J.R. BONNETT ENGINEERING

CIVIL & STRUCTURAL ENGINEERING/CONSULTING
803 E. 3RD AVENUE
SPOKANE, WA. 99202
(509) 534-3929

EAGLE BLUFF, P.U.D.

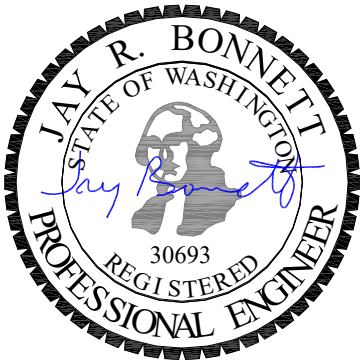
Spokane, WA

Conceptual Drainage Design Calculations

for

Harley C. Douglass

5520 N. Florida Street
Spokane, WA 99217



12/10/2025

December, 2025
JRBE Job No. 24-004.10

EAGLE BLUFF, P.U.D.

Conceptual Storm Water Management Narrative

PROJECT DESCRIPTION

The development site is located along the south boundary of the City of Spokane on the west side of US-195 and is directly east of the existing Eagle Ridge P.U.D and Eagle Ridge First Addition, P.U.D.

There are currently 11 parcels of land totaling approximately 106.59 acres that will be platted into a mixture of single-family and multi-family lots. The proposed project anticipates the construction of approximately 331 single-family homes and 33 four-unit buildings housing a total of 128 multi-family units.

The main access points to the development are located at the north end where the existing Meadow Lane Road improvements currently terminate and at the south end where the existing Moran View Street improvements currently terminate.

Lots within the development are generally arranged in a grid pattern that are well-connected by public streets and sidewalks. For the most part, the single-family lots will be developed in a manner that is consistent with single-family developments in the area. Each lot will consist of a wood-framed home with an attached garage served by a private driveway extending from the street. Exterior decks and/or patios will likely be constructed in the rear yard while covered porches and private sidewalks will connect the home to the adjacent public sidewalk or private driveway. The remainder of the lot will consist of typical residential-type landscaping, including grass lawn, shrubs, trees, and planting beds.

The proposed public streets will be asphalt-paved with concrete curb & gutter, planting strips and concrete sidewalk located on each side per City standards.

PURPOSE

This report has been prepared to conceptually describe, illustrate and summarize the extent of storm water drainage facilities required to safely collect, convey and dispose of the proposed project storm water runoff from a 10-year design frequency storm event in accordance with the Spokane Regional Storm Water Manual and best management practices. The overall stormwater system will consist of repetitive drainage facilities strategically placed around the site to contain anticipated storm events. It is anticipated that 100% of the post-developed runoff from within the right-of-way and a major portion of the improved lots will be contained and disposed of onsite. Not all drainage basins and related facilities will be quantified in this report, rather representative basins will be illustrated and quantified to reflect the type of systems that will be repeated around the development. A final drainage report and construction drawings that will illustrate and quantify all onsite drainage basins will be prepared for the overall development upon preliminary plat approval.

GEOTECHNICAL INFORMATION

The NRCS Soil Survey identifies three onsite soil types described as: 1) Brincken, moist-Speigle complex, 8 to 25 percent slopes; 2) Speigle-Rubble land-Rock outcrop complex, 30 to 90 percent slopes; 3) Hagen ashy sandy loam, 3 to 8 percent slopes.

The attached Geotechnical Engineering Report prepared by Inland Empire Geotech, LLC has identified three subsurface geologic conditions consisting of: 1) glacial flood deposits, predominantly sand (Qfs) described as medium-fine to coarse-grained sand and granules with sparse pebbles, cobbles, and boulders; 2) Glacial flood deposits predominantly gravel (Qfg) described as thick-bedded to massive mixture of boulders, cobbles, pebbles, granules, and sand. 3) Glacial lake and glacial flood deposits, undifferentiated (Qglf) described as fine-grained, massive, and thin-bedded lake deposits of sand and silt interbedded with irregularly distributed glacial-flood sand and gravel.

With the exception of the lower area at the north end of the site, stormwater disposal facilities will be placed in areas of significant fill. The fill soils will be imported and will consist of course-grained sand and gravels that will facilitate optimum infiltration capabilities.

The geotechnical evaluation prepared by Inland Empire Geotech, LLC found that subsurface soils varied across the sight and generally included natural sand and silts from glacial deposits and decomposed bedrock consisting of layers of sandstone and basalt deposits. Therefore, it is recommended that the stormwater facilities design should be calculated using equation 6-1D from Chapter 6 of the Spokane Regional Stormwater Manual.

PRE-DEVELOPMENT BASIN INFORMATION

While, there are multiple pre-developed drainage basin across the site, they all generally slope down from west to east. Predeveloped stormwater runoff (if any) would flow offsite to the adjacent properties along the east side of the plat. The survey data suggests that there are multiple locations where the runoff would cross the east boundary as concentrate flows rather than sheet flows.

POST-DEVELOPMENT BASIN INFORMATION

Onsite grading and roadway construction across of the development will produce multiple post-developed drainage basins. In general, each drainage basins will consist of paved roadways that will collect and convey stormwater generated within the right-of-way and front portion of developed lots to conventional grassy drainage ponds/swales where the water will be treated and discharged into the subsurface soil through drywells or subsurface galleries.

This conceptual report demonstrates the methodology used and quantifies the runoff flows and volumes of a typical post-developed drainage basin generated by a 10-year design frequency storm. The representative basin has been selected because it contains the largest impervious areas and will generate the most runoff compared to the other basins. All the other basins will be analyzed and design in a similar fashion. All ponds will be sized accordingly, based on the tributary runoff flows.

The representative Basin consists of multiple subbasins that contain impervious roadways, sidewalks, driveways, rooftops, and landscaping. The following is a breakdown of the sub-basin tributary drainage areas:

Sub-basins 5-1A and 5-1B draining to Pond 5-1.

- All pervious and impervious areas within the north half of the 71st Avenue right-of-way.
- All pervious and impervious areas of the developed front portions of the lots along the north half of 71st Avenue. This area includes driveways, rooftops and landscaping that slope towards the street.

Sub-basins 5-2A and 5-2B draining to Pond 5-2.

- Rear yards of the existing offsite developed properties within Eagle Ridge First Addition located to the west of Eagle Bluff.
- All pervious and impervious areas of the developed lots located west of Division Street.
- All pervious and impervious areas within the Division Street right-of-way between 70th Avenue and 71st Avenue.
- All pervious and impervious areas within the south half of the 70th Avenue right-of-way.
- All pervious and impervious areas of the developed front and rear portions of the lots along the south half of 70th Avenue. This area includes driveways, rooftops and landscaping that slope towards the street.

Sub-basin 5-3A draining to Pond 5-3.

- All pervious and impervious areas within the west half of the Spokane Street right-of-way.

Sub-basin 5-4(1), 5-4(2) and 5-4(3) draining to Pond 5-4.

- All pervious and impervious areas of the developed front portions of the lots along the east half of the Spokane Street right-of-way. This area includes driveways, rooftops and landscaping that slope towards the street. The rear roofs and yards will runoff away from the street to the east.

The following table summarizes the pervious and impervious areas for each drainage sub-basin and the pollutant-generating impervious surfaces.

Table No. 2 – Pollutant-Generating Impervious Surface Summary Table

Sub-Basin	Total Basin Area (sf)	PGIS Pavement Area (sf)	PGIS Concrete Area (sf)	PGIS Roof Area (sf)	Non-PGIS Roofs & Landscape Area (sf)	Total PGIS Area (sf)
'5-1A & 5-1B'	65,419	14,595	8,820	14,000	28,004	37,415
'5-2A & 5-2B'	250,789	26,071	12,600	20,000	192,118	58,671
'5-3A'	8,210	4,972	985	0	2,253	5,957
'5-4A & 5-4B'	21,750	5,507	4,139	5,000	7,104	14,646

CRITICAL AREAS

This project lies within the Critical Aquifer Recharge Area (CARA) or Aquifer Sensitive Area (ASA), which requires stormwater runoff from pollutant-generating impervious surfaces (PGIS), such as asphalt pavement, to be pre-treated prior to subsurface discharge.

DOWN-GRADIENT ANALYSIS

All stormwater runoff generated by the proposed project will be directed to onsite swales and discharged into subsurface soils except for the rear yards along the eastern plat boundary where the runoff will flow off site. The onsite soils are assumed to be adequate for subsurface disposal based on known soil profiles. The project will not have any down-gradient adverse impacts.

METHODOLOGY

The proposed swales have been sized to accommodate a 10-year design frequency storm event using the Rational Method and Bowstring Method. The times of concentration and rainfall intensities were determined using Table 5-6 and Table 5-7 of the Spokane Regional Stormwater Manual.

WATER QUALITY TREATMENT

Stormwater runoff from all post-developed basins will be directed to grassy bio-infiltration swales for the removal/treatment of Total Suspended Solids, Total Petroleum Hydrocarbons, Metals, and Phosphorous per the requirements of the Spokane Regional Stormwater Manual.

RESULTS

Per the Geotechnical Engineering Report prepared by Inland Empire Geotech, LLC, the proposed

bio-infiltration swales have been sized using the 1133 method to treat the tributary stormwater runoff per the attached table. An infiltration rate of 0.3 cfs for Type '1' drywells and 1.0 cfs for Type '2' drywells has been assumed for the purposes of these calculations assuming the soils are similar to those identified in the attached USGS soils survey maps.

Table No. 3 – Treatment and Storage Summary Table

Basin	Treatment Volume Required (cf)	Treatment Volume Provided (cf)	10-yr Storage Vol. Required (cf)	10-yr Storage Vol. Provided (cf)
'5-1A & 5-1B'	973	2179	1618	4577
'5-2A & 5-2B'	1526	2051	4149	4313
'5-3A'	155	237	64	769
'5-4A'	381	200	2010	671

Note, the roadside swales 5-4(1), 5-4(2) and 5-4(3) within sub-basin 5-4 do not have the capacity to contain the necessary treatment and storage volumes. As such, carryover volumes (the difference between volume required and volume provided) will be conveyed downstream to a larger drainage pond in Phase IV where it will be contained and discharged in to drywells. The final drainage design will account for all carryover volumes tributary to the pond.

OPERATIONAL CHARACTERISTICS

The operational characteristics for this project are simple and straight forward. Storm water runoff will flow across the paved surfaces to the grassy swales. The runoff will then fill the grassy swale up to the drywell rim and overflow into the drywell, where it will infiltrate into the subsurface soils.

CONCLUSION

As demonstrated by this report, the proposed storm water facilities will adequately pre-treat and dispose of the generated storm water runoff from a 10-year 24-hour storm event for the proposed onsite improvements.

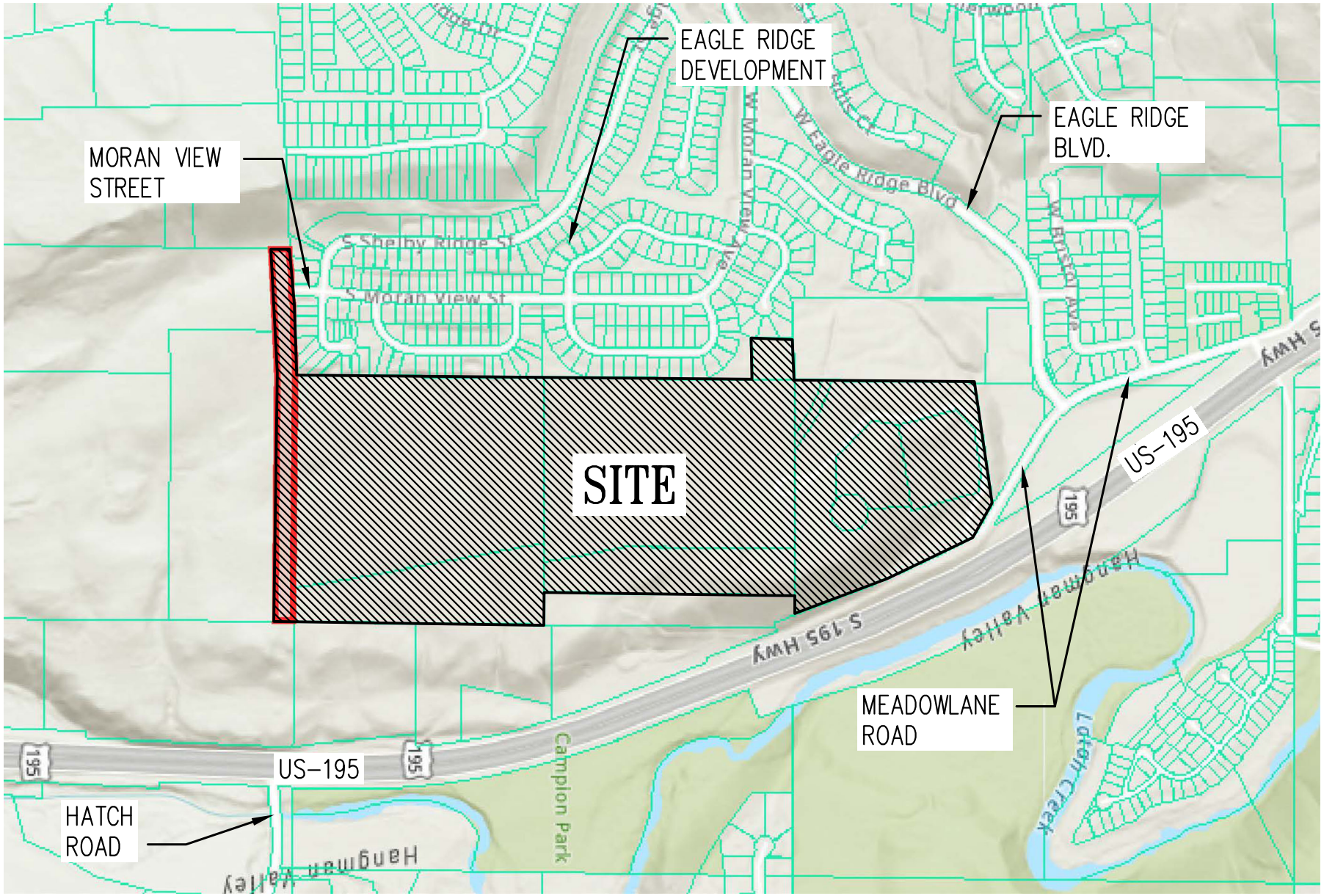
APPENDIX

MAPS
Vicinity Map
Soils Map
Pre-Developed Topography Map
PP2.0 - Overall Conceptual Drainage Plan
PP2.1 – Partial Conceptual Drainage Plan – Basin 5

DRAINAGE CALCULATIONS
10-Year, 24-Hour Bowstring Method Analysis

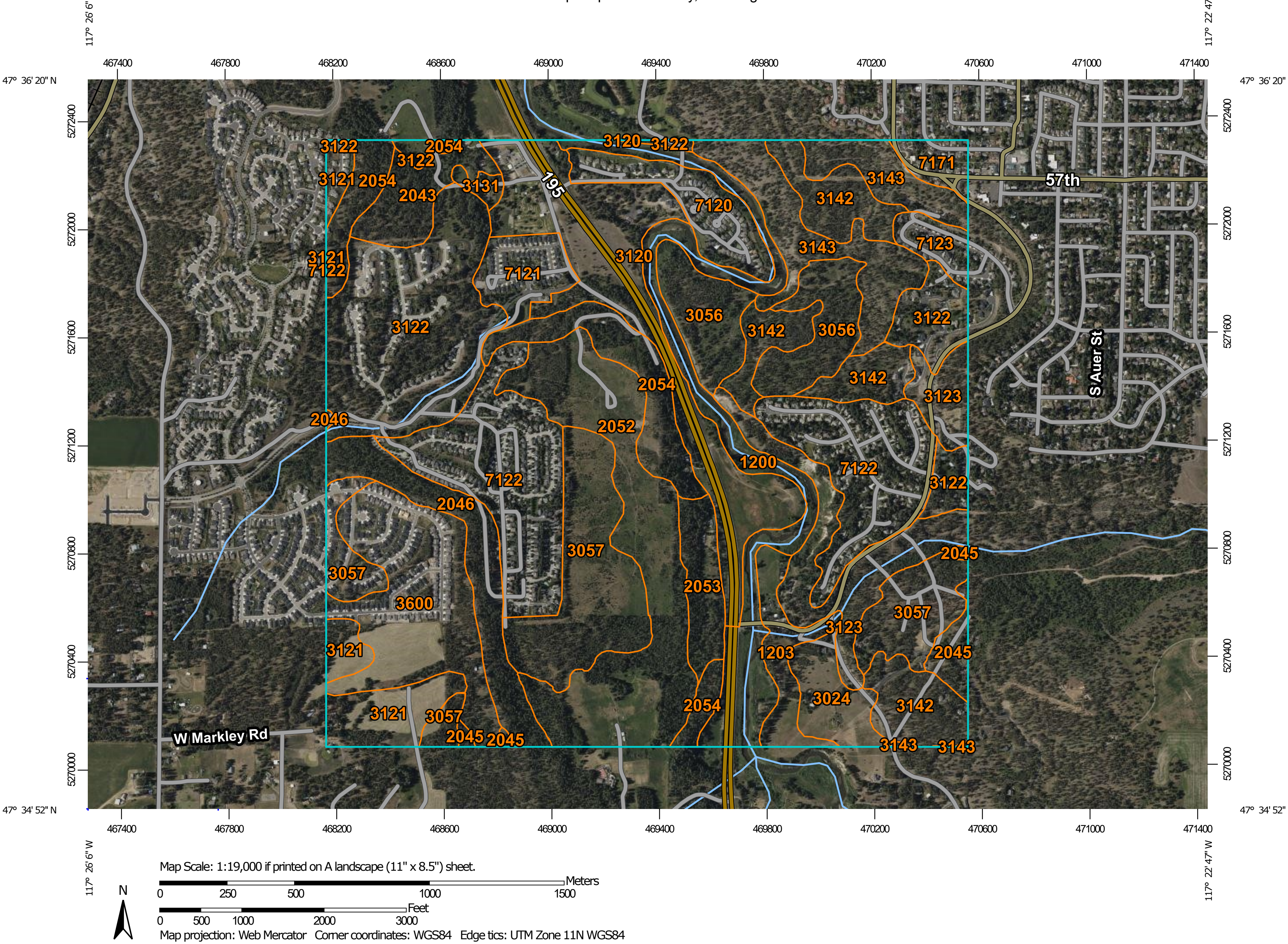
GEOTECHNICAL EVALUATION

MAPS



VICINITY MAP

N.T.S.


117° 26' 6" W
117° 22' 47" W
47° 36' 20" N
47° 34' 52" N
467400
467800
468200
468600
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469400
469800
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3057
3123
3121
1203
2045
3024
3142
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3121
3057
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3143
3143
W Markley Rd
Map Scale: 1:19,000 if printed on A landscape (11" x 8.5") sheet.
Meters
0
250
500
1000
1500
N
Feet
0
500
1000
2000
3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Spokane County, Washington
Survey Area Data: Version 16, Aug 26, 2024

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

Date(s) aerial images were photographed: May 9, 2022—Aug 15, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

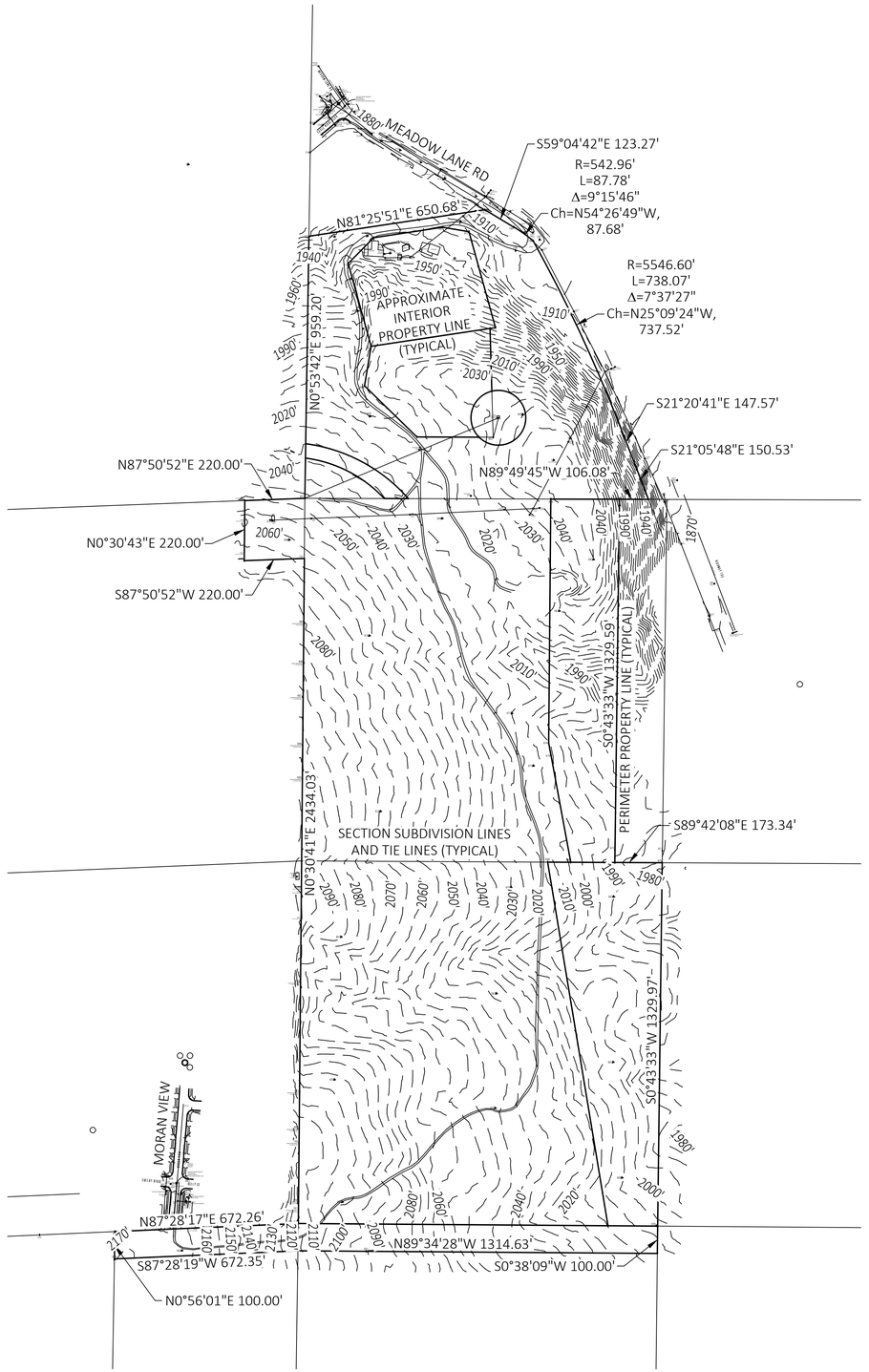
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1200	Endoaquolls and Fluvaquents, 0 to 3 percent slopes	68.9	5.2%
1203	Haploxerolls ashy silt loam, channeled, 0 to 8 percent slopes	22.1	1.7%
2043	Klickson-Speigle complex, mass wasted, 15 to 30 percent slopes	24.3	1.8%
2045	Marble-Speigle complex, mass wasted, 8 to 30 percent slopes	11.1	0.8%
2046	Klickson-Speigle-Rock outcrop complex, 30 to 60 percent slopes	42.7	3.2%
2052	Brincken, moist-Speigle complex, mass wasted, 8 to 25 percent slopes	111.1	8.4%
2053	Speigle-Rock outcrop complex, 15 to 30 percent slopes	21.0	1.6%
2054	Speigle-Rubble land-Rock outcrop complex, 30 to 90 percent slopes	57.2	4.3%
3024	Phoebe-Battleplain, moist, complex, 0 to 8 percent slopes	22.1	1.7%
3056	Hagen ashy sandy loam, 0 to 3 percent slopes	56.4	4.2%
3057	Hagen ashy sandy loam, 3 to 8 percent slopes	111.7	8.4%
3120	Marble loamy sand, 0 to 8 percent slopes	102.9	7.7%
3121	Marble loamy sand, 8 to 15 percent slopes	35.7	2.7%
3122	Marble loamy sand, 15 to 30 percent slopes	137.6	10.3%
3123	Marble loamy sand, 30 to 55 percent slopes	64.0	4.8%
3131	Phoebe ashy sandy loam, 3 to 8 percent slopes	3.9	0.3%
3142	Spens very gravelly loamy coarse sand, 15 to 30 percent slopes	75.5	5.7%
3143	Spens very gravelly loamy coarse sand, 30 to 65 percent slopes	66.0	5.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3600	Seaboldt ashy loam, 0 to 8 percent slopes	81.1	6.1%
7120	Urban land-Marble, disturbed complex, 0 to 3 percent slopes	31.8	2.4%
7121	Urban land-Marble, disturbed complex, 3 to 8 percent slopes	21.8	1.6%
7122	Urban land-Marble, disturbed complex, 8 to 15 percent slopes	138.9	10.4%
7123	Urban land-Marble, disturbed complex, 15 to 30 percent slopes	11.3	0.8%
7171	Urban land-Springdale, disturbed complex, 3 to 8 percent slopes	10.4	0.8%
Totals for Area of Interest		**1,329.7**	**100.0%**

EASEMENTS

(INSTRUMENT NUMBERS, EXPLANATIONS, AND DRAFTING TO BE ADDED LATER.)



TOPOGRAPHIC SURVEY

PORTIONS OF SECTIONS 5, 7, AND 8, TOWNSHIP 24 NORTH, RANGE 43 EAST, WILLAMETTE MERIDIAN, SPOKANE COUNTY, WASHINGTON

LEGEND

- BOUNDARY- PROPERTY CORNER
- CONTROL- RANDOM SURVEY POINT
- 13 BENCH MARK- SEE TABLE
- SIGN UTILITY AND MISCELLANEOUS FEATURES- AS NOTED
- MAJOR CONTOURS (5')
- MINOR CONTOURS (1')
- BOUNDARY- PROPERTY LINES

NOTES

1) VERTICAL DATUM = NAVD88, ESTABLISHED BY OPUS SOLUTION.
2) THIS IS NOT A BOUNDARY SURVEY. BOUNDARY AS SHOWN IS BASED ON FOUND SURVEY MONUMENTS, RECORDS OF SURVEY, AND PLATS.
3) THIS DRAWING IS BEST UTILIZED AT 1:2 SCALE ON 11X17 PAPER.
4) CAD DRAWING (MODELSPACE) SET TO 1"=25' SCALE.

BENCH MARKS

(FOUND SURVEY MONUMENTS, TEMPORARY CONTROL POINTS, ON-SITE REFERENCE MARKERS)

1	2057.91	659	2007.40	691	2046.27	723	1886.31
2	2045.59	660	2005.98	692	2010.34	724	1886.93
3	1897.25	662	2003.28	693	2039.70	725	1886.88
116	2331.53	663	2032.82	696	1976.13	726	1885.43
117	2335.73	665	1990.04	700	1945.92	731	2062.00
183	1927.11	666	2030.25	704	1929.84	795	2114.67
184	1998.65	667	2085.42	705	1925.43	796	2113.76
185	1999.00	668	2013.15	706	1907.39	797	2113.68
198	1937.51	669	2004.14	707	1902.00	798	2117.82
199	1912.33	670	1978.04	708	1901.25	799	1908.57
620	2165.78	671	1980.92	709	1900.51	800	2113.44
621	2174.40	672	1992.60	710	1899.72	801	2101.11
640	2159.06	673	2074.60	711	1899.35	802	2032.05
641	2159.79	674	2005.82	712	1894.41	803	1999.73
643	2157.72	675	2012.90	713	1890.78	804	2007.23
644	2159.15	676	2006.15	714	1888.02	805	2080.85
649	2114.36	677	2014.99	715	1886.06	806	2086.09
650	2117.05	679	2061.69	716	1885.06	807	2092.36
651	2090.47	681	2025.45	717	1879.55	808	2099.56
652	2092.00	682	2044.89	718	1884.52	809	2101.53
654	2167.36	686	2044.52	719	1888.74	810	2084.52
655	2101.33	688	2022.68	720	1887.59	811	1957.45
656	2097.12	689	2070.59	721	1886.94	812	1924.11
658	2046.75	690	2061.66	722	1887.18		

SCALE
1"=250'
250 500
(SEE NOTE 3)

SIGNED ORIGINAL ON FILE AT STEARNS SURVEYING

JOHN STEARNS, PLS 22-010938

DATE

JOHN STEARNS STATE OF WASHINGTON 22-010938 REGISTERED PROFESSIONAL LAND SURVEYOR

ADDRESS
6211 S MEADOW LANE RD, SPOKANE, WA

PARCELS
CITY OF SPOKANE: 34082.0010, 34082.0009, 34082.0051, 34082.0012, 34053.0045, 34053.0044, 34053.0070, 34053.0069, 34071.0001, 34053.0020. SPOKANE COUNTY: 34086.9098.

CLIENT
HARLEY C DOUGLASS INC

FILE
25.011

DATE
MARCH, 2025

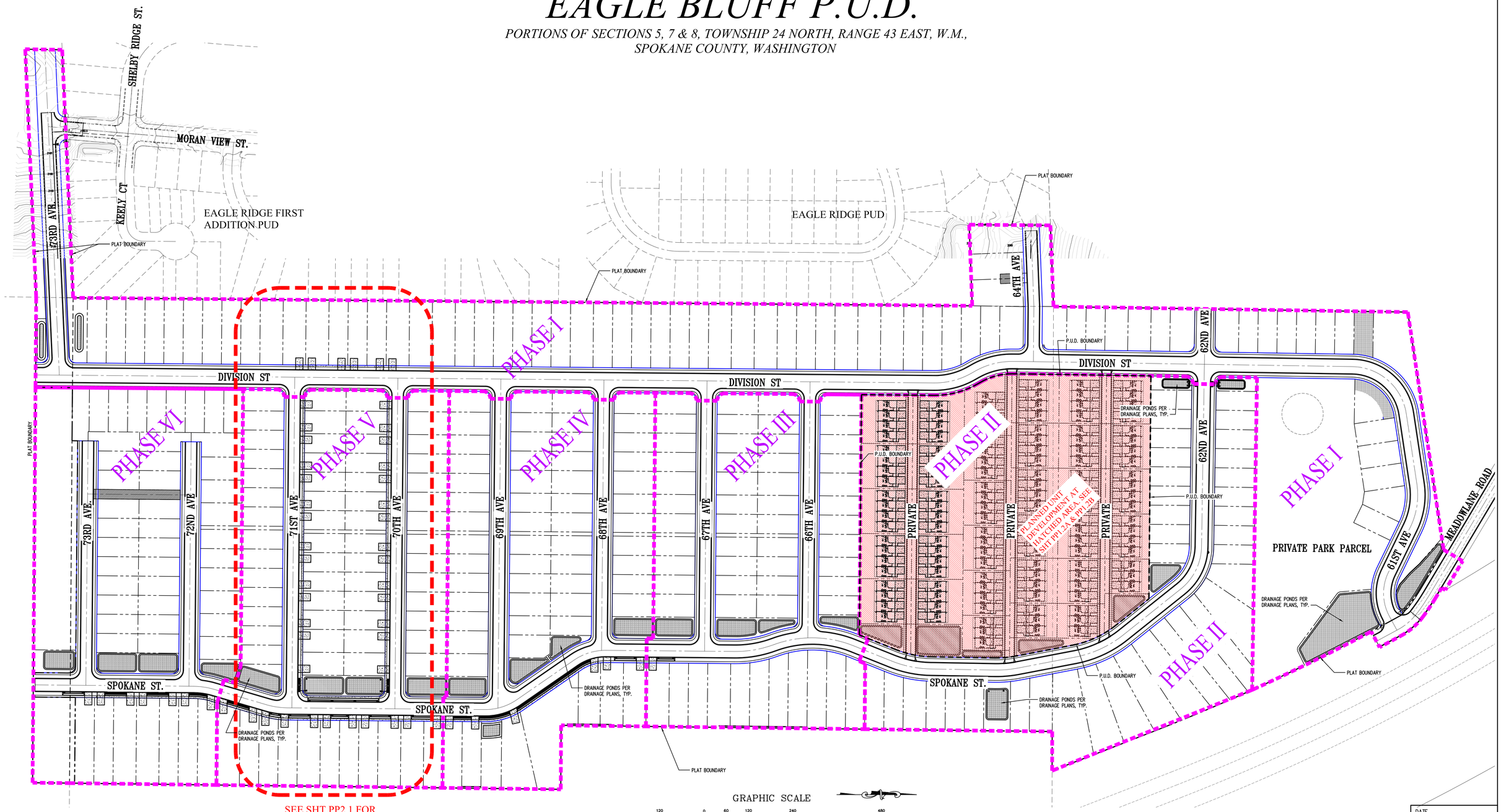
PHONE
208.696.2017

STEARNS SURVEYING
WWW.STEARNSSURVEYING.COM

CONCEPTUAL DRAINAGE PLAN
FOR

EAGLE BLUFF P.U.D.

PORTIONS OF SECTIONS 5, 7 & 8, TOWNSHIP 24 NORTH, RANGE 43 EAST, W.M.,
SPOKANE COUNTY, WASHINGTON



SEE SHT PP2.1 FOR PARTIAL CONCEPTUAL DRAINAGE PLAN

GRAPHIC SCALE

120 0 60 120 240 480

(IN FEET)
1 inch = 120 ft.

DATUM: NAVD88
CONTOUR INTERVAL = 1'

PRELIMINARY REVIEW SET - 9/26/25
NOT FOR CONSTRUCTION

REV.	DATE	BY	DESCRIPTION

SHEET TITLE

OVERALL CONCEPTUAL DRAINAGE PLAN

JOB TITLE

EAGLE BLUFF P.U.D.

SPOKANE, WA

J.R. BONNETT ENGINEERING
CIVIL AND STRUCTURAL CONSULTING AND DESIGN
803 E. 3RD AVENUE
SPOKANE, WASHINGTON 99202
(509) 534-3929 / FAX (509) 534-4014

9/26/25

DATE	DEC, 2025
DRAWN BY	JRB
DESIGN BY	JRB
JOB NO.	24-004.10
SHEET NO.	PP2.0

GENERAL NOTES

ALL METHODS AND MATERIALS SHALL COMPLY WITH THE LATEST EDITIONS OF THE INTERNATIONAL BUILDING CODE; THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION'S STANDARD SPECIFICATIONS FOR ROAD BRIDGE AND MUNICIPAL CONSTRUCTION; THE CITY OF SPOKANE SUPPLEMENTAL SPECIFICATIONS TO WSDOT'S STANDARD SPECIFICATIONS; AWWA; APWA; AND ALL OTHER APPLICABLE LOCAL, STATE AND FEDERAL CODES, RULES, AND REGULATIONS.

GRADING PLAN KEY NOTES:

1. '208' ROADSIDE SWALE (9.5' WIDE x 12" DEEP)
2. CURB INLET, TYPE 2, PER SPOKANE COUNTY STD. PLAN B-9.
3. 20' WIDE CONCRETE DRIVEWAY APPROACH WITH SWALE INLET PER CITY OF SPOKANE STD. PLAN F-104B. TYPICAL. WITH SEPARATED SIDEWALK AND 9.5' WIDE SWALE SECTION
4. 20' WIDE CONCRETE DRIVEWAY APPROACH PER CITY OF SPOKANE STD. PLAN F-104. TYPICAL. 6.5' WIDE PEDESTRIAN STRIP SECTION.
5. 20' WIDE CONCRETE DRIVEWAY APPROACH PER CITY OF SPOKANE STD. PLAN F-103A. TYPICAL ADJACENT SIDEWALK SECTION.
6. DRAINAGE TRACT WITH '208' SWALE AND DRYWELL.

5-1A — INDICATES POST-DEVELOPED DRAINAGE BASIN DESIGNATION.
5-1A: SUB-BASIN, PHASE #

BASIN AREAS

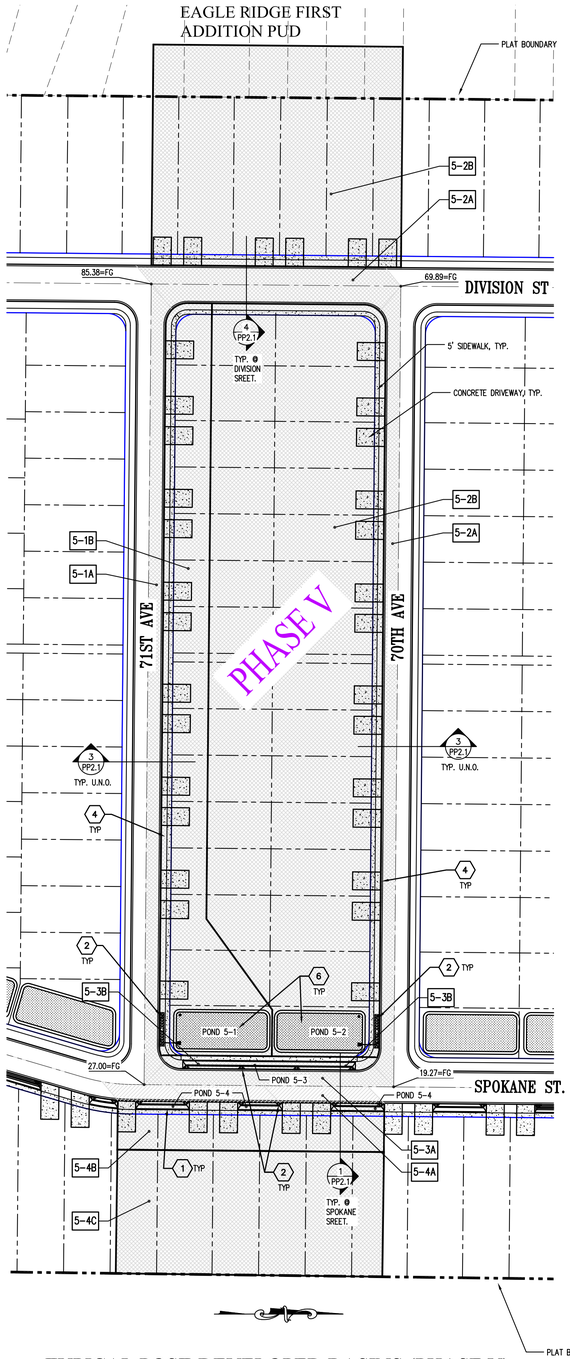
PHASE V – BASIN 5

BASINS 5-1A & 5-1B (TRIBUTARY TO POND 5-1)
5-1A (PGIS STREET) ---------- 14,595 SF
5-1B (PGIS SIDEWALKS) ---------- 0 SF
5-1B (PGIS DRIVEWAYS) ---------- 8,820 SF
5-1B (PGIS ROOFS) ---------- 14,000 SF
5-1B (NON-PGIS ROOFS & LANDSCAPE)-- 28,004 SF
TOTAL PGIS AREA ---------- 37,415 SF

BASINS 5-2A & 5-2B (TRIBUTARY TO POND 5-2)
5-2A (PGIS STREET) ---------- 26,071 SF
5-2B (PGIS SIDEWALKS) ---------- 0 SF
5-2B (PGIS DRIVEWAYS) ---------- 12,600 SF
5-2B (PGIS ROOFS) ---------- 20,000 SF
5-2B (NON-PGIS ROOFS & LANDSCAPE)-- 192,118 SF
TOTAL PGIS AREA ---------- 58,671 SF

BASINS 5-3A & 5-3B (TRIBUTARY TO POND 5-3)
5-3A (PGIS STREET) ---------- 4,972 SF
5-3B (PGIS SIDEWALKS) ---------- 985 SF
5-3B (PGIS DRIVEWAYS) ---------- 0 SF
5-3B (PGIS ROOFS) ---------- 0 SF
5-3B (NON-PGIS ROOFS & LANDSCAPE)-- 2,253 SF
TOTAL PGIS AREA ---------- 5,957 SF

BASINS 5-4A & 5-4B (TRIBUTARY TO POND 5-4)
5-3A (PGIS STREET) ---------- 5,507 SF
5-3B (PGIS SIDEWALKS) ---------- 989 SF
5-3B (PGIS DRIVEWAYS) ---------- 3,150 SF
5-3B (PGIS ROOFS) ---------- 5,000 SF
5-3B (NON-PGIS ROOFS & LANDSCAPE)-- 7,104 SF
TOTAL PGIS AREA ---------- 14,646 SF



TYPICAL POST-DEVELOPED BASINS (PHASE V)

GRAPHIC SCALE
80 0 40 80 160 320
(IN FEET)
1 inch = 80 ft.

POND DATA

POND '5-1'
POLLUTION GENERATING IMPERVIOUS SURFACE = 37,415 S.F.
TREATMENT VOL. REQ'D = 1133 * 37,415 S.F./43,560 S.F. = 973 CF
TREATMENT VOL. PROVIDED = 2,179 CF
10 YR STORM REQUIRED = 1,618 CF
10 YR STORM PROVIDED = 4,577 CF

POND '5-2'
POLLUTION GENERATING IMPERVIOUS SURFACE = 58,671 S.F.
TREATMENT VOL. REQ'D = 1133 * 58,671 S.F./43,560 S.F. = 1,526 CF
TREATMENT VOL. PROVIDED = 2,051 CF
10 YR STORM REQUIRED = 4,149 CF
10 YR STORM PROVIDED = 4,313 CF

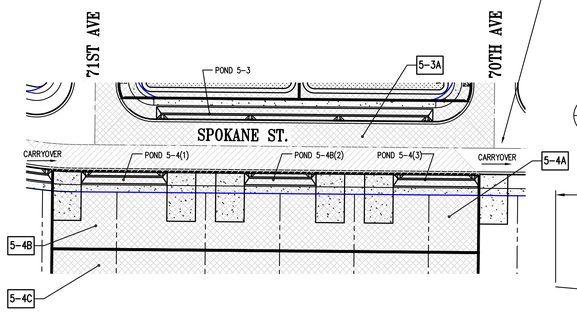
POND '5-3'
POLLUTION GENERATING IMPERVIOUS SURFACE = 5,957 S.F.
TREATMENT VOL. REQ'D = 1133 * 5,957 S.F./43,560 S.F. = 155 CF
TREATMENT VOL. PROVIDED = 237 CF
10 YR STORM REQUIRED = 64 CF
10 YR STORM PROVIDED = 769 CF

POND '5-4(1)'
POLLUTION GENERATING IMPERVIOUS SURFACE = 3,348 S.F.
TREATMENT VOL. REQ'D = 1133 * 3,348 S.F./43,560 S.F. = 87 CF
TREATMENT VOL. PROVIDED = 71 CF (16 CF CARRYOVER)
10 YR STORM REQUIRED = 492 CF
10 YR STORM PROVIDED = 237 CF (255 CF CARRYOVER)

POND '5-4(2)'
POLLUTION GENERATING IMPERVIOUS SURFACE = 5,504 S.F.
TREATMENT VOL. REQ'D = 1133 * 5,504 S.F./43,560 S.F. = 143 CF
TREATMENT VOL. PROVIDED = 58 CF (85 CF CARRYOVER)
10 YR STORM REQUIRED = 733 CF
10 YR STORM PROVIDED = 197 CF (536 CF CARRYOVER)

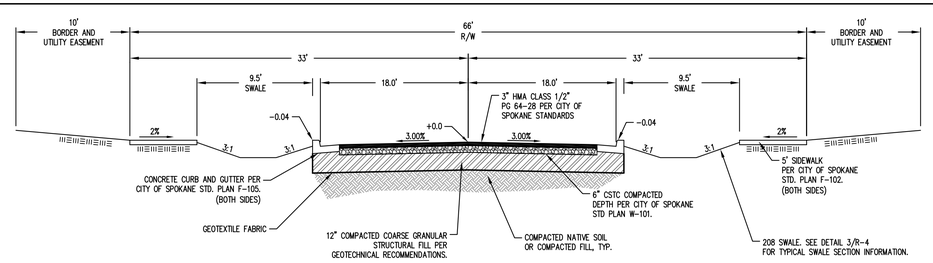
POND '5-4(3)'
POLLUTION GENERATING IMPERVIOUS SURFACE = 5,794 S.F.
TREATMENT VOL. REQ'D = 1133 * 5,794 S.F./43,560 S.F. = 151 CF
TREATMENT VOL. PROVIDED = 71 CF (80 CF CARRYOVER)
10 YR STORM REQUIRED = 785 CF
10 YR STORM PROVIDED = 237 CF (548 CF CARRYOVER)

NOTE:
TOTAL ACCUMULATED CARRYOVER TREATMENT AND STORAGE VOLUMES FROM ALL UPSTREAM TRIBUTARY SUB-BASINS ALONG THIS STREET WILL BE CONVEYED TO AND DISPOSED OF IN THE DRAINAGE POND LOCATED IN PHASE IV. CARRYOVER VOLUMES FROM THIS SUB-BASIN ARE AS FOLLOWS:
TOTAL TREATMENT CARRYOVER VOLUME = 181 CF.
TOTAL STORAGE CARRYOVER VOLUME = 1339 CF.



SUB-BASIN 5-4 (PHASE V)

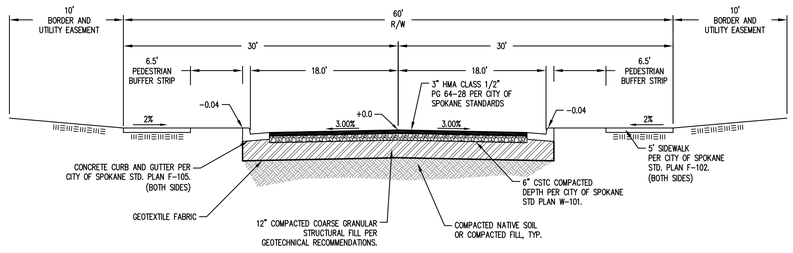
GRAPHIC SCALE
50 0 25 50 100 200
(IN FEET)
1 inch = 50 ft.



SPOKANE STREET SECTION - 66' R/W

1 PP2.1 N.T.S.

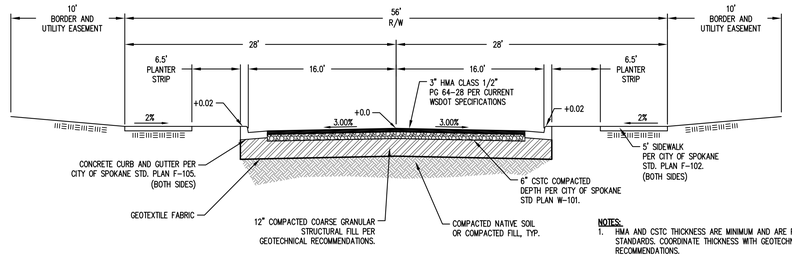
NOTES:
1. HMA AND CSTC THICKNESS ARE MINIMUM AND ARE PER CITY OF SPOKANE STANDARDS. COORDINATE THICKNESS WITH GEOTECHNICAL PAVEMENT DESIGN RECOMMENDATIONS.



TYPICAL STREET SECTION - 60' R/W

2 PP2.1 N.T.S.

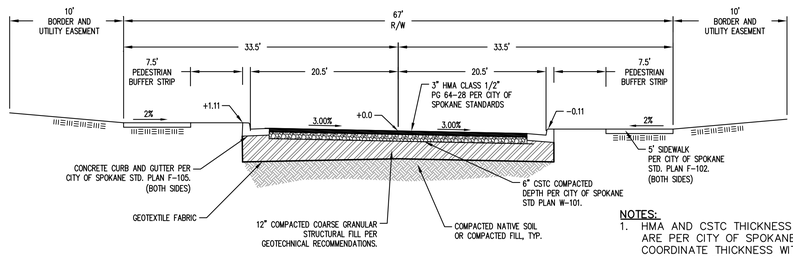
NOTES:
1. HMA AND CSTC THICKNESS ARE MINIMUM AND ARE PER CITY OF SPOKANE STANDARDS. COORDINATE THICKNESS WITH GEOTECHNICAL PAVEMENT DESIGN RECOMMENDATIONS.



NOTES:
1. HMA AND CSTC THICKNESS ARE MINIMUM AND ARE PER CITY OF SPOKANE STANDARDS. COORDINATE THICKNESS WITH GEOTECHNICAL PAVEMENT DESIGN RECOMMENDATIONS.
2. TRANSITION TO LAVENDER DRIVE SECTION PER DETAIL 4/R-9 AT 15+57.05'.

TYPICAL STREET SECTION - 56' R/W (NO SWALES)

3 PP2.1 N.T.S.



NOTES:
1. HMA AND CSTC THICKNESS ARE MINIMUM AND ARE PER CITY OF SPOKANE STANDARDS. COORDINATE THICKNESS WITH GEOTECHNICAL PAVEMENT DESIGN RECOMMENDATIONS.

DIVISION STREET SECTION - 67' R/W (NO CROWN)

4 PP2.1 N.T.S.

PRELIMINARY REVIEW SET - 9/26/25
NOT FOR CONSTRUCTION

REV.	DATE	BY	DESCRIPTION

SHEET TITLE
PARTIAL CONCEPTUAL DRAINAGE PLAN

JOB TITLE
EAGLE BLUFF P.U.D.
SPOKANE, WA

J.R. BONNETT ENGINEERING
CIVIL AND STRUCTURAL CONSULTING AND DESIGN
803 E. 3RD AVENUE
SPOKANE, WASHINGTON 99202
(509) 534-3929 / FAX (509) 534-4014

DRAFT
9/26/25

DATE	DEC, 2025
DRAWN BY	JRB
DESIGN BY	JRB
JOB NO.	24-004.10
SHEET NO.	PP2.1

DRAINAGE CALCULATIONS

BOWSTRING METHOD (10 YEAR STORM DESIGN)
DETENTION BASIN DESIGN

PROJECT: 24-004.10
BASIN: B5-1
REVIEWER: JRB
DATE: 06-Oct-25

NUMBER OF DRYWELLS PROPOSED
1 Single (type 1) 0 Double (type 2)

Total Area (calc.)	1.50	
Time of Conc. (calc.)	7.81	
Composite "C" (calc.)	0.82	
Time of Conc. (min)	7.81	
Area (Acres)	1.50	
C' Factor	0.82	
Impervious Asphalt Area to Pond	**37,415.00**	sf
Non-PGIS Roof Area	**14000.00**	sf
Other areas	(see above right)	
Outflow (cfs)	0.30	
Area * C" Factor	1.24	
m 6.98 n	0.609	

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage Req'd) (cu. ft.) (#5-#6)
7.81	468.71	2.00	2.47	1549	140.61	1409
5	300	2.62	3.24	1301	90	1211
10	600	1.72	2.12	1612	180	1432
15	900	1.34	1.66	1756	270	1486
20	1200	1.13	1.39	1892	360	1532
25	1500	0.98	1.21	2016	450	1566
30	1800	0.88	1.09	2130	540	1590
35	2100	0.80	0.99	2236	630	1606
40	2400	0.74	0.91	2335	720	1615
45	2700	0.69	0.85	2428	810	1618
50	3000	0.64	0.80	2516	900	1616
55	3300	0.61	0.75	2600	990	1610
60	3600	0.58	0.71	2679	1080	1599
90	5400	0.45	0.56	3095	1620	1475
120	7200	0.38	0.47	3439	2160	1279
180	10800	0.30	0.37	4001	3240	761
240	14400	0.25	0.31	4461	4320	141
300	18000	0.22	0.27	4857	5400	-543
360	21600	0.19	0.24	5208	6480	-1272
420	25200	0.18	0.22	5526	7560	-2034
480	28800	0.16	0.20	5818	8640	-2822

DRAINAGE POND CALCULATIONS

Required grassy swale treatment volume:

1133 x Asphalt/Contaminant Area x (1 ac/ 43,500 sf) =	**973 cu. ft.**	OK
1815 x Asphalt/Contaminant Area x (1 ac/ 43,500 sf) =	**1559 cu. ft.**	OK
Provided treatment volume (pond bot. to outlet) =	**2179 cu. ft.**	

DRYWELL REQUIREMENTS - 10 YEAR DESIGN STORM

Maximum storage required by Bowstring =	**1618 cu. ft.**	OK
Provided 10-yr total storage volume =	**4577 cu. ft.**	

Number and type of Drywells Required = 1 Single 0 Double

TIME OF CONCENTRATION (minutes)

Tc (sheet flow)		Tc (gutter)	
K (lawn) =	420	K (gutter) =	1200
L(A) =	928	L(gu) =	0
S(A) =	0.08	S(gu) =	0.08
Tc (A) =	7.81	Tc (gu) =	0.00
K (ACP) =	1200	Tc (gu) =	0.00
L(B) =	0	Tc (A+B) =	7.81
S(B) =	0.02	Tc (total) =	7.81
Tc (B) =	0.00	Intensity =	2.00

AREA SUMMARY

	Areas (AC)	Area (SF)	"C"	A*C
SITE	1.502	65419.00	--	--
Asphalt	0.335	14595.00	0.90	0.302
PGIS Roof	0.321	14000.00	0.90	0.289
Attached Concrete	0.202	8820.00	0.90	0.182
Detached Concrete	0.064	2797.00	0.90	0.058
Non PGIS Roof	0.321	14000.00	0.90	0.289
Landscape	0.257	11207.00	0.45	0.116
Undisturbed	0.000		0.25	0.000

Total Area	Comp "C"
1.50	0.82291

Q (total) = C*I*A$_{(total)}$ = 2.47 cfs
Q (roof) = C*I*A$_{(roof)}$ = * 0.58 cfs
Q (imp) = C*I*A$_{(imp)}$ = 1.54 cfs

	AREA			DEPTH		VOLUME	
POND	**BOTTOM**	**208**	**STORM**	**208**	**STORM**	**208**	**STORM**
5-1	4146	4569	5007	0.5	1	2178.75	4576.5
					TOTAL	2178.75	4576.5

NOTE: THE TREATMENT AREA LISTED ABOVE IS THE AREA LOCATED ABOVE THE POND FLOOR AT THE "OUTLET ELEV" AND INCLUDES THE POND SIDE SLOPES.

BOWSTRING METHOD (10 YEAR STORM DESIGN)
DETENTION BASIN DESIGN

PROJECT: 24-004.10
BASIN: B5-2
REVIEWER: JRB
DATE: 06-Oct-25

NUMBER OF DRYWELLS PROPOSED
0 Single (type 1) 1 Double (type 2)

Total Area (calc.)	5.76	
Time of Conc. (calc.)	7.81	
Composite "C" (calc.)	0.60	
Time of Conc. (min)	7.81	
Area (Acres)	5.76	
C' Factor	0.60	
Impervious Asphalt Area to Pond	**58,671.00**	sf
Non-PGIS Roof Area	**20000.00**	sf
Other areas	(see above right)	
Outflow (cfs)	1.00	
Area * C" Factor	3.45	
m 6.98 n 0.609		

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage Req'd) (cu. ft.) (#5-#6)
7.81	468.71	2.00	6.89	4328	468.71	3859
5	300	2.62	9.04	3635	300	3335
10	600	1.72	5.93	4502	600	3902
15	900	1.34	4.63	4906	900	4006
20	1200	1.13	3.89	5284	1200	4084
25	1500	0.98	3.39	5630	1500	4130
30	1800	0.88	3.04	5949	1800	4149
35	2100	0.80	2.76	6246	2100	4146
40	2400	0.74	2.55	6522	2400	4122
45	2700	0.69	2.37	6783	2700	4083
50	3000	0.64	2.22	7028	3000	4028
55	3300	0.61	2.10	7262	3300	3962
60	3600	0.58	1.99	7484	3600	3884
90	5400	0.45	1.56	8646	5400	3246
120	7200	0.38	1.31	9606	7200	2406
180	10800	0.30	1.02	11175	10800	375
240	14400	0.25	0.86	12460	14400	-1940
300	18000	0.22	0.75	13566	18000	-4434
360	21600	0.19	0.67	14548	21600	-7052
420	25200	0.18	0.61	15435	25200	-9765
480	28800	0.16	0.56	16250	28800	-12550

TIME OF CONCENTRATION (minutes)

Tc (sheet flow)		Tc (gutter)	
K (lawn) =	420	K (gutter) =	1200
L(A) =	928	L(gu) =	0
S(A) =	0.08	S(gu) =	0.08
Tc (A) =	7.81	Tc (gu) =	0.00
K (ACP) =	1200	Tc (gu) =	0.00
L(B) =	0	Tc (A+B) =	7.81
S(B) =	0.02	Tc (total) =	7.81
Tc (B) =	0.00	Intensity =	2.00

AREA SUMMARY

	Areas (AC)	Area (SF)	"C"	A*C
SITE	5.757	250789.00	--	--
Asphalt	0.599	26071.00	0.90	0.539
PGIS Roof	0.459	20000.00	0.90	0.413
Attached Concrete	0.289	12600.00	0.90	0.260
Detached Concrete	0.108	4698.00	0.90	0.097
Non PGIS Roof	0.459	20000.00	0.90	0.413
Landscape	3.843	167420.00	0.45	1.730
Undisturbed	0.000		0.25	0.000

Total Area	Comp "C"
5.76	0.5995921

Q (total) = C*I*A$_{(total)}$ = 6.89 cfs
Q (roof) = C*I*A$_{(roof)}$ = * 0.82 cfs
Q (imp) = C*I*A$_{(imp)}$ = 2.42 cfs

	AREA			DEPTH		VOLUME	
POND	**BOTTOM**	**208**	**STORM**	**208**	**STORM**	**208**	**STORM**
5-2	3900	4305	4725	0.5	1	2051.25	4312.5
					TOTAL	2051.25	4312.5

NOTE: THE TREATMENT AREA LISTED ABOVE IS THE AREA LOCATED ABOVE THE POND FLOOR AT THE "OUTLET ELEV" AND INCLUDES THE POND SIDE SLOPES.

DRAINAGE POND CALCULATIONS

Required grassy swale treatment volume:		
1133 x Asphalt/Contaminant Area x (1 ac/ 43,500 sf) =	**1526 cu. ft.**	**OK**
1815 x Asphalt/Contaminant Area x (1 ac/ 43,500 sf) =	**2445 cu. ft.**	**NG**
Provided treatment volume (pond bot. to outlet) =	**2051 cu. ft.**	

DRYWELL REQUIREMENTS - 10 YEAR DESIGN STORM

Maximum storage required by Bowstring =	**4149 cu. ft.**	**OK**
Provided 10-yr total storage volume =	**4313 cu. ft.**	

Number and type of Drywells Required = 1 Single 0 Double

BOWSTRING METHOD (10 YEAR STORM DESIGN)
DETENTION BASIN DESIGN

PROJECT: 24-004.10
BASIN: B5-3
REVIEWER: JRB
DATE: 06-Oct-25

NUMBER OF DRYWELLS PROPOSED
1 Single (type 1) 0 Double (type 2)

Total Area (calc.)	0.19	
Time of Conc. (calc.)	7.81	
Composite "C" (calc.)	0.78	
Time of Conc. (min)	7.81	
Area (Acres)	0.19	
C' Factor	0.78	
Impervious Asphalt Area to Pond	**5,957.00**	sf
Non-PGIS Roof Area	**0.00**	sf
Other areas	(see above right)	
Outflow (cfs)	0.30	
Area * C" Factor	0.15	
m 6.98 n 0.609		

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage Req'd) (cu. ft.) (#5-#6)
7.81	468.71	2.00	0.29	183	140.61	43
5	300	2.62	0.38	154	90	64
10	600	1.72	0.25	191	180	11
15	900	1.34	0.20	208	270	-62
20	1200	1.13	0.16	224	360	-136
25	1500	0.98	0.14	239	450	-211
30	1800	0.88	0.13	252	540	-288
35	2100	0.80	0.12	265	630	-365
40	2400	0.74	0.11	277	720	-443
45	2700	0.69	0.10	288	810	-522
50	3000	0.64	0.09	298	900	-602
55	3300	0.61	0.09	308	990	-682
60	3600	0.58	0.08	317	1080	-763
90	5400	0.45	0.07	367	1620	-1253
120	7200	0.38	0.06	407	2160	-1753
180	10800	0.30	0.04	474	3240	-2766
240	14400	0.25	0.04	528	4320	-3792
300	18000	0.22	0.03	575	5400	-4825
360	21600	0.19	0.03	617	6480	-5863
420	25200	0.18	0.03	654	7560	-6906
480	28800	0.16	0.02	689	8640	-7951

TIME OF CONCENTRATION (minutes)

Tc (sheet flow)		Tc (gutter)	
K (lawn) =	420	K (gutter) =	1200
L(A) =	928	L(gu) =	0
S(A) =	0.08	S(gu) =	0.08
Tc (A) =	7.81	Tc (gu) =	0.00
K (ACP) =	1200	Tc (gu) =	0.00
L(B) =	0	Tc (A+B) =	7.81
S(B) =	0.02	Tc (total) =	7.81
Tc (B) =	0.00	Intensity =	2.00

AREA SUMMARY

	Areas (AC)	Area (SF)	"C"	A*C
SITE	0.188	8210.00	--	--
Asphalt	0.114	4972.00	0.90	0.103
PGIS Roof	0.000	0.00	0.90	0.000
Attached Concrete	0.023	985.00	0.90	0.020
Detached Concrete	0.000	0.00	0.90	0.000
Non PGIS Roof	0.000	0.00	0.90	0.000
Landscape	0.052	2253.00	0.45	0.023
Undisturbed	0.000		0.25	0.000

Total Area 0.19 Comp "C" 0.7765104

Q (total) = C*I*A$_{(total)}$ = 0.29 cfs
Q (roof) = C*I*A$_{(roof)}$ = * 0.00 cfs
Q (imp) = C*I*A$_{(imp)}$ = 0.25 cfs

	AREA			DEPTH		VOLUME	
POND	**BOTTOM**	**208**	**STORM**	**208**	**STORM**	**208**	**STORM**
5-3	187	760	1351	0.5	1	236.75	769
					TOTAL	236.75	769

NOTE: THE TREATMENT AREA LISTED ABOVE IS THE AREA LOCATED ABOVE THE POND FLOOR AT THE "OUTLET ELEV" AND INCLUDES THE POND SIDE SLOPES.

DRAINAGE POND CALCULATIONS

Required grassy swale treatment volume:

1133 x Asphalt/Contaminant Area x (1 ac/ 43,500 sf) =	**155 cu. ft.**	OK
1815 x Asphalt/Contaminant Area x (1 ac/ 43,500 sf) =	**248 cu. ft.**	NG
Provided treatment volume (pond bot. to outlet) =	**237 cu. ft.**	

DRYWELL REQUIREMENTS - 10 YEAR DESIGN STORM

Maximum storage required by Bowstring =	**64 cu. ft.**	OK
Provided 10-yr total storage volume =	**769 cu. ft.**	

Number and type of Drywells Required = 1 Single 0 Double

BOWSTRING METHOD (10 YEAR STORM DESIGN)
DETENTION BASIN DESIGN

PROJECT: 24-004.10
BASIN: B 5-4(1)
REVIEWER: JRB
DATE: 06-Oct-25

NUMBER OF DRYWELLS PROPOSED

0 Single (type 1) 0 Double (type 2)

Total Area (calc.)	0.13	
Time of Conc. (calc.)	5.00	
Composite "C" (calc.)	0.79	
Time of Conc. (min)	5.00	
Area (Acres)	0.13	
C' Factor	0.79	
Impervious Asphalt Area to Pond	**3348.00**	sf
Non-PGIS Roof Area 0	**1000.00**	sf
Other areas	(see above right)	
Outflow (cfs)	0.00	
Area * C" Factor	0.10	

m 6.98 n 0.609

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage Req'd) (cu. ft.) (#5-#6)
5.00	300.00	2.62	0.27	110	0.00	110
5	300	2.62	0.27	110	0	110
10	600	1.72	0.18	126	0	126
15	900	1.34	0.14	141	0	141
20	1200	1.13	0.12	153	0	153
25	1500	0.98	0.10	165	0	165
30	1800	0.88	0.09	175	0	175
35	2100	0.80	0.08	185	0	185
40	2400	0.74	0.08	193	0	193
45	2700	0.69	0.07	202	0	202
50	3000	0.64	0.07	209	0	209
55	3300	0.61	0.06	217	0	217
60	3600	0.58	0.06	223	0	223
90	5400	0.45	0.05	259	0	259
120	7200	0.38	0.04	289	0	289
180	10800	0.30	0.03	337	0	337
240	14400	0.25	0.03	376	0	376
300	18000	0.22	0.02	410	0	410
360	21600	0.19	0.02	440	0	440
420	25200	0.18	0.02	467	0	467
480	28800	0.16	0.02	492	0	492

TIME OF CONCENTRATION (minutes)

Tc (sheet flow)		Tc (gutter)	
K (lawn) =	420	K (gutter) =	1200
L(A) =	0	L(gu) =	92
S(A) =	0.02	S(gu) =	0.01
Tc (A) =	0.00	Tc (gu) =	0.77
K (ACP) =	1200	Tc (gu) =	0.77
L(B) =	18	Tc (A+B) =	0.15
S(B) =	0.01	Tc (total) =	5.00
Tc (B) =	0.15	Intensity =	2.62

AREA SUMMARY

	Areas (AC)	Area (SF)	"C"	A*C
SITE	0.133	5784.00	--	--
Asphalt	0.033	1418.00	0.90	0.029
PGIS Roof	0.023	1000.00	0.90	0.021
Attached Concrete	0.021	930.00	0.90	0.019
Detached Concrete	0.000	0.00	0.90	0.000
Non PGIS Roof	0.023	1000.00	0.90	0.021
Landscape	0.033	1436.00	0.45	0.015
Undisturbed	0.000		0.25	0.000

Total Area	Comp "C"
0.13	0.788278

Q (total) = C*I*A$_{(total)}$ = 0.27 cfs
Q (roof) = C*I*A$_{(roof)}$ = * 0.05 cfs
Q (imp) = C*I*A$_{(imp)}$ = 0.18 cfs

	AREA			DEPTH		VOLUME	
POND	**BOTTOM**	**208**	**STORM**	**208**	**STORM**	**208**	**STORM**
5-4(1)	54	228	420	0.5	1	70.5	237
					TOTAL	70.5	237

NOTE: THE TREATMENT AREA LISTED ABOVE IS THE AREA LOCATED ABOVE THE POND FLOOR AT THE "OUTLET ELEV" AND INCLUDES THE POND SIDE SLOPES.

DRAINAGE POND CALCULATIONS

Required grassy swale treatment volume:

1133 x Asphalt/Contaminant Area x (1 ac/ 43,500 sf) =	**87 cu. ft.**	NG	CARRYOVER =	17	cu. ft.
1815 x Asphalt/Contaminant Area x (1 ac/ 43,500 sf) =	**140 cu. ft.**	NG	CARRYOVER =	69	cu. ft.
Provided treatment volume (pond bot. to outlet) =	**71 cu. ft.**				

DRYWELL REQUIREMENTS - 10 YEAR DESIGN STORM

Maximum storage required by Bowstring =	**492 cu. ft.**	NG	CARRYOVER =	255	cu. ft.
Provided 10-yr total storage volume =	**237 cu. ft.**				

Number and type of Drywells Required = 0 Single 0 Double

BOWSTRING METHOD (10 YEAR STORM DESIGN)
DETENTION BASIN DESIGN

PROJECT: 24-004.10
BASIN: B 5-4(2)
REVIEWER: JRB
DATE: 06-Oct-25

NUMBER OF DRYWELLS PROPOSED
0 Single (type 1) 0 Double (type 2)

Total Area (calc.)	0.17	
Time of Conc. (calc.)	5.00	
Composite "C" (calc.)	0.89	
Time of Conc. (min)	5.00	
Area (Acres)	0.17	
C' Factor	0.89	
Impervious Asphalt Area to Pond	**5504.00**	sf
Non-PGIS Roof Area	**2000.00**	sf
Other areas	(see above right)	
Outflow (cfs)	0.00	
Area * C" Factor	0.16	

m 6.98 n 0.609

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage Req'd) (cu. ft.) (#5-#6)
5.00	300.00	2.62	0.41	164	0.00	164
5	300	2.62	0.41	164	0	164
10	600	1.72	0.27	188	0	188
15	900	1.34	0.21	210	0	210
20	1200	1.13	0.18	229	0	229
25	1500	0.98	0.15	246	0	246
30	1800	0.88	0.14	261	0	261
35	2100	0.80	0.12	275	0	275
40	2400	0.74	0.12	288	0	288
45	2700	0.69	0.11	300	0	300
50	3000	0.64	0.10	312	0	312
55	3300	0.61	0.09	323	0	323
60	3600	0.58	0.09	333	0	333
90	5400	0.45	0.07	387	0	387
120	7200	0.38	0.06	431	0	431
180	10800	0.30	0.05	502	0	502
240	14400	0.25	0.04	561	0	561
300	18000	0.22	0.03	611	0	611
360	21600	0.19	0.03	655	0	655
420	25200	0.18	0.03	696	0	696
480	28800	0.16	0.03	733	0	733

TIME OF CONCENTRATION (minutes)

Tc (sheet flow)		Tc (gutter)	
K (lawn) =	420	K (gutter) =	1200
L(A) =	0	L(gu) =	92
S(A) =	0.02	S(gu) =	0.01
Tc (A) =	0.00	Tc (gu) =	0.77
K (ACP) =	1200	Tc (gu) =	0.77
L(B) =	18	Tc (A+B) =	0.15
S(B) =	0.01	Tc (total) =	5.00
Tc (B) =	0.15	Intensity =	2.62

AREA SUMMARY

	Areas (AC)	Area (SF)	"C"	A*C
SITE	0.174	7592.00	--	--
Asphalt	0.044	1924.00	0.90	0.040
PGIS Roof	0.046	2000.00	0.90	0.041
Attached Concrete	0.036	1580.00	0.90	0.033
Detached Concrete	0.000	0.00	0.90	0.000
Non PGIS Roof	0.046	2000.00	0.90	0.041
Landscape	0.002	88.00	0.45	0.001
Undisturbed	0.000		0.25	0.000

Total Area 0.17 Comp "C" 0.894784

Q (total) = C*I*A$_{(total)}$ = 0.41 cfs
Q (roof) = C*I*A$_{(roof)}$ = * 0.11 cfs
Q (imp) = C*I*A$_{(imp)}$ = 0.30 cfs

	AREA			DEPTH		VOLUME	
POND	BOTTOM	208	STORM	208	STORM	208	STORM
5-4(2)	44	188	350	0.5	1	58	197
					TOTAL	58	197

NOTE: THE TREATMENT AREA LISTED ABOVE IS THE AREA LOCATED ABOVE THE POND FLOOR AT THE "OUTLET ELEV" AND INCLUDES THE POND SIDE SLOPES.

DRAINAGE POND CALCULATIONS

Required grassy swale treatment volume:

1133 x Asphalt/Contaminant Area x (1 ac/ 43,500 sf) =	**143 cu. ft.**	NG	CARRYOVER =	85	cu. ft.
1815 x Asphalt/Contaminant Area x (1 ac/ 43,500 sf) =	**229 cu. ft.**	NG	CARRYOVER =	171	cu. ft.
Provided treatment volume (pond bot. to outlet) =	**58 cu. ft.**				

DRYWELL REQUIREMENTS - 10 YEAR DESIGN STORM

Maximum storage required by Bowstring =	**733 cu. ft.**	NG	CARRYOVER =	536	cu. ft.
Provided 10-yr total storage volume =	**197 cu. ft.**				

Number and type of Drywells Required = 0 Single 0 Double

BOWSTRING METHOD (10 YEAR STORM DESIGN)
DETENTION BASIN DESIGN

PROJECT: 24-004.10
BASIN: B 5-4(3)
REVIEWER: JRB
DATE: 06-Oct-25

NUMBER OF DRYWELLS PROPOSED

0 Single (type 1) 0 Double (type 2)

Total Area (calc.)	0.19	
Time of Conc. (calc.)	5.00	
Composite "C" (calc.)	0.87	
Time of Conc. (min)		5.00
Area (Acres)		0.19
C' Factor		0.87
Impervious Asphalt Area to Pond		**5794.00** sf
Non-PGIS Roof Area		**2000.00** sf
Other areas		(see above right)
Outflow (cfs)		0.00
Area * C" Factor		0.17

m 6.98 n 0.609

#1 Time Inc. (min.)	#2 Time Inc. (sec.) (#1*60)	#3 Intensity (in./hr.)	#4 Q dev. (cfs) (A*C*#3)	#5 V in (cu. ft.)	#6 V out (cu. ft.) (Outf.*#2)	#7 Storage Req'd) (cu. ft.) (#5-#6)
5.00	300.00	2.62	0.44	176	0.00	176
5	300	2.62	0.44	176	0	176
10	600	1.72	0.29	201	0	201
15	900	1.34	0.22	225	0	225
20	1200	1.13	0.19	245	0	245
25	1500	0.98	0.16	263	0	263
30	1800	0.88	0.15	279	0	279
35	2100	0.80	0.13	295	0	295
40	2400	0.74	0.12	309	0	309
45	2700	0.69	0.11	322	0	322
50	3000	0.64	0.11	334	0	334
55	3300	0.61	0.10	346	0	346
60	3600	0.58	0.10	357	0	357
90	5400	0.45	0.08	414	0	414
120	7200	0.38	0.06	461	0	461
180	10800	0.30	0.05	538	0	538
240	14400	0.25	0.04	601	0	601
300	18000	0.22	0.04	654	0	654
360	21600	0.19	0.03	702	0	702
420	25200	0.18	0.03	745	0	745
480	28800	0.16	0.03	785	0	785

TIME OF CONCENTRATION (minutes)

Tc (sheet flow)		Tc (gutter)	
K (lawn) =	420	K (gutter) =	1200
L(A) =	0	L(gu) =	92
S(A) =	0.02	S(gu) =	0.01
Tc (A) =	0.00	Tc (gu) =	0.77
K (ACP) =	1200	Tc (gu) =	0.77
L(B) =	18	Tc (A+B) =	0.15
S(B) =	0.01	Tc (total) =	5.00
Tc (B) =	0.15	Intensity =	2.62

AREA SUMMARY

	Areas (AC)	Area (SF)	"C"	A*C
SITE	0.192	8374.00	--	--
Asphalt	0.050	2165.00	0.90	0.045
PGIS Roof	0.046	2000.00	0.90	0.041
Attached Concrete	0.037	1629.00	0.90	0.034
Detached Concrete	0.000	0.00	0.90	0.000
Non PGIS Roof	0.046	2000.00	0.90	0.041
Landscape	0.013	580.00	0.45	0.006
Undisturbed	0.000		0.25	0.000

Total Area 0.19 Comp "C" 0.8688321

Q (total) = C*I*A$_{(total)}$ = 0.44 cfs
Q (roof) = C*I*A$_{(roof)}$ = * 0.11 cfs
Q (imp) = C*I*A$_{(imp)}$ = 0.31 cfs

	AREA			DEPTH		VOLUME	
POND	BOTTOM	208	STORM	208	STORM	208	STORM
5-4(3)	54	228	420	0.5	1	70.5	237
					TOTAL	70.5	237

NOTE: THE TREATMENT AREA LISTED ABOVE IS THE AREA LOCATED ABOVE THE

POND FLOOR AT THE "OUTLET ELEV" AND INCLUDES THE POND SIDE SLOPES.

DRAINAGE POND CALCULATIONS

Required grassy swale treatment volume:

1133 x Asphalt/Contaminant Area x (1 ac/ 43,500 sf) =	**151 cu. ft.**	NG	CARRYOVER =	80	cu. ft.
1815 x Asphalt/Contaminant Area x (1 ac/ 43,500 sf) =	**241 cu. ft.**	NG	CARRYOVER =	171	cu. ft.
Provided treatment volume (pond bot. to outlet) =	**71 cu. ft.**				

DRYWELL REQUIREMENTS - 10 YEAR DESIGN STORM

Maximum storage required by Bowstring =	**785 cu. ft.**	NG	CARRYOVER =	548	cu. ft.
Provided 10-yr total storage volume =	**237 cu. ft.**				

Number and type of Drywells Required = 0 Single 0 Double