EXHIBIT

L

PRELIMINARY STORMWATER MANAGEMENT REPORT

FOR

US MARKET – FLORENCE
at
NE Int. Oregon Coast Highway & 35th Street
Florence, OR.

July 12th, 2024

PREPARED BY:

7 OAKS ENGINEERING, INC.
Steven Johnson, P.E.
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Silverton, Or. 97381
503.308.8520
steven@7oaksengineering.com

Contents

APPENDICES

I. PURPOSE OF REPORT

This Stormwater Management Report was prepared for compliance with the minimum technical standards and requirements that are set forth in 2010 City of Florence Stormwater Design Manual.

II. PROJECT DESCRIPTION

The site is located at the northeast intersection of Oregon Coast Highway & 35th Street in Florence. The project is located at Lane County Tax Parcel No. 1812232206800, and is bordered by commercial development to the north and south, residential development to the east, and Highway 101 to the west.

A. EXISTING CONDITION

The existing site is currently undeveloped in Highway Commercial H-C Zone. The existing site generally slopes in the north to south direction. According to the National Wetland Inventory Mapping Center, there are no on-site Wetlands.

B. PROPOSED CONDITION

The proposed development will disturb the entire site, and will include the development of a new US Market Gas Station, Convenience Store with a drive-thru, parking lot, and landscape throughout.

The site will be divided into two main drainage areas, with proposed rain gardens located at the east and west property. The site has been designed to sheet flow to each of these stormwater planter areas, detain, and slowly release the allowable runoff rate into the existing storm drain lines, one located at the southeast corner of the site, and the other underneath the sidewalk in Highway 101.

A Geotechnical Report was prepared by Northern, Inc., Project No. 223-1642 dated May 2023, with an additional updated Memorandum dated May 28th, 2024. The Geotechnical findings found groundwater at an approximate 6.25-ft to 8-ft depth within the tested borings. Furthermore, the report notes the site is at high risk for Earthquake Liquefaction Hazard. Given the proximity to the encountered groundwater table, infiltration is not feasible for this development. The full Geotechnical Report can be found within the Appendices herein.

III. METHODOLOGY

The City of Florence regulates both quantity and quality of stormwater within the City of Florence. Onsite infiltration is required to the maximum extent feasible. Where complete onsite infiltration is not feasible, vegetated onsite retention facilities are required to the maximum extent feasible.

Table 3.1: Summary of Florence Stormwater Regulation.

Stormwater Quantity (Flow Control):	❖ Applies to all development projects (partitioning or subdividing). Also includes non-residential construction projects adding more than 500 square feet of impervious surfaces or disturbing over one acre. Individual single family residential construction projects are exempt. ❖ Site runoff must be retained/ detained so that post development runoff matches pre-development runoff for the 2 through 25 yr storms. ❖ Use of stormwater retention and vegetated facilities shall be maximized and pre-developed stormwater volumes should not be exceeded.
Stormwater Quality (Pollution Reduction):	❖ Applies to projects with greater than 5,000 square feet of any combination of new and/or replaced impervious surfaces. ❖ Also applies to projects with greater than 43,560 square feet (1 acre) of contiguous pollution generating pervious surface that will be added and/or modified ❖ Generally acceptable BMP's and standard design are outlined in this manual. However it may be necessary to reference the Portland SWMM for more detailed information and requirements. ❖ In groundwater protection areas additional measures may be required to protect drinking water.
Erosion Control	❖ No project is exempt from erosion and sediment control requirements ❖ Projects disturbing over one acre require a DEQ NPES 1200C erosion and sediment control permit. Applicant must demonstrate to the City that a DEQ permit has been obtained for the project prior to permit issuance. For more information on see: http://www.deq.state.or.us/wq/stormwater/constappl.htm ❖ Smaller projects are required to control runoff and wind erosion. A pamphlet is available at the Public Works department to provide additional guidance and is also included in Appendix F.

1. City code and policy is subject to revisions and updates. Refer to current Florence City Code for the most current rules and regulations.

Flow Control:

The standard requirement is to maintain peak flow rates at their pre-development levels for the 2-Year, 10-Year, and 25-Year 24-Hour runoff events. Note that redevelopment projects, pre-development condition is defined as conditions in the year prior to application, not pre-human conditions.

IV. CALCULATIONS

The Presumptive Approach methodology was utilized for sizing, as summarized below.

Method: Santa Barbara Urban Hydrograph (SBUH) Method
Program: HydroCAD 10.20-2g
Storm Event: Type 1-A 24-Hour Rainfall Distribution:

Table 4.1: City of Florence Design Storms

Return Frequency	24-hr Rainfall Depth (inches)
Water Quality	0.83
2- year	3.46
10-year	4.48
25-year	5.06
100-year	5.95

Tc: Minimum 5 Min
Soil Group: G*roup D*

V. SUMMARY

Two proposed rain gardens, one on the east and one on the west side of the site, will be installed to collect, treat, and slowly release the site runoff at an allowable rate that does not exceed the pre-development 25-year, 10-Year, and 2-Year storm event. Below is a summary of the results.

ENGINEERED METHOD SUMMARY						
PRE VS. POST CONSTRUCTION FLOW RATES						
FACILITY ID	PEAK FLOW RATE (CFS)					
	2-YEAR STOM		10 YEAR STORM		25 YEAR STORM	
PROJECT SITE	PRE	POST	PRE	POST	PRE	POST
A		0.17		0.19		0.27
B		0.15		0.16		0.18
TOTAL	0.36	0.32	0.58	0.35	0.71	0.45

APPENDIX A – MAPS

PRELIMINARY ENGINEERING PLANS FOR:

US MARKET

AT 35TH STREET AND US HIGHWAY 101
FLORENCE, OREGON 97439

GENERAL NOTES:

1. ALL CONSTRUCTION, MATERIALS, AND WORKMANSHIP SHALL CONFORM TO THE LATEST STANDARDS AND PRACTICES OF THE CITY OF FLORENCE, THE OREGON STRUCTURAL SPECIALITY CODE (BUILDING CODE), OREGON PLUMBING SPECIALITY (PLUMBING CODE), AND THE OREGON FIRE CODE (FIRE CODE), LATEST EDITIONS.
2. ALL PERMIT AND LICENSES NECESSARY FOR THE EXECUTION AND COMPLETION OF THE WORK SHALL BE SECURED BY THE CONTRACTOR PRIOR TO COMMENCING CONSTRUCTION.
3. ALL EXCAVATORS MUST COMPLY WITH THE RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER, INCLUDING NOTIFICATION OF ALL OWNERS OF UNDERGROUND UTILITIES AT LEAST 48 BUSINESS HOURS, BUT NOT MORE THAN 10 BUSINESS DAYS, BEFORE COMMENCING AN EXCAVATION. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 952-001-0090 AND ORS 757.541 TO 757.57. THE TELEPHONE NUMBER FOR THE OREGON UTILITY NOTIFICATION CENTER IS 503.232.1987 AND THE LOCAL "CALL 48 HOURS BEFORE YOU DIG NUMBER" IS 503.246.6699.
4. THE LOCATION OF EXISTING UNDERGROUND UTILITIES SHOWN ON THE PLAN IS FOR INFORMATION ONLY AND IS NOT GUARANTEED TO BE ACCURATE. CONTRACTOR SHALL VERIFY ELEVATIONS OF ALL UNDERGROUND UTILITY CONNECTION POINTS PRIOR TO COMMENCING WITH CONSTRUCTION AND SHALL BRING ANY DISCREPANCIES TO THE ATTENTION OF 7 OAKS ENGINEERING, INC. POTHOLE ALL CROSSINGS AS NECESSARY BEFORE CONSTRUCTION TO PREVENT GRADE AND ALIGNMENT CONFLICTS.
5. 7 OAKS ENGINEERING, INC. ASSUMES NO RESPONSIBILITY FOR ANY DISCREPANCIES ENCOUNTERED BETWEEN THE CURRENT FIELD CONDITIONS AND THE INFORMATION SHOWN ON THE SURVEY MAP (PERFORMED BY NORTHWEST LAND AND SURVYING, INC., JUNE 11 2024). THE CONTRACTOR IS RESPONSIBLE FOR REPORTING ANY DISCREPANCIES TO THE OWNER'S REPRESENTATIVE.

GRADING AND PAVING NOTES:

1. ALL SURFACES SHALL HAVE A MINIMUM 1.0% SLOPE UNLESS OTHERWISE NOTED ON THE PLANS. ALL SURFACES SHALL MEET EXISTING GRADES SMOOTHLY AND EVENLY AND MAINTAIN CONSTANT SLOPES UNLESS OTHERWISE NOTED ON THE PLANS.
2. THE CONTRACTOR SHALL NOTIFY 7 OAKS ENGINEERING, INC. IF THE GRADING PLAN DOES NOT PROVIDE POSITIVE DRAINAGE OR IF SLOPE CALLOUTS DO NOT MATCH SPOT GRADES.
3. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING EXISTING SITE AND DRAINAGE PATTERNS AND THE PROTECTION OF EXISTING ENGINEERED DRAINAGE FACILITIES.
4. THE CONTRACTOR SHALL REPLACE AND RESTORE AREAS NOT SCHEDULED FOR CONSTRUCTION TO THEIR ORIGINAL CONDITION AND TO THE APPROVAL OF THE OWNERS REPRESENTATIVE.
5. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHEN WORKING IN AREAS ADJACENT TO EXISTING TREES IN ORDER TO MINIMIZE DISTURBANCES TO THE ROOTS. THE CONTRACTOR SHALL INSTALL TREE PROTECTION FENCING PER CITY OF FLORENCE TREE CODE. NO PARKING VEHICLES UNDER TREES.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DEMOLITION AND DISPOSAL OF EXISTING AC, CURBS, SIDEWALKS, AND OTHER SITE ELEMENTS WITHIN THE LIMITS OF DEMOLITION., UNLESS OTHERWISE NOTED ON PLANS. DISPOSE OF DEMOLISHED ITEMS OFF-SITE IN A LEGAL MANNER.
7. ACTUAL LINES AND GRADES OF EXCAVATION SHALL BE STAKED BY A QUALIFIED SURVEYOR. BASED ON THE INFORMATION SHOWN ON THE PLANS, THE CONTRACTOR SHALL RETAIN A SURVEYOR LICENSED IN OREGON.
8. ADJUST ALL INCIDENTAL STRUCTURES, MANHOLE LIDS, VALVE BOXES, ETC. TO FINISH GRADE.
9. PAVING WILL NOT BE ALLOWED DURING WET OR COLD WEATHER.
10. ALL CONSTRUCTION WITHIN THE CITY RIGHT-OF-WAY SHALL HAVE AN APPROVED TRAFFIC CONTROL PLAN.
11. ALL CONSTRUCTION WITHIN THE CITY RIGHT-OF-WAY SHALL BE PERMITTED UNDER SEPARATE PERMIT.
12. PRIOR TO THE PLACEMENT OF AGGREGATE BASE MATERIALS RELATED TO SITE PAVING, A GEOTECHNICAL ENGINEER SHOULD BE PRESENT TO OBSERVE AND EVALUATE THE SUBGRADE SOIL CONDITIONS, AS OUTLINED IN THE GEOTECHNICAL REPORT.

UTILITY NOTES:

1. MATERIALS SHALL BE NEW. THE USE OF MANUFACTURER'S NAMES, MODELS, AND NUMBERS IS INTENDED TO ESTABLISH STYLE, QUALITY, APPEARANCE, AND USEFULNESS. PROPOSED SUBSTITUTIONS WILL REQUIRE WRITTEN APPROVAL FROM CITY ENGINEER PRIOR TO INSTALLATION.
2. ALL TRENCH BACKFILL SHALL BE SHOWN ON THE PIPE BEDDING AND BACKFILL DETAIL. FLOODING OR JETTING THE BACKFILLED TRENCHES WITH WATER IS NOT PERMITTED.
3. CONNECTIONS TO EXISTING UTILITIES SHALL CONFORM WITH THE CITY'S ENGINEERING DESIGN MANUAL AND STANDARD PLANS.
4. ALL WATER AND FIRE PROTECTION PIPE SHALL HAVE A MINIMUM 36-INCH COVER TO FINISHED GRADE.
5. ALL WATER LINES SHALL BE THOROUGHLY FLUSHED, CHLORINATED AND TESTED IN ACCORDANCE WITH OREGON STATE HEALTH DEPARTMENT PRIOR TO ANY METER HOOK-UP SERVICE.
6. BEGIN LAYING STORM AND SANITARY SEWER PIPE AT THE LOW POINT OF THE SYSTEM TRUE TO GRADE AND ALIGNMENT INDICATED WITH UNBROKEN CONTINUITY OF INVERT. ESTABLISH LINE AND GRADE FOR THE STORM AND SANITARY SEWER PIPE BY USE OF A LASER.
7. CONTRACTOR SHALL MAINTAIN A MINIMUM 5' HORIZONTAL AND 18" VERTICAL SEPARATION BETWEEN ALL EXISTING AND PROPOSED WATER AND SANITARY SEWER LINES.
8. FOR CROSSINGS OF WATER LINES AND SANITARY SEWER LINES, THE OREGON STATE HEALTH DEPARTMENT CRITERIA SHALL APPLY.
9. EXISTING STORM OR SANITARY LATERALS TO BE UTILIZED FOR NEW SYSTEM MUST BE VIDEO INSPECTED WITH CITY INSPECTOR PRESENT PRIOR TO CONNECTION.
10. ALL NEW DRYWELLS MUST BE ACCESSIBLE PER OREGON DEPARTMENT OF ENVIRONMENTAL SERVICES QUALITY REQUIREMENTS.
11. THE CONTRACTOR SHALL VACUUM OUT ALL TRAPPED INLETS, MANHOLES, AND DRYWELLS AT THE END OF CONSTRUCTION.
12. CONTRACTOR SHALL EXERCISE CARE IN ALL OPERATIONS TO PROTECT EXISTING UNDERGROUND UTILITIES, ANY DAMAGE RESULTING FROM THIS WORK MUST BE RESTORED AT THE CONTRACTOR'S EXPENSE TO THE APPROVAL OF THE OWNER'S REPRESENTATIVE.
13. PER ORS 92.044(7): UTILITY INFRASTRUCTURES MAY NOT BE PLACED WITHIN 1-FT OF A SURVEY MONUMENT LOCATION NOTED ON A SUBDIVISION OR PARTITION PLAT.

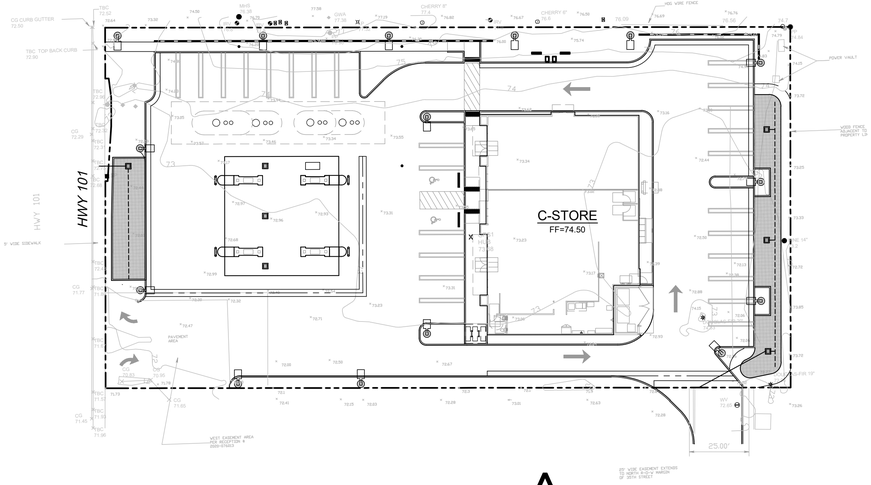
FEMA:

PROJECT IS LOCATED WITHIN MINIMAL FLOOD HAZARD
ZONE 'X' PER MAP 41067C0338E, EFFECTIVE 11/4/2016

SURVEY NOTES:

NOTE :
ELEVATIONS BASED ON GPS DATA, NAVD88

RECORD OF TOPOGRAPHIC SURVEY
LENITY ARCHITECTURE INC.
MAP 18-12-13-22 TAX LOT 6800
FLORANCE, LANE COUNTY, OR



INDEX MAP
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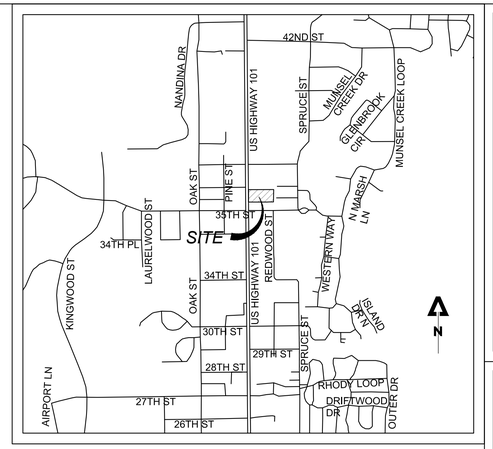

VICINITY MAP

SHEET INDEX:

ABBREVIATIONS:

PL	PROPERTY LINE	TYP.	TYPICAL
FF	FINISHED FLOOR	MIN.	MINIMUM
TC	TOP OF CURB	SS	SANITARY SEWER
FS	FINISHED SURFACE	SD	STORM DRAIN
FL	FLOW LINE	CF	CURB FACE
FG	FINISHED GRADE	WM	WATER METER
GB	GRADE BREAK	FDC	FIRE DEPARTMENT CONNECTION
CL	CENTERLINE	APN	ACCESSOR'S PARCEL MAP
R	RIDGE LINE	SQ.FT	SQUARE FEET
R/W	RIGHT OF WAY	INV.	INVERT
WV	WATER VALVE	BF	BACKFLOW
PR.	PROPOSED	CFS	CUBIC FEET PER SECOND
NAP	NOT A PART	SCH.	SCHEDULE
FT	FEET	PVC	POLYVINYL CHLORIDE
EV	ELECTRIC VEHICLE	SDR	SPECIAL DRAWING RIGHT
CAV	CLEAN AIR VEHICLE	PSI	POUNDS PER SQUARE INCH
STD.	STANDARD	NFPA	NATIONAL FIRE PREVENTION ASSOCIATION
AC.	ACRES	CB	CATCH BASIN
CUP	CONDITIONAL USE PERMIT	D	DIAMETER
EX.	EXISTING	VCP	VITRIFIED CLAY PIPE
TAD	TOP OF AREA DRAIN		

PROJECT DIRECTORY:

ARCHITECT:
LENITY ARCHITECTURE, INC.
3150 KETTLE COURT SE
SALEM OREGON 97301
503.399.1090

CIVIL ENGINEER:
7 OAKS ENGINEERING, INC.
STEVEN JOHNSON, P.E.
345 WESTFIELD ST. #107
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SURVEY:
NORTHWEST LAND SURVEYING, INC.
P.O BOX 2827
FLORENCE, OREGON 97439
541.997.9201

GEOTECH:
GN NORTHERN, INC.
CONSULTING GEOTECHNICAL ENGINEERS
81006 HWY 395
HERMINSTON, OREGON 97838
541.564.0991

UTILITY PURVEYORS:

WATER:
CITY OF FLORENCE PUBLIC WORKS
2675 KINGWOOD STREET
FLORENCE, OR 97439
541.997.4106

STORM DRAIN:
CITY OF FLORENCE PUBLIC WORKS
2675 KINGWOOD STREET
FLORENCE, OR 97439
541.997.4106

SEWER:
CITY OF FLORENCE PUBLIC WORKS
2675 KINGWOOD STREET
FLORENCE, OR 97439
541.997.4106

NATURAL GAS:
NORTHWEST NATURAL GAS COMPANY
1702 YAQUINA BAY RD,
NEWPORT, OREGON 97365
800.422.4012

ELECTRIC:
CENTRAL LINCOLN PUD
2129 N COAST HWY,
NEWPORT, OREGON 97365
877.265.3211

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POTENTIAL UNDERGROUND FACILITY OWNERS

Dig Safely.

Call the Oregon One-Call Center
DIAL 811 or 1-800-332-2344

ENGINEER'S NOTICE TO CONTRACTOR:

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITIES OR STRUCTURES SHOWN IN THESE PLANS ARE OBTAINED BY A SEARCH OF AVAILABLE RECORDS, AND TO THE BEST OF OUR KNOWLEDGE, THERE ARE NOT EXISTING UTILITIES EXCEPT THOSE SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE ALL PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN, AND ANY OTHER LINES OR STRUCTURES NOT SHOWN ON THESE PLANS, AND IS RESPONSIBLE FOR THE PROTECTION OF ANY DAMAGE TO THESE LINES OR STRUCTURES.

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION FOR THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENTS SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY, AND HOLD HARMLESS THE CITY, ITS EMPLOYEES, AND AGENTS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT.

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7OAKS ENGINEERING
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ADMIN@7OAKSENGINEERING.COM

STAMP:

REGISTERED PROFESSIONAL ENGINEER
96126PE
PRELIMINARY
OREGON
MAY 12, 2010
STEVEN JOHNSON

NO	DATE	ISSUE DESCRIPTION

QC BY: DRAWN BY:

PROJECT NAME: US MARKET
PROJECT ADDRESS: NEC 35TH ST & US HWY 101
FLORENCE, OREGON

SHEET TITLE: TITLE SHEET

DATE: 07/11/2024

SHEET NUMBER: 1

JOB #00334

7OAKS ENGINEERING
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STAMP:

REGISTERED PROFESSIONAL ENGINEER
96126PE
PRELIMINARY
OREGON
MAY 12, 2010
STEVEN JOHNSON

NO	DATE	ISSUE DESCRIPTION

QC BY: DRAWN BY:

PROJECT NAME: US MARKET

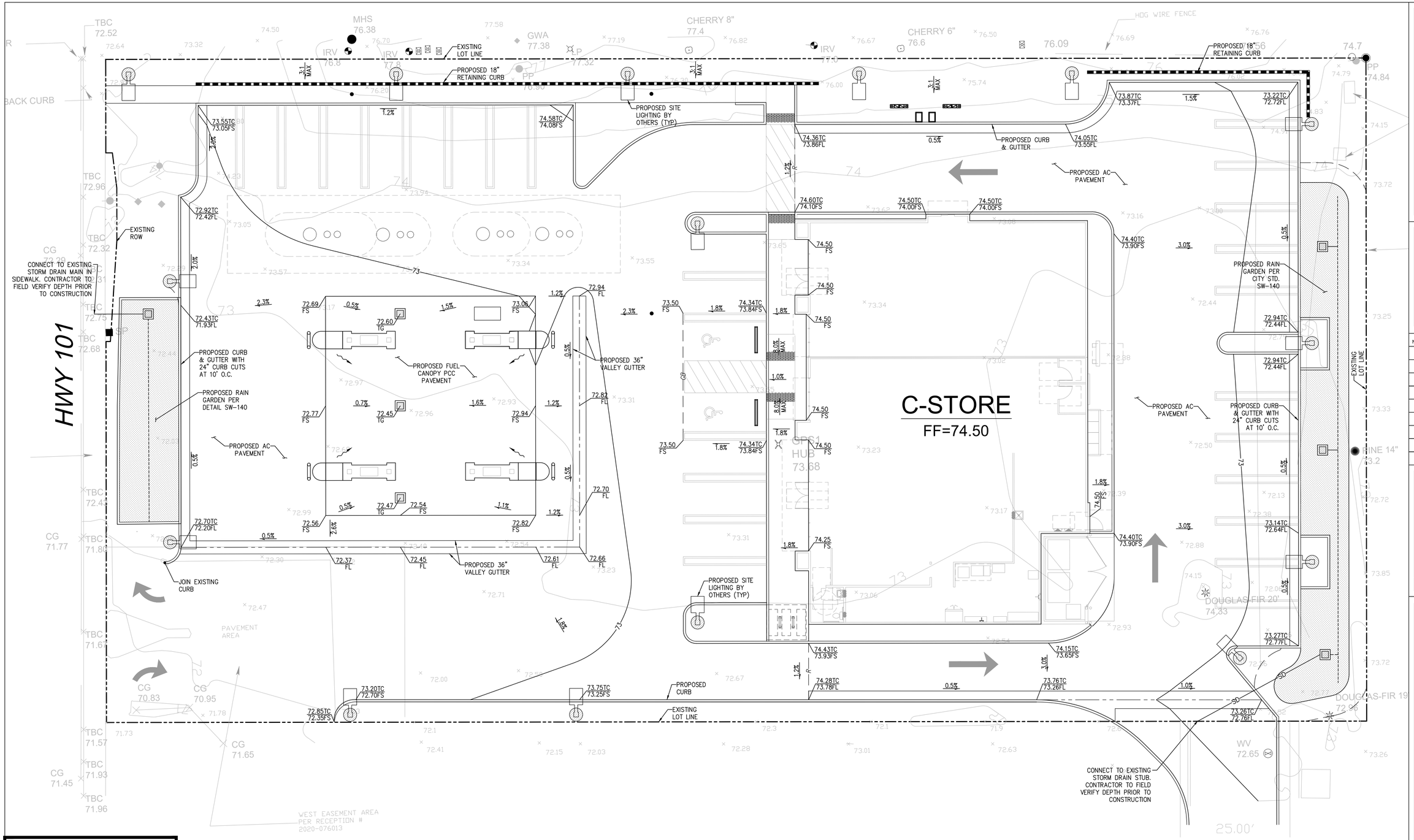
PROJECT ADDRESS: NEC 35TH ST & US HWY 101 FLORENCE, OREGON

SHEET TITLE: EXISTING CONDITIONS PLAN

DATE: 07/11/2024

SHEET NUMBER: 2

JOB #00334



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SCALE: 1"=10'

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STAMP:

REGISTERED PROFESSIONAL ENGINEER
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PRELIMINARY
OREGON
MAY 12, 2010
STEVEN JOHNSON

NO	DATE	ISSUE DESCRIPTION

QC BY: DRAWN BY:

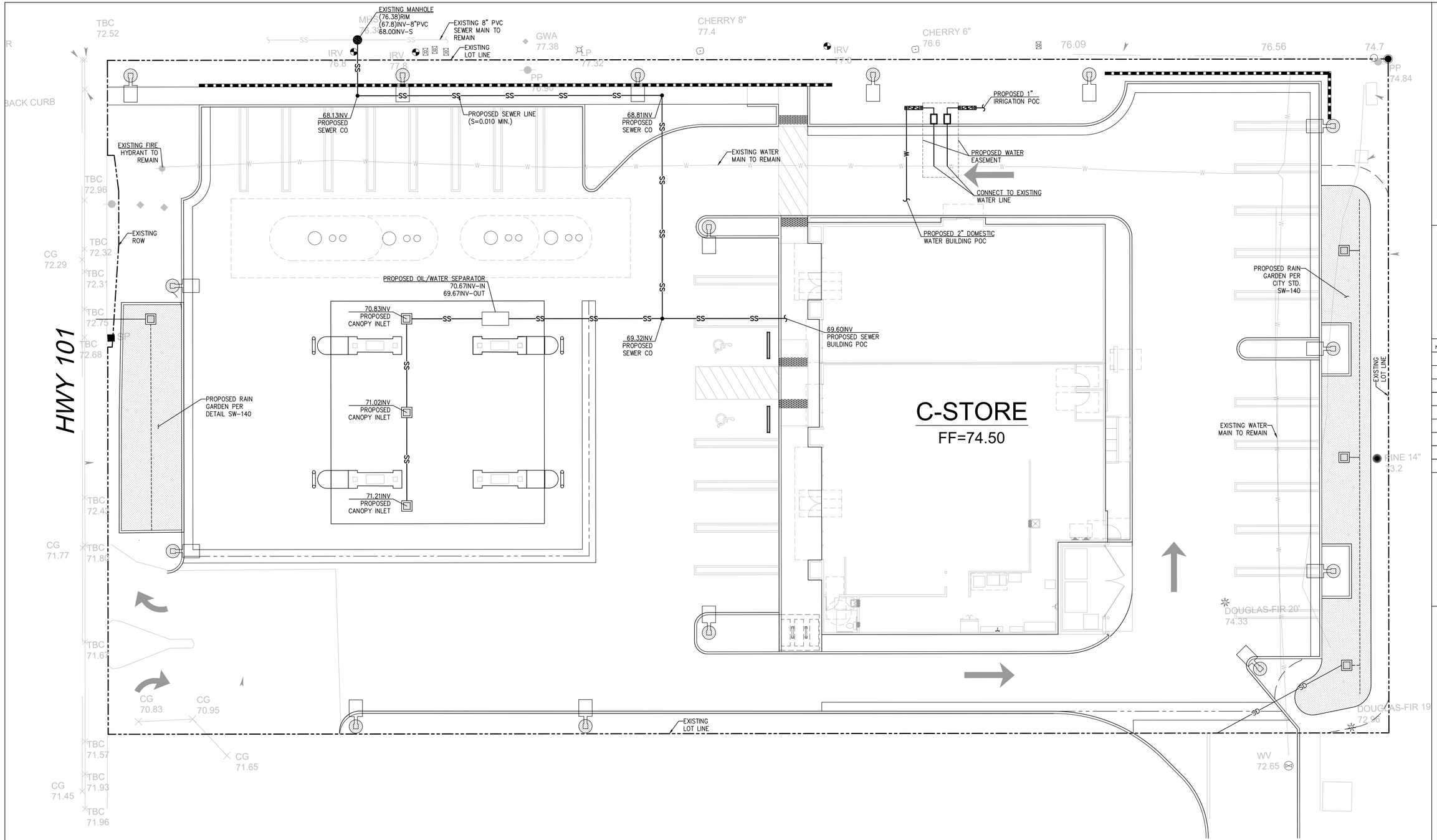
PROJECT NAME: US MARKET
PROJECT ADDRESS: NEC 35TH ST & US HWY 101
FLORENCE, OREGON

SHEET TITLE: PRELIMINARY GRADING PLAN

DATE: 07/11/2024

SHEET NUMBER: 3

JOB #00334



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N

10 5 0 10 20

SCALE: 1"=10'

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PRELIMINARY
OREGON
MAY 12, 2010
STEVEN JOHNSON

NO	DATE	ISSUE DESCRIPTION

QC BY: DRAWN BY:

PROJECT NAME: US MARKET

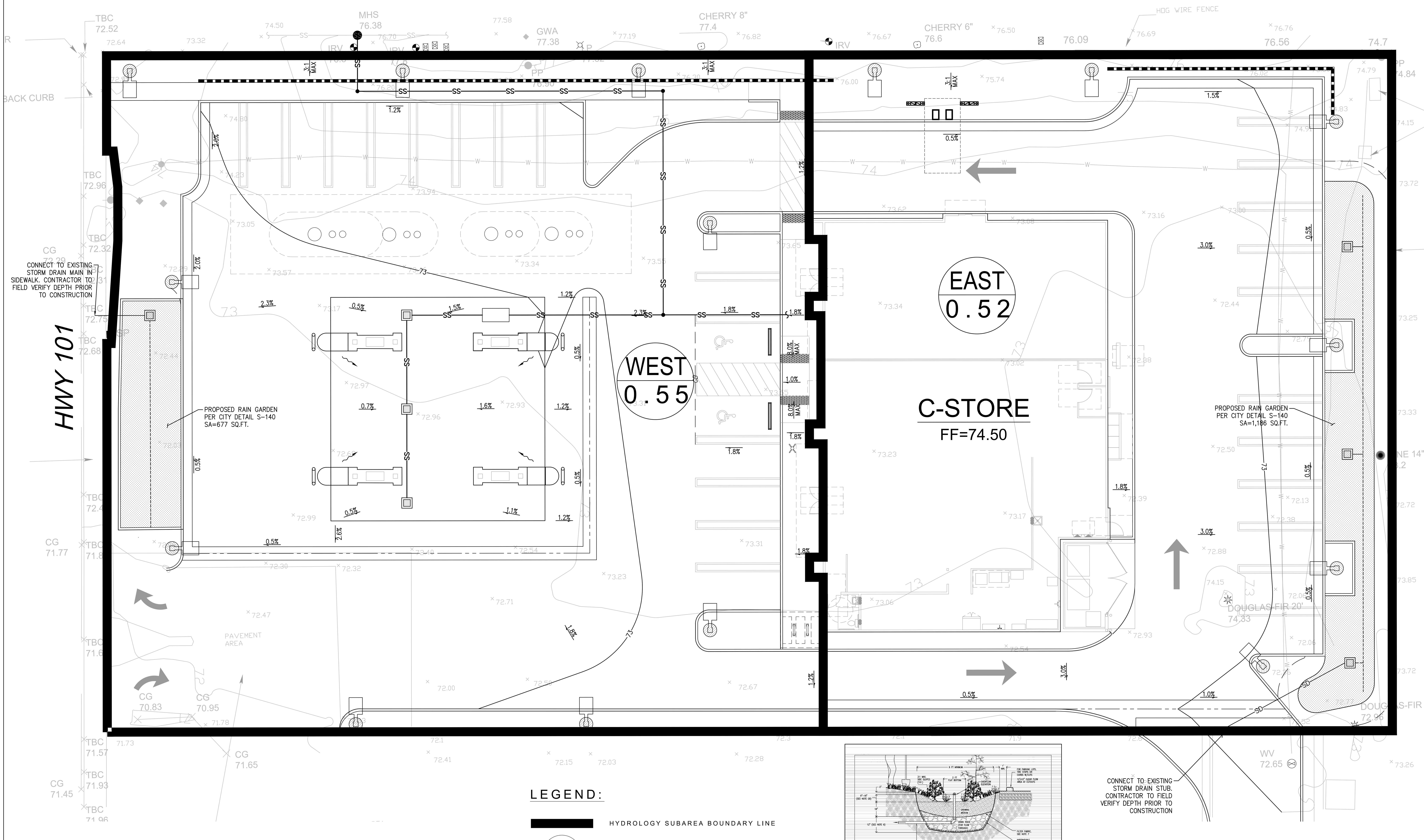
PROJECT ADDRESS: NEC 35TH ST & US HWY 101 FLORENCE, OREGON

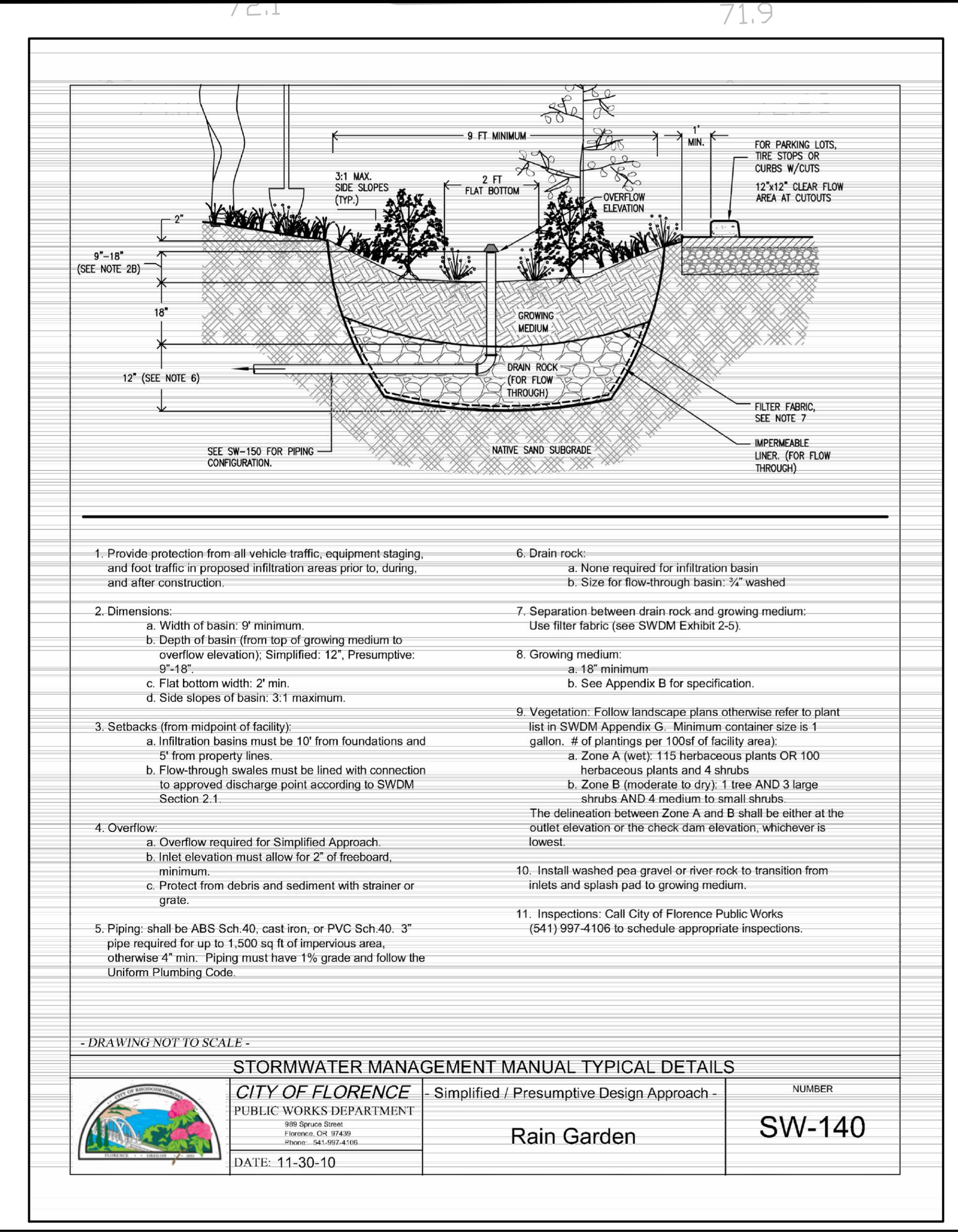
SHEET TITLE: PRELIMINARY WET UTILITY PLAN

DATE: 07/11/2024

SHEET NUMBER: 4

JOB #00334





N

SCALE: 1"=10'

LEGEND:

HYDROLOGY SUBAREA BOUNDARY LINE

XX / AC. — SUB-AREA LABEL

ENGINEERED METHOD SUMMARY						
PRE VS. POST CONSTRUCTION FLOW RATES						
FACILITY ID	PEAK FLOW RATE (CFS)					
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(NOTE: THE TELEPHONE NUMBER FOR THE OREGON UTILITY NOTIFICATION CENTER IS 503-232-1987).

POTENTIAL UNDERGROUND FACILITY OWNERS

Dig Safely.

Call the Oregon One-Call Center
DIAL 811 or 1-800-332-2344

ENGINEER'S NOTICE TO CONTRACTOR:

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CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION FOR THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENTS SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY, AND HOLD HARMLESS THE CITY, ITS EMPLOYEES, AND AGENTS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT.

THE CONTRACTOR SHALL BE RESPONSIBLE TO REPORT DISCREPANCIES IN PLANS AND/OR FIELD CONDITIONS IMMEDIATELY TO THE DESIGN ENGINEER FOR RESOLUTION PRIOR TO CONSTRUCTION, AND SHALL BE RESPONSIBLE FOR DISCREPANCIES NOT SO REPORTED AND RESOLVED.

7OAKS ENGINEERING
345 WESTFIELD ST. #107
SILVERTON, OR. 97381
503.308.8554
ADMIN@7OAKSENGINEERING.COM

STAMP:
REGISTERED PROFESSIONAL ENGINEER
96126PE
PRELIMINARY
OREGON
MAY 12, 2020
STEVEN JOHNSON

NO	DATE	ISSUE DESCRIPTION

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CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO PROCEEDING WITH CONSTRUCTION AND NOTIFY ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES OR CONFLICTS.

QC BY: DRAWN BY:

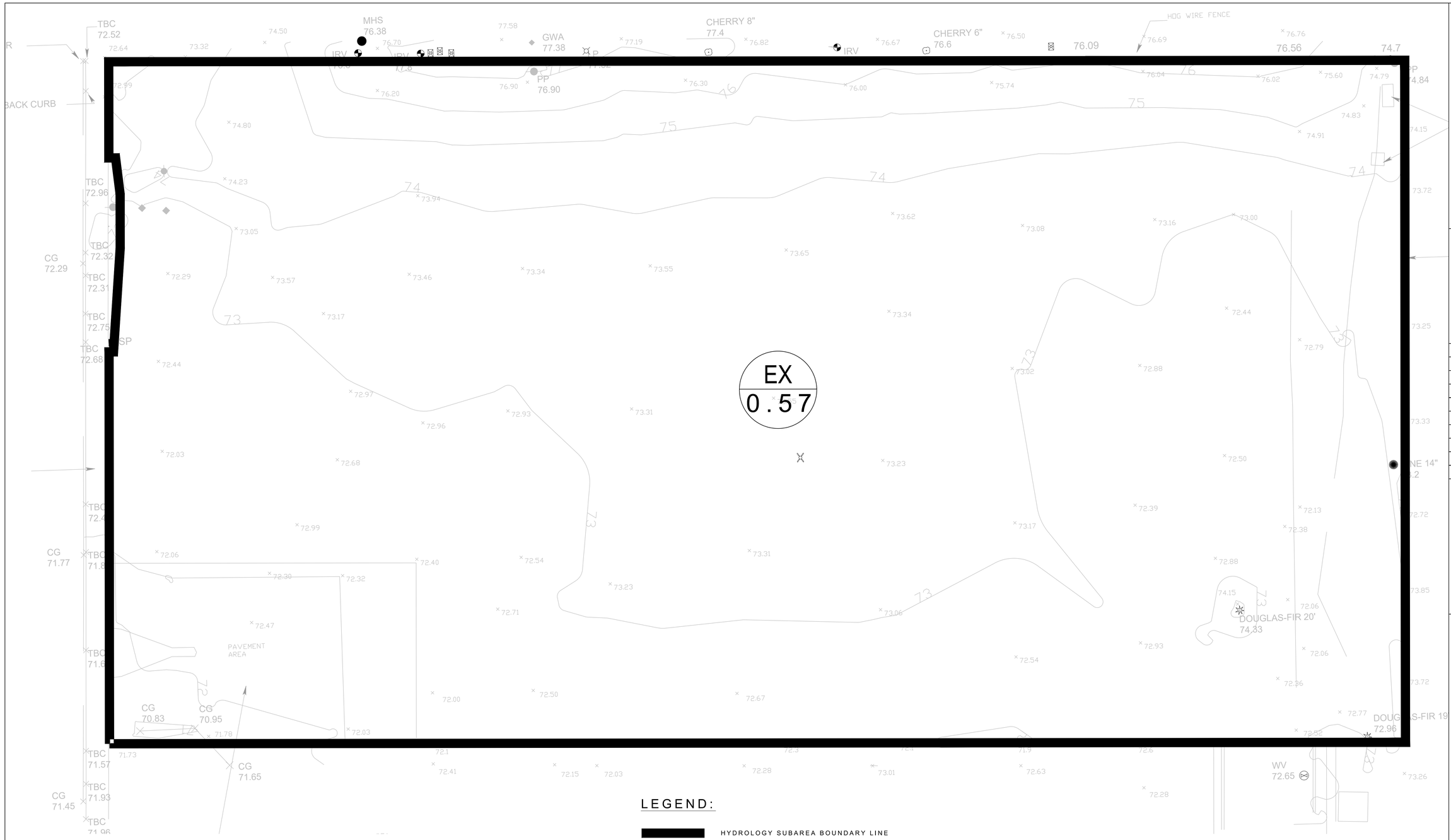
PROJECT NAME: US MARKET
PROJECT ADDRESS: NEC 35TH ST & US HWY 101
FLORENCE, OREGON

SHEET TITLE: PRELIMINARY STORMWATER PLAN

DATE: 07/11/2024

SHEET NUMBER: 5

JOB #00334



LEGEND:

HYDROLOGY SUBAREA BOUNDARY LINE

XX / AC. — SUB-AREA LABEL

ENGINEERED METHOD SUMMARY PRE VS. POST CONSTRUCTION FLOW RATES						
FACILITY ID	PEAK FLOW RATE (CFS)					
	2-YEAR STORM		10 YEAR STORM		25 YEAR STORM	
PROJECT SITE	PRE	POST	PRE	POST	PRE	POST
A		0.17		0.19		0.27
B		0.15		0.16		0.18
TOTAL	0.36	0.32	0.58	0.35	0.71	0.45

N

10 5 0 10 20

SCALE: 1"=10'

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STAMP:

REGISTERED PROFESSIONAL ENGINEER
96126PE
OREGON
PRELIMINARY
MAY 12, 2010
STEVEN JOHNSON

NO	DATE	ISSUE DESCRIPTION

QC BY: DRAWN BY:

PROJECT NAME: US MARKET
PROJECT ADDRESS: NEC 35TH ST & US HWY 101
FLORENCE, OREGON

SHEET TITLE: EXISTING STORMWATER PLAN

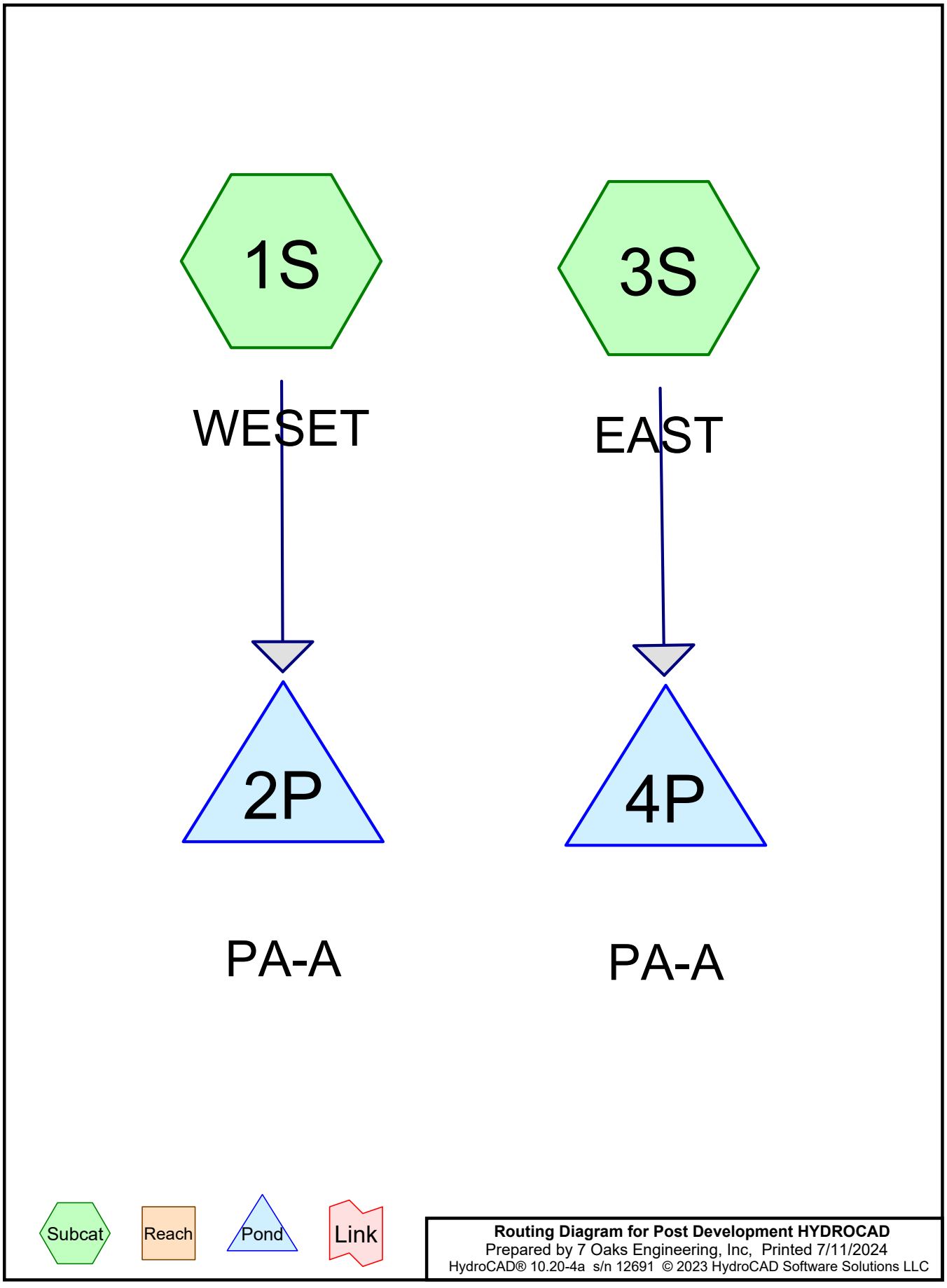
DATE: 07/11/2024

SHEET NUMBER: 6

JOB #00334

APPENDIX B – CALCULATIONS

POST DEVELOPMENT



Routing Diagram for Post Development HYDROCAD
Prepared by 7 Oaks Engineering, Inc, Printed 7/11/2024

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-YR	Type IA 24-hr		Default	24.00	1	3.46	2
2	10-YR	Type IA 24-hr		Default	24.00	1	4.48	2
3	25-YR	Type IA 24-hr		Default	24.00	1	5.06	2
4	WQ	Type IA 24-hr		Default	24.00	1	0.83	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.916	98	(1S, 3S)
0.157	84	50-75% Grass cover, Fair, HSG D (1S, 3S)
1.073	**96**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.157	HSG D	1S, 3S
0.916	Other	1S, 3S
1.073		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.916	0.916		1S, 3S
0.000	0.000	0.000	0.157	0.000	0.157	50-75% Grass cover, Fair	1S, 3S
0.000	**0.000**	**0.000**	**0.157**	**0.916**	**1.073**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	2P	100.33	100.28	5.0	0.0100	0.012	0.0	4.0	0.0	
2	2P	100.33	100.28	5.0	0.0100	0.012	0.0	2.0	0.0	
3	4P	100.33	100.28	5.0	0.0100	0.012	0.0	4.0	0.0	
4	4P	100.33	100.28	5.0	0.0100	0.013	0.0	2.0	0.0	

Time span=0.01-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: WESET Runoff Area=23,931 sf 85.75% Impervious Runoff Depth=3.01"
Tc=5.0 min CN=96 Runoff=0.43 cfs 0.138 af

Subcatchment3S: EAST Runoff Area=22,812 sf 85.05% Impervious Runoff Depth=3.01"
Tc=5.0 min CN=96 Runoff=0.41 cfs 0.131 af

Pond 2P: PA-A Peak Elev=103.28' Storage=732 cf Inflow=0.43 cfs 0.138 af
Outflow=0.17 cfs 0.136 af

Pond 4P: PA-A Peak Elev=102.94' Storage=878 cf Inflow=0.41 cfs 0.131 af
Outflow=0.15 cfs 0.130 af

Total Runoff Area = 1.073 ac Runoff Volume = 0.269 af Average Runoff Depth = 3.01"
14.59% Pervious = 0.157 ac 85.41% Impervious = 0.916 ac

Summary for Subcatchment 1S: WESET

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

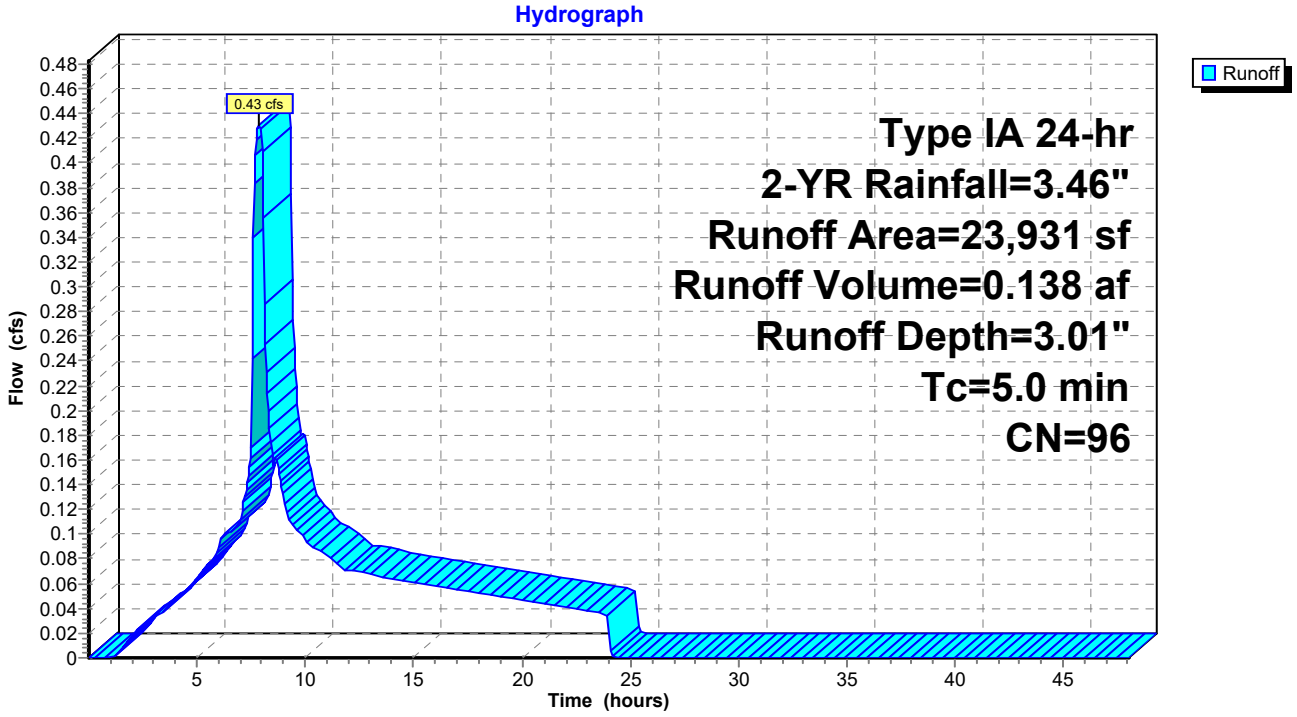
Runoff = 0.43 cfs @ 7.87 hrs, Volume= 0.138 af, Depth= 3.01"
Routed to Pond 2P : PA-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs
Type IA 24-hr 2-YR Rainfall=3.46"

	Area (sf)	CN	Description
*	20,521	98	
	3,410	84	50-75% Grass cover, Fair, HSG D
	23,931	96	Weighted Average
	3,410		14.25% Pervious Area
	20,521		85.75% Impervious Area

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

Subcatchment 1S: WESET



Summary for Subcatchment 3S: EAST

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

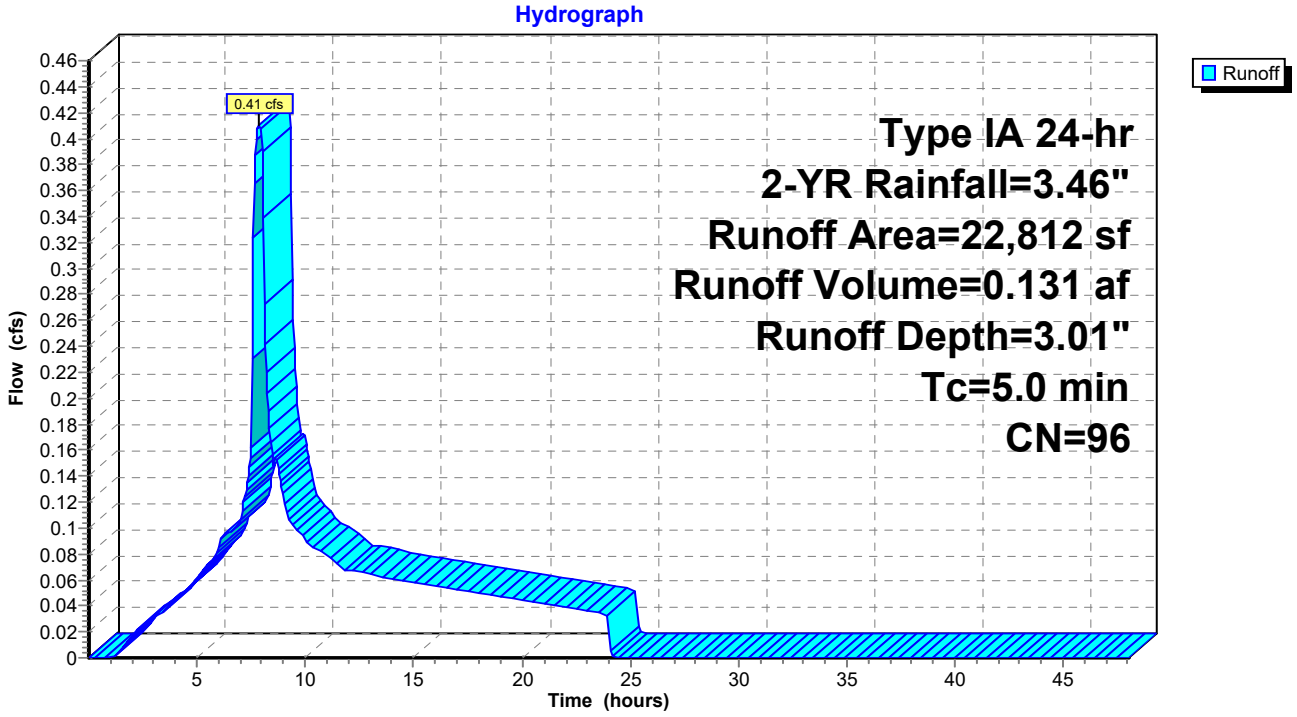
Runoff = 0.41 cfs @ 7.87 hrs, Volume= 0.131 af, Depth= 3.01"
Routed to Pond 4P : PA-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs
Type IA 24-hr 2-YR Rainfall=3.46"

	Area (sf)	CN	Description
*	19,401	98	
	3,411	84	50-75% Grass cover, Fair, HSG D
	22,812	96	Weighted Average
	3,411		14.95% Pervious Area
	19,401		85.05% Impervious Area

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

Subcatchment 3S: EAST



Summary for Pond 2P: PA-A

Inflow Area = 0.549 ac, 85.75% Impervious, Inflow Depth = 3.01" for 2-YR event
Inflow = 0.43 cfs @ 7.87 hrs, Volume= 0.138 af
Outflow = 0.17 cfs @ 8.43 hrs, Volume= 0.136 af, Atten= 60%, Lag= 33.5 min
Primary = 0.17 cfs @ 8.43 hrs, Volume= 0.136 af

Routing by Stor-Ind method, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs / 2
Peak Elev= 103.28' @ 8.43 hrs Surf.Area= 677 sf Storage= 732 cf

Plug-Flow detention time= 49.3 min calculated for 0.136 af (99% of inflow)
Center-of-Mass det. time= 39.7 min (726.0 - 686.3)

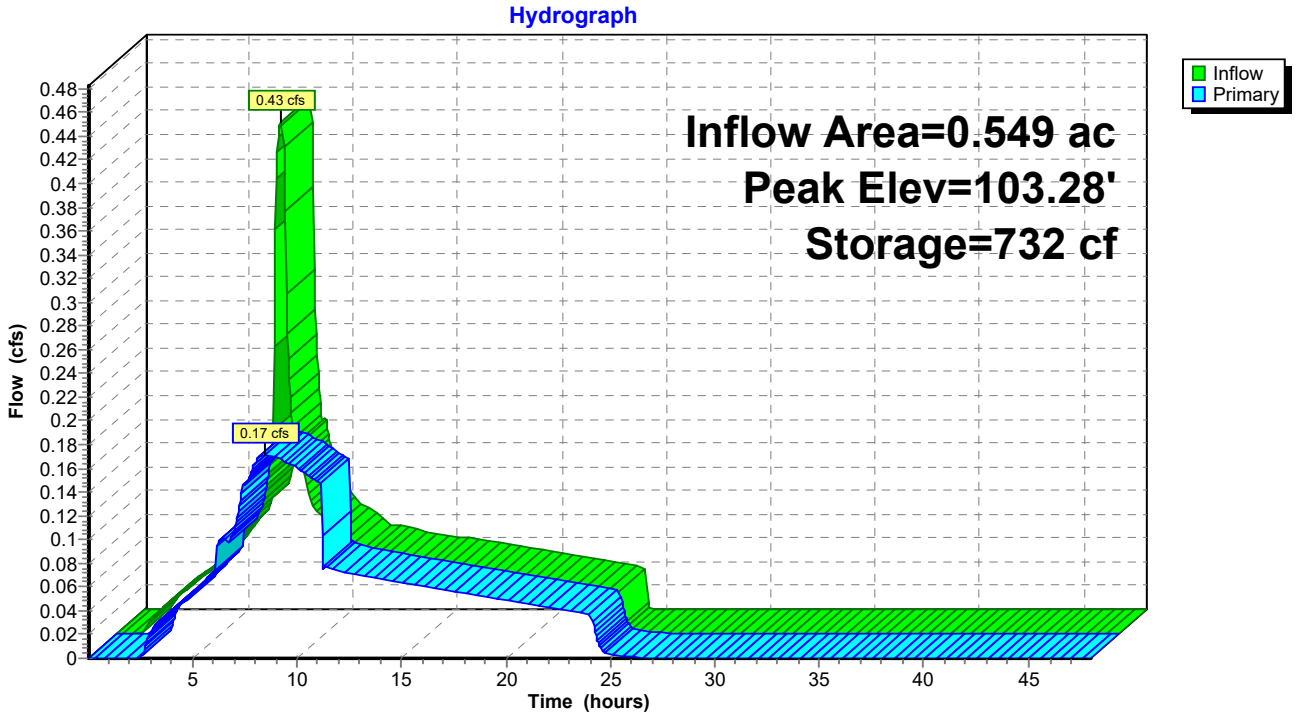
Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,327 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	677	0.0	0	0
101.00	677	30.0	203	203
102.50	677	0.0	0	203
104.00	677	100.0	1,016	1,219
104.16	677	100.0	108	1,327

Device	Routing	Invert	Outlet Devices
#1	Device 2	104.00'	**18.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	100.33'	**4.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 100.33' / 100.28' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#3	Device 2	100.33'	**2.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 100.33' / 100.28' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.02 sf

Primary OutFlow Max=0.17 cfs @ 8.43 hrs HW=103.28' (Free Discharge)
└**2=Culvert** (Passes 0.17 cfs of 0.70 cfs potential flow)
  ├**1=Orifice/Grate** (Controls 0.00 cfs)
  └**3=Culvert** (Barrel Controls 0.17 cfs @ 7.85 fps)

Pond 2P: PA-A


Hydrograph
Inflow
Primary
Inflow Area=0.549 ac
Peak Elev=103.28'
Storage=732 cf
0.43 cfs
0.17 cfs
Flow (cfs)
Time (hours)
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
0.42
0.44
0.46
0.48
5
10
15
20
25
30
35
40
45

Summary for Pond 4P: PA-A

Inflow Area = 0.524 ac, 85.05% Impervious, Inflow Depth = 3.01" for 2-YR event
Inflow = 0.41 cfs @ 7.87 hrs, Volume= 0.131 af
Outflow = 0.15 cfs @ 8.48 hrs, Volume= 0.130 af, Atten= 62%, Lag= 36.5 min
Primary = 0.15 cfs @ 8.48 hrs, Volume= 0.130 af

Routing by Stor-Ind method, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs / 2
Peak Elev= 102.94' @ 8.48 hrs Surf.Area= 1,186 sf Storage= 878 cf

Plug-Flow detention time= 69.7 min calculated for 0.130 af (99% of inflow)
Center-of-Mass det. time= 60.8 min (747.1 - 686.3)

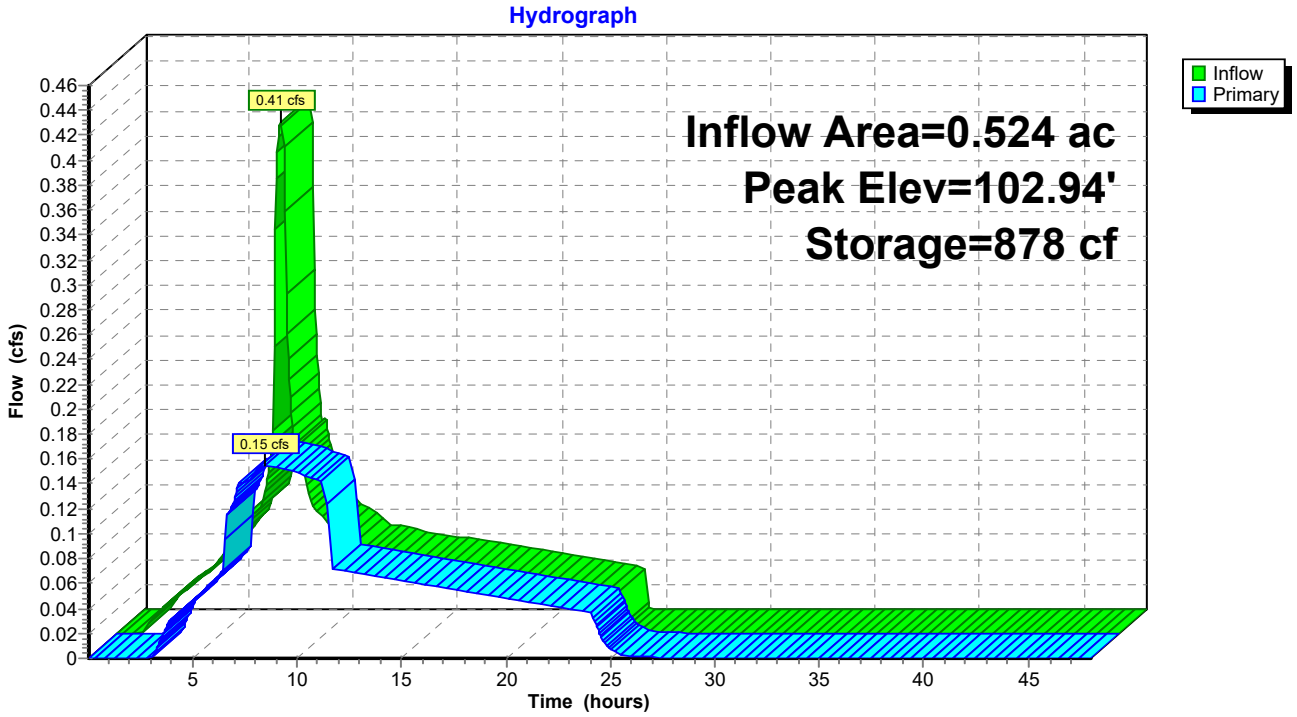
Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,743 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	1,186	0.0	0	0
101.00	1,186	30.0	356	356
102.50	1,186	0.0	0	356
103.50	1,186	100.0	1,186	1,542
103.67	1,186	100.0	202	1,743

Device	Routing	Invert	Outlet Devices
#1	Device 2	103.50'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	100.33'	**4.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 100.33' / 100.28' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#3	Device 2	100.33'	**2.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 100.33' / 100.28' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.02 sf

Primary OutFlow Max=0.15 cfs @ 8.48 hrs HW=102.94' (Free Discharge)
└**2=Culvert** (Passes 0.15 cfs of 0.66 cfs potential flow)
  ├**1=Orifice/Grate** (Controls 0.00 cfs)
  └**3=Culvert** (Barrel Controls 0.15 cfs @ 7.07 fps)

Pond 4P: PA-A


Hydrograph
Inflow Area=0.524 ac
Peak Elev=102.94'
Storage=878 cf
0.41 cfs
0.15 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4
0.42
0.44
0.46
5
10
15
20
25
30
35
40
45

Time span=0.01-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: WESET Runoff Area=23,931 sf 85.75% Impervious Runoff Depth=4.02"
Tc=5.0 min CN=96 Runoff=0.57 cfs 0.184 af

Subcatchment3S: EAST Runoff Area=22,812 sf 85.05% Impervious Runoff Depth=4.02"
Tc=5.0 min CN=96 Runoff=0.54 cfs 0.175 af

Pond 2P: PA-A Peak Elev=103.87' Storage=1,132 cf Inflow=0.57 cfs 0.184 af
Outflow=0.19 cfs 0.180 af

Pond 4P: PA-A Peak Elev=103.30' Storage=1,299 cf Inflow=0.54 cfs 0.175 af
Outflow=0.16 cfs 0.174 af

Total Runoff Area = 1.073 ac Runoff Volume = 0.359 af Average Runoff Depth = 4.02"
14.59% Pervious = 0.157 ac 85.41% Impervious = 0.916 ac

Summary for Subcatchment 1S: WESET

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

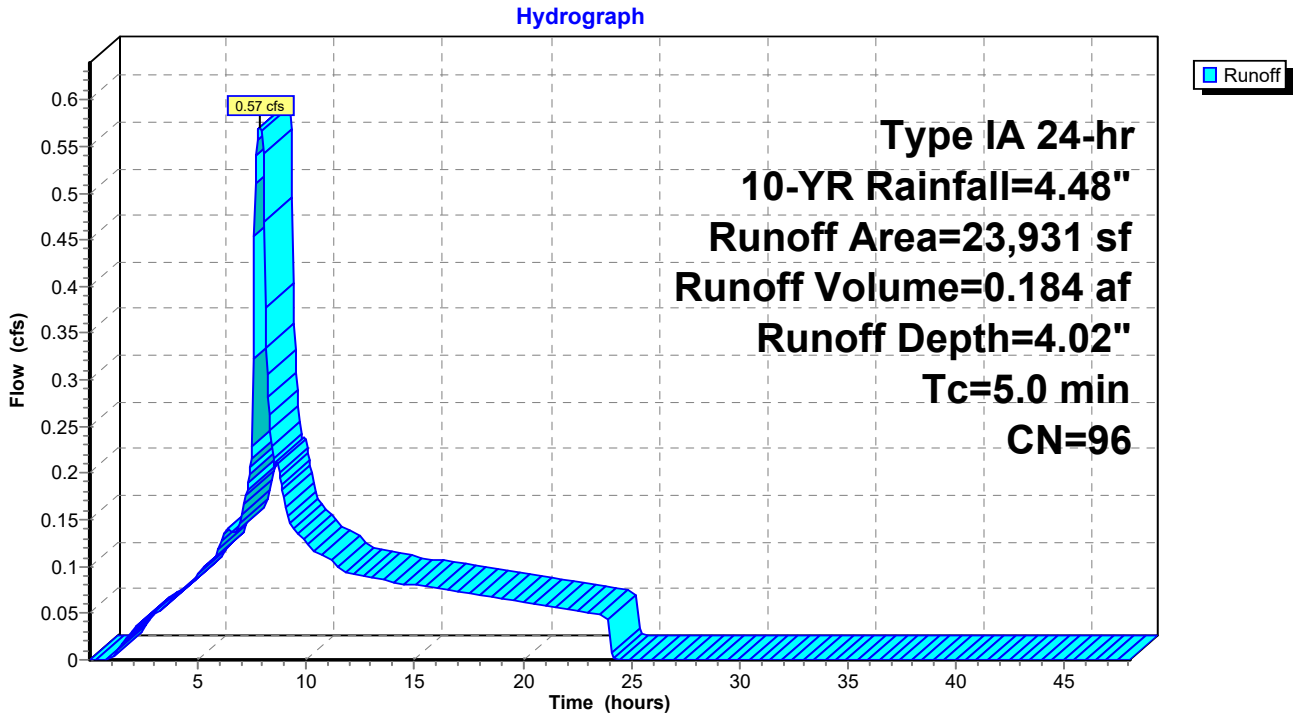
Runoff = 0.57 cfs @ 7.86 hrs, Volume= 0.184 af, Depth= 4.02"
Routed to Pond 2P : PA-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs
Type IA 24-hr 10-YR Rainfall=4.48"

	Area (sf)	CN	Description
*	20,521	98	
	3,410	84	50-75% Grass cover, Fair, HSG D
	23,931	96	Weighted Average
	3,410		14.25% Pervious Area
	20,521		85.75% Impervious Area

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

Subcatchment 1S: WESET



Summary for Subcatchment 3S: EAST

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

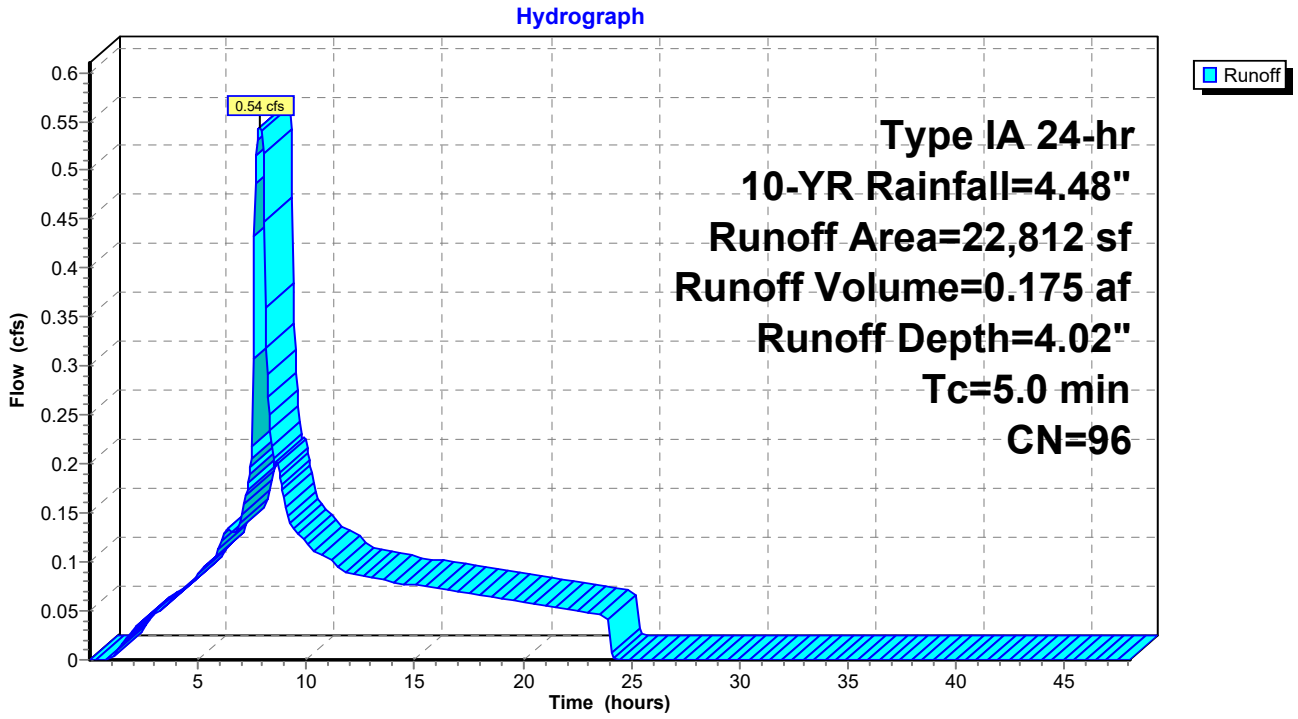
Runoff = 0.54 cfs @ 7.86 hrs, Volume= 0.175 af, Depth= 4.02"
Routed to Pond 4P : PA-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs
Type IA 24-hr 10-YR Rainfall=4.48"

	Area (sf)	CN	Description
*	19,401	98	
	3,411	84	50-75% Grass cover, Fair, HSG D
	22,812	96	Weighted Average
	3,411		14.95% Pervious Area
	19,401		85.05% Impervious Area

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

Subcatchment 3S: EAST



Summary for Pond 2P: PA-A

Inflow Area = 0.549 ac, 85.75% Impervious, Inflow Depth = 4.02" for 10-YR event
Inflow = 0.57 cfs @ 7.86 hrs, Volume= 0.184 af
Outflow = 0.19 cfs @ 8.86 hrs, Volume= 0.180 af, Atten= 67%, Lag= 60.0 min
Primary = 0.19 cfs @ 8.86 hrs, Volume= 0.180 af

Routing by Stor-Ind method, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs / 2
Peak Elev= 103.87' @ 8.86 hrs Surf.Area= 677 sf Storage= 1,132 cf

Plug-Flow detention time= 66.0 min calculated for 0.180 af (98% of inflow)
Center-of-Mass det. time= 50.0 min (726.3 - 676.4)

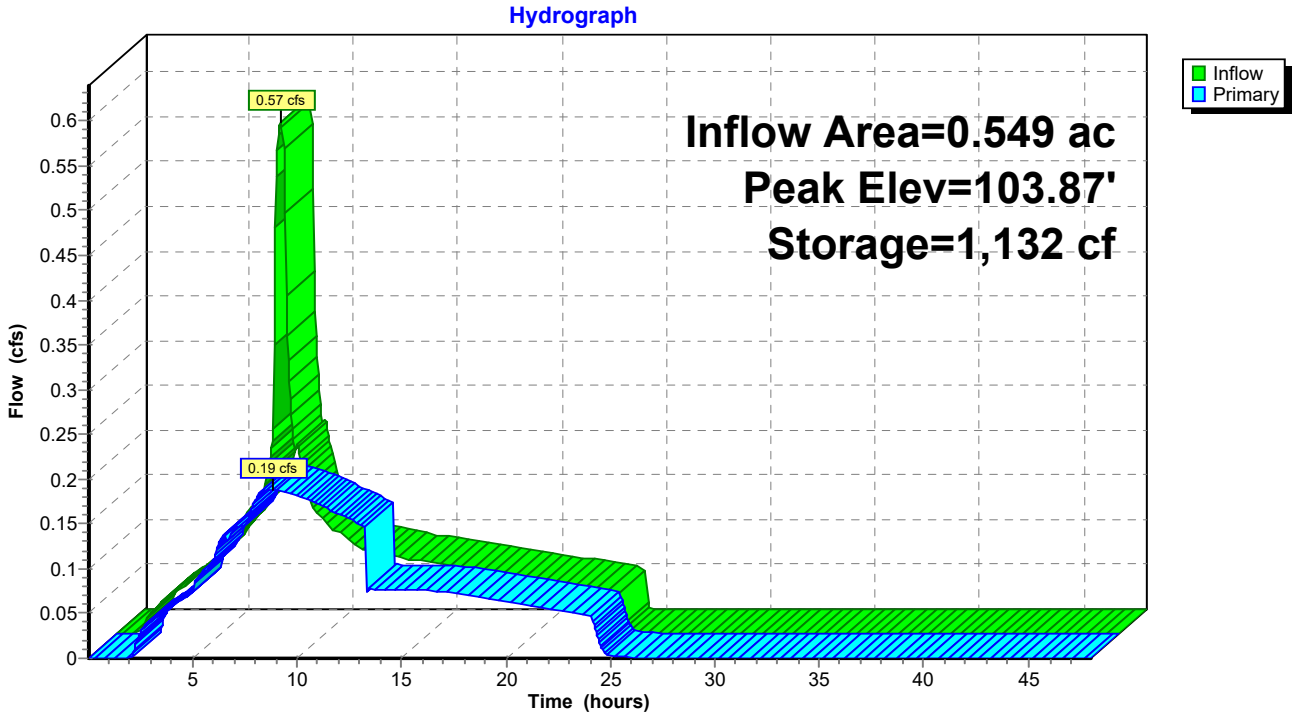
Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,327 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	677	0.0	0	0
101.00	677	30.0	203	203
102.50	677	0.0	0	203
104.00	677	100.0	1,016	1,219
104.16	677	100.0	108	1,327

Device	Routing	Invert	Outlet Devices
#1	Device 2	104.00'	**18.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	100.33'	**4.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 100.33' / 100.28' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#3	Device 2	100.33'	**2.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 100.33' / 100.28' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.02 sf

Primary OutFlow Max=0.19 cfs @ 8.86 hrs HW=103.87' (Free Discharge)
└**2=Culvert** (Passes 0.19 cfs of 0.77 cfs potential flow)
  ├**1=Orifice/Grate** (Controls 0.00 cfs)
  └**3=Culvert** (Barrel Controls 0.19 cfs @ 8.64 fps)

Pond 2P: PA-A


Hydrograph
Inflow
Primary
0.57 cfs
0.19 cfs
Inflow Area=0.549 ac
Peak Elev=103.87'
Storage=1,132 cf
Flow (cfs)
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
0.6
5
10
15
20
25
30
35
40
45
Time (hours)

Summary for Pond 4P: PA-A

Inflow Area = 0.524 ac, 85.05% Impervious, Inflow Depth = 4.02" for 10-YR event
Inflow = 0.54 cfs @ 7.86 hrs, Volume= 0.175 af
Outflow = 0.16 cfs @ 9.00 hrs, Volume= 0.174 af, Atten= 70%, Lag= 68.3 min
Primary = 0.16 cfs @ 9.00 hrs, Volume= 0.174 af

Routing by Stor-Ind method, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs / 2
Peak Elev= 103.30' @ 9.00 hrs Surf.Area= 1,186 sf Storage= 1,299 cf

Plug-Flow detention time= 77.2 min calculated for 0.174 af (99% of inflow)
Center-of-Mass det. time= 72.2 min (748.6 - 676.4)

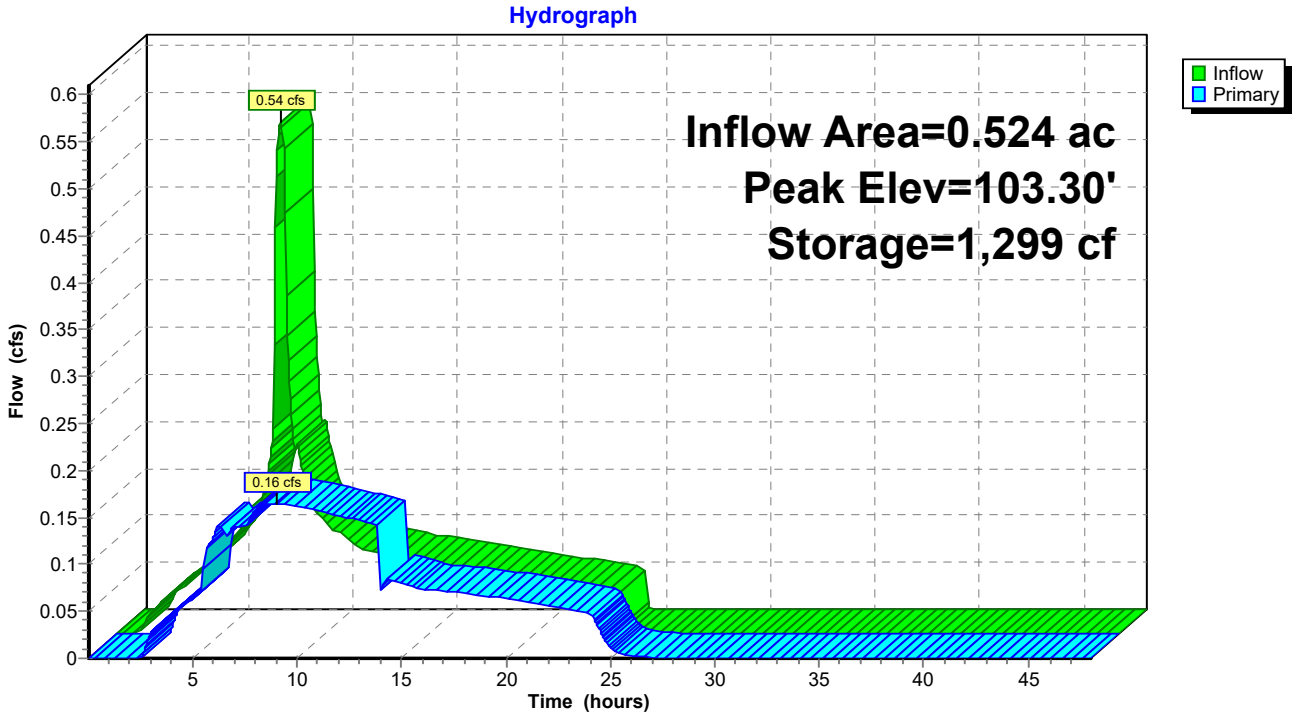
Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,743 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	1,186	0.0	0	0
101.00	1,186	30.0	356	356
102.50	1,186	0.0	0	356
103.50	1,186	100.0	1,186	1,542
103.67	1,186	100.0	202	1,743

Device	Routing	Invert	Outlet Devices
#1	Device 2	103.50'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	100.33'	**4.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 100.33' / 100.28' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#3	Device 2	100.33'	**2.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 100.33' / 100.28' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.02 sf

Primary OutFlow Max=0.16 cfs @ 9.00 hrs HW=103.29' (Free Discharge)
└**2=Culvert** (Passes 0.16 cfs of 0.70 cfs potential flow)
  ├**1=Orifice/Grate** (Controls 0.00 cfs)
  └**3=Culvert** (Barrel Controls 0.16 cfs @ 7.56 fps)

Pond 4P: PA-A


Hydrograph
Inflow
Primary
0.54 cfs
0.16 cfs
Inflow Area=0.524 ac
Peak Elev=103.30'
Storage=1,299 cf
Flow (cfs)
Time (hours)
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
0.6
5
10
15
20
25
30
35
40
45

Time span=0.01-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: WESET Runoff Area=23,931 sf 85.75% Impervious Runoff Depth=4.59"
Tc=5.0 min CN=96 Runoff=0.65 cfs 0.210 af

Subcatchment3S: EAST Runoff Area=22,812 sf 85.05% Impervious Runoff Depth=4.59"
Tc=5.0 min CN=96 Runoff=0.62 cfs 0.200 af

Pond 2P: PA-A Peak Elev=104.12' Storage=1,299 cf Inflow=0.65 cfs 0.210 af
Outflow=0.27 cfs 0.211 af

Pond 4P: PA-A Peak Elev=103.54' Storage=1,585 cf Inflow=0.62 cfs 0.200 af
Outflow=0.18 cfs 0.197 af

Total Runoff Area = 1.073 ac Runoff Volume = 0.411 af Average Runoff Depth = 4.59"
14.59% Pervious = 0.157 ac 85.41% Impervious = 0.916 ac

Summary for Subcatchment 1S: WESET

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

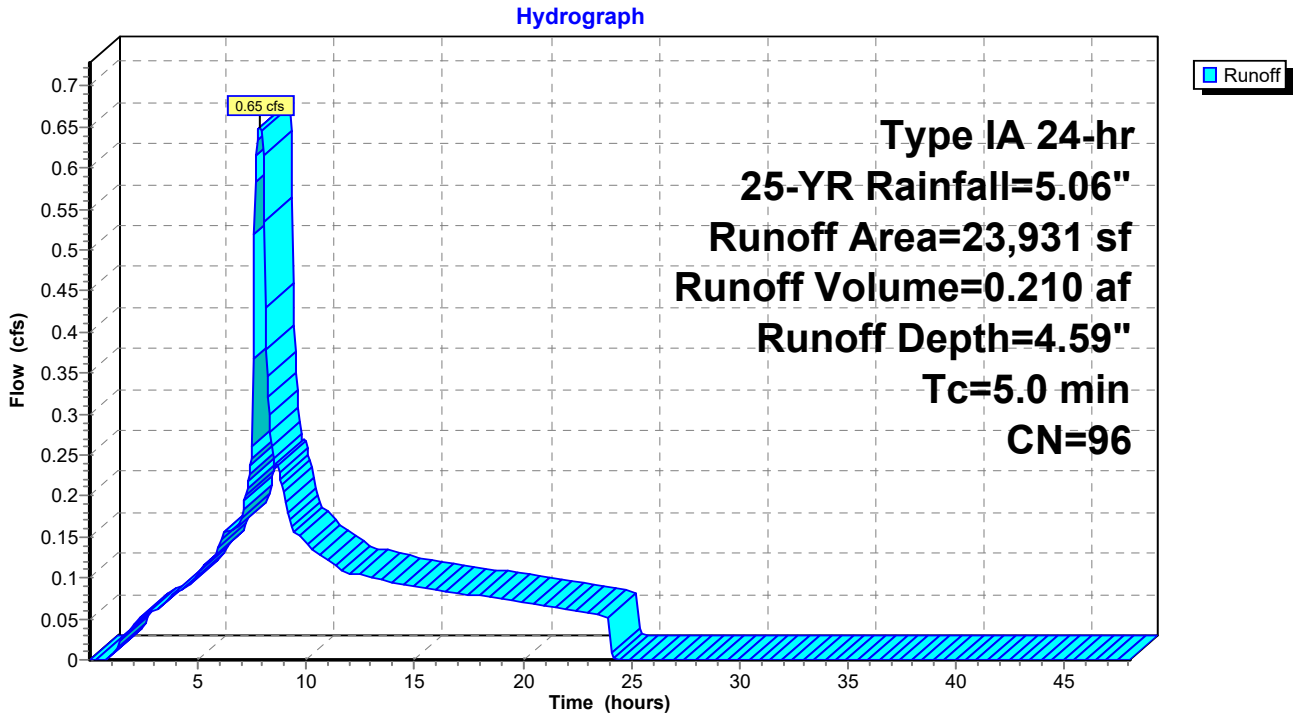
Runoff = 0.65 cfs @ 7.86 hrs, Volume= 0.210 af, Depth= 4.59"
Routed to Pond 2P : PA-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YR Rainfall=5.06"

	Area (sf)	CN	Description
*	20,521	98	
	3,410	84	50-75% Grass cover, Fair, HSG D
	23,931	96	Weighted Average
	3,410		14.25% Pervious Area
	20,521		85.75% Impervious Area

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

Subcatchment 1S: WESET



Summary for Subcatchment 3S: EAST

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

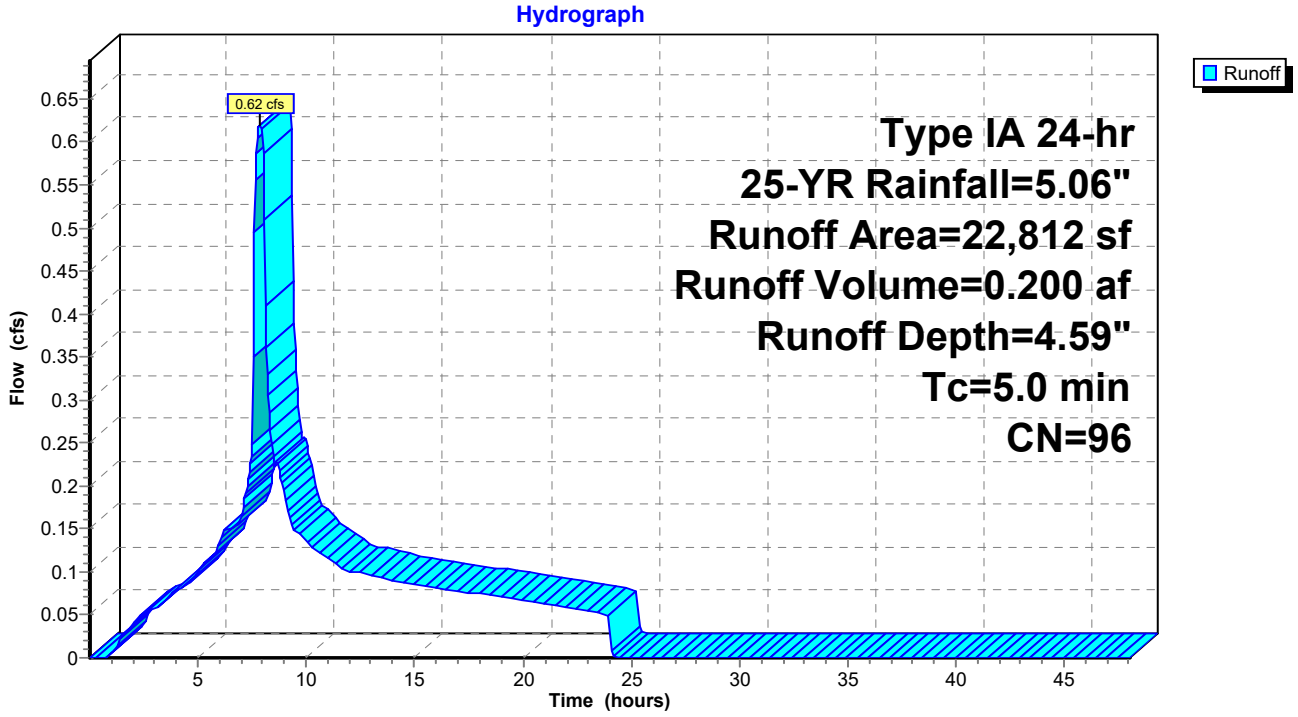
Runoff = 0.62 cfs @ 7.86 hrs, Volume= 0.200 af, Depth= 4.59"
Routed to Pond 4P : PA-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YR Rainfall=5.06"

	Area (sf)	CN	Description
*	19,401	98	
	3,411	84	50-75% Grass cover, Fair, HSG D
	22,812	96	Weighted Average
	3,411		14.95% Pervious Area
	19,401		85.05% Impervious Area

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

Subcatchment 3S: EAST



Summary for Pond 2P: PA-A

Inflow Area = 0.549 ac, 85.75% Impervious, Inflow Depth = 4.59" for 25-YR event
Inflow = 0.65 cfs @ 7.86 hrs, Volume= 0.210 af
Outflow = 0.27 cfs @ 8.38 hrs, Volume= 0.211 af, Atten= 58%, Lag= 31.0 min
Primary = 0.27 cfs @ 8.38 hrs, Volume= 0.211 af

Routing by Stor-Ind method, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs / 2
Peak Elev= 104.12' @ 8.38 hrs Surf.Area= 677 sf Storage= 1,299 cf

Plug-Flow detention time= 53.1 min calculated for 0.210 af (100% of inflow)
Center-of-Mass det. time= 55.8 min (728.0 - 672.2)

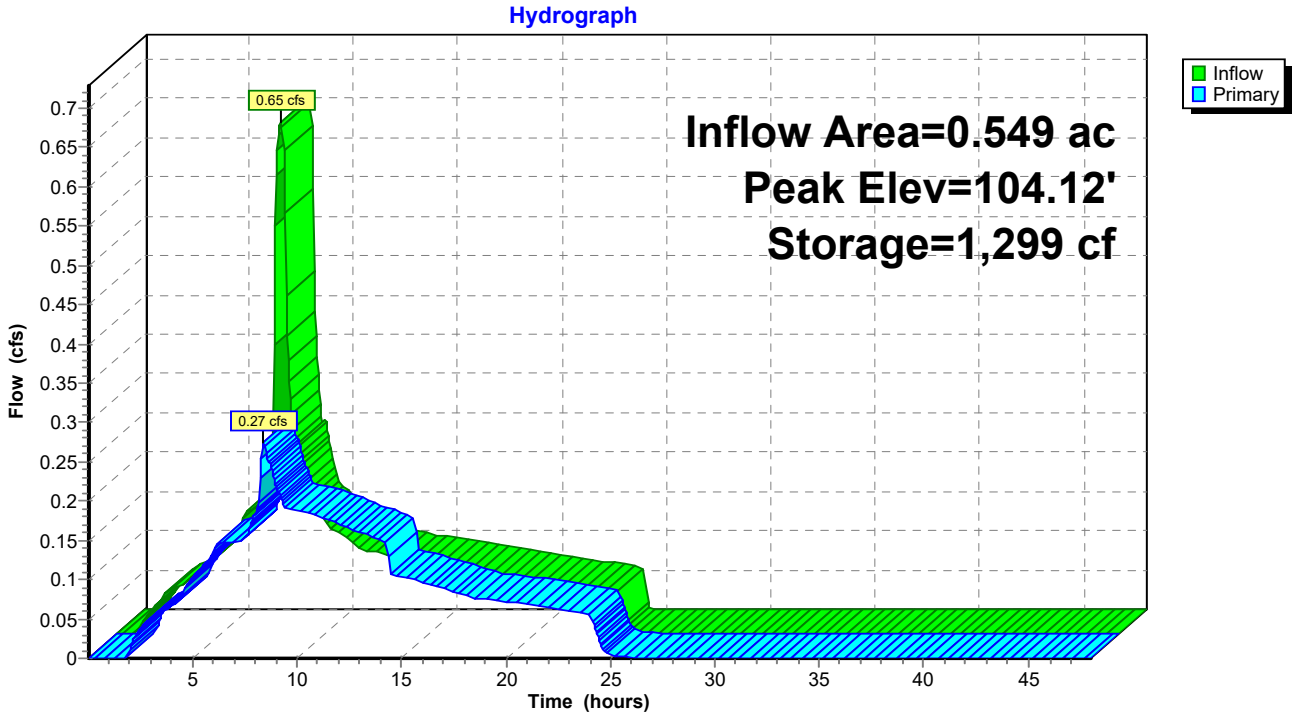
Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,327 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	677	0.0	0	0
101.00	677	30.0	203	203
102.50	677	0.0	0	203
104.00	677	100.0	1,016	1,219
104.16	677	100.0	108	1,327

Device	Routing	Invert	Outlet Devices
#1	Device 2	104.00'	**18.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	100.33'	**4.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 100.33' / 100.28' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#3	Device 2	100.33'	**2.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 100.33' / 100.28' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.02 sf

Primary OutFlow Max=0.27 cfs @ 8.38 hrs HW=104.12' (Free Discharge)
└**2=Culvert** (Passes 0.27 cfs of 0.80 cfs potential flow)
  ├**1=Orifice/Grate** (Orifice Controls 0.08 cfs @ 1.17 fps)
  └**3=Culvert** (Barrel Controls 0.20 cfs @ 8.94 fps)

Pond 2P: PA-A


Hydrograph
Inflow
Primary
0.65 cfs
0.27 cfs
Inflow Area=0.549 ac
Peak Elev=104.12'
Storage=1,299 cf
Flow (cfs)
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
0.6
0.65
0.7
5
10
15
20
25
30
35
40
45
Time (hours)

Summary for Pond 4P: PA-A

Inflow Area = 0.524 ac, 85.05% Impervious, Inflow Depth = 4.59" for 25-YR event
Inflow = 0.62 cfs @ 7.86 hrs, Volume= 0.200 af
Outflow = 0.18 cfs @ 9.06 hrs, Volume= 0.197 af, Atten= 71%, Lag= 72.2 min
Primary = 0.18 cfs @ 9.06 hrs, Volume= 0.197 af

Routing by Stor-Ind method, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs / 2
Peak Elev= 103.54' @ 9.06 hrs Surf.Area= 1,186 sf Storage= 1,585 cf

Plug-Flow detention time= 96.0 min calculated for 0.197 af (98% of inflow)
Center-of-Mass det. time= 82.4 min (754.6 - 672.2)

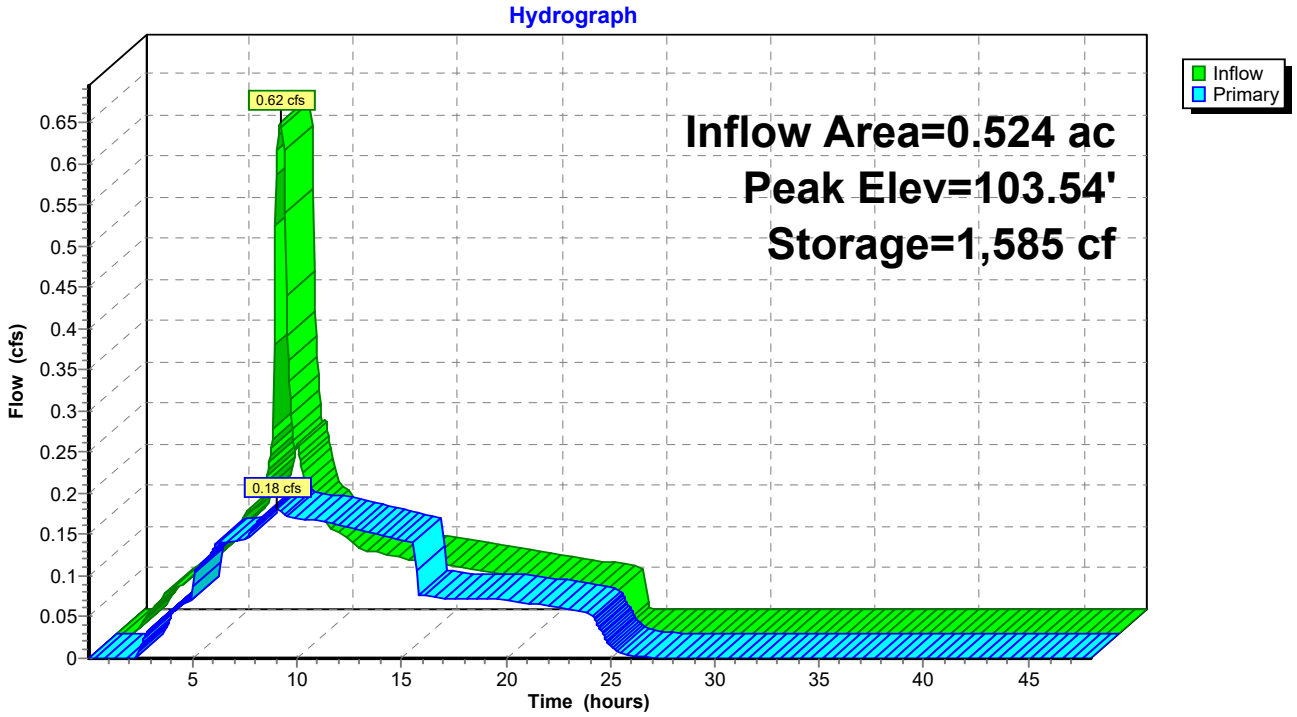
Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,743 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	1,186	0.0	0	0
101.00	1,186	30.0	356	356
102.50	1,186	0.0	0	356
103.50	1,186	100.0	1,186	1,542
103.67	1,186	100.0	202	1,743

Device	Routing	Invert	Outlet Devices
#1	Device 2	103.50'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	100.33'	**4.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 100.33' / 100.28' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#3	Device 2	100.33'	**2.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 100.33' / 100.28' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.02 sf

Primary OutFlow Max=0.18 cfs @ 9.06 hrs HW=103.54' (Free Discharge)
└**2=Culvert** (Passes 0.18 cfs of 0.73 cfs potential flow)
  ├**1=Orifice/Grate** (Orifice Controls 0.01 cfs @ 0.65 fps)
  └**3=Culvert** (Barrel Controls 0.17 cfs @ 7.87 fps)

Pond 4P: PA-A


Hydrograph
Inflow
Primary
Inflow Area=0.524 ac
Peak Elev=103.54'
Storage=1,585 cf
0.62 cfs
0.18 cfs
Flow (cfs)
Time (hours)
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
0.6
0.65
5
10
15
20
25
30
35
40
45

Time span=0.01-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: WESET Runoff Area=23,931 sf 85.75% Impervious Runoff Depth=0.48"
Tc=5.0 min CN=96 Runoff=0.07 cfs 0.022 af

Subcatchment3S: EAST Runoff Area=22,812 sf 85.05% Impervious Runoff Depth=0.48"
Tc=5.0 min CN=96 Runoff=0.06 cfs 0.021 af

Pond 2P: PA-A Peak Elev=100.66' Storage=135 cf Inflow=0.07 cfs 0.022 af
Outflow=0.05 cfs 0.020 af

Pond 4P: PA-A Peak Elev=100.53' Storage=189 cf Inflow=0.06 cfs 0.021 af
Outflow=0.03 cfs 0.018 af

Total Runoff Area = 1.073 ac Runoff Volume = 0.043 af Average Runoff Depth = 0.48"
14.59% Pervious = 0.157 ac 85.41% Impervious = 0.916 ac

Summary for Subcatchment 1S: WESET

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

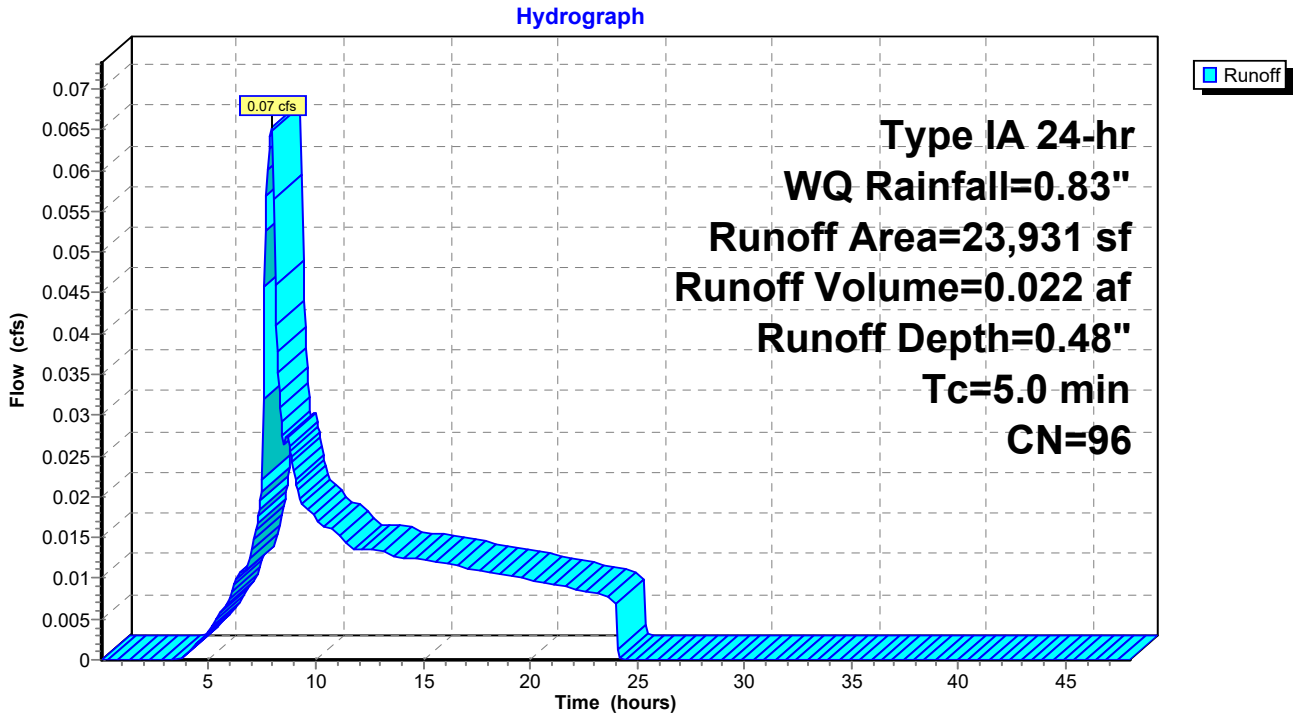
Runoff = 0.07 cfs @ 7.94 hrs, Volume= 0.022 af, Depth= 0.48"
Routed to Pond 2P : PA-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs
Type IA 24-hr WQ Rainfall=0.83"

	Area (sf)	CN	Description
*	20,521	98	
	3,410	84	50-75% Grass cover, Fair, HSG D
	23,931	96	Weighted Average
	3,410		14.25% Pervious Area
	20,521		85.75% Impervious Area

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

Subcatchment 1S: WESET



Summary for Subcatchment 3S: EAST

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

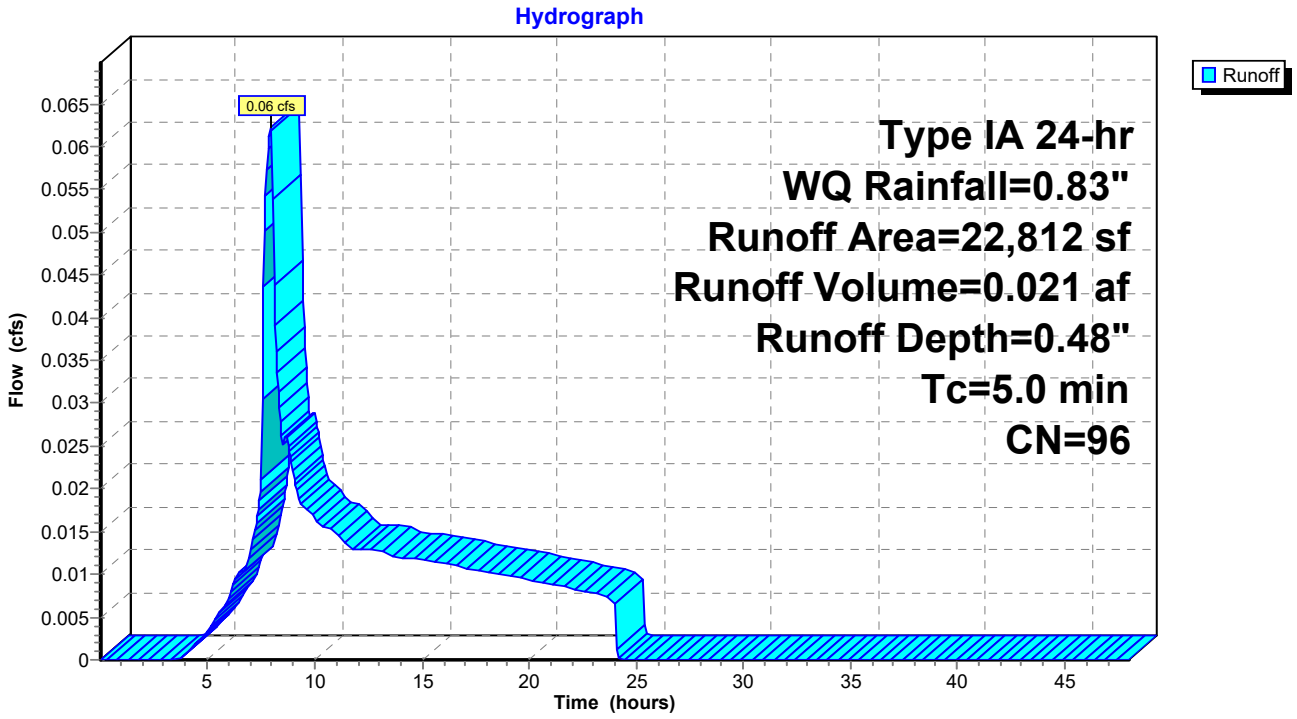
Runoff = 0.06 cfs @ 7.94 hrs, Volume= 0.021 af, Depth= 0.48"
Routed to Pond 4P : PA-A

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs
Type IA 24-hr WQ Rainfall=0.83"

	Area (sf)	CN	Description
*	19,401	98	
	3,411	84	50-75% Grass cover, Fair, HSG D
	22,812	96	Weighted Average
	3,411		14.95% Pervious Area
	19,401		85.05% Impervious Area

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

Subcatchment 3S: EAST



Summary for Pond 2P: PA-A

Inflow Area = 0.549 ac, 85.75% Impervious, Inflow Depth = 0.48" for WQ event
Inflow = 0.07 cfs @ 7.94 hrs, Volume= 0.022 af
Outflow = 0.05 cfs @ 8.11 hrs, Volume= 0.020 af, Atten= 28%, Lag= 10.3 min
Primary = 0.05 cfs @ 8.11 hrs, Volume= 0.020 af

Routing by Stor-Ind method, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs / 2
Peak Elev= 100.66' @ 8.11 hrs Surf.Area= 677 sf Storage= 135 cf

Plug-Flow detention time= 104.0 min calculated for 0.020 af (93% of inflow)
Center-of-Mass det. time= 58.4 min (834.6 - 776.2)

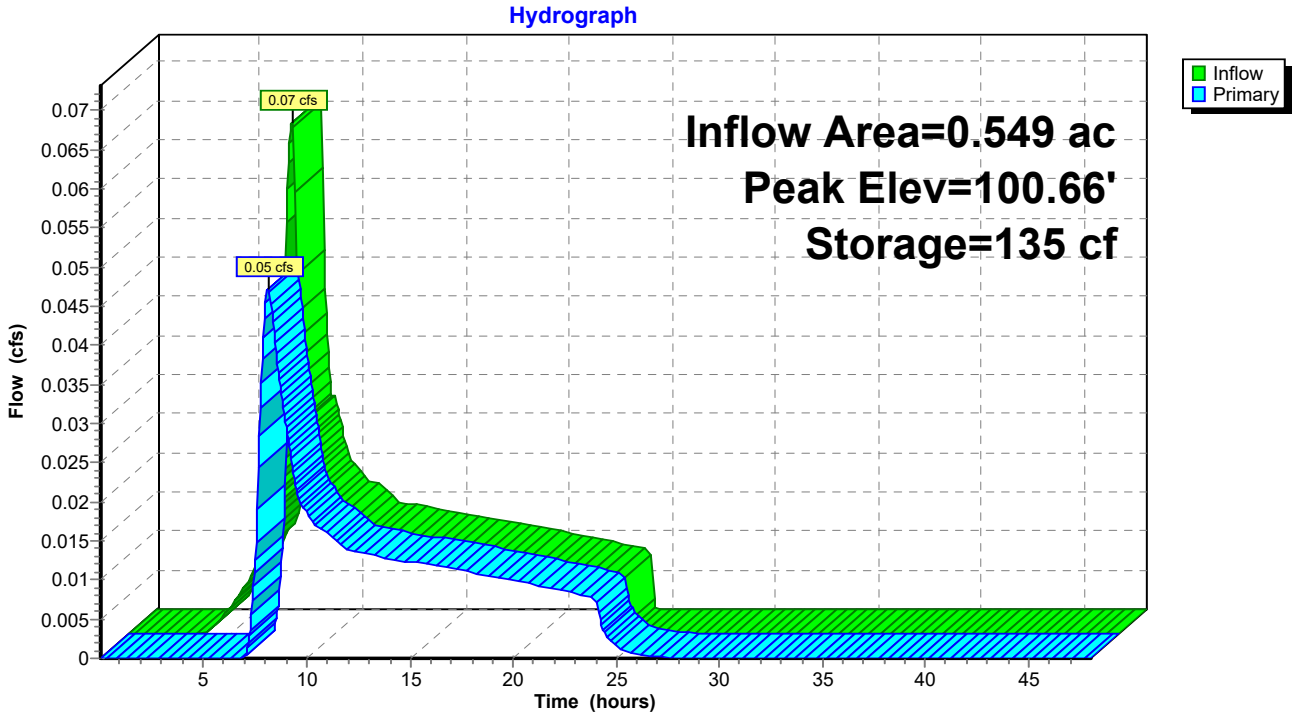
Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,327 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	677	0.0	0	0
101.00	677	30.0	203	203
102.50	677	0.0	0	203
104.00	677	100.0	1,016	1,219
104.16	677	100.0	108	1,327

Device	Routing	Invert	Outlet Devices
#1	Device 2	104.00'	**18.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	100.33'	**4.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 100.33' / 100.28' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#3	Device 2	100.33'	**2.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 100.33' / 100.28' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.02 sf

Primary OutFlow Max=0.05 cfs @ 8.11 hrs HW=100.66' (Free Discharge)
└**2=Culvert** (Passes 0.05 cfs of 0.15 cfs potential flow)
  ├**1=Orifice/Grate** (Controls 0.00 cfs)
  └**3=Culvert** (Barrel Controls 0.05 cfs @ 2.17 fps)

Pond 2P: PA-A


Hydrograph
Inflow
Primary
0.07 cfs
0.05 cfs
Inflow Area=0.549 ac
Peak Elev=100.66'
Storage=135 cf
Flow (cfs)
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04
0.045
0.05
0.055
0.06
0.065
0.07
5
10
15
20
25
30
35
40
45
Time (hours)

Summary for Pond 4P: PA-A

Inflow Area = 0.524 ac, 85.05% Impervious, Inflow Depth = 0.48" for WQ event
Inflow = 0.06 cfs @ 7.94 hrs, Volume= 0.021 af
Outflow = 0.03 cfs @ 8.33 hrs, Volume= 0.018 af, Atten= 51%, Lag= 23.5 min
Primary = 0.03 cfs @ 8.33 hrs, Volume= 0.018 af

Routing by Stor-Ind method, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs / 2
Peak Elev= 100.53' @ 8.33 hrs Surf.Area= 1,186 sf Storage= 189 cf

Plug-Flow detention time= 188.3 min calculated for 0.018 af (87% of inflow)
Center-of-Mass det. time= 107.6 min (883.8 - 776.2)

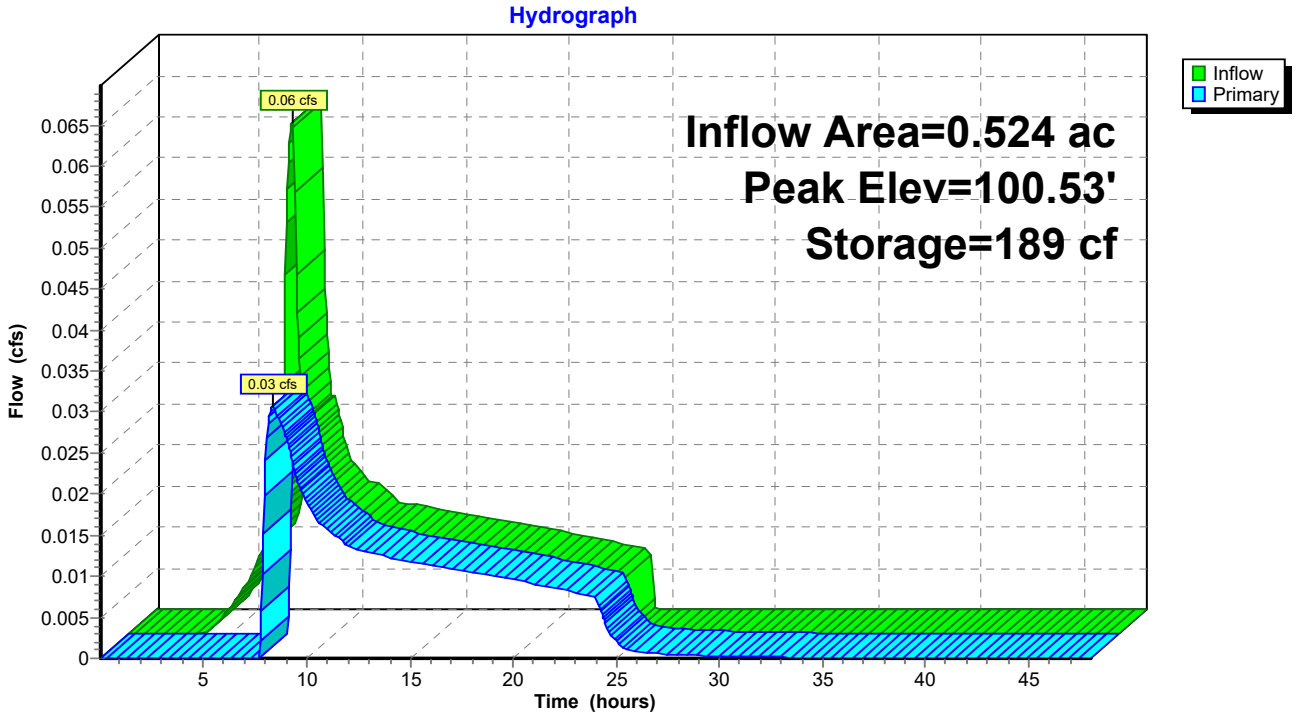
Volume	Invert	Avail.Storage	Storage Description
#1	100.00'	1,743 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
100.00	1,186	0.0	0	0
101.00	1,186	30.0	356	356
102.50	1,186	0.0	0	356
103.50	1,186	100.0	1,186	1,542
103.67	1,186	100.0	202	1,743

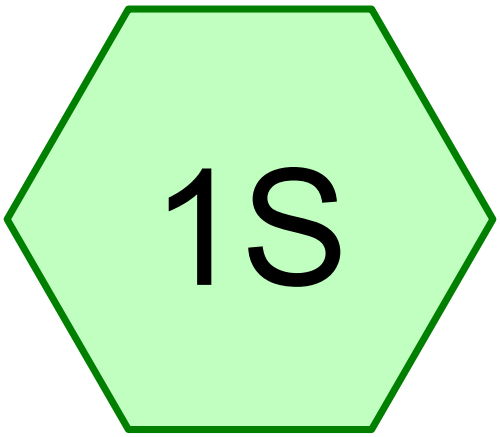
Device	Routing	Invert	Outlet Devices
#1	Device 2	103.50'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	100.33'	**4.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 100.33' / 100.28' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 0.09 sf
#3	Device 2	100.33'	**2.0" Round Culvert** L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 100.33' / 100.28' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.02 sf

Primary OutFlow Max=0.03 cfs @ 8.33 hrs HW=100.53' (Free Discharge)
└**2=Culvert** (Passes 0.03 cfs of 0.07 cfs potential flow)
  ├**1=Orifice/Grate** (Controls 0.00 cfs)
  └**3=Culvert** (Barrel Controls 0.03 cfs @ 1.50 fps)

Pond 4P: PA-A


Hydrograph
Inflow
Primary
0.06 cfs
0.03 cfs
Inflow Area=0.524 ac
Peak Elev=100.53'
Storage=189 cf
Flow (cfs)
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04
0.045
0.05
0.055
0.06
0.065
5
10
15
20
25
30
35
40
45
Time (hours)

PRE-DEVELOPMENT



EX

Subcat Reach Pond Link

Routing Diagram for Pre Development HYDROCAD
Prepared by 7 Oaks Engineering, Inc, Printed 7/11/2024

Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-YR	Type IA 24-hr		Default	24.00	1	3.46	2
2	10-YR	Type IA 24-hr		Default	24.00	1	4.48	2
3	25-YR	Type IA 24-hr		Default	24.00	1	5.06	2
4	WQ	Type IA 24-hr		Default	24.00	1	0.83	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.995	80	>75% Grass cover, Good, HSG D (1S)
0.995	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.995	HSG D	1S
0.000	Other	
0.995		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.995	0.000	0.995	>75% Grass cover, Good	1S
0.000	**0.000**	**0.000**	**0.995**	**0.000**	**0.995**	**TOTAL AREA**	

Time span=0.01-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: EX Runoff Area=43,332 sf 0.00% Impervious Runoff Depth=1.60"
Flow Length=150' Slope=0.0200 '/' Tc=13.0 min CN=80 Runoff=0.36 cfs 0.133 af

Total Runoff Area = 0.995 ac Runoff Volume = 0.133 af Average Runoff Depth = 1.60"
100.00% Pervious = 0.995 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: EX

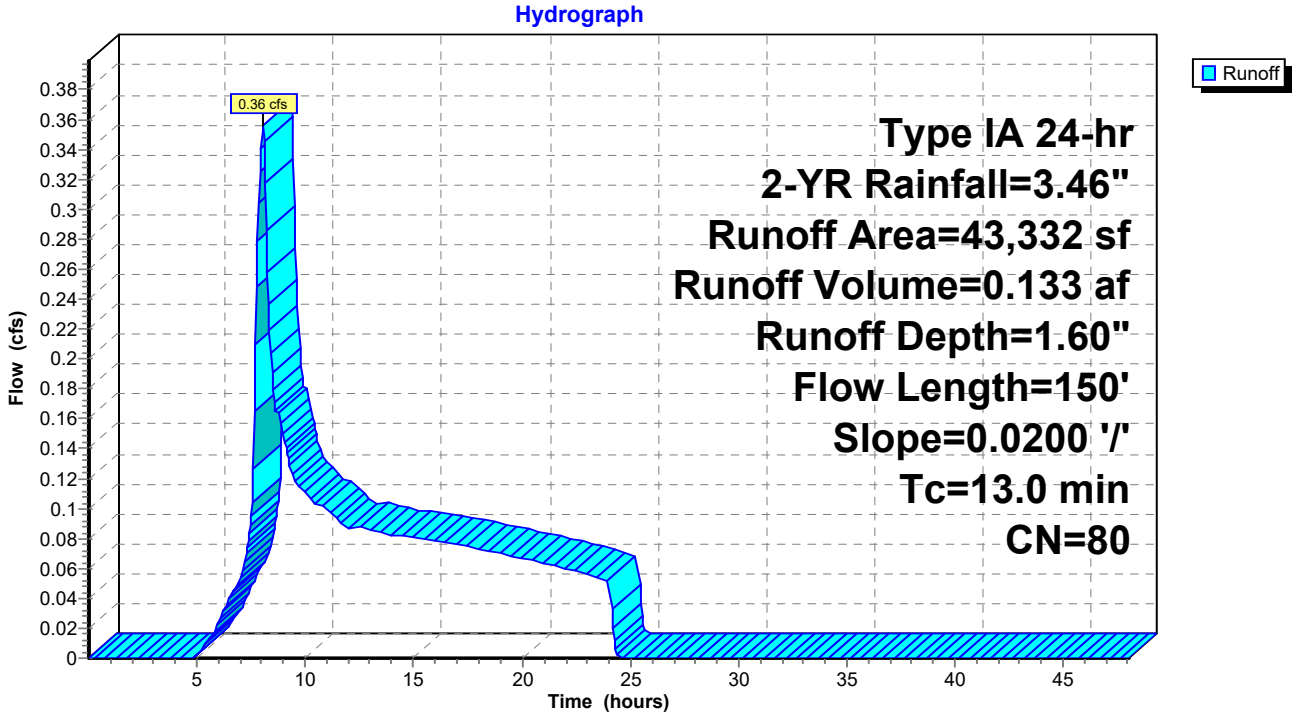
Runoff = 0.36 cfs @ 8.05 hrs, Volume= 0.133 af, Depth= 1.60"
Routed to nonexistent node 2P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs
Type IA 24-hr 2-YR Rainfall=3.46"

Area (sf)	CN	Description
43,332	80	>75% Grass cover, Good, HSG D
43,332		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	150	0.0200	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.46"

Subcatchment 1S: EX



Time span=0.01-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: EX Runoff Area=43,332 sf 0.00% Impervious Runoff Depth=2.44"
Flow Length=150' Slope=0.0200 '/' Tc=13.0 min CN=80 Runoff=0.58 cfs 0.203 af

Total Runoff Area = 0.995 ac Runoff Volume = 0.203 af Average Runoff Depth = 2.44"
100.00% Pervious = 0.995 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: EX

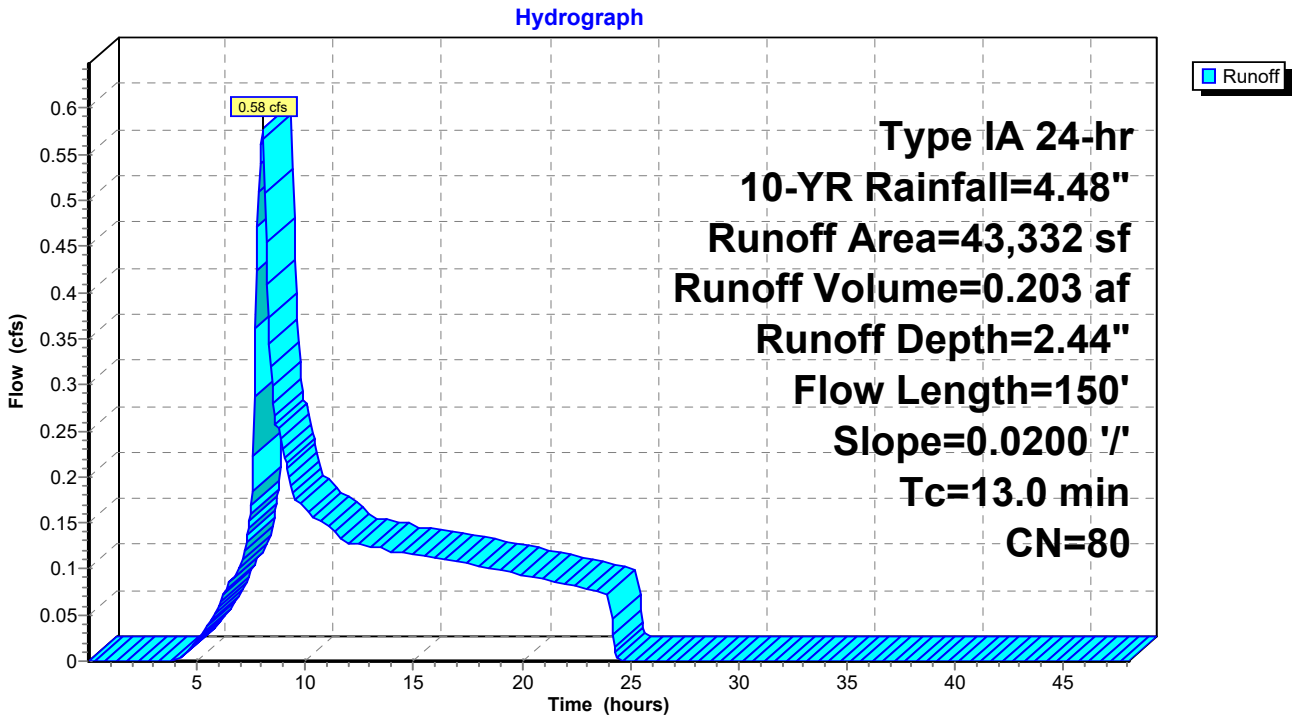
Runoff = 0.58 cfs @ 8.04 hrs, Volume= 0.203 af, Depth= 2.44"
Routed to nonexistent node 2P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs
Type IA 24-hr 10-YR Rainfall=4.48"

Area (sf)	CN	Description
43,332	80	>75% Grass cover, Good, HSG D
43,332		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	150	0.0200	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.46"

Subcatchment 1S: EX



Time span=0.01-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: EX Runoff Area=43,332 sf 0.00% Impervious Runoff Depth=2.95"
Flow Length=150' Slope=0.0200 '/' Tc=13.0 min CN=80 Runoff=0.71 cfs 0.244 af

Total Runoff Area = 0.995 ac Runoff Volume = 0.244 af Average Runoff Depth = 2.95"
100.00% Pervious = 0.995 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: EX

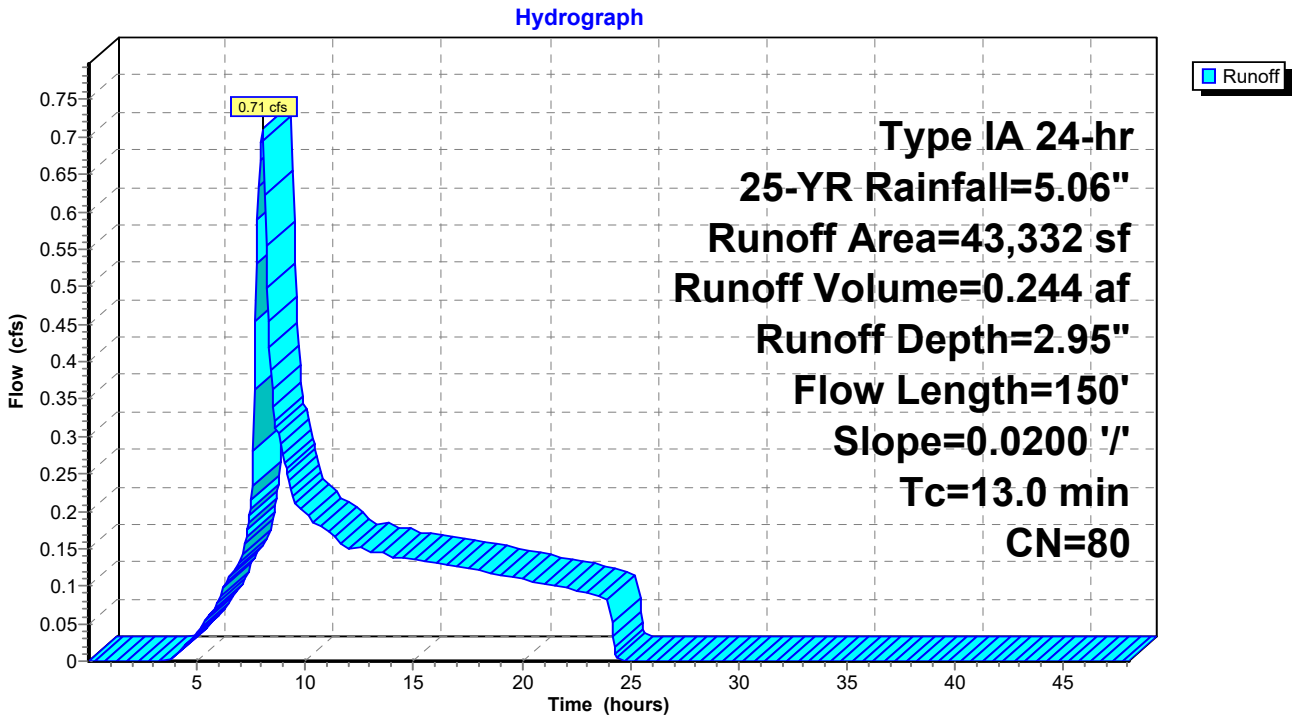
Runoff = 0.71 cfs @ 8.04 hrs, Volume= 0.244 af, Depth= 2.95"
Routed to nonexistent node 2P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs
Type IA 24-hr 25-YR Rainfall=5.06"

Area (sf)	CN	Description
43,332	80	>75% Grass cover, Good, HSG D
43,332		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	150	0.0200	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.46"

Subcatchment 1S: EX



Time span=0.01-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: EX Runoff Area=43,332 sf 0.00% Impervious Runoff Depth=0.04"
Flow Length=150' Slope=0.0200 '/' Tc=13.0 min CN=80 Runoff=0.00 cfs 0.003 af

Total Runoff Area = 0.995 ac Runoff Volume = 0.003 af Average Runoff Depth = 0.04"
100.00% Pervious = 0.995 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: EX

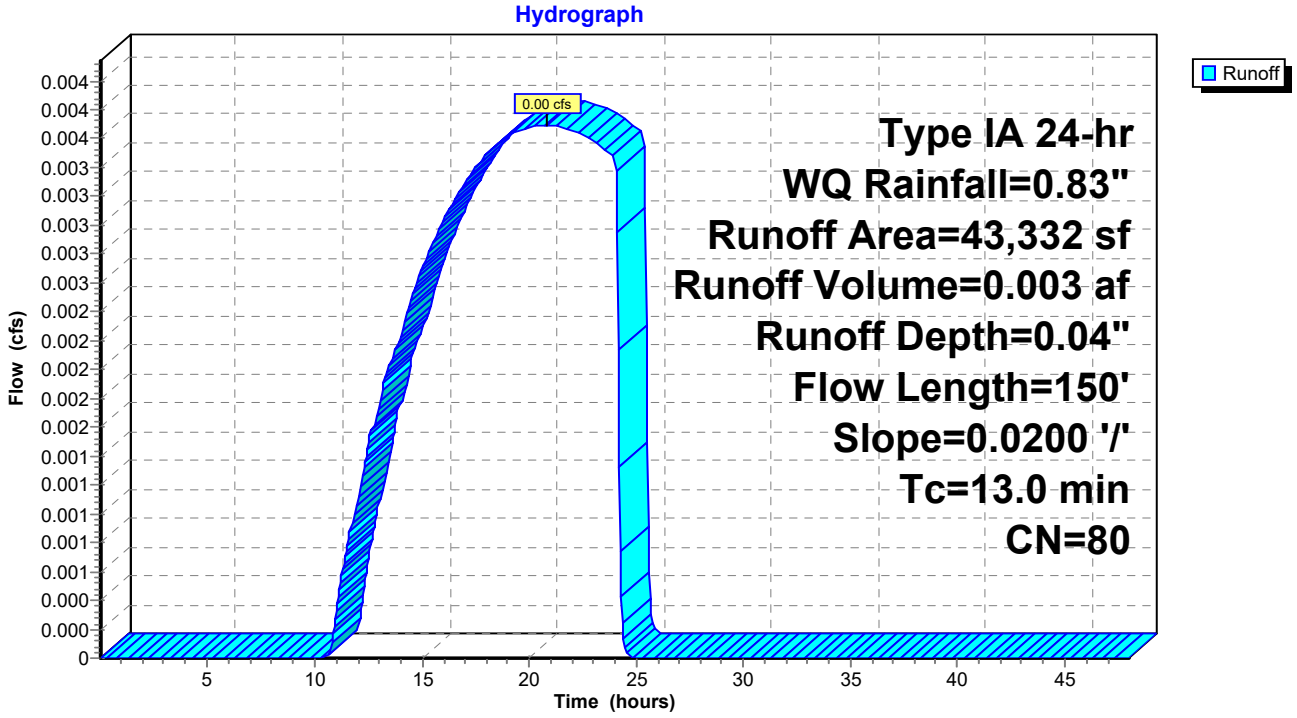
Runoff = 0.00 cfs @ 20.86 hrs, Volume= 0.003 af, Depth= 0.04"
Routed to nonexistent node 2P

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.01-48.01 hrs, dt= 0.05 hrs
Type IA 24-hr WQ Rainfall=0.83"

Area (sf)	CN	Description
43,332	80	>75% Grass cover, Good, HSG D
43,332		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.0	150	0.0200	0.19		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.46"

Subcatchment 1S: EX



APPENDIX C – PLANS

APPENDIX D – GEOTECHNICAL REPORT

Lane County Area, Oregon (OR637)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
131E	Waldport fine sand, 12 to 30 percent slopes	0.0	1.6%
140	Yaquina loamy fine sand	1.8	87.3%
141	Yaquina-Urban land complex	0.2	11.1%
Totals for Area of Interest		**2.0**	**100.0%**

USDA Soil Map

May 28, 2024

Lenity Architecture
3150 Kettle Court SE
Salem, OR 97301

Attn: David Hulbert, Architect, Project Manager

Subject: **MEMO: Geotechnical Report Update**
Proposed Gas Station & Convenience Store
Tax Lot 6800 of Tax Map 18122322
SE Corner of US Highway 101 & 36th Street
Florence, Lane County, Oregon

GNN Project No.: 223-1642-1

Reference: GN Northern, Inc., *Geotechnical Site Investigation Report, New Dollar General Store, Southeast Corner of 36th Street and Highway 101, Florence, Lane County, Oregon*, GNN Project No. 223-1642, dated May 18, 2023.

Dear Mr. Hulbert,

As requested, GN Northern, Inc. [GNN] has prepared this memorandum letter for the purpose of updating the referenced *Geotechnical Site Investigation Report* and to validate the recommendations and soil design parameters contained therein. You provided notice to proceed in the form of a signed document (Authorization to Proceed for US Market – 35th/US101 Florence, OR) dated 5/6/2024.

Except the additional recommendations presented in this memo, the findings and recommendations within the above referenced Geotechnical Site Investigation Report remain valid for design and construction of the planned gas station and convenience store.

The original geotechnical investigation at the subject site was completed for development of a new Dollar General store. Based on the *Architectural Site Plan* you provided via email on March 18, 2024, we understand that proposed development at the subject site will now consist of a gas station including four gas pumps with a 46'x50' overhead canopy in the western portion and a 5,856 SF convenience store & coffee shop building in the eastern portion. Site improvements will include associated drive-lanes and

parking spaces, along with the installation of two new underground storage tanks (USTs) for gas/diesel north of the fuel islands. Based on our experience with similar projects, we anticipate maximum wall loads and column loads to be less than or similar to those previously assumed.

As part of the previously performed subsurface investigation, GNN completed seven (7) exploratory borings and two (2) infiltration tests. The attached updated *Site Exploration Plan* (Figure 2A) shows these points of exploration/testing superimposed on the new site plan.

The following additional recommendations and design parameters apply to the planned development:

Canopy Foundations Uplift Resistance: Uplift forces on spread footings can be resisted by the weight of the footings and the backfill soil material that is placed over the footings. It is recommended that the backfill soil weight considered to resist uplift loads be limited to that immediately above the footings. A total soil unit weight of 115 pcf may be used for the onsite sandy soil placed as compacted engineered backfill atop the footings in accordance with the recommendations of the referenced report. An appropriate factor of safety shall be used for calculation of uplift resistance.

The footings should be founded below an imaginary line projecting at a 1-horizontal to 1-vertical (1H:1V) slope from the base of any adjacent parallel utility trenches.

UST Excavation Dewatering: Due to groundwater encountered at depths ranging from approximately 6.25 to 8 feet BGS within the borings, dewatering of the UST excavations will be necessary. The dewatering system should consist of sloping the excavated subgrade to one side of the excavation, and digging of a shallow sump at that corner. A perforated drum should then be placed in the sump excavation. Pea gravel, washed rock or crushed rock should then be packed around the perforated drum and the sump excavation. It shall be noted that groundwater is expected to recharge at a rapid rate, therefore, based on the soil type and hydrogeologic conditions, a high-capacity pump should be employed. The high-capacity pump should be placed in this sump and the water should be pumped out of the excavation to a suitable outlet. The pumped water should be filtered through hay bales or filter fabric before it is introduced into the drainage outlet.

UST Anchoring: Installation of USTs shall be in strict conformance with the tank manufacturer's requirements and specifications. All USTs should be adequately anchored to counteract buoyant forces acting upon the tanks due to the groundwater. The USTs should be fastened with straps anchored in

concrete deadman beams on both sides of the proposed tanks. The deadman anchors should be designed by a qualified structural engineer to counteract the buoyant forces acting upon the USTs empty tank conditions. Seismic design shall be completed in accordance with ASCE 7-22 (American Society of Civil Engineers, 2022). Adequate containment should be provided around the new USTs and UST intake valves to mitigate spills contributing to the contamination of the groundwater.

Trench Backfill: Trench backfill placed beneath, adjacent to, and for at least 2 feet above utility lines (e.g., the pipe zone) should consist of well-graded, granular material with a maximum particle size of 1.5 inches, have less than 10% by weight passing the U.S. Standard No. 200 Sieve, and meet Oregon Department of Transportation Standard Construction Specifications, 2021 version (ODOT SS) 405.12 - Pipe Zone Bedding. The pipe zone backfill should be compacted to at least 90% of the maximum dry density, as determined by ASTM D 1557 or as required by the pipe manufacturer or local building department.

Within roadway alignments or beneath building pad, the remainder of the trench backfill should consist of well-graded, granular material with a maximum particle size of 2.5 inches, have less than 10% by weight passing the U.S. Standard No. 200 Sieve, and meet ODOT SS 405.14 - Trench Backfill, Class B. This material should be compacted to at least 92% of the maximum dry density as determined by ASTM D1557, or as required by the pipe manufacturer or local building department. The upper 2-feet of the trench backfill should be compacted to at least 95% of the maximum dry density as determined by ASTM D1557.

Outside of structural improvement areas (e.g., roadway alignments or building pads), trench backfill placed above the pipe zone may consist of general fill materials free of organics and materials over 5 inches in size, and meet ODOT SS 405.14 - Trench Backfill, Class A, C, or D. This general trench backfill should be compacted to at least 90% of the maximum dry density, as determined by ASTM D1557 or as required by the pipe manufacturer or local building department.

Rigid Concrete (PCC) Pavement: Concrete pavement design recommendations are based on an assumed modulus of rupture of 500 psi and a minimum compressive strength of 4,000 psi for the concrete. Concrete mix shall be 1½" max. aggregate and use moderate exposure. Reinforcing steel shall be ASTM A615 Grade 40 and consist of #4's at 18" each-way in center of the section (special care

shall be taken during construction to locate the reinforcing steel in the center of the mat). Equivalent welded wire mesh may be substituted if approved by the Geotechnical Engineer or Civil Engineer. Construction joints (sawcuts) shall be 1/8" wide and T/4 deep and provided at a maximum of 15' spacing in each direction. 15' spacing is appropriate for 1" or 1 ½" aggregate. If ¾" aggregate is used, 10' spacing shall be used instead. The recommended pavement design sections are based on the assumption that subgrade preparation and fill placement are completed in accordance with the recommendations presented in the above referenced geotechnical report. Crushed base aggregate shall meet the grading requirements of ODOT SS 02630 and shall be compacted to at least 95% of the maximum dry density as determined by ASTM D1557 method. The material and construction procedures shall be in accordance with Oregon Department of Transportation Standard Specifications for Construction for Concrete Pavement.

Recommended Concrete Pavement Sections

Traffic	Crushed Aggregate Base Course Thickness (inches)	Concrete Paving Thickness (inches)
Standard Duty	6	5
Heavy Duty	6	8

Concrete Flatwork/ Pathways: Concrete sidewalk (pathways) sections shall be 4" portland cement concrete. To impede the wicking of moisture beneath pathways, we recommend a 4-inch layer of ¾" minus crushed aggregate be placed. Material shall meet the grading requirements of ODOT SS 02630 and contain less than 5% passing the No. 200 sieve size. The crushed rock material shall be compacted to at least 95% of the maximum dry density as determined by ASTM D1557 method. Prior to placing the crushed aggregate fill, the subgrade soil shall be proof rolled to a dense/non-yielding surface and to at least 95% of the maximum dry density as determined by ASTM D1557 method. Any areas pumping during proof-compacted shall be over-excavated and re-compacted.

It shall be noted that the project site is mapped within an area identified with a 'High' risk for *Earthquake Liquefaction Hazard*. Based on the findings of our site exploration and review of available geologic data, the onsite soils are susceptible to liquefaction. The scope of our original geotechnical study did not include a site- specific liquefaction analysis required to fully evaluate the risk of liquefaction induced settlement at the project site. The owner/developer should accept the risk of liquefaction settlement and angular distortion of the building pad/foundations from a seismic event.

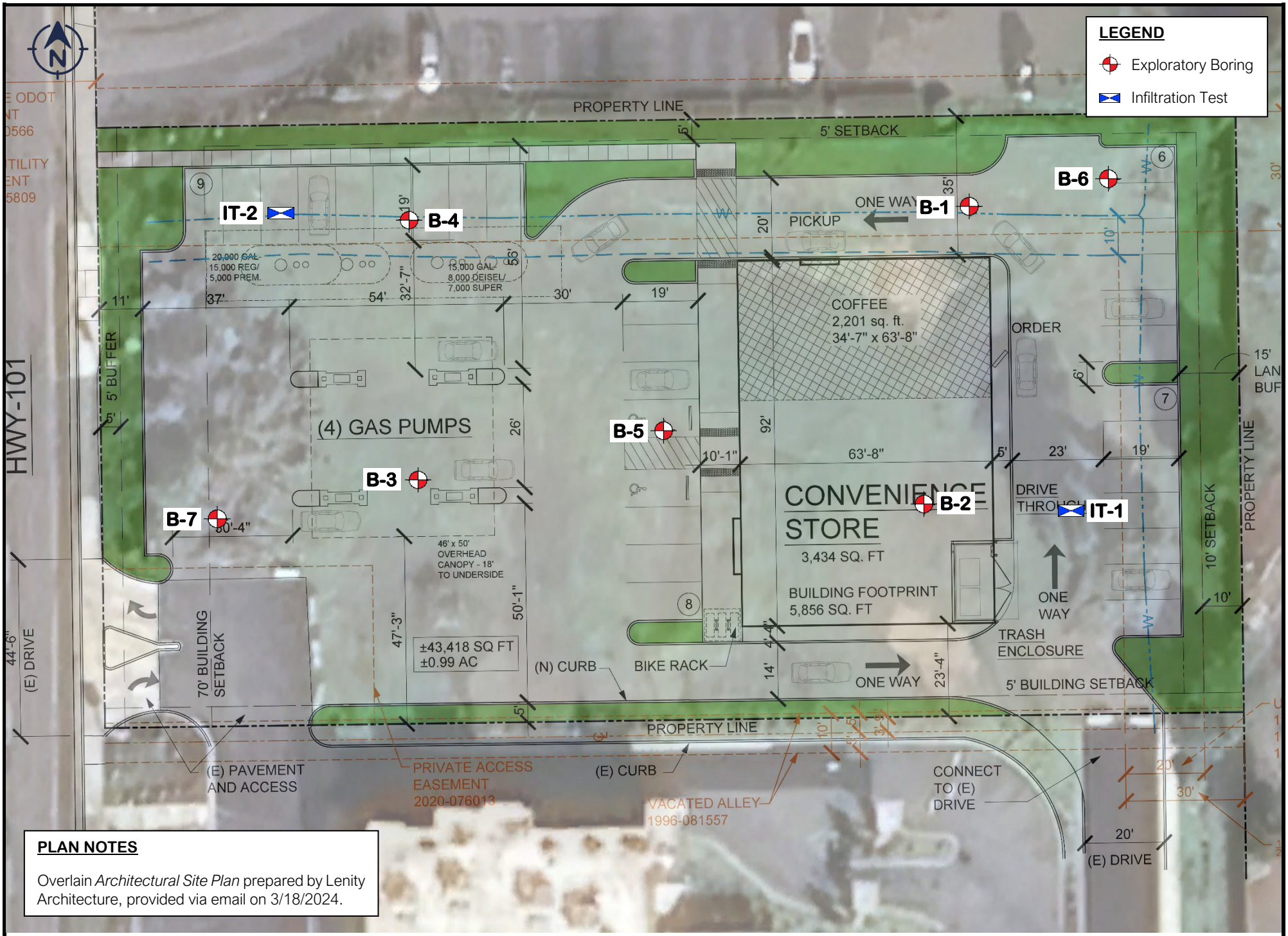
Please feel free to contact our office with any questions regarding this memorandum letter.

Sincerely,

GN Northern, Inc.

Imran Magsi, PE, GE
Sr. Geotechnical Engineer

Attachment: *Site Exploration Plan (Figure 2A)*



PLAN NOTES

Overlain *Architectural Site Plan* prepared by Lenity Architecture, provided via email on 3/18/2024.

FIGURE 2A: SITE EXPLORATION PLAN

PROJECT NO. 223-1642-1

EXHIBIT G

Northern, Inc.

Consulting Engineers Environmental Scientists Geologists
Construction Materials Testing Geophysical Services

GEOTECHNICAL SITE INVESTIGATION REPORT

NEW DOLLAR GENERAL STORE

TAX LOT 6800 OF TAX MAP 18122322

SOUTHEAST CORNER OF 36TH STREET AND HIGHWAY 101

FLORENCE, LANE COUNTY, OREGON

GNN PROJECT NO. 223-1642

MAY 2023

Prepared for

CAPITAL GROWTH BUCHALTER, INC.
361 SUMMIT BLVD., SUITE 110
BIRMINGHAM, AL 35243

Prepared by

GN NORTHERN, INC.
CONSULTING GEOTECHNICAL ENGINEERS
HERMISTON, OREGON
(541) 564-0991

Common Sense Approach to Earth and Engineering
Since 1995

At GN Northern our mission is to serve our clients in the most efficient, cost-effective way using the best resources and tools available while maintaining professionalism on every level. Our philosophy is to satisfy our clients through hard work, dedication, and extraordinary efforts from all of our valued employees working as an extension of the design and construction team.

May 18, 2023

GNN Project No. 223-1642

Capital Growth Buchalter, Inc.
361 Summit Blvd., Suite 110
Birmingham, AL 35243

Attn: Mark Bush, Project Coordinator

Subject: **Geotechnical Site Investigation Report**
New Dollar General Store
Southeast Corner of 36th Street and Highway 101
Florence, Lane County, Oregon

Dear Mr. Bush,

As requested, GN Northern (GNN) has completed a geotechnical site investigation for the proposed new Dollar General Store to be constructed at the ~1-acre single parcel identified as Tax Lot 6800 of Tax Map 18122322 located at the southeast corner of 36th Street and Highway 101 in Florence, Lane County, Oregon.

Based on the findings of our subsurface study, we conclude that the site is suitable for the proposed construction provided that our geotechnical recommendations presented in this report are followed during the design and construction phases of the project. Based on the findings of our site exploration and review of available geologic data, the risk of liquefaction at the project site is considered to be High. Development at the site will require ground improvement with appropriate engineered remedial grading to increase the strength and stability of the bearing subgrade soils in addition to an enhanced structural foundation design.

This report describes in detail the results of our investigation, summarizes our findings, and presents our recommendations concerning earthwork and the design and construction of foundations for the proposed project. ***It is very important that GNN be retained by the owner/developer to provide geotechnical engineering consultation during the design phase, and field geotechnical monitoring and compaction testing services during earthwork to ensure proper implementation of the geotechnical recommendations***.

If you have any questions regarding this report, please contact us at 541-564-0991.

Respectfully submitted,

GN Northern, Inc.

Karl A. Harmon
cn=Karl A. Harmon, o=GN Northern, Inc, ou, email=kharmon@gnnorthern.com, c=US
2023.05.18 19:02:54 -07'00'

REGISTERED PROFESSIONAL ENGINEER 80673PE

OREGON May 13, 2008 KARL ALLAN HARMON

Aaron B. Cleveland, GIT
Project Geologist

Karl A. Harmon, CEG, PE
Senior Geologist/Engineer

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Page No.

APPENDICES

1.0 PURPOSE AND SCOPE OF SERVICES

This report has been prepared for the proposed new Dollar General retail store to be constructed at southeast corner of Highway 101 and 36th Street in the City of Florence, Lane County, Oregon. The project site location is shown on the *Vicinity Map* (Figure 1, Appendix I). Our investigation was conducted to collect information regarding subsurface conditions and present recommendations for suitability of the subsurface materials to support the planned site development and allowable bearing capacity for the proposed construction.

GN Northern, Inc. has prepared this report for use by the client and their design consultants in the design of the proposed development. Do not use or rely upon this report for other locations or purposes without the written consent of GN Northern, Inc.

Our study was conducted in general accordance with our *REVISED Proposal for Geotechnical Investigation and Infiltration Testing* dated May 15, 2023; notice to proceed was provided in the form of a signed copy of the proposal dated May 15, 2023.

You provided a *Preliminary Site Plan* prepared by JSA Civil, LLC (dated 2/2/2023) showing the proposed building and site layout. Field exploration, consisting of seven (7) borings and two (2) infiltration tests, was completed on May 16 & 17, 2023. Boring and infiltration test locations are shown on the *Site Exploration Map* (Figure 2, Appendix I). Detailed boring logs are presented in Appendix II.

This report has been prepared to summarize the data obtained during this study and to present our recommendations based on the proposed construction and the subsurface conditions encountered at the site. Results of the field exploration were analyzed to develop recommendations for site development, earthwork, foundation bearing capacity and pavements. Design parameters and a discussion of the geotechnical engineering considerations related to construction are included in this report.

2.0 PROPOSED CONSTRUCTION

Based on the information provided, we understand that site development will include a new building and parking area. The new building will likely be a pre-engineered metal structure with a concrete slab on-grade. Asphalt paved drive-lanes and 32 parking spaces are currently planned on the west, south, and east sides of the building. Access to the site will be from Highway 101 to the west. Although final plans have not been prepared, we understand that stormwater runoff will be managed and disposed of on-site via new stormwater facilities.

Structural loading information was not available at the time of this report. Based on our experience with similar projects, we anticipate maximum wall loads to be on the order of 2.0 to 3.0 klf and column loads to be less than 20 kips. It shall be noted that assumed loading is based on information provided at the time of this report. If loading conditions differ from those described herein, GNN should be given an opportunity to perform re-analysis. Settlement tolerances for the structures are assumed to be limited to 1 inch, with differential settlement limited to ½ inch.

3.0 FIELD EXPLORATION

Our field exploration was completed on May 16 and 17, 2023 by The Galli Group. A local public utility clearance was obtained prior to the field exploration. Seven (7) borings and two (2) infiltration tests were completed at locations shown on the *Site Exploration Map* (Figure 2, Appendix I). Borings were drilled by The Galli Group using an ATV mounted drill rig with 4" solid stem auger to depths ranging from approximately 11.5 to 20 feet below existing ground surface (BGS). The borings were logged by a Galli Group field geologist/engineer. Upon completion, the borings were backfilled in general accordance with the Oregon State guidelines. Detailed boring logs are presented in Appendix II.

Samples were obtained from the test borings using a Standard Penetration (SPT) sampler. The SPT sampler has a 2-inch outside diameter and a 1.38-inch inside diameter. Samples were obtained by driving the sampler with a 140-pound automatic hammer, dropping 30 inches in general accordance with ASTM D1586. The number of blows required to advance the samplers through each 6-inch increment is recorded in the field. The SPT resistance, or N-value, is defined as the number of blows required to drive the sampler from 6 inches to 18 inches below the auger tip, with the value reported as the number of blows per one foot of penetration. The SPT N-value, adjusted

for hammer efficiency and sampler size, provides an indication of the relative density or consistency of the soil and is indicated on the boring logs.

The soils observed during our field exploration were classified according to the Unified Soil Classification System (USCS), utilizing the field classification procedures as outlined in ASTM D2488. A copy of the USCS Classification Chart is included in Appendix II. Photographs of the site and exploration are presented in Appendix III. Depths referred to in this report are relative to the existing ground surface elevation at the time of our investigation. The surface and subsurface conditions described in this report are as observed at the time of our field investigation.

4.0 SITE CONDITIONS

The ~1-acre subject *Property* is located southeast of the intersection of US Highway 101 and 36th Street in Florence, Lane County, Oregon. The site is situated in the NW ¼ of the NW ¼ of Section 23, Township 18 South & Range 12 West, Willamette Meridian. The site is bound by US Highway 101 to the west, an existing Burger King restaurant to the south, an existing Chinese food restaurant to the north, and single-family residential development to the east. The site is relatively flat and generally level with adjacent properties to the south, east, and west, and is approximately four feet lower in elevation than the property to the north. Based on a review of published topographic maps, the regional gradient generally slopes down towards the south. The site is covered with scattered brush and grasses with some surface gravels visible in the center towards the south and southeast corner of lot.

This geotechnical site investigation was performed in conjunction with a Phase I Environmental Site Assessment which included research of the historic and past use of the project site. Based on a review of selected available historic aerial photographs, aside from a previously pioneered alignment of a planned cul-de-sac, we did not observe any evidence of prior development on the subject site.

4.1 Regional Geology

The project site is located in the Coastal Range Geologic Province and is situated atop Quaternary sand dune deposits near the mouth of the Siuslaw River along the Pacific Ocean coastline of Oregon. This site is mapped as having Quaternary-aged surficial deposits of fine-grained sediments, including aeolian and beach deposits. Based on our knowledge of groundwater in the

project vicinity, we anticipate that fluctuating groundwater levels will generally range between approximately 5- to 8-feet below the ground surface.

4.2 Geologic Hazards

Potential geologic hazards that may affect the proposed development include: [i] landslides & slope instability, [ii] seismic hazards (ground shaking, surface fault rupture, soil liquefaction, and other secondary earthquake-related hazards), and [iii] flooding & erosion. A discussion of all the pertinent geologic hazards follows.

Site Slopes: The site is generally flat and level with surrounding properties. Slope gradients do not exceed 15% and are not deemed hazardous. We anticipate future site grading will not require large amounts of cuts and fills.

Regional Faulting and Surface Fault Rupture: For the purpose of this report, an active fault is defined as a fault that has had displacement within the Holocene epoch or last 11,700 years. Due to the lack of any known active fault traces in the immediate site vicinity, the risk of surface fault rupture to occur at the subject property is low. While future fault rupture could occur at other locations, rupture would most likely occur along previously established fault traces.

Soil Liquefaction: Liquefaction is the loss of soil strength from sudden shock or vibration (usually earthquake shaking), causing the soil to become a fluid mass. Liquefaction results in a loss of soil strength and can cause the structure/utility to settle if it occurs in the bearing zone. Soil liquefaction is a natural phenomenon that occurs when saturated granular soils (below the water table) are subjected to vibratory motions, causing an increase in the water pressure within soil pores, as the soil tends to reduce in volume. When the pore water pressure reaches the vertical effective stress, the soil particles become suspended in water causing a complete loss in soil strength. Liquefaction can cause excessive structural settlement, ground rupture, lateral spreading (movement), or failure of shallow bearing foundations.

Based on review of the published Oregon Department of Geology and Mineral's HazVu; Statewide Geohazards Viewer Map, the project site is mapped within area identified with a 'High' risk for *Earthquake Liquefaction Hazard*.

In general, for the effects of liquefaction to be manifested at the surface, groundwater levels must be within 50 feet of the ground surface and the soils within the saturated zone must also be susceptible to liquefaction. Soils that are most susceptible to liquefaction are saturated, loose sands with little fines content. Generally speaking, saturated soils with less than 15 percent fines and with SPT blow counts less than 20 to 30 are potentially susceptible to liquefaction, depending on the severity of seismic loading. The following four conditions are generally required before liquefaction can occur:

- The soils must be saturated below a relatively shallow groundwater level (< 50-ft).
- The soils must be loosely deposited (low to medium relative density).
- The soils must be relatively cohesionless (not clayey). Clean, poorly graded sands are the most susceptible. Silt (fines) content increase the liquefaction resistance in that more cycles of ground motions are required to fully develop pore pressures.
- Ground shaking must be of sufficient intensity to act as a trigger mechanism. Two important factors that affect the potential for soil liquefaction are duration as indicated by earthquake magnitude (M) and intensity as indicated by peak ground acceleration (PGA).

Based on the findings of our site exploration and review of available geologic data, the onsite soils are susceptible to liquefaction, therefore the risk from liquefaction at the project site is considered to be High. A detailed liquefaction analysis would be required to fully evaluate the risk of liquefaction induced settlement at the project site which would include a 50-foot-deep boring with continuous SPT sampling below the groundwater or CPT sounding.

In lieu of a site-specific liquefaction analysis, provided the owner/developer accepts the risk of liquefaction settlement of the building pad/foundation from a seismic event, adherence to the recommendations provided in this report can reduce the risk from earthquake-induced liquefaction settlement.

Development at the site will require shallow ground improvement with appropriate engineered remedial grading to increase the strength and stability of the bearing subgrade in addition to an enhanced structural foundation design. As part of remedial grading much of the shallow loose soils within the proposed foundation bearing zone footprint will be excavated and replaced with

compacted granular structural fill as part of building pad preparation. This process will reduce the potential for loose soil directly below the building pad to liquefy should they become saturated.

Lateral Spreading: Considering the site and surrounding area are relatively flat the risk of lateral spreading is considered low.

Secondary Seismic Hazards: Additional secondary seismic hazards related to ground shaking include ground subsidence, tsunamis, and seiches. The site is located at an elevation of approximately 75' above mean sea-level, so the hazard from tsunamis is very low. The potential hazard from seiches in also very low due to the distance and elevation difference between the site and any nearby water body.

Flooding and Erosion: The subject property is not mapped within a designated flood zone. The need for and design of erosion protection measures is within the purview of the design Civil Engineer. Appropriate erosion and sediment control plan(s) and a drainage plan shall be prepared by the project civil engineer with the final construction drawings. Erosion should be mitigated with appropriate BMPs consisting of proper drainage design including collecting and disposal (conveyance) of water to approved points of discharge in a non-erosive manner. Appropriate project design, construction, and maintenance will be necessary to mitigate the risk of site erosion.

4.3 Seismic Considerations

Based on the findings of our subsurface exploration and information from nearby well logs, a **Site Class 'D'** (ASCE 7-05, Table 20.1-1) may be used for seismic design purposes. Site Class 'D' corresponds to 'stiff soil'. The following site-specific design values may be used:

Table 1: IBC 2018 Design Response Spectra Parameters

Seismic Design Parameter	Value (unit)	Definition
S_S	1.405 (g)	MCE spectral response acceleration at short periods
S_1	0.738 (g)	MCE spectral response acceleration at 1-second period
F_a	1 (unitless)	Site coefficient for short periods
F_v	N/A	Site coefficient for 1-second period
S_{MS}	1.405 (g)	MCE spectral response acceleration at short periods as adjusted for site effects
S_{M1}	N/A	MCE spectral response acceleration at 1-second period as adjusted for site effects
S_{DS}	0.936 (g)	Design spectral response acceleration at short periods
S_{D1}	N/A	Design spectral response acceleration at 1-second period

5.0 SUBSURFACE CONDITIONS

Based on the findings of our field exploration, the apparent native subsurface soils encountered within the test-pits consist primarily of Poorly Graded Sand (SP) and occasional layers of Poorly Graded Sand with Silt (SP-SM). The native soils were generally observed to have an apparent 'very loose' to 'medium dense' relative in-place density and were typically observed to range from 'damp' to 'saturated.' Boring B-3 was terminated at a depth of 17.5 feet BGS due to apparent collapse of bore hole. SPT sampling at depths below the groundwater was typically blocked/prevented by sand heave. Boring logs in Appendix II show detailed descriptions and stratification of the soils encountered.

5.1 NRCS Soil Survey

The soil survey map of the site prepared by the Natural Resources Conservation Service (NRCS) identifies native site soils as *Yaquina loamy fine sand* and *Yaquina-Urban land complex.* The parent material is described as *eolian sand of mixed origin*. The typical soil profile for these soils is described as *slightly decomposed plant material* over *loamy fine sand* over *fine sand*. According to the NRCS map (Appendix IV), the natural drainage class for these units is described as *somewhat poorly drained*.

5.2 Groundwater

Groundwater was encountered in the exploratory borings ranging in depths from ~6.5' to ~8' BGS at the time of our exploration. One of the bore holes collapsed during drilling below the groundwater. To further assist in our evaluation, we reviewed the Oregon Water Resources Department Well Log database of nearby well logs (see Appendix V) to estimate groundwater levels in the site vicinity. Based on a review of nearby well logs, the groundwater table in the site vicinity has been noted at depths ranging from approximately 8 to 9 feet BGS. Note that groundwater levels can fluctuate with precipitation, irrigation, drainage, and regional pumping from wells.

6.0 SOIL INFILTRATION TESTING

Two infiltration tests were conducted at the site in general accordance with the EPA falling head method. The location of the infiltration tests are shown on *Site & Exploration Map* (Figure 2) attached to this report. The tests were performed within the augured borehole drilled to an

approximate depth of 4.5 feet below ground surface. The soils at this depth were classified as sand (SP). The test hole was filled with water and allowed to presoak for a period of time prior to testing. Timed measurements of the drop in water level were taken within the test hole until a stabilized rate was established. The test result is generally indicative of the infiltration characteristic of the soils encountered at the test depth interval. The following table presents the field results of the infiltration test performed at this site:

Test ID	Test Depth, BGS	Field Measured Soil Infiltration Rate (inch/hour)
IT-1	~4 feet	14
IT-2	~4.5 feet	15

The infiltration rate presented herein represents the un-factored field soil infiltration rate. An appropriate factor of safety should be applied to the field infiltration rate to determine long-term design infiltration rates. Determination of safety factors for long-term design infiltration should consider the following: pretreatment, potential for bio-fouling, system maintainability, horizontal and vertical variability of soils, and type of infiltration testing. Typical factors of safety for these soils generally range from 2.5 to 3.

The design of onsite stormwater management facilities should consider adequate separation from the highest groundwater levels.

7.0 GEOTECHNICAL RECOMMENDATIONS

The following geotechnical recommendations are based on our current understanding of the proposed project as described in Section 2.0 of this report. Note that Soil Design Parameters and Recommendations presented in this report are predicated upon appropriate geotechnical monitoring and testing of the site preparation and foundation and building pad construction by a representative of GNN's **Geotechnical-Engineer-of-Record (EOR)**. Any deviation and nonconformity from this requirement may invalidate, partially or in whole, the following recommendations. We recommend that GNN shall be engaged to review grading and foundation plans in order to provide revised, augmented, and/or additional geotechnical recommendations as required.

The applicability of our recommendations is contingent upon good construction practices. Poor construction techniques may alter conditions from those on which our recommendations are based and, therefore, result in reduced foundation capacity, additional settlement and/or movement, or inadequate subgrade stability, as appropriate. The following sections present construction considerations for this project.

7.1 Clearing and Grubbing

At the start of site grading, existing vegetation, roots, undocumented fills, any trash/debris, and any abandoned underground utilities shall be **fully removed** from proposed building, structural and pavement areas. The surface shall be stripped of all organic growth (vegetation). Based on our explorations, we estimate approximately 12 inches of material must be stripped from most development footprint; deeper and possibly shallower stripping depths may be necessary as identified by GN Northern during construction. The strippings are not suitable for use in engineered fill. Strippings may be used in landscaped areas or deposed of off-site. Areas disturbed during clearing shall be properly backfilled and compacted as described below.

7.2 Site Grading

Site grading shall incorporate the requirements of IBC 2018 Appendix J. Do not commence site clearing and grading operations until temporary erosion and sedimentation control measures are in place. A representative of the EOR should observe site clearing, grading, and the bottoms of excavations before placing fills. Local variations in soil conditions may warrant increasing the depth of over-excavation and recompaction. Do not place backfill or fill soil material on surfaces that are saturated, muddy, frozen, or contain frost, snow, or ice. To prevent potential pumping and unstable ground conditions and improve compaction efforts, we strongly recommend performing site grading during dryer periods of the year. Site grading and excavations should be avoided during winter and wet weather periods of the year.

Some limited areas of surficial fill materials were found in some borings at the site. The thickness of undocumented and potentially unsuitable fill material was generally observed to range from ~0.5 to ~1 foot. We recommend chasing the undocumented fill material to the full depth. Existing fill and unsuitable materials shall be fully removed and replaced with suitable onsite soils or

imported fill material placed as engineered structural fill. Note that the vertical and lateral extent of fill and potentially unsuitable materials cannot be quantified based on the scope of our exploration.

Prior to fill placement on cut ground surfaces, remove loose soil and debris. Scarify the cut and/or stripped soil subgrade a minimum 12 inches. Moisture-condition the exposed subgrade soils to within 2 percent of optimum, then compact to a minimum in-place dry density of 95 percent of the maximum dry density as determined by ASTM D 1557.

Subgrade preparation may be complicated due to the shallow groundwater. Our experience indicates kneading-type compactors (e.g., sheepsfoot roller) are preferable for fine sand and silt subgrade compaction. Vibratory-type compactors are not advisable within approximately 2 feet of the native materials based on the sensitivity of the subgrade soils to moisture.

Soil conditions shall be evaluated by in-place density testing, visual evaluation, probing, and proof-rolling of the imported fill and re-compacted on-site soil as it is prepared to check for compliance with recommendations of this report. A moisture-density curve shall be established in accordance with the ASTM D1557 method for all onsite soils and imported fill materials used as structural fill.

7.3 Suitability of the Onsite Soils as Engineered Fill

The onsite soil, free of organics or deleterious materials including trash and debris, is generally suitable for use as engineered structural fill, general fill and utility trench backfill. Engineered fill should be placed in maximum 8-inch-thick loose lifts and each lift compacted to at least 95% of the Modified Proctor maximum dry density, as determined by ASTM D1557 (Laboratory Compaction Characteristics of Soil Using Modified Effort) near optimum moisture content.

7.4 Soil Moisture Conditioning

Appropriate moisture conditioning of fill soils may be required to facilitate compaction and to achieve the required degree of compaction. Uniformly moisten subgrade and each subsequent fill or backfill soil layer before compaction to near optimum moisture content, unless indicated otherwise. A laboratory proctor test to determine optimum moisture content is required prior to field compaction testing. Maintain fills soils to near-optimum moisture content at time of compaction. Assume a plus/minus maximum tolerance of approximately 2% to 3% unless compaction efforts prove a wider tolerance from optimum moisture content is acceptable to meet

compaction requirements. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds near-optimum moisture content and is too wet to compact to specified dry density.

7.5 Temporary Excavations

It shall be the responsibility of the contractor to maintain safe temporary slope configurations since the contractor is at the job site, able to observe the nature and conditions of the slopes, and able to monitor the encountered subsurface conditions. Unsupported vertical cuts deeper than 4 feet are not recommended if worker access is necessary. The cuts shall be adequately sloped, shored or supported to prevent injury to personnel from caving and sloughing. The contractor and subcontractors shall be aware of, and familiar with, applicable local, state and federal safety regulations including the current OSHA Excavation and Trench Safety Standards, and OSHA Health and Safety Standards for Excavations, 29 CFR Part 1929, or successor regulations.

It is our opinion that the soil encountered at the site is classified as Type C soils. For excavation planning purposes, we recommend that temporary, unsupported, open cut slopes shall be no steeper than 1.5 feet horizontal to 1.0 feet vertical (1.5H:1V) in Type C soils. No heavy equipment should be allowed near the top of temporary cut slopes unless the cut slopes are adequately braced. Final (permanent) fill slopes should be graded to an angle of 2H:1V or flatter. We recommend that permanent slopes be hydroseeded and/or planted with vegetation after construction. Where unstable soils are encountered, flatter slopes may be required. We recommend protecting slopes with waterproof covering during periods of wet weather to reduce sloughing and erosion.

The native loose sandy soil will be prone to significant caving and sloughing in open excavations. Excavation stability may be achieved by sloping excavation banks or widening shallow excavations in the anticipation of caving. Deeper excavations may require external support such as shoring or bracing to provide excavation bank stability.

7.6 Utility Excavation, Pipe Bedding and Trench Backfill

To provide appropriate support and bedding for the pipe, we recommend the utilities be founded on suitable bedding material consisting of clean sand and/or sand & gravel mixture. Pipe bedding should provide a firm uniform cradle for support of the pipes. A minimum 4-inch thickness of bedding material beneath the pipe should be provided. Prior to installation of the pipe, the pipe

bedding should be shaped to fit the lower part of the pipe exterior with reasonable closeness to provide uniform support along the pipe. Pipe bedding material should be used as pipe zone backfill and placed in layers and tamped around the pipes to obtain complete contact. To protect the pipe, bedding material should extend at least 6 inches above the top of the pipe, however initial lift thickness could be increased to levels recommended by the manufacturer to protect utilities from damage by compacting equipment.

Placement of bedding material is particularly critical where maintenance of precise grades is essential. Backfill placed within the first 12 inches above utility lines should be compacted to at least 90% of the maximum dry density (ASTM D1557), such that the utility lines are not damaged during backfill placement and compaction. In addition, rock fragments greater than 1 inch in maximum dimension should be excluded from this first lift. The remainder of the utility excavations should be backfilled and compacted to 95% of the maximum dry density as determined by ASTM D1557.

Suitable backfill for the pipe bedding, pipe zone material and trench backfill shall meet the specifications of *2018 Oregon Standard Specification for Construction* sections 00405.12, 00405.13 and 00405.14, respectively. Onsite soils may be considered suitable for utility trench backfill provided they are free of significant organic matter and oversize material, and can be adequately compacted. All excavations should be wide enough to allow for compaction around the haunches of pipes. We recommend that utility trenching, installation, and backfilling conform to all applicable federal, state, and local regulations such as OSHA for open excavations.

Compaction of backfill material should be accomplished with soils within ±2% of their optimum moisture content in order to achieve the minimum specified compaction levels recommended in this report. Backfill operations shall be observed and tested to monitor compliance with these recommendations.

7.7 Use of Imported Fill Soils as Engineered Fill

If needed, imported fill material should consist of a clean, non-plastic, free draining crushed gravel and sand, which is free of organic matter, oversized material or other deleterious materials. Imported fill material should be pit or quarry run rock and should meet the ODOT Standard

Specification 00330.14 -Selected Granular Backfill and 00330.15 - Selected Stone Backfill. The imported fill material should have less than 5 percent fines (based on the ¾-inch fraction).

7.8 Imported Crushed Rock Structural Fill

Imported crushed rock structural fill shall consist of well-graded, crushed aggregate material meeting the grading and quality requirements of *2018 Oregon Standard Specifications for Construction* Section 02630.10 (Dense-Graded Aggregate, 1½ inch minus) presented in the table below:

Table 2: ODOT Standard Spec. Table 02630-1

Sieve Size	Percent Passing (by Weight)
2 Inch Square	100
1½ Inch Square	95 – 100
¾ Inch Square	55 – 75
¼ Inch Square	35 – 50
U.S. No. 10	*

* Of the fraction passing the ¼ inch sieve, 40-60% shall pass the No. 10 sieve

A fifty (50) pound sample of each imported fill material shall be collected by GNN personnel prior to placement to ensure proper gradation and establish a moisture-density relationship (proctor curve).

7.9 Compaction Requirements for Structural/ Engineered Fill

All fill or backfill shall be approved by a representative of our Geotechnical engineer (EOR), placed in uniform lifts, and compacted to a minimum 95% of the maximum dry density as determined by ASTM D1557. The compaction effort must be verified in the field using a nuclear density gauge in accordance with ASTM D6938. The thickness of the loose, non-compacted, lift of structural fill shall not exceed 8 inches for heavy-duty compactors or 4 inches for hand operated compactors.

7.10 Building Pad & Foundation Subgrade Improvement

The following two options will address the life safety concerns in the event of a design-level earthquake. However, each option has a varying degree of cost, which translates to different levels of protection of the building in terms of repairs or viability of the building after a design-level earthquake.

A ground improvement method that will provide highest level of protection of the building after an earthquake include installation of Rammed Aggregate Piers (RAP). While feasible, this method may be cost prohibitive, considering the type of construction, occupancy and extent of development.

Considering the owner/developer accepts the risk of liquefaction settlement, for a lightly loaded metal building with slab-on-grade with a seismic Risk Category II, a more cost-effective means to mitigate potential liquefaction settlement damage of the building after an earthquake, but does not prevent its occurrence, include an enhanced foundation system that is structurally designed (provide additional interior grade beams to stiffen the foundations at the column locations) to withstand some differential movement or tilting, along with shallow foundation ground improvements.

The minimum goal of liquefaction induced settlement mitigation for the proposed retail store facility should be to provide a foundation system with improved ground support that can withstand the expected movement without causing significant structural damage so as to pose a life-safety hazard.

To minimize the effects of seismically induced settlement, we recommend a uniform over-excavation (sub-cut) of 4.5 to 5 feet (depending on the groundwater elevation at the time of grading) below the design finish floor elevation across the entire building pad footprint plus 4 feet laterally on all sides. Scarify the cut subgrade a minimum 12 inches, moisture-condition the subgrade soils to within 2 percent of optimum, then compact to a minimum in-place dry density of 90 percent of the maximum dry density as determined by ASTM D 1557 and proof-rolled to a dense and non-yielding surface. Backfill the over-excavation with angular ballast rock structural fill material. The structural fill section shall be reinforced with 2 layers of geogrid consisting of Tensar TX160. The first layer of geogrid shall be placed over the prepared cut subgrade (bottom of over-excavation) after recomapction and the second geogrid layer at mid depth within the structural fill section. The bottom 18-inches of the over-excavation shall be backfilled with 4- to 5-inch size angular ballast rock and placed in 9-inch lifts. Complete several dozer passes over the ballast materials in entirety and compact to a firm and non-yielding surface before placing the next lift. Proof-roll the compacted ballast rock with a loaded dump truck and observe deflections for

indications of inadequate subgrade performance. The remainder of the over-excavation shall be backfilled with compacted 1½" minus crushed base rock placed over the ballast rock.

7.11 Foundation Bearing Support & Allowable Bearing Capacity

In our opinion, the proposed building may be supported on shallow enhanced foundations bearing on a layer of imported crushed rock placed atop a reinforced engineered fill section in accordance with the recommendations of this report. The minimum footing depth shall be 18 inches below adjacent grades for frost protection.

All foundations and building pad shall bear on a minimum of 12 inches of imported crushed rock structural fill. The crushed rock structural fill should extend laterally a minimum distance of four (4) foot beyond the outer edge of all footings. The crushed rock structural fill shall be compacted to minimum 95% of ASTM D1557.

Footings constructed in accordance with the above recommendations may be designed for an allowable **1,500 pounds per square foot (psf)** bearing pressure. The allowable bearing pressure may be increased by 1/3 for short-term, transient loading conditions. Provided footing subgrades are prepared in accordance with the recommendations presented in this report, we estimate total foundation settlements of approximately 1-inch. We anticipate differential settlement will be about half of total settlements between adjacent columns and along approximately 20 feet of continuous footings. We assume there is no stress overlap from adjacent footings. Footings located less than two times the footing width (2B) from each other will increase stresses beneath the adjacent footing, resulting in increased settlement. We expect elastic settlements to generally occur as loads are applied.

These settlement estimates do not account for seismically induced settlement (liquefaction) which will be greater based on the earthquake magnitude and intensity of ground shaking but is expected to be relatively uniform across the building footprint.

Lateral forces on foundations from short term wind and seismic loading would be resisted by friction at the base of foundations and passive earth pressure against the buried portions. We recommend an allowable passive earth pressure for compacted imported fill of **200 pcf**. This lateral foundation resistance value includes a factor of safety of 1.5. We recommend a coefficient

of friction of **0.45** be used between cast-in-place concrete and imported crushed rock. An appropriate factor of safety should be used to calculate sliding resistance at the base of footings.

Note: Typically for seismic life-safety design (per the building code for liquefaction analysis) the non-collapse allowable differential seismic settlements are around 3 inches over 40 feet and are acceptable for mostly single story lightly loaded buildings. Most buildings, both concrete and steel construction, allows up to 2 inches of differential seismic settlement. Note that this settlement is only applicable to the design earthquake which per building code is seismic event with a 2,475-year return period and the building code only mandates life-safety and non-collapse (not damage). Recently, documents such as 2015 NEHRP (National Earthquake Hazards Reduction Program) have quantified the amount of acceptable differential settlement from liquefaction. Allowable liquefaction differential settlement could be 3 inches over 40 feet. Also the 2015 NEHRP stresses the importance of making sure bearing capacity loss due to liquefaction does not occur as it has been shown in previous earthquakes that catastrophic loss of bearing capacity causes most building failures.

7.12 Slab-on-Grade Floors

A minimum 12-inch layer of ¾" minus crushed aggregate fill shall be placed beneath the building slab extending to the compacted ballast rock section. Material shall meet the *Oregon Standard Specification for Construction*, specification section 02630-1, provided it contains less than 5% passing the No. 200 sieve (fines). The crushed rock material shall be compacted to at least 95% of the maximum dry density as determined by ASTM D1557 method.

We recommend a modulus of subgrade reaction equal to **120 pounds per cubic inch (pci)** based on a value for gravel presented in the Portland Cement Association publication No. EB075.01D. Slab thickness, reinforcement and joint spacing shall be determined by a licensed engineer based on the intended use and loading.

An appropriate vapor retarder (15-mil polyethylene liner) shall be used (ASTM E1745/E1643) beneath areas receiving moisture sensitive resilient flooring/VCT where prevention of moisture migration through slab is essential. The slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder. The architect shall determine the need and use of a vapor retarder.

7.13 Lateral Earth Pressures

We recommend the following lateral earth pressures, in terms of equivalent fluid unit weight, for design of retaining walls or below-grade structures:

Drained Condition
At-Rest = 60 pcf Active = 40 pcf

Unndrained Condition
At-rest = 91 pcf Active = 82 pcf

We assume that the structural wall backfill is adequately drained to avoid saturation and introduction of hydrostatic pressures. For calculation of active pressures, we assume that the wall can deflect in order to develop an active condition. Use at-rest pressures for restrained or braced walls. The horizontal resultant force (pressure x H/2 where H is height of buried wall) should be applied at an H/3 distance from the base of the wall.

If any surface, surcharge loads are closer than one-half of the wall height (horizontal distance) to the edge of the below-grade and/or retaining wall, increase the design wall pressure by $q/2$ over the whole area of the retaining wall. In this expression, q is the surface surcharge load in psf. GNN should review anticipated surcharge loading to confirm that the appropriate design values are considered. The horizontal surcharge resultant force (pressure x H where H is height of buried wall) should be applied at an H/2 distance from the base of the wall.

For seismic design increase earth pressure by 0.7 of the peak ground acceleration (PGA) and apply at 0.4H above the base of the wall, where H is the wall height in feet.

7.14 Flexible Pavement

Pavement subgrade soils are generally expected to consist of the native sandy gravelly soil. A California Bearing Ratio (CBR) value of 5 has been estimated for the onsite soils for use in the pavement analysis. Using an empirical relationship, this CBR value corresponds to a resilient modulus value of approximately 7,500 psi. Pavement analyses are based on *1993 AASHTO Guide for Design of Pavement Structures*. The table below presents recommended pavement sections for this project:

Table 3: Recommended Asphalt Concrete Paving Sections

Traffic	Asphalt Thickness (inches)	Crushed Aggregate Base Course (inches)	Subgrade
Heavy Duty†	4.0	10*	upper min. 12 inches scarified, moisture conditioned and re-compacted to at least 95% of the maximum dry density as determined by ASTM D1557
Standard Duty††	2.5	8*	

†Heavy duty applies to pavements section for entrance drives, and trash enclosure drive lanes
††Standard duty applies to general parking areas
*The upper 2" of crushed rock should be top course rock placed over the base course layer

Pavement design recommendations assume proper and positive drainage and construction monitoring and are based on AASHTO Design parameters for a 20-year design period. Asphalt pavements tend to develop thermal and fatigue cracking over time from environmental factors and traffic loads. Asphalt, being a viscoelastic material, weakens from temperature influx. Timely preventative measures for continual flexible maintenance such as crack filling and seal coating at 8-10 year intervals to control the progression of surface cracking and distress to prevent water from infiltrating into the base course and subgrade shall be considered. Performing this intermediate level of maintenance will net at least a 20-year service life/performance life

Soils containing roots or organic materials shall be completely removed from the proposed paved areas prior to subgrade construction. The upper 12 inches of native sandy subgrade soils beneath the pavement section shall be scarified, moisture conditioned and re-compacted to at least 95% of the maximum dry density as determined by ASTM D1557. All fills used to raise low areas must be compacted onsite soils or structural gravel fill and shall be placed under engineering control conditions. The finished surface shall be smooth, uniform and free of localized weak/soft spots. All subgrade deficiency corrections and drainage provisions shall be made prior to placing the aggregate base course. All underground utilities shall be protected prior to grading.

The HMAC utilized for the project should be designed and produced in accordance with Section 00744 Asphalt Concrete Pavement of the *2018 Oregon Standard Specifications for Construction* (ODOT Specifications). Aggregate Base material shall comply with Section 02630.10 (Dense-Graded Aggregate, 1½ inch minus) of the ODOT Specifications. Aggregate base or pavement materials should not be placed when the surface is wet.

7.15 Subgrade Protection

The degree to which construction grading problems develop is expected to be dependent, in part, on the time of year that construction proceeds and the precautions which are taken by the contract to protect the subgrade. We recommend that the site shall be graded to prevent water from ponding within construction areas and/or flowing into excavations. Accumulated water must be removed immediately along with any unstable soil. Foundation concrete should be placed, and excavations backfilled as soon as possible to protect the bearing grade.

7.16 Subgrade Inspection and Compaction Verification

A representative of our Geotechnical engineer (soils inspector) shall be onsite during earthwork to inspect and test subgrade and each fill layer. Proceed with subsequent earthmoving only after inspections confirm previously completed work complies with requirements of this report. Inspections and tests include:

1. Determine prior to placement of fill that subgrade has been prepared in compliance with requirements of this Geotechnical Report.
2. Determine that fill material and maximum lift thickness and moisture comply with requirements of this Geotechnical Report.
3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements of this Geotechnical Report.

When the soils inspector indicates that subgrades, and fills have not achieved subgrade acceptance criteria or degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

7.17 Wet Weather Conditions

The onsite soils may be susceptible to pumping during wet weather when excessively wet and disturbed by construction traffic. Soil disturbance will negatively impact the soil's performance below slabs, pavement, and hardscape. Fine sandy soils are susceptible to erosion in the presence of moving water. During or subsequent to wet weather, compacting the on-site soils may be difficult. If earthwork takes place in wet weather or wet conditions, the following recommendations should be followed:

1. Accomplish earthwork in small sections and carry such work through to completion to reduce exposure to wet weather. Soils that become too wet for compaction are to be removed and replaced with clean, imported granular material.
2. Carefully stage equipment and/or stockpiles, route construction equipment away from subgrades, and implement aggressive site drainage procedures to help reduce saturating subgrades.
3. Cover work areas and stockpiles with plastic. Use straw bales, straw wattles, geotextile silt fences, and/or other measures as appropriate to control soil erosion.
4. Equipment with large tracks, lugs, or having toothed buckets has a significant potential to disturb the site soil prior to or following compaction. Rubber-tired vehicles should not access prepared subgrades unless the subgrade is sufficiently stiff to allow construction traffic without disturbance.
5. Maintain the subgrade in a compacted condition and protect subgrades from construction traffic disturbance after they have been prepared and meet compaction requirements. Consequently, do not operate construction equipment or vehicles on prepared subgrade areas during wet weather conditions. After inclement weather, inspect all subgrade areas prepared before the inclement weather conditions.
6. Prior to rain and other events that may cause fine sandy or silty soils to exceed optimum moisture content, stabilize such soils to minimize potential for erosion into adjacent excavations.
7. If necessary for continuing operations after wet weather, provide a layer of quarry spalls course for access or haul roads, underlying with geotextile fabric.

7.18 Surface Drainage

With respect to surface water drainage, we recommend that the ground surface be sloped to drain away from the structure. Final exterior site grades shall promote free and positive drainage from the building areas. Water shall not be allowed to pond or to collect adjacent to foundations or within the immediate building area. We recommend that a gradient of at least 5% for a minimum distance of 10 feet from the building perimeter be provided, except in paved locations. In paved areas, a minimum gradient of 1% should be provided unless provisions are included for

collection/disposal of surface water adjacent to the structure. Catch basins, drainage swales, or other drainage facilities should be aptly located. All surface water such as that coming from roof downspouts and catch basins be collected in tight drain lines and carried to a suitable discharge point, such as a storm drain system. Surface water and downspout water should not discharge into a perforated or slotted subdrain, nor should such water discharge onto the ground surface adjacent to the building. Cleanouts should be provided at convenient locations along all drain lines.

8.0 CONTINUING GEOTECHNICAL SERVICES

GNN recommends that the Client should maintain an adequate program of geotechnical consultation, construction monitoring, and soils testing during the final design and construction phases to monitor compliance with GNN's geotechnical recommendations. ***Maintaining GNN as the geotechnical consultant from beginning to end of the project will provide continuity of services.*** If GN Northern, Inc. is not retained by the owner/developer and/or the contractor to provide the recommended geotechnical inspections/observations and testing services, the geotechnical engineering firm or testing/inspection firm providing tests and observations shall assume the role and responsibilities of Geotechnical Engineer-of-Record.

GNN can provide construction monitoring and testing as additional services. The costs of these services are not included in our present fee arrangement but can be obtained from our office. The recommended construction monitoring and testing includes, but is not necessarily limited to, the following:

- Consultation during the design stages of the project.
- Review of the grading and drainage plans to monitor compliance and proper implementation of the recommendations in GNN's Report.
- Observation and quality control testing during site preparation, grading, and placement of engineered fill as required by the local building ordinances.
- Geotechnical engineering consultation as needed during construction.

Construction observation allows the Geotechnical engineer to observe the actual soil conditions exposed during construction, determine if the proposed design is compatible with the design recommendations, and if the conditions encountered at the site are consistent with those observed during site investigation. Construction observation is conducted to reduce the potential for problems arising during and after construction. However, in all cases, the Contractor is responsible for the quality and completeness of their work and for adhering to the plans, specifications, and recommendations on which their work is based.

9.0 LIMITATIONS OF THE GEOTECHNICAL SITE INVESTIGATION REPORT

This GEOTECHNICAL SITE INVESTIGATION REPORT ("Report") was prepared for the exclusive use of the Client. GN Northern, Inc.'s (GNN) findings, conclusions and recommendations in this Report are based on selected points of field exploration, laboratory testing, and GNN's understanding of the proposed project at the time the Report is prepared. Furthermore, GNN's findings and recommendations are based on the assumption that soil, rock and/or groundwater conditions do not vary significantly from those found at specific exploratory locations. Variations in soil, bedrock and/or groundwater conditions could exist between and beyond the exploration points. The nature and extent of these variations may not become evident until during or after construction. Variations in soil, bedrock and groundwater may require additional studies, consultation, and revisions to GNN's recommendations in the Report.

In many cases the scope of geotechnical exploration and the test locations are selected by others without consultation from the geotechnical engineer/consultant. GNN assumes no responsibility and, by preparing this Report, does not impliedly or expressly validate the scope of exploration and the test locations selected by others.

This Report's findings are valid as of the issued date of this Report. However, changes in conditions of the subject property or adjoining properties can occur due to passage of time, natural processes, or works of man. In addition, applicable building standards/codes may change over time. Accordingly, findings, conclusions, and recommendations of this Report may be invalidated, wholly or partially, by changes outside of GNN's control. Provided that the site conditions are not disturbed or altered after the planned grading is completed, the report will be valid for a period of 3 to 5 years from the issued date of the Report.

In the event that any changes in the nature, design, or location of structures are planned, the findings, conclusions and recommendations contained in this Report shall not be considered valid unless the changes are reviewed by GNN and the findings, conclusions, and recommendations of this Report are modified or verified in writing.

This Report is issued with the understanding that the owner or the owner's representative has the responsibility to bring the findings, conclusions, and recommendations contained herein to the attention of the architect and design professional(s) for the project so that they are incorporated

into the plans and construction specifications, and any follow-up addendum for the project. The owner or the owner's representative also has the responsibility to verify that the general contractor and all subcontractors follow such recommendations during construction. It is further understood that the owner or the owner's representative is responsible for submittal of this Report to the appropriate governing agencies. The foregoing notwithstanding, no party other than the Client shall have any right to rely on this Report and GNN shall have no liability to any third party who claims injury due to reliance upon this Report, which is prepared exclusively for Client's use and reliance.

GNN has provided geotechnical services in accordance with generally accepted geotechnical engineering practices in this locality at this time. GNN expressly disclaims all warranties and guarantees, express or implied.

Client shall provide GNN an opportunity to review the final design and specifications so that earthwork, drainage and foundation recommendations may be properly interpreted and implemented in the design and specifications. If GNN is not accorded the review opportunity, GNN shall have no responsibility for misinterpretation of GNN's recommendations.

Although GNN can provide environmental assessment and investigation services for an additional cost, the current scope of GNN's services does not include an environmental assessment or an investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater, or air on, below, or adjacent to the subject property.

APPENDICES

Appendix I

Vicinity Map (Figure 1)

Site Exploration Map (Figure 2)

Geologic Map (Figure 3)

Liquefaction Susceptibility Map (Figure 4)

Earthquake Hazard Map (Figure 5)

Cascadia Earthquake Hazard Map (Figure 6)

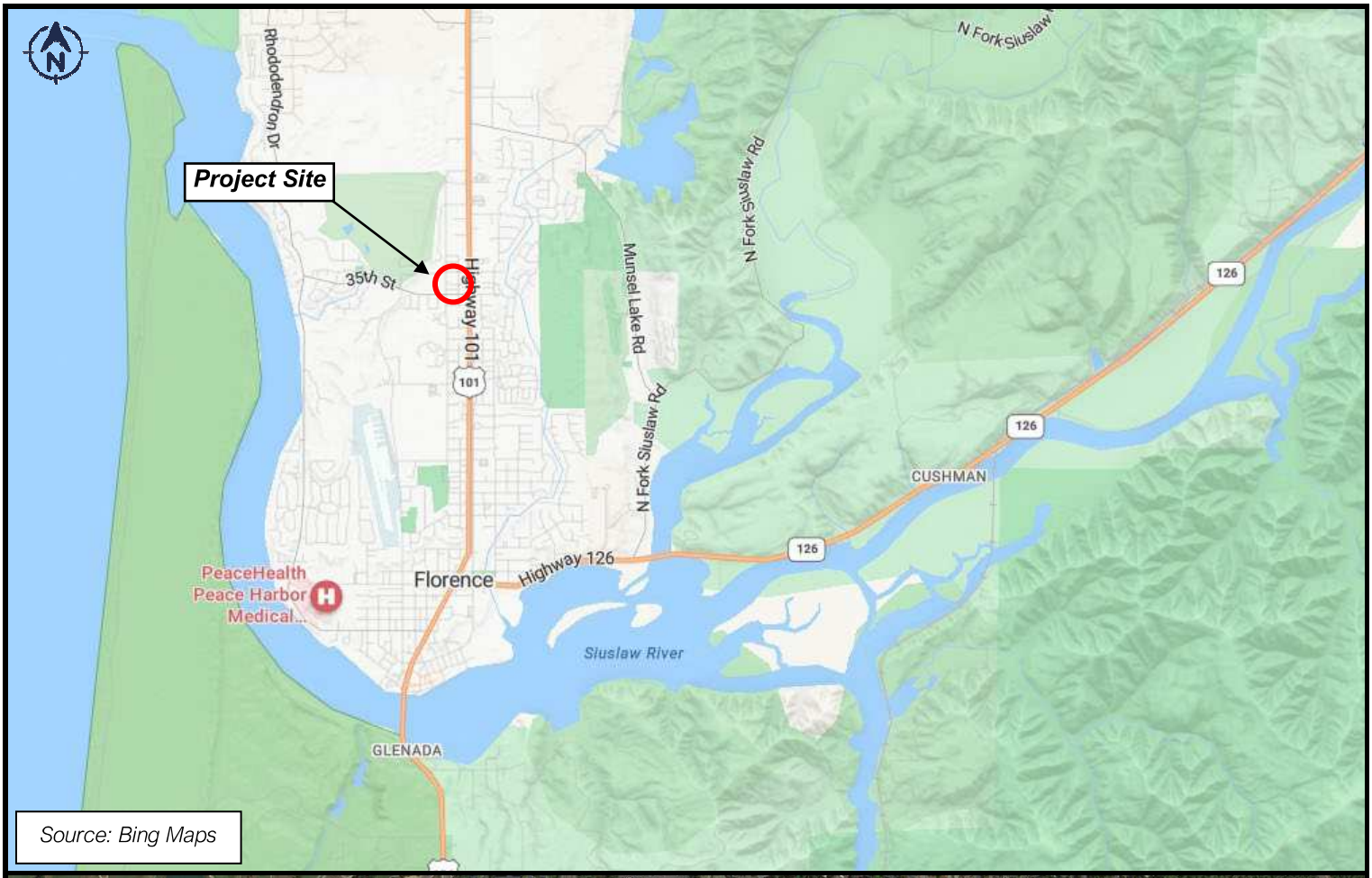

FIGURE 1: VICINITY MAP

PROJECT NO. 223-1642

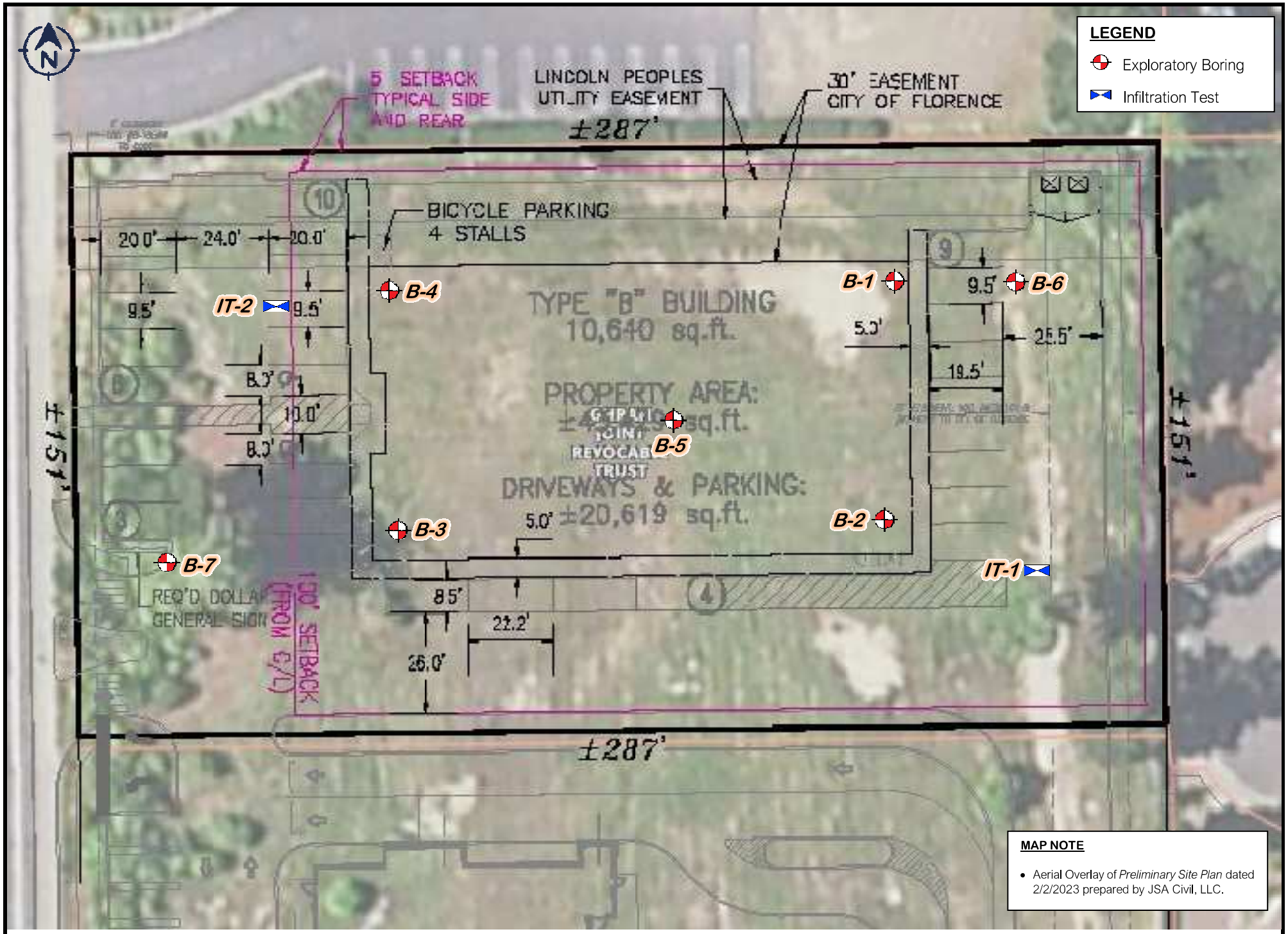

FIGURE 2: SITE EXPLORATION MAP

PROJECT NO. 223-1642

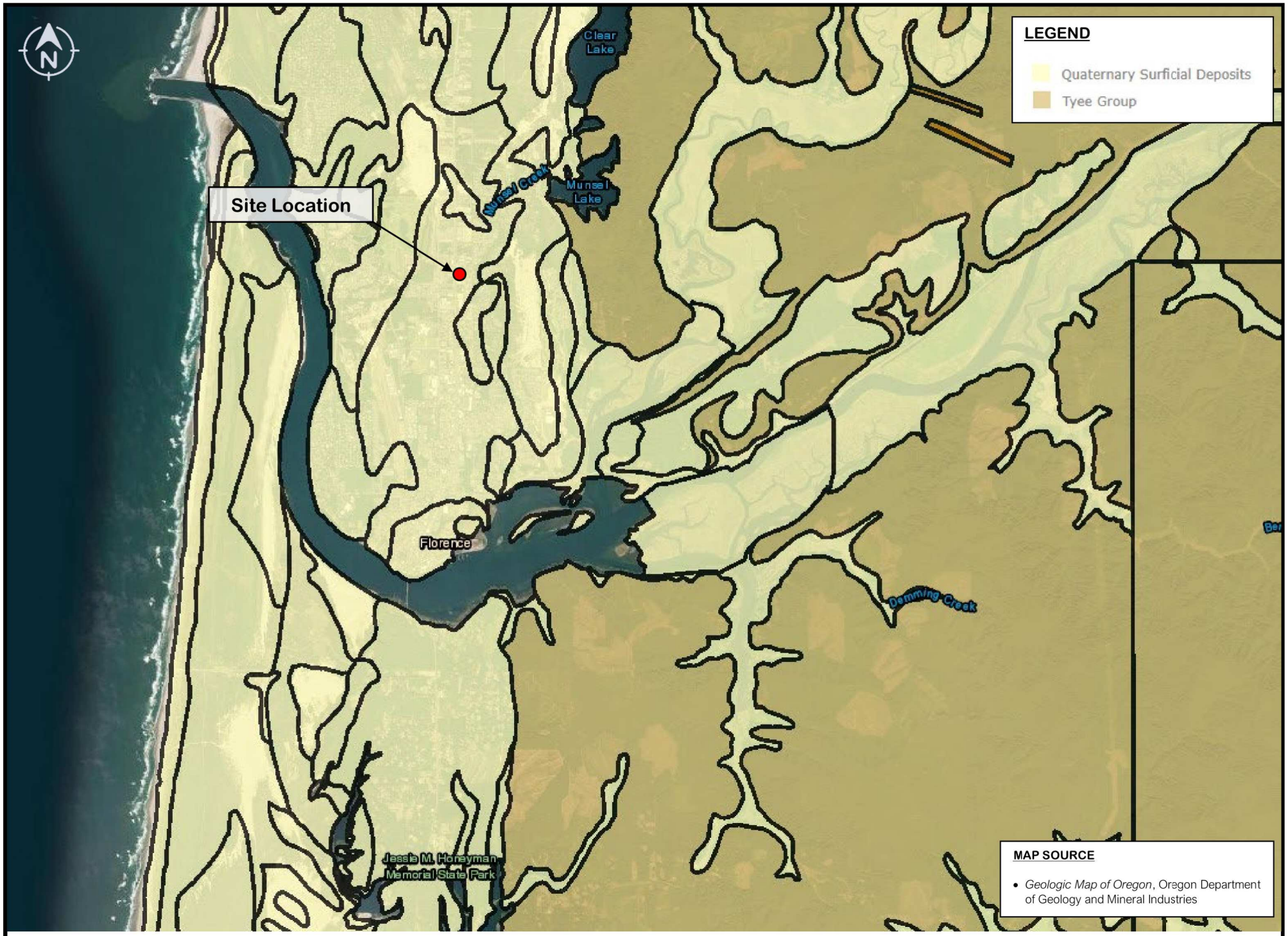

FIGURE 3: GEOLOGIC MAP

PROJECT NO. 223-1642

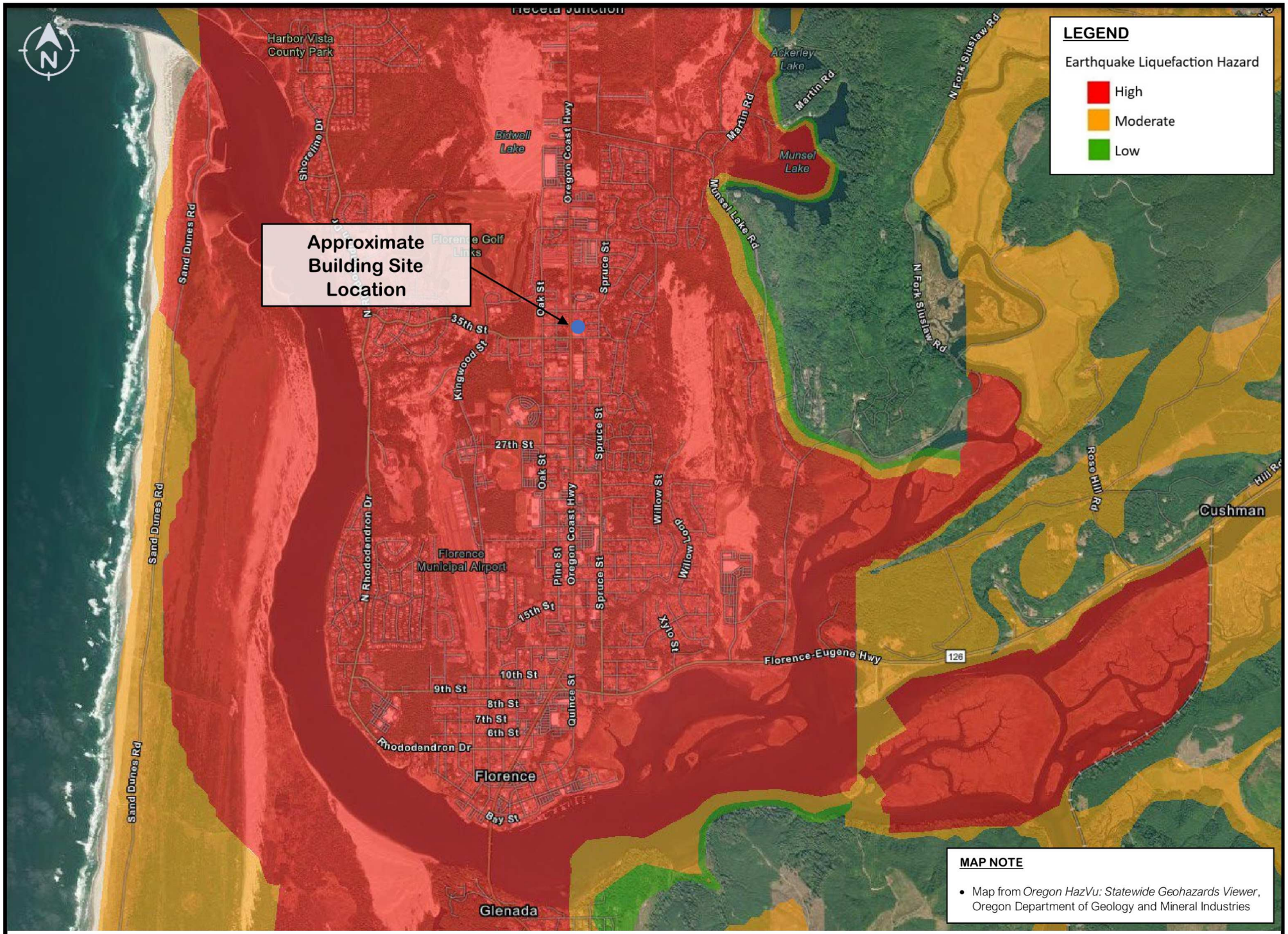

FIGURE 4: LIQUEFACTION SUSCEPTIBILITY MAP

PROJECT NO. 223-1642

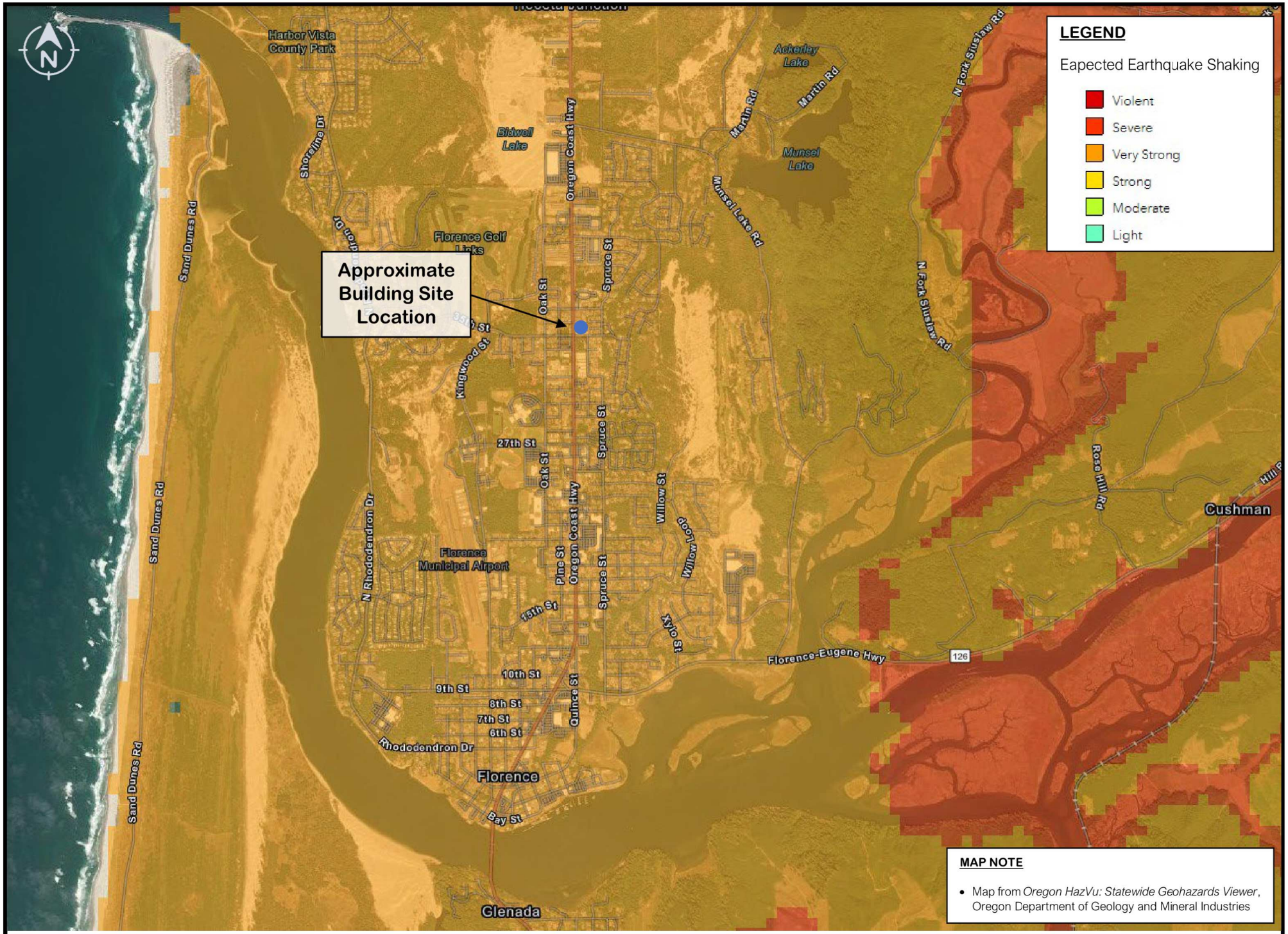

FIGURE 5: EARTHQUAKE HAZARD MAP

PROJECT NO. 223-1642

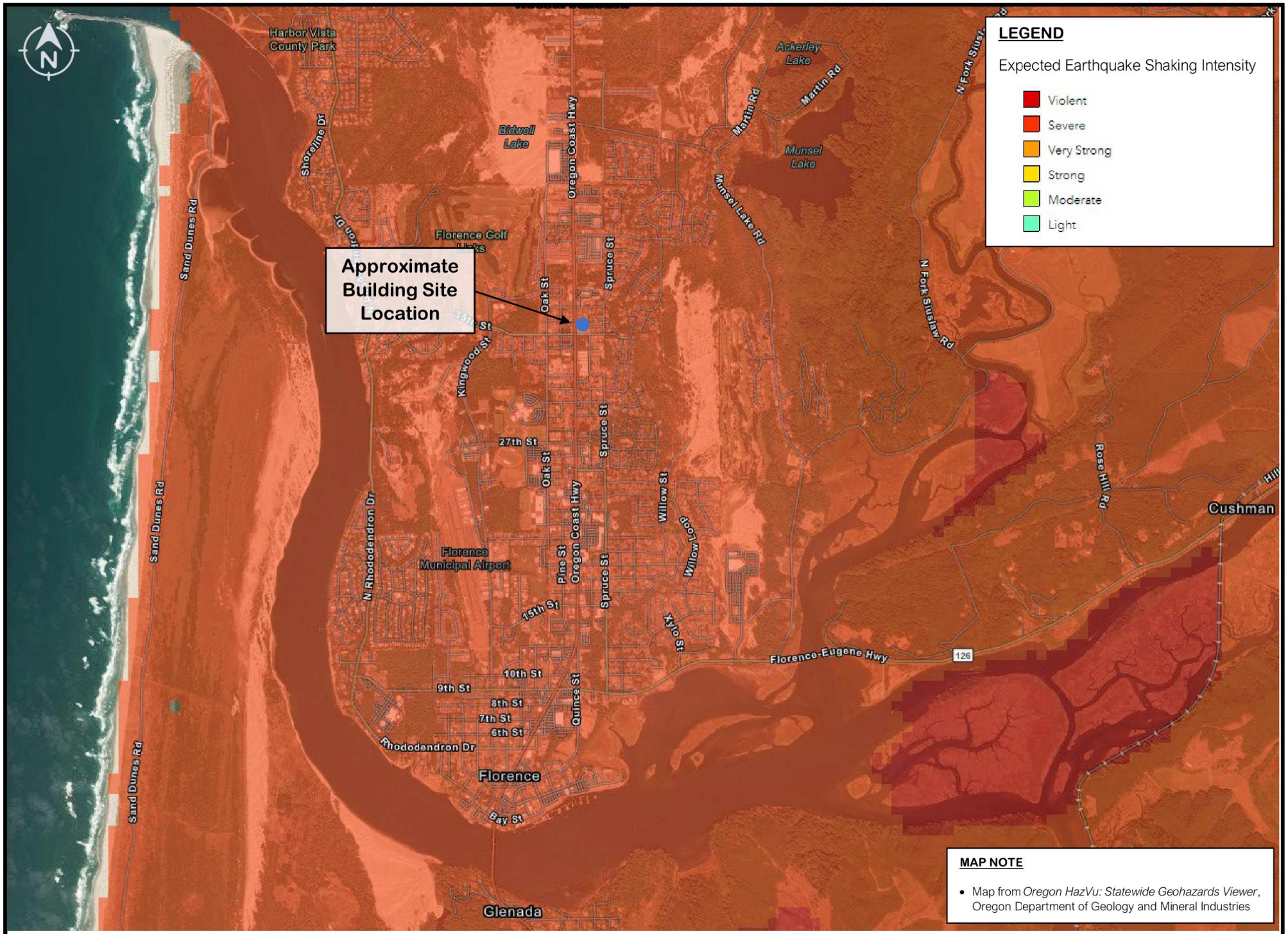

FIGURE 6: CASCADIA EARTHQUAKE HAZARD MAP

PROJECT NO. 223-1648

Appendix II

Exploratory Boring Logs
Key Chart (for Soil Classification)

GN Northern, Inc
722 N. 16th Ave Suite 31
Yakima, WA 99802
Telephone: (509) 248-9798

BORING NUMBER B-1

CLIENT Capital Growth Buchalter, Inc.
PROJECT NAME New Dollar Gerneral
PROJECT NUMBER 222-1642
PROJECT LOCATION NE of Intersection of Hwy. 101 & 35th St, Florence OR
DATE STARTED 4/17/23 **COMPLETED** 4/17/23
GROUND ELEVATION 74 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR The Galli Group
GROUND WATER LEVELS:
DRILLING METHOD ATV Mounted Drill rig w/ 4' soild stem auger
▽ **AT TIME OF DRILLING** 6.25 ft / Elev 67.75 ft
LOGGED BY LC **CHECKED BY** IM
AT END OF DRILLING ---
NOTES Approx. GPS Coords.: 43.997696°, -124.100520°
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					POORLY GRADED SAND, (SP) light brown to orangeish brown, fine grained, moist, loose
	SPT	2-2-3 (5)			
	SPT	2-3-2 (5)			
5			SP		
	SPT	2-2-2 (4)			very loose to loose, some orange sand
					▽
					caving
	SPT	2-3-2 (5)			brown, loose
10				10.0	64.0
	SPT	3-4-6 (10)			POORLY GRADED SAND WITH SILT, (SP-SM) brown, fine grained, loose to medium dense with dark brown sand lenses, trace roots
15			SP-SM		
20				20.0	54.0

- Groundwater encountered at ~6.25' BGS at time of drilling
- Referenced elevations are approximate and based on Google Earth topography

Bottom of borehole at 20.0 feet.

GN Northern, Inc
722 N. 16th Ave Suite 31
Yakima, WA 99802
Telephone: (509) 248-9798

BORING NUMBER B-2

CLIENT Capital Growth Buchalter, Inc.
PROJECT NAME New Dollar Gerneral
PROJECT NUMBER 222-1642
PROJECT LOCATION NE of Intersection of Hwy. 101 & 35th St, Florence OR
DATE STARTED 4/17/23 **COMPLETED** 4/17/23
GROUND ELEVATION 74 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR The Galli Group
GROUND WATER LEVELS:
DRILLING METHOD ATV Mounted Drill rig w/ 4' soild stem auger
▽ **AT TIME OF DRILLING** 6.70 ft / Elev 67.30 ft
LOGGED BY LC **CHECKED BY** IM
AT END OF DRILLING ---
NOTES Approx. GPS Coords.: 43.997517°, -124.100519°
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			SM		0.3 GRASS AND ROOTS (Z3.8)
					0.5 SILTY SAND, (SM) dark brown, fine grained, damp, loose, with organics (Z3.5)
	SPT	2-3-3 (6)			POORLY GRADED SAND, (SP) orange to light brown, fine grained, damp, loose
	SPT	2-3-5 (8)			damp to moist, trace organics
5			SP		
	SPT	3-3-4 (7)			▽
	SPT	3-4-5 (9)			loose
					9.5 (64.5)
10					POORLY GRADED SAND WITH SILT, (SP-SM) light brown, fine grained, medium dense
	SPT	3-5-7 (12)			~1/2" thick dark brown band
15			SP-SM		
20					20.0 (54.0)

- Groundwater encountered at ~6.7' BGS at time of drilling
- Referenced elevations are approximate and based on Google Earth topography

Bottom of borehole at 20.0 feet.

GN Northern, Inc
722 N. 16th Ave Suite 31
Yakima, WA 99802
Telephone: (509) 248-9798

BORING NUMBER B-3

CLIENT Capital Growth Buchalter, Inc.
PROJECT NAME New Dollar Gerneral
PROJECT NUMBER 222-1642
PROJECT LOCATION NE of Intersection of Hwy. 101 & 35th St, Florence OR
DATE STARTED 4/16/23 **COMPLETED** 4/16/23
GROUND ELEVATION 74 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR The Galli Group
GROUND WATER LEVELS:
DRILLING METHOD ATV Mounted Drill rig w/ 4' soild stem auger
▽ **AT TIME OF DRILLING** 8.00 ft / Elev 66.00 ft
LOGGED BY LC **CHECKED BY** IM
AT END OF DRILLING ---
NOTES Approx. GPS Coords.: 43.997509°, -124.101004°
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0					POORLY GRADED SAND, (SP) orangeish brown, fine grained, damp, very loose
	SPT	1-1-1 (2)			
	SPT	1-1-1 (2)	SP		trace organics
5					trace roots
	SPT	2-5-3 (8)			moist
	SPT	3-4-5 (9)			▽
					9.0 — 65.0
10					POORLY GRADED SAND WITH SILT, (SP-SM) orangeish brown to gray, fine grained, medium dense
	SPT	4-5-7 (12)			with thin layer of organics
	SPT	3-3-4 (7)	SP-SM		brown, loose, with silt and organics
15					wood/roots at tip
	SPT	3-4-8 (12)			gray brown, medium dense
					17.5 — 56.5

- Drilling terminated at ~17.5' BGS due to collapse
- Groundwater encountered at ~8' BGS at time of drilling
- Referenced elevations are approximate and based on Google Earth topography

Bottom of borehole at 17.5 feet.

GN Northern, Inc
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Yakima, WA 99802
Telephone: (509) 248-9798

BORING NUMBER B-4

CLIENT Capital Growth Buchalter, Inc.
PROJECT NAME New Dollar Gerneral
PROJECT NUMBER 222-1642
PROJECT LOCATION NE of Intersection of Hwy. 101 & 35th St, Florence OR
DATE STARTED 4/16/23 **COMPLETED** 4/16/23
GROUND ELEVATION 74 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR The Galli Group
GROUND WATER LEVELS:
DRILLING METHOD ATV Mounted Drill rig w/ 4' soild stem auger
▽ **AT TIME OF DRILLING** 7.00 ft / Elev 67.00 ft
LOGGED BY LC **CHECKED BY** IM
AT END OF DRILLING ---
NOTES Approx. GPS Coords.: 43.997689°, -124.101013°
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			SM		0.3 GRASS / BRUSH AND ROOTS TO ~4" BGS — 73.7
					0.6 SILTY SAND, (SM) dark brown, fine grained, moist, loose — 73.4
					POORLY GRADED SAND, (SP) light brown, fine grained, moist, loose
	SPT	2-3-3 (6)			
	SPT	3-3-3 (6)			
5					
	SPT	2-3-3 (6)			
					~2" band of dark brown sand
					▽
	SPT	3-3-4 (7)			
10					
	SPT	4-7-7 (14)	SP		medium dense
15					
20					20.0 — 54.0

- Groundwater encountered at ~7' BGS at time of drilling
- Referenced elevations are approximate and based on Google Earth topography

Bottom of borehole at 20.0 feet.

GN Northern, Inc
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Yakima, WA 99802
Telephone: (509) 248-9798

BORING NUMBER B-5

CLIENT Capital Growth Buchalter, Inc.
PROJECT NAME New Dollar Gerneral
PROJECT NUMBER 222-1642
PROJECT LOCATION NE of Intersection of Hwy. 101 & 35th St, Florence OR
DATE STARTED 4/16/23 **COMPLETED** 4/16/23
GROUND ELEVATION 74 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR The Galli Group
GROUND WATER LEVELS:
DRILLING METHOD ATV Mounted Drill rig w/ 4' soild stem auger
▽ **AT TIME OF DRILLING** 6.50 ft / Elev 67.50 ft
LOGGED BY LC **CHECKED BY** IM
AT END OF DRILLING ---
NOTES Approx. GPS Coords.: 43.997595°, -124.100735°
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0			SM		0.3 GRASS AND ROOTS — 73.8
					0.8 SILTY SAND, (SM) dark brown, fine grained, damp, loose, some orange sand — 73.2
					1.0 FILL ~2" of 1" MINUS CRUSHED ROCK — 73.0
	SPT	3-3-3 (6)			POORLY GRADED SAND, (SP) light brown, fine grained, damp, loose
	SPT	2-3-3 (6)			
5	SPT	2-2-2 (4)			light brown, moist, very loose to loose
					▽
	SPT	3-4-5 (9)			loose
10	SPT	3-3-6 (9)	SP		brown
					with scattered lenses of dark brown sand
15					
20					20.0 — 54.0

- Groundwater encountered at ~6.5' BGS at time of drilling
- Referenced elevations are approximate and based on Google Earth topography

Bottom of borehole at 20.0 feet.

GN Northern, Inc
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Telephone: (509) 248-9798

BORING NUMBER B-6

CLIENT Capital Growth Buchalter, Inc.
PROJECT NAME New Dollar Gerneral
PROJECT NUMBER 222-1642
PROJECT LOCATION NE of Intersection of Hwy. 101 & 35th St, Florence OR
DATE STARTED 4/17/23 **COMPLETED** 4/17/23
GROUND ELEVATION 73 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR The Galli Group
GROUND WATER LEVELS:
DRILLING METHOD ATV Mounted Drill rig w/ 4' soild stem auger
▽ **AT TIME OF DRILLING** 6.00 ft / Elev 67.00 ft
LOGGED BY LC **CHECKED BY** IM
AT END OF DRILLING ---
NOTES Approx. GPS Coords.: 43.997692°, -124.100393°
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0					0.3 GRASS AND ROOTS	72.8
	SPT	2-2-2 (4)	SP		POORLY GRADED SAND, (SP) orange to light brown, fine grained, damp to moist, very loose to loose	
	SPT	2-3-4 (7)			light brown, moist, loose	
					4.5	68.5
5	SPT	2-3-3 (6)	SP-SM		POORLY GRADED SAND WITH SILT, (SP-SM) light brown, fine grained, moist to wet, loose ▽ ~1/2" thick dark brown band	
	SPT	3-4-7 (11)			medium dense	
					9.5	63.5
10	SPT	3-4-6 (10)	SP		POORLY GRADED SAND, (SP) light brown, fine grained, loose to medium dense	
					11.5 ~1/2" thick dark brown band	61.5

- Groundwater encountered at ~6' BGS at time of drilling
- Referenced elevations are approximate and based on Google Earth topography

Bottom of borehole at 11.5 feet.

GN Northern, Inc
722 N. 16th Ave Suite 31
Yakima, WA 99802
Telephone: (509) 248-9798

BORING NUMBER B-7

CLIENT Capital Growth Buchalter, Inc.
PROJECT NAME New Dollar Gerneral
PROJECT NUMBER 222-1642
PROJECT LOCATION NE of Intersection of Hwy. 101 & 35th St, Florence OR
DATE STARTED 4/16/23 **COMPLETED** 4/16/23
GROUND ELEVATION 73 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR The Galli Group
GROUND WATER LEVELS:
DRILLING METHOD ATV Mounted Drill rig w/ 4' soild stem auger
▽ **AT TIME OF DRILLING** 7.00 ft / Elev 66.00 ft
LOGGED BY LC **CHECKED BY** IM
AT END OF DRILLING ---
NOTES Approx. GPS Coords.: 43.997491°, -124.101235°
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
0					0.3 GRASS / BRUSH AND ROOTS TO ~4" BGS	72.7
			SM		0.6 SILTY SAND, (SM) brown, fine grained, damp, loose	72.4
					POORLY GRADED SAND, (SP) orange and light brown, fine grained, damp, loose	
	SPT	5-5-5 (10)			loose to medium dense	
	SPT	4-4-2 (6)			loose	
5						
	SPT	2-3-3 (6)	SP		~2" band of dark brown sand	
					▽	
	SPT	2-3-3 (6)				
10						
	SPT	3-5-6 (11)			medium dense	
					11.5	61.5

- Groundwater encountered at ~7' BGS at time of drilling
- Referenced elevations are approximate and based on Google Earth topography

Bottom of borehole at 11.5 feet.

Northern, Inc.
Kennewick, Yakima, Spokane, Hermiston (OR)

KEY CHART

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COARSE-GRAINED SOILS			FINE-GRAINED SOILS		
DENSITY	N (BLOWS/FT)	FIELD TEST	CONSISTENCY	N (BLOWS/FT)	FIELD TEST
Very Loose	0 – 4	Easily penetrated with ½-inch reinforcing rod pushed by hand	Very Soft	0 – 2	Easily penetrated several inches by thumb
Loose	4 – 10	Difficult to penetrate with ½-inch reinforcing rod pushed by hand	Soft	2 – 4	Easily penetrated one inch by thumb
Medium -Dense	10 – 30	Easily penetrated with ½-inch rod driven with a 5-lb hammer	Medium-Stiff	4 – 8	Penetrated over ½-inch by thumb with moderate effort
Dense	30 – 50	Difficult to penetrate with ½-inch rod driven with a 5-lb hammer	Stiff	8 – 15	Indented about ½-inch by thumb but penetrated with great effort
Very Dense	> 50	penetrated only a few inches with ½-inch rod driven with a 5-lb hammer	Very Stiff	15 – 30	Readily indented by thumb
			Hard	> 30	Indented with difficulty by thumbnail

USCS SOIL CLASSIFICATION

MAJOR DIVISIONS			GROUP DESCRIPTION	
Coarse-Grained Soils <50% passes #200 sieve	**Gravel** and **Gravelly Soils** <50% coarse fraction passes #4 sieve	**Gravel** (with little or no fines)	GW	Well-graded **Gravel**
			GP	Poorly Graded **Gravel**
		Gravel (with >12% fines)	GM	Silty **Gravel**
			GC	Clayey **Gravel**
	Sand and **Sandy Soils** >50% coarse fraction passes #4 sieve	**Sand** (with little or no fines)	SW	Well-graded **Sand**
			SP	Poorly graded **Sand**
		Sand (with >12% fines)	SM	Silty **Sand**
			SC	Clayey **Sand**
Fine-Grained Soils >50% passes #200 sieve	**Silt** and **Clay** Liquid Limit < 50		ML	**Silt**
			CL	Lean **Clay**
			OL	Organic **Silt** and **Clay** (low plasticity)
	Silt and **Clay** Liquid Limit > 50		MH	Inorganic **Silt**
			CH	Inorganic **Clay**
			OH	Organic **Clay** and **Silt** (med. to high plasticity)
Highly Organic Soils			PT	**Peat**
				Top Soil

LOG SYMBOLS

	2S	2" OD Split Spoon (SPT)
	3S	3" OD Split Spoon
	NS	Non-Standard Split Spoon
	ST	Shelby Tube
	CR	Core Run
	BG	Bag Sample
	TV	Torvane Reading
	PP	Penetrometer Reading
	NR	No Recovery
	GW	Groundwater Table

MODIFIERS

DESCRIPTION	RANGE
Trace	<5%
Little	5% – 12%
Some	>12%

MOISTURE CONTENT

DESCRIPTION	FIELD OBSERVATION
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but not visible water
Wet	Visible free water

SOIL CLASSIFICATION INCLUDES

1. Group Name
2. Group Symbol
3. Color
4. Moisture content
5. Density / consistency
6. Cementation
7. Particle size (if applicable)
8. Odor (if present)
9. Comments

MAJOR DIVISIONS WITH GRAIN SIZE

SIEVE SIZE						
12"	3"	3/4"	4	10	40	200
GRAIN SIZE (INCHES)						
12	3	0.75	0.19	0.079	0.0171	0.0029

Boulders	Cobbles	Gravel		Sand			Silt and Clay
		Coarse	Fine	Coarse	Medium	Fine	

Conditions shown on boring and testpit logs represent our observations at the time and location of the fieldwork, modifications based on lab test, analysis, and geological and engineering judgment. These conditions may not exist at other times and locations, even in close proximity thereof. This information was gathered as part of our investigation, and we are not responsible for any use or interpretation of the information by others.

Appendix III

Site & Exploration Photographs

View of site conditions adjacent to Burger King looking east

View of site conditions on southeast corner looking east

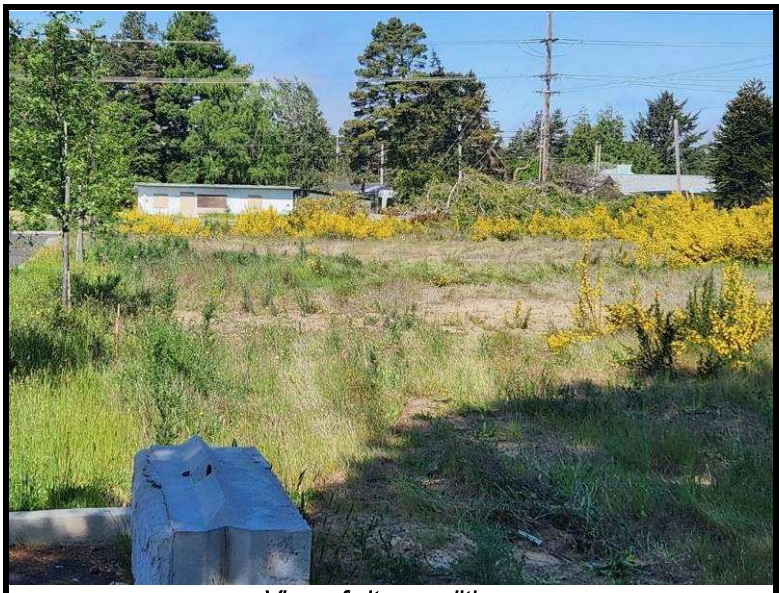
View of site conditions

View of site conditions

View of site conditions

View of site conditions from northeast corner looking southeast

PLATE 1: SITE & EXPLORATION PHOTOGRAPHS **PROJECT NO. 223-1642**



View of site conditions

Utilities located near northeast corner

View of site conditions looking north from southeast corner

View of site conditions

ATV mounted drill rig used for borings

Drilling of boring B-6

PLATE 2: SITE & EXPLORATION PHOTOGRAPHS **PROJECT NO. 223-1648**

Northern, Inc.

Appendix IV

NRCS Soil Survey

United States Department of Agriculture

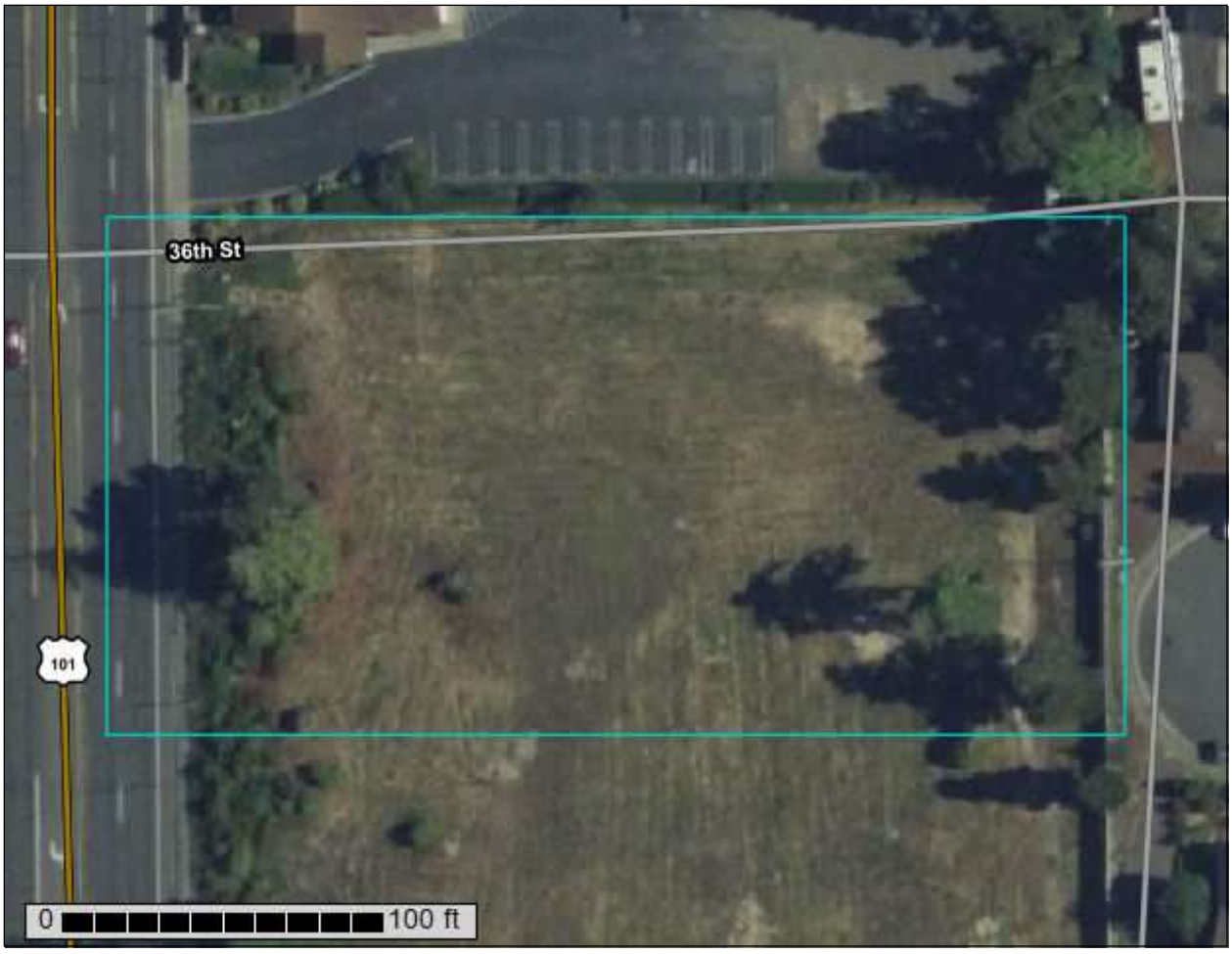
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

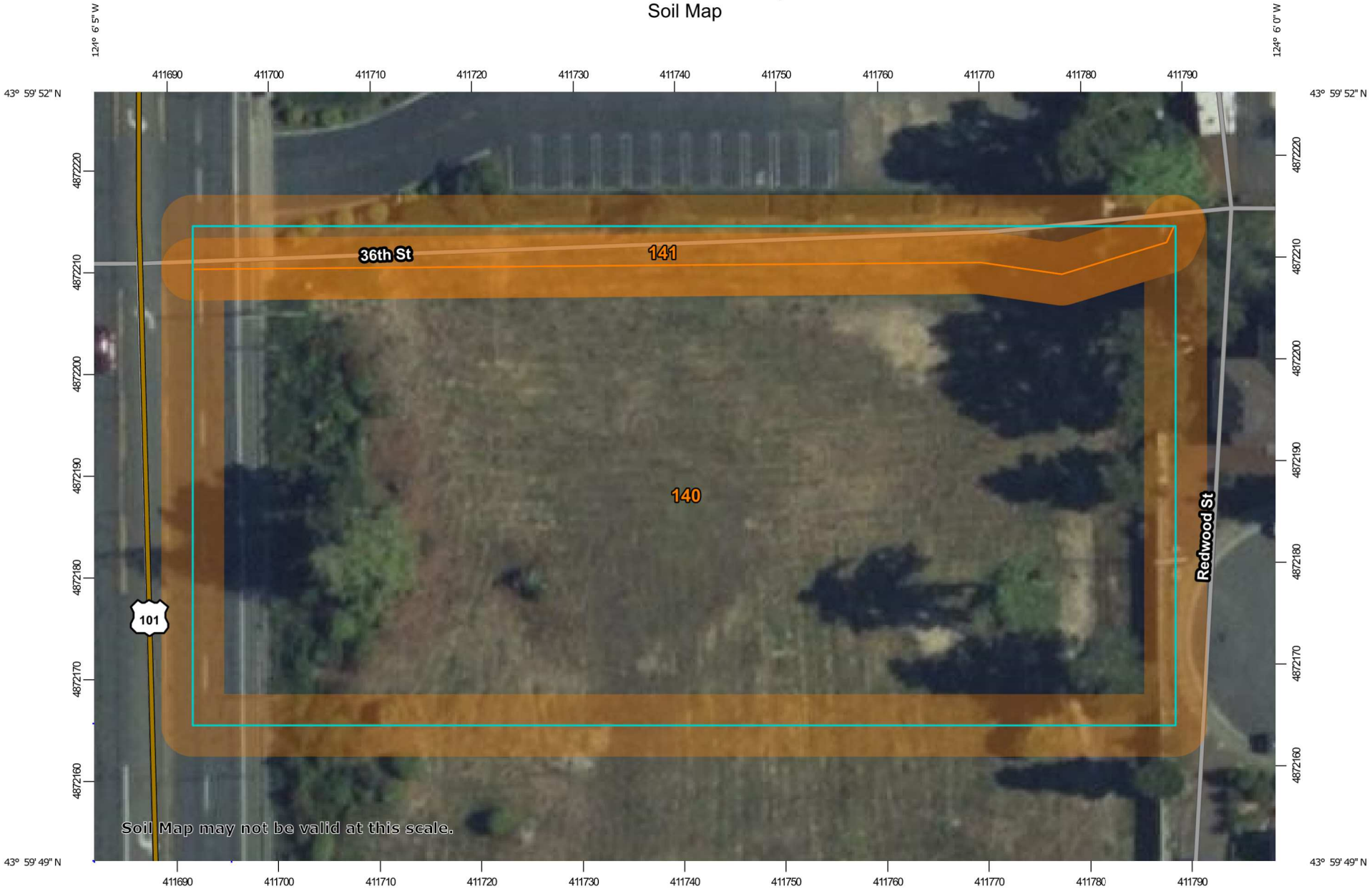
Custom Soil Resource Report for Lane County Area, Oregon

New Dollar General
Florence, OR



May 16, 2023

Custom Soil Resource Report
Soil Map



Map Scale: 1:532 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 25 50 100 150

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

Lane County Area, Oregon

140—Yaquina loamy fine sand

Map Unit Setting

National map unit symbol: 2359
Elevation: 20 to 130 feet
Mean annual precipitation: 70 to 80 inches
Mean annual air temperature: 50 to 52 degrees F
Frost-free period: 180 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Yaquina and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Yaquina

Setting

Landform: Dune slacks
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian sand of mixed origin

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
H1 - 1 to 9 inches: loamy fine sand
H2 - 9 to 30 inches: fine sand
H3 - 30 to 60 inches: fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Ecological site: F004AB202OR - Dune Forest
Forage suitability group: Somewhat Poorly Drained (G004AY017OR)
Other vegetative classification: Somewhat Poorly Drained (G004AY017OR)
Hydric soil rating: Yes

141—Yaquina-Urban land complex

Map Unit Setting

National map unit symbol: 235b
Elevation: 20 to 130 feet
Mean annual precipitation: 70 to 80 inches
Mean annual air temperature: 50 to 52 degrees F
Frost-free period: 180 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Yaquina and similar soils: 50 percent
Urban land: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Yaquina

Setting

Landform: Dune slacks
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian sand of mixed origin

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
H1 - 1 to 9 inches: loamy fine sand
H2 - 9 to 30 inches: fine sand
H3 - 30 to 60 inches: fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Ecological site: F004AB202OR - Dune Forest
Forage suitability group: Somewhat Poorly Drained (G004AY017OR)
Other vegetative classification: Somewhat Poorly Drained (G004AY017OR)
Hydric soil rating: Yes

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Appendix V

Oregon Water Resources Department Well Logs

STATE OF OREGON
WATER SUPPLY WELL REPORT
(ORS 537.765 & OAR 690-205-0210)
Instructions for completing this report are on the last page of this form.

LANE 71472

WELL LABEL # L
START CARD # 208165
ORIGINAL LOG #

(1) LANDOWNER Owner Well I.D.
First Name MIKE Last Name MILLER
Company CITY OF FLORENCE
Address 250 HWY 101
City FLORENCE State OR Zip 97439

(2) TYPE OF WORK ☒ New ☐ Conversion ☐ Deepening
☐ Alteration (complete Sections 2a & 10) ☒ Abandonment (complete Section 5a)

(2a) PRE-ALTERATION: Well Depth _____ ft.
Seal Material _____
Casing Type: ☐ Steel ☐ Plastic ☐ Other _____
Casing Gauge _____ Casing Diameter _____

(3) DRILL METHOD ☐ Rotary Air ☐ Rotary Mud ☐ Auger
☐ Cable ☐ Cable Mud ☐ Reverse Rotary ☒ Other JETTING

(4) PROPOSED USE ☐ Domestic ☐ Irrigation ☐ Community
☐ Industrial/Commercial ☐ Livestock ☒ Dewatering ☐ Injection
☐ Thermal ☒ Other COLLECTOR WELL

(5) BORE HOLE CONSTRUCTION
Depth of Completed Well 12 ft. Special Standard: ☒ Yes (attach copy)

BORE HOLE Dia	From	To	Material	SEAL From	To	Amount	Sacks/lbs
2"	0	12	NONE				

How was seal placed: Method ☐ A ☐ B ☐ C ☐ D ☐ E
☒ Other NONE
Backfill placed from _____ ft. to _____ ft. Material _____
Filter pack from _____ ft. to _____ ft. Material _____ Size _____

(5a) ABANDONMENT USING UNHYDRATED BENTONITE:
Calculated Amount Proposed to be Used: _____ sacks/lbs
Actual Amount Used: _____ sacks/lbs

(6) CASING/LINER

Csng	Linr	Dia	+	From	To	Gauge	Steel	Plastic	Welded	Thrd
X		2		0	12	.188	X			X

Shoe ☐ Inside ☐ Outside ☐ Other Location of shoe(s) _____
Temporary casing ☐ Yes Diameter _____ From _____ To _____

(7) PERFORATIONS/SCREENS
Perforations Method _____
Screens Type _____ Material _____

Perf	Scrn	Csng	Linr	Screen Dia	From	To	Screen/ slot width	Slot length	# of slots	Tele/ pipe size
X		X			10.5	12				

(8) WELL TESTS: Minimum testing time is 1 hour
☒ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
20-50			1 HR

Temperature 11-15 °F Lab analysis ☐ Yes By _____
Water quality concerns? ☐ Yes (describe below) TDS _____ ppm

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)
County LANE Twp 18 N or (S) Range 12 E or (W) W.M.
Sec 23 NW 1/4 of the NW 1/4 Tax Lot _____
Tax Map Number _____ Lot ROW
Lat ___ ___° ___ ___' ___.___" or ___ ___.___ ___ ___ ___ ___ DMS or DD
Long ___ ___° ___ ___' ___.___" or ___ ___ ___.___ ___ ___ ___ ___ DMS or DD
Street Address of Well (or nearest address) 32ND & OAK ST. IN FLORENCE

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL (ft)
Existing Well/Pre-Alteration				
Completed Well				8 FT

Flowing Artesian? ☐ Yes Dry Hole? ☐ Yes

WATER BEARING ZONES Depth water was first found _____

SWL Date	From	To	Est Flow	SWL (psi)	+	SWL (ft)
10/27/11	8	12	20-50			8 FT

(11) WELL LOG Ground Elevation _____

Material	From	To
SAND	0	12
100 2" INCH WELL POINTS		
PER EACH 6-INCH HEADER		

Date Started 10/27/11 Completed 10/27/11

(unbonded) Water Well Constructor Certification
I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

RECEIVED
NOV 14 2011
WATER RESOURCES DEPT
SALEM, OREGON

License Number _____ Date _____
Signed _____

(bonded) Water Well Constructor Certification
I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

License Number _____ Date 11/14/11
Signed _____
Contact Info. (optional) LAND OWNER PERMIT

ORIGINAL – WATER RESOURCES DEPARTMENT ONE COPY FOR CONSTRUCTOR ONE COPY FOR CUSTOMER
SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK

ORIGINAL
File Original and Duplicate with the STATE ENGINEER, SALEM, OREGON

WATER WELL REPORT
STATE OF OREGON

State Well No. 18/12W-23E
State Permit No. LANE 019258

(1) OWNER:
Name C. W. Edwards
Address Rt. 1 Box 273 Florence Ore

(2) LOCATION OF WELL:
County LANE Owner's number, if any—
¼ ¼ Section T. R. W.M.
Bearing and distance from section or subdivision corner
Lot 20
Block 33
Freasy & Burrey add.
29th St. Florence Ore

(3) TYPE OF WORK (check):
New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☒ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) TYPE OF WELL:
Rotary ☐ Driven ☒
Cable ☐ Jetted ☐
Dug ☐ Bored ☐

(6) CASING INSTALLED:
Threaded ☒ Welded ☐
..... " Diam. from ..... ft. to ..... ft. Gage .....
1¼ " Diam. from 15 ft. to standard ft. Gage galv.
..... " Diam. from ..... ft. to ..... ft. Gage pipe

(7) PERFORATIONS:
Perforated? ☐ Yes ☐ No
Type of perforator used
SIZE of perforations in. by in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

(8) SCREENS:
Well screen installed ☒ Yes ☐ No
Manufacturer's Name Mark Well
Type 60 mesh Model No. .....
Diam. 1¼" Slot size X36" Set from ..... ft. to ..... ft.
Diam. ..... Slot size ..... Set from ..... ft. to ..... ft.

(9) CONSTRUCTION:
Was well gravel packed? ☐ Yes ☒ No Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.
Was a surface seal provided? ☐ Yes ☒ No To what depth? ..... ft.
Material used in seal—
Did any strata contain unusable water? ☐ Yes ☒ No
Type of water? Depth of strata
Method of sealing strata off

(10) WATER LEVELS:
Static level 9 ft. below land surface Date Jan 22
Artesian pressure lbs. per square inch Date

Log Accepted by:
[Signed] C. W. Edwards (Owner) Date 4-19, 1957

(11) WELL TESTS:
Drawdown is amount water level is lowered below static level
Was a pump test made? ☐ Yes ☒ No If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No

(12) WELL LOG:
Diameter of well 1½ inches.
Depth drilled 18 ft. Depth of completed well 18 ft.
Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
black sand		

RECEIVED
APR 25 1957
STATE ENGINEER
SALEM, OREGON

Work started Jan 22 19 57 Completed Jan 22 19 57

(13) PUMP:
Manufacturer's Name Edward Pump Co.
Type: centrifugal H.P. ¾

Well Driller's Statement:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME CHARLES PANSCHOW (Person, firm, or corporation) (Type or print)
Address R. 1, Florence, Oregon Box 192
Driller's well number 56
[Signed] Charles E. Panschow (Well Driller)
License No. 87 Date , 1957

(USE ADDITIONAL SHEETS IF NECESSARY)