Western Geotechnical Consultants, Inc.

May 22, 2003 4183 Saltsprings Dr., Ferndale, WA 98248
Phone/FAX (360)380-2507

Ramo Construction & Realty, Inc.
16404 35th Ave. NE, Suite 201
Arlington, WA 98223
Attn: Bob Vaden

Re: Report – Geotechnical Engineering Investigation
The Park at Smokey Point, Lot 6
Arlington, WA

Western Geotechnical Consultants, Inc. is pleased to present the results of our geotechnical engineering investigation conducted at the above referenced property. Our understanding of the project is based on a site plan showing the development (see Figure 1), provided to us by Higa-Burkholder Associates, LLC. The property will be developed with a one- to two-story building complex surrounding an artificial pond that will also serve as a detention facility. Parking will be provided along the perimeter of the site. Additional stormwater infiltration facilities will be incorporated into the parking areas.

The purpose of our investigation was to characterize and evaluate the subsurface conditions at the site with respect to geotechnical issues affecting the proposed development. The specific scope of our investigation for the site included the following services:

- Excavating 11 test pits at the site to obtain representative subsurface information and soil samples for testing.
- Developing tabulated logs for each test pit as to the thickness and depth of each soil unit and describing the soils encountered in accordance with the Unified Soil Classification System (USCS).
- Performing field and laboratory testing, as required, for use in our engineering evaluation of the site.
- Preparing an engineering report including a summary of work performed, a description of the subsurface conditions encountered, and our recommendations for:
  - General site development including rough stripping criteria.
  - Structural fill criteria including the suitability of on site materials for use as structural fill.
  - Foundation design including allowable bearing pressures and settlement estimates
  - Floor slab support
  - Drainage considerations
  - Pavement Design
  - Construction monitoring

MJ-03-042

Site Conditions

Surface Conditions

The majority of the site is covered with grasses and a few trees. The easterly middle portion of the site is presently being used for some equipment and material storage on a slightly raised fill pad. There is also a building in this portion of the property. The topography of the site is relatively flat, but it appears that the ground surface elevations on the property are generally lower along 168th Place NE that bounds the north side of the project site.

Subsurface Conditions

Subsurface conditions at the site were explored on May 14, 2003 using a rubber tire backhoe with a two-foot-wide bucket. A total of 11 test pits were excavated to a maximum depth of 9 feet. The locations of the test pits are shown on Site Plan, Figure 1. A Geotechnical Engineer from our office continuously logged and classified the soils encountered in the test pits using the Unified Soils Classification System (USCS), and obtained representative samples of the soils for further analyses and testing. Edited, tabulated test pit logs are included with this report along with a USCS Chart explaining soil descriptions. The test pits were loosely backfilled upon completion of the explorations.

The subsurface explorations revealed relatively uniform subsurface soil conditions across the site below the topsoil layer and fill at some locations. The subsurface profile consists of organic and sandy SILTS (OL/ML) to silty SANDS (SM) at the surface, that constitute the topsoil and root zone. This layer ranged from about 6 to 12 inches thick in the test pit locations. In the storage area in the eastern-middle portion of the site a surface of apparent Asphalt Treated Base or gravel surface is present. Fill was encountered in some of the test pits to depths on order of 18 inches below the surface. This fill consists of silty SANDS (SM by the USCS) with occasional organic material. The native, non-organic soils encountered below the topsoil and/or fill, where encountered, consist of slightly silty SANDS (SM/SP by the USCS) that graded coarser with depth to medium SANDS (SP by the USCS) near the bottom of the test pits. These soils were generally in a compact and moist to wet condition. It appeared that coarser soils are present at shallower depths along the north side of the property.

Groundwater

Groundwater seepage was observed near the bottom in all of the test pits, except Test Pit 7, which was only excavated to a depth of 4 feet. Seepage was encountered in the medium SANDS (SP by the USCS) and was relatively shallow in the test pits on the north side of the property (see logs of test pits). Based on soil coloration in these test pits, a groundwater table may have periodically formed at an elevation as high as 4 feet below present grade.

Piezometers were installed in several of the test pits for future groundwater monitoring, as indicated on the test pit logs. Piezometers were not installed in all of the test pits because piezometers had previously been installed in several test pits excavated at the site by Ramo Construction.

Conclusions and Recommendations

General

Based on our site investigation, we conclude the site will be suitable for the type of development planned from a geotechnical standpoint, provided our recommendations are followed and good construction practices are used. Conventional, shallow column (spread) and continuous wall footings will provide adequate support for the proposed buildings, subject to the possible impacts of liquefaction as indicated below.

Liquefaction Potential

The site is located in Earthquake Intensity Zone 3 according to the Uniform Building Code (UBC). Zone 3 seismic loading can cause intense ground motion amplification. The soils encountered in our shallow test pit would have a low potential for liquefaction since they are either sufficiently compact or of a coarse enough gradation not to be susceptible to liquefaction. Note, however, that finer and looser, saturated granular soils that would be susceptible liquefaction may be present below the depth of our test pit investigation. The surface effects of liquefaction would depend on the depth and thickness of these soils. Since the site is relatively flat, the principal effect of liquefaction, if it were to occur, would be to cause differential settlements in the building foundations. This would have the greatest impact on isolated, column footings.

Infiltration Rate

We determined the infiltration rate for representative soils encountered in our test pits at the site in accordance with "Method 2, ASTM Gradation Testing at Full Scale Infiltration Facilities" of Section 3.3.5, "Design Infiltration Rate Determination – Guidelines and Criteria" per the August 2001, Stormwater Management Manual for Western Washington. Samples taken from Test Pits 5 and 10 were tested, since these test pits were closest to the areas where infiltration facilities are planned. The soils were classified in the field and are indicated on the test logs as slightly silty, fine SANDS (SM/SP by USCS) grading to medium to coarse SANDS (SP by the USCS). Grain size analyses of these samples were performed to determine the d_{10} size, or that size of particles for which 10 percent of the sample is smaller, in order to use Table 3.8 of the Stormwater Manual. The Soil Gradation Curves are attached as Figures 2 through 6.

Based on this information, an estimated long-term (design) infiltration rate of 0.8 inches /hour was determined for the native soils below the topsoil layer to a depth of about 3 feet and 2 inches/hour was determined for the native soils below about 3 feet in accordance with Table 3.8 of the Stormwater Manual. Subject to the requirements of this section of the Stormwater Manual, we recommend that these values be used for infiltration design for the slightly silty, fine SANDS (SM/SP by the USCS) to medium SANDS (SP by the USCS) encountered below the topsoil layer in Test Pits 5 and 10. Note that the infiltration rate increases with depth as the soils become coarser.

Site Preparation

All topsoil, organics, soft material, existing fill and any other deleterious materials must be striped away from the areas to be occupied by structural improvements. Based on the test pit exploration, we estimate that the stripping depth on the property will vary from about 6 to 18 inches with an average stripping depth of about 1 foot. It will be important to verify that all organic or other unsuitable materials are removed during striping of the site, including existing building foundations and fill soils.

The exposed subgrade under all areas to be occupied by structural fill or structural improvements should be inspected by a qualified geotechnical engineer following stripping and site excavations. Hand push probing and/or proof-rolling with appropriate compaction equipment (loaded dump truck of equivalent) may be necessary to detect possible localized zones of soft of loose soil within the subgrade.

It will be important to completely remove the foundations and floor slabs and any other buried structures from the existing development on the property and replace them with structural fill. The soils loosely backfilled in the test pits should also be removed and replaced with structural fill.

The soils below the stripping depth should exhibit no significant shrinkage or swelling with seasonal changes in moisture content. However, some of the siltier soils near the surface are moisture sensitive and could soften when wet and disturbed by construction equipment. Therefore, earthwork operations will be easier and less costly if performed during the dry season.

Structural Fill and Compaction

Structural fill is defined as fill supporting buildings, sidewalks, driveways, etc. All structural fill used to replace unsuitable soils or to raise the site grade should be placed and compacted on a horizontal subgrade surface. Structural fill should extend beyond the edge of building foundations a distance equal to the thickness of the fill beneath the foundation.

In general, the suitability of a soil for use as compacted structural fill depends on the gradation and moisture content of the soil when it is placed. As the quantity of fines (that portion finer than the No. 200 sieve) increases, the soils become increasingly sensitive to small changes in moisture content and adequate compaction becomes more difficult to achieve. Soils containing more than about 5% fines cannot be consistently compacted to a dense, non-yielding condition when the water content is much greater than optimum. Optimum moisture content is the moisture content that results in the greatest dry density.

The on-site, relatively clean sands (SP and SP/SM by the USCS) may be suitable for use in the project development, if available during site grading. We recommend that import fill consist of relatively clean sandy GRAVEL with less than 5% fines (GW by Unified Soils Classification System (USCS).

Fill should be placed in maximum 8- to 10-inch loose, horizontal lifts and be thoroughly compacted. Under all building foundations, structural fill should be compacted to a minimum of 95% of maximum dry density as determined by the ASTM D-1557 test procedure. Under sidewalks and drive areas, the structural fill should be compacted to a minimum of 92%, except for the top 2-feetfoot, which should be a minimum of 95%.

Building Foundation Support

Based on subsurface exploration, the site will be suitable for foundation support using conventional shallow spread footings. The building foundations should be supported on isolated spread and continuous footings founded on compact, undisturbed native, non-organic silty SANDS (SM/SP) or compacted granular structural fill. Bearing soil that is disturbed during foundation excavation should be re-compacted or removed and replaced with structural fill. All soil directly below and around footings should be compacted to at least 95% of maximum dry density (ASTM D-1557) prior to placement of forms or reinforcing steel. All continuous and isolated spread footings should have minimum widths of 18 and 24 inches, respectively, and should be founded a minimum of 18 inches below final grade for frost protection. All footings supported on properly prepared native non-organic, silty SANDS or structural fill may be proportioned using a net allowable bearing pressure of 2,500 pounds per square foot (psf). The term net allowable bearing pressure refers to the pressure that can be imposed on the soil at foundation level due to the total of all dead plus live loads, exclusive of the weight of the footing or any backfill placed above the footing. This bearing pressure may be increased by a value of one-third for transient wind or seismic loading.

Note that our subsurface investigation of the property was performed using a conventional backhoe and assumes moderately light loads. In that respect we have assumed that perimeter footings will not exceed 2 feet wide and column footing dimensions will not exceed 3 feet by 3 feet when the footings are proportioned using the net allowable bearing pressure of 2,500 psf.

Settlement of spread footing foundations depends on the foundation size and bearing pressure as well as the strength and compressibility characteristics of the underlying bearing soils. Assuming construction is accomplished as recommended above and for the loads anticipated, we estimate total settlement of the foundation should be less than one inch and differential settlement between two adjacent load bearing components supported on competent soils should be less than about half the total settlement estimate. Most of the settlement should take place relatively rapidly during construction as loads are applied. We recommend that footing excavations be observed by a geotechnical engineer to confirm that design assumptions are met.

Floor Slab Support

We have assumed that the lower level of the town houses may have earth supported floor slabs. Preparation of the building areas in a manner described in the previous sections of this report should provide an adequate base for the floor slab support. We recommend that all earth-supported floor slabs be underlain by a minimum of four inches of sand or clean crushed gravel, which will act as a capillary break to prevent moisture wicking to the slab. The capillary break should be placed over a minimum of six inches of compacted structural fill or the undisturbed firm native material. A vapor barrier, consisting of polyethylene sheeting, may be placed below the floor slab. If a vapor barrier is used, it should be covered with a thin layer of clean sand or crushed gravel to protect it during concrete placement and to aid in concrete curing. After the sand or crushed gravel layer is placed, it should be maintained in a relatively dry condition.

It is important that drainage is provided such that the 4-inch capillary layer located below the vapor barrier will drain via gravity from beneath the floor slab. This can be accomplished by installing 2-inch diameter PVC pipes through the stem wall that outlet into the footing drain system or by extending the capillary break layer below the footing.

In addition, the Portland Cement Association recommends the following, "... to prevent problems with floor covering materials caused by the concrete itself, the following steps should be taken (*Design and Control of Concrete Mixture*, Portland Cement Association, 13th Ed.):

- use low water-cement ratio concrete,
- moisture-cure the slab for five to seven days,
- allow the slab a two of more month drying period, and
- test the slab moisture condition before installing a floor covering."

Parking Lot Pavement Sections

Some of the important factors that affect the durability of pavement surfacing include stability and permeability of the subgrade soils and base materials, the presence of ground water, the traffic volume, and the frequency of heavy truck traffic. Since pavement design factors are not well defined for the project, we are providing typical pavement sections based on observed subgrade soil conditions.

Fill placement to obtain final pavement subgrade elevation should be accomplished as previously described for placement of structural fill. On the basis of our review of site soil conditions, a minimum CBR value of 10 has been assumed for the native, compact sandy soils (SM/SP and SP by USCS) encountered in our test pit investigation below the topsoil and uncontrolled fill materials at the site. This value is based on correlation of soil type and our experience at sites with similar soil conditions.

The pavement section should be installed over firm/compact subgrade. Following excavation and/or filling to establish subgrade elevation, but immediately prior to paving, the subgrade surface should be proof rolled with a loaded 10 cubic yard dump truck, or equivalent, to verify that the subgrade is in a firm condition. Any soft areas exposed by the proof rolling that cannot be easily compacted should be over-excavated and backfilled with compacted granular fill.

We assume that most of the paved areas on the site will be used primarily for cars and light trucks, except that portion of the paved areas, such as entrance lanes that would need to be designed to accommodate heavier trucks. In the lighter loaded areas, we assume that occasional heavier trucks may use portions of the site for deliveries, etc. Typical recommended pavement sections for car and light truck parking consists of a minimum of 2 inches of asphalt over at least 4 inches of crushed rock base on a properly prepared subgrade. Two inches of asphalt treated base (ATB) could be substituted for the 4 inches of crushed rock. Areas where heavy truck loading will be present should consist of a minimum of 3 inches of asphalt over 5 inches of crushed rock base or 2.5 inches of ATB. These pavement sections should be confirmed based on the conditions observed during site grading.

The pavement sections provided above are recommended by the Asphalt Institute, IS-91, "Full Depth Asphalt Pavements for Parking Lots, Service Stations and Driveways". The design of pavement sections may be refined if vehicle loading, frequency and duration are known along with pavement design life. Base course materials should be compacted to a minimum 95 percent of maximum dry density, as determined by the ASTM D-1557 test procedure. Asphalt concrete should be Class B aggregate material conforming to Section 5-04 of the Washington State Department of Transportation (WSDOT) Standard Specifications. Crushed rock should be 5/8-inch minus meeting the requirements of Section 9-03.4(2) of the WSDOT specifications.

Drainage and Grading Considerations

We recommend that footing drains be placed around the perimeter of building foundations. The drains should be placed below the base of the foundations. The drains should consist of a 4-inch diameter perforated pipe surrounded by washed rock. Due to the likelihood of fine-grained soils such as silts at the foundation level, we recommend against the use of a separation geotextile, since fine-grained soils can clog the geotextile and make the drain system inoperable. The perforated pipe should be placed a minimum of 2 inches below the base of the footings and ½ foot outside of the footings.

The footing drains should discharge to the storm drainage system. Roof drainage should be discharged separately and not introduced into the footing drain system.
The ground surface around buildings should be graded so that storm water runoff is directed away from buildings and foundations.

Erosion Control

Erosion control during construction of the proposed development 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 area. Typical details for siltation control using either hay bales or silt fences are attached to this report.

Siltation devices should be placed downgradient of all construction areas and cleared areas to provide siltation control during construction. All siltation control devices should be maintained 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.

Construction Monitoring

We should review the site development plans, including foundation design and earthwork plan, prior to construction to ensure compliance with our recommendations. Qualified personnel should be present during construction to inspect the exposed subgrade before any placement of structural fill or forming begins for building foundations.

Qualified personnel should also be present during placement of any fill and compaction activities to verify that the required soil compaction is obtained. Gradation of fill and drainage materials should also be checked for conformance with our recommendations.

Closure

This report is intended for use by Ramo Construction and their representatives in the development of Lot 6 for the Park at Smokey Point. It should not be used for any other purposes or other project sites without the specific consent of Western Geotechnical Consultants, Inc.

Our test pit logs show subsurface conditions at the dates and locations indicated. The analysis, conclusions, and recommendations contained in our report are based on site conditions to the limited depth of our test pits at the time of our investigation. We assume that the exploratory test pits are representative of the subsurface conditions throughout the site. If during construction, different subsurface conditions from those encountered during our explorations are observed or appear to be present in excavations, we must be advised promptly so that we can review these conditions and reconsider and/or modify our recommendations and conclusions where necessary.

We appreciate the opportunity to be of assistance to you on this project. If you have any questions regarding the contents of this report, or if we can be of further assistance, please contact our office.

Sincerely,

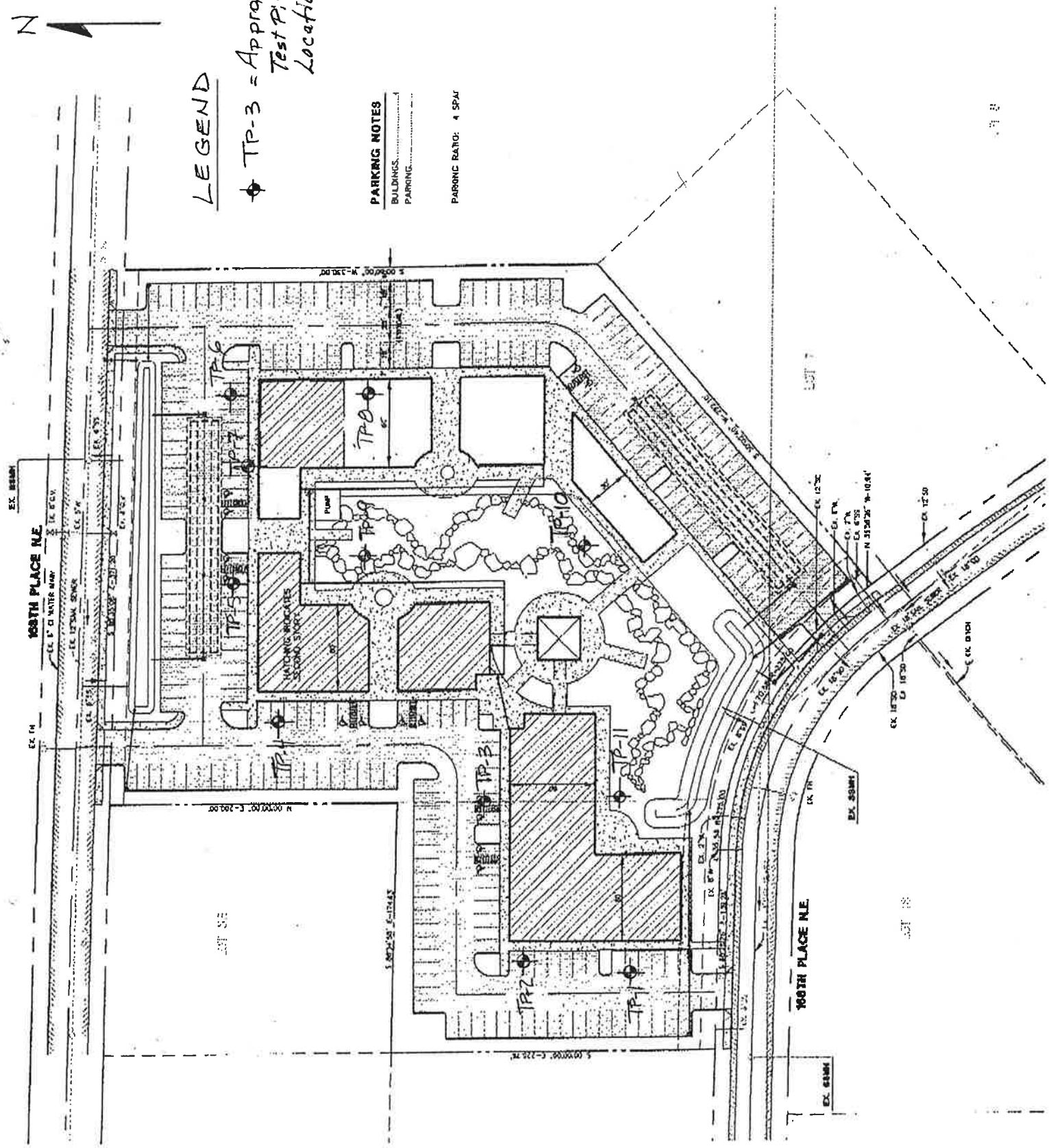
Western Geotechnical Consultants, Inc.

Theodore A. Hammer, P.E.
Geotechnical Engineer

Attachments: Figure 1, Site Plan and Test Pit Locations
Unified Soil Classification Chart
Tabulated Test Pit Logs
Figures 2 through 6 – Soil Gradation Curves
Typical Erosion Control Facilities

File:03811

Figure 1
Site Plan & Test Pit Locations
Lot 6, The Park at Smokey Point
Arlington, Washington



USCS Classification Chart & Key to Test Pit Logs

UNIFIED SOIL CLASSIFICATION CHART (USCS)

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES) <5%		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES) <12%		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES) <5%		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES) <12%		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS RO CLAYEY SILTS WITH SLIGHY PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

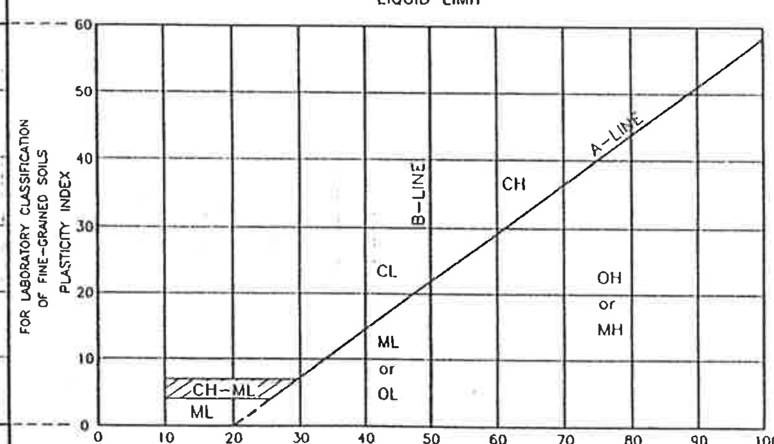
GRADATION CHART

MATERIAL SIZE		PARTICLE SIZE			
		LOWER LIMIT		UPPER LIMIT	
		MILLIMETERS	SIEVE SIZE	MILLIMETERS	SIEVE SIZE
SAND	FINE	.074	#200 •	0.42	#40 •
	MEDIUM	0.42	#40 •	2.00	#10 •
	COARSE	2.00	#10 •	4.76	#4 •
GRAVEL	FINE	4.76	#4 •	191	3/4" •
	COARSE	191	3/4" •	762	3" •
COBBLES		76.2	3" •	304.8	12" •
BOULDERS		304.8	12" •	914.4	

• U.S. STANDARD • CLEAR SQUARE OPENINGS

5-12% FINES (SILT & CLAY) DUAL CLASS

PLASTICITY CHART



Western Geotechnical Consultants, Inc.
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Key to Test Pit Logs Using the Unified Soil Classification System

DATE: 5/11/95 SCALE: H: N/A V: N/A

A:TEST PITS

Test Pit Logs (revised 5/27/03)

			Table A-1 Log of Test Pits		file:03811.doc	
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Pocket Pen. (Kg/sq. cm)
1	0-0.5	OL/SM	Brown, organic SILT to silty SAND (root zone) (relatively loose, moist)			
	0.5-3.0	SM/SP	Light brown with orange mottling, silty fine SAND (compact, moist)	1-1/1.0 1-2/2.5	15 17	
	3.0-8.0	SP	Brown, fine SAND with occasional gravel (compact, moist) -grades gray, very moist at 5' -grades coarser, increased gravel at 7'	1-3/3.0 1-4/7.0	6 15	

Notes:

- Test Pit terminated on 5/14/03 at 8 feet
- Groundwater seepage at 7.5'
- Piezometer not installed
- Test Pit loosely backfilled upon completion

			Table A-1 Log of Test Pits		file:03811.doc	
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Pocket Pen. (Kg/sq. cm)
2	0-0.7	OL/SM	Brown, organic SILT to silty SAND (root zone) (relatively loose, moist)			
	0.7-1.5	SM (FILL)	Light brown with orange mottling, silty fine SAND (compact, moist)			
	1.5-9.0	SP	Brown, fine SAND with occasional gravel (compact, moist) -grades gray-brown at 3' -grades gray, coarser sand with increased gravel at 5'	2-1/2.0 2-2/3.5 2-4/5.0	18 8 14	

Notes:

- Test Pit terminated on 5/14/03 at 9 feet
- Groundwater seepage and caving at 7'
- Piezometer installed to 9 feet
- Test Pit loosely backfilled upon completion

			Table A-1 Log of Test Pits		file:03811.doc	
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Pocket Pen. (Kg/sq. cm)
3	0-0.7	OL/SM	Brown, organic SILT to silty SAND (root zone) (relatively loose, moist)			
	0.7-1.5	SM (FILL)	Light brown with orange mottling, silty fine SAND; some organics			
	1.5-2.5	SM/SP	Orange-brown, silty SAND (compact, moist)	3-1/2.0	13	
	2.5-7.0	SP	Gray-brown, fine to medium SAND with occasional gravel (compact, moist) -grades gray at 5'	3-2/3.0 3-3/6.5	8 14	

Notes:

- Test Pit terminated on 5/14/03 at 7 feet
- Groundwater seepage and caving at 6.5'
- Piezometer installed to 7 feet
- Test Pit loosely backfilled upon completion

			Table A-1 Log of Test Pits		file:03811.doc	
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Pocket Pen. (Kg/sq. cm)
4	0-1.0	OL/SM	Brown, organic SILT to silty SAND (root zone) (relatively loose, moist)			
	1.0-2.5	SM/SP	Orange-brown, slightly silty SAND (compact, moist)	4-1/2.0	11	
	2.5-7.0	SP	Gray-brown, fine to medium SAND with occasional gravel (compact, moist) -grades gray at 5' -grades coarser sand with gravel at 7'	4-2/3.5 4-3/7.0	19 13	

Notes:

- Test Pit terminated on 5/14/03 at 7 feet
- Groundwater seepage and caving at 7'
- Piezometer not installed
- Test Pit loosely backfilled upon completion

			Table A-1 Log of Test Pits			file:03811.doc
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Pocket Pen. (Kg/sq. cm)
5	0-0.5	SM	Brown-dark brown, silty SAND (root zone) (relatively loose, moist)			
	0.5-6.0	SP	Gray-brown, with orange staining, fine SAND (compact, moist-very moist) -grades fine to medium SAND at 2.5'; gray, medium SAND at 5.5'	5-1/1.5 5-2/3.5 5-3/5.5	16 21 16	

Notes:

- Test Pit terminated on 5/14/03 at 6 feet
- Groundwater seepage and caving at 4'
- Piezometer not installed
- Test Pit loosely backfilled upon completion

			Table A-1 Log of Test Pits			file:03811.doc
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Pocket Pen. (Kg/sq. cm)
6	0-0.5	ML	Brown-dark brown, sandy SILT (root zone) (relatively loose, moist)			
	0.5-4.5	SP	Brown, fine SAND (compact, moist) - grades gray-brown, fine to medium SAND with gravel at 3'; gray at 3.5'; saturated at 4'	6-1/1.5 6-2/3.5	7 13	

Notes:

- Test Pit terminated on 5/14/03 at 4.5 feet
- Groundwater seepage and caving at 4'
- Piezometer not installed
- Test Pit loosely backfilled upon completion

			Table A-1 Log of Test Pits		file:03811.doc	
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Pocket Pen. (Kg/sq. cm)
7	0-1.0	OL/SM	Brown-dark brown, organic and silty SAND (root zone) (relatively loose, moist)			
	1.0-4.0	SM/SP	Orange-brown, slightly silty, fine SAND (compact, moist) -grades fine to medium SAND at 3'	7-1/2.0 7-2/3.5	19 7	

Notes:

- Test Pit terminated on 5/14/03 at 4.0 feet
- No Groundwater seepage or caving observed
- Piezometer not installed
- Test Pit loosely backfilled upon completion

			Table A-1 Log of Test Pits		file:03811.doc	
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Pocket Pen. (Kg/sq. cm)
8	0-0.5		Asphalt Treated Base			
	0.5-0.8	OL/SM	Brown, slightly silty and organic fine SAND			
	0.8-2.5	SM/SP	Orange-brown, slightly silty fine SAND with occasional gravel (compact, damp)	8-1/1.5	14	
	2.5-7.5	SP	Gray-brown, fine to medium SAND with occasional gravel (compact, damp to moist) -grades gray at 5'; coarser, increase gravel	8-2/3.0 8-3/5.0	11 23	

Notes:

- Test Pit terminated on 5/14/03 at 7.5 feet
- Groundwater seepage and caving at 7'
- Piezometer not installed
- Test Pit loosely backfilled upon completion

			Table A-1 **Log of Test Pits**		file:03811.doc	
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Pocket Pen. (Kg/sq. cm)
9	0-0.8	OL/SM	Dark brown, silty SAND (topsoil and root zone) (relatively loose, moist)			
	0.8-2.5	SM/SP	Orange-brown, slightly silty, fine SAND (compact, moist)	9-1/2.0	8	
	2.5-7.5	SP	Gray-brown, fine to medium SAND with occasional gravel (compact, damp to moist) -grades gray at 5', coarser sand, increase gravel	9-2/3.0 9-3/7.0	8 12	

Notes:

- Test Pit terminated on 5/14/03 at 7.5 feet
- Groundwater seepage at 7.5'
- Piezometer installed
- Test Pit loosely backfilled upon completion

			Table A-1 **Log of Test Pits**		file:03811.doc	
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Pocket Pen. (Kg/sq. cm)
10	0-0.5	OL/SM	Dark brown, organic and silty SAND (topsoil and root zone) (relatively loose, moist)			
	0.5-1.5	SM/SP	Orange-brown, slightly silty, fine SAND (compact, moist)	10-1/1.0	19	
	1.5-8.0	SP	Gray-brown, fine SAND with occasional gravel (compact, damp to moist) -grades fine to medium SAND at 3'; gray, coarser, very moist at 5'	10-2/3.0 10-3/6.0	10 20	

Notes:

- Test Pit terminated on 5/14/03 at 8.0 feet
- Caving observed at 5'; Groundwater seepage at 7'
- Piezometer installed
- Test Pit loosely backfilled upon completion

			Table A-1 **Log of Test Pits**		file:03811.doc	
Test Pit No.	Depth Interval (feet)	USCS Class.	Soil Description	Sample No./ Depth (feet)	Water Content (%)	Pocket Pen. (Kg/sq. cm)
11	0-0.8	OL/SM	Dark brown, organic and silty SAND (topsoil and root zone) (relatively loose, moist)			
	0.8-3.0	SM/SP	Orange-brown, slightly silty, fine SAND (compact, moist)	11-1/2.0	13	
	3.0-7.5	SP	Gray-brown, fine to medium SAND with occasional gravel (compact, damp to moist)	11-2/3.5	7	
			-grades gray, coarser, very moist at 5.5'	11-3/6.5	12	

Notes:

- Test Pit terminated on 5/14/03 at 7.5 feet
- Groundwater seepage and caving observed at 7'
- No piezometer installed
- Test Pit loosely backfilled upon completion

FILE
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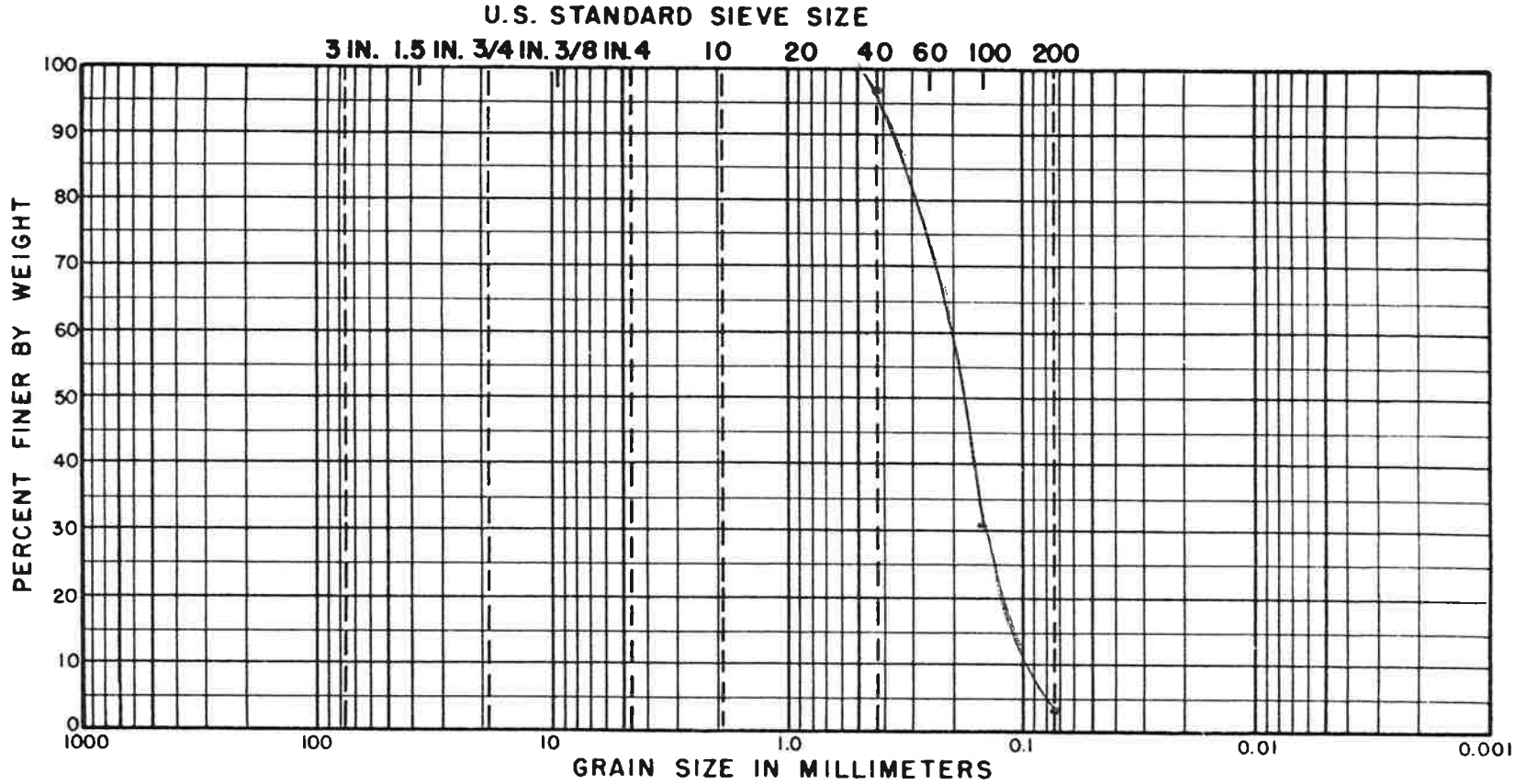
REVISIONS
BY DATE
BY DATE
PLATE OF



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
TP-5/S-1	1.5'	SP	Fine SAND					$D_{10} = 0.09$

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GRADATION CURVE

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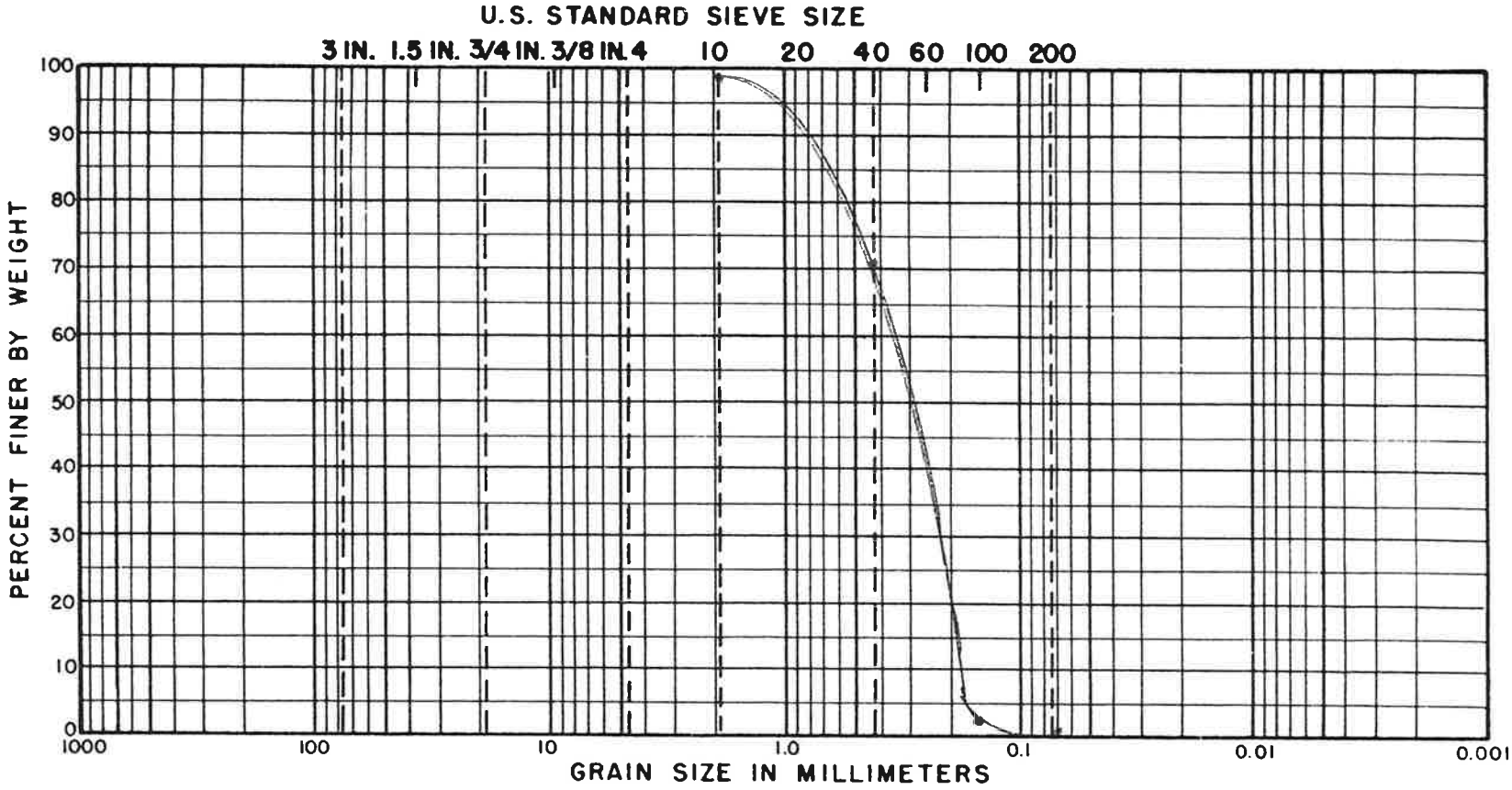

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
TP-5/S-2	3.5'	SP	Fine-Medium SAND					$D_{10} = 0.17$

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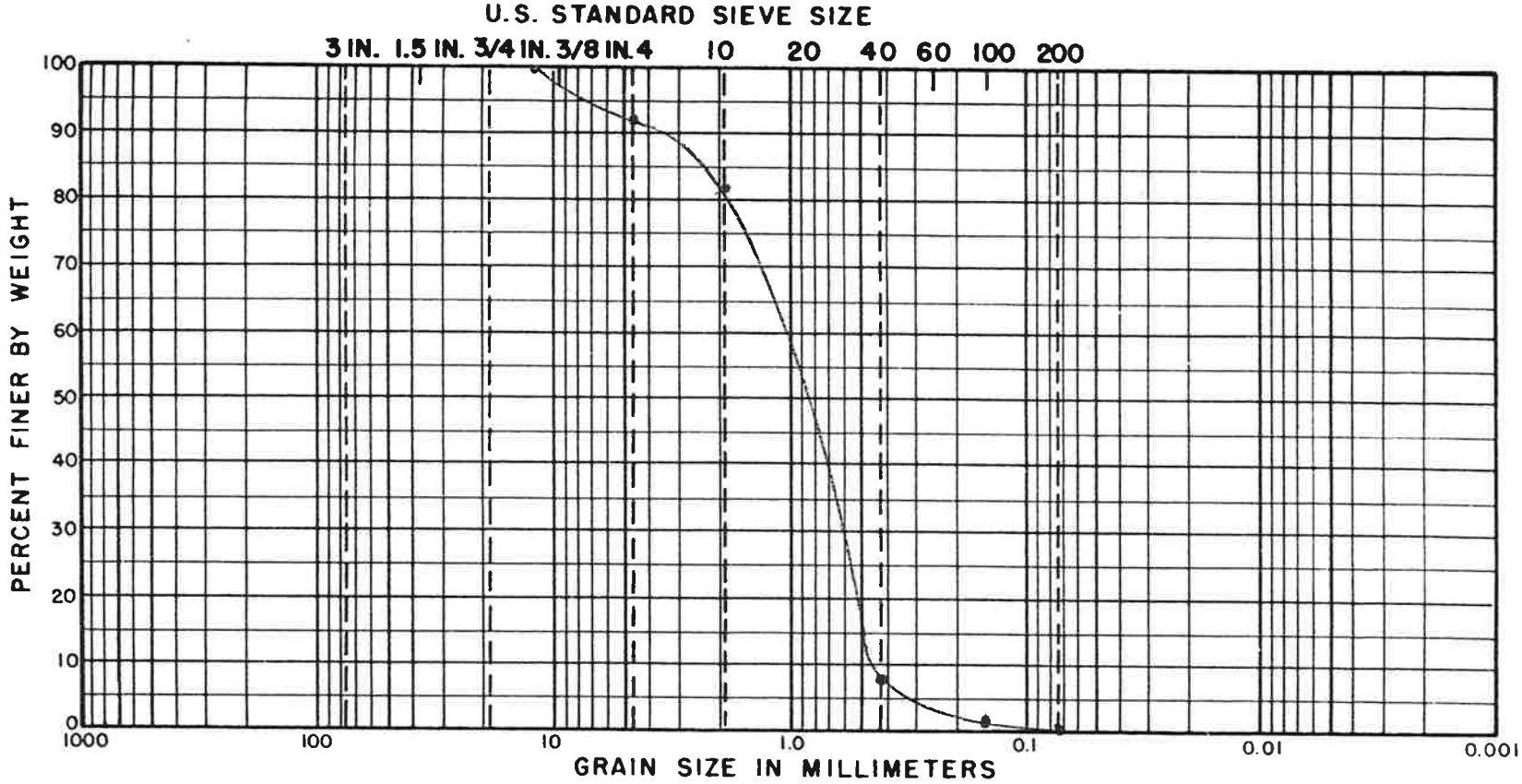

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
TP-5/S-3	5.5'	SP	Medium SAND					$D_{10} = 0.26$

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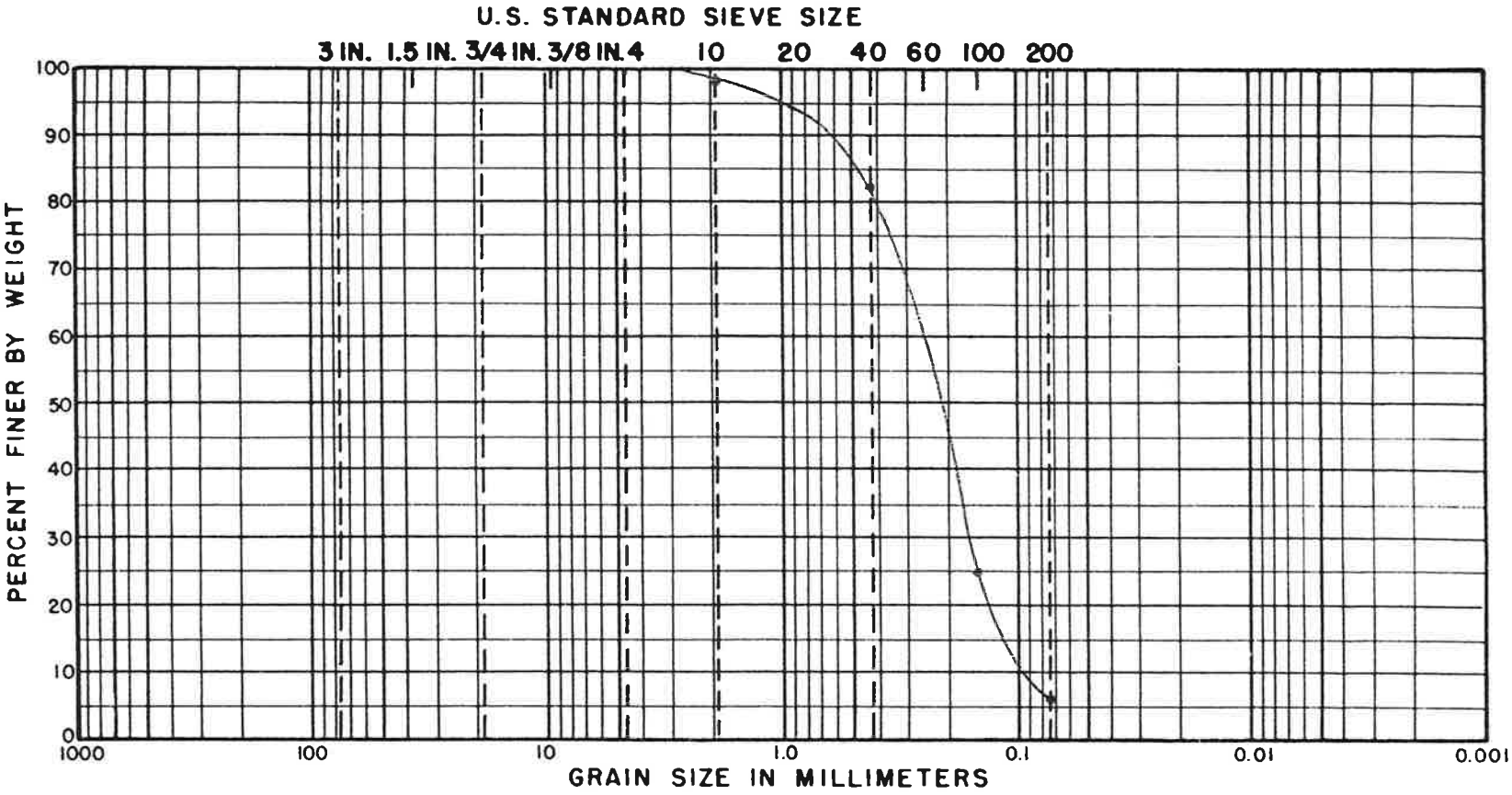

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

	DEPTH	CLASSIFICATION	NAT. WC	LL	PL	PI	
TP10/S1	1.0'	SP/SM Fine SAND, Trace silt					$D_{10} = 0.09$

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GRADATION CURVE

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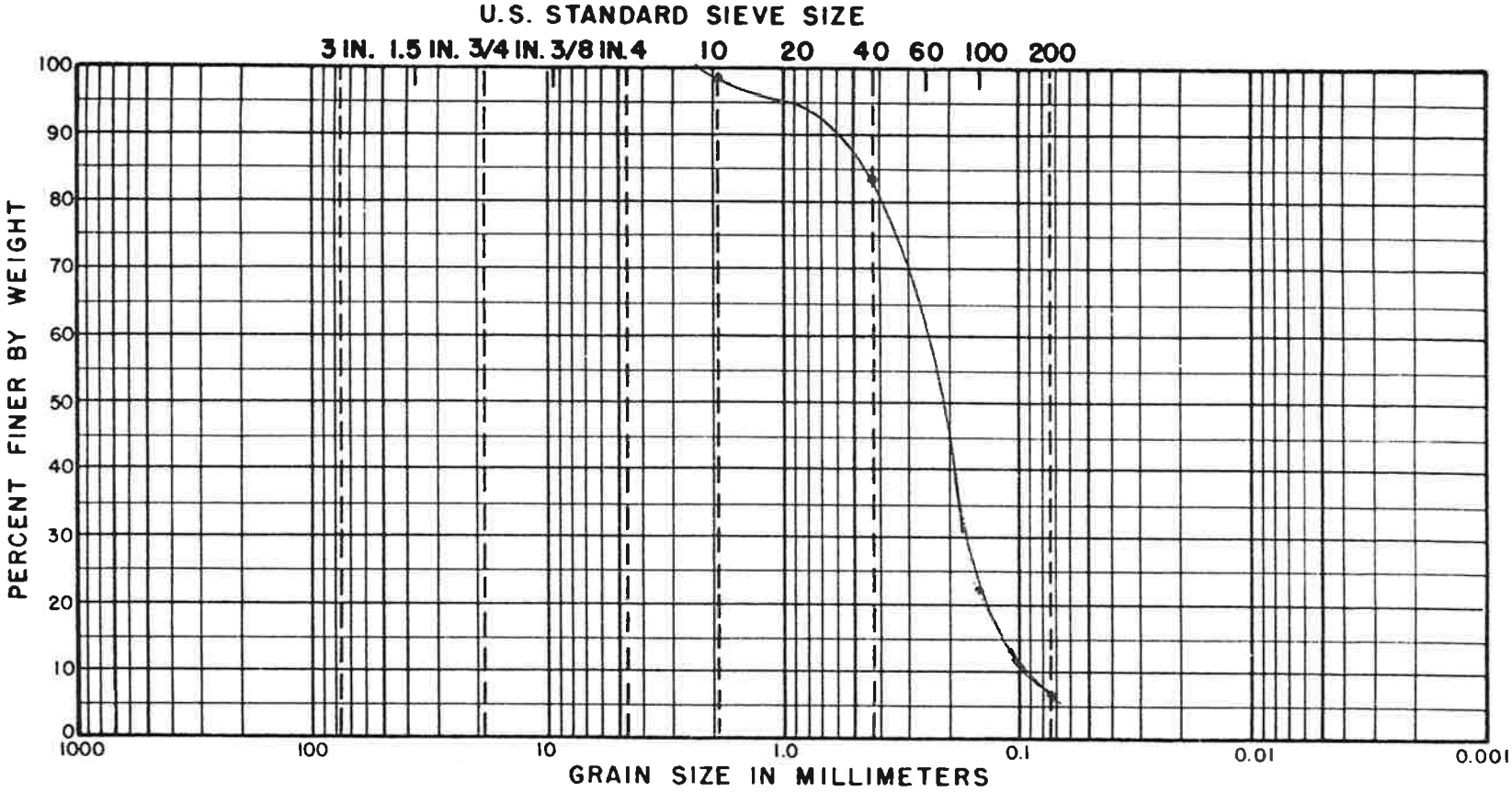

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
TP10/S2	3.0'	SP/SM	Fine SAND, Trace silt					$D_{10} = 0.09$

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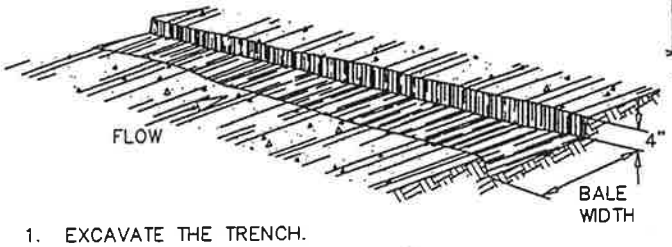
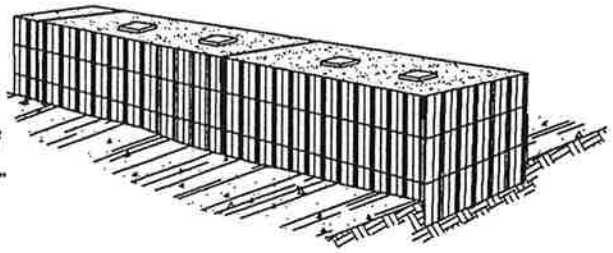
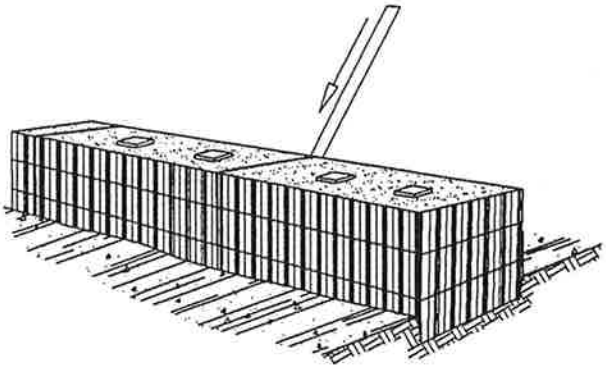


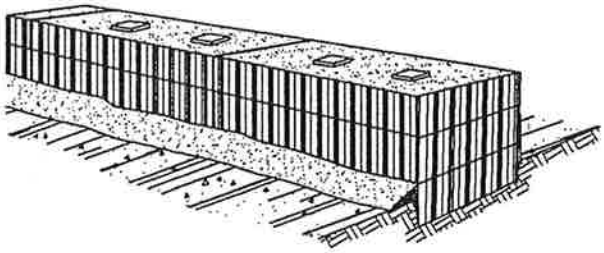
1. EXCAVATE THE TRENCH.



2. PLACE AND STAKE STRAW BALES.



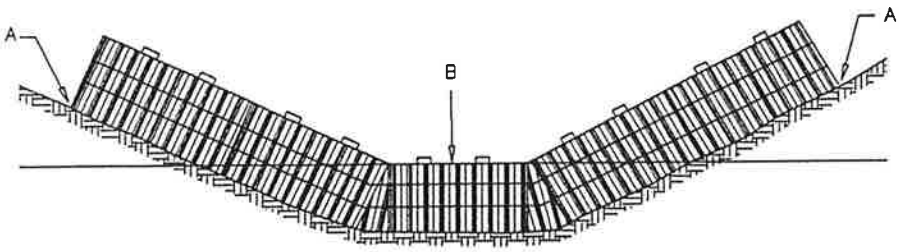
3. WEDGE LOOSE STRAW BETWEEN BALES.



4. BACKFILL AND COMPACT THE EXCAVATED SOIL.

CONSTRUCTION OF A STRAW BALE BARRIER

NOT DRAWN TO SCALE

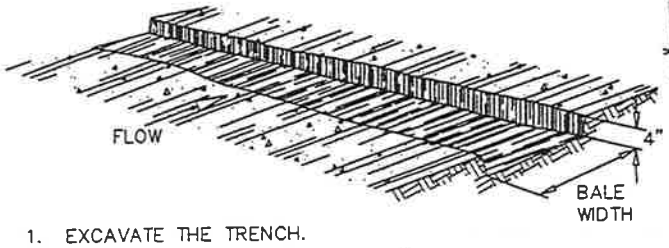


POINTS A SHOULD BE HIGHER THAN POINT B

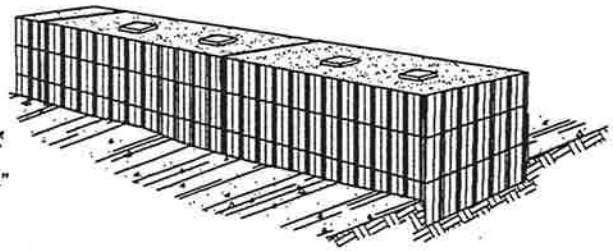
PROPER PLACEMENT OF STRAW BALE BARRIER IN DRAINAGE WAY

NOT DRAWN TO SCALE

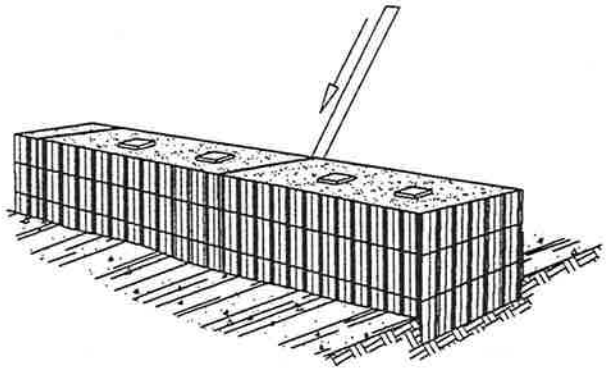
JOB NO.:	**Western Geotechnical Consultants, Inc.**	SEDIMENT CONTROL STRAW BALE BARRIER
DESIGNED BY:		
DRAWN BY:	4181 Saltsprings Drive • Ferndale, WA 98248 Phone (360) 380-2507 • Fax (360) 380-2507	
CHECKED BY:		DATE: SCALE: H: N/A V: N/A



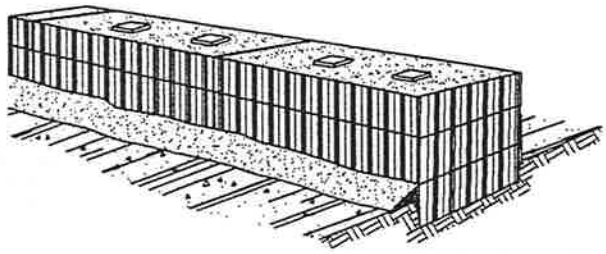
1. EXCAVATE THE TRENCH.



2. PLACE AND STAKE STRAW BALES.



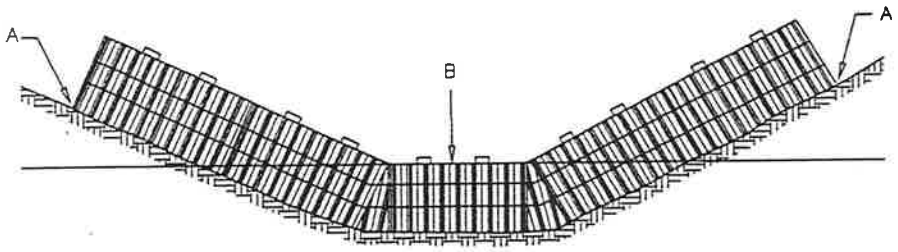
3. WEDGE LOOSE STRAW BETWEEN BALES.



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

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