McNEARNEY MILL

DESIGN REPORT, STORMWATER, AND EROSION CONTROL PLAN

2018

AUGUST 6

7B ENGINEERING
Authored by: Daniel W. Larson, PE

PROFESSIONAL ENGINEER REGISTERED 10086 8/6/18 STATE OF IDAHO DANIEL W. LARSON

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PLANNING OFFICE
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A Design Report, Stormwater and Erosion Control Plan
For McNearney Mill Subdivision

RPP00000028002A aka 2-57N-2W N 440FT OF W 495 OF SE4 LESS S 220FT OF W 160FT, Section 2, Township 57 North, Range 2 West, Boise Meridian, Bonner County, 300 McNearney Road, Ponderay, Idaho

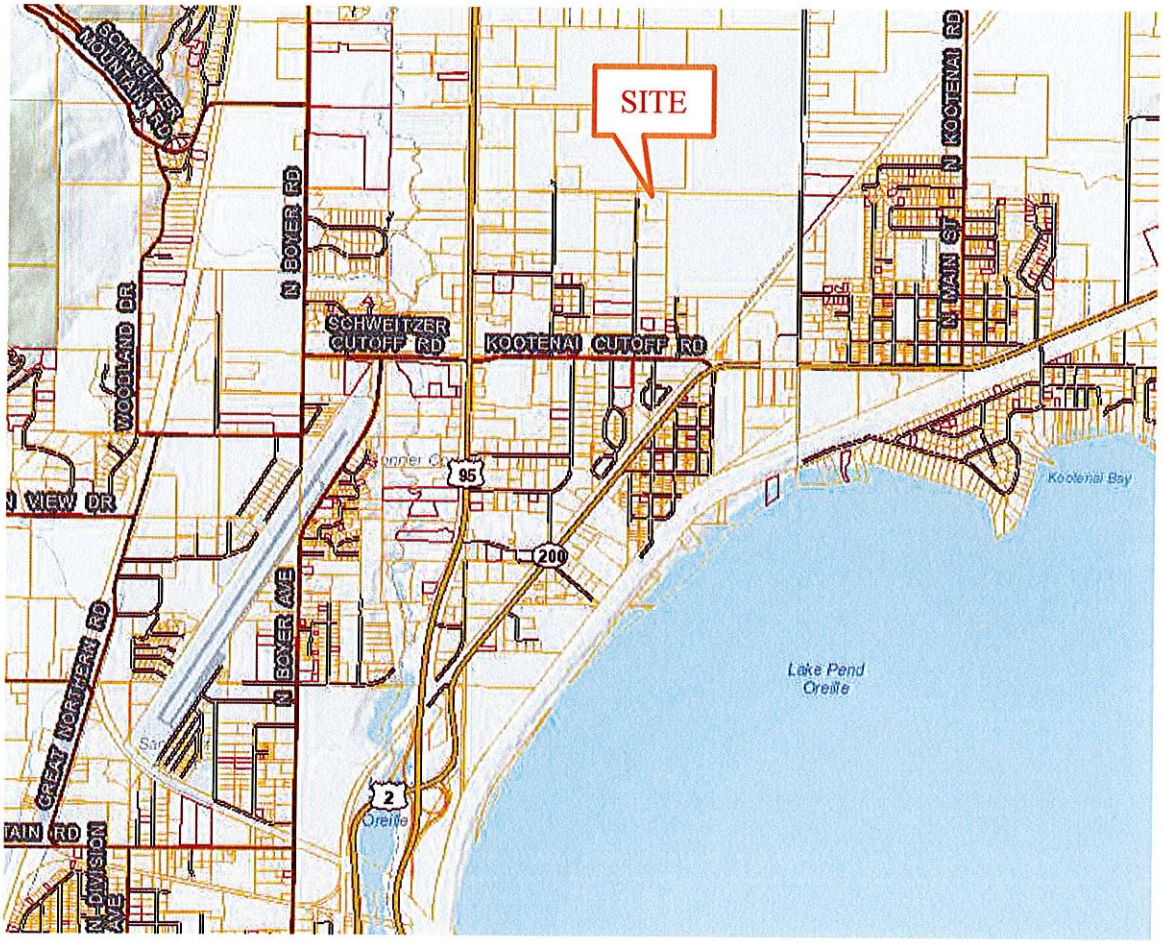

Figure 1: Vicinity Map

Table of Contents

Table of Figures

Attachments

Soils Information
Rational Calculations for Flush Mount GIA

Introduction

This report has been prepared to address design features relating to a subdivision application in the Industrial zone in the city of Ponderay, Idaho for Phillip McNearney and Joyce of Spirit Lake, Idaho. More specifically, this Plan addresses site changes to construct an access driveway and associated stormwater facilities. No new structures are proposed at this time.

Approximately 6400 SF of new gravel will be constructed and directed to stormwater treatment and disposal locations. This report, calculations, and drawings are for review by the city of Ponderay and shall become the property of the Owner when approved for construction. All other requirements for any future building permits must be met by the Owner. This report addresses design decisions and calculations that will aid the city and the Owner in the review of this proposal.

Project Location

The site is located on the right-hand side (east side) at the end of McNearney Road in Ponderay. Primary access is from Kootenai Cutoff Road to McNearney Road, both paved city streets.

Property Identification Numbers: RPP00000028002A aka 2-57N-2W N 440FT OF W 495 OF SE4 LESS S 220FT OF W 160FT, Section 2, Township 57 North, Range 2 West, Boise Meridian, Bonner County, 300 McNearney Road, Ponderay, Idaho

Mailing address:
300 McNearney Rd.
Ponderay, ID 83852

Property owner:
Phillip McNearney and
Joyce Broadsword

Size of Lot:
4.2 Acres

Location:
Section 2, T57N, R2W

Geotechnical

The USDA NRCS Web Soil Survey was used to categorize the soil characteristics at this site. A site visit confirmed the findings of the NRCS and the soils appeared to be consistent with the Survey. In general, the site consists of **Odenson Silt Loam,** a soil in that is Hydrologic group D unless it is drained (generally via drain tile), then it becomes a B soil. These soils have a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission. Soil amendment and underdrains (where feasible) are advised.

All required testing and inspections will be coordinated by the Owner and Contractor and/or his representative and will submitted to the city of Ponderay at the completion of construction.

Public Water System
Public water is available from the City of Sandpoint in McNearney Road. New water services will install a standard tap, meter, and corp stop per the city of Sandpoint requirements.

Public Sewer System
Public sewer is available for this project. An existing 3" PVC pressure pipe is already serving the site and will be utilized for future sewer service for these properties. A sewer plan to convert the existing 3" PVC to a 3" Force Main are included in these plans.

Road Specifications
The existing McNearney Road is a public road maintained by the Independent Highway District on behalf of the city of Ponderay. An additional 10-feet of Right-of-Way dedication may be required, pending the outcome of the centerline discrepancy survey.

Stormwater Facility Calculations

In general, this project disturbs a very small amount of flat area and no erosion control plan is presented. Care must be taken by the Contractor to practice erosion control measures as needed.

All new impervious surface areas are required to be treated per Ponderay Revised Code. Ponderay requires treatment of the first ½" of runoff for new impervious surface areas, a volume based treatment option. To treat the increased impervious runoff from the private drive, biofiltration swales, "Grassed Infiltration Areas" (Kennedy Engineers, 1992), or raingardens are proposed. Although the referenced Kennedy report recommends only the GIA, Biofiltration and Bioretention designs can be found in the BMP Manual (Catalog, 2005) but are not discussed in the Kennedy report. All of these options are designed to work without an Operator and to be simple to maintain. The stormwater treatment facility area is shown on the Plans and the exact version is to be chosen by the Owner when constructed. The attached infiltration and treatment sizing calculations (see Attachments) can be adjusted on-site for biofiltration or bioretention.

In general, we have planned for a soil infiltration rate of 2 in/hr with facilities sized for a combined area of 6,400 SF. Other infiltration rates may warrant a variation in biofiltration facility size. It is the Owners' choice to construct and landscape this feature as desired at the time of construction of the permanent Impervious Areas (ie. Road) with the following considerations:

Hydrologic Model Used
Rational Method

Assumptions Made
Impervious Area to be treated and detained: 6,400 sf
Rational Method Runoff Coefficient: 0.60 (gravel)

Intensity-Duration-Frequency Curve: Zone C
Design Storm Return Period: 25-Year
Precipitation Rate: 0.1 inches/hour for 24-hour event
Soil Infiltration Rate: 0.5 – 3.0 inches/hour
No Off-site runoff coming onto site
Anticipated Infiltration Rates of GIA: 2 in/hr

Stormwater Facility Construction Options

Grassed Infiltration Area: Construction Considerations

1) Grass or sod may be used but should be a species adapted to permeable soils. Avoid grass intended for clay soils or sod grown on clay.
2) Soil should be less than 25% clay, 3 to 5% organic material, and at least 60% sand.
3) Apply compost at a depth of 3 inches over area and till to 8-inch depth.
4) Scarify facility subgrade to 12-inch depth before planting. DO NOT COMPACT.
5) Grass height should be kept at 3 inches to 9 inches and all grass clippings removed.
6) Sediment should be removed when it begins to inhibit the growth of grass, but in this case – treating only the roof runoff from a future house - no sediment is likely.

Biofiltration: Construction Considerations

1) Place 18-inches of sand at the bottom of the facility as subgrade. If native soils are clay (non-exfiltrative), a perforated drain pipe may be installed to prevent ponding.
2) Topsoil should be less than 25% clay, 8-9% organic material, and at least 60% sand 2 ft to 4 ft thick.
3) Place a 3 inch layer of mulch to line the pond before planting.
4) Grass or other landscape plantings may be used (preferably native species).
5) A grassed buffer strip at least 5 feet wide around the facility is encouraged.
6) Ponding depth should be limited to 6 inches or water tolerant plantings should be chosen.
7) Infiltration rates should not exceed 9 inches per hour and should not be less than 1.0 inches per hour.

Bioretention (or Raingarden): Construction Considerations

1) Place 18-inches of sand at the bottom of the facility as subgrade. Scarify native soil.
2) Topsoil should be less than 25% clay, 8-9% organic material, and at least 60% sand 2 ft to 4 ft thick.
3) Place a 3 inch layer of mulch to line the pond before planting.
4) A mixture of trees, shrubs, and grass is preferred.
5) Ponding depth should be limited to 6 inches or water-loving plantings should be chosen (Alder, Willow, Ash, Dogwood, Sedges, etc.)
6) Infiltration rates should not exceed 9 inches per hour.
7) Undesirable ponding may occur on some native soils.

Inspect the chosen facility monthly and between large storm events for the first year. After the facility is established and working as designed, inspect in the spring and fall. Remove any dead or diseased vegetation and replant as needed. Mulch any bare spots at inspection and the entire facility every 2 to 3 years.

Water standing for more than 4 days after a storm when temperatures are above 50 degrees Fahrenheit may indicate a problem with the facility. Sediment removal and scarification of the topsoil or subgrade may be required. In extreme cases, soils may need to be replaced. An overflow weir (catch basin) six inches above the bottom of the GIA will release flood waters into the proposed drywell for subsurface disposal.

In addition to the treatment/detention/infiltration facility required to treat the driving surfaces, the drainage ditches must be kept clean and clear to allow snow storage and stormwater flows.

Erosion and Sediment Control BMP's

To properly construct this project, approximately 18,000sf of the site will be disturbed, including:

- Tree and brush removal
- Driveway grading
- Placement of Fill
- Utility and roadway excavations
- Fine grading of landscape and stormwater facilities

All disturbed exposed areas will be covered with suitable topsoil, mulched, and either landscaped or re-vegetated on slopes 3:1 or less. Slopes steeper than 2:1 will be stabilized with stone mulch, riprap or boulders.

Temporary Erosion and Sediment Controls

All temporary erosion control features shall be installed and maintained as detailed and shall prevent stormwater runoff or sediment migration off-site. Barriers shall be placed perpendicular to the direction of flow and shall be deployed before construction begins. Leave all temporary stormwater and erosion control measures in place until vegetation has been re-established. Construct silt fence as shown on plans or where overland flow may allow runoff to leave the construction site or enter the neighboring properties. Mulching of disturbed, final graded areas can be done with hay, straw, or grass clippings (8-10 pounds per 100 sf).

Timing of Construction

Construction activities for this site grading will proceed as follows:

Construction Schedule	Timing
Tree and stump removal	Jun-18
Excavation and grading	Aug-18
Utility Construction	Sep-18
Import rock and finish grade driveway and ditches	Sep-18
Finish grade GIA and landscape areas	Sep-18
Reseed slopes and distrubed areas	Oct-18

By constructing in the dry season, the risk of sediment laden runoff is minimized and the sequence of construction will occur during optimal conditions. The Owner and Contractor shall continually monitor the site conditions and progress of the work, keeping erosion control measures in good repair.

Staging Areas

Equipment will be staged at the property and the City right-of-way that is undeveloped, ensuring any runoff from equipment or vehicles has adequate time for treatment. No dikes, berms or grading of staging areas is warranted or proposed.

Preservation of Existing Vegetation

Preserve all vegetation (trees and grass) not within the areas to be graded and minimize bare soil exposure. Grading activity areas shall be limited to those shown on the Plan. Keep all construction equipment, materials, and waste within the areas designated on the Plan and out of areas to be preserved.

Clearing Limits

Minimize the total area of bare soil exposed to 1 acre and cover with straw or stone mulch within 14 days of disturbance. Mulch slopes and cover exposed driveway surfaces with rock as grading progresses to reduce dust and erosion potential. Do not disturb areas outside of the grading limits established by the Plan. At the end of construction, prepare all slopes and landscape areas for seeding or include seed in the erosion control mulch used.

Mulching

Apply straw, grass, grass hay, compost, wood chips, or wood fibers onto exposed soils leaving no more than 1 acre exposed for no more than 14 days. Driveway graded surfaces should be mulched or covered by aggregate as soon as practical to prevent erosion and reduce dust. Slopes steeper than 2:1 may require netting or tacking agents to hold mulch in place.

If wood chips or fibers are used, especially if obtained by chipping trees or stumps on the site, limit use to slopes under 6%. If vegetation is desired, treat chipped areas with a nitrogen fertilizer to aid plant germination and growth – otherwise wood chips tent to reduce growth of undesirable plants.

Use wood or stone mulches in areas that are not desirable to mowed or maintain. Bark chips in particular should not be used on sloped areas as they tend to be carried away by spring runoff.

Gravel or crushed rock placed as mulch should be placed at 10 tons / 0.10 acre (4,400 sf) at a depth of 3 inches (average). Use where subject to traffic or on slopes where maintenance of vegetation is not desired.

Hay or straw mulch should be free of unwanted seeds and applied at 2 or 3 bales per 1,100 sf of exposed soil at a depth of 2 to 3 inches in a uniform mat. No more than 40% of the original ground or exposed soils should be visible through the mat. Netting or tacking agents may be needed on slopes exposed to wind or steeper than 2:1.

Wood fiber mulches should be used where plant growth is to be inhibited, particularly on slopes steeper than 3:1 where mowing or maintenance of vegetation is not desired. If used in areas where growth is to be encouraged, nitrogen treatment will be needed. Apply to an average depth of 3 inches or about 25 lbs per 1,000 sf.

Compost used as mulching should be applied to the Grassed Infiltration Area and any other areas where growth (grasses) is desired. Apply compost at a depth of 3 inches over areas where seeding is to be done.

Inspect all mulched areas weekly and repair any damaged or exposed soils immediately. Mulching should cease once vegetation is re-established.

Silt Fence

Stretch silt fencing along the contour between supporting posts and use an extra-strength filter fabric or a wire mesh backing if not supplied with the silt fence material used. Anchor filter cloth a 4 in. by 4 in. trench with backfill. Where silt fence is joined, overlap, fold, and staple the connection to prevent sediment from bypassing. Join silt fence fabric only at a fence post with a minimum 6 inch overlap. Do not attach silt fence to trees

Fence posts should be 36 inches long. Wooden posts (if used) should be hardwood and at minimum 2x2's (minimum of 3 square inches of wood). T or U posts should not weigh less than 1 lb per lineal foot. Space posts 10 feet apart when fence is supported by a wire mesh, or 6.5 feet apart if using extra-strength filter fabric without a wire mesh. Posts should be driven 16 inches into the ground, leaving 20 inches exposed to support the silt fence.

Wire fence (if not supplied) should be a minimum 14.25 gauge with a maximum of 6 in. mesh openings. Fasten the support fence to the upslope side of the fence posts using heavy duty wire staples, tie wires, or hog rings. Extend the wire mesh support fence to the bottom of the trench and staple or wire the silt fence fabric to the wire support fence.

Inspect silt fence periodically for damage (tearing, sagging, etc) and for sediment accumulation. Remove sediment when it reaches ½ the height of the silt fence or when heavy rains are anticipated. Keep silt fence in place until permanent erosion control measures are stabilized.

Permanent Erosion Controls

After construction is complete, all exposed soils shall be covered by a minimum of 3-inches topsoil or mulch. Areas to be vegetated will be seeded, planted, or landscaped. Slopes in excess of 2:1 shall be armored with rip-rap or covered with topsoil, seeding, mulch, and matt.

Seeding and mulching shall not be applied to areas of standing water. Mulch shall be applied at a rate of 8-10 pounds per 100 square feet (2" – 3" thick when loose) with a maximum of 20% of original ground noticeable. Slopes in excess of 3:1 which are not rip-rapped shall be covered with Jute matting or hydro-seeded for stability of seed bed.

Operation and Maintenance Plan

Temporary and Permanent Erosion and Stormwater control measures will be the responsibility of the Owner:

Phil McNearney
300 McNearney Rd.
Ponderay, ID 83852
(208) 263-3250

Inspection Schedule & Maintenance Activities

As described above, both temporary and permanent erosion and sediment control measures should be inspected by the Owner and/or Contractor. Below is an inspection schedule table for convenience.

Stormwater Feature or Erosion Control Measure	Inspection Frequency	Maintenance Activities
Mulching	Weekly & following major rain event	Mulch exposed soil
Netting or Mulch Anchoring / Tackifier	Weekly & following major rain event	Repair netting or add tacking agent
Silt Fence	Weekly & following major rain event	Repair and remove sediment
GIA/Biofiltration/ Bioretention cell	Monthly the first year and bi-annually thereafter	Mulch exposed soil and mulch cell every 2 to 3 years

In conclusion, I find that the proposed permanent improvements if properly constructed and maintained as described herein and shown on the Plans, will treat and detain the additional runoff to be generated with the future construction of a home on this property.

References

Catalog, I. S. (2005). *http://www.deq.idaho.gov/media/622263-Stormwater.pdf.* Retrieved from deq.idaho.gov: http://www.deq.idaho.gov/media/622263-Stormwater.pdf

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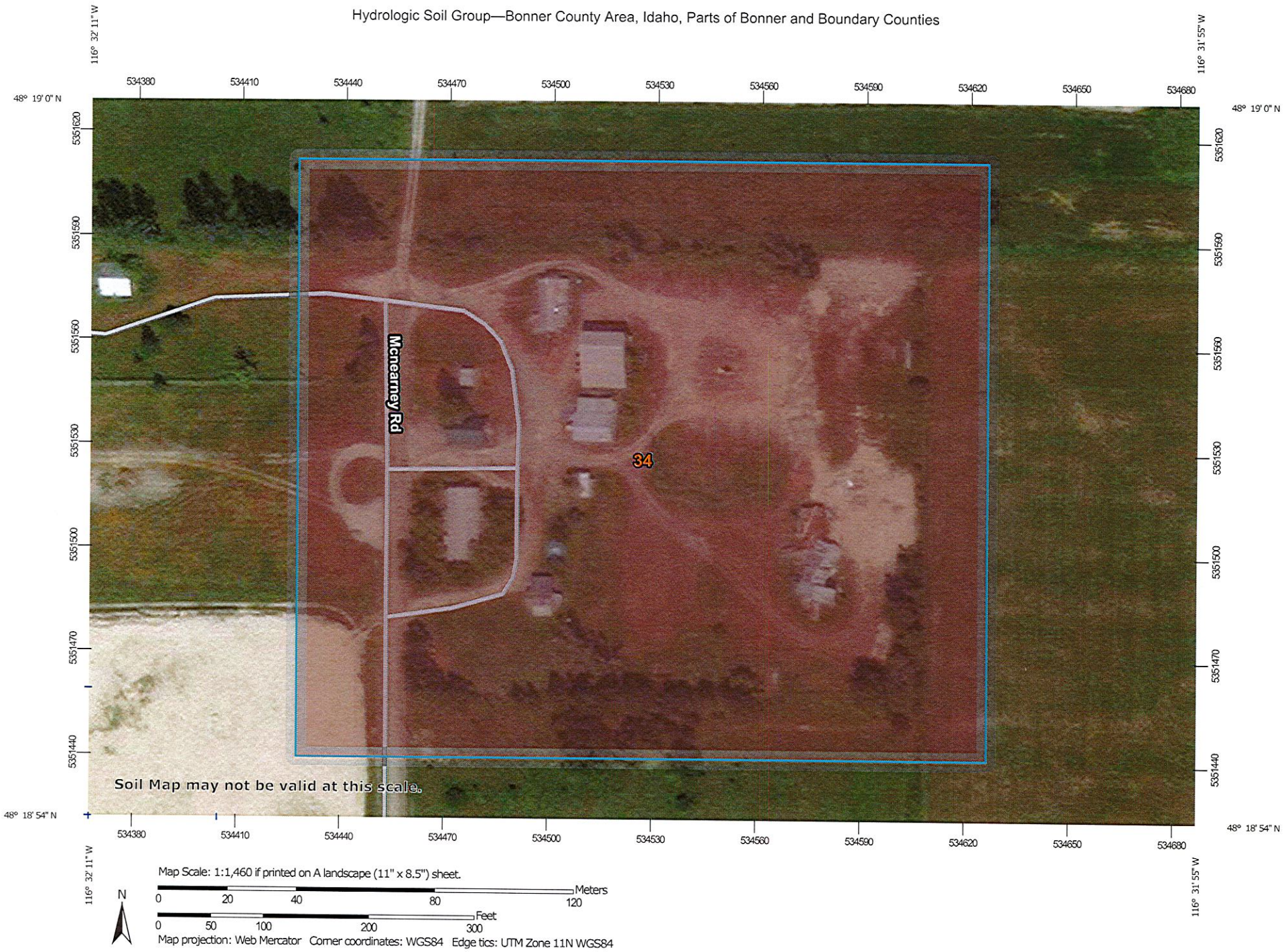

Map Scale: 1:1,460 if printed on A landscape (11" x 8.5") sheet.

N

0 20 40 80 120 Meters

0 50 100 200 300 Feet

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 Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

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

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

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

Soil Survey Area: Bonner County Area, Idaho, Parts of Bonner and Boundary Counties
Survey Area Data: Version 13, Apr 11, 2018

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

Date(s) aerial images were photographed: Aug 15, 2010—Aug 23, 2016

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
34	Odenson silt loam, 0 to 2 percent slopes	B/D	8.5	100.0%
Totals for Area of Interest			8.5	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Soil Map—Bonner County Area, Idaho, Parts of Bonner and Boundary Counties

Map Scale: 1:1,460 if printed on A landscape (11" x 8.5") sheet.

N

0 20 40 80 120 Meters

0 50 100 200 300 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

USDA **Natural Resources Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

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

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Source of Map: Natural Resources Conservation Service
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Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
34	Odenson silt loam, 0 to 2 percent slopes	8.5	100.0%
Totals for Area of Interest		**8.5**	**100.0%**

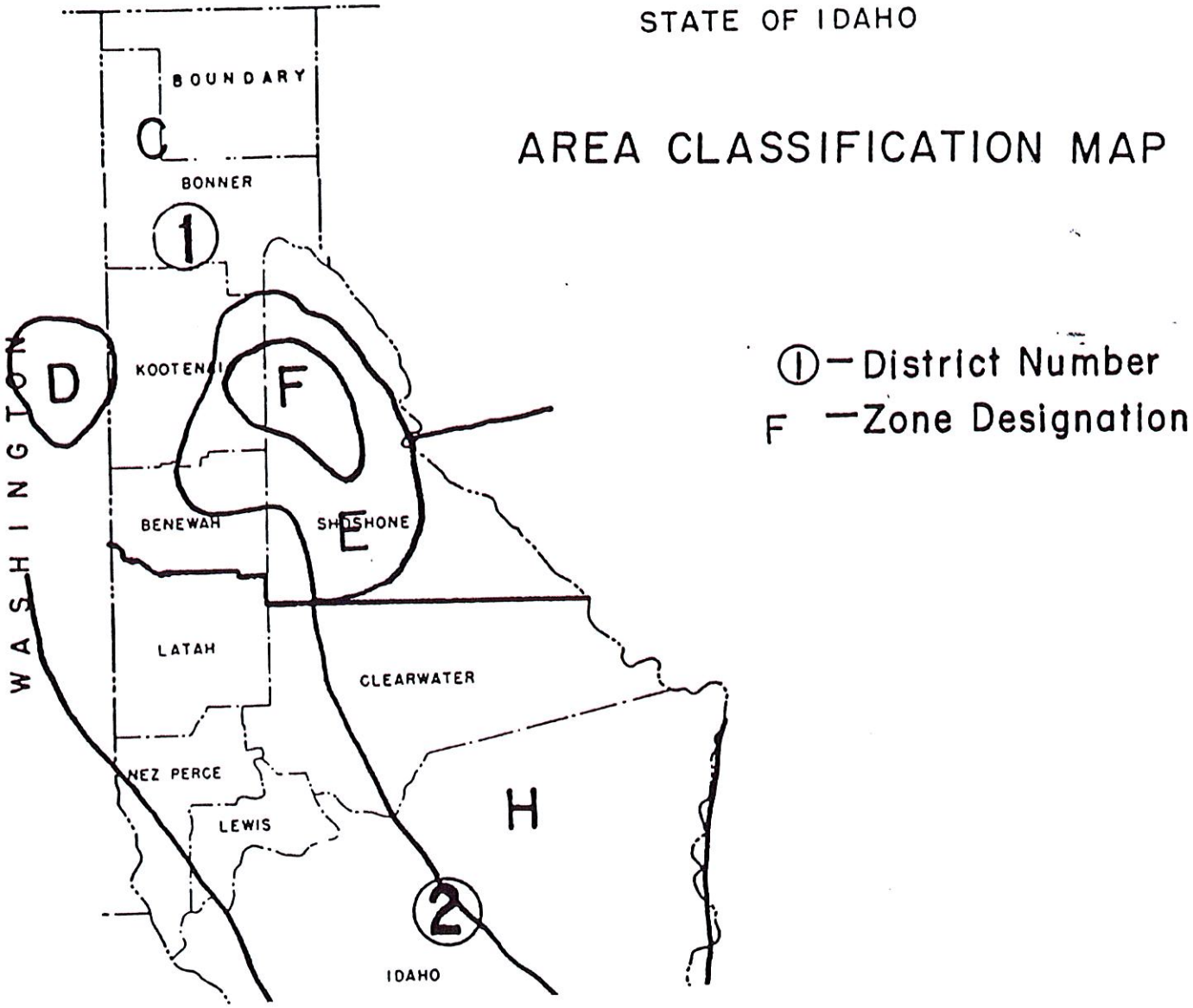

FIGURE 6-3 AREA CLASSIFICATION MAP FOR IDF CURVES - IDAHO
(IDAHO TRANSPORTATION DEPARTMENT)

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

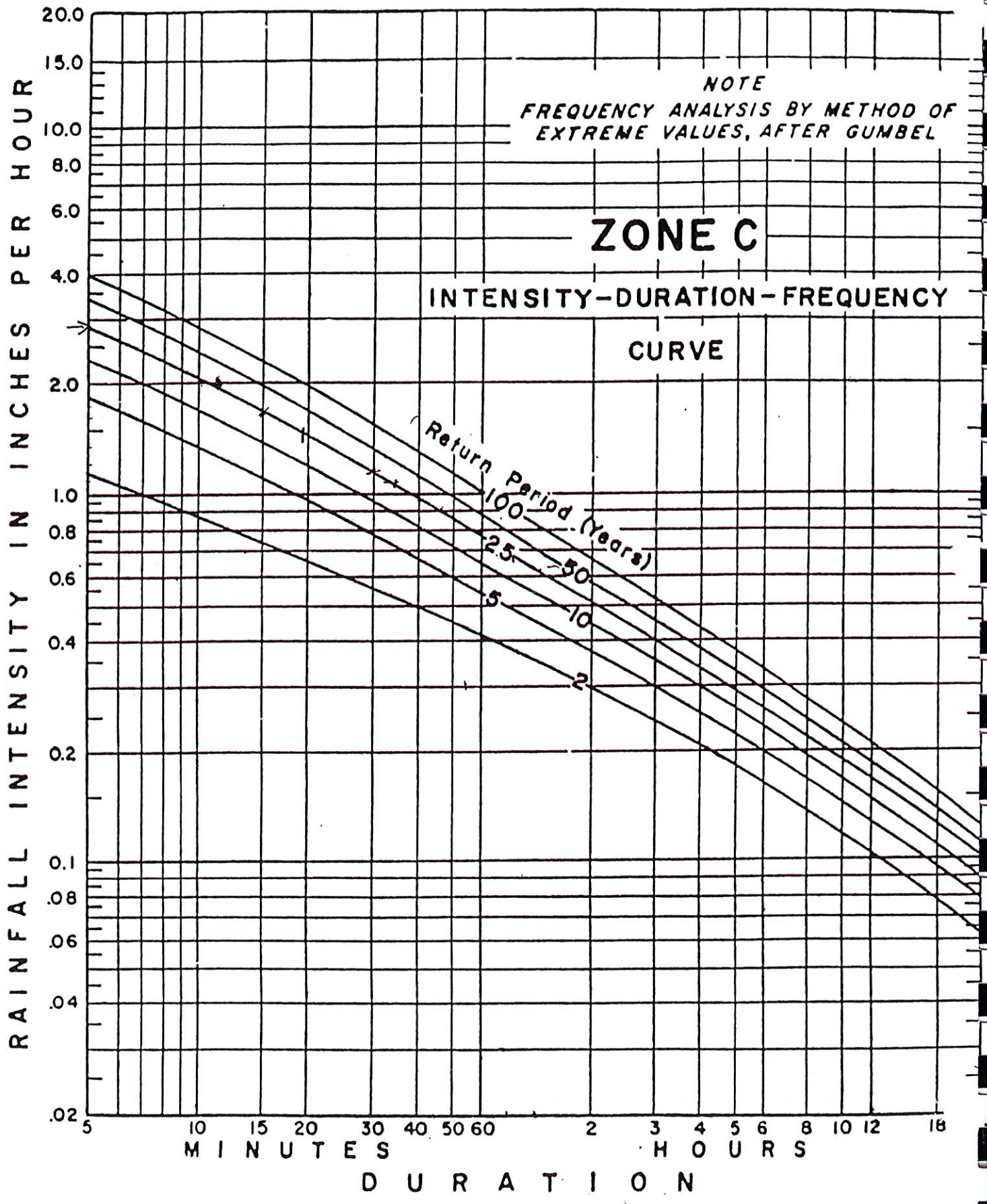

TABLE 6-2 RUNO. .: COEFFICIENTS FOR THE RATIONAL METHOD FOR DETERMINING PEAK DISCHARGE

Type of Cover	Flat	Rolling 2%-10%	Hilly Over 10%
Pavement and Roofs	0.90	0.90	0.90
Earth Shoulders	0.50	0.50	0.50
Drives and Walks	0.75	0.80	0.85
Gravel Pavement	0.50	0.55	0.60
City Business Areas	0.80	0.85	0.85
Suburban Residential	0.25	0.35	0.40
Single Family Residential	0.30	0.40	0.50
Multi Units, Detached	0.40	0.50	0.60
Multi Units, Attached	0.60	0.65	0.70
Lawns, Very Sandy Soil	0.05	0.07	0.10
Lawns, Sandy Soil	0.10	0.15	0.20
Lawns, Heavy Soil	0.17	0.22	0.35
Grass Shoulders	0.25	0.25	0.25
Side Slopes, Earth	0.60	0.60	0.60
Side Slopes, Turf	0.30	0.30	0.30
Median Areas, Turf	0.25	0.30	0.30
Cultivated Land, Clay and Loam	0.50	0.55	0.60
Cultivated Land, Sand and Gravel	0.25	0.30	0.35
Industrial Areas, Light	0.50	0.70	0.80
Industrial Areas, Heavy	0.60	0.80	0.90
Parks and Cemetaries	0.10	0.15	0.25
Playgrounds	0.20	0.25	0.30
Woodland and Forests	0.10	0.15	0.20
Meadows and Pasture Land	0.25	0.30	0.35
Pasture with Frozen Ground	0.40	0.45	0.50
Unimproved Areas	0.10	0.20	0.30

TABLE 6-3 GROUND COVER COEFFICENTS

Type of Cover		K (ground cover coefficient)
Forest with heavy ground cover		150
Minimum tillage cultivation		280
Short pasture grass or lawn		420
Nearly bare ground		600
Grassed waterway or small roadside ditch		900
Paved area		1,200
Gutter flow	0.25 feet deep	1,500
	0.50 feet deep	2,400
	0.75 feet deep	3,100

		Concrete (n = 0.012)	CMP (n = 0.024)
Storm Sewers (Concrete)	12 inch diameter	3,000	1,500
	18 inch diameter	3,900	1,950
	24 inch diameter	4,700	2,350

		Narrow W/D = 1	Medium W/D = 2	Wide W/D = 9
Open Channel Flow (n = 0.040)	1 foot deep	1,100	1,500	2,000
	2 feet deep	1,800	2,300	3,100
	4 feet deep	2,800	3,700	5,000

Stormwater Management Calculations
Rational Method
Bowstring Method

Time increment	5	min	
Time of concentration	5	min	
Outflow	0	cfs	1) input outflow (0.3 cfs 600 gal drywell, 1.0 cfs 1000 gal drywell)
Design year	25		
Area (sqft)	6400	sqft	2) input surface area for basin (in sqft)
Area (acres)	0.15	Ac	3) input the basins "C" factor
Area x "C"	0.09		
Developed "C" factor	0.60		

Time Inc. (min)	Time Inc. (sec)	Intensity (in / hr)	Q dev (cfs)	V in	V out	Storage
5	300	2.80	0.25	99	0	99
10	600	2.10	0.19	130	0	130
11	660	2.00	0.18	134	0	134
12	720	1.90	0.17	138	0	138
13	780	1.85	0.16	144	0	144
14	840	1.75	0.15	145	0	145
15	900	1.70	0.15	150	0	150
20	1200	1.60	0.14	184	0	184
25	1500	1.40	0.12	198	0	198
30	1800	1.20	0.11	201	0	201
35	2100	1.10	0.10	214	0	214
40	2400	0.95	0.08	210	0	210
45	2700	0.90	0.08	222	0	222
50	3000	0.87	0.08	238	0	238
55	3300	0.85	0.07	255	0	255
60	3600	0.78	0.07	255	0	255
65	3900	0.75	0.07	265	0	265
70	4200	0.70	0.06	265	0	265
75	4500	0.69	0.06	280	0	280
80	4800	0.67	0.06	290	0	290
85	5100	0.65	0.06	298	0	298
90	5400	0.63	0.06	306	0	306
95	5700	0.60	0.05	307	0	307
100	6000	0.59	0.05	317	0	317
105	6300	0.58	0.05	327	0	327
110	6600	0.55	0.05	325	0	325
115	6900	0.52	0.05	321	0	321
120	7200	0.5	0.04	322	0	322

Post Development

		Area(ft^2)	Area(acres)	CN	Runoff		
Pavement		0	0.00		0.90	0.00	0
Gravel		6400	0.15	96	0.60	0.09	14

Building		0	0.00	98	0.90	0.00	0
Grass		0	0.00		0.15	0.00	0
Trees		0	0.00	66	0.20	0.00	0
	Totals	6400	0.1500	96	2.75	0.09	

Developed "C" 0.60

25 year design (store or discharge 25 year / 2-hour storm event)
max storage required (bowstring) 327 cu ft Required Storage
max storage provided cu ft does not include side slopes
Dry wells required 0 Single Depth 0
0 Double Depth 0
Provided Treatment Area? 657 (sqft)
Provided Storage Volume? 329 (cubic ft)

Flush Mount Design

Flush Mount 300 (sqft.) Aimp*0.0469
Treatment Area (sqft) Provided Does Provide Adequate Treatment Area.

'208' Design Method

'208' Design (store first 1/2" of rainfall event prior to drywell)
Required storage volume 267 cu ft
storage provided cu ft does not include side slopes

Treatment Volume (cubic ft)	
Required (Aimp*.5/12)	Provided
267	328.5

Treatment Area (sqft)	
Required (Aimp/12)	Provided
533	657

Treatment Area (sqft) Provided Does Provide Adequate Treatment Area.
Storage Vol (ft^3) Provided Does Provide Adequate Storage Volume.

Residential 534 square feet of swale to provide treatment at 6" depth.
Commercial 400 square feet of swale to provide treatment at 8" depth.

Drywells Directly Injected? (1 for Yes)	0
Total Impervious Surface	6400
Total Impervious Surface w/o Direct Injection	6400

208' Design will use 6400 for the impervious surface.