HIGA·BURKHOLDER
ASSOCIATES, LLC
LAND USE PLANNING / CIVIL ENGINEERING

Preliminary Drainage Calculations For Whidbey Island Bank Arlington, Washington

Z-04-054

Prepared for:
Whidbey Island Bank
c/o Jack Wagner
P.O. Box 7001
450 SW Bayshore Drive
Oak Harbor, WA 98277

Prepared by:
Kurt Watanabe, E.I.T.

Reviewed by:
Bryant O. Mercil, P.E.

September 2, 2004

1721 Hewitt Avenue ■ Suite 401
Everett, Washington 98201
(425) 252-2826
fax: (425) 252-9551

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INTRODUCTION

The following report presents the conceptual storm water drainage plan for a proposed 4,830 square foot Whidbey Island Bank building and 8,730 square foot multi-use building on 1.62 acres in the city of Arlington, Washington. The project site is located on the south side of 172nd St. NE (SR 531), just west of 43rd Ave NE, within the Arlington city limits.

PRE DEVELOPED DRAINAGE CONDITIONS

Within the site, there is a paved utility easement road that parallels the west property line which provides acces to an infiltration pond that is just south of the property. The infiltration pond is about 600 feet in length and a 6.5-foot wide base with an average depth of 5 feet. The infiltration facility handles stormwater runoff from the right-of-way area within 172nd Street NE. Most of the ground surface is composed of grass and blackberry bushes. The site is approximately 1.5 acres in size with about a 1-2% surface gradient to the south. A gasoline pipeline crosses through the northeastern portion of the site.

The site is underlain by Lynnwood loamy sand, which the SCS classifies as a hydrologic group A soil. Western Geotechnical Consultants Inc. performed subsurface explorations and soil logs to obtain subsurface soil and groundwater information (see attached Geotechnical report). Soil logs reveal the uniform presence of a 2-foot layer of brown sandy silt to silty sand covering a layer of fine to medium sand throughout the site. Ground water was encountered at approximately 5 feet below the surface. Due to the highly permeable Lynnwood soil located on the property, it can be deduced that site runoff infiltrates into the native soil and leaves the site via subsurface flow.

PROPOSED DRAINAGE CONDITIONS

As shown on the storm drainage plan, runoff will flow to a closed catch basin system. Runoff from the proposed parking and 43rd Avenue extension area will discharge into either of two water quality infiltration trenches located on-site. One water quality trench will be located in the northeast corner of the site, and the second trench will be located in the southwest portion of the site. The water quality trenches have been designed to provide water quality treatment in accordance with DOE requirements. Pretreatment will be provided upstream of the trenches in oil/water separator tees and sumps in the catch basins. The underlying soils will be replaced as needed with at least 24-inches of loamy sand with a minimum cation exchange capacity of 5.0 milliequivalents per 100 grams. Both water quality trenches will handle the 6-month storm for the 43rd Avenue extension and proposed parking area and will release any excess runoff into a proposed infiltration trench, located in the middle of the property.

Roof runoff from the proposed buildings will be tightlined via storm-drain pipe to the infiltration trench. The infiltration trench has been designed to completely infiltrate runoff from up to and including a 100-year storm event. The design bottom elevations of the proposed trenches have been set to meet the 3-foot separation requiremen from the existing ground water table.

SUMMARY OF RESULTS

WATER QUALITY INFILTRATION TRENCH NO. 1 (NORTH)

Total Area Tributary to Basin: ..... 0.75 Acres

WATER QUALITY (6-MONTH) STORM

Peak Inflow to Water Quality Basin: ..... 0.13 cfs
Proposed Release Rate (Infiltration): ..... 0.13 cfs
Design Water Surface Elevation: 121.10
Approximate Volume of Storage Provided: ..... 40 cf

100 YEAR STORM

Peak Inflow to Water Quality Basin: ..... 0.50 cfs
Proposed Release Rate (Infiltration): ..... 0.23 cfs
Proposed Release Rate (To Infiltration Trench): ..... 0.11 cfs
Design Water Surface Elevation: 122.59
Approximate Design Volume of Storage Provided: ..... 676 cf

WATER QUALITY INFILTRATION TRENCH NO. 2 (SOUTH)

Total Area Tributary to Basin: ..... 0.56 Acres

WATER QUALITY (6-MONTH) STORM

Peak Inflow to Water Quality Basin: ..... 0.10 cfs
Proposed Release Rate (Infiltration): ..... 0.10 cfs
Design Water Surface Elevation: 121.10
Approximate Volume of Storage Provided: ..... 30 cf

100 YEAR STORM

Peak Inflow to Water Quality Basin: ..... 0.37 cfs
Proposed Release Rate (Infiltration): ..... 0.18 cfs
Proposed Release Rate (To Infiltration Trench): ..... 0.09 cfs
Design Water Surface Elevation: 122.41
Approximate Design Volume of Storage Provided: ..... 472 cf

INFILTRATION TRENCH

Total Roof Area Tributary to Infiltration Trench:..... 0.31 Acres

100 YEAR STORM

Peak Inflow to Infiltration Trench: ..... 0.42 cfs
Proposed Release Rate (Infiltration):..... 0.26 cfs
Design Water Surface Elevation:..... 122.61
Approximate Design Volume of Storage Provided: ..... 876 cf

HISTORY OF HYDROGRAPH ACTIVITY

```
LPOOL  1 "BASIN 1 - WQ STORM" B1-WQ B1-WQ STO-1 DIS-1  1
Description          MatchQ   PeakQ Sto   Dis      PkStg    OutQ  hyd    Volume
BASIN 1 - WQ STORM     0.00    0.13  STO-1  DIS-1  121.05   0.09    1     143.28 cf

LPOOL  2 "BASIN 1 - 100YR STO" B1-100 B1-100 STO-1 DIS-1  2
Description          MatchQ   PeakQ Sto   Dis      PkStg    OutQ  hyd    Volume
BASIN 1 - 100YR STO    0.00    0.50  STO-1  DIS-1  122.64   0.11    2    1834.35 cf

LPOOL  4 "BASIN 2 - WQ STORM" B2-WQ B2-WQ STO-2 DIS-2  3
Description          MatchQ   PeakQ Sto   Dis      PkStg    OutQ  hyd    Volume
BASIN 2 - WQ STORM     0.00    0.10  STO-2  DIS-2  121.02   0.07    3      97.49 cf

LPOOL  5 "BASIN 2 - 100YR STO" B2-100 B2-100 STO-2 DIS-2  4
Description          MatchQ   PeakQ Sto   Dis      PkStg    OutQ  hyd    Volume
BASIN 2 - 100YR STO    0.00    0.37  STO-2  DIS-2  122.20   0.09    4    1199.44 cf


ADD  2 4 5
0.2065 cfs    0.3314 ac-ft    11.33 hrs

ADD  5 B3-100 6
0.4249 cfs    0.4213 ac-ft     8.00 hrs


LPOOL  1 "TRENCH - WQ STORM" B3-WQ B3-WQ STO-3 DIS-3  7
Description          MatchQ   PeakQ Sto   Dis      PkStg    OutQ  hyd    Volume
TRENCH - WQ STORM      0.00    0.07  STO-3  DIS-3  121.00   0.07    7      44.00 cf

LPOOL  2 "TRENCH - 100YR STO" 6 6 STO-3 DIS-3  8
Description          MatchQ   PeakQ Sto   Dis      PkStg    OutQ  hyd    Volume
TRENCH - 100YR STO     0.00    0.42  STO-3  DIS-3  122.61   0.26    8     876.02 cf
```

BASIN SUMMARIES

WHIDBEY ISLAND BANK

BASIN ID: B1-WQ **NAME: BASIN 1 - WATER QUALITY STORM**

```
SBUH METHODOLOGY
TOTAL AREA.......:   0.75 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                      PERV          IMP
PRECIPITATION....:   1.15 inches    AREA..:     0.13 Acres    0.62 Acres
TIME INTERVAL....:     10.00 min    CN....:    68.00          98.00
                                    TC....:     7.14 min      6.00 min

ABSTRACTION COEFF:   0.20
TcReach - Sheet   L:  30.00 ns:0.1500 p2yr: 1.80 s:0.0100
TcReach - Channel L:  50.00 kc:21.00 s:0.0050
```
PEAK RATE: 0.13 cfs VOL: 0.05 Ac-ft TIME: 480 min

BASIN ID: B1-100 **NAME: BASIN 1 - 100YR STORM**

```
SBUH METHODOLOGY
TOTAL AREA.......:   0.75 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                      PERV          IMP
PRECIPITATION....:   3.70 inches    AREA..:     0.13 Acres    0.62 Acres
TIME INTERVAL....:     10.00 min    CN....:    68.00          98.00
                                    TC....:     7.14 min      6.00 min

ABSTRACTION COEFF:   0.20
TcReach - Sheet   L:  30.00 ns:0.1500 p2yr: 1.80 s:0.0100
TcReach - Channel L:  50.00 kc:21.00 s:0.0050
```
PEAK RATE: 0.50 cfs VOL: 0.19 Ac-ft TIME: 480 min

BASIN ID: B2-WQ **NAME: BASIN 2 - WATER QUALITY STORM**

```
SBUH METHODOLOGY
TOTAL AREA.......:   0.56 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                      PERV          IMP
PRECIPITATION....:   1.15 inches    AREA..:     0.10 Acres    0.46 Acres
TIME INTERVAL....:     10.00 min    CN....:    68.00          98.00
                                    TC....:    12.06 min      6.00 min

ABSTRACTION COEFF:   0.20
TcReach - Sheet   L:  50.00 ns:0.1500 p2yr: 1.80 s:0.0100
TcReach - Sheet   L:  30.00 ns:0.0110 p2yr: 1.80 s:0.0100
TcReach - Channel L: 120.00 kc:21.00 s:0.0050
```
PEAK RATE: 0.10 cfs VOL: 0.04 Ac-ft TIME: 480 min

BASIN ID: B2-100 **NAME: BASIN 2 - 100YR STORM**

```
SBUH METHODOLOGY
TOTAL AREA.......:   0.56 Acres     BASEFLOWS:   0.00 cfs
RAINFALL TYPE....:    TYPE1A                      PERV          IMP
PRECIPITATION....:   3.70 inches    AREA..:     0.10 Acres    0.46 Acres
TIME INTERVAL....:     10.00 min    CN....:    68.00          98.00
                                    TC....:    12.06 min      6.00 min

ABSTRACTION COEFF:   0.20
TcReach - Sheet   L:  50.00 ns:0.1500 p2yr: 1.80 s:0.0100
TcReach - Sheet   L:  30.00 ns:0.0110 p2yr: 1.80 s:0.0100
TcReach - Channel L: 120.00 kc:21.00 s:0.0050
```
PEAK RATE: 0.37 cfs VOL: 0.14 Ac-ft TIME: 480 min

BASIN ID: B3-WQ **NAME: BASIN 3 - WATER QUALITY STORM**

SBUH METHODOLOGY

TOTAL AREA.....:	0.31 Acres	BASEFLOWS:	0.00 cfs	
RAINFALL TYPE....:	TYPE1A		PERV	IMP
PRECIPITATION....:	1.15 inches	AREA..:	0.00 Acres	0.31 Acres
TIME INTERVAL....:	10.00 min	CN....:	0.00	98.00
		TC....:	0.00 min	6.00 min

ABSTRACTION COEFF: 0.20

PEAK RATE: 0.07 cfs VOL: 0.02 Ac-ft TIME: 480 min

BASIN ID: B3-100 **NAME: BASIN 3 - 100YR STORM**

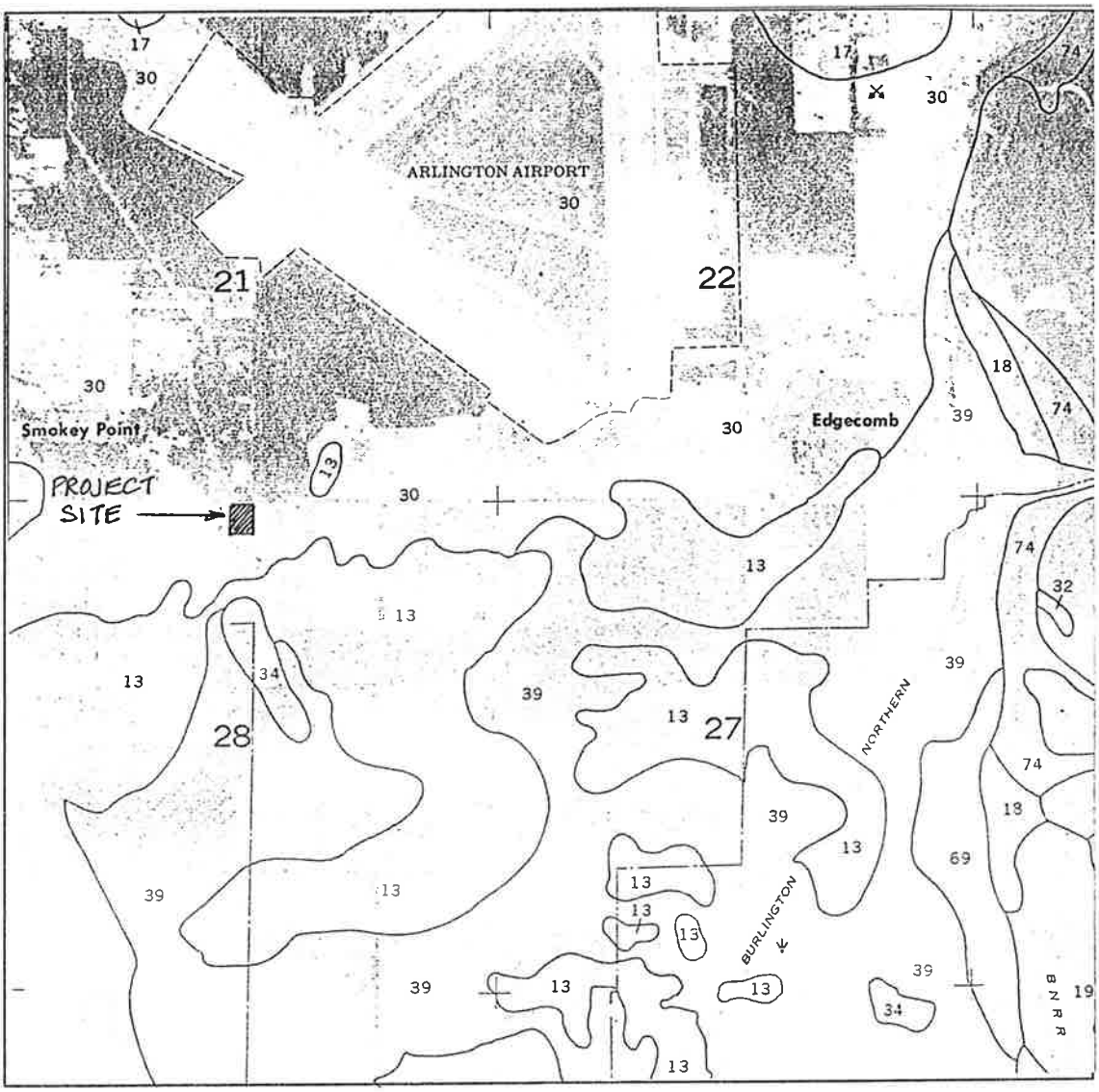
SBUH METHODOLOGY

TOTAL AREA.....:	0.31 Acres	BASEFLOWS:	0.00 cfs	
RAINFALL TYPE....:	TYPE1A		PERV	IMP
PRECIPITATION....:	3.70 inches	AREA..:	0.00 Acres	0.31 Acres
TIME INTERVAL....:	10.00 min	CN....:	0.00	98.00
		TC....:	0.00 min	6.00 min

ABSTRACTION COEFF: 0.20

PEAK RATE: 0.24 cfs VOL: 0.09 Ac-ft TIME: 480 min

RUNOFF CURVE NUMBER
TIME OF CONCENTRATION



SOILS MAP

SCALE: 1" = 2,000'

Reference: Soil Survey of Snohomish County
Sheet Number 19

Soil Type: Symbol 30-Lynnwood Loamy Sand
Hydrologic Soil Group A

WHIDBEY ISLAND BANK
RUNOFF CURVE NUMBER CALCULATIONS
POST DEVELOPED CONDITIONS

BASIN 1
PERVIOUS AREAS

Total Retained Area (Acres):..... 0.754

Soil Name and Hydrologic Soil Group		Cover Description	Runoff Curve Number RCN	Area (Acres) A	RCN x A
Name	HSG				
Lynnwood	A	Landscaping	68	0.134	9.112
					0.000
		Totals		0.134	9.112

Runoff Curve Number = (RCN x A) / A: 68.00
Runoff Curve Number Used in Basin Calculations..... 68.00

BASIN 1
IMPERVIOUS AREAS

Soil Name and Hydrologic Soil Group		Cover Description	Runoff Curve Number RCN	Area (Acres) A	RCN x A
Name	HSG				
Lynnwood	A	Sidewalks	98	0.040	3.920
Lynnwood	A	Parking & Roadway Area	98	0.580	56.840
		Totals		0.620	60.760

Runoff Curve Number = (RCN x A) / A: 98.00
Runoff Curve Number Used in Basin Calculations..... 98.00

WHIDBEY ISLAND BANK
TIME OF CONCENTRATION
POST DEVELOPED CONDITIONS

BASIN 1
PERVIOUS AREAS

Sheet Flow (Applicable to Tc only)

Surface Description		Landscaping
Manning's Roughness Coefficient, nsheet		0.150
Flow Length (L<=300'), Lsheet		30 feet
2-Year, 24-Hour Rainfall, P2		1.80 inches
Land Slope, Ssheet		0.010 ft/ft
Tt Sheet		0.110 hours
Tt Sheet		6.579 minutes

Shallow Concentrated Flow (See DOE SWM Manual, Page III-1-14)

Surface Description	Parking
Flow Length, Lshallow	0 ft
Watercourse Slope, So	0.010 ft/ft
Time of Concentration Velocity Factor, k	27.00
Average Velocity, Vshallow = k x So^0.5	2.70 fps
Tt Shallow	0.000 hours
Tt Shallow	0.000 minutes

Channel Flow (See DOE SWM Manual, Pages III-1-15, III-1-16)

Type of Channel	Pipe
Flow Length, Lchannel	50 ft
Watercourse Slope, So	0.005 ft/ft
Time of Concentration Velocity Factor, kc	21.00
Average Velocity, Vchannel = k x So^0.5	1.48 fps
Tt Channel	0.009 hours
Tt Channel	0.561 minutes

Results: Watershed or Subarea Tc or Tt

Total Tc or Tt	**0.119 hours**
Total Tc or Tt	**7.141 minutes**
Minimum Tc Used	**7.141 minutes**

WHIDBEY ISLAND BANK
RUNOFF CURVE NUMBER CALCULATIONS
POST DEVELOPED CONDITIONS

BASIN 2
PERVIOUS AREAS

Total Project Area (Acres):..... 0.869
Minus Building Areas (Acres):..... 0.311
Total Basin Area (Acres):..... 0.558

Soil Name and Hydrologic Soil Group		Cover Description	Runoff Curve Number RCN	Area (Acres) A	RCN x A
Name	HSG				
Lynnwood	A	Landscaping	68	0.099	6.732
					0.000
		Totals		0.099	6.732

Runoff Curve Number = (RCN x A) / A: 68.00
Runoff Curve Number Used in Basin Calculations..... 68.00

BASIN 2
IMPERVIOUS AREAS

Soil Name and Hydrologic Soil Group		Cover Description	Runoff Curve Number RCN	Area (Acres) A	RCN x A
Name	HSG				
Lynnwood	A	Sidewalks	98	0.065	6.370
Lynnwood	A	Parking Area	98	0.394	38.612
		Totals		0.459	44.982

Runoff Curve Number = (RCN x A) / A: 98.00
Runoff Curve Number Used in Basin Calculations..... 98.00

WHIDBEY ISLAND BANK
TIME OF CONCENTRATION
POST DEVELOPED CONDITIONS

BASIN 2
PERVIOUS AREAS

Sheet Flow (Applicable to Tc only)

Surface Description	Landscaping	Parking
Manning's Roughness Coefficient, nsheet	0.150	0.011
Flow Length (L<=300'), Lsheet	50 feet	30 feet
2-Year, 24-Hour Rainfall, P2	1.80 inches	1.80 inches
Land Slope, Ssheet	0.010 ft/ft	0.010 ft/ft
Tt Sheet	0.165 hours	0.014 hours
Tt Sheet	9.901 minutes	0.814 minutes

Shallow Concentrated Flow (See DOE SWM Manual, Page III-1-14)

Surface Description		
Flow Length, Lshallow		
Watercourse Slope, So		0.050 ft/ft
Time of Concentration Velocity Factor, k		11.00
Average Velocity, Vshallow = k x So^0.5		2.46 fps
Tt Shallow		0.000 hours
Tt Shallow		0.000 minutes

Channel Flow (See DOE SWM Manual, Pages III-1-15, III-1-16)

Type of Channel	Pipe
Flow Length, Lchannel	120 ft
Watercourse Slope, So	0.005 ft/ft
Time of Concentration Velocity Factor, kc	21.00
Average Velocity, Vchannel = k x So^0.5	1.48 fps
Tt Channel	0.022 hours
Tt Channel	1.347 minutes

Results: Watershed or Subarea Tc or Tt

Total Tc or Tt	**0.201 hours**
Total Tc or Tt	**12.061 minutes**
Minimum Tc Used	**12.061 minutes**

WHIDBEY ISLAND BANK
RUNOFF CURVE NUMBER CALCULATIONS
POST DEVELOPED CONDITIONS

BASIN 3 - BANK + FUTURE BUILDING
PERVIOUS AREAS

Total Area (Acres):..... 0.311

Soil Name and Hydrologic Soil Group		Cover Description	Runoff Curve Number RCN	Area (Acres) A	RCN x A
Name	HSG				
		Totals		0.000	0.000

Runoff Curve Number = (RCN x A) / A: 0.00
Runoff Curve Number Used in Basin Calculations..... 0.00

BASIN 3 - BANK
IMPERVIOUS AREAS

Soil Name and Hydrologic Soil Group		Cover Description	Runoff Curve Number RCN	Area (Acres) A	RCN x A
Name	HSG				
Lynnwood	A	Buildings	98	0.311	30.478
		Totals		0.311	30.478

Runoff Curve Number = (RCN x A) / A: 98.00
Runoff Curve Number Used in Basin Calculations..... 98.00

WHIDBEY ISLAND BANK
TIME OF CONCENTRATION
POST DEVELOPED CONDITIONS

BASIN 3 - BUILDINGS
IMPERVIOUS AREAS

Sheet Flow (Applicable to Tc only)

Surface Description	
Manning's Roughness Coefficient, nsheet	0.010
Flow Length (L<=300'), Lsheet	0 feet
2-Year, 24-Hour Rainfall, P2	1.90 inches
Land Slope, Ssheet	0.010 ft/ft
Tt Sheet	0.000 hours
Tt Sheet	0.000 minutes

Shallow Concentrated Flow (See DOE SWM Manual, Page III-1-14)

Surface Description	
Flow Length, Lshallow	0 ft
Watercourse Slope, So	0.010 ft/ft
Time of Concentration Velocity Factor, k	27.00
Average Velocity, Vshallow = k x So^0.5	2.70 fps
Tt Shallow	0.000 hours
Tt Shallow	0.000 minutes

Channel Flow (See DOE SWM Manual, Pages III-1-15, III-1-16)

Type of Channel	Pipe
Flow Length, Lchannel	40 ft
Watercourse Slope, So	0.005 ft/ft
Time of Concentration Velocity Factor, kc	42.00
Average Velocity, Vchannel = k x So^0.5	2.97 fps
Tt Channel	0.004 hours
Tt Channel	0.224 minutes

Results: Watershed or Subarea Tc or Tt

Total Tc or Tt	**0.004 hours**
Total Tc or Tt	**0.224 minutes**
Minimum Tc Used	**6.00 minutes**

DESIGN DATA
WATER QUALITY TRENCHES
INFILTRATION TRENCHES

WHIDBEY ISLAND BANK STAGE / STORAGE TABULATION WATER QUALITY INFILTRATION TRENCH - BASIN 1				
Water Surface Elevation	Increm. Storage In Voids cu. ft.	Increm. Storage In Pipe cu. ft.	Total Storage Volume cu. ft.	Design Storage Volume cu. ft.
120.90			0.00	0.00
	475.00	0.00		
121.40			470.00	470.00
	693.49	294.52		
122.23			1,450.00	1,450.00
	475.00	0.00		
122.73			1,920.00	1,920.00

NOTES

Incremental Storage in Voids, Sv = Nt(Vr x Lt x Wt x h)

Number of Trenches, Nt:	1.00
Void Ratio in Rock, Vr:	0.33
Length of Each Trench, Lt (feet):	95.00
Width of Each Trench, Wt (feet):	30.00

Storage in Perforated Pipes, Sp = Np x Lp x Ap

Number of Pipes per Trench, Np:	6.00
Length of Pipe per Row, Lin (feet):	90.00
Area of Pipe, Ap (sq. ft. / lin. ft.):	0.55
Diameter of Pipe, Dp (inches):	10.00

WHIDBEY ISLAND BANK STAGE / DISCHARGE TABULATION WATER QUALITY INFILTRATION TRENCH - BASIN 1									
Water Surface Elevation	Design Infil. Rate fd, in\hr	Design Infil. Rate fd, cfs	Depth to Water Table L, feet	Depth Of Ponding h, feet	Hydraulic Gradient i, feet	Surface Area As, sf	Trench Outflow Qout, cfs	Riser Outflow Qr, cfs	Total Outflow Qtotal, cfs
120.90	1.27	0.000029	3.00	0.00	1.00	2,850.00	0.084	0.000	0.084
121.40	1.27	0.000029	3.50	0.50	1.14	2,850.00	0.096	0.000	0.096
122.23	1.27	0.000029	4.33	1.33	1.31	2,850.00	0.110	0.000	0.110
122.73	1.27	0.000029	4.83	1.83	1.38	2,850.00	0.116	0.000	0.116
123.00	1.27	0.000029	5.10	2.10	1.41	2,850.00	0.118	0.000	0.118
123.10	1.27	0.000029	5.20	2.20	1.42	2,850.00	0.119	0.494	0.614
123.20	1.27	0.000029	5.30	2.30	1.43	2,850.00	0.120	1.398	1.518

NOTES

Measured Infiltration Rate From Geotech Report, fm (in/hr):	2.54
Design Infiltration Rate = 50 Percent of Measured infiltration Rate	
Depth to Water Table, L = Bottom of Infiltration Trench - Water Table Elevation	
Water Table Elevation (from Geotech Report):	117.90
Depth of Ponding, h = Water Surface Elevation - Bottom of Trench	
Hydraulic Gradient, i = (h+L)/L	
Surface Area, As = Width of Trench x Length of Trench	
Basin Outflow, Qo = fd x i x As	

Overflow Riser (Weir Flow)

Q =Nr x 9.379 x D x (restrictor head)^1.5

Number of Risers, Nr:	2.00
Elevation of Overflow Restrictor:	124.00
Diameter of Overflow Restrictor, D (Inches):	10.00
Transition Elevation (elevation at which flow over riser changes from weir flow to orifice flow):	124.30

Overflow Riser (Orifice Flow)

Q = Nr x 3.782 x D^2 x (restrictor head)^0.5

Elevation of Overflow Restrictor:	124.00
Diameter of Overflow Restrictor, D (Inches):	10.00
Transition Elevation (elevation at which flow over riser changes from weir flow to orifice flow):	124.30

WHIDBEY ISLAND BANK STAGE / STORAGE TABULATION WATER QUALITY INFILTRATION TRENCH (BASIN 2)				
Water Surface Elevation	Increm. Storage In Voids cu. ft.	Increm. Storage In Pipe cu. ft.	Total Storage Volume cu. ft.	Design Storage Volume cu. ft.
120.90			0.00	0.00
	400.00	0.00		
121.40			400.00	400.00
	582.31	253.07		
122.23			1,230.00	1,230.00
	400.00	0.00		
122.73			1,630.00	1,630.00

NOTES

Incremental Storage in Voids, Sv = Nt(Vr x Lt x Wt x h)

Number of Trenches, Nt:	1.00
Void Ratio in Rock, Vr:	0.33
Length of Each Trench, Lt (feet):	120.00
Width of Each Trench, Wt (feet):	20.00

Storage in Perforated Pipes, Sp = Np x Lp x Ap

Number of Pipes per Trench, Np:	4.00
Length of Pipe per Row, Lin (feet):	116.00
Area of Pipe, Ap (sq. ft. / lin. ft.):	0.55
Diameter of Pipe, Dp (inches):	10.00

WHIDBEY ISLAND BANK STAGE / DISCHARGE TABULATION WATER QUALITY INFILTRATION TRENCH (BASIN 2)									
Water Surface Elevation	Design Infil. Rate fd, in\hr	Design Infil. Rate fd, cfs	Depth to Water Table L, feet	Depth Of Ponding h, feet	Hydraulic Gradient i, feet	Surface Area As, sf	Trench Outflow Qout, cfs	Riser Outflow Qr, cfs	Total Outflow Qtotal, cfs
120.90	1.27	0.000029	3.00	0.00	1.00	2,400.00	0.071	0.000	0.071
121.40	1.27	0.000029	3.50	0.50	1.14	2,400.00	0.081	0.000	0.081
122.23	1.27	0.000029	4.33	1.33	1.31	2,400.00	0.092	0.000	0.092
122.73	1.27	0.000029	4.83	1.83	1.38	2,400.00	0.097	0.000	0.097
123.00	1.27	0.000029	5.10	2.10	1.41	2,400.00	0.100	0.000	0.100
123.10	1.27	0.000029	5.20	2.20	1.42	2,400.00	0.100	0.395	0.496
123.20	1.27	0.000029	5.30	2.30	1.43	2,400.00	0.101	1.119	1.220

NOTES

Measured Infiltration Rate From Geotech Report, fm (in/hr):	2.54
Design Infiltration Rate = 50 Percent of Measured infiltration Rate	
Depth to Water Table, L = Bottom of Infiltration Trench - Water Table Elevation	
Water Table Elevation (from Geotech Report):	117.90
Depth of Ponding, h = Water Surface Elevation - Bottom of Trench	
Hydraulic Gradient, i = (h+L)/L	
Surface Area, As = Width of Trench x Length of Trench	
Basin Outflow, Qo = fd x i x As	

Overflow Riser (Weir Flow)

Q =Nr x 9.379 x D x (restrictor head)^1.5	
Number of Risers, Nr:	2.00
Elevation of Overflow Restrictor:	123.00
Diameter of Overflow Restrictor, D (Inches):	8.00
Transition Elevation (elevation at which flow over riser changes from weir flow to orifice flow):	123.30

Overflow Riser (Orifice Flow)

Q = Nr x 3.782 x D^2 x (restrictor head)^0.5	
Elevation of Overflow Restrictor:	123.00
Diameter of Overflow Restrictor, D (Inches):	8.00
Transition Elevation (elevation at which flow over riser changes from weir flow to orifice flow):	123.30

WHIDBEY ISLAND BANK STAGE / STORAGE TABULATION INFILTRATION TRENCH (BASIN 3)				
Water Surface Elevation	Increm. Storage In Voids cu. ft.	Increm. Storage In Pipe cu. ft.	Total Storage Volume cu. ft.	Design Storage Volume cu. ft.
120.90			0.00	0.00
	333.33	0.00		
121.40			330.00	220.00
	485.74	209.44		
122.23			1,020.00	700.00
	333.33	0.00		
122.73			1,350.00	930.00

NOTES

Incremental Storage in Voids, Sv = Vr x Lt x Wt x h

Void Ratio in Rock, Vr:	0.33
Length of Trench, Lt (feet):	100.00
Width of Trench, Wt (feet):	20.00

Storage in Perforated Pipe, Sp = Np x Lp x Ap

Number of Pipes, Np:	4.00
Total Length of Pipe per Row, Lin (feet):	96.00
Area of Pipe, Ap (sq. ft. / lin. ft.):	0.55
Diameter of Pipe, Dp (inches):	10.00

NOTE: The total storage volume has been oversized per DOE guidelines (Chapter III-1.1)

Percentage of Impervious Area to Total Site Area:		86%
Total Impervious Area (Acres):	1.390	
Total Retained Area (Acres):	1.622	
Correction Factor (From Figure III-1.1, Page III-1-3)		0.445

WHIDBEY ISLAND BANK
STAGE / DISCHARGE TABULATION
INFILTRATION TRENCH (BASIN 3)

Water Surface Elevation	Design Infil. Rate fd, in\hr	Design Infil. Rate fd, cfs	Depth to Water Table L, feet	Depth Of Ponding h, feet	Hydraulic Gradient i, feet	Surface Area As, sf	Trench Outflow Qout, cfs
120.90	4.14	0.000096	3.00	0.00	1.00	2,000.00	0.191
121.40	4.14	0.000096	3.50	0.50	1.14	2,000.00	0.219
122.23	4.14	0.000096	4.33	1.33	1.31	2,000.00	0.250
122.73	4.14	0.000096	4.83	1.83	1.38	2,000.00	0.264

NOTES

Measured Infiltration Rate From Geotech Report, fm (in/hr):..... 8.27

Design Infiltration Rate = 50 Percent of Measured infiltration Rate

Depth to Water Table, L = Bottom of Infiltration Trench - Water Table Elevation

Water Table Elevation (from Geotech Report):..... 117.90

Depth of Ponding, h = Water Surface Elevation - Bottom of Trench

Hydraulic Gradient, i = (h+L)/L

Surface Area, As = Width of Trench x Length of Trench

Basin Outflow, Qo = fd x i x As

STAGE STORAGE TABLE

CUSTOM STORAGE **ID No. STO-1**
Description: WQ TRENCH BASIN 1

STAGE (ft)	<----STORAGE----> ---cf---	--Ac-Ft-	STAGE (ft)	<----STORAGE----> ---cf---	--Ac-Ft-	STAGE (ft)	<----STORAGE----> ---cf---	--Ac-Ft-	STAGE (ft)	<----STORAGE----> ---cf---	--Ac-Ft-
121.00	0.0000	0.0000	121.50	200.00	0.0046	122.00	431.34	0.0099	122.50	642.00	0.0147
121.10	40.000	0.0009	121.60	246.27	0.0057	122.10	477.61	0.0110	122.60	682.00	0.0157
121.20	80.000	0.0018	121.70	292.54	0.0067	122.20	522.00	0.0120	122.67	710.00	0.0163
121.30	120.00	0.0028	121.80	338.81	0.0078	122.30	562.00	0.0129			
121.40	160.00	0.0037	121.90	385.07	0.0088	122.40	602.00	0.0138			

CUSTOM STORAGE **ID No. STO-2**
Description: WQ TRENCH BASIN 2

STAGE (ft)	<----STORAGE----> ---cf---	--Ac-Ft-	STAGE (ft)	<----STORAGE----> ---cf---	--Ac-Ft-	STAGE (ft)	<----STORAGE----> ---cf---	--Ac-Ft-	STAGE (ft)	<----STORAGE----> ---cf---	--Ac-Ft-
121.00	0.0000	0.0000	121.50	150.00	0.0034	122.00	336.57	0.0077	122.50	499.00	0.0115
121.10	30.000	0.0007	121.60	187.31	0.0043	122.10	373.88	0.0086	122.60	529.00	0.0121
121.20	60.000	0.0014	121.70	224.63	0.0052	122.20	409.00	0.0094	122.67	550.00	0.0126
121.30	90.000	0.0021	121.80	261.94	0.0060	122.30	439.00	0.0101			
121.40	120.00	0.0028	121.90	299.25	0.0069	122.40	469.00	0.0108			

CUSTOM STORAGE **ID No. STO-3**
Description: INFILTRATION TRENCH

STAGE (ft)	<----STORAGE----> ---cf---	--Ac-Ft-	STAGE (ft)	<----STORAGE----> ---cf---	--Ac-Ft-	STAGE (ft)	<----STORAGE----> ---cf---	--Ac-Ft-	STAGE (ft)	<----STORAGE----> ---cf---	--Ac-Ft-
121.00	0.0000	0.0000	121.50	360.00	0.0083	122.00	817.83	0.0188	122.50	1246	0.0286
121.10	72.000	0.0017	121.60	451.57	0.0104	122.10	909.40	0.0209	122.60	1320	0.0303
121.20	144.00	0.0033	121.70	543.13	0.0125	122.20	1001	0.0230	122.70	1394	0.0320
121.30	216.00	0.0050	121.80	634.70	0.0146	122.30	1093	0.0251	122.80	1468	0.0337
121.40	288.00	0.0066	121.90	726.27	0.0167	122.40	1172	0.0269	122.83	1490	0.0342

STAGE DISCHARGE TABLE

DISCHARGE LIST ID No. DIS-1
Description: WQ TRENCH - BASIN 1 DISCHARGE

STAGE (ft)	<--DISCHARGE---> ---cfs-- -------	STAGE (ft)	<--DISCHARGE---> ---cfs-- -------	STAGE (ft)	<--DISCHARGE---> ---cfs-- -------	STAGE (ft)	<--DISCHARGE---> ---cfs-- -------
121.00	0.1720	121.50	0.1960	122.00	0.2132	122.40	0.2254
121.10	0.1768	121.60	0.1994	122.10	0.2166	122.50	0.2282
121.20	0.1816	121.70	0.2029	122.17	0.2190	122.60	0.2310
121.30	0.1864	121.80	0.2063	122.20	0.2198	122.67	0.2330
121.40	0.1912	121.90	0.2097	122.30	0.2226		

DISCHARGE LIST ID No. DIS-2
Description: WQ TRENCH - BASIN 2 DISCHARGE

STAGE (ft)	<--DISCHARGE---> ---cfs-- -------	STAGE (ft)	<--DISCHARGE---> ---cfs-- -------	STAGE (ft)	<--DISCHARGE---> ---cfs-- -------	STAGE (ft)	<--DISCHARGE---> ---cfs-- -------
121.00	0.1340	121.50	0.1530	122.00	0.1664	122.40	0.1756
121.10	0.1378	121.60	0.1557	122.10	0.1691	122.50	0.1776
121.20	0.1416	121.70	0.1584	122.17	0.1710	122.60	0.1796
121.30	0.1454	121.80	0.1611	122.20	0.1716	122.67	0.1810
121.40	0.1492	121.90	0.1637	122.30	0.1736		

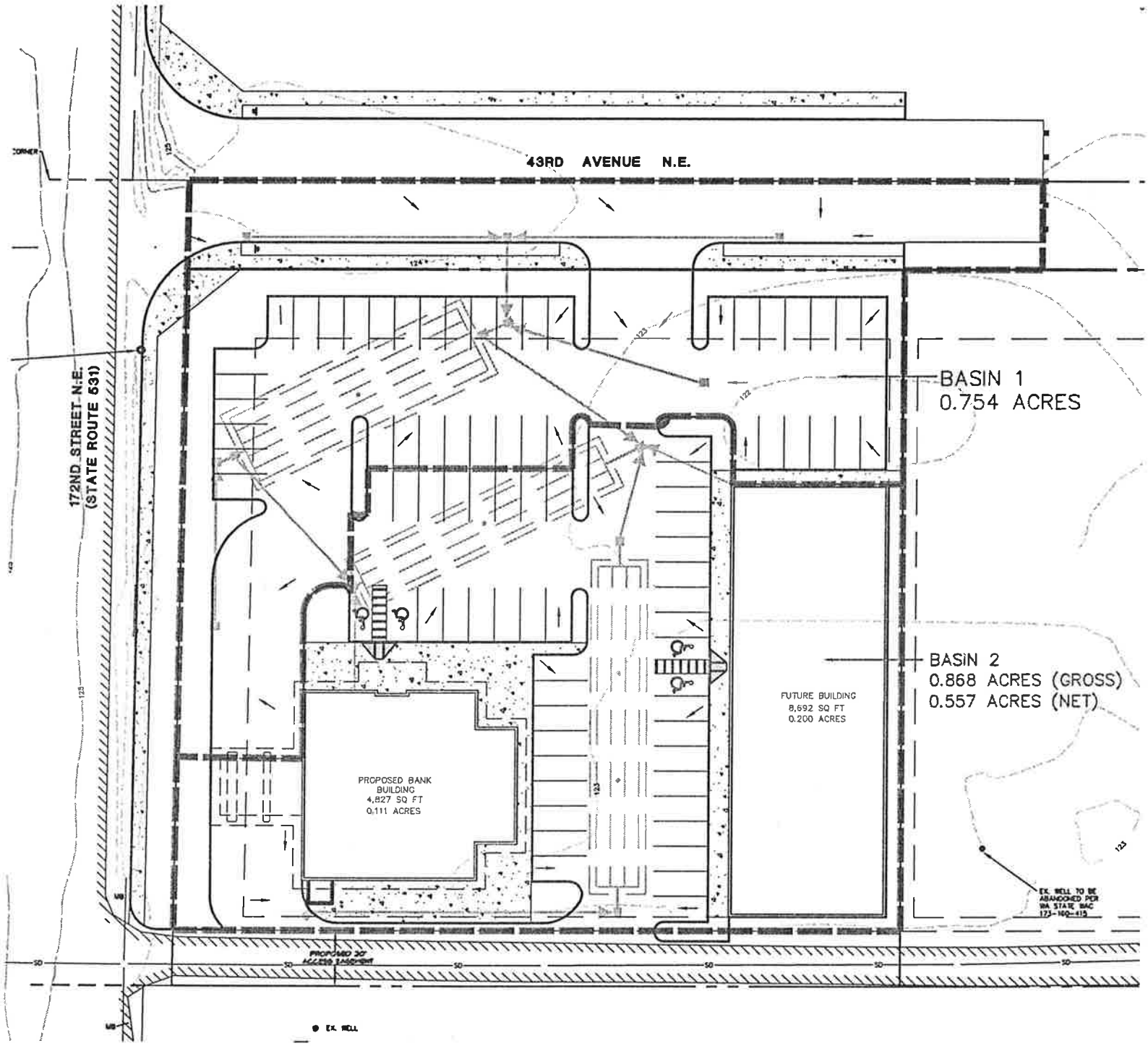
DISCHARGE LIST ID No. DIS-3
Description: INFILTRATION TRENCH DISCHARGE

STAGE (ft)	<--DISCHARGE---> ---cfs-- -------	STAGE (ft)	<--DISCHARGE---> ---cfs-- -------	STAGE (ft)	<--DISCHARGE---> ---cfs-- -------	STAGE (ft)	<--DISCHARGE---> ---cfs-- -------
121.00	0.3160	121.60	0.3661	122.20	0.4030	122.70	0.4273
121.10	0.3248	121.70	0.3723	122.30	0.4092	122.80	0.4317
121.20	0.3336	121.80	0.3784	122.33	0.4110	122.83	0.4330
121.30	0.3424	121.90	0.3846	122.40	0.4141		
121.40	0.3512	122.00	0.3907	122.50	0.4185		
121.50	0.3600	122.10	0.3969	122.60	0.4229		

LEVEL POOL ROUTING

<--------DESCRIPTION--------->	MATCH (cfs)	INFLOW (cfs)	-STO- --id-	-DIS- --id-	<-PEAK-> <-STAGE>	id	OUTFLOW (cfs)	STORAGE VOL (cf)
BASIN 1 - WQ STORM	0.00	0.13	STO-1	DIS-1	121.10	1	0.13	40.00 cf
BASIN 1 - 100YR STO	0.00	0.50	STO-1	DIS-1	122.59	2	0.23	676.16 cf
BASIN 2 - WQ STORM	0.00	0.10	STO-2	DIS-2	121.10	3	0.10	30.00 cf
BASIN 2 - 100YR STO	0.00	0.37	STO-2	DIS-2	122.41	4	0.18	472.58 cf
TRENCH - WQ STORM	0.00	0.07	STO-3	DIS-3	121.00	7	0.07	44.00 cf
TRENCH - 100YR STO	0.00	0.42	STO-3	DIS-3	122.61	8	0.26	876.02 cf

DRAINAGE AREA MAP



DRAINAGE AREA MAP
POST-DEVELOPED
CONDITIONS
FOR
WHIDBEY ISLAND BANK

N

GRAPHIC SCALE

0 25 50

SCALE: 1"=50'

GEOTECHNICAL REPORT

Western Geotechnical Consultants, Inc.

4181 Saltsprings Drive • Ferndale, WA 98248
Phone (360) 380-2507 • Fax (360) 380-2507

March 4, 2000

Mr. Kim Gudgel
c/o RAMO Realty
16494 35th Ave. NE, Suite 301
Smokey Point, WA 98223

Re: Report – Geotechnical Feasibility Study
SW Quadrant from Intersection of 43rd Ave. NE and 172nd St. NE
Section 28, T31N, R05, WM
Snohomish County, WA

Western Geotechnical Consultants, Inc. is pleased to present the results of our geotechnical site investigation conducted at the above referenced property. On February 25, 2000 a geotechnical engineer from our firm traveled to the site to oversee the excavation of 5 test pits across the property.

Higa Engineering, Inc. provided us with a preliminary site plan for use in performing the investigation. The site plan shows that the property has approximately 280 feet of frontage along 172nd St. NE and is about 1330 feet deep. We understand the development of the approximate 8.6-acre parcel will consist of commercial buildings with storm water detention facilities located on the south side of the property. Figure 1 is a Site Plan showing the general property layout together with the approximate locations of our test pits.

The purpose of our investigation was to obtain subsurface soil and ground water information for use in evaluating the feasibility of constructing detention facilities on the site and to obtain geotechnical information for general site development. Specifically the scope of our services included:

- Excavating 5 test pits across the site to obtain subsurface information for use in general site development. We excavated 2 test pits at the storm water detention location and 3 additional test pits across the remainder of the site to obtain general geotechnical information. Piezometers were installed in all the test pits for future water level reading so as to define the seasonal high ground water table.
- Developing continuous logs of subsurface soil and groundwater conditions encountered. Soils encountered were classified in accordance with the Unified Soils Classification System (USCS).
- Performing engineering analyses and laboratory testing as deemed necessary in developing our conclusions and recommendations.

- Preparing this engineering report, which includes a summary of work performed, a description of the subsurface conditions encountered, and our conclusions and recommendations regarding detention pond design parameters and general geotechnical issues associated with development of the site.

SITE CONDITIONS

Surface Conditions

The property is approximately 8.6 acres in size and it is very nearly level, with a slight surface gradient to the south end of the site. Several buildings, including a house, are located in the front (northerly) third of the property. There is a driveway along the westerly property line providing access from 172nd St. A drainage channel extends back from the driveway along the westerly property line part way toward the back of the property.

The ground surface is covered primarily with grasses, with blackberry bushes and occasional small trees toward the back of the property. There is also a wet area at the back of the property (low point) where the storm water facilities are planned.

Subsurface Conditions

Subsurface conditions at the site were evaluated by excavating a total of 5 test pits on February 25, 2000, with a rubber tire backhoe using a 3-foot-wide bucket. The approximate locations of the test pits are shown on the attached Site Plan, Figure 1. The test pits were roughly located in the field from the property boundaries. Piezometers were installed in all of the test pits and the test pits were loosely backfilled upon completion of the explorations.

The soils encountered in the test pits were classified using the Unified Soils Classification System (USCS) and a log was maintained for each test pit. Edited, tabulated test pit logs are attached to in this report along with a USCS Chart explaining soil descriptions.

The general subsurface profile outside the wetland area (i.e., Test Pits 1, 2 and 5), consists of an organic rich topsoil layer (OL/ML by USCS classification) above silty SANDS (SM by USCS) that grades to fine to coarse sands (SP by USCS) with depth, extending to the bottom of the test pits. The two test pits excavated in the southern wet area (Test Pits 3 and 4) revealed an approximate 1.5-foot peat (Pt by USCS) layer underlain by sandy SILTS (ML) grading to some coarse SANDS (SP by USCS) at the bottom of the test pits. Note that the two test pits in the southern wet area were excavated to relatively shallow depths because the shallow ground water caused caving of the test pits.

Ground Water Conditions

The depth to ground water appears to reflect the surface gradient that slopes from the front (north) to back (south) of the property. At the time of our subsurface explorations, ground water was encountered at a maximum depth of about 6 feet in the front (north) of the property to near the surface in the wetland area at the back of the property. At the proposed storm water detention facility, the water table was measured at about 2 feet below the surface in our test pits, but standing water was present in other areas of the wetland. Piezometers were installed in each of the test pits for future monitoring of ground water levels. Water levels should be measured again this winter to establish the seasonal high ground water level.

Conclusions and Recommendations

General

Based on our geotechnical engineering investigation, we conclude that the site will likely be suitable for development of the type proposed provided good construction practices are used and provided our recommendations are followed. The area contains a high groundwater table, which can be problematic for storm water detention facilities. Storm water detention is planned for the south side of the property, and we understand the commercial development will utilize the remainder of the site. The following sections provide recommended soil and groundwater parameters for storm water detention and general site development.

Storm water Detention

The property is relatively level with a surface gradient toward the rear (south) of the property. The proposed storm water detention facility will occupy the southerly end of the site. We excavated 2 test pits within the proposed storm water detention area along with 3 additional test pits across the remainder of the site. Piezometers were installed in all of the test pits for future monitoring of ground water. The ground water table within the proposed stormwater detention area (see Figure 1) was measured at 2 feet below the surface in the two test pits excavated there as part of our exploration, but standing water was also present at the ground surface nearby.

The USDA Soil Conserfvation Service (SCS), "Soil Survey of Snohomish County Area, WA" has classified the near surface soils as Soil Unit 30, Lynnwood Loamy Sand, which the SCS also classifies as a member of Hydrologic Group A. According to the Stormwater Management Manual for the Puget Sound Basin the soils present at the site, which are classified as a Loamy Sand, also fall within Hydrologic Soil Group A.

We recommend the piezometers be read again this winter to verify the seasonal high water level. Once the seasonal high water level has been established the detention facilities can be final designed by Higa Engineering, Inc.

General Site Development

We make the following recommendations for general site development, in addition to the storm water detention design information provided above. Note that these recommendations are based on the limited scope of subsurface exploration performed as a part of our geotechnical services for this project. Additional subsurface explorations may be necessary once specific site development plans are determined, or if the nominal foundation dimensions indicated below are exceeded.

Site Preparation

All topsoil and other organic or soft material must be striped away from areas to be occupied by building foundations, paved areas, or other structural improvements. Based on our test pit explorations, we estimate that the stripping depth will be about ½ to 1 foot. Note that there could be isolated areas with deeper pockets of organic material (root balls, etc.), old building foundations, abandoned utilities, or unsuitable materials beneath existing structures that will have to be removed. All structural improvements should be founded on firm, non-organic, native soils or on structural fill placed on a properly prepared subgrade.

Fill and Compaction

We have assumed that some structural fill may be required beneath structures and/or paved areas. Structural fill may also be required to obtain proper elevation for the design of storm water detention facilities or to promote positive surface drainage away from structures. Structural fill used to obtain final grade elevations for footings and other structural improvements (pavements, floor slabs, etc.), must be properly placed and compacted.

Structural fill can be any non-organic, predominantly granular soil that is placed in maximum 8- to 10- inch loose, horizontal lifts and compacted to 95% of maximum dry density as determined by the ASTM D-1557 test procedure. The on-site native, non-organic, sandy soils could be used as structural fill provided the moisture content can be properly controlled and adequate compaction can be achieved.

Foundations

The on site soils will support moderately light structures using conventional shallow spread footings. Typical, 1 to 2 story, wood-frame structures without heavy column loads would be considered moderately light structures. Due to the limited depth and coverage of our test pits, an evaluation of foundations for heavier loaded structures was beyond the scope of this study.

For moderately light structures, conventional shallow spread foundations proportioned in accordance with the Uniform building code (UBC) will perform satisfactorily on a properly prepared subgrade in firm, non-organic, native soils or structural fill. Wall footings and column footings should have minimum dimensions of 18 inches and 24 , respectively. Continuous footings should not exceed 2 feet in width and isolated spread footings should not exceed 4 feet by 4 feet. These maximum dimensions are appropriate for the depth of subsurface exploration performed in our investigation of the property. These footings may be proportioned using a maximum bearing capacity of 2000 pounds per square foot (psf). All footings should be founded a minimum of 18 inches below the lowest adjacent grade for frost protection. Please note that test pit coverage was not extensive since the site layout is still in the preliminary planning stages. Once site development plans are known, it may be necessary to excavate additional test pits at known building locations or drill borings if heavy foundation loads will be part of the design.

Drainage

We recommend that an exterior footing drain system be constructed around the perimeter of all building foundations. The footing drain system is typically constructed with a perforated or slotted pipe placed in clean, free-draining gravel with less than 3% by weight passing the U.S. No. 200 sieve size, based on a wet sieve analysis of that portion passing the U.S. No. 4 Sieve. The perforated or slotted pipe should be placed at or below the level of the base of the footings and 1/2 foot outside the footings. Based on the sandy native soils present on the site, we recommend surrounding the footing drain system with a separation geotextile (Mirafi 4NP or equivalent). If fine-grained soils such as silts or clays are encountered at foundation level, we recommend against the use of a separation geotextile, since fine grained soils can clog geotextiles and make them inoperable.

The footing drains should discharge to the storm drainage system for the property. Roof drainage must not be introduced into the perimeter footing drain, but should be discharged separately to the storm drainage system by tightline. The final ground surface should be graded away from the building to promote surface runoff away from the footing drain system.

Erosion Control

Erosion control during construction of the proposed facilities can be accomplished through placement of proper sedimentation control facilities. We recommend siltation control facilities, consisting of either hay bales or silt fences, be fabricated around the construction areas. Typical details for siltation control facilities using either hay bales or silt fences are attached to this report.

Siltation devices should be placed down gradient of all construction areas and cleared areas to provide siltation control during construction. All siltation control devices should be maintained in operable condition during construction, and left in operable condition until the site has been revegetated and siltation is no longer a threat. At that time the siltation facilities should be removed.

We appreciate the opportunity to be of assistance to you on this project. We will be glad to discuss a scope of work for monitoring and reporting on the water levels in the piezometers installed at the site, at your request. If final plans require additional geotechnical studies we would be pleased to provide a proposal to perform the work. If you have any questions regarding the contents of this report, or if we can be of further assistance, please contact our office.

Sincerely,

Western Geotechnical Consultants, Inc.

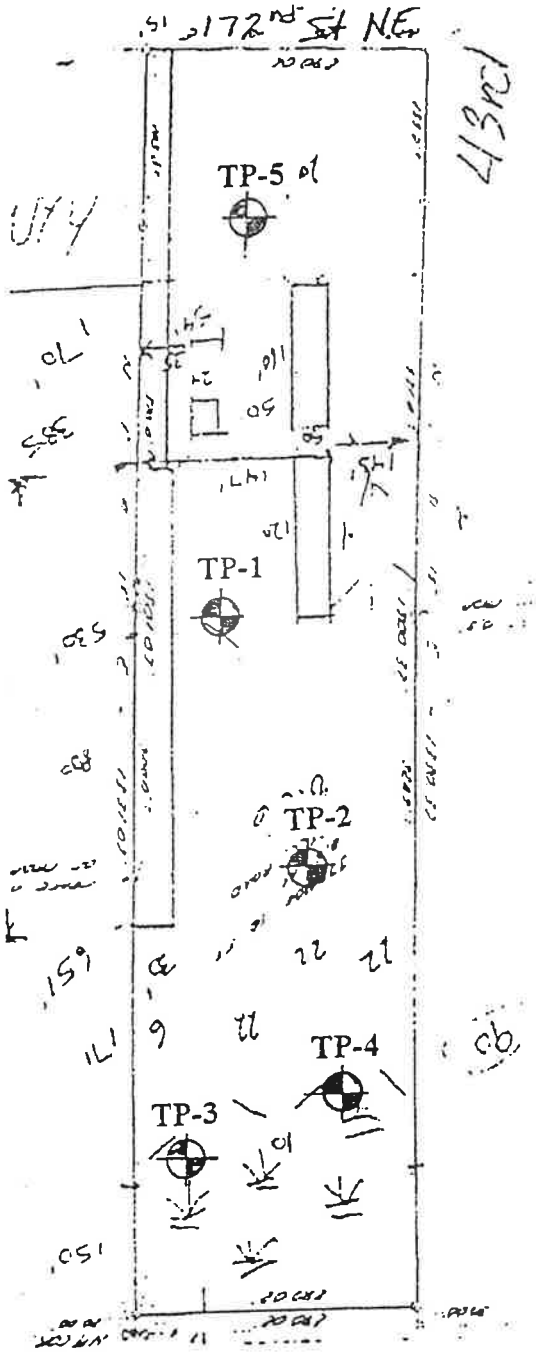
Theodore A. Hammer, P.E.
Geotechnical Engineer

Attachment: Figure 1, Site Plan Sketch
USCS Classification Chart
Tabulated Test Pit Logs
Typical Erosion Control Facilities

cc: Higa Engineering, Inc.

File:20181

Figure 1
Site Plan & Test Pit Locations
SW Quadrant From the Intersection of 43rd Ave. NE and 172nd St. NE
Section 28, T31N, R05E, WM
Snohomish County, WA



(Approximate Scale 1"=200')

North

Figure Source: Higa Engineering, Inc.
Everett, WA

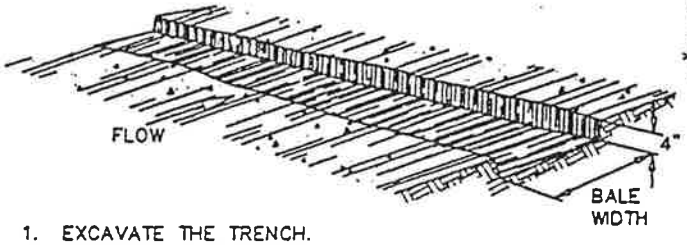
Log of Test Pits

			Table A-1 Log of Test Pits		File: Turner	
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Pocket Pen. (Kg/sq. cm)
1	0.0-0.5	OL/ML	Dark brown, organic-rich sandy SILT (moist, soft) (topsoil and root zone)	1-1/0.5	21.9	
	0.5-2.2	ML/SM	Brown, sandy SILT to silty SAND (compact, moist)	1-2/1.5	18.9	
	2.2-7.0	SP	Light brown, fine to medium SAND with trace gravel (compact, moist) (grades brownish-gray with coarse sand and occasional gravel, and wet at 5')	1-3/3.5 1-4/5.0	9.8 19.3	

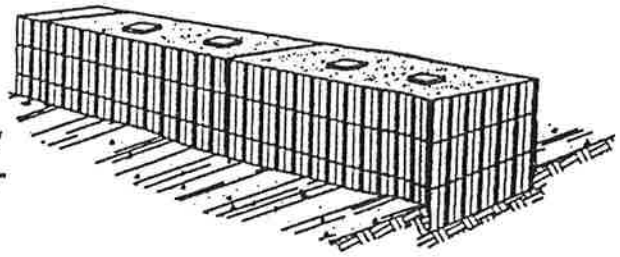
Notes:
- Test Pit terminated on 2/25/00 at 7.0 feet
- Test Pit loosely backfilled upon completion
- Ground water seepage encountered at 5.0 feet
- Piezometer installed to 7 feet

			Table A-1 Log of Test Pits		File: Turner	
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Pocket Pen. (Kg/sq. cm)
2	0.0-0.5	OL/ML	Dark brown, organic-rich sandy SILT (moist, soft) (topsoil and root zone)			
	0.5-2.5	ML/SM	Brown, sandy SILT to silty SAND (compact, moist)	2-1/1.5	29.0	
	2.2-5.5	SP	Brownish-gray, fine to medium SAND with trace gravel (compact, moist) (grades coarse sand and occasional gravel, wet at 5')	2-2/3.0 2-3/5.0	15.6 19.7	

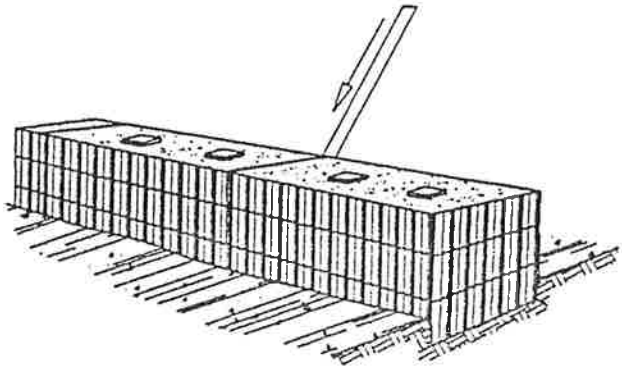
Notes:
- Test Pit terminated on 2/25/00 at 5.5 feet
- Test Pit loosely backfilled upon completion
- Ground water seepage encountered at 4.8 feet
- Piezometer installed to 5.5 feet



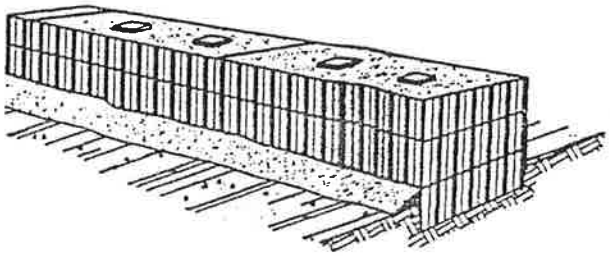
1. EXCAVATE THE TRENCH.



2. PLACE AND STAKE STRAW BALES.



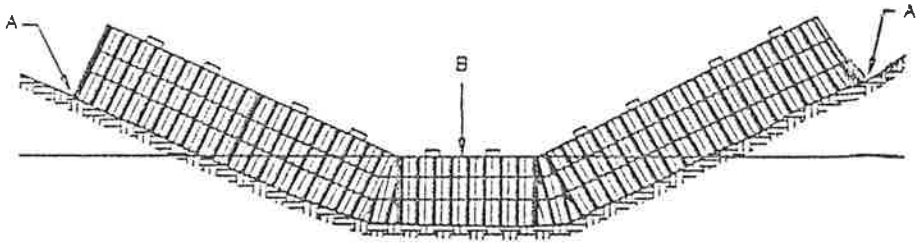
3. WEDGE LOOSE STRAW BETWEEN BALES.



4. BACKFILL AND COMPACT THE EXCAVATED SOIL.

CONSTRUCTION OF A STRAW BALE BARRIER

NOT DRAWN TO SCALE



POINTS A SHOULD BE HIGHER THAN POINT B

PROPER PLACEMENT OF STRAW BALE BARRIER IN DRAINAGE WAY

NOT DRAWN TO SCALE

JOB NO.:	**Western Geotechnical Consultants, Inc.**	SEDIMENT CONTROL STRAW BALE BARRIER
DESIGNED BY:		
DRAWN BY:	*4181 Saltsprings Drive • Ferndale, WA 98248*	
CHECKED BY:	*Phone (360) 380-2507 • Fax (360) 380-2507*	DATE: SCALE: H: N/A V: N/A