STORM DRAINAGE REPORT

FOR

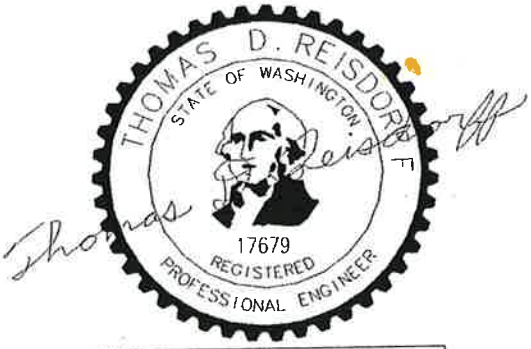
STILLAGUAMISH
BEHAVIORAL HEALTH BUILDING

Site:
4126 – 172nd St. N.E.
Arlington, WA

July 26, 2004

Job #404

Z-04-053



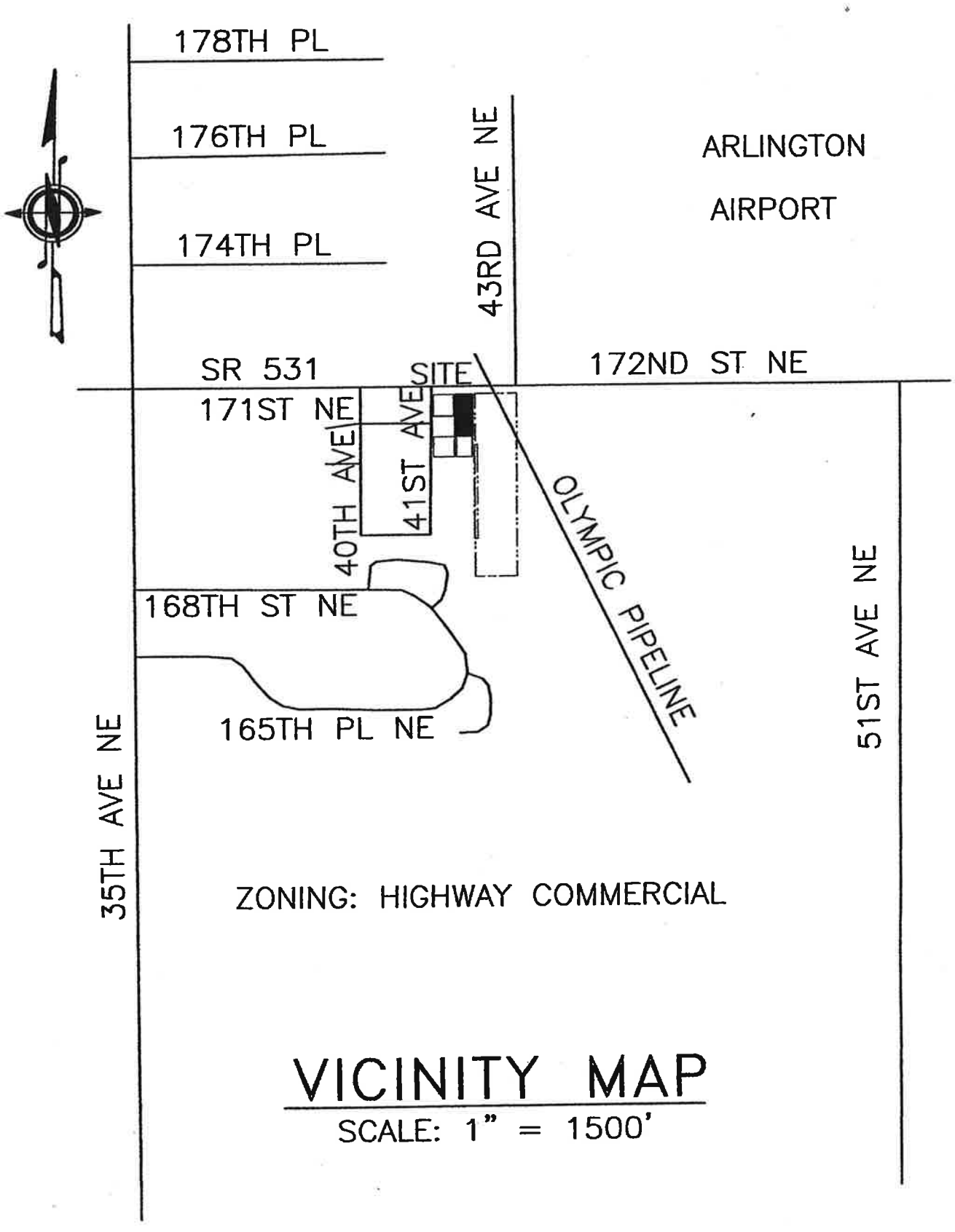
EXPIRES 2/27/06

Owner:
Herman C. Mount
13410 – 67th Ave. N.E.
Arlington, WA 98223
PH: (360)

Prepared by:
EAGLE ENGINEERING
7701 - 272th St. NW
STANWOOD, WA 8292
PH:(360) 629-2761

TABLE OF CONTENTS

APPENDICES



VICINITY MAP

SCALE: 1" = 1500'

EAGLE ENGINEERING
Tom Reisdorff
Professional Engineer
7701 - 272nd St. NW
Stanwood, WA 98292

Telephone (360) 629-2761

July 26, 2004
PROJECT:
Tax # 31052800200200
Project No.
Proposed Stilaguamish Behavioral Health Building
4126 – 172nd St. N.E.
Arlington, WA 98223

DEVELOPER:
James McKenzie
P.O. Box 339
Darrington, WA. 98241
Ph: (360) 436-1060

DRAINAGE REPORT & DOWNSTREAM ANALYSIS

OVERVIEW:
An existing 37,838 sq. ft. residential lot is being redeveloped into a commercial site with an existing 4,400 sq. ft. building and a 15,072 sq. ft. asphalt parking lot and driveway at 4126 – 172nd St. N.E. in Arlington. The site is 2350 feet east of the intersection with 35th Ave. Access to the Site will be taken from 172nd St. N.E. using the existing driveway. The lot is within the NE ¼ of the NW ¼ of Section 28, Township 31 N., Range 5 E., of the Willamette Meridian, in Snohomish County, WA.

EXISTING CONDITIONS
The property consists of one parcel with a total area of 37,838 square feet and one building and two sheds. The existing ground cover is grass lawn and gravel. Existing impervious area consists of 12,931 sq. ft. The parcel is virtually flat with an existing storm drain. The area is flat and shows no sign of high water. Storm water runoff evidently all sheet flows to the street and the existing storm drain. Some runoff possibly infiltrates the ground. The soil is SCS Lynnwood loamy sand.

DEVELOPED CONDITIONS
New onsite impervious areas will include 15,072 sq. ft. of new asphalt pavement for the existing and future 4,400 sq. ft. commercial building for a net total of 26,045 square feet of impervious surfaces. New impervious will be 69% of the total area. With the exception of decorative landscaping the entire site will be covered with impervious surfaces. Frontage improvements along 172nd St. will be included with this project consisting of road widening and installation of curb, gutter, planter strip, and sidewalk. The project will also include installation of a fire hydrant.
The total increase in the post development runoff for the 100 year event will be 0.27 cfs or less.

Streambank erosion control will be accomplished via existing storm sewer. (See Construction Plans)

SOURCE CONTROL OF POLLUTION

The source control BMP recommended for this site would be good housekeeping.

WATER QUALITY BEST MANAGEMENT PLAN

Oil/water separator tee installed before discharge from the parking lot to the infiltration system. Since onsite soils are loamy sand which have a cation exchange capacity of 5 milliequivalents/ 100 grams, infiltration is a suitable water quality BMP. A minimum of 18" depth is required.

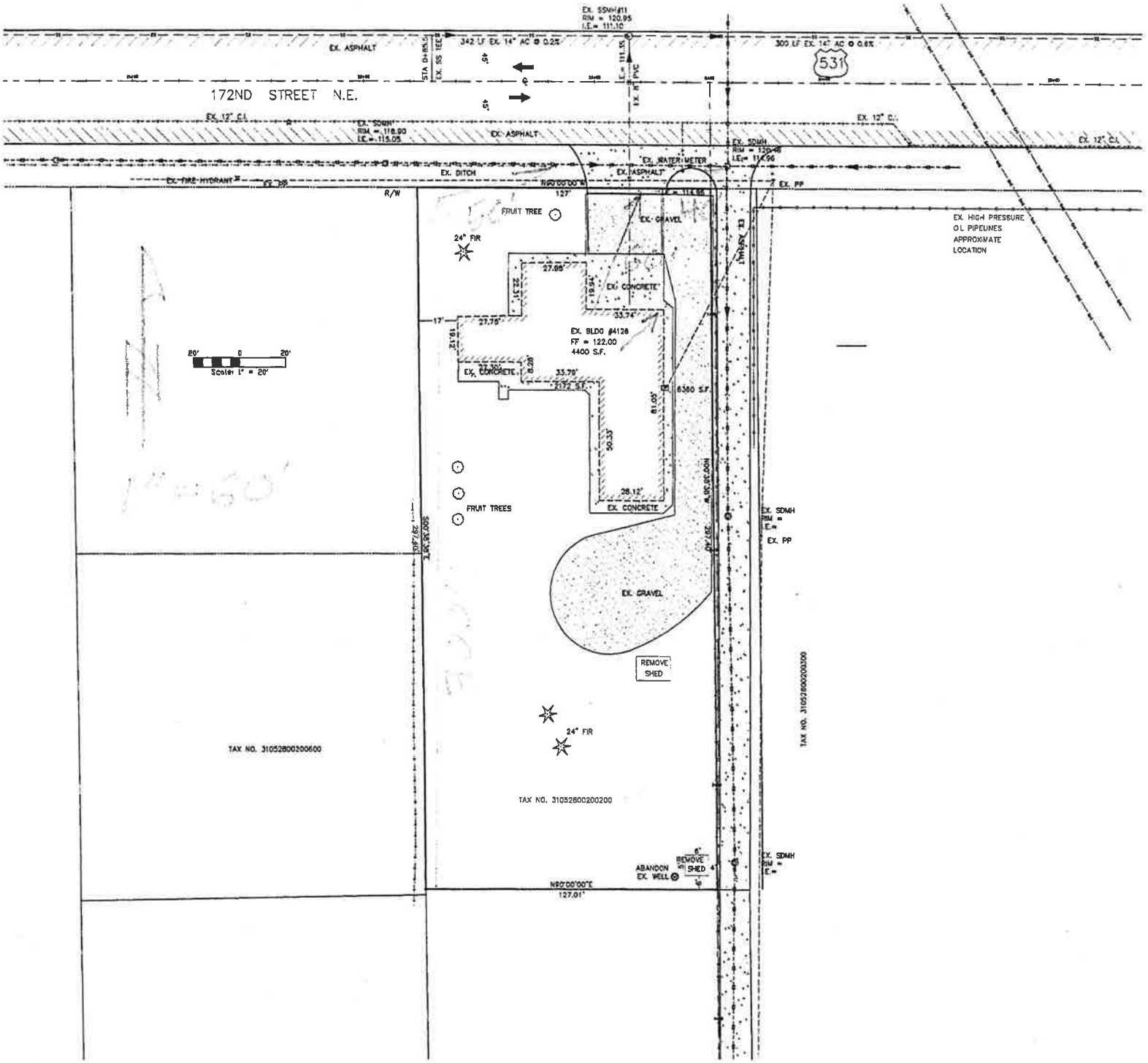
Submitted by:

Tom Reisdorff, P.E.

Professional Engineer

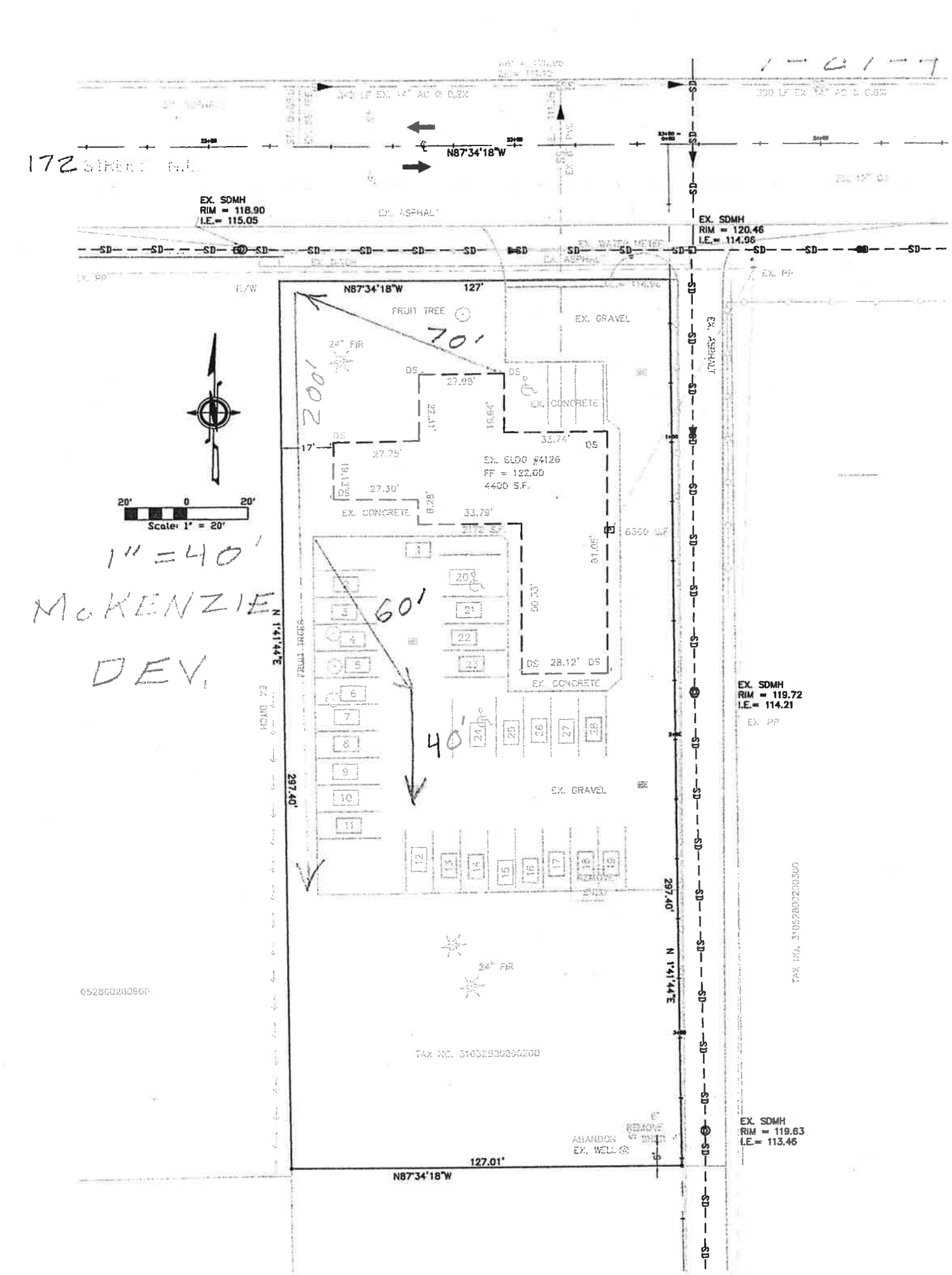
PRE-DEVELOPED

APPENDIX A:


172ND STREET N.E.
EX. ASPHALT
342 LF EX. 14" AC @ 0.2%
300 LF EX. 14" AC @ 0.6%
531
EX. SSMH #11
RIM = 120.95
I.E.= 111.10
EX. 12" C.I.
EX. SDMH
RIM = 118.90
I.E.= 115.05
EX. DITCH
EX. WATER METER
EX. FIRE HYDRANT
EX. PP
R/W
FRUIT TREE
24" FIR
EX. GRAVEL
EX. CONCRETE
EX. BLDG #4128
FF = 122.00
4400 S.F.
EX. CONCRETE
6380 S.F.
FRUIT TREES
EX. HIGH PRESSURE
O.L. PIPELINES
APPROXIMATE
LOCATION
EX. SDMH
RIM =
I.E.=
EX. PP
EX. GRAVEL
REMOVE
SHED
24" FIR
TAX NO. 310528002006OO
TAX NO. 310528002002OO
TAX NO. 310528002003OO
ABANDON
EX. WELL
REMOVE
SHED
EX. SDMH
RIM =
I.E.=
N90°00'00"E
127.01'
20' 0 20'
Scale: 1" = 20'

POST-DEVELOPED

APPENDIX B:


1-21-7
172 STREET N.E.
N87°34'18"W
EX. SDMH
RIM = 118.90
I.E.= 115.05
EX. SDMH
RIM = 120.46
I.E.= 114.96
EX. ASPHALT
EX. GRAVEL
FRUIT TREE
24" FIR
70'
200'
27.09'
EX. CONCRETE
19.64'
22.51'
33.74'
17'
27.75'
EX. BLDG #4126
FF = 122.00
4400 S.F.
19.12'
27.30'
8.28'
EX. CONCRETE
33.79'
6360 S.F.
61.08'
90.33'
60'
40'
28.12'
EX. CONCRETE
EX. GRAVEL
297.40'
N 1°41'44"E
127.01'
TAX NO. 3105280320360
TAX NO. 3105280320200
ABANDON EX. WELL
EX. SDMH
RIM = 119.72
I.E.= 114.21
EX. SDMH
RIM = 119.63
I.E.= 113.46
20' 0 20'
Scale: 1" = 20'
1" = 40'
McKENZIE
DEV.

MCKENZIE DRAINAGE 7-31-4

CLEARHIS

RLPCOMPUTE [PLPOOL] SUMMARY

2 yr	Match Q: 0.0593 cfs Peak Out Q: 0.0523 cfs - Peak Stg: 100.66 ft - Active Vol: 797.65 cf
10 yr	Match Q: 0.1882 cfs Peak Out Q: 0.0715 cfs - Peak Stg: 101.01 ft - Active Vol: 1549.46 cf
100 yr	Match Q: 0.2647 cfs Peak Out Q: 0.0902 cfs - Peak Stg: 101.35 ft - Active Vol: 2490.54 cf

Running C:\Land Projects 2004\MCKENZIE\PLPOOL Report.pgm on Friday, July 30, 2004

Summary Report of all RLPool Data

Project Precips

[2 yr]	1.70 in
[5 yr]	2.20 in
[10 yr]	2.60 in
[25 yr]	3.00 in
[100 yr]	3.60 in
[6 MO.]	1.27 in

BASLIST2

[EX] Using [TYPE1A] As [2 yr]
[EX] Using [TYPE1A] As [10 yr]
[EX] Using [TYPE1A] As [100 yr]
[DEV] Using [TYPE1A] As [2 yr]
[DEV] Using [TYPE1A] As [10 yr]
[DEV] Using [TYPE1A] As [100 yr]

LSTEND

BasinID	Peak Q (cfs)	Peak T (hrs)	Peak Vol (ac-ft)	Area ac	Method /Loss	Raintype	Event
EX	0.1185	7.83	0.0369	0.77	SBUH/SCS	TYPE1A	2 yr
EX	0.1882	7.83	0.0610	0.77	SBUH/SCS	TYPE1A	10 yr
EX	0.2647	7.83	0.0939	0.77	SBUH/SCS	TYPE1A	100 yr
DEV	0.2371	7.83	0.0739	0.87	SBUH/SCS	TYPE1A	2 yr
DEV	0.3764	7.83	0.1195	0.87	SBUH/SCS	TYPE1A	10 yr
DEV	0.5294	7.83	0.1740	0.87	SBUH/SCS	TYPE1A	100 yr

BASLIST [TYPE1A] AS [2 yr] DETAILED

[EX] [DEV]

LSTEND

Drainage Area: EX

Hyd Method:	SBUH Hyd		Loss Method:	SCS CN Number
Peak Factor:	484.00		SCS Abs:	0.20
Storm Dur:	24.00 hrs		Intv:	10.00 min
	Area	CN	TC	
Pervious	0.4700 ac	51.00	0.72 hrs	
Impervious	0.3000 ac	98.00	0.03 hrs	
Total	0.7700 ac			

Supporting Data:

Pervious CN Data:

MULT. ORIF.
LSTEND

Control Structure ID: SDMH control structure

Descrip:	Multiple Orifice			
Start El	Max El	Increment		
100.0000 ft	105.0000 ft	0.10		
Infil:	1.20 in/hr		Multiplier:	1.00

EAGLE ENGINEERING
7701 – 272nd St. N.W.
Stanwood, WA 98292
Ph: 360-629-2761

July 30, 2004

ENGINEERING CALCULATIONS For first submittal of Civil Engineering Full Drainage plans for construction @ 4126 – 172nd St. N.E.

SEDIMENT TRAP:

DESIGN SURFACE @ INVERT USE Q_2 DEV.

SA = FS (Q_2 /V_S) = 2 x 0.24 / 0.00096 = **500 SQ. FT.** @ OUTLET INVERT

BIOSWALE: USE CITY OF ARLINGTON STANDARD 2' WIDE x 200' LONG

DRAINAGE SUMMARY INFORMATION

APPENDIX C:

Effective January 1, 2002

Planning and Development Services
Commercial Section
5th Floor, County Administration Building
M/S 604, 3000 Rockefeller, Everett, WA 98201
(425) 388-3311

DRAINAGE INFORMATION SUMMARY FORM

Project Name: STILLAGUAMISH BEHAVIORAL HEALTH BLDG. **ZA or PFN:** _____

Project Engineer: TOM REISDORFF, EAGLE ENGR.

Project Applicant: STILLAGUAMISH TRIBE OF INDIANS

Project Total Area: 0.87 AC.

Project Development Area: 0.87 AC. Number of Lots (if applies): _____

Summary Table

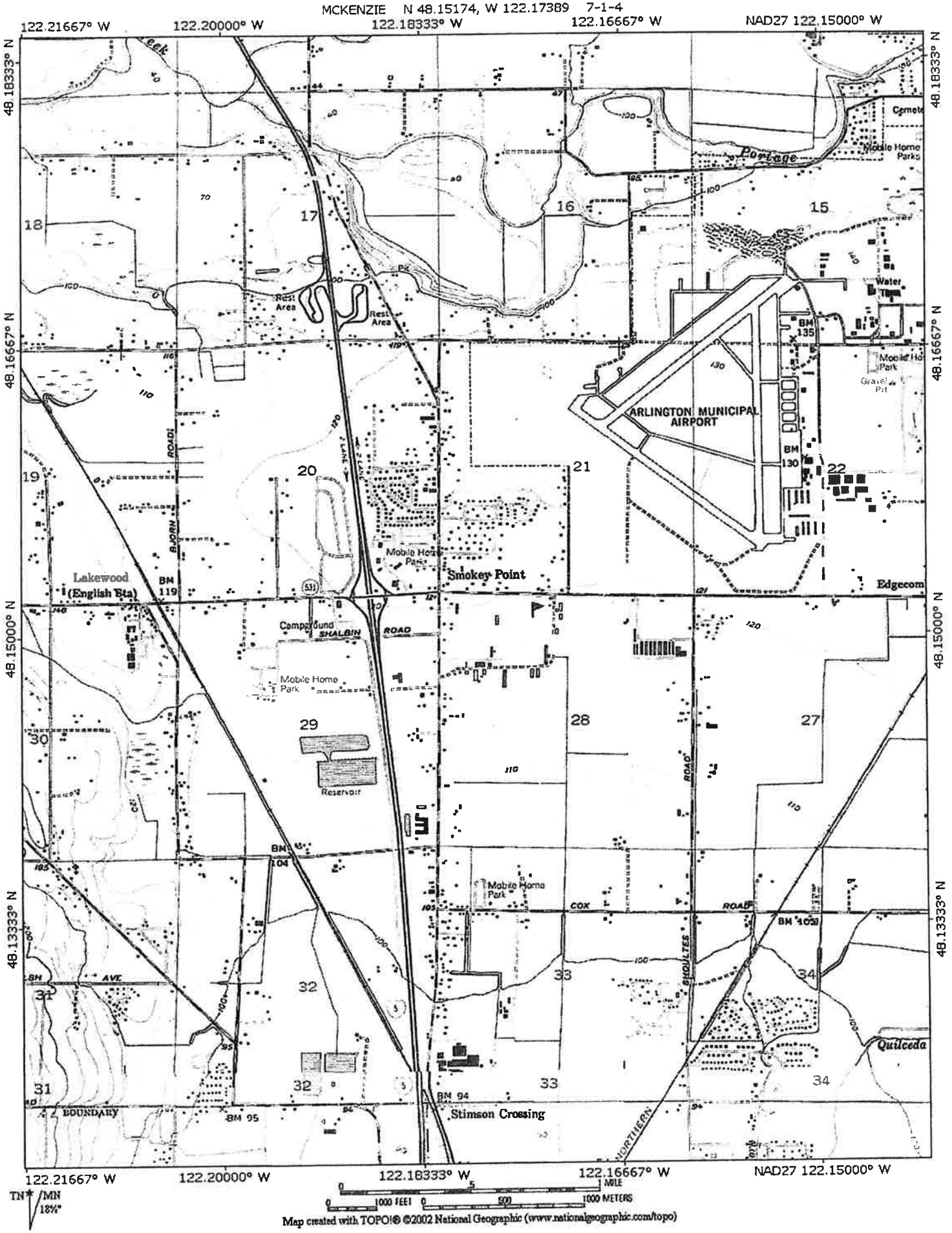
Drainage Basin Information		Individual Basin Information			
		A	B	C	D
On-Site Sub-basin Area (acres)		0.87			
Type of Storage Proposed	UNDERGROUND	PIPE			
Approx. Storage Volume (cut.)	1413				
Soil Type(s)					
Pre-developed Runoff Rates					
Q (cfs.)	2 yr.	0.12			
	10 yr.	0.19			
	100 yr.	0.26			
Redevelopment Area					
Post-development Runoff Rates					
Q (cfs.)	2 yr.	0.24			
	10 yr.	0.38			
	100 yr.	0.53			
Offsite Up-stream Flow					
Q (cfs.)	100 yr.				

PROVIDE A WRITTEN EXECUTIVE SUMMARY OF THE PLAN (2 PAGES MAXIMUM).

- Drainage plan description, outline the concept(s) to comply with the code
- Water quality measures being proposed
- Describe the drainage basins and sub-basins on-site and off-site, existing and proposed (refer to basin maps in the report)
- Describe or sketch of the drainage system proposed for the development
- Downstream analysis, summary of key issues and limitations
- Upstream analysis, summary of key issues to be addressed.

UPSTREAM/DOWNSTREAM DRAINAGE MAP

APPENDIX D:


MCKENZIE N 48.15174, W 122.17389 7-1-4
122.21667° W
122.20000° W
122.18333° W
122.16667° W
NAD27 122.15000° W
48.18333° N
48.16667° N
48.15000° N
48.13333° N
Portage
Cemete
Mobile Home Parks
Water
BM 135
Mobile Ho Park
Gravel Pit
ARLINGTON MUNICIPAL AIRPORT
BM 130
Rest Area
Rest Area
Pit
ROAD
BJORN
LANE
Lakewood (English Eta)
BM 119
Mobile Home Park
Smokey Point
Edgecom
Campground
SHALBIN
ROAD
Mobile Home Park
Reservoir
BM 104
Mobile Home Park
COX
ROAD
BM 102
BHOULTES
AVE
BOUNDARY
BM 95
BM 94
Stimson Crossing
NORTHERN
Quilceda
TN
MN
18½°
MILE
1000 FEET
1000 METERS
Map created with TOPO!® ©2002 National Geographic (www.nationalgeographic.com/topo)

REFERENCE CHARTS

APPENDIX E:


R. 5 E.
ARLINGTON AIRPORT
Smokey Point
Edgecomb
Stimson Crossing
Sisco
Creek
Quilceda
NORTHERN
BURLINGTON
water
water
20
21
22
27
28
29
32
33
34
TULALIP INDIAN RESERVATION BOUNDARY
1 3/4 1/2 1/4 0 1
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

Unsurfaced roads and skid trails are soft when wet, and they are impassable during rainy periods. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available on this unit.

Establishing plant cover on steep road cut and fill slopes reduces erosion. Steep yarding paths, skid trails, and firebreaks are subject to rilling and gullying unless adequate water bars are provided or they are protected by plant cover. Following road construction and harvesting, road failure and landslides are likely. Because the rooting depth is restricted by a seasonal perched water table, trees are frequently subject to windthrow.

Reforestation can be accomplished by planting Douglas-fir seedlings. If seed trees are present, natural reforestation of cutover areas by red alder occurs readily. When openings are made in the canopy, invading brushy plants, if not controlled, can prevent the establishment of seedlings.

The main limitations for building sites are steepness of slope, the hazard of hillside slippage, and soil wetness. Drainage is needed if buildings with basements and crawl spaces are constructed. Access roads must be designed to control surface runoff and help stabilize cut slopes. The soil in this unit may slump readily in excavated areas.

The main limitations for septic tank absorption fields are the seasonal perched water table, slow permeability, and steepness of slope. Conventional septic tank absorption fields often fail or do not function properly.

This map unit is in capability subclass VIe.

30—Lynnwood loamy sand, 0 to 3 percent slopes. This very deep, somewhat excessively drained soil is on terraces and outwash plains. It formed in glacial outwash. Areas generally are 10 to 30 acres in size, but a few areas are as much as 600 acres. The native vegetation is mainly conifers. Elevation is 50 to 500 feet. The average annual precipitation is about 40 inches, the average annual air temperature is about 49 degrees F, and the average frost-free season is 180 to 200 days.

Typically, the surface is covered with a mat of leaves, needles, and twigs about 3 inches thick. The surface layer is grayish brown loamy sand about 1 inch thick. The upper part of the subsoil is dark brown loamy sand about 14 inches thick. The lower part is dark yellowish brown loamy sand about 14 inches thick. The substratum to a depth of 60 inches or more is grayish brown sand. In some areas the surface layer and subsoil are sandy loam.

Included in this unit are small areas of Everett, Indianola, Pastik, and Ragnar soils. Also included are Custer soils in basins and soils that have slopes of more than 3 percent. Included areas make up about 15 percent of the total acreage.

Permeability of this Lynnwood soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly as woodland and for urban development. It is also used for hay and pasture.

Douglas-fir is the main woodland species on this unit. On the basis of a 100-year site curve, the mean site index is 158. On the basis of a 50-year site curve, the mean site index is 121. The mean annual increment at culmination (CMAI) for Douglas-fir at age 65 is 168 cubic feet per acre. Among the trees of limited extent are western hemlock and western redcedar. Among the common forest understory plants are western swordfern, brackenfern, deer fern, and red huckleberry.

This unit is well suited to year-round logging. Logging roads require suitable surfacing for year-round use. Rock for road construction is not readily available on this unit.

Reforestation can be accomplished by planting Douglas-fir seedlings. The droughtiness of the surface layer reduces the survival of seedlings. When openings are made in the canopy, invading brushy plants, if not controlled, can delay the establishment of seedlings.

The main limitation for hay and pasture is low available water capacity. Use of proper stocking rates, pasture rotation, and restricted grazing during wet periods helps to keep the pasture in good condition. Proper grazing practices, weed control, and fertilizer are needed for maximum quality of forage. In most years supplemental irrigation is needed. Fertilizer is needed for optimum growth of grasses and legumes.

This unit is suited to use as homesites. The main limitation for septic tank absorption fields is seepage. If the density of housing is moderate to high, community sewage systems are needed to prevent contamination of water supplies as a result of seepage from onsite sewage disposal systems. Cutbanks are not stable and are subject to caving in.

This map unit is in capability subclass IVs.

31—Lynnwood-Nargar complex, 65 to 90 percent slopes. This map unit is on terrace escarpments. Areas are irregular in shape and are 20 to 200 acres in size. The native vegetation is mainly conifers. Elevation is 400 to 1,200 feet. The average annual precipitation is about 55 inches, the average annual air temperature is about 48 degrees F, and the average frost-free season is 140 to 190 days.

This unit is about 60 percent Lynnwood loamy sand and about 25 percent Nargar fine sandy loam. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Pastik, Everett, Skykomish, and Winston soils on terraces and outwash plains and soils that have a gravelly sandy loam surface layer. Included areas make up about 15 percent of the total acreage.

The Lynnwood soil is very deep and somewhat excessively drained. It formed in glacial outwash. Typically, the surface is covered with a mat of leaves, needles, and twigs about 3 inches thick. The surface

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
27, 28, 29------- Kitsap	0-6	Silt loam---------	ML	A-4	0	100	100	90-100	80-90	25-40	NP-10
	6-33	Silt loam, silty clay loam.	ML, MH	A-4, A-5, A-7	0	95-100	90-100	90-100	85-100	35-55	5-20
	33-60	Stratified silt to silty clay loam.	ML, MH	A-4, A-5, A-7	0	95-100	90-100	90-100	85-100	35-55	5-20
30--------------- Lynnwood	0-7	Loamy sand--------	SM	A-2	0	95-100	90-100	50-80	20-35	---	NP
	7-29	Loamy sand, loamy fine sand.	SM	A-2	0	80-100	75-100	50-75	15-35	---	NP
	29-60	Loamy sand, sand, loamy fine sand.	SM, SP-SM, SP	A-2, A-3, A-1	0	80-100	75-100	40-75	0-30	---	NP
31*: Lynnwood--------	0-7	Loamy sand--------	SM	A-2	0	95-100	90-100	50-80	20-35	---	NP
	7-29	Loamy sand, loamy fine sand.	SM	A-2	0	80-100	75-100	50-75	15-35	---	NP
	29-60	Loamy sand, sand, loamy fine sand.	SM, SP-SM, SP	A-2, A-3, A-1	0	80-100	75-100	40-75	0-30	---	NP
Nargar----------	0-6	Fine sandy loam	ML, SM	A-4	0	90-100	85-100	65-90	35-60	25-35	NP-5
	6-26	Loam, fine sandy loam, sandy loam.	ML, SM	A-4	0	90-100	85-100	50-90	35-60	25-40	NP-10
	26-41	Stratified fine sand to coarse sand.	SM	A-1, A-2	0	60-100	50-100	40-80	10-30	20-30	NP-5
	41-60	Very gravelly loamy coarse sand.	GM	A-1, A-2	0	40-60	25-50	20-40	10-30	---	NP
32--------------- McKenna	0-8	Gravelly silt loam.	ML, GM	A-4	0-5	60-80	55-75	55-65	40-60	20-40	NP-10
	8-33	Gravelly silt loam, gravelly clay loam, gravelly loam.	GM-GC, GC, CL-ML, CL	A-4, A-6	0-5	65-90	50-75	45-65	40-60	25-40	5-15
	33	Cemented---------	---	---	---	---	---	---	---	---	---
33--------------- Menzel	0-4	Silt loam--------	ML	A-4	0	100	100	75-90	60-85	20-30	NP-5
	4-16	Silt loam, very fine sandy loam, loam.	ML	A-4	0	85-100	85-100	70-85	50-70	20-30	NP-5
	16-60	Silt loam, very fine sandy loam, fine sandy loam.	ML, SM	A-4	0	85-100	85-100	75-80	40-70	20-30	NP-5
34--------------- Mukilteo	0-4	Muck--------------	Pt, OH	A-8	0	---	---	---	---	---	---
	4-35	Hemic material----	Pt	A-8	0	---	---	---	---	---	---
	35-54	Hemic material, sapric material.	Pt	A-8	0	---	---	---	---	---	---
	54-60	Fine sandy loam	ML	A-4	---	100	100	75-85	50-60	20-30	NP-5
35, 36----------- Nargar	0-6	Fine sandy loam	ML, SM	A-4	0	90-100	85-100	65-90	35-60	25-35	NP-5
	6-26	Loam, fine sandy loam, sandy loam.	ML, SM	A-4	0	90-100	85-100	50-90	35-60	25-40	NP-10
	26-41	Stratified fine sand to coarse sand.	SM	A-1, A-2	0	60-100	50-100	40-80	10-30	20-30	NP-5
	41-60	Very gravelly loamy coarse sand.	GM	A-1, A-2	0	40-60	25-50	20-40	10-30	---	NP

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
							K	T	
	In	Pct	In/hr	In/in	pH				Pct
30----------	0-7	0-5	2.0-6.0	0.08-0.11	5.1-6.0	Low----------	0.24	5	1-2
Lynnwood	7-29	0-5	6.0-20	0.07-0.10	5.1-6.5	Low----------	0.24		
	29-60	0-5	6.0-20	0.05-0.08	5.1-6.5	Low----------	0.17		
31*:									
Lynnwood--------	0-7	0-5	2.0-6.0	0.08-0.11	5.1-6.0	Low----------	0.24	5	1-2
	7-29	0-5	6.0-20	0.07-0.10	5.1-6.5	Low----------	0.24		
	29-60	0-5	6.0-20	0.05-0.08	5.1-6.5	Low----------	0.17		
Nargar----------	0-6	---	0.6-2.0	0.18-0.22	5.6-6.5	Low----------	0.32	5	1-2
	6-26	---	0.6-2.0	0.18-0.22	5.6-6.5	Low----------	0.24		
	26-41	0-10	2.0-6.0	0.05-0.08	6.1-6.5	Low----------	0.17		
	41-60	0-10	>20	0.03-0.06	6.1-6.5	Low----------	0.15		
32----------	0-8	10-25	0.6-2.0	0.16-0.19	4.5-7.3	Low----------	0.32	3	3-15
McKenna	8-33	20-35	0.06-0.2	0.12-0.16	5.1-7.3	Moderate-------	0.32		
	33	---	---	---	---	----------	----		
33----------	0-4	10-15	0.6-2.0	0.22-0.25	5.6-6.5	Low----------	0.32	5	2-5
Henzel	4-16	10-15	0.6-2.0	0.20-0.25	6.1-7.3	Low----------	0.43		
	16-60	10-15	0.6-2.0	0.14-0.20	6.1-7.3	Low----------	0.43		
34----------	0-4	---	0.6-2.0	0.30-0.34	4.5-5.0	Low----------	0.10	5	20-40
Mukilteo	4-35	---	0.6-2.0	0.30-0.34	4.5-5.5	Low----------	----		
	35-54	---	0.6-2.0	0.30-0.40	4.5-5.5	Low----------	----		
	54-60	---	2.0-6.0	0.10-0.14	6.6-7.3	Low----------	0.37		
35, 36----------	0-6	---	0.6-2.0	0.18-0.22	5.6-6.5	Low----------	0.32	5	1-2
Nargar	6-26	---	0.6-2.0	0.18-0.22	5.6-6.5	Low----------	0.24		
	26-41	0-10	2.0-6.0	0.05-0.08	6.1-6.5	Low----------	0.17		
	41-60	0-10	>20	0.03-0.06	6.1-6.5	Low----------	0.15		
37*:									
Nargar----------	0-6	---	0.6-2.0	0.18-0.22	5.6-6.5	Low----------	0.32	5	1-2
	6-26	---	0.6-2.0	0.18-0.22	5.6-6.5	Low----------	0.24		
	26-41	0-10	2.0-6.0	0.05-0.08	6.1-6.5	Low----------	0.17		
	41-60	0-10	>20	0.03-0.06	6.1-6.5	Low----------	0.15		
Lynnwood--------	0-7	0-5	2.0-6.0	0.08-0.11	5.1-6.0	Low----------	0.24	5	1-2
	7-29	0-5	6.0-20	0.07-0.10	5.1-6.5	Low----------	0.24		
	29-60	0-5	6.0-20	0.05-0.08	5.1-6.5	Low----------	0.17		
38----------	0-4	---	0.6-2.0	0.14-0.18	5.6-6.0	Low----------	0.24	5	1-2
Nargar Variant	4-31	---	0.6-2.0	0.14-0.18	5.6-6.5	Low----------	0.24		
	31-60	0-10	6.0-20	0.04-0.08	6.1-6.5	Low----------	0.17		
39----------	0-10	10-15	0.6-2.0	0.19-0.21	5.6-6.5	Low----------	0.24	5	5-15
Norma	10-28	5-10	2.0-6.0	0.12-0.15	5.6-6.5	Low----------	----		
	28-60	5-20	0.6-2.0	0.12-0.15	5.6-7.3	Low----------	----		
40----------	0-9	10-15	0.6-2.0	0.19-0.21	4.5-5.0	Low----------	0.37	5	2-5
Norma Variant	9-26	20-35	0.2-0.6	0.19-0.21	5.6-6.0	Moderate-------	0.32		
	26-35	5-10	2.0-6.0	0.11-0.13	6.1-6.5	Low----------	0.32		
	35-60	0-5	6.0-20	0.06-0.08	6.1-6.5	Low----------	0.20		
41*:									
Ogarty----------	0-6	---	0.6-2.0	0.08-0.11	4.5-6.0	Low----------	0.24	2	5-10
	6-38	---	0.6-2.0	0.06-0.10	5.1-6.0	Low----------	0.28		
	38	---	---	---	---	----------	----		
Tokul----------	0-4	---	0.6-2.0	0.16-0.19	5.1-6.5	Low----------	0.28	2	15-20
	4-22	---	0.6-2.0	0.15-0.19	5.1-6.5	Low----------	0.32		
	22-31	---	0.6-2.0	0.14-0.18	5.1-6.5	Low----------	0.28		
	31	---	---	---	---	----------	----		
Rock outcrop.									

See footnote at end of table.

TABLE 15.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
23*:							
Oso	C	None	---	---	1.5-3.0	Perched	Nov-May
Rock outcrop.							
24 Greenwater	A	None	---	---	>6.0	---	---
25*:							
Hartnit	C	None	---	---	1.5-3.5	Perched	Nov-May
Potchub	C	None	---	---	1.5-3.0	Perched	Nov-May
Rock outcrop.							
26 Indianola	A	None	---	---	>6.0	---	---
27, 28, 29 Kitsap	C	None	---	---	1.5-2.5	Perched	Dec-May
30 Lynnwood	A	None	---	---	>6.0	---	---
31*:							
Lynnwood	A	None	---	---	>6.0	---	---
Nargar	A	None	---	---	>6.0	---	---
32 McKenna	D	None	---	---	+1-0.5	Perched	Nov-Mar
33 Menzel	B	Rare	---	---	>6.0	---	---
34 Mukilteo	D	None	---	---	+1-0	Apparent	Oct-May
35, 36 Nargar	A	None	---	---	>6.0	---	---
37*:							
Nargar	A	None	---	---	>6.0	---	---
Lynnwood	A	None	---	---	>6.0	---	---
38 Nargar Variant	A	None	---	---	>6.0	---	---
39 Norma	D	None	---	---	+1-1.0	Apparent	Nov-Apr
40 Norma Variant	D	None	---	---	+1-1.0	Apparent	Nov-Apr
41*:							
Ogarty	C	None	---	---	>6.0	---	---
Tokul	C	None	---	---	1.5-3.0	Perched	Nov-May
Rock outcrop.							
42 Olomount	C	None	---	---	1.5-3.5	Perched	Nov-May

See footnote at end of table.

TABLE 16.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Cemented pan		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In		In	In			
23*:									
Getchell	>60	---	20-40	Thin	---	---	High	High	High.
Oso	20-40	Hard	---	---	---	---	High	High	High.
Rock outcrop.									
24 Greenwater	>60	---	---	---	---	---	Low	Moderate	Moderate.
25*:									
Hartnit	20-40	Hard	---	---	---	---	High	High	High.
Potchub	>60	---	20-40	Thin	---	---	High	High	High.
Rock outcrop.									
26 Indianola	>60	---	---	---	---	---	Low	Moderate	High.
27, 28, 29 Kitsap	>60	---	---	---	---	---	Low	Moderate	Moderate
30 Lynnwood	>60	---	---	---	---	---	Low	Moderate	High.
31*:									
Lynnwood	>60	---	---	---	---	---	Low	Moderate	High.
Nargar	>60	---	---	---	---	---	Low	Moderate	Moderate.
32 McKenna	>60	---	20-40	Thin	---	---	Low	High	Moderate.
33 Menzel	>60	---	---	---	---	---	Low	Moderate	Moderate.
34 Mukilteo	>60	---	---	---	4-10	>60	Low	High	High.
35, 36 Nargar	>60	---	---	---	---	---	Low	Moderate	Moderate.
37*:									
Nargar	>60	---	---	---	---	---	Low	Moderate	Moderate.
Lynnwood	>60	---	---	---	---	---	Low	Moderate	High.
38 Nargar Variant	>60	---	---	---	---	---	Low	Moderate	Moderate.
39 Norma	>60	---	---	---	---	---	Low	High	Moderate.
40 Norma Variant	>60	---	---	---	---	---	Low	High	High.
41*:									
Ogarty	20-40	Hard	---	---	---	---	Low	High	High.
Tokul	>60	---	20-40	Thin	---	---	Low	High	High.
Rock outcrop.									

See footnote at end of table.

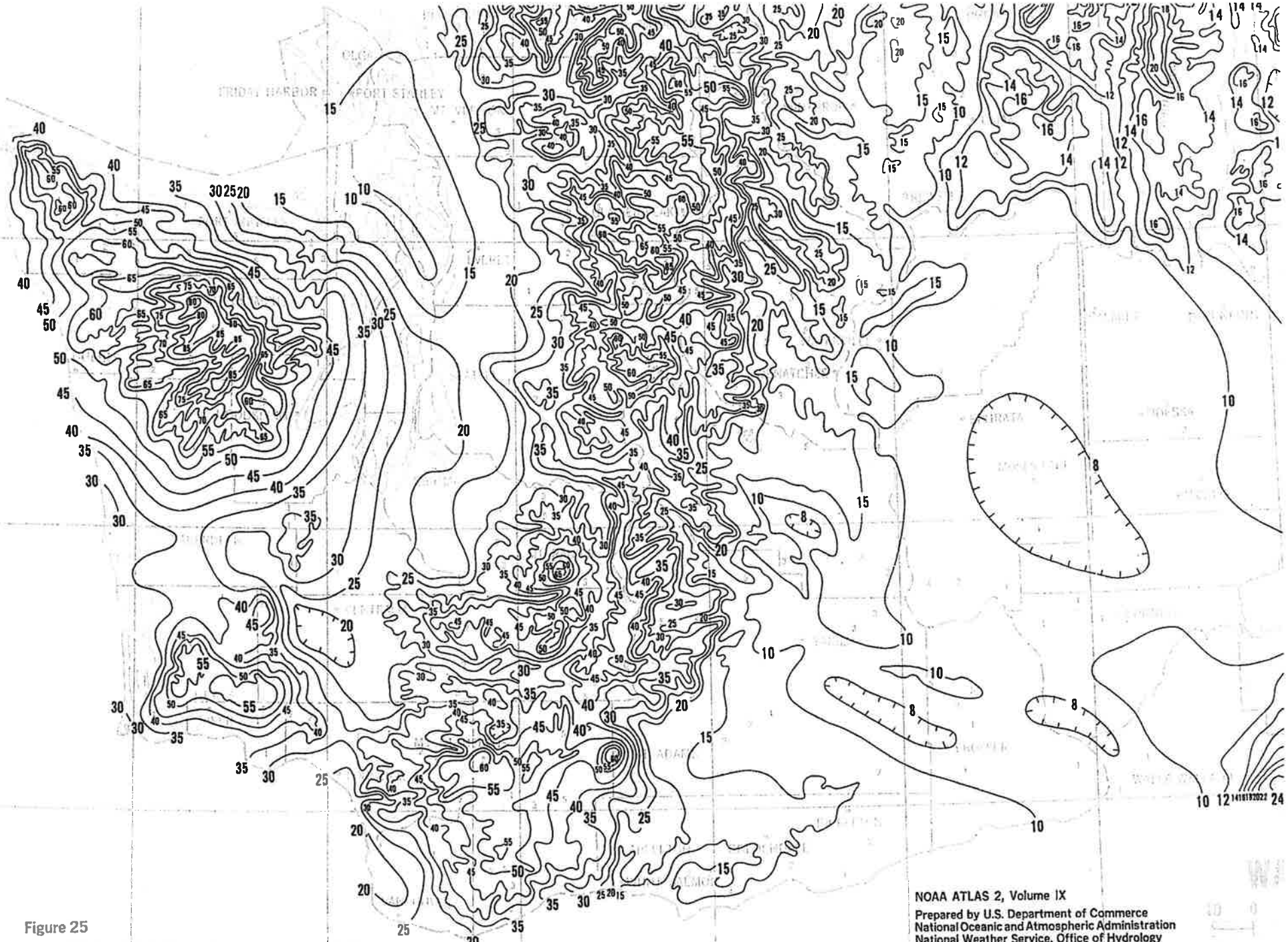


Figure 25

ISOPLUVIALS OF 2-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume IX

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

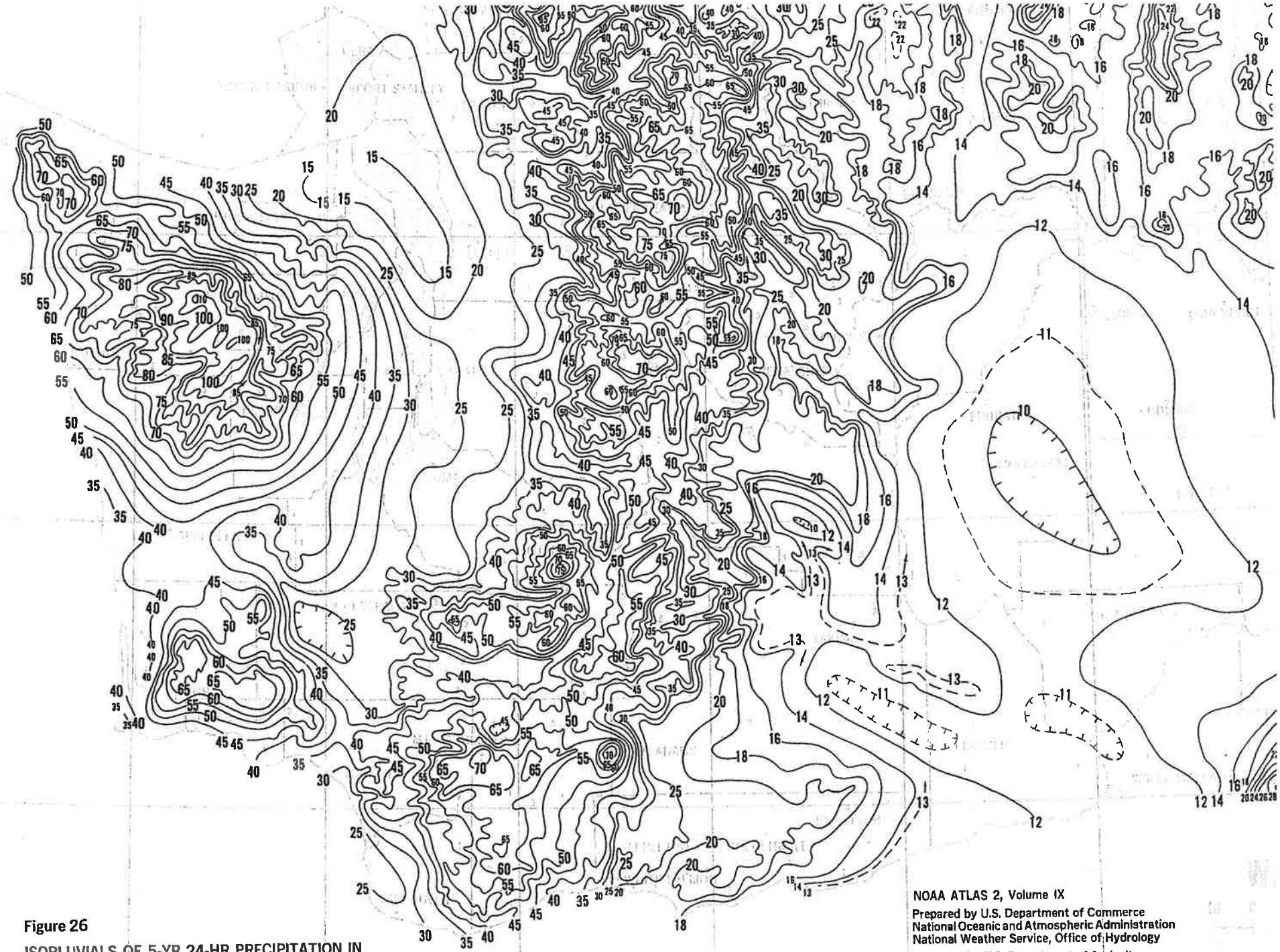


Figure 26

ISOPLUVIALS OF 5-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume IX

Prepared by U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

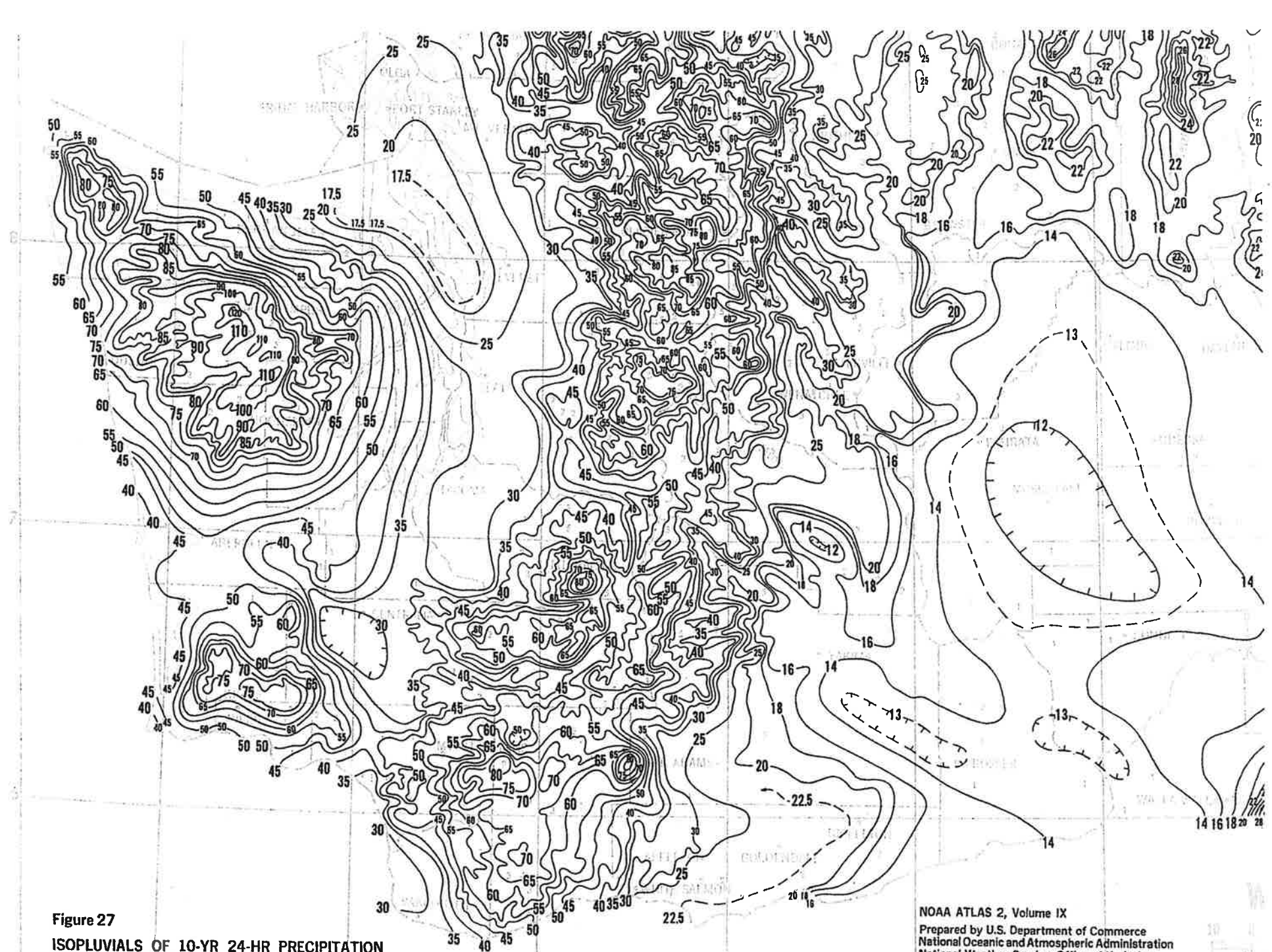


Figure 27

ISOPLUVIALS OF 10-YR 24-HR PRECIPITATION IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume IX

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National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

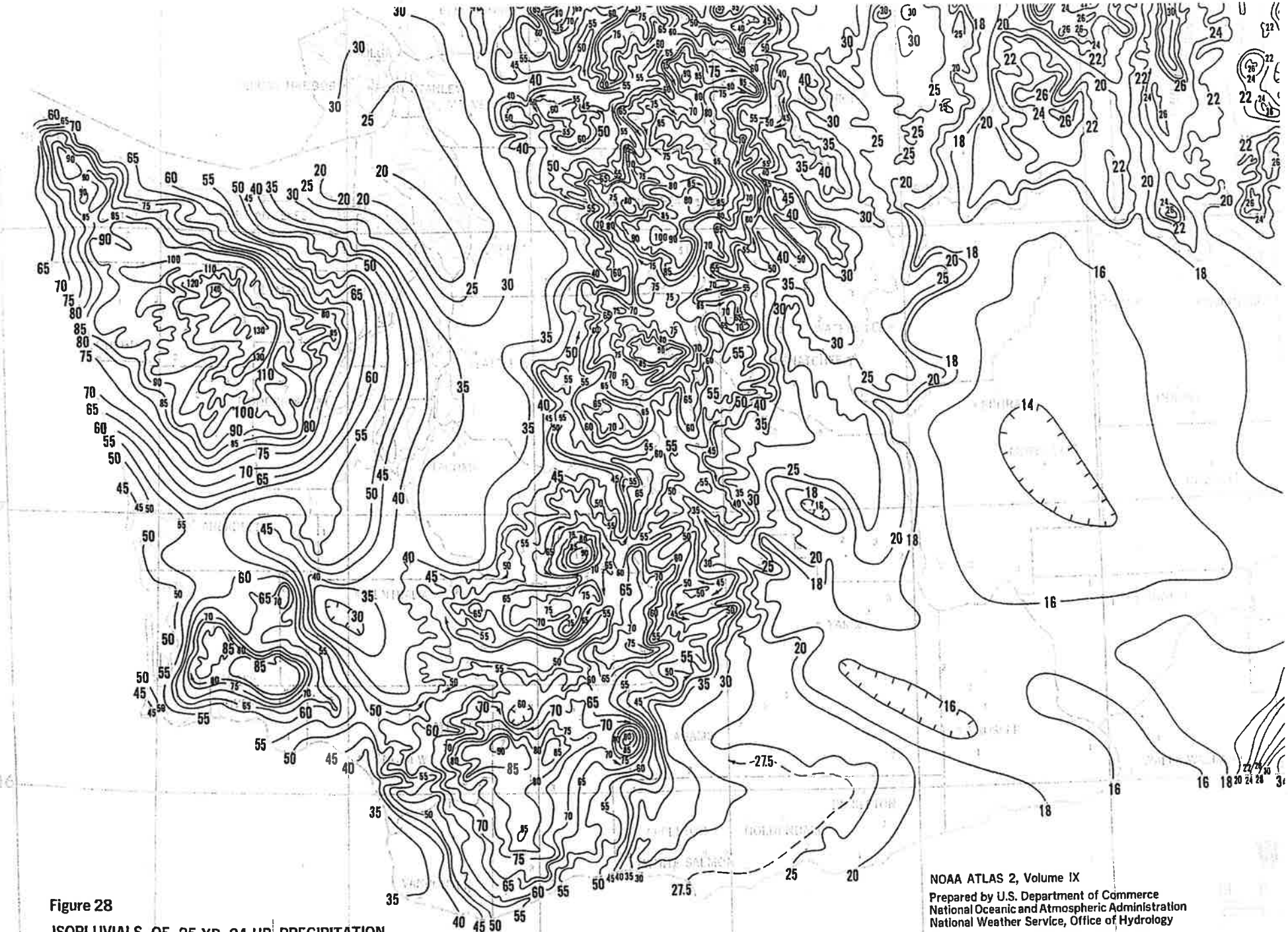

Figure 28

ISOPLUVIALS OF 25-YR 24-HR PRECIPITATION
IN TENTHS OF AN INCH

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National Weather Service, Office of Hydrology

Prepared for U.S. Department of Agriculture,
Soil Conservation Service, Engineering Division

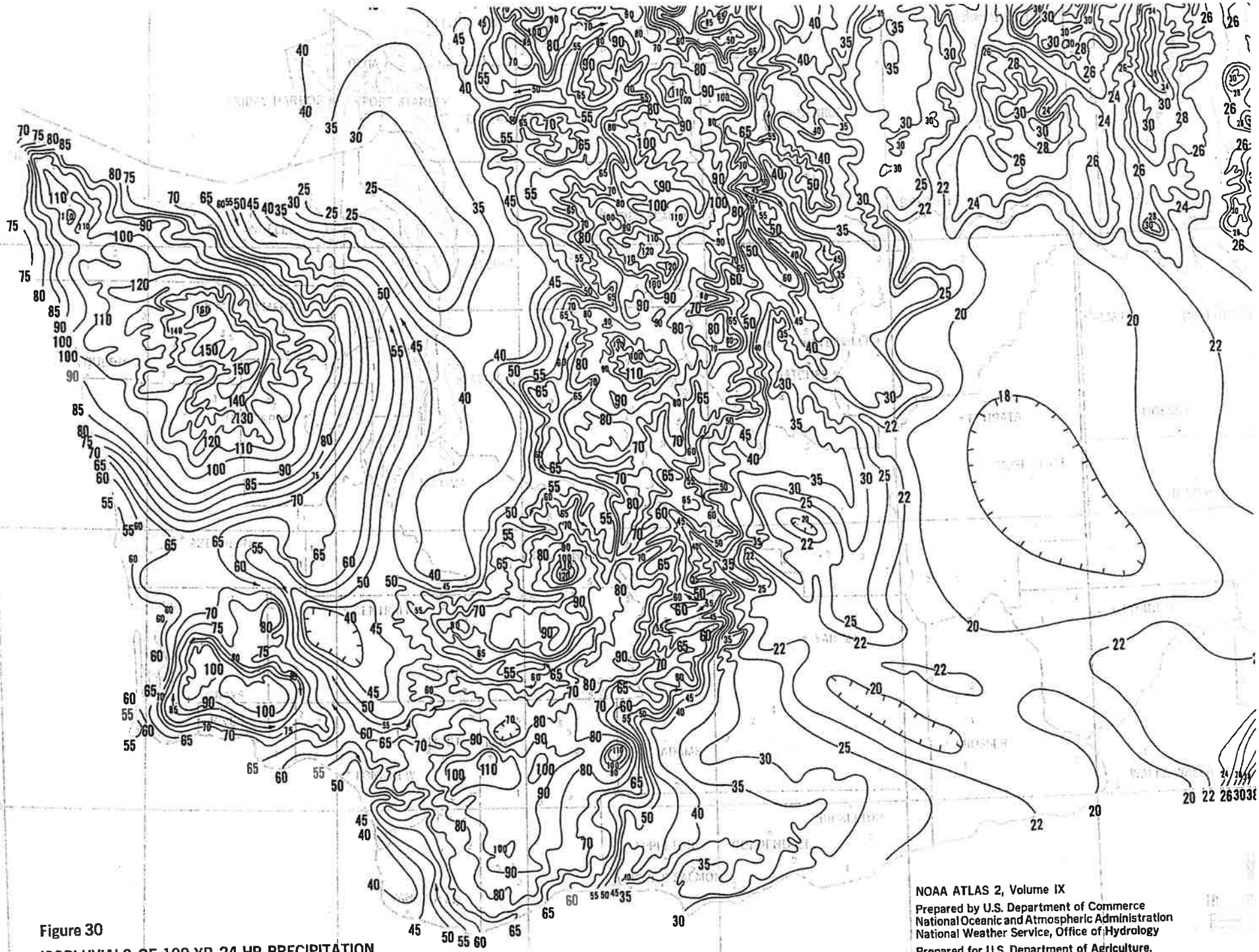

Figure 30

ISOPLUVIALS OF 100-YR 24-HR PRECIPITATION
IN TENTHS OF AN INCH

NOAA ATLAS 2, Volume IX

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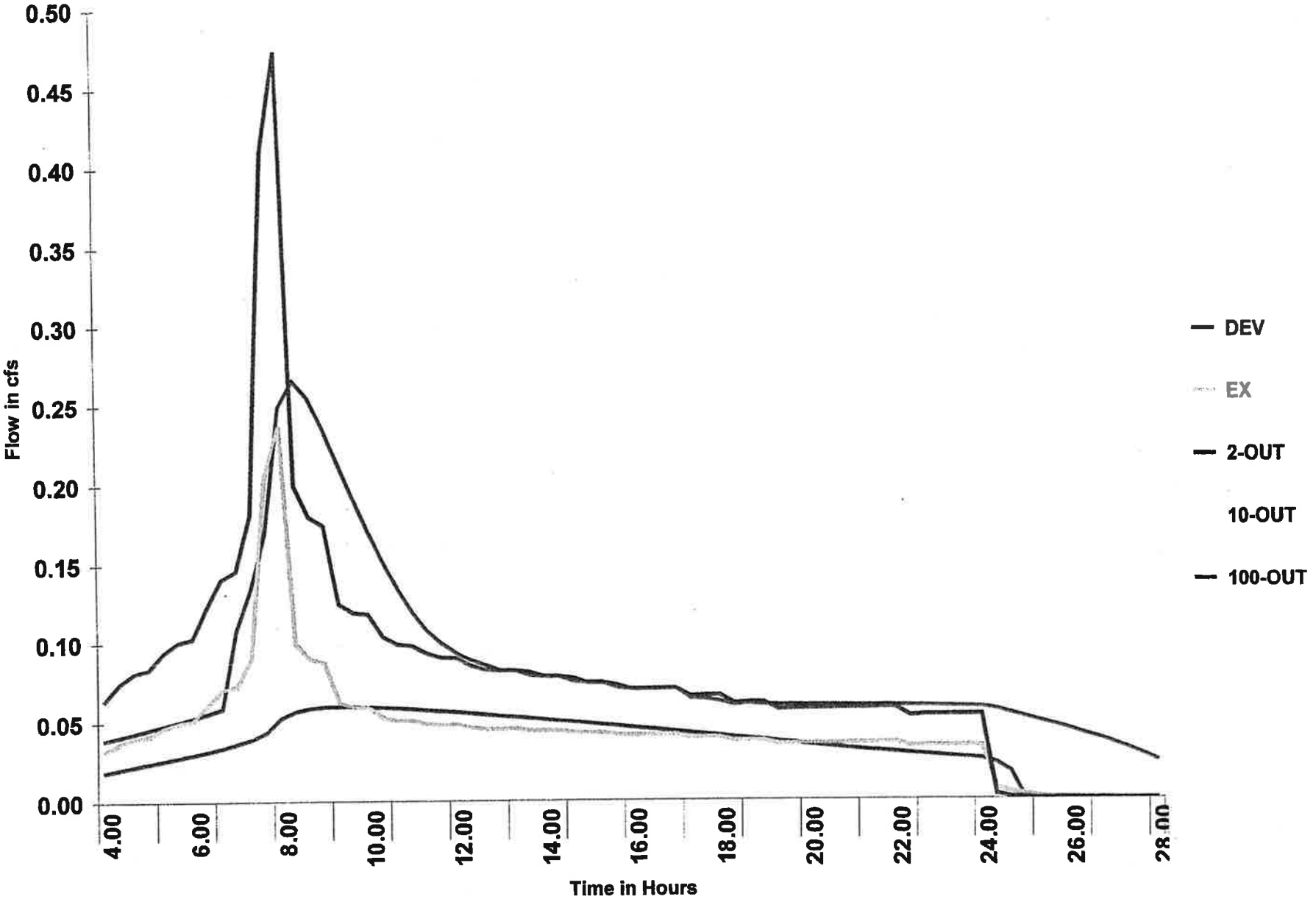
Hydrograph Plot 7-30-4



100 YR STILLY HEALTH