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CITY OF PONDERAY

STORMWATER MANAGEMENT AND EROSION CONTROL PLAN METHODOLOGY AND HYDROLOGIC CALCULATIONS for STATE STORAGE, LLC MCNEARNEY RD., PONDERAY, IDAHO

Applicant: Isaac Womack

Prepared by: James A. Sewell & Associates, LLC
1319 North Division
Sandpoint, Idaho 83864

Date: May 19, 2025

PROFESSIONAL ENGINEER REGISTERED 8607 5/19/2025 STATE OF IDAHO B. SCOTT BROWN

INTRODUCTION

State Storage, LLC is proposing to construct additional mini-storages on a developed 4.5-acre parcel located along McNearney Rd. in Ponderay, ID. As a result, approximately 31,400 sf of roof top and 35,600 sf of pavement will be constructed. After construction is complete, the site will consist of 76,080 sf of rooftop and 93,920 sf of total pavement.

The purpose of this report is to recommend facilities to control storm water and prevent erosion and sediment transport, and to describe the analysis used in the selection and design of those facilities. The design and selection of storm water facilities are based on and limited to soils information obtained from the "Soil Survey of Bonner County Area, Idaho".

During frequent storm events, runoff will be retained, periodically infiltrated, and detained with flow-controlled outlets during larger storm events onsite in shallow grass lined swales prior to regaining predevelopment flow patterns.

EXISTING SITE CONDITIONS

The site slopes in all directions at an average 1-percent. Building construction will occur in an area that has been graded from 1-perent to 2-percent. A storm water management swale encompasses three sides of the site managing water from existing roof tops and pavement. Flow controlled PVC pipe outlets are located in the swale near McNearney Rd. ditches. The outlets do not appear to be functioning properly.

SOILS

The NRCS Soil survey defines native soil at the site as Mission Silt Loam. The soil is classified as poor draining and having a depth to water table of 12-inches below the surface. It has been assumed for design purposes that infiltration will be governed by native soil at a rate of 0.06-inches per hour.

A summary of the typical properties of each soil type found on the site is included in Appendix A, and is taken from the NCRS Soil survey of *Bonner County Area, Idaho, Parts of Bonner and Boundary Counties (Version 14, September 13, 2018).*

A predeveloped runoff coefficient of 0.65 was chosen which is representative a pasture having Hydrologic Group D soil.

PRE-CONSTRUCTION LAND COVER – TOTAL SITE

Undeveloped Area (C = 0.65)	=	2.15 ac
Pavement (C = 0.9)	=	1.34 ac
Rooftops (C = 0.9)	=	1.03 ac
Total all surface types	=	4.51 ac
Composite Runoff Coefficient (C)	=	0.78

POST-CONSTRUCTION LAND COVER – TOTAL SITE

Total Area	=	4.51 ac
Rooftops (C = 0.9)	=	1.75 ac
Pavement (C = 0.9)	=	2.16 ac
Composite Runoff Coefficient (C)	=	0.87

STORMWATER MANAGEMENT

Based on topography and soil characteristics, surface dispersion of storm water and shallow retainment areas are recommended for flow management and treatment. It is further recommended that site disturbance be minimal and all vegetated areas be retained and protected as much as possible.

The proposed infiltration and detainment facilities have been sized to retain and treat the first ½" of runoff from impervious areas, and also detain the difference between pre-development and post-development peak flow based on a 25-year storm event. Post development flows will be detained by a flow-controlled outlet pipe. Grassed infiltration swales have been designed with an operating depth of 8-inches.

Calculation Summary – Grassy Infiltration Area Design

Sub Area (area within property boundaries)
Predevelopment Conditions (assume undeveloped):
Impervious Surface = 0 sf
Vegetated Surface = 196,540 sf
Time of Concentration = 10 min.
Runoff Coefficient = 0.65
Predeveloped Peak Flow = 6.36 cfs

Post Development Conditions:
Impervious Surface = 170,000 sf
Vegetated Surface = 266,540 sf
Time of Concentration = 5 min.
Composite Runoff Coefficient = 0.87
Post Developed Peak Flow = 10.94 cfs

Resulting Swale Volume Required:
First ½-inch of Runoff from Impervious Surface = 7,083 cf
Detention during a 24-hour, 25-year Storm = 1,478 cf (Bowstring Method)
Swale Volume Required = 7,083 sf
Swale Volume Provided = 7,157 cf

EROSION CONTROL PLAN

Temporary erosion control shall be maintained through the use of existing vegetation and swale surrounding three sides of the property and an existing stabilized construction entrance. Permanent facilities that will also serve to control erosion during construction include the grass infiltration basins, vegetated buffer, and reseeding of disturbed areas. Use the BMP's described in *Catalog of Stormwater Best Management Practices for Idaho Cities and Counties* (Idaho BMP Manual). Areas where construction activities temporarily cease for more than 21 days shall be stabilized with seeding or straw mulching. All erosion control measures shall be maintained in good working order. The contractor shall be responsible for maintenance of erosion control measures until such time that final stabilization of the site is complete. Once final stabilization is complete, the owner shall be responsible for maintenance of permanent erosion control measures.

Site Re-seeding Recommendation:

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Fertilization

It is recommended that a soil analysis be performed prior to fertilization and seeding. The fertilization guidelines should be determined by the soil analysis. The fertilizer type and rate of application should follow the recommendation of the U.S.D.A. Natural Resource Conservation Service or a landscape architect.

OPERATION AND MAINTENANCE PLAN

During Construction

During construction the contractor shall walk the site and inspect storm water and erosion control measures at least once every 7 days and following any storm event of 0.5 inches or greater. Items the contractor shall inspect are:

- Reseeding / Straw Mulching
  - Re-seed add straw mulch to bare spots and washouts, and verify healthy growth

- Grass ditches and/or Rock-Lined channels along McNearney Rd.
  - Periodically inspect ditches or and/or channels and remove any sediment deeper than 6 inches
  - Re-establish vegetation that is damaged during high runoff events.
  - Add additional rock as necessary to prevent erosion of channel sides and bottom

- Grass infiltration basins
  - Periodically inspect basins and remove any sediment deeper than 6 inches
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If maintenance of any temporary or final BMP is found to be necessary, the contractor shall begin repairs within 24 hours.

After Final Stabilization

Upon completion of construction and final stabilization, the owners shall take responsibility for operation and maintenance of the stormwater management and erosion control system as well as the funding for the continued maintenance of this system. After final stabilization, the stormwater management and erosion control system shall be inspected at least every six months. The items that shall be inspected are:

- Grass filtration swales
  - Remove all sediment from the basin and dispose off-site at the end of construction, and during each inspection.
- Grass ditches and/or Rock-Lined Channels
  - Remove all sediment from the ditches and/or channels and dispose off-site at the end of construction, and during each inspection.
- Sloped areas
  - Re-establish grass or vegetation in bare spots found on all sloped areas, or stabilize with another best management practice.

IMPLEMENTATION SCHEDULE

The proposed construction schedule is as follows:

Spring 2025
- Install temporary erosion control
- Foundation construction
- Perform fill and excavation work for building pad, utilities and drive surfaces

Late Summer 2025
- Complete construction
- Check re-vegetated areas for bare spots, washouts, etc.

Late Summer/Fall 2025
- Repair and reseed as necessary
- Final stabilization complete

SUMMARY

With the proper implementation of the best management practices listed above, the subject property is capable of supporting the proposed site development without substantial risk of soil erosion or sedimentation of surface waters. The site is capable of treating and conveying stormwater runoff from the proposed pavement using the best management practices described in this report.

APPENDIX A

NRCS Soils Classification, IDF Curve Area Classification Map, Rainfall Intensity Diagram, Runoff Coefficients

Bonner County Area, Idaho, Parts of Bonner and Boundary Counties

31—Mission silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 5462
Elevation: 2,000 to 2,800 feet
Mean annual precipitation: 25 to 38 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 90 to 120 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Mission and similar soils: 75 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mission

Setting

Landform: Lake terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash and loess over silty glaciolacustrine deposits

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 3 inches: silt loam
Bw - 3 to 12 inches: silt loam
2Btx - 12 to 21 inches: silt loam
2E - 21 to 33 inches: silt
2Bt - 33 to 48 inches: silt loam
3C - 48 to 67 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 10 to 20 inches to fragipan
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water capacity: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): 6e

Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: F043AY527WA - Warm-Frigid, Udic, Loamy Foothills/Valleys, high water table (western redcedar, moist herb) Thuja plicata / Clintonia uniflora
Other vegetative classification: western redcedar/queencup beadlily (CN530)
Hydric soil rating: No

Minor Components

Hoodoo
Percent of map unit: 3 percent
Landform: Flood plains, drainageways
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

Odenson
Percent of map unit: 2 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Bonner County Area, Idaho, Parts of Bonner and Boundary Counties
Survey Area Data: Version 16, Jun 4, 2020

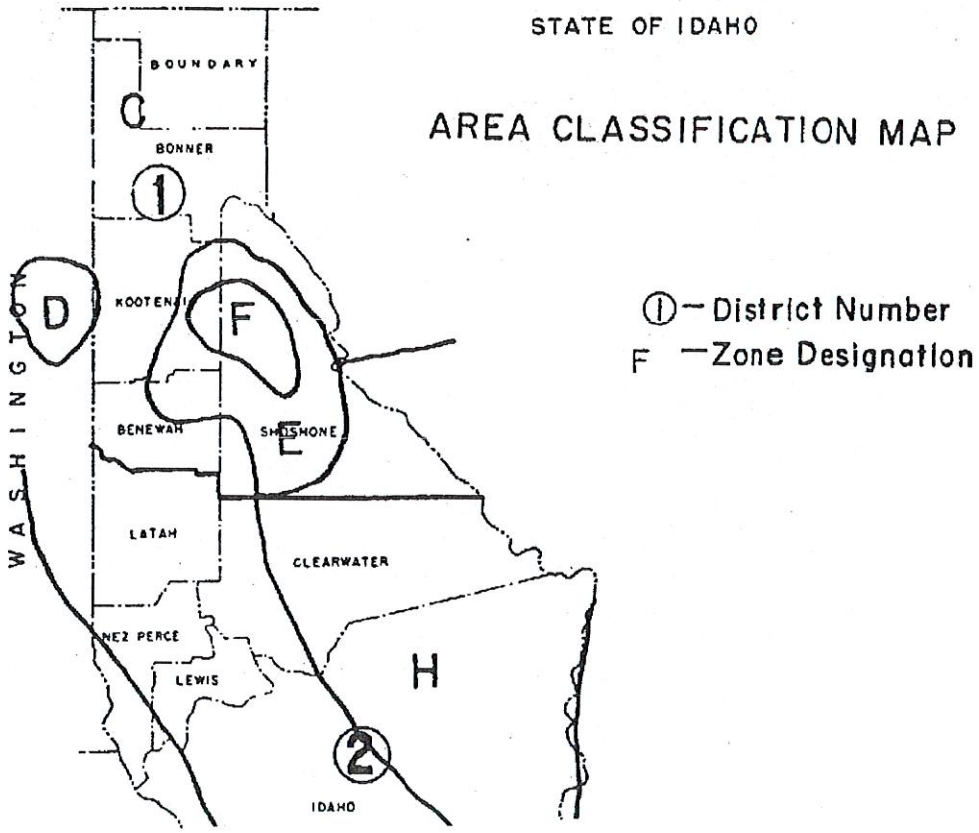

FIGURE 6-3 AREA CLASSIFICATION MAP FOR IDF CURVES - IDAHO
(IDAHO TRANSPORTATION DEPARTMENT)

FIGURE 6-4 ZONE C, INTENSITY-DURATION-FREQUENCY CURVE
(IDAHO TRANSPORTATION DEPARTMENT)

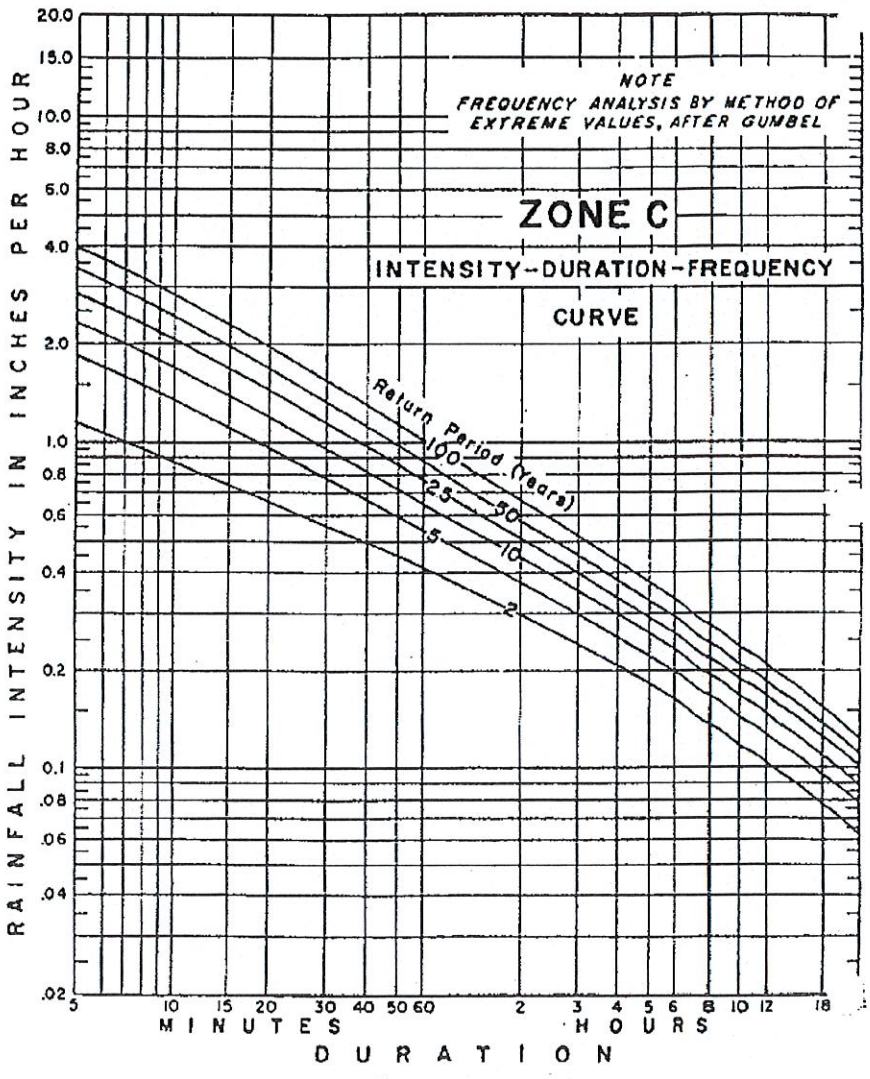

Table 4B.2. Values of Runoff Coefficient (C) for Rational Formula

Land Use	Description	Hydrologic Soils Group			
		A	B	C	D
Cultivated Land	Without conservation treatment	0.49	0.67	0.81	0.88
	With conservation treatment	0.27	0.43	0.67	0.67
Pasture or Range Land	Poor condition	0.38	0.63	0.78	0.84
	Good condition	---	0.25	0.51	0.65
Meadow	Good condition	---	---	0.41	0.61
Wood or Forest Land	Thin stand, poor cover, no mulch	---	0.34	0.59	0.70
	Good cover	---	---	0.45	0.59
Open Space, Lawn, Park, Golf Course, or Cemetery	Good condition (grass cover on 75% or more)	---	0.25	0.51	0.65
	Fair condition (grass cover on 50% to 75%)	---	0.45	0.63	0.74
Commercial and Business Area	85% impervious	0.84	0.90	0.93	0.96
Industrial District	72% impervious	0.67	0.81	0.88	0.92
Residential Lot Average lot size (acres): 1/8 1/4 1/3 1/2 1.0	Average % of lot impervious: 65 38 30 25 20	 0.59 0.29 --- --- ---	 0.76 0.55 0.49 0.45 0.41	 0.86 0.70 0.67 0.65 0.63	 0.90 0.80 0.78 0.76 0.74
Paved Area	Parking lots, roofs, driveways, etc.	0.99	0.99	0.99	0.99
Street or Road	Paved with curbs and storm sewers	0.99	0.99	0.99	0.99
	Gravel	0.57 0.49	0.76 0.69	0.84 0.80	0.88 0.84

Note: The designer must use judgment to select the appropriate C value within the range. Generally, larger areas with permeable soils, flat slopes, and dense vegetation should have the lowest C values. Smaller areas with dense soils, moderate to steep slopes, and sparse vegetation should assigned the highest C values.

SOURCE: Panhandle Stormwater Erosion Control and Education Program Training Manual (2007)

APPENDIX B

Storm Water Management Calculations

Grassy Infiltration Area

Date: 05/15/2025

IMPERVIOUS SURFACE CALCULATIONS

Basin Description		Area (sf)	Area (ac)	C	
Sub Drainage Area 1		196,540	4.51		
ACP Driveway		93,920	2.16	0.90	
Rooftops		76,080	1.75	0.90	
Total Impervious Area		170,000	3.90		
Green Space	14%	26,540	0.61	0.65	Assumed Pasture, Group D
Composite Runoff Coeff.				0.87	

BOWSTRING CALCULATIONS

Design Storm Return Period	25	yr	**Infiltration (max. 2 in/hr)**	
Drywell Outflow	0.00	cfs	Infiltration Rate (in/hr)=	0.1
Bed of GIA Outflow	0.00	cfs	Infiltration Area (sf) =	7
Check Dam Outflow (Geotex + Drain Rock)	0.000	cfs	**Fabric Transmissivity**	
Wier Outflow	0.00	cfs	Trans. Rate (cfs/sf)=	0.000
Orifice Outflow	0.53	cfs	Outlet Area (sf) =	0.00
Post Developed			**Treatment Storage (cf)**	
Area	4.51	acres	First 1/2-Inch Runoff =	7,083
Composite Runoff Coefficient	0.87			
AxC=	3.91		**Drywell Capacities**	
Time of Concentration	5.00	min	Single Barell (cfs) =	0.30
Pre-Developed:			Double Barell (cfs) =	1.00
Sub Basin Area	4.51	acres		
Composite Runoff Coefficient	0.65	Assumed Pasture, Group D		
AxC=	2.93			
Time of Concentration	10	min		
Pre-Developed Flow Rate (cfs)	6.36	*(flow rate based on 10-min time of concentration)*		

Time (min)	Time (sec)	25-Year Storm Intensity (in/hr)	Qpost(cfs)	Vpost (cf)	Qpre(cfs)	Vpre(cf)	Operating Storage (cf)
5	300	2.8	10.94	4,399	8.21	3,301	940
10	600	2.17	8.48	5,954	6.36	4,468	1,171
15	900	1.83	7.15	7,167	5.37	5,378	1,316
20	1200	1.65	6.45	8,396	4.84	6,300	1,465
25	1500	1.45	5.67	9,079	4.25	6,813	1,478
30	1800	1.27	4.96	9,441	3.72	7,084	1,410
35	2100	1.19	4.65	10,242	3.49	7,685	1,453
40	2400	1.11	4.34	10,855	3.26	8,145	1,448

45	2700	1.04	4.06	11,389	3.05	8,546	1,424
50	3000	0.96	3.75	11,639	2.82	8,734	1,328
55	3300	0.88	3.44	11,701	2.58	8,780	1,186
60	3600	0.8	3.13	11,575	2.35	8,686	997
65	3900	0.78	3.05	12,200	2.29	9,155	995
70	4200	0.75	2.93	12,611	2.20	9,463	940
75	4500	0.72	2.81	12,950	2.11	9,718	867
80	4800	0.7	2.74	13,411	2.05	10,063	824
85	5100	0.67	2.62	13,622	1.96	10,222	719
90	5400	0.65	2.54	13,978	1.91	10,488	650
95	5700	0.63	2.46	14,286	1.85	10,720	570
100	6000	0.61	2.38	14,548	1.79	10,916	477
105	6300	0.59	2.31	14,763	1.73	11,078	373
110	6600	0.57	2.23	14,931	1.67	11,204	257
115	6900	0.55	2.15	15,052	1.61	11,294	130
120	7200	0.53	2.07	15,126	1.55	11,350	-9
125	7500	0.51	1.99	15,153	1.50	11,370	-160
130	7800	0.49	1.92	15,133	1.44	11,356	-323
135	8100	0.47	1.84	15,067	1.38	11,306	-497
150	9000	0.43	1.68	15,297	1.26	11,478	-913
165	9900	0.4	1.56	15,637	1.17	11,733	-1,301
180	10800	0.38	1.49	16,192	1.11	12,150	-1,636
195	11700	0.37	1.45	17,067	1.09	12,807	-1,891
210	12600	0.36	1.41	17,872	1.06	13,411	-2,163
225	13500	0.34	1.33	18,075	1.00	13,563	-2,585
240	14400	0.33	1.29	18,704	0.97	14,035	-2,902
300	18000	0.29	1.13	20,518	0.85	15,396	-4,342
360	21600	0.25	0.98	21,205	0.73	15,912	-6,063
365	21900	0.25	0.98	21,498	0.73	16,132	-6,147
370	22200	0.25	0.98	21,791	0.73	16,352	-6,232
1080	64800	0.14	0.55	35,513	0.41	26,648	-25,203
1440	86400	0.11	0.43	37,190	0.32	27,906	-36,141

GIA Design Dimensions

GIA Bed Variables (North & South PL):

Length =	926.00	ft
Width =	5.67	ft
Depth =	8.00	in
Side Slopes =	3	:1
Free Board =	2.00	in

Required Treatment Volume:

	cf
7,083	**Required**

Resulting Dimensions at Operating Level:

930.00	ft	Bed Area	**5,250**	sf
9.67	ft	Top Area	8,993	sf

Resulting Top Dimensions (including free board):

931.00	ft	Height	10.00	in
10.67	ft	Top Area	9,934	sf

Resulting Volume:

4,745 cf

GIA Bed Variables (East PL):

Length =	400.00	ft
Width =	7.00	ft
Depth =	8.00	in
Side Slopes =	3	:1
Free Board =	2.00	in

Required Treatment Volume:

Resulting Dimensions at Operating Level:

404.00	ft	Bed Area	**2,800**	sf
11.00	ft	Top Area	4,444	sf

Resulting Top Dimensions (including free board):

405.00	ft	Height	10.00	in
12.00	ft	Top Area	4,860	sf

Resulting Volume:

2,412 cf

7,157 **cf Provided**

Orifice Flow

Coefficient =	0.60	
Pipe Dia. =	3.00	in
Head =	5.00	ft (measured to the center of the orifice)
Orifice Area =	0.05	sf
Discharge =	**0.53**	**cfs Outflow**

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APPENDIX A

NRCS Soils Classification, IDF Curve Area Classification Map, Rainfall Intensity Diagram, Runoff Coefficients

Bonner County Area, Idaho, Parts of Bonner and Boundary Counties

31—Mission silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 5462
Elevation: 2,000 to 2,800 feet
Mean annual precipitation: 25 to 38 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 90 to 120 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Mission and similar soils: 75 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mission

Setting

Landform: Lake terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash and loess over silty glaciolacustrine deposits

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 3 inches: silt loam
Bw - 3 to 12 inches: silt loam
2Btx - 12 to 21 inches: silt loam
2E - 21 to 33 inches: silt
2Bt - 33 to 48 inches: silt loam
3C - 48 to 67 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 10 to 20 inches to fragipan
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water capacity: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): 6e

Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: F043AY527WA - Warm-Frigid, Udic, Loamy Foothills/Valleys, high water table (western redcedar, moist herb) Thuja plicata / Clintonia uniflora
Other vegetative classification: western redcedar/queencup beadlily (CN530)
Hydric soil rating: No

Minor Components

Hoodoo

Percent of map unit: 3 percent
Landform: Flood plains, drainageways
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

Odenson

Percent of map unit: 2 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Bonner County Area, Idaho, Parts of Bonner and Boundary Counties
Survey Area Data: Version 16, Jun 4, 2020

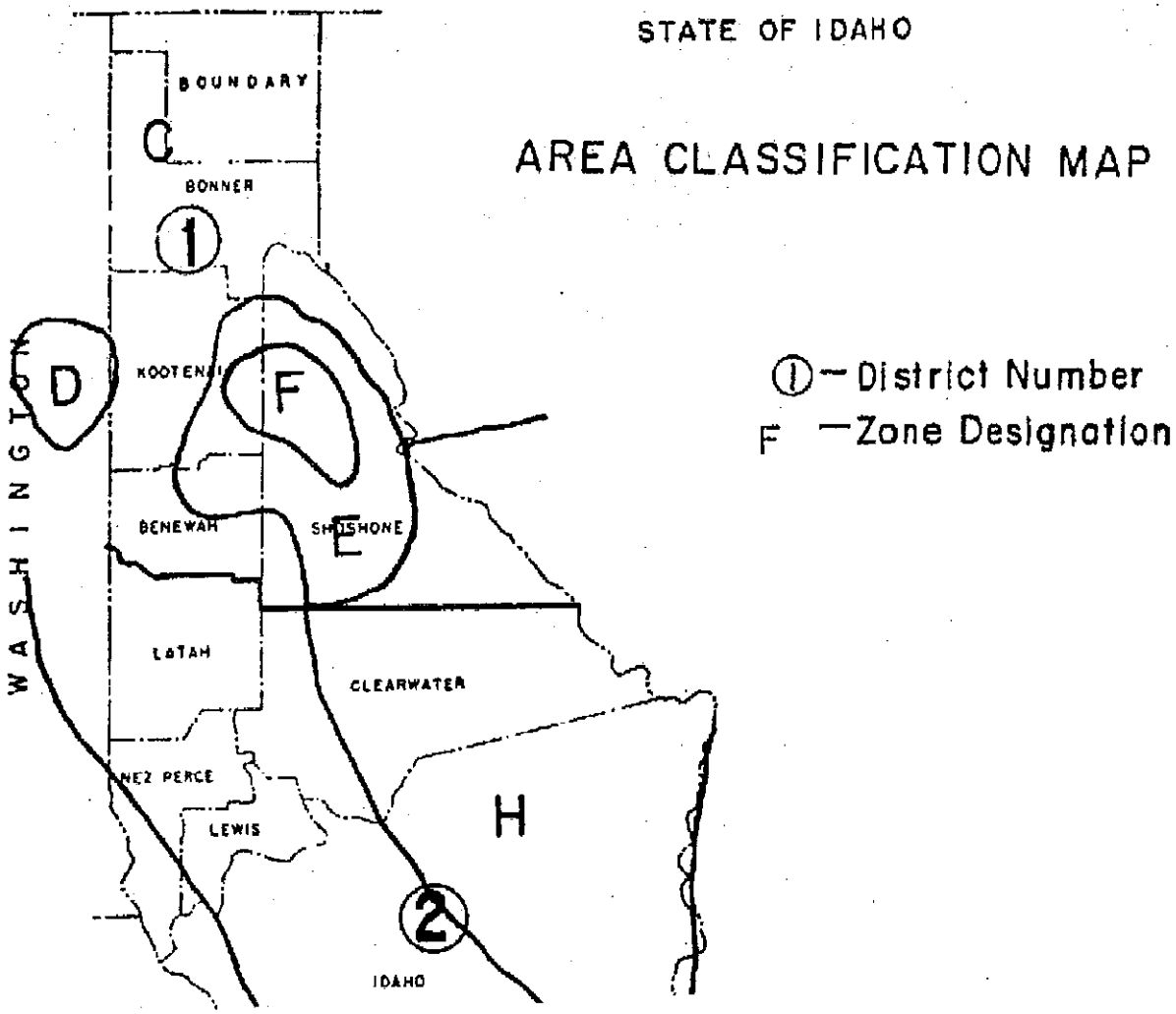

FIGURE 6-3 AREA CLASSIFICATION MAP FOR IDF CURVES - IDAHO
(IDAHO TRANSPORTATION DEPARTMENT)

FIGURE 6-4 ZONE C, INTENSITY-DURATION-FREQUENCY CURVE
(IDAHO TRANSPORTATION DEPARTMENT)

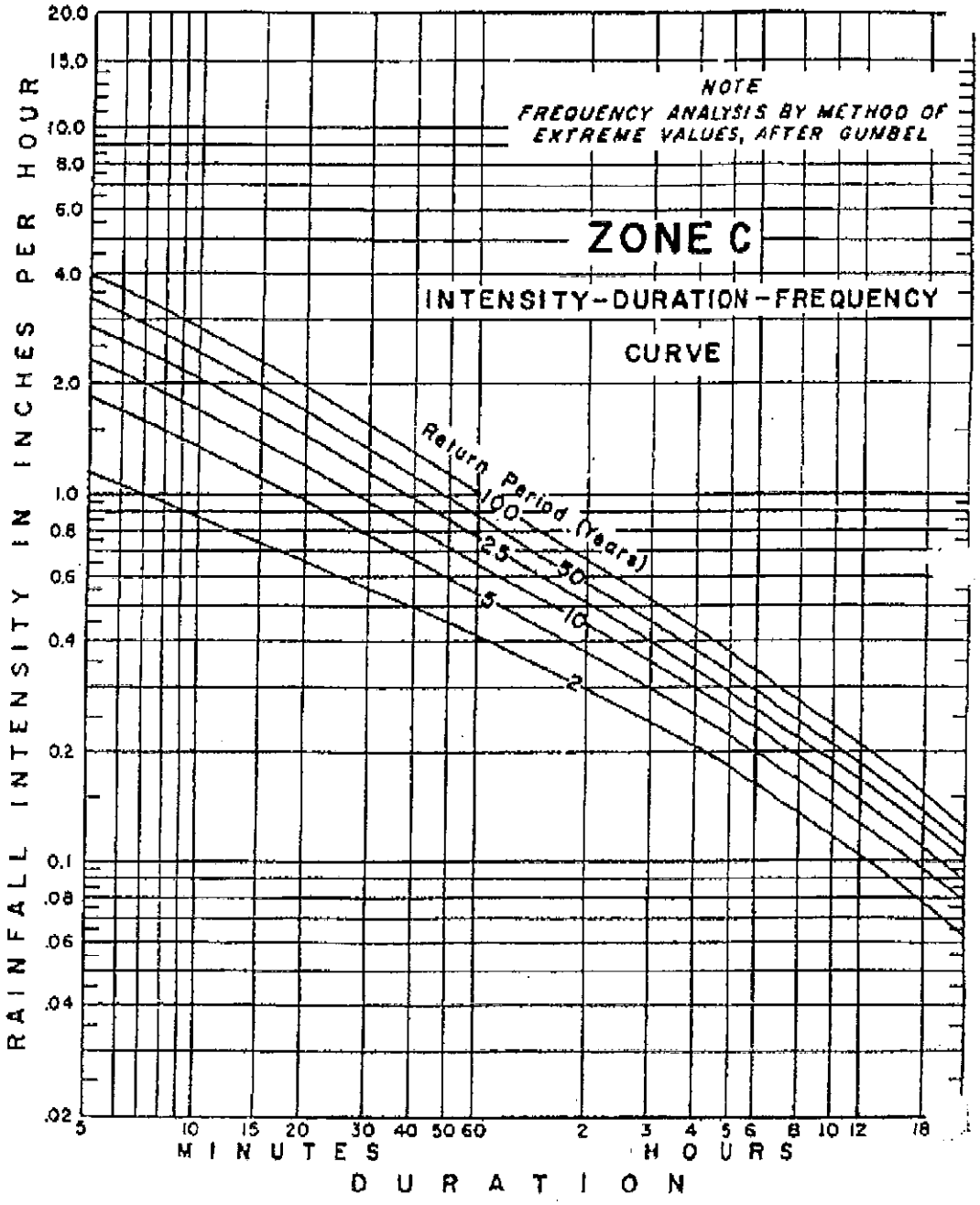

Table 4B.2. Values of Runoff Coefficient (C) for Rational Formula

Land Use	Description	Hydrologic Soils Group			
		A	B	C	D
Cultivated Land	Without conservation treatment	0.49	0.67	0.81	0.88
	With conservation treatment	0.27	0.43	0.67	0.67
Pasture or Range Land	Poor condition	0.38	0.63	0.78	0.84
	Good condition	---	0.25	0.51	0.65
Meadow	Good condition	---	---	0.41	0.61
Wood or Forest Land	Thin stand, poor cover, no mulch	---	0.34	0.59	0.70
	Good cover	---	---	0.45	0.59
Open Space, Lawn, Park, Golf Course, or Cemetery	Good condition (grass cover on 75% or more)	---	0.25	0.51	0.65
	Fair condition (grass cover on 50% to 75%)	---	0.45	0.63	0.74
Commercial and Business Area	85% impervious	0.84	0.90	0.93	0.96
Industrial District	72% impervious	0.67	0.81	0.88	0.92
Residential Lot Average lot size (acres): 1/8 1/4 1/3 1/2 1.0	Average % of lot impervious: 65 38 30 25 20	 0.59 0.29 --- --- ---	 0.76 0.55 0.49 0.45 0.41	 0.86 0.70 0.67 0.65 0.63	 0.90 0.80 0.78 0.76 0.74
Paved Area	Parking lots, roofs, driveways, etc.	0.99	0.99	0.99	0.99
Street or Road	Paved with curbs and storm sewers	0.99	0.99	0.99	0.99
	Gravel	0.57 0.49	0.76 0.69	0.84 0.80	0.88 0.84

Note: The designer must use judgment to select the appropriate C value within the range. Generally, larger areas with permeable soils, flat slopes, and dense vegetation should have the lowest C values. Smaller areas with dense soils, moderate to steep slopes, and sparse vegetation should assigned the highest C values.

SOURCE: Panhandle Stormwater Erosion Control and Education Program Training Manual (2007)

APPENDIX B

Storm Water Management Calculations

Grassy Infiltration Area

IMPERVIOUS SURFACE CALCULATIONS

Date: 05/15/2025

Basin Description		Area (sf)	Area (ac)	C	
Sub Drainage Area 1		196,540	4.51		
ACP Driveway		93,920	2.16	0.90	
Rooftops		76,080	1.75	0.90	
Total Impervious Area		170,000	3.90		
Green Space	14%	26,540	0.61	0.65	Assumed Pasture, Group D
Composite Runoff Coeff.				0.87	

BOWSTRING CALCULATIONS

Design Storm Return Period	25	yr	**Infiltration (max. 2 in/hr)**	
			Infiltration Rate	
Drywell Outflow	0.00	cfs	(in/hr)=	0.1
Bed of GIA Outflow	0.00	cfs	Infiltration Area (sf) =	7
Check Dam Outflow (Geotex + Drain Rock)	0.000	cfs	**Fabric Transmissivity**	
Wier Outflow	0.00	cfs	Trans. Rate (cfs/sf)=	0.000
Orifice Outflow	0.53	cfs	Outlet Area (sf) =	0.00
Post Developed			**Treatment Storage (cf)**	
			First 1/2-Inch Runoff	
Area	4.51	acres	=	7,083
Composite Runoff Coefficient	0.87			
AxC=	3.91		**Drywell Capacities**	
Time of Concentration	5.00	min	Single Barell (cfs) =	0.30
Pre-Developed:			Double Barell (cfs) =	1.00
Sub Basin Area	4.51	acres		
		Assumed Pasture,		
Composite Runoff Coefficient	0.65	Group D		
AxC=	2.93			
Time of Concentration	10	min		
Pre-Developed Flow Rate (cfs)	6.36	*(flow rate based on 10-min time of concentration)*		

Time (min)	Time (sec)	25-Year Storm Intensity (in/hr)	Qpost(cfs)	Vpost (cf)	Qpre(cfs)	Vpre(cf)	Operating Storage (cf)
5	300	2.8	10.94	4,399	8.21	3,301	940
10	600	2.17	8.48	5,954	6.36	4,468	1,171
15	900	1.83	7.15	7,167	5.37	5,378	1,316
20	1200	1.65	6.45	8,396	4.84	6,300	1,465
25	1500	1.45	5.67	9,079	4.25	6,813	1,478
30	1800	1.27	4.96	9,441	3.72	7,084	1,410
35	2100	1.19	4.65	10,242	3.49	7,685	1,453
40	2400	1.11	4.34	10,855	3.26	8,145	1,448

45	2700	1.04	4.06	11,389	3.05	8,546	1,424
50	3000	0.96	3.75	11,639	2.82	8,734	1,328
55	3300	0.88	3.44	11,701	2.58	8,780	1,186
60	3600	0.8	3.13	11,575	2.35	8,686	997
65	3900	0.78	3.05	12,200	2.29	9,155	995
70	4200	0.75	2.93	12,611	2.20	9,463	940
75	4500	0.72	2.81	12,950	2.11	9,718	867
80	4800	0.7	2.74	13,411	2.05	10,063	824
85	5100	0.67	2.62	13,622	1.96	10,222	719
90	5400	0.65	2.54	13,978	1.91	10,488	650
95	5700	0.63	2.46	14,286	1.85	10,720	570
100	6000	0.61	2.38	14,548	1.79	10,916	477
105	6300	0.59	2.31	14,763	1.73	11,078	373
110	6600	0.57	2.23	14,931	1.67	11,204	257
115	6900	0.55	2.15	15,052	1.61	11,294	130
120	7200	0.53	2.07	15,126	1.55	11,350	-9
125	7500	0.51	1.99	15,153	1.50	11,370	-160
130	7800	0.49	1.92	15,133	1.44	11,356	-323
135	8100	0.47	1.84	15,067	1.38	11,306	-497
150	9000	0.43	1.68	15,297	1.26	11,478	-913
165	9900	0.4	1.56	15,637	1.17	11,733	-1,301
180	10800	0.38	1.49	16,192	1.11	12,150	-1,636
195	11700	0.37	1.45	17,067	1.09	12,807	-1,891
210	12600	0.36	1.41	17,872	1.06	13,411	-2,163
225	13500	0.34	1.33	18,075	1.00	13,563	-2,585
240	14400	0.33	1.29	18,704	0.97	14,035	-2,902
300	18000	0.29	1.13	20,518	0.85	15,396	-4,342
360	21600	0.25	0.98	21,205	0.73	15,912	-6,063
365	21900	0.25	0.98	21,498	0.73	16,132	-6,147
370	22200	0.25	0.98	21,791	0.73	16,352	-6,232
1080	64800	0.14	0.55	35,513	0.41	26,648	-25,203
1440	86400	0.11	0.43	37,190	0.32	27,906	-36,141

GIA Design Dimensions

GIA Bed Variables (North & South PL):

Length =	926.00	ft
Width =	5.67	ft
Depth =	8.00	in
Side Slopes =	3	:1
Free Board =	2.00	in

Resulting Dimensions at Operating Level:

930.00	ft	Bed Area	**5,250**	sf
9.67	ft	Top Area	8,993	sf

Resulting Top Dimensions (including free board):

931.00	ft	Height	10.00	in
10.67	ft	Top Area	9,934	sf

Required Treatment Volume:

	cf
7,083	**Required**

Resulting Volume:

4,745 cf

GIA Bed Variables (East PL):

Length =	400.00	ft
Width =	7.00	ft
Depth =	8.00	in
Side Slopes =	3	:1
Free Board =	2.00	in

Required Treatment Volume:

Resulting Dimensions at Operating Level:

404.00	ft	Bed Area	**2,800**	sf
11.00	ft	Top Area	4,444	sf

Resulting Top Dimensions (including free board):

405.00	ft	Height	10.00	in
12.00	ft	Top Area	4,860	sf

Resulting Volume:

2,412 cf

7,157 **cf Provided**

Orifice Flow

Coefficient =	0.60	
Pipe Dia. =	3.00	in
Head =	5.00	ft (measured to the center of the orifice)
Orifice Area =	0.05	sf
Discharge =	**0.53**	**cfs Outflow**