LANCE MUELLER & ASSOCIATES

ARCHITECTS · AIA

W5	March 2023

96XX SW Boeckman Road, Wilsonville, OR 97070

Architectural Review Narrative:

Narrative Index:

Section 6: Reports & Documents (Cover Sheet & Index)

PROPERTY INFORMATION REPORT

Date: December 9, 2021

File No.: 21-321617
Property: 9600 SW Boeckman Road, Wilsonville, OR 97070

Martin Development NW
P O Box 15523
Seattle, WA 98115

Your Reference: **REPORT FEE:**

The information contained in this report is furnished by WFG National Title Insurance Company (the "Company") as an information service based on the records and the indices maintained by the Company for the county identified below. This report does not constitute title insurance and is not to be construed or used as a commitment for title insurance. The Company assumes and shall have no liability whatsoever for any errors or inaccuracies in this report. In the event any such liability is ever asserted or enforced, such liability shall in no event exceed the paid herein. No examination has been made of the Company's records, other than as specifically set forth in this report.

The effective date of this report is December 3, 2021

REPORT FINDINGS

A. The land referred to in this report is located in the county of Clackamas State of Oregon, and is described as follows:

See Attached Exhibit "A"

B. As of the Effective Date and according to the last deed of record, we find the title to the land to be vested as follows:

W-4 LLC, an Oregon limited liability company

C. As of the Effective Date and according to the Public Records, the Land is subject to the following liens and encumbrances, which are not necessarily shown in the order of priority:

1. Easement, including the terms and provisions thereof:
   For : Transmission Line and rights to remove danger trees
   Granted to : the United States of America
   Recorded : August 28, 1941
   Recording No(s) : (book) 284 (page) 434
   Affects : 25 foot strip lying West of the Oregon Electric Railway right-of-way along Southerly portion

2. Easement, including the terms and provisions thereof:
   For : Transmission Line and rights to remove danger trees
   Granted to : the United States of America
   Recorded : September 22, 1941
   Recording No(s) : (book) 285 (page) 301
   Affects : 45 foot strip lying West of the Oregon Electric Railway right-of-way along Northerly portion

3. We find a Notice of Intention of Preserve Interest, including the terms and provisions thereof

Regarding	:	Future cost for road construction
Recorded	:	November 29, 2000
Recording No(s)	:	2000-077005
Executed by	:	RFD Publications, Inc.

4. Easement, including the terms and provisions thereof:

For	:	Slope
Granted to	:	the City of Wilsonville, a municipal corporation
Recorded	:	June 2, 2006
Recording No(s)	:	2006-050622
Affects	:	the Northerly lot line - see document for actual location

5. Easement, including the terms and provisions thereof:

For	:	Slopes
Granted to	:	Tri-County Metropolitan Transportation District of Oregon, a mass transit district
Recorded	:	December 5, 2006
Recording No(s)	:	2006-111828
Affects	:	the Easterly 14 feet

6. Easement, including the terms and provisions thereof:

For	:	Railroad facilities
Granted to	:	Tri-County Metropolitan Transportation District of Oregon (Tri-Met), a mass transit district
Recorded	:	December 3, 2007
Recording No(s)	:	2007-100710
Affects	:	a 8 foot by 8 foot area abutting Oregon Electric Railroad See document for actual location

7. Easement, including the terms and provisions thereof:

For	:	Water line
Granted to	:	the City of Wilsonville, an Oregon municipal corporation of the State of Oregon
Recorded	:	June 28, 2013
Recording No(s)	:	2013-045155
Affects	:	Westerly portions of premises - see document for actual location

8. Easement, including the terms and provisions thereof:

For	:	Slope
Granted to	:	the City of Wilsonville, a municipal corporation
Recorded	:	January 29, 2016
Recording No(s)	:	2016-005509
Affects	:	the Westerly lot line - see document for actual location

9. Water System Facilities Easement, including the terms and provisions thereof:

For	:	Public Utility
Granted to	:	Tualatin Valley Water District, a domestic water supply district, organized under ORS Chapter 264 and the City of Hillsboro
Recorded	:	April 8, 2016
Recording No(s)	:	2016-22826
Affects	:	variable width along the Northerly lot line

10. Water System Facilities Easement, including the terms and provisions thereof:

For	:	Utilities
Granted to	:	Tualatin Valley Water District, a domestic water supply district, organized under ORS Chapter 264 and the City of Hillsboro
Recorded	:	May 24, 2018
Recording No(s)	:	2018-032085
Affects	:	A 184 square foot strip along the Westerly portion - see document for actual location

11. Stormwater Maintenance Easement Agreement, including the terms and provisions thereof:

For	:	onsite stormwater facilities
Between	:	W-4 LLC, an Oregon limited company
And	:	the City of Wilsonville, a municipal corporation of the State of Oregon
Recorded	:	November 15, 2019
Recording No(s)	:	2019-072356

12. Unpaid Taxes for 2021 -2022:

Levied Amount	:	$565,179.31
Balance Owing	:	$376,786.21, plus interest and fees, if any
Property ID No.	:	00810331
Levy Code	:	003.023
Map Tax Lot No.	:	31W14B 00202

13. Unpaid Taxes for 2021-2022:

Levied Amount	:	$1,839.79, plus interest and fees, if any
Balance Owing	:	$1,226.52
Property ID No.	:	05021199
Levy Code	:	003-023
Map Tax Lot No.	:	31W14B 00282

14. Unpaid Taxes for 2021-2022:

Levied Amount	:	$656.76, plus interest and fees, if any
Balance Owing	:	$437.84
Property ID No.	:	05008927
Levy Code	:	003-023
Map Tax Lot No.	:	31W14B 00292

15. City liens, if any, of the City of Wilsonville.

16. Line of Credit Deed of Trust with Absolute Assignment of Rents and Leases, Security Agreement and Fixture Filing, including the terms and provisions thereof to secure the amount noted below and other amounts secured thereunder, if any:

Grantor	:	W-4 LLC, an Oregon limited liability company
Trustee	:	Wells Fargo Financial National Bank
Beneficiary	:	Wells Fargo Bank, National Association
Dated	:	September 23, 2016
Recorded	:	September 23, 2016
Recording No(s)	:	2016-065036
Amount	:	$17,500,000.00

17. Financing Statement, including the terms and provisions thereof:

Debtor	:	W-4 LLC
Secured Party	:	Wells Fargo Bank, National Association
Recorded	:	September 23, 2016
Recording No(s)	:	2016-065037
Affecting	:	Fixtures

The financing statement was Continued by Continuation:

Recorded	:	March 23, 2021
Recording No.	:	2021-029545, of Official Records

The financing statement was Amended:

Recorded	:	April 12, 2021
Recording No.	:	2021-037768, of Official Records

18. Lease, including the terms and provisions thereof, as evidenced by Memorandum:

Lessor	:	W-4 LLC, an Oregon limited liability company
Lessee	:	DWFritz Automation, Inc., an Oregon corporation
Dated	:	July 1, 2016
Recorded	:	September 23, 2016
Recording No(s)	:	2016-065038

Subordination, Non-Disturbance, Attornment and Estoppel Agreement, including the terms and provisions thereof:

Recorded	:	September 23, 2016
Recording No(s)	:	2016-065110

The above Lease was subordinated to the Deed of Trust recorded September 23, 2016 as Recording No(s) 2016-65036.

19. Any unrecorded leases or rights of tenants in possession.

20. No search has been made for Financing Statements filed in the office of the Secretary of State. Exception may be taken to such matters as may be shown thereby. No liability is assumed if a Financing Statement is filed in the office of the County Recorder covering timber, crops, fixtures or contracts on the premises wherein the lands are described other than by metes and bounds or under the rectangular survey system or by recorded lot and block.

END OF EXCEPTIONS

NOTE: We find NO judgments or Federal Tax Liens against the name(s) of W-4 LLC.

NOTE: LINKS FOR ADDITIONAL SUPPORTING DOCUMENTS:
Assessor's map
Taxes 00810331
Taxes 05021199
Taxes 05008927
Vested Deed
Deed Book 383 page 262 ref in legal
Deed 2006-050621 excepted in legal
CMap TL 202
CMap TL 282
CMap TL 292

NOTE: ADJOINING DEEDS FOR TAX LOT 401 AND 491.

NOTE: The following Personal Property Taxes are connected to Tax Lot 202:

P2253193	:	DWFritz Automation Inc.
P2255283	:	Otto DesignWorks LLC

NOTE: The Oregon Corporation Commission disclosed that W-4 LLC, is an active Oregon limited liability company:

Filed	:	July 1, 2016
Manager	:	Mac Martin
Member	:	Fritz Brothers Investments LLC
Manager	:	Jack Martin
Manager	:	Michael Fritz
Registered Agent	:	Michael Fritz

END OF REPORT

Diane Brokke
WFG National Title Insurance Company
12909 SW 68th Pkwy., Suite 350
Portland, OR 97223
Phone: **(503) 431-8504**
Fax: **(503) 684-2978**
Email: **dbrokke@wfgnationaltitle.com**

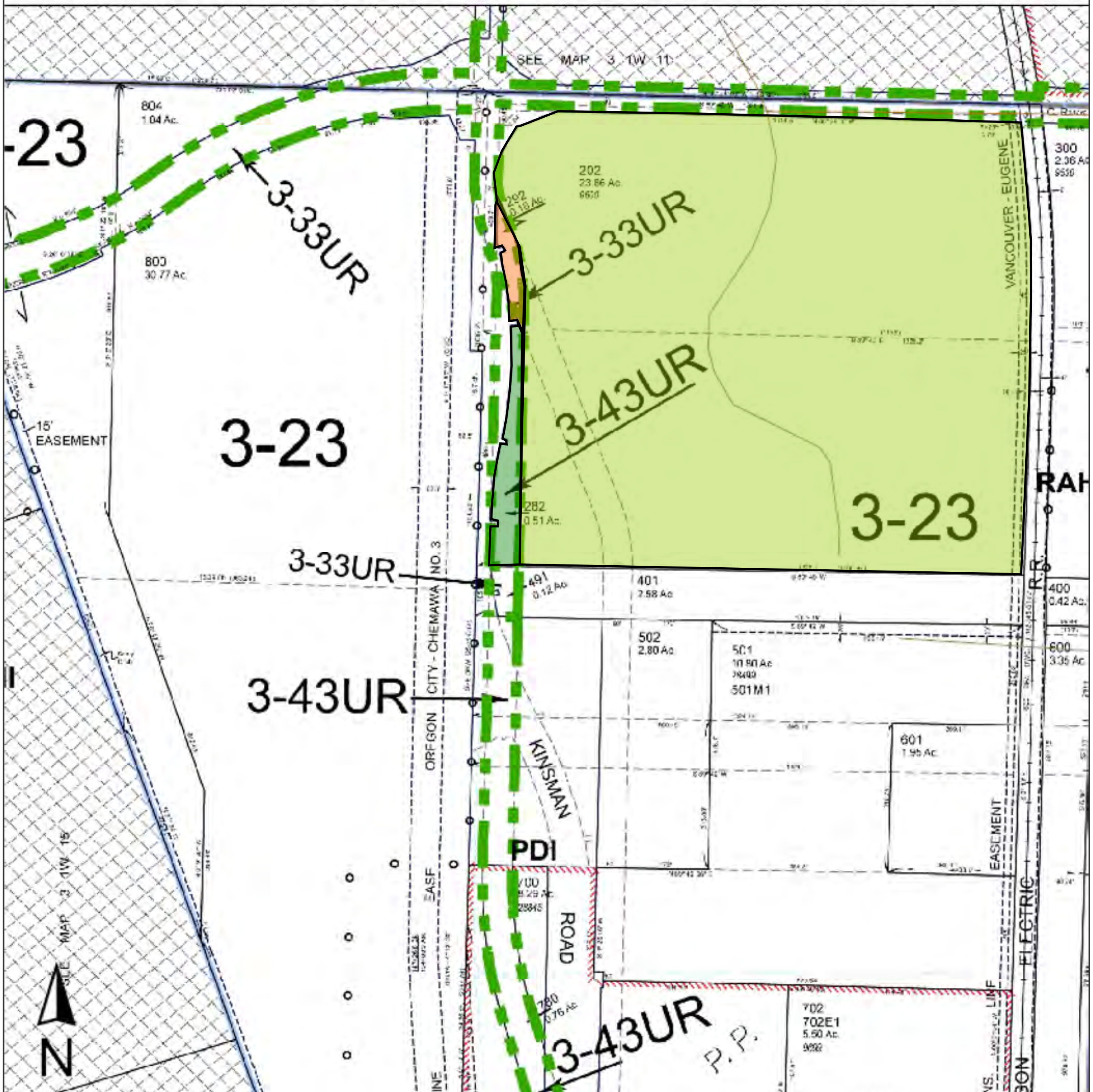
EXHIBIT A
LEGAL DESCRIPTION

A tract of land in Section 14, Township 3 South, Range 1 West of the Willamette Meridian, in the City of Wilsonville, County of Clackamas and State of Oregon, described as follows:

Beginning at an iron pipe at the Northwest corner of the Northeast one-quarter of the Northwest one-quarter of said Section 14, said point being the Northwest corner of that tract conveyed to Frederic W. Young, et ux, recorded January 13, 1947 in Book 383 page 262, Deed Records; thence South 0º13' East along the West line of said Young tract 499.70 feet to an iron pipe at the Southwest corner thereof and the true point of beginning of the tract herein to be described; thence North 89°43' East along the South line of said Young tract 25.00 feet to a point; thence North 0°13' West parallel with the West line of said Young tract 474.70 feet to a point that is Southerly 25.00 feet measured at right angles from the North line of said Young tract; thence North 89°42' East parallel to the North line of said Young tract 1080.00 feet, more or less, to the West line of the Oregon Electric Railway right of way; thence Southerly along the West line of said Oregon Electric Railway right of way 980.00 feet, more or less, to a point of intersection with the South boundary of the tract conveyed to Sunn Musical Equipment Company, a corporation, by Deed recorded May 5, 1969 as Recorder's Fee No 69 7881, Film Records; thence South 89°44' West along said South boundary 1160.00 feet, more or less, to the Southwest corner thereof, said point being in the Westerly boundary of the Northeast one-quarter of the Northwest one-quarter of said Section 14; thence North 0°13' West along said boundary 499.7 feet to the true point of beginning.

EXCEPTING THEREFROM that portion conveyed to the City of Wilsonville, a municipal corporation by Deed recorded June 2, 2006, Recording No. 2006-050621.

FURTHER EXCEPTING THEREFROM those portions conveyed to the City of Wilsonville, a municipal corporation of the State of Oregon by Deed recorded January 29, 2006, Recording No. 2016-005508.



0502199 31W14B 00282 05008927 31W14B 00292

00810331 31W14B 00202

WFG National Title Insurance Company
a Williston Financial Group company

This map/plat is being furnished as an aid in locating the herein described land in relation to adjoining streets, natural boundaries and other land, and is not a survey of the land depicted. Except to the extent a policy of title insurance is expressly modified by endorsement, if any, the company does not insure dimensions, distances, location of easements, acreage or other matters shown thereon.

DKS 117 COMMERCIAL STREET NE, SUITE 310, SALEM, OR 97301 • 503.391.8773 • DKSASSOCIATES.COM

MEMORANDUM

REGISTERED PROFESSIONAL ENGINEER 56,267
OREGON
JULY 9, 2002
SCOTT M. MANSUR
EXPIRES: DEC. 31, 2022

DATE: November 17, 2021

TO: Matt Palmer, P.E. | City of Wilsonville

FROM: Scott Mansur, P.E., PTOE | DKS Associates
Jenna Bogert, P.E. | DKS Associates

SUBJECT: Wilsonville DW Fritz Phase 2 Trip Generation Memo Project #19006-014

This memorandum documents the trip generation estimates for the proposed second phase of the DW Fritz Automation site, located at 9600 SW Boeckman Road in Wilsonville, Oregon. The current proposed land use for Phase 2 consists of an industrial use building. Previously, when the original Transportation Impact Study (TIS)[1] was conducted, the proposed land use for Phase 2 included industrial and restaurant land uses. The applicant desires to update the land use for Phase 2 and therefore, the net change in trip generation must be evaluated to determine if any significant impacts are expected.

The purpose of this memorandum is to estimate the weekday and PM peak hour trip generation for the site's original proposed land use (industrial and restaurant) and its current proposed land use for Phase 2 (industrial only). Then, a comparison of the trip generation estimates will be provided to determine the net change in expected vehicle generation. The memorandum will also contain a site plan review which evaluates the site accesses, internal circulation, bicycle and pedestrian needs, and parking.

TRIP GENERATION COMPARISON

Based on the original DW Fritz Phase TIS, the estimated trip generation for the proposed Phase 2 building was 65 PM peak hour trips. An excerpt from the original TIS showing the estimated trip generation is provided as an attachment. The original land use that was evaluated consisted of a single building containing 70,000 square feet of industrial use and a 4,000 square-foot restaurant. The current proposed land use for Phase 2 is an industrial use building of 80,000 square feet.

[1] Wilsonville DW Fritz Traffic Impact Analysis, DKS Associates, August 2017.

The ITE Land Use Code, Manufacturing (140), was selected to estimate the trip generation for the industrial land use, which is consistent with the original TIS.

Table 1 documents the trip generation for both the original and current proposed land uses. The site is estimated to generate fewer overall trips for the PM peak hour and average weekday as compared to the original TIS assumptions. The proposed modified use is estimated to reduce trip generation by 11 PM peak hour trips and 199 weekday trips.

TABLE 1: SITE TRIP GENERATION

LAND USE (ITE CODE)	SIZE [a]	TRIP TYPE	PM PEAK HOUR IN	PM PEAK HOUR OUT	PM PEAK HOUR TOTAL	WEEKDAY
ORIGINAL PROPOSED LAND USE						
MANUFACTURING (140)	70 KSF	Vehicle	16	29	45	382
RESTAURANT (932)	4 KSF	Vehicle	23	16	39	450
INTERNAL TRIP (10%) AND PASS-BY TRIP (43%) REDUCTIONS (RESTAURANT ONLY)	-	*Vehicle*	*-11*	*-8*	*-19*	*-219*
TOTAL	74 KSF	-	28	37	65	613
CURRENT PROPOSED LAND USE						
MANUFACTURING (140)	80 KSF	Vehicle	17	37	54	414
NET DIFFERENCE (CURRENT – ORIGINAL)		***-***	***-11***	***0***	***-11***	***-199***

[a] KSF = 1,000 square feet.

PROJECT TRIPS THROUGH I-5 INTERCHANGE AREAS

Because the proposed project site is estimated to generate fewer trips than the original land use, the number of project trips enroute to/from the Wilsonville Road and Elligsen Road I-5 Interchanges were not estimated.

SITE PLAN EVALUATION

This section reviews the proposed site plan including site access, internal circulation, bicycle and pedestrian needs, and parking. The project applicant has provided a preliminary site plan, which is provided in the attachments.

SITE ACCESS

The site currently has two existing driveway access points along the south side of Boeckman Road. Based on the site plan provided, there are no additional site accesses proposed or any modifications to the existing site accesses.

INTERNAL CIRCULATION

The site plan for proposed Phase 2 shows the internal circulation for vehicles on-site. The drive aisle widths shown vary between 20 feet and 26 feet, which is sufficient for safe and efficient two-way traffic flow. New parking areas are shown the site plan, two larger lots to the southeast corner of the proposed building and a smaller lots along the north, west, and east sides of the proposed building.

Based on the site plan, the internal roadway network appears to provide adequate turning radii to allow for safe circulation.

BICYCLE AND PEDESTRIAN FACILITIES

There are existing sidewalks along SW Kinsman Road and Boeckman Road surrounding the project site. There are internal sidewalks and marked crosswalks that connect the existing and proposed parking lots to the existing building (W4) and proposed building (W5). Additionally, there are sidewalks shown on the site plan along the north, east, and south face of the proposed building. There is adequate bicycle and pedestrian facilities, therefore, no additional bicycle and pedestrian facilities are recommended.

PARKING

The proposed 80,000 square-foot manufacturing building is required to comply with the City of Wilsonville Development Code for the number of vehicular parking stalls and bicycle parking spaces that are provided on site.[5] Table 2 lists the vehicular and bicycle parking requirements for the proposed Phase 2 building only. The required stall counts are based on the type and size of the building.

TABLE 2: VEHICULAR AND BICYCLE PARKING SUMMARY

LAND USE	SIZE [a]	VEHICLE STALLS		BICYCLE STALL MINIMUM
		MINIMUM	MAXIMUM	
FLEX SPACE	80 KSF	216	328	16
	PROPOSED (SITE PLAN)	315		-

[a] KSF = 1,000 square feet

As shown in the table above, 216 new vehicular stalls are needed to meet the minimum City Code requirements for the new building. Because the site is expected to have 315 parking stalls, the site meet's the City Code requirements. The table above also indicates that 16 new bicycle parking spaces are needed at the proposed building (W5) to meet the minimum City Code requirements.

[5] City of Wilsonville, Development Code, Sections 4.155, Table 5, Updated June 2020.

Currently, the site plan shows a bicycle parking rack on the northeast corner of the proposed building. However, it is unknown how many bicycle parking spaces are provided. At minimum, 16 bicycle parking spaces will need to be built and should be located near the W5 building entrances in order to provide convenient access.

SUMMARY

Key findings of the trip generation memo are as follows:

- The current proposed land use is estimated to reduce PM peak hour trips (-11 trips) and weekday trips (-199 trips) compared to the original land use assumptions.
- Because the site will generate fewer trips than the original land use, the number of trips that travel through the I-5/Elligsen Road interchange area and the I-5/Wilsonville Road interchange area were not estimated.
- At minimum, 16 bicycle parking spaces will need to be provided and should be located near the new building entrances in order to provide convenient access.

Attachments:

- Tables 4 and 5, DW Fritz Traffic Impact Study, DKS Associates, August 14, 2017.
- Site Plan

increases. The proposed Phase 1 and Phase 2 development is expected to generate approximately 183 (75 in, 108 out) PM peak hour primary trips.

Table 4: PM Peak Hour Primary Trip Generation Phases 1 and 2

Phase	Land Use (ITE Code)	Building area (square feet)	Trip Rate per 1,000 square feet	In	Out	Total
1 and 2	Manufacturing (140)	155,000 + 70,000	0.64[a]	52	92	**144**
2	Restaurant (932)	4,000	9.85	23	16	**39**
		Phases 1 and 2 Total Primary Trips		75	108	**183**

[a]Rate back-calculated from ITE equation

As per ITE Trip Generation Handbook guidance,[3] two reductions in primary trips were included in the trip generation analysis; internal trips and pass-by trips. The following paragraphs discuss these reductions and Table 5 displays the total net new trips after accounting for the internal and pass-by trip reductions.

Internal Trips. A reduction of internal trips was evaluated to reduce the total number of driveway trips to account for trips between uses (for example employees from the industrial uses staying to eat at the restaurant). An internal capture rate of 10% was applied to the PM peak hour primary trips of the restaurant.

Pass-By Trips. A reduction of pass-by trips was evaluated to account for traffic that currently exists on the adjacent roadways that the proposed project will have primary access. Pass-by trips are subtracted out after the internal trips are applied and for this project and were only applied to the restaurant trip generation. Pass-by rate of 43% was taken from the ITE Trip Generation Handbook. Pass-by trips result in new driveway trips only and will not increase traffic to the adjacent roadways.

[3] Institute of Transportation Engineers, Trip Generation Handbook, October 1998.

Table 5: PM Peak Hour Net New Trips

	In	Out	Total
Total Primary Trips (Phases 1 and 2)	75	108	**183**
Internal Trip Reduction (10% of restaurant trips)	-2	-2	**-4**
Pass-By Trip Reduction (43% of restaurant trips)	-9	-6	**-15**
Net New Trips (Phase 1 and Phase 2)	64	100	**164**

After reducing the primary project site trips for the restaurant by the internal trip reduction of 10% and then the pass-by trip rate of 43%, the net new total trips to the project site is 164 (64 in/100 out) during the PM peak hour.

Project Trips Through City of Wilsonville Interchange Areas

The project trips through the two City of Wilsonville I-5 interchange areas were estimated based on the trip generation and distribution assumptions. The proposed DW Fritz development is expected to generate 32 PM peak hour trips for Phase 1 and a total of 49 PM peak hour trips for Phases 1 and 2 through the I-5/SW Elligsen Road interchange area. The development is expected to generate 21 PM peak hour trips for Phase 1 and 33 PM peak hour trips for Phases 1 and 2 through the I-5/Wilsonville Road interchange area.

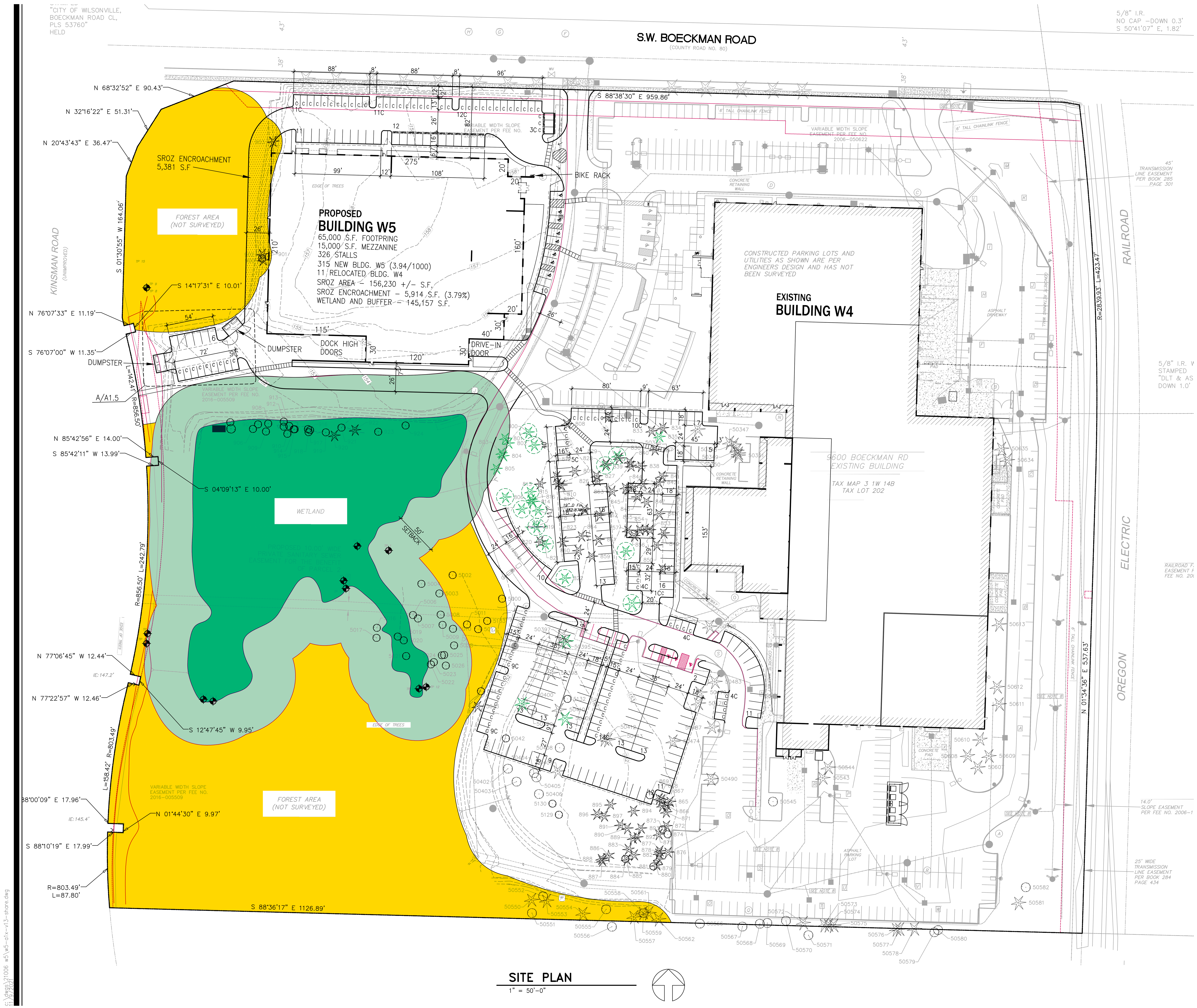
Project Traffic Impact

The impact analysis includes trip generation, trip distribution, and PM peak hour project trips for Phase 1 and Phase 2 of the project. The analysis also includes scenarios that account for Stage II approved developments in the area, including those under construction or built but not yet occupied. The scenarios include:

- Existing + Stage II (includes traffic from other developments with Stage II approval or are under construction)
- Existing + Project (Phase 1)
- Existing + Project (Phase 1) + Stage II
- Existing + Project (Phase 1 and Phase 2)
- Existing + Project (Phase 1 and Phase 2) + Stage II

The study intersection operating conditions for the project trips during Phase 1 development and future Stage II developments are listed in Table 6. All the study intersections meet operating standards for “Existing plus Phase 1,” “Existing plus Stage II,” and “Existing plus Phase 1 plus Stage II” scenarios.

Attachment B



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date
no.
revision
date

REGISTERED ARCHITECT
LANCE MUELLER
SEATTLE, WA
1491
STATE OF OREGON

BUILDING W5
9900 SW Boeckman Rd.
Wilsonville, OR 97070

LANCE MUELLER & ASSOCIATES
ARCHITECTS AIA
130 LAKESIDE • SUITE 250 • SEATTLE, WA 98122 • (206) 325-2553

SITE PLAN
sheet
A1.1

Geotechnical Engineering Report

Martin Development – Building W5
Wilsonville, Oregon

for
Martin Development

July 14, 2021

GeoEngineers
Earth Science + Technology

Geotechnical Engineering Report

Martin Development – Building W5
Wilsonville, Oregon

for
Martin Development

July 14, 2021

GeoEngineers

4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, Oregon 97035
503.624.9274

Geotechnical Engineering Report

Martin Development – Building W5
Wilsonville, Oregon

File No. 0821-016-00

July 14, 2021

Prepared for:

Martin Development
PO Box 15523
Seattle, Washington 98115

Attention: Mac Martin

Prepared by:

GeoEngineers, Inc.
4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, Oregon 97035
503.624.9274

Tygh Gianella

Tygh Gianella, PE
Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
77490PE
OREGON
NOVEMBER 08, 2005
GREG ALAN LANDAU

Greg A. Landau, PE, GE
Associate Geotechnical Engineer

EXPIRES: 12.31.2022

TNG:GAL:cje

Disclaimer: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

GEOENGINEERS

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LIST OF FIGURES

APPENDICES

1.0 INTRODUCTION

GeoEngineers, Inc. (GeoEngineers) is pleased to submit this geotechnical engineering report for the proposed Martin Development project located at 9600 SW Boeckman Road in Wilsonville, Oregon. The total project site is approximately 24.5 acres and located south of SW Boeckman Road, east of SW Kinsman Road, west of the existing railroad tracks and north of an existing development. The eastern portion of the site (Parcel 2 ~11.9 acres) is currently developed with Building W4 and associated parking. The western portion of the site (Parcel 1 ~12.6 acres) is proposed to be developed with a single-story Building W5 and associated parking. The location of the site is shown in the Vicinity Map, Figure 1.

Based on correspondence with you and a conceptual site plan (Sheet A1.1) prepared by Lance Mueller & Associates dated March 26, 2021, we understand the project will consist of an approximate 65,000-square-foot, single-story Building W5 within the currently vacant open space west of Building W4. Associated improvements are expected to include underground utilities, asphalt-paved drive aisles, a parking lot and potentially stormwater infiltration facilities.

At the time this report was prepared, VLMK Engineering + Design indicated maximum column and wall loads will be on the order of 600 to 750 kips per column and 12 to 15 kips per lineal foot (klf), respectively. We have assumed that floor loads for slabs-on-grade will be 150 pounds per square foot (psf) or less.

2.0 SCOPE OF SERVICES

Our specific scope of services is detailed in our proposal to you dated April 21, 2021, and authorized April 22, 2021, but in general included: reviewing selected geotechnical information about the site; exploring subsurface soil and groundwater conditions; collecting representative soil samples; completing relevant laboratory testing and geotechnical analyses; and preparing this geotechnical report with our conclusions, findings and design recommendations. Infiltration testing was added to our original scope at the request of Mackenzie.

3.0 SITE CONDITIONS

3.1. Area Geology

Site geology is mapped by the Geology and Geologic Hazards of Northwestern Clackamas County (Schlicker and Finlayson 1979) as underlain by "lacustrine sediments" of Willamette Silt. These sedimentary deposits consist of late-stage "cross-bedded to graded" fine sandy silt and clay deposited across the Willamette Valley by impoundment of the late Pleistocene glacial-outburst floods.

Our subsurface explorations suggest, however, that the shallow subsurface conditions reflect the effects of the so-called "Tonquin Scabland" that traverses the immediate area west of the site. This late-stage Missoula Flood outwash channel incised the earlier Willamette Silt sediment and deposited a layer of coarse lag gravel alluvium in the alluvial channel during the early, high-energy phase of the flood that was capped by silt and sand during the latter, lower-energy phase.

Based on our subsurface explorations we believe that the contact with the Tonquin alluvium is mapped too far to the west, and the surface of the site is mantled by these alluvial materials, typically encountered in our borings as a 10- to 15-foot-thick surficial layer of clayey slack water deposits overlying a 15- to 20-foot-thick early-stage layer consisting of gravelly alluvium. Where our investigations penetrated the gravels we encountered the Willamette Silt as mapped by Schlicker and Finlayson (1979).

3.2. Surface Conditions

The proposed development consists of an approximate 12.6 acre site that is currently undeveloped with the exception of an access roadway on the east side of the site leading to the south side of Building W4. The undeveloped area within the northern portion of the site (proposed Building W5) is generally covered with rough field grass. Undeveloped area within the southern proposed parking lot consists of rough field grass, an existing asphalt drive aisle, and occasional trees. The site is generally flat with elevations ranging from approximately 157 to 159 feet above mean sea level (MSL) within the proposed building footprint and slopes gradually south of the building footprint to approximately 152 to 154 feet above MSL.

3.3. Subsurface Conditions

We explored subsurface soil and groundwater conditions at the site on May 26 and 27, 2021 by drilling four borings (B-1 through B-4) within the proposed building footprint to depths of 29 to 41½ feet below ground surface (bgs), three borings (B-5 through B-7) within proposed parking areas to a depth of 6½ feet bgs, and three borings (IT-1 through IT-3) for infiltration testing to a depth of 5 feet bgs at the approximate locations shown in the Site Plan, Figure 2.

Representative soil samples from the borings were returned to our laboratory for examination and testing. Detailed descriptions of our site exploration and laboratory-testing programs, along with exploration logs and laboratory test results, are presented in Appendix A.

3.3.1. Soil Conditions

In general, underlying an approximately 2- to 4-inch-thick grass/topsoil zone, we encountered approximately 10 to 15 feet of very soft to very stiff gray-brown clay with varying amounts of sand and gravel. Underlying the upper clay soils, a medium dense to dense brown silty gravel with varying amounts of sand was observed between approximately 10 to 20 feet bgs, where the soil transitioned to a medium dense to very dense brown gravel with varying amounts of silt and sand from approximately 20 to 33 feet bgs. Underlying the gravel, a medium stiff to very stiff gray clay with varying amounts of sand and gravel was observed to the maximum depths explored.

3.3.2. Groundwater

We encountered groundwater at approximately 17¾ feet bgs during drilling at boring B-1, performed using hollow-stem auger. Boring B-1 was left open and allowed to equilibrate overnight. The groundwater at this boring was confined and rose from approximately 17¾ feet bgs to 13 feet bgs approximately 19 hours after drilling. The mud rotary drilling methods did not allow for direct observation of groundwater in our other borings. Sample saturation indicated that groundwater was consistent between the explorations and encountered at approximately 15 feet bgs. We reviewed water well logs on file with the Oregon Water Resources Department to estimate the depth to regional groundwater. Based on our review, regional groundwater is present at approximately 10 to 20 feet bgs and is consistent with water levels observed in our exploration of the site. Groundwater should be expected to rise several feet during periods of extended rainfall as well as from capillary rise. We recommend using a static groundwater of approximately 8 feet bgs at Building W5 for design purposes. Groundwater conditions at the site are expected to vary seasonally due to rainfall events and other factors not observed in our explorations.

4.0 INFILTRATION TESTING

We conducted a total of three infiltration tests at the three requested exploration locations (IT-1, IT-2 and IT-3), at a depth of approximately 5 feet bgs as shown in Figure 2. Testing was conducted using the encased falling head method in general accordance with the procedures outlined in Appendix B of Section 3 Public Works Standards, in the City of Wilsonville 2015 Stormwater & Surface Water Design & Construction Standards (SSWDCS). Test procedure is based on a modified procedure of the U.S. Environmental Protection Agency (EPA) Falling Head Percolation Test (Onsite Wastewater Treatment and Disposal Systems Design Manual, EPA/625/1-80-012, 1980). Our general procedure included drilling to the specified depth with a 6-inch hollow-stem auger, placing a 2-inch-thick layer of washed bagged gravel in the bottom of the hollow-stem auger prior to adding water to reduce disturbance from flowing water at the base of the auger.

Infiltration tests IT-1, IT-2, and IT-3 were pre-soaked over a 4-hour period by repeated addition of water into the pipe when necessary. In our opinion, a good seal was present between the auger and the surrounding soil at the test depth. After the saturation period, the hole was filled with clean water to at least 12 inches above the soil in the bottom of the auger. The drop-in water level was measured over a period of time after the soak period. Field-measured test results are summarized in Table 1. Appropriate correction factors should be applied to the field-measured rates, as discussed below.

TABLE 1. INFILTRATION RESULTS

Infiltration Test No.	Location	Depth (feet)	USCS Material Type	Field Measured Infiltration Rate[1] (inches/hour)
IT-1	NW corner of Building (See Site Plan)	5	CL	0.05-0.1
IT-2	Parking Area SW of Building (See Site Plan)	5	CL	0.1
IT-3	SE corner of Building (See Site Plan)	5	CL	0.1

Notes:

[1] Appropriate factors should be applied to the field-measured infiltration rate, based on the design methodology and specific system used.

USCS = Unified Soil Classification System

The infiltration rates shown in Table 1 and discussed above, are field-measured infiltration rates. These represent the short-term measured rate, and factors of safety have not been applied for the type of infiltration system being considered, variability that may be present in the on-site soil, frequency and type of system maintenance, potential for siltation and bio-fouling, as well as system design correction factors for overflow or redundancy.

Appropriate correction factors should also be applied by the project civil engineer to account for long-term infiltration parameters. From a geotechnical perspective, we recommend a factor of safety (correction factor) of at least 3 be applied to the field-measured infiltration values to account for potential soil variability with depth and location within the area tested. This is the minimum required factor of safety allowed in the SSWDCS for encased falling head tests. In addition, the stormwater system design engineer should determine and apply appropriate remaining correction factor values, or factors of safety, to account for other factors, as identified above.

The actual depths, lateral extent and estimated infiltration rates can vary from the values presented above. We recommend that the design infiltration values be confirmed by field testing completed during installation. Field testing/confirmation during construction is often required in large or long systems or other situations where soil conditions may vary within the area where the system is constructed. The results of this field testing might necessitate that the infiltration locations be modified to achieve the design infiltration rate.

As a result of fine-grained soil conditions and very low measured infiltration rates, we recommend infiltration of stormwater not be used as the sole method of stormwater management at this site unless those design factors can be otherwise accounted for by increasing infiltration area or coupling with other methods of stormwater disposal.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on our explorations, testing and analyses, it is our opinion that the site is generally suitable for the proposed development from a geotechnical engineering standpoint, provided the recommendations in this report are included in design and construction. We offer the following conclusions regarding geotechnical engineering design at the site.

- On-site near surface soils generally consist of clay. The clay soils will become significantly disturbed from earthwork occurring during periods of wet weather, or when the moisture content of the soil is more than a few percentage points above optimum. Wet weather construction practices will be required unless earthwork occurs during the dry summer months (typically mid-July to mid-September).
- Groundwater was encountered between approximately 17¾ feet bgs during drilling and measured at approximately 13 feet bgs approximately 19 hours later in boring B-1. We recommend using a static groundwater of approximately 8 feet bgs at Building W5 for design purposes.
- On-site clay soils are generally not suitable for reuse as structural fill.
- Structures with column loads less than 50 kips and wall loads less than 5 klf can be supported on continuous and isolated spread foundations supported on a minimum 1-foot-thick compacted gravel pad over medium stiff or firmer native silt. Soft/loose or unsuitable soil encountered beneath the foundations should be removed to medium stiff or stiffer material and replaced with compacted structural fill.
- Structures with column loads up to 200 kips and wall loads less than 15 klf can be supported on continuous and isolated spread foundations supported on a minimum 2-foot-thick compacted gravel pad over medium stiff or firmer native clay.
- Structures with column loads up to 750 kips can be supported on isolated spread foundations supported on a minimum 3-foot-thick compacted gravel pad over medium stiff or firmer native clay.
- Floor slabs supporting 150 psf loads or less can be founded on aggregate base placed on native medium stiff or firmer clay.
- Standard concrete and asphalt pavement sections prepared as described in this report will suitably support estimated traffic loads.

6.0 EARTHWORK RECOMMENDATIONS

6.1. Site Preparation

Initial site preparation and earthwork operations will include stripping and grubbing, removing existing pavements within the improvement area, grading the site and excavating for utilities and foundations described below.

6.1.1. Demolition

If present, existing utilities in the construction area should be identified prior to excavation. Live utility lines identified beneath proposed structures should be relocated. Abandoned utility lines beneath structures should be completely removed or filled with grout in order to reduce potential settlement of new structures. Soft or loose soil encountered in utility line excavations should be removed and replaced with structural fill where the soft soil is located within structural areas.

Existing voids and new depressions created during site preparation, and resulting from removal of existing utilities or other subsurface elements, should be cleared of loose soil or debris down to firm soil and backfilled with compacted structural fill. Disturbance to a greater depth should be expected if site preparation and earthwork are conducted during periods of wet weather.

6.1.2. Stripping

Based on our observations, we estimate that the depth of stripping of organics will be on the order of about 3 inches. Greater stripping depths may be required to remove localized zones of loose or organic soil, and in areas where moderate to heavy vegetation may be present, or surface disturbance has occurred. Stripped material should be transported off site for disposal or processed and used as fill in landscaping areas, if approved by the landscape architect. Clearing and grubbing recommendations provided below should be used in areas where moderate to heavy vegetation are present, or where surface disturbance from prior use has occurred.

6.1.3. Clearing and Grubbing

Where thicker vegetation is present, more extensive site clearing will be required to remove site vegetation, including thick grass, shrubs and trees that are designated for removal. Following clearing, grubbing and excavations up to several feet will be required to remove the root zones of thick shrubs and trees. Deeper excavations, up to 4 or 5 feet may be required to remove the root zones of large trees. Roots larger than ½ inch in diameter should be removed. Excavations to remove root zones should be done with a smooth bucket to minimize subgrade disturbance. Portions of the site are heavily vegetated and previously buried roots may be present, even in the current grassy areas of the site. Grubbed materials should be hauled off site and properly disposed unless otherwise allowed by the project specifications for other uses such as landscaping, stockpiling or on-site burning.

Existing voids and new depressions created during demolition, clearing, grubbing or other site preparation activities, should be excavated to firm soil and backfilled with Imported Select Structural Fill. Greater depths of disturbance should be expected if site preparation and earthwork are conducted during periods of wet weather.

6.2. Subgrade Preparation and Evaluation

Upon completion of site preparation activities, the exposed subgrade should be proof-rolled with a fully loaded dump truck or similar heavy rubber-tired construction equipment to identify soft, loose or unsuitable areas. Proof-rolling should be conducted prior to placing fill, and should be observed by a representative of GeoEngineers who will evaluate the suitability of the subgrade and identify areas of yielding that are indicative of soft or loose soil. If soft or loose zones are identified during proof-rolling, these areas should be excavated to the extent indicated by our representative and replaced with Imported Select Structural Fill as defined in this report.

During wet weather, or when the exposed subgrade is wet or unsuitable for proof-rolling, the prepared subgrade should be evaluated by observing excavation activity and probing with a steel foundation probe. Observations, probing and compaction testing should be performed by a member of our staff. Wet soil that has been disturbed due to site preparation activities or soft or loose zones identified during probing, should be removed and replaced with Imported Select Structural Fill as defined in this report.

6.3. Wet Weather Construction

The fine-grained soils at the site are highly susceptible to moisture. Wet weather construction practices will be necessary if work is performed during periods of wet weather. If site grading will occur during wet weather conditions, it will be necessary to use track-mounted equipment, load removed material into trucks supported on existing pavement, use gravel working pads and employ other methods to reduce ground disturbance. The contractor should be responsible to protect the subgrade during construction.

During wet weather we recommend that:

- The ground surface in and around the work area should be sloped so that surface water is directed to a sump or discharge location. The ground surface should be graded such that areas of ponded water do not develop.
- Slopes with exposed soils should be covered with plastic sheeting or similar means.
- The site soils should not be left uncompacted and exposed to moisture. Sealing the surficial soils by rolling with a smooth-drum roller prior to periods of precipitation will reduce the extent to which these soils become wet or unstable.
- Construction activities should be scheduled so that the length of time that soils are left exposed to moisture is reduced to the extent practicable.

In general, if construction activities are planned during periods of wet weather, the contractor should consider the use of granular haul roads and staging area to reduce subgrade disturbance. Based on our experience, between 18 and 24 inches of imported granular material is generally required to provide stable staging areas and haul roads. However, the actual thickness will depend on the contractor's means and methods and accordingly, should be the contractor's responsibility. Additionally, a geotextile fabric, such as Propex Geotex 104F, or approved alternate, should be placed as a barrier between the subgrade and imported granular material in areas of repeated construction traffic.

6.4. Excavation

Based on the material encountered in our subsurface explorations, it is our opinion that conventional earthmoving equipment in proper working condition should be capable of making necessary general excavations.

The earthwork contractor should be responsible for reviewing this report, including the boring logs, providing their own assessments and providing equipment and methods needed to excavate the site soils while protecting subgrades.

6.5. Dewatering

As discussed in the "Groundwater" Section 3.3.2 of this report, groundwater was encountered in our explorations. If groundwater is encountered during construction, saturated/wet soils should be dewatered. Sump pumps are expected to adequately address groundwater encountered in shallow excavations. In addition to groundwater seepage, surface water inflow to the excavations during the wet season can be problematic. Provisions for surface water control during earthwork and excavations should be included in the project plans and should be installed prior to commencing earthwork.

6.6. Shoring

All trench excavations should be made in accordance with applicable Occupational Safety and Health Administration (OSHA) and state regulations. Site soils within expected excavation depths typically range from very soft to stiff clay. Very soft to soft clay soils should be classified as OSHA Soil Type C, while medium stiff to stiff clay soils should be considered OSHA Soil Type B—provided there is no seepage and excavations occur during periods of dry weather. Excavations deeper than 4 feet should be shored or laid back at an inclination of 1H:1V (horizontal to vertical) for Type B soils and 1.5H:1V for Type C soils. Flatter slopes may be necessary if workers are required to enter. Excavations made to construct footings or other structural elements should be laid back or shored at the surface as necessary to prevent soil from falling into excavations.

Shoring for trenches less than 6 feet deep that are above the effects of groundwater should be possible with a conventional box system. Moderate sloughing should be expected outside the box. Shoring deeper than 6 feet or below the groundwater table should be designed by a registered engineer before installation. Further, the shoring design engineer should be provided with a copy of this report.

In our opinion, the contractor will be in the best position to observe subsurface conditions continuously throughout the construction process and to respond to the soil and groundwater conditions. Construction site safety is generally the sole responsibility of the contractor, who also is solely responsible for the means, methods and sequencing of the construction operations and choices regarding excavations and shoring. Under no circumstances should the information provided by GeoEngineers be interpreted to mean that GeoEngineers is assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and should not be inferred.

6.7. Structural Fill and Backfill

6.7.1. General

Materials used to support building foundations, floor slabs, hardscape, pavements and any other areas intended to support structures or within the influence zone of structures are classified as structural fill for the purposes of this report.

All structural fill should be free of debris, clay balls, roots, organic matter, frozen soil, man-made contaminants, particles with greatest dimension exceeding 4 inches and other deleterious materials. The suitability of soil for use as structural fill will depend on the gradation and moisture content of the soil. As the amount of fines in the soil matrix increases, the soil becomes increasingly more sensitive to small changes in moisture content and achieving the required degree of compaction becomes more difficult or impossible. Recommendations for suitable fill material are provided in the following sections.

6.7.2. Use of On-site Soil

As described in the "Subsurface Conditions" Section 3.3, the on-site near surface soil consists of clay. On-site soils are generally not suitable for use as structural fill.

6.7.3. Imported Select Structural Fill

Imported select granular material may be used as structural fill. Imported Select Structural Fill should consist of pit or quarry run rock, crushed rock, or crushed gravel and sand that is fairly well-graded between coarse and fine sizes, with approximately 25 to 65 percent passing the U.S. No. 4 sieve. It should have less than 5 percent passing the U.S. No. 200 sieve and have a minimum of two mechanically fractured faces. During dry weather, the fines content can be increased to a maximum of 12 percent.

6.7.4. Aggregate Base

Aggregate base material located under floor slabs and pavements, and crushed rock used in footing overexcavations should consist of imported clean, durable, crushed angular rock. Such rock should be well-graded, have a maximum particle size of 1 inch and have less than 5 percent passing the U.S. No. 200 sieve (3 percent for retaining walls). In addition, aggregate base shall have a minimum of 75 percent fractured particles according to American Association of State Highway and Transportation Officials (AASHTO) TP-61 and a sand equivalent of not less than 30 percent based on AASHTO T-176.

6.7.5. Retaining Wall Backfill

Fill placed to provide a drainage zone behind retaining walls should meet the general requirements above and consist of free-draining sand and gravel or crushed rock with a maximum particle size of ¾ inch and less than 3 percent passing the U.S. No. 200 sieve.

6.7.6. Trench Backfill

Backfill for pipe bedding and in the pipe zone should consist of well-graded granular material with a maximum particle size of ¾ inch and less than 5 percent passing the U.S. No. 200 sieve. Trench backfill material should be free of organic matter and other deleterious materials. Further, the backfill should meet the pipe manufacturer's recommendations. Above the pipe zone, Imported Select Structural Fill may be used as described above.

6.7.7. Cement Treated Subgrade Design

As an alternative to the use of imported granular material for wet weather structural fill, an experienced contractor may be able to amend the on-site soil with portland concrete cement (PCC), or with limekiln dust and PCC, to obtain suitable support properties. Successful use of soil amendment depends on the use of correct mixing techniques, soil moisture content and amendment quantities. Specific recommendations, based on exposed site conditions, for soil amending can be provided if necessary. However, for preliminary planning purposes, it may be assumed that a minimum of 5 percent cement (by dry weight, assuming a unit weight of 100 pounds per cubic foot [pcf]) will be necessary for subgrade and general fill amendment. Treatment depths of 12 to 16 inches for roadway subgrades are typical (assuming a seven-day unconfined compressive strength of at least 80 pounds per square inch [psi]), though they may be adjusted in the field depending on site conditions. Soil amending should be conducted in accordance with the specifications provided in the 2021 Oregon Department of Transportation (ODOT) Standard Specifications for Construction Section 00344 (Treated Subgrade).

6.7.8. Fill Placement and Compaction

Structural fill should be compacted at moisture contents that are within 3 percent of the optimum moisture content as determined by ASTM International (ASTM) Standard Practices Test Method D 1557 (Modified Proctor). The optimum moisture content varies with gradation and should be evaluated during construction. Fill material that is not near the optimum moisture content should be moisture conditioned prior to compaction.

Fill and backfill material should be placed in uniform, horizontal lifts and compacted with appropriate equipment. The appropriate lift thickness will vary depending on the material and compaction equipment used. Fill material should be compacted in accordance with Table 2, below. It is the contractor's responsibility to select appropriate compaction equipment and place the material in lifts that are thin enough to meet these criteria. However, in no case should the loose lift thickness exceed 18 inches.

TABLE 2. COMPACTION CRITERIA

Fill Type	Compaction Requirements		
	Percent Maximum Dry Density Determined by ASTM Test Method D 1557 at ± 3% of Optimum Moisture		
	0 to 2 Feet Below Subgrade	> 2 Feet Below Subgrade	Pipe Zone
Fine-grained soils (non-expansive)	95	95	----
Imported Granular, maximum particle size < 1¼ inch	95	95	----
Imported Granular, maximum particle size 1¼ inch to 4 inches (3-inch maximum under building footprints)	n/a (proof-roll)	n/a (proof-roll)	----
Retaining Wall Backfill*	92	92	-----
Nonstructural Zones	90	90	90

Fill Type	Compaction Requirements		
	Percent Maximum Dry Density Determined by ASTM Test Method D 1557 at ± 3% of Optimum Moisture		
	0 to 2 Feet Below Subgrade	> 2 Feet Below Subgrade	Pipe Zone
Trench Backfill	95	90	90

Note:

*Measures should be taken to prevent overcompaction of the backfill behind retaining walls. We recommend placing the zone of backfill located within 5 feet of the wall in lifts not exceeding about 6 inches in loose thickness and compacting this zone with hand-operated equipment such as a vibrating plate compactor and a jumping jack.

A representative from GeoEngineers should evaluate compaction of each lift of fill. Compaction should be evaluated by compaction testing, unless other methods are proposed for oversized materials and are approved by GeoEngineers prior to fill placement. These other methods typically involve procedural placement and compaction specifications together with verifying requirements such as proof-rolling.

6.8. Slopes

6.8.1. Permanent Slopes

Permanent cut or fill slopes should not exceed a gradient of 2H:1V. Where access for landscape maintenance is desired, we recommend a maximum gradient of 3H:1V. Fill slopes should be overbuilt by at least 12 inches and trimmed back to the required slope to maintain a firm face.

Slopes should be planted with appropriate vegetation to provide protection against erosion as soon as possible after grading. Surface water runoff should be collected and directed away from slopes to prevent water from running down the face of the slope.

6.8.2. Temporary Slopes

All temporary soil cuts associated with site excavations (greater than 4 feet in depth) should be adequately sloped back to prevent sloughing and collapse, in accordance with applicable OSHA and state guidelines.

Temporary cut slopes should not exceed a gradient appropriate for the soil type being excavated. As noted in the “Shoring” Section 6.6, very soft to soft clay should be considered OSHA Soil Type C and medium stiff to stiff clay soils should be considered OSHA Soil Type B. However, because of the variables involved, actual slope angles required for stability in temporary cut areas can only be estimated before construction.

The stability and safety of cut slopes depend on a number of factors, including:

- The type and density of the soil
- The presence and amount of any seepage
- Depth of cut
- Proximity and magnitude of the cut to any surcharge loads, such as stockpiled material, traffic loads, or structures
- Duration of the open excavation
- Care and methods used by the contractor

We recommend that stability of the temporary slopes used for construction be the responsibility of the contractor, since the contractor is in control of the construction operation and is continuously at the site to observe the nature and condition of the subsurface. If groundwater seepage is encountered within the excavation slopes, the cut slope inclination may have to be flatter than 1.5H:1V. However, appropriate inclinations will ultimately depend on the actual soil and groundwater seepage conditions exposed in the cuts at the time of construction. It is the responsibility of the contractor to ensure that the excavation is properly sloped or braced for worker protection, in accordance with applicable guidelines. To assist with this effort we make the following recommendations regarding temporary excavation slopes:

- Protect the slope from erosion with plastic sheeting for the duration of the excavation to minimize surface erosion and raveling.
- Limit the maximum duration of the open excavation to the shortest time period possible.
- Place no surcharge loads (equipment, materials, etc.) within 10 feet of the top of the slope.

More restrictive requirements may apply depending on specific site conditions, which should be continuously assessed by the contractor.

If temporary sloping is not feasible based on site spatial constraints, excavations could be supported by internally braced shoring systems, such as a trench box or other temporary shoring. There are a variety of options available. We recommend that the contractor be responsible for selecting the type of shoring system to apply.

6.8.3. Slope Drainage

If seepage is encountered at the face of permanent or temporary slopes, it will be necessary to flatten the slopes or install a subdrain to collect the water. We should be contacted to evaluate such conditions on a case-by-case basis.

7.0 STRUCTURAL DESIGN RECOMMENDATIONS

At the time this report was prepared, VLMK Engineering + Design indicated maximum column loads will be 750 kips per column or less and maximum wall loads will be 15 klf or less. We have assumed that floor loads for slabs-on-grade will be 150 psf or less. If design loads exceed these values, our recommendations may need to be revised.

7.1. Foundation Support Recommendations

Depending on the building loads, the structure can be supported on spread footings bearing on thickened granular fill pads over native medium stiff or stiffer clay soils.

We recommend the shallow foundations be founded at least 18 inches below the lowest adjacent grade, or as needed to meet the design loads. The recommended minimum foundation depth is greater than the anticipated frost depth.

7.1.1. Foundation Subgrade Preparation

We recommend that prepared subgrades be observed by a member of our firm, who will evaluate the suitability of the subgrade and identify areas of yielding, which are indicative of soft or loose soil.

Individual spread and continuous wall footings should be supported on a thickened granular fill pad bearing on medium stiff or stiffer clay, as follows:

- Column loads less than 50 kips and wall loads less than 5 klf can be supported on continuous and isolated spread foundations supported on a minimum 1-foot-thick compacted gravel pad over medium stiff or firmer native clay.
- Column loads up to 200 kips and wall loads less than 15 klf can be supported on continuous and isolated spread foundations supported on a minimum 2-foot-thick compacted gravel pad over medium stiff or firmer native clay.
- Column loads up to 750 kips can be supported on isolated spread foundations supported on a minimum 3-foot-thick compacted gravel pad over medium stiff or firmer native clay.

Granular pads should consist of ¾-inch-minus select granular fill placed and compacted as structural fill. Granular pads should extend outward from the edge of the footing 1 foot for every 2 feet of depth.

Any fill material encountered beneath proposed foundation elements should be removed to competent native soils and replaced with structural fill. The width of the overexcavation should extend beyond the edge of the footing a distance equal to the depth of the overexcavation below the base of the footing. The exposed subgrade soil should be probed with a ½-inch-diameter steel rod by GeoEngineers personnel. If soft, yielding or otherwise unsuitable areas are revealed during probing, the unsuitable soils should be removed and replaced with structural fill, as needed.

We recommend loose or disturbed soils be removed before placing reinforcing steel and concrete. Foundation bearing surfaces should not be exposed to standing water. If water infiltrates and pools in the excavation, the water, along with any disturbed soil, should be removed before placing reinforcing steel.

We recommend GeoEngineers observe all foundation excavations before placing concrete forms and reinforcing steel to determine that bearing surfaces have been adequately prepared and the soil conditions are consistent with those observed during site explorations.

7.1.2. Bearing Capacity

We recommend shallow footings be proportioned using a maximum allowable bearing pressure of 3,000 psf if supported on a minimum 1- to 3-foot-thick granular fill pads described above. This bearing pressure applies to the total of dead and long-term live loads and may be increased by one-third when considering earthquake or wind loads. This is a net bearing pressure. The weight of the footing and overlying backfill can be ignored in calculating footing sizes.

7.1.3. Foundation Settlement

Foundations designed and constructed as recommended are expected to experience settlements of less than 1 inch. Differential settlements of up to one-half of the total settlement magnitude can be expected between adjacent footings supporting comparable loads.

7.1.4. Lateral Resistance

Lateral loads on footings can be resisted by passive earth pressures on the sides of footings and by friction on the bearing surface. We recommend that passive earth pressures be calculated using an equivalent fluid unit weight of 240 pcf for foundations confined by native medium stiff or stiffer clay and 350 pcf if confined by a minimum of 2 feet of imported granular fill.

We recommend using a friction coefficient of 0.35 for foundations placed on the native medium stiff or stiffer clay, or 0.50 for foundations placed on a minimum 2-foot-thickness of compacted crushed rock. The passive earth pressure and friction components may be combined provided the passive component does not exceed two-thirds of the total.

The passive earth pressure value is based on the assumptions that the adjacent grade is level and static groundwater remains below the base of the footing throughout the year. The top 1 foot of soil should be neglected when calculating passive lateral earth pressures, unless the adjacent area is covered with pavement. The lateral resistance values include a safety factor of approximately 1.5.

7.2. Drainage Considerations

We recommend the ground surface be sloped away from the buildings at least 2 percent. All downspouts should be tightlined away from the building foundation areas and should also be discharged into a stormwater disposal system. Downspouts should not be connected to footing drains.

Although not required based on expected groundwater depths, if perimeter footing drains are used for below-grade structural elements or crawlspaces, they should be installed at the base of the exterior footings. The perimeter footing drains should be provided with cleanouts and should consist of at least 4-inch-diameter perforated pipe placed on a 3-inch bed of, and surrounded by, 6 inches of drainage material enclosed in a non-woven geotextile such as Mirafi 140N (or approved equivalent) to prevent fine soil from migrating into the drain material. We recommend against using flexible tubing for footing drainpipes. The perimeter drains should be sloped to drain by gravity to a suitable discharge point, preferably a storm drain. We recommend that the cleanouts be covered and placed in flush-mounted utility boxes. Water collected in roof downspout lines must not be routed to the footing drain lines.

7.3. Floor Slabs

Subgrade support for concrete floor slabs supporting up to 150 psf areal loading can be obtained from the medium stiff or firmer native clay or on new structural fill placed on these materials.

A minimum 6-inch-thick layer of crushed rock Aggregate Base material should be placed over the prepared subgrade as a capillary break. Aggregate Base material placed directly below the slab should be ¾-inch maximum particle size or less. We recommend using a subgrade modulus value of 125 pounds per cubic inch (pci) to design slabs on grade, provided the site is prepared as recommended. Concrete slabs constructed as recommended will likely settle less than 1 inch. We recommend that concrete slabs be jointed around columns to allow the individual structural elements to settle differentially.

Due to the presence of fine-grained soils, moisture should be expected at the subgrade surface. Where moisture vapor emission through the slab must be minimized, a vapor retarding membrane or vapor barrier below the slab should be considered.

7.4. Retaining Walls

7.4.1. Concrete Retaining Walls

Retaining structures free to rotate slightly around the base should be designed for active earth pressures using an equivalent fluid unit weight of 40 pcf when the ground surface extends level behind the wall equal to the wall height and 72 pcf for a 2H:1V slope above the wall. For lesser slopes between flat and 2H:1V, the equivalent fluid unit weight can be linearly interpolated between the recommended values.

Retaining walls that are restrained against rotation such as embedded building walls, should be designed for an at-rest equivalent fluid unit weight of 60 pcf for a flat backslope. The at-rest earth pressure should be increased to 90 pcf equivalent fluid unit weight for a backslope of 2H:1V behind the wall and can be linearly interpolated for slopes between the recommended values.

The earth pressure values are based on the following assumptions.

- Walls are adequately designed for the appropriate condition being restrained or not restrained against rotation.
- Walls are 8 feet or less in total wall support height.
- The backfill within 2 feet of the wall consists of free-draining granular materials.
- Grades above the wall heights are no steeper than 2H:1V slope.
- Total wall heights are based on a level front slope from the base of the wall.
- Hydrostatic pressures do not develop, and drainage will be provided behind the wall.

Seismically induced lateral forces on retaining walls can be calculated using a dynamic force equal to 9H psf, where H is the wall height. This seismic force should be applied with the centroid located at 0.6H from the wall base. These values assume that the wall is vertical and unrestrained and the backfill behind the wall is horizontal. Seismic lateral earth pressures were computed using the Mononobe-Okabe equation.

Surcharge loads applied closer than one-half of the wall height should be considered as uniformly distributed horizontal pressures equal to one-third of the distributed vertical surcharge pressure. Footings for retaining walls should be designed as recommended for shallow foundations. Backfill should be placed and compacted as recommended for structural fill.

Re-evaluation of our recommendations will be required if the retaining wall design criteria for the project vary from these assumptions.

We recommend that GeoEngineers be retained to review the retaining wall design to confirm that it meets the requirements in our report.

7.5. Seismic Design

Parameters provided in Table 3 are based on the conditions encountered during our subsurface exploration program and the procedure outlined in the 2018 International Building Code (IBC), which references the 2016 Minimum Design Loads for Buildings and Other Structures (American Society of Civil Engineers [ASCE] 7-16). Per ASCE 7-16 Section 11.4.8, a ground motion hazard analysis or site-specific response analysis is required to determine the design ground motions for structures on Site Class D sites with S_1 greater than or equal to 0.2g.

For this project, the site is classified as Site Class D with an S_1 value of 0.383g; therefore, the provision of 11.4.8 applies. The parameters listed in Table 3 below may be used to determine the design ground motions if Exception 2 of Section 11.4.8 of ASCE 7-16 is used. Using this exception, the seismic response coefficient (C_S) is determined by Equation (Eq.) (12.8-2) for values of $T \leq 1.5T_S$, and taken as equal to 1.5 times the value computed in accordance with either Eq. (12.8-3) for $T_L \geq T > 1.5T_s$ or Eq. (12.8-4) for $T > T_L$, where T represents the fundamental period of the structure and T_S=0.764 sec. If requested, we can complete a site-specific seismic response analysis, which might provide somewhat reduced seismic demands from the parameters in Table 3 and the requirements for using Exception 2 of Section 11.4.8 in ASCE 7-16. The reduced values will likely not be significant enough to warrant the additional cost of further evaluation if designing to 2018 IBC.

TABLE 3. MAPPED 2018 IBC SEISMIC DESIGN PARAMETERS

Parameter	Recommended Value[1,2]
Site Class	D
Mapped Spectral Response Acceleration at Short Period (S_S)	0.820 g
Mapped Spectral Response Acceleration at 1 Second Period (S_1)	0.383 g
Site Modified Peak Ground Acceleration (PGA_M)	0.458 g
Site Amplification Factor at 0.2 second period (F_a)	1.172
Site Amplification Factor at 1.0 second period (F_v)	1.917
Design Spectral Acceleration at 0.2 second period (S_{DS})	0.641 g
Design Spectral Acceleration at 1.0 second period (S_{D1})	0.489 g

Notes:

[1] Parameters developed based on Latitude 45.316573° and Longitude -122.778908° using the ATC Hazards online tool.

[2] These values are only valid if the structural engineer utilizes Exception 2 of Section 11.4.8 (ASCE 7-16).

8.0 PAVEMENT DESIGN RECOMMENDATIONS

8.1. General

Pavement subgrades should be prepared in accordance with the "Site Preparation" Section 6.1 of this report. The design of the recommended pavement sections are based on an assumed California Bearing Ratio of 3. We do not have specific information on the frequency and type of vehicles that will use the area; however, we have based our design analysis on traffic consisting of 500 cars and up to five, three-axle delivery trucks per day. Light duty pavement areas are considered those accessed only by auto traffic (i.e., parking areas). Heavy-duty pavement areas include those within the drive path of heavy trucks and delivery vehicles.

Heavy construction traffic has not been considered in our pavement design; therefore, we assume that the pavements will be constructed at the end of the project after heavy construction vehicles, such as concrete trucks and construction material delivery trucks, will no longer access the site. Construction traffic should not be allowed on new pavements. If this is not the case, we will have to re-design the pavements for those heavier loading conditions.

8.2. Drainage

Long-term performance of pavements is influenced significantly by drainage conditions beneath the pavement section. Positive drainage can be accomplished by crowning the subgrade with a minimum 2 percent cross slope and establishing grades to promote drainage.

8.3. Pavement Sections

Based on the estimated traffic data and our analyses, our recommended pavement sections are presented in Table 4.

TABLE 4. RECOMMENDED PAVEMENT SECTIONS

Section	Minimum PCC Thickness (inches)	Minimum Asphalt Thickness (inches)	Minimum Aggregate Base Thickness (inches)
Light Duty (general automobile parking areas)	4	--	6
	--	3.5	6
Heavy Duty (drive aisles and heavy delivery areas supporting up to five three-axle trucks/day)	6	--	6
	--	4	9

The aggregate base course should conform to the "Aggregate Base" Section 6.7.4 of this report and be compacted to at least 95 percent of the maximum dry density determined in accordance with AASHTO T-180/ASTM Test Method D 1557.

The asphalt concrete (AC) pavement should conform to Section 00745 of the most current edition of the ODOT Standard Specifications for Highway Construction. The Job Mix Formula should meet the requirements for a ½-inch Dense Graded Level 2 Mix. The AC binder should be PG 64-22 grade meeting the ODOT Standard Specifications for Asphalt Materials. AC pavement should be compacted to 91.0 percent of the Maximum Theoretical Unit Weight (Rice Gravity) as determined by AASHTO T-209.

PCC pavement sections should be Class 4000 ¾-inch-minus with minimum 28-day flexural strength of 600 psi. Class 4000 indicates a design compressive strength of 4,000 psi.

The recommended pavement sections assume that final improvements surrounding the pavement will be designed and constructed such that stormwater or excess irrigation water from landscape areas does not infiltrate below the pavement section into the crushed base.

9.0 DESIGN REVIEW AND CONSTRUCTION SERVICES

Recommendations provided in this report are based on the assumptions and preliminary design information stated herein. We welcome the opportunity to review and discuss construction plans and specifications for this project as they are being developed. In addition, GeoEngineers should be retained to review the geotechnical-related portions of the plans and specifications to evaluate whether they are in conformance with the recommendations provided in this report.

Satisfactory foundation and earthwork performance depends to a large degree on quality of construction. Sufficient monitoring of the contractor's activities is a key part of determining that the work is completed in accordance with the construction drawings and specifications. Subsurface conditions observed during construction should be compared with those encountered during the subsurface explorations. Recognition of changed conditions often requires experience; therefore, qualified personnel should visit the site with sufficient frequency to detect whether subsurface conditions change significantly from those anticipated.

We recommend that GeoEngineers be retained to observe construction at the site to confirm that subsurface conditions are consistent with the site explorations, and to confirm that the intent of project plans and specifications relating to earthwork, pavement, and foundation construction are being met.

10.0 LIMITATIONS

We have prepared this report for the exclusive use of Martin Development and their authorized agents and/or regulatory agencies for the proposed W5 building development project in Wilsonville, Oregon.

This report is not intended for use by others and the information contained herein is not applicable to other sites. No other party may rely on the product of our services unless we agree in advance and in writing to such reliance.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix C titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

11.0 REFERENCES

City of Wilsonville. 2015. Stormwater & Surface Water Design & Construction Standards (SSWDCS).

International Code Council. 2018. 2018 International Building Code.

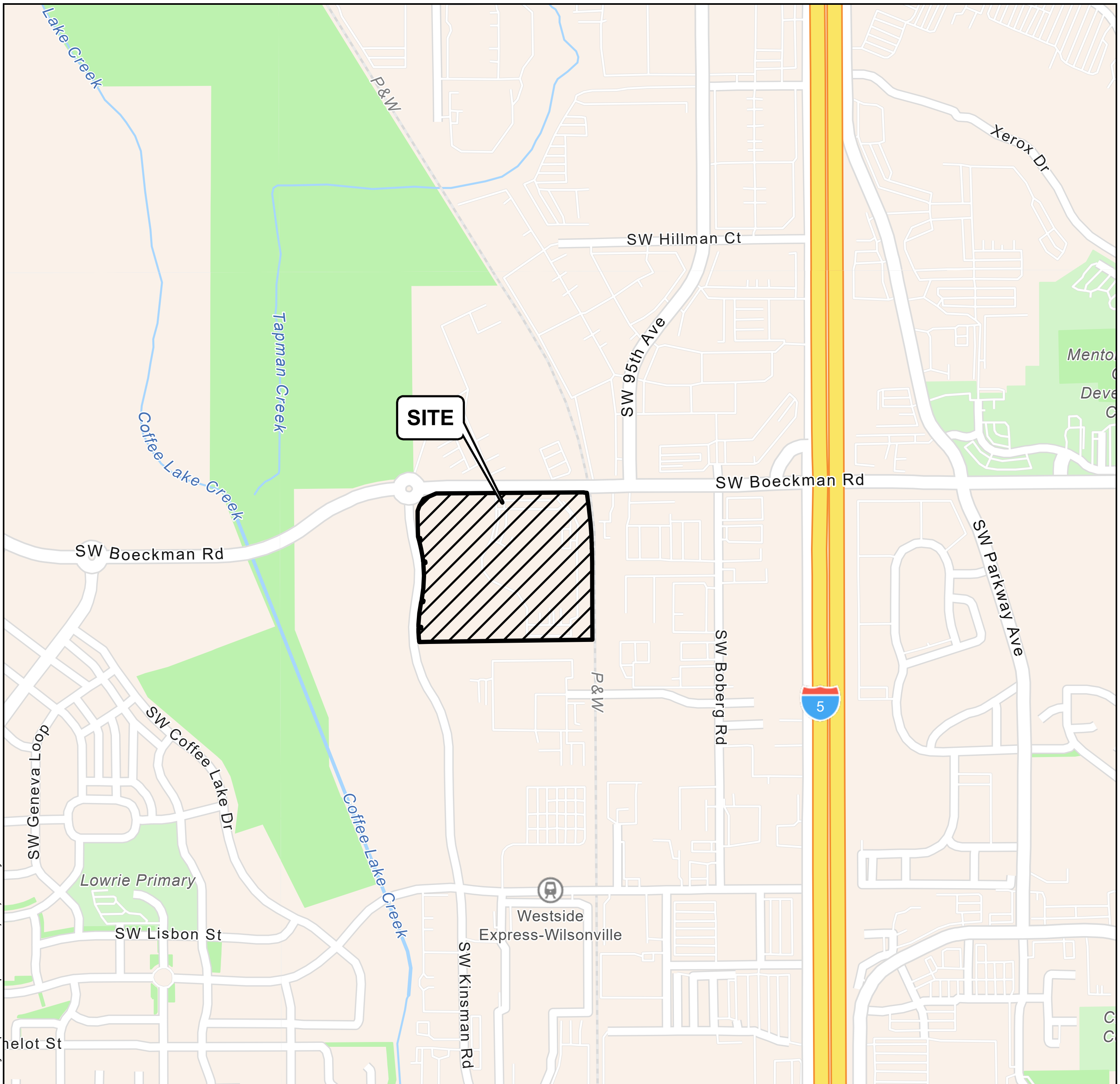
International Code Council. 2019. 2019 Oregon Structural Specialty Code.

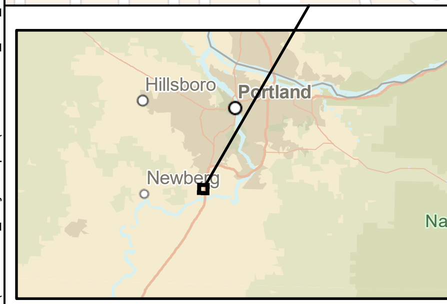
Occupational Safety and Health Administration (OSHA). Technical Manual Section V: Chapter 2, Excavations: Hazard Recognition in Trenching and Shoring: http://www.osha.gov/dts/osta/otm/otm_v/otm_v_2.html.

Oregon Department of Transportation (ODOT). 2021. Oregon Standard Specifications for Construction. Salem, Oregon.

Schlicker, H.G. and C.T. Finlayson. 1979. Geology and Geologic Hazards of Northwestern Clackamas County, Oregon: Oregon Department of Geology and Mineral Industries Bulletin 99, 79 p. 10 pl., 1:24,000 scale.

FIGURES





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Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: ESRI

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

Martin Development – Building W5
Wilsonville, Oregon

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Figure 1

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Boring Number and Approximate Location

Infiltration Test Number and Approximate Location

Data Source: Bing Maps.
Site plan overlay from Lance Mueller & Associates.

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Site Plan

Martin Development – Building W5
Wilsonville, Oregon

GEOENGINEERS

Figure 2

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Notes:

Legend

APPENDICES

GeoEngineers

APPENDIX A
Field Explorations and Laboratory Testing

APPENDIX A
FIELD EXPLORATIONS AND LABORATORY TESTING

Field Explorations

Soil and groundwater conditions at the site were explored on May 26 and May 27, 2021 by completing seven borings (B-1 through B-7) and three infiltration test borings (IT-1 through IT-3) at the approximate locations shown in the Site Plan, Figure 2. The borings were advanced with mud rotary and hollow-stem auger methods, using a MDI B-58 truck-mounted drill rig owned and operated by PLI Systems, Inc.

The drilling was continuously monitored by a staff engineer from our office who maintained a detailed log of subsurface explorations, visually classified the soil encountered and obtained representative soil samples from the borings. Samples were collected using a 1-inch, inside-diameter, standard split spoon sampler, a 3-inch, inside-diameter, Dames and Moore split spoon sampler, and a 3-inch, outside diameter, thin-wall Shelby Tube sampler. Split spoon samplers were driven into the soil using an automatically driven 140-pound hammer, free-falling 30 inches on each blow. The number of blows required to drive the sampler each of three, 6-inch increments of penetration were recorded in the field. The sum of the blow counts for the last two, 6-inch increments of penetration was reported on the boring logs as the ASTM International (ASTM) Standard Practices Test Method D 1556 standard penetration test (SPT) N-value. The approximate N-values for D&M samples were converted to SPT N-values using the Lacroix-Horn Conversion [N(SPT) = (2*N1*W1*H1)/(175*D1*D1*L1), where N1 is the non-standard blowcount, W1 is the hammer weight in pounds (140), H1 is the hammer drop height in inches (30), D1 is the non-standard sampler outside diameter in inches (3.23), and L1 is the length of penetration in inches (12)].

Recovered soil samples were visually classified in the field in general accordance with ASTM D 2488 and the classification chart listed in Key to Exploration Logs, Figure A-1. The logs of the borings are presented in Figures A-2 through A-11. The logs are based on interpretation of the field and laboratory data, and indicate the depth at which subsurface materials or their characteristics change, although these changes might actually be gradual.

Laboratory Testing

Soil samples obtained from the explorations were visually classified in the field and in our laboratory using the Unified Soil Classification System (USCS) and ASTM classification methods. ASTM Test Method D 2488 was used to visually classify the soil samples, while ASTM D 2487 was used to classify the soils based on laboratory test results. Moisture content tests were performed on selected samples in general accordance with ASTM D 2216 and moisture-density tests in general accordance with ASTM D 7263. One Atterberg limits test was performed in accordance with ASTM D 4318. One consolidation test was performed in general accordance with ASTM D 2435. Results of the laboratory testing are presented in the appropriate exploration logs at the respective sample depths in this appendix. The Atterberg limits and consolidation results are presented in Figures A-12 through A-14 in this appendix.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

Sampler Symbol Descriptions

- 2.4-inch I.D. split barrel
- Standard Penetration Test (SPT)
- Shelby tube
- Piston
- Direct-Push
- Bulk or grab
- Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	SOD	Sod/Forest Duff
	TS	Topsoil

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PL	Point load test
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

Key to Exploration Logs

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Figure A-1

Drilled	Start 5/26/2021	End 5/26/2021	Total Depth (ft)	29	Logged By IT / Checked By TG	Driller PLI Systems, Inc.	Drilling Method	Hollow-stem Auger

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	B-58 MDI truck-mounted
Latitude / Longitude	45.31705 / -122.778913	System / Datum	Decimal Degrees / WGS84	See "Remarks" section for groundwater observed	

Notes: D&M N-value reduced using Lacroix-Horn conversion to approximate SPT N-value.

Elevation (feet)	Depth (feet)	Recovered (in)	Blows/foot	Sample Name / Testing	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0				CL	Gray-brown clay, trace fine sands, orange mottling, trace organic matter (medium stiff, moist)			
		24		1					
	5	16	6	2					Sample at 5 feet is disturbed (re-sampled)
		18	8	3		Becomes gray, medium stiff to stiff			
	10	18	26	4	GM	Gray-brown silty gravel, occasional sand, orange mottling (medium dense, moist)			
									Groundwater observed at approximately 13 feet below ground surface approximately 19 hours after drilling.
	15	8	33	5		Becomes dense			
									Rig chatter at 17 feet
									Groundwater observed at approximately 17¾ feet below ground surface during drilling. Slower auger progress
	20	12	40	6		Becomes gray			
	25	14	30	7	GP-GM	Gray gravel with silt and sand (medium dense to dense, wet)			
			40	8		Becomes dense			Auger refusal at 27½ feet

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

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GEOENGINEERS

Project: Martin Development - Building W5
Project Location: Wilsonville, Oregon
Project Number: 0821-016-00

Drilled	Start 5/27/2021	End 5/27/2021	Total Depth (ft) 36.5	Logged By IT / Checked By TG	Driller PLI Systems, Inc.	Drilling Method Mud Rotary

Surface Elevation (ft) / Vertical Datum: Undetermined	Hammer Data: Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment: B-58 MDI truck-mounted	
Latitude 45.316573 / Longitude -122.778908	System: Decimal Degrees / Datum: WGS84	Groundwater not observed at time of exploration	

Notes: D&M N-value reduced using Lacroix-Horn conversion to approximate SPT N-value.

Elevation (feet)	Depth (feet)	Recovered (in)	Blows/foot	Sample Name / Testing	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0				CL	Brown clay with sand, occasional gravel, black and gold mottling (soft, moist)			
		4	3	1					
	5	18	1	2		Becomes gray, rootlets, very soft			
		6	1	3		Grades with red mottling			
	10	18	13	4	GM	Gray-blue silty gravel, occasional fine sand, red mottling (medium dense, moist)			Rig chatter
	15	18	33	5	GP-GM	Brown gravel with silt and sand, red and black mottling (dense, wet)			
	20	12	30	6		Becomes medium dense to dense			
									Rig chatter
	25	5	64/9"	7		Becomes very dense			
									Driller reports increased resistance
					CL	Gray-blue clay, trace fine sand, trace gravel (medium stiff to stiff, wet)			Driller reports material change at 28½ feet
	30	2	8	8					
	35								

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

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GEOENGINEERS

Project: Martin Development - Building W5
Project Location: Wilsonville, Oregon
Project Number: 0821-016-00

Figure A-3
Sheet 1 of 2

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Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	35		12	12		9A 9B			Becomes with gravel, very stiff			

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GeoEngineers

Project: Martin Development - Building W5
Project Location: Wilsonville, Oregon
Project Number: 0821-016-00

Figure A-3
Sheet 2 of 2

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Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	5/26/2021	5/26/2021	41.5	IT	TG	PLI Systems, Inc.	Mud Rotary

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	B-58 MDI truck-mounted
Latitude / Longitude	45.316438 / -122.778013	System / Datum	Decimal Degrees / WGS84	Groundwater not observed at time of exploration	

Notes: D&M N-value reduced using Lacroix-Horn conversion to approximate SPT N-value.

Elevation (feet)	Depth (feet)	Recovered (in)	Blows/foot	Sample Name / Testing	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0				CL	Brown clay, trace fine sand, rootlets (stiff, moist)			
	2.5	18	14	1 / MD			23		DD = 99 pcf
	5	18	6	2		Becomes gray-brown with orange mottling, trace organic matter, medium stiff			
	7.5	18	14	3 / AL		Becomes with gravel, stiff	42		AL (LL = 42; PI = 18)
	10	16	54	4	GM	Gray-brown silty gravel, occasional fine sand (very dense, moist)			Driller reports gravel at 10 feet
	15	14	28	5		Grades with red mottling, medium dense, wet			
									Rig chatter
									Slowed progress
	20	8	31	6		Becomes dense			Rig chatter
	25	5	67/11"	7	GP-GM	Gray gravel with silt and sand (very dense, wet)			Rig chatter
	30	18	6	8	CL	Gray-blue clay, occasional fine sand (medium stiff, wet)			
	35								

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

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GeoEngineers

Project: Martin Development - Building W5
Project Location: Wilsonville, Oregon
Project Number: 0821-016-00

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Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	35		18	11		9			Becomes light gray with brown and gold mottling, stiff			
	40		18	13		10			Becomes reddish brown mix with light gray			

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GeoEngineers

Project: Martin Development - Building W5
Project Location: Wilsonville, Oregon
Project Number: 0821-016-00

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	5/27/2021	5/27/2021	41.5	IT	TG	PLI Systems, Inc.	Mud Rotary

Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	B-58 MDI truck-mounted
Latitude Longitude	45.317015 -122.777994	System Datum	Decimal Degrees WGS84	Groundwater not observed at time of exploration	

Notes: D&M N-value reduced using Lacroix-Horn conversion to approximate SPT N-value.

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0							CL	Dark gray and brown clay, occasional fine sand, black mottling (very soft to soft, moist)			
			18	2		1 / MD				27		DD = 87 pcf
	5		4			2 / CS				30		
			18	7		3			Becomes dark gray, medium stiff			
	10		18	10		4			Becomes gray and brown, red mottling with sand, stiff			
												Rig chatter
	15		18	26		5		GM	Brown and red silty gravel, occasional sand, orange mottling (medium dense, wet)			
	20		5	22		6		GP-GM	Gray-brown gravel with silt and sand (medium dense, wet)			Rig chatter
	25		8	28		7			Grades with black and orange mottling			
												Rig chatter
	30		8	48		8			Becomes dark bluish gray, dense			
								CL	Gray sandy clay with gravel (stiff, wet)			Driller reports material change at 33 feet
	35											

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

Date:7/1/21 Path:P:\0\0821016\GINT\082101600.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_GEOTECH_STANDARD_%F_NO_GW

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GEOENGINEERS

Project: Martin Development - Building W5
Project Location: Wilsonville, Oregon
Project Number: 0821-016-00

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	35		0	16		9A						
			18	14		9B						
	40		18	15		10						

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GeoEngineers

Project: Martin Development - Building W5
Project Location: Wilsonville, Oregon
Project Number: 0821-016-00

Drilled	Start 5/26/2021	End 5/26/2021	Total Depth (ft)	6.5	Logged By IT	Checked By TG	Driller PLI Systems, Inc.	Drilling Method Mud Rotary

Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	B-58 MDI truck-mounted
Latitude Longitude	45.317166 -122.778356	System Datum	Decimal Degrees WGS84	Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	FIELD DATA: Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample	FIELD DATA: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0							CL	Gray-brown clay with fine sand, orange mottling (very soft, moist)			
			6	0		1						
	5		10	5		2			Becomes medium stiff, rootlets			

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

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GEOENGINEERS

Project: Martin Development - Building W5
Project Location: Wilsonville, Oregon
Project Number: 0821-016-00

Figure A-6
Sheet 1 of 1

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Drilled	Start 5/26/2021	End 5/26/2021	Total Depth (ft)	6.5	Logged By IT Checked By TG	Driller PLI Systems, Inc.	Drilling Method	Mud Rotary

Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	B-58 MDI truck-mounted
Latitude Longitude	45.316398 -122.779312	System Datum	Decimal Degrees WGS84	Groundwater not observed at time of exploration	
Notes:					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0							CL	Gray-brown clay with fine sand, rootlets (medium stiff, moist)			
			8	5		1 / MC				27		
	5		14	16		2			Becomes dark gray with orange mottling, stiff to very stiff			

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

Date:6/22/21 Path:C:\USERS\CESTES\DOCUMENTS\SHAREPOINT DRAFTS\08210160.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_GEOTECH_STANDARD_%F_NO_GW

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Drilled	Start 5/27/2021	End 5/27/2021	Total Depth (ft) 6.5	Logged By IT / Checked By TG	Driller PLI Systems, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	B-58 MDI truck-mounted
Latitude Longitude	45.315387 -122.777342	System Datum	Decimal Degrees WGS84	Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0							CL	Brown-gray clay, occasional fine sand (medium stiff, moist)			
			18	7		1 MC				29		
	5		18	11		2			Becomes brown, stiff			

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

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GeoEngineers

Project: Martin Development - Building W5
Project Location: Wilsonville, Oregon
Project Number: 0821-016-00

Date:6/22/21 Path:C:\USERS\CESTES\DOCUMENTS\SHAREPOINT DRAFTS\0821016\00.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_GEOTECH_STANDARD_%F_NO_GW

Drilled	Start 5/26/2021	End 5/26/2021	Total Depth (ft) 5	Logged By IT Checked By TG	Driller PLI Systems, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) / Vertical Datum: Undetermined	Hammer Data: Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment: B-58 MDI truck-mounted
Latitude 45.316304 / Longitude -122.778176	System: Decimal Degrees / Datum: WGS84	Groundwater not observed at time of exploration

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	FIELD DATA: Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample	FIELD DATA: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0							CL	Dark brown clay, occasional fine sand, rootlets to 4 feet (stiff to very stiff, moist)			
			8	10		1						
	5											Infiltration test performed at 5 feet

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

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GEOENGINEERS

Project: Martin Development - Building W5
Project Location: Wilsonville, Oregon
Project Number: 0821-016-00

Figure A-9
Sheet 1 of 1

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Drilled Start 5/26/2021 End 5/26/2021	Total Depth (ft) 5	Logged By IT Checked By TG	Driller PLI Systems, Inc.		Drilling Method Hollow-stem Auger
Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	B-58 MDI truck-mounted
Latitude Longitude	45.316307 -122.779374	System Datum	Decimal Degrees WGS84	Groundwater not observed at time of exploration	
Notes:					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0							CL	Dark gray-brown clay, occasional fine sand, rootlets to 5 feet, black mottling (soft to medium stiff, moist)			
		⊠	6	4		1						
	5											Infiltration test performed at 5 feet

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

Date:6/22/21 Path:C:\USERS\CESTES\DOCUMENTS\SHAREPOINT DRAFTS\082101600.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_GEOTECH_STANDARD_%F_NO_GW

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GeoEngineers

Project: Martin Development - Building W5
Project Location: Wilsonville, Oregon
Project Number: 0821-016-00

Drilled	Start 5/26/2021	End 5/26/2021	Total Depth (ft)	5	Logged By IT	Checked By TG	Driller	PLI Systems, Inc.	Drilling Method	Hollow-stem Auger

Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	B-58 MDI truck-mounted
Latitude Longitude	45.31713 -122.778861	System Datum	Decimal Degrees WGS84	Groundwater not observed at time of exploration	
Notes:					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	FIELD DATA: Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample	FIELD DATA: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0							CL	Gray-brown clay, occasional fine sand, orange mottling, rootlets to 4 feet (stiff, moist)			
			10	9		1						
	5											Infiltration test performed at 5 feet

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

Date:6/22/21 Path:C:\USERS\CESTES\DOCUMENTS\SHAREPOINT DRAFTS\082101600.GPJ DBLibrary/Library:GEOENGINEERS_DF_STD_US_JUNE_2017.GLB/GEI8_GEOTECH_STANDARD_%F_NO_GW

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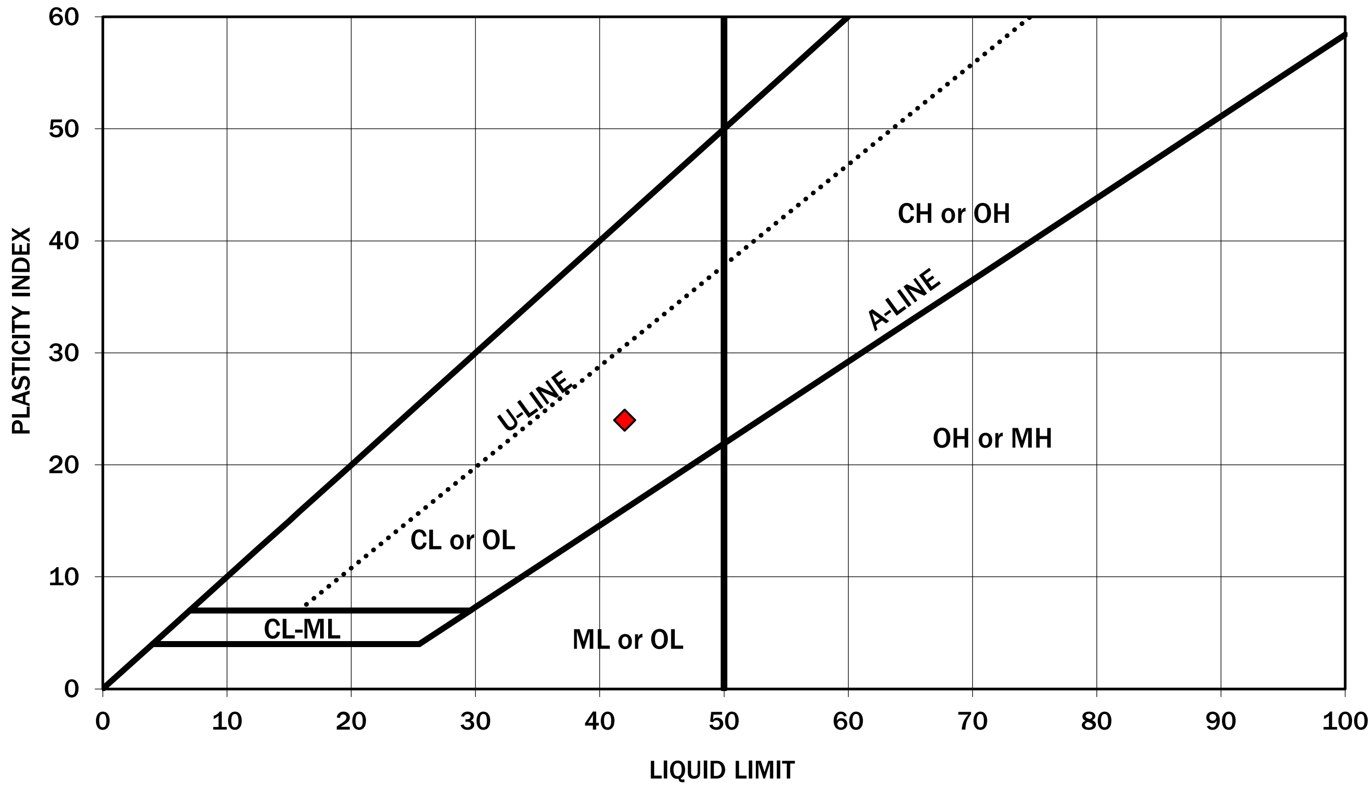
Project: Martin Development - Building W5
Project Location: Wilsonville, Oregon
Project Number: 0821-016-00

PLASTICITY CHART



Symbol	Boring Number	Depth (feet)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Soil Description
◆	B-3	5	42	42	24	Brown clay w/gravel & occasional sand (CL)

Note: This report may not be reproduced, except in full, without written approval of GeoEngineers, Inc. Test results are applicable only to the specific sample on which they were performed, and should not be interpreted as representative of any other samples obtained at other times, depths or locations, or generated by separate operations or processes.

The liquid limit and plasticity index were obtained in general accordance with ASTM D 4318.

Atterberg Limits Test Results

Martin Development – Building W5
Wilsonville, Oregon

GeoEngineers

Figure A-12

One-Dimensional Consolidation — Test Summary

ASTM D2435 — **B-4, S-2**

Project: Martin Development W5
Project No.: 0821-016-00
Boring: B-4
Sample: S-2
Depth: 5

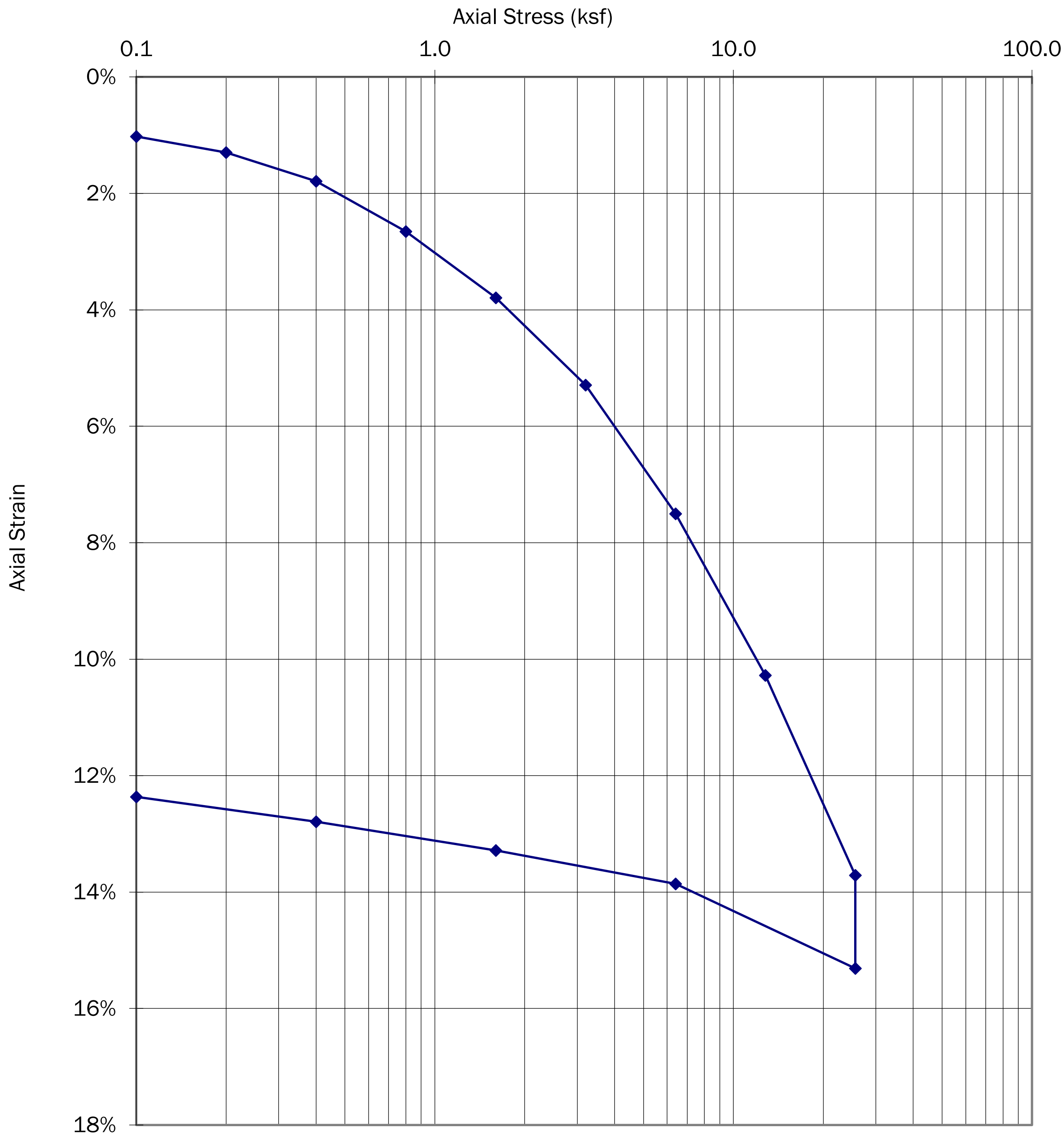
Trimming Procedure: Turntable/Blade/Ring
Condition of Test: Inundated/Distilled
Test Method: B
Interpretation Procedure: 2 (Taylor)
Approved: Joe Laprade 6/30/21

	Before Inundation	After Final Load
Height (in)	0.7446	0.6530
Diameter (in)	2.4653	2.4653
Volume (in^3)	3.554	3.117
Wet Weight (g)	108.72	105.36
Dry Weight (g)	83.93	83.93
Wet Density (pcf)	116.5	128.8
Dry Density (pcf)	90.0	102.6
Water Content (%)	30%	26%
Void Ratio	0.87	0.64
Saturation (%)	91%	100%

	Load (psf)	d_{100} (in)	d_{50} (in)	t_{90} (min)	C_v (cm^2/s)
Load	100	0.0076	0.0063	0.9	0.826
	200	0.0097	0.0092	1.2	0.634
	400	0.0134	0.0125	0.6	1.205
	800	0.0198	0.0184	0.8	0.891
	1600	0.0282	0.0265	0.6	1.102
	3200	0.0394	0.0374	0.6	1.216
	6400	0.0559	0.0525	0.7	0.907
	12800	0.0765	0.0725	0.6	1.099
	25600	0.1021	0.0966	0.7	0.854
Unload	6400	0.1032	0.1042	0.2	2.770
	1600	0.0989	0.0999	3.2	0.175
	400	0.0952	0.0965	3.2	0.177
	100	0.0921	0.0924	0.4	1.377

Soil Description: fine to coarse sandy silt; numerous fine to coarse organics; ML

Project:	Martin Development W5
Project No.:	0821-016-00
Boring:	B-4
Sample:	S-2
Depth:	5



APPENDIX B
Geotechnical Specifications

SECTION 02510

ASPHALT CONCRETE PAVEMENT

PART I - GENERAL

1.1 DESCRIPTION OF THE WORK

A. Furnish all labor, materials, equipment, and incidentals required for the aggregate base and asphalt concrete paving as shown in the Drawings and specified herein, and as reasonably inferable therefrom.

B. Related Sections:
   1. Section 31 10 00, Site Preparation.
   2. Section 31 20 00, Earthwork.

1.2 REFERENCE STANDARDS AND DOCUMENTS

A. Oregon Standard Specifications for Construction, Oregon Department of Transportation (ODOT), 2021 Edition.

B. ASTM International (ASTM) Standard Practices, 2018 Edition.
   1. ASTM D 1557, Test Methods of Laboratory Compaction Characteristics of Soil Using Modified Effort.
   2. ASTM D 2041, Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures.

C. Geotechnical report prepared by GeoEngineers, Inc. titled “Geotechnical Engineering Report, Martin Development - Building W5, Wilsonville, Oregon” dated July 14, 2021.

1.3 SUBMITTALS

A. Mix Design:
   1. Submit job mix formula with laboratory test results at least 10 working days prior to the anticipated start of paving operations.

B. Reports:
   1. Submit paving vendor’s certified test results for the second truckload and each sixth truckload of asphalt concrete delivered to the site.
   2. Submit calculations on paving area and quantities of each paving material to complete the project.
   3. Submit weigh bills and delivery tickets for materials delivered to the site.

C. Aggregate Materials:
   1. Submit one 50-pound sample of base aggregate to the Geotechnical Engineer at least 10 working days prior to use. No base aggregate materials shall be used until evaluated by the Geotechnical Engineer.
   2. Submit a written statement indicating the source and character of all base aggregate with the sample.
   3. Submit copies of sieve analysis and moisture density test reports indicating conformance of the base aggregate with the Specification.
   4. Confirm that the base aggregate used conforms with the sample supplied to the Geotechnical Engineer.

1.4 QUALITY ASSURANCE

A. Mixing Plant Qualifications:
   1. Asphalt concrete supplier shall have a minimum of 5 years' experience in the production of hot-mix, hot-laid asphalt concrete pavement.
B. Installer's Qualifications:
   1. Installer shall have a minimum of 2 years' experience in the placement of asphalt concrete pavement.
   2. Construction superintendent assigned to the project shall have a minimum of 2 years of documentable experience with successful completion of paving projects of similar size.
C. Quality Control Testing:
   1. Owner will engage Geotechnical Engineer for quality control testing during subgrade preparation and paving operations as specified in Part 1.05 of Section 31 20 00 of these specifications.
D. Temperature and Precipitation Requirements:
   1. Do not apply tack coat when air temperature is below 50 degrees Fahrenheit.
   2. Place asphalt concrete paving only when air temperature is above 40 degrees Fahrenheit.
   3. Place asphalt concrete only when surface of aggregate base is unsaturated, and precipitation is not expected before pavement can be compacted.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Base Aggregate: 1 inch- or ¾-inch- (in)-minus crushed gravel or crushed rock that has less than 5 percent fines passing the U.S. Standard No. 200 Sieve meeting the requirements of Oregon Department of Transportation (ODOT) Section 02630.
B. Asphalt Concrete Materials:
   1. Aggregate Mix: 1-inch or ¾-inch dense graded mix meeting the requirements of ODOT Section 00745.
C. Tack Coat: Use CR-1, CSS-1 or CSS-1h.

2.2 MIXES

A. Job Mix Formula Requirements:
   1. Job mix formula shall be in accordance with ODOT standards, except where modified in this Section.
B. Adjusting the Job Mix Formula:
   1. If physical properties of asphalt concrete paving are not as specified in this Section or if other unsatisfactory conditions as determined by the Geotechnical Engineer results, Geotechnical Engineer will require changes in the job mix formula or materials.
   2. Should the need for a new job mix formula result from Contractor's or his agent's operations, contractor shall develop a new formula to correct deficiencies.
   3. Owner will not be responsible for construction delays caused by changing the job mix formula.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection:
   1. Protect subgrades from disturbance by paving equipment. Subgrades that are disturbed by the Contractor's activities shall be corrected as directed by the Geotechnical Engineer at the sole expense of the Contractor.
   2. Protect existing site improvements from damage by paving work.

3. Place barricades and traffic cones to keep traffic away from paving work.

B. Subgrade Preparation:
   1. Prepare subgrade in accordance with Sections 31 20 00. Prior to placing base aggregate, notify Geotechnical Engineer.
   2. Proof-roll prepared subgrade with a loaded dump truck or similar heavy, wheeled construction equipment as directed by the Geotechnical Engineer. If construction occurs during the wet season or if the ground surface remains wet, the subgrade should be evaluated by a qualified geotechnical engineer by probing with a steel rod, rather than by proof-rolling.
   3. Overexcavate soft or loose zones as directed by the Geotechnical Engineer. Backfill excavated areas in accordance with Section 31 20 00.

3.2 INSTALLATION

A. Placing Base Aggregate:
   1. Place base aggregate to the lines and grades shown in the Drawings.
   2. Compact base aggregate to 95 percent of maximum dry density within 3 percent of optimum moisture content as determined by ASTM D 1557.

B. Placing Asphalt Concrete:
   1. Place asphalt concrete in accordance with ODOT standards.
   2. Place asphalt concrete only after acceptance of base aggregate by Geotechnical Engineer.
   3. Place asphalt concrete in maximum compacted lift thickness of 2.5 inches.
   4. Place asphalt concrete at temperature between 240 degrees Fahrenheit and 325 degrees Fahrenheit.
   5. Manually shovel to fill in low areas and rake asphalt concrete to obtain required paving level.

C. Compaction of Asphalt Concrete:
   1. Roll asphalt concrete in accordance to minimum density of 91.0 percent of laboratory density as determined by ASTM 2041 (Rice Test Procedure).
   2. Level paving surface to within 1/2 inch in 10 feet.
   3. Finish top of paving to plus or minus 0.17 foot from line and 0.04 foot from grade indicated.

3.3 COMPLETION

A. Adjusting Defective Work:
   1. Fill paving cracks with tack coat asphalt.
   2. Repair variations of more than 0.04 foot from surface grade indicated on Drawings.
   3. Repair variations of more than 0.17 foot from perimeter paving lines indicated on Drawings.

B. Final Cleaning:
   1. Clean asphalt splatters from concrete curbs and walks.
   2. Remove loose aggregate from paving and walks.
   3. Remove excess asphalt materials from the site.

END OF SECTION

SECTION 31 10 00
SITE PREPARATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Removing above- and below-grade site improvements

B. Disconnecting, capping or sealing site utilities

1.02 RELATED REQUIREMENTS

A. Section 31 20 00 – Earth Moving

1.03 REFERENCES

A. Geotechnical report prepared by GeoEngineers, Inc. titled “Geotechnical Engineering Report, Martin Development - Building W5, Wilsonville, Oregon” dated July 14, 2021.

PART 2 - PRODUCTS

2.01 Materials

Not applicable

2.01 Equipment

A. Equipment shall be adequate to accomplish the Work.

PART 3 - EXECUTION

3.01 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance.

B. Protect existing site improvements to remain from damage during construction. Restore damaged improvements to their original condition, as acceptable to Owner.

3.02 UTILITIES

A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place. Arrange for utility companies to shut off indicated utilities.

B. Interrupting Existing Utilities: Do not interrupt utilities serving property except as permitted and coordinated with the utility provider.

3.03 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

3.04 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner’s property.

END OF SECTION

SECTION 31 20 00

EARTH MOVING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Preparing subgrades

B. Excavating and backfilling for structures

C. Excavating and backfilling for utility trenches

1.02 RELATED REQUIREMENTS

A. Section 31 10 00- Site Preparation

1.03 REFERENCES

A. Oregon Standard Specifications for Construction, Oregon Department of Transportation (ODOT), 2021 Edition.

B. ASTM International (ASTM), 2018 Edition.

1. ASTM D 1557, Test Methods of Laboratory Compaction Characteristics of Soil Using Modified Effort.
2. ASTM C 117, Standard Test Method for Materials Finer than 75 μm (No. 200) sieve in Mineral Aggregates by Washing.
3. ASTM D 6938, Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods.

C. American Association of State Highway and Transportation Officials (AASHTO), 2018 Edition.

1. AASHTO TP-61, Determining the Percentage of Fracture in Coarse Aggregate.
2. AASHTO T-176, Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by use of the Sand Equivalent Test.

D. Geotechnical report prepared by GeoEngineers, Inc. titled “Geotechnical Engineering Report, Martin Development - Building W5, Wilsonville, Oregon” dated July 14, 2021.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Provide the following submittals:

1. Fifty-pound samples of imported materials proposed for use as fill or backfill to the Geotechnical Engineer at least 10 business days prior to use. Do not use materials until approved by the Geotechnical Engineer.
2. A written statement indicating the source, character, and proposed use of all imported materials with the samples.
3. Certification of test results, source, and samples of imported materials.
4. Confirm that the fill material conforms with the material samples supplied to the Geotechnical Engineer throughout its use on the project.

1.05 QUALITY ASSURANCE

A. The Owner will engage a Geotechnical Engineer as the Owner’s on-site representative for quality control and observation of earthwork. The Owner will notify the Contractor of the person or organization that is to serve as the Geotechnical Engineer.

B. The Geotechnical Engineer will evaluate subgrade conditions, materials proposed for use as fill and backfill, make and/or review appropriate tests, evaluate compaction of in-place fill and backfill, and designate for removal of identified unsuitable materials.

C. In-place field density tests will be made by the Geotechnical Engineer to determine the adequacy of compaction of fill and backfill materials. Tests will be performed as deemed necessary to determine the adequacy of compaction. Contractor shall cooperate with such testing by the Geotechnical Engineer.

D. Do not cover site improvements with backfill materials prior to required evaluations, tests and approvals. Backfill materials covering uninspected, untested, and rejected site improvements shall be removed and replaced at the Contractor’s sole expense.

PART 2 - PRODUCTS

2.01 Materials

A. Imported Select Structural Fill:

1. Imported structural fill shall be well graded, pit or quarry run rock, crushed rock or crushed gravel and sand that is fairly well-graded between coarse and fine sizes, with approximately 25 to 65 percent passing the U.S. No. 4 sieve. It should be free of clay balls, roots, organic matter and other deleterious materials. Imported structural fill shall have a maximum particle size of 4 inches and shall have less than 5 percent passing the U.S. Standard No. 200 sieve when tested in accordance with ASTM C 117 and have a minimum of two mechanically fractured faces.
2. Imported structural fill placed during periods of dry weather shall have less than 12 percent passing the U.S. Standard No. 200 sieve when tested in accordance with ASTM C 117.

B. Aggregate Base:

1. Crushed rock shall be free of various types of wood or deleterious materials and consist of hard, angular, durable, well-graded 1-inch-minus crushed rock with a minimum of 75 percent fractured particles according to American Association of State Highway and Transportation Officials (AASHTO) TP-61 and a sand equivalent of not less than 30 percent based on AASHTO T-176.
2. The percent passing the U.S. Standard No. 200 sieve shall be less than 5 percent by weight when tested in accordance with ASTM C 117.

C. Retaining Wall Backfill:

1. Fill placed to provide a drainage zone behind retaining walls should consist of free-draining sand and gravel or crushed rock with a maximum particle size of ¾ inch and less than 3 percent passing the U.S. No. 200 sieve when tested in accordance with ASTM C 117.

C. Trench Backfill:

1. Pipe bedding and pipe zone materials shall be as specified for aggregate base, 3/4-inch-minus size, with less than 5 percent by weight passing the U.S. Standard No. 200 sieve when tested in accordance with ASTM C 117, or as specified by the pipe manufacturer.

2.02 Equipment

A. Operate compaction equipment in accordance with the manufacturer’s instructions and recommendations. Maintain equipment in such a condition that it will deliver the manufacturer’s rated compactive effort. Provide larger and/or different types of equipment if required to obtain adequate compaction. Hand-operated equipment shall be capable of achieving the specified compaction.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Excavation: Excavation consists of removal and disposal of material of any classification and all material encountered when establishing required grades.

1. Excavate to depth, lines and grades as shown on the Drawings or as otherwise specified.
2. Notify the Geotechnical Engineer when excavation has reached required subgrade elevations. Allow Geotechnical Engineer to evaluate finished subgrades.

3. If unsuitable bearing materials are encountered at the required subgrade elevations, carry excavations deeper and replace the excavated material as directed by the Geotechnical Engineer.
4. Excavate as necessary such that all foundations are founded on firm native material, or as directed by the Geotechnical Engineer. The width of overexcavation shall extend at least 6 inches beyond the margins of the footings for every additional foot of excavation.
5. If unsuitable bearing materials are a result of the Contractor's earthwork activities, excavation and backfill shall be completed at the Contractor's sole expense.

B. Unauthorized excavation: Excavation carried below the lines and grades shown on the Drawings or in excess of overexcavation as directed by the Geotechnical Engineer will be considered unauthorized. Unauthorized excavation, as well as remedial work resulting from unauthorized overexcavation, shall be at the Contractor's sole expense.
1. Unauthorized overexcavation under foundations shall be corrected by replacing the excavated material with Aggregate Base compacted as specified in Part 3.03 of this Section, or as approved by the Geotechnical Engineer.
2. Unauthorized overexcavation in areas to receive fill shall be corrected by replacing the excavated materials with Imported Select Structural Fill placed and compacted as specified for the overlying materials.
3. Unauthorized overexcavation in non-structural areas shall be corrected by replacing the excavated materials and compacting to a density not less than the underlying materials.

C. Overexcavation:
1. Excavation of materials determined by the Geotechnical Engineer to be unsuitable will be considered overexcavation.

D. Temporary Sheeting, Shoring, Bracing or Sloping:
1. Provide and maintain temporary sheeting, shoring, and bracing necessary to support the sides of excavations.
2. Prevent any movement that may damage adjacent utilities, or structures, damage or delay the Work, or endanger life and health.
3. Install, maintain, and remove sheeting, shoring, and bracing as required by Occupational Safety and Health Administration (OSHA) and other applicable governmental regulations.

E. Disposal of Waste Material:
1. All waste materials and excess topsoil shall be stockpiled or disposed off site as directed by the Owner. Verify off-site disposal with the Owner.
2. Restrict temporary storage of waste materials and materials to be reused at work areas to locations directed by the Owner.

3.02 SUBGRADE PREPARATION

A. Perform excavation as indicated on Drawings.

B. Notify the Geotechnical Engineer prior to placing fill materials, constructing forms or placing reinforcing steel or concrete.

C. The subgrade should be evaluated by the Geotechnical Engineer by probing with a steel rod.

D. Overexcavate soft or loose zones as directed by the Geotechnical Engineer. Backfill to the specified elevation with Imported Select Structural Fill. Compact as specified in Part 3.03 of this section.

3.03 BACKFILL AND FILL

A. Notification of Geotechnical Engineer: Notify the Geotechnical Engineer 48 hours prior to any fill, backfill, or compaction operations.
1. Permit Geotechnical Engineer to test all fill and backfill. Do not place additional fill or backfill unless the subgrade and/or previous layer of fill has been tested.
2. When requested by the Geotechnical Engineer, provide the field elevations of the compacted subgrade or fill layer.

3. If, based on the Geotechnical Engineer's tests and observations, subgrade or fill which has been placed is below specified density for respective construction areas, provide additional moisture conditioning and compaction at no additional expense to Owner.

B. Fill Placement:

1. Place all fill and backfill on a prepared subgrade that consists of firm, inorganic native soils or compacted fill.
2. Place all fill or backfill in uniform horizontal lifts with a thickness appropriate for the material type and compaction equipment.
3. Place imported structural fill, select structural fill, and crushed rock in layers that do not exceed 12 inches prior to compaction.
4. Fill or backfill materials compacted by hand-operated compaction equipment shall be placed in layers not exceeding 6 inches prior to compaction.
5. Compact soils using equipment designed for compacting the type of soil being placed. Utilize operating procedures to attain uniform compaction of the area being filled.
6. Place fill at a moisture content within 3 percent of optimum as determined by ASTM D 1557. Moisture condition to achieve a moisture content within the specified range before compacting.
7. Do not place, spread, or compact fill material during freezing or unfavorable weather conditions. All frozen or disturbed subgrade materials should be removed prior to placement of subsequent lifts of fill materials.
8. Do not place fill and backfill until tests and inspections of the underlying material have been made and the appropriate approvals have been obtained. Do not damage or displace underground utilities during backfilling and compaction.

C. Compaction Requirements: Compact soils to not less than 95 percent of maximum dry density as determined in accordance with ASTM D 1557.

3.04 COMPLETION

A. Remove waste materials, including unacceptable excavated materials, trash, debris, and native materials resulting from excavation and grading. Load, haul, and legally dispose of materials off site, or as otherwise directed in Drawings or Division 1 of these specifications.

END OF SECTION

SECTION 32 13 13

CONCRETE PAVING

PART 1 - GENERAL

1.1 DESCRIPTION OF THE WORK

A. Furnish all labor, materials, equipment, and incidentals required for the aggregate base and Portland cement concrete paving as shown in the Drawings and specified herein, and as reasonably inferable therefrom.

B. Related Sections:

1. Section 31 10 00, Site Preparation.
2. Section 31 20 00, Earthwork.

1.2 REFERENCE STANDARDS AND DOCUMENTS

A. Specifications for Structural Concrete, American Concrete Institute (ACI 301 M).

B. Geotechnical Geotechnical report prepared by GeoEngineers, Inc. titled "Geotechnical Engineering Report, Martin Development - Building W5, Wilsonville, Oregon" dated July 14, 2021.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to concrete paving, including but not limited to, the following:

   a. Concrete mixture design.

   b. Quality control of concrete materials and concrete paving construction practices.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.6 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

B. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:

2. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

3. Do not use frozen materials or materials containing ice or snow.

4. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

C. Hot-Weather Concrete Placement: Comply with ACI 301 (ACI 301M) and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover steel reinforcement with water-soaked burlap, so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 (ACI 301M) unless otherwise indicated.

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

2.3 CONCRETE MATERIALS

A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C 150/C 150M, gray portland cement Type I.

2. Fly Ash: ASTM C 618, Class F.

B. Normal-Weight Aggregates: ASTM C 33/C 33M, uniformly graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C 260/C 260M.

D. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain no more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

2. Retarding Admixture: ASTM C 494/C 494M, Type B.

3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

E. Water: Potable and complying with ASTM C 94/C 94M.

2.4 CURING MATERIALS

A. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B, dissipating.

2.5 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.

2. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that comply with or exceed requirements.

B. Cementitious Materials:

1. Fly Ash or Pozzolan: 25 percent.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content: 6 percent plus or minus 1-1/2 percent for 3/4-inch (19-mm) nominal maximum aggregate size.

D. Concrete Mixtures: Normal-weight concrete.

1. Compressive Strength (28 Days): 4000 psi (27.6 MPa).
2. Maximum W/C Ratio at Point of Placement: 0.45.
3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).

2.6 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For concrete batches of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For concrete batches larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

   1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

   1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
   2. Provide tie bars at sides of paving strips where indicated.
   3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
   4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
   5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

   1. Locate expansion joints at intervals of 50 feet (15.25 m) unless otherwise indicated.
   2. Extend joint fillers full width and depth of joint.
   3. Terminate joint filler not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.
   4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
   5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
   6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

   1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch (6-mm) radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.
      a. Tolerance: Ensure that grooved joints are within 3 inches (75 mm) either way from centers of dowels.
   2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
      a. Tolerance: Ensure that sawed joints are within 3 inches (75 mm) either way from centers of dowels.

3. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.5 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation and items to be embedded or cast-in.

B. Remove snow, ice, or frost from subbase surface before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 (ACI 301M) requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 (ACI 301M) by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating joint devices.

H. Screed paving surface with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.

K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.

3.6 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.

2. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.

3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.

3.7 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound or a combination of these as follows:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.

   b. Continuous water-fog spray.

   c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period, using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.8 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 (ACI 117M) and as follows:

1. Elevation: 3/4 inch (19 mm).
2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
3. Surface: Gap below 10-feet- (3-m-) long; unleveled straightedge not to exceed 1/2 inch (13 mm).
4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches (13 mm per 300 mm) of tie bar.
5. Lateral Alignment and Spacing of Dowels: 1 inch (25 mm).
6. Vertical Alignment of Dowels: 1/4 inch (6 mm).
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches (6 mm per 300 mm) of dowel.
8. Joint Spacing: 3 inches (75 mm).
9. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
10. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Contractor to provide a qualified testing agency to perform tests and inspections.

B. Testing Services: Testing and inspecting of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100-cu. yd. (76 cu. m), 5000 sq. ft. (465 sq. m), or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231/C 231M, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when it is 80 deg F (27 deg C) and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.

    a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

D. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.

G. Concrete paving will be considered defective if it does not pass tests and inspections.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Prepare test and inspection reports.

3.10 REPAIR AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Engineer.

B. Drill test cores, where directed by Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

APPENDIX C
Report Limitations and Guidelines for Use

APPENDIX C
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) rely on professional judgment and opinion to a greater extent than other engineering and natural science disciplines, where more precise and/or readily observable data may exist. To help clients better understand how this difference pertains to our services, GeoEngineers includes the following explanatory "limitations" provisions in its reports. Please confer with GeoEngineers if you need to know more about how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical Services Are Performed for Specific Purposes, Persons and Projects

This report has been prepared for Martin Development for the Project specifically identified in the report. The information contained herein is not applicable to other sites or projects.

GeoEngineers structures its services to meet the specific needs of its clients. No party other than the party to whom this report is addressed may rely on the product of our services unless we agree to such reliance in advance and in writing. Within the limitations of the agreed scope of services for the Project, and its schedule and budget, our services have been executed in accordance with our Agreement with Martin Development dated April 21, 2021 (authorized April 22, 2021) and generally accepted geotechnical practices in this area at the time this report was prepared. We do not authorize, and will not be responsible for, the use of this report for any purposes or projects other than those identified in the report.

A Geotechnical Engineering or Geologic Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the proposed Martin Development W5 Building project at in Wilsonville, Oregon. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- the function of the proposed structure;
- elevation, configuration, location, orientation or weight of the proposed structure;

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[1] Developed based on material provided by GBA, Geoprofessional Business Association; www.geoprofessional.org.

- composition of the design team; or
- project ownership.

If changes occur after the date of this report, GeoEngineers cannot be responsible for any consequences of such changes in relation to this report unless we have been given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

Environmental Concerns Are Not Covered

Unless environmental services were specifically included in our scope of services, this report does not provide any environmental findings, conclusions, or recommendations, including but not limited to, the likelihood of encountering underground storage tanks or regulated contaminants.

Subsurface Conditions Can Change

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the site, new information or technology that becomes available subsequent to the report date, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. If more than a few months have passed since issuance of our report or work product, or if any of the described events may have occurred, please contact GeoEngineers before applying this report for its intended purpose so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

Geotechnical and Geologic Findings Are Professional Opinions

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies the specific subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied its professional judgment to render an informed opinion about subsurface conditions at other locations. Actual subsurface conditions may differ, sometimes significantly, from the opinions presented in this report. Our report, conclusions and interpretations are not a warranty of the actual subsurface conditions.

Geotechnical Engineering Report Recommendations Are Not Final

We have developed the following recommendations based on data gathered from subsurface investigation(s). These investigations sample just a small percentage of a site to create a snapshot of the subsurface conditions elsewhere on the site. Such sampling on its own cannot provide a complete and accurate view of subsurface conditions for the entire site. Therefore, the recommendations included in this report are preliminary and should not be considered final. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for the recommendations in this report if we do not perform construction observation.

We recommend that you allow sufficient monitoring, testing and consultation during construction by GeoEngineers to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes if the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective means of managing the risks associated with unanticipated conditions. If another party performs field observation and confirms our expectations, the other party must take full responsibility for both the observations and recommendations. Please note, however, that another party would lack our project-specific knowledge and resources.

A Geotechnical Engineering or Geologic Report Could Be Subject to Misinterpretation

Misinterpretation of this report by members of the design team or by contractors can result in costly problems. GeoEngineers can help reduce the risks of misinterpretation by conferring with appropriate members of the design team after submitting the report, reviewing pertinent elements of the design team's plans and specifications, participating in pre-bid and preconstruction conferences, and providing construction observation.

Do Not Redraw the Exploration Logs

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. The logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Photographic or electronic reproduction is acceptable, but separating logs from the report can create a risk of misinterpretation.

Give Contractors a Complete Report and Guidance

To help reduce the risk of problems associated with unanticipated subsurface conditions, GeoEngineers recommends giving contractors the complete geotechnical engineering or geologic report, including these "Report Limitations and Guidelines for Use." When providing the report, you should preface it with a clearly written letter of transmittal that:

- advises contractors that the report was not prepared for purposes of bid development and that its accuracy is limited; and
- encourages contractors to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer.

Contractors Are Responsible for Site Safety on Their Own Construction Projects

Our geotechnical recommendations are not intended to direct the contractor's procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and adjacent properties.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants, and no conclusions or inferences should be drawn regarding Biological Pollutants as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria and viruses, and/or any of their byproducts.

A Client that desires these specialized services is advised to obtain them from a consultant who offers services in this specialized field.

GeoEngineers

THE PACIFIC RESOURCES GROUP

December 9, 2021

Mr. Mac Martin
Martin Development
PO Box 15523
Seattle, Washington 98115

Subject: Preliminary Tree Assessment at 9600 Boeckman Road Wilsonville, Oregon

Dear Mr. Martin,
As requested I visited the site on the south east corner of SW Boeckman and Kinsman Roads. You requested a preliminary assessment of the trees that will be affected by the proposed building and parking lot construction. (See the attached 6 diagrams and chart for tree locations and descriptions). The following are my observations, findings and recommendations.

OBSERVATIONS & FINDINGS
The portions of the site that are proposed for development and are shown on the attached tree location diagrams have changes in topography from past placement fill that have disrupted natural surface runoff and results in standing water in several locations during the winter months. The grading of the site to develop it will significantly change this. The predominant tree species, found in this tree assessment, are mainly made up of Douglas Fir and Ponderosa Pine, with a few other species including Oregon White Oak, Oregon Ash, Pacific Madrone, Bird Cherry, Bigleaf Maple and Scouler Willow. Over the years, these trees adapted to the existing drainage conditions, but the serious drought over the last few years has adversely affected a number of them as evidenced by reduced annual growth. Approximately 176 trees were assessed and the description for each tree is listed on the accompanying chart. All the trees assessed were tagged with metal tags with numbers that correspond to those on the assessment chart and on the existing conditions survey performed by Andy Paris and Associates. Several trees that were missed by the surveyors have been added to the tree location diagrams and the tree assessment chart.

The trees included for assessment are those that are within the project's construction limits, in close proximity to areas where construction will disturb the soil surface and affect tree root systems and in an area on the south end of the site that the City requested be included. The assessment includes approximately 176 trees, 93 of which could be retained. Based on the grading plans dated 11/22/21, my preliminary assessment indicates that 73 trees have a variable chance for long term survival if protected during construction depending on their health and condition. These trees will have a very limited amount of disturbance within their root zones and post construction care can mitigate changes in growing conditions that occur during construction. An additional 20 trees may have a significant amount of their root systems covered by fill which can cause root loss, decline in health and death over a number of years. These trees would have a good chance of surviving if an aeration system is constructed over the roots before fill is placed over them.

The suggested aeration system for the 20 trees is comprised of perforated pipe vented outside the fill. Large cobble rock is placed over the pipe so that holes in the pipe and the voids in the rock allow air to continue to circulate and allow roots to continue to exchange air, which is essential for their survival and continued function. Those noted to be retained with and without aeration are indicated in the last column of the assessment chart.

Some of 93 trees are poor specimens, have health issues and have not been evaluated for their value and possible contribution to the landscape on the finished project. They are in locations that offer the possibility for their retention. At this preliminary stage in the design process I have made very preliminary recommendations for their retention. Even though individually they may have health or condition issues due to years of insect, disease and or drought related problems, they could improve with care or changes in growing conditions. More specific recommendations or retention or removal will be made when construction documents are being prepared.

TREE PROTECTION

For those trees planned for retention, some form of tree protection should be provided. For trees that are outside the construction limits and which are outside the erosion control fencing, I do not recommend any tree protection fencing beyond the erosion fencing, unless any construction associated activities (job trailers, parking or material storage, etc.) are allowed outside the construction limits. The City may request that tree protection fencing be placed before demolition begins. I recommend requesting a variance since in some areas where tree removal will take place, the trees are close together and any fencing will be damaged or destroyed during tree removal. If fencing is required, I recommend orange plastic fabric on "T" posts, which can be put back up or replaced easily. Once trees and associated debris are removed tree protection fencing should be placed.

For trees that are within the construction limits and are in an area where they are unlikely to have construction activities within their drip lines, I recommend construction fencing such as chain link panels or orange plastic 4' to 6' tall fence fabric on stakes 8' to 10' apart. The City may require chain link fencing, so check with them before specifying material.

If work is unlikely to be required within the tree protection area, driven posts with light duty chain link fabric could be used. However, if there is any chance that the fencing will have to be relocated temporarily to allow work within the tree protection area, the driven posts and light duty chain link fabric is not recommended as it is typically destroyed when removed. Panels on blocks would be a better option. Single trees needing protection should be fenced at or beyond the drip line. Since there are some trees that will have fill placed over their root systems with side slopes that are not suitable for chain link on panels, I recommend the orange plastic fencing which would be more effective in these situations.

For any trees having work done within their root zone or drip line, the Project Arborist should be present. Any fencing moved to allow work within the protection area should be placed back in it's original position at the end of the work day. Any traffic, storage of materials or other activities that can compact soil or damage roots exposed on the surface should be kept out of the tree protection areas.

POST CONSTRUCTION TREE CARE

Whether plants are established or newly installed in the landscape, making sure that they have access to adequate soil moisture and nutrients is essential. We recommend that composite soil sample(s) be taken and analyzed to get specific recommendations on nutrients and other soil amendments to help optimize growing conditions. The most reliable local lab is A & L Western Agricultural Laboratory, 10220 SW Nimbus Avenue, Bldg K-9, Tigard, Oregon 97223. Phone 503.968.9225. Website: http://www.al-labs-west.com/. A & L's Agronomists can provide instructions on how to take soil or plant samples for analysis and, depending on your needs, provide soil analysis with recommendations.

Fertilization For Root Replacement

For both existing trees and woody plants, it would be wise to provide these plants with an inexpensive fertilization. This would include new plants the growing season after installation. Trees affected by construction and by transplanting typically suffer root loss and loss of vigor. With new plantings here in the Pacific Northwest, after one season, nitrogen is frequently leached below the root zone by irrigation and winter rain. The adverse effects of construction activities or the general lack of essential nutrients can be mitigated to a great extent by promoting new root growth, which can be accelerated by soil aeration, fertilization and other recommended soil amendments.

Until a soil analysis is obtained, as a general rule here in the Pacific Northwest we recommend that as a first step, the owner or maintenance contractor aerate the soil and fertilize the entire area beneath existing trees using a highly soluble high nitrogen fertilizer applied at a time when surface vegetation is dormant and tree roots are still growing. The best time to do this is in late November and again in late January or early February while plants are still dormant. We suggest using a water soluble fertilizer that is best applied just prior to or during a rain, otherwise it should be watered into the soil. We recommend using Ammonium Sulfate (21-0-0 or 23-0-0) at a rate of 4 lbs. of Nitrogen per 1000 square feet, which is often best made in two applications of 2 lbs. each. This equates to applying 9 lbs. of the Ammonium Sulfate fertilizer to each 1000 square feet of area within the drip line or area to be treated for each tree. If a single application is to be made, we recommend using 4 lbs. of Nitrogen or 18 lbs. of fertilizer in the fall application. The fertilizer can be applied to the surface of the ground with a cyclone or "whirly" type spreader. The fertilization program for woody plants (both trees and woody landscape ornamentals benefit from this) should occur every year for the first 3 years then at a reduced rate every year or two thereafter. The fertilization should be done within the drip line and up to 10 feet outside the drip line of smaller trees and shrubs. For larger trees the area to be treated is within the circle, with the tree at its center, that has a radius equal to one foot for every inch of the tree's diameter at 6" above ground.

NOTE -Once the results of a soil analysis have been obtained the recommended addition of missing nutrients and or soil amendments should take the place of the general fertilization recommendation above.

Soil Compaction Prevention And Reversal

In addition to fertilization, preventing or reversing soil compaction can effectively extend the functional life of trees and woody plants on developed sites. Traffic over the root zone compacts the soil, which cuts off the tree root's ability to get oxygen and expel carbon dioxide. Compaction also provides favorable conditions for disease and soil decay organisms. If traffic occurs within the drip line and soil is compacted, symptoms of decline may appear within a few years. The symptoms to watch for include the appearance of very fine dead wood where small twigs are dying in the outer most portion of the tree's crown or canopy. This dieback typically occurs from the tips of branches, progressing toward the trunk and from the top of the tree down. This pattern can vary with species of tree. To prevent this from occurring or to treat it where it has occurred, the area where the compaction occurred can be aerated using an aerating machine that penetrates at least 4" to 6" into the soil in areas without lawn. Rototilling the affected soil can also accomplish this, however, care should be taken to avoid root damage and loss. In most cases the preferred alternative would be to use a 2" auger and drill holes 12" to 18" in depth spaced about 2' apart throughout the area within the drip line. The holes can be left open or filled with small round rocks with no fines. The voids between rocks will extend the movement of air into the soil. Following tilling, fertilizer can be applied to stimulate root growth. A durable carbide tipped soil auger can be obtained from A.M. Leonard, at this link - http://www.amleo.com/augers-%26-drills/c/P08A/.

Pre And Post Construction Pruning
Where appropriate, to reduce liability from falling branches and to better assess subtle changes in tree health, we recommend pruning to remove large to medium size dead wood. In areas where equipment and or workers will be passing beneath trees with large deadwood, its removal should be done during demolition and prior to placing tree protection fencing. Following construction we recommend monitoring tree health for several years after construction is complete. New deadwood appearing after construction is an indicator of declining health, and insect or disease problems that should be addressed. If significant root loss has occurred, we also recommend observing the ground at the base of trees for signs of instability during periods of high winds. Should you have any questions about these recommendations, feel free to contact us.

CONCLUSIONS
This report is based on a preliminary grading plan that will be changed and refined as construction documents are developed. Therefore this report is preliminary and all recommendations are subject to change as the design and review process proceeds. The recommendations contained in this report are both specific and general in nature and will be revised to cover specific situations prior to and during construction.

This completes my report. If any additional information, which would effect my conclusions and recommendations, becomes available I would welcome the opportunity to consider it and revise this report accordingly. If I omitted any information or if you have any questions please do not hesitate to contact me.

Sincerely yours,

Stephen F. Goetz, Principal
American Society of Consulting Arborists Reg #260
American Society of Landscape Architects, OR Lic. #80
Society of American Foresters

SG:mac
Enclosures

ARBORIST DISCLOSURE STATEMENT: Arborists are tree specialists who use their education, knowledge training and experience to examine trees, recommend measures to enhance their health and beauty and to attempt to reduce the risk of living near trees. Clients may choose to accept or disregard the recommendations of the arborist or to seek additional advice. Trees and other plant life are living, changing organisms affected by innumerable factors beyond our control. Trees fail in ways and because of conditions we do not fully understand. Arborists cannot detect or anticipate every condition or event that could possibly lead to the structural failure of a tree. Conditions are often hidden within the trees and below ground. Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, for any specific period or when a tree or its parts may fail. Further, remedial treatments, as with any treatment or therapy, cannot be guaranteed. Treatment, pruning, bracing and removal of trees may involve considerations beyond the scope of the arborist's skills and usual services such as the boundaries of properties, property ownership, site lines, neighbor disputes and agreements and other issues. Therefore, arborists cannot consider such issues unless complete and accurate information is disclosed in a timely fashion. Then, the arborist can be expected, reasonably, to rely upon the completeness and accuracy of the information provided. Trees can be managed but not controlled. To live near trees, regardless of their condition, is to accept some degree of risk. The only way to eliminate all risk associated with trees is to eliminate all trees.
HAZARD/HAZARD POTENTIAL: For the purposes of this evaluation and/report, a tree or tree part that presents a threat to humans, livestock, vehicles, structures, landscape features or other entity of civilization from uprooting, falling, breaking or growth development (e.g., roots). While all large landscape trees in proximity to such targets present some degree of hazard regardless of their condition, such inherent hazard is not intended as within this definition and its usage in this evaluation and report.
INSPECTION LIMITATIONS: The inspection of these trees consisted solely of a visual inspection from the ground. While more thorough techniques are available for inspection and evaluation, they were neither requested nor considered necessary or appropriate at this time. Because trees and other plant life are living, changing organisms effected by innumerable factors beyond our control, The Pacific Resources Group and it's personnel offer no guarantees, stated or implied, as to tree, plant or general landscape safety, health, condition or improvement, beyond that specifically stated in writing in accepted contracts.

9600 Boeckman Rd Tree Assessment

Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
800	48	Ponderosa Pine	100+ x 37	Fair	Moderate & non-correctable defects	Partial lower crown due to crowding with a full upper crown. Co-dominant stems at 70'. Average annual twig growth.	A
801	17	Ponderosa Pine	60 x 30	Poor	Moderate & non-correctable defects	Partial 1/3 very thin crown due to crowding. Below average annual twig growth. May improve with care.	B
802	20	Ponderosa Pine	70 x 25	Fair	Moderate & non-correctable defects	Partial 3/4 crown due to crowding. Co-dominant stems at 50'. Average annual twig growth and moderate amount of large to medium deadwood in crown to remove.	A
803	22	Ponderosa Pine	15 x 0	DEAD	DEAD	Dead 15' tall stump/snag has bark sloughing off and several holes from woodpeckers. DEAD STUMP, REMOVE.	
804	12	Ponderosa Pine	50 x 12	Good	Few & minor or correctable defects	Nearly full asymetric crown with average to above average annual twig growth.	A
805	15	Ponderosa Pine	50 x 15	Fair	Moderate & non-correctable defects	Partial 1/2 crown due to crowding and below average annual twig growth.	B
806	36	Ponderosa Pine	100+ x 42	Good	Moderate & non-correctable defects	Partial 1/3 crown due to crowding and average annual twig growth.	A
807	32	Ponderosa Pine	100+ x 30	Fair	Moderate & non-correctable defects	Partial 3/4 crown due to crowding and average annual twig growth.	A
808	30	Douglas Fir	100+ x 46	Good	Few & minor or correctable defects	Full crown with good annual twig growth.	
809	27	Douglas Fir	100+ x 35	Poor	Moderate & non-correctable defects	Partial 2/3 crown due to crowding. Codominant stems at 30'. Large deadwood in lower crown should be removed if tree is retained. Below average annual twig growth.	
810	19	Douglas Fir	100+ x 25	Fair	Moderate & non-correctable defects	Partial 1/4 crown due to crowding with below average annual twig growth.	
811	34	Douglas Fir	100+ x 40	Fair	Moderate & non-correctable defects	Partial 1/2 crown due to crowding and below average annual twig growth.	
812	29	Douglas Fir	90 x 25	Poor	Major defects or problems	Very thin partial crown, top broken out at 90' with very poor annual twig growth.	
813	22	Douglas Fir	80 x 22	Poor	Major defects or problems	Partial 1/2 crown due to crowding and below average annual twig growth. Top broken out at 80'.	B
814	11	Douglas Fir	35 x15	Poor	Major defects or problems	Partial very thin 1/8 crown due to crowding. Top 12' to 15' dead with very poor annual twig growth. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	A
815	24	Ponderosa Pine	100+ x 18	Fair	Moderate & non-correctable defects	Full narrow asymetric crown with broken out top. Below average annual twig growth.	A
816	17	Ponderosa Pine	90 x 10	Poor	Major defects or problems	Very small, 5% to 8% live crown ratio, with below average annual twig growth.	A

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Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
817	34	Ponderosa Pine	100+ x 25	Good	Moderate & non-correctable defects	Partial 1/4 crown due to crowding with good annual twig growth.	A
818	25	Ponderosa Pine	100+ x 18	Good	Moderate & non-correctable defects	Partial 7/8 asymetrical crown due to crowding with good annual twig growth.	A
818 B	20	Douglas Fir	100+ x 30	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with average annual twig growth. Light amount of medium deadwood to remove if retaining.	B
819	36	Ponderosa Pine	100+ x 30	Good	Moderate & non-correctable defects	Partial 2/3 crown due to crowding. Good annual twig growth.	A
820	24	Douglas Fir	80 x 20	Fair	Moderate & non-correctable defects	Subdominant tree with partial 1/3 crown due to crowding. Below average annual twig growth.	A
821	36	Ponderosa Pine	100+ x 25	Good	Moderate & non-correctable defects	Partial lower crown and full upper crown due to crowding. Good annual twig growth.	A
822	36	Ponderosa Pine	100+ x 35	Good	Few & minor or correctable defects	Full asymetric crown with good annual twig growth. Nice specimen.	B
823	25	Douglas Fir	90 x 30	Very Poor	Major defects or problems	Very thin partial 1/2 crown due to crowding with very poor annual twig growth indicates declining health. May improve with care.	
826	30	Douglas Fir	100+ x 40	Fair	Moderate & non-correctable defects	Partial 2/3 asymetric crown due to crowding with below average annual twig growth. Large amount of medium to large deadwood in lower crown to be removed if retaining.	
827	15	Douglas Fir	75 x 28	Fair	Moderate & non-correctable defects	Subdominant tree with thin partial 1/3 crown due to crowding. Below average annual twig growth. Some medium to fine deadwood in lower crown.	
828	36	Ponderosa Pine	100+ x 33	Good	Few & minor or correctable defects	Nearly full asymetric crown with average to above average annual twig growth. Large amount of medium to large deadwood in lower crown to remove if retaining.	
829	17	Douglas Fir	90 x 30	Fair	Moderate & non-correctable defects	Subdominant tree with partial 2/3 crown due to crowding and below average annual twig growth. Some medium deadwood in lower crown to remove if retaining.	
830	17	Douglas Fir	90 x 22	Fair	Moderate & non-correctable defects	Top broken out at 90' with partial 2/3 crown due to crowding. Below average annual twig growth.	
831	36	Ponderosa Pine	100+ x 38	Fair	Moderate & non-correctable defects	Below average annual twig growth. Some fine deadwood at branch tips indicates declining health which may improve with care.	
832	30	Douglas Fir	90 x 50	Excellent	Moderate & non-correctable defects	Top broken out at 90' with full symetrical crown and good annual twig growth. Some medium to large deadwood in lower crown to remove if retaining.	
833	30	Douglas Fir	80 x 30	Poor	Major defects or problems	Fungal fruiting bodies (conks) on trunk indicate presence of internal decay. Top splits into crooked top at 45'. Tree leans southwest at 15° to 20° with partial 2/3 crown due to crowding. Below average annual twig growth. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	

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Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
834	30	Douglas Fir	75 x 38	Fair	Moderate & non-correctable defects	Subdominant tree with top broken out. Partial 3/4 crown due to crowding with below average annual twig growth.	
835	41	Ponderosa Pine	100+ x 50	Good	Moderate & non-correctable defects	Partial 2/3 lower crown due to crowding with full asymetric upper crown. Average annual twig growth with some medium to fine deadwood in crown to remove if retaining.	
837	33	Douglas Fir	100+ x 37	Good	Moderate & non-correctable defects	Partial lower crown with full asymetric upper crown due to crowding. Average annual twig growth. Some large, medium and fine deadwood to remove if retaining.	
838	14	Douglas Fir	55 x 25	Very Poor	Major defects or problems	Fungal fruiting bodies (conks) on trunk indicate presence of internal decay. Partial 1/3 crown due to crowding. Below average annual twig growth and trunk has long swoop. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	
839	18	Douglas Fir	90 x 18	Poor	Moderate & non-correctable defects	Subdominant tree with top broken out. Thin partial 1/3 crown due to crowding with very poor annual twig growth. POOR SPECIMEN, MARGINAL FOR RETENTION.	
840	23	Douglas Fir	100+ x 25	Fair	Moderate & non-correctable defects	Thin partial lower and full upper crown with below average annual twig growth.	
841	18	Douglas Fir	90 x 40	Fair	Moderate & non-correctable defects	Thin partial 1/3 crown due to crowding. Below average annual twig growth.	
842	24	Douglas Fir	100+ x 40	Fair	Moderate & non-correctable defects	Partial 1/2 crown due to crowding and average annual twig growth. Large amount of medium to large deadwood in lower crown to remove if retaining.	
843	30	Douglas Fir	100+ x 45	Fair	Moderate & non-correctable defects	Nearly full asymetric crown with below average annual twig growth. Large amount of large deadwood on west side of lower crown to remove if retaining.	
844	16	Douglas Fir	60 x 28	Poor	Major defects or problems	Subdominant tree with top broken out at 60', thin crown and below average annual twig growth.	
845	12	Douglas Fir	80 x 25	Poor	Major defects or problems	Top broken out at 80', partial 3/4 crown due to crowding. Below average annual twig growth.	B
846	21	Douglas Fir	100+ x 30	Fair	Moderate & non-correctable defects	Partial 1/8 & 1/4 crown due to crowding. Below average annual twigh growth with some medium to large deadwood to remove if retaining.	
847	20	Douglas Fir	90 x 30	Fair	Moderate & non-correctable defects	Partial 1/2 crown due to crowding with below average annual twig growth. Some medium to fine deadwood in crown.	
848	24	Douglas Fir	100+ x 40	Fair	Moderate & non-correctable defects	Partial 3/8 crown due to crowding with average annual twig growth. Some medium deadwood on west side of lower crown to remove if retaining.	
849	30	Douglas Fir	100+ x 42	Good	Moderate & non-correctable defects	Partial 1/2 lower and full asymetric upper crown with average annual twig growth. Large amount of large deadwood on northwest side of lower crown to remove if retaining.	
850	30	Douglas Fir	100+ x 40	Good	Moderate & non-correctable defects	Partial 1/2 lower and full asymetric upper crown with average annual twig growth. Large amount of large deadwood on north side of lower crown to remove if retaining.	

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Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
851	45	Douglas Fir	100+ x 42	Good	Few & minor or correctable defects	Full crown with average annual twig growth. Two stems at 55'. Prune to improve structure if retaining.	
853	8	Douglas Fir	65 x 12	Poor	Major defects or problems	Subdominant tree with thin partial 1/4 crown due to crowding. Below average annual twig growth. POOR SPECIMEN MARGINAL FOR PRESERVATION.	
854	16	Douglas Fir	100+ x 16	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with below average annual twig growth.	
855	22	Douglas Fir	100+ x 35	Fair	Moderate & non-correctable defects	Partial 1/8 & 1/8 lower crown with a nearly full upper crown. Below average annual twig growth.	
856	22	Douglas Fir	90 x 18	Poor	Moderate & non-correctable defects	Very thin partial 1/4 crown due to crowding with below average annual twig growth. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	
857	29	Douglas Fir	100+ x 30	Fair	Moderate & non-correctable defects	Partial 1/3 lower and full upper crown with well below average annual twig growth.	
858	35	Ponderosa Pine	100+ x 25	Good	Moderate & non-correctable defects	Partial 1/2 lower with full upper crown. Average annual twig growth with some deadwood in lower crown to be removed if retaining.	A
859	40	Douglas Fir	100+ x 50	Good	Moderate & non-correctable defects	2 stems at 3' with a partial 3/4 crown due to crowding. Below average annual twig growth. Some deadwood in lower crown to remove if retaining.	
860	26	Douglas Fir	100+ x 18	Fair	Moderate & non-correctable defects	Partial 1/4 crown due to crowding with below average annual twig growth. Some medium to fine deadwood to remove if retaining.	
861	24	Douglas Fir	100+ x 32	Fair	Moderate & non-correctable defects	Thin partial 1/4 crown due to crowding with below average annual twig growth.	
862	27	Douglas Fir	100+ x 35	Fair	Few & minor or correctable defects	Full asymetric crown due to crowding with below average annual twig growth.	
863	17	Douglas Fir	100+ x 30	Fair	Moderate & non-correctable defects	Partial 1/3 lower and full upper crown. Below average annual twig growth.	B
864	14	Douglas Fir	95 x 14	Fair	Moderate & non-correctable defects	Partial 1/4 lower with full upper crown due to crowding. Below average annual twig growth.	
865	22	Douglas Fir	100+ x 25	Good	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with average annual twig growth. Moderate amount of medium to fine deadwood to remove if retaining.	B
866	11	Douglas Fir	100+ x 20	Poor	Moderate & non-correctable defects	Partial 1/8 very narrow crown due to crowding with poor annual twig growth and a light amount of deadwood. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	A
867	11	Douglas Fir	55 x 16	Fair	Moderate & non-correctable defects	Partial 1/4 crown due to crowding with average annual twig growth. Some medium deadwood to remove if retaining.	B

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Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
868	26	Douglas Fir	100+ x 45	Fair	Moderate & non-correctable defects	Partial 1/3 lower and nearly full upper crown with average annual twig growth. Moderate amount of medium to large deadwood to remove if retaining.	B
869	13	Pacific Madrone	35 x 30	Good	Moderate & non-correctable defects	Wound on south side at 3'. Asymetrical crown with good leaf size and annual twig growth. Some structural issues could be improved with pruning.	
870	24	Douglas Fir	100+ x 30	Fair	Moderate & non-correctable defects	Partial 1/4 crown due to crowding with below average annual twig growth. Some medium deadwood to remove if retaining.	A
871	28	Douglas Fir	100+ x 50	Good	Moderate & non-correctable defects	Partial 1/4 lower and full upper crown due to crowding. Average annual twig growth wth a large amount of medium to large deadwood to remove if retaining.	A
872	12	Douglas Fir	70 x 25	Fair	Moderate & non-correctable defects	Subdominant tree with partial 1/4 crown due to crowding. Average annual twig growth. Light amount of medium to fine deadwood in crown.	A
873	24	Oregon White Oak	85 x 30	Good	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with good annual twig growth and average leaf size. Some fine deadwood in upper crown suggests some insect or health issue that should be further investigated if it is retained.	A
874	17	Oregon White Oak	85 x 30	Good	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with average annual twig growth and average leaf size. Some large deadwood to remove if retaining.	A
875	14	Douglas Fir	70 x 25	Fair	Moderate & non-correctable defects	Partial 2/3 crown due to crowding with average annual twig growth. Light amount of medium deadwood to remove if retaining.	A
876	30	Douglas Fir	100+ x 50	Good	Moderate & non-correctable defects	Partial 1/2 lower and full upper crown due to crowding with average annual twig growth. Some light deadwood in crown.	A
877	22	Douglas Fir	100+ x 37	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with poor annual twig growth. Some medium deadwood to remove if retaining.	A
878	10	Douglas Fir	70 x 16	Fair	Moderate & non-correctable defects	Subdominant tree with partial 1/3 crown due to crowding. Below average annual twig growth with some light deadwood in lower crown.	A
879	13	Douglas Fir	85 x 16	Poor	Major defects or problems	Partial 1/2 very thin crown due to crowding with poor annual twig growth. Some light deadwood. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	A
880	24	Douglas Fir	100+ x 28	Fair	Moderate & non-correctable defects	Partial 1/8 lower and 1/2 partial upper crown due to crowding. Average annual twig growth with some medium deadwood to remove if retaining.	A
881	24	Oregon White Oak	85 x 43	Good	Moderate & non-correctable defects	Partial 2/3 crown due to crowding with good annual twig growth and leaf size. 2 stems at 6.5.' Crown is off center and heavy to south. Prune to balance and improve structure.	A
882	13	Douglas Fir	50 x 25	Poor	Moderate & non-correctable defects	Partial 3/4 crown due to crowding with very poor annual twig growth and with a moderate amountd of medium to fine deadwood. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	A
883	23	Douglas Fir	100 x 16	DYING	DYING	Nearly dead. Top 40' is dead. Dying tree is a POTENTIAL HAZARD, DO NOT PRESERVE.	A

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Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
884	23	Oregon White Oak	70 x 38	Fair	Moderate & non-correctable defects	Partial 1/2 crown due to crowding with average leaf size and annual twig growth. 2 stems at 6' and some medium deadwood to remove if retaining. Prune to improve structure.	A
885	17	Douglas Fir	80 x 20	Poor	Major defects or problems	Weak connection at base and partial 1/4 crown due to crowding. Poor annual twig growth and some medium deadwood in crown. POOR SPECIMEN, DO NOT PRESERVE.	A
886	24	Douglas Fir	95 x 25	Poor	Major defects or problems	Thin partial 2/3 crown due to crowding with poor annual twig growth. Clearly declining health with med to large deadwood in mid crown. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	A
887	17	Douglas Fir	85 x 25	Poor	HAZARD REMOVE	Partial 1/2 crown due to crowding with major wound and exposed internal decay on south side from 0' to 6'. HAZARD REMOVE.	A
888	17	Douglas Fir	75 x 25	Poor	Major defects or problems	Thin partial 1/3 crown due to crowding with very poor annual twig growth. Some medium to large deadwood in lower crown. Serious decline in health and condition. POOR SPECIMEN MARGINAL FOR PRESERVATION.	A
889	17	Douglas Fir	80 x 25	Poor	Major defects or problems	Thin partial 1/4 crown due to crowding with very poor annual twig growth. Moderate amount of medium to fine deadwood throughout crown. Serious decline in health and condition. POOR SPECIMEN MARGINAL FOR PRESERVATION.	A
890	21	Douglas Fir	100+ x 35	Poor	Major defects or problems	Small thin full crown due to crowding with poor annual twig growth. Large amount of large deadwood. Serious decline in health and condition. POOR SPECIMEN MARGINAL FOR PRESERVATION.	A
891	21	Douglas Fir	100+ x 18	Poor	Major defects or problems	Small thin crown due to crowding with poor annual twig growth. Serious decline in health and condition. POOR SPECIMEN MARGINAL FOR PRESERVATION.	**A**
892	21	Douglas Fir	85 x 25	Poor	Major defects or problems	Thin partial 1/3 crown due to crowding. Poor annual twig growth. Serious decline in health and condition. POOR SPECIMEN MARGINAL FOR PRESERVATION.	A
893	22	Douglas Fir	100+ x 25	Poor	Major defects or problems	Narrow thin nearly full crown with poor annual twig growth. Serious decline in health and condition. POOR SPECIMEN MARGINAL FOR PRESERVATION.	
894	24	Douglas Fir	100+ x 35	Poor	Major defects or problems	Thin full crown with poor annual twig growth. Top is dying back and has fine deadwood throughout crown, Serious decline in health and condition. POOR SPECIMEN MARGINAL FOR PRESERVATION.	B
895	22	Douglas Fir	100+ x 32	Fair	Moderate & non-correctable defects	Partial 2/3 crown due to crowding with below average annual twig growth. Moderate amount of medium to large deadwood to remove if retaining.	B
896	22	Douglas Fir	85 x 32	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with average annual twig growth. Top is split with a dead side stem attached. Prune to remove deadwood and improve structure if retaining.	A
897	27	Douglas Fir	100+ x 35	Poor	Major defects or problems	Thin full crown with dead top. Dying and serious decline in condition. POOR SPECIMEN MARGINAL FOR PRESERVATION.	A
900	13	Douglas Fir	65 x 20	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding. Below average annual twig growth.	

9600 Boeckman Rd Tree Assessment

Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
901	6	Scouler Willow	23 x 12	Very Poor	DYING HAZARD	Open wound exposes internal decay at 1' to 3'. Dead top and bark is sloughing off from 5' to top. DYING, HAZARD REMOVE.	
902	8	Douglas Fir	35 x 10	Fair	Major defects or problems	Subdominant tree with partial 1/8 crown due to crowding. Below average annual twig growth. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	
903	13	Douglas Fir	55 x 20-	Fair	Moderate & non-correctable defects	Partial 2/3 crown due to crowding with below average annual twig growth.	
904	14	Oregon Ash	45 x 21	Fair	Moderate & non-correctable defects	Nearly full narrow crown due to crowding. Top leans 15° to 25° to north. Average annual leaf size and twig growth. May require inspection and pruning to improve structure if retained.	
905	14	Oregon Ash	60 x 24	Good	Few & minor or correctable defects	Full upper and partial lower crown due to crowding. Good annual leaf size and twig growth.	A
906	12	Oregon Ash	80 x 20	Good	Moderate & non-correctable defects	2 co-dominant stems at 30' with nearly full asymetric crown. Average annual leaf size and twig growth. Some medium size deadwood to be removed if area beneath it is developed.	A
907	10	Oregon Ash	75 x 18	Fair	Moderate & non-correctable defects	2 co-dominant stems at 40' with partial, 2/3 crown due to crowding. Average annual leaf size and twig growth.	A
908	15	Oregon Ash	70 x 30	Good	Moderate & non-correctable defects	Partial 2/3 crown due to crowding is off balance and heavy to north. Good annual leaf size and twig growth.	A
909	11	Oregon Ash	75 x 20	Good	Few & minor or correctable defects	Nearly full narrow crown due to crowding. Good annual leaf size and twig growth.	A
910	8	Oregon Ash	80 x 18	Good	Few & minor or correctable defects	Nearly full narrow crown due to crowding. Good annual leaf size and twig growth.	A
911	8	Oregon Ash	80 x 15	Good	Few & minor or correctable defects	Nearly full narrow crown due to crowding. Good annual leaf size and twig growth.	A
912	8	Oregon Ash	75 x 20	Fair	Moderate & non-correctable defects	Partial crown due to crowding with below average annual twig growth. Top broken out at 60' and may need pruning to improve structure.	A
913	11	Oregon Ash	20 x 5	Poor	Major defects or problems	Top broken out at 20' with a small amount of sucker growth from trunk. TREE DESTROYED, DO NOT PRESERVE.	A
914	7	Oregon Ash	28 x 2	Poor	Major defects or problems	Top broken out at 28' with a small amount of sucker growth from trunk. TREE DESTROYED, DO NOT PRESERVE.	A
915	15	Oregon Ash	80 x 25	Fair	Few & minor or correctable defects	Nearly full asymetric crown with average annual leaf size and twig growth. Some stubs from ice storm broken branches.	A
916	11	Oregon Ash	80 x 25	Good	Moderate & non-correctable defects	Partial crown due to crowding with good annual leaf size and twig growth. Off balance and heavy to north. Some stubs from ice storm broken branches.	A

9600 Boeckman Rd Tree Assessment

Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
917	14	Oregon Ash	80 x 25	Good	Moderate & non-correctable defects	Partial crown due to crowding with good annual leaf size and twig growth. Off balance and heavy to north. Some stubs from ice storm broken branches.	A
918	5, 4	Common Hawthorne	30 x 20	Poor	Major defects or problems	Partial crown due to crowding. Off balance to west. INVASIVE SPECIES & POOR SPECIMEN, DO NOT PRESERVE.	A
5000	15	Oregon White Oak	60 x 45	Good	Few & minor or correctable defects	Full crown with good annual leaf size and twig growth. Some medium to fine deadwood to remove.	
5002	17	Douglas Fir	0 x 0	DEAD	DEAD	Broken off lower trunk. TAKEN DOWN & REMOVED.	B
5003	48	Ponderosa Pine	100+ x 40	Good	Few & minor or correctable defects	Full crown with good annual twig growth. Some medium deadwood to remove.	A
5011	9	Bird Cherry	50 x 15	Very Poor	Moderate & non-correctable defects	Partial very small crown due to crowding. Sapsucker damage has nearly girdled trunk. Large amount of deadwood. VERY POOR SPECIMEN, DO NOT PRESERVE.	A
5012	13	Oregon White Oak	50 x 20	Fair	Moderate & non-correctable defects	Partial asymetric crown with below average annual twig growth and leaf size.	A
5042	27, 18	Oregon White Oak	85 x 75	Good	Moderate & non-correctable defects	2 stems at 30". Crown off balance to east with some medium and large deadwood to remove. Prune to balance and improve structure. Cable two stems together if retaining.	
5043	48	Ponderosa Pine	100+ x 47	Good	Moderate & non-correctable defects	Full asymetric crown due to crowding with average annual twig growth. Some recently dead branches and some large deadwood throughout crown to remove if retaining.	
5044	14	Oregon Ash	90 x 37	Good	Moderate & non-correctable defects	Partial 3/4 crown due to crowding with good leaf size and annual twig growth. Some medium to fine deadwood throughout crown.	
5129	12	Oregon Ash	80 x 23	Fair	Moderate & non-correctable defects	Full asymetric crown with chlorotic leaves, below average leaf size and annual twig growth indicates current health problems. May improve with care.	
5130	14	Oregon Ash	80 x 40	Fair	Moderate & non-correctable defects	Full asymetric crown with below average leaf size and annual twig growth. Tree has some structural problems that can be improved with pruning.	
5132	24	Oregon White Oak	0 X 0	DEAD	DEAD	15' stump lying on ground due to being toppled by winter ice storm.	
5133	23	Oregon White Oak	8 x 0	DEAD	DEAD	Trunk broken off at 8', only stump remains. REMOVE STUMP.	
6604	34	Douglas Fir	100+ x 45	Very Poor	Major defects or problems	Nearly full asymetric very thin crown with very poor annual twig growth. Tree in serious decline, likely due to saturated soil in wetland. Medium to fine deadwood throughout crown. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	
6612		NO TREE			NO TREE	No tree at this location	
6616	12	Oregon Ash	75 x 30	DYING	DYING HAZARD	Wounds extensive internal decay exposed from 0' to 7' across over 50% of circumference. DYING, HAZARD, REMOVE.	

9600 Boeckman Rd Tree Assessment

Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
6587	17	Oregon Ash	80 x 25	Fair	Moderate & non-correctable defects	Partial 2/3 crown due to crowding with average annual leaf size and twig growth. Some large to medium deadwood to remove if area beneath it is improved.	A
6597	11	Oregon White Oak	90 x 20	Fair	Moderate & non-correctable defects	Partial 1/8 & 1/8 crown due to crowding with average annual leaf size and twig growth.	A
50346	32	Douglas Fir	85 x 35	Very Poor	Dying Hazard	Thin partial 3/4 crown due to crowding with very poor annual twig growth. Top was broken out and remaining top is dying with large amount of deadwood throughout crown. Dying tree is a POTENTIAL HAZARD REMOVE.	
50347	26	Douglas Fir	95 x 35	Good	Moderate & non-correctable defects	Partial lower and full upper crown due to crowding. Below average annual twig growth. Leans to northwest at 8° to 10°.	A
50348	9	Douglas Fir	25 x 18	Fair	Moderate & non-correctable defects	Partial crown due to crowding with below average annual twig growth. POOR SPECIMEN MARGINAL FOR PRESERVATION.	A
50349	34	Ponderosa Pine	100+ x 40	Good	Moderate & non-correctable defects	Partial lower and full upper crown with average annual twig growth. Top broken out and recently dead branches on north side indicates some potential health problem. May improve with care.	A
50350	24	Douglas Fir	100+ x 40	Good	Moderate & non-correctable defects	Partial crown due to crowding with below average annual twig growth. Some medium to fine deadwood to remove if retaining.	A
50351	35	Douglas Fir	100+ x 35	Fair	Moderate & non-correctable defects	Partial crown due to crowding with below average annual twig growth. Light amount of fine deadwood throughout crown.	A
50361	41	Ponderosa Pine	100+ x 50	Good	Few & minor or correctable defects	Full crown with average annual twig growth. Moderate amount of medium to large deadwood to remove is retaining.	B
50363	No Tree	NO TREE		NO TREE		No tree at this location.	
50364	No Tree	NO TREE		NO TREE		No tree at this location.	
50395	36	Ponderosa Pine	100+ x 35	Good	Few & minor or correctable defects	Full crown with good annual twig growth. Some medium to large deadwood to remove if retaining.	
50396	19	Ponderosa Pine	75 x 20	Fair	Moderate & non-correctable defects	Partial 1/2 crown due to crowding with average annual twig growth. Some recently dead branches in crown.	
50397	19	Douglas Fir	75 x 30	Fair	Moderate & non-correctable defects	Subdominant tree with partial 2/3 crown due to crowding and good annual twig growth.	
50398	19	Douglas Fir	90 x 27	Fair	Few & minor or correctable defects	Full crown with below average annual twig growth.	
50399	21	Oregon White Oak	75 x 30	Good	Moderate & non-correctable defects	Full asymetric crown is off balance and heavy to south. Some large, medium to fine deadwood in crown. Prune to improve structure if retaining.	

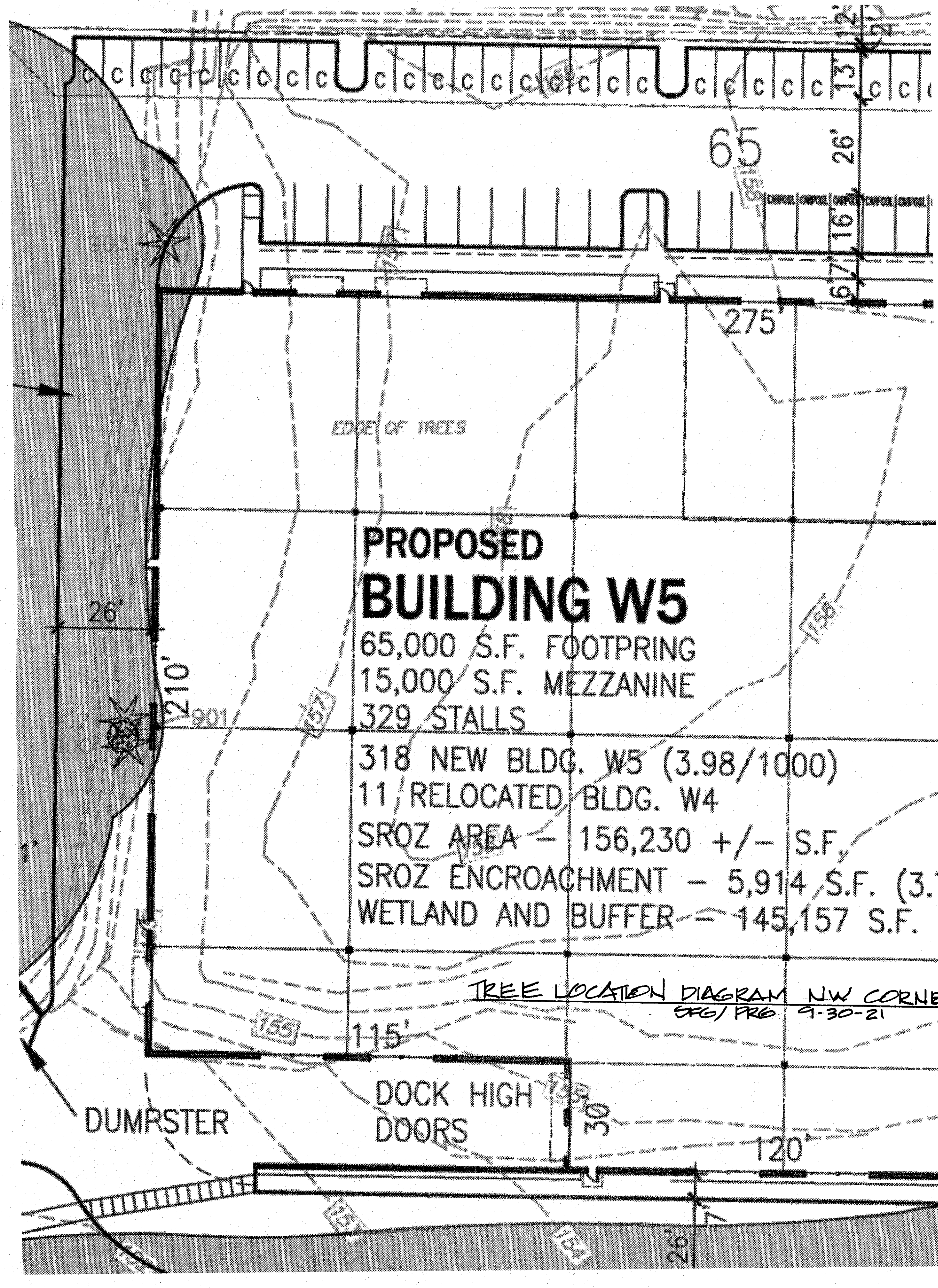
9600 Boeckman Rd Tree Assessment

Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
50400	42	Ponderosa Pine	100+ x 45	Good	Few & minor or correctable defects	Full crown with average annual twig growth. Some medium to large deadwood to remove if retaining.	
50402	15, 13	Oregon Ash	85 x 42	Good	Moderate & non-correctable defects	2 stems at 3', full asymetric crown is off balance to south. Some medium deadwood. Good leaf size and annual twig growth. Prune to improve structure and remove deadwood.	
50403	17	Oregon White Oak	80 x 35	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with average leaf size and annual twig growth. Prune to improve structure and balance.	
50404	17	Oregon White Oak	85 x 40	Good	Moderate & non-correctable defects	Full asymetric crown with average leaf size and annual twig growth. Some medium to large deadwood to remove if retaining.	
50405	12	Oregon Ash	70 x 27	Poor	HAZARD REMOVE	Large open wound that exposes internal decay from 0' to 3'. Partial crown due to crowding. Some large deadwood. Poor specimen and not sound due to decay. HAZARD REMOVE.	
50406	12, 9	Bird Cherry	65 x 30	Fair	Moderate & non-correctable defects	Full crown with 2 stems at ground. Thin crown, average size wilted leaves due drought and average annual twig growth. May improve with care.	
50407	24	Douglas Fir	100+ x 40	Fair	Moderate & non-correctable defects	Partial 1/2 lower crown and full upper crown. Average annual twig growth with large, medium and fine deadwood to remove if retaining.	
50408	15	Bigleaf Maple	60 x 40	Fair	Moderate & non-correctable defects	Full crown with dead top. Below average annual twig growth and average leaf size may be due to drought. Prune to remove deadwood.	
50409	32	Ponderosa Pine	100+ x 40	Good	Moderate & non-correctable defects	Partial 3/4 asymetric crown due to crowding with good annual twig growth. Some large, medium and fine deadwood to remove if retaining.	
50410	23	Douglas Fir	100+ x 42	Good	Moderate & non-correctable defects	Partial 7/8 asymetrical crown due to crowding with average annual twig growth. Some medium to fine deadwood.	
50412	15	Douglas Fir	100+ x 23	Fair	Moderate & non-correctable defects	Partial 2/3 crown due to crowding with below average annual twig growth. Medium to fine deadwood to remove if retaining.	
50413	20	Douglas Fir	100+ x 30	Fair	Moderate & non-correctable defects	Partial 2/3 lower and full upper crown due to crowding with average annual twig growth. Some medium to fine deadwood to remove if retaining.	
50474	28	Douglas Fir	100+ x 35	Good	Few & minor or correctable defects	Full crown with below average annual twig growth. Moderate amount of medium to fine deadwood to remove if retaining.	
50476	35	Douglas Fir	100+ x 45	Good	Few & minor or correctable defects	Partial 2/3 lower and nearly full upper crown with good annual twig growth. Moderate amount of large, medium and fine deadwood to remove if retaining.	B
50476 B	16	Douglas Fir	90 x 32	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with below average annual twig growth. Some medium to large deadwood to remove if retaining.	A
50476 C	17	Douglas Fir	100 x 32	Fair	Moderate & non-correctable defects	Partial 1/4 crown due to crowding with below average annual twig growth. Some medium to large deadwood to remove if retaining.	A

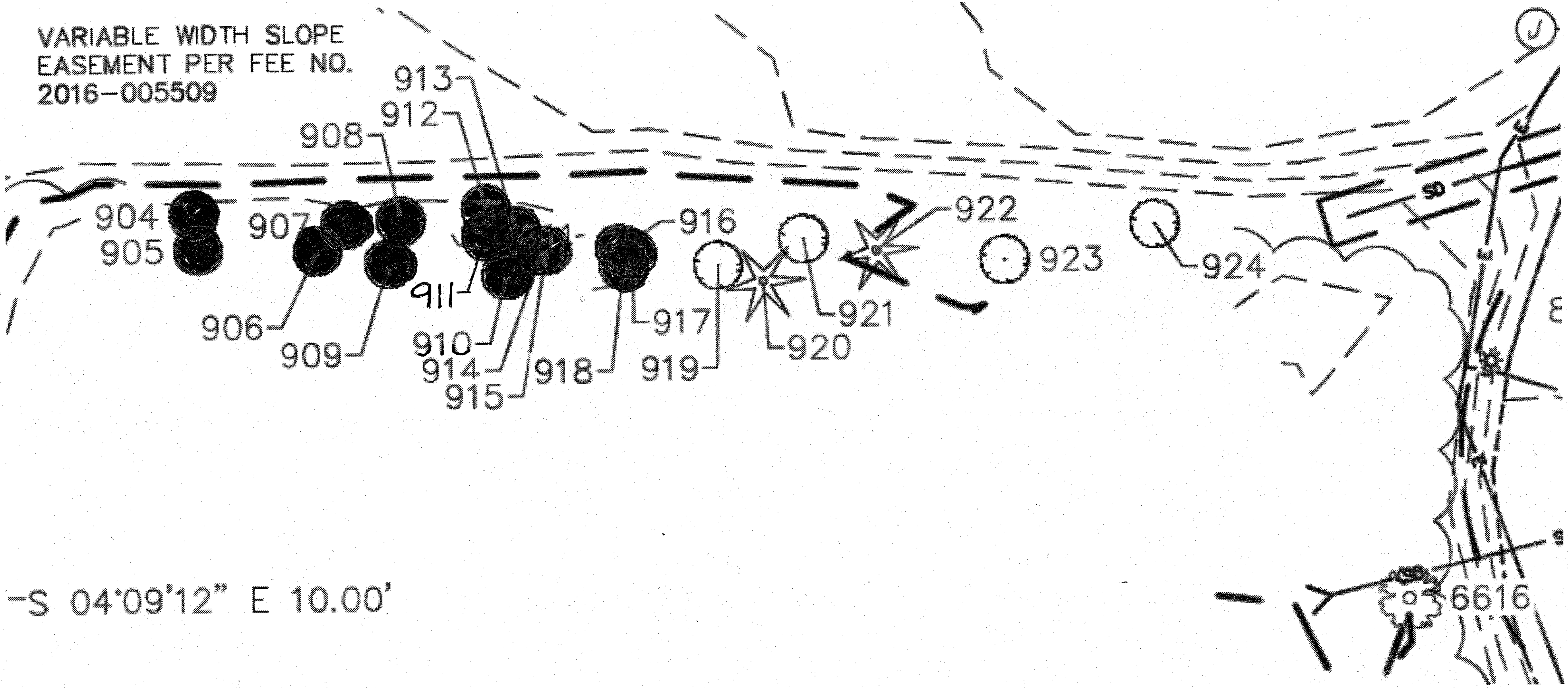
9600 Boeckman Rd Tree Assessment

Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
50479	24	Douglas Fir	100+ x 35	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with average annual twig growth. Moderate amount of medium to fine deadwood to remove if retaining.	B
50479 B	11	Douglas Fir	60 x 16	Poor	Moderate & non-correctable defects	Subdomiant tree with partial 1/4 crown due to crowding with below average annual twig growth. Serious declining health with significant deadwood. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	B
50479 C	7	Douglas Fir	50 x 12	Poor	Major defects or problems	Subdominant tree with 1/8 crown due to crowding with very poor annual twig growth. Seriously declining health with significant deadwood. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	A
50479 D	6	Douglas Fir	35 x 0	DEAD	DEAD	DEAD TREE, REMOVE.	
50483	25	Douglas Fir	100+ x 28	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with average annual twig growth. Moderate amount of medium to fine deadwood to remove if retaining.	B
50483 B	25	Douglas Fir	100+ x 45	Good	Moderate & non-correctable defects	Partial 2/3 crown due to crowding with below average annual twig growth. Moderate amount of medium to find deadwood to remove if retaining.	B
50483 C	19	Douglas Fir	100+ x 28	Fair	Moderate & non-correctable defects	Partial 1/4 crown due to crowding with below average annual twig growth. Some fine deadwood.	B
50487	16	Douglas Fir	100+ x 25	Fair	Moderate & non-correctable defects	Partial 1/4 crown due to crowding with below average annual twig growth. Some fine deadwood.	A
50487 B	18	Douglas Fir	100+ x 28	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with below average annual twig growth. Some medium to large deadwood to remove if retaining.	A
50487 C	7	Douglas Fir	25 x 10	Poor	Major defects or problems	Subdominant tree with 1/2 crown due to crowding and below average annual twig growth. Moderate amount of medium deadwood. POOR SPECIMEN MARGINAL FOR PRESERVATION.	A
50487 D	22	Douglas Fir	100+ x 32	Fair	Moderate & non-correctable defects	Partial 2/3 crown due to crowding with below average annual twig growth. Moderate amount of medium to find deadwood to remove if retaining.	A
50490	30	Douglas Fir	100+ x 40	Fair	Moderate & non-correctable defects	Full crown with below average annual twig growth. Moderate amount of medium to fine deadwood to remove if retaining.	A
50496	41	Douglas Fir	100+ x 50	Good	Few & minor or correctable defects	Full crown with average annual twig growth. Some medium to large deadwood to remove if retaining.	A
70824	19	Douglas Fir	100+ x 35	Fair	Moderate & non-correctable defects	Partial 1/4 lower and full upper crown due to crowding. Below average annual twig growth with a moderate amount of medium to large deadwood to remove if retaining.	
70824 B	20	Douglas Fir	100+ x 35	Fair	Moderate & non-correctable defects	Partial 1/4 lower and full upper crown due to crowding. Below average annual twig growth with a moderate amount of medium to large deadwood to remove if retaining.	

Notes: Retain A = Retain without aeration, Retain B = Retain with aeration



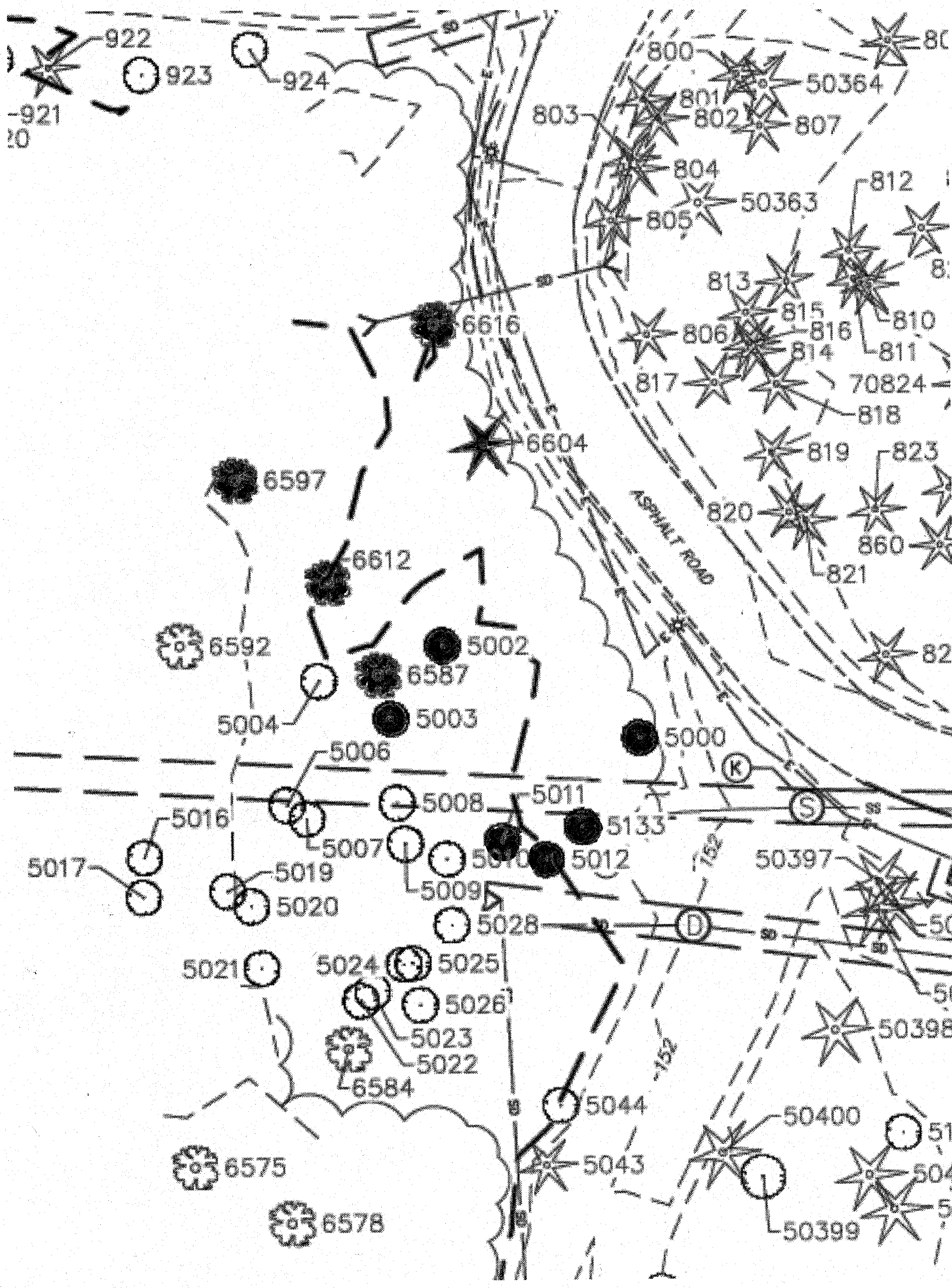
TREE LOCATION DIAGRAM NW CORNER
SFG/ PRG 9-30-21



NORTH STORMPOND TREES

EFG/PRG 12-07-21

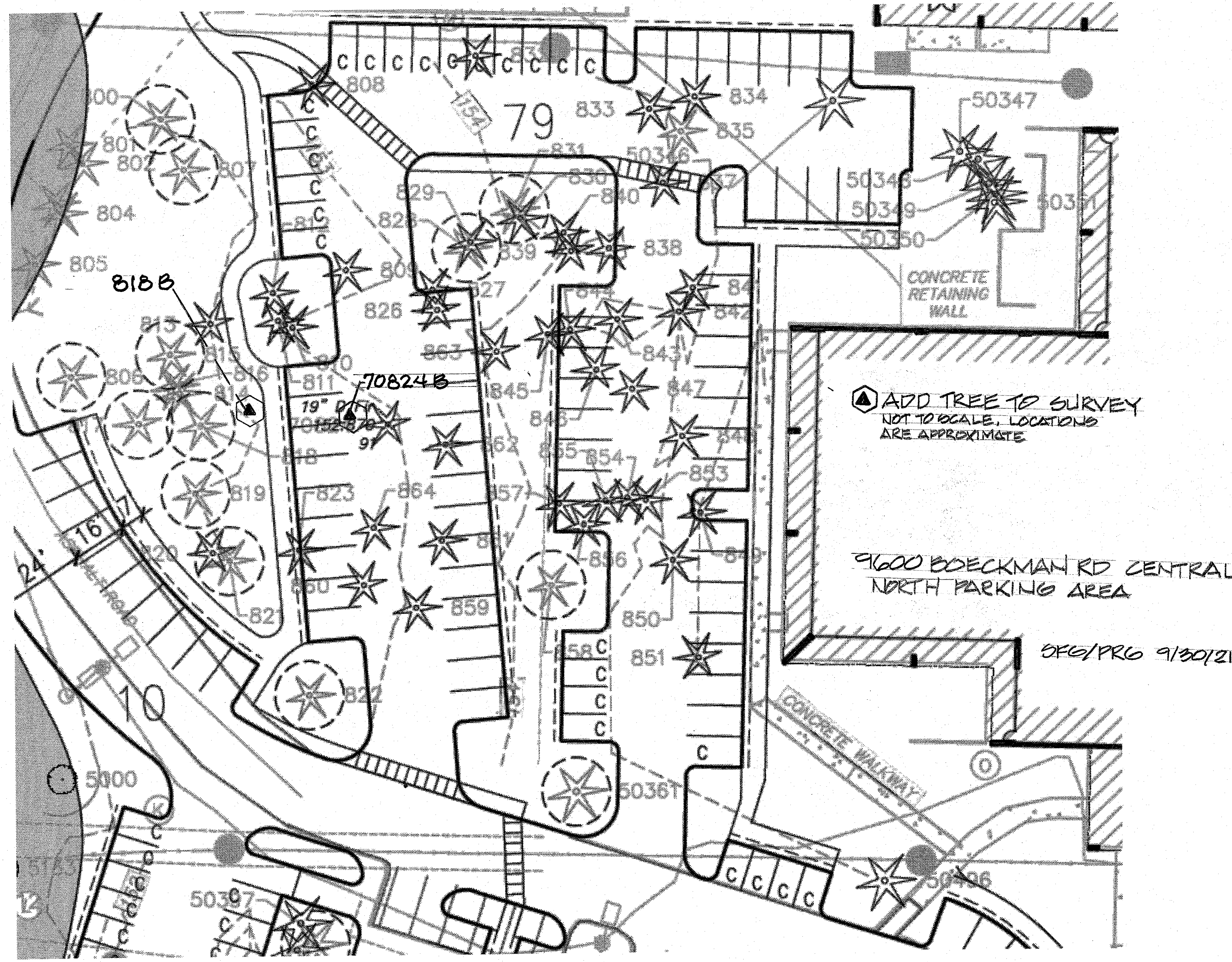
■ EFFECTED TREES - SEE CHART FOR DETAILS



MID SITE STORMPOND TREES

SFG/PRG - 12-07-21

EFFECTED TREES - SEE CHART FOR DETAILS



ADD TREE TO SURVEY
NOT TO SCALE, LOCATIONS ARE APPROXIMATE
9600 BOECKMAN RD CENTRAL
NORTH PARKING AREA
SFG/PRG 9/30/21
818 B
70824 B
19" DFIR
CONCRETE RETAINING WALL
CONCRETE WALKWAY
79
10
154
50347
50348
50349
50350
50361
808
833
834
835
838
839
840
829
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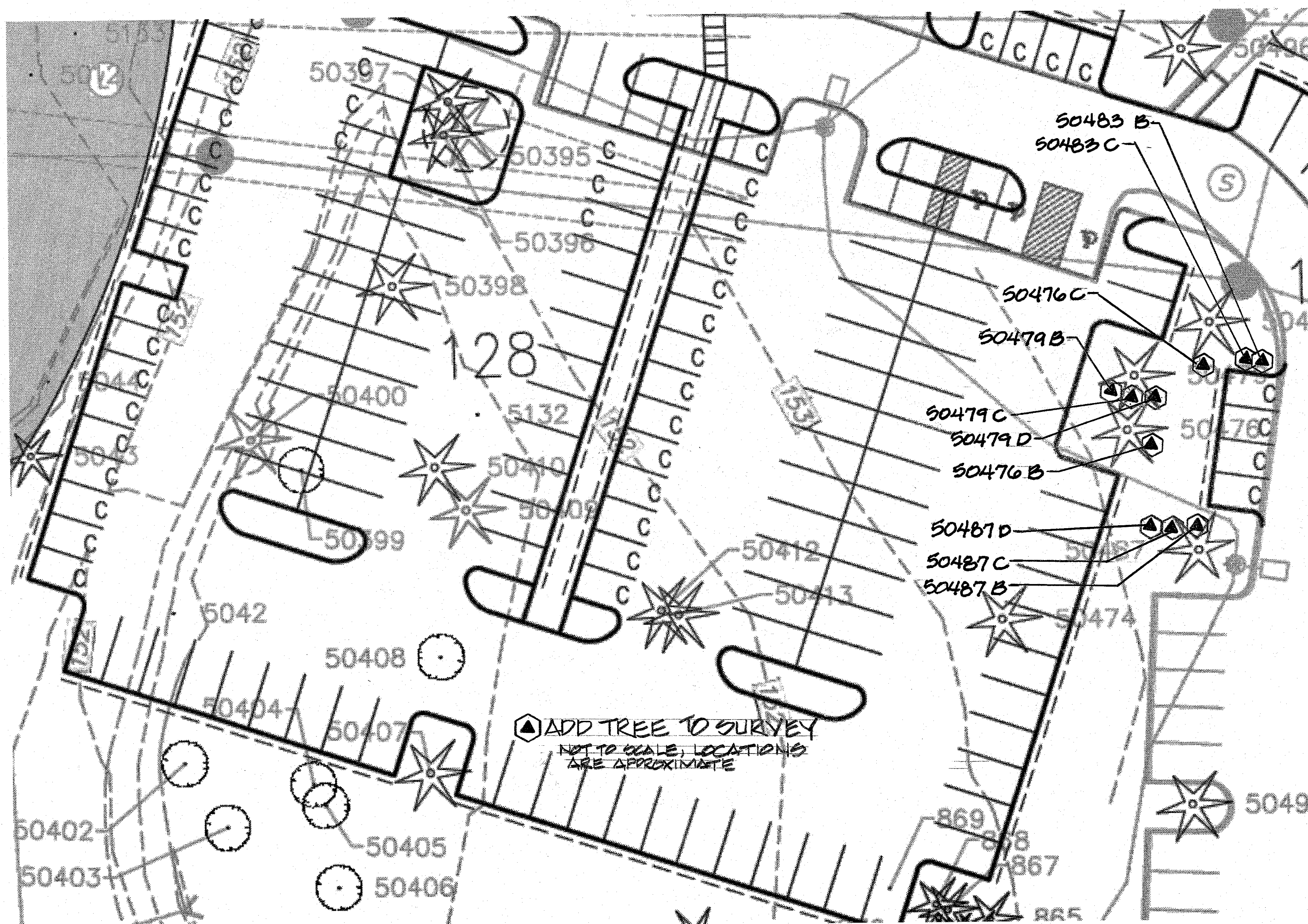
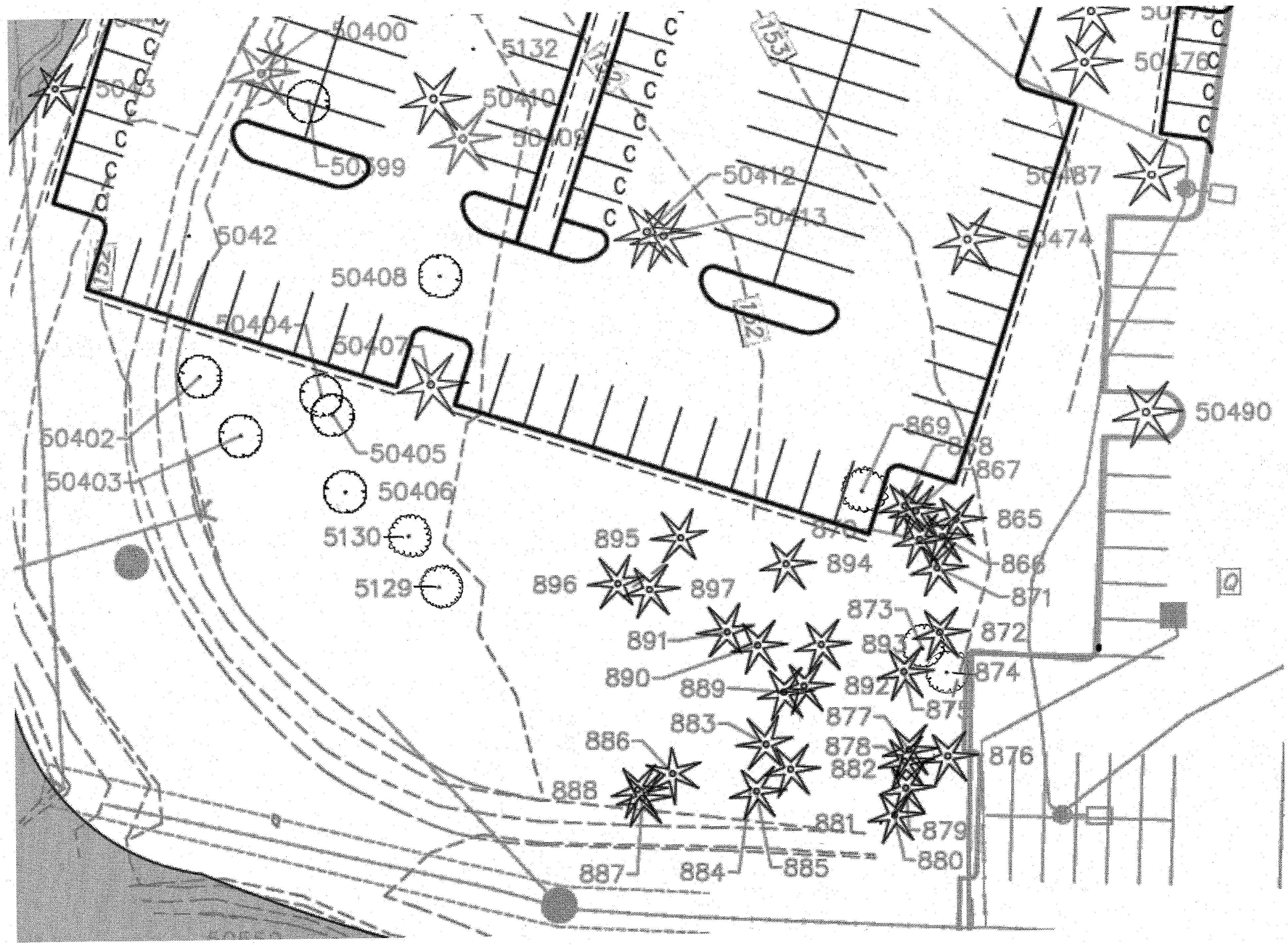


9600 BOECKMAN RD. SOUTH
SOUTH PARKING AREA

SFG/PRG 9/30/21



TREE LOCATION DIAGRAM SE CORNER
SFG/PRG 9-30-21

PACIFIC HABITAT SERVICES, INC
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070
(800) 871-9333 ● (503) 570-0800 ● Fax (503) 570-0855

Date: **January 16, 2023**

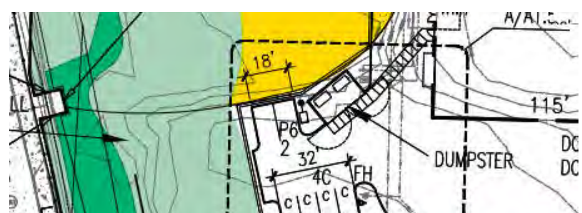
To: **Mac Martin**
Martin Development

From: **John van Staveren, SPWS**

Re: **Update to the Significant Resource Impact Report for the 9900 SW Boeckman Road Property Wilsonville, Clackamas County, Oregon**
PHS Project Number: 7264

Mac – Pacific Habitat Services prepared the SRIR for the proposed development at 9900 SW Boeckman Road in Wilsonville on January 26, 2022. We have now been informed that the site has been redesigned, so that 2,624 square feet of parking has been removed from the SR Impact Area. The original impact to the SR Impact Area was 22,948 square feet (0.53 acres). The new impact is now 20,324 square feet (0.47 acres). The two graphics below show the original and the proposed design.

Original Parking Lot Design



Proposed Parking Lot Design

There has been no reduction in areas requiring mitigation, as such, the proposed mitigation plan included in the January 26, 2022, report will remain the same.

Please let me know if you have any questions.

Thanks

John

Significant Resource Impact Report for the 9900 SW Boeckman Road Property Wilsonville, Clackamas County, Oregon

(Section 14B, Township 3 South, Range 1 West,
Tax lots 202, 282, and 292)

Prepared for Mac Martin
Martin Development PO Box 15523 Seattle, WA 98115

Prepared by

Joe Thompson PWS John van Staveren SPWS **Pacific Habitat Services, Inc.**
Wilsonville, Oregon 97070 (503) 570-0800
(503) 570-0855 FAX PHS Project Number: 7264

January 27, 2022

TABLE OF CONTENTS

1.0 INTRODUCTION

Pacific Habitat Services, Inc. (PHS) has prepared this Significant Resource Impact Report (SRIR) for improvements to the existing property at the 9900 SW Boeckman Road in Wilsonville, Oregon. A resource is mapped on the City of Wilsonville's Significant Resources Overlay Zone (SROZ) in the western portion of the property; therefore, a SRIR is required. The format follows the pertinent sections of the City of Wilsonville's Planning and Land Development Ordinance for a Standard SRIR (Section 4.139.05-06). For ease of review by the City of Wilsonville, key portions of the ordinance language are included (italicized), followed by specific responses to the requirements.

Figures 1, 2, and 3 show the general topography, tax lot map, and soils for the site, respectively. Figure 4 shows the existing site conditions. Figure 5 show the site development plan, 5A shows the tree removal plan, Figure 6 shows the mitigation plan, Figure 7 shows the Metro Title 3 boundaries on the site, Figure 8 is the Local Wetland Inventory Map, and Figure 9 shows the Metro Title 13 boundaries. All Figures are in Attachment A.

2.0 CITY DEVELOPMENT CODE

SECTION 4.139.06 SIGNIFICANT RESOURCE IMPACT REPORT (SRIR) AND REVIEW CRITERIA

(.02) Application Requirements for a Standard SRIR. The following requirements must be prepared and submitted as part of the SRIR evaluation for any development not included in paragraph A above:

A. A Site Development Permit Application must be submitted in compliance with the Planning and Land Development Ordinance.

A Site Development Permit Application is being submitted for this project in compliance with the Planning and Land Development Ordinance.

B. The SRIR shall be conducted and prepared by a natural resource professional knowledgeable and qualified to complete such a report.

The SRIR was prepared by Pacific Habitat Services, Inc. (PHS). PHS provides a wide range of services to the public and private sector, ranging from natural resource assessments to environmental design and construction. PHS offers professional expertise in the disciplines of wetland science, wildlife biology, hydrology, soil science, environmental toxicology, botany, and environmental planning.

C. The qualifications of the person or persons preparing each element of the analysis shall be included with the SRIR.

Joe Thompson is a Professional Wetland Scientist (PWS) with Pacific Habitat Services, Inc.(PHS) and has been a permanent member of the staff since 2016. Joe has over 20 years of experience performing a variety of wildlife, National Environmental Policy Act (NEPA) and wetland related studies, including: biological assessments, special status wildlife and rare plant surveys, wetland delineations, wetland permitting, functional assessments, habitat restoration and compensatory mitigation. John van Staveren is a Senior Professional Wetland Scientist (SPWS) with PHS and has been a permanent member of PHS since 1995. John has over 34 years of experience as a natural resource professional performing a wide-range of wetland, botanical, wildlife, Endangered Species Act and NEPA studies and overseeing the work of PHS' staff.

D. The SRIR shall include the following:

1. Physical Analysis. The analysis shall include, at a minimum:

a. Soil types;

The Natural Resources Conservation Services (NRCS) mapped soils within the tax lot include Aloha silt loam, 0-3% slopes; Amity silt loam; Cove silty clay loam; and Woodburn silt loam, 0-3 percent and 3-8 percent slopes. The Cove silty clay loam soils are considered hydric based on the Clackamas County hydric soils list, and the Aloha and Woodburn soils are considered partially hydric with inclusions. Figure 3 summarizes mapped locations of the soils within the site.

b. Geology;

The site is located approximately 0.35 mile west of Interstate 5 (I-5), and approximately 1.5 miles north of the Willamette River. The USGS DOGAMI[1] Digital Map describes the geology of the site as belonging to the Terrane Group: Quaternary Surficial Deposits, the Formation: Alluvial Deposits, and the Rock Type: Mixed Grain Sediments, which are described as:

> "*Deposits of unconsolidated sediments. Includes alluvium, colluvium, river and coastal terrace, landslide, glacial, eolian, beach, lacustrine, playa and pluvial lake deposits, and outburst flood deposits left by the Missoula and Bonneville floods.*"

Elevations in the site range from approximately 144 feet National Geodetic Vertical Datum (NGVD) in the ditch along the western boundary, to approximately 162 feet NGVD in the northern and eastern portions of the site.

c. Hydrology of the site;

Three wetlands (Wetlands A, B, and C) are present on the site (Figure 4). Wetland Delineation fieldwork was performed by PHS on July 1, 2021. During summer, many seasonal wetlands in the Willamette Valley such as Wetlands A, B, and C do not have surface water or saturation in the upper 12 inches of the soil profile and therefore, hydrology was evaluated using indirect primary and secondary indicators including the FAC-neutral test, geomorphic position, drainage patterns, and oxidized rhizospheres along living roots. Mapped soils in wetland areas include Aloha silt loam, 0 to 3 percent slopes, Amity silt loam, and Cove silty clay loam.

<u>Wetland A</u>

Wetland A is located in a large, fairly shallow basin that was excavated long ago as a stormwater feature. The primary source of hydrology within Wetland A is from direct precipitation, runoff from adjacent impermeable surfaces, and stormwater discharges. A seasonally high water table may also be present. The dominant vegetation includes Oregon ash (*Fraxinus latifolia*), English hawthorn (*Crataegus monogyna*), sweet briar rose (*Rosa rubiginosa*), common camas (*Camasia quamash*), reed canarygrass (*Phalaris arundinacea*), and spreading rush (*Juncus patens*). Wetland

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[1] USGS: United State Geological Survey; DOGAMI: Department of Geology and Mineral Industries

hydrology indicators include the FAC-neutral test, geomorphic position, drainage patterns, and oxidized rhizospheres along living roots. Hydric soils meet the requirements for redox dark surface.

<u>Wetlands B and C</u>

Wetlands B and C are located in a drainage ditch oriented north to south and located near the western boundary of the site. These wetland mainly receive runoff from upslope areas as well as groundwater. The dominant vegetation includes Oregon ash, salmonberry (*Rubus spectabilis*), velvet grass (*Holcus lanatus*), reed canarygrass, bird's-foot trefoil (*Lotus corniculatus*), yellow glandweed (*Parentucellia viscosa*), lemon balm (*Melissa officinalis*), and spreading rush.

According to the Oregon Explorer interactive web mapping service, and the local FEMA flood insurance rate mapping (FIRM), no 100-year floodplain is mapped within the site.

d. Outline of any existing features including, but not limited to, structures, decks, areas previously disturbed, and existing utility locations;

The eastern portion of the site is currently developed and houses DW Fritz Precision Automation. The development features a large, modern office building, with parking areas north and south of the building, and west of the northern portion of the building connected by paved access roads. Drainage infrastructure carries runoff to Wetland A, which drains to a ditch containing Wetlands B and C. Industrial development borders the north, east, and south sides of the site and SW Kinsman Road borders the west side. Coffee Lake Creek is located in a large wetland swale west of SW Kinsman Road and residential development is located farther west.

e. Location of any wetlands or water bodies on the site and the location of the stream centerline and top-of-bank.

As stated previously, there are three wetlands within the site; however, no streams exist within the site. Figure 4 depicts the locations of Wetlands A, B, and C within the proposed project area, and the adjacent slopes, which are less than 25%. PHS has prepared a wetland delineation report, and will submit it to the Oregon Department of State Lands (DSL). Once submitted, DSL will have 120 days to review the report and issue a concurrence letter. As the project (Figure 5) will not impact wetlands, a Joint Permit Application (JPA) will not be submitted to the US Army Corps of Engineers (Corps) and DSL.

f. Within the area proposed to be disturbed, the location, size and species of all trees that are more than six (6) inches DBH. Trees outside the area proposed to be disturbed may be individually shown or shown as drip line with an indication of species type or types;

The Pacific Resources Group performed a tree inventory that includes all trees of the site that are in the vicinity of the proposed development. Figure 5 shows the development plan, and Figure 5A shows the existing trees in the vicinity of the development as well as those that will be removed. On Figure 5A, trees are depicted as either conifer or deciduous. Trees that that will be removed (59 in total) are given a reference number and their species, diameter at breast height (DBH), and mitigation criteria are shown in the Arborist Report (Attachment B). A tree removal permit will be prepared as part of the Site Development Permit Application.

g. A property survey together with topography shown by contour lines prepared at two-foot vertical intervals. Five-foot vertical intervals may be allowed for steep sloped areas. An Oregon Registered Land Surveyor or Civil Engineer shall prepare the survey.

Figures 4 and 5 shows the development as surveyed by Andy Paris and Associates, Professional Land Surveying. The two-foot contours were obtained from the National Oceanic and

Atmospheric Administration (NOAA). Slopes measurements were calculated at several areas adjacent to the wetland to display slope variation and gradients below 25% (Figure 4).

h. The location of the SROZ and Impact Area boundaries;

Figure 4 shows the location of the City applied SROZ and Impact Area boundaries within the project area. The refined boundary is based upon a wetland delineation conducted by PHS, which differs somewhat from the City's existing SROZ boundary. While the existing boundaries were based on a wetland determination drawn onto aerial photographs with limited ground truthing in 1998, the new boundaries are based on field documented, flagged and surveyed wetland boundaries conducted in 2021. This is the reason for the submittal of this SRIR and request for map verification.

The delineation methodology followed the 1987 Corps of Engineers *Wetlands Delineation Manual*, *Technical Report Y-87-1*, and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* which is recognized by both the DSL and the Corps.

i. A minimum of three slope cross-section measurements transecting the site, equally spaced at no more than 100-foot increments. The measurements should be made perpendicular to the stream;

Slope measurements calculations adjacent to Wetlands A, B, and C are shown on Figure 4, which includes more than three measurements less than 100-foot increments. The measurements were made perpendicular to the wetland boundaries.

j. A map that delineates the Metro UGMFP Title 3 Water Quality Resource Area boundary (using Metro Title 3 field observed standards);

Figure 7 depicts the UGMFP Title 3 land, which was mapped based on drainage areas upslope and riparian corridors. As described in Section (.02)(h) above, field investigations (including a formal wetland delineation) have refined these boundaries. Title 3 applies to: (1) Development in Water Quality Resource and Flood Management Areas and (2) Development which may cause temporary or permanent erosion on any property within the Metro Boundary. Metro's Water Quality performance standards will be met by: (A) Providing a vegetated corridor to separate Protected Water Features from development; (B) Maintaining or reducing stream temperatures; (C) Maintaining natural stream corridors; (D) Minimizing erosion, nutrient and pollutant loading into water; (E) Filtering, infiltration and natural water purification; and (F) Stabilizing slopes to prevent erosion and contributing to sedimentation of water features.

k. A map that delineates the Goal 5 safe harbor boundary (using the standards found within the Oregon Administrative Rule OAR 660-23(1996));

A Goal 5 safe harbor boundary of 50 feet has been applied to Wetlands A, B, and C (Figures 4, 5, 5A, and 6). This boundary is equal to the SROZ boundary. According to OAR 660-23-0090(5), safe harbor buffers are applied to the following criteria: (a) Along all streams with average annual stream flow greater than 1,000 cubic feet per second (cfs) the riparian corridor boundary shall be 75 feet upland from the top of each bank; (b) Along all lakes, and fish-bearing streams with average annual stream flow less than 1,000 cfs, the riparian corridor boundary shall be 50 feet from the top of bank; (c) Where the riparian corridor includes all or portions of a significant wetland as set out in OAR 660-023-0100, the standard distance to the riparian corridor boundary shall be measured from, and include, the upland edge of the wetland; (d) In areas where the top of each bank is not clearly defined, or where the predominant terrain consists of steep cliffs, local governments shall apply OAR 660-023-0030 rather than apply the safe harbor provisions of this section.

*l. **The existing site significant resource conditions shall be determined and identified by a natural resource professional; and***

A resource assessment was conducted by Fishman Environmental Services (FES) at the site in 1998 (Local Wetland Inventory (LWI), which confirmed that the project area includes four locally significant wetlands (LSW). Three of these wetlands are designated as 4.01d on the LWI; however, one in the southwest corner of the project area is designated as 4.02d (Figure 8). The wetland in the northern portion adjacent to SW Boeckman Road is no longer present as there is now a sidewalk and planters in that location. The large wetland in the western portion of the project area is in general agreement with the boundaries of Wetland A, while the two small wetlands in the southwest corner are somewhat aligned with Wetlands B and C.

PHS concurs with the previous assessment that Wetlands A and C are locally significant; however, Wetland B is confined to a small portion of the ditch. Due to its small size, lack of a tree canopy, and lack of water quality functions, Wetland B should not be considered significant.

The LWI for Wilsonville assessed these wetland groups for the following significance criteria:

1) Wetlands that score the highest rank for any of the four ecological functions addressed by OFWAM or equivalent: Diverse wildlife habitat, intact fish habitat, intact water quality, or intact hydrologic control.
2) Wetlands that are rated in the second highest functional category for water quality, and that occur within ¼ mile of a water quality-limited stream listed by DEQ.
3) Contain one or more rare/uncommon wetland plant communities in Oregon.
4) Inhabited by any species listed by the federal or state government as a sensitive, threatened, or endangered species in Oregon.
5) Wetland rates in the second highest functional category for fish habitat, and has a surface water connection to a stream segment that is mapped by ODFW as habitat for "indigenous anadromous salmonids".
6) Optional criterion: Wetland represents a locally unique plant community.
7) Optional criterion: Wetland rates in highest category for education potential and there is documented use for educational purposes by a school or organization.

Summary of overall significance findings by FES in 1998:

Wetland A: (LWI: 4.01d, Unit CL)
"Provides diverse wildlife habitat and has intact water quality functions and hydrologic control functions (fish habitat is degraded). Has educational uses and provides recreational opportunities." OFWAM sheets are provide in Attachment C

PHS concurs with the previous assessment that Wetland A is a locally significant wetland; however, wetlands within the site are not visible or accessible by the public and therefore would not provide recreational or educational benefits. They do, however, provide foraging and reproductive habitat for resident and migratory birds as well as small to medium sized mammals and a few large mammals including deer and coyotes, amphibians, reptiles, and insects.

<u>Wetlands B and C (Portion):</u> (LWI: 4.02d, Unit CL)
The OFWAM data sheet states "Water quality ponds present in wetland", which likely refers to Wetland A, which appears to have been modified for such use. The OFWAM data sheet also states "Provides rich wildlife habitat and has intact water quality functions and hydrologic control functions (fish habitat is degraded). Has educational uses and provides recreational opportunities." It also states that the wetland is a mitigation site. These descriptions are most likely intended for much larger offsite wetlands that are connected to Wetlands B and C; however, Wetland B and C's proximity to Wetland A serves to create a wetland complex with overall water quality functions and hydrologic control functions. As with Wetlands A, Wetlands B and C are on private property and lack public access or visibility.

m. Current photos of site conditions shall be provided to supplement the above information.

Wetland delineation fieldwork was completed in July, 2021 and the report and figures are provided in Attachment D.

2. The analysis shall include development recommendations including grading procedures, soil erosion control measures, slope stabilization measures, and methods of mitigating hydrologic impacts. For projects that affect possible wetlands, a copy of the Local Wetland Inventory (LWI) map pertaining to the site shall be provided. Notice of the proposal shall be given to the Oregon Division of State Lands and the Army Corps of Engineers.

The development will not result in hydrologic impacts to Wetlands A, B, and C. Grading procedures will follow proper erosion control measures, including the placement of sediment fencing around wetland boundaries, inlet protection around all stormwater inlets, and a construction entrance to reduce dust and tracking within and outside of the work area (See the development plan application for erosion control details). Inlet protection will include a polypropylene filter sack (woven) to reduce the transport of sediment into storm pipes, the construction entrance will include subgrade reinforcement geotextile fabric to prevent infiltration or transport of sediment, and sediment fencing will consist of filter fabric material mounted to 2-foot posts around wetlands to mitigate the potential for sedimentation from the construction areas.

The proposed project will also conform to City of Wilsonville's stormwater standards and will feature two stormwater planters with bioswales that will be planted with native vegetation and will treat runoff from the proposed impervious surfaces before they are permitted to enter wetlands or waters.

Figure 8 displays the LWI map pertaining to the site.

No impacts to state or federally jurisdictional waters are proposed (Figure 5), therefore no notification will be sent to DSL or the Army Corps of Engineers. Wetland delineation fieldwork has been completed, and a copy of the wetland delineation report will be submitted to DSL for concurrence.

> ***3. Ecological Analysis. The Ecological Analysis shall include a map, using the Physical Analysis map as a base, showing the delineated boundaries and coverage of wetlands, riparian corridors, and wildlife habitat resources identified on the site.***

Figure 4 shows the delineated boundaries and coverage of wetland resources within the project area as well as the SROZ boundary, slope measurements calculations adjacent to Wetland A, and the SR Impact Area. Figure 9 shows Metro's map of Regionally Significant Habitat (under Title 13), the site includes the following habitat classifications:

- Upland Wildlife Habitat Class A areas with secondary riparian value that have high value for wildlife habitat
- Riparian Corridors / Wildlife Habitat Class I - Areas support 3 or more riparian functions
- Riparian Corridors / Wildlife Habitat Class II - areas supporting 1 or 2 primary riparian functions

Wetlands A, B, and C are within Riparian Corridors / Wildlife Habitat Class I.

> ***a. Wetland boundaries shall be delineated using the method currently accepted by the Oregon Division of State Lands and the US Army Corps of Engineers. Riparian boundaries shall be delineated using the riparian corridor descriptions in this ordinance. Boundaries of mapped Goal 5 wildlife habitat shall be verified by field observation.***

PHS delineated the limits of the wetlands on the site based on the presence of wetland hydrology, hydric soils, and hydrophytic vegetation, in accordance with the Routine On-site Determination, as described in the *Corps of Engineers Wetland Delineation Manual, Wetlands Research Program Technical Report Y-87-1* ("The 1987 Manual") and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region*. As stated previously, wetland delineation fieldwork has been completed, and a wetland delineation report is being prepared for submittal to DSL.

Riparian boundaries were also verified during the delineation field visit, using the descriptions in this ordinance. Please refer to question 3 above for the riparian habitat classification for the site.

> ***b. The analysis shall include an inventory that lists and describes the native and ornamental dominant and sub-dominant groundcover, shrub and tree species occurring on the site and wildlife observed during at least one site visit (specify date). The report shall also include recommended measures for minimizing the adverse impacts of the proposed development on unique and/or significant features of the ecosystem. The analysis shall include a report that discusses the ecological functions and values of the SROZ area, discussing each parameter listed below. The discussion shall be based on actual field observations and data obtained by a natural resource professional.***

Vegetation and Wildlife Species

Table 1 summarizes vegetation occurring on the site during the delineation field work completed on July 1, 2021. Table 2 contains wildlife species that are assumed to potentially occupy the site; however, focused or general surveys for wildlife were not conducted. Habitats include the mixed conifer and broad-leaf forests within the riparian communities mapped in Figure 9 as well as two managed grass/lawn areas east of the Riparian Corridors / Wildlife Habitat Class I area. The larger of these is in the northern part of the site and the other is near the site's southern boundary. The eastern portion of the site is developed.

Table 1. Non-Comprehensive List of Vegetation Observed within the Project Area

Scientific Name	Common Name	Non-Native or Ornamental
TREES		
Acer macrophyllum	bigleaf maple	
Alnus rubra	red alder	
Fraxinus latifolia	Oregon ash	
Pinus ponderosa var. willamettensis	Willamette Valley ponderosa pine	
Populus balsamifera	balsam poplar	
Prunus avium	sweet cherry	X
Pseudotsuga menziesii	Douglas' fir	
Quercus garryana	Oregon white oak	
Salix sp.	willow	
SHRUBS		
Crataegus monogyna	English hawthorn	X
Cornus alba	red osier dogwood	
Corylus cornuta	beaked hazelnut	
Ilex iberica	holly	X
Ranunculus acris	meadow buttercup	
Rosa sp.	wild rose	
Rubus armeniacus	Himalayan blackberry	X
Rubus laciniatus	cutleaf blackberry	X
Rubus ursinus	trailing blackberry	
Symphoricarpos alba	snowberry	
Toxicodendron diversilobum	poison oak	
WOODY VINES		
Hedera helix	English ivy	X
HERBS		
Agrostis capillaris	colonial bentgrass	X
Bromus spp.	brome grasses	X
Camasia quamash	common camas	
Cirsium arvense	Canada thistle	
Conium maculatum	poison hemlock	X
Daucus carota	Queen Anne's lace	X
Epilobium ciliatum	slender willow herb	
Epilobium densiflorum	dense-flower willow-herb	
Gallium aparine	bedstraw	X
Geranium lucidum	shiny geranium	X
Geranium molle	dove's-foot Crane's-bill	X

Scientific Name	Common Name	Non-Native or Ornamental
Geum macrophyllum	long-leaved avens	
Holcus lanatus	common velvet grass	X
Hypericum perforatum	St. Johnswort	X
Hypochaeris radicata	spotted cat's ear	X
Jacobaea vulgaris	stinking willie	X
Juncus balticus	Baltic rush	
Lactuca serriola	prickly lettuce	X
Leucanthemum vulgare	ox-eye daisy	X
Lotus corniculatus	bird's-foot trefoil	X
Melissa officinalis	lemon balm	X
Parentucellia viscosa	yellow glandweed	X
Phalaris arundinacea	reed canarygrass	X
Physocarpus capitatus	Pacific ninebark	
Poa sp.	bluegrass	X
Ranunculus repens	creeping buttercup	X
Ribes sanguineum	Red-flowering currant	
Rumex acetosella	sheep sorrel	X
Schedonorus arundinaceus	tall fescue	
Sonchus spp.	sow thistle	
Torilis arvensis	spreading hedgeparsley	X
Trifolium repens	white clover	X
Tellima grandiflora	fringe cup	
Vicia spp.	vetch	

Table 2. Non-Comprehensive List of Wildlife Species *Potentially* within the Project Area*

Common Name	Scientific Name
MAMMALS	
Black-tailed deer	*Odocoileus hemionus columbianus*
Chickeree	*Tamiasciurus douglasii*
Coyote	*Canis latrans*
Deer mouse	*Peromyscus maniculatus*
Eastern fox squirrel	*Sciurus niger*
Raccoon	*Procyon lotor*
Western gray squirrel	*Sciurus griseus*
BIRDS	
American crow	*Corvus brachyrhynchos*
American kestrel	*Falco sparverius*
American goldfinch	*Carduelis tristis*
American robin	*Turdus migratorius*
Barn swallow	*Hirundo rustica*
Bewick's wren	*Thryomanes bewickii*

Common Name	**Scientific Name**
Black-capped chickadee	*Parus atricapillus*
Black-headed grosbeak	*Pheucitus melanocephalus*
Brewer’s blackbird	*Euphagus cyanocephalus*
Brown creeper	*Certhia americana*
Bushtit	*Psaliparus minimus*
California quail	*Callipepla californica*
Canada goose	*Branta canadensis*
Cedar waxwing	*Bombycilla cedrorum*
Chestnut-backed chickadee	*Parus rufescens*
Cooper’s hawk	*Accipiter cooperii*
Dark-eyed junco	*Junco hyemalis*
Downy woodpecker	*Picoides pubescens*
European starling*	*Sturnus vulgaris*
Fox sparrow	*Passerella iliaca*
Golden-crowned kinglet	*Regulus satrapa*
Golden-crowned sparrow	*Zonotrichia atricapilla*
Great-horned owl	*Bubo virginianus*
Hairy woodpecker	*Picoides villosus*
Hermit thrush	*Catharus guttatus*
House finch	*Carpodacus mexicanus*
House sparrow	*Passer domesticus*
House wren	*Troglodytes aedon*
Killdeer	*Charadrius vociferus*
Lesser goldfinch	*Carduelis psaltria*
Mourning dove	*Zenaida macroura*
Northern flicker	*Colaptes auratus*
Orange-crowned warbler	*Vermivora celata*
Pileated woodpecker	*Dryocopus pileatus*
Red-breasted nuthatch	*Sitta canadensis*
Red-breasted sapsucker	*Sphyrapicus ruber*
Red tailed hawk	*Buteo jamaicensis*
Red-winged blackbird	*Agelaius phoeniceus*
Ring-necked pheasant	*Phasianus colchicus*
Ruby-crowned kinglet	*Regulus calendula*
Rufous hummingbird	*Selasphorus rufus*
Savannah sparrow	*Passerculus sandwichensis*
Song sparrow	*Melospiza melodia*
Spotted towhee	*Pipilo erythrophthalmus*
Steller’s jay	*Cyanocitta stelleri*
Swainson’s thrush	*Catharus ustulatus*
Tree swallow	*Tachycineta bicolor*

Common Name	Scientific Name
Turkey vulture	*Cathartes aura*
Varied thrush	*Ixoreus naevius*
Violet green swallow	*Tachycineta thalassina*
Western screech owl	*Otus kennicottii*
Western scrub jay	*Aphelocoma coerulescens*
Western tanager	*Piranga ludoviciana*
Western wood pewee	*Contopus sordidulus*
White crowned sparrow	*Zonotricha leucophrys*
Winter wren	*Troglodytes*
AMPHIBIANS	
Pacific treefrog	*Hyla regilla*
REPTILES	
Common garter snake	*Thamnophis sirtalis*

*These species are assumed to potentially occupy the habitats of the site due to its suitability for foraging, nesting, or cover. Focused or general surveys for wildlife were not conducted.

<u>Impacts to unique or significant features of the ecosystem</u>

As depicted in the Site Plan (Figure 5), the proposed development would permanently impact 22,948 square feet / 0.53 acres of the City of Wilsonville SR Impact Area and 340 square feet / 0.01 acres of the Area of Limited Conflicting Uses (ALCU) boundary. As stated previously, the development would result in the unavoidable removal of 59 trees, 58 of which are native. Impacts within the ALCU that are exempt include two stormwater ponds and a fire access road around the new building, which is required by the City of Wilsonville. The total permanent impacts for exempt activities within the ALCU are 19,061 square feet / 0.44 acres.

<u>Ecological Functions and Values</u> of the resources are discussed below.

c.W etlands (based on evaluation criteria in the Oregon Freshwater Wetlands Assessment Methodology (OFWAM), Oregon Division of State Lands)
- ***i. wildlife habitat diversity***
- ***ii. fish habitat***
- ***iii. water quality protection***
- ***iv. hydrologic control***

Wetlands A and C came in as significant through an OFWAM assessment conducted by FES in 1998. Per that assessment Wetland A is part of LWI Wetland 4.01d and Wetlands B and C are designated as part of the much larger complex of LWI Wetland 4.02d (the letter d means the wetland has been delineated).

<u>Wildlife Habitat</u>

According to the OFWAM summary sheets, the wetlands provide diverse wildlife habitat; however, it should be noted that the forest habitat is relatively small and fragmented so that it does not have the capacity to support large mammals that need extensive cover or have large home ranges, although black-tailed deer (*Odocoileus hemionus columbianus*) and coyotes (*Canis latrans*), which have become adapted to humans are likely common. Fencing, buildings, and human intrusion also limit the use of the site by large mammals; however, small and medium sized mammals such as raccoons (*Procyon lotor*), striped skunks (*Memphitis memphitis*), and western gray squirrels (*Sciurus griseus*) are likely to use the site. The habitat is also unlikely to provide nesting opportunities for large raptors, although they may on occasion hunt on the site for songbirds and small mammals. Acorn woodpeckers (*Melanerpes formicivorus*), American robins (*Turdus migratorius*), dark-eyed juncos (*Junco hyemalis*), black-capped chickadee (*Poecile atricapillus*), and spotted towhees (*Pipilo maculatus*) are native avian species that are likely to nest in trees and shrubs within the wetland. Northern red-legged frogs (*Rana aurora*), Pacific tree frogs (*Pseudacris regilla*), and rough-skinned newts (*Taricha granulosa*) may forage and breed in ponded areas within the wetland during winter and spring.

<u>Fisheries Habitat</u>

The OFWAM summary sheet described the wetland’s fish habitat as degraded, although the description pertains to the larger portion of Wetlands B and C, which extend offsite. Wetlands A, B, and C are seasonal and only have ponded water during winter and spring. The presence of fish on-site is highly unlikely, since water leaves the wetlands via a few small culverts that are not designed for fish passage.

<u>Water Quality Protection</u>

The OFWAM summary sheet states that the water quality (pollutant removal) functions of Wetlands A, B, and C are intact due to vegetation, surface inflow, size, and connectedness. PHS agree in part with this statement. Stormwater entering the wetlands passes over uplands is trapped for long periods in Wetland A, which has dense vegetation that is highly beneficial for pollutant removal, although it appears that most water entering Wetland A as runoff stays and settles in Wetland A rather than flowing into the ditch containing Wetlands B and C; however, some water certainly flows from Wetland A to Wetlands B and C and dense herbaceous vegetation in these wetlands and heavy clay soils are also highly beneficial for pollutant removal .

<u>Hydrologic Control</u>

The OFWAM summary sheet states that the flood control and water supply functions of Wetlands A, B, and C are intact due to floodplain, vegetation and size. It also states that perennial seeps are present, which is likely true for portions of Wetland C that are offsite; however, no perennial wetland seeps are present in the wetlands that are onsite. All three wetlands receive the majority of their hydrology as direct precipitation and runoff, although a seasonally high water table may also provide winter and spring hydrology.

d. Wildlife Habitat (includes riparian corridors and upland forested areas)
- ***i. wildlife habitat diversity***
- ***ii. water quality protection***
- ***iii. ecological integrity***
- ***iv. connectivity***
- ***v. uniqueness***

The wildlife habitat which is present within Wetlands A and C is of high quality, although as stated previously, it is small and fragmented which makes it unlikely to have high value for large mammals and raptors. The plant community is comprised of a mix of native and non-native species, although native species are dominant. Trees within these areas are of mixed age classes including small, medium and large Douglas' firs, big-leaf maples, western redcedars, Willamette Valley ponderosa pines, madrones (*Arbutus menziesii*), Oregon ash, and Oregon white oaks. These species along with a well-developed understory of native and non-native shrubs, support a variety of resident and migratory avian species, small mammals, reptiles, and amphibians. Wetlands A and C actively treat runoff from the adjacent developed areas to improve downstream water quality.

e. Riparian Corridors
Stream-riparian ecosystems:

i. Presence and abundance of Large Woody Debris (LWD) in and adjacent to stream
ii. Tree/shrub canopy stream shade production (water temperature and aquatic plant growth control)
iii. Erosion and sediment control by riparian vegetation
iv. Water quality protection by riparian vegetation
v. River-floodplain ecosystem (Willamette River)
vi. Presence of functional floodplain (inundated annually)
vii. Type and condition of functional floodplain vegetation
viii. Use of river-floodplain by ESA-listed species
ix. Role as wildlife corridor connecting significant wildlife habitat areas

There are no streams either within or adjacent to the site. Wetlands A, B, and the portion of Wetland C that lies within the site are forested wetlands that have a physical connection via culverts to Seely Ditch, which is west of the site.

Presence and abundance of Large Woody Debris (LWD) in and adjacent to stream
As stated above, there are no streams within the site and therefore, large pieces of woody debris, which are present do not have any effect on stream morphology or aquatic habitats. They do, however, provide cover for terrestrial and some avian wildlife species as well as a source of organic material for soil health.

Tree/shrub canopy stream shade production (water temperature and aquatic plant growth control)
Trees and shrub canopies within the site are well-developed in some areas; however, they bear little to no relationship to water temperature and aquatic plant growth control in offsite waterways including Seely Ditch.

Erosion and sediment control by riparian vegetation
The forest vegetation of the site may have a very slight beneficial effect of limiting the potential for erosion by slowing the velocity of waters and trapping sediments that would otherwise leave the site and end up in offsite Seely Ditch.

Water quality protection by riparian vegetation
The site's dense and healthy vegetation provides treatment of waters collected from unvegetated upslope areas that would otherwise enter offsite Seely Ditch untreated.

River-floodplain ecosystem (Willamette River)
Wetlands A, B, and C as well as adjacent vegetated upland areas within the site provide treatment of upslope runoff, which benefits the Willamette River's floodplain ecosystem.

Presence of functional floodplain (inundated annually)
The wetlands of the study area partially inundated during winter and spring of each year. Wetlands are largely the function of runoff from adjacent impervious surfaces and direct precipitation that accumulated within the confined boundaries of the detention facility. There may also be a seasonally high water table. The site is not located in FEMA's 100 year floodplain.

Type and condition of functional floodplain vegetation
The site lies outside of the floodplain, which is west of SW Kinsman Road. The dominant vegetation of the site is a mix of deciduous and conifer trees with well-developed shrub and herbaceous layers. The wetlands and the adjacent upland vegetation of the site provide ecological uplift to the overall water quality of Seely Ditch and the Willamette River floodplain ecosystem. There are no known listed ESA species at this site, and none were observed at the time of the delineation. This habitat is poorly functioning as a connecting wildlife corridor, due to the existing roadways and other development.

4. ***Mitigation and Enhancement Proposal. The applicant must propose a Significant Resource mitigation and enhancement plan as part of the SRIR. The mitigation and enhancement shall increase the natural values and quality of the remaining Significant Resource lands located on the site or other location as approved by the City. The mitigation and enhancement proposal shall conform to the mitigation standards identified in this Section.***

As depicted on the Proposed Site Development Plan (Figure 5), non-exempt permanent impacts within the ALCU (340 square feet / 0.01 acres) of the 140,301 square feet / 3.22 acre ALCU, which is approximately 0.24 percent of the allowed ALCU impact of five percent. Impacts to the City of Wilsonville SR Impact Area are 22,948 square feet (0.53 acres). Impacts also include 58 native trees. The arborist tree assessment is found in Attachment B.

The requirements for tree replacement are found in Section 4.139.07 of the City of Wilsonville SROZ ordinance, which bases the required number of tree and shrub plantings on the size of removed trees. Table 3 depicts the number of trees in each size category, the required number of trees and shrubs to be replanted per category, and the total number of trees and shrubs to be replanted. Of the 59 trees to be removed, 58 are native and will require mitigation, while one non-native sweet cherry (*Prunus avium*) will not require mitigation. Based on the DBH of the native trees, a total of 328 native trees and 840 native shrubs will need to be planted. Section 4.139 specifies that native trees and shrubs shall be planted at a rate of five (5) trees and twenty-five (25) shrubs per every 500 square feet of disturbance, which will require an area of 33,000 square feet (0.75 acres) based on the required spacing of five trees for every 500 square feet.

Table 3. Mitigation Requirements for Native Tree Removal

Native Trees Proposed for Removal		Replacement Per-Tree		Total Replacement	
Quantity	**DBH (inches)**	**Trees**	**Shrubs**	**Trees**	**Shrubs**
4	6-12	2	3	8	12
14	Over 12-18	3	6	42	84
16	Over 18-24	5	12	80	192

14	Over 24-30	7	18	98	252
10	Over 30	10	30	100	300
TOTAL				**328**	**840**

This activity will improve the function of the remaining SROZ by replacing invasive shrubs with native conifer and deciduous trees, shrubs, and herbaceous plants that will provide greater wildlife benefits and protection for the wetland resources than those that are present.

5. ***Waiver of Documentation: The Planning Director may waive the requirement that an SRIR be prepared where the required information has already been made available to the City, or may waive certain provisions where the Director determines that the information is not necessary to review the application. Such waivers may be appropriate for small-scale developments and shall be processed under Administrative Review. Where such waivers are granted by the Planning Director, the Director shall clearly indicate the reasons for doing so in the record, citing the relevant information relied upon in reaching the decision.***

Not applicable. An SRIR is required by the City.

(.03) SRIR Review Criteria. In addition to the normal Site Development Permit Application requirements as stated in the Planning and Land Development Ordinance, the following standards shall apply to the issuance of permits requiring an SRIR. The SRIR must demonstrate how these standards are met in a manner that meets the purposes of this Section.

A. Except as specifically authorized by this code, development shall be permitted only within the Area of Limited Conflicting Use (see definition) found within the SROZ;

Development within the SROZ will take place within the ALCU. The repair and maintenance of existing of water quality detention basins and the construction of fire access roads are considered exempted activities, and therefore do not count toward the five percent of allowed impacts within the ALCU.

The new building construction and a small piece of a new access road are non-exempt impacts to the ALCU and their total impacts are 340 square feet / 0.01 acres and comprise 0.24 percent of the ALCU.

A request for exemption shall be consistent with the submittal requirements listed under Section 4.139.06(.01)(B – I), as applicable to the exempt use and activity. [Added by Ord. # 674 11/16/09].

(.05) Operation, maintenance, and repair of irrigation and drainage ditches, constructed ponds, wastewater facilities, stormwater detention or retention facilities, and water facilities consistent with the Stormwater Master Plan or the Comprehensive Plan.

B. Except as specifically authorized by this code, no development is permitted within Metro's Urban Growth Management Functional Plan Title 3 Water Quality Resource Areas boundary;

As stated previously, the repair and maintenance of the existing water quality detention basins are an allowed use within Metro's Urban Growth Management Functional Plan Title 3 Water Quality Resource Areas boundary as specified under 4.139.06(.01) of the SROZ Ordinance.

C. No more than five (5) percent of the Area of Limited Conflicting Use (see definition) located on a property may be impacted by a development proposal. On properties that are large enough to include Areas of Limited Conflicting Use on both sides of a waterway, no more than five (5) percent of the Area of Limited Conflicting Use on each side of the riparian corridor may be impacted by a development proposal. This condition is cumulative to any successive

development proposals on the subject property such that the total impact on the property shall not exceed five (5) percent;

Approximately 340 square feet / 0.01 acres of the ALCU will be impacted to facilitate the construction of the new building and a small portion of an access road. Reconstruction of two stormwater ponds and fire access roads are exempt and will result in 19,061 square feet / 0.44 acres of exempt activity within the ALCU. Much of this area has been previously impacted by existing parking areas and lawns. Most of this area is dominated by Himalayan blackberry and other invasive shrubs and forbs, although some large native trees are present.

D.M itigation of the area to be impacted shall be consistent with Section 4.139.06 of this code and shall occur in accordance with the provisions of this Section;

As described previously, for impacts of 340 square feet / 0.01 acres to the ALCU and the removal of 58 native trees, the applicant proposes to restore 33,000 square feet (0.75 acres) of degraded habitat within the remaining ALCU (Figure 6). The applicant will remove invasive and non-native species including Himalayan and cut-leaf blackberry, English ivy and holly, and plant 328 native trees and 840 native shrubs, which per the SROZ ordinance will more than offset the loss of riparian function associated with the proposed impacts to the existing habitat. A mitigation plan showing the location of the proposed mitigation and a proposed plant list is included in Figure 6.

The mitigation plan will adhere to the requirements of Section 4.139.06, Section 4.139.07 Mitigation Standards and Section 4.139.07(.02)(E.) of the SROZ ordinance and be designed to replace lost or impacted functions by enhancement of existing resources on site. The existing functions of the impact and mitigation sites are low, based on the predominance of invasive species and in some places an absence of a shrub layer due to mowing as well as low native tree canopy cover. As such, the SROZ ordinance prescribes a ratio of 1.5:1 in order to bring the proposed mitigation area to a functional rating of High; however, in order to compensate for the loss of 58 native trees, based on the diameter at breast height of the trees, the SROZ ordinance prescribes the planting of 328 total native trees and 840 native shrubs. Five trees will be planted for every 500 square feet, which will require 33,000 square feet / 0.75 acres of mitigation area, which in terms of permanent square footage non-exempt impacts is a ratio of approximately 97: 1.

E. The impact on the Significant Resource is minimized by limiting the degree or magnitude of the action, by using appropriate technology or by taking affirmative steps to avoid, reduce or mitigate impacts;

The applicant designed the proposed project to avoid impacts to jurisdictional wetlands and to ensure that only permitted activities (i.e. the water quality control basins) were constructed in the ALCU.

F. The impacts to the Significant Resources will be rectified by restoring, rehabilitating, or creating enhanced resource values within the "replacement area" (see definitions) on the site or, where mitigation is not practical on-site, mitigation may occur in another location approved by the City;

As stated previously, the proposed mitigation plan includes replacement trees and shrubs in accordance with the provisions in the SROZ Ordinance. The proposed replacement area consists of the remaining SROZ in the northwest corner and improves the overall riparian functions.

G. Non-structural fill used within the SROZ area shall primarily consist of natural materials similar to the soil types found on the site;

The water quality control features will be constructed per the City of Wilsonville standards using native soil material and native plants. Fire access roads will be constructed in accordance with City code.

H. The amount of fill used shall be the minimum required to practically achieve the project purpose;

No fill will be placed in jurisdictional wetlands and fill placed in the SROZ is the minimum amount needed to meet the minimum requirements for construction of the proposed stormwater detention facilities and the fire access roads, which are required by the City.

I. Other than measures taken to minimize turbidity during construction, stream turbidity shall not be significantly increased by any proposed development or alteration of the site;

Stormwater will be treated prior to leaving the construction site and is not anticipated to increase turbidity during construction due to appropriate erosion and sediment control measures, including silt fencing. Wetlands A, B, and C naturally attenuate turbidity prior to flowing into Seely Ditch downstream; therefore, stream turbidity is not anticipated to increase as a result of the project.

J. Appropriate federal and state permits shall be obtained prior to the initiation of any activities regulated by the U.S. Army Corps of Engineers and the Oregon Division of State Lands in any jurisdictional wetlands or water of the United States or State of Oregon, respectively.

This section does not apply, as no impacts to wetlands are proposed; however, a wetland delineation report will be submitted to the Oregon Department of State Lands. Concurrence will be received prior to initiation of the project.

SECTION 4.139.07 MITIGATION STANDARDS

The following mitigation standards apply to significant wildlife habitat resource areas for encroachments within the Area of Limited Conflicting uses and shall be followed by those proposing such encroachments. <u>Wetland mitigation shall be conducted as per permit conditions from the U.S. Army Corps of Engineers and the Oregon Division of State Lands [emphasis ours]</u>. While impacts are generally not allowed in the riparian corridor resource area, permitted impacts shall be mitigated by: using these mitigation standards if the impacts are to wildlife habitat values, and using state and federal processes if the impacts are to wetland resources in the riparian corridor…

No fill will be placed within potentially jurisdictional wetlands or waters and no state or federal permits for discharges of fill are required; therefore, wetland mitigation is not required nor proposed.

Although the Title 3 Inventory depicts the forested areas within the ALCU as Riparian Wildlife Habitat Class 1, the areas proposed to be permanently impacted are at the edges of the habitat adjacent to areas that are either lawn or pavement. These habitat edges have high percentages of invasive species and generally low canopy cover. As described previously, for impacts of 340 square feet / 0.01 acres to the ALCU and the removal of 58 native trees, the applicant proposes to restore 33,000 square feet (0.75 acres) of degraded habitat within the remaining ALCU (Figure

6). The applicant will remove invasive and non-native species including Himalayan and cut-leaf blackberry, English ivy and holly, and plant 328 native trees and 840 native shrubs, which per the SROZ ordinance will more than offset the loss of riparian function associated with the proposed impacts to the existing habitat. A mitigation plan showing the location of the proposed mitigation and a proposed plant list is included in Figure 6.

The mitigation plan will adhere to the requirements of Section 4.139.06, Section 4.139.07 Mitigation Standards and Section 4.139.07(.02)(E.) of the SROZ ordinance and be designed to replace lost or impacted functions by enhancement of existing resources on site. The following measures will be applied.

- Mitigation actions shall be implemented prior to or at the same time as the impact activity is conducted.
- Mitigation shall be monitored for a period of five years following implementation
- The applicant shall be responsible for ongoing maintenance and management activities, and shall submit an annual report to the Planning Director documenting such activities, and reporting progress towards the mitigation goals. The report shall contain, at a minimum, photographs from established photo points, quantitative measure of success criteria, including plant survival and vigor if these are appropriate data. The Year 1 annual report shall be submitted one year following mitigation action implementation. The final annual report (Year 5 report) shall document successful satisfaction of mitigation goals, as per the stated performance standards. If the ownership of the mitigation site property changes, the new owners will have the continued responsibilities established by this section.
- Prior to any site clearing, grading or construction, the SROZ area shall be staked, and fenced per approved plan. During construction, the SROZ area shall remain fenced and undisturbed except as allowed by an approved development permit.
- For any development which creates multiple parcels intended for separate ownership, the City shall require that the SROZ areas on the site be encumbered with a conservation easement or tract.
- The City may require a conservation easement over the SROZ that would prevent the owner from activities and uses inconsistent with the purpose of this Section and any easements therein. The purpose of the conservation easement is to conserve and protect resources as well as to prohibit certain activities that are inconsistent with the purposes of this section. Such conservation easements do not exclude the installation of utilities.

SECTION 4.139.10 Development Review Board (DRB) Process

(.01) ***Exceptions. The following exceptions may be authorized through a Development Review Board quasi-judicial review procedure.***

D ***<u>Map Refinement process.</u> The applicant may propose to amend the SROZ boundary through a Development Review Board quasi-judicial zone change where more detailed information is provided, such as a state approved wetland delineation. The criteria for amending the SROZ are as follows:***

Adjustments to the SROZ are proposed based on the locations of delineated wetland, and its associated 50-foot buffer. Verification (concurrence from the DSL) of the onsite wetland is still pending.

(.03) Development of structures, additions and improvements that relate to uses other than single family residential.

This SRIR addresses the development of additions and improvements to a structure other than single family residential and thus requires DRB process.

SECTION 4.139.11 Special Provisions

(.03) Alteration of constructed drainageways. Alteration of constructed drainageways may be allowed provided that such alterations do not adversely impact stream flows, flood storage capacity and in stream water quality and provide more efficient use of the land as well as provide improved habitat value through mitigation, enhancement and/or restoration. Such alterations must be evaluated through an SRIR and approved by the City Engineer and Development Review Board.

As stated previously, Wetland A is located in a shallow excavation that has served for many years as a stormwater detention facility. Several culverts at the west end of Wetland A convey stormwater to a constructed drainageway containing Wetlands B and C within its banks. These improvements are not anticipated to have any noticeable effects on downstream flows, since flows are already muted; however, they will definitely increase flood storage capacity and in stream water quality and provide more efficient use of the land in its current state, particularly since the areas where improvements are proposed contain variable topography that is mostly dominated by invasive Himalayan blackberry, cutleaf blackberry, and holly, although some native trees are present. Proposed mitigation consisting of the planting of native trees, shrubs, and herbaceous species within the SROZ will improved habitat values.

REFERENCES

Adamus, P.R. and D. Field. 2001 *Guidebook for Hydrogeomorphic (HGM)-based Assessment of Oregon Wetland and Riparian Study areas. Willamette Valley Ecoregion, Riverine Impounding and Slopes/Flats Subclasses*. Oregon Division of State Lands, Salem, OR.

Fishman Environmental Services, 1999. *City of Wilsonville Local Wetlands and Riparian Corridor Inventory Southwest*

GoogleEarth Map, 2020 Aerial photograph.

ORMAP tax maps, 2021. *http://www.ormap.net/*

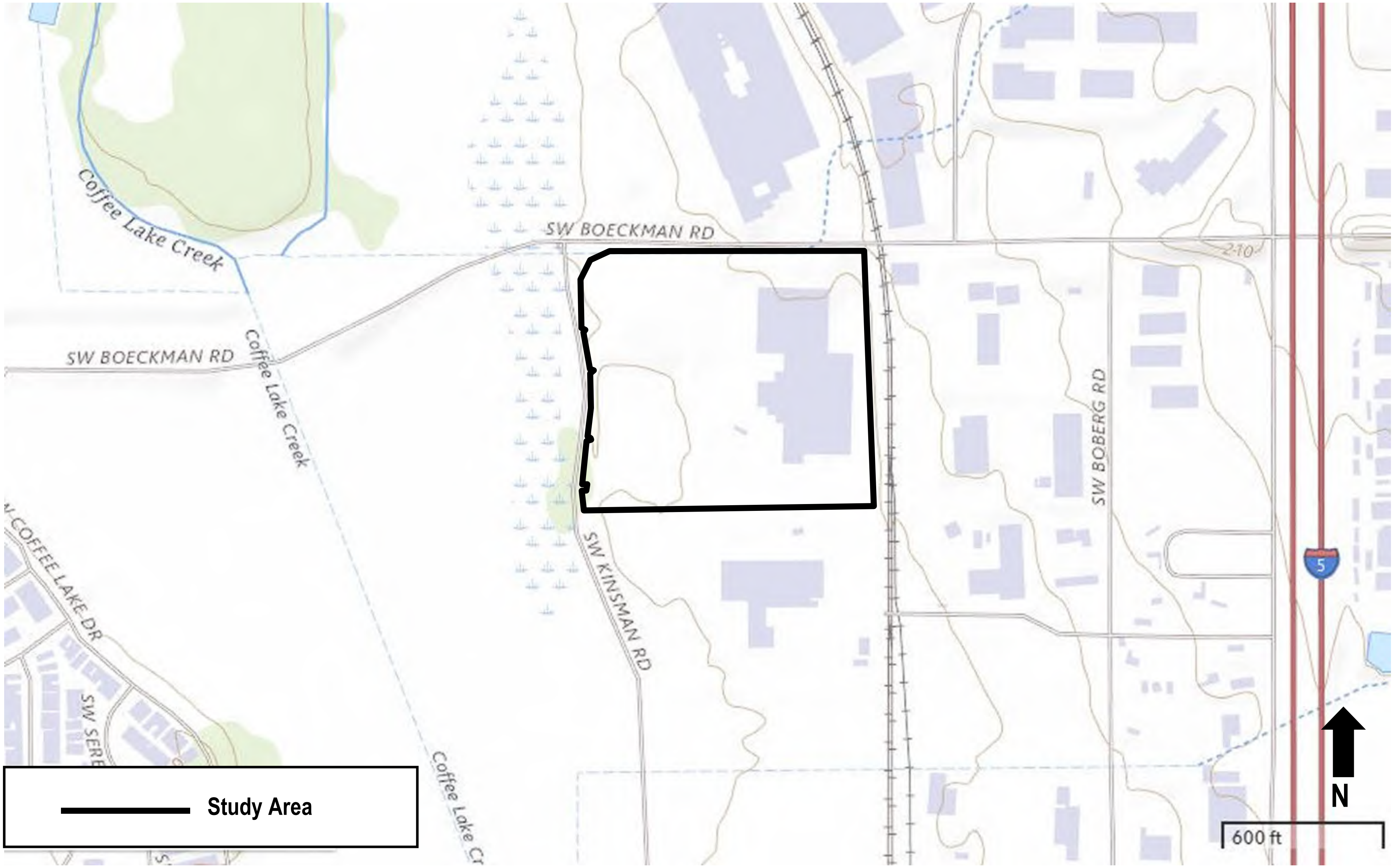
U.S. Department of Agriculture, 2021. NRCS Web Soil Survey, Clackamas County, Oregon. Source: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

U.S. Geological Survey, 2021. 7.5 minute quadrangle topographical map, Sherwood, Oregon.

Wilsonville, OR, 2022. *Section 4.139.00 Significant Resource Overlay Zone (SROZ) Ordinance* https://www.ridesmart.com/sites/default/files/fileattachments/planning/page/4911/section_4.139_to_4.139.11_sroz_pdf.pdf

Attachment A

Figures

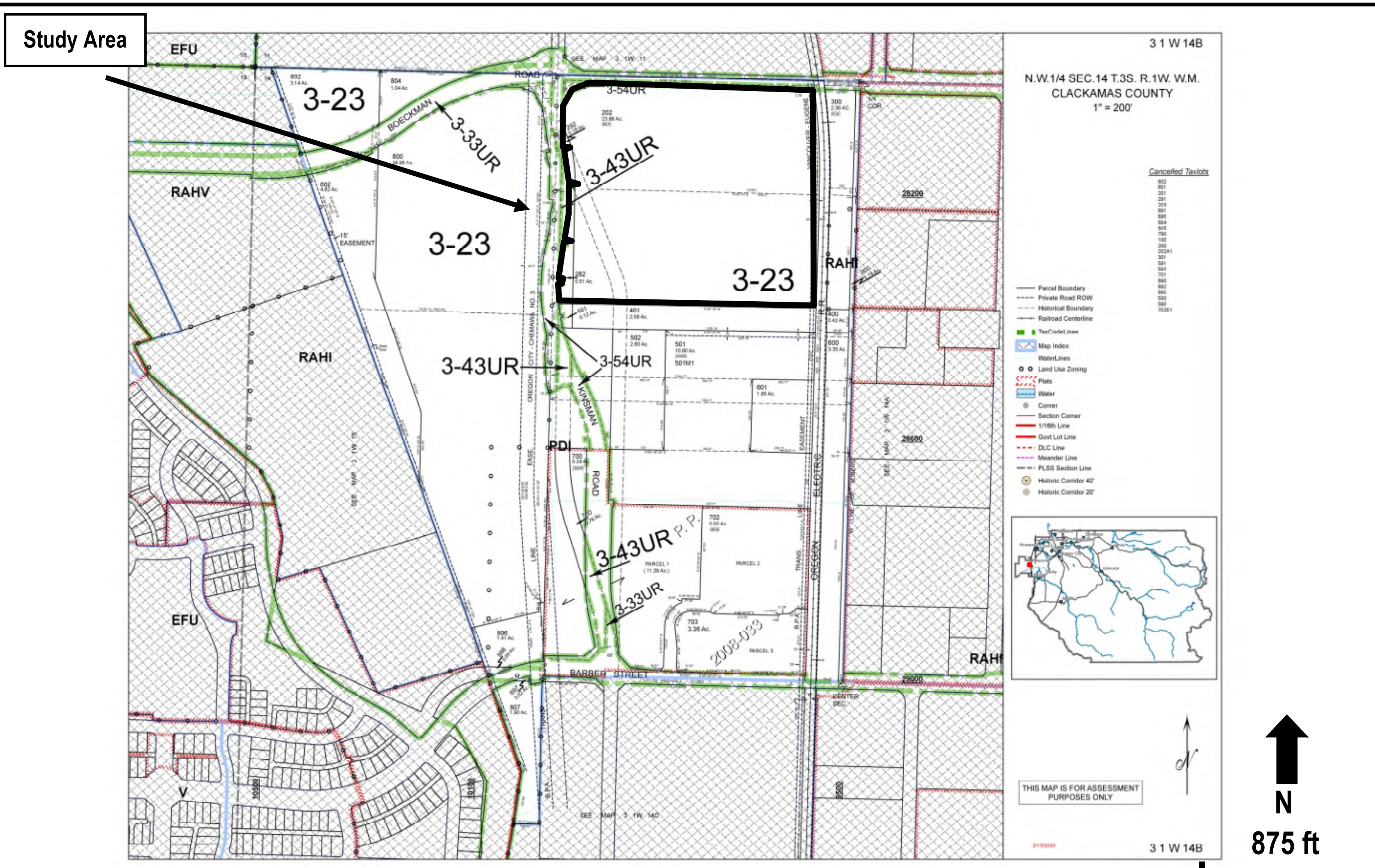


Project #7264
11/24/2021

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

General Location and Topography
9900 SW Boeckman Road Property - Wilsonville, Oregon
United States Geological Survey (USGS) Sherwood, Oregon 7.5 quadrangle, 2020
(viewer.nationalmap.gov/basic)

FIGURE
1

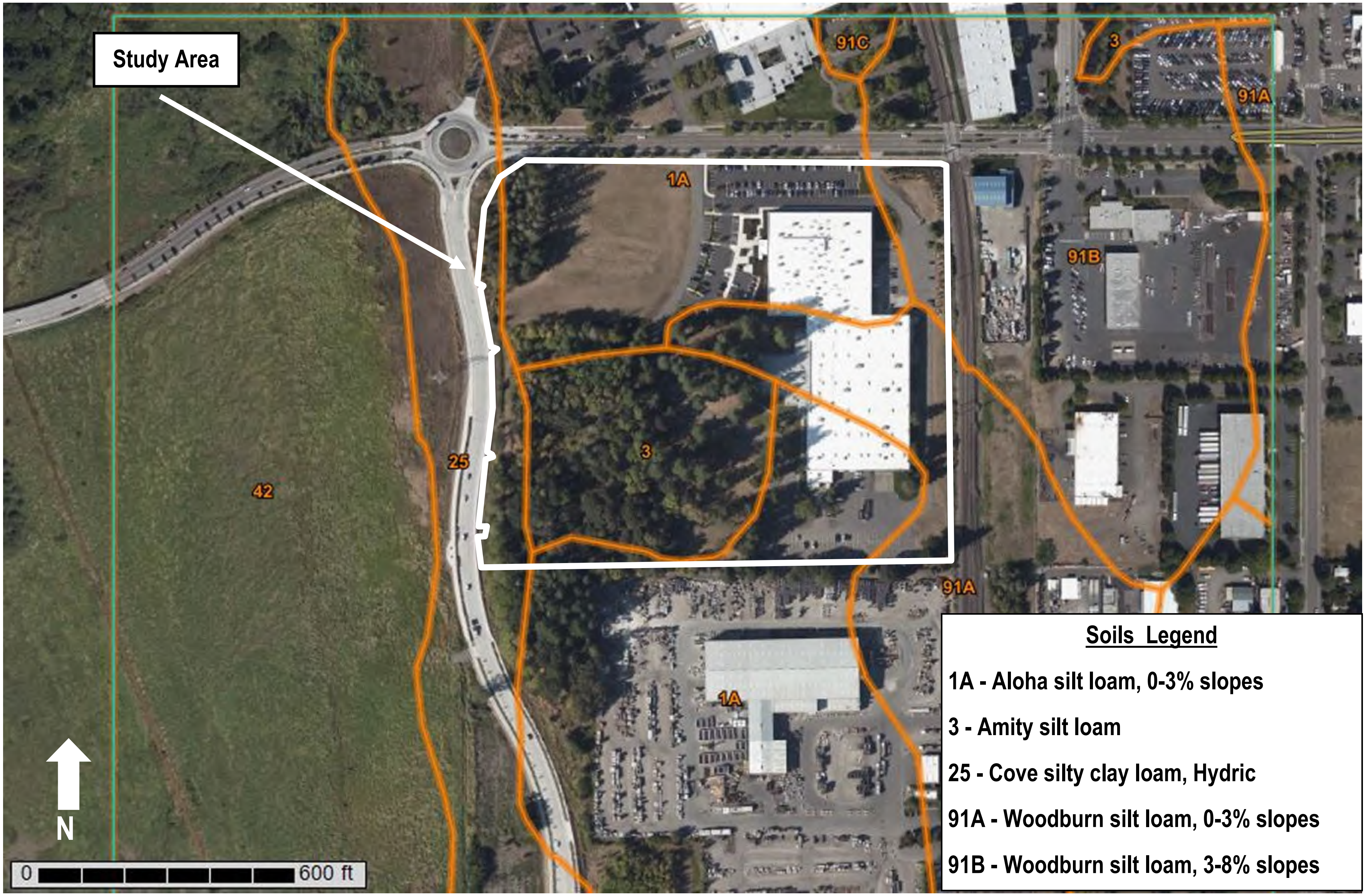


Project #7264
11/24/2021

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Tax Lot Map
9900 SW Boeckman Road Property - Wilsonville, Oregon
The Oregon Map (ormap.net)

FIGURE
2

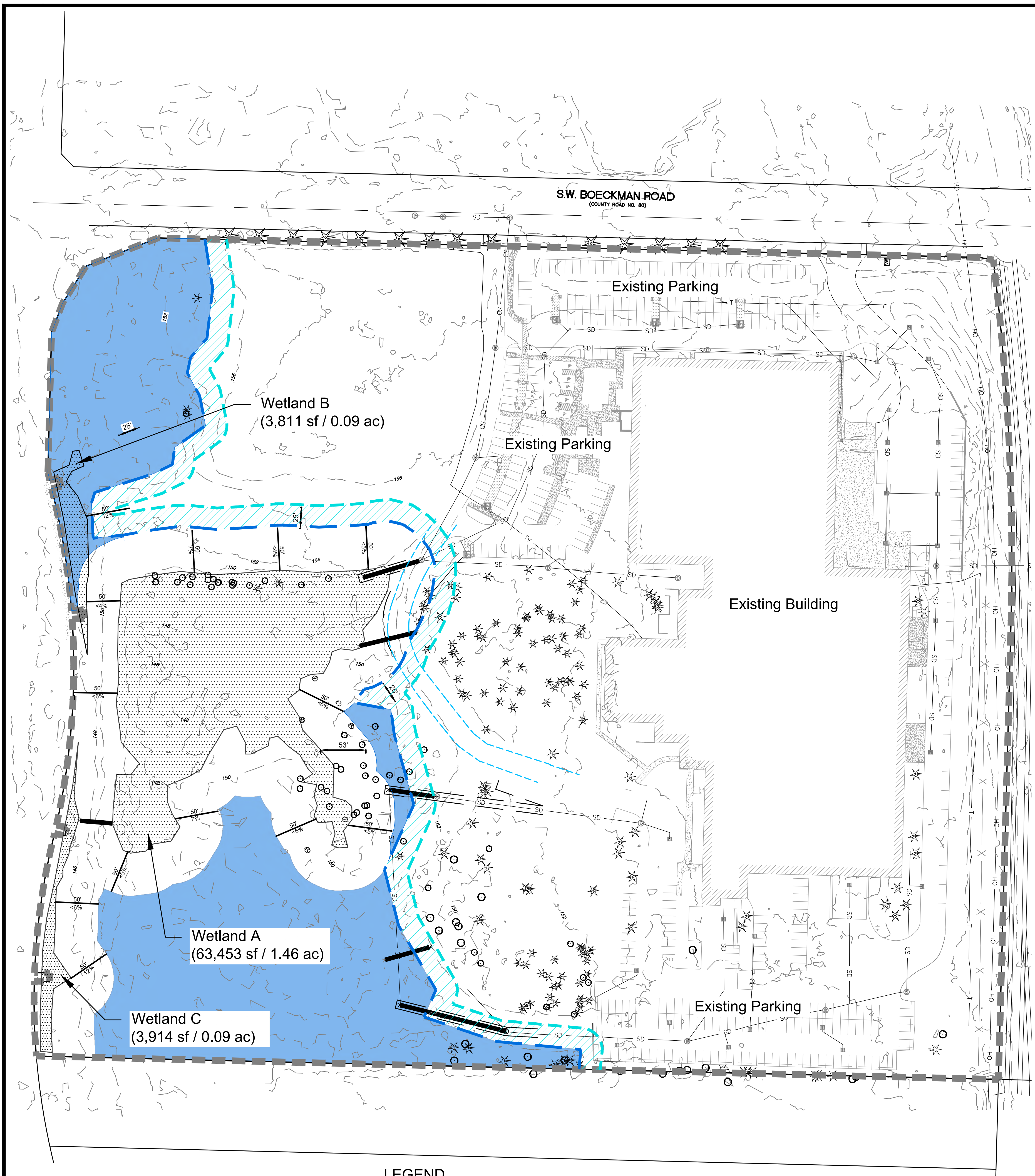


Project #7264
11/24/2021

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Soils
9900 SW Boeckman Road Property - Wilsonville, Oregon
Natural Resources Conservation Services, Web Soil Survey, 2020
(websoilsurvey.sc.egov.usda.gov)

FIGURE
3



LEGEND

- Project Area Boundary (1,066,705 sf / 24.5 ac)
- Wetland (71,178 sf / 1.63 ac)
- 50 ft. Safe Harbor / SROZ Boundary (Area of Conflicting Use) (143,703 sf / 3.3 ac)
- City of Wilsonville SR Impact Area (25' Width) (41,843 sf / 0.96 ac)
- Culvert
- Storm Drain
- LIDAR 2' Contours
- Tree (Deciduous)
- Tree (Conifer)
- SD — Existing Storm Pipe

N

0 62.5 125 250
SCALE IN FEET

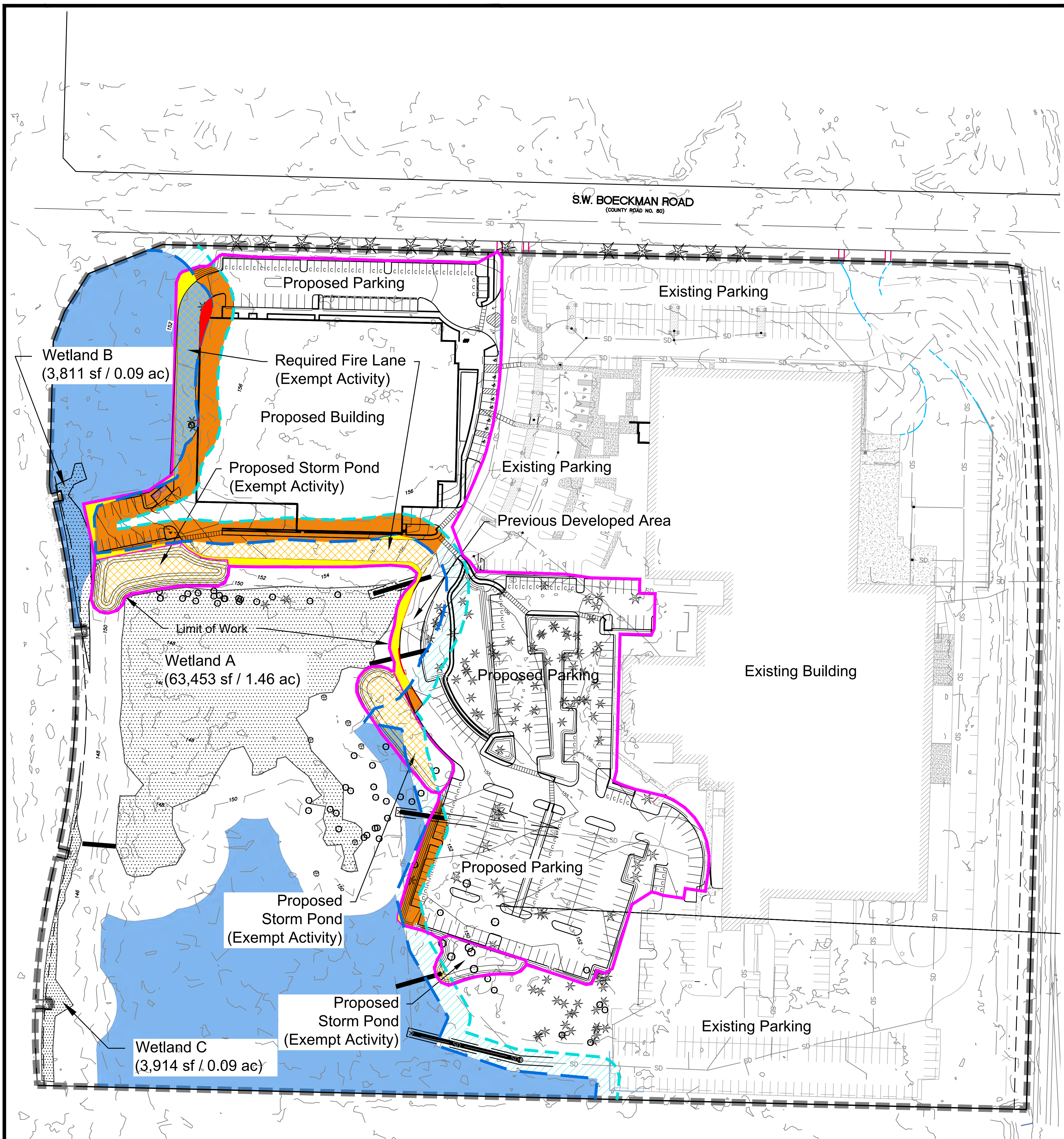
Survey provided by
Andy Paris and Associates, Inc., PLS

PHS
Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180 Wilsonville, Oregon 97070
Phone: (503) 570-0800 Fax (503) 570-0855

Existing Conditions
9900 SW Boeckman Road Property - Wilsonville, Oregon

FIGURE
4

1-21-2022



LEGEND

Project Area Boundary (1,066,705 sf / 24.5 ac)	Temporary Impact (5,069 sf / 0.12 ac)
Wetland (71,178 sf / 1.63 ac)	Exempt Activity (19,061 sf / 0.44 ac)
50 ft. Safe Harbor / SROZ Boundary (Area of Limted Conflicting Use) (140,301 sf / 3.22 ac)	Culvert
City of Wilsonville SR Impact Area (41,907 sf / 0.96 ac)	Storm Drain
Safe Harbor / SROZ Impact (340 sf / 0.01 ac)	Existing LIDAR 2' Contours
City of Wilsonville SR Area Impact (22,948 sf / 0.53 ac)	Manhole
Limit of Work	Tree (Deciduous)
	Tree (Conifer)

0 62.5 125 250
SCALE IN FEET

N

Survey provided by Andy Paris and Associates, Inc. PLS

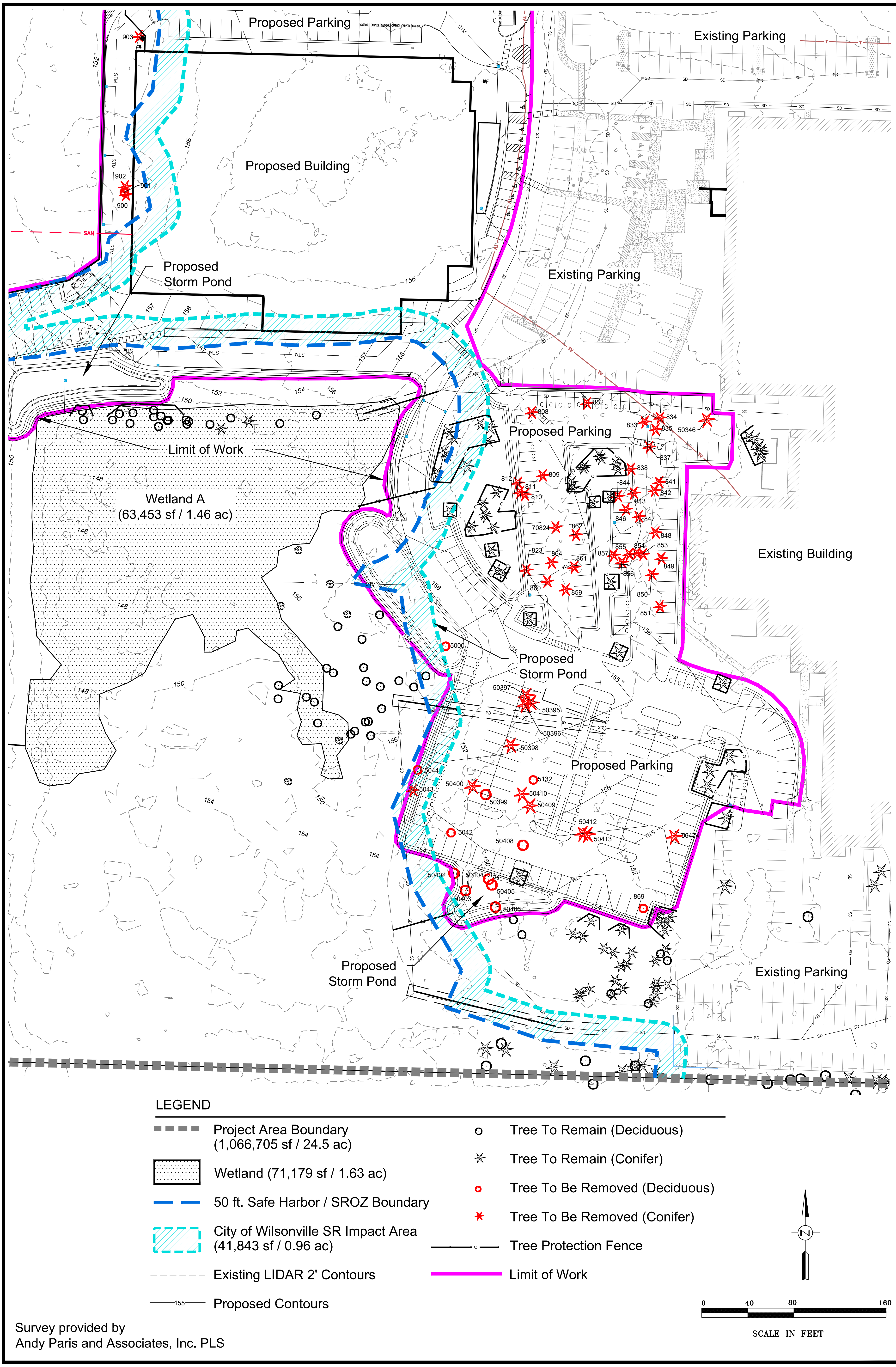
PHS
Pacific Habitat Services,Inc.
9450 SW Commerce Circle, Suite 180 Wilsonville, Oregon 97070
Phone: (503) 570-0800 Fax (503) 570-0855

Proposed Site Development Plan and SRIR/SROZ Impacts
9900 SW Boeckman Road Property - Wilsonville, Oregon

FIGURE
5

1-26-2022

X:\Project Directories\7200\7264 Boeckman South Development\AutoCAD\Plot Dwg\Fig5 SitePlan.dwg, 1/27/2022 10:43:56 AM



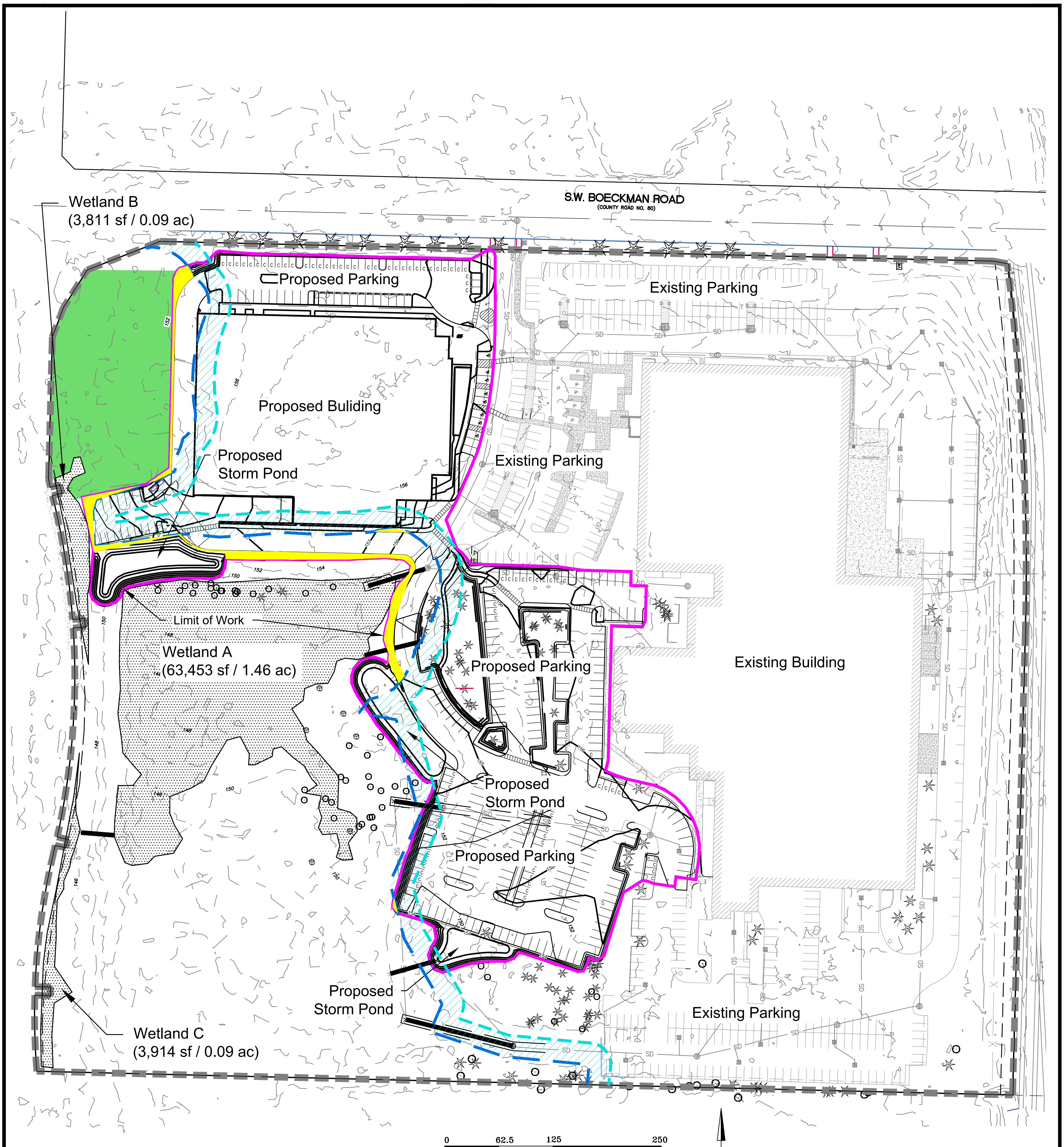
Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180 Wilsonville, Oregon 97070
Phone: (503) 570-0800 Fax (503) 570-0855

Tree Removal Plan
9900 SW Boeckman Road Property - Wilsonville, Oregon

FIGURE 5A

1-20-2022

\\PHS-NAS\Shared\Project Directories\7200\7264 Boeckman South Development\AutoCAD\Plot Dwg\Fig5A TreePlan.dwg, 1/20/2022 10:39:48 AM



LEGEND

- Project Area Boundary (1,066,705 sf / 24.5 ac)
- Wetland (71,178 sf / 1.63 ac)
- 50 ft. Safe Harbor / SROZ Boundary
- City of Wilsonville SR Impact Area (41,907 sf / 0.96 ac)
- Mitigation Area (33,053 sf / 0.76 ac)
- Temporary Impact to be Seeded (5,069 sf / 0.12 ac)
- Limit of Work
- Culvert
- Storm Drain
- Existing LIDAR 2' Contours
- Manhole
- Tree (Deciduous)
- Tree (Conifer)

Botanical Name	Wetland Indicator Status	Common Name	Minimum Rooting Size	Minimum Planting Densities
TREES				
Acer macrophyllum	FACU	Big leaf maple	2-gallon	50
Alnus rubra	FACW	Red alder	2-gallon	60
Quercus garryana	UPL	Oregon white oak	2-gallon	60
Pseudotsuga menziesii	FACU	Douglas' Fir	2-gallon	60
Pinus ponderosa var. willamettensis	FACU	Willamette Valley Ponderosa Pine	2- gallon	60
Fraxinus latifolia	FACW	Oregon ash	2-gallon	40
SHRUBS				
Symphoricarpos alba	FACU	Snowberry	1-gallon	140
Rubus ursinus	FACU	Pacific swordfern	1-gallon	140
Mahonia aquifolium	UPL	Tall Oregon grape	1-gallon	140
Rosa nutkana	FACU	Nootka rose	1-gallon	100
Corylus cornuta	FACU	Hazelnut	1-gallon	100
Oemleria cerasiformis	FACU	Indian plum	1-gallon	120
Amelanchier alnifolia	FACU	Service berry	1-gallon	100
Festuca idahoensis	FACU	Idaho fescue	5 pounds	7-10 pounds/acre
			Trees	**328**
			Shrubs	**840**

Survey provided by Andy Paris and Associates, Inc. PLS

PHS
Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180 Wilsonville, Oregon 97070
Phone: (503) 570-0800 Fax (503) 570-0855

Mitigation Plan
9900 SW Boeckman Road Property - Wilsonville, Oregon

FIGURE 6

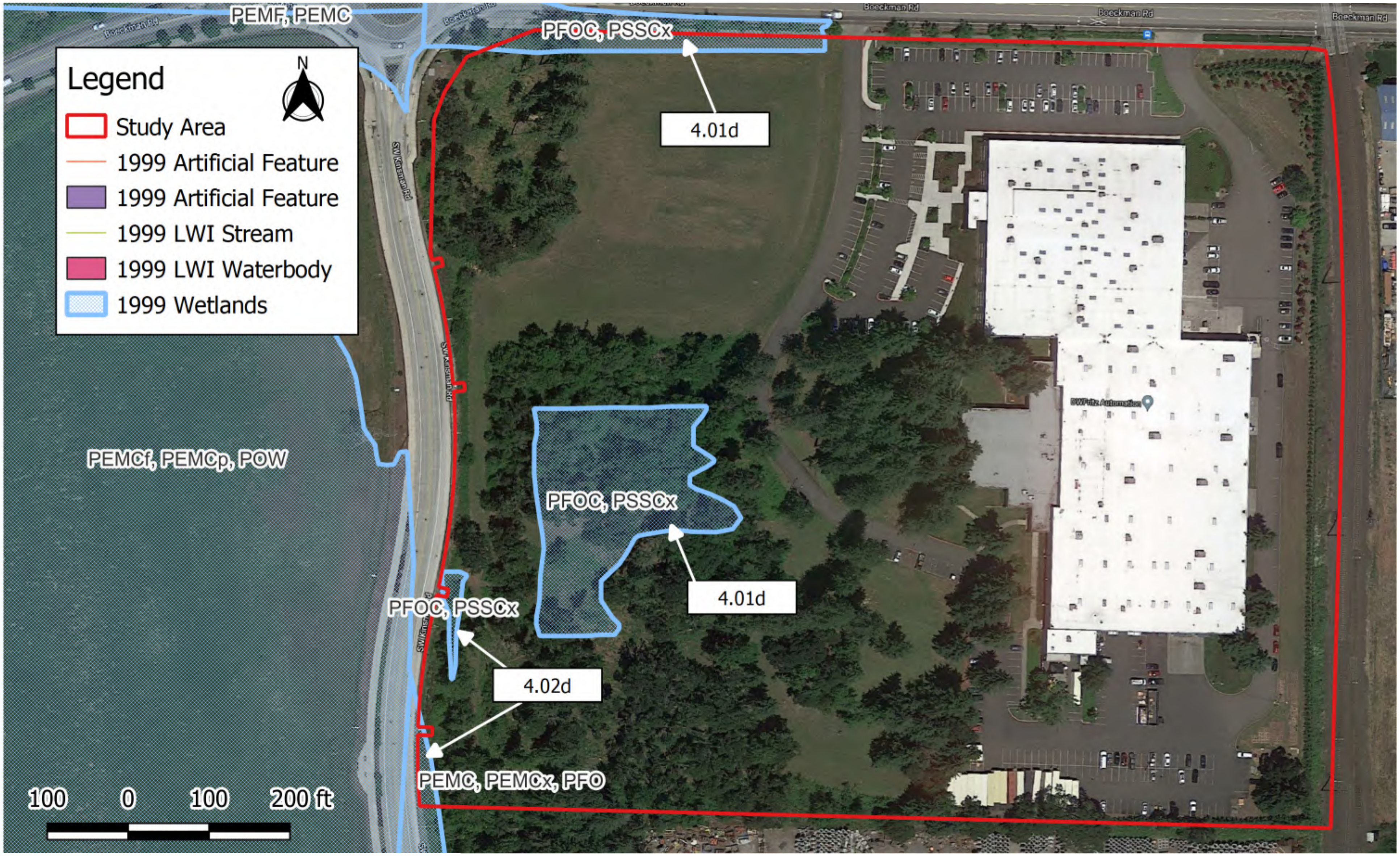
1-26-2022

#7264
1/10/2022

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Title 3 Land in the Portland Metro Region
9900 SW Boeckman Road Property - Wilsonville, Oregon
www.oregonmetro.gov/rlis, 2012

FIGURE
7



#7264
12/29/2021

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

City of Wilsonville Local Wetlands Inventory
9900 SW Boeckman Road Property - Wilsonville, Oregon
Fishman Associates, 1999

FIGURE
8

#7264
1/10/2022

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Title 13 Land in the Portland Metro Region
9900 SW Boeckman Road Property - Wilsonville, Oregon
www.oregonmetro.gov/rlis, 2012

FIGURE
9

Attachment B

Arborist Tree Inventory

9600 Boeckman Rd Tree Assessment

Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
800	48	Ponderosa Pine	100+ x 37	Fair	Moderate & non-correctable defects	Partial lower crown due to crowding with a full upper crown. Co-dominant stems at 70'. Average annual twig growth.	A
801	17	Ponderosa Pine	60 x 30	Poor	Moderate & non-correctable defects	Partial 1/3 very thin crown due to crowding. Below average annual twig growth. May improve with care.	B
802	20	Ponderosa Pine	70 x 25	Fair	Moderate & non-correctable defects	Partial 3/4 crown due to crowding. Co-dominant stems at 50'. Average annual twig growth and moderate amount of large to medium deadwood in crown to remove.	A
803	22	Ponderosa Pine	15 x 0	DEAD	DEAD	Dead 15' tall stump/snag has bark sloughing off and several holes from woodpeckers. DEAD STUMP, REMOVE.	
804	12	Ponderosa Pine	50 x 12	Good	Few & minor or correctable defects	Nearly full asymetric crown with average to above average annual twig growth.	A
805	15	Ponderosa Pine	50 x 15	Fair	Moderate & non-correctable defects	Partial 1/2 crown due to crowding and below average annual twig growth.	B
806	36	Ponderosa Pine	100+ x 42	Good	Moderate & non-correctable defects	Partial 1/3 crown due to crowding and average annual twig growth.	
807	32	Ponderosa Pine	100+ x 30	Fair	Moderate & non-correctable defects	Partial 3/4 crown due to crowding and average annual twig growth.	A
808	30	Douglas Fir	100+ x 46	Good	Few & minor or correctable defects	Full crown with good annual twig growth.	
809	27	Douglas Fir	100+ x 35	Poor	Moderate & non-correctable defects	Partial 2/3 crown due to crowding. Codominant stems at 30'. Large deadwood in lower crown should be removed if tree is retained. Below average annual twig growth.	
810	19	Douglas Fir	100+ x 25	Fair	Moderate & non-correctable defects	Partial 1/4 crown due to crowding with below average annual twig growth.	
811	34	Douglas Fir	100+ x 40	Fair	Moderate & non-correctable defects	Partial 1/2 crown due to crowding and below average annual twig growth.	
812	29	Douglas Fir	90 x 25	Poor	Major defects or problems	Very thin partial crown, top broken out at 90' with very poor annual twig growth.	
813	22	Douglas Fir	80 x 22	Poor	Major defects or problems	Partial 1/2 crown due to crowding and below average annual twig growth. Top broken out at 80'.	
814	11	Douglas Fir	35 x15	Poor	Major defects or problems	Partial very thin 1/8 crown due to crowding. Top 12' to 15' dead with very poor annual twig growth. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	
815	24	Ponderosa Pine	100+ x 18	Fair	Moderate & non-correctable defects	Full narrow asymetric crown with broken out top. Below average annual twig growth.	
816	17	Ponderosa Pine	90 x 10	Poor	Major defects or problems	Very small, 5% to 8% live crown ratio, with below average annual twig growth.	

9600 Boeckman Rd Tree Assessment

Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
817	34	Ponderosa Pine	100+ x 25	Good	Moderate & non-correctable defects	Partial 1/4 crown due to crowding with good annual twig growth.	
818	25	Ponderosa Pine	100+ x 18	Good	Moderate & non-correctable defects	Partial 7/8 asymetrical crown due to crowding with good annual twig growth.	
818 B	20	Douglas Fir	100+ x 30	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with average annual twig growth. Light amount of medium deadwood to remove if retaining.	
819	36	Ponderosa Pine	100+ x 30	Good	Moderate & non-correctable defects	Partial 2/3 crown due to crowding. Good annual twig growth.	
820	24	Douglas Fir	80 x 20	Fair	Moderate & non-correctable defects	Subdominant tree with partial 1/3 crown due to crowding. Below average annual twig growth.	
821	36	Ponderosa Pine	100+ x 25	Good	Moderate & non-correctable defects	Partial lower crown and full upper crown due to crowding. Good annual twig growth.	
822	36	Ponderosa Pine	100+ x 35	Good	Few & minor or correctable defects	Full asymetric crown with good annual twig growth. Nice specimen.	B
823	25	Douglas Fir	90 x 30	Very Poor	Major defects or problems	Very thin partial 1/2 crown due to crowding with very poor annual twig growth indicates declining health. May improve with care.	
826	30	Douglas Fir	100+ x 40	Fair	Moderate & non-correctable defects	Partial 2/3 asymetric crown due to crowding with below average annual twig growth. Large amount of medium to large deadwood in lower crown to be removed if retaining.	
827	15	Douglas Fir	75 x 28	Fair	Moderate & non-correctable defects	Subdominant tree with thin partial 1/3 crown due to crowding. Below average annual twig growth. Some medium to fine deadwood in lower crown.	
828	36	Ponderosa Pine	100+ x 33	Good	Few & minor or correctable defects	Nearly full asymetric crown with average to above average annual twig growth. Large amount of medium to large deadwood in lower crown to remove if retaining.	
829	17	Douglas Fir	90 x 30	Fair	Moderate & non-correctable defects	Subdominant tree with partial 2/3 crown due to crowding and below average annual twig growth. Some medium deadwood in lower crown to remove if retaining.	
830	17	Douglas Fir	90 x 22	Fair	Moderate & non-correctable defects	Top broken out at 90' with partial 2/3 crown due to crowding. Below average annual twig growth.	
831	36	Ponderosa Pine	100+ x 38	Fair	Moderate & non-correctable defects	Below average annual twig growth. Some fine deadwood at branch tips indicates declining health which may improve with care.	
832	30	Douglas Fir	90 x 50	Excellent	Moderate & non-correctable defects	Top broken out at 90' with full symetrical crown and good annual twig growth. Some medium to large deadwood in lower crown to remove if retaining.	
833	30	Douglas Fir	80 x 30	Poor	Major defects or problems	crooked top at 45'. Tree leans southwest at 15° to 20° with partial 2/3 crown due to crowding. Below average annual twig growth. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	

9600 Boeckman Rd Tree Assessment

Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
834	30	Douglas Fir	75 x 38	Fair	Moderate & non-correctable defects	Subdominant tree with top broken out. Partial 3/4 crown due to crowding with below average annual twig growth.	
835	41	Ponderosa Pine	100+ x 50	Good	Moderate & non-correctable defects	Partial 2/3 lower crown due to crowding with full asymetric upper crown. Average annual twig growth with some medium to fine deadwood in crown to remove if retaining.	
837	33	Douglas Fir	100+ x 37	Good	Moderate & non-correctable defects	Partial lower crown with full asymetric upper crown due to crowding. Average annual twig growth. Some large, medium and fine deadwood to remove if retaining.	
838	14	Douglas Fir	55 x 25	Very Poor	Major defects or problems	Fungal fruiting bodies (conks) on trunk indicate presence of internal decay. Partial 1/3 crown due to crowding. Below average annual twig growth and trunk has long swoop. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	
839	18	Douglas Fir	90 x 18	Poor	Moderate & non-correctable defects	Subdominant tree with top broken out. Thin partial 1/3 crown due to crowding with very poor annual twig growth. POOR SPECIMEN, MARGINAL FOR RETENTION.	
840	23	Douglas Fir	100+ x 25	Fair	Moderate & non-correctable defects	Thin partial lower and full upper crown with below average annual twig growth.	
841	18	Douglas Fir	90 x 40	Fair	Moderate & non-correctable defects	Thin partial 1/3 crown due to crowding. Below average annual twig growth.	
842	24	Douglas Fir	100+ x 40	Fair	Moderate & non-correctable defects	Partial 1/2 crown due to crowding and average annual twig growth. Large amount of medium to large deadwood in lower crown to remove if retaining.	
843	30	Douglas Fir	100+ x 45	Fair	Moderate & non-correctable defects	Nearly full asymetric crown with below average annual twig growth. Large amount of large deadwood on west side of lower crown to remove if retaining.	
844	16	Douglas Fir	60 x 28	Poor	Major defects or problems	Subdominant tree with top broken out at 60', thin crown and below average annual twig growth.	
845	12	Douglas Fir	80 x 25	Poor	Major defects or problems	Top broken out at 80', partial 3/4 crown due to crowding. Below average annual twig growth.	B
846	21	Douglas Fir	100+ x 30	Fair	Moderate & non-correctable defects	Partial 1/8 & 1/4 crown due to crowding. Below average annual twigh growth with some medium to large deadwood to remove if retaining.	
847	20	Douglas Fir	90 x 30	Fair	Moderate & non-correctable defects	Partial 1/2 crown due to crowding with below average annual twig growth. Some medium to fine deadwood in crown.	
848	24	Douglas Fir	100+ x 40	Fair	Moderate & non-correctable defects	Partial 3/8 crown due to crowding with average annual twig growth. Some medium deadwood on west side of lower crown to remove if retaining.	
849	30	Douglas Fir	100+ x 42	Good	Moderate & non-correctable defects	Partial 1/2 lower and full asymetric upper crown with average annual twig growth. Large amount of large deadwood on northwest side of lower crown to remove if retaining.	
850	30	Douglas Fir	100+ x 40	Good	Moderate & non-correctable defects	Partial 1/2 lower and full asymetric upper crown with average annual twig growth. Large amount of large deadwood on north side of lower crown to remove if retaining.	

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Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
851	45	Douglas Fir	100+ x 42	Good	Few & minor or correctable defects	Full crown with average annual twig growth. Two stems at 55'. Prune to improve structure if retaining.	
853	8	Douglas Fir	65 x 12	Poor	Major defects or problems	Subdominant tree with thin partial 1/4 crown due to crowding. Below average annual twig growth. POOR SPECIMEN MARGINAL FOR PRESERVATION.	
854	16	Douglas Fir	100+ x 16	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with below average annual twig growth.	
855	22	Douglas Fir	100+ x 35	Fair	Moderate & non-correctable defects	Partial 1/8 & 1/8 lower crown with a nearly full upper crown. Below average annual twig growth.	
856	22	Douglas Fir	90 x 18	Poor	Moderate & non-correctable defects	Very thin partial 1/4 crown due to crowding with below average annual twig growth. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	
857	29	Douglas Fir	100+ x 30	Fair	Moderate & non-correctable defects	Partial 1/3 lower and full upper crown with well below average annual twig growth.	
858	35	Ponderosa Pine	100+ x 25	Good	Moderate & non-correctable defects	Partial 1/2 lower with full upper crown. Average annual twig growth with some deadwood in lower crown to be removed if retaining.	A
859	40	Douglas Fir	100+ x 50	Good	Moderate & non-correctable defects	2 stems at 3' with a partial 3/4 crown due to crowding. Below average annual twig growth. Some deadwood in lower crown to remove if retaining.	
860	26	Douglas Fir	100+ x 18	Fair	Moderate & non-correctable defects	Partial 1/4 crown due to crowding with below average annual twig growth. Some medium to fine deadwood to remove if retaining.	
861	24	Douglas Fir	100+ x 32	Fair	Moderate & non-correctable defects	Thin partial 1/4 crown due to crowding with below average annual twig growth.	
862	27	Douglas Fir	100+ x 35	Fair	Few & minor or correctable defects	Full asymetric crown due to crowding with below average annual twig growth.	
863	17	Douglas Fir	100+ x 30	Fair	Moderate & non-correctable defects	Partial 1/3 lower and full upper crown. Below average annual twig growth.	B
864	14	Douglas Fir	95 x 14	Fair	Moderate & non-correctable defects	Partial 1/4 lower with full upper crown due to crowding. Below average annual twig growth.	
865	22	Douglas Fir	100+ x 25	Good	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with average annual twig growth. Moderate amount of medium to fine deadwood to remove if retaining.	B
866	11	Douglas Fir	100+ x 20	Poor	Moderate & non-correctable defects	Partial 1/8 very narrow crown due to crowding with poor annual twig growth and a light amount of deadwood. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	A
867	11	Douglas Fir	55 x 16	Fair	Moderate & non-correctable defects	Partial 1/4 crown due to crowding with average annual twig growth. Some medium deadwood to remove if retaining.	B

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Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
868	26	Douglas Fir	100+ x 45	Fair	Moderate & non-correctable defects	Partial 1/3 lower and nearly full upper crown with average annual twig growth. Moderate amount of medium to large deadwood to remove if retaining.	B
869	13	Pacific Madrone	35 x 30	Good	Moderate & non-correctable defects	Wound on south side at 3'. Asymetrical crown with good leaf size and annual twig growth. Some structural issues could be improved with pruning.	
870	24	Douglas Fir	100+ x 30	Fair	Moderate & non-correctable defects	Partial 1/4 crown due to crowding with below average annual twig growth. Some medium deadwood to remove if retaining.	A
871	28	Douglas Fir	100+ x 50	Good	Moderate & non-correctable defects	Partial 1/4 lower and full upper crown due to crowding. Average annual twig growth wth a large amount of medium to large deadwood to remove if retaining.	A
872	12	Douglas Fir	70 x 25	Fair	Moderate & non-correctable defects	Subdominant tree with partial 1/4 crown due to crowding. Average annual twig growth. Light amount of medium to fine deadwood in crown.	A
873	24	Oregon White Oak	85 x 30	Good	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with good annual twig growth and average leaf size. Some fine deadwood in upper crown suggests some insect or health issue that should be further investigated if it is retained.	A
874	17	Oregon White Oak	85 x 30	Good	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with average annual twig growth and average leaf size. Some large deadwood to remove if retaining.	A
875	14	Douglas Fir	70 x 25	Fair	Moderate & non-correctable defects	Partial 2/3 crown due to crowding with average annual twig growth. Light amount of medium deadwood to remove if retaining.	A
876	30	Douglas Fir	100+ x 50	Good	Moderate & non-correctable defects	Partial 1/2 lower and full upper crown due to crowding with average annual twig growth. Some light deadwood in crown.	A
877	22	Douglas Fir	100+ x 37	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with poor annual twig growth. Some medium deadwood to remove if retaining.	A
878	10	Douglas Fir	70 x 16	Fair	Moderate & non-correctable defects	Subdominant tree with partial 1/3 crown due to crowding. Below average annual twig growth with some light deadwood in lower crown.	A
879	13	Douglas Fir	85 x 16	Poor	Major defects or problems	Partial 1/2 very thin crown due to crowding with poor annual twig growth. Some light deadwood. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	A
880	24	Douglas Fir	100+ x 28	Fair	Moderate & non-correctable defects	Partial 1/8 lower and 1/2 partial upper crown due to crowding. Average annual twig growth with some medium deadwood to remove if retaining.	A
881	24	Oregon White Oak	85 x 43	Good	Moderate & non-correctable defects	Partial 2/3 crown due to crowding with good annual twig growth and leaf size. 2 stems at 6.5.' Crown is off center and heavy to south. Prune to balance and improve structure.	A
882	13	Douglas Fir	50 x 25	Poor	Moderate & non-correctable defects	Partial 3/4 crown due to crowding with very poor annual twig growth and with a moderate amountd of medium to fine deadwood. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	A
883	23	Douglas Fir	100 x 16	DYING	DYING	Nearly dead. Top 40' is dead. Dying tree is a POTENTIAL HAZARD, DO NOT PRESERVE.	A

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Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
884	23	Oregon White Oak	70 x 38	Fair	Moderate & non-correctable defects	Partial 1/2 crown due to crowding with average leaf size and annual twig growth. 2 stems at 6' and some medium deadwood to remove if retaining. Prune to improve structure.	A
885	17	Douglas Fir	80 x 20	Poor	Major defects or problems	Weak connection at base and partial 1/4 crown due to crowding. Poor annual twig growth and some medium deadwood in crown. POOR SPECIMEN, DO NOT PRESERVE.	A
886	24	Douglas Fir	95 x 25	Poor	Major defects or problems	Thin partial 2/3 crown due to crowding with poor annual twig growth. Clearly declining health with med to large deadwood in mid crown. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	A
887	17	Douglas Fir	85 x 25	Poor	HAZARD REMOVE	Partial 1/2 crown due to crowding with major wound and exposed internal decay on south side from 0' to 6'. HAZARD REMOVE.	A
888	17	Douglas Fir	75 x 25	Poor	Major defects or problems	Thin partial 1/3 crown due to crowding with very poor annual twig growth. Some medium to large deadwood in lower crown. Serious decline in health and condition. POOR SPECIMEN MARGINAL FOR PRESERVATION.	A
889	17	Douglas Fir	80 x 25	Poor	Major defects or problems	Thin partial 1/4 crown due to crowding with very poor annual twig growth. Moderate amount of medium to fine deadwood throughout crown. Serious decline in health and condition. POOR SPECIMEN MARGINAL FOR PRESERVATION.	A
890	21	Douglas Fir	100+ x 35	Poor	Major defects or problems	Small thin full crown due to crowding with poor annual twig growth. Large amount of large deadwood. Serious decline in health and condition. POOR SPECIMEN MARGINAL FOR PRESERVATION.	A
891	21	Douglas Fir	100+ x 18	Poor	Major defects or problems	Small thin crown due to crowding with poor annual twig growth. Serious decline in health and condition. POOR SPECIMEN MARGINAL FOR PRESERVATION.	**A**
892	21	Douglas Fir	85 x 25	Poor	Major defects or problems	Thin partial 1/3 crown due to crowding. Poor annual twig growth. Serious decline in health and condition. POOR SPECIMEN MARGINAL FOR PRESERVATION.	A
893	22	Douglas Fir	100+ x 25	Poor	Major defects or problems	Narrow thin nearly full crown with poor annual twig growth. Serious decline in health and condition. POOR SPECIMEN MARGINAL FOR PRESERVATION.	
894	24	Douglas Fir	100+ x 35	Poor	Major defects or problems	Thin full crown with poor annual twig growth. Top is dying back and has fine deadwood throughout crown, Serious decline in health and condition. POOR SPECIMEN MARGINAL FOR PRESERVATION.	B
895	22	Douglas Fir	100+ x 32	Fair	Moderate & non-correctable defects	Partial 2/3 crown due to crowding with below average annual twig growth. Moderate amount of medium to large deadwood to remove if retaining.	B
896	22	Douglas Fir	85 x 32	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with average annual twig growth. Top is split with a dead side stem attached. Prune to remove deadwood and improve structure if retaining.	A
897	27	Douglas Fir	100+ x 35	Poor	Major defects or problems	Thin full crown with dead top. Dying and serious decline in condition. POOR SPECIMEN MARGINAL FOR PRESERVATION.	A
900	13	Douglas Fir	65 x 20	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding. Below average annual twig growth.	

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Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
901	6	Scouler Willow	23 x 12	Very Poor	DYING HAZARD	Open wound exposes internal decay at 1' to 3'. Dead top and bark is sloughing off from 5' to top. DYING, HAZARD REMOVE.	
902	8	Douglas Fir	35 x 10	Fair	Major defects or problems	Subdominant tree with partial 1/8 crown due to crowding. Below average annual twig growth. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	
903	13	Douglas Fir	55 x 20-	Fair	Moderate & non-correctable defects	Partial 2/3 crown due to crowding with below average annual twig growth.	
904	14	Oregon Ash	45 x 21	Fair	Moderate & non-correctable defects	Nearly full narrow crown due to crowding. Top leans 15° to 25° to north. Average annual leaf size and twig growth. May require inspection and pruning to improve structure if retained.	
905	14	Oregon Ash	60 x 24	Good	Few & minor or correctable defects	Full upper and partial lower crown due to crowding. Good annual leaf size and twig growth.	A
906	12	Oregon Ash	80 x 20	Good	Moderate & non-correctable defects	2 co-dominant stems at 30' with nearly full asymetric crown. Average annual leaf size and twig growth. Some medium size deadwood to be removed if area beneath it is developed.	A
907	10	Oregon Ash	75 x 18	Fair	Moderate & non-correctable defects	2 co-dominant stems at 40' with partial, 2/3 crown due to crowding. Average annual leaf size and twig growth.	A
908	15	Oregon Ash	70 x 30	Good	Moderate & non-correctable defects	Partial 2/3 crown due to crowding is off balance and heavy to north. Good annual leaf size and twig growth.	A
909	11	Oregon Ash	75 x 20	Good	Few & minor or correctable defects	Nearly full narrow crown due to crowding. Good annual leaf size and twig growth.	A
910	8	Oregon Ash	80 x 18	Good	Few & minor or correctable defects	Nearly full narrow crown due to crowding. Good annual leaf size and twig growth.	A
911	8	Oregon Ash	80 x 15	Good	Few & minor or correctable defects	Nearly full narrow crown due to crowding. Good annual leaf size and twig growth.	A
912	8	Oregon Ash	75 x 20	Fair	Moderate & non-correctable defects	Partial crown due to crowding with below average annual twig growth. Top broken out at 60' and may need pruning to improve structure.	A
913	11	Oregon Ash	20 x 5	Poor	Major defects or problems	Top broken out at 20' with a small amount of sucker growth from trunk. TREE DESTROYED, DO NOT PRESERVE.	A
914	7	Oregon Ash	28 x 2	Poor	Major defects or problems	Top broken out at 28' with a small amount of sucker growth from trunk. TREE DESTROYED, DO NOT PRESERVE.	A
915	15	Oregon Ash	80 x 25	Fair	Few & minor or correctable defects	Nearly full asymetric crown with average annual leaf size and twig growth. Some stubs from ice storm broken branches.	A
916	11	Oregon Ash	80 x 25	Good	Moderate & non-correctable defects	Partial crown due to crowding with good annual leaf size and twig growth. Off balance and heavy to north. Some stubs from ice storm broken branches.	A

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Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
917	14	Oregon Ash	80 x 25	Good	Moderate & non-correctable defects	Partial crown due to crowding with good annual leaf size and twig growth. Off balance and heavy to north. Some stubs from ice storm broken branches.	A
918	5, 4	Common Hawthorne	30 x 20	Poor	Major defects or problems	Partial crown due to crowding. Off balance to west. INVASIVE SPECIES & POOR SPECIMEN, DO NOT PRESERVE.	A
5000	15	Oregon White Oak	60 x 45	Good	Few & minor or correctable defects	Full crown with good annual leaf size and twig growth. Some medium to fine deadwood to remove.	
5002	17	Douglas Fir	0 x 0	DEAD	DEAD	Broken off lower trunk. TAKEN DOWN & REMOVED.	B
5003	48	Ponderosa Pine	100+ x 40	Good	Few & minor or correctable defects	Full crown with good annual twig growth. Some medium deadwood to remove.	A
5011	9	Bird Cherry	50 x 15	Very Poor	Moderate & non-correctable defects	Partial very small crown due to crowding. Sapsucker damage has nearly girdled trunk. Large amount of deadwood. VERY POOR SPECIMEN, DO NOT PRESERVE.	A
5012	13	Oregon White Oak	50 x 20	Fair	Moderate & non-correctable defects	Partial asymetric crown with below average annual twig growth and leaf size.	A
5042	27, 18	Oregon White Oak	85 x 75	Good	Moderate & non-correctable defects	2 stems at 30". Crown off balance to east with some medium and large deadwood to remove. Prune to balance and improve structure. Cable two stems together if retaining.	
5043	48	Ponderosa Pine	100+ x 47	Good	Moderate & non-correctable defects	Full asymetric crown due to crowding with average annual twig growth. Some recently dead branches and some large deadwood throughout crown to remove if retaining.	
5044	14	Oregon Ash	90 x 37	Good	Moderate & non-correctable defects	Partial 3/4 crown due to crowding with good leaf size and annual twig growth. Some medium to fine deadwood throughout crown.	
5129	12	Oregon Ash	80 x 23	Fair	Moderate & non-correctable defects	Full asymetric crown with chlorotic leaves, below average leaf size and annual twig growth indicates current health problems. May improve with care.	
5130	14	Oregon Ash	80 x 40	Fair	Moderate & non-correctable defects	Full asymetric crown with below average leaf size and annual twig growth. Tree has some structural problems that can be improved with pruning.	
5132	24	Oregon White Oak	0 X 0	DEAD	DEAD	15' stump lying on ground due to being toppled by winter ice storm.	
5133	23	Oregon White Oak	8 x 0	DEAD	DEAD	Trunk broken off at 8', only stump remains. REMOVE STUMP.	
6604	34	Douglas Fir	100+ x 45	Very Poor	Major defects or problems	Nearly full asymetric very thin crown with very poor annual twig growth. Tree in serious decline, likely due to saturated soil in wetland. Medium to fine deadwood throughout crown. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	
6612		NO TREE			NO TREE	No tree at this location	

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Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
6616	12	Oregon Ash	75 x 30	DYING	DYING HAZARD	Wounds extensive internal decay exposed from 0' to 7' across over 50% of circumference. DYING, HAZARD, REMOVE.	
6587	17	Oregon Ash	80 x 25	Fair	Moderate & non-correctable defects	Partial 2/3 crown due to crowding with average annual leaf size and twig growth. Some large to medium deadwood to remove if area beneath it is improved.	A
6597	11	Oregon White Oak	90 x 20	Fair	Moderate & non-correctable defects	Partial 1/8 & 1/8 crown due to crowding with average annual leaf size and twig growth.	A
50346	32	Douglas Fir	85 x 35	Very Poor	Dying Hazard	Thin partial 3/4 crown due to crowding with very poor annual twig growth. Top was broken out and remaining top is dying with large amount of deadwood throughout crown. Dying tree is a POTENTIAL HAZARD REMOVE.	
50347	26	Douglas Fir	95 x 35	Good	Moderate & non-correctable defects	Partial lower and full upper crown due to crowding. Below average annual twig growth. Leans to northwest at 8° to 10°.	A
50348	9	Douglas Fir	25 x 18	Fair	Moderate & non-correctable defects	Partial crown due to crowding with below average annual twig growth. POOR SPECIMEN MARGINAL FOR PRESERVATION.	A
50349	34	Ponderosa Pine	100+ x 40	Good	Moderate & non-correctable defects	Partial lower and full upper crown with average annual twig growth. Top broken out and recently dead branches on north side indicates some potential health problem. May improve with care.	A
50350	24	Douglas Fir	100+ x 40	Good	Moderate & non-correctable defects	Partial crown due to crowding with below average annual twig growth. Some medium to fine deadwood to remove if retaining.	A
50351	35	Douglas Fir	100+ x 35	Fair	Moderate & non-correctable defects	Partial crown due to crowding with below average annual twig growth. Light amount of fine deadwood throughout crown.	A
50361	41	Ponderosa Pine	100+ x 50	Good	Few & minor or correctable defects	Full crown with average annual twig growth. Moderate amount of medium to large deadwood to remove is retaining.	B
50363	No Tree	NO TREE		NO TREE		No tree at this location.	
50364	No Tree	NO TREE		NO TREE		No tree at this location.	
50395	36	Ponderosa Pine	100+ x 35	Good	Few & minor or correctable defects	Full crown with good annual twig growth. Some medium to large deadwood to remove if retaining.	
50396	19	Ponderosa Pine	75 x 20	Fair	Moderate & non-correctable defects	Partial 1/2 crown due to crowding with average annual twig growth. Some recently dead branches in crown.	
50397	19	Douglas Fir	75 x 30	Fair	Moderate & non-correctable defects	Subdominant tree with partial 2/3 crown due to crowding and good annual twig growth.	
50398	19	Douglas Fir	90 x 27	Fair	Few & minor or correctable defects	Full crown with below average annual twig growth.	

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Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
50399	21	Oregon White Oak	75 x 30	Good	Moderate & non-correctable defects	Full asymetric crown is off balance and heavy to south. Some large, medium to fine deadwood in crown. Prune to improve structure if retaining.	
50400	42	Ponderosa Pine	100+ x 45	Good	Few & minor or correctable defects	Full crown with average annual twig growth. Some medium to large deadwood to remove if retaining.	
50402	15, 13	Oregon Ash	85 x 42	Good	Moderate & non-correctable defects	2 stems at 3', full asymetric crown is off balance to south. Some medium deadwood. Good leaf size and annual twig growth. Prune to improve structure and remove deadwood.	
50403	17	Oregon White Oak	80 x 35	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with average leaf size and annual twig growth. Prune to improve structure and balance.	
50404	17	Oregon White Oak	85 x 40	Good	Moderate & non-correctable defects	Full asymetric crown with average leaf size and annual twig growth. Some medium to large deadwood to remove if retaining.	
50405	12	Oregon Ash	70 x 27	Poor	HAZARD REMOVE	Large open wound that exposes internal decay from 0' to 3'. Partial crown due to crowding. Some large deadwood. Poor specimen and not sound due to decay. HAZARD REMOVE.	
50406	12, 9	Bird Cherry	65 x 30	Fair	Moderate & non-correctable defects	Full crown with 2 stems at ground. Thin crown, average size wilted leaves due drought and average annual twig growth. May improve with care.	
50407	24	Douglas Fir	100+ x 40	Fair	Moderate & non-correctable defects	Partial 1/2 lower crown and full upper crown. Average annual twig growth with large, medium and fine deadwood to remove if retaining.	
50408	15	Bigleaf Maple	60 x 40	Fair	Moderate & non-correctable defects	Full crown with dead top. Below average annual twig growth and average leaf size may be due to drought. Prune to remove deadwood.	
50409	32	Ponderosa Pine	100+ x 40	Good	Moderate & non-correctable defects	Partial 3/4 asymetric crown due to crowding with good annual twig growth. Some large, medium and fine deadwood to remove if retaining.	
50410	23	Douglas Fir	100+ x 42	Good	Moderate & non-correctable defects	Partial 7/8 asymetrical crown due to crowding with average annual twig growth. Some medium to fine deadwood.	
50412	15	Douglas Fir	100+ x 23	Fair	Moderate & non-correctable defects	Partial 2/3 crown due to crowding with below average annual twig growth. Medium to fine deadwood to remove if retaining.	
50413	20	Douglas Fir	100+ x 30	Fair	Moderate & non-correctable defects	Partial 2/3 lower and full upper crown due to crowding with average annual twig growth. Some medium to fine deadwood to remove if retaining.	
50474	28	Douglas Fir	100+ x 35	Good	Few & minor or correctable defects	Full crown with below average annual twig growth. Moderate amount of medium to fine deadwood to remove if retaining.	
50476	35	Douglas Fir	100+ x 45	Good	Few & minor or correctable defects	Partial 2/3 lower and nearly full upper crown with good annual twig growth. Moderate amount of large, medium and fine deadwood to remove if retaining.	B
50476 B	16	Douglas Fir	90 x 32	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with below average annual twig growth. Some medium to large deadwood to remove if retaining.	A

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Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
50476 C	17	Douglas Fir	100 x 32	Fair	Moderate & non-correctable defects	Partial 1/4 crown due to crowding with below average annual twig growth. Some medium to large deadwood to remove if retaining.	A
50479	24	Douglas Fir	100+ x 35	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with average annual twig growth. Moderate amount of medium to fine deadwood to remove if retaining.	B
50479 B	11	Douglas Fir	60 x 16	Poor	Moderate & non-correctable defects	Subdomiant tree with partial 1/4 crown due to crowding with below average annual twig growth. Serious declining health with significant deadwood. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	B
50479 C	7	Douglas Fir	50 x 12	Poor	Major defects or problems	Subdominant tree with 1/8 crown due to crowding with very poor annual twig growth. Seriously declining health with significant deadwood. POOR SPECIMEN, MARGINAL FOR PRESERVATION.	A
50479 D	6	Douglas Fir	35 x 0	DEAD	DEAD	DEAD TREE, REMOVE.	
50483	25	Douglas Fir	100+ x 28	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with average annual twig growth. Moderate amount of medium to fine deadwood to remove if retaining.	B
50483 B	25	Douglas Fir	100+ x 45	Good	Moderate & non-correctable defects	Partial 2/3 crown due to crowding with below average annual twig growth. Moderate amount of medium to find deadwood to remove if retaining.	B
50483 C	19	Douglas Fir	100+ x 28	Fair	Moderate & non-correctable defects	Partial 1/4 crown due to crowding with below average annual twig growth. Some fine deadwood.	B
50487	16	Douglas Fir	100+ x 25	Fair	Moderate & non-correctable defects	Partial 1/4 crown due to crowding with below average annual twig growth. Some fine deadwood.	A
50487 B	18	Douglas Fir	100+ x 28	Fair	Moderate & non-correctable defects	Partial 1/3 crown due to crowding with below average annual twig growth. Some medium to large deadwood to remove if retaining.	A
50487 C	7	Douglas Fir	25 x 10	Poor	Major defects or problems	Subdominant tree with 1/2 crown due to crowding and below average annual twig growth. Moderate amount of medium deadwood. POOR SPECIMEN MARGINAL FOR PRESERVATION.	A
50487 D	22	Douglas Fir	100+ x 32	Fair	Moderate & non-correctable defects	Partial 2/3 crown due to crowding with below average annual twig growth. Moderate amount of medium to find deadwood to remove if retaining.	A
50490	30	Douglas Fir	100+ x 40	Fair	Moderate & non-correctable defects	Full crown with below average annual twig growth. Moderate amount of medium to fine deadwood to remove if retaining.	A
50496	41	Douglas Fir	100+ x 50	Good	Few & minor or correctable defects	Full crown with average annual twig growth. Some medium to large deadwood to remove if retaining.	A
70824	19	Douglas Fir	100+ x 35	Fair	Moderate & non-correctable defects	Partial 1/4 lower and full upper crown due to crowding. Below average annual twig growth with a moderate amount of medium to large deadwood to remove if retaining.	

9600 Boeckman Rd Tree Assessment

Tag No.	Dia. Inches	Species	Est Ht x Crown Width(ft)	Health	Condition	Comments	Retain A or B
70824 B	20	Douglas Fir	100+ x 35	Fair	Moderate & non-correctable defects	Partial 1/4 lower and full upper crown due to crowding. Below average annual twig growth with a moderate amount of medium to large deadwood to remove if retaining.	

Notes: Retain A = Retain without aeration, Retain B = Retain with aeration

Attachment C

OFWAM Summary Sheets

City of Wilsonville

Oregon Freshwater Wetland Assessment Method Summary Sheet

Unit CL Coffee Lake
(3.06. 307, 4.01, 4.02, 4.20)

Function	Evaluation Descriptor	Rationale
Wildlife Habitat	Provides Diverse	Excellent wildlife habitat, very diverse. Red-legged frogs in wet forest. Secretive rails (birds) live in area (and some of the biggest bull frogs I've ever seen)
Fish Habitat	Degraded	Seely Ditch channelized, could use more shade
Water Quality (pollutant removal)	Intact	Vegetation, surface inflow, size, and connectedness
Hydrologic Control (flood control & water supply)	Intact	Flood plain, vegetation, size. Perennial seeps present.
Sensitivity to Future Impacts	Potentially Sensitive	All wetlands in Wilsonville potentially sensitive to future impacts.**
Enhancement Potential*		Enhancement potential on plowed portion owned by The Wetlands Conservancy
Education	Has	Parts owned by Metro and The Wetlands Conservancy. Only area of peat soils in city.
Recreation	Provides	Parts owned by Metro.
Aesthetic Quality	Pleasing	Very large wet area.

Narrative Description of Overall Wetland Functions and Conditions

Premier wetland-wildlife habitat in the city; provides groundwater discharge and recharge, too wet for development, unique area, corridor to Tonquin Scablands

Attachment D

Wetland Delineation Report

Wetland Delineation
9900 SW Boeckman Road,
Wilsonville, Oregon

Section 14B, Township 3 South, Range 1 West,
Tax lots 202, 282, and 292)

Prepared for

Mac Martin
Martin Development
PO Box 15523
Seattle, WA 98115

Prepared by

Joe Thompson (PWS), Carlee Michelson, and
John van Staveren (SPWS)
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PHS Project Number: 7264

January 5, 2021

TABLE OF CONTENTS

I. INTRODUCTION

Pacific Habitat Services, Inc. (PHS) conducted a wetland delineation for property at 9900 SW Boeckman Road in Wilsonville, Oregon (Township 3 South, Range 1 West, Section 14B, Tax Lots 202, 282, and 292, and a portion of Right of Way (ROW) for Boeckman Road. This report presents the results of PHS's delineation of the study area. Figures, including a map depicting the location of wetlands within the study area, are in Appendix A. Data sheets documenting on-site conditions are provided in Appendix B. Ground-level photos of the study area are included in Appendix C, and a discussion of the wetland delineation methodology (for the client) is provided in Appendix D.

II. RESULTS AND DISCUSSION

A. Landscape Setting and Land Use

The approximately 24.57-acre study area is located in the western portion of Wilsonville, south of SW Boeckman Road and east of SW Kinsman Road. The eastern portion of the site consists of an existing business (DW Fritz Automation), which includes an industrial building, parking, a pair of very old detention basins, and access roads. The northwestern portion of the site is undeveloped and has a grass field mainly consisting of tall fescue *(Schedonorus arundinacea*, FAC), rough cat's ear (*Hypochaeris radicata*, FACU), hairy hawkbit (*Leontodon saxatilis*, FACU), dandelion (*Taraxacum officinalis*, FACU), self-heal (*Prunella vulgaris*, FACU), and English plantain (*Plantago lanceolata*, FACU). This area has higher topography than the southwestern portion of the site and may be composed of spoils that were used to excavate a detention basin in the southern middle portions of the site.

Detention Basin

A large, very old detention basin occupies the majority of the southwestern portion of the site. The basin does not appear to have been excavated, but is surrounded by large berms at all four sides. The northern portion of the detention basin contains a wetland (Wetland A), and is dominated by Oregon ash (*Fraxinus latifolia*, FACW), Himalayan blackberry (*Rubus armeniacus*, FAC), spreading rush (*Juncus patens*, FACW), and camas (*Camassia quamash*, FACW). The southern portion of the detention basin is upland, and is dominated by Oregon white oak (*Quercus garryana*, FACU), Douglas' fir (*Pseudotsuga menziesii*, FACU), snowberry (*Symphoricarpos alba*, FACU), sweetbrier rose (*Rosa rubiginosa*, UPL), Himalayan blackberry, trailing blackberry (*Rubus ursinus*, FACU), and shiny geranium (*Geranium lucidum*, UPL).

Drainage Ditch

At the western boundary of the site there is a drainage ditch that runs parallel to SW Kinsman Road and contains wetlands (Wetlands B and C). Dominant species in the ditch include Himalayan blackberry, reed canarygrass (*Phalaris arundinacea*, FACW), common rush (*Juncus effusus*, FACW), and spreading rush. Several drainpipes convey stormwater from the westernmost basin into the ditch, which flow south and has a less than one percent gradient.

The Natural Resources Conservation Service (NRCS) depicts six soil map units within the study area: Aloha silt loam, 0 to 3 percent slopes (non-hydric), Amity silt loam (non-hydric), Cove silty clay loam (hydric), Woodburn silt loam, 0 to 3 percent slopes (non-hydric), and Woodburn silt loam, 3 to 8 percent slopes (non-hydric).

B. Site Alterations

As previously discussed, a large stormwater detention basin is located in the western portion of the study area that is surrounded on all sides by berms. Because the site slopes very slightly to the west, several pipes convey stormwater from the eastern part of the study area westward, below the berms and discharge into the detention basin. Several pipes at the western boundary of the detention basin are also used to convey stormwater from the detention basin to the excavated ditch containing Wetlands B and C. It is uncertain whether or not Wetland A would exist if not the for the constructed berms, but they certainly augment the retention of wetland hydrology and the few, small drainpipes exiting the basin to the ditch effectively mute stormwater outflow. For the majority of the basin, mapped soils are also Amity silt loam; however, Cove silty clay loam soils are mapped in the westernmost portion of the wetland, adjacent to the berm.

At the northwestern corner of the study area, a former wetland depicted in the Wilsonville Local Wetland Inventory (LWI) has been filled and replaced by a bioswale for SW Boeckman Road.

C. Precipitation Data and Analysis

PHS performed the wetland delineation and data collection on July 1, 2021, and on January 11, 2022. Recorded precipitation for the water year, beginning on October 1, 2020, and up to the day of the July 1, 2021, fieldwork, was 40.78 inches, which is 100 percent of normal (40.48 inches).

For climate analysis, PHS used the Direct Antecedent Rainfall Analysis Method (DAREM) for both field dates. Using DAREM, if rainfall of prior period was drier than normal (sum is 6-9), normal (sum is 10-14), wetter than normal (sum is 15-18). As shown in Table 1, the weighted average precipitation for the three months preceding the July fieldwork was normal. Recorded rainfall for the water year (October 1, 2020 – June 30, 2021) was 41.07 inches, which is 97 percent of normal (42.29 inches). No precipitation was recorded in the two weeks preceding or on the day of the July fieldwork.

Table 1: Comparison of recorded monthly precipitation at the Oregon City Weather Station to the WETS Tables, prior to July 2021 wetland delineation field work.

Prior Month Name	WETS[1] Rainfall Percentile (inches)		Measured Rainfall[2] (inches)	Condition*:	Condition Value	Month weight	Multiply Previous two columns
	30th	70th		Dry, Wet, Normal	(1=dry, 2=normal, or 3=wet)		
June	1.13	2.18	1.38	Normal	2	3	6
May	1.78	3.24	2.29	Normal	2	2	4
April	2.49	4.08	0.18	Dry	1	1	1
						Sum	**11**

1 WETS Table for the Oregon City Weather Station; Source: (http://agacis.rcc-acis.org/?fips=41005)

2 Observed precipitation is the precipitation recorded at the Oregon City Weather Station. Source: (https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg/?fips=41005)

Additional fieldwork was conducted on January 11, 2022. As shown in Table 1, the weighted average precipitation for the three months preceding the January fieldwork was above normal. Recorded precipitation for the two weeks preceding the January fieldwork was 4.99 inches, which is 156 percent of normal (3.2 inches); 0.18 inches fell on the day of this fieldwork.

Table 2: Comparison of recorded monthly precipitation at the Oregon City Weather Station to the WETS Tables, prior to the January 2022 wetland delineation field work.

Prior Month Name	WETS[1] Rainfall Percentile (inches)		Measured Rainfall[2] (inches)	Condition*:	Condition Value	Month weight	Multiply Previous two columns
	30th	70th		Dry, Wet, Normal	(1=dry, 2=normal, or 3=wet)		
December	5.01	8.72	6.64	Normal	2	3	6
November	4.48	8.07	5.92	Normal	2	2	4
October	1.93	4.24	7.26	Wet	3	1	3
						Sum	**13**

[1] WETS Table for the Oregon City Weather Station; Source: (http://agacis.rcc-acis.org/?fips=41005)
[2] Observed precipitation is the precipitation recorded at the Oregon City Weather Station. Source: (https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg/?fips=41005)

D. Methods

PHS delineated the limits of the wetlands in the study area based on the presence of wetland hydrology, hydric soils, and hydrophytic vegetation, in accordance with the routine onsite determination method, as described in the *Corps of Engineers Wetland Delineation Manual, Wetlands Research Program Technical Report Y 87 1* ("The 1987 Manual") and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region*.

Investigations of potential wetlands were performed in all undeveloped areas of the site; however, the majority of the fieldwork took place in areas of low topography. i.e. the two detention basins and ditch.

July 2021 Fieldwork

Although precipitation was considered normal for the early July wetland delineation fieldwork, water tables in the Willamette Valley recede during the summer months, therefore, direct observations of wetland hydrology including surface water, saturation and a high water table were not possible in the seasonal wetlands of the site. Wetland hydrology indicators that were recorded at soils/hydrology pits included geomorphic position, the FAC-neutral test, drainage patterns and oxidized rhizospheres along living roots.

January 2022 Fieldwork

Because hydrological conditions were considered above normal, direct observations of wetland hydrology, including surface water, a high water table, and saturation were utilized when making wetland determinations; however, other indirect indicators, including geomorphic position, the FAC-neutral test, and oxidized rhizospheres along living roots were utilized whenever present.

E. Description of all Wetlands and Other Waters

PHS identified the jurisdictional limits of three wetlands within the study area.

Wetland A

Wetland A (1.46 acre) is located in the western portion of the study area. Its Cowardin classification is palustrine forested broad-leaved deciduous seasonally flooded/saturated (PFO1E) and its Hydrogeomorphic (HGM) classification is Flats. The dominant vegetation is Oregon ash, sweetbrier rose, trailing blackberry, spreading rush, and common camas. Soils meet the requirements for redox dark surface, and wetland hydrology indicators include high oxidized rhizospheres along living roots, geomorphic position, and occasionally the FAC-neutral test. Wetland A does not continue offsite.

The adjacent uplands are on slightly higher topography, and typically do not meet the requirements for hydrophytic vegetation. The dominant vegetation is Oregon white oak, Oregon ash, snowberry, sweetbrier rose, Himalayan blackberry, cutleaf blackberry (*Rubus laciniatus*, FACU), trailing blackberry, and shiny geranium. Owing to the site's history as a detention basin, some areas have hydric soils meeting the requirements for redox dark surface; however, wetland hydrology indicators are absent.

Wetlands B and C

Wetlands B (0.09 acre) and C (0.09 acre) are located in a broad ditch on the site's western boundary. Their Cowardin classification is palustrine emergent seasonally flooded (PEMC) and its HGM classification is Flats. Several culverts convey surface water from Wetland A to the ditch. The dominant vegetation includes velvet grass (*Holcus lanatus*, FAC), reed canarygrass (*Phalaris arundinacea*, FACW), brome grasses (*Bromus* spp.), bluegrass (*Poa* spp.), yellow glandweed (*Parentucellia viscosa*, FAC), and bird's-foot trefoil (*Lotus corniculatus*, FAC). Soils meet the requirements for redox dark surface. Wetland hydrology indicators include oxidized rhizospheres along living roots, geomorphic position, and the FAC-neutral test.

Dominant vegetation in the adjacent uplands includes Oregon white oak, Oregon ash, Himalayan blackberry, Kentucky bluegrass (*Poa pratensis*, FAC), and brome grasses. Wetland hydrology indicators are absent.

F. Deviation from Local or National Wetland Inventories

The 1999 Wilsonville Local Wetlands Inventory (LWI) depicts four wetlands within the site.

The LWI depicts a wetland adjacent to SW Boeckman Road. This wetland no longer exists and appears to have been filled for the construction of a roundabout that was built around the same time as SW Kinsman Road in 2016.

The LWI depicts a wetland in the approximate location of Wetland A. The LWI wetland is somewhat smaller and is farther to the south. These discrepancies are fairly minor and are likely due to the fact that the LWI wetlands were hand-drawn onto a field map, whereas the delineated wetland was flagged, supported with data, and professionally surveyed.

The LWI depicts a wetland in the approximate location of the southern part of Wetland B. The differences between the LWI wetland and Wetland B are also fairly minor, and likely are also the result of the LWI wetland being hand-drawn, whereas the delineated wetland was flagged, supported with data, and professionally surveyed.

The LWI also depicts a wetland in the southwestern portion of the study area that is part of a much larger contiguous wetland and overlaps delineated Wetland C that was partially filled for the construction of SW Kinsman Road in 2016.

G. Mapping Method

The wetland delineation boundaries, sample points 1-9 and 11-15, tax lots, and the study area were surveyed by Andy Paris and Associates, Inc., PLS; however sample points 10, 16, 17, and 18 were surveyed using a Trimble Geo 7X GPS with an accuracy of submeter. The one-foot contour intervals were downloaded from the National Oceanic and Atmospheric Administration (NOAA) website and extracted from a digital elevation model.

H. Additional Information

Wetland A is located in a constructed stormwater basin and is likely the result of water being collected from upslope areas

I. Results and Conclusions

PHS delineated boundaries of three wetlands (Wetlands A, B, and C). The total area of potentially jurisdictional wetlands within the study area is 1.64 acres, as summarized in Table 2.

Table 2: Summary of Wetlands and Water Resources within the Study Area

Wetland	Area (acres)	Cowardin Class	HGM Class
Wetland A	1.46	PFO1E	Flats
Wetland B	0.09	PEMC	Flats
Wetland C	0.09	PEMC	Flats
Wetland Total	**1.64**		

J. Required Disclaimer

This report documents the investigation, best professional judgment and conclusions of the investigators. It is correct and complete to the best of our knowledge. It should be considered a Preliminary Jurisdictional Determination of wetlands and other waters and used at your own risk unless it has been reviewed and approved in writing by the Oregon Department of State Lands in accordance with OAR 141-090-0005 through 141-090-0055.

III. REFERENCES

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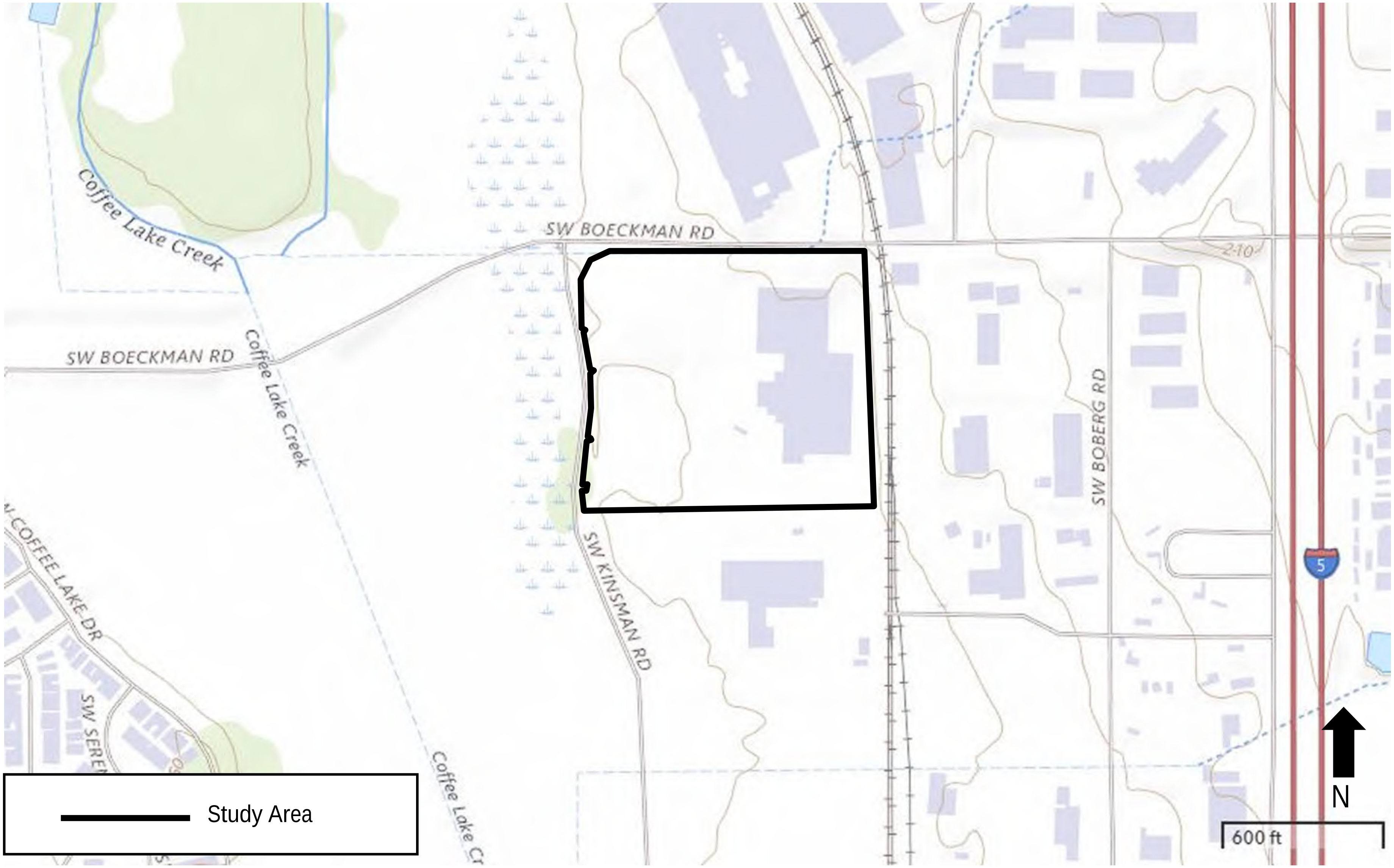
Appendix A

Figures

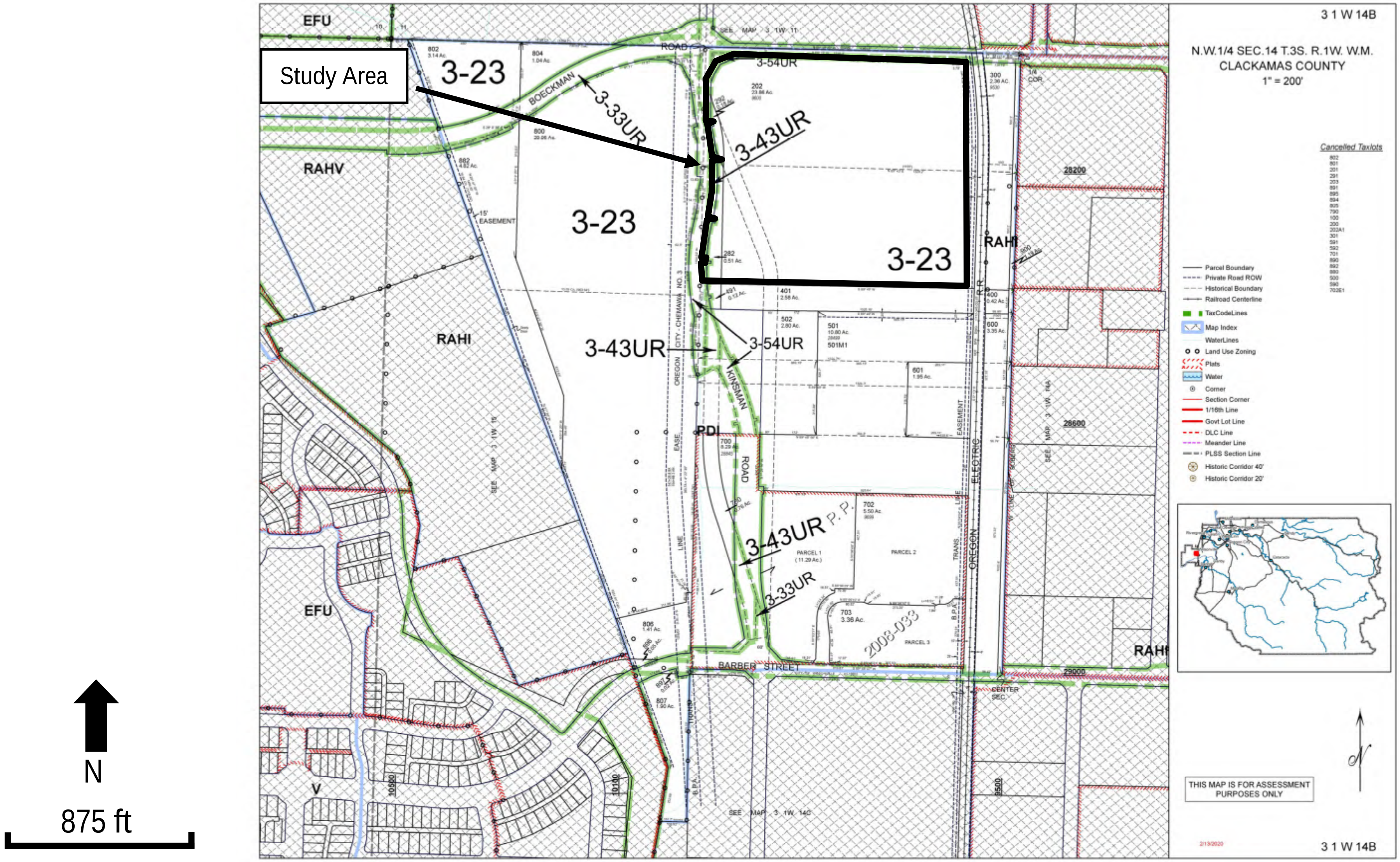


Project #7264
1/10/2022

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

General Location and Topography
9900 SW Boeckman Road Property - Wilsonville, Oregon
United States Geological Survey (USGS) Sherwood, Oregon 7.5 quadrangle, 2020
(viewer.nationalmap.gov/basic)

FIGURE
1

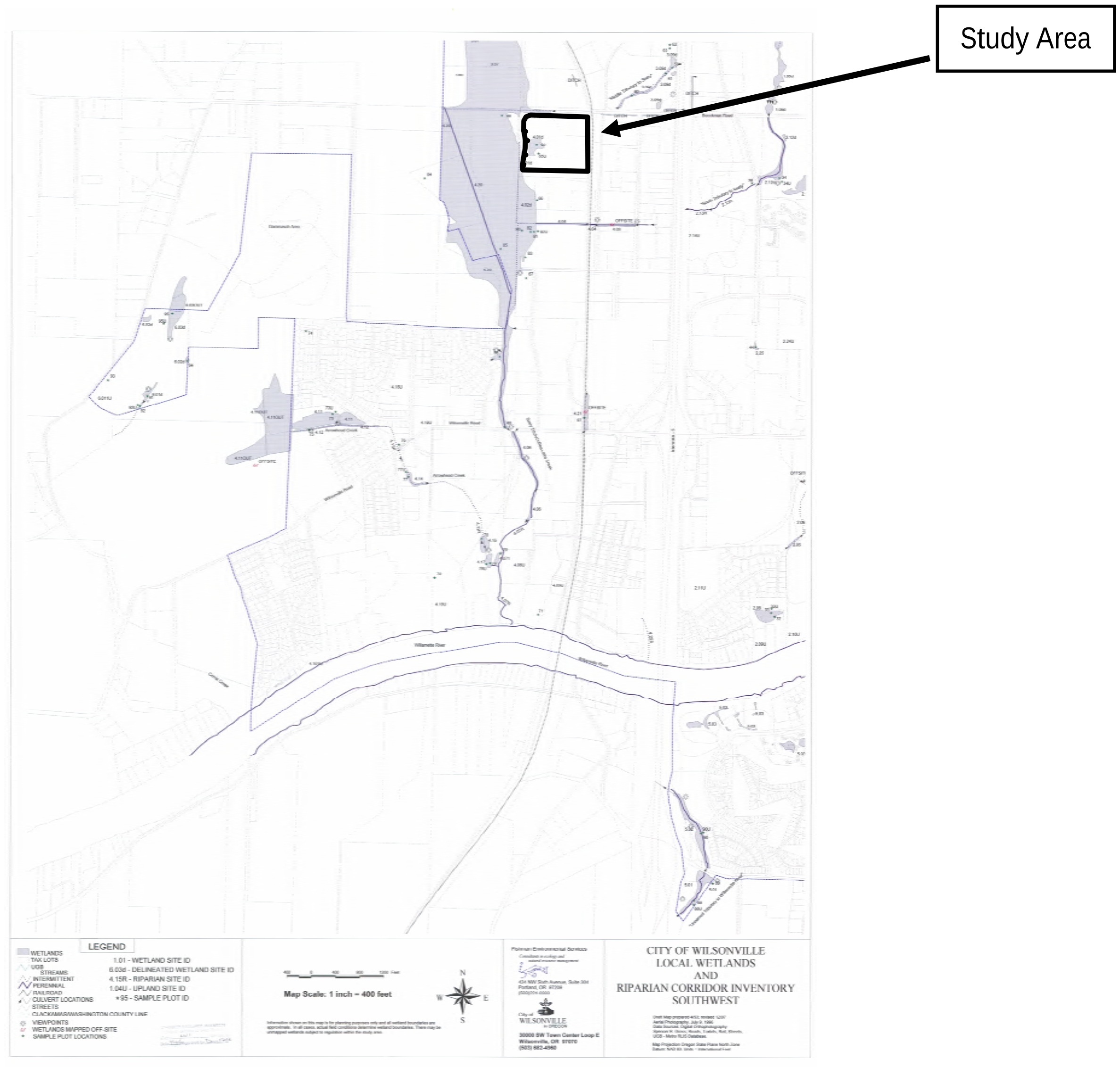


Project #7264
1/10/2022

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Tax Lot Map
9900 SW Boeckman Road Property - Wilsonville, Oregon
The Oregon Map (ormap.net)

FIGURE
2

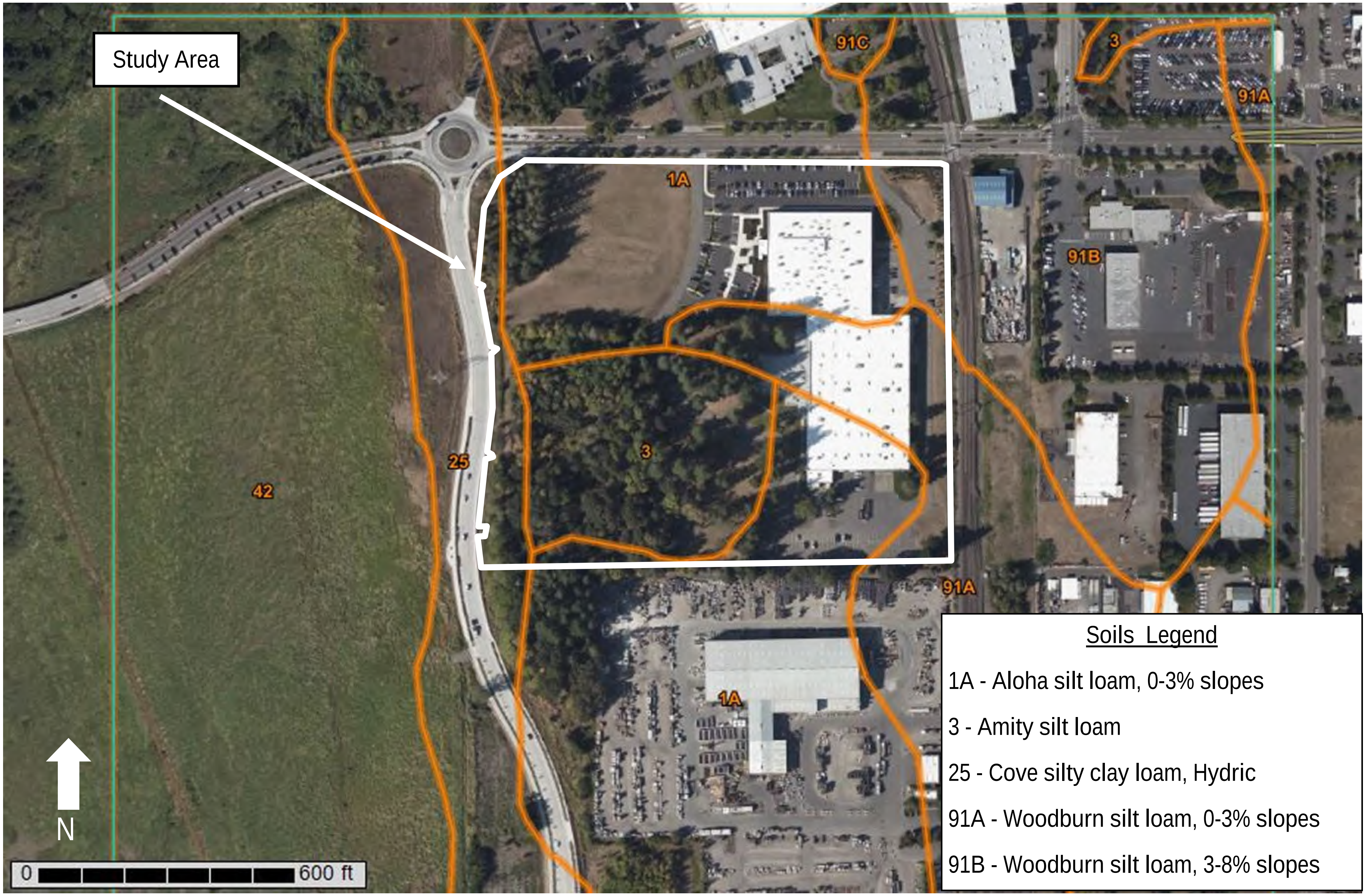


Project #7264
1/10/2022

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Local Wetlands Inventory
9900 SW Boeckman Road Property - Wilsonville, Oregon
Fishman Environmental Services, 1999

FIGURE
3



Project #7264
1/10/2022

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Soils
9900 SW Boeckman Road Property - Wilsonville, Oregon
Natural Resources Conservation Services, Web Soil Survey, 2021
(websoilsurvey.sc.egov.usda.gov)

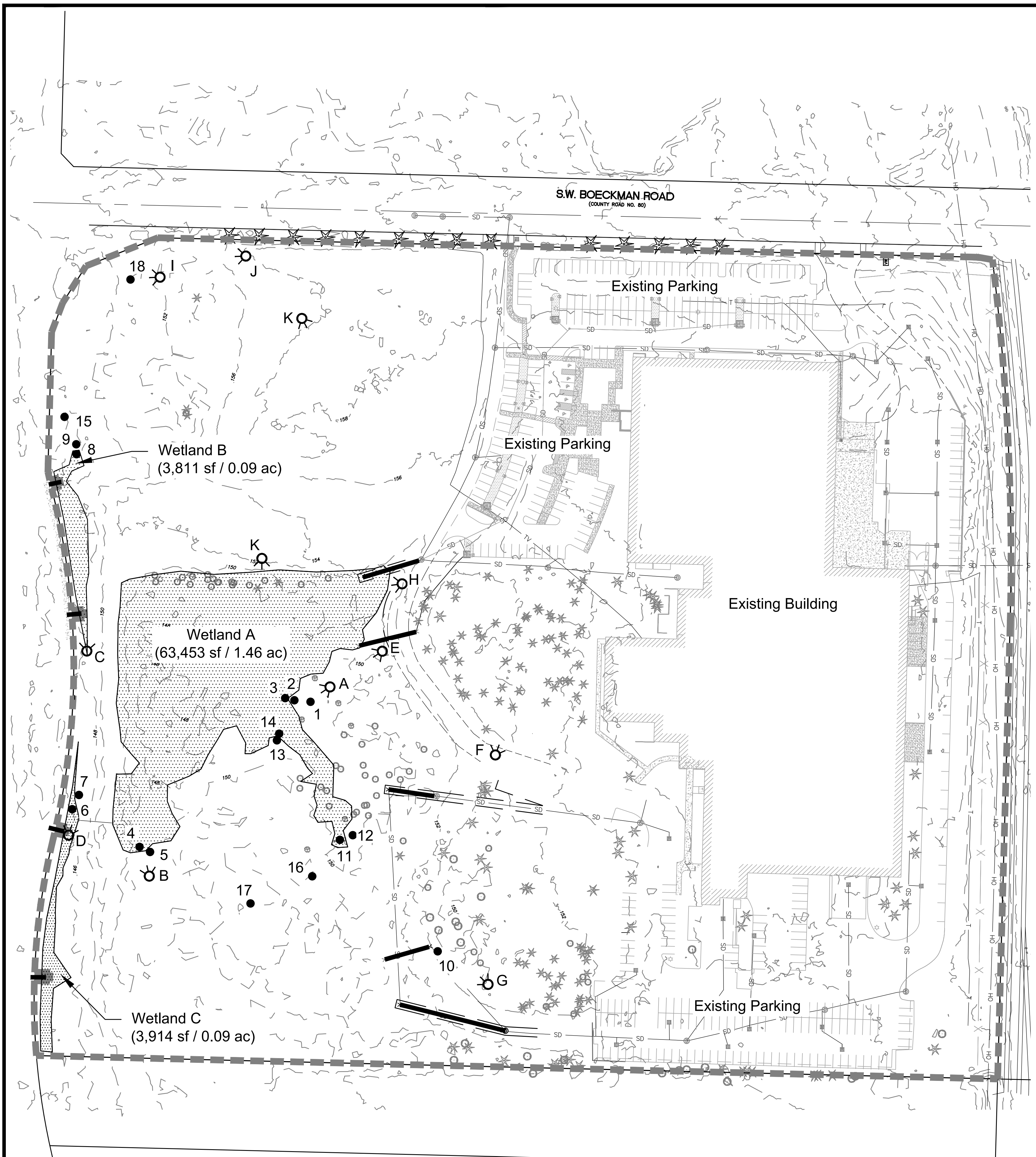
FIGURE
4

Project #7264
1/10/2022

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Aerial Photo
9900 SW Boeckman Road Property - Wilsonville, Oregon
GoogleEarth, 2021

FIGURE
5



LEGEND

- Project Area Boundary (1,066,705 sf / 24.5 ac)
- Wetland (71,178 sf / 1.64 ac)
- Sample Points
- Photo Points
- Culvert
- Storm Drain
- LIDAR 2' Contours
- Tree (Deciduous)
- Tree (Conifer)
- SD Existing Storm Pipe

0 62.5 125 250

SCALE IN FEET

Survey of wetland boundaries, sample points 1-9 and 11-15, tax lots and study area provided by Andy Paris and Associates, Inc., PLS
Sample Points 10, 16, 17, and 18 were surveyed using a Trimble Geo7X GPS unit and have submeter accuracy

PHS
Pacific Habitat Services,Inc.
9450 SW Commerce Circle, Suite 180 Wilsonville, Oregon 97070
Phone: (503) 570-0800 Fax (503) 570-0855

Wetland Delineation

9900 SW Boeckman Road Property - Wilsonville, Oregon

FIGURE 6

1-13-2022

Appendix B

Wetland Determination Data Sheets

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: **Boeckman Road** City/County: **Wilsonville/Clackamas** Sampling Date: **7/1/2021**

Applicant/Owner: **Martin Development** State: **OR** Sampling Point: **1**

Investigator(s): **JT/CM** Section, Township, Range: **Section 14B, Township 3 South, Range 1 West**

Landform (hillslope, terrace, etc.:) **Depression** Local relief (concave, convex, none): **None** Slope (%): **~1**

Subregion (LRR): **LRR A** Lat: **45.3158** Long: **-122.7785** Datum: **WGS84**

Soil Map Unit Name: **Amity Silt Loam** NWI Classification: **N/A**

Are climatic/hydrologic conditions on the site typical for this time of year? Yes **X** No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) **Y**

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		X
Hydric Soil Present?	X	
Wetland Hydrology Present?		X

Is Sampled Area within a Wetland? Yes ____ No **X**

Remarks:

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: 30)			
1 ***Fraxinus latifolia***	80	X	FACW
2 ***Pinus ponderosa***	10		FACU
3 ***Quercus garryana***	5		FACU
4			
	95	= Total Cover	
Sapling/Shrub Stratum (plot size: 15)			
1 ***Symphoricarpos albus***	50	X	FACU
2 ***Rubus ursinus***	30	X	FACU
3			
4			
5			
	80	= Total Cover	
Herb Stratum (plot size: 5)			
1 ***Rumex acetosella***	5		FACU
2 ***Ranunculus acris***	2		FAC
3 ***Vicia sp.***	10		(FAC)
4 ***Geranium lucidum***	50	X	UPL
5			
6			
7			
8			
	67	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum **0**

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: **1** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That are OBL, FACW, or FAC: **25%** (A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	0
FACW species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals	0 (A)		0 (B)

Prevalence Index =B/A = **#DIV/0!**

Hydrophytic Vegetation Indicators:

____ 1- Rapid Test for Hydrophytic Vegetation
____ 2- Dominance Test is >50%
____ 3-Prevalence Index is ≤ 3.0[1]
____ 4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
____ 5- Wetland Non-Vascular Plants[1]
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No **X**

Remarks:
Quercus garryana <1 percent in the shrub layer (seedling).

SOIL **PHS #** 7264 Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	7.5YR 2.5/2	98	7.5YR 3/2	2	C	M	Silty Clay Loam	
8-24	7.5YR 3/2	80	7.5YR 4/6	10	C	M	Silty Clay Loam	
			7.5YR 4/2	10	D	M	Silty Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Fac-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	
Water Table Present?		X	>24
Saturation Present? (includes capillary fringe)		X	>24

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site:	Boeckman Road	City/County:	Wilsonville/Clackamas	Sampling Date:	7/1/2021
Applicant/Owner:	Martin Development	State:	OR	Sampling Point:	2
Investigator(s):	JT/CM	Section, Township, Range:	Section 14B, Township 3 South, Range 1 West		
Landform (hillslope, terrace, etc.:)	Depression	Local relief (concave, convex, none):	None	Slope (%):	~1
Subregion (LRR):	LRR A	Lat:	45.3158	Long:	-122.7786
Datum:	WGS84				
Soil Map Unit Name:	Amity Silt Loam	NWI Classification:	N/A		

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) Y

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		X
Hydric Soil Present?	X	
Wetland Hydrology Present?		X
Is Sampled Area within a Wetland?		X

Remarks:

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: 30)			
1 *Fraxinus latifolia*	90	X	FACW
2 *Quercus garryana*	10		FACU
3			
4			
	100	= Total Cover	
Sapling/Shrub Stratum (plot size: 15)			
1 *Rubus laciniatus*	20	X	FACU
2 *Rubus ursinus*	60	X	FACU
3 *Rosa rubiginosa*	2		UPL
4			
5			
	82	= Total Cover	
Herb Stratum (plot size: 5)			
1 *Geum macrophyllum*	20	X	FAC
2 *Carex leptopoda*	10	X	FAC
3 *Geranium lucidum*	20	X	UPL
4			
5			
6			
7			
8			
	50	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	
% Bare Ground in Herb Stratum	0		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	3	(A)
Total Number of Dominant Species Across All Strata:	6	(B)
Percent of Dominant Species That are OBL, FACW, or FAC:	50%	(A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	0
FACW species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals	0 (A)		0 (B)

Prevalence Index =B/A = #DIV/0!

Hydrophytic Vegetation Indicators:

____ 1- Rapid Test for Hydrophytic Vegetation
____ 2- Dominance Test is >50%
____ 3-Prevalence Index is ≤ 3.0[1]
____ 4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
____ 5- Wetland Non-Vascular Plants[1]
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

SOIL PHS # 7264 Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(Inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-5	**10YR 3/2**	**99**	**7.5YR 3/4**	**1**	**C**	**M**	**Silty Clay Loam**	
5-12	**10YR 3/2**	**80**	**7.5YR 3/4**	**20**	**C**	**M**	**Silty Clay Loam**	**Coarse**

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___	Histosol (A1)	___	Sandy Redox (S5)	___	2 cm Muck (A10)
___	Histic Epipedon (A2)	___	Stripped Matrix (S6)	___	Red Parent Material (TF2)
___	Black Histic (A3)	___	Loamy Mucky Mineral (F1) **(except MLRA 1)**	___	Very Shallow Dark Surface (TF12)
___	Hydrogen Sulfide (A4)	___	Loamy Gleyed Matrix (F2)	___	Other (explain in Remarks)
___	Depleted Below Dark Surface (A11)	___	Depleted Matrix (F3)		
___	Thick Dark Surface (A12)	**X**	Redox Dark Surface (F6)		
___	Sandy Mucky Mineral (S1)	___	Depleted Dark Surface (F7)		
___	Sandy Gleyed Matrix (S4)	___	Redox Depressions (F8)		

Indicators for Problematic Hydric Soils[3]: (right column above)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___	Surface Water (A1)	___	Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___	High Water Table (A2)		
___	Saturation (A3)	___	Salt Crust (B11)
___	Water Marks (B1)	___	Aquatic Invertebrates (B13)
___	Sediment Deposits (B2)	___	Hydrogen Sulfide Odor (C1)
___	Drift Deposits (B3)	___	Oxidized Rhizospheres along Living Roots (C3)
___	Algal Mat or Crust (B4)	___	Presence of Reduced Iron (C4)
___	Iron Deposits (B5)	___	Recent Iron Reduction in Plowed Soils (C6)
___	Surface Soil Cracks (B6)	___	Stunted or Stressed Plants (D1) **(LRR A)**
___	Inundation Visible on Aerial Imagery (B7)	___	Other (Explain in Remarks)
___	Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (2 or more required)

___	Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
___	Drainage Patterns (B10)
___	Dry-Season Water Table (C2)
___	Saturation Visible on Aerial Imagery (C9)
___	Geomorphic Position (D2)
___	Shallow Aquitard (D3)
___	Fac-Neutral Test (D5)
___	Raised Ant Mounds (D6) **(LRR A)**
___	Frost-Heave Hummocks (D7)

Field Observations:

	Yes		No		Depth (inches):
Surface Water Present?	Yes	___	No	X	
Water Table Present?	Yes	___	No	X	>12
Saturation Present? (includes capillary fringe)	Yes	___	No	X	>12

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: **Boeckman Road** City/County: **Wilsonville/Clackamas** Sampling Date: **7/1/2021**

Applicant/Owner: **Martin Development** State: **OR** Sampling Point: **3**

Investigator(s): **JT/CM** Section, Township, Range: **Section 14B, Township 3 South, Range 1 West**

Landform (hillslope, terrace, etc.:) **Flat** Local relief (concave, convex, none): **Concave** Slope (%): **~1**

Subregion (LRR): **LRR A** Lat: **45.3158** Long: **-122.7786** Datum: **WGS84**

Soil Map Unit Name: **Amity Silt Loam** NWI Classification: **N/A**

Are climatic/hydrologic conditions on the site typical for this time of year? Yes **X** No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) **Y**

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	X	
Hydric Soil Present?	X	
Wetland Hydrology Present?	X	
Is Sampled Area within a Wetland?	X	

Remarks:
Sample Point located in a very shallow swale.

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: 30)			
1 ***Fraxinus latifolia***	90	X	FACW
2			
3			
4			
	90	= Total Cover	
Sapling/Shrub Stratum (plot size: 15)			
1 ***Crataegus monogyna***	10		FAC
2 ***Rosa rubiginosa***	20	X	UPL
3 ***Rubus ursinus***	20	X	FACU
4 ***Fraxinus latifolia***	5		FACW
5			
	55	= Total Cover	
Herb Stratum (plot size: 5)			
1 ***Juncus balticus***	30	X	FACW
2 ***Camassia quamash***	30	X	FACW
3 ***Geum macrophyllum***	10		FAC
4			
5			
6			
7			
8			
	70	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum **30**

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That are OBL, FACW, or FAC: **60%** (A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	0
FACW species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals	0 (A)		0 (B)

Prevalence Index =B/A = **#DIV/0!**

Hydrophytic Vegetation Indicators:

- ____ 1- Rapid Test for Hydrophytic Vegetation
- **X** 2- Dominance Test is >50%
- ____ 3-Prevalence Index is ≤ 3.0[1]
- ____ 4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
- ____ 5- Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes **X** No ____

Remarks:

SOIL PHS # 7264 Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 2/2	100					Silt Loam	
3-12	10YR 3/2	90	7.5YR 2.5/3	10	C	M	Silty Clay Loam	Fine

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

	Indicator		Indicator
	Histosol (A1)		Sandy Redox (S5)
	Histic Epipedon (A2)		Stripped Matrix (S6)
	Black Histic (A3)		Loamy Mucky Mineral (F1) **(except MLRA 1)**
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F2)
	Depleted Below Dark Surface (A11)		Depleted Matrix (F3)
	Thick Dark Surface (A12)	X	Redox Dark Surface (F6)
	Sandy Mucky Mineral (S1)		Depleted Dark Surface (F7)
	Sandy Gleyed Matrix (S4)		Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

	Indicator
	2 cm Muck (A10)
	Red Parent Material (TF2)
	Very Shallow Dark Surface (TF12)
	Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X **No** ______

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

	Indicator		Indicator
	Surface Water (A1)		Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
	High Water Table (A2)		
	Saturation (A3)		Salt Crust (B11)
	Water Marks (B1)		Aquatic Invertebrates (B13)
	Sediment Deposits (B2)		Hydrogen Sulfide Odor (C1)
	Drift Deposits (B3)		Oxidized Rhizospheres along Living Roots (C3)
	Algal Mat or Crust (B4)		Presence of Reduced Iron (C4)
	Iron Deposits (B5)		Recent Iron Reduction in Plowed Soils (C6)
	Surface Soil Cracks (B6)		Stunted or Stressed Plants (D1) **(LRR A)**
	Inundation Visible on Aerial Imagery (B7)		Other (Explain in Remarks)
	Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (2 or more required)

	Indicator
	Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
X	Drainage Patterns (B10)
	Dry-Season Water Table (C2)
	Saturation Visible on Aerial Imagery (C9)
X	Geomorphic Position (D2)
	Shallow Aquitard (D3)
	Fac-Neutral Test (D5)
	Raised Ant Mounds (D6) **(LRR A)**
	Frost-Heave Hummocks (D7)

Field Observations:

	Yes	No	Depth (inches):
Surface Water Present?		X	
Water Table Present?		X	>12
Saturation Present? (includes capillary fringe)		X	>12

Wetland Hydrology Present? Yes X **No** ______

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: **Boeckman Road** City/County: **Wilsonville/Clackamas** Sampling Date: **7/1/2021**

Applicant/Owner: **Martin Development** State: **OR** Sampling Point: **4**

Investigator(s): **JT/CM** Section, Township, Range: **Section 14B, Township 3 South, Range 1 West**

Landform (hillslope, terrace, etc.:) **Swale** Local relief (concave, convex, none): **Concave** Slope (%): **2**

Subregion (LRR): **LRR A** Lat: **45.3153** Long: **-122.7793** Datum: **WGS84**

Soil Map Unit Name: **Amity Silt Loam** NWI Classification: **N/A**

Are climatic/hydrologic conditions on the site typical for this time of year? Yes **X** No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) **Y**

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes **X**	No
Hydric Soil Present?	Yes **X**	No
Wetland Hydrology Present?	Yes **X**	No

Is Sampled Area within a Wetland? Yes **X** No ____

Remarks:
Sample Point located in a very shallow swale.

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: 30)			
1 ***Fraxinus latifolia***	**40**	**X**	**FACW**
2			
3			
4			
	40	= Total Cover	
Sapling/Shrub Stratum (plot size: 15)			
1 ***Rosa sp***	**20**	**X**	**(FAC)**
2 ***Fraxinus latifolia***	**20**	**X**	**FACW**
3 ***Symphoricarpos albus***	**5**		**FACU**
4			
5			
	45	= Total Cover	
Herb Stratum (plot size: 5)			
1 ***Phalaris arundinacea***	**50**	**X**	**FACW**
2 ***Geranium lucidum***	**20**	**X**	**UPL**
3 ***Epilobium ciliatum***	**5**		**FACW**
4 ***Cirsium arvense***	**5**		**FAC**
5			
6			
7			
8			
	80	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum **20**

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That are OBL, FACW, or FAC: **80%** (A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	**0**
FACW species		x 2 =	**0**
FAC Species		x 3 =	**0**
FACU Species		x 4 =	**0**
UPL Species		x 5 =	**0**
Column Totals	**0** (A)		**0** (B)

Prevalence Index =B/A = **#DIV/0!**

Hydrophytic Vegetation Indicators:

- ____ 1- Rapid Test for Hydrophytic Vegetation
- **X** 2- Dominance Test is >50%
- ____ 3-Prevalence Index is ≤ 3.0[1]
- ____ 4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
- ____ 5- Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes X** **No** ____

Remarks:

SOIL PHS # 7264 Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(Inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-2	10YR 3/1	99	7.5YR 3/3	1	C	M	Silt Loam	Fine
2-7	10YR 3/1	70	7.5YR 3/3	30	C	M	Silt Loam	Coarse
7-13	7.5YR 3/1	30	5YR 3/4	70	C	M	Silt Loam	Coarse

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
X Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
X Geomorphic Position (D2)
___ Shallow Aquitard (D3)
X Fac-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

	Yes	No	Depth (inches):
Surface Water Present?		X	
Water Table Present?		X	>13
Saturation Present? (includes capillary fringe)		X	>13

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site:	Boeckman Road	City/County:	Wilsonville/Clackamas	Sampling Date:	7/1/2021
Applicant/Owner:	Martin Development	State:	OR	Sampling Point:	5
Investigator(s):	JT/CM	Section, Township, Range:	Section 14B, Township 3 South, Range 1 West		
Landform (hillslope, terrace, etc.:)	Flat	Local relief (concave, convex, none):	None	Slope (%):	1
Subregion (LRR):	LRR A	Lat:	45.3153	Long:	-122.7792
Datum:	WGS84				
Soil Map Unit Name:	Amity Silt Loam	NWI Classification:	N/A		

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) Y

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		X
Hydric Soil Present?	X	
Wetland Hydrology Present?		X
Is Sampled Area within a Wetland?		X

Remarks:
Sample Point located in a very shallow swale.

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: 30)			
1 *Quercus garryana*	40	X	FACU
2			
3			
4			
	40	= Total Cover	
Sapling/Shrub Stratum (plot size: 15)			
1 *Rosa rubiginosa*	70	X	UPL
2 *Symphoricarpos albus*	20	X	FACU
3 *Fraxinus latifolia*	5		FACW
4			
5			
	95	= Total Cover	
Herb Stratum (plot size: 5)			
1 *Geranium lucidum*	20	X	UPL
2 *Vicia sp*	20	X	(FAC)
3 *Phalaris arundinacea*	10	X	FACW
4 *Sonchus sp*	10	X	(FAC)
5 *Galium aparine*	10	X	FACU
6 *Cirsium arvense*	10	X	FAC
7 *Lactuca serriola*	5		FACU
8			
	85	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum 15

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	4	(A)
Total Number of Dominant Species Across All Strata:	9	(B)
Percent of Dominant Species That are OBL, FACW, or FAC:	44%	(A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	0
FACW species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals	0 (A)		0 (B)

Prevalence Index =B/A = #DIV/0!

Hydrophytic Vegetation Indicators:

____ 1- Rapid Test for Hydrophytic Vegetation
____ 2- Dominance Test is >50%
____ 3-Prevalence Index is ≤ 3.0[1]
____ 4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
____ 5- Wetland Non-Vascular Plants[1]
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ____ **No** X

Remarks:

SOIL

PHS # 7264 Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(Inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-6	10YR 3/1	100					Silt Loam	
6-8	10YR 3/2	80	7.5YR 4/4	20	C	M	Silt Loam	Medium
8-13	10YR 3/2	70	7.5YR 3/3	30	C	M	Silt Loam	Medium

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Fac-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	
Water Table Present?		X	>13
Saturation Present? (includes capillary fringe)		X	>13

Wetland Hydrology Present? Yes ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: **Boeckman Road** City/County: **Wilsonville/Clackamas** Sampling Date: **7/1/2021**

Applicant/Owner: **Martin Development** State: **OR** Sampling Point: **6**

Investigator(s): **JT/CM** Section, Township, Range: **Section 14B, Township 3 South, Range 1 West**

Landform (hillslope, terrace, etc.:) **Ditch** Local relief (concave, convex, none): **Concave** Slope (%): **3**

Subregion (LRR): **LRR A** Lat: **45.3154** Long: **-122.7796** Datum: **WGS84**

Soil Map Unit Name: **Amity Silt Loam** NWI Classification: **N/A**

Are climatic/hydrologic conditions on the site typical for this time of year? Yes **X** No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) **Y**

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	X	
Hydric Soil Present?	X	
Wetland Hydrology Present?	X	

Is Sampled Area within a Wetland? Yes **X** No ____

Remarks:
Sample Point located in a very shallow swale.

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: ____)			
1			
2			
3			
4			
	0	= Total Cover	
Sapling/Shrub Stratum (plot size: ____)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb Stratum (plot size: 5)			
1 ***Holcus lanatus***	30	X	FAC
2 ***Phalaris arundinacea***	20	X	FACW
3 ***Bromus sp***	20	X	(FAC)
4 ***Poa sp***	10		(FAC)
5 ***Parentucellia viscosa***	10		FAC
6 ***Lotus corniculatus***	5		FAC
7 ***Juncus balticus***	5		FACW
8			
	100	= Total Cover	
Woody Vine Stratum (plot size: ____)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum **0**

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: **3** (A)

Total Number of Dominant Species Across All Strata: **3** (B)

Percent of Dominant Species That are OBL, FACW, or FAC: **100%** (A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	0
FACW species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals	0 (A)		0 (B)

Prevalence Index =B/A = **#DIV/0!**

Hydrophytic Vegetation Indicators:

- ____ 1- Rapid Test for Hydrophytic Vegetation
- **X** 2- Dominance Test is >50%
- ____ 3-Prevalence Index is ≤ 3.0[1]
- ____ 4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
- ____ 5- Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes X** **No** ____

Remarks:

SOIL PHS # 7264 Sampling Point: 6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 2/2	97	7.5YR 4/6	2	C	PL	Sand	Fine
0-5			7.5YR 4/6	1	C	M		Fine
5-13	10YR 2/2	90	7.5YR 4/6	5	C	PL	Silt Loam	Fine
5-13			7.5YR 4/6	5	C	M		Fine

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X Fac-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	
Water Table Present?		X	>13
Saturation Present? (includes capillary fringe)		X	>13

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site:	**Boeckman Road**	City/County:	**Wilsonville/Clackamas**	Sampling Date:	**7/1/2021**
Applicant/Owner:	**Martin Development**	State:	**OR**	Sampling Point:	**7**
Investigator(s):	**JT/CM**	Section, Township, Range:	**Section 14B, Township 3 South, Range 1 West**		
Landform (hillslope, terrace, etc.:)	**Ditch**	Local relief (concave, convex, none):	**Concave**	Slope (%):	**~1**
Subregion (LRR):	**LRR A**	Lat:	**45.3155**	Long:	**-122.7796**
Datum:	**WGS84**				
Soil Map Unit Name:	**Amity Silt Loam**	NWI Classification:	**N/A**		

Are climatic/hydrologic conditions on the site typical for this time of year? Yes **X** No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) **Y**

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	**X**	
Hydric Soil Present?		**X**
Wetland Hydrology Present?		**X**
Is Sampled Area within a Wetland?		**X**

Remarks:
Sample Point located in a very shallow swale.

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: **30**)			
1 ***Quercus garryana***	**40**	**X**	**FACU**
2 ***Fraxinus latifolia***	**10**	**X**	**FACW**
3			
4			
	50	= Total Cover	
Sapling/Shrub Stratum (plot size: **15**)			
1 ***Rubus armeniacus***	**25**	**X**	**FAC**
2			
3			
4			
5			
	25	= Total Cover	
Herb Stratum (plot size: **5**)			
1 ***Poa pratensis***	**75**	**X**	**FAC**
2 ***Bromus sp***	**20**	**X**	**(FAC)**
3 ***Phalaris arundinacea***	**5**		**FACW**
4			
5			
6			
7			
8			
	100	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum **0**

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That are OBL, FACW, or FAC: **80%** (A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	**0**
FACW species		x 2 =	**0**
FAC Species		x 3 =	**0**
FACU Species		x 4 =	**0**
UPL Species		x 5 =	**0**
Column Totals	**0** (A)		**0** (B)

Prevalence Index =B/A = **#DIV/0!**

Hydrophytic Vegetation Indicators:

- ____ 1- Rapid Test for Hydrophytic Vegetation
- **X** 2- Dominance Test is >50%
- ____ 3-Prevalence Index is ≤ 3.0[1]
- ____ 4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
- ____ 5- Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** **X** **No** ____

Remarks:
Daucus carota is less than 1%.

SOIL PHS # 7264 Sampling Point: 7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-13	10YR 3/2	100					Loamy Sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
X Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Fac-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	
Water Table Present?		X	>13
Saturation Present? (includes capillary fringe)		X	>13

Wetland Hydrology Present? Yes ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: **Boeckman Road** City/County: **Wilsonville/Clackamas** Sampling Date: **7/1/2021**

Applicant/Owner: **Martin Development** State: **OR** Sampling Point: **8**

Investigator(s): **JT/CM** Section, Township, Range: **Section 14B, Township 3 South, Range 1 West**

Landform (hillslope, terrace, etc.:) **Swale** Local relief (concave, convex, none): **Concave** Slope (%): **~1**

Subregion (LRR): **LRR A** Lat: **45.3166** Long: **-122.7796** Datum: **WGS84**

Soil Map Unit Name: **Amity Silt Loam** NWI Classification: **N/A**

Are climatic/hydrologic conditions on the site typical for this time of year? Yes **X** No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) **Y**

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	X	
Hydric Soil Present?	X	
Wetland Hydrology Present?	X	
Is Sampled Area within a Wetland?	X	

Remarks:
Sample Point located in a very shallow swale.

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: 30)			
1 ***Fraxinus latifolia***	50	X	FACW
2			
3			
4			
	50	= Total Cover	
Sapling/Shrub Stratum (plot size: 15)			
1 ***Rubus spectabilis***	25	X	FAC
2 ***Symphoricarpos albus***	10	X	FACU
3			
4			
5			
	35	= Total Cover	
Herb Stratum (plot size: 5)			
1 ***Juncus balticus***	30	X	FACW
2 ***Melissa officinalis***	20	X	FACU
3 ***Phalaris arundinacea***	20	X	FACW
4 ***Bromus sp***	20	X	(FAC)
5 ***Torilis arvensis***	10		UPL
6			
7			
8			
	100	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	
% Bare Ground in Herb Stratum			

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	5	(A)
Total Number of Dominant Species Across All Strata:	7	(B)
Percent of Dominant Species That are OBL, FACW, or FAC:	71%	(A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	0
FACW species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals	0 (A)		0 (B)

Prevalence Index =B/A = **#DIV/0!**

Hydrophytic Vegetation Indicators:

	1- Rapid Test for Hydrophytic Vegetation
X	2- Dominance Test is >50%
	3-Prevalence Index is ≤ 3.0[1]
	4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
	5- Wetland Non-Vascular Plants[1]
	Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes **X** No ____

Remarks:

SOIL PHS # 7264 Sampling Point: 8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(Inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-5	10YR 3/1	100					Silt Loam	
5-12	10YR 3/1	90	7.5YR 3/4	10			Silt Loam	Blotchy

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

	Histosol (A1)
	Histic Epipedon (A2)
	Black Histic (A3)
	Hydrogen Sulfide (A4)
	Depleted Below Dark Surface (A11)
	Thick Dark Surface (A12)
	Sandy Mucky Mineral (S1)
	Sandy Gleyed Matrix (S4)
	Sandy Redox (S5)
	Stripped Matrix (S6)
	Loamy Mucky Mineral (F1) **(except MLRA 1)**
	Loamy Gleyed Matrix (F2)
	Depleted Matrix (F3)
X	Redox Dark Surface (F6)
	Depleted Dark Surface (F7)
	Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

	2 cm Muck (A10)
	Red Parent Material (TF2)
	Very Shallow Dark Surface (TF12)
	Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes X **No**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

	Surface Water (A1)
	High Water Table (A2)
	Saturation (A3)
	Water Marks (B1)
	Sediment Deposits (B2)
	Drift Deposits (B3)
	Algal Mat or Crust (B4)
	Iron Deposits (B5)
	Surface Soil Cracks (B6)
	Inundation Visible on Aerial Imagery (B7)
	Sparsely Vegetated Concave Surface (B8)
	Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
	Salt Crust (B11)
	Aquatic Invertebrates (B13)
	Hydrogen Sulfide Odor (C1)
	Oxidized Rhizospheres along Living Roots (C3)
	Presence of Reduced Iron (C4)
	Recent Iron Reduction in Plowed Soils (C6)
	Stunted or Stressed Plants (D1) **(LRR A)**
	Other (Explain in Remarks)

Secondary Indicators (2 or more required)

	Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
	Drainage Patterns (B10)
	Dry-Season Water Table (C2)
	Saturation Visible on Aerial Imagery (C9)
X	Geomorphic Position (D2)
	Shallow Aquitard (D3)
X	Fac-Neutral Test (D5)
	Raised Ant Mounds (D6) **(LRR A)**
	Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes		No	X	Depth (inches):	
Water Table Present?	Yes		No	X	Depth (inches):	>12
Saturation Present? (includes capillary fringe)	Yes		No	X	Depth (inches):	>12

Wetland Hydrology Present? Yes X **No**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: **Boeckman Road** City/County: **Wilsonville/Clackamas** Sampling Date: **7/1/2021**

Applicant/Owner: **Martin Development** State: **OR** Sampling Point: **9**

Investigator(s): **JT/CM** Section, Township, Range: **Section 14B, Township 3 South, Range 1 West**

Landform (hillslope, terrace, etc.:) **Flat** Local relief (concave, convex, none): **None** Slope (%): **1**

Subregion (LRR): **LRR A** Lat: **45.3166** Long: **-122.7796** Datum: **WGS84**

Soil Map Unit Name: **Amity Silt Loam** NWI Classification: **N/A**

Are climatic/hydrologic conditions on the site typical for this time of year? Yes **X** No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) **Y**

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		X
Hydric Soil Present?	X	
Wetland Hydrology Present?		X
Is Sampled Area within a Wetland?		X

Remarks:
Sample Point located in a very shallow swale.

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: 30)			
1 ***Quercus garryana***	60	X	FACU
2 ***Fraxinus latifolia***	10		FACW
3 ***Pseudotsuga menziesii***	10		FACU
4			
	80	= Total Cover	
Sapling/Shrub Stratum (plot size: 15)			
1 ***Rubus armeniacus***	30	X	FAC
2 ***Symphoricarpos albus***	30	X	FACU
3 ***Rosa rubiginosa***	20		UPL
4 ***Toxicodendron diversilobum***	20		FAC
5 ***Ribes sanguineum***	5		FACU
	105	= Total Cover	
Herb Stratum (plot size: 5)			
1 ***Melissa officinalis***	30	X	FACU
2 ***Daucus carota***	20	X	FACU
3 ***Poa sp***	20	X	(FAC)
4 ***Rosa rubiginosa***	10		UPL
5 ***Epilobium densiflorum***	10		(FAC)
6 ***Vicia sp***	10		(FAC)
7 ***Conium maculatum***	10		FAC
8			
	110	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum **0**

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That are OBL, FACW, or FAC: **33%** (A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	0
FACW species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals	0 (A)		0 (B)

Prevalence Index =B/A = **#DIV/0!**

Hydrophytic Vegetation Indicators:

____ 1- Rapid Test for Hydrophytic Vegetation
____ 2- Dominance Test is >50%
____ 3-Prevalence Index is ≤ 3.0[1]
____ 4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
____ 5- Wetland Non-Vascular Plants[1]
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No **X**

Remarks:

SOIL

PHS # 7264   Sampling Point: 9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 2/2	100					Silt Loam	
7-16	10YR 3/2	95	10YR 3/3	5	C	M	Silt Loam	Coarse

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

	Histosol (A1)		Sandy Redox (S5)		2 cm Muck (A10)
	Histic Epipedon (A2)		Stripped Matrix (S6)		Red Parent Material (TF2)
	Black Histic (A3)		Loamy Mucky Mineral (F1) **(except MLRA 1)**		Very Shallow Dark Surface (TF12)
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F2)		Other (explain in Remarks)
	Depleted Below Dark Surface (A11)		Depleted Matrix (F3)		
	Thick Dark Surface (A12)	X	Redox Dark Surface (F6)		
	Sandy Mucky Mineral (S1)		Depleted Dark Surface (F7)		
	Sandy Gleyed Matrix (S4)		Redox Depressions (F8)		

Indicators for Problematic Hydric Soils[3]: (right column above)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes X **No**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

	Surface Water (A1)		Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
	High Water Table (A2)		Salt Crust (B11)
	Saturation (A3)		Aquatic Invertebrates (B13)
	Water Marks (B1)		Hydrogen Sulfide Odor (C1)
	Sediment Deposits (B2)		Oxidized Rhizospheres along Living Roots (C3)
	Drift Deposits (B3)		Presence of Reduced Iron (C4)
	Algal Mat or Crust (B4)		Recent Iron Reduction in Plowed Soils (C6)
	Iron Deposits (B5)		Stunted or Stressed Plants (D1) **(LRR A)**
	Surface Soil Cracks (B6)		Other (Explain in Remarks)
	Inundation Visible on Aerial Imagery (B7)		
	Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (2 or more required)

	Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
	Drainage Patterns (B10)
	Dry-Season Water Table (C2)
	Saturation Visible on Aerial Imagery (C9)
	Geomorphic Position (D2)
	Shallow Aquitard (D3)
	Fac-Neutral Test (D5)
	Raised Ant Mounds (D6) **(LRR A)**
	Frost-Heave Hummocks (D7)

Field Observations:

	Yes	No	Depth (inches):
Surface Water Present?		X	
Water Table Present?		X	>16
Saturation Present? (includes capillary fringe)		X	>16

Wetland Hydrology Present? Yes   **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site:	Boeckman Road	City/County:	Wilsonville/Clackamas	Sampling Date:	1/11/2022
Applicant/Owner:	Martin Development	State:	OR	Sampling Point:	10
Investigator(s):	JT/CM	Section, Township, Range:	Section 14B, Township 3 South, Range 1 West		
Landform (hillslope, terrace, etc.:)	Depression	Local relief (concave, convex, none):	Concave	Slope (%):	0
Subregion (LRR):	LRR A	Lat:	45.3150	Long:	-122.7779
Datum:	WGS84				
Soil Map Unit Name:	Amity Silt Loam	NWI Classification:	N/A		

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) Y

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	X	
Hydric Soil Present?		X
Wetland Hydrology Present?		X
Is Sampled Area within a Wetland?		X

Remarks:
Sample Point located in a very shallow swale.

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: 30)			
1 *Fraxinus latifolia*	5		FACW
2 *Alnus rubra*	20	X	FAC
3 *Quercus garryana*	25	X	FACU
4			
	50	= Total Cover	
Sapling/Shrub Stratum (plot size:)			
1			
2			
3			
4			
5			
	0	= Total Cover	
Herb Stratum (plot size: 5)			
1 *Poa pratensis*	60	X	FAC
2 *Bellis perennis*	10		(UPL)
3 *Geranium lucidum*	10		(UPL)
4 *Carex leptopoda*	5		FAC
5 *Jacobaea vulgaris*	5		FACU
6			
7			
8			
	90	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	
% Bare Ground in Herb Stratum	5		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	0
FACW species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals	0 (A)		0 (B)

Prevalence Index =B/A = #DIV/0!

Hydrophytic Vegetation Indicators:

- ____ 1- Rapid Test for Hydrophytic Vegetation
- X 2- Dominance Test is >50%
- ____ 3-Prevalence Index is ≤ 3.0[1]
- ____ 4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
- ____ 5- Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

SOIL PHS # 7264 Sampling Point: 10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-9	7.5YR 3/2	100					Silt Loam	
9-13	7.5YR 3/2	98	7.5YR 4/3	2	C	M	Silt Loam	faint/few

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Fac-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	
Water Table Present?		X	>13
Saturation Present? (includes capillary fringe)		X	>13

Wetland Hydrology Present? Yes ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site:	Boeckman Road	City/County:	Wilsonville/Clackamas	Sampling Date:	7/1/2021
Applicant/Owner:	Martin Development	State:	OR	Sampling Point:	11
Investigator(s):	JT/CM	Section, Township, Range:	Section 14B, Township 3 South, Range 1 West		
Landform (hillslope, terrace, etc.:)	Flat	Local relief (concave, convex, none):	None	Slope (%):	1
Subregion (LRR):	LRR A	Lat:	45.3154	Long:	-122.7784
Datum:	WGS84				
Soil Map Unit Name:	Amity Silt Loam	NWI Classification:	N/A		

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) Y

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	X	
Hydric Soil Present?	X	
Wetland Hydrology Present?	X	
Is Sampled Area within a Wetland?	X	

Remarks:
Sample Point located in a very shallow swale.

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: 30)			
1 *Fraxinus latifolia*	20	X	FACW
2			
3			
4			
	20	= Total Cover	
Sapling/Shrub Stratum (plot size: 15)			
1 *Symphoricarpos albus*	10	X	FACU
2 *Rosa rubiginosa*	5	X	UPL
3 *Crataegus monogyna*	5	X	FAC
4 *Fraxinus latifolia*	5	X	FACW
5			
	25	= Total Cover	
Herb Stratum (plot size: 5)			
1 *Camassia quamash*	80	X	FACW
2 *Juncus balticus*	10		FACW
3 *Hypericum perforatum*	5		FACU
4 *Agrostis capillaris*	5		FAC
5			
6			
7			
8			
	100	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That are OBL, FACW, or FAC: 67% (A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	0
FACW species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals	0 (A)		0 (B)

Prevalence Index =B/A = #DIV/0!

Hydrophytic Vegetation Indicators:

	1- Rapid Test for Hydrophytic Vegetation
X	2- Dominance Test is >50%
	3-Prevalence Index is ≤ 3.0[1]
	4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
	5- Wetland Non-Vascular Plants[1]
	Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks:

SOIL PHS # 7264 Sampling Point: 11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(Inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-3	10YR 2/2	98	7.5YR 4/6	2	C	PL	Silt Loam	Fine
3-12	10YR 2/2	90	7.5YR 4/6	10	C	M	Silt Loam	Fine

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X Fac-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

	Yes	No	Depth (inches):
Surface Water Present?		X	
Water Table Present?		X	>12
Saturation Present? (includes capillary fringe)		X	>12

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: **Boeckman Road** City/County: **Wilsonville/Clackamas** Sampling Date: **7/1/2021**

Applicant/Owner: **Martin Development** State: **OR** Sampling Point: **12**

Investigator(s): **JT/CM** Section, Township, Range: **Section 14B, Township 3 South, Range 1 West**

Landform (hillslope, terrace, etc.:) **Flat** Local relief (concave, convex, none): **None** Slope (%): **1**

Subregion (LRR): **LRR A** Lat: **45.3154** Long: **-122.7783** Datum: **WGS84**

Soil Map Unit Name: **Amity Silt Loam** NWI Classification: **N/A**

Are climatic/hydrologic conditions on the site typical for this time of year? Yes **X** No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) **Y**

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		X
Hydric Soil Present?		X
Wetland Hydrology Present?		X

Is Sampled Area within a Wetland? Yes ____ No **X**

Remarks:
Sample Point located in a very shallow swale.

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: 30)			
1 *Fraxinus latifolia*	30	X	FACW
2 *Quercus garryana*	20	X	FACU
3 *Pinus ponderosa*	10		FACU
4			
	60	= Total Cover	
Sapling/Shrub Stratum (plot size: 15)			
1 *Rosa rubiginosa*	40	X	UPL
2 *Symphoricarpos albus*	40	X	FACU
3 *Rubus ursinus*	30	X	FACU
4 *Toxicodendron diversilobum*	10		FAC
5 *Corylus cornuta*	5		FACU
	127	= Total Cover	
Herb Stratum (plot size: 5)			
1 *Camassia quamash*	80	X	FACW
2 *Juncus balticus*	10		FACW
3 *Hypericum perforatum*	5		FACU
4 *Agrostis capillaris*	5		FAC
5			
6			
7			
8			
	100	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum **60**

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **6** (B)

Percent of Dominant Species That are OBL, FACW, or FAC: **33%** (A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	0
FACW species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals	0 (A)		0 (B)

Prevalence Index =B/A = **#DIV/0!**

Hydrophytic Vegetation Indicators:

____ 1- Rapid Test for Hydrophytic Vegetation
____ 2- Dominance Test is >50%
____ 3-Prevalence Index is ≤ 3.0[1]
____ 4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
____ 5- Wetland Non-Vascular Plants[1]
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No **X**

Remarks:
Shrubs continued: Fraxinus latifolia (FACW) 1%, Crataegus monogyna (FAC) 1%.

SOIL **PHS #** 7264 Sampling Point: 12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 2/2	98	7.5YR 4/3	2	C	M	Silt Loam	Fine
9-20	10YR 2/2	80	7.5YR 4/6	20	C	M	Silt Loam	Coarse

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Fac-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	
Water Table Present?		X	>20
Saturation Present? (includes capillary fringe)		X	>20

Wetland Hydrology Present? Yes ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: **Boeckman Road** City/County: **Wilsonville/Clackamas** Sampling Date: **7/1/2021**

Applicant/Owner: **Martin Development** State: **OR** Sampling Point: **13**

Investigator(s): **JT/CM** Section, Township, Range: **Section 14B, Township 3 South, Range 1 West**

Landform (hillslope, terrace, etc.:) **Berm** Local relief (concave, convex, none): **Convex** Slope (%): **2**

Subregion (LRR): **LRR A** Lat: **45.3157** Long: **-122.7787** Datum: **WGS84**

Soil Map Unit Name: **Amity Silt Loam** NWI Classification: **N/A**

Are climatic/hydrologic conditions on the site typical for this time of year? Yes **X** No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) **Y**

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		X
Hydric Soil Present?	X	
Wetland Hydrology Present?		X

Is Sampled Area within a Wetland? Yes ____ No **X**

Remarks:
Sample Point located in a very shallow swale.

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: 30)			
1 *Quercus garryana*	30	X	FACU
2			
3			
4			
	30	= Total Cover	
Sapling/Shrub Stratum (plot size: 15)			
1 *Rosa rubiginosa*	50	X	UPL
2 *Symphoricarpos albus*	30	X	FACU
3 *Rubus ursinus*	30	X	FACU
4 *Rubus armeniacus*	20		FAC
5			
	130	= Total Cover	
Herb Stratum (plot size: 5)			
1 *Geranium lucidum*	30	X	UPL
2 *Geum macrophyllum*	10	X	FAC
3 *Vicia sp*	10	X	(FAC)
4			
5			
6			
7			
8			
	50	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum **60**

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **7** (B)

Percent of Dominant Species That are OBL, FACW, or FAC: **29%** (A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	0
FACW species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals	0 (A)		0 (B)

Prevalence Index =B/A = **#DIV/0!**

Hydrophytic Vegetation Indicators:

____ 1- Rapid Test for Hydrophytic Vegetation
____ 2- Dominance Test is >50%
____ 3-Prevalence Index is ≤ 3.0[1]
____ 4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
____ 5- Wetland Non-Vascular Plants[1]
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No **X**

Remarks:

SOIL PHS # 7264 Sampling Point: 13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(Inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-8	10YR 2/2	100					Silt Loam	
8-16	10YR 2/2	95	7.5YR 3/3	5	C	M	Silt Loam	Fine

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

	Histosol (A1)		Sandy Redox (S5)
	Histic Epipedon (A2)		Stripped Matrix (S6)
	Black Histic (A3)		Loamy Mucky Mineral (F1) **(except MLRA 1)**
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F2)
	Depleted Below Dark Surface (A11)		Depleted Matrix (F3)
	Thick Dark Surface (A12)	X	Redox Dark Surface (F6)
	Sandy Mucky Mineral (S1)		Depleted Dark Surface (F7)
	Sandy Gleyed Matrix (S4)		Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

	2 cm Muck (A10)
	Red Parent Material (TF2)
	Very Shallow Dark Surface (TF12)
	Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes X No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

	Surface Water (A1)		Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
	High Water Table (A2)		Salt Crust (B11)
	Saturation (A3)		Aquatic Invertebrates (B13)
	Water Marks (B1)		Hydrogen Sulfide Odor (C1)
	Sediment Deposits (B2)		Oxidized Rhizospheres along Living Roots (C3)
	Drift Deposits (B3)		Presence of Reduced Iron (C4)
	Algal Mat or Crust (B4)		Recent Iron Reduction in Plowed Soils (C6)
	Iron Deposits (B5)		Stunted or Stressed Plants (D1) **(LRR A)**
	Surface Soil Cracks (B6)		Other (Explain in Remarks)
	Inundation Visible on Aerial Imagery (B7)		
	Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (2 or more required)

	Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
	Drainage Patterns (B10)
	Dry-Season Water Table (C2)
	Saturation Visible on Aerial Imagery (C9)
	Geomorphic Position (D2)
	Shallow Aquitard (D3)
	Fac-Neutral Test (D5)
	Raised Ant Mounds (D6) **(LRR A)**
	Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes		No X	Depth (inches):	
Water Table Present?	Yes		No X	Depth (inches):	>16
Saturation Present? (includes capillary fringe)	Yes		No X	Depth (inches):	>16

Wetland Hydrology Present? Yes No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: Boeckman Road | City/County: Wilsonville/Clackamas | Sampling Date: 7/1/2021

Applicant/Owner: Martin Development | State: OR | Sampling Point: 14

Investigator(s): JT/CM | Section, Township, Range: Section 14B, Township 3 South, Range 1 West

Landform (hillslope, terrace, etc.:) Old road | Local relief (concave, convex, none): Concave | Slope (%): 0

Subregion (LRR): LRR A | Lat: 45.3157 | Long: -122.7787 | Datum: WGS84

Soil Map Unit Name: Amity Silt Loam | NWI Classification: N/A

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) Y

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	X	
Hydric Soil Present?	X	
Wetland Hydrology Present?	X	
Is Sampled Area within a Wetland?	X	

Remarks:
Sample Point located in a very shallow swale.

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: 30)			
1 *Fraxinus latifolia*	60	X	FACW
2			
3			
4			
	60	= Total Cover	
Sapling/Shrub Stratum (plot size: 15)			
1 *Rosa rubiginosa*	2		UPL
2 *Rubus armeniacus*	2		FAC
3			
4			
5			
	4	= Total Cover	
Herb Stratum (plot size: 5)			
1 *Poa sp*	60	X	(FAC)
2 *Leucanthemum vulgare*	10		FACU
3 *Unidentified grass*	10		(FAC)
4 *Trifolium sp*	10		(FAC)
5			
6			
7			
8			
	90	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum: 60

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	0
FACW species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals	0 (A)		0 (B)

Prevalence Index =B/A = #DIV/0!

Hydrophytic Vegetation Indicators:

- ____ 1- Rapid Test for Hydrophytic Vegetation
- X 2- Dominance Test is >50%
- ____ 3-Prevalence Index is ≤ 3.0[1]
- ____ 4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
- ____ 5- Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks:

SOIL PHS # 7264 Sampling Point: 14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(Inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	**10YR 3/2**	**100**					**Silt Loam**	
5-12	**10YR 3/4**	**88**	**7.5YR 3/4**	**10**	**C**	**M**	**Silt Loam**	**Medium**
			7.5YR 3/4	**2**	**C**	**PL**		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

	Histosol (A1)		Sandy Redox (S5)		2 cm Muck (A10)
	Histic Epipedon (A2)		Stripped Matrix (S6)		Red Parent Material (TF2)
	Black Histic (A3)		Loamy Mucky Mineral (F1) **(except MLRA 1)**		Very Shallow Dark Surface (TF12)
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F2)		Other (explain in Remarks)
	Depleted Below Dark Surface (A11)		Depleted Matrix (F3)		
	Thick Dark Surface (A12)	**X**	Redox Dark Surface (F6)		
	Sandy Mucky Mineral (S1)		Depleted Dark Surface (F7)		
	Sandy Gleyed Matrix (S4)		Redox Depressions (F8)		

Indicators for Problematic Hydric Soils[3]: (right column above)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes X No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply) / Secondary Indicators (2 or more required)

	Surface Water (A1)		Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**		Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
	High Water Table (A2)				
	Saturation (A3)		Salt Crust (B11)		Drainage Patterns (B10)
	Water Marks (B1)		Aquatic Invertebrates (B13)		Dry-Season Water Table (C2)
	Sediment Deposits (B2)		Hydrogen Sulfide Odor (C1)		Saturation Visible on Aerial Imagery (C9)
	Drift Deposits (B3)	**X**	Oxidized Rhizospheres along Living Roots (C3)	**X**	Geomorphic Position (D2)
	Algal Mat or Crust (B4)		Presence of Reduced Iron (C4)		Shallow Aquitard (D3)
	Iron Deposits (B5)		Recent Iron Reduction in Plowed Soils (C6)	**X**	Fac-Neutral Test (D5)
	Surface Soil Cracks (B6)		Stunted or Stressed Plants (D1) **(LRR A)**		Raised Ant Mounds (D6) **(LRR A)**
	Inundation Visible on Aerial Imagery (B7)		Other (Explain in Remarks)		Frost-Heave Hummocks (D7)
	Sparsely Vegetated Concave Surface (B8)				

Field Observations:

Surface Water Present?	Yes	No **X**	Depth (inches):	
Water Table Present?	Yes	No **X**	Depth (inches):	**>12**
Saturation Present? (includes capillary fringe)	Yes	No **X**	Depth (inches):	**>12**

Wetland Hydrology Present? Yes X No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: **Boeckman Road** City/County: **Wilsonville/Clackamas** Sampling Date: **7/1/2021**

Applicant/Owner: **Martin Development** State: **OR** Sampling Point: **15**

Investigator(s): **JT/CM** Section, Township, Range: **Section 14B, Township 3 South, Range 1 West**

Landform (hillslope, terrace, etc.:) **Ditch** Local relief (concave, convex, none): **Concave** Slope (%): **2**

Subregion (LRR): **LRR A** Lat: **45.3167** Long: **-122.7797** Datum: **WGS84**

Soil Map Unit Name: **Amity Silt Loam** NWI Classification: **N/A**

Are climatic/hydrologic conditions on the site typical for this time of year? Yes **X** No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) **Y**

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	X	
Hydric Soil Present?		X
Wetland Hydrology Present?		X
Is Sampled Area within a Wetland?		X

Remarks:
Sample Point located in a very shallow swale.

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: 30)			
1 *Fraxinus latifolia*	20	X	FACW
2			
3			
4			
	20	= Total Cover	
Sapling/Shrub Stratum (plot size: 15)			
1 *Rubus ursinus*	20	X	FACU
2 *Crataegus monogyna*	20	X	FAC
3 *Symphoricarpos albus*	10		FACU
4 *Toxicodendron diversilobum*	10		FAC
5			
	60	= Total Cover	
Herb Stratum (plot size: 5)			
1 *Bromus sp*	40	X	(FAC)
2 *Holcus lanatus*	30	X	FAC
3 *Jacobaea vulgaris*	10		FACU
4 *Unidentified grass*	10		(FAC)
5			
6			
7			
8			
	90	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum **10**

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That are OBL, FACW, or FAC: **80%** (A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	0
FACW species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals	0 (A)		0 (B)

Prevalence Index =B/A = **#DIV/0!**

Hydrophytic Vegetation Indicators:

____ 1- Rapid Test for Hydrophytic Vegetation
X 2- Dominance Test is >50%
____ 3-Prevalence Index is ≤ 3.0[1]
____ 4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
____ 5- Wetland Non-Vascular Plants[1]
____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes X** **No** ____

Remarks:

SOIL

PHS # 7264 Sampling Point: **15**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-10	**10YR 3/2**	**98**	**10YR 3/4**	**2**	**C**	**M**	**Silt Loam**	**Fine**
10-16	**10YR 3/2**	**90**	**7.5YR 3/4**	**10**	**C**	**M**	**Silt Loam**	**Fine**

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
X Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Fac-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

	Yes		No		Depth (inches):
Surface Water Present?	Yes		No	**X**	
Water Table Present?	Yes		No	**X**	**>16**
Saturation Present? (includes capillary fringe)	Yes		No	**X**	**>16**

Wetland Hydrology Present? Yes ___ **No** **X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site:	**Boeckman Road**	City/County:	**Wilsonville/Clackamas**	Sampling Date:	**7/1/2021**
Applicant/Owner:	**Martin Development**	State:	**OR**	Sampling Point:	**16**
Investigator(s):	**JT/CM**	Section, Township, Range:	**Section 14B, Township 3 South, Range 1 West**		
Landform (hillslope, terrace, etc.:)	**Flat**	Local relief (concave, convex, none):	**Concave**	Slope (%):	**0**
Subregion (LRR):	**LRR A**	Lat:	**45.3152**	Long:	**-122.7785**
Datum:	**WGS84**				
Soil Map Unit Name:	**Amity Silt Loam**	NWI Classification:	**N/A**		

Are climatic/hydrologic conditions on the site typical for this time of year? Yes **X** No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) **Y**

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?	**X**	
Hydric Soil Present?		**X**
Wetland Hydrology Present?	**X**	
Is Sampled Area within a Wetland?		**X**

Remarks:
Sample Point located in a very shallow swale.

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: 30)			
1 ***Fraxinus latifolia***	**20**	**X**	**FACW**
2			
3			
4			
	20	= Total Cover	
Sapling/Shrub Stratum (plot size: 15)			
1 ***Symphoricarpos albus***	**40**	**X**	**FACU**
2 ***Rubus armeniacus***	**25**	**X**	**FAC**
3 ***Fraxinus latifolia***	**20**	**X**	**FACW**
4 ***Rosa rubiginosa***	**5**		**UPL**
5 ***Toxicodendron diversilobum***	**5**		**FAC**
	95	= Total Cover	
Herb Stratum (plot size: 5)			
1 ***Camassia quamash***	**60**	**X**	**FACW**
2			
3			
4			
5			
6			
7			
8			
	60	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	
% Bare Ground in Herb Stratum **40**			

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: **4** (A)

Total Number of Dominant Species Across All Strata: **5** (B)

Percent of Dominant Species That are OBL, FACW, or FAC: **80%** (A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	**0**
FACW species		x 2 =	**0**
FAC Species		x 3 =	**0**
FACU Species		x 4 =	**0**
UPL Species		x 5 =	**0**
Column Totals	**0** (A)		**0** (B)

Prevalence Index =B/A = **#DIV/0!**

Hydrophytic Vegetation Indicators:

- ____ 1- Rapid Test for Hydrophytic Vegetation
- **X** 2- Dominance Test is >50%
- ____ 3-Prevalence Index is ≤ 3.0[1]
- ____ 4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
- ____ 5- Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes X** **No** ____

Remarks:

SOIL PHS # 7264 Sampling Point: 16

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(Inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-6	10YR 3/2						Silt Loam	
6-9	10YR 3/2	98	7.5YR 3/4	2	C	M	Silt Loam	Medium
9-13	10YR 3/3	95	7.5YR 4/6	5	C	M	Silt Loam	Large

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X Fac-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

	Yes	No	Depth (inches):
Surface Water Present?		X	
Water Table Present?		X	>13
Saturation Present? (includes capillary fringe)		X	>13

Wetland Hydrology Present? Yes X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site:	Boeckman Road	City/County:	Wilsonville/Clackamas	Sampling Date:	1/11/2022
Applicant/Owner:	Martin Development	State:	OR	Sampling Point:	17
Investigator(s):	JT	Section, Township, Range:	Section 14B, Township 3 South, Range 1 West		
Landform (hillslope, terrace, etc.:)	Flat	Local relief (concave, convex, none):	Concave	Slope (%):	0
Subregion (LRR):	LRR A	Lat:	45.3151	Long:	-122.7788
Datum:	WGS84				
Soil Map Unit Name:	Amity Silt Loam	NWI Classification:	N/A		

Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No ___ (if no, explain in Remarks)

Are vegetation ___ Soil ___ or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? (Y/N) Y

Are vegetation ___ Soil ___ or Hydrology ___ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		X
Hydric Soil Present?		X
Wetland Hydrology Present?		X
Is Sampled Area within a Wetland?		X

Remarks:

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: 30)			
1 *Quercus garryana*	10	X	FACU
2			
3			
4			
	10	= Total Cover	
Sapling/Shrub Stratum (plot size: 15)			
1 *Symphoricarpos albus*	25	X	FACU
2 *Rubus armeniacus*	50	X	FAC
3			
4			
5			
	75	= Total Cover	
Herb Stratum (plot size: 5)			
1 *Juncus patens*	1		FACW
2			
3			
4			
5			
6			
7			
8			
	1	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	
% Bare Ground in Herb Stratum	0		

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC:	1	(A)
Total Number of Dominant Species Across All Strata:	3	(B)
Percent of Dominant Species That are OBL, FACW, or FAC:	33%	(A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	0
FACW species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals	0 (A)		0 (B)

Prevalence Index =B/A = #DIV/0!

Hydrophytic Vegetation Indicators:

___ 1- Rapid Test for Hydrophytic Vegetation
___ 2- Dominance Test is >50%
___ 3-Prevalence Index is ≤ 3.0[1]
___ 4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)
___ 5- Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks:

SOIL PHS # 7264 Sampling Point: 17

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	**7.5YR 3/1**	**100**					**Silt Loam**	
5-12	**7.5YR 3/3**	**100**					**Silt Loam**	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

	Histosol (A1)		Sandy Redox (S5)		2 cm Muck (A10)
	Histic Epipedon (A2)		Stripped Matrix (S6)		Red Parent Material (TF2)
	Black Histic (A3)		Loamy Mucky Mineral (F1) **(except MLRA 1)**		Very Shallow Dark Surface (TF12)
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F2)		Other (explain in Remarks)
	Depleted Below Dark Surface (A11)		Depleted Matrix (F3)		
	Thick Dark Surface (A12)		Redox Dark Surface (F6)		
	Sandy Mucky Mineral (S1)		Depleted Dark Surface (F7)		
	Sandy Gleyed Matrix (S4)		Redox Depressions (F8)		

Indicators for Problematic Hydric Soils[3]: (right column above)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? Yes ____ **No X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply) | Secondary Indicators (2 or more required)

	Surface Water (A1)		Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**		Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
	High Water Table (A2)				
	Saturation (A3)		Salt Crust (B11)		Drainage Patterns (B10)
	Water Marks (B1)		Aquatic Invertebrates (B13)		Dry-Season Water Table (C2)
	Sediment Deposits (B2)		Hydrogen Sulfide Odor (C1)		Saturation Visible on Aerial Imagery (C9)
	Drift Deposits (B3)		Oxidized Rhizospheres along Living Roots (C3)	X	Geomorphic Position (D2)
	Algal Mat or Crust (B4)		Presence of Reduced Iron (C4)		Shallow Aquitard (D3)
	Iron Deposits (B5)		Recent Iron Reduction in Plowed Soils (C6)		Fac-Neutral Test (D5)
	Surface Soil Cracks (B6)		Stunted or Stressed Plants (D1) **(LRR A)**		Raised Ant Mounds (D6) **(LRR A)**
	Inundation Visible on Aerial Imagery (B7)		Other (Explain in Remarks)		Frost-Heave Hummocks (D7)
	Sparsely Vegetated Concave Surface (B8)				

Field Observations:

Surface Water Present?	Yes		No	X	Depth (inches):	
Water Table Present?	Yes		No	X	Depth (inches):	>12
Saturation Present? (includes capillary fringe)	Yes		No	X	Depth (inches):	>12

Wetland Hydrology Present? Yes ____ **No X**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

PHS # 7264

WETLAND DETERMINATION DATA FORM - Western Mountains, Valleys, and Coast Region

Project/Site: **Boeckman Road** City/County: **Wilsonville/Clackamas** Sampling Date: **1/11/2022**

Applicant/Owner: **Martin Development** State: **OR** Sampling Point: **17**

Investigator(s): **JT** Section, Township, Range: **Section 14B, Township 3 South, Range 1 West**

Landform (hillslope, terrace, etc.:) **Flat** Local relief (concave, convex, none): **Concave** Slope (%): **0**

Subregion (LRR): **LRR A** Lat: **45.3171** Long: **-122.7794** Datum: **WGS84**

Soil Map Unit Name: **Aloha Silt Loam, 0-3 Percent Slopes** NWI Classification: **N/A**

Are climatic/hydrologic conditions on the site typical for this time of year? Yes **X** No ____ (if no, explain in Remarks)

Are vegetation ____ Soil ____ or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? (Y/N) **Y**

Are vegetation ____ Soil ____ or Hydrology ____ naturally problematic? If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

	Yes	No
Hydrophytic Vegetation Present?		X
Hydric Soil Present?		X
Wetland Hydrology Present?		X

Is Sampled Area within a Wetland? Yes ____ No **X**

Remarks:

VEGETATION - Use scientific names of plants.

	absolute % cover	Dominant Species?	Indicator Status
Tree Stratum (plot size: 30)			
1 *Pseudotsuga menziesii*	30	X	FACU
2			
3			
4			
	30	= Total Cover	
Sapling/Shrub Stratum (plot size: 15)			
1 *Symphoricarpos albus*	10		FACU
2 *Rubus armeniacus*	40	X	FAC
3 *Corylus cornuta*	10		FACU
4			
5			
	60	= Total Cover	
Herb Stratum (plot size: 5)			
1 *Holcus lanatus*	60	X	FAC
2 *Stellaria media*	5		FACU
3 *Daucus carota*	5		FACU
4 *Geranium lucidum*	20	X	UPL
5 *Geranium robertianum*	5		FACU
6			
7			
8			
	95	= Total Cover	
Woody Vine Stratum (plot size:)			
1			
2			
	0	= Total Cover	

% Bare Ground in Herb Stratum **0**

Dominance Test worksheet:

Number of Dominant Species That are OBL, FACW, or FAC: **2** (A)

Total Number of Dominant Species Across All Strata: **4** (B)

Percent of Dominant Species That are OBL, FACW, or FAC: **50%** (A/B)

Prevalence Index Worksheet:

Total % Cover of		Multiply by:	
OBL Species		x 1 =	0
FACW species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
UPL Species		x 5 =	0
Column Totals	0 (A)		0 (B)

Prevalence Index =B/A = **#DIV/0!**

Hydrophytic Vegetation Indicators:

____ 1- Rapid Test for Hydrophytic Vegetation

____ 2- Dominance Test is >50%

____ 3-Prevalence Index is ≤ 3.0[1]

____ 4-Morphological Adaptations[1] (provide supporting data in Remarks or on a separate sheet)

____ 5- Wetland Non-Vascular Plants[1]

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No **X**

Remarks:

SOIL **PHS #** 7264 Sampling Point: 17

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (Inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	7.5YR 3/1	100					Silt Loam	
5-12	7.5YR 3/3	100					Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water stained Leaves (B9) **(Except MLRA 1, 2, 4A, and 4B)**
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Stunted or Stressed Plants (D1) **(LRR A)**
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water stained Leaves (B9) **(MLRA1, 2, 4A, and 4B)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
X Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Fac-Neutral Test (D5)
___ Raised Ant Mounds (D6) **(LRR A)**
___ Frost-Heave Hummocks (D7)

Field Observations:

	Yes		No		Depth (inches):
Surface Water Present?	Yes		No	X	
Water Table Present?	Yes		No	X	>13
Saturation Present? (includes capillary fringe)	Yes		No	X	>13

Wetland Hydrology Present? Yes ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Appendix C

Study Area Photos
(ground level)

Photo A:

Looking southwest at upland Sample Point 1, east of Wetland A.

Photo taken on July 1, 2021

Photo B:

Looking northwest at Sample Points 4 (wetland) and 5 (upland).

Photo taken on July 1, 2021

Project #7264
11/30/2021

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Photo documentation

9900 SW Boeckman Road - Wilsonville, Oregon

Photo C:

Looking north at Wetland B, which is confined to a ditch at the west end of the site.

Photo taken on July 1, 2021

Photo D:

Looking north at Sample Points 6 (wetland) and 7 (upland) at the north end of Wetland C, which is confined to a ditch.

Photo taken on July 1, 2021

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Photo documentation

9900 SW Boeckman Road - Wilsonville, Oregon

Photo E:

Looking west at an access road through Wetland A.

Photo taken on January 11, 2022

Photo F:

Looking north / northeast at a grove of Douglas' fir trees east of Wetland A.

Photo taken on January 11, 2022

Project #7264
11/30/2021

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Photo documentation

9900 SW Boeckman Road - Wilsonville, Oregon

Photo G:

Looking northwest at Sample Point 10, located adjacent to a pipe that carries runoff below a constructed berm to the basin in the western portion of the study area.

Photo taken on January 11, 2022

Photo H:

Looking west at the northern portion of Wetland A.

Photo taken on January 11, 2022

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Photo documentation

9900 SW Boeckman Road - Wilsonville, Oregon

Photo I:

Looking west at Sample Point 18.

Photo taken on January 11, 2022

Photo J:

Looking east at the northwestern corner of the site. The Wilsonville LWI depicts a wetland in this area that has since been filled. The planter adjacent to the roadway is a bioswale.

Photo taken on January 11, 2022

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Photo K:

Looking southeast at the lawn area in the northwestern portion of the study area. This area is raised above the natural grade and likely consists of imported soil.

Photo taken on January 11, 2022

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Appendix D

Wetland Definitions, Methodology

WATERS OF THE STATE AND WETLAND DEFINITION AND CRITERIA

Regulatory Jurisdiction

Wetlands and water resources in Oregon are regulated by the Oregon Department of State Lands (DSL) under the Removal-Fill Law (ORS 196.800-196.990) and by the U.S. Army Corps of Engineers (COE) through Section 404 of the Clean Water Act.

The primary source documents for wetland delineations within Oregon is the *Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (U.S. Army Corps of Engineers, 2010), which are required by both DSL and COE.

Waters of This State and Wetland Definition

Waters of This State are defined as "all natural waterways, all tidal and non-tidal bays, intermittent streams, constantly flowing streams, lakes, wetlands, that portion of the Pacific Ocean that is in the boundaries of this state, all other navigable and non-navigable bodies of water in this state and those portions of the ocean shore …" (DSL, 2009).

Wetlands are defined as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (DSL 2009).

Wetland Criteria

Based on the above definition, three major factors characterize a wetland: hydrology, substrate, and biota.

Wetland Hydrology

Wetland hydrology is related to duration of saturation, frequency of saturation, and critical depth of saturation. The 1987 manual defines wetland hydrology as inundation or saturation within a major portion of the root zone (usually above 12 inches), typically for at least 12.5% of the growing season. The wetland hydrology criterion can be met, however, if saturation within the major portion of the root zone is present for only 5% of the growing season, depending on other evidence.

The growing season is defined as the portion of the year when soil temperatures at 12.0 inches below the soil surface are higher than biological zero (41 degrees Fahrenheit, 5 degrees Celsius), but also allows approximation from frost-free days, based on air temperature. The growing season for any given study area or location is determined from US Natural Resources Conservation Service, (formerly Soil Conservation Service) data and information.

Wetland hydrologic indicators include the following: visual observation of inundation or saturation, watermarks, drift lines, sediment deposits, and/or oxidized rhizospheres with living roots. Oxidized rhizospheres are defined as yellowish-red zones around the roots and rhizomes of some plants that grow in frequently saturated soils. Other indicators of hydrology, including algal mats or crust, iron deposits, surface soil cracks, sparsely vegetated concave surface, salt crust, aquatic invertebrates, hydrogen sulfide odor, reduced iron, iron reduction in tilled soils, and stunted or stressed plants can also be used to determine the presence of wetland hydrology.

Wetland Substrate (Soils)

Most wetlands are characterized by hydric soils. Hydric soils are those that are ponded, flooded, or saturated for long enough during the growing season to develop anaerobic conditions. Periodic saturation of soils causes alternation of reduced and oxidized conditions, which leads to the formation of redoximorphic features (gleying and mottling). Mineral hydric soils will be either gleyed or will have bright mottles and/or low matrix chroma. The redoximorphic feature known as gley is a result of greatly reduced soil conditions, which result in a characteristic grayish, bluish or greenish soil color. The term mottling is used to describe areas of contrasting color within a soil matrix. The soil matrix is the portion of the soil layer that has the predominant color. Soils that have brightly colored mottles and a low matrix chroma are indicative of a fluctuating water table.

Hydric soil indicators include organic content of greater than 50% by volume, and/or presence of redoximorphic features and dark soil matrix, as determined by the use of a Munsell Soil Color Chart. This chart establishes the chroma, value and hue of soils based on comparison with color chips. Mineral hydric soil must meet one of the 16 definitions for hydric soil indicators or be classified as a “problem soil” in the Regional Supplement.

Wetland Biota (Vegetation)

Wetland biota is defined as hydrophytic vegetation. A hydrophyte is a plant species that is capable of growing in substrates that are periodically deficient in oxygen as a result of saturated soil conditions. The U.S. Fish and Wildlife Service, in the *National List of Plant Species that Occur in Wetlands*, has established five basic groups of vegetation based on their frequency of occurrence in wetlands. These categories, referred to as the "wetland indicator status”, are as follows: obligate wetland plants (OBL), facultative wetland (FACW), facultative (FAC), facultative upland (FACU), and obligate upland (UPL). Table 1 gives a definition of the plant indicator codes.

Table 1. Description of Wetland Plant Indicator Status Codes

Indicator Code	Status
OBL	Obligate wetland. Plants that always occur in standing water or in saturated soils.
FACW	Facultative wetland. Plants that nearly always occur in areas of prolonged flooding or require standing water or saturated soils but may, on rare occasions, occur in non-wetlands.
FAC	Facultative. Plants that occur in a variety of habitats, including wetland and mesic to xeric non-wetland habitats but commonly occur in standing water or saturated soils.
FACU	Facultative upland. Plants that typically occur in xeric or mesic non-wetland habitats but may frequently occur in standing water or saturated soils.
UPL	Obligate upland. Plants that rarely occur in water or saturated soils.

Observations of hydrology, soils, and vegetation were made using the "Routine On-study area" delineation method as defined in the 1987 manual and the Regional Supplement for areas that were not currently in agricultural production. One-foot diameter soil pits were excavated to 20 inches and soil profiles were examined for hydric soil and wetland hydrology field indicators. In addition, a visual absolute cover estimate of the dominant species of the plant community was performed using soil pit locations as a center of reference. Dominant plant species are based on estimates of absolute cover for herbaceous, and shrub species within a 5-foot radius of the sample point, and basal area cover for tree and woody vine species within a 30-foot radius of the sample point. Plant species in each vegetative layer, which are estimated at less than 20% of the total cover, are not considered dominant. The wetland indicator status is then used to determine if there is an overall dominance (greater than 50%) of wetland or upland plant species. If less than 50% of the dominant species are hydrophytic, then the prevalence index may be used to determine if the subdominant species are hydrophytic. If the prevalence index is less than or equal to three, hydrophytic vegetation criterion is met.

During data collection, the soil profiles were examined for hydric soil and wetland hydrology field indicators. Plant species and cover were recorded. Data was recorded on standard data sheets, which contain the information specified in the 1987 Corps Manual and the Regional Supplement.

MACKENZIE.

REGISTERED PROFESSIONAL
ENGINEER
91897
OREGON
JAN. 10, 2017
GREGORY I. MINO
EXPIRES: 12/31/22

STORM DRAINAGE REPORT

Project
W-5
Planning DB No. ________

Applicant
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Attn: Mac Martin
P.O. Box 15523
Seattle, WA 98115

Design Engineer
Mackenzie
Attn: Greg Mino
1515 SE Water Ave, #100
Portland, OR 97214
503.224.9560

Submitted
December 10, 2021

Mackenzie Project #
2210115.00

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Figures

Appendices

I. PROJECT DESCRIPTION

This report documents the stormwater management calculations and design approach carried out by Mackenzie to manage stormwater runoff for the W-5 project compliant with applicable code(s). The proposed W-5 project is located at the SE corner of the intersection of Boeckman Road and SW Kinsman Road in Wilsonville, Oregon (see Figure 1, Vicinity Map). According to City of Wilsonville GIS, the project site is approximately 23.86 acres when considered along with the existing W-4 development that resides on the easterly half of the property. The applicant is pursuing a subdivision to divide the property into two lots, apportioning the westerly 10.046 acres for this new development (referred to as the "project site" or "site" throughout the report). The overall site is currently addressed as 9600 Boeckman Road as Tax Lot 202 of Tax Map 3 1W 14B, and is zoned as Planned Development Industrial (PDI).

In pursuit of this project, the applicant (or their contractor(s)) is applying for the following permits: Development, Commercial Building, Mechanical, Plumbing, Clackamas County Electrical, Grading, Fire Alarm, Fire Sprinkler, DEQ 1200-C, and Type B/C Tree Removal permits. No right-of-way permits or environmental/regulatory permits are expected to be required at this time.

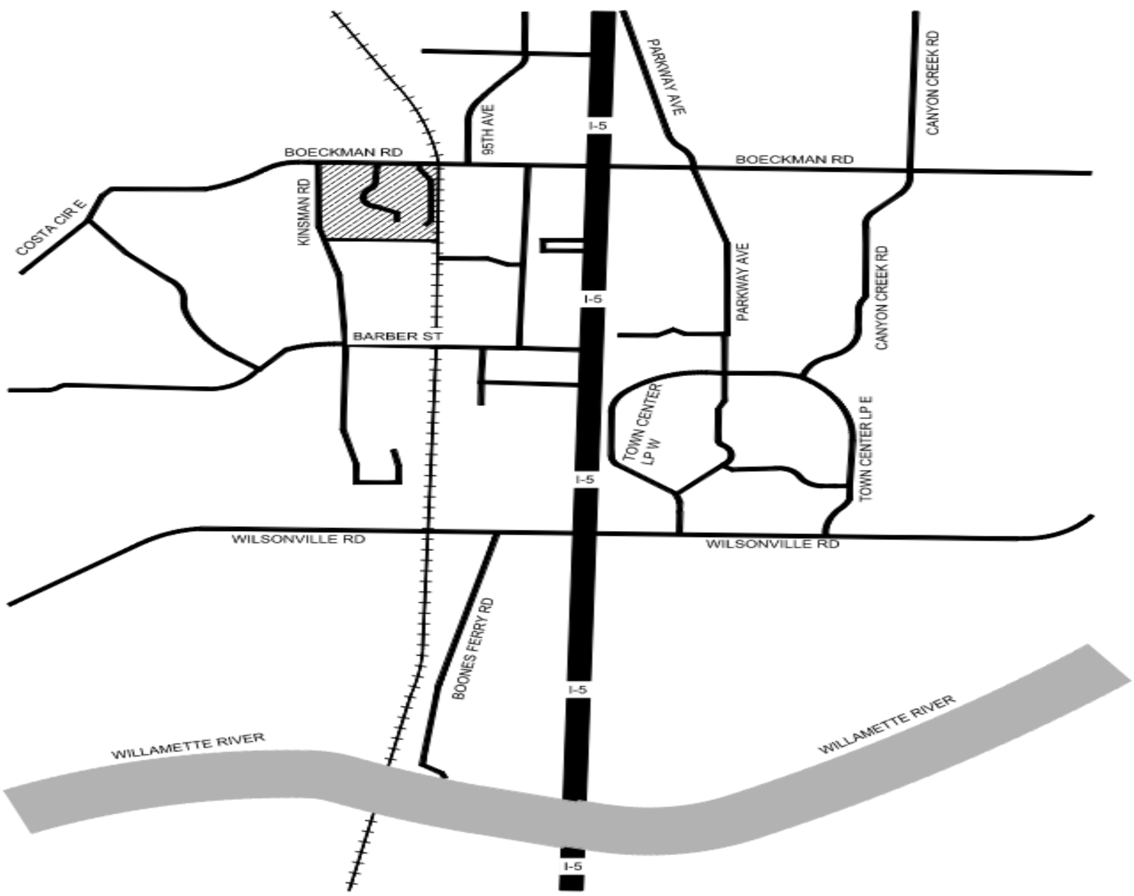


Figure 1: Vicinity Map

Existing Conditions

The existing site consists of a generally open grassy area bounded by the Significant Resource Overlay Zone (SROZ) in the NW corner and southerly portion of the site, Boeckman Road to the north, SW Kinsman Road to the west, and an existing private paved drive aisle to the east. The existing development known as W-4 resides on the easterly portion of the overall property. Figure 2 provides a simplified graphical depiction of the existing conditions.

Stormwater that falls on site generally either infiltrates into the grassy area or drains in a predominantly southerly direction over shallow sloped ground and into the larger SROZ/Wetlands prior to discharge to the public storm drain system. There are no identifiable upstream drainage basins to consider in design. Per City GIS, it appears that rainwater discharge from the project site ultimately outfalls to the Willamette River to the south.

SW Kinsman Road and Boeckman Road are fully improved roads with their own public drainage system.

Soil Conditions

Per the USDA Web Soil Survey, the existing soils on the portion of the site to be developed are almost entirely Aloha silt loam which are identified as Hydrologic Soil Group C/D for the purposes of relating to Technical Release 55 (TR-55) to assign the runoff curve number to be used in the hydrologic analysis of the existing conditions. Referring to Table 2-2a of TR-55 and designating the site as Open Space in Good Condition, the resulting curve number is between 74 and 80 – 76 will be used in the calculations.

Please see the Web Soil Survey Soils Map in Appendix C.

Hydrologic Analysis (Existing)

The hydrologic analysis of the existing conditions was performed using the Water Environment Services (WES) BMP Sizing Tool. For the purposes of hydrologic modeling, the WES BMP Sizing Tool models the historical vegetation which existed onsite prior to development. All subbasins are either defined as grass or forested. Please see the WES BMP Sizing Report, Appendix B, pages 62-63, for details on the hydrologic pre-developed conditions onsite.

Figure 2: Existing Conditions

II. DEVELOPED CONDITIONS

The proposed development consists of the construction of a 65,000 square foot (footprint) manufacturing building with an integral depressed truck dock, associated drive aisles and parking, an exterior trash enclosure, and associated utility services to the building and site. Although the site area (after subdivision) is 10.046 acres, the area to be developed is substantially less due to the SROZ/Wetland areas encumbering more than 50% of the southerly portion and the NW corner of the lot. The total site area being developed is 4.88 acres. Figure 3 provides a simplified graphical depiction of the developed conditions.

See the Drainage Management Area (DMA) Map in Appendix A that provides a breakdown of impervious and pervious areas within each DMA/subbasin.

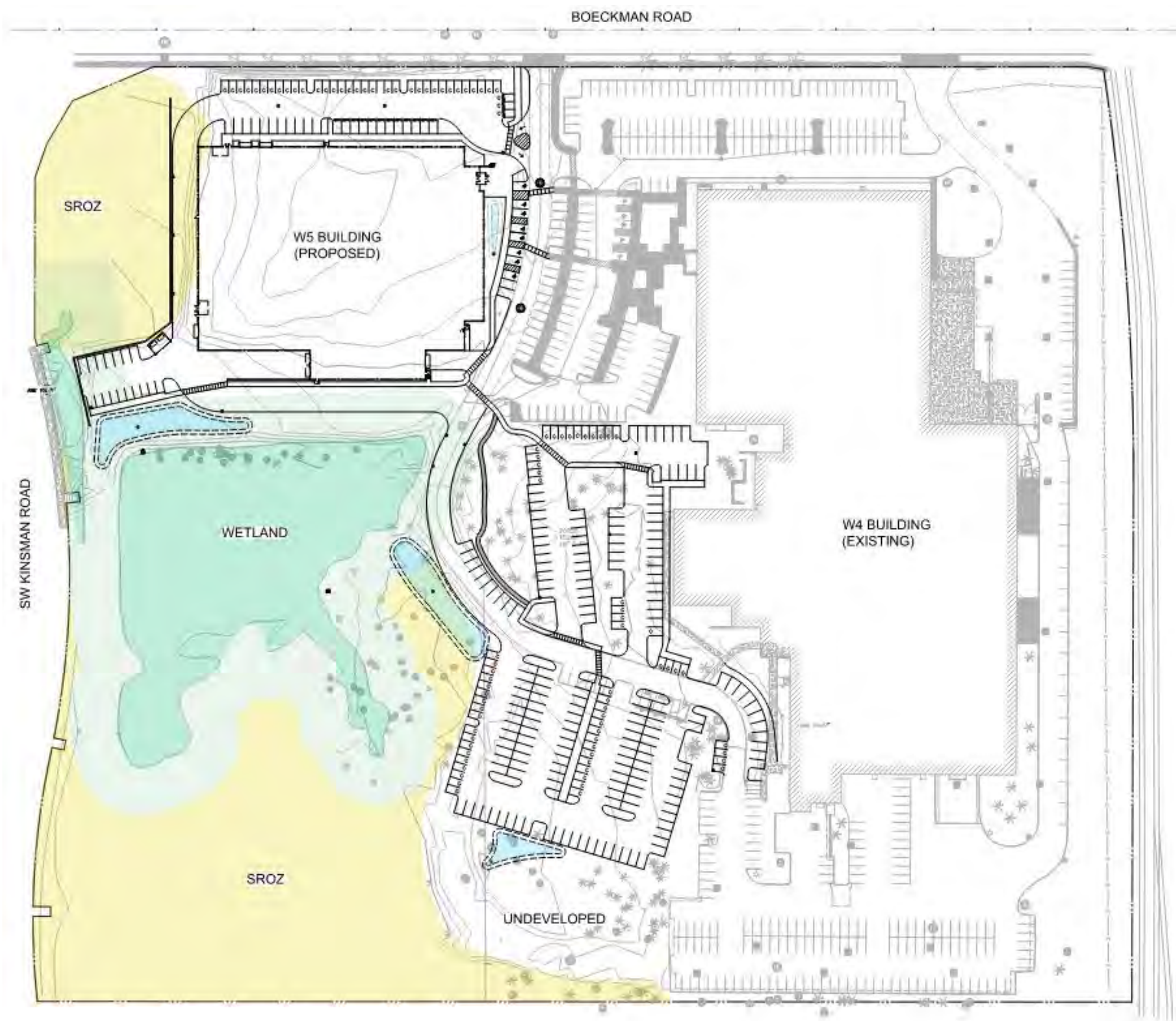


Figure 3: Developed Conditions

Water Quality Standard

Water quality facilities shall be designed to capture and treat 80% of the average annual runoff volume to the Maximum Extent Practicable (MEP) with the goal of 70% total suspended soils (TSS) removal. In this context, MEP means less effective treatment may not be substituted when it is practicable to provide more effective treatment. This treatment volume equates to a design storm of **1.0 inch over 24 hours**.

The BMP Sizing Tool addresses these water quality requirements to size stormwater management facilities.

Hydrodynamic separators, when used as a sole method of stormwater treatment, do not meet the MEP requirement for stormwater treatment effectiveness with regard to these stormwater standards.

Flow Control Standard

The duration of peak flow rates from post-development conditions shall be less than or equal to the duration of peak flow rates from pre-development conditions for all peak flows between **42% of the 2-year storm peak flow rate up to the 10-year peak flow rate**.

Hydrologic Analysis (Proposed)

Water Quality

In order to meet the goals of Low Impact Development, rain gardens have been selected as the proposed BMP to provide water quality treatment for this project. Although the project site has limited infiltration due to relatively high groundwater table (8' bgs) and low infiltration rates (0.1"/hr) , the BMP facilities are not proposed to be lined in order to promote any amount of infiltration that may still occur. The stormwater planters are dispersed throughout the site at strategic locations for capture of runoff, upon which underground piping collects the water and routes it to the SROZ/Wetland area for discharge.

Please refer to the DMA Map and WES BMP Sizing Report (Appendix A, pages 62-63) for facility sizes and impervious areas that are conveyed to each facility. Appendix B contains the Operations & Maintenance Manual for the proposed facilities.

Flow Control

As noted in the Water Quality section, rain gardens have been selected as the proposed BMP which will meet both treatment and flow control requirements.

Please refer to the Drainage Management Area (DMA) Map and WES BMP Sizing Report, Appendix A, pages 62-63, for further detail. Appendix B contains the Operations & Maintenance Manual for the proposed facilities.

Hydraulic Design Computations

The proposed underground storm drainage system for this project has been designed to collect and convey the runoff from a 25-year storm event per the City of Wilsonville 2015 Stormwater & Surface Water Design & Construction Standards. The peak flow has been calculated using the Santa Barbara Urban Hydrograph (SBUH) within the Storm & Sanitary Analysis (SSA) for Autodesk Civil3D software. The peak flow from the 25-year event over the project site has then been prorated on a cfs/sf basis into the various drainage management areas (DMAs)/subbasins throughout the site. Underground piping has then been sized accordingly using SSA software. Please refer to the DMA Map and Profile Plots, pages 1-7, in Appendix A. In the occurrence of a storm event in excess of the design storm, adequate overland flow has been provided to prevent flooding of habitable structures.

Downstream Analysis

The existing drainage system downstream of the development has been analyzed to verify that it has the capacity to convey the 25-year design storm. The analysis is intended to extend downstream to a point in the drainage system where the proposed development site constitutes 10% or less of the total tributary drainage flow. However, the overall property containing the existing W-4 Building and proposed W-5 Building discharge to a major water body, being Coffee Lake Creek, just across Kinsman Road and as such, the analysis was terminated there.

City of Wilsonville GIS reveals that water is conveyed from the overall property to Coffee Lake Creek through three 18" culverts that run beneath SW Kinsman Road. Figure 4 is a snapshot of City of Wilsonville GIS, and it depicts the conveyance of the stormwater offsite into Coffee Lake Creek. Culverts 1-3 are hydraulically connected such that if stormwater backed up in the furthest downstream culvert (Culvert 3), then stormwater would be conveyed through Culverts 2 and 1 respectively.

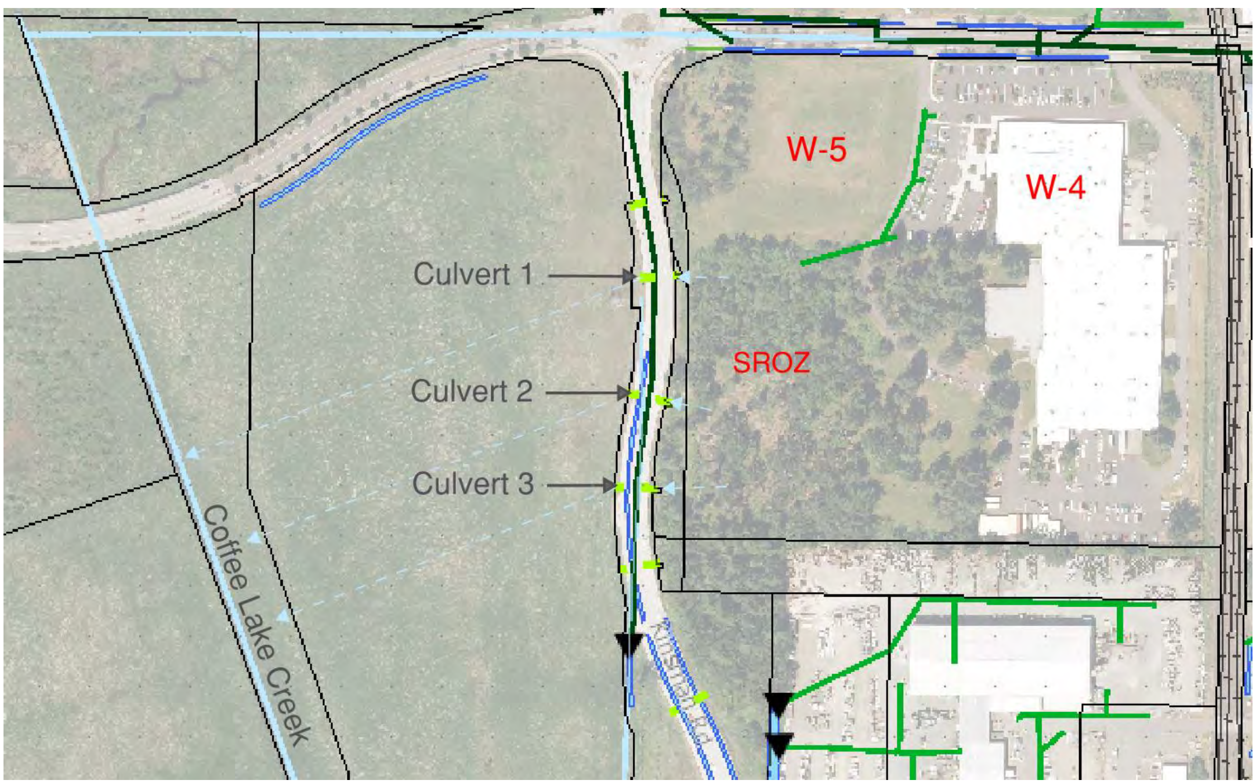


Figure 4: Downstream Analysis Study Area

Hyd. No. 1

Post Developed

Hydrograph type	= SBUH Runoff	Peak discharge	= 13.67 cfs
Storm frequency	= 25 yrs	Time to peak	= 8.00 hrs
Time interval	= 2 min	Hyd. volume	= 236,391 cuft
Drainage area	= 23.860 ac	Curve number	= 89*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.70 min
Total precip.	= 3.90 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(4.280 x 98) + (0.760 x 76) + (6.910 x 76) + (10.120 x 98) + (1.790 x 76)] / 23.860

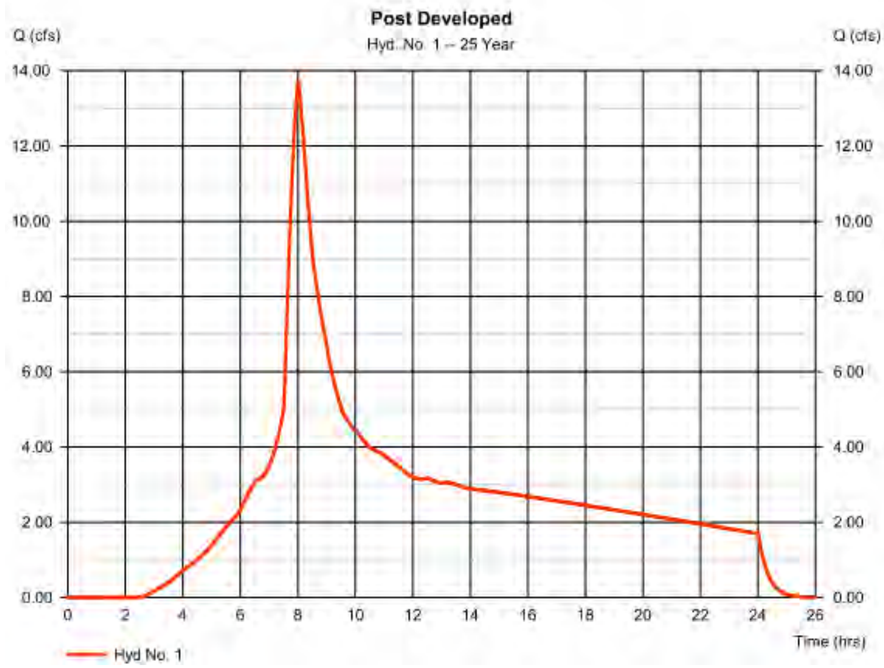


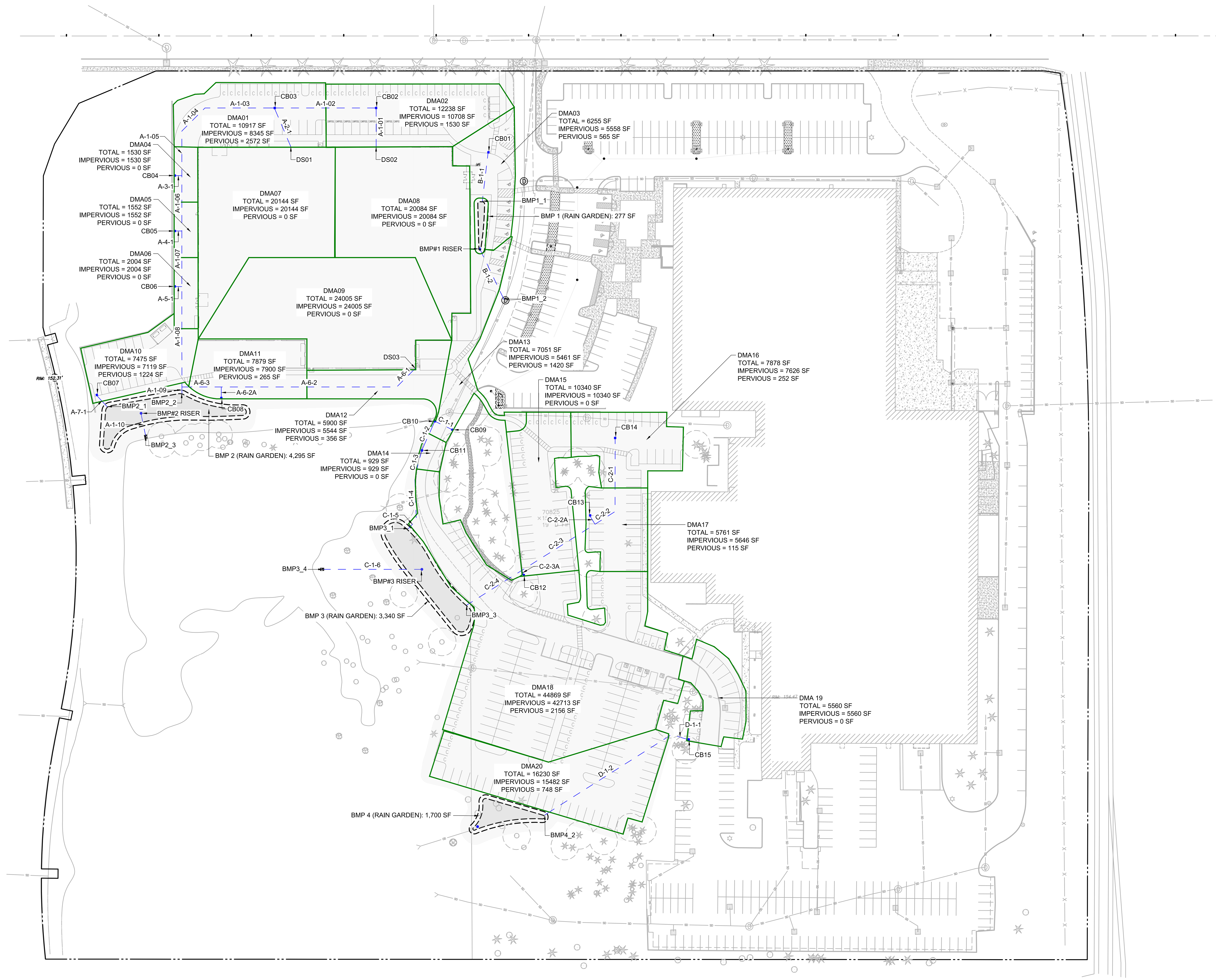
Figure 5: Post Developed Discharge Hydrograph

Runoff (cfs)	Slope(%)	Diameter (in)	Pipe Area (sf)	Hydraulic Radius^2/3	Capacity (cfs)	Velocity at Design Flow (fps)	Runoff/Capacity (ratio)
6.84	0.50	18	1.767	0.520	7.40	4.69	0.92
6.84	0.50	18	1.767	0.520	7.40	4.69	0.92

Figure 6: Culvert Downstream Conveyance Spreadsheet

Figure 5 illustrates the peak flow (13.67 cfs) for the 25-year storm from the overall property. Figure 6 lists the variables used in a Manning's calculations to determine capacity, and it is conclusive that two 18" culverts are sufficient to adequately convey the 25-year storm peak discharge from the overall property to Coffee Lake Creek.

APPENDIX A –
HYDRAULIC DESIGN
COMPUTATIONS AND
DMA MAP



1
-
DRAINAGE MANAGEMENT AREA MAP

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

THE SURVEY INFORMATION SHOWN AS A BACKGROUND SCREEN ON THIS SHEET IS SHOWN FOR REFERENCE ONLY AND IS BASED ON A SURVEY BY: ANDY PARIS & ASSOCIATES, INC. DATE: 08/23/2022

M.

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REVISION SCHEDULE

Delta	Issued As	Issue Date

SHEET TITLE:
DRAINAGE MANAGEMENT AREA MAP

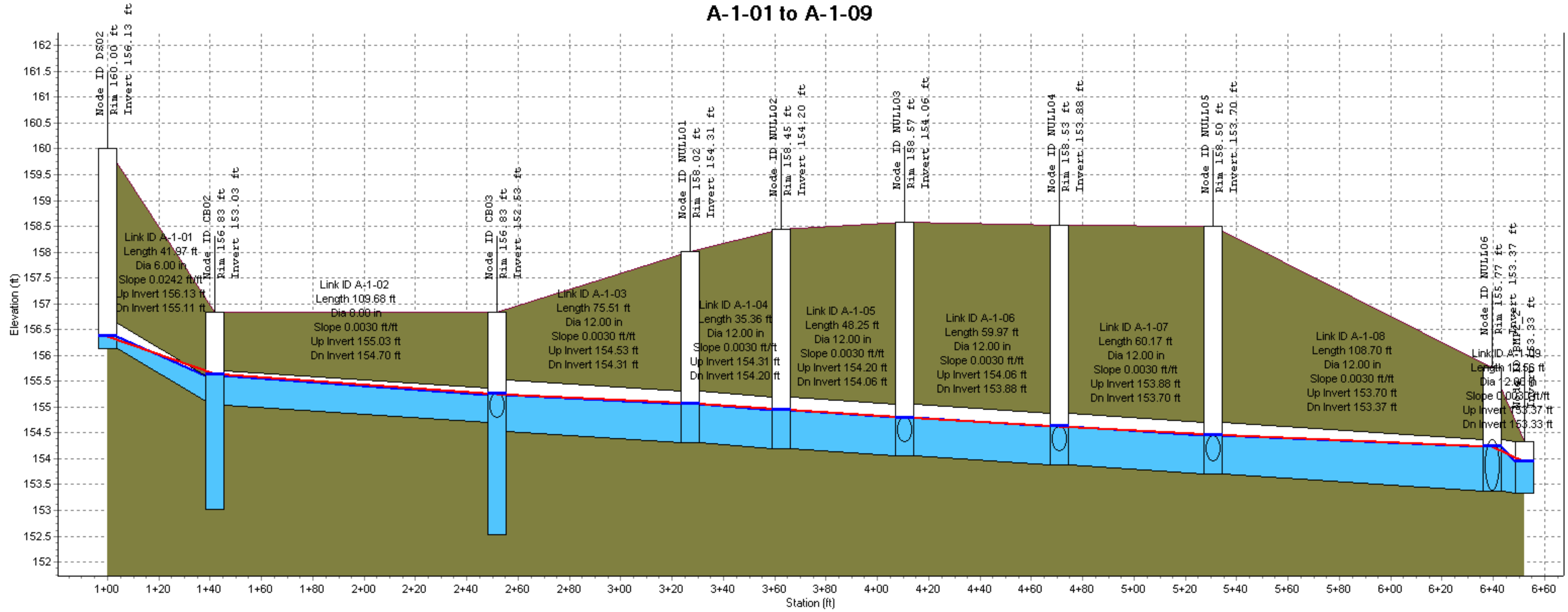
DRAWN BY: BTC
CHECKED BY: GIM
SHEET:
-

JOB NO. 2210115.00

LAND USE SUBMITTAL - 12/03/2021

221011500\DRAWINGS\CIVIL\EXHIBITS\115-DMA MAP_VSN.DWG VSN 12/02/21 12:19 1:50

Profile Plot
A-1-01 to A-1-09

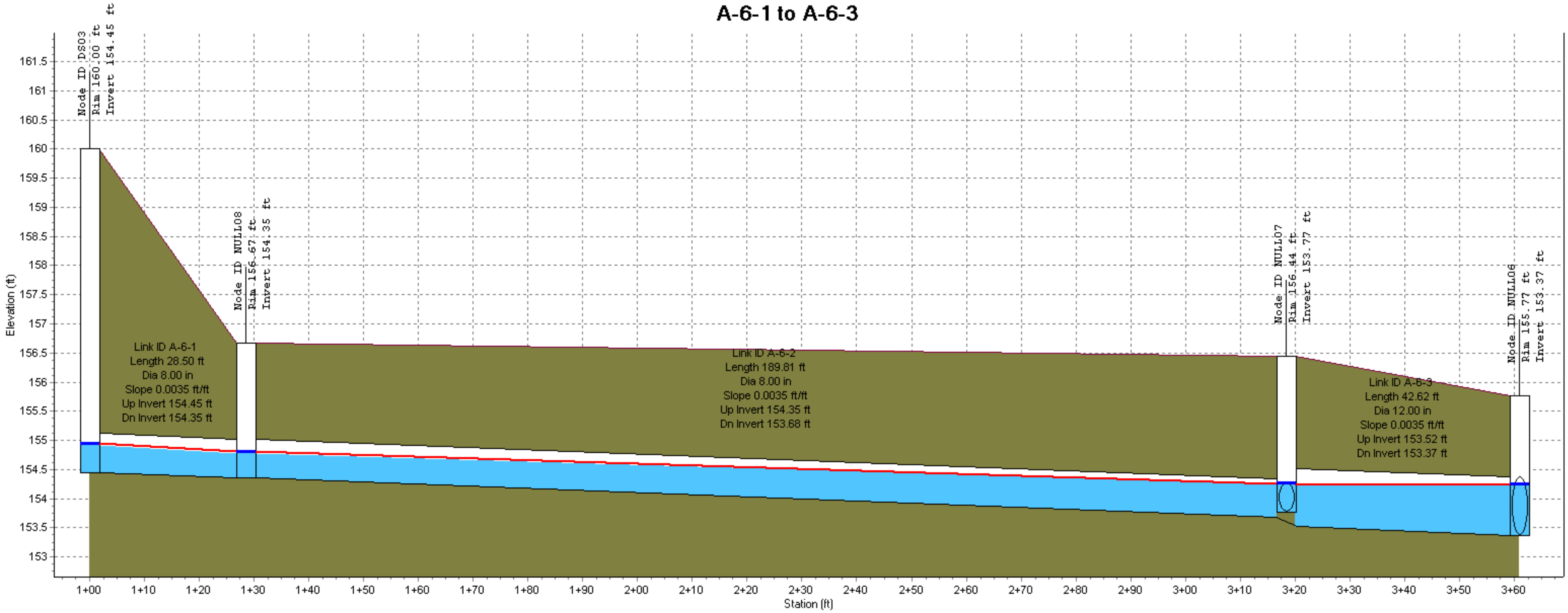


Node ID:	DS02	CB02	CB03	NULL01	NULL02	NULL03	NULL04	NULL05	NULL06	EMP2_2
Rim (ft):	160.00	156.83	156.83	158.02	158.45	158.57	158.53	158.50	155.77	
Invert (ft):	156.13	153.03	152.53	154.31	154.20	154.06	153.88	153.70	153.37	153.33
Min Pipe Cover (ft):				2.71	3.25	3.51	3.65	3.80	1.40	
Max HGL (ft):	156.37	155.64	155.26	155.07	154.95	154.80	154.63	154.46	154.24	153.95

Link ID:	A-1-01	A-1-02	A-1-03	A-1-04	A-1-05	A-1-06	A-1-07	A-1-08	A-1-09
Length (ft):	41.97	109.68	75.51	35.36	48.25	59.97	60.17	108.70	12.56
Dia (in):	6.00	8.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
Slope (ft/ft):	0.0242	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030	0.0030
Up Invert (ft):	156.13	155.03	154.53	154.31	154.20	154.06	153.88	153.70	153.37
Dn Invert (ft):	155.11	154.70	154.31	154.20	154.06	153.88	153.70	153.37	153.33
Max Q (cfs):	0.43	0.68	1.31	1.31	1.30	1.33	1.36	1.41	2.09
Max Vel (ft/s):	2.75	2.10	2.13	2.08	2.13	2.16	2.19	2.05	3.34
Max Depth (ft):	0.37	0.58	0.74	0.75	0.74	0.75	0.76	0.82	0.74

Autodesk Storm and Sanitary Analysis

Profile Plot
A-6-1 to A-6-3



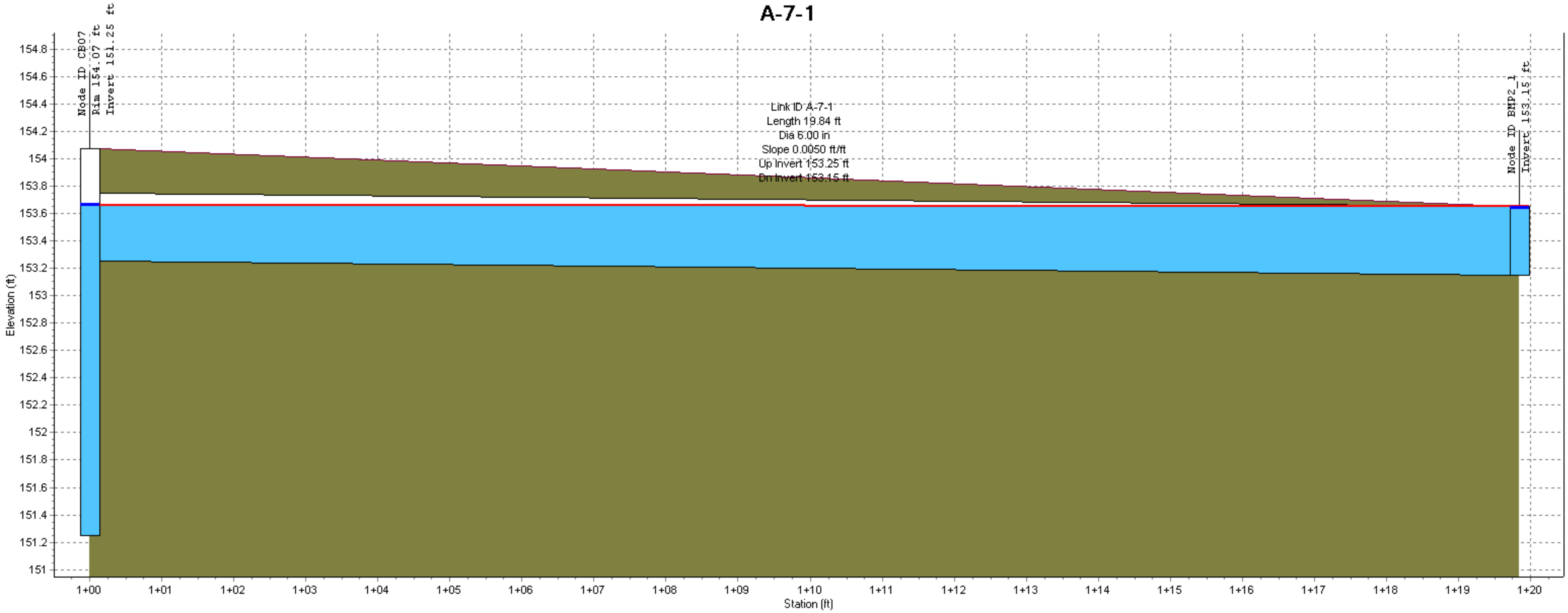
Node ID:	DS03	NULL08	NULL07	NULL06
Rim (ft):	160.00	156.67	156.44	155.77
Invert (ft):	154.45	154.35	153.77	153.37
Min Pipe Cover (ft):		1.65	1.92	1.40
Max HGL (ft):	154.95	154.81	154.26	154.24

Link ID:	A-6-1	A-6-2	A-6-3
Length (ft):	28.50	189.81	42.62
Dia (in):	8.00	8.00	12.00
Slope (ft/ft):	0.0035	0.0035	0.0035
Up Invert (ft):	154.45	154.35	153.52
Dn Invert (ft):	154.35	153.68	153.37
Max Q (cfs):	0.52	0.52	0.68
Max Vel (ft/s):	1.95	2.20	1.45
Max Depth (ft):	0.48	0.47	0.68

Autodesk Storm and Sanitary Analysis

Profile Plot

A-7-1

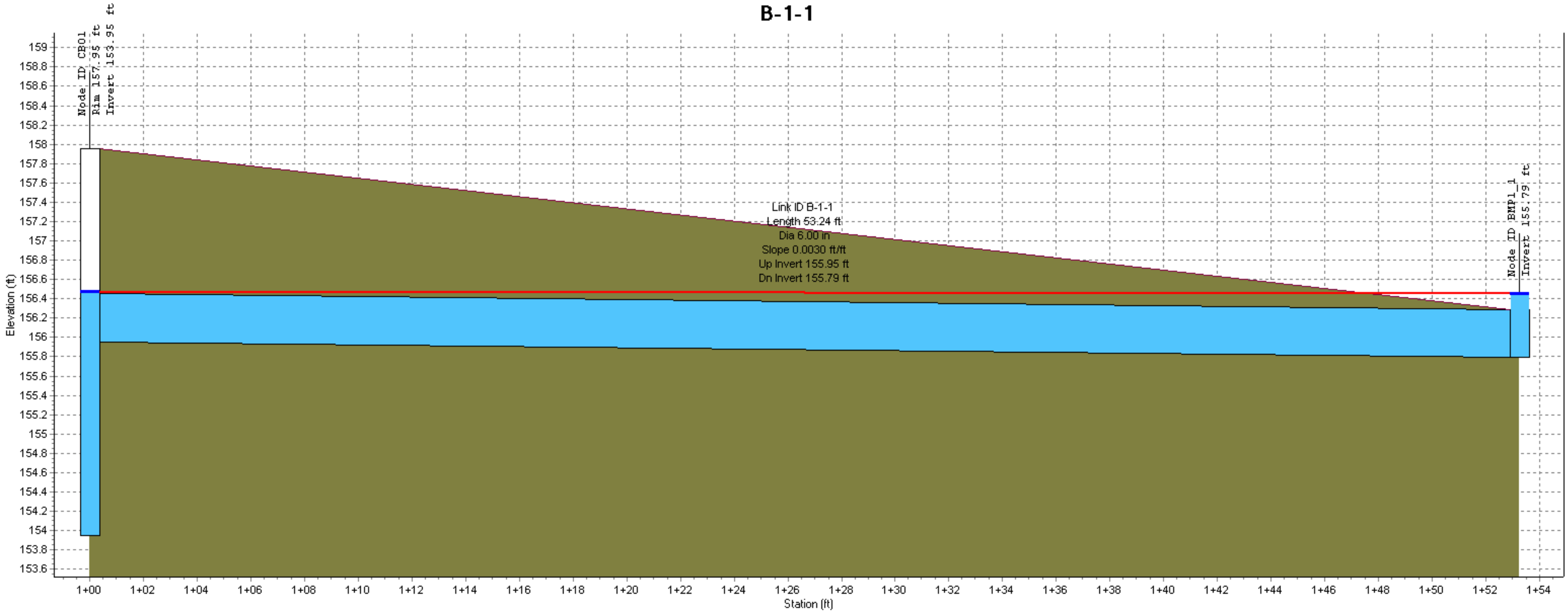


Node ID:	CB07	BMP2_1
Rim (ft):	154.07	
Invert (ft):	151.25	153.15
Min Pipe Cover (ft):		
Max HGL (ft):	153.67	153.65
Link ID:	A-7-1	
Length (ft):	19.84	
Dia (in):	6.00	
Slope (ft/ft):	0.0050	
Up Invert (ft):	153.25	
Dn Invert (ft):	153.15	
Max Q (cfs):	0.15	
Max Vel (ft/s):	0.81	
Max Depth (ft):	0.46	

Autodesk Storm and Sanitary Analysis

Profile Plot

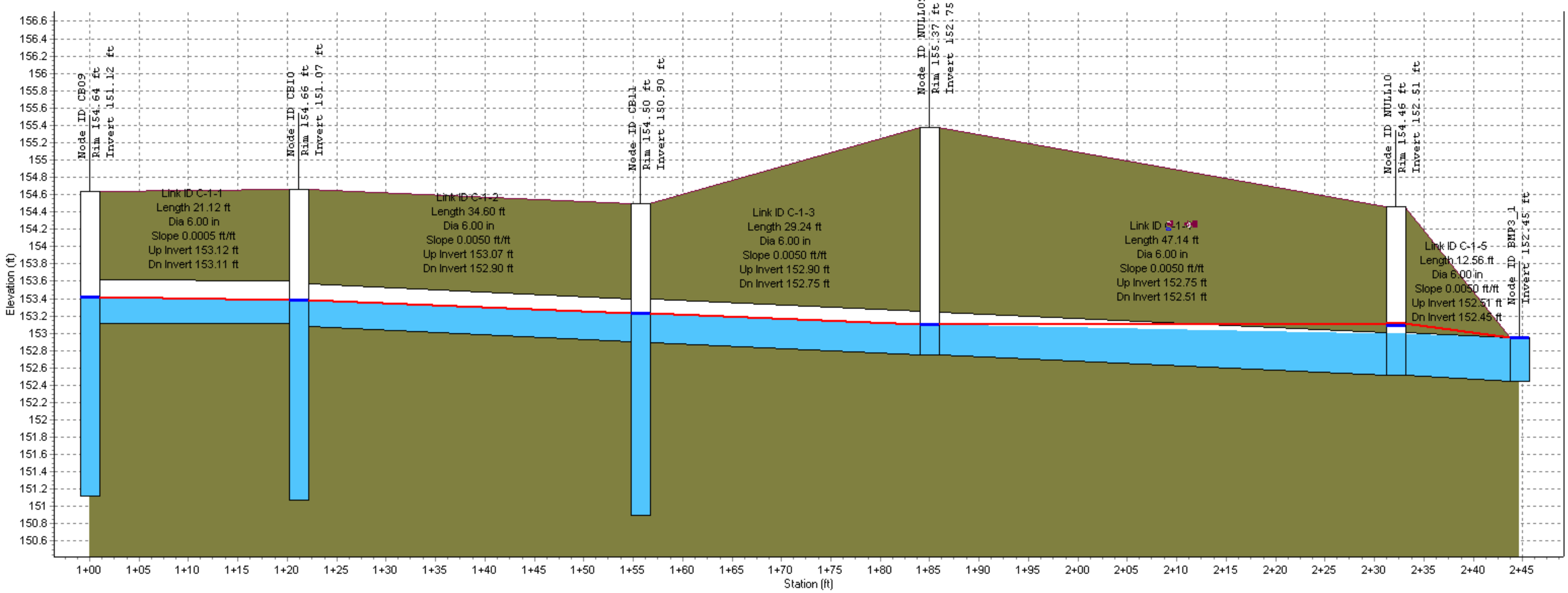
B-1-1



Node ID:	CB01	BMP1_1
Rim (ft):	157.95	
Invert (ft):	153.95	155.79
Min Pipe Cover (ft):		
Max HGL (ft):	156.48	156.45
Link ID:	B-1-1	
Length (ft):	53.24	
Dia (in):	6.00	
Slope (ft/ft):	0.0030	
Up Invert (ft):	155.95	
Dn Invert (ft):	155.79	
Max Q (cfs):	0.13	
Max Vel (ft/s):	0.64	
Max Depth (ft):	0.50	

Autodesk Storm and Sanitary Analysis

Profile Plot
C-1-1 to C-1-5

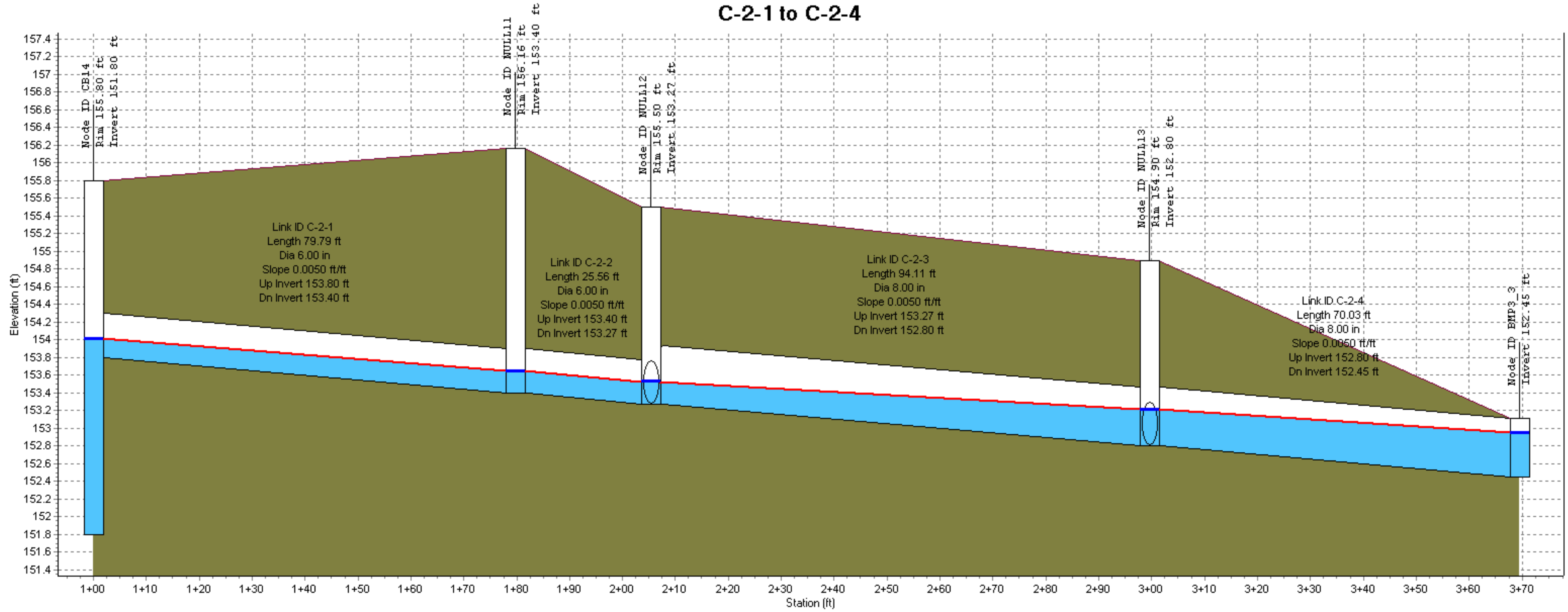


Node ID:	CB09	CB10	CB11	NULL09	NULL10	BMP3_1
Rim (ft):	154.64	154.66	154.50	155.37	154.46	
Invert (ft):	151.12	151.07	150.90	152.75	152.51	152.45
Min Pipe Cover (ft):				2.12	1.45	
Max HGL (ft):	153.42	153.38	153.23	153.10	153.11	152.95

Link ID:	C-1-1	C-1-2	C-1-3	C-1-4	C-1-5
Length (ft):	21.12	34.60	29.24	47.14	12.56
Dia (in):	6.00	6.00	6.00	6.00	6.00
Slope (ft/ft):	0.0005	0.0050	0.0050	0.0050	0.0050
Up Invert (ft):	153.12	153.07	152.90	152.75	152.51
Dn Invert (ft):	153.11	152.90	152.75	152.51	152.45
Max Q (cfs):	0.11	0.23	0.25	0.25	0.33
Max Vel (ft/s):	1.05	1.74	1.73	1.41	2.03
Max Depth (ft):	0.29	0.32	0.34	0.42	0.50

Autodesk Storm and Sanitary Analysis

Profile Plot
C-2-1 to C-2-4

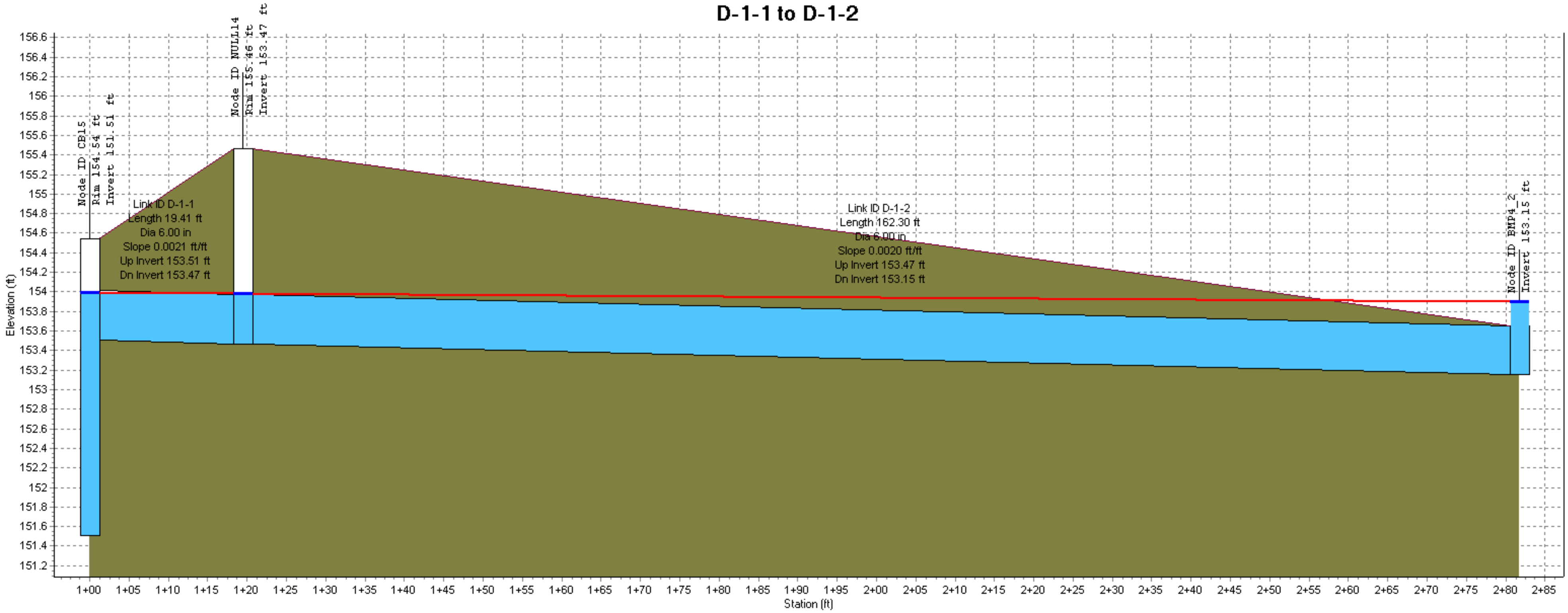


Node ID:	CB14	NULL11	NULL12	NULL13	BMP3_3
Rim (ft):	155.80	156.16	155.50	154.90	
Invert (ft):	151.80	153.40	153.27	152.80	152.45
Min Pipe Cover (ft):		2.26	1.56	1.43	
Max HGL (ft):	154.02	153.65	153.53	153.22	152.95

Link ID:	C-2-1	C-2-2	C-2-3	C-2-4
Length (ft):	79.79	25.56	94.11	70.03
Dia (in):	6.00	6.00	8.00	8.00
Slope (ft/ft):	0.0050	0.0050	0.0050	0.0050
Up Invert (ft):	153.80	153.40	153.27	152.80
Dn Invert (ft):	153.40	153.27	152.80	152.45
Max Q (cfs):	0.16	0.16	0.28	0.50
Max Vel (ft/s):	1.76	1.59	1.55	1.93
Max Depth (ft):	0.24	0.26	0.34	0.46

Autodesk Storm and Sanitary Analysis

Profile Plot
D-1-1 to D-1-2



Node ID:	CB15	NULL14	BMP4_2
Rim (ft):	154.54	155.46	
Invert (ft):	151.51	153.47	153.15
Min Pipe Cover (ft):		1.49	
Max HGL (ft):	153.99	153.98	153.90

Link ID:	D-1-1	D-1-2
Length (ft):	19.41	162.30
Dia (in):	6.00	6.00
Slope (ft/ft):	0.0021	0.0020
Up Invert (ft):	153.51	153.47
Dn Invert (ft):	153.47	153.15
Max Q (cfs):	0.17	0.16
Max Vel (ft/s):	2.75	1.09
Max Depth (ft):	0.49	0.50

Autodesk Storm and Sanitary Analysis

Project Description

File Name 115-SSA.SPF

Project Options

Flow Units .... CFS
Elevation Type .... Elevation
Hydrology Method .... Santa Barbara UH
Time of Concentration (TOC) Method .... SCS TR-55
Link Routing Method .... Hydrodynamic
Enable Overflow Ponding at Nodes .... YES
Skip Steady State Analysis Time Periods .... YES

Analysis Options

Start Analysis On	Nov 23, 2021	00:00:00
End Analysis On	Nov 24, 2021	00:00:00
Start Reporting On	Nov 23, 2021	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins..	20
Nodes...	48
Junctions	17
Outfalls	11
Flow Diversions	0
Inlets	20
Storage Nodes	0
Links..	37
Channels	2
Pipes	35
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-025yr	Time Series	TS-025YR	Intensity	inches	Oregon	Clackamas	25	4.00	SCS Type IA 24-hr

Subbasin Summary

SN	Subbasin ID	Area (ft²)	Impervious Area (%)	Impervious Area Curve Number	Pervious Area Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	DMA01	10917.01	76.00	98.00	76.00	3.99	3.27	0.82	0.20	0 00:05:00
2	DMA02	12238.01	87.00	98.00	76.00	3.99	3.49	0.98	0.24	0 00:05:00
3	DMA03	6123.01	91.00	98.00	76.00	3.99	3.57	0.50	0.13	0 00:05:00
4	DMA04	1530.00	100.00	98.00	76.00	3.99	3.76	0.13	0.03	0 00:05:00
5	DMA05	1552.00	100.00	98.00	76.00	3.99	3.76	0.13	0.03	0 00:05:00
6	DMA06	2004.02	100.00	98.00	76.00	3.99	3.76	0.17	0.04	0 00:05:00
7	DMA07	20144.02	100.00	98.00	76.00	3.99	3.76	1.74	0.44	0 00:05:00
8	DMA08	20083.99	100.00	98.00	76.00	3.99	3.76	1.73	0.43	0 00:05:00
9	DMA09	24005.00	100.00	98.00	76.00	3.99	3.76	2.07	0.52	0 00:05:00
10	DMA10	8343.00	85.00	98.00	76.00	3.99	3.44	0.66	0.15	0 00:11:12
11	DMA11	8165.02	97.00	98.00	76.00	3.99	3.70	0.69	0.17	0 00:05:00
12	DMA12	5899.98	94.00	98.00	76.00	3.99	3.63	0.49	0.12	0 00:05:00
13	DMA13	6881.00	79.00	98.00	76.00	3.99	3.32	0.52	0.11	0 00:17:06
14	DMA14	929.00	100.00	98.00	76.00	3.99	3.76	0.08	0.02	0 00:05:00
15	DMA15	10340.01	100.00	98.00	76.00	3.99	3.76	0.89	0.22	0 00:05:00
16	DMA16	7878.00	97.00	98.00	76.00	3.99	3.69	0.67	0.16	0 00:07:46
17	DMA17	5760.98	98.00	98.00	76.00	3.99	3.71	0.49	0.12	0 00:08:01
18	DMA18	44869.02	95.00	98.00	76.00	3.99	3.65	3.76	0.90	0 00:08:53
19	DMA19	5560.00	100.00	98.00	76.00	3.99	3.76	0.48	0.12	0 00:05:00
20	DMA20	16230.02	95.00	98.00	76.00	3.99	3.64	1.36	0.30	0 00:14:24

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	BMP#1 RISER	Junction	152.48	155.73	152.48	155.73	0.00	0.00	152.48	0.00	3.25	0 00:00	0.00	0.00
2	BMP#2 RISER	Junction	149.65	152.90	149.65	152.90	0.00	0.00	149.65	0.00	3.25	0 00:00	0.00	0.00
3	BMP#3 RISER	Junction	148.95	153.20	148.95	152.20	0.00	0.00	148.95	0.00	4.25	0 00:00	0.00	0.00
4	NULL01	Junction	154.31	158.02	154.31	155.38	0.00	1.31	155.07	0.00	2.95	0 00:00	0.00	0.00
5	NULL02	Junction	154.20	158.45	154.20	155.28	0.00	1.31	154.95	0.00	3.50	0 00:00	0.00	0.00
6	NULL03	Junction	154.06	158.57	154.06	155.13	0.00	1.34	154.80	0.00	3.77	0 00:00	0.00	0.00
7	NULL04	Junction	153.88	158.53	153.88	154.95	0.00	1.37	154.63	0.00	3.90	0 00:00	0.00	0.00
8	NULL05	Junction	153.70	158.50	153.70	154.77	0.00	1.41	154.46	0.00	4.04	0 00:00	0.00	0.00
9	NULL06	Junction	153.37	155.77	153.65	154.45	0.00	2.09	154.24	0.00	1.53	0 00:00	0.00	0.00
10	NULL07	Junction	153.77	156.44	153.55	154.91	0.00	0.69	154.26	0.00	2.18	0 00:00	0.00	0.00
11	NULL08	Junction	154.35	156.67	154.33	155.69	0.00	0.52	154.81	0.00	1.86	0 00:00	0.00	0.00
12	NULL09	Junction	152.75	155.37	152.75	153.29	0.00	0.25	153.10	0.00	2.27	0 00:00	0.00	0.00
13	NULL10	Junction	152.51	154.46	152.51	153.06	0.00	0.33	153.11	0.00	1.35	0 00:00	0.00	0.00
14	NULL11	Junction	153.40	156.16	153.40	153.94	0.00	0.16	153.65	0.00	2.51	0 00:00	0.00	0.00
15	NULL12	Junction	153.27	155.50	153.27	154.41	0.00	0.28	153.53	0.00	1.97	0 00:00	0.00	0.00
16	NULL13	Junction	152.80	154.90	152.80	153.93	0.00	0.50	153.22	0.00	1.68	0 00:00	0.00	0.00
17	NULL14	Junction	153.47	155.46	153.47	154.80	0.00	0.30	153.98	0.00	1.48	0 00:00	0.00	0.00
18	BMP1_1	Outfall	155.79					0.13	156.45					
19	BMP1_2	Outfall	151.57					0.00	151.57					
20	BMP2_1	Outfall	153.15					0.15	153.65					
21	BMP2_2	Outfall	153.33					2.09	153.95					
22	BMP2_3	Outfall	149.53					0.00	149.53					
23	BMP3_1	Outfall	152.45					0.33	152.95					
24	BMP3_2	Outfall	152.45					0.00	152.95					
25	BMP3_3	Outfall	152.45					0.50	152.95					
26	BMP3_4	Outfall	148.42					0.00	148.42					
27	BMP4_1	Outfall	153.40					0.01	153.90					
28	BMP4_2	Outfall	153.15					0.16	153.90					

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	A-1-01	Pipe	DS02	CB02	41.97	156.13	154.94	2.8200	6.000	0.0130	0.43	0.94	0.46	2.83	0.37	0.74	0.00	Calculated
2	A-1-02	Pipe	CB02	CB03	109.68	154.86	154.53	0.3000	8.000	0.0130	0.68	0.66	1.02	1.94	0.67	1.00	16.00	SURCHARGED
3	A-1-03	Pipe	CB03	NULL01	75.51	154.53	154.31	0.3000	12.000	0.0130	1.31	1.95	0.67	2.13	0.74	0.74	0.00	Calculated
4	A-1-04	Pipe	NULL01	NULL02	35.36	154.31	154.20	0.3000	12.000	0.0130	1.31	1.95	0.67	2.09	0.75	0.75	0.00	Calculated
5	A-1-05	Pipe	NULL02	NULL03	48.25	154.20	154.06	0.3000	12.000	0.0130	1.30	1.95	0.67	2.12	0.74	0.74	0.00	Calculated
6	A-1-06	Pipe	NULL03	NULL04	59.97	154.06	153.88	0.3000	12.000	0.0130	1.33	1.95	0.68	2.16	0.75	0.75	0.00	Calculated
7	A-1-07	Pipe	NULL04	NULL05	60.17	153.88	153.70	0.3000	12.000	0.0130	1.36	1.95	0.70	2.18	0.76	0.76	0.00	Calculated
8	A-1-08	Pipe	NULL05	NULL06	108.70	153.70	153.37	0.3000	12.000	0.0130	1.41	1.95	0.72	2.05	0.82	0.82	0.00	Calculated
9	A-1-09	Pipe	NULL06	BMP2_2	12.56	153.37	153.33	0.3000	12.000	0.0130	2.09	1.95	1.07	3.34	0.74	0.74	0.00	> CAPACITY
10	A-1-10	Pipe	BMP#2 RISER	BMP2_3	24.86	149.65	149.53	0.5000	6.000	0.0130	0.00	0.40	0.00	0.00	0.00	0.00	0.00	Calculated
11	A-2-1	Pipe	DS01	CB03	45.40	155.39	154.78	1.3400	6.000	0.0130	0.44	0.65	0.67	2.94	0.39	0.78	0.00	Calculated
12	A-3-1	Pipe	CB04	NULL03	7.60	154.35	154.31	0.5000	6.000	0.0130	0.03	0.40	0.08	0.84	0.47	0.94	0.00	Calculated
13	A-4-1	Pipe	CB05	NULL04	7.60	154.17	154.13	0.5000	6.000	0.0130	0.03	0.40	0.08	0.84	0.48	0.96	0.00	Calculated
14	A-5-1	Pipe	CB06	NULL05	7.61	153.99	153.95	0.5000	6.000	0.0130	0.04	0.40	0.11	0.95	0.49	0.97	0.00	Calculated
15	A-6-1	Pipe	DS03	NULL08	28.50	154.45	154.35	0.3500	8.000	0.0130	0.52	0.72	0.72	1.95	0.48	0.71	0.00	Calculated
16	A-6-2	Pipe	NULL08	NULL07	189.81	154.35	153.68	0.3500	8.000	0.0130	0.52	0.67	0.78	2.20	0.47	0.70	0.00	Calculated
17	A-6-2A	Pipe	CB08	NULL07	11.86	154.15	153.77	3.2000	6.000	0.0130	0.17	1.00	0.17	1.97	0.31	0.63	0.00	Calculated
18	A-6-3	Pipe	NULL07	NULL06	42.62	153.52	153.37	0.3500	12.000	0.0130	0.68	3.45	0.20	1.46	0.68	0.68	0.00	Calculated
19	A-7-1	Pipe	CB07	BMP2_1	19.84	153.25	153.15	0.5000	6.000	0.0130	0.15	0.40	0.38	0.81	0.46	0.92	0.00	Calculated
20	B-1-1	Pipe	CB01	BMP1_1	53.24	155.95	155.79	0.3000	6.000	0.0130	0.13	0.31	0.41	0.64	0.50	1.00	1424.00	SURCHARGED
21	B-1-2	Pipe	BMP#1 RISER	BMP1_2	60.16	152.48	151.57	1.5100	8.000	0.0130	0.00	1.48	0.00	0.00	0.00	0.00	0.00	Calculated
22	C-1-1	Pipe	CB09	CB10	21.12	153.12	153.11	0.0500	6.000	0.0130	0.11	0.25	0.44	1.05	0.29	0.57	0.00	Calculated
23	C-1-2	Pipe	CB10	CB11	34.60	153.07	152.90	0.5000	6.000	0.0130	0.23	0.40	0.58	1.74	0.32	0.64	0.00	Calculated
24	C-1-3	Pipe	CB11	NULL09	29.24	152.90	152.75	0.5000	6.000	0.0130	0.25	0.40	0.63	1.73	0.34	0.69	0.00	Calculated
25	C-1-4	Pipe	NULL09	NULL10	47.14	152.75	152.51	0.5000	6.000	0.0130	0.25	0.39	0.63	1.41	0.42	0.84	0.00	Calculated
26	C-1-5	Pipe	NULL10	BMP3_1	12.56	152.51	152.45	0.5000	6.000	0.0130	0.33	0.40	0.84	2.03	0.50	1.00	0.00	SURCHARGED
27	C-1-6	Pipe	BMP#3 RISER	BMP3_4	106.93	148.95	148.42	0.5000	6.000	0.0130	0.00	0.40	0.00	0.00	0.00	0.00	0.00	Calculated
28	C-2-1	Pipe	CB14	NULL11	79.79	153.80	153.40	0.5000	6.000	0.0130	0.16	0.40	0.41	1.76	0.24	0.47	0.00	Calculated
29	C-2-2	Pipe	NULL11	NULL12	25.56	153.40	153.27	0.5000	6.000	0.0130	0.16	0.40	0.41	1.59	0.26	0.51	0.00	Calculated
30	C-2-2A	Pipe	CB13	NULL12	10.96	153.32	153.27	0.5000	6.000	0.0130	0.12	0.39	0.30	1.19	0.25	0.51	0.00	Calculated
31	C-2-3	Pipe	NULL12	NULL13	94.11	153.27	152.80	0.5000	8.000	0.0130	0.28	0.85	0.33	1.55	0.34	0.51	0.00	Calculated
32	C-2-3A	Pipe	CB12	NULL13	5.51	152.83	152.80	0.5000	6.000	0.0130	0.22	0.40	0.56	1.41	0.43	0.85	0.00	Calculated
33	C-2-4	Pipe	NULL13	BMP3_3	70.03	152.80	152.45	0.5000	8.000	0.0150	0.50	0.74	0.67	1.93	0.46	0.69	0.00	Calculated
34	D-1-1	Pipe	CB15	NULL14	19.41	153.51	153.47	0.2100	6.000	0.0130	0.17	0.25	0.67	2.75	0.49	0.98	0.00	Calculated
35	D-1-2	Pipe	NULL14	BMP4_2	162.30	153.47	153.15	0.2000	6.000	0.0130	0.16	0.25	0.65	1.09	0.50	1.00	15.00	SURCHARGED
36	BMP3_CURBBREAK	Channel	BMP3_CURBBREAK	BMP3_2	2.83	153.54	152.45	38.5200	12.000	0.0330	0.00	13.44	0.00	0.00	0.25	0.25	0.00	
37	BMP4_CURBBREAK	Channel	BMP4_CURBBREAK	BMP4_1	6.53	154.50	153.40	16.8500	12.000	0.0330	0.01	8.89	0.00	0.03	0.25	0.25	0.00	

Inlet Summary

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Initial Water Elevation (ft)	Ponded Area (ft²)	Peak Flow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Allowable Spread (ft)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)
1	BMP3_CURBBREAK	FHWA HEC-22 GENERIC	N/A	On Sag	1	0.00	153.54	0.00	10.00	0.90	N/A	N/A	N/A	7.00	-1.60	153.76
2	BMP4_CURBBREAK	FHWA HEC-22 GENERIC	N/A	On Sag	1	0.00	154.51	0.00	10.00	0.30	N/A	N/A	N/A	7.00	3.67	154.83
3	CB01	FHWA HEC-22 GENERIC	N/A	On Sag	1	153.95	157.95	156.45	0.00	0.13	N/A	N/A	N/A	7.00	1.53	158.09
4	CB02	FHWA HEC-22 GENERIC	N/A	On Sag	1	152.86	156.83	154.64	0.00	0.24	N/A	N/A	N/A	7.00	1.83	156.97
5	CB03	FHWA HEC-22 GENERIC	N/A	On Sag	1	152.53	156.83	154.53	0.00	0.20	N/A	N/A	N/A	7.00	1.73	156.97
6	CB04	FHWA HEC-22 GENERIC	N/A	On Sag	1	152.35	158.57	154.35	0.00	0.03	N/A	N/A	N/A	7.00	1.22	158.70
7	CB05	FHWA HEC-22 GENERIC	N/A	On Sag	1	152.17	158.53	154.17	0.00	0.03	N/A	N/A	N/A	7.00	1.22	158.66
8	CB06	FHWA HEC-22 GENERIC	N/A	On Sag	1	151.99	158.48	153.99	0.00	0.04	N/A	N/A	N/A	7.00	1.26	158.61
9	CB07	FHWA HEC-22 GENERIC	N/A	On Sag	1	151.25	154.07	153.65	0.00	0.15	N/A	N/A	N/A	7.00	1.60	154.21
10	CB08	FHWA HEC-22 GENERIC	N/A	On Sag	1	152.15	156.17	154.15	0.00	0.17	N/A	N/A	N/A	7.00	1.66	156.31
11	CB09	FHWA HEC-22 GENERIC	N/A	On Sag	1	151.12	154.64	153.12	0.00	0.11	N/A	N/A	N/A	7.00	1.49	154.78
12	CB10	FHWA HEC-22 GENERIC	N/A	On Sag	1	151.07	154.66	153.07	0.00	0.12	N/A	N/A	N/A	7.00	1.52	154.80
13	CB11	FHWA HEC-22 GENERIC	N/A	On Sag	1	150.90	154.50	152.95	0.00	0.02	N/A	N/A	N/A	7.00	1.16	154.63
14	CB12	FHWA HEC-22 GENERIC	N/A	On Sag	1	150.83	154.88	152.95	0.00	0.22	N/A	N/A	N/A	7.00	1.78	155.02
15	CB13	FHWA HEC-22 GENERIC	N/A	On Sag	1	151.32	155.44	153.32	0.00	0.12	N/A	N/A	N/A	7.00	1.51	155.58
16	CB14	FHWA HEC-22 GENERIC	N/A	On Sag	1	151.80	155.80	153.80	0.00	0.16	N/A	N/A	N/A	7.00	1.63	155.94
17	CB15	FHWA HEC-22 GENERIC	N/A	On Sag	1	151.51	154.54	153.90	0.00	0.12	N/A	N/A	N/A	7.00	1.52	154.68
18	DS01	FHWA HEC-22 GENERIC	N/A	On Sag	1	155.39	160.00	155.39	0.00	0.44	N/A	N/A	N/A	7.00	2.22	160.15
19	DS02	FHWA HEC-22 GENERIC	N/A	On Sag	1	156.13	160.00	156.13	0.00	0.43	N/A	N/A	N/A	7.00	2.21	160.15
20	DS03	FHWA HEC-22 GENERIC	N/A	On Sag	1	154.45	160.00	154.45	0.00	0.52	N/A	N/A	N/A	7.00	2.37	160.15

Subbasin Hydrology

Subbasin : DMA01

Input Data

Area (ft²) 10917.01
Impervious Area (%) 76.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	10917.01		92.72

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

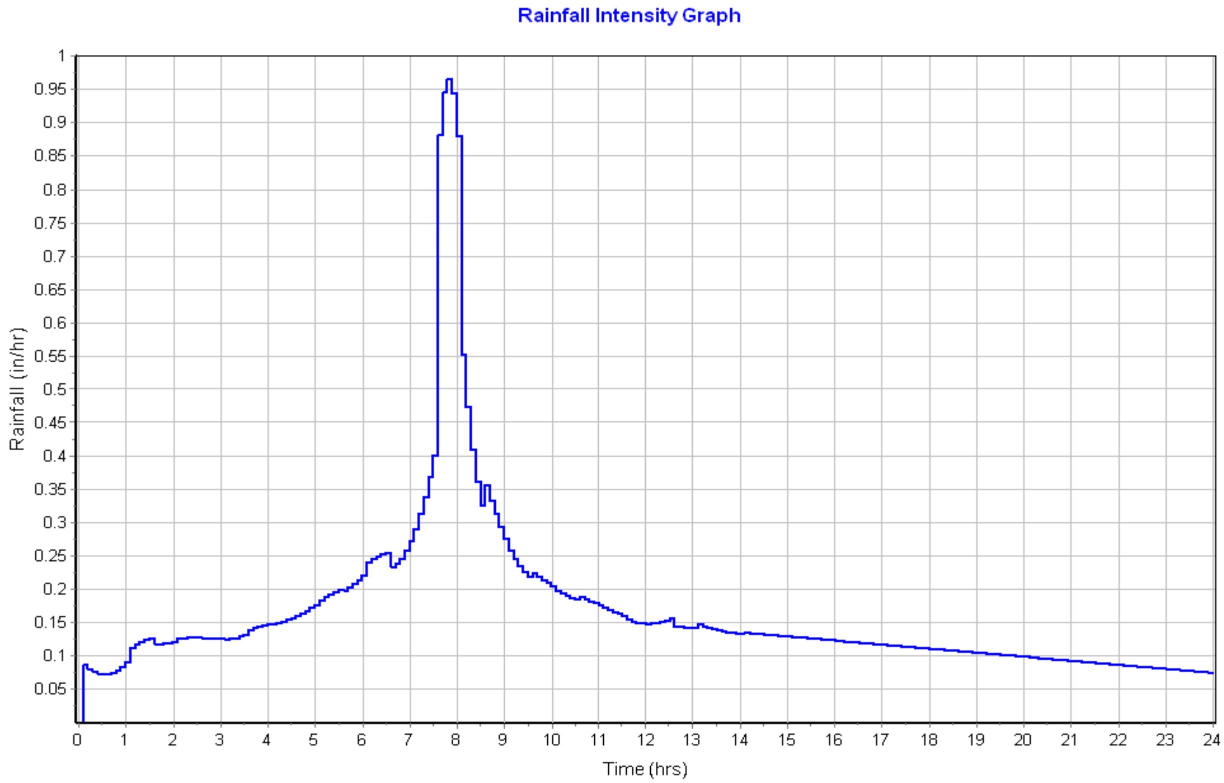
Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

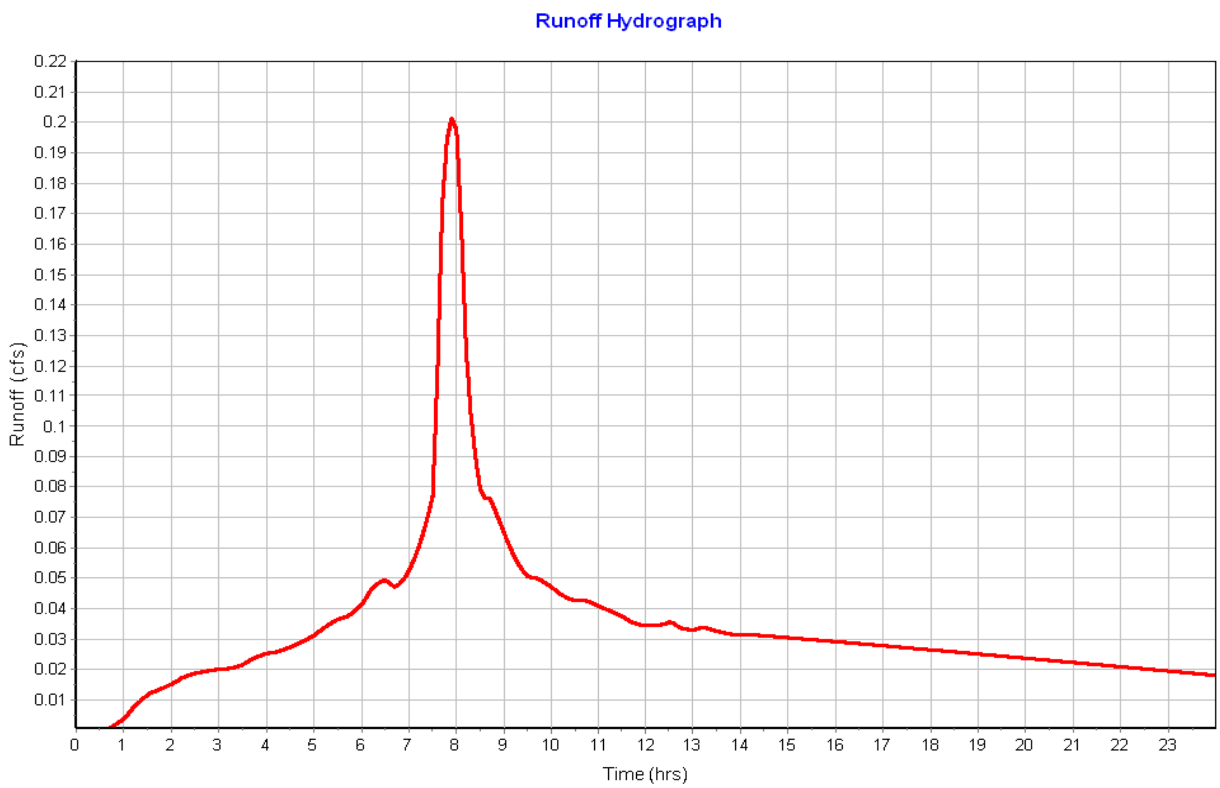
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.27
Peak Runoff (cfs) 0.20
Weighted Curve Number 92.72
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : DMA01





Subbasin : DMA02

Input Data

Area (ft²) 12238.01
Impervious Area (%) 87.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	12238.01		95.14

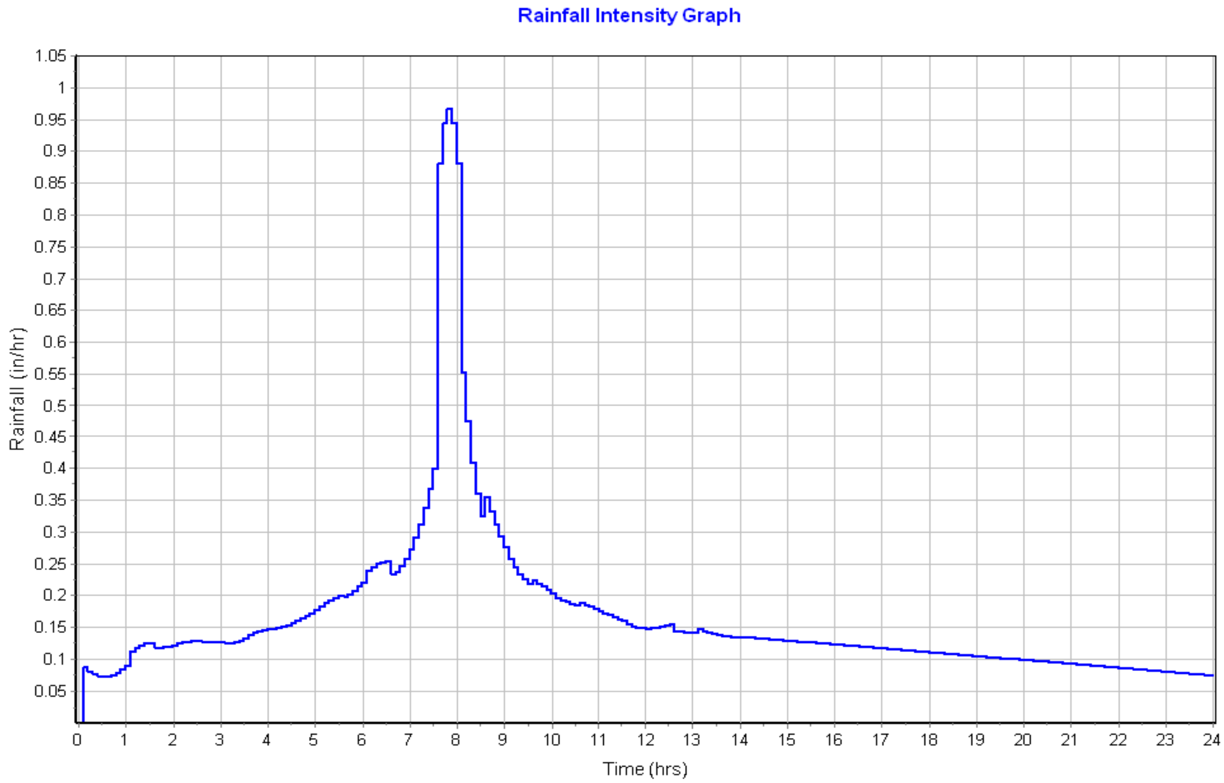
Time of Concentration

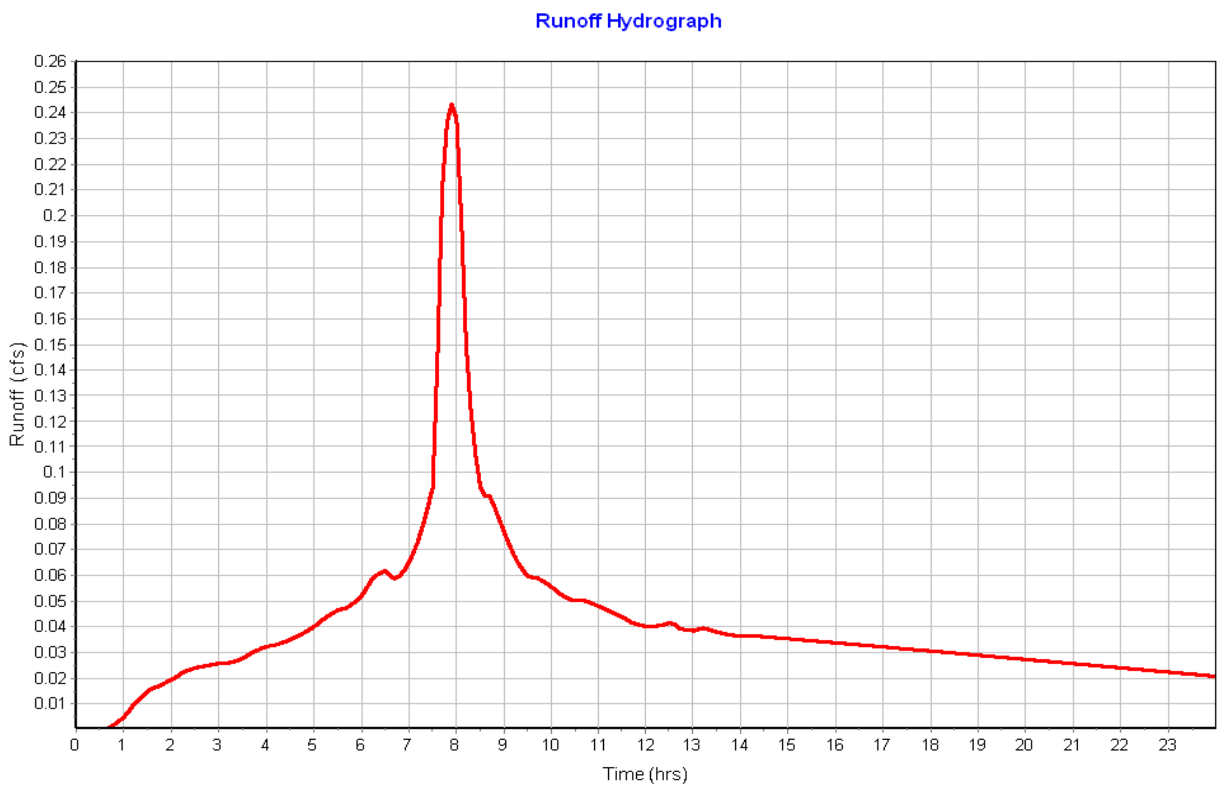
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.49
Peak Runoff (cfs) 0.24
Weighted Curve Number 95.14
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : DMA02





Subbasin : DMA03

Input Data

Area (ft²) 6123.01
Impervious Area (%) 91.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	6123.01		96.02

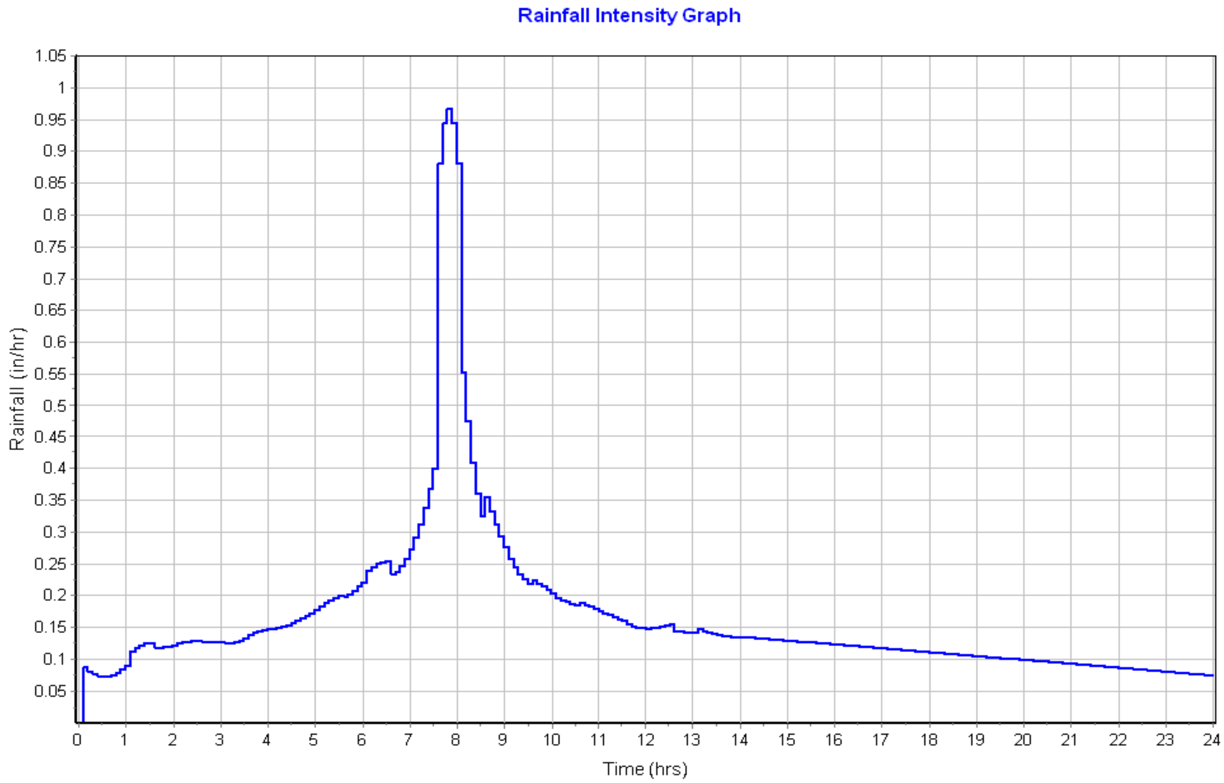
Time of Concentration

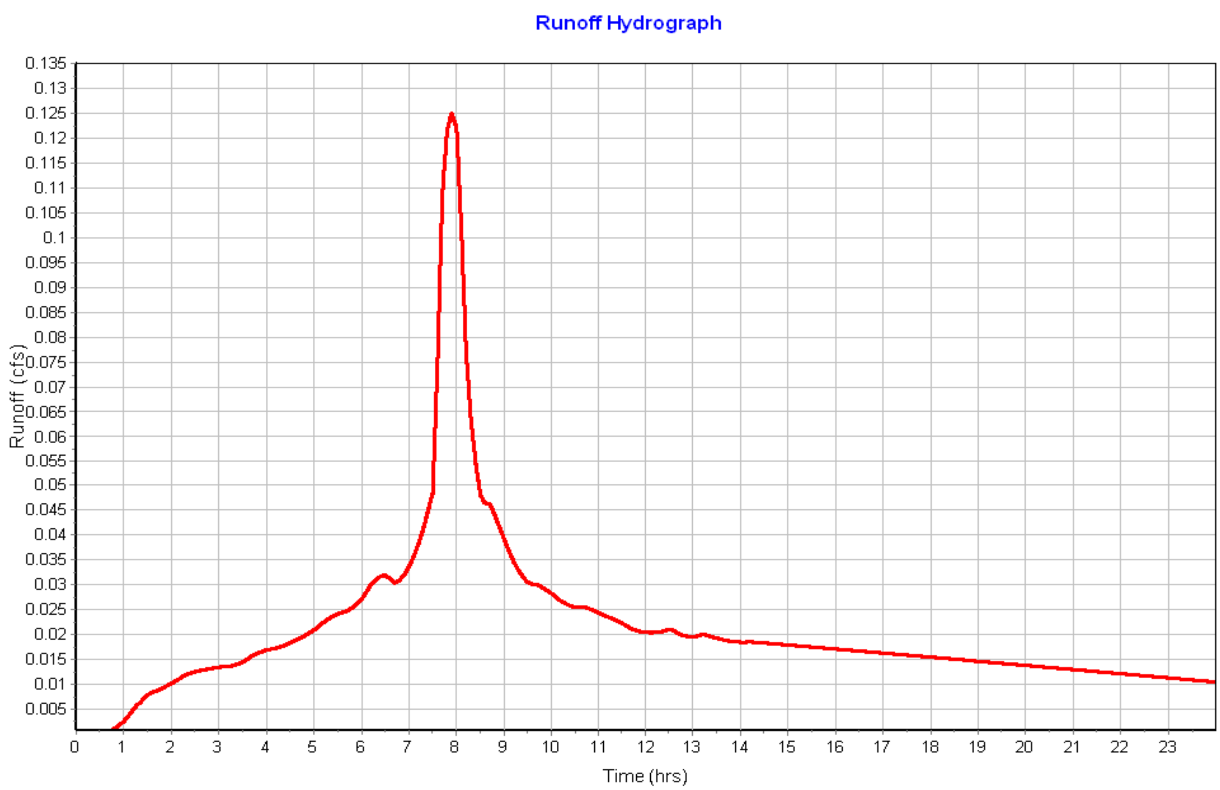
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.57
Peak Runoff (cfs) 0.13
Weighted Curve Number 96.02
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : DMA03





Subbasin : DMA04

Input Data

Area (ft²) 1530.00
Impervious Area (%) 100.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	1530.00		98

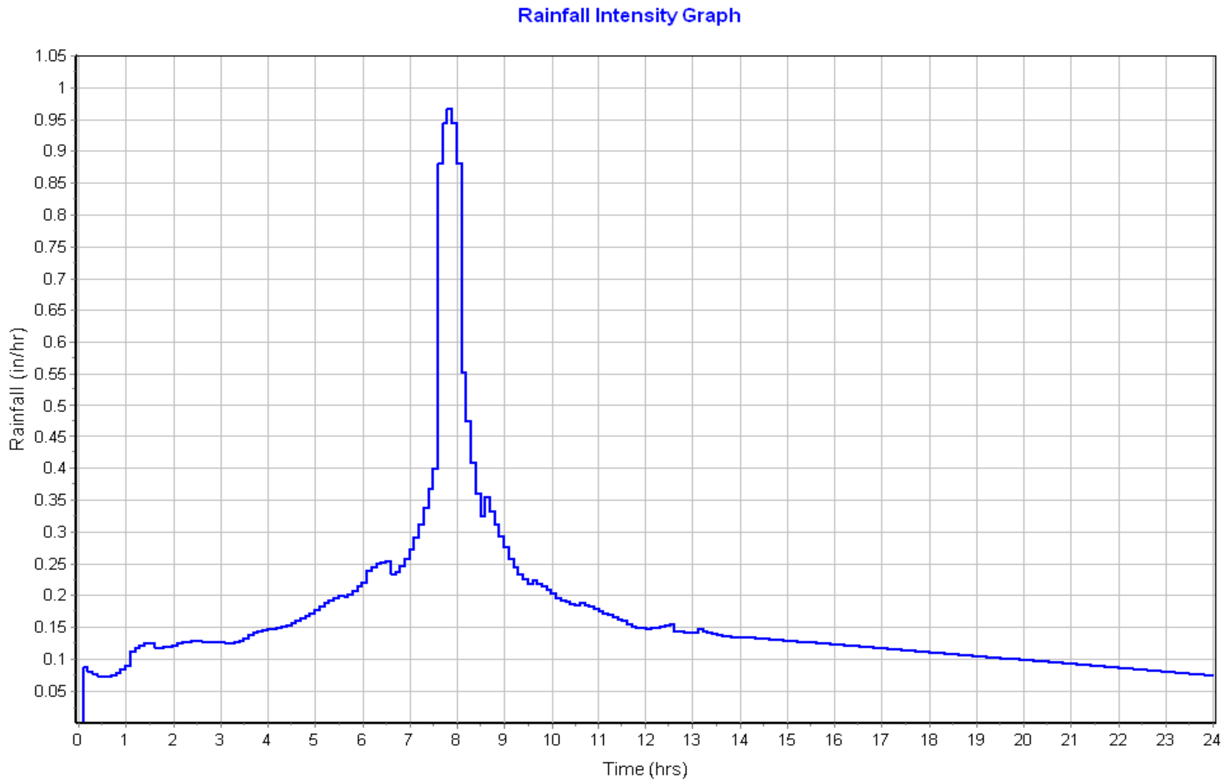
Time of Concentration

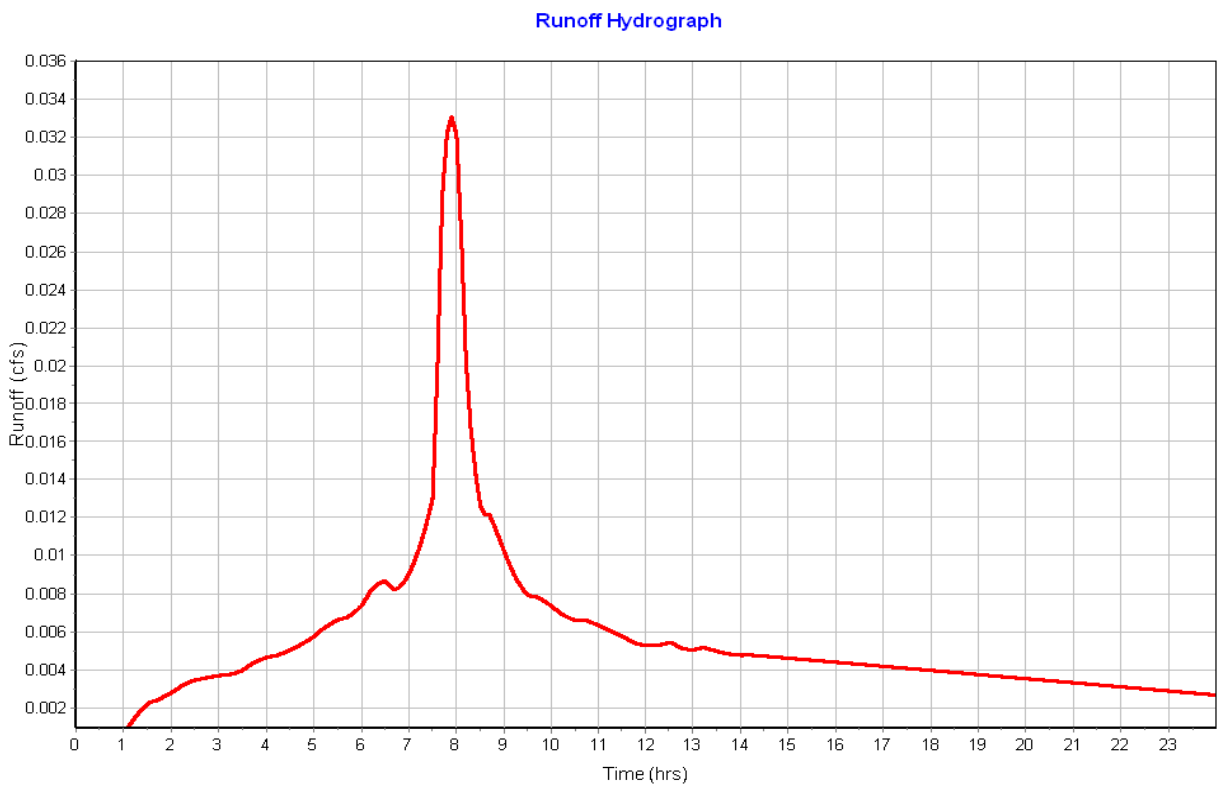
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.76
Peak Runoff (cfs) 0.03
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : DMA04





Subbasin : DMA05

Input Data

Area (ft²) 1552.00
Impervious Area (%) 100.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	1552.00		98

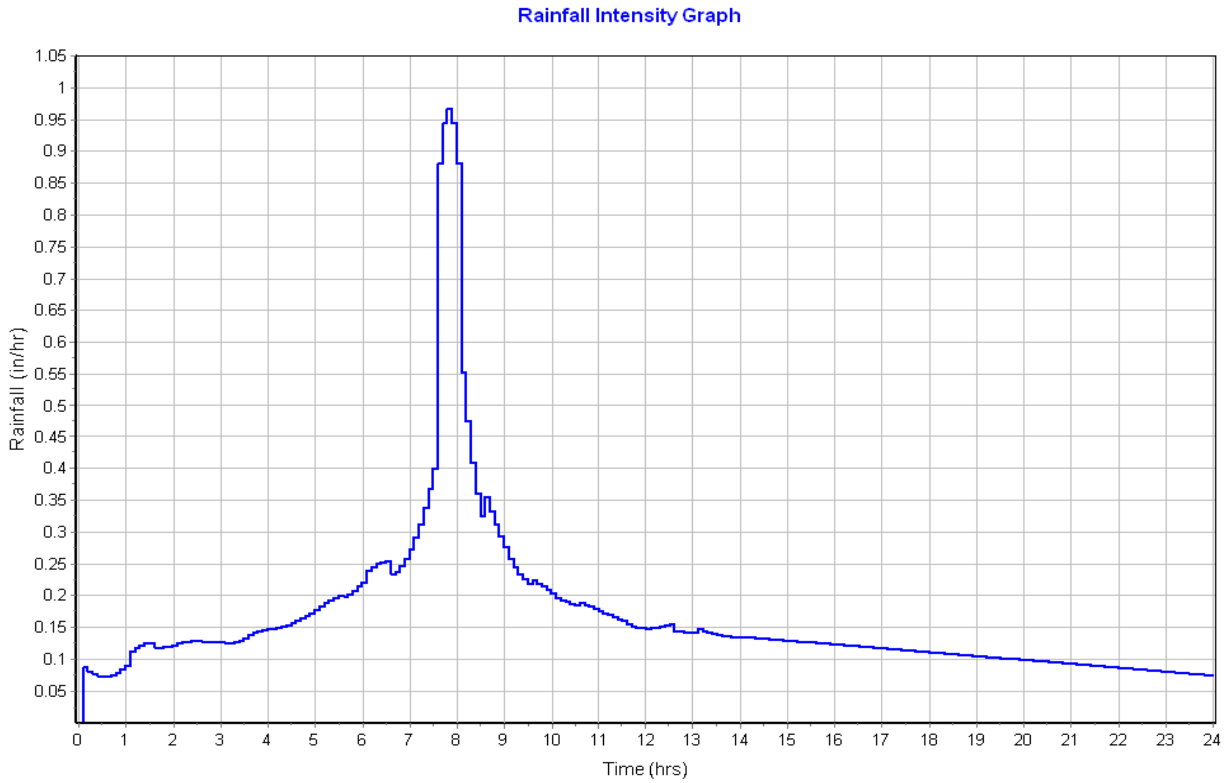
Time of Concentration

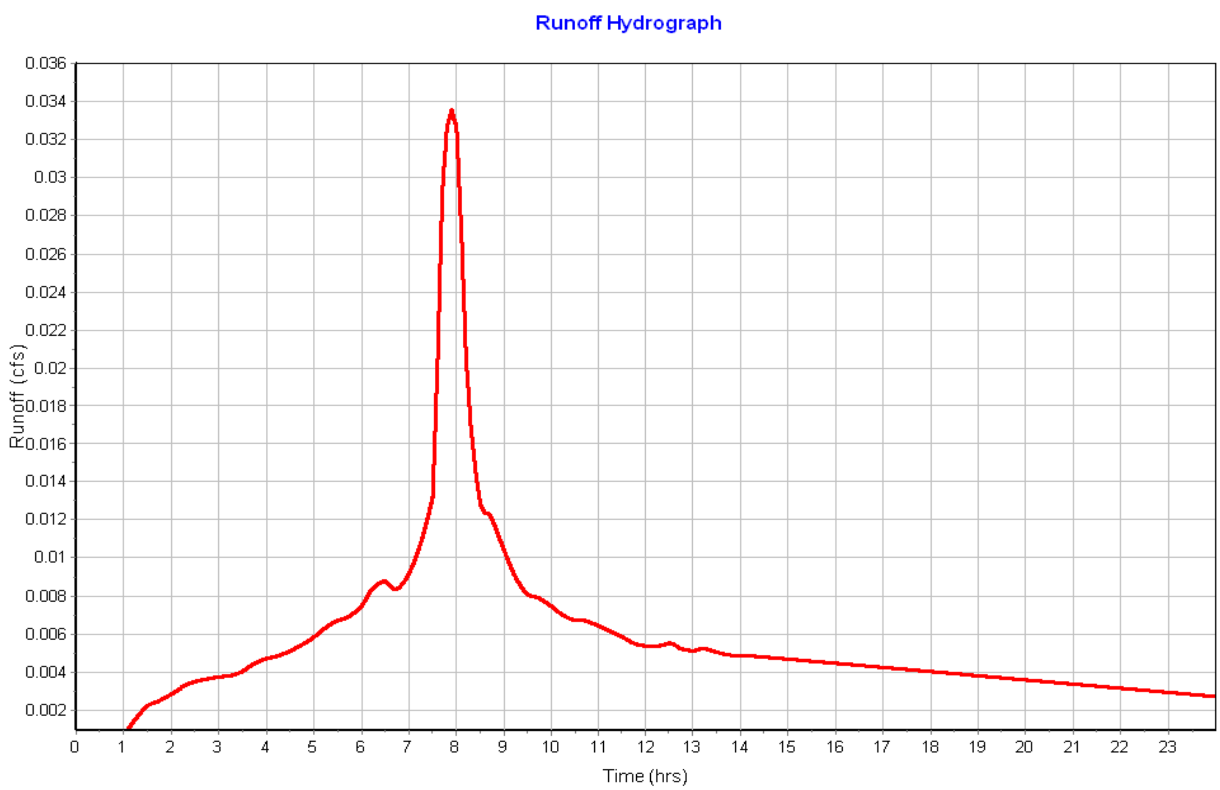
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.76
Peak Runoff (cfs) 0.03
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : DMA05





Subbasin : DMA06

Input Data

Area (ft²) 2004.02
Impervious Area (%) 100.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	2004.02		98

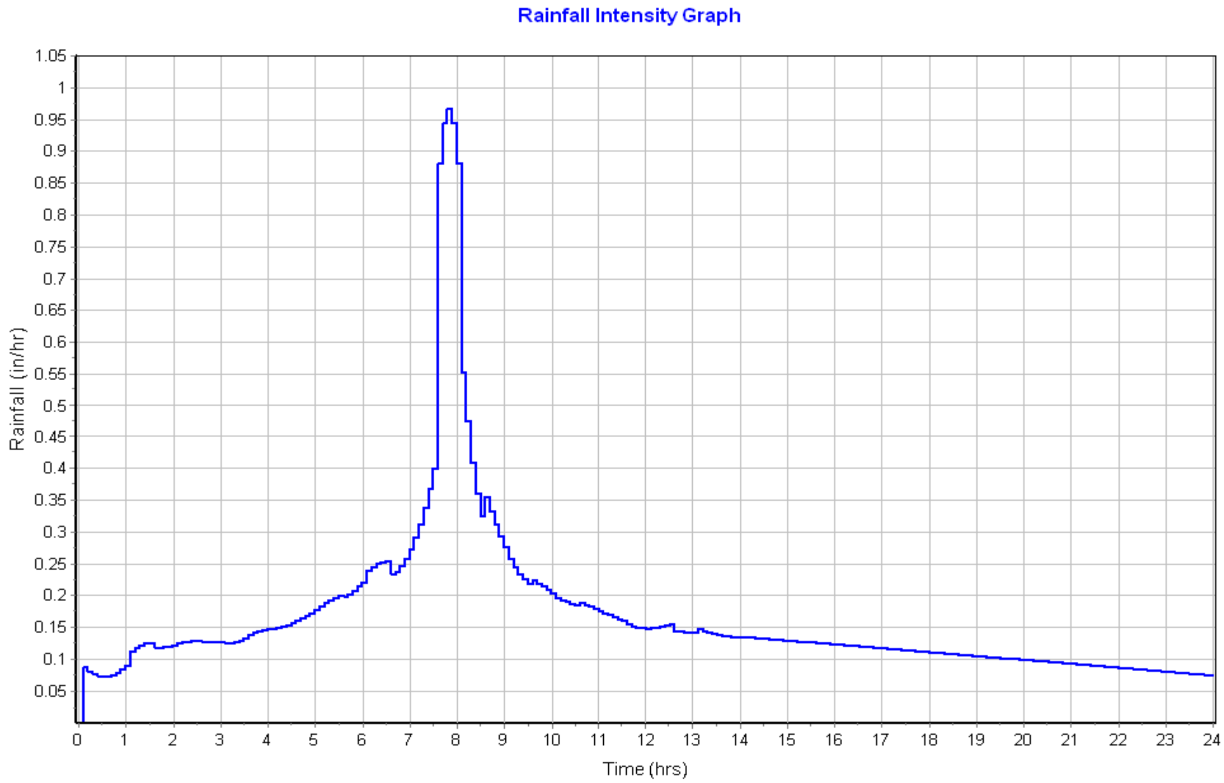
Time of Concentration

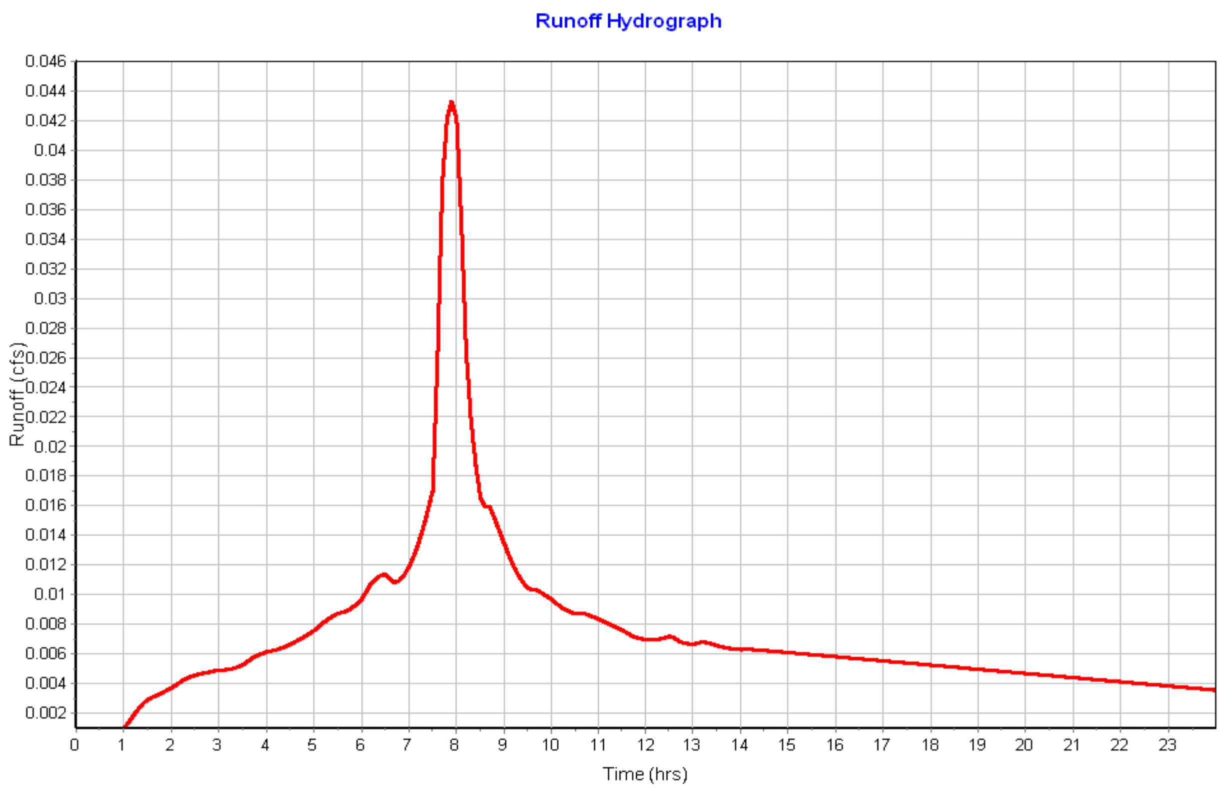
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.76
Peak Runoff (cfs) 0.04
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : DMA06





Subbasin : DMA07

Input Data

Area (ft²) 20144.02
Impervious Area (%) 100.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	20144.02		98

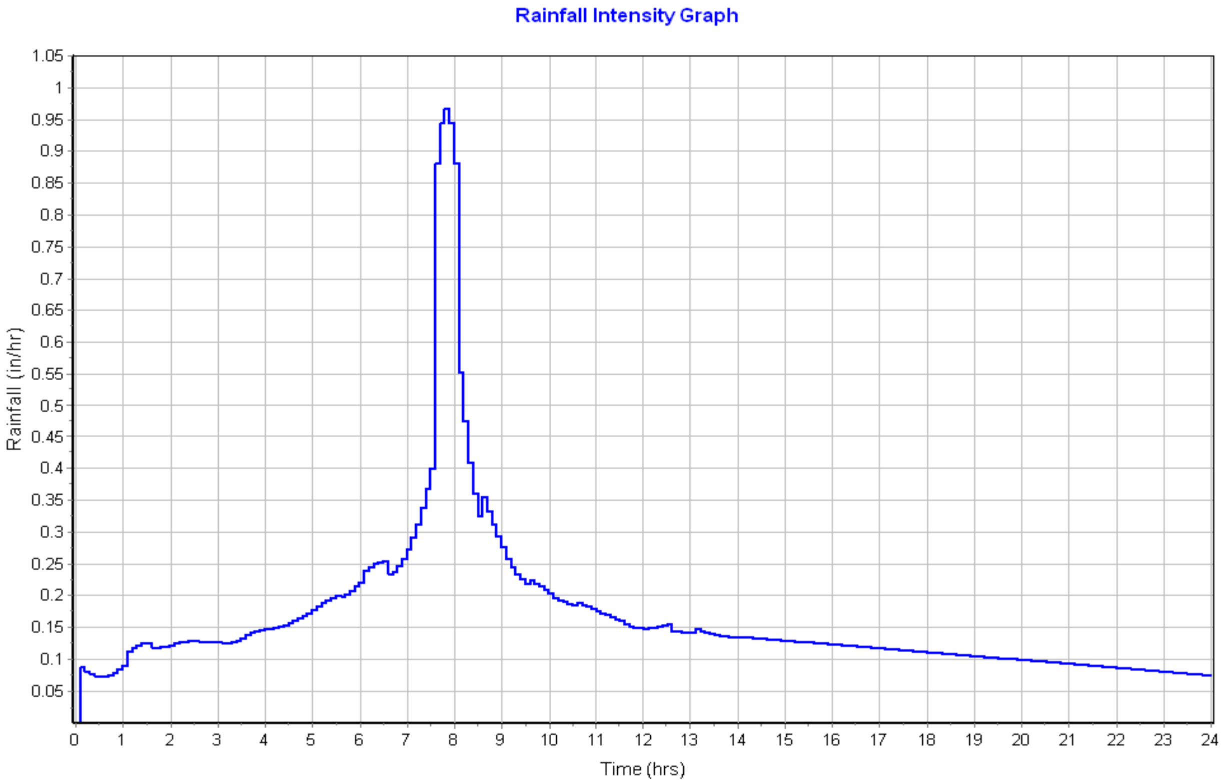
Time of Concentration

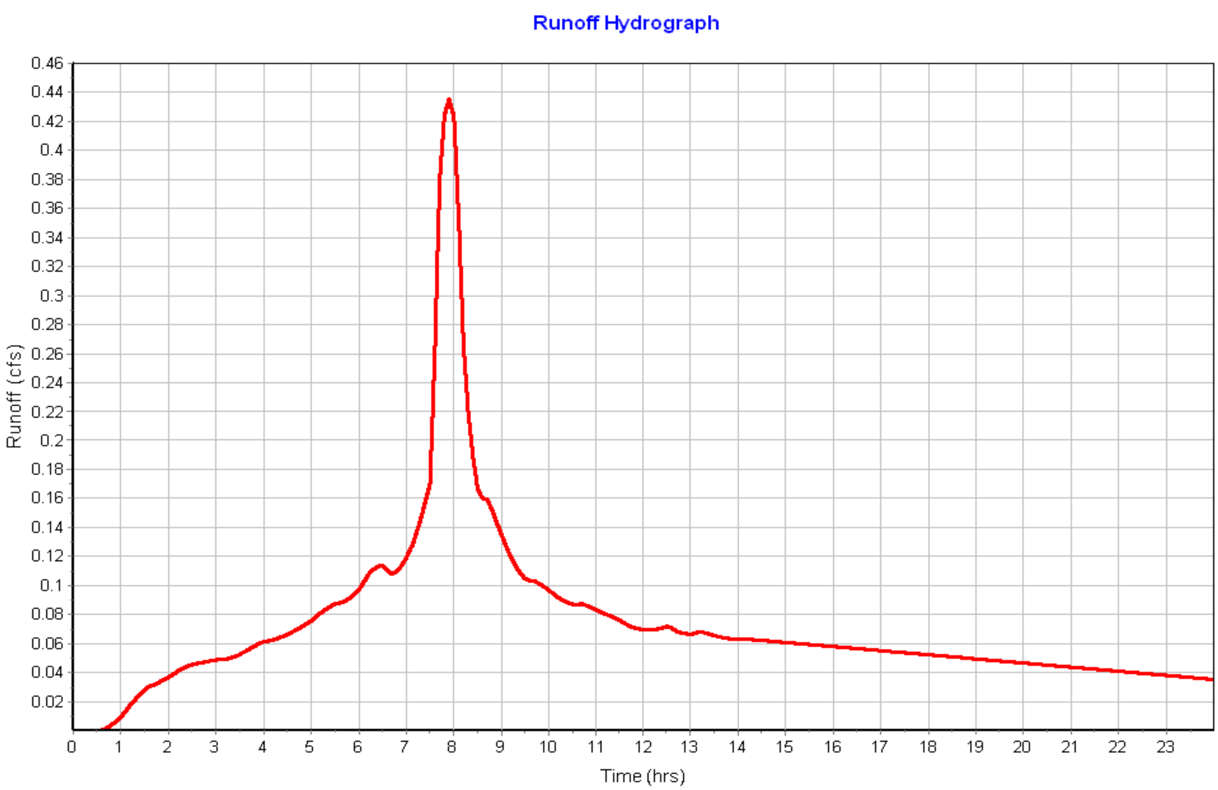
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.76
Peak Runoff (cfs) 0.44
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : DMA07





Subbasin : DMA08

Input Data

Area (ft²) 20083.99
Impervious Area (%) 100.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	20083.99		98

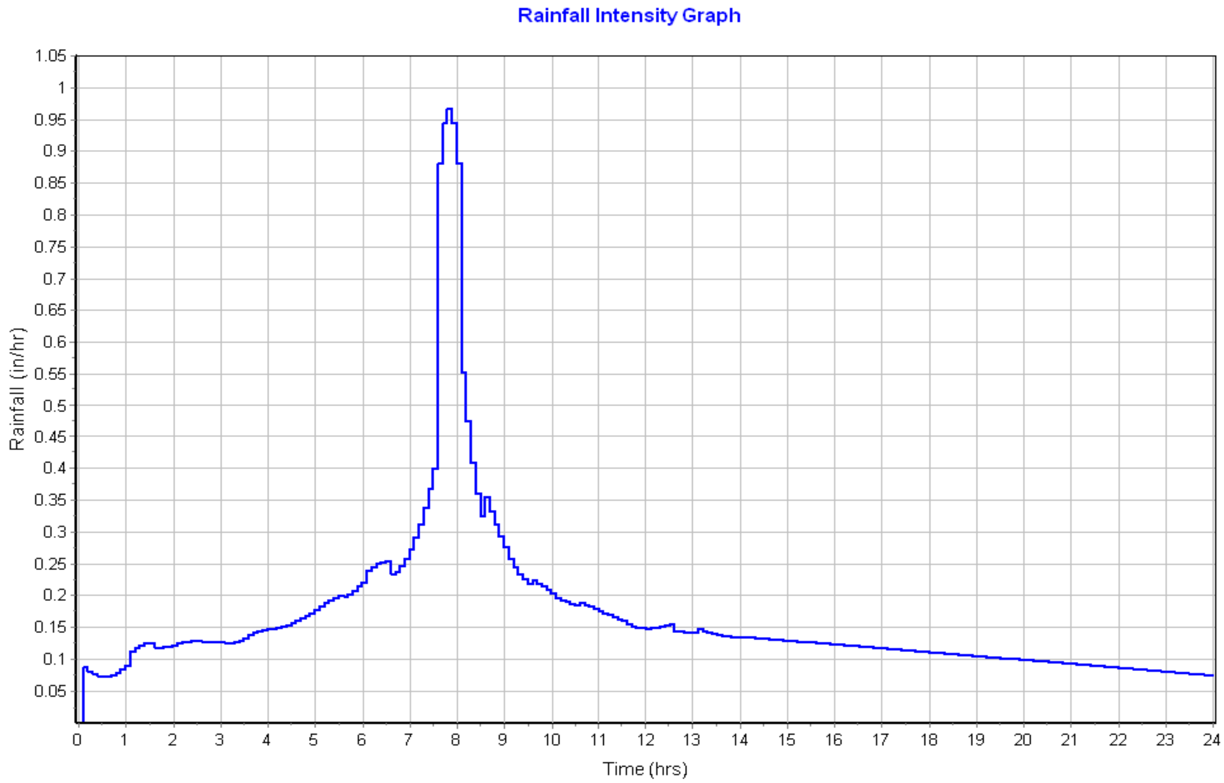
Time of Concentration

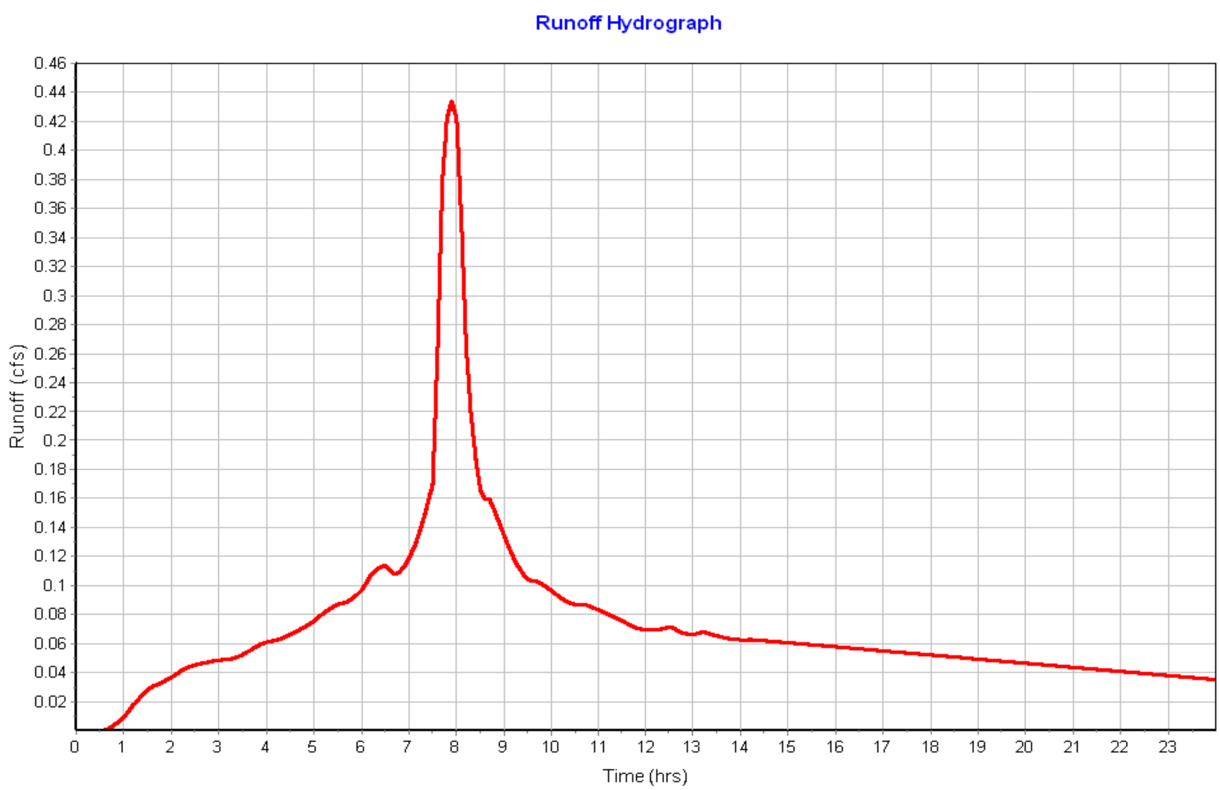
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.76
Peak Runoff (cfs) 0.43
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : DMA08





Subbasin : DMA09

Input Data

Area (ft²) 24005.00
Impervious Area (%) 100.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	24005.00		98

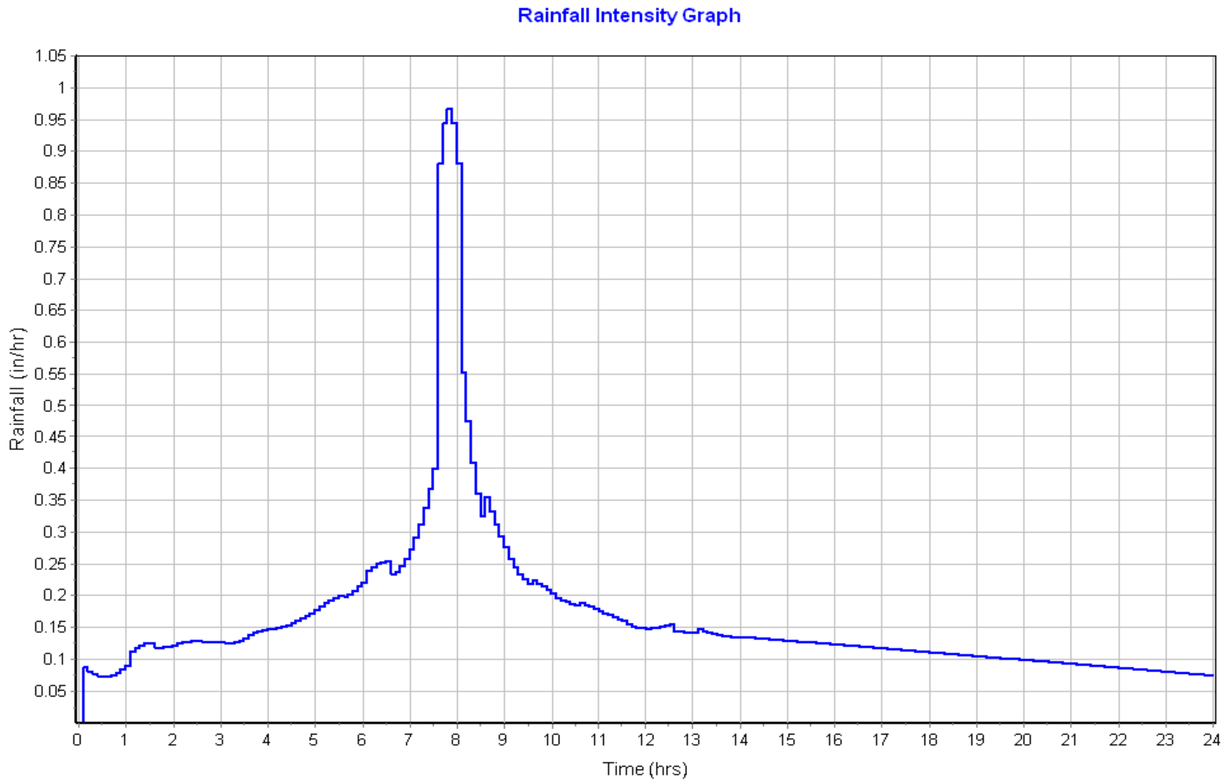
Time of Concentration

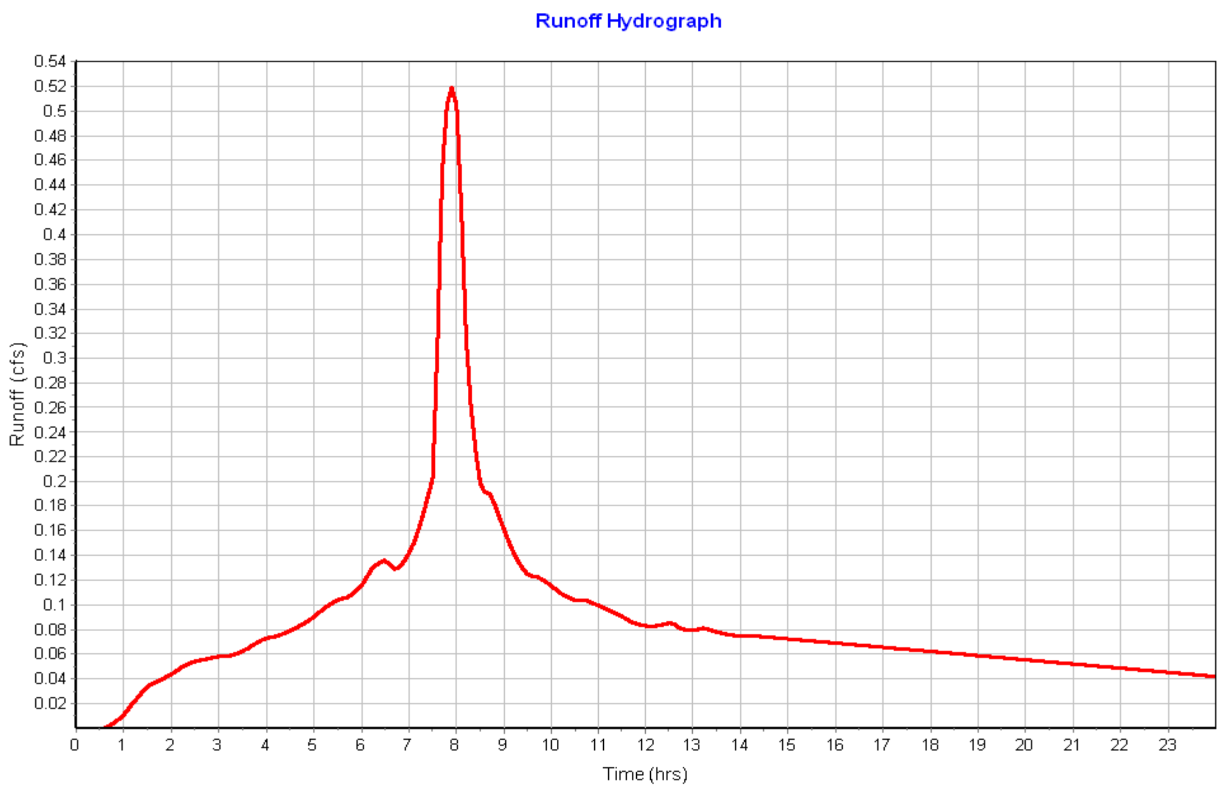
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.76
Peak Runoff (cfs) 0.52
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : DMA09





Subbasin : DMA10

Input Data

Area (ft²) 8343.00
Impervious Area (%) 85.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	8343.00		94.7

Time of Concentration

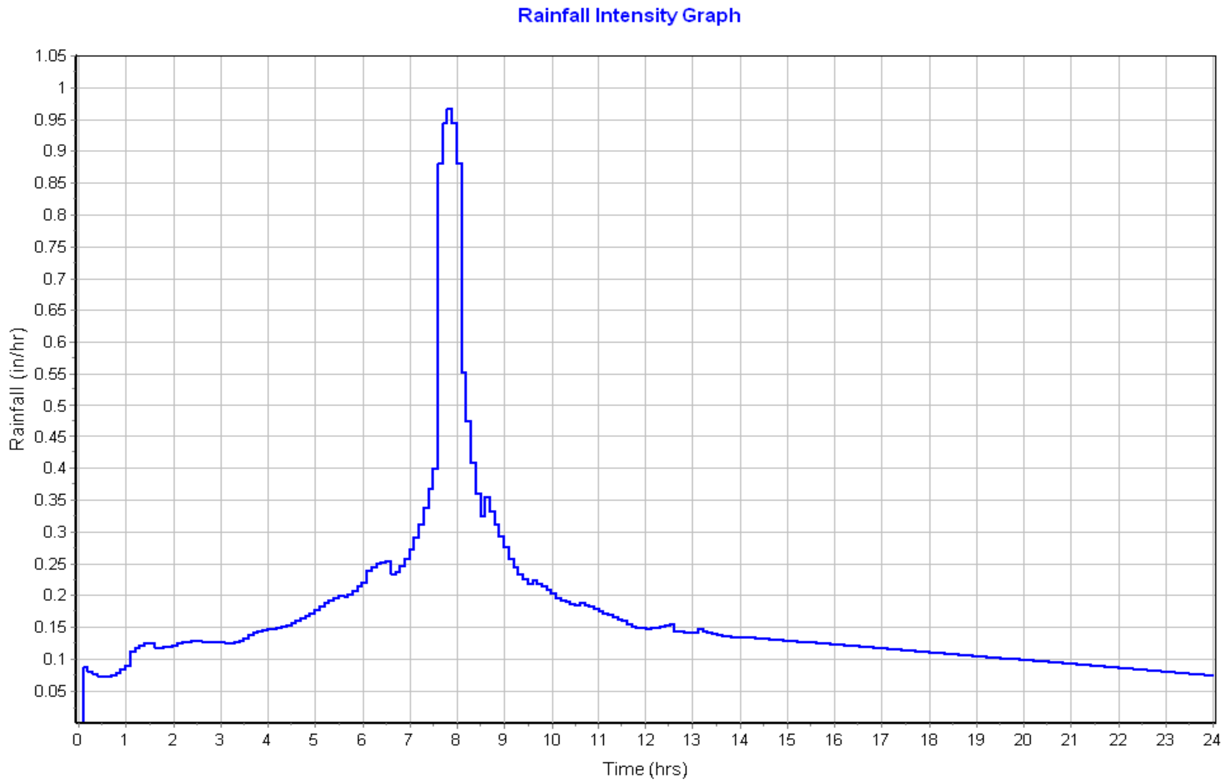
Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0.01	0.00
Flow Length (ft) :	23.84	107.52	0.00
Slope (%) :	1	2	0.00
2 yr, 24 hr Rainfall (in) :	2.65	2.65	0.00
Velocity (ft/sec) :	0.04	1.37	0.00
Computed Flow Time (min) :	9.89	1.31	0.00

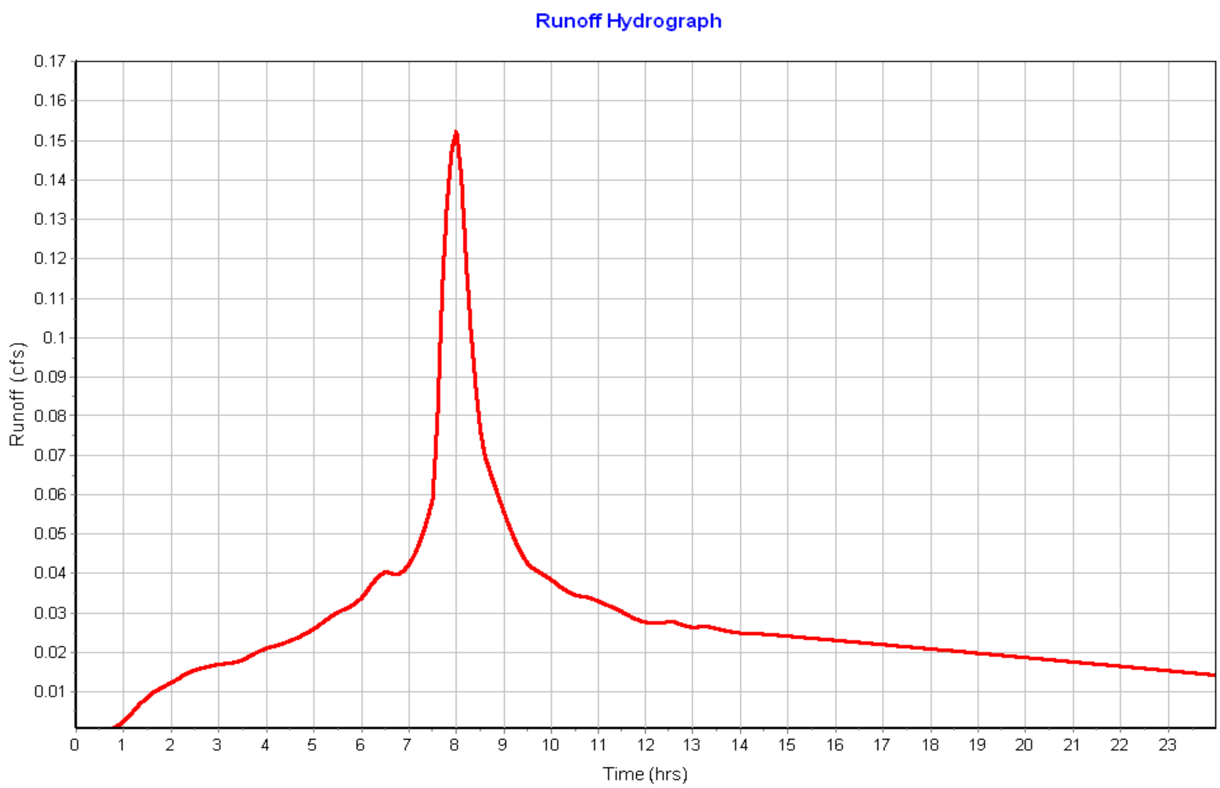
Total TOC (min) 11.20

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.44
Peak Runoff (cfs) 0.15
Weighted Curve Number 94.70
Time of Concentration (days hh:mm:ss) 0 00:11:12

Subbasin : DMA10





Subbasin : DMA11

Input Data

Area (ft²) 8165.02
Impervious Area (%) 97.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	8165.02		97.34

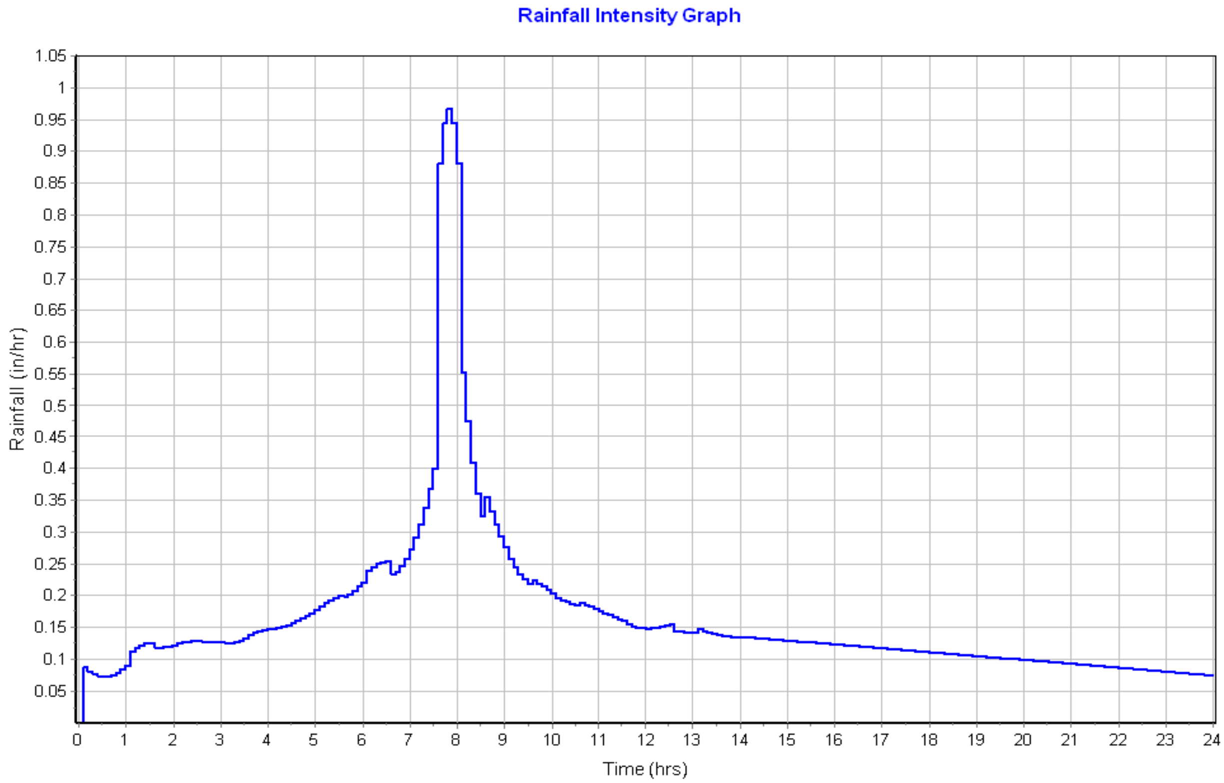
Time of Concentration

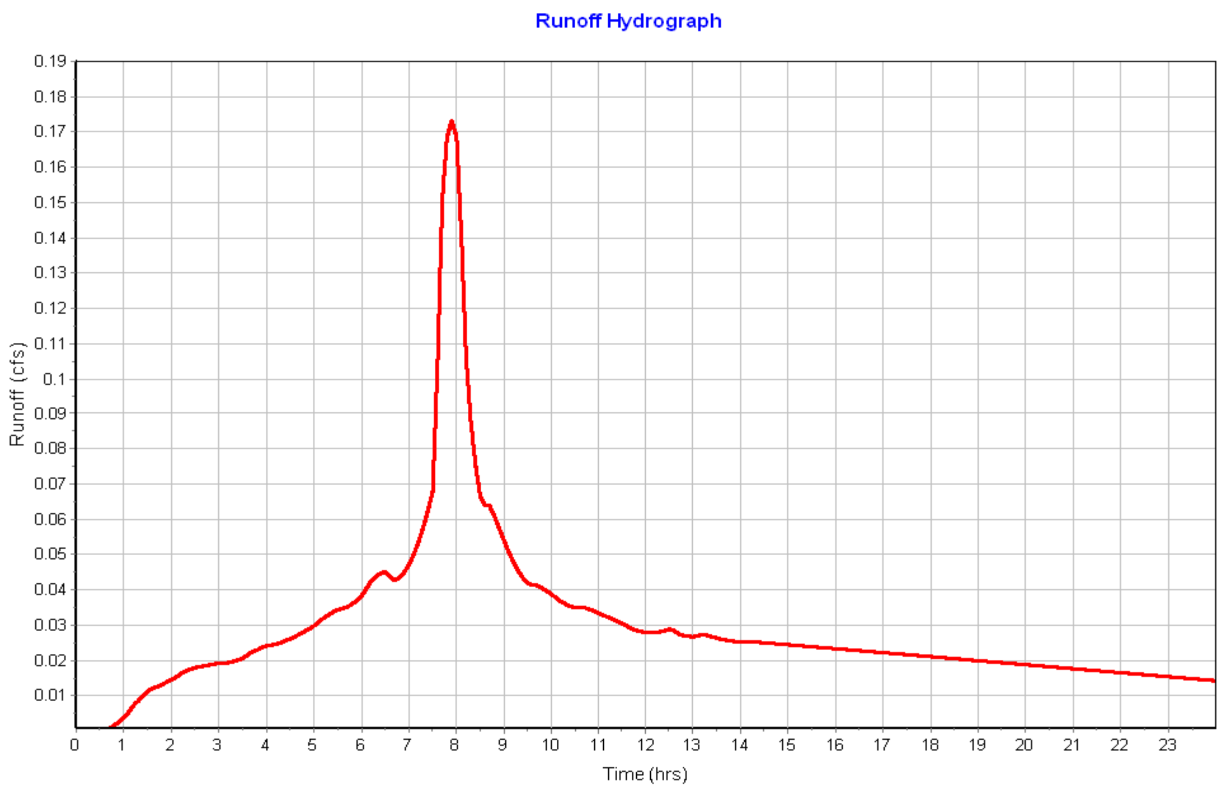
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.70
Peak Runoff (cfs) 0.17
Weighted Curve Number 97.34
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : DMA11





Subbasin : DMA12

Input Data

Area (ft²) 5899.98
Impervious Area (%) 94.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	5899.98		96.68

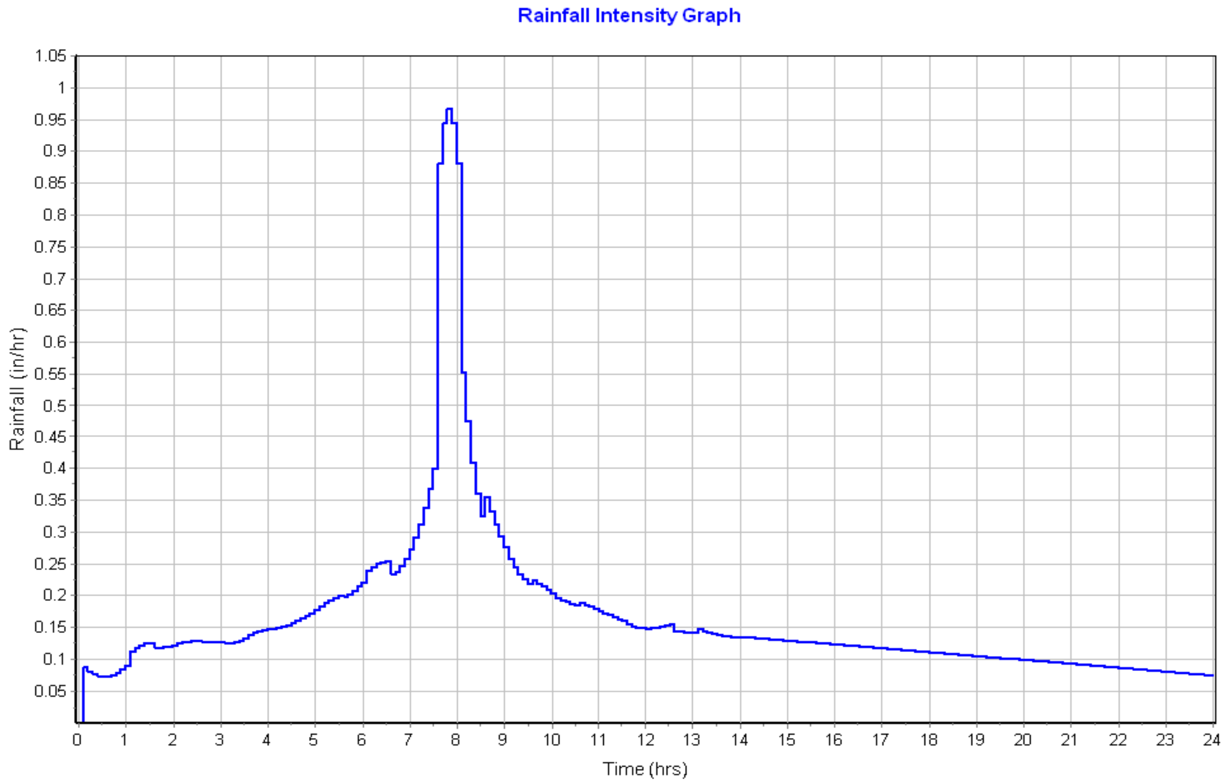
Time of Concentration

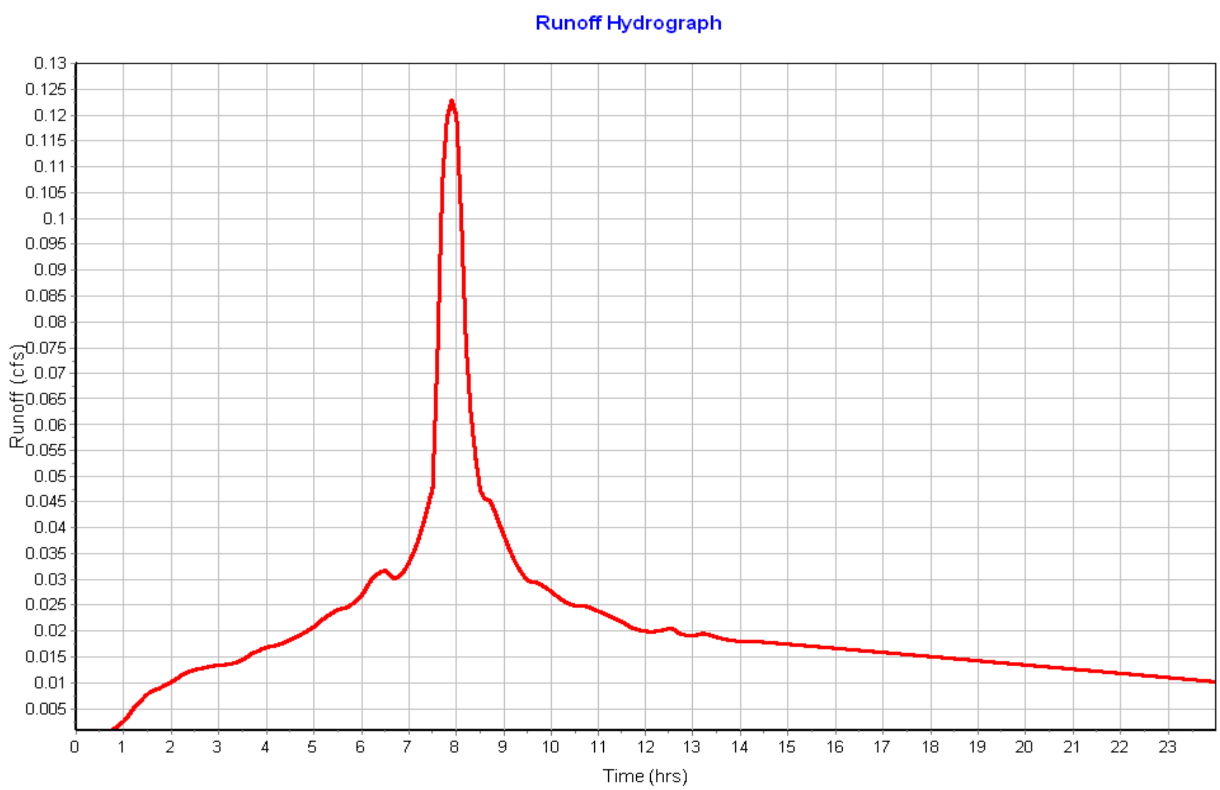
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.63
Peak Runoff (cfs) 0.12
Weighted Curve Number 96.68
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : DMA12





Subbasin : DMA13

Input Data

Area (ft²) 6881.00
Impervious Area (%) 79.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	6881.00		93.38

Time of Concentration

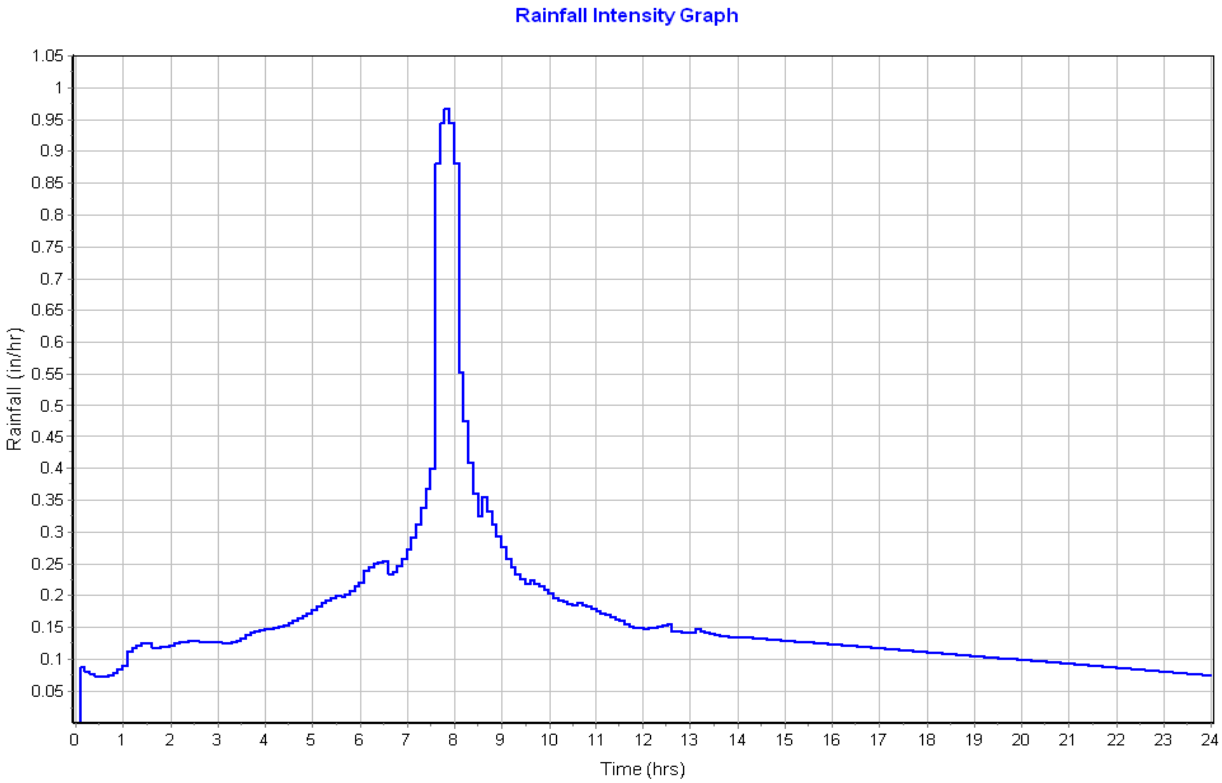
Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0.01	0.00
Flow Length (ft) :	59.68	126.6	0.00
Slope (%) :	2	2	0.00
2 yr, 24 hr Rainfall (in) :	2.65	2.65	0.00
Velocity (ft/sec) :	0.06	1.42	0.00
Computed Flow Time (min) :	15.61	1.49	0.00

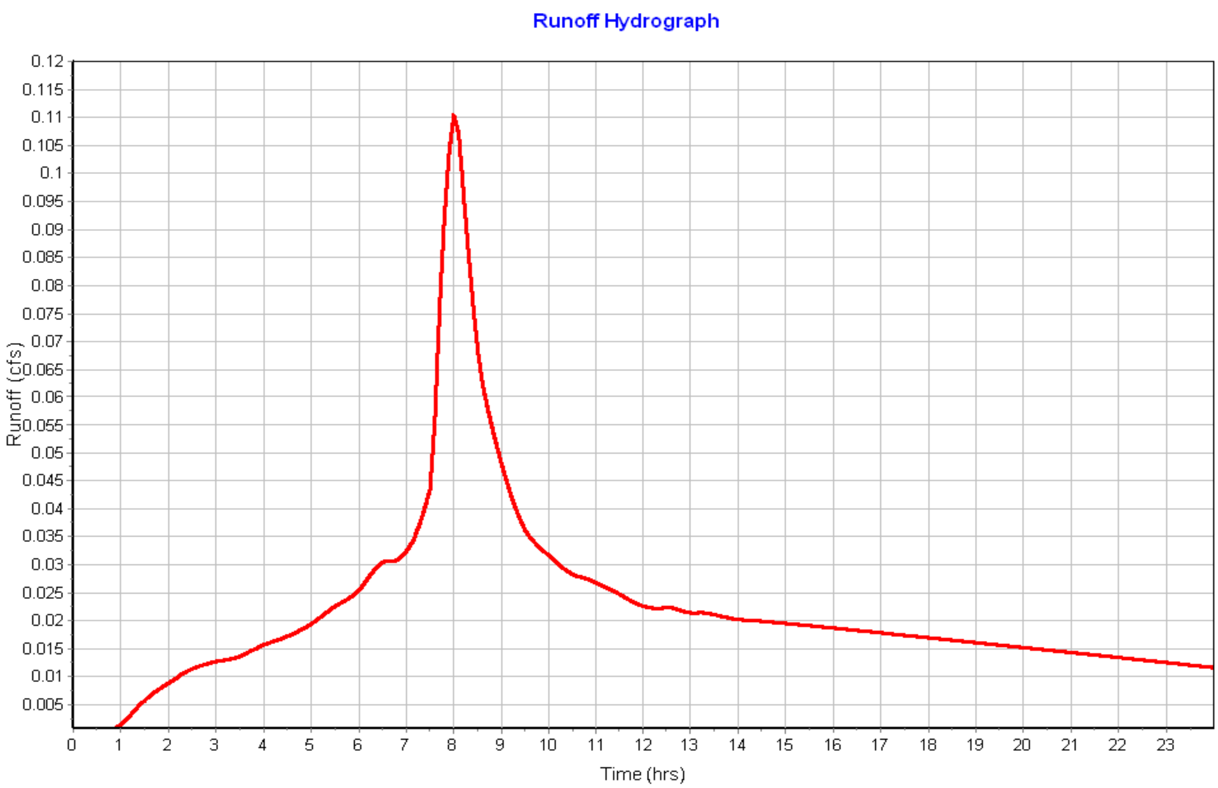
Total TOC (min) 17.10

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.32
Peak Runoff (cfs) 0.11
Weighted Curve Number 93.38
Time of Concentration (days hh:mm:ss) 0 00:17:06

Subbasin : DMA13





Subbasin : DMA14

Input Data

Area (ft²) 929.00
Impervious Area (%) 100.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	929.00		98

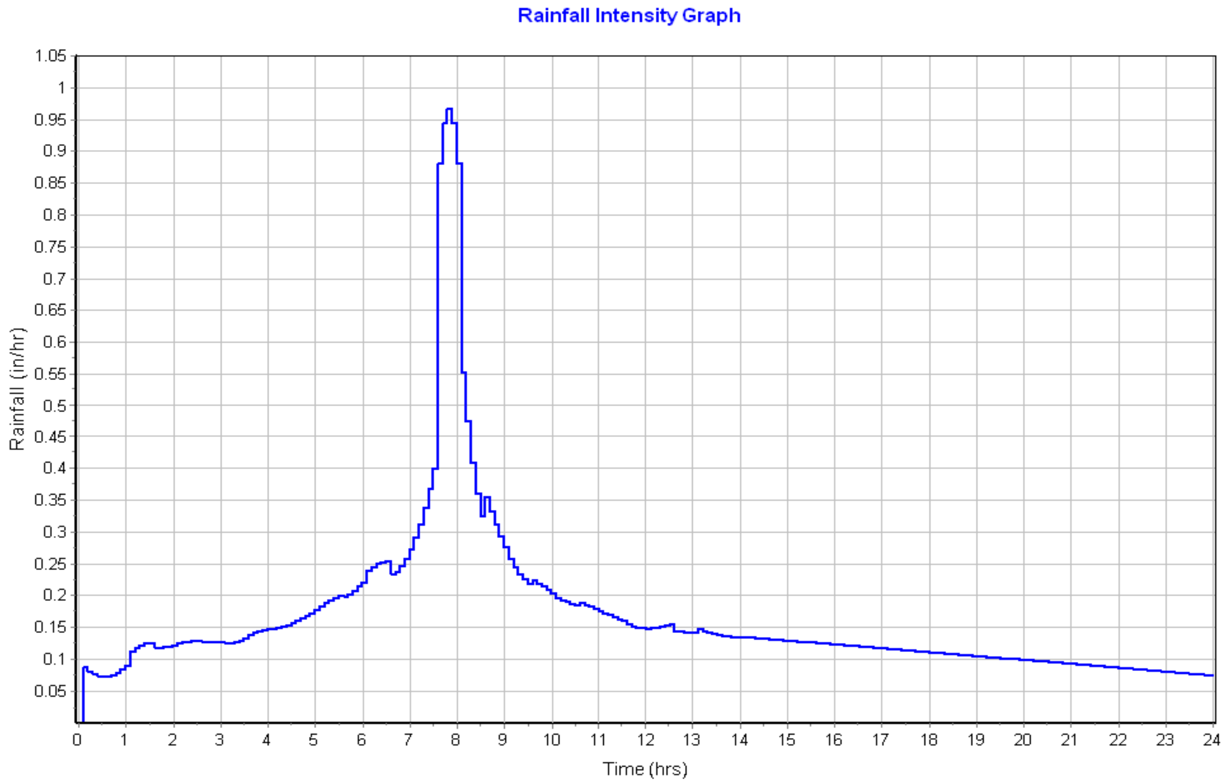
Time of Concentration

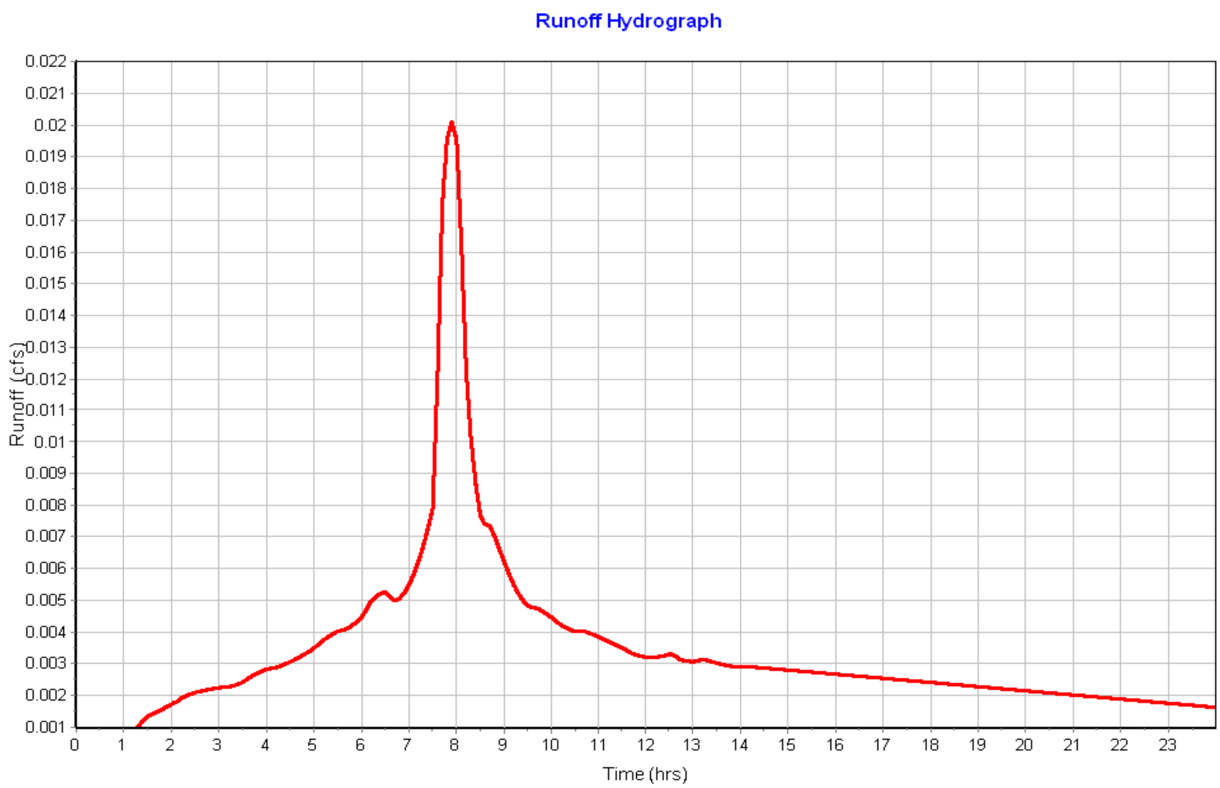
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.76
Peak Runoff (cfs) 0.02
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : DMA14





Subbasin : DMA15

Input Data

Area (ft²) 10340.01
Impervious Area (%) 100.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	10340.01		98

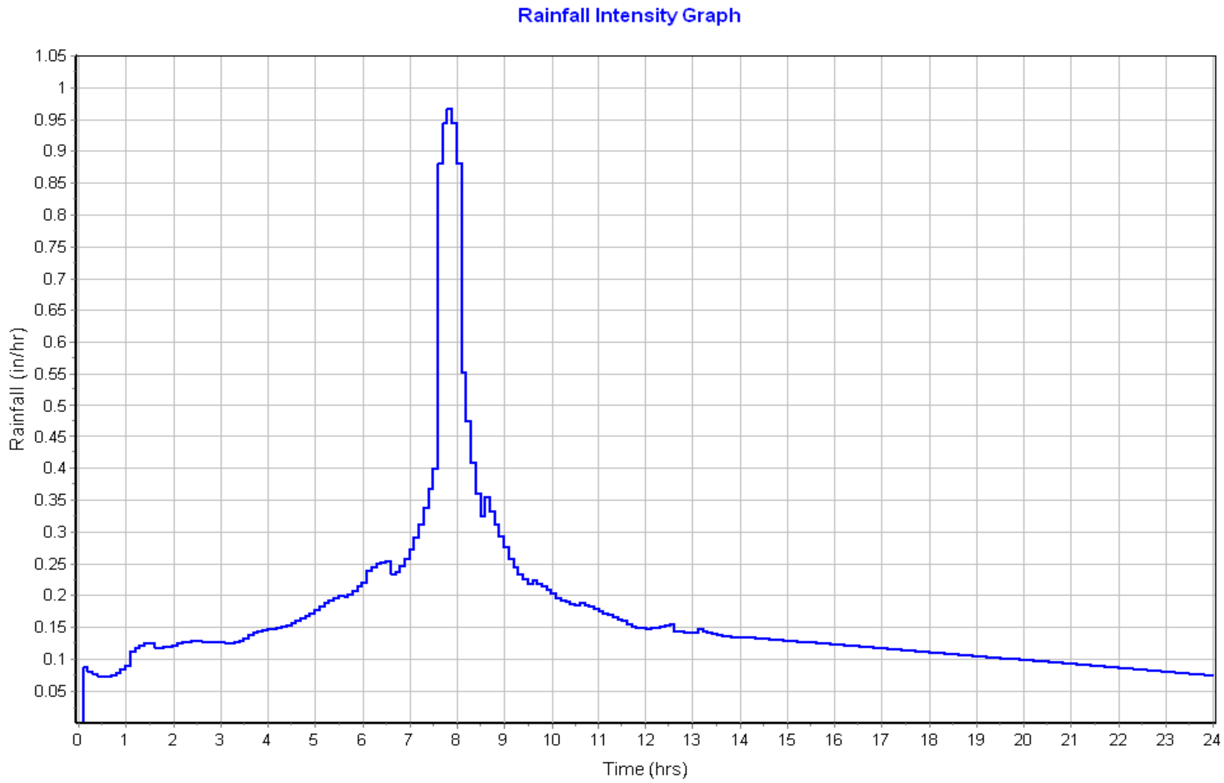
Time of Concentration

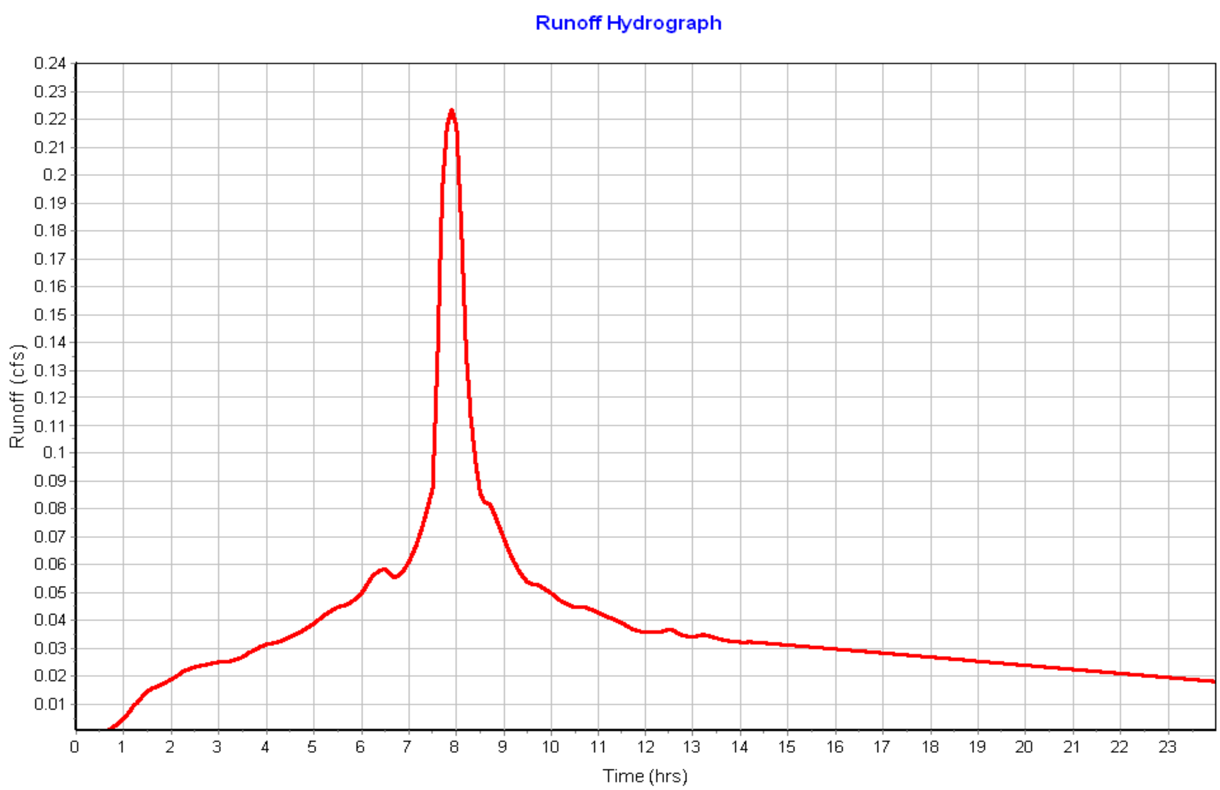
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.76
Peak Runoff (cfs) 0.22
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : DMA15





Subbasin : DMA16

Input Data

Area (ft²) 7878.00
Impervious Area (%) 97.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	7878.00		97.34

Time of Concentration

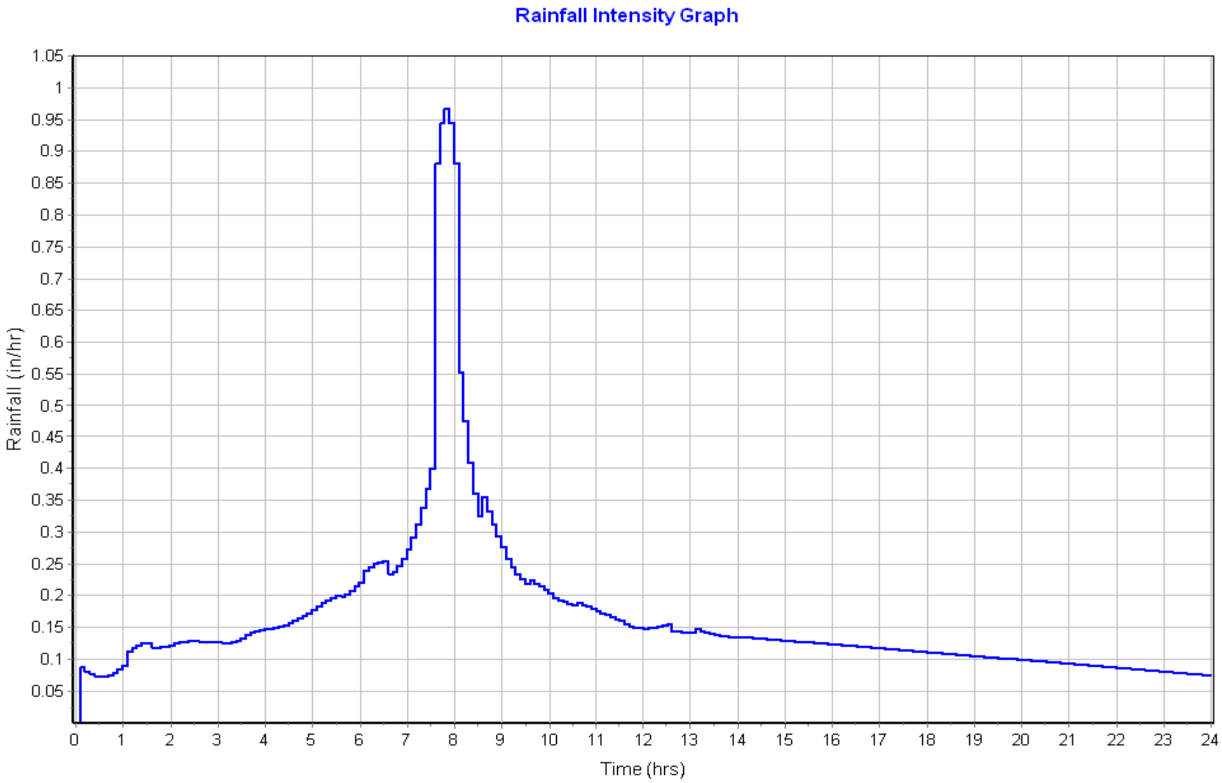
Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0.01	0.00
Flow Length (ft) :	16.62	21.91	0.00
Slope (%) :	1	2	0.00
2 yr, 24 hr Rainfall (in) :	2.65	2.65	0.00
Velocity (ft/sec) :	0.04	1.00	0.00
Computed Flow Time (min) :	7.41	0.37	0.00

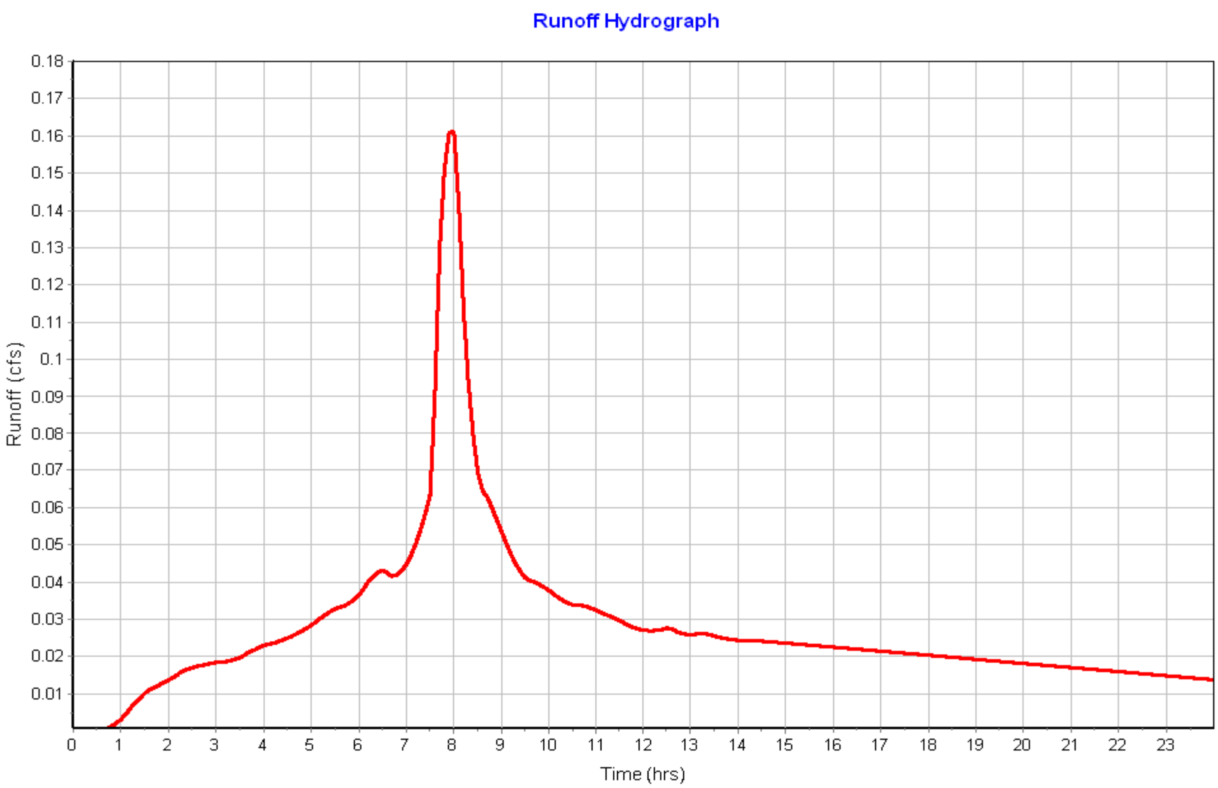
Total TOC (min) 7.78

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.69
Peak Runoff (cfs) 0.16
Weighted Curve Number 97.34
Time of Concentration (days hh:mm:ss) 0 00:07:47

Subbasin : DMA16





Subbasin : DMA17

Input Data

Area (ft²) 5760.98
Impervious Area (%) 98.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	5760.98		97.56

Time of Concentration

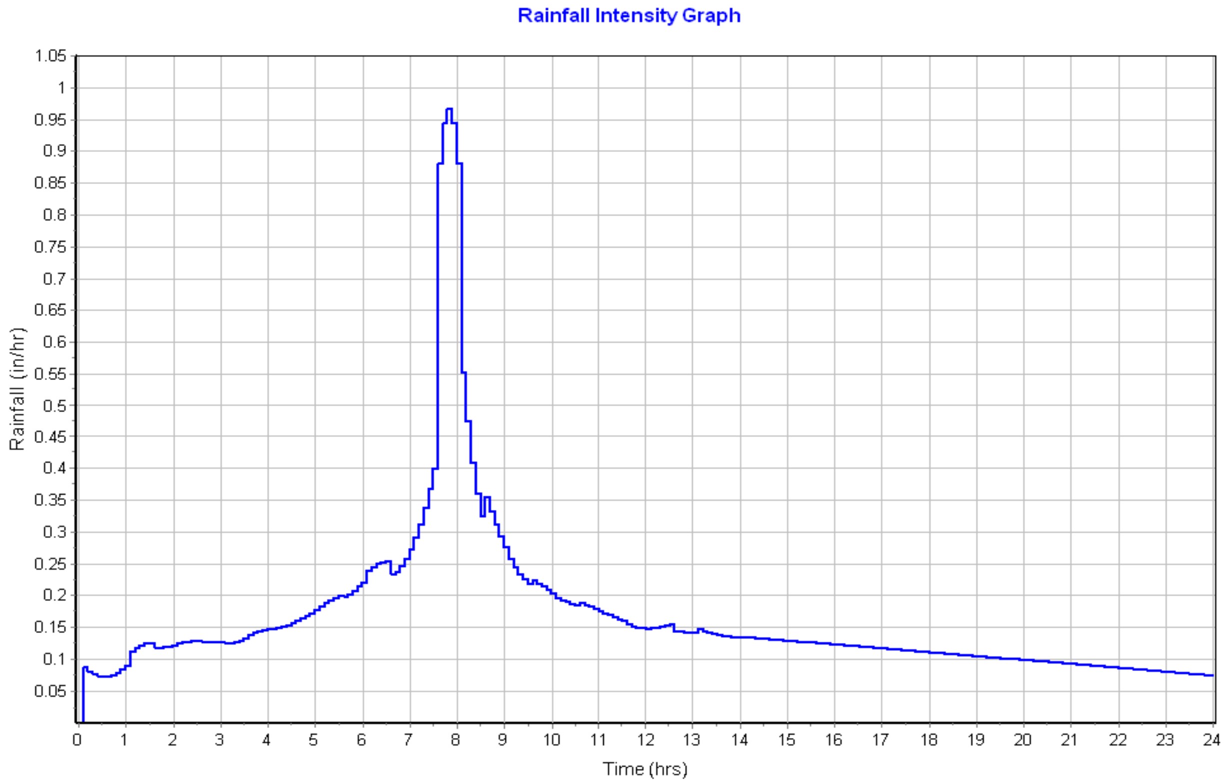
Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0.01	0.00
Flow Length (ft) :	16.47	45.71	0.00
Slope (%) :	1	2	0.00
2 yr, 24 hr Rainfall (in) :	2.65	2.65	0.00
Velocity (ft/sec) :	0.04	1.16	0.00
Computed Flow Time (min) :	7.36	0.66	0.00

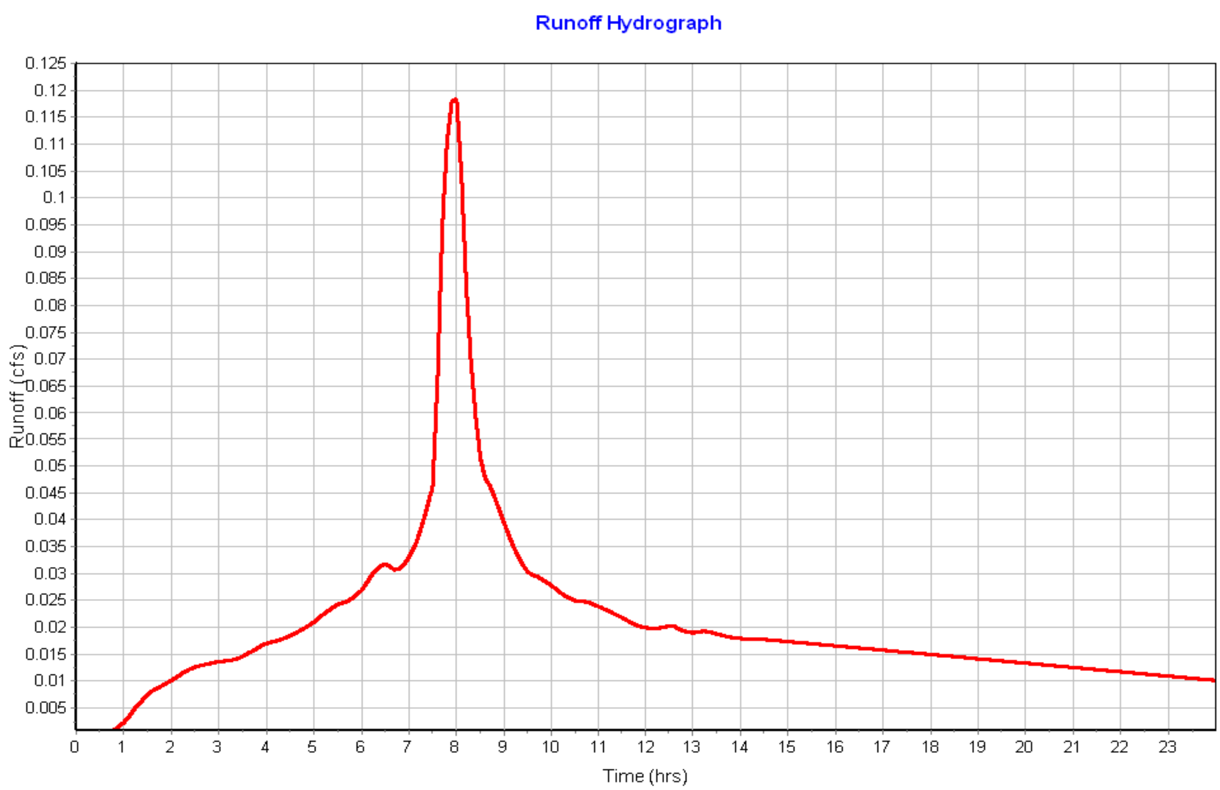
Total TOC (min) 8.02

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.71
Peak Runoff (cfs) 0.12
Weighted Curve Number 97.56
Time of Concentration (days hh:mm:ss) 0 00:08:01

Subbasin : DMA17





Subbasin : DMA18

Input Data

Area (ft²) 44869.02
Impervious Area (%) 95.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	44869.02		96.9

Time of Concentration

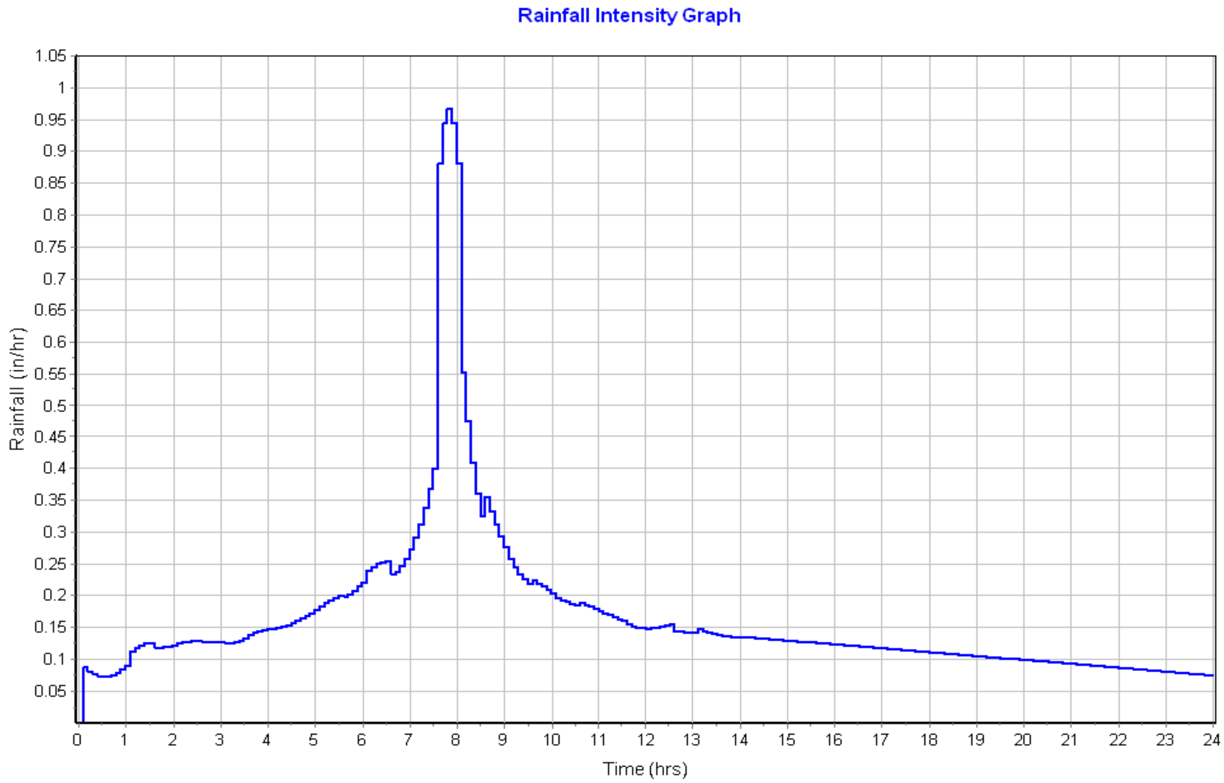
Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0.01	0.00
Flow Length (ft) :	13.39	261.42	0.00
Slope (%) :	1	2	0.00
2 yr, 24 hr Rainfall (in) :	2.65	2.65	0.00
Velocity (ft/sec) :	0.04	1.64	0.00
Computed Flow Time (min) :	6.23	2.66	0.00

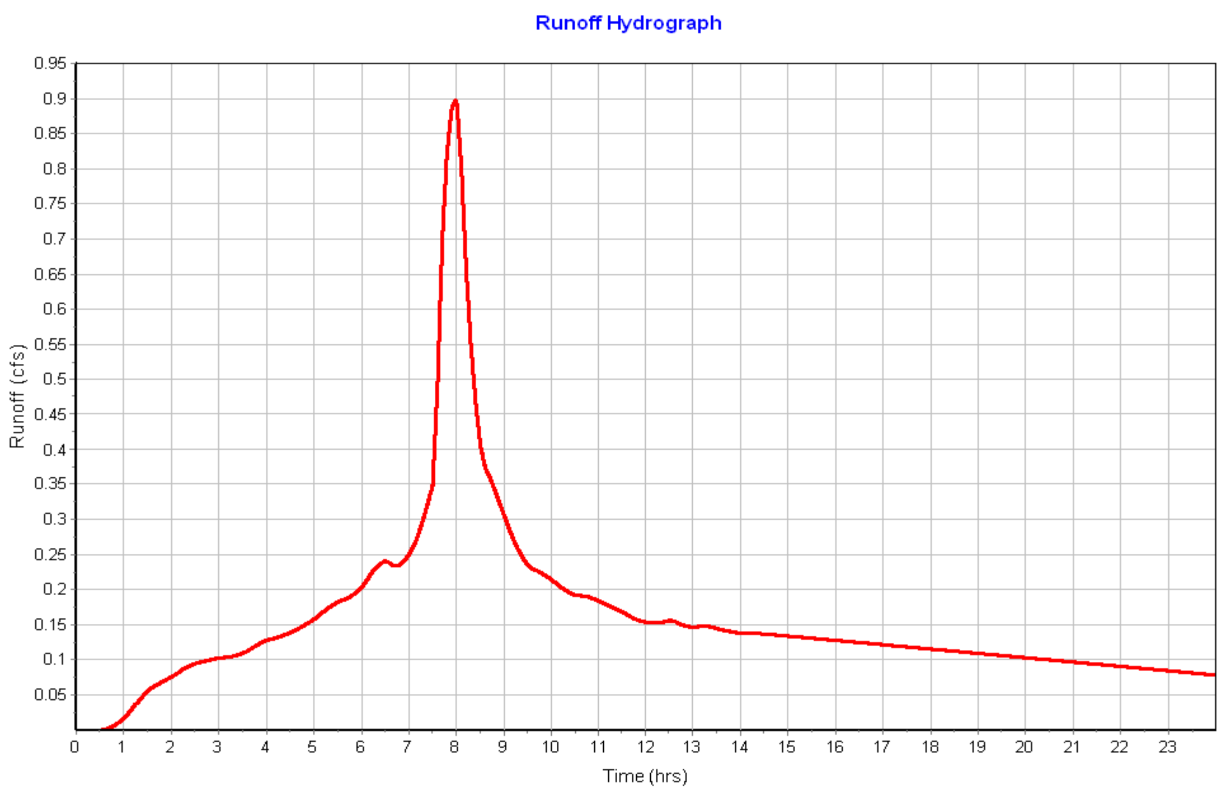
Total TOC (min) 8.89

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.65
Peak Runoff (cfs) 0.90
Weighted Curve Number 96.90
Time of Concentration (days hh:mm:ss) 0 00:08:53

Subbasin : DMA18





Subbasin : DMA19

Input Data

Area (ft²) 5560.00
Impervious Area (%) 100.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	5560.00		98

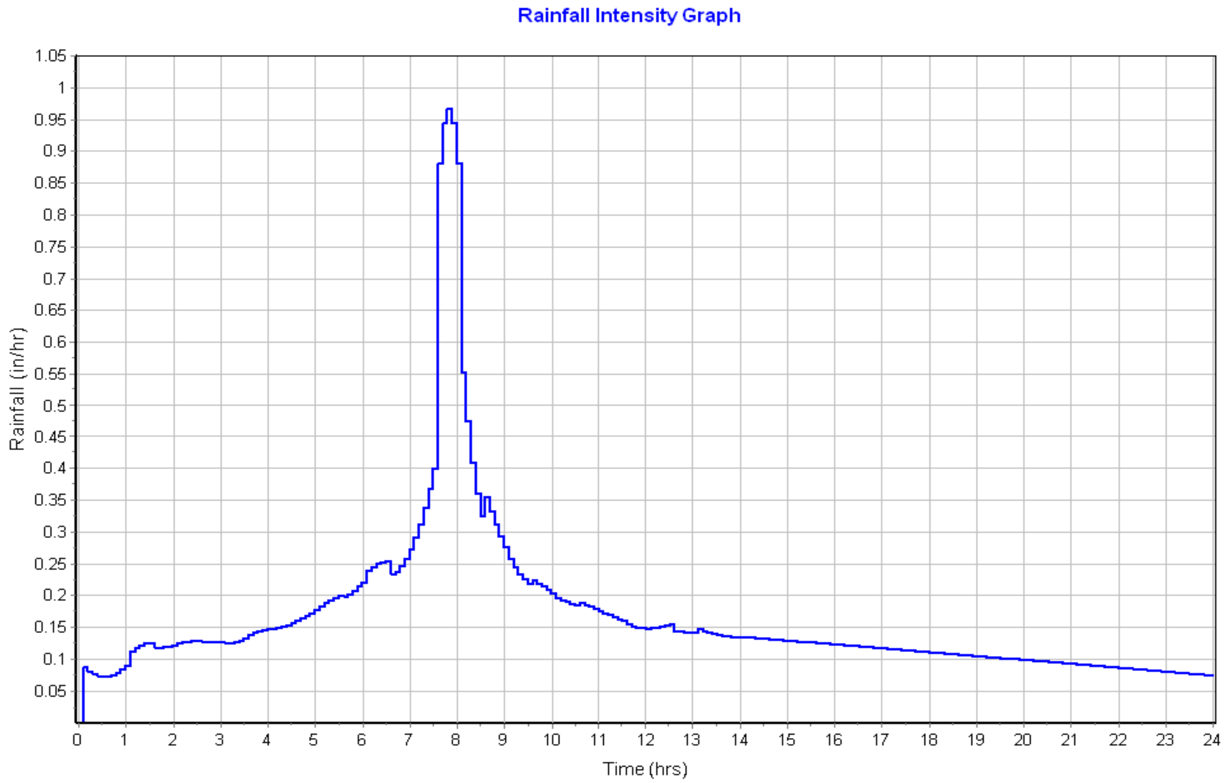
Time of Concentration

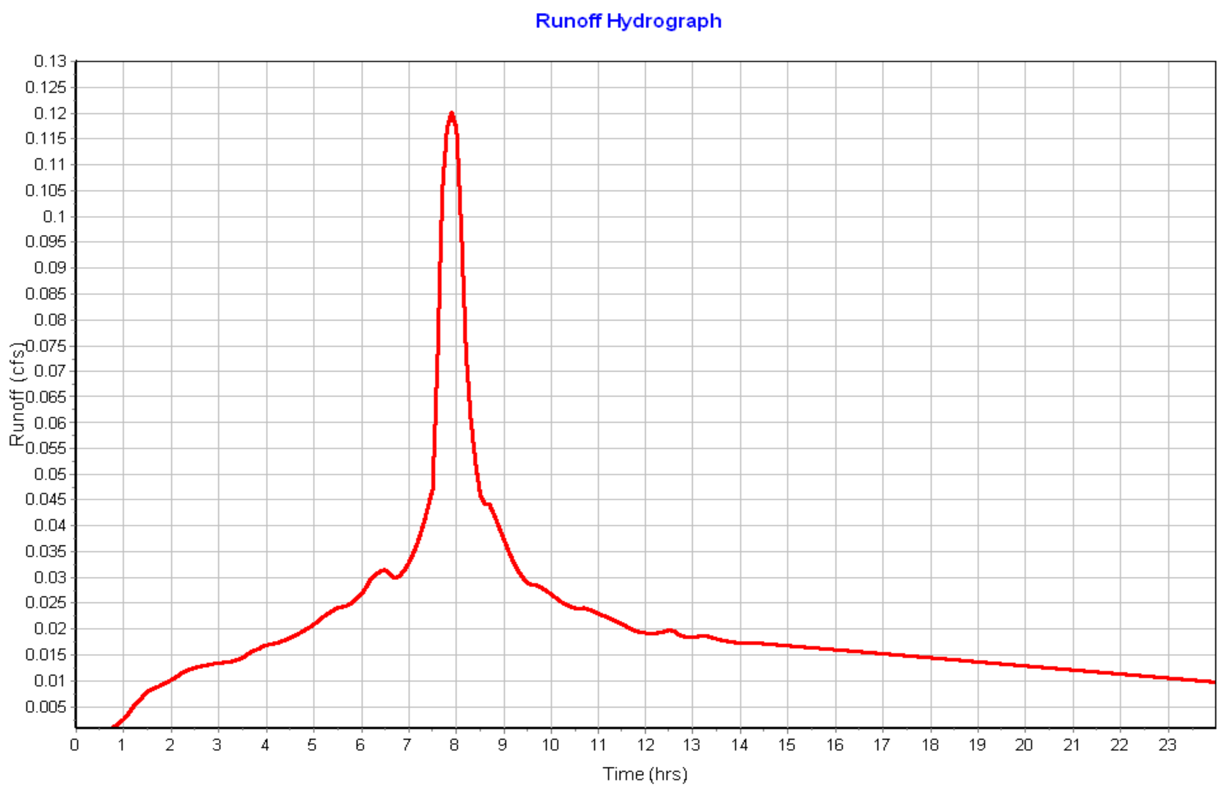
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.76
Peak Runoff (cfs) 0.12
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : DMA19





Subbasin : DMA20

Input Data

Area (ft²) 16230.02
Impervious Area (%) 95.00
Impervious Area Curve Number 98.00
Pervious Area Curve Number 76.00
Rain Gage ID .... Rain Gage-025yr

Composite Curve Number

Soil/Surface Description	Area (ft²)	Soil Group	Curve Number
Composite Area & Weighted CN	16230.02		96.9

Time of Concentration

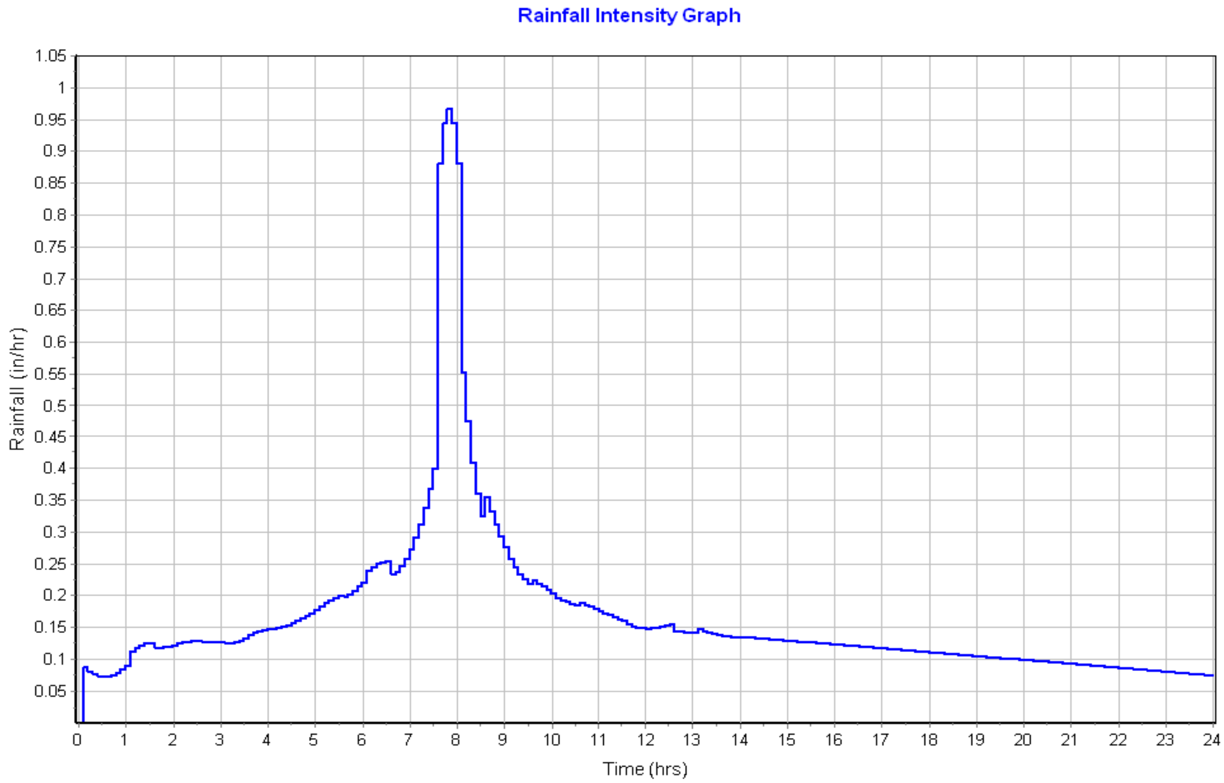
Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.4	0.01	0.00
Flow Length (ft) :	34.47	88.38	0.00
Slope (%) :	1	2	0.00
2 yr, 24 hr Rainfall (in) :	2.65	2.65	0.00
Velocity (ft/sec) :	0.04	1.32	0.00
Computed Flow Time (min) :	13.28	1.12	0.00

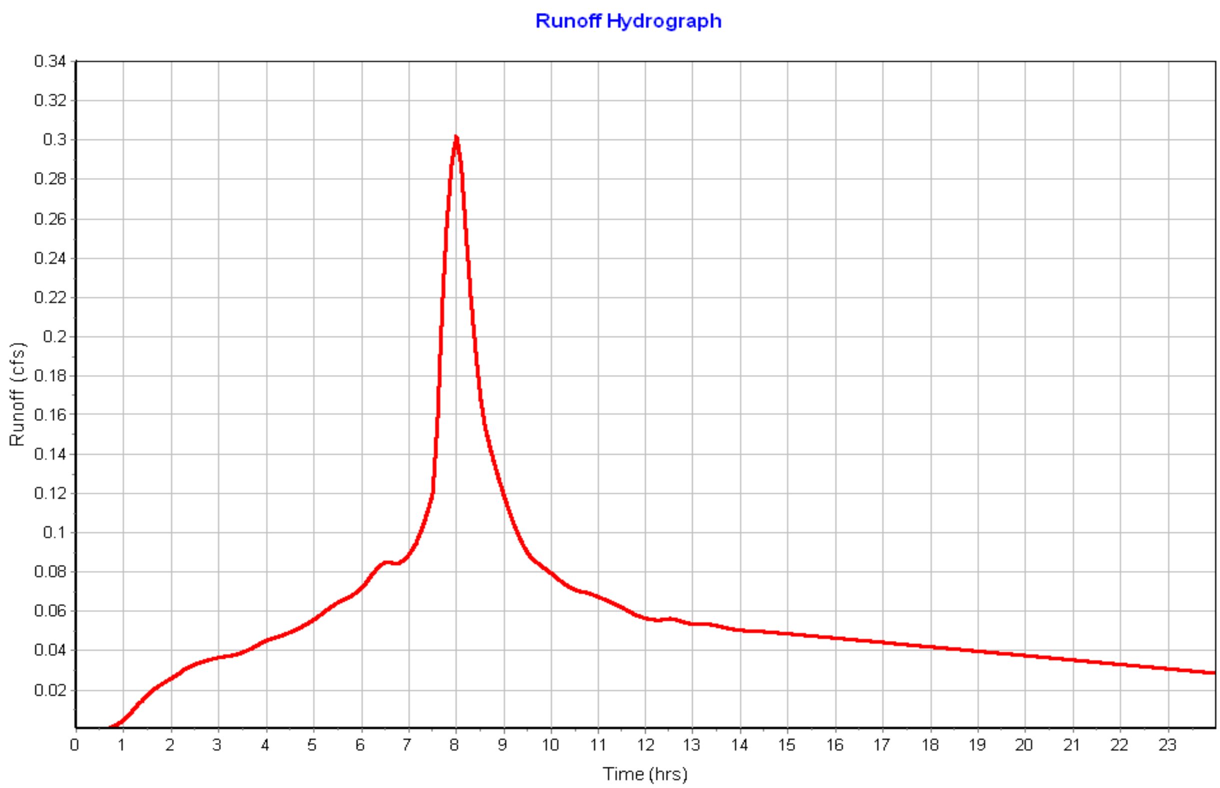
Total TOC (min) 14.40

Subbasin Runoff Results

Total Rainfall (in) 3.99
Total Runoff (in) 3.64
Peak Runoff (cfs) 0.30
Weighted Curve Number 96.90
Time of Concentration (days hh:mm:ss) 0 00:14:24

Subbasin : DMA20





Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft²)	Minimum Pipe Cover (in)
1	BMP#1 RISER	152.48	155.73	3.25	152.48	0.00	155.73	0.00	0.00	31.00
2	BMP#2 RISER	149.65	152.90	3.25	149.65	0.00	152.90	0.00	0.00	33.00
3	BMP#3 RISER	148.95	153.20	4.25	148.95	0.00	152.20	-1.00	0.00	45.00
4	NULL01	154.31	158.02	3.71	154.31	0.00	155.38	-2.64	0.00	32.55
5	NULL02	154.20	158.45	4.25	154.20	0.00	155.28	-3.17	0.00	38.99
6	NULL03	154.06	158.57	4.51	154.06	0.00	155.13	-3.44	0.00	42.16
7	NULL04	153.88	158.53	4.65	153.88	0.00	154.95	-3.58	0.00	43.84
8	NULL05	153.70	158.50	4.80	153.70	0.00	154.77	-3.73	0.00	45.65
9	NULL06	153.37	155.77	2.40	153.65	0.28	154.45	-1.32	0.00	16.80
10	NULL07	153.77	156.44	2.67	153.55	-0.22	154.91	-1.53	0.00	23.04
11	NULL08	154.35	156.67	2.32	154.33	-0.02	155.69	-0.98	0.00	19.84
12	NULL09	152.75	155.37	2.62	152.75	0.00	153.29	-2.08	0.00	25.44
13	NULL10	152.51	154.46	1.95	152.51	0.00	153.06	-1.40	0.00	17.37
14	NULL11	153.40	156.16	2.76	153.40	0.00	153.94	-2.22	0.00	27.12
15	NULL12	153.27	155.50	2.23	153.27	0.00	154.41	-1.09	0.00	18.75
16	NULL13	152.80	154.90	2.10	152.80	0.00	153.93	-0.97	0.00	17.20
17	NULL14	153.47	155.46	1.99	153.47	0.00	154.80	-0.67	0.00	17.88

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	BMP#1 RISER	0.00	0.00	152.48	0.00	0.00	3.25	152.48	0.00	0 00:00	0 00:00	0.00	0.00
2	BMP#2 RISER	0.00	0.00	149.65	0.00	0.00	3.25	149.65	0.00	0 00:00	0 00:00	0.00	0.00
3	BMP#3 RISER	0.00	0.00	148.95	0.00	0.00	4.25	148.95	0.00	0 00:00	0 00:00	0.00	0.00
4	NULL01	1.31	0.00	155.07	0.76	0.00	2.95	154.55	0.24	0 07:56	0 00:00	0.00	0.00
5	NULL02	1.31	0.00	154.95	0.75	0.00	3.50	154.44	0.24	0 07:57	0 00:00	0.00	0.00
6	NULL03	1.34	0.00	154.80	0.74	0.00	3.77	154.30	0.24	0 07:58	0 00:00	0.00	0.00
7	NULL04	1.37	0.00	154.63	0.75	0.00	3.90	154.12	0.24	0 07:58	0 00:00	0.00	0.00
8	NULL05	1.41	0.00	154.46	0.76	0.00	4.04	153.93	0.23	0 07:59	0 00:00	0.00	0.00
9	NULL06	2.09	0.00	154.24	0.87	0.00	1.53	153.73	0.36	0 07:59	0 00:00	0.00	0.00
10	NULL07	0.69	0.00	154.26	0.49	0.00	2.18	153.90	0.13	0 07:59	0 00:00	0.00	0.00
11	NULL08	0.52	0.00	154.81	0.46	0.00	1.86	154.52	0.17	0 07:49	0 00:00	0.00	0.00
12	NULL09	0.25	0.00	153.10	0.35	0.00	2.27	152.96	0.21	0 08:01	0 00:00	0.00	0.00
13	NULL10	0.33	0.00	153.11	0.60	0.00	1.35	152.95	0.44	0 00:01	0 00:00	0.00	0.00
14	NULL11	0.16	0.00	153.65	0.25	0.00	2.51	153.49	0.09	0 08:00	0 00:00	0.00	0.00
15	NULL12	0.28	0.00	153.53	0.26	0.00	1.97	153.38	0.11	0 08:00	0 00:00	0.00	0.00
16	NULL13	0.50	0.00	153.22	0.42	0.00	1.68	152.98	0.18	0 07:57	0 00:00	0.00	0.00
17	NULL14	0.30	0.00	153.98	0.51	0.00	1.48	153.90	0.43	0 07:54	0 00:00	0.00	0.00

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	BMP3_CURBBREAK	2.83	153.54	153.54	152.45	0.00	1.09	38.5200	Rectangular	1.000	1.000	0.0330	0.5000	0.5000	0.0000	0.00	No
2	BMP4_CURBBREAK	6.53	154.50	154.50	153.40	0.00	1.10	16.8500	Rectangular	1.000	1.000	0.0330	0.5000	0.5000	0.0000	0.00	No

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	BMP3_CURBBREAK	0.00	0 00:00	13.44	0.00	0.00		0.25	0.25	0.00		
2	BMP4_CURBBREAK	0.01	0 08:21	8.89	0.00	0.03	3.63	0.25	0.25	0.00		

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1	A-1-01	41.97	156.13	0.00	154.94	2.08	1.19	2.8200	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	A-1-02	109.68	154.86	2.00	154.53	2.00	0.33	0.3000	CIRCULAR	8.040	8.040	0.0130	0.5000	0.5000	0.0000	0.00	No	1
3	A-1-03	75.51	154.53	2.00	154.31	0.00	0.23	0.3000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
4	A-1-04	35.36	154.31	0.00	154.20	0.00	0.11	0.3000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
5	A-1-05	48.25	154.20	0.00	154.06	0.00	0.14	0.3000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
6	A-1-06	59.97	154.06	0.00	153.88	0.00	0.18	0.3000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
7	A-1-07	60.17	153.88	0.00	153.70	0.00	0.18	0.3000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
8	A-1-08	108.70	153.70	0.00	153.37	0.00	0.33	0.3000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
9	A-1-09	12.56	153.37	0.00	153.33	0.00	0.04	0.3000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
10	A-1-10	24.86	149.65	0.00	149.53	0.00	0.12	0.5000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
11	A-2-1	45.40	155.39	0.00	154.78	2.25	0.61	1.3400	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
12	A-3-1	7.60	154.35	2.00	154.31	0.25	0.04	0.5000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
13	A-4-1	7.60	154.17	2.00	154.13	0.25	0.04	0.5000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
14	A-5-1	7.61	153.99	2.00	153.95	0.25	0.04	0.5000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
15	A-6-1	28.50	154.45	0.00	154.35	0.00	0.10	0.3500	CIRCULAR	8.040	8.040	0.0130	0.5000	0.5000	0.0000	0.00	No	1
16	A-6-2	189.81	154.35	0.00	153.68	-0.09	0.67	0.3500	CIRCULAR	8.040	8.040	0.0130	0.5000	0.5000	0.0000	0.00	No	1
17	A-6-2A	11.86	154.15	2.00	153.77	0.00	0.38	3.2000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
18	A-6-3	42.62	153.52	-0.25	153.37	0.00	0.15	0.3500	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
19	A-7-1	19.84	153.25	2.00	153.15	0.00	0.10	0.5000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
20	B-1-1	53.24	155.95	2.00	155.79	0.00	0.16	0.3000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
21	B-1-2	60.16	152.48	0.00	151.57	0.00	0.91	1.5100	CIRCULAR	8.040	8.040	0.0130	0.5000	0.5000	0.0000	0.00	No	1
22	C-1-1	21.12	153.12	2.00	153.11	2.04	0.01	0.0500	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
23	C-1-2	34.60	153.07	2.00	152.90	2.00	0.17	0.5000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
24	C-1-3	29.24	152.90	2.00	152.75	0.00	0.15	0.5000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
25	C-1-4	47.14	152.75	0.00	152.51	0.00	0.24	0.5000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
26	C-1-5	12.56	152.51	0.00	152.45	0.00	0.06	0.5000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
27	C-1-6	106.93	148.95	0.00	148.42	0.00	0.53	0.5000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
28	C-2-1	79.79	153.80	2.00	153.40	0.00	0.40	0.5000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
29	C-2-2	25.56	153.40	0.00	153.27	0.00	0.13	0.5000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
30	C-2-2A	10.96	153.32	2.00	153.27	0.00	0.05	0.5000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
31	C-2-3	94.11	153.27	0.00	152.80	0.00	0.47	0.5000	CIRCULAR	8.040	8.040	0.0130	0.5000	0.5000	0.0000	0.00	No	1
32	C-2-3A	5.51	152.83	2.00	152.80	0.00	0.03	0.5000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
33	C-2-4	70.03	152.80	0.00	152.45	0.00	0.35	0.5000	CIRCULAR	8.040	8.040	0.0150	0.5000	0.5000	0.0000	0.00	No	1
34	D-1-1	19.41	153.51	2.00	153.47	0.00	0.04	0.2100	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
35	D-1-2	162.30	153.47	0.00	153.15	0.00	0.32	0.2000	CIRCULAR	6.000	6.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1

Pipe Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	A-1-01	0.43	0 07:54	0.94	0.46	2.83	0.25	0.37	0.74	0.00		Calculated
2	A-1-02	0.68	0 07:54	0.66	1.02	1.94	0.94	0.67	1.00	16.00		SURCHARGED
3	A-1-03	1.31	0 07:54	1.95	0.67	2.13	0.59	0.74	0.74	0.00		Calculated
4	A-1-04	1.31	0 07:55	1.95	0.67	2.09	0.28	0.75	0.75	0.00		Calculated
5	A-1-05	1.30	0 07:55	1.95	0.67	2.12	0.38	0.74	0.74	0.00		Calculated
6	A-1-06	1.33	0 07:57	1.95	0.68	2.16	0.46	0.75	0.75	0.00		Calculated
7	A-1-07	1.36	0 07:58	1.95	0.70	2.18	0.46	0.76	0.76	0.00		Calculated
8	A-1-08	1.41	0 07:59	1.95	0.72	2.05	0.88	0.82	0.82	0.00		Calculated
9	A-1-09	2.09	0 07:59	1.95	1.07	3.34	0.06	0.74	0.74	0.00		> CAPACITY
10	A-1-10	0.00	0 00:00	0.40	0.00	0.00		0.00	0.00	0.00		Calculated
11	A-2-1	0.44	0 07:54	0.65	0.67	2.94	0.26	0.39	0.78	0.00		Calculated
12	A-3-1	0.03	0 08:03	0.40	0.08	0.84	0.15	0.47	0.94	0.00		Calculated
13	A-4-1	0.03	0 07:59	0.40	0.08	0.84	0.15	0.48	0.96	0.00		Calculated
14	A-5-1	0.04	0 07:59	0.40	0.11	0.95	0.13	0.49	0.97	0.00		Calculated
15	A-6-1	0.52	0 07:54	0.72	0.72	1.95	0.24	0.48	0.71	0.00		Calculated
16	A-6-2	0.52	0 07:55	0.67	0.78	2.20	1.44	0.47	0.70	0.00		Calculated
17	A-6-2A	0.17	0 07:54	1.00	0.17	1.97	0.10	0.31	0.63	0.00		Calculated
18	A-6-3	0.68	0 07:56	3.45	0.20	1.46	0.49	0.68	0.68	0.00		Calculated
19	A-7-1	0.15	0 08:00	0.40	0.38	0.81	0.41	0.46	0.92	0.00		Calculated
20	B-1-1	0.13	0 07:54	0.31	0.41	0.64	1.39	0.50	1.00	1424.00		SURCHARGED
21	B-1-2	0.00	0 00:00	1.48	0.00	0.00		0.00	0.00	0.00		Calculated
22	C-1-1	0.11	0 08:01	0.25	0.44	1.05	0.34	0.29	0.57	0.00		Calculated
23	C-1-2	0.23	0 08:00	0.40	0.58	1.74	0.33	0.32	0.64	0.00		Calculated
24	C-1-3	0.25	0 08:00	0.40	0.63	1.73	0.28	0.34	0.69	0.00		Calculated
25	C-1-4	0.25	0 08:01	0.39	0.63	1.41	0.56	0.42	0.84	0.00		Calculated
26	C-1-5	0.33	0 00:01	0.40	0.84	2.03	0.10	0.50	1.00	0.00		SURCHARGED
27	C-1-6	0.00	0 00:00	0.40	0.00	0.00		0.00	0.00	0.00		Calculated
28	C-2-1	0.16	0 08:00	0.40	0.41	1.76	0.76	0.24	0.47	0.00		Calculated
29	C-2-2	0.16	0 08:00	0.40	0.41	1.59	0.27	0.26	0.51	0.00		Calculated
30	C-2-2A	0.12	0 08:00	0.39	0.30	1.19	0.15	0.25	0.51	0.00		Calculated
31	C-2-3	0.28	0 08:00	0.85	0.33	1.55	1.01	0.34	0.51	0.00		Calculated
32	C-2-3A	0.22	0 07:54	0.40	0.56	1.41	0.07	0.43	0.85	0.00		Calculated
33	C-2-4	0.50	0 07:57	0.74	0.67	1.93	0.60	0.46	0.69	0.00		Calculated
34	D-1-1	0.17	0 00:00	0.25	0.67	2.75	0.12	0.49	0.98	0.00		Calculated
35	D-1-2	0.16	0 00:01	0.25	0.65	1.09	2.48	0.50	1.00	15.00		SURCHARGED

Inlet Input

SN	Element ID	Inlet Manufacturer	Manufacturer Part Number	Inlet Location	Number of Inlets	Catchbasin Invert Elevation (ft)	Max (Rim) Elevation (ft)	Inlet Depth (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Ponded Area (ft²)	Grate Clogging Factor (%)
1	BMP3_CURBBREAK	FHWA HEC-22 GENERIC	N/A	On Sag	1	0.00	153.54	153.54	0.00	0.00	10.00	0.00
2	BMP4_CURBBREAK	FHWA HEC-22 GENERIC	N/A	On Sag	1	0.00	154.51	154.51	0.00	0.00	10.00	0.00
3	CB01	FHWA HEC-22 GENERIC	N/A	On Sag	1	153.95	157.95	4.00	156.45	2.50	0.00	0.00
4	CB02	FHWA HEC-22 GENERIC	N/A	On Sag	1	152.86	156.83	3.97	154.64	1.78	0.00	0.00
5	CB03	FHWA HEC-22 GENERIC	N/A	On Sag	1	152.53	156.83	4.30	154.53	2.00	0.00	0.00
6	CB04	FHWA HEC-22 GENERIC	N/A	On Sag	1	152.35	158.57	6.22	154.35	2.00	0.00	0.00
7	CB05	FHWA HEC-22 GENERIC	N/A	On Sag	1	152.17	158.53	6.36	154.17	2.00	0.00	0.00
8	CB06	FHWA HEC-22 GENERIC	N/A	On Sag	1	151.99	158.48	6.49	153.99	2.00	0.00	0.00
9	CB07	FHWA HEC-22 GENERIC	N/A	On Sag	1	151.25	154.07	2.82	153.65	2.40	0.00	0.00
10	CB08	FHWA HEC-22 GENERIC	N/A	On Sag	1	152.15	156.17	4.02	154.15	2.00	0.00	0.00
11	CB09	FHWA HEC-22 GENERIC	N/A	On Sag	1	151.12	154.64	3.52	153.12	2.00	0.00	0.00
12	CB10	FHWA HEC-22 GENERIC	N/A	On Sag	1	151.07	154.66	3.59	153.07	2.00	0.00	0.00
13	CB11	FHWA HEC-22 GENERIC	N/A	On Sag	1	150.90	154.50	3.60	152.95	2.05	0.00	0.00
14	CB12	FHWA HEC-22 GENERIC	N/A	On Sag	1	150.83	154.88	4.05	152.95	2.12	0.00	0.00
15	CB13	FHWA HEC-22 GENERIC	N/A	On Sag	1	151.32	155.44	4.12	153.32	2.00	0.00	0.00
16	CB14	FHWA HEC-22 GENERIC	N/A	On Sag	1	151.80	155.80	4.00	153.80	2.00	0.00	0.00
17	CB15	FHWA HEC-22 GENERIC	N/A	On Sag	1	151.51	154.54	3.03	153.90	2.39	0.00	0.00
18	DS01	FHWA HEC-22 GENERIC	N/A	On Sag	1	155.39	160.00	4.61	155.39	0.00	0.00	0.00
19	DS02	FHWA HEC-22 GENERIC	N/A	On Sag	1	156.13	160.00	3.87	156.13	0.00	0.00	0.00
20	DS03	FHWA HEC-22 GENERIC	N/A	On Sag	1	154.45	160.00	5.55	154.45	0.00	0.00	0.00

Roadway & Gutter Input

SN	Element ID	Roadway Longitudinal Slope (ft/ft)	Roadway Cross Slope (ft/ft)	Roadway Manning's Roughness	Gutter Cross Slope (ft/ft)	Gutter Width (ft)	Gutter Depression (in)	Allowable Spread (ft)
1	BMP3_CURBBREAK	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
2	BMP4_CURBBREAK	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
3	CB01	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
4	CB02	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
5	CB03	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
6	CB04	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
7	CB05	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
8	CB06	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
9	CB07	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
10	CB08	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
11	CB09	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
12	CB10	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
13	CB11	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
14	CB12	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
15	CB13	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
16	CB14	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
17	CB15	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
18	DS01	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
19	DS02	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00
20	DS03	N/A	0.0200	0.0160	0.0620	2.00	0.0656	7.00

Inlet Results

SN	Element ID	Peak Flow (cfs)	Peak Lateral Inflow (cfs)	Peak Flow Intercepted by Inlet (cfs)	Peak Flow Bypassing Inlet (cfs)	Inlet Efficiency during Peak Flow (%)	Max Gutter Spread during Peak Flow (ft)	Max Gutter Water Elev. during Peak Flow (ft)	Max Gutter Water Depth during Peak Flow (ft)	Time of Max Depth Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	BMP3_CURBBREAK	0.90	0.90	N/A	N/A	N/A	-1.60	153.76	0.22	0 05:47	3.23	1093.00
2	BMP4_CURBBREAK	0.30	0.30	N/A	N/A	N/A	3.67	154.83	0.32	0 08:21	0.69	939.00
3	CB01	0.13	0.13	N/A	N/A	N/A	1.53	158.09	0.14	0 07:54	0.00	0.00
4	CB02	0.24	0.24	N/A	N/A	N/A	1.83	156.97	0.14	0 07:54	0.00	0.00
5	CB03	0.20	0.20	N/A	N/A	N/A	1.73	156.97	0.14	0 07:55	0.00	0.00
6	CB04	0.03	0.03	N/A	N/A	N/A	1.22	158.70	0.13	0 07:58	0.00	0.00
7	CB05	0.03	0.03	N/A	N/A	N/A	1.22	158.66	0.13	0 07:59	0.00	0.00
8	CB06	0.04	0.04	N/A	N/A	N/A	1.26	158.61	0.13	0 07:59	0.00	0.00
9	CB07	0.15	0.15	N/A	N/A	N/A	1.60	154.21	0.14	0 08:00	0.00	0.00
10	CB08	0.17	0.17	N/A	N/A	N/A	1.66	156.31	0.14	0 07:54	0.00	0.00
11	CB09	0.11	0.11	N/A	N/A	N/A	1.49	154.78	0.14	0 08:00	0.00	0.00
12	CB10	0.12	0.12	N/A	N/A	N/A	1.52	154.80	0.14	0 08:00	0.00	0.00
13	CB11	0.02	0.02	N/A	N/A	N/A	1.16	154.63	0.13	0 08:00	0.00	0.00
14	CB12	0.22	0.22	N/A	N/A	N/A	1.78	155.02	0.14	0 07:57	0.00	0.00
15	CB13	0.12	0.12	N/A	N/A	N/A	1.51	155.58	0.14	0 08:00	0.00	0.00
16	CB14	0.16	0.16	N/A	N/A	N/A	1.63	155.94	0.14	0 07:54	0.00	0.00
17	CB15	0.12	0.12	N/A	N/A	N/A	1.52	154.68	0.14	0 07:54	0.00	0.00
18	DS01	0.44	0.44	N/A	N/A	N/A	2.22	160.15	0.15	0 07:48	0.00	0.00
19	DS02	0.43	0.43	N/A	N/A	N/A	2.21	160.15	0.15	0 07:54	0.00	0.00
20	DS03	0.52	0.52	N/A	N/A	N/A	2.37	160.15	0.15	0 07:54	0.00	0.00

WES BMP Sizing Software Version 1.6.0.2, May 2018

WES BMP Sizing Report

Project Information

Project Name	W5
Project Type	Industrial
Location	9600 Boeckman Road
Stormwater Management Area	9612
Project Applicant	W5, LLC (c/o Mac Martin)
Jurisdiction	OutofDistrict

Drainage Management Area

Name	Area (sq-ft)	Pre-Project Cover	Post-Project Cover	DMA Soil Type	BMP
DMA 01 - Impervious	8,345	Grass	ConventionalConcrete	D	BMP 2
DMA 01 - Pervious	2,572	Grass	LandscapeDsoil	D	BMP 2
DMA 02 - Impervious	10,708	Grass	ConventionalConcrete	D	BMP 2
DMA 02 - Pervious	1,530	Grass	LandscapeDsoil	D	BMP 2
DMA 03 - Impervious	5,558	Forested	ConventionalConcrete	D	BMP 1
DMA 03 - Pervious	565	Forested	LandscapeDsoil	D	BMP 1
DMA 04 - Impervious	1,530	Forested	ConventionalConcrete	D	BMP 2
DMA 05 - Impervious	1,552	Grass	ConventionalConcrete	D	BMP 2
DMA 06 - Impervious	2,004	Grass	ConventionalConcrete	D	BMP 2
DMA 07 - Roof	20,144	Grass	Roofs	D	BMP 2
DMA 08 - Roof	20,084	Grass	Roofs	D	BMP 2
DMA 09 - Roof	24,005	Grass	Roofs	D	BMP 2
DMA 10 - Impervious	7,119	Grass	ConventionalConcrete	D	BMP 2
DMA 10 - Pervious	1,224	Grass	LandscapeDsoil	D	BMP 2
DMA 11 - Impervious	7,900	Grass	ConventionalConcrete	D	BMP 2

DMA 11 - Pervious	265	Grass	LandscapeDsoil	D	BMP 2
DMA 12 - Impervious	5,544	Grass	ConventionalConcrete	D	BMP 3
DMA 12 - Pervious	356	Grass	LandscapeDsoil	D	BMP 3
DMA 13 - Impervious	5,461	Grass	ConventionalConcrete	D	BMP 3
DMA 13 - Pervious	1,420	Grass	LandscapeDsoil	D	BMP 3
DMA 14 - Impervious	929	Grass	ConventionalConcrete	D	BMP 3
DMA 15 - Impervious	10,340	Grass	ConventionalConcrete	D	BMP 3
DMA 16 - Impervious	7,626	Grass	ConventionalConcrete	D	BMP 3
DMA 16 - Pervious	252	Grass	LandscapeDsoil	D	BMP 3
DMA 17 - Impervious	5,646	Grass	ConventionalConcrete	D	BMP 3
DMA 17 - Pervious	115	Grass	LandscapeDsoil	D	BMP 3
DMA 18 - Impervious	42,713	Grass	ConventionalConcrete	D	BMP 3
DMA 18 - Pervious	2,156	Grass	LandscapeDsoil	D	BMP 3
DMA 19 - Impervious	5,560	Grass	ConventionalConcrete	D	BMP 4
DMA 20 - Impervious	15,482	Grass	ConventionalConcrete	D	BMP 4
DMA 20 - Pervious	748	Grass	LandscapeDsoil	D	BMP 4

LID Facility Sizing Details

LID ID	Design Criteria	BMP Type	Facility Soil Type	Minimum Area (sq-ft)	Planned Areas (sq-ft)	Orifice Diameter (in)
BMP 2	FlowControlAndTreatment	Rain Garden - Filtration	D1	4,292.2	4,295.0	3.3
BMP 3	FlowControlAndTreatment	Rain Garden - Filtration	D1	3,250.7	3,340.0	2.9
BMP 4	FlowControlAndTreatment	Rain Garden - Filtration	D1	862.6	1,700.0	1.5
BMP 1	FlowControlAndTreatment	Rain Garden - Filtration	D1	238.1	277.0	0.8

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 B –
OPERATIONS AND
MAINTENANCE MANUAL

Stormwater Operations & Maintenance Manual

For:

Building W-5
Wilsonville, Oregon

December 2021

Prepared by:

Mackenzie
1515 SE Water Avenue
Suite 100
Portland, OR 97214
2210115.00

TABLE OF CONTENTS

ATTACHMENTS

1. O&M Facility Map
2. Sample Maintenance Report
3. City of Wilsonville 2012 Manual for the Operation & Maintenance of Privately Owned Stormwater Facilities

I. GENERAL- SITE DESCRIPTION, ASSUMPTIONS AND GENEREAL SYSTEM DESCRIPTION

This plan was developed to provide a basis for maintenance of stormwater facilities for the W-5 Building project located in Wilsonville, Oregon. The W-5 project includes the construction of a 65,000 square foot (footprint) manufacturing building with an integral depressed truck dock, associated drive aisles and parking, an exterior trash enclosure, and associated utility services to the building and site..

Runoff from the site sheets flows to various standard catch basins and is conveyed to four rain garden stormwater systems onsite.

This Operations and Maintenance Plan generally provides maintenance requirements of the stormwater collection and treatment system. Best Management Practices (BMPs) related to maintenance of the facilities shall include regular maintenance and upkeep of the parking and landscape areas.

II. GENERAL MAINTENANCE AND FACILITY-SPECIFIC MAINTENANCE REQUIREMENTS

The W-5 Facilities Manager shall be responsible for regular inspections and maintenance of the storm drainage system and related facilities. Inspections shall include observations of the landscaping, parking areas, catch basin grates and basins for debris, loose soil or sediment that may enter the system. Inspection of the collection system includes observation of the catch basins, and conveyance lines. General maintenance requirements of those facilities include removal of sediment and debris, repair of damaged components and general maintenance of mechanical systems.

Facility-specific maintenance requirements shall also be the responsibility of the W-5 Facilities Manager. Inspections shall include documentation of observations and maintenance or repairs of each of the drainage system facilities. This would include:

- Landscape areas
- Parking areas
- Catch basins
- Cleanouts
- Conveyance pipes
- Treatment devices
- Detention elements

Operations and Maintenance Contact

W-5 – Facilities Manager

Mac Martin
206.399.6676
macmartinis@gmail.com

III. GENERAL MAINTENANCE ACTIVITIES

Maintenance of stormwater system components is the key to a successful stormwater plan. Most stormwater systems can fail in the first few years due to lack of adequate maintenance. The following guidelines will be used for general maintenance of the stormwater system.

1. Dry sweeping of the parking area to reduce accumulation of sediments and debris in the catch basins will be conducted regularly. Clogging the catch basin with sediments will result in its failure.

2. Quarterly visual inspection of the catch basins for debris and obstructions. All catch basins or other structures shall be kept clear of sediment, debris or other obstructions that may affect the flow or treatment of stormwater.

3. Visually inspect the rain gardens after all major storm events for evidence of system problems. Look for ponded water, debris, erosion, or any other signs of system problems.

4. Annually inspect the spill kit to ensure all supplies are available and have not deteriorated or expired (Note: each tenant shall have a separate spill kit or access to a shared spill kit). Check with city staff to stay aware of newly available products or spill containment procedures. Become familiar with the spill control plan (included with this O&M Plan) and ensure that at least one employee during each work shift is familiar with the plan (always have someone on-site who is aware of the spill containment kit and procedures).

5. Biannually or quarterly inspect the catch basin sumps. Sediments need to be removed along with any oils before the deposits reach one foot in depth and before the outlet is obstructed. Materials removed from the catch basin inlet shall be disposed of in accordance with applicable state law. Records of debris disposal shall be kept on file at the main office in accordance with the state law and shall be available for review by regulating agencies.

IV. SITE PLAN SHOWING LOCATION OF FACILITY COMPONENTS

The attached O&M Facility Map shows the general location of the facility components. The site utility "As-built" drawings should be consulted for further information regarding facility locations, sizes or details.

V. INSPECTION PROGRAM – PERFORMANCE MEASURES FOR MAINTENANCE ACTIVITIES

Objective

The objective of this manual is to help the property owner to maintain the storm sewer system for W-5 so it can continue to operate as designed.

Requirements

Conduct inspections with the as-built plans in hand. Inspect the facility on a quarterly basis for the first 3 years from construction, and a minimum or semi-annually thereafter. Additional inspections will be necessary after long dry periods, large storms or spills. Immediately remove spilled material, taking the appropriate safety and disposal precautions.

Keep inspection records to track the progressive development of the system over time. The inspection records shall include:

1. Sediment condition and depth in sumps
2. Water elevation/observations (sheen, smell, etc.)
3. Conditions of the inlet and outlet pipes, and remaining storage capacity
4. Unscheduled maintenance needs
5. Components that do not meet performance criteria and require immediate maintenance
6. Common problem areas, solutions, and general observations
7. Aesthetic conditions

Collection System

The collection system consists of underground pipes and catch basins.

Catch Basins

The catch basins are metal basins with steel grates. The catch basins have a trapped outlet and sump and need to be inspected and maintained (if necessary) on a quarterly basis and following major storm events. Maintenance includes inspection of the structure itself and removal of any oils, debris or sediment as described in the maintenance table. Check to see if sediment has built up on the bottom of the catch basin by measuring down from the outlet pipe. If it is less than 12-inches then the catch basin needs to be cleaned out.

Storm Sewer Pipes

The storm sewer pipes are plastic with associated fittings. The pipes need to be inspected and cleaned quarterly (if necessary) following major storm events. Cleanouts and manholes are provided for access to the pipe system. The pipes need to be inspected for sediment buildup and cleaned out, if necessary, using a vactor truck so that sediment is removed.

Rain Gardens

Refer to attached City of Wilsonville 2012 Manual for the Operation & Maintenance of Privately Owned Stormwater Facilities.

Maintenance Schedule

Summer: Make structural repairs; clean gutters and downspouts; remove any build-up of weeds or organic debris.

Fall: Replant exposed soil and replace dead plants. Remove sediment and plant debris.

Winter: Clear gutters and downspouts.

Spring: Remove sediment and plant debris. Replant exposed soil and replace dead plants.

All season: Weed as necessary.

Maintenance Record

All facility operators are required to keep an inspection and maintenance log. Record date, description, and contractor (if applicable) for all repairs, landscape maintenance, and facility cleanout activities. Keep work orders and invoices on file and make available upon request of the City inspector.

Access

Maintain ingress/egress per design standards.

Vector (Mosquitoes and Rats)

Facilities must not harbor mosquito larvae or rodents. Record the time/date, weather, and site conditions when vector activity is observed. Record when vector abatement started and ended.

VI. O&M INSPECTION SCHEDULE

- Quarterly inspection of the catch basins and drainage system for accumulation of sediments or oils

- Annual inspection of the emergency spill kit to ensure that all supplies are available and have not deteriorated or expired

- Quarterly inspection of the swale for proper landscape maintenance, removal of trash or sediment and repair of erosion

- Materials removed from the catch basin or pipes shall be disposed of in accordance with state law

Employee and Public Education

Employees will be trained upon hiring and thereafter annually, when new requirements are published or when there are any changes to the system equipment. Employee training will include:

- Reading this Stormwater Management Plan
- Familiarity of all components and locations for materials indicated in the SWMP
- Spill response and Personal Protective Equipment (PPE)
- Documentation requirements

VII. MAINTENANCE EQUIPMENT

Hand tools or other specialized equipment may be necessary to maintain the facilities. Suggested maintenance equipment is listed in the Inspection Checklist. The Facility Manager shall be responsible to maintain on-site, or be able to make available, all required equipment.

Suggested Maintenance Equipment and Materials

- Push broom
- Rake
- Shovel
- Spill kit
- Manhole lid puller
- General landscape tools (weed cutters, pruning clippers, leak rake, etc.)
- Vactor Truck

VIII. SEDIMENT STORAGE, TESTING, AND DISPOSAL

Maintenance of the storm drainage facilities (manholes and catch basins) may include removal of oils, sediments or debris that requires specialized testing or disposal. All removed oils, sediments or other debris shall be disposed of in accordance with applicable regulations. The Facility Manager shall be responsible to retain a qualified company to dispose of this material or otherwise comply with the applicable regulations. The Facility Manager should contact the City of Wilsonville Public Works to verify current regulations or requirements. Local companies providing testing, storage and disposal services:

Clearwater Environmental Services in Wilsonville: (503) 582-1951
River City Environmental in Portland: (503) 252-6144
Bravo Environmental in NW Portland: (503) 261-9800

IX. EMERGENCY CONTACTS

Emergency Contacts

Mac Martin
206.399.6676
macmartinis@gmail.com

Maintenance Responsibilities

The Facility Manager shall be responsible to inspect, maintain or otherwise repair the stormwater facilities. Regular inspections shall occur, and documentation of the inspections, maintenance or repairs kept on-site for a minimum of three years from the date of the activity.

X. SPILL PREVENTION AND CONTROL PLAN

Spill prevention is an important factor in the successful operation of a stormwater management system. All employees will be trained to this plan so that they are certain of the location of materials, who to notify in case of a spill, and how to initially contain the spill of hazardous materials. Employees shall never dump water materials into the stormwater collection/treatment system. Employees shall be observant of other potential contamination occurrences. All employees will review the following page regarding detailed spill response steps.

This data will be posted in an accessible area.

WHAT TO DO IN CASE OF A SPILL

1. The spill kit is located at the stand up shelter near the site entry
2. Get the spill kit (and spill kit instructions when provided)
    a. If possible, determine visually what type of fluids have been spilled
    b. Put on gloves and glasses or any other necessary Personal Protective Equipment (PPE)
    c. Get the absorbent material provided in the kit and drain block cover (pig)
    d. Place the absorbent material in the path of the spill
    e. Remove any debris from the vicinity of the catch basin inlets in the parking lot
    f. Unroll the drain blocker, and place is snugly over the catch basin inlet
    g. Verify the cover has full contact with the rim of the catch basin inlet
    h. Use snakes, pillow or pigs to completely contain the areas
    i. If the spill cannot be contained locally, shut off the storm drain pumps so any spilled material does not leave the site
3. Notify the following personnel immediately:

City of Wilsonville Public Works:	(503) 682-4092
After Hours:	(866) 252-3614
Department of Environmental Quality:	(800) 452-0311
	(800) 452-4011
	(503) 229-5263

Note: **Only dry cleanup methods may be employed to clean up spills (i.e. no use of water to wash spilled materials from pavement will be conducted).**

XI. ADDITIONAL MAINTENANCE REQUIREMENTS FOR INITIAL ESTABLISHMENT PERIOD

Initial maintenance of landscape vegetation may require additional attention to ensure that landscaping, groundcover and erosion control measures are established or maintained as intended. Proper landscaping and groundcover are an important feature of a successful storm drainage system.

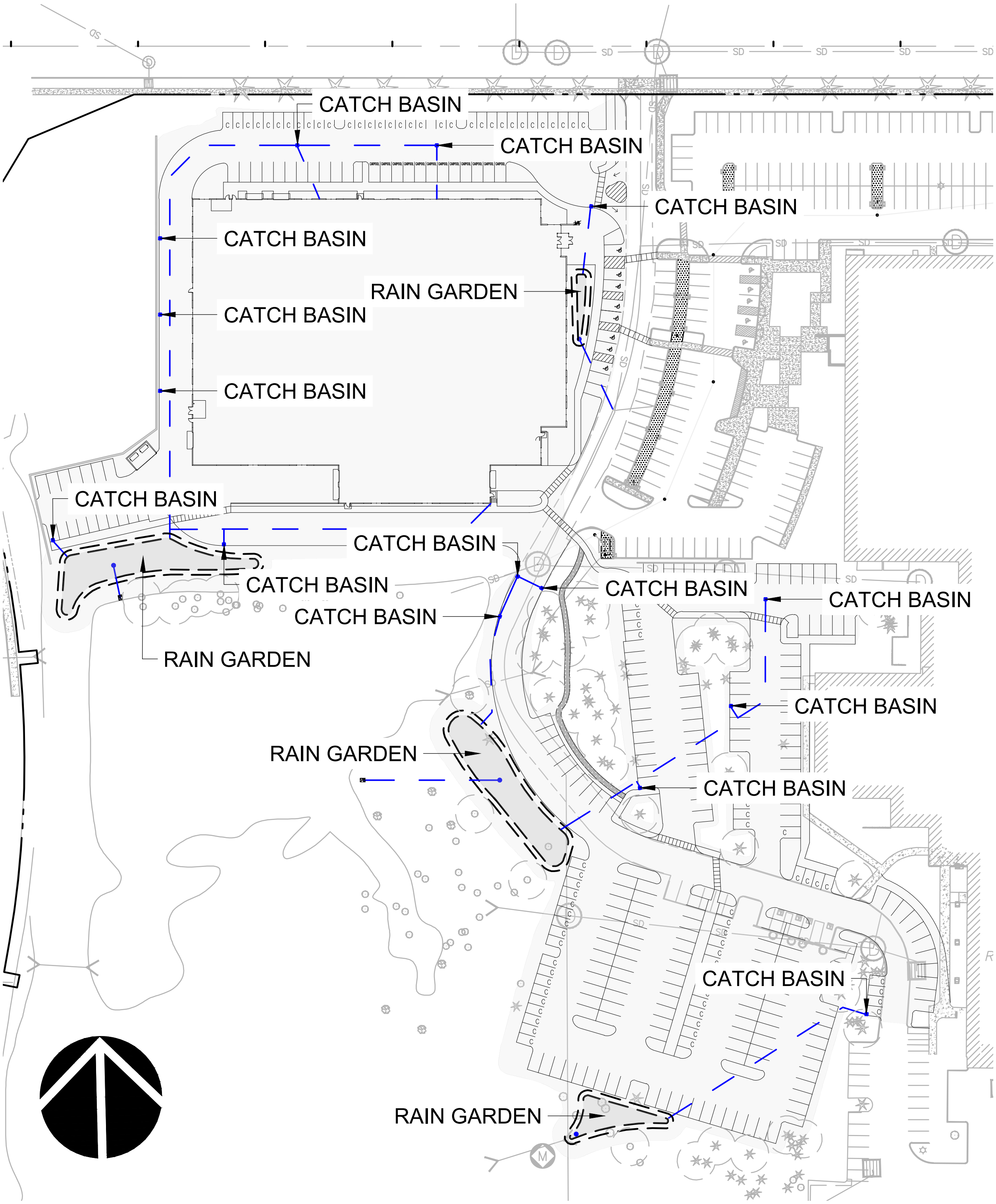
1. During the initial 3-year establishment period, remove undesired vegetation using minimal (or preferably no) use of toxic herbicides and pesticides at least 3 times a year. Replace plants that die during this period.

2. Irrigate as necessary to establish site landscaping

3. Replenish mulch at least annually. Make sure that all exposed soil is covered with mulch or other groundcover

4. Do not use excessive fertilizers, herbicides or pesticides for vegetation maintenance

5. Use replacement plants that conform to the initial planting list



MARTIN DEVELOPMENT
W-5
12/2/2021 © 2021 | Mackenzie |

O&M FACILITY MAP
2210115.00

City of Wilsonville
Annual Stormwater Facility Inspection and Maintenance Report

Name of Development:
Location/Site Address:
Contact Name:
Telephone:
Email:
Mailing Address (if different from Site Address):

Facilities to be Maintained:

	Catch Basin(s)		
	Pretreatment Manhole(s)		
____	Flow Control Manhole(s)		
____	Detention Pond(s)	# of inlets	
____		# of outlets	
____	Rain Garden(s)	# of inlets	____
		#of outlets	____
____	Stormwater Planter(s)	# of inlets	____
		# of outlets	____
____	Vegetated Swale(s)	# of inlets	____
		# of outlets	____
____	All Other Facilities as Described on Plans:		____

Inspection Date:
Describe Inspection, Maintenance, Repair, or Replanting Activities (attach invoices for work performed)**:**

Owner or Representative Signature   Date

The Owner(s) or Owner's designee shall be responsible for annually conducting inspections and performing maintenance on the above stormwater management facilities annually, in conformance with Section 301.13.00, "Operation and Maintenance Requirements," of the City of Wilsonville Public Works Standards. This requirement pertains to all Stormwater Facilities, including but not limited to: catch basins, pipes, treatment manholes, manholes, trash racks, vegetated swales, and detention ponds.

<u>For vegetated stormwater facilities, particular attention will be given to:</u>

- Examine inlets, outlets, and curb cuts for sediment buildup. Remove sediment as necessary to maintain flow into and out of facility.
- Inspect facility for erosion, gullies, and slope slippage. Repair if present.
- Check for evidence of ponding or slow draining soil media. If necessary, remove and clean or replace the clogged soil media.
- Remove weeds manually.
- Ensure that all plants are healthy. Replace all dead or dying plants with approved plantings.
- Remove trash and excess debris.
- Ensure overflow covers are in place.

<u>For structural facilities and components, particular attention will be given to:</u>

- Remove sediment at least once a year or when basin is half full of sediment.
- Remove trash, oils, and debris.
- Ensure facility is structurally sound by repairing or replacing cracked, loose, askew, or damaged pipes.
- Access covers, trash racks, and metal grates shall be kept free of trash and debris, closed, and in good working order.
- Maintain filter cartridges and other proprietary systems according to manufacturer’s recommendations.

Spring	Summer	Fall	Winter
Remove sediment Remove trash Remove weeds Fix erosion **Plant** **Prune grasses** Check irrigation	Remove sediment Remove trash Remove weeds Fix erosion Check irrigation Water plants **Structural repairs**	Remove sediment Remove trash Remove weeds Fix erosion **Plant** Drain irrigation **Structural repairs**	Remove sediment Remove trash Fix erosion **Prune trees & shrubs**

City of Wilsonville

A MANUAL FOR THE

OPERATION & MAINTENANCE OF PRIVATELY OWNED STORMWATER FACILITIES

March 2012

Working together...

towards a common goal...

clean waters and healthy rivers.

City of Wilsonville
Natural Resources Program
(503) 682-4960
www.ci.wilsonville.or.us

TABLE OF CONTENT

CARING FOR YOUR STORMWATER FACILITY

THANK YOU

As the owner of a stormwater management facility, you are making a meaningful contribution to the health of Wilsonville's streams, wetlands and the Willamette River. This handbook will help you maintain your facility to make sure it performs the work it is designed to accomplish.

WHAT ARE STORMWATER FACILITIES?

Stormwater facilities are any combination of landscape and structural features that slow, filter, or infiltrate (absorb) runoff on your property after a rainfall. Types of facilities include vegetated systems (planters, swales, ponds, created wetlands, etc.), and structural systems (ecoroofs, porous pavement and manufactured facilities). Piping, inlets and catch basins are also important components that need adequate maintenance to assure facility function. All of these serve a common purpose: controlling the quality and quantity of stormwater runoff from your site to help safeguard our valuable water resources.

PROPERTY OWNER RESPONSIBILITIES

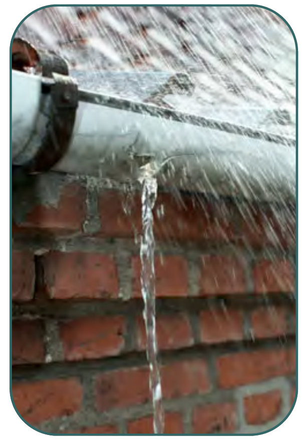
Federal, state and local agencies created management regulations and guidelines so as to improve stormwater quality and protect watersheds, rivers, streams and drinking water resources. The City of Wilsonville has a Stormwater Maintenance and Access Easement that includes the following requirements:

- Annual maintenance on storm drainage facilities in conformance with City of Wilsonville's Public Works Standards. For more information go to: www.ci.wilsonville.or.us/Index.aspx?page=127 Go to Important Links at the bottom of the page and click on Public Works Construction Standards 2006 (section 301.6.00 Operations and Maintenance Req.)
- Removal of debris, leaves and sediment from manholes, detention outlet structures, and catch basins.
- Disposal of all oils, sediment and debris in an approved dumpsite.
- Replacement of all dead or dying plants in ponds and swales. Maintenance of original plantings.
- Removal of trash from ditches, swales, catch basins, or any stormwater conveyance.

The steps we take today will greatly influence Wilsonville's environmental health and quality of life for years to come. Individual actions can make a big difference. Thank you for the significant part you and your stormwater management facility are playing.

* For information or questions about your facility, call the Natural Resources Program at (503) 682-4960

YOUR CONNECTION TO WILSONVILLE'S STREAMS AND THE WILLAMETTE RIVER



THE PROBLEM WITH STORMWATER RUNOFF

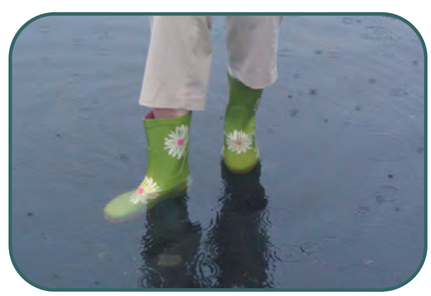
When it rains, the stormwater runs off impervious surfaces (such as roofs and paved areas) instead of soaking into the ground.

Conventional stormwater management directs runoff into drains and pipes that carry it offsite and eventually discharge it into a local stream. This approach has a number of harmful effects:

- Impervious areas generate large volumes of runoff relatively quickly. The increased volume and speed of the runoff can cause flooding and erosion and damage natural habitat.
- The runoff picks up a variety of pollutants including oil, pesticides, metals, chemicals, and sediment that negatively impact water quality and fish habitat.
- During warm weather, the runoff absorbs heat from impervious surfaces. This increases the temperature of the receiving waters, with negative impacts on fish and other aquatic life.
- Less water is able to infiltrate into the ground. This reduces groundwater recharge, which reduces summer flows in streams.

For information on the City's stormwater permitting requirements please visit:

www.ci.wilsonville.or.us/Index.aspx?page=693



A BETTER WAY TO FLOW

The City of Wilsonville is actively pursuing a variety of measures to reduce stormwater impacts. One important approach is to manage stormwater on the property where it originates. This is commonly referred to as Low Impact Development. It includes the use of vegetated swales, pervious concrete, rain gardens, eco-roofs, etc. Onsite stormwater management uses processes that mimic nature. Onsite facilities allow runoff to soak into the ground, help filter out pollutants, and slow the flow rate of runoff leaving your site. This significantly reduces the volume and pollution levels in stormwater leaving your property and ending up in local streams and the Willamette River.

WHAT ELSE IS THE CITY DOING?

Onsite management, through the use of Low Impact Development, is just one component of a comprehensive citywide program to limit stormwater runoff impacts. Here are some other steps the City is taking:

- The City requires onsite stormwater management for new construction and redevelopment on public and private property.
- Adhering to and updating the procedures outlined in the Stormwater Master Plan.
- Natural areas, especially riparian areas adjacent to rivers and streams, help filter out pollution, control erosion, and provide shade, food, and habitat for fish and wildlife. The City uses a variety of measures to preserve these critical areas including development and land use zoning requirements and enhancement and restoration efforts.
- In partnership with numerous other organizations, the City provides education and technical assistance aimed at reducing stormwater impacts and promoting watershed health.

INSPECTING AND MAINTAINING YOUR FACILITY

PROTECTING YOUR RESOURCES

It is essential to maintain your facility so it functions as intended and limits off-site environmental impacts. You are required to inspect your facility at a minimum of once a year to determine maintenance needs. Routine inspection and maintenance can help keep overall maintenance costs low by detecting problems early and avoiding large repair or replacement costs. This section identifies general guidelines on what to look for and how to maintain your facility. It also notes non-routine maintenance that may require professional assistance. **If you are unsure of what type of facility you have, call the City of Wilsonville's Natural Resources Program at (503) 682-4960.**

LEGAL REQUIREMENTS: OPERATIONS AND MAINTENANCE PLAN

As a property owner, you are legally required to follow all of the maintenance tasks and schedules outlined in your recorded maintenance and access easement. An Annual Inspection and Maintenance Report must be submitted to the City of Wilsonville no later than May 1 each year (see sample form on page 7). Pictures included with the report are very helpful. Include copies of invoices of work performed by contractors. While inspecting your facility, please keep in mind that it will be necessary for you to refer to your landscape plan in order to maintain your facility as it was originally designed.

INSPECTION SCHEDULE: HOW OFTEN

It is recommended that you inspect your facility at least::

- Quarterly for the first two years
- Once a year there after, and
- Within 48 hours of major rainfall events (more than one inch of rain over a 24-hour period).

SAMPLE REPORTING FORM

Stormwater Annual Inspection and Maintenance Report

- The owner(s) or owner's designee shall be responsible for having inspections conducted and maintenance performed on the above private stormwater facilities annually, in conformance with Section 301.6.00, "Operation and Maintenance," of the City of Wilsonville Public Works Standards. All oils, sediment and debris will be removed and deposited in an approved waste disposal site. Any damaged equipment will be repaired promptly.
- Particular attention will be given to sedimentation and pollution control manholes, and stormwater facility inlet and outlet structures. All debris shall be removed to assure proper functioning.
- The grates of all catch basins shall be kept free of debris and leaves.
- The stormwater facility outlet structure(s) shall be checked to assure that sediment accumulation has not encroached on the required stormwater facility volume. Sediment shall be removed as necessary to maintain that required volume.
- The outlet control manhole shall be inspected to assure that all parts are intact and the orifice is free of any debris that could cause malfunction.
- Inspect all stormwater facilities for survival and viability of plantings. Replace all dead or dying plants with in-kind plantings, and remove sediments and debris. **Maintain all original landscaping in swales, ponds, etc.**
- This includes all stormwater facilities including but not limited to: catch basins, pipes, treatment manholes, manholes, trash racks, and structural controls.

The above inspection and maintenance activities shall be documented annually by sending a signed original letter format report of what was completed to the City of Wilsonville at the mailing address below. **The Annual Inspection and Maintenance Report must be submitted no later than May 1 each year.**

City of Wilsonville
Stormwater Management Coordinator
29799 SW Town Center Loop
Wilsonville, OR 97070
(Stormwater facilities Maintenance Plan Exhibit B Stormwater Maintenance and Access Easement)

____
Name of Development

Contact ______________________________
Telephone ______________________________
Mailing Address ______________________________

Location
Tax Lot ______________________________
Street Address ______________________________

Facilities to be maintained
_____ Trapped catch basin(s) (number of each)
_____ Pollution control manhole(s) (number of each)
_____ Outlet control manhole(s) (number of each)
_____ Detention pond(s); ____ tank(s) (number of each)
_____ WQ pond(s) swales; ____ MH(s); ____ vault(s); ____
All other facilities as described on plans______________________________

Inspection Date ______________________

Describe inspection, maintenance, repair or replanting ______________________

____
____
____
____
____

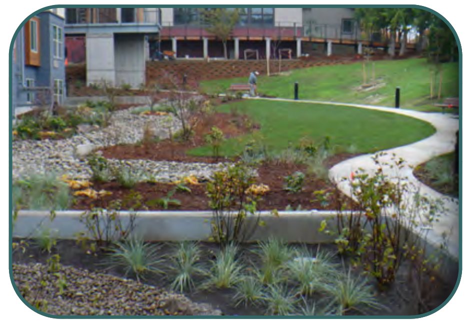
(Attach invoices for work performed) (Continue above on additional sheet if needed)

Owner, Owners or their Representative Signature ______________________

Date ______________________

SEDIMENT REMOVAL AND DISPOSAL

FACILITIES AND SYSTEM COMPONENTS THIS APPLIES TO



Vegetated Facilities: ecoroofs, infiltration basins, planters, ponds, swales, trees, vegetated filters, and created wetlands.

Structural Facilities: catch basins, curb cuts, inlets, manufactured facilities, piping, sedimentation manholes, and vaults.

Pervious Pavement: porous concrete or asphalt, permeable pavers.

IMPACT ON FACILITY PERFORMANCE

The purpose of a stormwater treatment facility is to remove pollutants, including suspended solids, by capturing sediment. Sediment can include dirt, leaves, and litter. These materials can restrict or clog the facility. Timely removal of sediment will improve infiltration rates, water quality, and help prevent clogging and flooding.

WHAT TO LOOK FOR

Check the depth of accumulated sediments. Sediment markers can be placed in the facility to help identify depths. Remove sediment when:

Vegetated Facilities:

- Sediment is 4" deep,
- Sediment depth is damaging or killing vegetation, or
- Sediment is preventing the facility from draining within a 24-48 hour period.

Structural Facilities:

- At least once a year, or
- When the basin is half full of sediment.

Pervious Pavement:

- Sediment is preventing the facility from draining in 24 hours.

WHAT TO DO

Often sediment can be removed by hand. Large facilities and underground facilities will need to be cleaned with heavy equipment by trained professionals.

- Remove sediment during dry months when it is easier to remove, weighs less, and creates fewer secondary environmental impacts (such as wet sediment running off the site).

NOTE: It is illegal to hose sediments through your system.

Doing it yourself

Vegetated Facilities:

- Use rakes and shovels to dig out accumulated sediment.
- Avoid damage to existing vegetation.
- If sediment is deep, plants may need to be removed in order to excavate sediment.
- Reseed and mulch disturbed areas to prevent erosion.
- Excavate sand or gravel and clean or replace.

Doing it yourself (continued)

Structural Facilities, Dispersion Trenches and Pervious Pavement:

- Catch Basins: Clean debris off the grate and bars. Lift the grate and use a bucket to remove water and a shovel to dig out sediment.
- Curb cuts, piping and other conveyance facilities: Use a shovel, router, air hose or other dry method to clear sediment and debris.
- Dispersion Trenches: Excavate sand or gravel and clean or replace.
- Pervious Pavement: Remove accumulated sediment from the surface with a dry broom, vacuum system, or other hand tools.

Hiring Professionals

Cleaning certain facilities will require professional assistance.

- Underground facilities such as manholes, and manufactured facilities must be cleaned by a vactor truck. Do not enter these facilities. They are defined by the Oregon Occupational Safety and Health Division as confined spaces and require proper certification to enter.
- Certain components such as collection basins, piping or pervious pavement systems may require vacuuming with a vactor truck or street sweeping equipment.

DISPOSAL

When deciding how to dispose of sediment, you need to consider the types of activities and pollutants on site. Sediment from commercial or industrial sites is usually not considered hazardous waste. However, as the generator of this waste you are responsible for deciding how to properly manage the removed solids.

Contaminated Water and Sediment

Catch basins and stormwater facilities in areas used for chemical or hazardous waste storage, material handling or equipment maintenance may collect the chemicals used in these activities from spills or via stormwater runoff. If you observe an oily sheen, odors, discoloration, or other signs of pollution, hire a professional laboratory or sampling firm to assess whether the material needs specialized hauling, treatment or disposal to comply with Oregon State Department of Environmental Quality (DEQ) rules. If you need assistance deciding whether the solids should be managed as hazardous waste, contact DEQ.

Non-Contaminated Water and Sediment

If the pollutant load is non-hazardous, water may be spread across vegetation onsite. Let the solids dry out, then properly dispose of them. Temporary erosion control measures may be needed to contain the material onsite. Dry materials may be reused elsewhere on your site, may be eligible for reuse by others, or can be disposed of at a designated solid waste facility.

REDUCING SEDIMENT ACCUMULATION AND POLLUTION IN YOUR FACILITY

- Minimize outside sources of sediment, such as eroding soil upstream of your facility.
- Sweep paved areas on your property regularly.
- Make sure chemical and waste storage areas are not exposed to rainfall and stormwater runoff.
- Don't let water from washing vehicles or equipment drain to your stormwater facility.

RESOURCES

City of Wilsonville Public Works Standards: www.ci.wilsonville.or.us/Index.aspx?page=127
Go to *Important Links* at the bottom of the page and click on *Public Works Construction Standards 2006* (section 301.6.00 Operations and Maintenance Req.)

Environmental Protection Agency: www.cfpub.epa.gov/npdes/home.cfm?program_id=6

Department of Environmental Quality: www.oregon.gov/DEQ

Private Maintenance Companies (listed below are just a few examples of companies that provide maintenance services, more companies are available)

- Clearwater Environmental Services in Wilsonville (503) 582-1951
- River City Environmental in Portland (503) 252-6144
- Bravo Environmental NW in Portland (503) 261-9800

Stormwater runoff has substantial impacts on the water quality and habitat that fish depend on. By reducing those impacts, we are taking direct action on behalf of threatened species as well as other fish and wildlife that are under stress.

VEGETATION MANAGEMENT

FACILITIES THIS APPLIES TO

Vegetated Facilities: ecoroofs, infiltration basins, planters, ponds, swales, trees, vegetated filters, and created wetlands.

IMPORTANCE TO FACILITY PERFORMANCE

Plants play an important role in stormwater facilities. They absorb water, improve infiltration rates of soil, prevent erosion by stabilizing soil, cool water, and capture pollutants. Plants create habitat for birds and other wildlife and provide aesthetic value to a property. Proper maintenance of vegetation improves the appearance and performance of your facility. Your facility must be kept in accordance with the original landscape design.

WHAT TO LOOK FOR

When identifying maintenance needs it is helpful to have a copy of your landscape plan, this shows the plants you are required to have in your facility. Facilities should be checked for maintenance needs quarterly for the first two years and once a year after that.

Facility needs maintenance when:

- Areas of soil are bare.
- Vegetation is buried by sediment.
- Vegetation appears unhealthy or has died.
- Nuisance and invasive plants are present.
- Vegetation is compromising the facility's structure by blocking inlets or outlets, or roots are intruding into a component of the facility.
- Dropped leaves and other debris are contributing to sediment accumulation or are blocking inlets or outlets.

WHAT TO DO

Maintenance activities can easily be incorporated into existing site landscape maintenance contracts. Vegetation can be maintained with a formal or more natural appearance depending on your preference.

General Maintenance

- Remove dropped leaves, dead plants, and grass and other plant clippings. Plant debris adds nutrient pollution as it breaks down, and can clog facility piping and reduce infiltration.
- Avoid using fertilizers, herbicides, or pesticides in the facility. These products add to the pollution problems the facilities are designed to remedy.
- Use mulch to inhibit weed growth, retain moisture, and add nutrients. Replenish when needed. Ensure mulch does not inhibit water flow.
- Irrigate all new plantings as needed for the first two years.

Caring for wanted vegetation

Facility owners are responsible for maintaining healthy vegetation and must replace any plants that have died or been removed.

- You are required to maintain vegetation to the density approved on your landscape plans or specified in the City's Public Works Standards.
- Replant with vegetation approved for use in the original planting plan or from the recommended plant list in the City's Public Works Standards.

Caring for wanted vegetation (continued)

- Plant in late fall or early spring so plant roots can establish during the cool, rainy seasons, before summer.
- Amend and aerate compacted soils before replanting by adding compost to increase nutrients and enhance soil texture.
- If plants are not surviving, determine the reason for the plant die-off. Survivability may be improved by planting vegetation better suited for the site conditions or by irrigating more. You may need to test planting bed soils for pH, moisture, and other factors such as nutrient levels, soil structure, and organic matter content.

Mowing

- Grassy facilities are designed for routine mowing. Mow at least twice a year.
- Grass should be mowed to keep it 4" to 9" tall. Grass that is at least 4" tall captures more pollutants and is hardier. Do not allow grass to become a fire hazard.

Nuisance and unwanted vegetation

- Remove nuisance and invasive vegetation, such as Himalayan blackberry, English ivy and reed canarygrass, before it goes to seed in the spring. Do additional weeding in the fall. A list of nuisance plants can be found in the Portland Plant List (see below).
- Immediately remove vegetation that is clogging or impeding flow into the facility.
- Remove potentially large and deep-rooted trees or bushes when they might impede the flow path or compromise facility structures.
- Provide ground cover on any dirt exposed by vegetation removal.

Wildlife

Vegetated facilities create habitat, especially for birds. The Migratory Bird Treaty Act protects all native bird species. Birds and other animals will generally adjust to human activity. However, there are simple measures that should be taken to avoid disturbance:

- Avoid maintenance during bird nesting season from early March to late July. Prune and mow during late summer. Many baby birds will spend some time on the ground after leaving a nest.
- Walk the site before you do maintenance. Look for nests, burrows and animals in the facility. Reroute around animal areas by at least a few yards.

RESOURCES

Clackamas County Resources:

Clackamas County Soil and Water Conservation District: www.conservationdistrict.org

Plant Identification:

Native Plant Society: www.npsoregon.org

Master Gardeners: www.extension.oregonstate.edu/mg

Native Plant Nurseries:

Native Plant Nursery: www.plantnative.org

EROSION, BANK FAILURE, CHANNEL FORMATION

FACILITIES THIS APPLIES TO

Vegetated Facilities: ecoroofs, infiltration basins, planters, ponds, swales, trees, vegetated filters, and created wetlands.

IMPORTANCE TO FACILITY PERFORMANCE

Stormwater flowing through a facility can cause erosion. Erosion can increase sediment build up, clog outlets, reduce water quality benefits, add to pollution and cause facility components to fail. Eroded channels create an easy path for water to travel down reducing the ability of the facility to filter pollutants and infiltrate water.

WHAT TO LOOK FOR

Any area with erosion more than two inches deep needs maintenance. Signs of erosion and common locations:

- The formation of flow restricting channels in the bottom of the facility, around inlet pipes and curb cuts, or at overflows.
- Undercutting, scouring, and slumping along banks or berms.
- Channels and undercutting through check dams. (check dams are small berms built across a facility to slow water and create small areas of ponding).

WHAT TO DO

- Fill the eroded area with soil, compact it lightly, and cover with mulch, compost, seed, sod, or other erosion prevention materials.
- Plant banks with deep or heavily rooted plants to permanently stabilize soil.
- Install or repair structures designed to dissipate energy and spread flow, such as splash blocks on downspouts, or riprap around inlet pipes and curb cuts. See the City's Public Works Standards for requirements.
- If erosion continues to be a problem, consult a professional to determine the cause and a solution.
- Replant in accordance with the landscape plan.

STRUCTURAL DEFICIENCIES

FACILITIES THIS APPLIES TO

Most stormwater facilities have some structural components. Some facilities such as vaults, drywells, and sediment manholes are completely structural. In vegetated facilities, structural components often control how water enters, travels through, or exits a facility. Common structural components include:

- Inflow and outflow pipes, curb cuts, and trenches.
- Valves, orifices, trash racks, and pipes.
- Concrete, metal, and plastic structures and components such as curbs, retaining walls, and manholes.
- Manufactured devices such as filter cartridges.
- Earthworks such as embankments, check dams, dikes, berms and side slopes.
- Riprap and other flow spreading elements.
- Access roads, gates and signs.

IMPORTANCE TO FACILITY PERFORMANCE

These elements need to be in good working order to route flows into a facility and for the facility to function properly.

WHAT TO LOOK FOR

Look at the general condition of these elements. Do they need repair or replacement? Are they still properly aligned? Look for:

- cracks, scratches, dents, rust, or other conditions of wear.
- loose fittings, broken or missing components.
- insufficient oil/grease for moving parts.
- appropriate gravel cover or bedding to support the structures.
- misaligned parts or other impediments to the component's ability to still pass flow.

MAINTENANCE

- Immediately repair or replace any major damage to prevent catastrophic failure. This includes any structural component that is cracked, loose or askew. You may need to consult a professional engineer or hire a trained contractor to design and perform any repairs. Refer to page 10 for a list of resources.
- Minor damage such as dents, or rust spots may not need immediate replacement but should be monitored.
- Maintain access to the facility by keeping the access route open and structurally sound, fence gates and vault lids oiled and locks functioning. Access must be available in an emergency.

PONDING WATER

FACILITIES THIS APPLIES TO

Vegetated Facilities: dry ponds, infiltration basins, planters, rain gardens, sand filters, swales, created wetlands, and vegetated filter strips.

Structural Facilities: manufactured facilities and pervious pavement.

NOTE: Some facilities are specifically designed to always hold water such as: wet ponds, spill control manholes, and sedimentation manholes.

IMPORTANCE TO FACILITY PERFORMANCE

Most facilities are designed to drain in a certain amount of time. This varies from 2 to 48 hours depending on the type of facility. This time is stated in the Operations and Maintenance plan for the type of facility. Ponding water is usually a sign that the facility's outlet is clogged or it is not infiltrating properly.

WHAT TO LOOK FOR

- clogging of overflows or outlets with debris, trash or other obstructions.
- fine sediments filtering into the soil or other filtration media (like sand or gravel) that can prevent proper infiltration.
- water that has remained ponded for more than 48 hours.

MAINTENANCE

- For surface facilities, first try raking the top few inches of soil to break up clogged sections and restore water flow.
- Clean out overflows and outlets with hand tools, if possible. Difficult or hard to access blockages may require a professional contractor.
- Identify sources of sediment and debris to prevent them from entering the facility. Simple actions like sweeping a parking lot regularly can keep sediment out of facilities.
- Make sure the facility has enough vegetation. Vegetation absorbs water and roots help keep soil loose so it can infiltrate water.

For more thorough instructions on removing sediment, see the "Sediment Removal and Disposal" section of this handbook. Sediment accumulated in stormwater facilities may be considered hazardous waste and must be handled and disposed of properly.

If ponding still occurs, contact a landscape architect, professional engineer or trained contractor for more assistance.

PESTS


Nutria photo by NDomer

FACILITIES THIS APPLIES TO

All types of stormwater facilities

IMPORTANCE TO FACILITY PERFORMANCE

Mosquitoes can breed in ponded or other stagnant water. Vegetated areas can be attractive habitat for rats, nutria, beaver, and a variety of birds and amphibians. While some species are desirable, others can be public health or nuisance concerns. In particular, mosquitoes and rats can breed quickly and cause a public health hazard if not removed. The presence of pests does not necessarily impact the ability of your facility to treat and manage stormwater but may indicate maintenance needs, such as lack of proper infiltration.

WHAT TO LOOK FOR

- Check for mosquito larvae in any system with open, slow, or non-moving waters - especially during warmer weather. Larvae look like tiny wiggling sticks floating perpendicular to the water's surface.
- Look for nutria, rat, and other animal droppings year round. Also check for structural indicators such as beaver dams and rodent holes and burrows.

WHAT TO DO

Mosquitos

- The best way to avoid breeding mosquitoes is to prevent ponding water. Mosquitoes need standing water to lay their eggs, and for their larvae and pupae to develop. Most stormwater facilities are designed to drain in at least 48 hours. If your facility is not draining properly see the "Ponding Water" and "Sediment Removal and Disposal" sections of this handbook.
- As a temporary control for mosquitoes, the county or other licensed professionals can apply pesticides to kill mosquito larvae in the water or adult insects in the air.

Rats

Rats need shelter, food and water to survive.

- Remove plant debris that may provide shelter for rats from the facility.
- Remove fruits and nuts that fall to the ground.
- Fill in burrows.
- Trap and remove individual animals.

Other Wildlife Other non-native and invasive animal species may take up residence in your facility. Contact the Oregon Department of Fish and Wildlife (ODFW) to help identify these species and suggest removal processes. Permits from ODFW are required to capture and relocate native wildlife. Some common non-native species are:

- Opossum
- Eastern gray squirrel
- Nutria
- Bullfrog
- Fox squirrel
- Eastern cottontail
- Egyptian goose
- Red-eared slider turtle
- Snapping turtle

PEST RESOURCES

Rats and mosquitoes:

Clackamas County Vector Control (includes Washington County)
www.clackamas.us\vector
(503) 655-8394

Other pest issues:
Look in yellow pages or on the internet under "Pest Control"

Other Wildlife:
Oregon Department of Fish and Wildlife
www.dfw.state.or.us/wildlife/
(503) 947-6000 or (800) 720-6339

POLLUTION YOU CAN SEE OR SMELL

FACILITIES THIS APPLIES TO

All types of stormwater facilities.

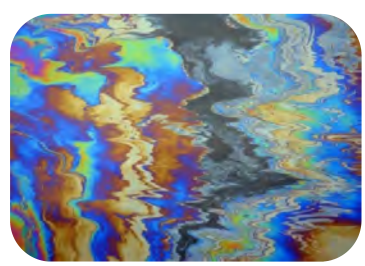
IMPORTANCE TO FACILITY PERFORMANCE

Stormwater facilities often collect a variety of trash and debris. Trash and debris, especially floating debris, can clog pipes or treatment media. It can also cause odors through decay or by collecting spilled or dumped materials.

Stormwater facilities are designed to help prevent pollutants from entering rivers and streams. Any visible water quality pollutants may wash out of the facility spreading the pollution problem.

WHAT TO LOOK FOR

- Check monthly for Trash and debris.



Any unusual or unpleasant smells from sources such as:

- Natural plant decay.
- Dying plants trapped under sediment.
- A spill or a leak (e.g., gasoline or sewage).

Visible pollution such as:

- Sheens
- Turbid (cloudy) water
- Discoloration, or
- Other pollutants on the surface of the water.

Pollution You Can See And Smell (continued)

WHAT TO DO

- Regularly remove trash and plant debris.
- Remove accumulated sediment (see “Sediment Removal and Disposal” in this manual).
- Make sure inlets and outlets are not clogged.
- Identify the source of trash, debris or pollutant, such as a spill, leak, or illicit discharge.
- If there is evidence of a spill or leak, contact a professional laboratory or sampling firm to assess whether the material needs specialized removal, treatment, and disposal. Use trained professional staff for any cleanup and remediation.

SAFETY

In addition to keeping the facility in good working order, maintenance should also strive to meet safety and aesthetic goals that benefit the community and protect your site workers. Consider establishing maintenance triggers and practices that respond to the following issues below. Keep in mind the safety of both the employees who maintain your facility and the general public.

WHAT TO LOOK FOR

Site Conditions

Conditions, such as steep slopes, slick surfaces, and vegetation debris, can create a falling hazard to employees and visitors.

Public Safety

Some stormwater facilities, such as ponds and created wetlands, can be “attractive nuisances” attracting undesirable activity, vandalism, or use that could be harmful to public safety. Consider the safety features now in place at your facility.

WHAT TO DO

- Use barrier plantings or fencing to bar entry into the facility area.
- Install road bollards, lighting, and signage to discourage illegal dumping.
- Avoid maintaining facilities in wet weather to reduce the risk of injuries from slipping. Always make sure that appropriate safety gear (e.g., harness, gloves, face shields, safety line) is used.
- For underground facilities, avoid entering anything defined as a confined space. Vaults, deep ponds, manufactured facilities or manholes are examples of confined spaces. These areas require special permits, training and entry techniques. Some can be inspected and cleaned from above without entering. Always use caution when working with underground facilities. You are legally required to meet Oregon Occupational Safety and Health Division (OR-OSHA) requirements for such activities.

RESOURCES

Confined space entry:

OR-OSHA (confined space entry requirements)
www.orosha.org/subjects/confined_spaces.html
(503) 229-5910

PAYING FOR MAINTENANCE

Specific maintenance costs depend on the characteristics of the facility, the site, and the area draining to the facility. The general rule of thumb is that annual maintenance costs will be 5 to 10% of the facility's total capital cost. Routine, scheduled maintenance can help keep overall costs down by addressing problems before they require major attention. Contact your stormwater system manufacturer for information about your system.

FINANCING MAINTENANCE

You need to determine how you will finance your maintenance needs. A facility maintenance fund is recommended for both capital maintenance procedures (e.g., facility replacement and non-routine maintenance, such as sediment removal, facility component repair or replacement, major replanting, or safety structure construction) and operating maintenance procedures (routine activities such as facility inspection, debris removal, and vegetation management). For homeowner associations, this could be a portion of homeowner fees or a specific assessment.

HOW MUCH TO SAVE

- An average 5 to 10% per year of the facility's capital cost for annual routine maintenance.
- A percentage of the non-routine maintenance costs per year (i.e. for sediment removal, vegetation replacement) based on the needed frequency. For example, if the facility is designed to need mechanical sediment removal every five years, 20% of the total cost should be put aside each year.
- An additional 3 to 5% of the facility's capital cost per year for eventual facility replacement (based on the facility's life expectancy). Most of these facilities have a life expectancy of 25 to 50 years.

VEGETATED FACILITIES

- Most required routine maintenance (excluding major repair and replacement) is estimated to have an annual cost of $200 to $600 dollars per acre of facility, above current landscape maintenance costs. Costs can vary depending on the types and level of maintenance practices used.
- The cost and intensity of maintenance activities are usually higher during the two-year plant establishment period. During this time, plants will need additional watering and plants that die will need to be replaced.



WHERE TO GET MORE ASSISTANCE

City of Wilsonville Natural Resources Program
www.ci.wilsonville.or.us/Index.aspx?page=91
(503) 682-4960

City of Wilsonville Public Works Standards:
www.ci.wilsonville.or.us/Index.aspx?page=127 Go to *Important Links* at the bottom of the page and click on *Public Works Construction Standards 2006* (section 301.6.00 Operations and Maintenance Req.)
(503) 682-4092

HIRING CONTRACTORS

Professional maintenance services phone book/internet references:

Vegetation Management:

- "Landscape Contractors"

Sediment Removal and Disposal:

- "Sewage," or
- "Waste Disposal"

Facility Alterations:

- "Landscape Architects" or
- "Engineers - Civil"

Manufactured Facilities:

- Find the specific manufacturer

CONFINED SPACE ENTRY

Oregon Occupational Safety and Health Division (OR-OSHA):
www.orosha.org/subjects/confined_spaces.html
(503) 229-5910

PEST RESOURCES

Rats and mosquitoes:

Clackamas County Vector Control (includes Washington County)
www.clackamas.us\vector
(503) 655-8394

Other pest issues:
Look in yellow pages or on the internet under "Pest Control"

Other Wildlife:
Oregon Department of Fish and Wildlife
www.dfw.state.or.us/wildlife/
(503) 947-6000 or (800) 720-6339

Portland Audubon Wildlife Care Center
Help with injured animals and animal identification questions:
www.audubonportland.org
(503) 292-0304

The Audubon Wildlife Care Center is the oldest and busiest wildlife rehabilitation facility in Oregon. Each year they treat over 3,000 wild animals for release back to the wild and respond to more than 15,000 wildlife related inquiries.

VEGETATION

Clackamas County Resources:

Clackamas County Soil and Water Conservation District:
www.conservationdistrict.org

Plant Identification:

Native Plant Society:
www.npsoregon.org
Master Gardeners:
www.extension.oregonstate.edu/mg

Native Plant Nurseries:

Native Plant Nursery:
www.plantnative.org

City of Wilsonville

29799 SW Town Center
Loop E

Phone: 503-682-4960
Fax: 503-682-7025

www.ci.wilsonville.or.us

This brochure was prepared by the City of Wilsonville's Natural Resources Program staff.
March 2012
NOTE: A considerable amount of information was obtained from the City of Portland's Stormwater Management Facilities Operations and Maintenance for Private Property Owners guide.

OTHER WAYS TO PROTECT OUR STREAMS AND THE WILLAMETTE RIVER

In Your Home or Business

- Use nontoxic cleaners.
- Properly dispose of hazardous materials.
- Conserve energy: switch to compact fluorescent bulbs, turn down the heat, do the laundry with cold water, purchase energy-efficient appliances.
- Use water wisely: fix leaks, use low-flow showerheads, use only the water you need.

In Your Yard

- Plant native vegetation.
- Consider planting perennials versus annuals.
- Sweep instead of hose.
- Cover bare soil with mulch or plants.
- Compost yard debris.
- Disconnect downspouts (where appropriate).
- Use drip irrigation.

In and Out of Your Car

- Properly maintain vehicles.
- Wash vehicles where water is recycled.
- Drive less: use transit, bike, walk, or carpool.
- Recycle motor oil.
- Clean up spills or leaks.

In Your Community

- Volunteer for tree planting, cleanup, stream restoration, or invasive plant species removal projects.
- Report spills and illegal dumping (call 503-823-7180).
- Don't litter, and pick up litter when you see it.
- Pick up pet waste and put it in the garbage or toilet.

In Parks and Natural Areas

- Stay on designated hiking trails and biking areas.
- Keep dogs on leashes and away from the streambanks and water. Pick up pet

THANK YOU

for helping keep Wilsonville clean, healthy and sustainable and for stewarding this beautiful place that we all share.

Printed on recycled paper.

APPENDIX C – WEB SOIL SURVEY SOILS MAP

Hydrologic Soil Group—Clackamas County Area, Oregon
(W-5)

Map Scale: 1:2,660 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 35, 70, 140, 210

Feet: 0, 100, 200, 400, 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

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

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clackamas County Area, Oregon
Survey Area Data: Version 18, Oct 27, 2021

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

Date(s) aerial images were photographed: Aug 1, 2019—Sep 12, 2019

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1A	Aloha silt loam, 0 to 3 percent slopes	C/D	13.2	48.2%
3	Amity silt loam	C/D	5.7	21.0%
25	Cove silty clay loam	D	2.6	9.4%
91A	Woodburn silt loam, 0 to 3 percent slopes	C	4.3	15.7%
91B	Woodburn silt loam, 3 to 8 percent slopes	C	1.6	5.8%
Totals for Area of Interest			**27.3**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie. The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

REPUBLIC SERVICES

November 19, 2021

Bob Wells
Lance Mueller and Associates

Re: Building W5
9600 SW Boeckman Rd.
Wilsonville, OR 97070

Dear Bob,

Thank you, for sending us the preliminary site plans for this proposed development in Wilsonville OR.

My Company: Republic Services of Clackamas and Washington Counties has the franchise agreement to service this area with the City of Wilsonville. We will provide complete commercial waste removal and recycling services as needed on a weekly basis for this location

The planned traffic pattern entering the site from Boeckman Rd. and proceeding in a clockwise circulation of the proposed building, is adequate for our trucks to navigate the site.

The enclosure location at the Southwest corner of the property, and an approach of 75' Ft., will provide our trucks adequate space to approach and access our equipment inside the enclosure.

The proposed enclosures inside dimensions of 20'Ft. wide and 12'Ft. deep, with double gates that open 180 degrees with wind pins to secure the gates in the open and closed positions, and a 20'Ft. clear opening will allow adequate space for housing our trash and recycle receptacles, and space for our trucks to service the equipment.

Thanks Bob, for your help and concerns for our services prior to this project being developed.

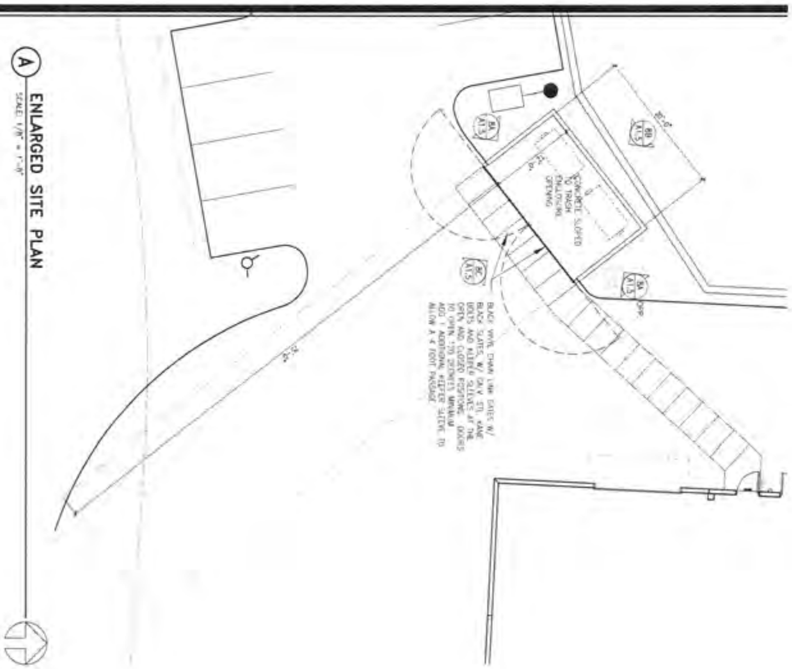
Sincerely,

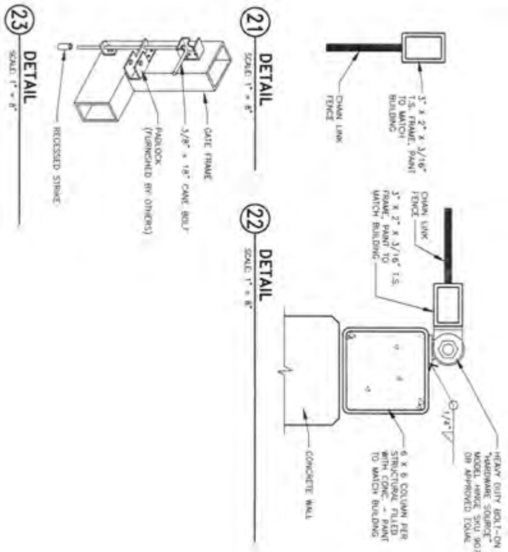
Kelly Herrod
Operations Supervisor
Republic Services Inc.

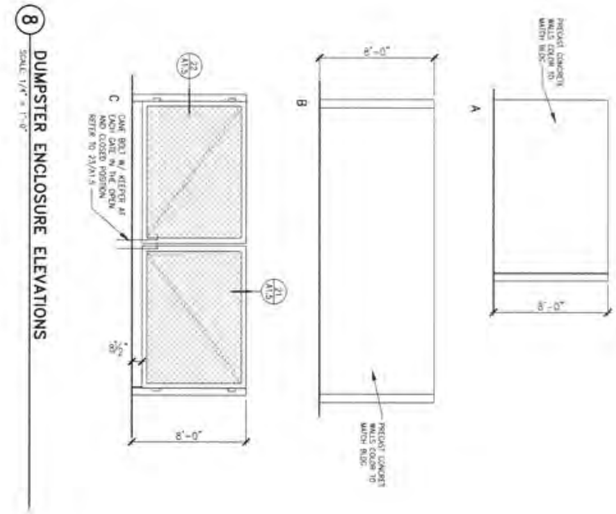
Kelly Herrod
Republic Services
1/10/2023

SITE PLAN A1.0 sheet	LANCE MUELLER & ASSOCIATES ARCHITECTS AIA 130 LAKESIDE • SUITE 250 • SEATTLE, WA 98122 • (206) 325-2553	BUILDING W5 99XX SW Boeckman Rd. Wilsonville, OR 97070	REGISTERED ARCHITECT LANCE MUELLER SEATTLE, WA. 1991 STATE OF OREGON	18003 job no. EM drawn BW checked 11-11-22 date

no.	revision	date
	LAND USE SUBMITTAL #5	11-11-22
	SITE DESIGN REVIEW RESUBMITTAL	7-6-22
	SITE DESIGN REVIEW	1-21-22







Kelly Herrod
Republic Services
1/10/2023

ENLARGED PLANS AND DETAILS

sheet A1.2

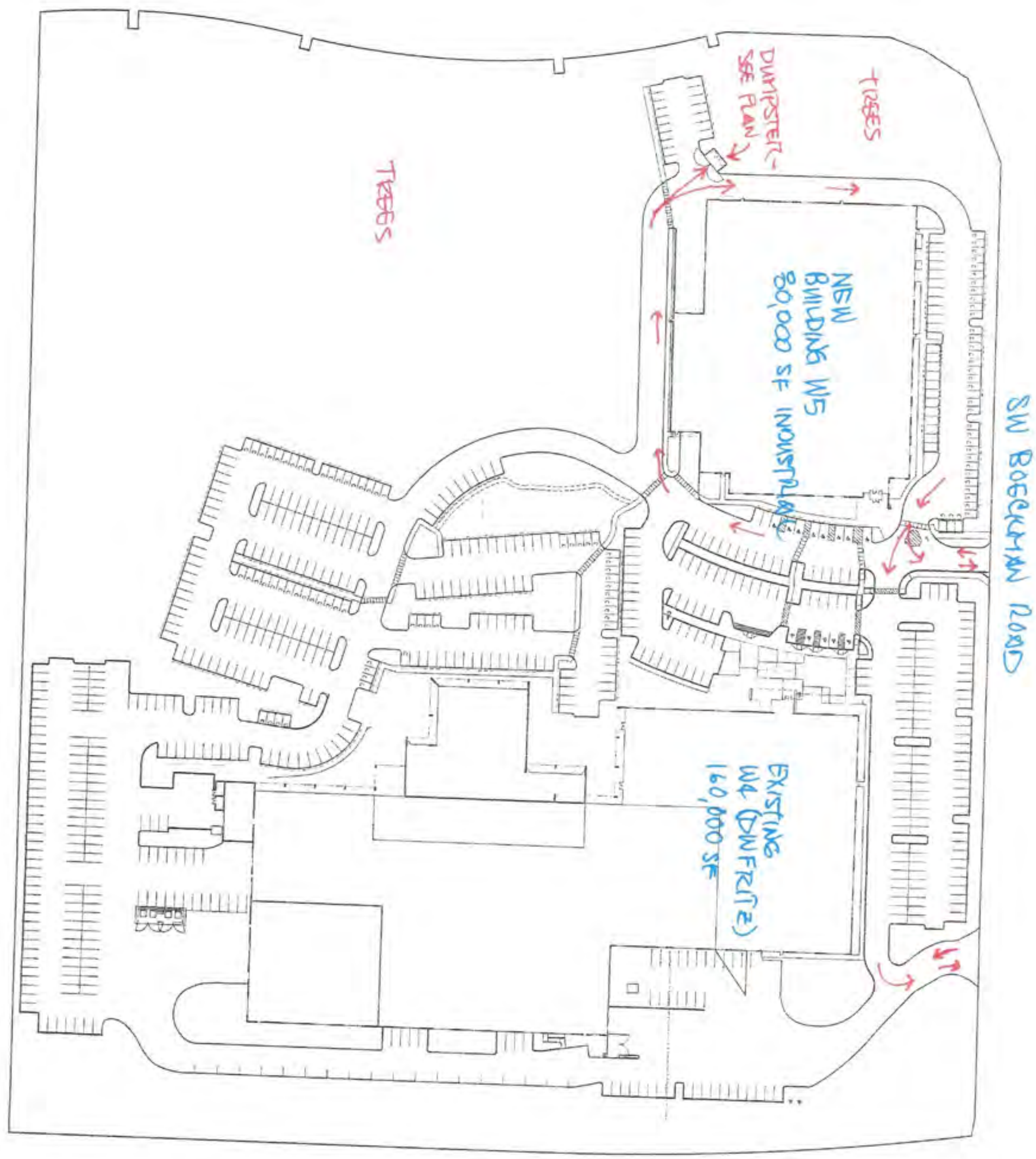
LANCE MUELLER & ASSOCIATES
ARCHITECTS AIA
130 LAKESIDE • SUITE 250 • SEATTLE, WA 98122 • (206) 325-2553

BUILDING W5
99XX SW Boeckman Rd.
Wilsonville, OR 97070

REGISTERED ARCHITECT
LANCE MUELLER
SEATTLE, WA
1911
STATE OF OREGON

18003	job no.
EW	drawn
BW	checked
11-11-22	date

no.	revision	date
	LAND USE SUBMITTAL #5	8-8-22
	SITE DESIGN RESUBMITTAL	7-8-22
	SITE DESIGN REVIEW	1-2-22



SITE PLAN
1" = 50'-0"

Kelly Hennol
Republic Services
1/10/2023

SITE PLAN sheet A1.1	LANCE MUELLER & ASSOCIATES ARCHITECTS AIA 130 LAKESIDE · SUITE 250 · SEATTLE, WA 98122 · (206) 325-2553	BUILDING W5 9900 SW Boeckman Rd. Wilsonville, OR 97070

REGISTERED ARCHITECT
LANCE MUELLER
SEATTLE, WA
STATE OF OREGON

11-17-21

LANCE MUELLER & ASSOCIATES

ARCHITECTS · AIA

W5 –Lighting Fixture Schedule & Cut Sheets	January 2022

96XX SW Boeckman Road, Wilsonville, OR 97070

Summary: This proposal is for the second of a two-building industrial campus in a heavily treed site. The new W5 building's lighting fixtures match the existing building's LED fixtures for a unified campus.

Lighting Fixture Schedule

Label	Type	Manufacturer	Part Description	Watts
P3	Pole mounted LED area lighting fixture - 25' height.	Visionaire Lighting	VLX Series - II_T3_64LC_7_4K	(1) = 142W
P6	Pole mounted LED area lighting fixture - 25' height.	Visionaire Lighting	VLX Series - II_T4_64LC_7_4K	(1) = 142W
P6-1	Double-Head Pole mounted LED area lighting fixture - 25' height.	Visionaire Lighting	VLX Series - II_T4_64LC_7_4K	(2) = 284W
P8	Pole mounted LED area lighting fixture - 25' height.	Visionaire Lighting	VLX Series - II_T2_64LC_7_4K	(1) = 142W
PC2	Pedestrian area LED light column – 12' height	Generation Brands	700OCTUR8401220HUNV2S	(1) = 26.8W
S4	LED Downlights in Lobby Vestibule	Cooper Lighting - HALO	SMD4R6940WH	(1) = 9.8W
SP1	Pole mounted LED area lighting fixture - 25' height. (Existing on W4 site)	Visionaire Lighting	Existing – shown on site lighting plan for over-all lighting levels.	(1) = 78W
SP2	Pole mounted LED area lighting fixture - 25' height. (Existing on W4 site)	Visionaire Lighting	Existing – shown on site lighting plan for over-all lighting levels.	(2) = 424W
SP3	Pole mounted LED area lighting fixture - 25' height. (Existing on W4 site)	Visionaire Lighting	Existing – shown on site lighting plan for over-all lighting levels.	(1) = 142W
SP5	Pole mounted LED area lighting fixture - 25' height. (Existing on W4 site)	Visionaire Lighting	Existing – shown on site lighting plan for over-all lighting levels.	(1) = 142W
WM1	Wall mounted LED area lighting fixture - 25' height.	Visionaire Lighting	VMX Series - II_T4_64LC_7_4K-UNV-WM-SL+BAWP	(1) = 142W
WM2	Wall mounted LED loading area lighting fixture – Full cut-off wall pack - 25' height.	Industrial Lighting Products Inc.	WPCS-44WLED-UNIV-40-T3	(1) = 43.6W
WM3	Wall mounted LED Sconce accent fixture – 9.5' top height	Generation Brands	700OWTUR 840 18 C Z UNV S	(1) = 15.3W
WM7	Wall mounted LED area lighting fixture - 25' height.	Visionaire Lighting LLC	VMX Series - II_T2_48LC_5_4K-UNV-WM-SL+BAWP	(1) = 78W

P Pole-Mounted Area Fixtures (P3, P6, P6.1 and P8)

Pole-mounted LED area lighting fixture - 25' height, which match existing.
(SP Fixtures are similar and existing, and shown on the plans for transition lighting levels.)

VLX LED Specifications

Project Name:

Catalog Number:

Type:

The new **VLX LED** Series offers clean, functional styling that is defined by its sleek low profile design and rugged construction. It combines LED performance and advanced LED thermal management technology and provides outdoor lighting that is both energy efficient and aesthetically pleasing.

The LED's performance and the driver's life are maximized by enclosing them in two separate die cast aluminum housings. Easy tool-less access for mounting and maintenance.

The LED light assemblies come with 96 to 192 LEDs. Eight optical distribution patterns are available. Choose between 3000, 4000 or 5000 Kelvin temperature of the LEDs.

A durable polyester powder coat finish is guaranteed for five years; and is available in standard or custom colors.

The **VLX LED** series is an exceptional choice for commercial parking lots, office complexes, architectural projects, and other general lighting projects.

Ordering Information

MODEL	OPTICS	LEDS	CURRENT	KELVIN	VOLTAGE	MOUNTING	FINISH	OPTIONS	OPTIONS
VLX-1	**T1** Type 1 **T2** Type 2 **T3** Type 3 **T4** Type 4 **T4A** Type 4 Automotive **T5** Type 5 **T5W** Type 5 Wide **T5WR** Type 5 Wide Round	**96LC** **128LC** **160LC** **192LC**	**3** 350mA **5** 530mA **7** 700mA	**3K** 3000K **4K** 4000K **5K** 5000K	**UNV** 120-277V **8** 347V **5** 480V	**AM** Arm Mount Round Pole Plate Adaptors (RPP) are to be ordered separately. **WM** Wall Mount *Requires BAWP BAWP to be ordered separately.	**BZ** Bronze **BK** Black **SBK** Smooth Black **WH** White **SWH** Smooth White **GP** Graphite **GY** Grey **SL** Silver Metallic **CC** Custom Color	**PCR-120** **PCR-208** **PCR-240** **PCR-277** **PCR-347** **PCR-480** Photocell & Receptacle **PER** **5PINPER** **7PINPER** 3, 5, or 7 Pin Photo Receptacle w/shorting cap Requires Dimming Driver **DIM** 0-10v Dimming Driver **WSC-8** Motion Sensor 8' Mounting Height **WSC-20** Motion Sensor 9-20' Mounting Height **WSC-40** Motion Sensor 21-40' Mounting Height *The WSC options will require (1) FSIR 100 remote for programing	**RPP** Round Pole Plate Adaptor **UPMA-S** Universal Square Pole Mount Adaptor **UPMA-R** Universal Round Pole Mount Adaptor **BAWP** Cast Wall Plate **ROT-R** Rotated Optics Right Side **ROT-L** Rotated Optics Left Side **CLS** Back Side Cutoff Louver Shield **RCLS** Right Side Cutoff Louver Shield **LCLS** Left Side Cutoff Louver Shield **VWC** Visionaire Wireless Controls *Consult Factory

VISIONAIRE LIGHTING

Features & Specifications

VLX

Heatsink
Die cast aluminum heatsink with integral cooling fins for thermal management.

Mounting Arm/Driver Compartment
·Durable two-piece die cast aluminum driver compartment utilizes a tool-less push button latch for ease of maintenance and sealed with a one-piece silicone gasket.
· Meets ANSI C136.31-2010 1.5G Vibration Standards.

Thermal Management
· The VLX series provides excellent thermal management by mounting the LEDs to the substantial heat sink of the housing. This enables the Luminaire to withstand higher ambient temperatures and driver currents without degrading LED life.
· The L70 test determines the point in an LEDs life when it reaches 70 percent of its initial output. The VLX series LEDs have been determined to last 90,000+ hours in 25° C environments when driven at 350 mA.

Optical System
· The highest lumen output LEDs are utilized in the VLX series. IES distribution Types I, II, III, IV and V are available. The optical system qualifies as IES full cutoff to restrict light trespass, glare and light pollution. The correlated color temperature (CCT) is a specification of the color appearance of the light emitted by a LED, relating its color to the color of light from a reference source when heated to a particular temperature, measured in degrees Kelvin (K).
· CRI values are 70.

Quali-Guard® Finish
· The finish is a Quali-Guard® textured, chemically pretreated through a multiple-stage washer, electrostatically applied, thermoset polyester powder coat finish, with a minimum of 3-5 millimeter thickness. Finish is oven-baked at 400º F to promote maximum adherence and finish hardness. All finishes are available in standard and custom colors.
· Finish is guaranteed for five (5) years.

Electrical Assembly
· The VLX LED series is supplied with a choice of 350, 530 or 700 mA high-performance LED drivers that accept 120v thru 480v, 50 Hz to 60 Hz, input. Power factor of 90%. Rated for -40°C operations.
· 10 kV surge protector supplied as standard.
· Terminal block supplied as standard.

Warranty
Five (5) year Limited Warranty on entire system, including finish. For full warranty information, please visit visionairelighting.com.

Options
· Photocell & receptacle
· Photo receptacle
· Round pole plate adapter
· Cast Wall Plate
· 0-10v Dimming Driver
· Motion Sensor
· Wireless Control
· Universal Pole Mount Adaptor
· Cutoff Louver Shield

Listings
· The VLX is ETL listed
· IP65 Rated
· Powder Coated Tough.
· DLC Listed
· IDA Certification

DesignLights Consortium (DLC) qualified Product. Some configurations of this product family may not be DesignLights Consortium (DLC) listed, please refer to the DLC qualified products list to confirm listed configurations. http://www.designlights.org/
3000K must be selected for IDA certification. Fixed mount must be selected for IDA dark sky certification.

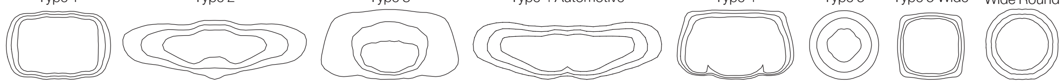
VLX - ELECTRICAL LOAD (A)							
Ordering Nomenclature	**System Watts**	**120**	**208**	**240**	**277**	**347**	**480**
VLX-1-T5-96LC-3	103	0.86	0.50	0.43	0.37	0.30	0.21
VLX-1-T5-96LC-5	159	1.33	0.76	0.66	0.57	0.46	0.33
VLX-1-T5-96LC-7	215	1.79	1.03	0.90	0.78	0.62	0.45
VLX-1-T5-128LC-3	136	1.13	0.65	0.57	0.49	0.39	0.28
VLX-1-T5-128LC-5	215	1.79	1.03	0.90	0.78	0.62	0.45
VLX-1-T5-128LC-7	285	2.38	1.37	1.19	1.03	0.82	0.59
VLX-1-T5-160LC-3	171	1.43	0.82	0.71	0.62	0.49	0.36
VLX-1-T5-160LC-5	266	2.22	1.28	1.11	0.96	0.77	0.55
VLX-1-T5-160LC-7	353	2.94	1.70	1.47	1.27	1.02	0.74
VLX-1-T5-192LC-3	206	1.72	0.99	0.86	0.74	0.59	0.43
VLX-1-T5-192LC-5	317	2.64	1.52	1.32	1.14	0.91	0.66
VLX-1-T5-192LC-7	421	3.51	2.02	1.75	1.52	1.21	0.88

19645 Rancho Way · Rancho Dominguez, CA 90220 · Phone: 310 512 6480 Fax 310 512 6486
www.visionairelighting.com

VLX LED Specifications

Photometric Optical Summary

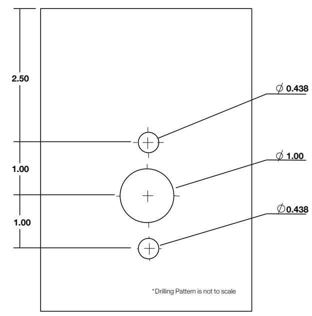
T1	T2	T3	T4A	T4	T5	T5W	T5WR
Type 1	Type 2	Type 3	Type 4 Automotive	Type 4	Type 5	Type 5 Wide	Type 5 Wide Round

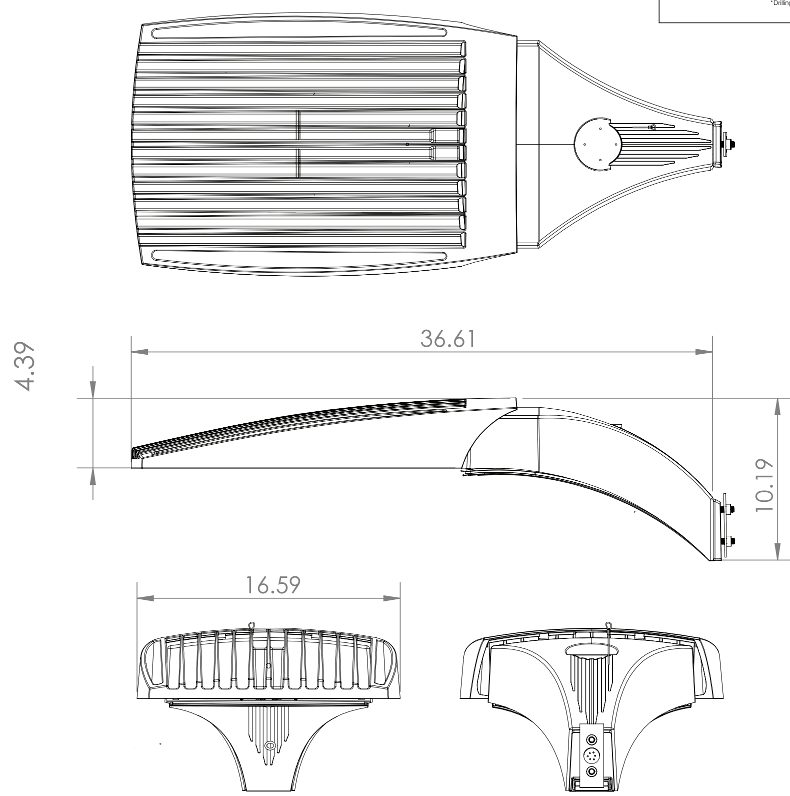


EPA Data						
	1.0	1.6	2.0	2.5	2.4	2.5

Dimensions

Width:	VLX-1	16.5”
Depth:	VLX-1	36.6”
Height:	VLX-1	4.39”
Overall Height:	VLX-1	10.19”
Weight:	58 LBS	





VISIONAIRE LIGHTING

PC2 Pedestrian Pole Fixture

Pedestrian pole LED area lighting fixture

TURBO LIGHT COLUMN

TECH LIGHTING

The distinctively modern Turbo cylindrical light column is a powerful outdoor LED solution for general illumination and area lighting. The Turbo light column has symmetric optics with beam spread options 20° or 40° as well as two different lumen output options.

High quality LM80-tested LEDs
for consistent long-life performance and color

Universal 120-277V driver with integral transient surge protection

Outstanding protection against the elements:

- Marine-grade powder coat finishes
- Stainless Steel mounting hardware
- Impact-resistant, UV stabilized frosted acrylic lensing

Beam spread options, 20 degree and 40 degree

S ECIFICATIONS

DELIVERED LUMENS	2100 or 4517
WATTS	28 or 60
VOLTAGE	Universal 120-277V, with integral transient 2.5kV surge protection (driver)
SECONDARY SURGE PROTECTOR	10kA
DIMMING	0-10
LIGHT DISTRIBUTION	Symmetric
OPTICS	20° or 40°
MOUNTING OPTIONS	Bolt
PERFORMANCE OPTIONS	Photocontrol / In-line Fuse
CCT	3000K or 4000K
CRI	80
COLOR BINING	3 Step
BUG RATING	B1-U2-G0
DARK SKY	Compliant
WET LISTED	IP65
GENERAL LISTING	ETL, Title 24
START TEMP	-30°C
FIELD SERVICEABLE LED	Yes
CONSTRUCTION	Aluminum
HARDWARE	Stainless Steel
FINISH	Marine Grade Powder Coat
LED LIFETIME	L70; 70,000 Hours
WARRANTY*	5 Years

* Visit techlighting.com for specific warranty limitations and details.

TURBO COLUMN shown in bronze

TURBO COLUMN shown in charcoal

ORDERING INFORMATION

700OCTUR	CRI/CCT	LENGTH	BEAM SPREAD	FINISH	VOLTAGE	OUTPUT	DISTRIBUTION	OPTIONS
	830 80 CRI, 3000K	**12** 12'	**20** 20° NARROW	**Z** BRONZE	**U** 120V–277V	**1** 55W / 3800 LUMENS	**S** SYMMETRIC	NONE
	840 80 CRI, 4000K		**40** 40° WIDE	**H** CHARCOAL		**2** 25W / 1800 LUMENS		**PC** BUTTON PHOTOCONTROL
								LF IN-LINE FUSE
								PCLF BUTTON PHOTOCONTROL & IN-LINE FUSE

use 4Use 00k

echlighting.com

Use 4000k

WM Wall-Mounted Area Fixtures (WM1 and WM7)

Wall-mounted LED area lighting fixture - 25’ height.

VMX-II LED Specifications

*Universal Arm Mount (UAM) Version Shown.

Project Name:

Catalog Number:

Type:

The **VMX-II LED** Series offers clean, functional styling that is defined by its sleek low profile design and rugged construction. It combines the latest LED technology, advanced LED thermal management and provides outdoor lighting that is both energy efficient and aesthetically pleasing.

The LED’s performance and the driver’s life are maximized by enclosing them in two separate cast aluminum housings. Easy tool-less access for mounting and maintenance.

The LED light assemblies come with 48 to 96 LEDs. Eight optical distribution patterns are available. Choose between 3000, 4000 or 5000 Kelvin temperature of the LEDs.

A durable polyester powder coat finish is guaranteed for five years; and is available in standard or custom colors.

The **VMX-II LED** series is an exceptional choice for commercial parking lots, office complexes, architectural projects, and other general lighting projects.

Ordering Information

MODEL	OPTICS	LEDs	CURRENT	KELVIN	VOLTAGE	MOUNTING	FINISH	OPTIONS	OPTIONS	OPTIONS
VMX-II	**T1** Type 1 **T2** Type 2 **T3** Type 3 **T4** Type 4 **T4A** Type 4 Automotive **T5** Type 5 **T5W** Type 5 Wide **T5WR** Type 5 Wide Round	**48LC** **64LC** **80LC** **96LC**	**3** 350mA **5** 530mA **7** 700mA **10** 1050mA *Not available in 96LC	**3K** 3000K **4K** 4000K **5K** 5000K	**UNV** 120-277V **8** 347V **5** 480V	**AM** Arm Mount **SAM** Straight Arm Mount W/ Terminal Block (New Construction) **UAM** Universal ArmW/ Terminal Block Mount (Retrofit) **MAF** Mast Arm Fitter **KM** Knuckle Mount **WM** Wall Mount *Requires BAWP **AWM** Adjustable Wall Mount *Round Pole Plate Adapters (RPP) are to be ordered separately. *BAWP to be ordered separately	**BZ** Bronze **BK** Black **SBK** Smooth Black **WH** White **SWH** Smooth White **GP** Graphite **GY** Grey **SL** Silver Metallic **CC** Custom Color	**PCR-120** **PCR-208** **PCR-240** **PCR-277** **PCR-347** **PCR-480** Photocell & Receptacle **PER** **5PINPER** **7PINPER** 3, 5, or 7 Pin Photo Receptacle w/shorting cap Requires Dimming Driver **DIM** 0-10v Dimming Driver **RPP-3"** **RPP-4"** **RPP-5"** Round Pole Plate Adaptor **VWC** Visionaire Wireless Controls *Consult Factory	**WSC-8** Motion Sensor 8’ Mounting Height **WSC-20** Motion Sensor 9-20’ Mounting Height **WSC-40** Motion Sensor 21-40’ Mounting Height *The WSC option will require (1) FSIR 100 remote for programing **UMAP** Universal Mast arm fitter **ECLS** Egg Crate Louver Shield **ADJLS** Adjustable Louver Light Shield **BD** Barn Door Shield	**UPMA-S** Universal Square Pole Mount Adaptor **UPMA-R** Universal Round Pole Mount Adaptor **BAWP** Cast Wall Plate **ROT-R** Rotated Optics Right Side **ROT-L** Rotated Optics Left Side **CLS** Backside cutoff shield *Not to be used with KM **RCLS** Rightside cutoff shield *Not to be used with KM **LCLS** Leftside cutoff shield *Not to be used with KM **HS** House shield

VISIONAIRE LIGHTING

236

Features & Specifications

VMX-II

Heatsink
Cast aluminum heatsink with integral cooling fins for thermal management.

Mounting Arm/Driver Compartment
Durable two-piece die cast aluminum driver compartment utilizes stainless steel hardware and sealed with a one-piece silicone gasket.

Thermal Management
• The VMX-II series provides excellent thermal management by mounting the LEDs to the substantial heat sink of the housing. This enables the Luminaire to withstand higher ambient temperatures and driver currents without degrading LED life.
• The L70 test determines the point in an LEDs life when it reaches 70 percent of its initial output. The VMX-II series LEDs have been determined to last 100,000+ hours in 25° C environments when driven at 350 mA.

Optical System
• The highest lumen output, LEDs are utilized in the VMX-II series. IES distribution Types I, II, II, III, IV, IV-A, V, V-WR are available. The optical system qualifies as IES full cutoff to restrict light trespass, glare and light pollution.
• CRI values are 70.

Quali-Guard® Finish
• The finish is a Quali-Guard® textured, chemically pretreated through a multiple-stage washer, electrostatically applied, thermoset polyester powder coat finish, with a minimum of 3-5 millimeter thickness. Finish is oven-baked at 400º F to promote maximum adherence and finish hardness. All finishes are available in standard and custom colors.
• Finish is guaranteed for five (5) years.

Electrical Assembly
• The VMX-II LED series is supplied with a choice of 350, 530, 700 or 1050 mA high-performance LED drivers that accept 120v thru 480v, 50 Hz to 60 Hz, input. Power factor of 90%. Rated for -40°C operations.
• 10 kV surge protector supplied as standard.
• Terminal block supplied as standard on AM, SAM and UAM as standard

Warranty
• Five (5) year Limited Warranty on entire system, including finish. For full warranty information, please visit visionairelighting.com.

Options
• Photocell & Receptacle
• Photo Receptacle with Shorting Cap
• 0-10v Dimming Driver
• Motion Sensor
• Wireless Control
• Round pole plate adapter
• Universal Pole Mount Adaptor
• Cast Wall Plate
• Rotated Optics
• Cutoff Louver Shielding (CLS)

Listings
• The VMX-II Series is cUL Listed
• IP65 Rated Housing
• ANSI Certification
• Powder Coated Tough
• IDA Certification
• DLC Listed

DesignLights Consortium (DLC) qualified Product. Some configurations of this product family may not be DesignLights Consortium (DLC) listed, please refer to the DLC qualified products list to confirm listed configurations. http://www.designlights.org/
3000K must be selected with a fixed mount for IDA certification. Fixed mount must be selected for IDA dark sky certification.

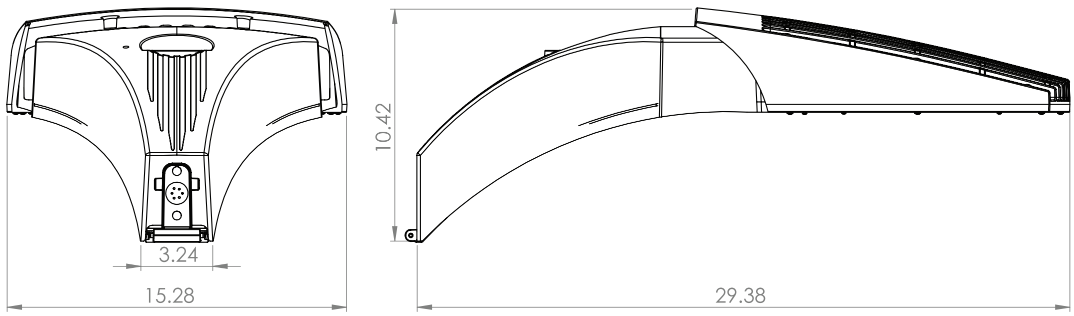
VMX-II - ELECTRICAL LOAD (A)							
Ordering Nomenclature	**System Watts**	**120**	**208**	**240**	**277**	**347**	**480**
VMX-II-T5-48LC-3	52	0.43	0.25	0.22	0.19	0.15	0.11
VMX-II-T5-48LC-5	78	0.65	0.38	0.33	0.28	0.22	0.16
VMX-II-T5-48LC-7	106	0.88	0.51	0.44	0.38	0.31	0.22
VMX-II-T5-48LC-10	161	1.34	0.77	0.67	0.58	0.46	0.34
VMX-II-T5-64LC-3	70	0.58	0.34	0.29	0.25	0.20	0.15
VMX-II-T5-64LC-5	107	0.89	0.51	0.45	0.39	0.31	0.22
VMX-II-T5-64LC-7	142	1.18	0.68	0.59	0.51	0.41	0.30
VMX-II-T5-64LC-10	218	1.82	1.05	0.91	0.79	0.63	0.45
VMX-II-T5-80LC-3	87	0.73	0.42	0.36	0.31	0.25	0.18
VMX-II-T5-80LC-5	132	1.10	0.63	0.55	0.48	0.38	0.28
VMX-II-T5-80LC-7	177	1.48	0.85	0.74	0.64	0.51	0.37
VMX-II-T5-80LC-10	272	2.27	1.31	1.13	0.98	0.78	0.57
VMX-II-T5-96LC-3	104	0.87	0.50	0.43	0.38	0.30	0.22
VMX-II-T5-96LC-5	157	1.31	0.75	0.65	0.57	0.45	0.33
VMX-II-T5-96LC-7	212	1.77	1.02	0.88	0.77	0.61	0.44

19645 Rancho Way • Rancho Dominguez, CA 90220 • Phone: 310 512 6480 Fax 310 512 6486
www.visionairelighting.com

VMX-II LED Specifications

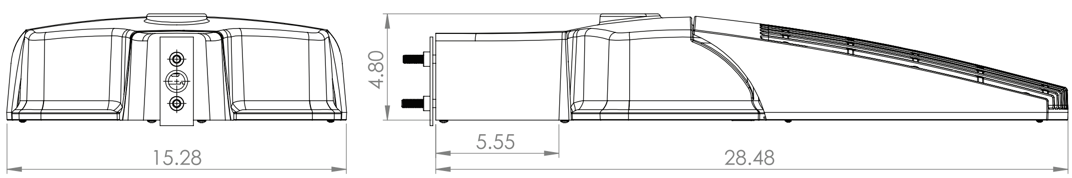
Arm Mount (AM)

The Arm Mount (AM) utilizes a 2 piece cleat system for easy installation, a terminal block is supplied as standard. A Round Pole Plate Adapter (RPP) is required for mounting to round poles.



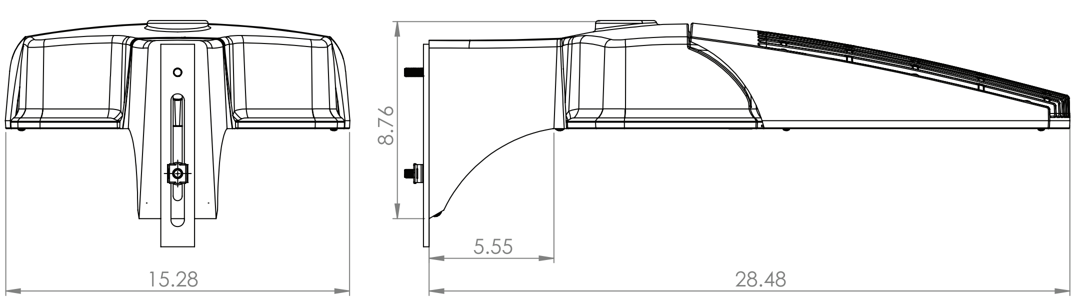
Straight Arm Mount (SAM)

The Straight Arm Mount (SAM) uses a 2 piece mounting system, a terminal block is supplied as standard. A Round Pole Plate Adapter (RPP) is required for mounting to round poles.



Universal Arm Mount (UAM)

The Unviersal Arm Mount (UAM) is meant for retrofit Applications and has a drilling templat raning from 3” to 5.5”. A Round Pole Plate Adapter (RPP) is required for mounting to round poles.



VISIONAIRE LIGHTING

WM2 Wall Pack Fixture

Wall mounted LED loading area lighting fixture – Full cut-off wall pack - 25' height.

Project Name:	Part Number:	Type:

FULL CUTOFF WALL PACK - 44W LED

OUTDOOR

ILP
407-478-3759
www.ilp-inc.com

FEATURES

- Bronze die-cast aluminum housing
- Custom and factory select colors available (Contact factory for pricing)
- Hinged full cutoff front frame
- ½" Coin plugs with o-rings for conduit or optional photocell
- Forward throw optic lens
- Cast-in template for mounting directly over a 4" recessed outlet box
- 3000K, 4000K and 5000K color options
- 0-10V Dimmable Driver
- ETL Listed for wet locations
- Meets Dark Sky Requirements
- 5 Year warranty
- DesignLights Consortium® Premium Qualified Luminaire

SUITABLE APPLICATIONS

- Parking Lots
- Loading Dock Areas
- Exterior Wall Lighting
- Building Entrance Ways

LED SYSTEMS INFO

	4000K T2	4000K T3	4000K T4	5000K T2	5000K T3	5000K T4
Calculated L_{70} (TM-21)	>100K	>100K	>100K	>100K	>100K	>100K
Delivered Lumens	4,849 lm	4,786 lm	4,618 lm	4,757 lm	4,694 lm	4,530 lm
Total Input Watts	42 W	42 W	42 W	42 W	42 W	42 W
Luminaire Efficacy Rating (LER)	115 lm/W	113 lm/W	109 lm/W	113 lm/W	111 lm/W	107 lm/W
Correlated Color Temperature (CCT)	4000K	4000K	4000K	5000K	5000K	5000K
Color Rendering Index (CRI)	>70	>70	>70	>70	>70	>70
BUG Rating	B2 U0 G2	B1 U0 G1	B1 U0 G2	B2 U0 G2	B1 U0 G1	B1 U0 G2
Maximum Ambient Temperature	125˚F	125˚F	125˚F	125˚F	125˚F	125˚F
Universal Driver	120-277 V	120-277 V	120-277 V	120-277 V	120-277 V	120-277 V

LED System data above based on WPCS-44WLED-UNIV-40 and WPCS-44WLED-UNIV-50
LED Lumen maintenance estimates based on TM-21 projections for the light source at 25˚C ambient.

ORDERING GUIDE:

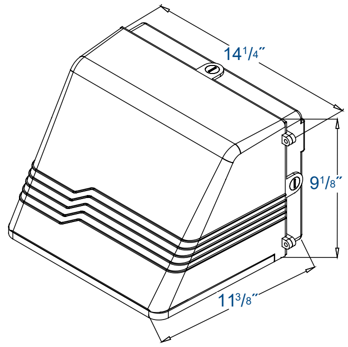
Series	Watts	Driver	Color	Optics	Options	
WPCS Full Cutoff Wall Pack	**44WLED**	**UNIV** 120-277V Driver	**50**	**T2**	**WPC15WG**	Wire Guard,SS Construction
			40	**T3**	**PCxxx***	Photocell (xxx = Voltage)
			30	**T4**	**FI/ILBCP05**	5W LED Factory Installed Battery Backup
					FUSE/SXXX	Single-line Voltage Fuse (120, 277,347)
					FUSE/DXXX	Dual-line Voltage Fuse (208, 240, 480)
					SP1	10kA Max Univolt Surge Protector
					SP2	22kA Max Univolt Surge Protector

* Photocell option available for field install.

FULL CUTOFF WALL PACK - 44W LED

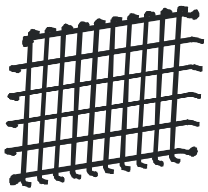
OUTDOOR

LINE DRAWING

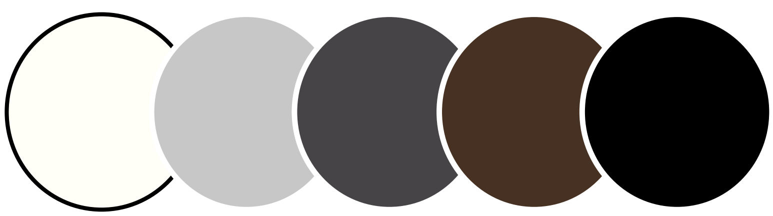


SECURITY OPTIONS

- **WPC15WG** - Wire Guard,SS Construction



FACTORY SELECT COLOR GUIDE



COLOR NAME AND DESCRIPTION	SHEEN	PRODUCT	VENDOR	PRICING
WHT - ILP White	SEMI GLOSS	POLANE T	SHERWIN-WILLIAMS	Contact Factory for Pricing
SLV - ILP Silver - Ultrasonic Chrome	GLOSS	POLANE T	SHERWIN-WILLIAMS	Contact Factory for Pricing
BRZ - ILP Bronze - std. & in stock	SEMI GLOSS	POLANE T	SHERWIN-WILLIAMS	Standard
BRN - ILP Brown	SEMI GLOSS	POLANE T	SHERWIN-WILLIAMS	Contact Factory for Pricing
BLK - ILP Black	SEMI GLOSS	POLANE T	SHERWIN-WILLIAMS	Contact Factory for Pricing
COLORS SHOWN ABOVE ARE TO BE USED AS REFERENCE, NOT EXACT MATCH. PLEASE REQUEST PAINT CHIPS FOR EXACT MATCH.				

FULL CUTOFF WALL PACK - 44W LED

OUTDOOR

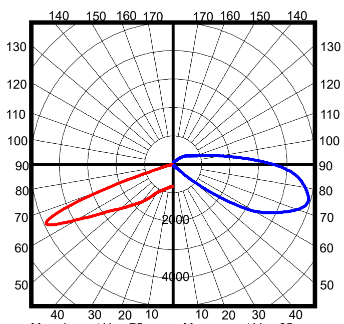
PHOTOMETRIC REPORTS

WPCS-44WLED-UNIV-40-T2

SUMMARY DATA

HEMISPHERES TESTED:	BOTH
EFFICIENCY (Downlight/Uplight):	100.0 % / 0.0 %
EFFICIENCY (Street/House):	66.1 % / 33.9 %
ROADWAY CLASSIFICATION:	TYPE II, SHORT
CUTOFF CLASSIFICATION:	NONCUTOFF
LUMENS:	4,883.41
INPUT WATTS:	43.3

CANDELA PLOT



Max plane at H = 75 Max cone at V = 65
MAX CANDLEPOWER: 4936.1

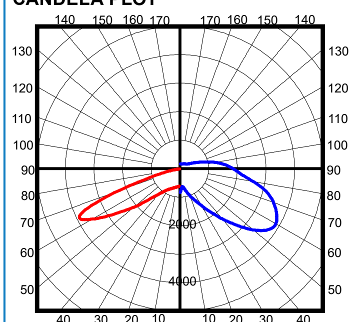
Photometric values based upon tests performed in compliance w/ LM-79.
Download IES files at www.ilp-inc.com

WPCS-44WLED-UNIV-40-T3

SUMMARY DATA

HEMISPHERES TESTED:	BOTH
EFFICIENCY (Downlight/Uplight):	100.0 % / 0.0 %
EFFICIENCY (Street/House):	75.4 % / 24.6 %
ROADWAY CLASSIFICATION:	TYPE III, SHORT
CUTOFF CLASSIFICATION:	CUTOFF
LUMENS:	4,541.77
INPUT WATTS:	43.58

CANDELA PLOT



Max plane at H = 60 Max cone at V = 62.5
MAX CANDLEPOWER: 3874.4

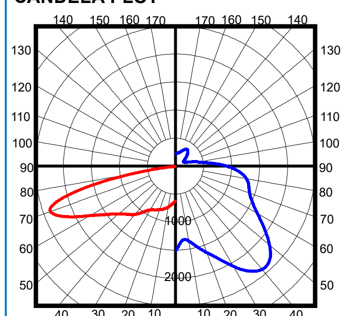
Photometric values based upon tests performed in compliance w/ LM-79.
Download IES files at www.ilp-inc.com

WPCS-44WLED-UNIV-40-T4

SUMMARY DATA

HEMISPHERES TESTED:	BOTH
EFFICIENCY (Downlight/Uplight):	100.0 % / 0.0 %
EFFICIENCY (Street/House):	77.6 % / 22.4 %
ROADWAY CLASSIFICATION:	TYPE IV, SHORT
CUTOFF CLASSIFICATION:	NONCUTOFF
LUMENS:	4,383.33
INPUT WATTS:	43.54

CANDELA PLOT



Max plane at H = 45 Max cone at V = 70
MAX CANDLEPOWER: 2382.3

Photometric values based upon tests performed in compliance w/ LM-79.
Download IES files at www.ilp-inc.com

WM3 Sconce Fixture

Wall mounted LED loading area lighting fixture – Full cut-off wall pack - 25’ height.

TURBO WALL SCONCE

TECH LIGHTING

Offering an inviting and open cylindrical silhouette with decorative fins evenly spaced around the circumference, the Turbo LED wall sconce adds a modern aesthetic to any façade. Mounting options enable the fixture to be mounted in three different height positions relative to the back plate position to meet a variety of installation needs and aesthetic preferences.

Outstanding protection against the elements:

- Powder coat finishes
- Stainless Steel mounting hardware
- Impact-resistant, UV stabilized frosted acrylic lensing

Three-position mounting option allows variable height adjustment to back plate

SPECIFICATIONS

DELIVERED LUMENS	597.7
WATTS	15.7
VOLTAGE	Universal 120-277V, with integral transient 2.5kV surge protection (driver)
DIMMING	0-10, ELV
LIGHT DISTRIBUTION	Symmetric
OPTICS	40°
MOUNTING OPTIONS	3-Position Variable Height
PERFORMANCE OPTIONS	Surge Protector
CCT	3000K or 4000K
CRI	80+
COLOR BINNING	3 Step
BUG RATING	B1-U2-G0
DARK SKY	Compliant
WET LISTED	IP65
GENERAL LISTING	ETL
CALIFORNIA TITLE 24	Can be used to comply with CEC 2019 Title 24 Part 6 for outdoor use. Registration with CEC Appliance Database not required.
START TEMP	-30°C
FIELD SERVICEABLE LED	Yes
CONSTRUCTION	Aluminum
HARDWARE	Stainless Steel
FINISH	Powder Coat
LED LIFETIME	L70; >60,000 Hours
WARRANTY*	5 Years
WEIGHT	8.5 lbs.

* Visit techlighting.com for specific warranty limitations and details.

TURBO WALL shown in bronze

TURBO WALL shown in charcoal

TURBO WALL shown in black

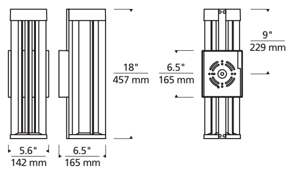
ORDERING INFORMATION

PRODUCT	CRI/CCT	LENGTH	LENS	FINISH	VOLTAGE	DISTRIBUTION	OPTIONS
700OWTUR	830 80 CRI, 3000K 840 80 CRI, 4000K	18 18"	C CLEAR FLAT	B BLACK Z BRONZE H CHARCOAL	UNV 120V–277V	S SYMMETRIC	NONE SP SURGE PROTECTION

techlighting.com

TURBO WALL SCONCE

TECH LIGHTING



Turbo Sconce

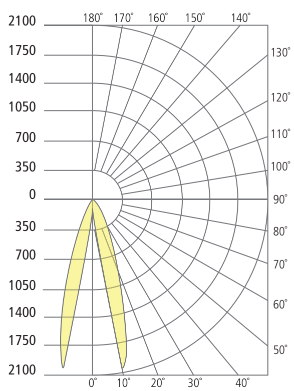
Integrated height adjustment system allows you to customize your fixture position. Low, Mid or High.

PHOTOMETRICS*

*For latest photometrics, please visit www.techlighting.com/OUTDOOR

TURBO WALL

Total Lumen Output:	597.7
Total Power:	15.7
Luminaire Efficacy:	37.8
Color Temp:	3000K
CRI:	80+
BUG Rating:	B1-U2-G0



PROJECT INFO

FIXTURE TYPE & QUANTITY

JOB NAME & INFO

NOTES

TECH LIGHTING

VISUAL COMFORT & CO.

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7400 Linder Avenue, Skokie, Illinois 60077
T 847.410.4400

techlighting.com

COMcheck Software Version COMcheckWeb
Exterior Lighting Compliance Certificate

Project Information

Energy Code:	2021 IECC
Project Title:	W5
Project Type:	New Construction
Permit Date:	March 11, 2022
Permit No.	DB22-0004 (Boeckman W5)
Exterior Lighting Zone	2 (Light industrial area with limited nighttime use (LZ2))

Construction Site:
9600 Boeckman Road
Wilsonville, Oregon 97070

Owner/Agent:
Bob Wells
Lance Mueller & Associates / Architects
130 Lakeside Ave. S.; Suite 250
Seattle, Washington 98122
206-915-2442
BWells@LMueller.com

Designer/Contractor:

Allowed Exterior Lighting Power

A Area/Surface Category	B Quantity	C Allowed Watts /	D Tradable Wattage	E Allowed Watts (B X C)
W5 (area only) (Parking area)	117780 ft2	0.04	Yes	4711
W5 (area only) (Walkway >= 10 feet wide)	1209 ft2	0.1	Yes	121
			Total Tradable Watts (a) =	9924
			Total Allowed Watts =	9924
			Total Allowed Supplemental Watts (b) =	400

(a) Wattage tradeoffs are only allowed between tradable areas/surfaces.
(b) A supplemental allowance equal to 400 watts may be applied toward compliance of both non-tradable and tradable areas/surfaces.

Proposed Exterior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixture	D Fixture Watt.	E (C X D)
W5 (area only) (Walkway < 10 feet wide, 10183 ft of walkway length): Tradable Wattage				
W5 (area only) (Parking area, 117780 ft2): Tradable Wattage				
LED: P3_B, P6_B, P8_B: 26' ht.; pole mtd area light: LED Roadway-Parking Unit 130W:	1	6	87	522
LED: P6_BB: 26' ht.; pole mtd area light: LED Roadway-Parking Unit 130W:	2	6	87	522
LED: WM1_B: 25' ht.; Bldg mtd area light: LED Roadway-Parking Unit 130W:	1	6	87	522
LED: WM2_B: 25' ht.; Bldg mtd area light: LED Roadway-Parking Unit 42W:	1	2	27	53
LED: WM3: 12' ht.; Bldg mtd sconce: LED Other Fixture Unit 16W:	1	10	15	153
LED: WM7_B: 25' ht.; Bldg mtd area light: LED Roadway-Parking Unit 82W:	1	7	78	546
W5 (area only) (Walkway >= 10 feet wide, 1209 ft2): Tradable Wattage				
LED: PC2: 12' high ground mtd pedestrian : LED Other Fixture Unit 6.5W:	2	1	27	27
LED: S4: Soffit downlight mtd 13' ht.: LED Other Fixture Unit 6.5W:	1	4	10	39
			Total Tradable Proposed Watts =	2384

Exterior Lighting PASSES: Design 77% better than code

Exterior Lighting Compliance Statement

Compliance Statement: The proposed exterior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed exterior lighting systems have been designed to meet the 2021 IECC requirements in COM*check* Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Bob Wells		7/10/22
Name - Title	Signature	Date

LANCE MUELLER & ASSOC./ ARCHITECTS

Tualatin Valley Fire & Rescue

FIRE CODE / LAND USE / BUILDING REVIEW APPLICATION

North Operating Center
11945 SW 70th Avenue
Tigard, OR 97223
Phone: 503-649-8577

South Operating Center
8445 SW Elligsen Rd
Wilsonville, OR 97070
Phone: 503-649-8577

REV 6-30-20

Project Information

Applicant Name: W-5 LLC

Address: PO Box 15523, Seattle, WA 98115

Phone: 206-399-6676

Email: MartinDevelopment@outlook.com

Site Address: 9600 Boeckman road

City: Wilsonville, OR

Map & Tax Lot #: 14B, 202 Clackamus Co.

Business Name: (No tenant defined yet)

Land Use/Building Jurisdiction: Wilsonville

Land Use/ Building Permit # DB22-0004 (Boeckman W5)

Choose from: Beaverton, Tigard, Newberg, Tualatin, North Plains, West Linn, **Wilsonville**, Sherwood, Rivergrove, Durham, King City, Washington County, Clackamas County, Multnomah County, Yamhill County

Project Description

Construct a new 80,000sf flex building shell and sitework for a future light industrial tenant. W5 is east of the existing DWFRITZ Precision Automation building (permitted as W4), and anticipates a similar tenant.

Permit/Review Type (check one):

- ☐ **Land Use / Building Review - Service Provider Permit**
- ☐ Emergency Radio Responder Coverage Install/Test
- ☐ LPG Tank (Greater than 2,000 gallons)
- ☐ Flammable or Combustible Liquid Tank Installation (Greater than 1,000 gallons)
  - * Exception: Underground Storage Tanks (UST) are deferred to DEQ for regulation.
- ☐ Explosives Blasting (Blasting plan is required)
- ☐ Exterior Toxic, Pyrophoric or Corrosive Gas Installation (in excess of 810 cu.ft.)
- ☐ Tents or Temporary Membrane Structures (in excess of 10,000 square feet)
- ☐ Temporary Haunted House or similar
- ☐ OLCC Cannabis Extraction License Review
- ☐ Ceremonial Fire or Bonfire (For gathering, ceremony or other assembly)

For Fire Marshal's Office Use Only

TVFR Permit # 2022-0078

Permit Type: SPP- Wilsonville

Submittal Date: 7/1/2022

Assigned To: DFM McGladrey

Due Date: 7/11/2022

Fees Due: Ø

Fees Paid: Ø

Approval/Inspection Conditions
(For Fire Marshal's Office Use Only)

This section is for application approval only

DFM Alex McGladrey McR 7/11/2022

Fire Marshal or Designee Date

Conditions:

TVF&R Final Inspection Required

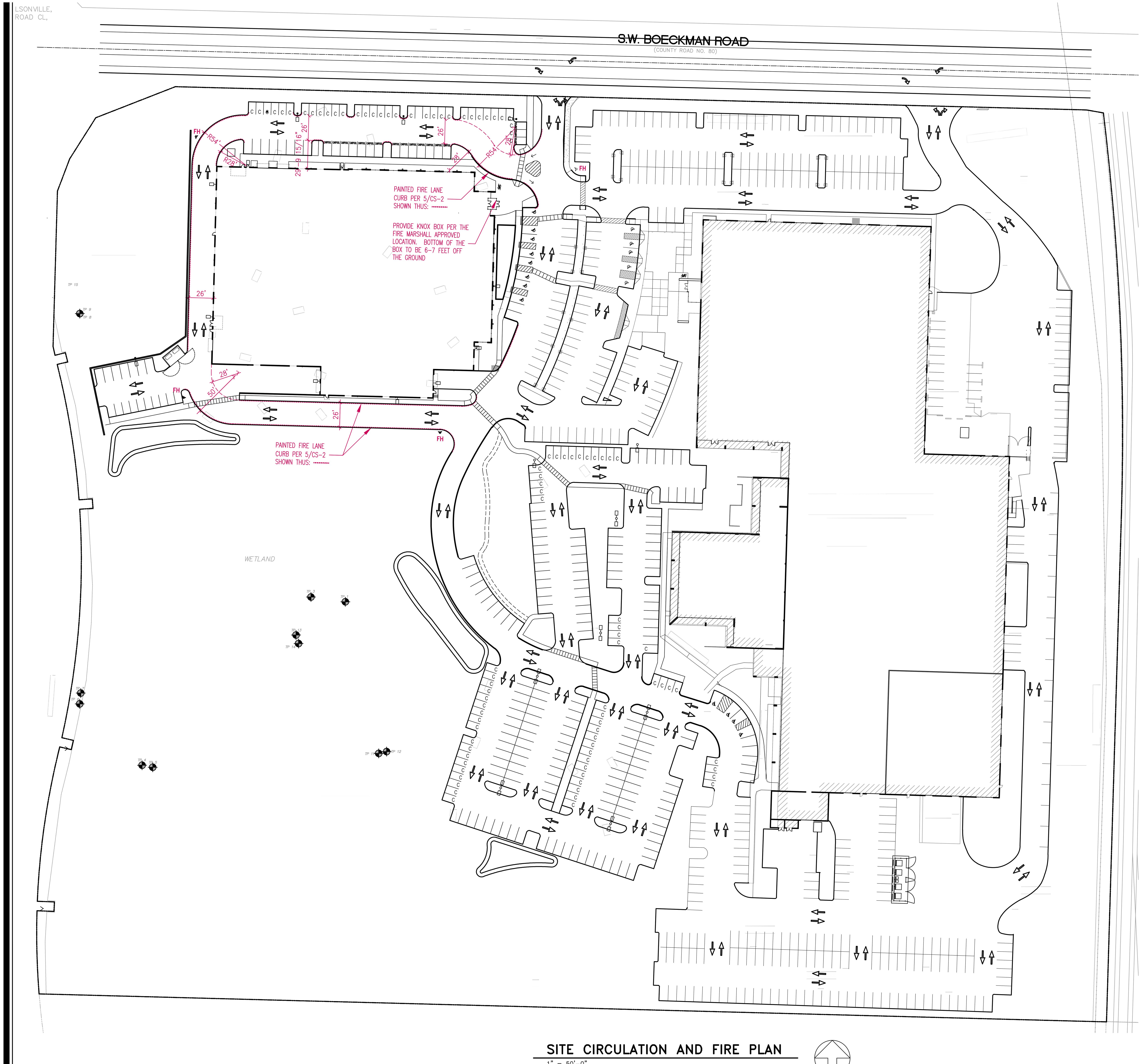
See Attached Conditions: ☐ Yes ☐ No

Site Inspection Required: ☒ Yes ☐ No

This section used when site inspection is required

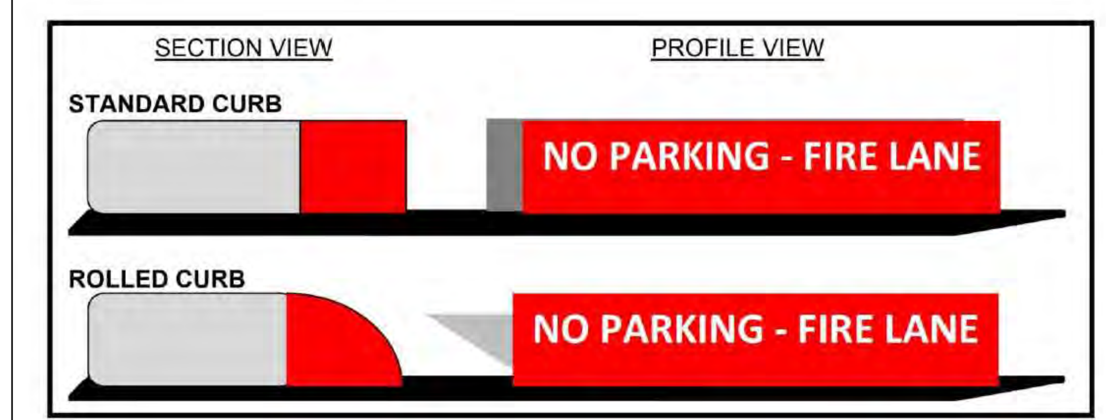
Inspection Comments:

Final TVFR Approval Signature & Emp ID Date



SITE CIRCULATION AND FIRE PLAN
1" = 50'-0"

- Curb paint shall be red for the entire length of the fire lane.
- "NO PARKING FIRE LANE" shall be stenciled with a 3 ½ inch minimum height block in white lettering with a minimum of ½ inch stroke width.
- The markings shall be spaced at 25 foot intervals.



5 PAINTED FIRE LANE CURB
N.T.S.

TVF&R Tualatin Valley Fire & Rescue
APPROVED PLANS
APPROVAL OF PLANS IS NOT AN APPROVAL OF OMISSIONS OR OVERSIGHTS.
Alex McGlothlin
Deputy Fire Marshal II

TVF&R Permit # 2002-0078

FIRE SITE NOTES:
1. FIRE APPARATUS ACCESS ROADS TO BE DESIGNED TO SUPPORT NOT LESS THAN 12,500 POUND POINT LOAD (WHEEL LOAD) AND 75,000 POUND LIVE LOAD (GROSS VEHICLE WEIGHT)
2. FIRE FLOW DEMAND = 1,500 GPM ((FROM 2004 OREGON FIRE CODE, APPENDIX B, TABLE B105.1 – TYPE IIB WITH 75% REDUCTION)
3. FIRE HYDRANT FLOW TEST OR MODELING OF WATER AVAILABILITY AS A DEFERRED SUBMITTAL.
4. EMERGENCY RESPONDER RADIO COVERAGE TO BE MERRC (MOBILE EMERGENCY RESPONDER RADIO COVERAGE) – PROVIDE DOCUMENTATION OF TVF&R PROVIDER PRIOR TO THE ISSUANCE OF THE BUILDING PERMIT.

no.	revision	date
	DESIGN REVIEW RESUBMITTAL	7-8-22

18003 job no.
EM drawn
BW checked
7-8-22 date

REGISTERED ARCHITECT · LANCE MUELLER · SEATTLE, WA. · 1491 · STATE OF OREGON

BUILDING W5
99XX SW Boeckman Rd.
Wilsonville, OR 97070

LANCE MUELLER & ASSOCIATES
A R C H I T E C T S A I A
130 LAKESIDE · SUITE 250 · SEATTLE, WA 98122 · (206) 325-2553

SITE CIRCULATION AND FIRE PLAN
sheet
CS-3

BUILDING W5

ABBREVIATIONS

AC	ACOUSTICAL CEILING
ACC	ACCESSIBLE
ACT	ACOUSTICAL CEILING TILE
AD	AREA DRAIN
ADDM	ADDENDUM
ADJ	ADJUSTABLE
AFF	ABOVE FINISH FLOOR
AHU	AIR HANDLING UNIT
ALT	ALTERNATE
ALUM	ALUMINUM
AMB	AIR/MOISTURE BARRIER
ANOD	ANODIZED
APPROX	APPROXIMATE/APPROXIMATELY
ARCH	ARCHITECT/ARCHITECTURAL
AV	AUDIO VISUAL
BLDG	BUILDING
BLKG	BLOCKING
BO	BOTTOM OF
BOM	BOTTOM OF MULLION
BOT	BOTTOM
BOR	BOTTOM OF REVEAL
BRG	BEARING
B/S	BUILDING STANDARD
BUR	BUILT UP ROOFING
BW	BOTTOM OF WALL
CB	CATCH BASIN
CEM	CEMENT/CEMENTITIOUS
CFLG	COUNTER FLASHING
CI	CAST IRON
CIP	CAST IN PLACE
CJ	CONTROL JOINT
CL	CENTER LINE
CLR	CLEAR
CMU	CONCRETE MASONRY UNIT
CO	CLEAN OUT
COL	COLUMN
COM	CENTER OF MULLION
COMM	COMMUNICATION
CONC	CONCRETE
CONT	CONTINUOUS
COR	CENTER OF REVEAL
CORR	CORRIDOR
CPT	CARPET
CS	CEILING SYSTEM
CT	CERAMIC TILE
CTR	CENTER
CU	CUBIC
DEMO	DEMOLISH/DEMOLITION
DET	DETAIL
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIV	DIVIDE/DIVISION
DMPF	DAMPPROOF/DAMPPROOFING
DN	DOWN
DS	DOWN SPOUT
DWG	DRAWING
E	EAST
EFIS	EXTERIOR INSULATION & FINISH SYSTEM
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC	ELECTRIC/ELECTRICAL
ELEV	ELEVATOR
ENCL	ENCLOSE/ENCLOSURE
ENL	ENLARGE
EP	ELECTRIC PANEL
EQ	EQUAL
EQUIP	EQUIPMENT
EXH	EXHAUST
EXP	EXPANSION/EXPOSED
EXIST	EXSISTING
EXT	EXTERIOR
FA	FIRE ALARM
FCIO	FURNISHED BY CONTRACTOR/INSTALLED BY OWNER
FCIC	FURNISHED BY CONTRACTOR/INSTALLED BY CONTRACTOR
FD	FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION
FDTN	FOUNDATION
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FF	FINISH FLOOR
FH	FIRE HYDRENT
FHC	FIRE HOSE CABINET
FIG	FIGURE
FIN	FINISH/FINISHED
FIXT	FIXTURE
FLEX	FLEXIBLE
FLR	FLOOR
FLUOR	FLUORESCENT
FO	FACE OF/FINISHED OPENING
FOIC	FURNISHED BY OWNER/INSTALLED BY CONTRACTOR
FOIO	FURNISHED BY OWNER/INSTALLED BY OWNER
FP	FIRE PROTECTION
FR	FRAME/FIRE RATED
FRMG	FRAMING
FRPF	FIRE PROOF/FIREPROOFING
FRT	FIRE RETARDENT TREATED
FS	FLOOR SINK
FT	FOOT/FEET
FTG	FOOTING
FUT	FUTURE
FVC	FIRE HOSE VALVE CABINET
G	GRADE/GROUND
GA	GAUGE
GALV	GALVANIZED
GB	GRAB BAR
GC	GENERAL CONTRACTOR
GI	GALVANIZED IRON
GL	GLASS
GWB	GYPSUM WALL BOARD
GYP	GYPSUM
GYP BD	GYPSUM BOARD
H	HIGH
HB	HOSE BIB
HC	HOLLOW CORE
HDW	HARDWARE
HDWD	HARDWOOD
HM	HOLLOW METAL
HO	HOLD OPEN
HORIZ	HORIZONTAL
HR	HOUR
HT	HEIGHT
HVAC	HEATING, VENTILATING, & AIR CONDITIONING
IBC	INTERNATIONAL BUILDING CODE
ID	INSIDE DIAMETER
INCL	INCLUDE/INCLUDING
INFO	INFORMATION
INSUL	INSULATE/INSULATION
INT	INTERIOR
INT AL	INTERIOR ALUMINUM
JAN	JANITOR
JC	JANITOR CLOSET
JS	JANITOR SINK
JT	JOINT
LAM	LAMINATE/LAMINATED
LAV	LAVATORY
LT	LIGHT
LTG	LIGHTING
M	MIRROR
MAS	MASONRY
MATL	MATERIAL
MAX	MAXIMUM
MECH	MECHANICAL
MED	MEDIUM
MEMB	MEMBRANE
MEZZ	MEZZANINE
MGT	MANEGMENT
MFR	MANUFACTURE
MH	MANHOLE
MIN	MINIMUM/MINUTE
MISC	MISCELLANEOUS
MO	MASONRY OPENING
MS	MOP SINK
MTD	MOUNTED
MTL	METAL
N	NORTH
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OH	OVERHEAD
OPNG	OPENING
OPP	OPPOSITE/OPPOSITE HAND
ORD	OVERFLOW ROOF DRAIN
OTS	OPEN TO STRUCTURE ABOVE
PC	PRECAST
PCG	PLASTIC CORNER GUARD
PD	PLANTER DRAIN
PERP	PERPENDICULAR
PLAM	PLASTIC LAMINATE
PLAS	PLASTER
PLYWD	PLYWOOD
PNL	PANEL
PL	PROPERTY LINE
PR	PAIR
PRK	PARKING
PROP	PROPERTY
PT	PAINT/POINT/PRESSURE TREATED/POST TENSION
PTD	PAPER TOWEL DISPENSER WASTE RECEPTACLE
PTN	PARTITION
PTD/WR	PAPER TOWEL DISPENSER WITH
R	RADIUS/RISER
RCP	REFLECTED CEILING PLAN
RD	ROOF DRAIN/ROAD
REF	REFER TO/REFERENCE
REINF	REINFORCED/REINFORCING
REQD	REQUIRED
REV	REVISED/REVISION
RFG	ROOFING
RM	ROOM
RO	ROUGH OPENING
S	SOUTH/SPANDRAL
SC	SOLID CORE
SCD	SEAT COVER DISPENSER
SCHED	SCHEDULE
SD	STORM DRAIN
SECT	SECTION
SF	SQUARE FOOT
SGL	SINGLE
SHT	SHEET
SHTHG	SHEATHING
SIM	SIMILAR
SPEC	SPECIFICATION
SPKLR	SPRINKLER
SQ	SQUARE
SS	SERVICE SINK
SST	STAINLESS STEEL
STL	STEEL
STOR	STORAGE
STRUCT	STRUCTURAL/STRUCTURE
SUSP	SUSPENDED
T	TREAD/TEMPERED
TC	TOP OF CURB
T&G	TONGUE & GROVE
TEL	TELEPHONE
TEMP	TEMPERATURE/TEMPORARY
THK	THICK/THICKNESS
TO	TOP OF
TOM	TOP OF MULLION
TOR	TOP OF REVEAL
TOSD	TOP OF STEEL DECK
TPD	TOILET PAPER DISPENSER
TW	TOP OF WALL
TYP	TYPICAL
U	URINAL
UNFIN	UNFINISHED
UON	UNLESS OTHERWISE NOTED
VB	VAPOR BARRIER
VERT	VERTICAL
VEST	VESTIBULE
VIF	VERIFY IN FIELD
VNR	VENEER
VR	VAPOR RETARDER
W	WEST/WIDE
W/	WITH
W/O	WITH OUT
WC	WATER CLOSET/WALL COVERING
WD	WOOD
WLD	WELD/WELDED
WP	WEATHER PROOF/WATER PROOF WATERPROOFING/WORK POINT
WR	WATER RESISTANT
WT	WEIGHT
WWF	WELDED WIRE FABRIC

LEGEND

EARTH
GRAVEL/ROCK
CONCRETE
ASPHALT PAVING
WOOD FRAMING
BLOCKING OR SHIM
FINISH WOOD
GLASS (ELEVATION)
GLASS (SECTION)
GYPSUM WALL BOARD
CAULKING/SEALANT
PLYWOOD
BRICK
ACOUSTIC TILE
RIGID INSULATION
BATT INSULATION
METAL

GENERAL NOTES

1. MECHANICAL & ELECTRICAL ARE BIDDER DESIGN SYSTEMS. PORTIONS OF THIS WORK ON ARCHITECTURAL, CIVIL & LANDSCAPE ARE FOR DESIGN INTENT.
2. DRAWINGS ARE NOT TO BE SCALED. CONTACT ARCHITECT FOR RESOLUTION OF ANY CONFLICTS OR DISCREPANCY.
3. CONTRACTOR TO VERIFY ALL FIELD DIMENSIONS AND CONDITIONS – ANY DISCREPANCY BETWEEN PLAN AND ACTUAL CONDITION IS TO BE BROUGHT TO THE ATTENTION OF ARCHITECT FOR RESOLUTION.
4. ALL DIMENSION LINES ARE TO FACE OF CONC.. AND METAL STUD WALLS AND CENTERLINE OF COLUMNS AND BEAMS, UNLESS NOTED.
5. THE CONTRACTOR SHALL APPLY AND SECURE ALL OCCUPANCY, SEWER, STORM, WATER, MECHANICAL, ELECTRICAL AND OTHER PERMITS EXCEPT BUILDING PERMITS. CONTRACTOR SHALL PAY ALL NECESSARY FEES AND POST BONDS REQUIRED.
6. GENERAL CONTRACTOR RESPONSIBLE FOR ALL CUTTING AND PATCHING.
7. REPETITIVE FEATURES MAY BE DRAWN ONLY ONCE, BUT SHALL BE PROVIDED AS IF DRAWN FULL.
8. PORTABLE FIRE EXTINGUISHERS PER NFPA 10 AND IN CONSTRUCTION SHACK. PERMANENT FIRE EXTINGUISHERS BY OWNER.
9. ELEVATOR INSTALLER SHALL SUBMIT PERMIT FOR FUTURE T.I. ELEVATOR PER ORS CHAPTER 460 CONTACT THE STATE BUILDING CODES DIVISION, ELEVATOR SAFETY PROGRAM (503) 373–1298
10. ELECTRICAL – PROVIDE TOGGLE ON–OFF SWITCH FOR FUTURE T.I. LIGHTING, PROVIDE IN EACH ROOM PER SECTION 1313.1.1
11. ELECTRICAL – PROVIDE OCCUPANT SENSORS IN FUTURE T.I. RESTROOMS. CONTROLS TO SHUT OFF LIGHTING PER SECTION 1313.3.1.2.2

BUILDING CODE NOTES:

CODES:
2019 OREGON STRUCTURAL & SPECIALTY CODE
2019 OREGON FIRE CODE
2019 OREGON MECHANICAL SPECIALTY CODE (OMSC)
2021 OREGON ELECTRICAL SPECIALTY CODE (OESC)
2021 OREGON PLUMBING SPECIALTY CODE (OPSC)
2011 OREGON ELEVATOR SPECIALTY CODE
2021 OREGON ENERGY EFFICIENCY SPECIALTY CODE (OEESC)

CONSTRUCTION TYPE: II–B SPRINKLERED
OCCUPANCY GROUPS: B, F–1, S–1, A–3 (ACCESSORY USE)
ALLOWABLE AREA: UNLIMITED PER SECTION 507 (60' MIN. YARD ALL SIDES)

OSSC BUILDING HEIGHT (TABLE 503):
TYPE II–B W/ F–1, B OR S–1 OCCUPANCY GROUP ALLOWS TABULAR 2 STORIES. SECTION 504.2 INCREASES THIS BY ONE STORY W/ THE FIRE SPRINKLER SYSTEM.

OSSC OCCUPANCY SEPARATIONS (SECTION 508.3.1):
NON–SEPARATED USES ARE ALLOWED AS THE MOST RESTRICTIVE OCCUPANCY (F–1) APPLIES TO ENTIRE BUILDING IN CALCULATING ALLOWABLE AREA.

OSSC FIRE RESISTANCE RATINGS FOR BUILDING ELEMENTS (TABLE 601 & 602):

BUILDING ELEMENTS:	RATING:
STRUCTURAL FRAME:	0 HOURS
BEARING WALLS – EXTERIOR:	2 HOURS
BEARING WALLS – INTERIOR:	0 HOURS
NON–BEARING WALLS/PARTITIONS – EXTERIOR:	0 HOURS
NON–BEARING WALLS/PARTITIONS – INTERIOR:	0 HOURS
FLOOR CONSTRUCTION:	0 HOURS
ROOF CONSTRUCTION:	0 HOURS

OSSC EXTERIOR WALL OPENINGS:
AREA OF OPENINGS (TABLE 705.8): TABLE SHOWS "NO LIMIT" FOR UNPROTECTED OPENINGS GREATER THAN 30 SETBACK, TYPICAL THIS CASE ON ALL SIDES OF THE BUILDING.

OSSC PARAPETS (SECTION 705.11.1):
SHALL HAVE SAME FIRE RESISTANCE AS SUPPORTING WALL, WHICH IT DOES.

SHELL DEFERRED SUBMITTAL LIST

1. FLOOR JOIST LAYOUT. LAYOUT NEEDS TO REFLECT ALL MAJOR POINT LOADING, SUCH AS PIPE SUPPORTS – BY JOIST MFGR.
2. ROOF JOIST LAYOUT. LAYOUT NEEDS TO REFLECT ALL MAJOR POINT LOADING, SUCH AS PIPE SUPPORTS – BY JOIST MFGR.
3. WINDOW WALL PACKAGE – LICENSED OR INSTALLER
4. GLASS & ALUM. PORTIONS OF AWNING SYSTEMS – BY LICENSED STATE ENGINEER
5. STAIR SUPPLIER TO PROVIDE ALL ENGINEERING OF STAIRS (VERIFY WITH STRUCTURAL ENGINEER REGARDING SPECIAL LOADING TO STRUCTURE)

PROJECT TEAM:

OWNER / DEVELOPER
W5 LLC
PO BOX 15523
SEATTLE, WA 98115
CONTACT: MAC MARTIN
206–399–6676 MOBILE
MACMARTINIS@GMAIL.COM

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LANCE MUELLER & ASSOCIATES / ARCHITECTS
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BWELLS@LMUELLER.COM;

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PORTLAND, OR 97214
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GMINO@MCKNZE.COM

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GEOENGINEERS, INC.
4000 KRUSE WAY PLACE, BUILDING 3, SUITE 200
LAKE OSEWEGO, OR 97035
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GLANDAU@GEOENGINEERS.COM

LANDSCAPE ARCHITECT
OTTEN + ASSOCIATES LANDSCAPE ARCHITECTURE
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JVS@PACIFICHABITAT.COM

ARBORIST
PACIFIC RESOURCES GROUP
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FRANKLIN ENGINEERING
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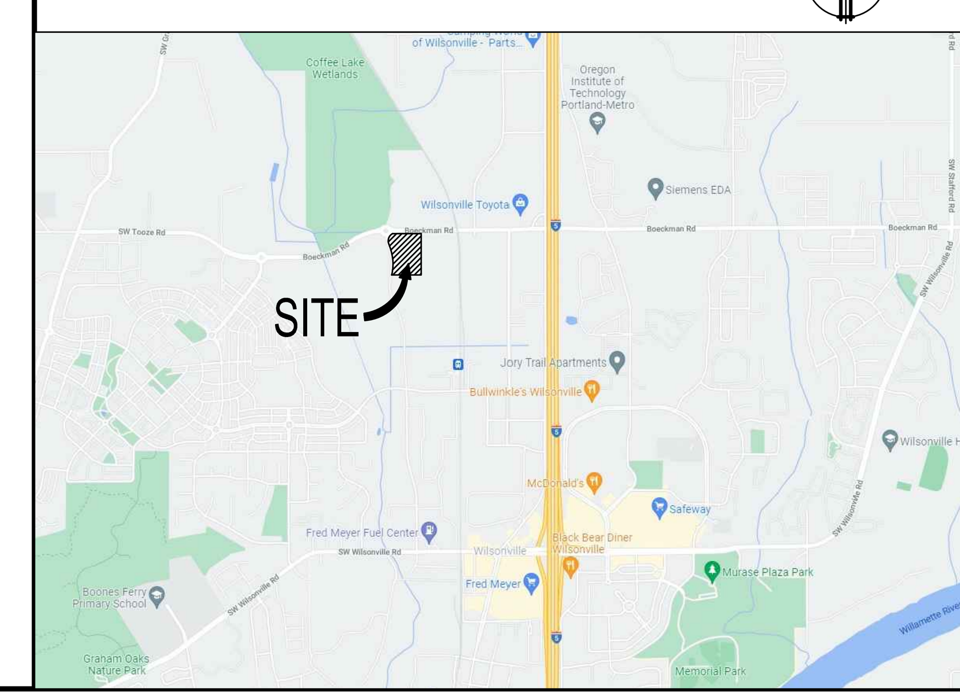
GENERAL CONTRACTOR
PERLO CONSTRUCTION
11450 SW AMU STREET
TUALATIN, OR 97062
CONTACT: JORDAN PETERSON
503–624–2090; (FAX) 503–926–9391
JPETERSON@PERLO.BIZ

VICINITY MAP

north



SCOPE:

CONSTRUCT AN 80,446 SF INDUSTRIAL BUILDING EAST OF THE EXISTING DWFRITZ AUTOMATION BUILDING ON AN UNBUILT TREELESS PORTION OF THE 24.49–ACRE LOT. THE PROJECT LEAVES SIGNIFICANT PORTIONS AS TREED NATURAL AREAS, INCLUDING SUBSTANTIAL SROZ AND WETLAND BUFFER DESIGNATED AREAS. W5 IS INTENDED AS EXPANSION SPACE FOR THE DWFRITZ AUTOMATION OPERATION, WHICH IN THE FUTURE COULD BE SEPARATE INDUSTRIAL TENANTS. W5 WILL SHARE WITH DWFRITZ THEIR TWO EXISTING BOECKMAN ROAD DRIVE ENTRIES AND VEHICLE CIRCULATION. THE LOBBIES WILL HAVE A DEFINED PEDESTRIAN CONNECTION, AND SERVICE AREAS ARE SCREENED FROM SW BOECKMAN ROAD AND SW KINSMAN ROAD.

LEGAL DESCRIPTION:

A TRACT OF LAND SITUATED IN SECTION 14, TOWNSHIP 3 SOUTH, RANGE 1 WEST OF THE WILLIAMETTE MERIDIAN, IN THE CITY OF WILSONVILLE, CLACKAMAS COUNTY, OREGON, MORE PARTICULARLY DESCRIBED AS FOLLOWS: BEGINNING AT AN IRON PIPE AT THE NORTHWEST CORNER OF THE NORTHEAST ONE QUARTER OF THE NORTHWEST ONE QUARTER OF SAID SECTION 14, SAID POINT BEING THE NORTHWEST CORNER OF THAT TRACT CONVEYED TO FREDERIC W. YOUNG, ET UX, RECORDED JANUARY 13, 1947 IN BOOK 383, PAGE 262, DEED RECORDS; THENCE SOUTH 0° 13' EAST ALONG THE WEST LINE OF SAID YOUNG TRACT 499.70 FEET TO AN IRON PIPE AT THE SOUTHWEST CORNER THEREOF; AND THE TRUE POINT OF BEGINNING OF THE TRACT HEREIN TO BE DESCRIBED; THENCE NORTH 89° 43' EAST ALONG THE SOUTH LINE OF SAID YOUNG TRACT 25.00 FEET TO A POINT; THENCE NORTH 0° 13' WEST PARALLEL WITH THE WEST LINE OF SAID YOUNG TRACT 474.70 FEET TO A POINT THAT IS SOUTHERLY 25.00 FEET MEASURED AT RIGHT ANGLES FROM THE NORTH LINE OF SAID YOUNG TRACT; THENCE NORTH 89° 42' EAST PARALLEL WITH THE NORTH LINE OF SAID YOUNG TRACT 1080.00 FEET, MORE OR LESS, TO THE WEST LINE OF THE OREGON ELECTRIC RAILWAY RIGHT OF WAY; THENCE SOUTHERLY ALONG THE WEST LINE OF SAID OREGON ELECTRIC RAILWAY RIGHT OF WAY 980.00 FEET, MORE OR LESS, TO A POINT OF INTERSECTION WITH THE SOUTH BOUNDARY OF THE TRACT CONVEYED TO SUNN MUSICAL EQUIPMENT COMPANY, A CORPORATION, BY DEED FILED MAY 5, 1969 AS RECORDER'S FEE NO. 69–7881, FILM RECORDS; THENCE SOUTH 89° 44' WEST ALONG SAID SOUTH BOUNDARY, 1160.00 FEET, MORE OR LESS, TO THE SOUTHWEST CORNER THEREOF, SAID POINT BEING IN THE WESTERLY BOUNDARY OF THE NORTHEAST ONE QUARTER OF THE NORTHWEST ONE QUARTER OF SAID SECTION 14; THENCE NORTH 0° 13' WEST ALONG SAID BOUNDARY 499.7 FEET TO THE TRUE POINT OF BEGINNING.
EXCEPTING THEREFROM: ALL THAT PORTION DESCRIBED IN DEED TO THE CITY OF WILSONVILLE FOR ROAD PURPOSES, RECORDED JUNE 2, 2006, RECORDERS FEE NO. 2006–050621.
ALSO EXCEPTING THEREFROM: ALL THAT PORTION DESCRIBED IN DEED TO THE CITY OF WILSONVILLE FOR ROAD PURPOSES, RECORDED JANUARY 29, 2016, RECORDERS FEE NO. 2016–005508.

TAX PARCEL NUMBERS:

00810331; 05021199; 05008927

ZONING:

PDI (PLANNED DEVELOPMENT INDUSTRIAL)

STATISTICS:

BUILDING AREA:
1ST FLOOR: 64,988 SF
MEZZANINE: 15,458 SF
TOTAL: 80,446 SF

SITE AREA: 24.50 ACRES

PARKING:
REQUIRED: MANUFACTURING: 1.6/1,000 SF MIN. AND NO MAXIMUM LIMIT
80,446 SF => 50 MIN AND NO MAXIMUM LIMIT
(SECTION 4.155 F INDUSTRIAL 1. MANUFACTURING ESTABLISHMENT)
PROPOSED: 317 STALLS (210 STANDARD/ACCESSIBLE, 107 COMPACTS 32.6%)
ACCESSIBLE REQUIRED: 317 = 8 W/ 2 WHEEL CHAIR ONLY SPACES
(TABLE 1106.1 OSSC)
ACCESSIBLE PROPOSED: 8 W/ 2 WHEEL CHAIR ONLY SPACES
CAR/VAN POOL REQUIRED: 317 X .05 => 16 REQUIRED
(SECTION 4.155.06 B)
CAR/VAN POOL PROPOSED: 16 PROPOSED

BIKE REQUIREMENTS:
REQUIRED: PDI FLEX SPACE: 1 PER 10,000 SF MIN
80,446 SF / 10,000 SF => 9 REQ'D MIN.
(SECTION 4.155 F INDUSTRIAL 1. MANUFACTURING ESTABLISHMENT)
PROPOSED: 11 (2 UNCOVERED OUTSIDE AT LOBBY; 9 INSIDE AS TI)

LOADING REQUIREMENTS:
REQUIRED BERTHS: INDUSTRIAL 30,000 SF –100,000 SF => 2 MIN. (12' X 35' MIN.)
(SECTION 4.155.05 A1)
PROPOSED: 3 (2 DOCK–HIGH; 1 ON–GRADE DRIVE–IN)

TRASH ENCLOSURE REQUIREMENTS:
REQUIRED: 10 SF MINIMUM PLUS
80,000 SF MANUF (6 SF/1,000 SF) = 483 SF MIN.
10 SF + 483 SF = 493 SF MINIMUM TOTAL (4' TALL)
(SECTION 4.178.06 B)
PROPOSED: 415 SF (12' X 20' EXTERIOR ENCLOSURE W/ 6.9' TALL CONTAINERS)
85 SF (INTERIOR CONTAINERS NEAR DOCKS AS TI FOR CARDBOARD)
500 SF TOTAL

SHEET INDEX

ARCHITECTURAL
A0 COVER SHEET
A1.0 SITE PLAN
A1.1 ENLARGED PL
A1.2 ENLARGED PL
A2.0 FLOOR PLAN
A2.2 ROOF PLAN
A3.0 EXTERIOR EL

CIVIL
C1.01 TREE PROTEC
C1.20 GRADING PLA
C1.21 GRADING PLA
C1.30 UTILITY PLAN NORTH
C1.31 UTILITY PLAN SOUTH
EC2.0 CLEARING AND DEMOLISION AND SEDIMENT CONTROL PLAN
– CUT/FILL MAP

LANDSCAPE
L1.0 LANDSCAPE PLAN
L1.1 ENLARGED LANDSCAPE PLAN – NORTH
L1.2 ENLARGED LANDSCAPE PLAN – SOUTH
L2.0 LANDSCAPE SPECIFICATIONS & DETAILS

SITE LIGHTING
1 OF 4 SITE LIGHTING PLAN & CALCULATIONS
2 OF 4 ENLARGED SITE LIGHTING PLAN – NORTH
3 OF 4 ENLARGED SITE LIGHTING PLAN – SOUTH
4 OF 4 GRAPHIC SITE LIGHTING PLANS AND CALCULATIONS

TVF&R Tualatin Valley Fire & Rescue
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Alex McGl...
Deputy Fire Marshal II

TVF&R Permit # 2002-0078

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LANCE MUELLER
SEATTLE, WA
1491
STATE OF OREGON

18003 job no.
EM drawn
BW checked
1-21-22 date

SITE DESIGN REVIEW revision
1-21-22 date

BUILDING W5
99XX SW Boeckman Rd.
Wilsonville, OR 97070

LANCE MUELLER & ASSOCIATES
ARCHITECTS
130 LAKESIDE • SUITE 250 • SEATTLE, WA 98122 • (206) 325-2553

COVER SHEET
sheet
A0

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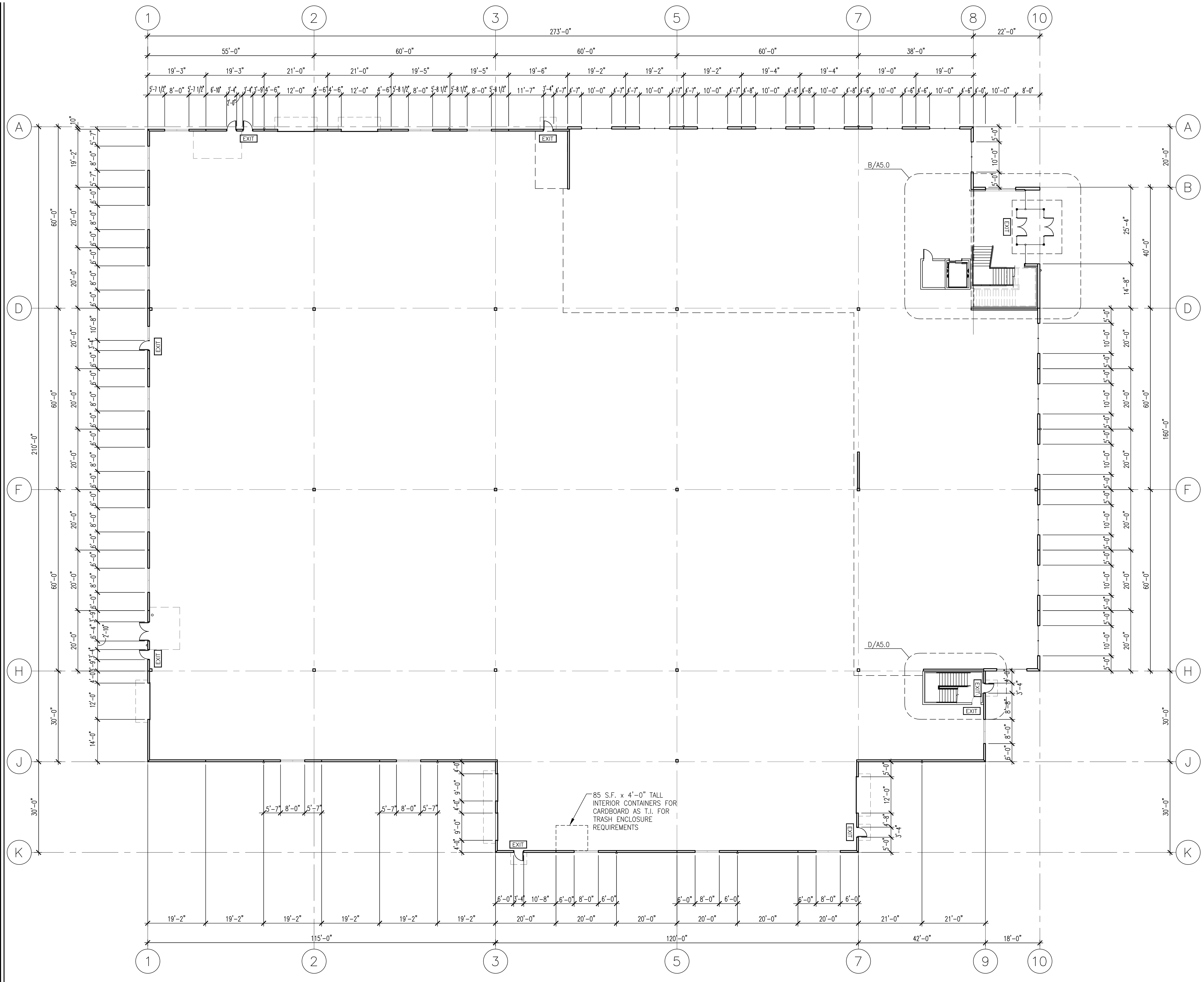
1/21/2022



FLOOR PLAN
1/16" = 1'-0"

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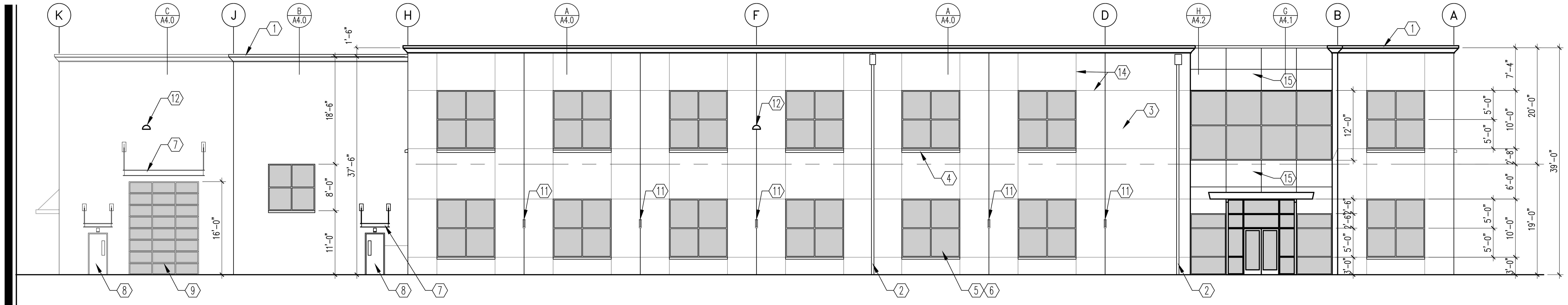
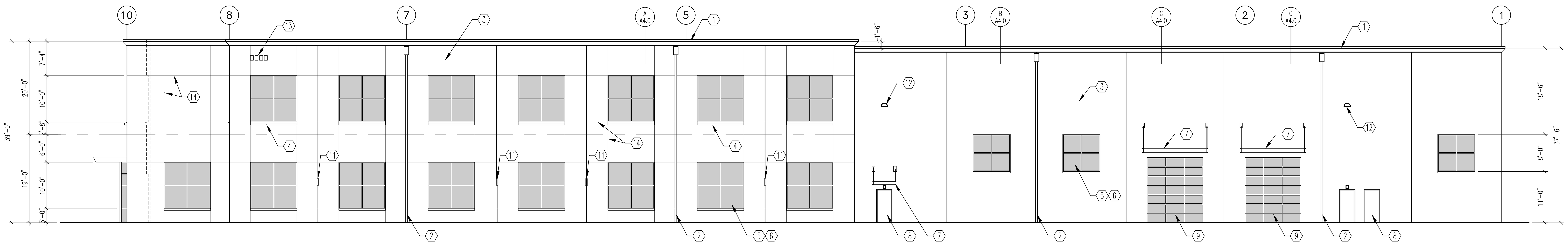
LANCE MUELLER & ASSOCIATES
ARCHITECTS AIA
130 LAKESIDE • SUITE 250 • SEATTLE, WA 98122 • (206) 325-2553

1ST FLOOR PLAN

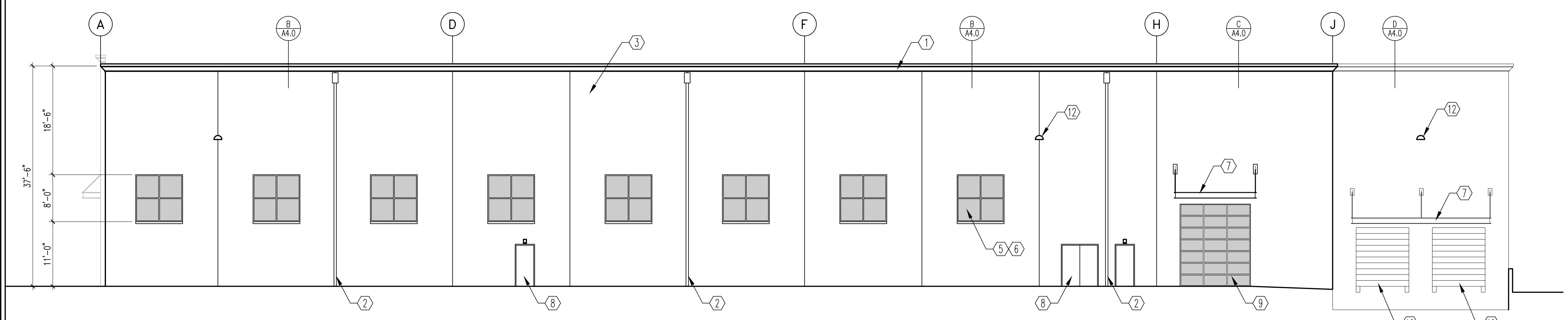
sheet
A2.0



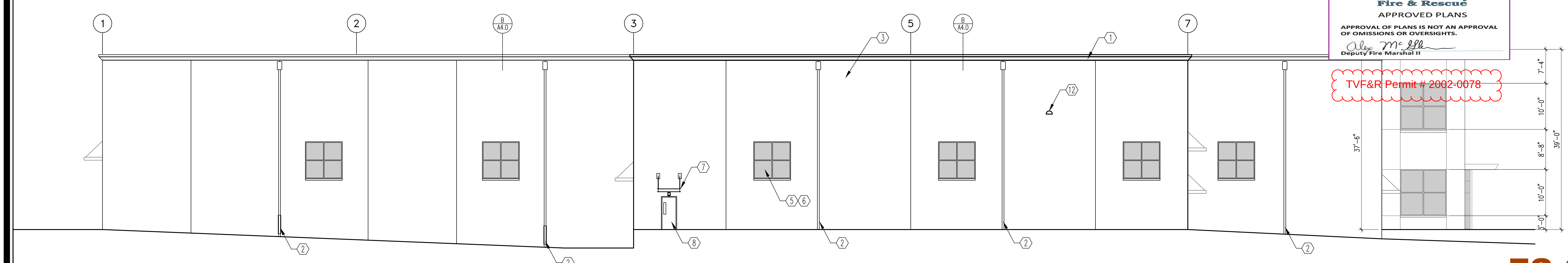
A EAST ELEVATION
3/32" = 1'-0"



B NORTH ELEVATION
3/32" = 1'-0"



C WEST ELEVATION
3/32" = 1'-0"



C SOUTH ELEVATION
3/32" = 1'-0"

FLAG NOTES

MARK	ITEM	DESCRIPTION	REMARKS
1	COPING & SCUPPER	PRE-FINISHED GALVANIZED IRON	COLOR: SILVER
2	RAIN LEADERS		COLOR: NEUTRAL BRONZE TBD
3	CONCRETE WALL	SITE CAST CONCRETE	STAIN & SEALER TYPICAL. (SEMI-TRANSPARENT STAIN) COLOR: NEUTRAL RANGE TBD
4	PRECAST WINDOW SILL	CAST CONCRETE	COLOR: NEUTRAL RANGE TBD
5	GLASS	LOW-E (SOLARBAN 60) INSULATED GLASS - 1" THICK	COLOR: CLEAR
6	STOREFRONT	FRAMING DESIGN IS BASED UPON ARECADIA AG451t SERIES	THERMAL BREAK STOREFRONT COLOR: CLEAR ANODIZED
7	CANOPIES	STEEL FRAME, PAINTED WITH PRE-FINISHED METAL PANEL INFILL	COLOR: NEUTRAL BRONZE TBD
8	HOLLOW METAL DOORS	INSULATED SOLID CORE H.M., WITH GALVANIZED METAL FRAMES	COLOR: NEUTRAL BRONZE TBD
9	ON-GRADE SERVICE DOORS	ALUMINUM RAIL STILE & INSULATED GLASS SECTIONAL UPWARD ACTING	COLOR: CLEAR ANODIZED & GLASS TBD
10	TRUCK DOCK DOORS	HOLLOW METAL SECTIONAL UPWARD ACTING - PAINT	COLOR: NEUTRAL BRONZE TBD
11	SCONCE	TECH LIGHTING, TURBO WALL	
12	WALL PACK LIGHT		
13	ADDRESS LETTERS	12" HIGH STAINLESS STEEL	
14	CONCRETE REVEAL		
15	ACM METAL PANELS		SILVER TO MATCH CLEAR ANODIZED STOREFRONT

GENERAL NOTES

1. ALL EXTERIOR LIGHTING SHALL BE SHIELDED TO CONFINE LIGHTING TO THE PROJECT SITE
2. PROVIDE RECESSED KNOX EMERGENCY ACCESS KEY BOX. LOCATION TO BE DETERMINED BY THE CITY FIRE DEPARTMENT. BUILDING ACCESS KEYS SHALL BE MARKED AND PLACED IN BOX PRIOR TO FINAL INSPECTION. THE BUILDING OWNER SHALL PROVIDE REPLACEMENT KEYS WHENEVER LOCKS ARE CHANGED.

TVF&R Tualatin Valley Fire & Rescue
APPROVED PLANS
APPROVAL OF PLANS IS NOT AN APPROVAL OF OMISSIONS OR OVERSIGHTS.
Alex McGl...
Deputy Fire Marshal II

TVF&R Permit # 2002-0078

no.	revision	date
	SITE DESIGN REVIEW	1-21-22

18003 job no.
EM drawn
BW checked
1-21-22 date

REGISTERED ARCHITECT · STATE OF OREGON · LANCE MUELLER · SEATTLE, WA. · 1491

BUILDING W5
99XX SW Boeckman Rd.
Wilsonville, OR 97070

LANCE MUELLER & ASSOCIATES
ARCHITECTS AIA
130 LAKESIDE · SUITE 250 · SEATTLE, WA 98122 · (206) 325-2553

EXTERIOR ELEVATIONS

sheet
A3.0

FS-2

LANCE MUELLER & ASSOCIATES

A R C H I T E C T S · A I A

W5	July 2022

96XX SW Boeckman Road, Wilsonville, OR 97070

Colors and Materials Selections (Prelim)

Coping & Scupper: Prefinished Galvanized Iron, Paint – Color: Silver (to match W4)

Precast Concrete walls & Sill: Sealer & Stain – Color: color range per images below

Glass: Low-e insulated – Color: clear (to match W4)

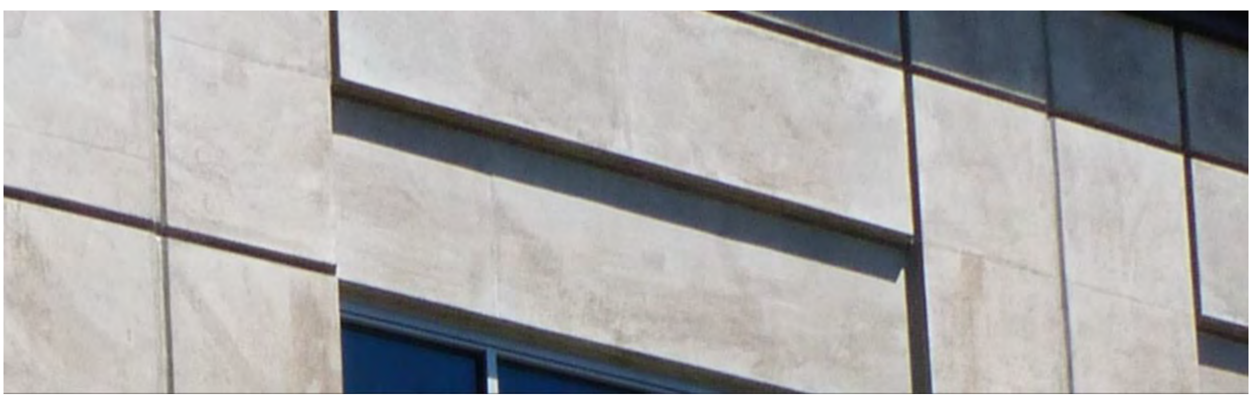
Storefront: – Color: clear anodized (to match W4)

ACM (or other approved metal wall panel system): – Color: Silver (to match W4 coping)

Canopies: – Color: Neutral Bronze (TBD – to blend with wall stain)

Dock Doors & Man Doors: Steel, paint – Color: Neutral Bronze (TBD – to blend with wall stain)

On-Grade Service Doors: Alum stile & rail – Color: clear anodized (to match W4)
Glass, insulated – Color: TBD – to match glass in storefront



Precast Concrete Walls & Sills: The dominant exterior surface is walls, which receive two layers of clear sealer with semi-transparent stain. These images show the range of the warm vs. cool neutral colors from past projects in the area by ownership. W5 will be a neutral color between these two examples. Final selection is by owner from field samples. (Top is Lam Research in Tualatin. Bottom is W1 in Wilsonville. Appearance varies pending underlying concrete color variations, time of day, sunny or cloudy, etc. Color lightens over decades from sun exposure, and we think the patina softens and improves with age.)

We recognize this is an unusual color board. All the selections either match a product on adjacent W4 or are selected after the wall stain sample is approved. Unfortunately, the dominant facade surface, the semi-transparent stained walls, is selected from field samples at the end of construction. To explain why I'll first describe the stain system:

The precast wall finish is a field applied semi-transparent stain installed in two layers with pigment change between the layers for subtle added color depth. The stain pigment is applied in a clear penetrating sealer. This is a premium finish compared to paint, and we believe a richer and more natural aesthetic (with the subtle mottled neutral colors) compared to a flat paint finish. Importantly, this stain is proven tough enough to hold up to vine covered green walls, which is questionable with paint finish. Besides the initial aesthetic preference, long-term the stain maintains its subtle patina and waterproofing capabilities longer than paint, so the precast facade holds its quality appearance longer. This is important on its own merits, but it is more important when vines are attached to the walls as we propose. Imagine the time and expense involved to repaint a vine covered building. First the vine removal, then the painting process with surface prep, and then waiting a few years for the vines to grow back on the wall. We consider the stain finish linked to the green walls proposed aesthetically and practically.

The stain is custom field applied for each of the owner's buildings, who uses his own long-term subcontractor to control the application. The final colors are selected by the owner, who takes a personal interest, from field samples on the precast walls. For accuracy we place the field samples on the actual concrete walls because concrete color varies from batch to batch, which influences how the semi-transparent stain color is perceived.

The color board presentation issue is how do we present a field sample that is not created yet? Unfinished concrete walls colors vary from cool (bluish) to warm (off-white) hues, which significantly influences the semi-transparent stain color perceived. This makes it impossible to present an accurate precast color sample at a DRB hearing. Instead, the owners do have three (3) Wilsonville examples of their stained precast buildings of similar scale and materials that have received Wilsonville approval in the past. At the DRB hearing we will present pictures of these representing the stain color range with their addresses for field visits to verify the color. We will also offer three (3) Tualatin building examples (also with addresses) by the owner showing a slightly darker semi-transparent color range. We think these aged examples provide a good sense for how the concrete finish will ultimately appear, and the exact hue or value is less important. In the owner's previous Wilsonville buildings with stained precast walls (permitted as W1, W2 and W3) DRB and Planning was able to grant approval based upon previous building examples by the owner. It is our hope that DRB and Planning can do this again.

Other comments about the proposed color board: Because many of the other colors and finishes are proposed to match existing W4, the adjacent building provides definitive samples of some well-known building products as follows:

- Coping is silver paint (to match W4).
- Clear glass (to match W4).
- Storefront is clear anodized (to match W4).
- ACM at main entry is silver paint (to match W4 coping).

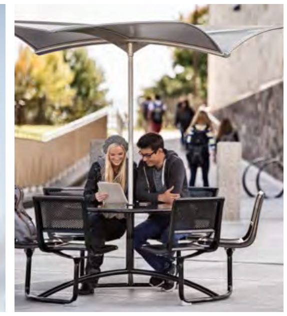
Other paint colors are chosen to be similar to the wall stain. These selections are delayed until after the wall stain sample is chosen, which is late in construction:

- Painted canopies & hollow metal doors (TBD - to blend with wall stain)

35 Collection

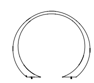
landscapeforms®

Product Data Sheet



Loop

- Loop bike rack is a simple, sweeping circle with a twist.
- Both functional and sculptural.
- Cyclists can loop and lock one or two bikes around its shape-shifting cast aluminum ribbon frame.
- The aluminum casting, finished with Pangard II® powdercoat, is offered in a selection of colors. Must be embedded to a concrete surface.
- Refer to install guide for spacing guidelines.
- Meets APBP guidelines.

	Style	Depth	Length	Height	Product Weight
	bike rack	14"	36"	31"	25 lb

Metal Finishes

- All metal is finished with Pangard II®, offered exclusively by Landscape Forms, a 19-step program of cleaning, priming, and powder coating that resists rusting, chipping, peeling and fading to produce the finest metal finish available for site furniture. In addition, Pangard II® contains no heavy metals and is free of Hazardous Air Pollutants.
- Call for standard color chart.

Recycled Content

- Loop has a recycled content of 97%, and is 100% recyclable.

To Specify

- Specify collection name and product name.

Click here for patent information related to this product.

W1 in Wilsonville from 2009 at the front entry showing the simple palette of stained precast concrete walls, deep facade rustication with deeply set windows and extensive ornamental landscaping in addition to the preserved natural areas. This stain is in the warm range. Originally occupied by DWFRITZ Precision Automation until their expansion. Shell architecture by Lance Mueller & Associates (LMA).

W1 in Wilsonville shown where it abuts an on-site SROZ natural area. This back-of-building view proves the high-quality materials and architecture extend all around the building. Vines on stained precast concrete walls are part of the architecture that include facade rustication and deeply set windows for visual interest. The big trees on left are part of the SROZ. Scale of this facade is similar to W5. Shell architecture by Lance Mueller & Associates. **Address: 27200 SW Parkway Ave, Wilsonville, OR 97070**

W2 in Wilsonville from 2006 in foreground with W1 beyond on left. W2 wall stain is slightly cooler than W1. Extensive large ornamental landscaping adds to the significant preserved SROZ natural areas, same as proposed in W5. Shell architecture by LMA. **Address: 27300 SW Parkway Ave, Wilsonville, OR 97070**

Two views of W3 in Wilsonville from 2012, the last part of the complex that includes W1 and W2 and borders the SROZ. Originally expansion space for DWFRITZ, it is now occupied by Sig Sauer, Electro-Optics. This wall stain is another warm example, and the warm afternoon sunlight is an influence. Shell architect is LMA.
Address: 27100 SW Parkway Ave, Wilsonville, OR 97070

Another development by the owners in nearby Tualatin from 2014 that has a similar limited material palette as proposed in W5. In the foreground is Industry Restaurant and the background a 2-story hi-tech industrial building. Both show a strong architectural presence with facades in stained precast concrete, like W5. The restaurant includes vines on the facade and the project preserves protected natural areas (Hedges Creek), also same as W5. This stain is a slightly darker value and grayer hue. Shell architect is LMA. Address: 20185 SW 112th Ave, Tualatin, OR 97062

An office development with stained walls by the owners in Bellevue, WA from 1998 (permitted as I-90 1997). I include this close-up view from 2021 to show the nicely patinaed stained pre-cast concrete after weathering for 34 years. The vines have been cut back a few times to control them and the stain holds up very well. This was the first successful stained project by the owners after previous attempts ended being painted. I check every few years to verify if the sealer is still functioning, and irrigation spray still beads up on the walls! Shell architect is LMA. Address: 15405 SE 37th Street, Bellevue, WA 98006