af
 Tertiary = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 208.21' @ 9.08 hrs Surf.Area= 271 sf Storage= 154 cf

Plug-Flow detention time= 137.5 min calculated for 0.015 af (100% of inflow)
 Center-of-Mass det. time= 137.5 min (792.4 - 654.9)

Volume	Invert	Avail.Storage	Storage Description
#1	207.00'	243 cf	30.00'L x 1.50'H Prismatic Z=3.0

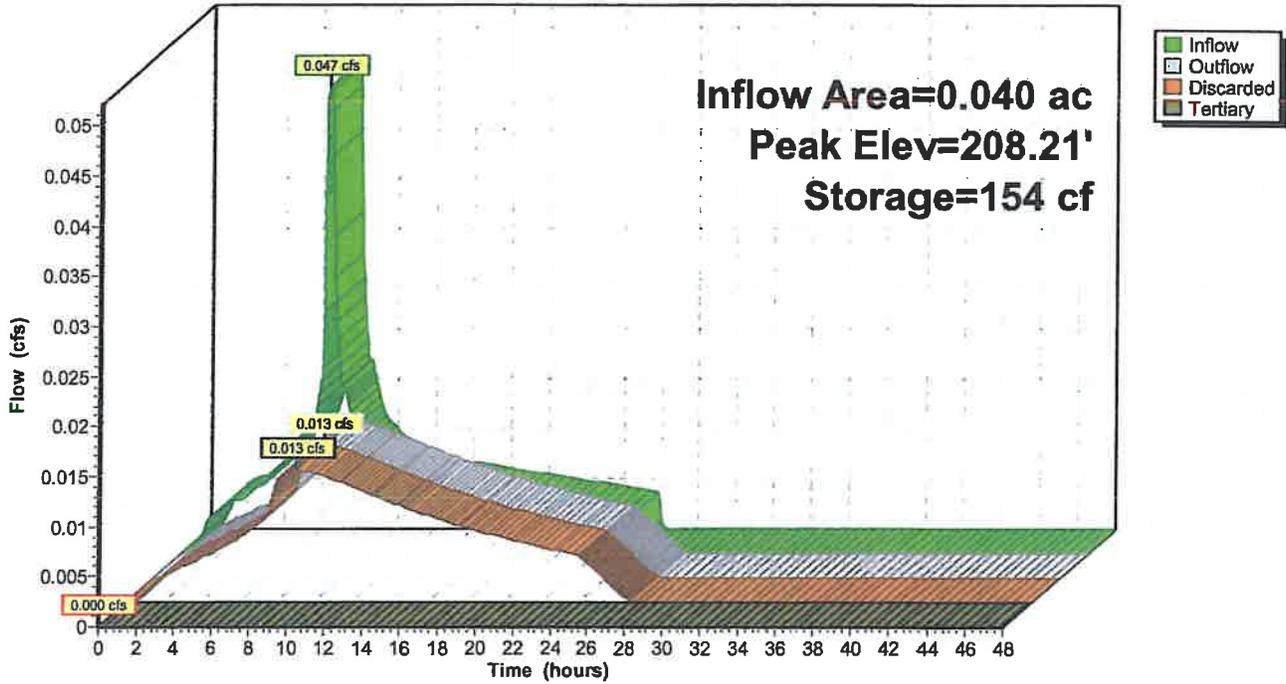
Device	Routing	Invert	Outlet Devices
#1	Discarded	207.00'	2.000 in/hr Exfiltration over Wetted area above 207.00' Excluded Wetted area = 0 sf
#2	Tertiary	208.50'	4.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.013 cfs @ 9.08 hrs HW=208.21' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.013 cfs)

Tertiary OutFlow Max=0.000 cfs @ 0.00 hrs HW=207.00' (Free Discharge)
 ↑2=Orifice/Grate (Controls 0.000 cfs)

Pond 2 SW: Swale 2

Hydrograph



Summary for Pond 2CB: C 82/Cornwell CB

Inflow = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.000 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

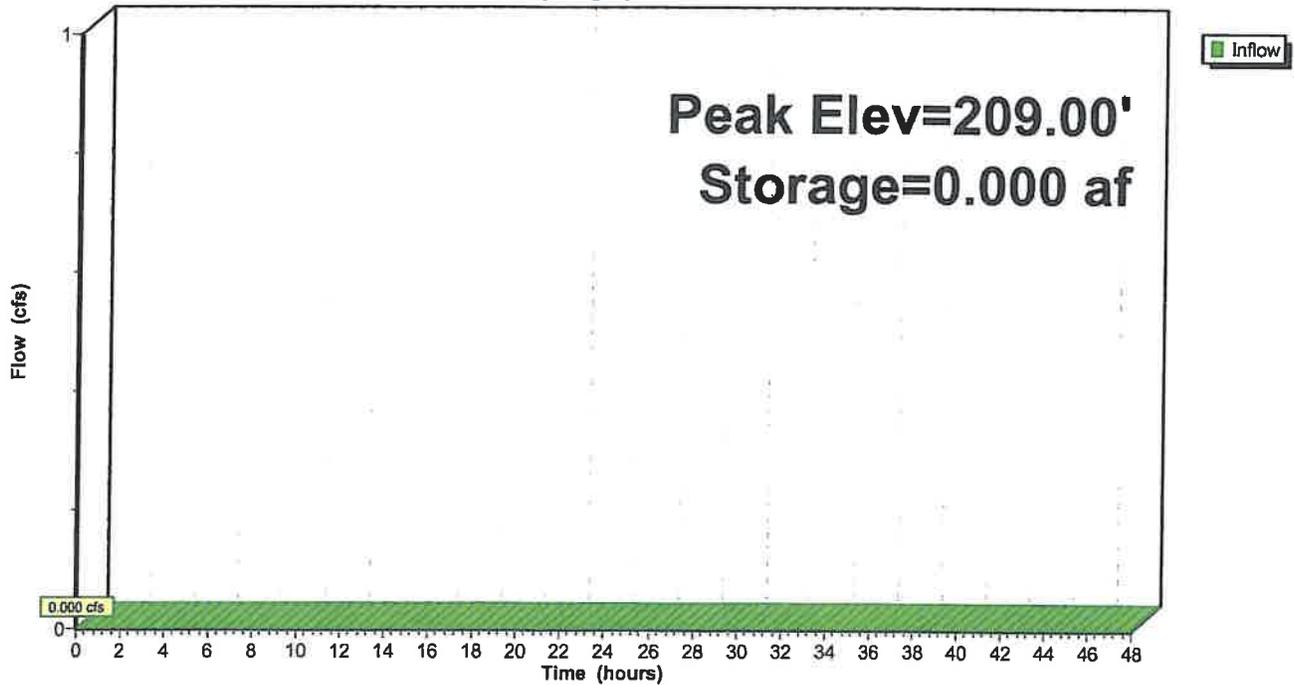
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 209.00' @ 0.00 hrs Surf.Area= 0.023 ac Storage= 0.000 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Table with 4 columns: Volume, Invert, Avail.Storage, Storage Description. Row #1: 209.00', 0.138 af, 20.00'W x 50.00'L x 6.00'H Prismatic

Pond 2CB: C 82/Cornwell CB

Hydrograph



APPENDIX C

WES BMP Sizing Tool

WES BMP Sizing Report

Project Information

Project Name	WASHMAN/LINDY - WES/ODOT
Project Type	Commercial
Location	8864 SE 82ND AVE
Stormwater Management Area	21457
Project Applicant	Washman, LLC
Jurisdiction	HappyValleyCCSD1

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
MITIGATE ODOT SW1	3,019	Grass	ConventionalConcrete	B	SW1
MITIGATE ODOT SW2	1,285	Grass	ConventionalConcrete	B	SW2
NEW WES SW1	1,013	Grass	ConventionalConcrete	B	SW1
NEW WES SW2	475	Grass	ConventionalConcrete	B	SW2

LID Facility Sizing Details

LID ID	Design Criteria	BMP Type	Facility Soil Type	Minimum Area (sq-ft)	Planned Areas (sq-ft)	Orifice Diameter (in)
SW1	FlowControlAndTreatment	Vegetated Swale - Infiltration	A1	403.2	620.0	0.0
SW2	FlowControlAndTreatment	Vegetated Swale - Infiltration	A1	176.0	195.0	0.0

Pond Sizing Details

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only
2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).
3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.
4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

WES BMP Sizing Report

Project Information

Project Name	WASHMAN/LINDY - WES/ODOT
Project Type	Commercial
Location	8864 SE 82ND AVE
Stormwater Management Area	21457
Project Applicant	Washman, LLC
Jurisdiction	HappyValleyCCSD1

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
MITIGATE ODOT SW1	3,019	Grass	ConventionalConcrete	B	SW1
MITIGATE ODOT SW2	1,285	Grass	ConventionalConcrete	B	SW2
NEW WES SW1	1,013	Grass	ConventionalConcrete	B	SW1
NEW WES SW2	475	Grass	ConventionalConcrete	B	SW2

LID Facility Sizing Details

LID ID	Design Criteria	BMP Type	Facility Soil Type	Minimum Area (sq-ft)	Planned Areas (sq-ft)	Orifice Diameter (in)
SW1	FlowControlAndTreatment	Vegetated Swale - Infiltration	A1	403.2	620.0	0.0
SW2	FlowControlAndTreatment	Vegetated Swale - Infiltration	A1	176.0	195.0	0.0

Pond Sizing Details

1. FCWQT = Flow control and water quality treatment, WQT = Water quality treatment only
2. Depth is measured from the bottom of the facility and includes the three feet of media (drain rock, separation layer and growing media).
3. Maximum volume of the facility. Includes the volume occupied by the media at the bottom of the facility.
4. Maximum water storage volume of the facility. Includes water storage in the three feet of soil media assuming a 40 percent porosity.

APPENDIX D

Infiltration Test Report



INFILTRATION TEST REPORT

January 17, 2018

Washman, LLC
PO Box 4124
Portland, OR 97208

Subject: Soil Stormwater Infiltration Testing Report
Washman SE 82nd and Lindy
Portland, OR 97206

INTRODUCTION

This report was prepared by Symons Engineering Consultants (SEC) to provide the results for soil infiltration testing. The infiltration results will be used to size the proposed stormwater infiltration facilities. The facilities will accommodate stormwater runoff from the proposed buildings, roadway and parking. The project site is located east of SE 82nd Ave. and north of SE Lindy St.

Authorization was received from Washman LLC for this infiltration test and included the following scope:

- EPA Open Pit Falling Head infiltration test in accordance with Infiltration testing per Clackamas County Service District No. 1 standards.
- Logging of soil conditions encountered, infiltration test results, and design recommendations.

SURFACE CONDITIONS

The location of the proposed site is presently is a reasonably flat asphalt lot with a strip of vegetation running north to south on the east side of the property. (See map attached)

SUBSURFACE CONDITIONS

On January 2, 2018 SEC began preparations to conduct an Open Pit Falling Head soil infiltration test. Test Pit #1 was excavated to a depth of 3'-2" below ground surface (BGS), Test Pit #2 was excavated to a depth of 3'-0" BGS, Test Pit #3 was excavated to a depth of 7'-6" BGS. The infiltration test was to be conducted at the proposed stormwater facility locations at various facility elevations for evaluating the subsurface conditions and establishing a soil infiltration rate.

The soil strata from Test Pit #1 consists of

- 6" asphalt layer;
- 8" rock layer;
- 12"-14" undocumented fill;
- 10" gravelly silt

Test Pit #2 consists of:

- 6" organic layer;
- 8" rock layer;
- 22" gravely/cobble silt

Test Pit #3 consists of:

- 6" organic layer;
- 72" gravely/cobble silt layer;
- 12" of silty sandy gravel.

GROUNDWATER AND CAVING

No groundwater seepage was encountered at any test pit, side walls were stiff and stable for duration of testing. Soils in the area are generally Hydrologic Group "B", water table is reported to be greater than 6' deep by USGS.

INFILTRATION TESTING

The EPA Open Pit Falling Head Test was conducted on Test Pit #1. Test Pit #2 & #3 could not be tested with the Open Pit Falling Head Test because the water source flow rate was less than the infiltration rate of the two pits. The pre-soak water in Test Pit #1 had to be refilled multiple times because of the quick draining soil. After conducting the EPA Open Pit Falling Head tests the following was determined:

- Test Pit #1 infiltrates at 6" per hour with 11"-13" of hydraulic head, unfactored
- Test Pit #2 infiltrates at greater than 20" per hour, (See Attached for infiltration rate), unfactored
- Test Pit #3 infiltrates at greater than 20" per hour, (See Attached for infiltration rate), unfactored

RECOMMENDATION FOR STORMWATER TREATMENT FACILITY DESIGN

The proposed stormwater facilities shall be designed to handle the building, roadway and parking runoff in accordance with Stormwater Standards of WES. Infiltration for the disposal of stormwater is feasible for the quick draining soils encountered and will be limited by the infiltration rate of the growing medium if deeper infiltration facilities such as U.I.C.'s are not used. The bottom of all facilities shall be located at a depth consistent with the soil type and infiltration rates as desired.

LIMITATIONS

We have prepared this report for use of Washman, LLC and their agents for the design of storm water infiltration facilities at the property referenced above. Our work was completed in general accordance with the agreement. Our recommendations are based on shallow pit explorations with an infiltration test performed at each location. Conditions encountered at our exploration locations are believed to be representative of site conditions, but subsurface conditions can vary between explorations; conditions encountered during construction may differ from those encountered at the exploration locations either naturally, or due to previous or current construction disturbance. No warranty or other conditions expressed or implied should be understood.

APPENDIX E

Private O&M Plan

DECLARATION OF PERPETUAL STORMWATER OPERATION AND MAINTENANCE PLAN

This PERPETUAL STORMWATER OPERATION AND MAINTENANCE PLAN delegated the responsibility and authority to implement a comprehensive and integrated the perpetual stormwater maintenance facility plan to the present and successive property owners. This Perpetual Stormwater Maintenance Plan (the Maintenance Plan”) shall be recorded with the Clackamas County Clerk’s Office and referenced on the Partition Plat binding the Property Owner(s) and each successive property owner(s) (the “Owner(s)”) of each lot within the proposed partition plat (the “Property”). This Operation and Maintenance Plan shall bind the Owner(s) to the following responsibilities:

1. Property. The boundary of the Partition Plat including all parcels and any stormwater, drainage tracts or easements for the benefit of mitigating the stormwater runoff.
2. Plat Referenced. This Maintenance Plan shall be recorded with Clackamas County Clerk’s Office and referenced on the Partition Plat binding the Owner(s).
3. Stormwater Maintenance Responsibilities. The Owner(s) shall assume proportional, operation, maintenance and repair and/or replacement responsibilities of the stormwater facilities as described in Exhibit “A”, attached hereto and incorporated by reference.

The Owner(s) and successive Owner(s) are bound by the recording of this Perpetual Stormwater Operation and Maintenance Plan to the following responsibilities:

- a. The Owner(s) shall allow WES to perpetually have the access right to inspect the stormwater facilities following completion of construction; and require the Owner(s) to make repairs or perform maintenance on the stormwater facilities. All this work shall be performed by the Owner(s) at their expense. If this work is not done in a timely manner to the requirements of WES, or is not done at all, WES shall have the right to perform this required repairs/maintenance and to Charge the Owner for this work.
 - b. If there is a dispute as to paying for operation and maintenance as required for this facility which cannot be settled by routine negotiations, the parties shall settle the dispute by mediation under the current Construction Industry Mediation Rules of the American Arbitration Association. Once a party files a request for mediation with the other party and with the American Arbitration Association, the parties agree to conclude such mediation within sixty (60) days of filing the request. The determination of the mediator shall be final.
4. Access Rights. The Owner(s), heirs, successors and assigns hereby grants to all of the successive Owner(s) the Access Rights to jointly and effectively perform operation, maintenance, repair and/or replacement of the stormwater facilities as described in Exhibit “A” (attached).

5. Fees and Funds. The Owner(s) and successive Owner(s), heirs, successors, and assigns, hereby voluntarily consents to any reasonable charges and fees shared proportionally by, the Owner(s) for the performance of operation, maintenance, repair, and/or replacement of the stormwater facility(s) to effectively maintained the intended functionality of the stormwater facility.

6. Acknowledgement. The current Property Owner(s) hereby acknowledges that this Operation and Maintenance Plan was recorded for the purpose of assuring perpetual operation, maintenance responsibilities and intended functionality of the stormwater facilities as described in Exhibit "A" (attached). Any amendment or revision to this document will require written approval of all Owners and WES.

[Signature Page Follows]

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date set forth above.

OWNER

Name: _____
Title: _____

STATE OF OREGON)
County of _____) ss.

This instrument was acknowledged before me on this ____ day of _____, 20____,
by _____ as _____ on behalf of Clackamas County Service District No. 1.

Notary Public for Oregon
My Commission expires: _____

OWNER

Name: _____
Title: _____

STATE OF OREGON)
County of _____) ss.

This instrument was acknowledged before me on this ____ day of _____,
20____, by _____ [name] as _____ [title] on behalf
of _____, Owner of the property.

Notary Public for Oregon
My Commission expires: _____

Exhibit "A"

Exhibit "A" hereto describes the stormwater management facilities which will be constructed as part of the approved stormwater management plans including conveyance pipes and related appurtenances as follows:

- A) Owner will/has constructed the following stormwater facilities in accordance with the approved stormwater management plans (list all applicable private stormwater facilities): (examples)
- ✓ Private Stormwater Detention
 - ✓ Private Water Quality Treatment Facilities
 - ✓ Private Conveyance Piping
 - ✓ Private Flow Control Manhole
- B) The above listed facilities will be able to mitigate the impacts of the additional surface water and pollutants associated with stormwater runoff.
- C) Below is/are description(s) of each stormwater management facilities, maintenance tasks and schedule to be performed to assure the functionality of the stormwater facilities-see attached Stormwater Planters Operations & Maintenance Plan, Operations & Maintenance Checklist, Flow Control Manhole and Downstream Private Storm Sewer inspection and maintenance sheet, and the following construction plan sheets:

Table of Content

Page 4 of 10	Stormwater Planters Operation & Maintenance Plan
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Page 7 of 10	Plan Sheet 4 - Site Plan
Page 8 of 10	Plan Sheet 7 - Storm Line Plan and Profile
Page 9 of 10	Plan Sheet 8 - Water Quality Facility Planting Plan and Section
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