King County
Department of Transportation
Road Services Division
Engineering Services Section
Environmental Unit
King Street Center
201 South Jackson Street
Seattle, WA 98104-3856
(206) 296-6520 Fax (206) 296-0567
TTY Relay: 711
www.metrokc.gov

February 9, 2011

TO: Doug Chin, Senior Engineer, Water and Land Resources Division, Department of Natural Resources and Parks

FM: Julia Turney, L.G., Environmental Engineer, Environmental Unit, Road Services Division, Department of Transportation
and
Jeff Burkey, Hydrologist, Water and Land Resources Division, Department of Natural Resources and Parks

RE: May Creek Drainage Improvement Project: SE May Valley Road and 148th Avenue SE – Sediment Assessment

Introduction

This memo provides information on sediment conditions in May Creek from approximately 148th Avenue SE upstream to 164th Avenue SE. This evaluation addresses geomorphologic controls, sediment sources, sediment behavior in the drainage and how the project actions are likely to influence future sedimentation in May Valley. The purpose of the following background evaluation is to provide information to assist King County Department of Natural Resources and Parks, Water and Land Resources Division in the design process for a drainage improvement project in May Valley. The proposed project location is shown in Figure 1.

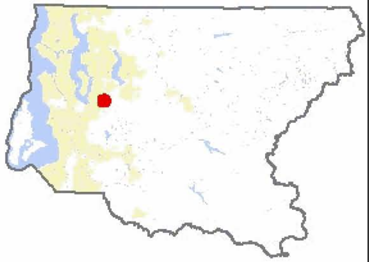
Two questions have been raised regarding sediment associated with the May Valley drainage improvement project:

Question 1: Will the project change sediment delivery downstream to May Creek?
Question 2: After the proposed drainage improvement project and mitigation on May Creek in May Valley, will sediment refill the May Valley project area?

May Creek Channel Restoration Project

Project Vicinity

- Study Area
- Mile Markers
- Stream
- Incorporated Areas
- Cougar Mountain Wildland Park



N

March 2010

King County

0 95 190 380 570 760 Feet

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Figure 1

PD \\Red-dwarf2\Org\Environmental\Projects\9A1205 - DNRP May Creek Restoration (Miller)\Steams GIS

There are a number of factors that were not available for the assessment:

- The actual suspended sediment loads in May Creek in the project area, the suspended and bedloads from the tributaries and the relative contribution of sediment from different sources are not known.
- The change in sediment loading over time due to changes in land use in the basin; logging, development, agriculture and channel dredging is not known.
- All of the tributaries provide some amount of sediment to May Creek within the valley but the actual volume is not known. Long Marsh Creek delivers gravel to silt sized sediment to May Creek. A depositional area of gravel and sand is visible in May Creek. Estimates of the delivery rate for Long Marsh are made from surveyed elevation changes between a sediment-removal project in 2002 and 2010.
- Beaver dams above the project area trap sediment and release sediment periodically due to flooding or breaching.

An assessment of the sediment behavior presented here is based on published basin information, aerial photo interpretation, survey data from 1965, 1979, 1993, 2002 and 2010, a soil-loss analysis by Jeff Burkey, sediment samples from the May Creek channel, and May Creek survey records and studies conducted for the project. This assessment provides a working hypothesis about sediment movement in the valley and the basis for future investigations.

Background Geology and Stream History

The wide and relatively flat May Valley (RM 3.9 to RM 7.0) was created by glacial ice melt runoff and is part of the "Kennydale Channel". The valley is underlain by recent alluvium over recessional outwash deposits and compacted glacial till. These deposits overlie Eocene Tukwila Formation. The formation is composed of volcanic tuff, fine-grained volcanic sandstone and volcanic tuff-breccia. The formation is reported to outcrop west of 146th and forms a physical boundary between the downstream ravine and May Valley upstream. The geologic map is shown on Figure 2. The creek gradient within May Valley is 0.2 percent and the valley is predominately a depositional environment. Aerial photography and Lidar image of the valley show evidence of pre-dredging channel meanders. Historic survey mapping from 1872 shows May Creek as a meandering stream and Tributary 0291a extending north to join May Creek just south of Indian Meadows rather than the current confluence approximately 1,440 feet west of 164th Avenue SE. The alluvial fans from Indian Meadows and Long Marsh Creeks appear on the 1872 map and the mapped location of May Creek is routed to the southwest around the higher elevations of the Long Marsh/Indian Meadows alluvial fans. The historic channel map for 0291a is consistent with Lidar images showing meander scars in the valley. (Aerial photos and historic map information is located in Appendix A).

May Creek was dredged to form a linear channel between 1910 and 1936 (Foster Wheeler, 1995). A description of May Creek by Bretz (1913) describes May Valley as a "swampy, wide bottomed old channel". A project plan dated 1935 (King County Map Vault) shows creek modifications extending from Lake Washington to 164th Avenue SE.

May Creek, May Valley

Geology

Legend
Qw- Wetland Deposits Organic Rich Sediment
Qvr- Recessional Outwash Deposits Sand and Gravel
Qvt- Vashon Till Compacted Mix of Silt Sand and Gravel
Tpt- Tukwila Formation- Mix of Volcanic and Sedimentary Material

Figure 2

King County

Aerial photos from 1936 show the May Creek channel cut as approximately 25 to 30 feet wide as measured from the aerial photos. The photos clearly show the channel excavation boundaries. The channel is uniform with limited shrubs or trees. Periodic dredging is reported during the 1940s through 1960s (Foster Wheeler, 1995). Property owners may have removed sediment periodically.

Sediment Sources to May Creek

Agriculture and Pastures

In the immediate area of the proposed project there are roughly 8.4 hectares of active animal pasture that abut the stream on both sides with a few animal access points to the stream water (assumed watering holes). Under existing conditions, these animal pasture areas are flooded at stream flows below mean annual flow rate (8.6cfs)—over-bank flooding begins approximately at 6 cfs at the low point in the bank. Thus, its likely sediments that may not have washed off during a rain event with overland flow will be washed off when the stream-system capacity is exceeded and floods overbank. After a flood event, there does not appear to be any visual deposition of sediments resulting from the stream itself and upstream conditions but erosion rills are present in the pastures. Thus, it is assumed that sediments suspended in the water column that flush into the pasture retreat back into the stream system. Given this condition with the added animal activity, sediments from soil disturbance would be additive to upstream sediment loads, thus increasing sediment loads downstream. The proposed project goal is to reduce frequency of pasture flooding, thus sediment loads, from a frequency of any appreciable storm to a near one-year storm frequency.

To assess potential sediment loads from pastures in the project area, similar studies in the Green River watershed were evaluated (King County, 2007). The Green River studies have estimated sediment loads (via total suspended solids) ranging from 50 to 170 kg/ha/yr; residential = 158 kg/ha/yr, commercial = 172 kg/ha/yr, forest = 110 kg/ha/yr, and agriculture = 50 kg/ha/yr. Literature values (Burton and Pitt, 2002) are significantly different with 10, 420, 3, and 343 kg/ha/yr for residential, commercial, forest, and agriculture, respectively. Monitoring stations used for agriculture land use in the Green River watershed study were downstream of pasture lands in ditches that had significant amounts of choking vegetation in them just upstream of the sampling station. Given the relative position of the sampling location and the proximity of vegetation upstream, one may expect the Green River sediment loads to be lower than expected because of the vegetation trapping wash-off loads. Consequently, estimated loads from the May Valley pasture areas are then estimated in the range of 50 – 340 kg/ha/yr (assumed 200 kg/ha/yr average). Simplistically if we estimate loads from the pasture lands to be 200 kg/ha/yr, and post-project loads are reduced in half, then for a ten-year period and 8.4 ha, there is a reduction of 8.4 metric tons of sediment contribution to May Creek. An estimated range would be a reduction of 2.1 to 8.4 metric tons of sediment contributed to May Creek.

Hydraulic model results estimate that the channel capacity to carry bedload and suspended sediment through the project area will be increased after the proposed project by increasing the channel efficiency. Velocities associated with lower flow rates are increased with the removal of vegetation choke points in the channel along with channel-bottom high points that otherwise create backwater conditions conducive to deposition, while depths are increased with a lower channel bottom in conjunction with more water kept in-channel rather than over bank because of improved flow-rate capacity.

Reduced overbank flooding into reed canarygrass may allow the annual volume of fine sediment and muck moving downstream to increase on a yearly basis. Higher flow or flood events would continue to carry stored in-channel and off-channel fine sediment downstream in a larger pulse, rather then metering sediment at lower flows. The cumulative total volume of sediment over a longer time frame, ten years for example, would not be expected to change.

May Creek bottom sediments were sampled by the King County Department of Transportation Materials Laboratory (King County, May 2010 and October 2010, Appendix B). In the area of 146th Avenue SE the channel bottom is composed on sands and gravels, to well-graded gravel. Larger gravel, cobbles and occasional boulders are also present. In the relatively flat and low-gradient portions of May Valley in the area of 148th Avenue SE the hard channel is composed of silty-sand and sandy-silt. At the confluence with Long Marsh Creek the hard-channel bottom is composed of well-graded gravel. A variable layer of semi-liquid, organic rich mud (herein referred to as muck) is present within the stream channel behind constrictions in the channel (Figure 3). The muck was sampled 25 feet upstream of a private bridge at RM 4.6. A modified Loss on Ignition analysis (LOI) was performed on the sample and the organic content was approximately 28 percent. This is a very high percent organic material compared to King County streams (Burkey, personal communication). The exact source of this high organic content is unknown; however, the tributary stream channels within the project area do not contain the same muck material and the most likely sources are pastures, agricultural fields and grass/tree litter within and above the project limits.

Sources of Stream Sediment

Most of the major tributaries to May Valley enter May Creek upstream of 164th or downstream of 146th, outside of the project area. From just below 148th and 164th four tributaries: an unnamed tributary (0291a), Indian Meadows (0291), Long Marsh Creek (0289) and Greenes Creek (0288) enter May Creek. Small alluvial fans occurring at the base of Trib. 0291a and Indian Meadows identify where sediment is deposited at the valley floor.

- A ditch carries Indian Meadows Creek to May Creek. The ditch carrying Indian Meadows has piles of sediment adjacent to the ditch. These appear to be hand dug sediment piles removed from Indian Meadows Creek (Bauman, personal communication). Finer sand and silt reached May Creek and the confluence with May Creek is clogged with silt and reed canarygrass (GeoEngineers, 2008).

- Tributary 0291a is shown on the 1872 map and before development of the valley flowing northwest parallel to May Creek, joining May Creek near the confluence with Indian Meadows. The stream now joins May Creek downstream of 164th and is hydraulically controlled by a culvert under SR-900. Sediment is primarily deposited upstream from the culvert (Foster Wheeler). The creek lacks a defined channel above the confluence with May Creek.
- Greenes Creek enters May Creek west of 148th Street and currently does not contribute significant sediment to the project area because Greenes Creek discharges to a wetland and the confluence with May Creek is choked with reed canarygrass.

Table 1: Two year flow for May Creek Tributaries in the Project Area (Foster Wheeler, 1995).

Drainage	Unnamed Trib. 0291a	Indian Meadows	Long Marsh	Greenes
2 year flow in cfs	23.8*	17	42	26

*USGS StreamStats Estimate

Within the project area, Long Marsh is one of the largest flow (Table 1) and sediment inputs. The Long Marsh sediment deposits constrict flow and muck movement in May Creek. Long Marsh Creek joins May Creek south of May Valley Road near 150th Place NE.

Aerial photography from 1936 shows the creek in a relatively straight channel. The current channel is on the order of two (2) feet wide and several inches in depth at winter low flow. The stream banks are approximately one foot in height, and the surrounding floodplain/fan surface is primarily planted in pasture grass with some recent native plantings. Evidence was found of gravel deposition throughout this reach. Discussions with earlier property tenants indicate that sediment deposition extended into the adjacent pastures following a January 2009 storm event. Long Marsh Creek deposits form an alluvial fan composed of cobble- to silt-sized particles and discharge silt, sand and gravel into May Creek. May Creek channel bottom elevations are higher near the confluence and this channel fill is a choke point for flow within the channel. During high-flow events, Long Marsh carries large gravel-sized sediment to May Creek. Before Long Marsh was straightened, the stream would have migrated across the alluvial fan as sediment was deposited in the stream channel. As noted in the previous section, the Long Marsh and Indian Meadows alluvial fans built out into May Valley and forced May Creek around the fan.

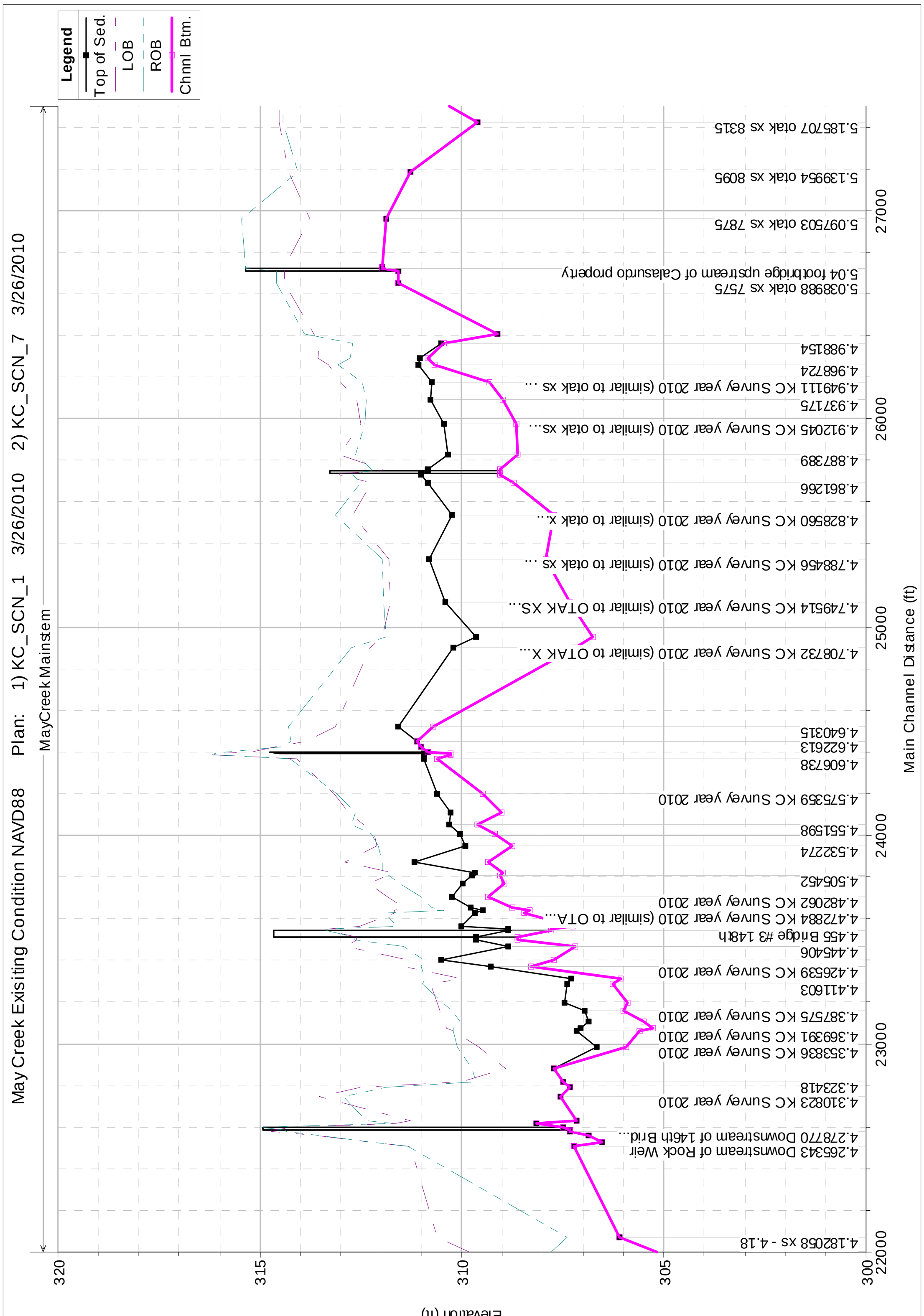
May Creek Channel Changes with Time

Horizontal Boundaries

Aerial photos from 1936 show the May Creek channel cut as approximately 25 to 30 feet wide as measured from the aerial photos. The photos clearly show the channel excavation boundaries. The channel is uniform with limited vegetation. Foster Wheeler measured the mean May Valley Creek channel width in 1995 as 20 to 25 feet, with wider sections up to 60 feet at RM 5.6 (Foster Wheeler, 1995). In March of 2002 a stream survey was conducted between 164th Avenue SE and 148th Avenue SE (O'Rollins, 2002) and measured the average channel width at ten to 14 feet. A stream survey was conducted in 2010 (Thompson and Bauman), and the average wetted width of habitat units was approximately 12.1 feet and the widest wetted width was 23 feet (surveyed reach RM 4.35 to RM 4.87). While no change in average width occurred from 2002 to 2010, there is a possible pattern of channel narrowing between the 1936 and 1995 and comparison between the 2002 and 2010 stream surveys. This is reflected in the available measurements; especially in areas dominated by reed canarygrass. The channel is still a relatively straight excavated ditch but grass, shrubs and trees have encroached into the channel.

Survey data from 2002 and 2010 surveys are also available. Cross sections of May Creek are shown in Figure 4 (cross section locations are shown in Figure 5). Five cross sections were chosen to compare the stream channel at relatively fixed locations in the stream. Upstream of the road bridge at 148th Avenue SE the channel is narrower and slightly shallower (Section B-B). Downstream of the bridge the channel is wider and more uniform in shape (Section A-A). The cross section at Long Marsh (Section D-D) shows the 2002 bank deposits (right bank) associated with excavating sediment from May Creek (private property owner activity) and the filled-in 2002 channel profile from Long Marsh Creek deposits. During the 2002 pilot excavation project in May Creek at the Long Marsh confluence, sediment was removed to approximately elevation 309. The left bank (looking upstream) has now filled in to 2002 elevations at the confluence but the rectangular channel shape is still present on the right bank. Upstream of Long Marsh Creek, the channel is approximately the same width but shallower. This may be due to where the survey staff was placed and the CAD program interpolating between points. Downstream of Long Marsh Creek the channel has narrowed. Survey locations varied slightly between center line, right bank or left bank and cross section elevations are approximate.

Figure 3 May Creek Profile Showing Channel Bottom Elevation and MuckSediment Thickness in 2010 (From King County, 2010a).

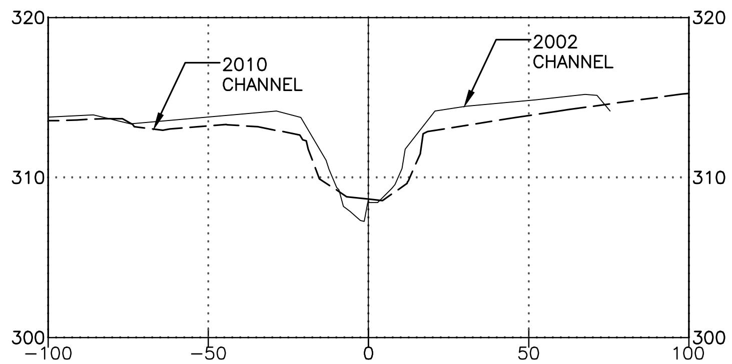


Channel Bottom Elevation

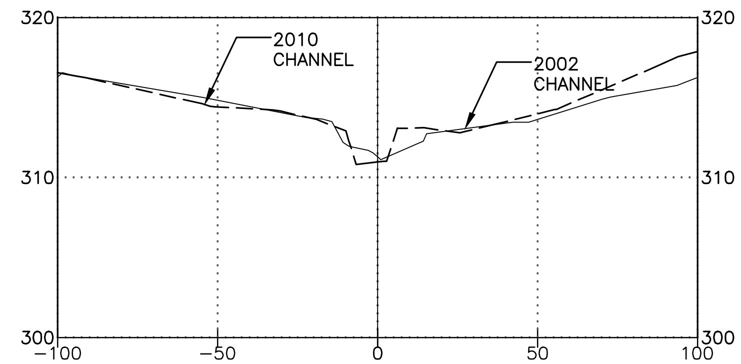
Channel elevation surveys were conducted in 1965, 1979, 1993, 2002 and 2010 (Data is located in Appendix C). A profile of May Creek channel from just below 148th Avenue SE to approximately 1,300 feet upstream of the confluence with Long Marsh Creek as shown in Figure 5. The figure compares the 2002 and 2010 survey profiles and gives spot elevations at the 148th Avenue road bridge and at the horse-crossing bridge on parcel 0223059091, 15019 SE May Valley Road from 1965, 1979, and 1993. Upstream of Long Marsh, between 2002 and 2010 the hard channel bottom is a foot lower in some areas and a foot to two feet higher in others. At the horse bridge the elevation has varied from 307 feet to 311 feet associated with sediment deposition from Long Marsh Creek. From station 11+00 to 8+00 at 148th Avenue, the channel profile has flattened and the channel bottom has shallowed approximately three feet. This area coincides with thick areas of reed canarygrass. Between 1965 and 2010, the 148th Avenue road bridge channel profile has stayed relatively consistent at 307 to 308 feet. It appears from the elevation differences that where the muck and vegetation builds up, the channel bottom has also been aggrading. Changes in the bottom elevation should be considered approximate, perhaps within a foot of elevation change. Survey elevations have not been taken at the exact same locations and stationing is different between projects. Stream profiles in 2002 and 2010 (Figures 4 and 5) show thicker areas of muck build up behind higher elevations in the channel. Up to four feet of muck was measured above the Long Marsh Creek confluence in 2002 and three feet in 2010. Stream and elevation survey data indicates that soft muck present in the channel varies in thickness by location and with time. The muck thickness is variable and transitory, building up in the channel until higher flows in May Creek are able to move the sediment downstream.

Muck and fine sediment is moved downstream by May Creek within the valley as bedload and suspended sediment. However, the valley and May Creek above May Valley is not the main source of sediment to Lake Washington. The May Creek Current and Future Conditions report (1995) identified the major source of sediment to the May Creek delta in Lake Washington as the May Creek canyon and eroding channels of tributaries that enter the mainstem downstream of May Valley.

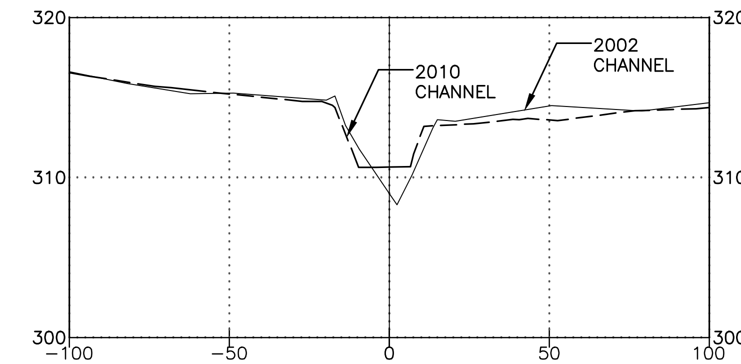
MAY CREEK CHANNEL RESTORATION
FIG. 4 CROSS SECTIONS



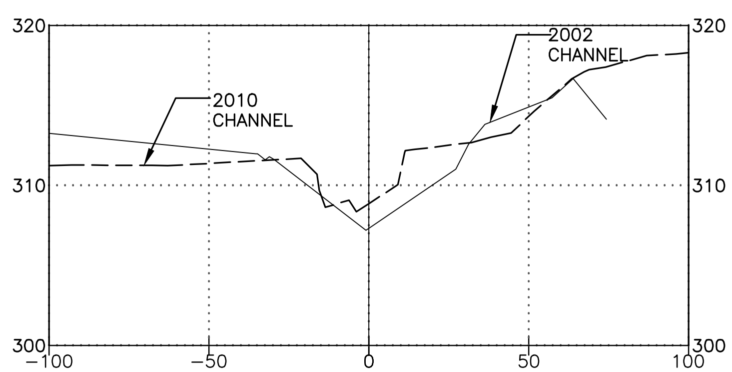
SECTION A–A
STA. 7+00
DOWNSTREAM OF 148TH ST
1
NTS



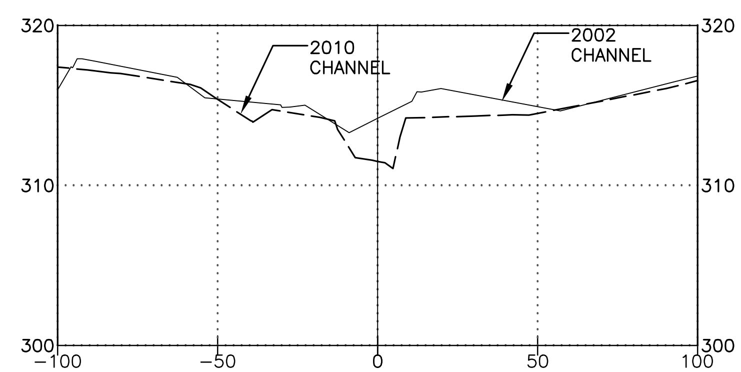
SECTION C–C
STA. 15+00
DOWNSTREAM OF LONG MARSH CREEK
3
NTS



SECTION E–E
STA. 17+00
UPSTREAM OF LONG MARSH CREEK
5
NTS



SECTION B–B
STA. 8+00
UPSTREAM OF 148TH ST
2
NTS

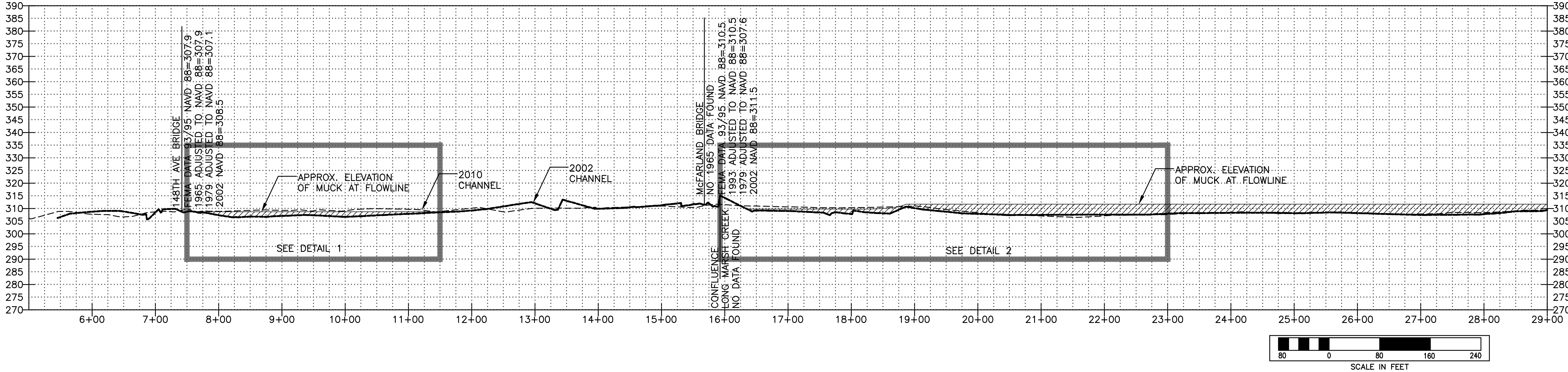


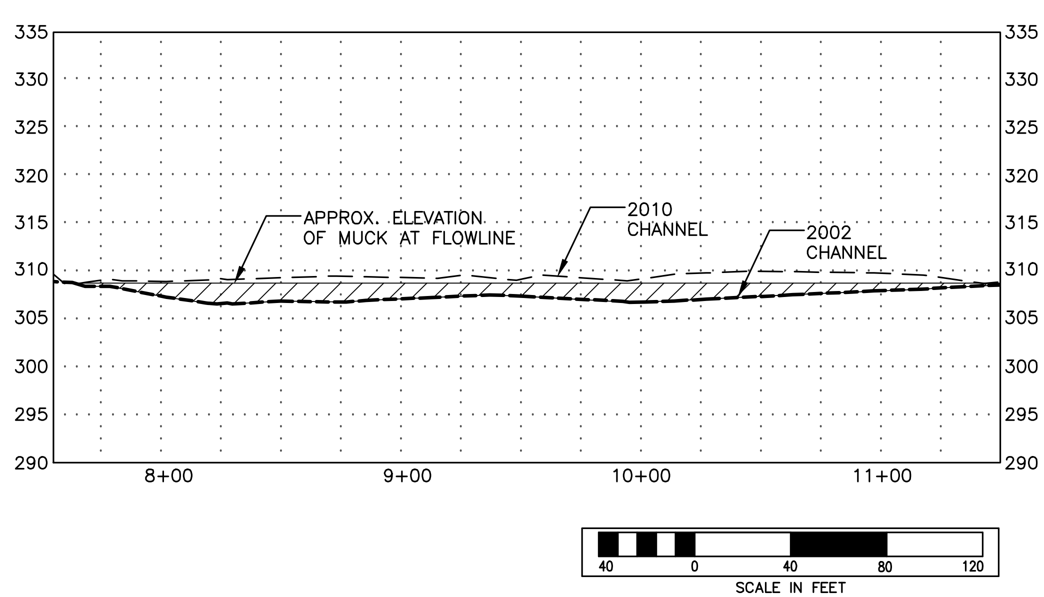
SECTION D–D
STA. 16+00
LONG MARSH CREEK
4
NTS

NOTE:

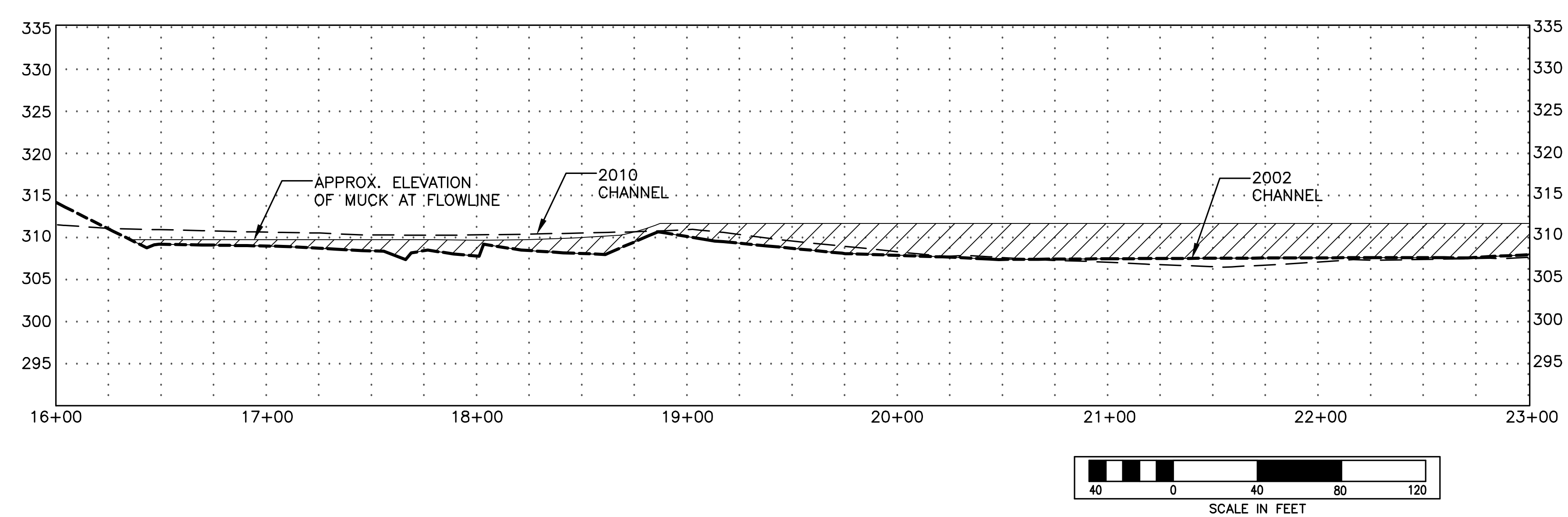
ALL CROSS SECTIONS ARE CREATED LEFT TO RIGHT LOOKING UPSTREAM.

MAY CREEK CHANNEL RESTORATION
FIG. 5 PROFILES





DETAIL 1
SCALE: 1"=40'



DETAIL 2
SCALE: 1"=40'

Findings: Project Features and Estimated Results

Pre-project May Creek Sediment Sources and Channel Behavior above the May Creek Ravine:

Based on field reviews of the project area, stream report (King County, 2010), a literature review of past reports on the May Creek basin, and a review of aerial photographs a qualitative estimate of sediment sources has been developed. Sediment entering the project area comes from:

- Upstream May Creek (east of 164th). Most of the major tributaries enter May Creek above the project and therefore will be a contributor to suspended sediment in the Creek. Six beaver dams are present or have been active in the past above the project area; two below 164th and four upstream of the project.
- Long Marsh Creek is a contributor to channel fill by sand, gravel and small cobbles. The larger materials are able to reach May Creek during high flows due to the straight channel, slope and past channel maintenance by property owners.
- Indian Meadows Creek is a minor drainage that is partially ditched through a pasture that reaches May Creek and contributes sediment to May Creek.
- Tributaries (0291A, 0291) contribute minor but unknown amounts of fine sediment.
- Stormwater runoff and pasture flooding contributes an estimated .2 to .8 metric tons of organic material and sediment to the stream.

The May Creek channel is essentially a ditch, excavated in a historic wetland system prior to 1930. The gradient in May Valley is very low and the creek is only able to transport clay to sand sized sediment.

- The May Creek channel stores organic muck/sediment from pastures behind relatively high spots in the channel bottom and releases it downstream to the ravine during higher flows. Muck then builds up again as flows recede and during rain events. Some of the muck contributes to aggrading the channel bottom as it is trapped and entrained by vegetation.

The May Creek project proposes a number of features to reduce sedimentation to May Creek and channel filling. The 70% design plans include:

- removal and control of reed canarygrass (Phalaris arundinacea);
- native plant buffers along the banks;
- reducing overbank flooding;
- selected removal of vegetation from the channel downstream of 148th Avenue SE;
- excavated alcoves adjacent to the channel downstream of 148th Avenue SE,
- a sediment management design for Long Marsh Creek, the primary source of sediment and channel constriction in the project area.

These features are expected to produce the following results:

- Removal and control of reed canarygrass will slow channel narrowing and infilling due to growth during spring and summer during low flows.

- Adding plant buffers on either side of May Creek will shade the banks where reed canarygrass is present and help control grass growth and encroachment.
- Reducing over-bank flooding of pastures will reduce the amount of sediment and organic material being carried to the creek by an estimated .2 to 0.8 metric tons per year.
- Improved channel hydraulic efficiency will improve and move fine sediment and organic material that reaches the creek downstream, reducing the amount of sediment trapped in reed canarygrass above 148th Avenue SE.
- The proposed alcove excavation and planting areas west of 148th Avenue SE will allow the creek to overflow into the alcoves during higher flows; this will slow the current velocities and minor amounts of sediment will drop out of suspension, but the amount of deposition is unknown.
- The May Creek channel is likely to be both a depositional area and a source of suspended sediment during higher flows. Soft muck in the stream bottom above the confluence with Long Marsh Creek is a combination of organic material from pasture runoff with mineral sediment. The muck builds up in the channel after rain storms and floods and is moved downstream during higher flows. Reducing flooding within the project area will help reduce the build up of muck in the channel.
- A mitigation project in Long Marsh Creek will intercept gravel and large sand-size sediment reaching May Creek.
- Bank stabilization with jute netting and seeding will reduce erosion and sediment input to May Creek after excavation.

Estimated Changes in Sediment Transport and Channel Dimensions after Drainage Improvement Project:

The proposed project elements and existing conditions were evaluated for how sediment would enter and move within the project area. If no change in behavior was expected, the conditions were assumed to remain the same and are listed below as "constant". If the project element was expected to modify sediment behavior by qualitatively reducing the amount of sediment reaching May Creek, a reduction is noted in the bulleted list below. During construction, temporary increases in sediment are possible and this is noted.

- *Constant* Upstream May Creek (east of 164th). Most of the major tributaries enter May Creek above the project and therefore will continue to be a contributor to fine sediment in the Creek. Beaver dams will hold back sediment and periodically release it when breached.
- *Constant* Tributaries (0291A, 0291 and Indian Meadows Creek) contribute unknown amounts of fine sediment. These are expected to be minor.
- *Reduction* Small proposed mitigation alcoves downstream from 148th will allow sediment to deposit at higher flows.
- *Reduction* Long Marsh Creek mitigation project will minimize course sediment reaching May Creek and channel infilling.
- *Reduction* Reduced pasture flooding will reduce the organic material and sediment discharged to the stream, estimated at .2 to .8 metric tons.

- *Reduction* Reduce channel narrowing by controlling reed canarygrass along the banks by establishing a buffer of plants on either side of the channel and shading the banks.
- *Temporary Increase* Channel excavation will temporarily expose "raw" bank and channel sediments to the channel. Jute matting and bank planting will control erosion but minor erosion within the channel may occur as the channel stabilizes.
- *Change in fine sediment movement* Fine mineral and organic sediments that reach May Creek and are now stored in the stream channel or trapped by grass during low flows will move downstream during lower flows. Fine sediment and organic material currently stored in the channel and moved downstream during high-flow events, will move downstream at a constant rate rather than episodic rate.

The overall estimate is a net reduction in fine sediment and organic material reaching May Creek within the project area. Long Marsh Creek mitigation, the mitigation alcoves, reduced flooding, and reed canarygrass control are project features that decrease sediment contributions to May Creek in the project area. Controlling willow and reed canarygrass will control channel narrowing.

Responses to Questions on Project Performance

Question 1: Will the project change sediment delivery downstream to May Creek?

Response: The May Creek Current and Future Conditions report (Foster Wheeler, 1995) identified the major sources of sediment to May Creek as coming from the ravine and tributaries below May Valley. The hydraulic analysis (King County, 2010a) shows that changes in flow velocity below 143rd Avenue SE are negligible. Sediment movement is controlled by flow. Therefore, the same size sediments would be moved within the May Creek system. Muck sediments are currently stored behind topographic highs in the stream channel and are moved downstream in pulses during high flow events. In general fine sediment that does enter the creek as bedload or suspended sediment will move downstream due to improved channel efficiency rather than being stored in the creek channel above 148th, incorporated into the banks and moving though during large flow events. However, some fine sediment or muck that does enter the creek will continue to be stored behind topographic highs in the channel or in topographic lows above and below 148th Avenue. We estimate the project-related reductions in sediment delivered to the creek primarily from reduced overbank flooding, will reduce the total fine sediment and organic muck in the stream.

Question 2: After the proposed drainage improvement project and mitigation on May Creek in May Valley, will sediment refill the May Valley project area?

Response: We estimate that there will be an overall reduction in sediment contributions to May Creek within the project area. The stream channel bottom elevation is relatively stable, except where Long Marsh Creek discharges to May Creek and where reed cannarygrass and muck aggrades the channel. Reducing sediment and organic matter input to the channel from Long Marsh Creek and the pastures and removing reed canarygrass will slow narrowing of the channel. Active monitoring and buffer-planting management along the creek banks will take place for ten years to allow establishment of native vegetation buffers. The larger channel can be expected to last beyond ten years.

This assessment is based on qualitative analysis with available information. Quantitative sediment estimates are not available.

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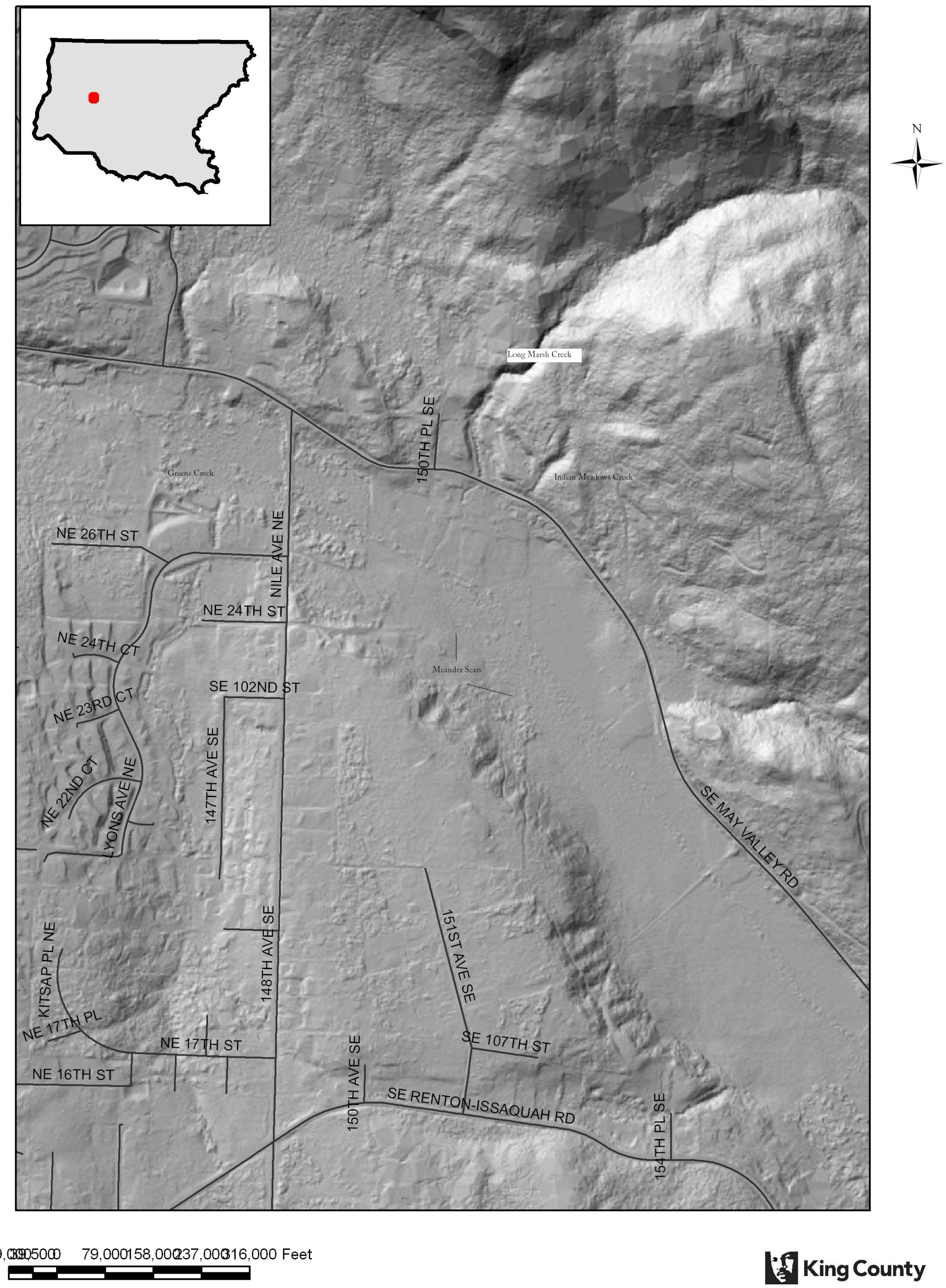
Appendix A Aerial Photos and Historic Maps

May Creek Drainage Project, May Valley

Lidar Image 2002



King County

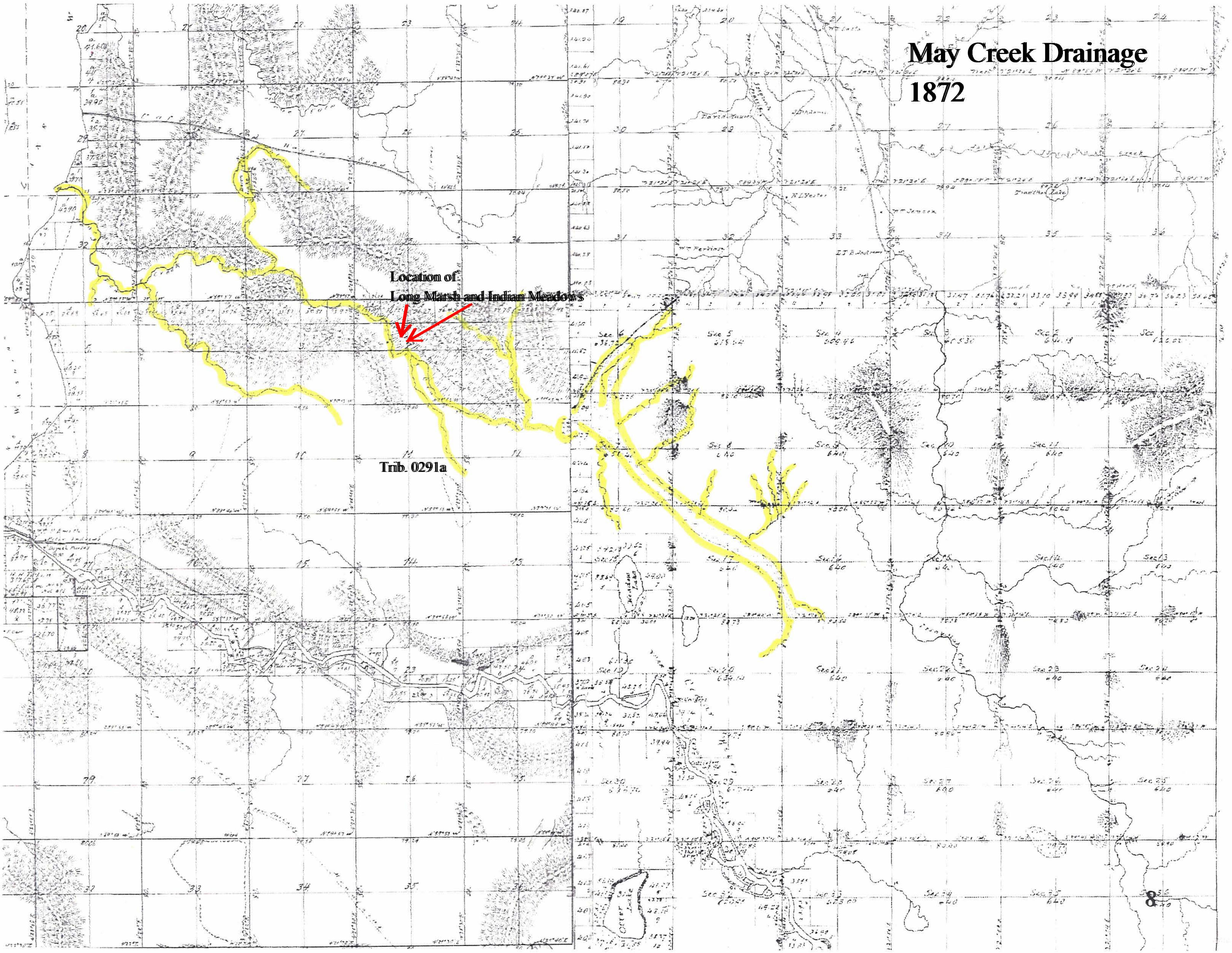
May Creek Drainage Project, May Valley

1936 Aerial Photo

79,000 39,500 0 79,000 158,000 237,000 316,000 Feet

King County

May Creek Drainage 1872



Appendix B Channel Bottom Sediment Sample Analysis

King County
Road Services Division
Materials Laboratory
Department of Transportation
RSD-TR-0100
155 Monroe Avenue Northeast, Building D
Renton, WA 98056-4199
www.metrokc.gov/roads

May 11, 2010

TO: Jeff Burkey, Hydrologist, King County Department of Natural Resources and Parks, Water and Land Resources Division

VIA: Alan D. Corwin, Materials Engineer, King County Department of Transportation, Road Services Division, Materials Laboratory

FM: Timothy R. Hyden, Engineer III, King County Department of Transportation, Road Services Division, Materials Laboratory

RE: **Particle Size Evaluation of May Creek Water Channel Soils**
Job Number 1B1205, Task MTR

The King County Materials Laboratory (KCML) obtained soil samples and performed field evaluations to determine the distribution of soil and rock particle sizes in the water channel along a section of May Creek. Areas from which samples were obtained or evaluations performed are summarized as follows:

Area 1: Colasurdo Property (Red Barn)

Sample KC-10-429: The sample was obtained using chest waders and a shovel from the north side of the water channel approximately 75 feet downstream from the bridge. The water was approximately 4 feet deep, flowing relatively slowly and the surface of the water channel consisted of very soft soils. This sample represents materials from approximately 0" to 3" below the bottom of the channel. At the sample location, the bottom of the channel appeared to be exposed and was not covered with grasses. Particle size distribution tests were performed, including portions of the sample finer than a No. 200 sieve using a hydrometer, and the USCS classification for this material is sandy silt (ML).

Sample KC-10-430: The sample was obtained from the same location and using the same methods as KC-10-429, except at a depth of approximately 3" to 6" below the bottom of the channel. At approximately 3" there was a transition in the soil and it was visually classified as a mixture of the silt from KC-10-429 with gray, fine silty sand. Particle size distribution tests were performed, including portions of the sample finer than a No. 200 sieve using a hydrometer, and the USCS classification for this material is silty sand (SM).

Gambini 2010

Area 2: McFarland Property (Yellow House and Out Buildings)

Sample KC-10-426: The sample was obtained at the confluence of a small unnamed stream and May Creek, approximately 30 feet upstream from the bridge. The water depth was approximately 12 inches with moderate flow and the surface of the water channel consisted of clean sand and gravels. This sample represents materials from approximately 0" to 6" below the bottom of the channel. No significant vegetation was noted at the sampling location. A gradation test using conventional screening methods was performed and the USCS classification for this material is well graded gravel (GW).

Sample KC-10-431: The sample was obtained using chest waders and a shovel from the south side of the water channel, approximately 100 foot upstream from the bridge. The water depth was approximately 4 feet deep, flowing relatively slowly and the surface of the water channel consisted of very soft soils. This sample represents materials from approximately 0" to 6" below the bottom of the channel. At the sample location, the bottom of the channel did not appear to be covered with grasses. Particle size distribution tests were performed, including portions of the sample finer than a No. 200 sieve using a hydrometer, and the USCS classification for this material is sandy silt (ML).

Area 3: 148th Avenue SE

Sample KC-10-432: The sample was obtained using chest waders and a shovel from the north side of the water channel approximately 75 feet downstream from the bridge. The water was approximately 4 feet deep, flowing relatively slowly and the surface of the water channel consisted of very soft soils. This sample represents materials from approximately 0" to 6" below the bottom of the channel. At the sample location, the bottom of the channel appeared to be exposed and was not covered with grasses. Particle size distribution tests were performed, including portions of the sample finer than a No. 200 sieve using a hydrometer, and the USCS classification for this material is silty sand (SM).

Area 4: 146th Avenue SE

Sample KC-10-427: The sample was obtained using hip waders and a shovel from the thalweg area of the creek channel, immediately adjacent to the upstream side of the bridge. The water was approximately 2 feet deep, flowing moderately fast and the surface of the water channel consisted of sands and gravels. Some of the fine sands were washed off the shovel while sampling due to the moderately fast water flows. It is roughly estimated that 75% percent of the bottom of the water channel surface area consists of sand and small gravel. Larger gravel and cobbles with a maximum particle size of about 4 inches make up the remaining approximate 25% of the channel bottom surface area. A gradation test using conventional screening methods was performed and the USCS classification for this material is well graded gravel with sand (GW). The mid-stream bridge pier appears to have 12" to 18" rip rap placed as armoring on the upstream nose of the footing/pile cap.

Sample KC-10-428: The sample was obtained using hip waders and a shovel from the thalweg area of the creek channel, immediately adjacent to the downstream side of the bridge. The water was approximately 2 feet deep, flowing moderately fast and the surface of the water channel consisted of sands and gravels. Some of the fine sands were washed off the shovel while sampling due to the moderately fast water flows. It is roughly estimated that 60% percent of the bottom of the water channel surface area consists of sand and small gravel. A gradation test using conventional screening methods was performed on material finer than a 3" sieve and the USCS classification for this material is well graded gravel (GW).

Larger gravel, cobbles and occasional boulders with a maximum particle size of about 12 inches make up the remaining approximate 40% of the channel bottom surface area. The sides of the channel directly adjacent to the abutment are armored with broken pieces of concrete. A few pieces of broken concrete were observed in the thalweg of the creek channel. Directly downstream from the concrete armoring the sides of the water channel are undercut.

An estimate of the overall creek bottom material gradation was obtained in the vicinity of the thalweg. The evaluation of material gradation was determined by reaching into the water and randomly touching a location on the creek bed. Material encountered at the bottom of the creek bed larger than 1 inch was removed from the water and measured. Materials finer than 1 inch were visually assessed as being similar to materials from sample KC-10-428 that were also finer than 1 inch. The particular sizes of material found on the creek bed were recorded and are shown in Table 1. The dimensions shown in Table 1 are approximately equal to a square mesh sieve that the materials would pass.

TABLE 1			
Sieve Size	***Count**	**Sieve Size**	**Count**
-1" Fines	5	5"	2
1 ½"	5	6"	1
2"	5	7"	1
3"	5	12"	1
4"	0		

** Indicates number of times the referenced size of material was encountered.*

Area 5: 143rd Avenue SE

Samples of fine materials for laboratory gradation testing were not obtained from the bottom of the creek channel. The water was approximately 18 inches deep and flowing fast. There was very little fine (sand size and smaller) material present on the creek bed surface and representative samples could not be obtained with a shovel or similar tool due to the fast flowing water.

An estimate of the overall creek bottom material gradation was obtained in the vicinity of the thalweg. The estimate was performed directly adjacent to, and on the upstream and downstream sides of the bridge. The evaluation of material sizes was determined as previously described for Area 4: 146th Avenue SE, Sample KC-10-428. Most all materials larger than about 3 inches had sharp edges and a few pieces of broken brick were encountered. Material size counts for the upstream and downstream sides of the bridge are shown below as Table 2 and Table 3, respectively.

TABLE 2

Sieve Size	Count	Sieve Size	Count
-1 1/2" Fines	2	8"	2
2"	2	9"	0
3"	3	10"	0
4"	6	10" – 12"	0
5"	5	12" – 15"	2
6"	3	15" – 18"	0
7"	1		

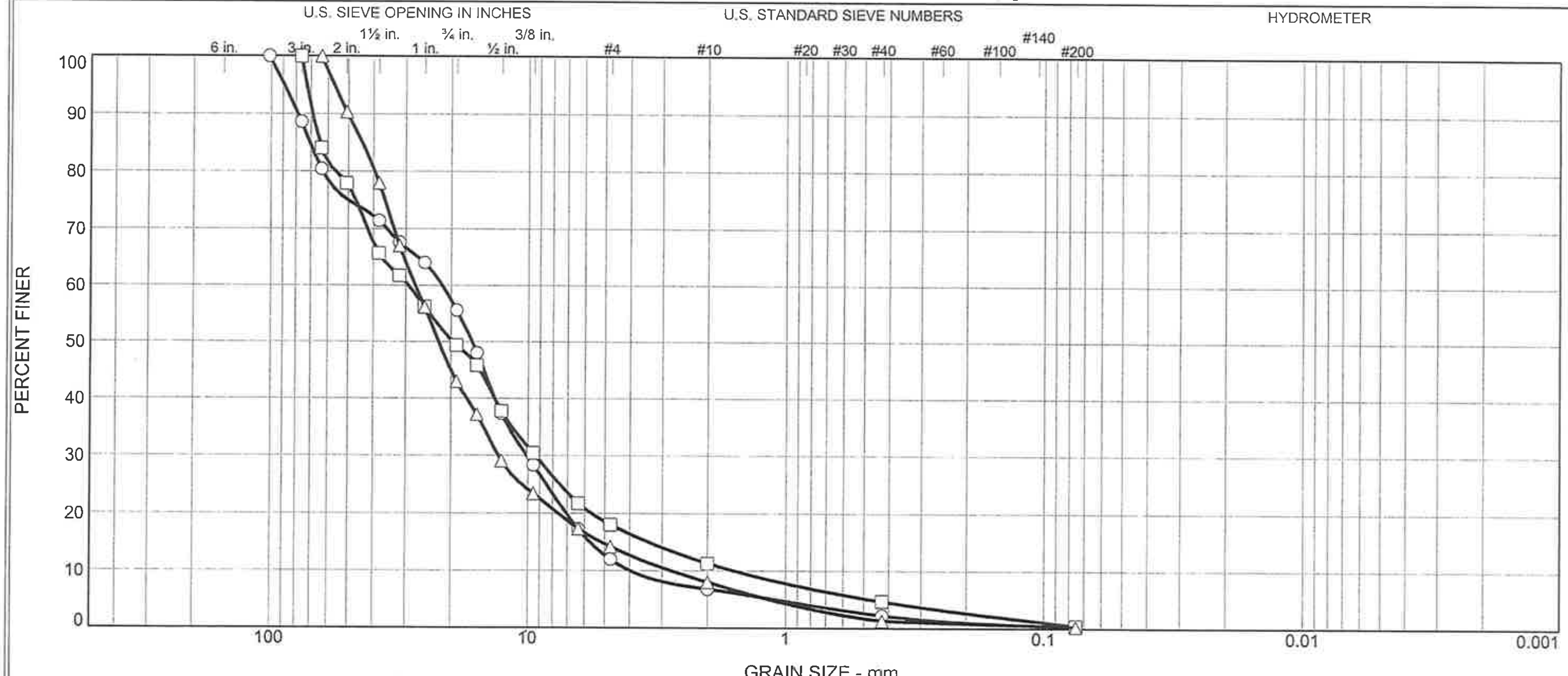
TABLE 3

Sieve Size	Count	Sieve Size	Count
-1 1/2" Fines	1	8"	3
2"	0	9"	0
3"	1	10"	0
4"	2	10" – 12"	1
5"	4	12" – 15"	1
6"	8	15" – 18"	2
7"	4		

We appreciate the opportunity to have been of service and trust this report addresses your current needs. Please call me at 206-391-0552 or Alan Corwin at 206-296-7711, should you have questions or we can be of further assistance.

Attachments: Figure 1 – Laboratory Test Results KC-10-426 through KC-10-428
Figure 2 – Laboratory Test Results KC-10-429 through KC-10-431
Figure 3 – Laboratory Test Results KC-10--432

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	11.4	33.0	43.6	5.2	4.6	1.9	0.3	
□	0.0	50.6	31.3	6.7	6.7	4.2	0.5	
△	0.0	57.0	28.7	6.3	6.7	1.0	0.3	

	Source	Sample #	Depth/Elev.	Date Sampled	USCS	Material Description	NM %	LL	PL
○		KC-10-426		4/27/10	GW	Well-graded gravel		NV	NP
□		KC-10-427		4/27/10	GW	Well-graded gravel with sand		NV	NP
△		KC-10-428		4/27/10	GW	Well-graded gravel		NV	NP

Client King County
Project May Creek Stream Bottom Evaluation
Project No. 1B1205 Figure 1

KING COUNTY

MATERIALS LABORATORY

○ McFarland residence, upstream from bridge
□ 146th Ave SE, upstream side of bridge
△ 146th Ave SE, downstream side of bridge

Tested By: vw

Particle Size Distribution Report

	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	2.0	2.4	10.5	33.6	38.1	13.4
□	0.0	0.0	0.5	4.2	21.5	45.9	27.9	
△	0.0	7.7	0.8	0.5	6.6	19.5	46.9	18.0

	Source	Sample #	Depth/Elev.	Date Sampled	USCS	Material Description	NM %	LL	PL
○		KC-10-429	0" - 3"	4/27/10	ML	Sandy silt		NV	NP
□		KC-10-430	3" - 6"	4/27/10	SM	Silty sand		NV	NP
△		KC-10-431	0" - 6"	4/27/10	ML	Sandy silt		NV	NP

Client King County
Project May Creek Stream Bottom Evaluation

Project No. 1B1205 Figure 2

KING COUNTY

MATERIALS LABORATORY

○ Colossurdo 75' downstream from bridge, center of channel
□ Colosurdo 75' downstream from bridge, N third of channel
△ McFarland 100' upstream from bridge, N third of channel

Tested By: vw

Particle Size Distribution Report

	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.5	1.1	14.5	50.5	33.4	

	Source	Sample #	Depth/Elev.	Date Sampled	USCS	Material Description	NM %	LL	PL
○		KC-10-432	0" - 6"	4/27/10	SM	Silty sand		NV	NP

Client King County

Project May Creek Stream Bottom Evaluation

Project No. 1B1205 Figure 3

KING COUNTY

MATERIALS LABORATORY

○ 148th, 75' downstream from bridge, N third of channel

Department of Transportation
Road Services Division
Engineering Services Section
Environmental Unit
King Street Center
201 South Jackson Street
Seattle, WA 98104-3856
(206) 296-6520 Fax (206) 296-0567
TTY Relay: 711
www.metrokc.gov

M E M O

DATE: February 8, 2011

TO: File

FROM: Julia Turney, LG 2493
King County Road Services Division
Environmental Unit

RE: May Creek Organic Sediment Sample Results

Sample Date: October 8, 2010.

Sample Location: The sample was obtained from the May Creek Channel approximately 25 feet upstream from the foot bridge crossing the May Creek Channel (Gambini and Tsegay properties 15019 SE May Valley Road Parcel number 0223059091 and 10008 148th Ave SE Parcel 0223059075.)

Sample Methodology: The sample was taken using a small three cup plastic container. The sample was scooped from the soft sediment layer on the bottom of the channel. Several passes were made in the sediment to obtain a full container and representative sample. Free water was decanted from the top of the container and the soft muck sample was poured into a wide mouth one quart plastic jar with a screw top. The jar was labeled and taken back to the KCRSD office at 201 S Jackson Street, Seattle WA. The sample was stored in the sample refrigerator in a locked storage room from Oct. 9-11. The sample was transported to the King County Materials Laboratory (KCML) on October 12th.

Sample Analysis: The King County Materials Laboratory (KCML) performed testing to determine the percent of organic material. The sample was designated as "May Creek Sediment Muck – Gambini Prop., 25' Upstream from Bridge". The sample was initially placed in an oven and dried at a temperature of 140^0 Fahrenheit to a constant weight to determine moisture content. The dried material was weighed and placed in an oven at 440^0 Fahrenheit until reaching a constant weight to determine the organic material content based upon loss on ignition. Organic matter that had not ignited at a temperature of 440^0 Fahrenheit was observed in the sample. The remaining sample was weighed and placed in an oven at 1000^0 until reaching a constant weight to ignite additional organic material.

Sample Results:

- Initial Moisture Content of Material Dried at 140^0 Fahrenheit: 498% (140^0 Fahrenheit Oven)
- Total Loss on Ignition (Organic Content) of Material Initially Dried at 140^0 Fahrenheit: 15.3% (440^0 Fahrenheit Oven)
- Total Loss on Ignition (Organic Content) of Material Initially Dried at 140^0 Fahrenheit: 28.2% (1000^0 Fahrenheit Oven)
- The moisture content percent is weight of water lost compared to the dry weight of the sediment sample.
- The total percent organic material in the sample is 28.2%.
- The organic material content percent is weight loss during the test compared to the dry weight of the sediment sample.
- The 1000 degree test temperature may cause water loss in the clay mineral structure and this would contribute to a high reading for organics. The test was run until the sample weight was consistent.
- 28.2% represents an approximate organic content but may be a slightly high result due to test conditions.

References

King County 2010a. Particle Size Evaluation of May Creek Water Channel Soils, Job Number 1B1205, Task MTR. King County Department of Transportation, Materials Lab, Renton, WA.

King County 2010b. Sediment Muck Analysis of May Creek Water Channel Sample, email communication, King County Department of Transportation, Materials Lab, Renton, WA.

NCRS 1993. Soil Survey Division Staff. *Soil Survey Manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.*
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Oliver, H. et.al.2001. Loss on Ignition as a Method For Estimating Organic and Carbonate Content in Sediments: Reproducibility and Comparability of Results, Journal of Paleolimnology 25: 101–110, 2001

Appendix C May Creek Channel Survey Elevations 1965, 1979, 1993, 2002 and 2010.

May Creek
Profiles Comparison

1993 Stream Profile				1965 Harstad Study			1979 Stream Profile			FEMA Data for May Creek		
Cross-sections Surveyed 4/1993 for HEC-2 Model for May Creek Basin Plan				*Drainage Comprehensive Plan Referenced by 1981 May Creek Basin Plan Techincal Appendix*			*May Creek Basin Plan Technical Appendix, Figure C-1*			*Flood Profiel for May Creek*		
River Station	Min Ch El (ft)	Length Chnl (ft)	Cum Chnl Length (ft)	Seg #	Chnl Elevation	Chnl Length (ft)	Sta ID	Chnl Elevation	Chnl Length (ft)	River Station	Chnl Elevation	Chnl Length (ft)
2756	298.3	10	10	930	300.4	20	1	299.3	30			
3061	302.5	305	315									
3571	303.3	510	825									
3591	303.2	20	845									
3596.5	**146th Ave Bridge**											
3602	303.2	0.1	**845**	929	304	895	2	304.9	842	**AG**	**303.1**	850
3622	304.4	20	865	928	304.1	930						
							2A	304.2	1060			
4047	304.3	425	1290									
4397	303.2	350	1640									
4507	304.3	110	1750									
4518.5	**148th Ave Bridge**											
4530	304.3	0.1	**1750**	927	304.1	1835	3	303.5	1755	**AI**	**304.3**	1748
4580	304.4	50	1800	926	304.5	1860						
4630	305.3	50	1850									
4825	305.3	195	2045									
5310.5	**Red Barn Pvt. Bridge**											
5316	306.9	0.1	2045					304	2055	**AK**	**306.9**	2540
5366	306.4	50	2095									
6041	305.8	695	2790									
6646	306.8	605	3395									
6652	**Colasurdo East Pvt. Bridge**											
6658	307.2	0.1	3395					305.4	3425	**AM**	**307**	3913
6708	306.8	50	3445									
							3A	306.8	3690			
7123	306	455	3900	924	305.9	4010						
7618	308.4	495	4395									
7628	308.1	10	4405									
7634	**Private Bridge**											
7640	308.1	0.1	4406					308	4455	**AO**	**308**	4969
7650	308.4	10	4416									

BX 85

1993 Stream Profile				1965 Harstad Study			1979 Stream Profile			FEMA Data for May Creek		
Cross-sections Surveyed 4/1993 for HEC-2 Model for May Creek Basin Plan				***Drainage Comprehensive Plan Referenced by 1981 May Creek Basin Plan Techincal Appendix***			***May Creek Basin Plan Technical Appendix, Figure C-1***			***Flood Profiel for May Creek***		
River Station	Min Ch El (ft)	Length Chnl (ft)	Cum Chnl Length (ft)	Sta ID	Chnl Elevation	Chnl Length (ft)	Sta ID	Chnl Elevation	Chnl Length (ft)	River Station	Chnl Elevation	Chnl Length (ft)
8835	307.1	1185	5601									
							4A	306.1	5900			
9985	310.4	1150	6751									
							5	310.7	7030			
10935	310.1	950	7701									
11435	313.3	500	8201									
11735	313.5	300	8501									
11835	313.5	100	8601									
11849	**164th Ave Bridge**											
11863	313.5	0.1	**8601**	921	313.5	9200	6	314	8670	**AS**	**314.5**	8290
11963	314.2	50	8651									
12323	313.3	410	9061									
13143	315	820	9881									
13893	316.4	750	10631									
14608	316.5	715	11346				7	317	11340			
15488	318.5	880	12226									
							8	317.1	12680			
16148	318.7	660	12886									
							8A	319.9	13060			
16953	319.8	805	13691									
17563	321.6	610	14301									
17573	322	10	14311									
17602	**Renton-Issaq. Road Bridge**											
17631	322	0.1	**14311**	918	320.3	14955	9	321.5	14380	**BA**	**322**	14045
17641	321.5	10	14321									
17741	321.5	100	14421									
18026	326.1	285	14706									
18216	327.7	190	14896									
18316	327.8	100	14996									
18323	**SE May Valley Road Bridge**											
18329	327.8	0.1	**14996**	915	327.8	15735	10	328	15030	**BC**	**328**	14784

1993 PROFILE

Min Ch El (ft)	Length Chnl (ft)	CAD Values for drawing profile Elv. Difference	Elv Div. By 10	Distance Div. By 100	Cum Length Chnl (ft)
298.[illegible]	10			**0.10**	10
302.5	305	-4.2	**0.42**	**3.05**	315
303.3	530	-0.8	**0.08**	**5.30**	845
304.3	445	-1	**0.1**	**4.45**	1290
303.2	350	1.1	**0.11**	**3.50**	1640
304.3	160	-1.1	**0.11**	**1.60**	1800
305.3	245	-1	**0.1**	**2.45**	2045
306.4	50	-1.1	**0.11**	**0.50**	2095
305.8	695	0.6	**0.06**	**6.95**	2790
306.8	655	-1	**0.1**	**6.55**	3445
306	455	0.8	**0.08**	**4.55**	3900
308.4	515	-2.4	**0.24**	**5.15**	4415
307.1	1185	1.3	**0.13**	**11.85**	5600
310.4	2100	-3.3	**0.33**	**21.00**	7700
313.3	900	-2.9	**0.29**	**9.00**	8600
314.2	50	-0.9	**0.09**	**0.50**	8650
313.3	410	0.9	**0.09**	**4.10**	9060
315	820	-1.7	**0.17**	**8.20**	9880
316.4	1465	-1.4	**0.14**	**14.65**	11345
318.5	1540	-2.1	**0.21**	**15.40**	12885
319.8	805	-1.3	**0.13**	**8.05**	13690
321.6	610	-1.8	**0.18**	**6.10**	14300
322	10	-0.4	**0.04**	**0.10**	14310
321.5	110	0.5	**0.05**	**1.10**	14420
326.1	285	-4.6	**0.46**	**2.85**	14705
327.7	290	-1.6	**0.16**	**2.90**	14995
328.5	100	-0.8	**0.08**	**1.00**	15095
329.2	305	-0.7	**0.07**	**3.05**	15400

1993 STREAM PROFILE

CAD Values for drawing profile

Min Ch El (ft)	Length Chnl (ft)	Cum Length Chnl (ft)	Elv. Difference	Elv Div. By 10	Distance Div. By 100
298.3	10	10			**0.10**
302.5	305	315	-4.2	**-0.42**	**3.15**
303.3	510 (530)	825			
~~303.2~~	~~20~~	~~845~~	0.1	**0.01**	**8.45**
Bridge [redacted] Bridge					
~~303.2~~	~~0.1~~	[redacted]			
~~304.4~~	~~20~~	~~865.1~~	-1.2	**-0.12**	**8.65**
304.3	425 (445)	1290.1	0.1	**0.01**	**12.90**
303.2	350	1640.1	1.1	**0.11**	**16.40**
304.3	110	1750.1	-1.1	**-0.11**	**17.50**
179 profile Bridge [redacted]					
~~304.3~~	~~0.1~~	[redacted]			
#3.1 → 304.4	50	1800.2	-0.1	**-0.01**	**18.00**
~~305.3~~	~~50~~	~~1850.2~~	-0.9	**-0.09**	**18.50**
305.3	195 (245)	2045.2	0	**0**	**20.45**
Bridge					
~~306.9~~	~~0.1~~	~~2045.3~~			
306.4	50	2095.3	0.5	**0.05**	**20.95**
305.8	695	2790.3	0.6	**0.06**	**27.90**
306.8	605	3395.3	-1	**-0.1**	**33.95**
Bridge					
~~307.2~~	~~0.1~~	~~3395.4~~			
306.8	50	3445.4	0.4	**0.04**	**34.45**
306	455	3900.4	0.8	**0.08**	**39.00**
308.4	495 (505)	4395.4	-2.4	**-0.24**	**43.95**
~~308.1~~	~~10~~	~~4405.4~~	0.3	**0.03**	**44.05**
Bridge					
~~308.1~~	~~0.1~~	~~4405.5~~			
308.4	10	4415.5	-0.3	**-0.03**	**44.16**
307.1	1185	5600.5	1.3	**0.13**	**56.01**
310.4	1150	6750.5	-3.3	**-0.33**	**67.51**
310.1	950	7700.5	0.3	**0.03**	**77.01**
313.3	500	8200.5	-3.2	**-0.32**	**82.01**
313.5	300 (400)	8500.5	-0.2	**-0.02**	**85.01**
~~313.5~~	~~100~~	~~8600.5~~	0	**0**	**86.01**
Bridge [redacted]					
~~313.5~~	~~0.1~~	[redacted]			
#6.1 → 314.2	50	8650.6	0	**0**	**86.51**
313.3	410	9060.6	0.9	**0.09**	**90.61**
315	820	9880.6	-1.7	**-0.17**	**98.81**
316.4	750 (1465)	10630.6	-1.4	**-0.14**	**106.31**
~~316.5~~	~~715~~	~~11345.6~~	-0.1	**-0.01**	**113.46**
318.5	880 (1540)	12225.6	-2	**-0.2**	**122.26**
~~318.7~~	~~660~~	~~12885.6~~	-0.2	**-0.02**	**128.86**
319.8	805	13690.6	-1.1	**-0.11**	**136.91**
321.6	610	14300.6	-1.8	**-0.18**	**143.01**
322	10	14310.6	-0.4	**-0.04**	**143.11**
Bridge [redacted]					

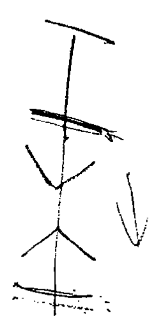
140th AVE BRIDGE (A1)

1979 profile

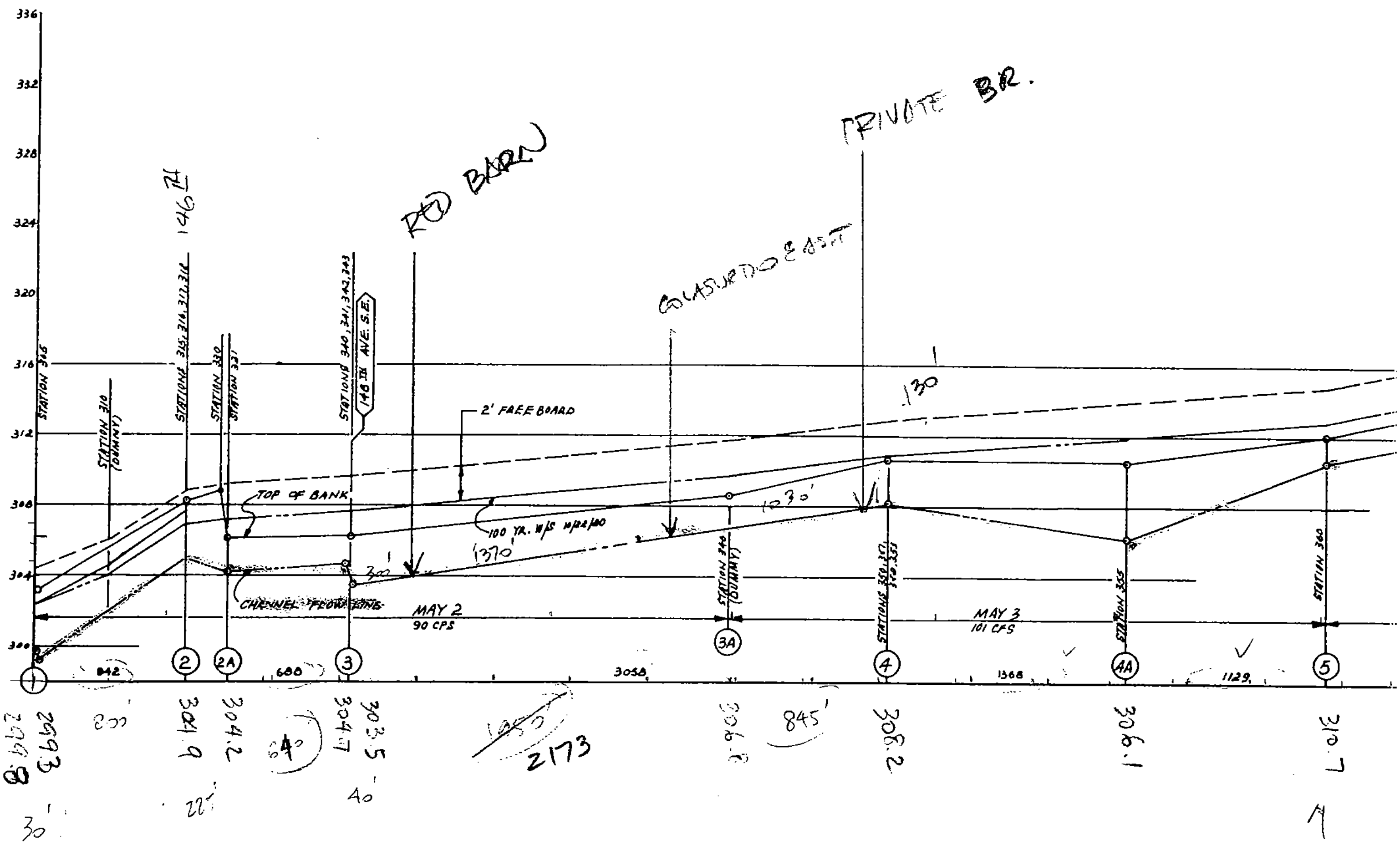
	~~322~~	~~0.1~~	[redacted]			
# 9.1 →	321.5	10	14320.7	0.5	**0.05**	**143.21**
	321.5	100	14420.7	0	**0**	**144.21**
	326.1	285	14705.7	-4.6	**-0.46**	**147.06**
	327.7 8	190 290	14895.7	-1.6	**-0.16**	**148.96**
	~~327.8~~	~~100~~	~~14995.7~~	[redacted]	**-0.01**	**149.96**
Bridge	X-section 10 is about here [redacted]					
#10 →	~~327.8~~	~~0.1~~	[redacted]			
	328.5	100	15095.8	-0.7	**-0.07**	**150.96**
	329.2	305	15400.8	-0.7	**-0.07**	**154.01**

1993 Stream Profile

	HEC-RAS Plan River Sta	Min Ch El (ft)	Length Chnl (ft)	Cum Length Chnl (ft)	
	2756	298.3	10	10	↑ d/s
D/S	3061	302.5	305	315	
	X-sec 1 starts about here + about another 96 ft d/s				
	3571	303.3	510	825	
	3591	303.2	20	845	
AG?	3596.5 Bridge – u/s face				
	3602	303.2	0.1	845.1	STA 5+00
	3622	304.4	20	865.1	
	4047	304.3	425	1290.1	
	4397	303.2	350	1640.1	
	4507	304.3	110	1750.1	compares w/ 1747 of 1979 profile
AI	4518.5 Bridge	**148th Ave Bridge**			
	4530	304.3	0.1	1750.2	
	4580	304.4	50	1800.2	same as #31 of 1979 profile
	4630	305.3	50	1850.2	
	4825	305.3	195	2045.2	
AK	5310.5 Bridge				
	5316	306.9	0.1	2045.3	
	5366	306.4	50	2095.3	
	6041	305.8	695	2790.3	
	6646	306.8	605	3395.3	
AM	6652 Bridge				
	6658	307.2	0.1	3395.4	
	6708	306.8	50	3445.4	
	7123	306	455	3900.4	
	7618	308.4	495	4395.4	
	7628	308.1	10	4405.4	
AO	7634 Bridge				
	7640	308.1	0.1	4405.5	
	7650	308.4	10	4415.5	
	8835	307.1	1185	5600.5	
	9985	310.4	1150	6750.5	
	10935	310.1	950	7700.5	
	11435	313.3	500	8200.5	
	11735	313.5	300	8500.5	
	11835	313.5	100	8600.5	
AS	11849 Bridge	**164th Ave Bridge**			
	~~11863~~	~~313.5~~	~~0.1~~	~~8600.6~~	
	11963	314.2	50	8650.6	# 6.1 of 1979 profile
	12323	313.3	410	9060.6	
	13143	315	820	9880.6	
	13893	316.4	750	10630.6	
	14608	316.5	715	11345.6	
	15488	318.5	880	12225.6	
	16148	318.7	660	12885.6	
	16953	319.8	805	13690.6	
U/S	17563	321.6	610	14300.6	



17573		322	10	14310.6
17602	Bridge		Renton-Issaq. Road Bridge	
17631		322	0.1	14310.7
17641		321.5	10	14320.7
17741		321.5	100	14420.7
18026		326.1	285	14705.7
18216		327.7	190	14895.7
18316		327.8	100	14995.7
18322.5	Bridge		X-section 10 is about here	
18329		327.8	0.1	14995.8
18429		328.5	100	15095.8
18734		329.2	305	15400.8
19514		331.2	780	16180.8
20444		335.2	930	17110.8
21144		338.8	700	17810.8



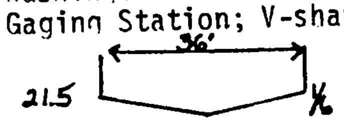
Total length fr. ① → ⑩ = 15,292 ft.

40 + 2193 + 845 = 3058

1979 May Creek Basin Plan's Stream Profile

	Sta. ID	Elv	Chnl Length	Cum Length
D/S	1	299.8	0	0
	1.1	299.3	30	30
146 ft	2	304.9	812	→ 842
	2A	304.2	225	1067
	3	304.7	680	1747
148 ft	3.1	303.5	40	1787
	3A	306.8	2173	3960 (Σ=3058)
	4	308.2	845	4805
	4A	306.1	1368	6173
	5	310.7	1129	7302
	6	313.8	1736	9038
164 ft	6.1	314	40	9078
	7	317	2630	11708
	8	317.1	1348	13056
	8A	319.9	384	13440
	9	320.8	1422	14862
SR900	9.1	321.5	60	14922
SE May	10	328.2	590	15512
U/S valley	11	328	358	15870

Subcatchment	Segment Number	Identification	Bottom Width or Pipe Dia. (ft.)	Segment Length (ft.)	Inlet Elev. (msl)	Outlet Elev. (msl)	Bank Slope Vert./Horiz. Left	Bank Slope Vert./Horiz. Right	Max. Flow Depth (ft.)	Roughness	Remarks
						MAY CREEK MAINSTEM (Downstream Order)					
	901	CH	4	290	451.3±.5	426.0±.5	1/1	1/1	3	Grassy roadside ditch	Inflow at Segment 003 at upstream end.
	902	CU	1.5	80	426.0±.5	422.4±.5	-	-	1.5	Concrete	Two driveways.
	903	CH	5	100	422.4±.5	416.4±.5	2/1	2/1	3	Roadside ditch	Bank erosion.
	904	CU	1.5	30	416.4±.5	415.0±.5	-	-	1.5	Concrete	Driveway.
	905	CH	3	400	415.0±.5	395.2±.5	1/1	1/1	2	Roadisde ditch	Bank erosion.
	906	CU	1.5	30	395.2±.5	394.8±.5	-	-	1.5	Concrete	Driveway.
	907	CH	2	110	394.8±.5	385.9±.7	1/1	1/1	3	Roadside ditch	Bank erosion, small inflow from Subcatchment 3.
	908	CU	1.5	30	385.9±.7	384.5±.5	-	-	1.5	Concrete	Driveway.
	909	CH	3	1,800	384.5±.5	357.0±.5	1/2	1/2	2	Natural channel	Bank erosion.
	910	CH	5	40	357.0±.5	356.0±.5	1/4	1/4	1	Brushy	After inflow of Segment 044.
	911	CU	3.0	30	356.0±.5	355.9±.5	-	-	3.0	Corrugated steel	Driveway to campground in Subcatchment 5.
	912	CH	4	1,850	355.9±.5	339.8±.4	3/5	3/5	3	Soil bnk, mud bot.	Begin Harstad profile (1965).
	913	BR	3.0	20	339.8±.4	339.7±.4	-	-	3.0		Private drive; SE 109th Street.
	914	CH	5	2,840	339.7±.4	327.9±.4	1/1	1/1	3	Bottom sand, gravel, mud	
	[redacted]						Vert.	Vert.	5		Under [redacted]
	916	CH	5	330	327.8±.4	326.6±.5	2/1	1.5/1	3		
	917	CH	6	370	326.6±.5	321.0±1	1/1	1/1	1.5		Below inflow of Segment 116.
	[redacted]						-	-	6.1	Corrugated steel	[redacted] 12.8 x 8 foot culvert with 2.9 foot weir on upstream end and 2.4 foot on downstream end.
	919	CH	7.5	2,200	320.3±1	312.8±.4	1/1	1/1	3	Mud bottom, grassy banks	
	920	CH	9.5	3,530	312.8±.4	313.6±.3	1.5/1	1/1	3.0		Below inflow of Segment 195.
	[redacted]						Vert.	Vert.	4.5		[redacted] inflow of Segment 259.
	922	CH	6.5	2,090	313.5±.3	309.8±.4	1.5/1	1/1	4	Heavy brush in channel	
	923	CH	8.5	3,100	309.8±.4	305.1±.4	1/1	1/1	3.5	Gravel bottom	Below inflow of Segment 319.
	924	CH	6.5	1,320	305.1±.4	305.9±.4	.5/1	.5/1	3.5	Mud bottom	Below inflow of Segment 333.

Subcatchment	Segment Number	Identification	Bottom Width or Pipe Dia. (ft.)	Segment Length (ft.)	Inlet Elev. (msl)	Outlet Elev. (msl)	Bank Slope Vert./Horiz. Left	Bank Slope Vert./Horiz. Right	Max. Flow Depth (ft.)	Roughness	Remarks
	925	CH	11.0	830	305.9±.4	304.5±.5	1.5/1	1/1	3.5	Mud bottom	Below inflow of Segment 345.
	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Vert.	Vert.	5.6	Mud bottom	[redacted] inflow of Segment 369.
	927	CH	9.0	905	303.5±.4	304.1±.4	1/1	1/1	4.0	Thick mud bottom	Small bridge. (146 ft)
	928	BR	17	15	304.1±.4	304.0±.4	Vert.	Vert.	8	Five 1.5 foot supports	
	929	CH	14	895	304.0±.5	300.7±.4	.5/1	.5/1	2.5	Gravel bottom	Small arch bridge.
	930	BR	6.8 arch	20	300.7±.4	300.4±.4	-	-	6.8	Concrete	End Harstad profile; 136th Ave.
	931	CH	16	3,370	300.4±.4	243±1	.5/1	.5/1	4.5	Gravel bottom	bridge does not affect flow.
	932	CH	17	3,030	243±1	186±2	1/1	1/1	4		Below Segment 472.
	933	CH	15.5	3,220	186±2	147.1±.5	1/1	1/1	3.5		Below Segment 535.
	934	CH	16	1,390	147.1±.5	121.3±.5	1/1	1/1	4.5		Below Segment 994. (Honeydew Creek).
	935	CH	17	1,050	121.3±.5	107.2±.5	1/1	1/1	3		Below Segment 763.
	936	CH	14	200	107.2±.5	100.2±.5	1/1	1/1	3.5		Below Segment 787.
	937	BR	7.25	30	100.2±.5	100.1±.5	-	-	7.25		Bridge over NE 31st.
	938	CH	15	280	100.1±.5	100.0±.5	1/1	1/1	3		Riprapped banks.
	939	CH	15	490	100.0±.5	89.3±.5	1/1	1/1	3		Below Segment 784.
	940	BR	31	30	89.3±.5	90.4±.5	Vert.	Vert.	6		Bridge over NE 31st; elevations double checked.
	941	CH	20	1,050	90.4±.5	77.4±.5	1/1	1/2	2.5	Gravel bottom	Below inflow of Segment 816.
	942	CH	20	3,980	77.4±.5	34.0±1	1/1	1/1	3		I-405 freeway bridge as built in 1956
	943	BR	18	250	34.0±1	32.0±1	1/1	1/1	50		
	944	CH	20	930	32.0±1	21.2±.1	1/1	1/1	3	Gravel bottom	Lake Washington Blvd.
	945	BR	40	30	21.2±.1	21.2±.1	1/1	1/1	12	Concrete	USGS Gaging Station; V-shaped
	946	WEIR	36	3	21.5±.5	21.5±.5	Vert.	Vert.	6		weir 
	947	CH	40	50	20.5±1	20.6±.1	1/2	1/2	5		Railroad bridge.
	948	BR	40.5	15	20.6±.1	20.5±.1	Vert.	Vert.	12		
	949	CH	25	530	20.5±.1	16.2±.2	2/1	2/1	5	Concrete	
	950	BR	32	25	16.2±.2	15.5±.2	Vert.	Vert.	6	Gravel	Man-made channel; enter Lake Wash.
	951	CH	30	480	15.5±.2	12.9±.2	2/1	2/1	4		
				43,800	Total						

Segment Parameters

After the subcatchment was divided into segments, each was described by seven parameters as required by the SWMM model:

1) Channel bottom width OR pipe diameter
2) Segment length
3) Inlet elevation
4) Outlet elevation
5) Bank slopes
6) Roughness
7) Maximum flow depth

Existing information was reviewed to minimize field work. Major sources included:

1) [redacted] For four of the eight miles of May Creek, a longitudinal profile with cross sections every 100 feet was surveyed. This study provided information for Segments 912 - 931.

2) Topographic maps with 5, 10, and 20 foot contour intervals. These maps were crucial to check surveyed elevations, to supply spot elevations at many points, and to estimate some remote inlet and outlet elevations.

3) USGS topographic map of 25 foot contour interval. In spite of the large scale, these maps provided the most accurate positions of stream channels. The upstream elevations of most natural channels in the uplands were taken from these maps.

4) Engineering plat maps for urbanized areas. These were used to locate storm sewers. As requested, all storm sewers greater than twelve inches are shown on the base map overlay. As can be clearly seen, most residential areas do not have storm sewers.

5) Road crossing plans for I-405, State Highway 900, 148th Avenue and 164th Avenue. In addition to describing channel segments, they provided references and checks for our survey.

Values from the RIBCO study were not used.

A brief discussion about the accuracy, sources, measuring techniques and other pertinent information for each parameter may help in using the data most effectively.

Channel Bottom Width:

For Segments 912 - 931, bottom width was measured by averaging four to eight Harstad cross sections within each segment. In a majority of cases, bottom width was measured in the field. Please note that for tributaries flowing from the hills, channel dimensions were measured only on the downstream end. If additional descriptions are needed, these segments can be further investigated. Normal channel irregularities limited accuracy to within one foot. For Segments 919 - 927, the completeness of the Harstad study enabled us to stretch this to within ½ foot.

Pipe Diameter:

Culvert diameters were nearly all measured in the field to within ±.1 foot. Bridges were measured as accurately as possible, from ±.05 to ±.5 foot. In the table in Appendix 2, care should be taken to notice that crossings may have rectangular, oval or circular cross sections.

Segment Length:

Smaller values (less than 100 feet) were usually determined in the field by pacing. These are ±2 feet. Longer distances were measured and carefully compared on the base map and on at least one other map. Values from the most accurate map were chosen. Therefore, base map distances may not be the same as distances on the table. The table values should be regarded as the most accurate. Table values are at least ±20 feet.

Inlet and Outlet Elevations:

Determination of elevation represented the majority of time expended. Because of the absence or destruction of almost all benchmarks in the basin, most surveys were run from points of known elevations. These included spot elevations on road and topographic maps, engineering plat maps and bridge plans. The precision of these starting elevations has been taken into account in assessing accuracy. Elevations surveyed from benchmarks and these spot elevations are usually listed as ±.5 foot. The elevations of some remote segments were taken from maps of 5 foot contour interval. They are evaluated as ±2 feet. Elevations from the USGS map of 25 foot contour interval are assessed as ±5 feet. Elevations taken from the Harstad profile are given as ±.4 foot.

Bank Slopes:

In Segments 912 - 931, bank slopes were measured on the Harstad cross sections. For most segments, bank slopes were estimated in the field. Natural channels are usually not trapezoidal as required by the SWMM model; and, therefore, precision in these values should not be expected.

Maximum Flow Depth:

Again the natural changes and irregularities of stream channels prevented great accuracy in measuring the bank full depths. Values should be considered to be within one foot. Measurements for culverts represent the actual depth available for flow as of January, 1977. If the culvert has been filled, this will be evident because the maximum flow depth will be less than the pipe diameter. The accuracy of maximum flow depth in pipes is ±.1 foot. Maximum flow depth may change during flood conditions due to scouring or filling.

Roughness:

Roughness was described briefly to aid in selection of a Manning's n. Culverts were noted as either concrete or corrugated steel, and the general conditions of channels were stated. For the mainstream of May Creek, roughness due to mid channel vegetation can be most adequately described by examining the available air photos.

1965 HARSTAD STUDY

CHNL LENGTH	CUM LENGTH	CUM LENGTH	
30	**30**	15765	
330	360	15735	MAY VALLEY RD
370	730	15405	
80	810	15035	
2200	3010	14955	SR 900
3530	6540	12755	
25	6565	9225	
2090	8655	9200	164 TH
3100	11755	7110	
1320	13075	4010	
830	13905	2690	
25	13930	1860	148 TH
905	14835	1835	
15	14850	930	146 TH
895	15745	915	
20	**15765**	**20**	

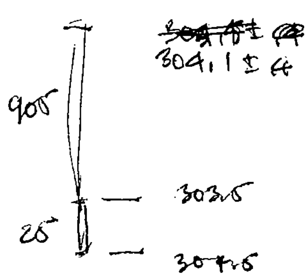


TABLE 1 - SUMMARY OF DISCHARGES (Cont'd)

Flooding Source and Location	Drainage Area (sq. miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
North Fork Issaquah Creek					
At mouth	4.8	176	269	315	445
At mouth (including overtopping from Issaquah Creek)	4.8	176	489	835	1,995
East Fork Issaquah Creek					
At mouth	9.5	440	725	850	1,100
West Fork Issaquah Creek					
Above Issaquah Creek confluence	4.9	290	460	550	790
2,900 feet upstream of 229th Drive S.E.	4.7	270	440	530	770
Above tributary confluence near 208th Avenue S.E.	1.5	100	160	200	280
Holder Creek					
Above confluence with Carey Creek	7.5	420	660	800	1,150
Tibbetts Creek					
At mouth	3.9	220	355	425	600
May Creek					
At USGS gage 12-119600	12.7	480	800	870	1,020
At Coal Creek Parkway	8.9	350	580	640	750
At 146th Avenue S.E.	7.7	310	520	560	660
At 148th Avenue S.E.	6.9	280	470	510	600
At 164th Avenue S.E.	4.8	200	340	370	440
At S.E. Renton-Issaquah Road	2.9	130	220	240	280
At S.E. May Valley Road	1.2	59	100	110	130
At S.E. 109th Place	0.9	46	78	87	100
May Creek Tributary					
Above confluence with May Creek	1.5	72	120	140	160
Vasa Creek					
At mouth	1.37	55	81	93	123
At cross section R	0.53	24	38	44	60

King County Surface Water Management
Everyone lives downstream
Engineering & Environmental Services

MAY CREEK
1993 vs. 1979 STREAM PROFILES

Comp TJP Chk ____ Rev ____
Date 11/17/0[illegible] Date ____ Date ____

Project ____
Page ____ of ____ Pages

X - SEC	DISTANCE	DATA SOURCE: 1979 MEASURED FR. PLAN	DATA SOURCE: 1993 FROM HEC-RAS MODEL	DATA SOURCE: FEMA (TABLE 4 IN MILES)
146TH	∅			
		850'	905'	898'
148TH				
		6675'	6850'	7392'
164TH				
		6100'	5710'	5755'
SR 900				
	Total length ⇒	13,625'	13,465'	14,045'

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE
May Creek								
A	0.14	34	158	5.5	21.0	21.0	21.5	0.5
B	0.16	60	239	3.6	21.8	21.8	22.2	0.4
C	0.24	42	99	8.8	23.3	23.3	23.3	0.0
D	0.25	42	110	7.9	25.7	25.7	25.7	0.0
E	0.31	31	121	7.2	29.0	29.0	29.2	0.2
F	0.39	40	150	5.8	32.5	32.5	33.0	0.5
G	0.46	28	87	10.0	35.8	35.8	35.8	0.0
H	0.52	23	123	7.1	40.0	40.0	40.6	0.6
I	0.57	45	165	5.3	41.8	41.8	42.5	0.7
J	0.63	31	89	9.7	45.3	45.3	45.3	0.0
K	0.78	33	133	6.5	55.2	55.2	55.2	0.0
L	0.94	79	143	6.1	64.7	64.7	64.7	0.0
M	1.09	33	113	7.7	76.4	76.4	76.6	0.2
N	1.25	39	128	6.6	85.4	85.4	85.4	0.0
O	1.36	32	89	9.6	93.1	93.1	93.2	0.1
P	1.39	40	172	4.9	95.6	95.6	96.0	0.4
Q	1.41	33	90	9.5	95.8	95.8	95.8	0.0
R	1.42	33	111	7.7	96.4	96.4	96.4	0.0
S	1.46	30	95	8.9	99.8	99.8	99.9	0.1
T	1.54	22	91	9.3	106.8	106.8	106.9	0.1
U	1.56	8	68	12.5	112.2	112.2	112.2	0.0
V	1.61	43	283	2.9	114.2	114.2	115.1	0.9
W	1.74	27	81	9.9	120.9	120.9	120.9	0.0
X	1.83	38	170	4.8	125.0	125.0	125.7	0.7
Y	1.96	52	101	8.0	135.8	135.8	135.8	0.0
Z	2.02	42	130	6.3	140.4	140.4	140.5	0.1

[1]Miles Above Mouth

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

MAY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE
May Creek (Cont'd)								
AA	3.23	37	124	5.1	266.4	266.4	267.3	0.9
AB	3.34	33	78	8.2	278.3	278.3	278.3	0.0
AC	3.49	41	135	4.7	289.6	289.6	290.2	0.6
AD	3.68	40	134	4.8	300.3	300.3	300.3	0.0
AE	3.74	15	78	8.2	304.3	304.3	304.5	0.2
AF	3.80	21	80	8.0	306.5	306.5	306.9	0.4
AG	3.90	18	105	5.3	309.2	309.2	310.0	0.8
AH	3.99	53	257	2.2	310.0	310.0	310.7	0.7
AI	4.07	19	92	5.5	310.2	310.2	311.1	0.9
AJ	4.13	92	371	1.4	311.5	311.5	312.1	0.6
AK	4.22	75	303	1.7	311.5	311.5	312.3	0.8
AL	4.37	231	983	0.5	311.8	311.8	312.8	1.0
AM	4.48	96	387	1.3	311.9	311.9	312.9	1.0
AN	4.58	137	540	0.9	312.1	312.1	313.1	1.0
AO	4.68	19	78	6.5	312.5	312.5	313.1	0.6
AP	4.90	133	559	0.9	313.4	313.4	314.4	1.0
AQ	5.12	115	325	1.6	313.8	313.8	314.8	1.0
AR	5.30	44	120	4.2	315.5	315.5	316.0	0.5
AS	5.47	12	57	6.5	319.2	319.2	319.2	0.0
AT	5.56	73	413	0.9	320.3	320.3	321.1	0.8
AU	5.72	85	444	0.8	320.3	320.3	321.2	0.9
AV	5.86	184	743	0.5	320.4	320.4	321.4	1.0
AW	6.00	216	491	0.8	320.4	320.4	321.4	1.0
AX	6.16	50	70	5.3	321.9	321.9	322.2	0.3
AY	6.29	100	271	1.4	323.2	323.2	324.2	1.0
AZ	6.44	170	324	1.1	324.0	324.0	324.8	0.8

[1]Miles Above Mouth

TABLE 4	FEDERAL EMERGENCY MANAGEMENT AGENCY KING COUNTY, WA AND INCORPORATED AREAS	FLOODWAY DATA MAY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE
May Creek (Cont'd)								
(SR 900) BA	6.56	13	40	6.0	324.3	324.3	325.3	1.0
BB	6.65	138	106	2.3	329.5	329.5	329.5	0.0
SE MAY VALLEY BC	6.70	11	26	4.3	330.8	330.8	331.4	0.6
BD	6.78	34	58	1.9	332.0	332.0	332.8	0.8
BE	6.93	61	48	2.3	334.1	334.1	335.1	1.0
BF	7.10	33	37	2.9	338.1	338.1	338.8	0.7
BG	7.24	11	26	4.2	341.9	341.9	342.7	0.8

739'

[1]Miles Above Mouth

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA

AND INCORPORATED AREAS

FLOODWAY DATA

MAY CREEK

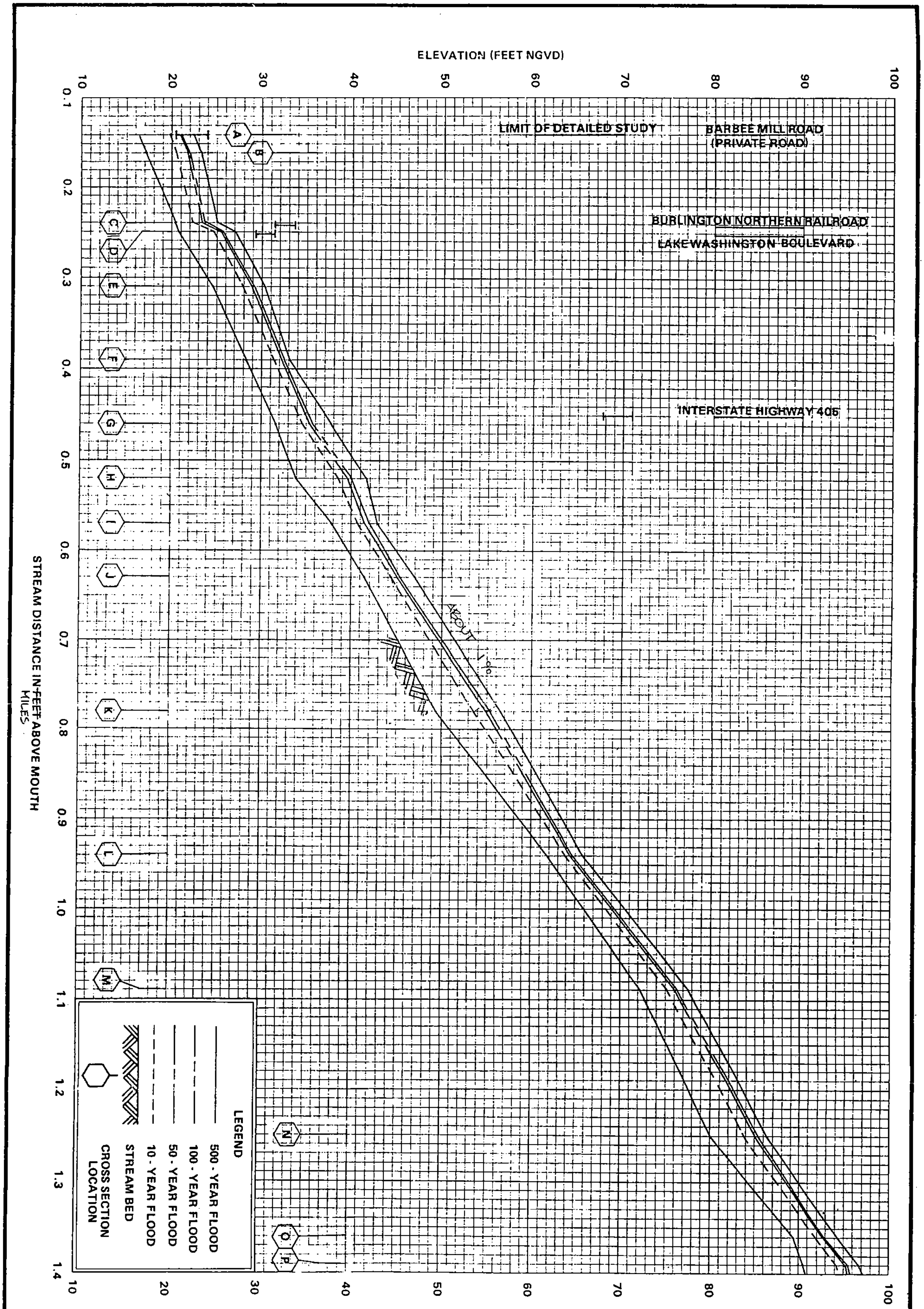
FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT[2] FLOODWAY (FEET NGVD)	WITH[2] FLOODWAY (FEET NGVD)	INCREASE
May Creek Tributary								
A	700	61	127	1.1	329.5	328.0	329.0	1.0
B	1,100	78	198	0.7	329.5	328.1	329.1	1.0
C	1,600	69	151	0.3	329.5	328.2	329.2	1.0
D	1,950	45	92	0.5	329.5	328.2	329.2	1.0
E	2,420	51	96	0.5	329.5	328.3	329.3	1.0
F	2,760	13	22	2.1	329.5	328.5	329.4	0.9

[1]Feet Above Mouth
[2]Elevations Computed Without Consideration of Backwater from May Creek

FEDERAL EMERGENCY MANAGEMENT AGENCY
KING COUNTY, WA
AND INCORPORATED AREAS

FLOODWAY DATA

MAY CREEK TRIBUTARY

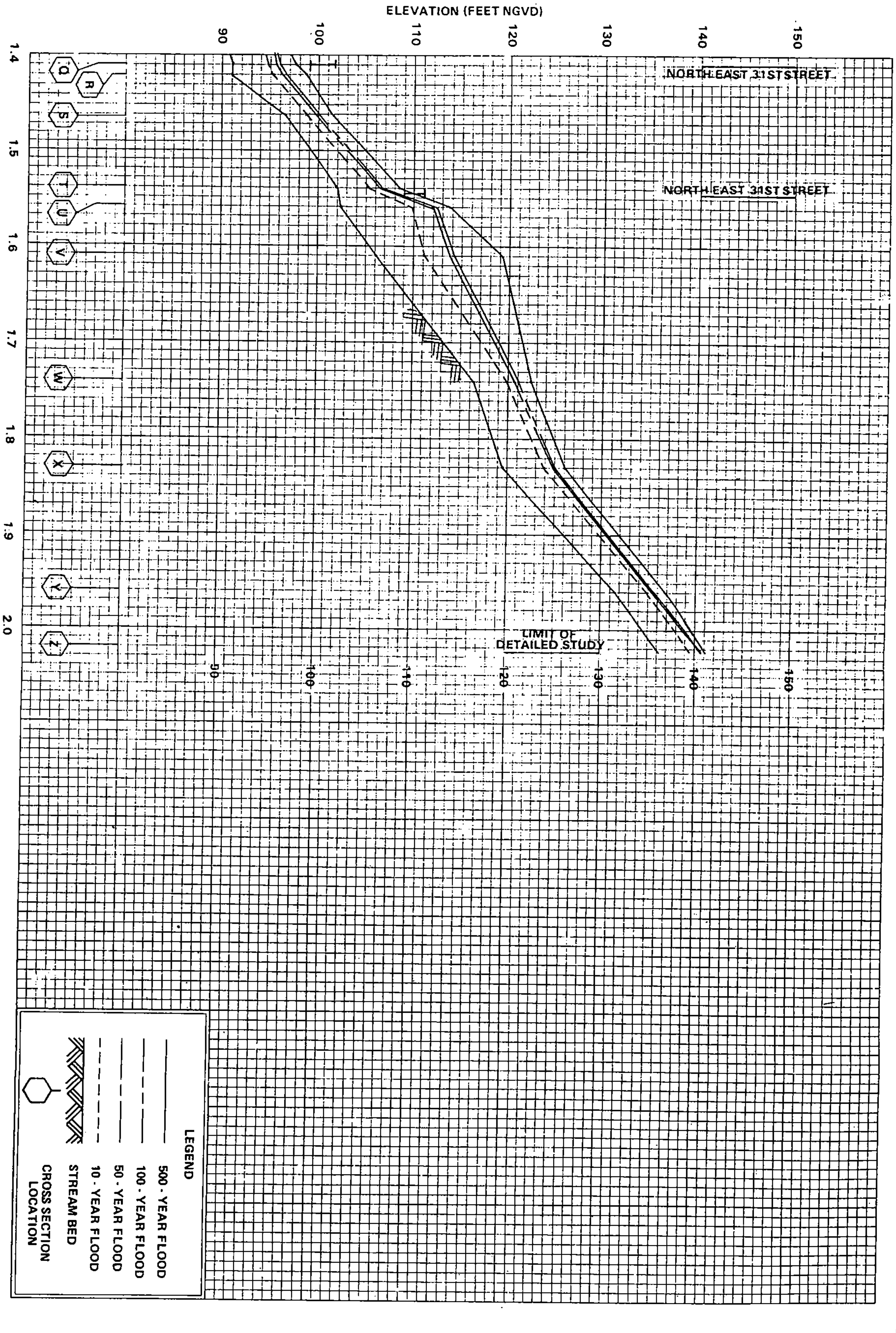


FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA
AND INCORPORATED AREAS

FLOOD PROFILES

MAY CREEK

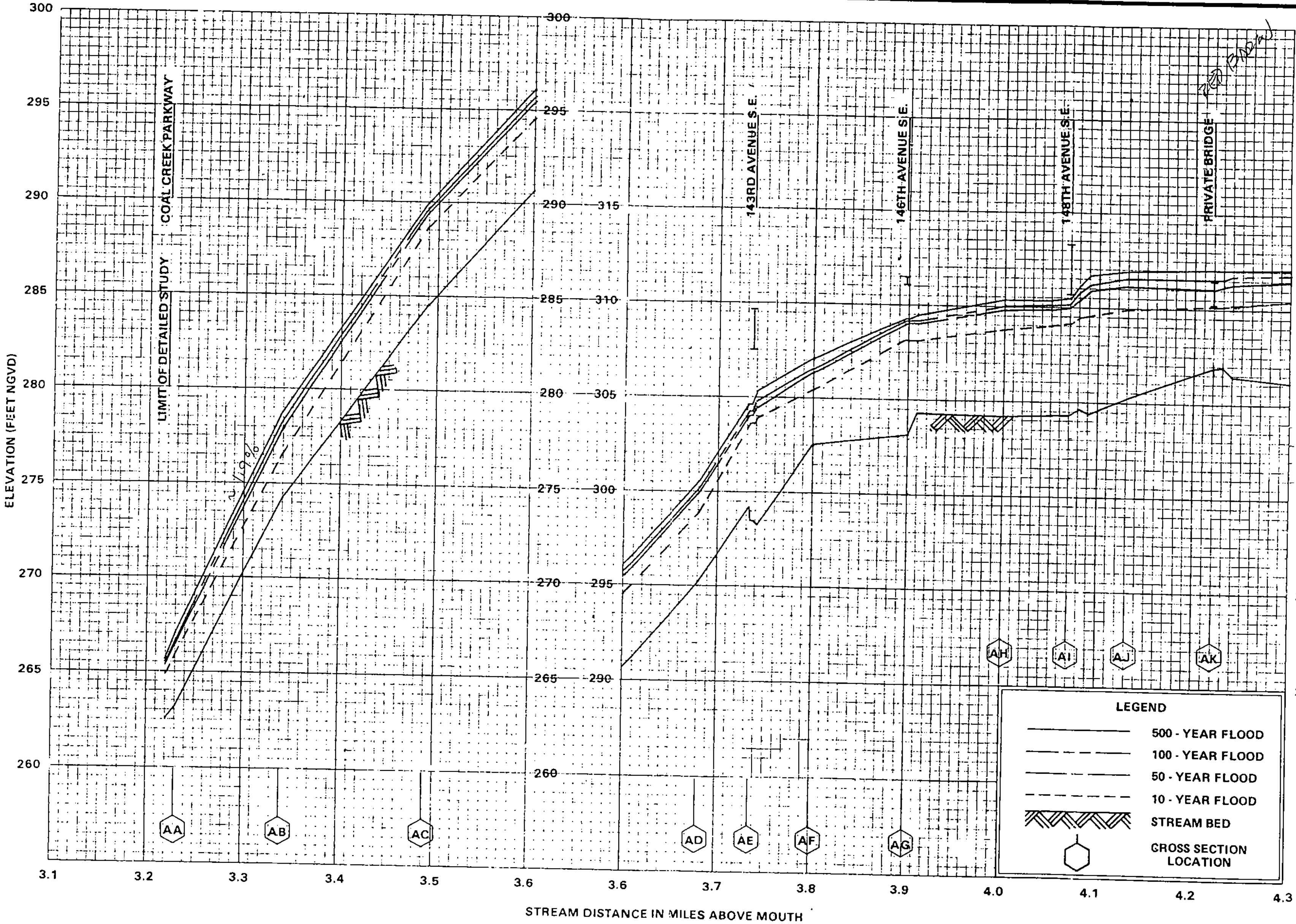


FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA
AND INCORPORATED AREAS

FLOOD PROFILES

MAY CREEK



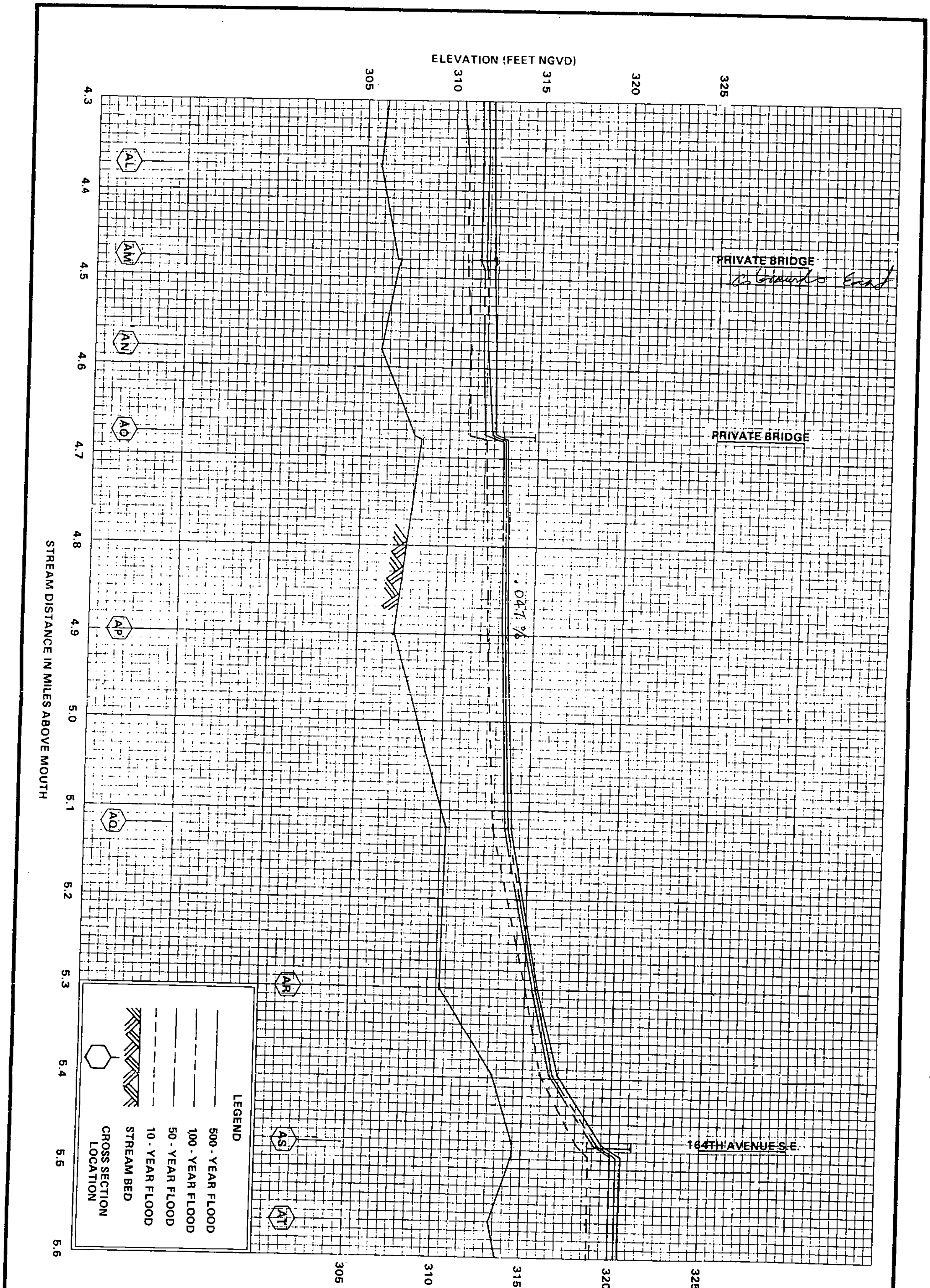
FLOOD PROFILES

MAY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA
AND INCORPORATED AREAS

111P



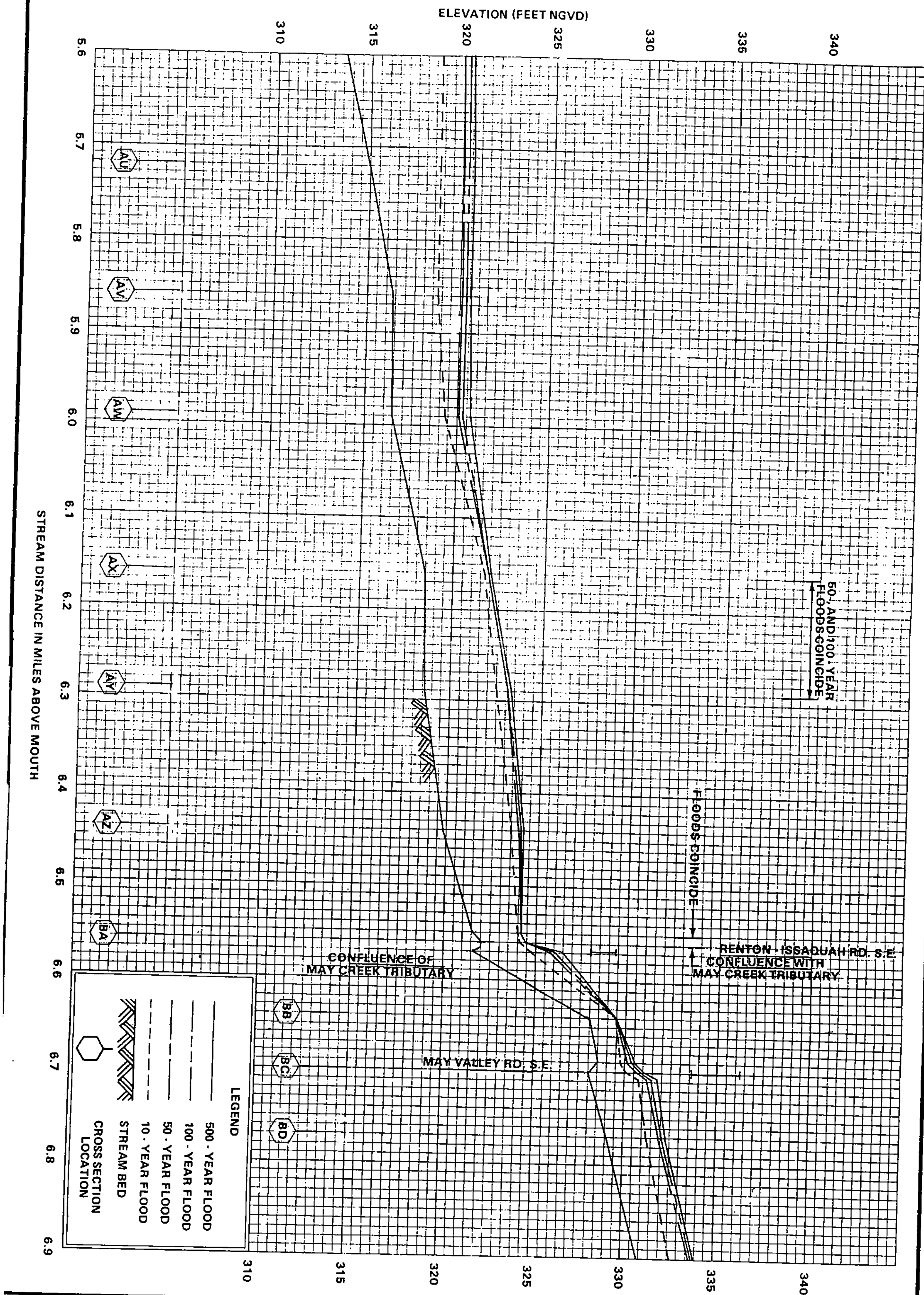
112P

FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA AND INCORPORATED AREAS

FLOOD PROFILES

MAY CREEK

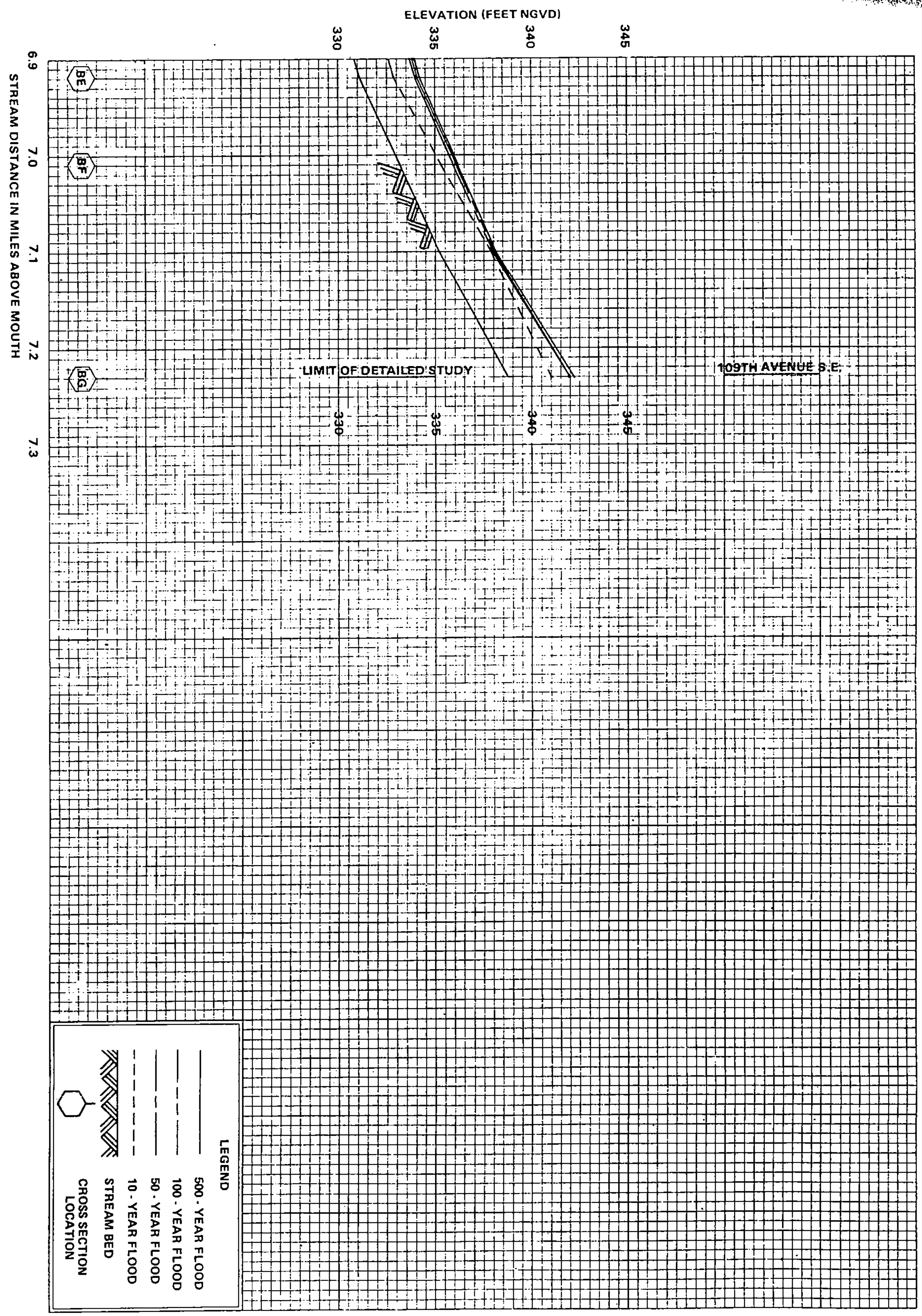


FEDERAL EMERGENCY MANAGEMENT AGENCY

KING COUNTY, WA
AND INCORPORATED AREAS

FLOOD PROFILES

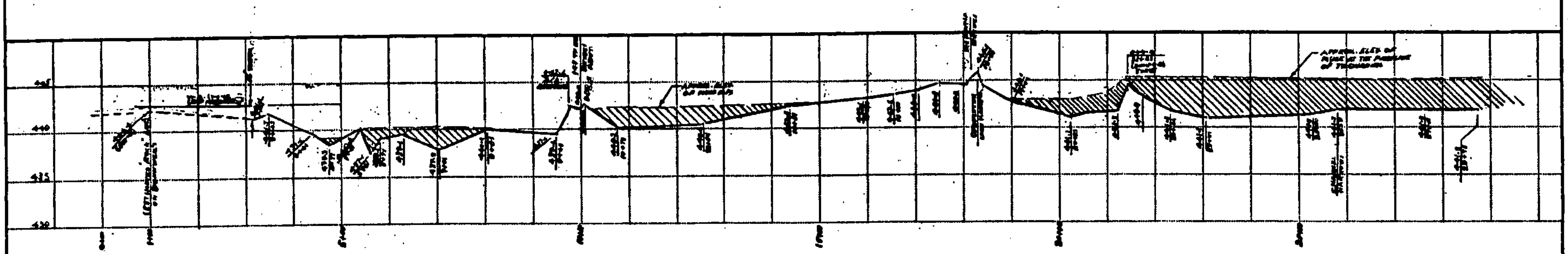
MAY CREEK



FEDERAL EMERGENCY MANAGEMENT AGENCY KING COUNTY, WA AND INCORPORATED AREAS	FLOOD PROFILES MAY CREEK

CALL 2 DAYS
BEFORE YOU DIG
1-800-424-5555

MAY CREEK PROFILE



KING COUNTY DEPT. OF NATURAL RESOURCES AND PARKS
WATER AND LAND RESOURCES DIVISION
CAPITAL PROJECTS AND OPEN SPACE ACQUISITION SECTION
SURFACE WATER - ENGINEERING AND ECOLOGICAL SERVICES UNITS

TITLE

SUB-TITLE 1
SUB-TITLE 2

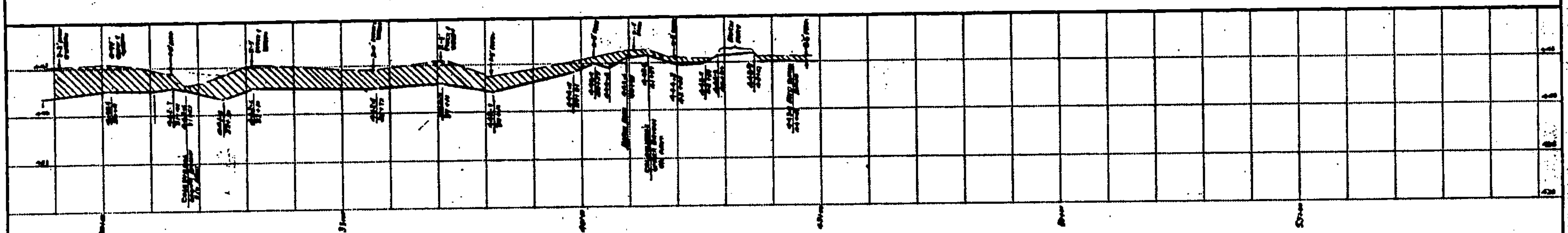
SHEET X OF X SHEETS

MAP-NO

FED. AID No. ____
PROJECT No. XXX
SURVEY No. XXX
MAINTENANCE DIVISION No. XXX

CALL 2 DAYS
BEFORE YOU DIG
1-800-424-5555

(Rock at ... up ... of ...)
MAY CREEK PROFILE
(PLOTTED FROM SWM SURVEY ...)
DATUM is ASSUMED



SURVEYED XXX	XXX		APPROVED XXX DATE XXX	FED. AID No.
BASE MAP PLOT. XXX	XXX		PROJECT MANAGER XXX DATE XXX	PROJECT No. XXX
DESIGN PLOT. XXX	XXX		DESIGNED XXX DATE XXX	SURVEY No. XXX
CHECKED XXX	XXX		DRAWN XXX DATE XXX	MAINTENANCE DIVISION No. XXX
FIELD BOOK XXX	XXX			
BY	DATE	REVISION / BY / DATE		

KING COUNTY DEPT. OF NATURAL RESOURCES AND PARKS
WATER AND LAND RESOURCES DIVISION
CAPITAL PROJECTS AND OPEN SPACE ACQUISITION SECTION
SURFACE WATER – ENGINEERING AND ECOLOGICAL SERVICES UNITS

TITLE

SUB-TITLE 1
SUB-TITLE 2

SHEET X OF X SHEETS

MAP-NO

Remarks:

Remarks included any supplemental information which might help to describe the segment or subcatchment. Land use for each subcatchment was entered in this column. Other comments included: Street names to aid in locating culverts, clarification of inflow of one segment into another, or the existence of storm sewers or curbs. Please note that streets in this area have changed their names and numbers several times. Names or numbers listed under remarks are those taken from street signs.

PROBLEM AREAS

The second objective of this study was to photograph and briefly comment on areas subject to serious flooding, erosion or sedimentation. Forty-eight color slides and their descriptions are included in Appendix 1.

Flooding

The problem of flooding along May Creek has been a subject of local concern for several years. Harstad and Associates were contracted in 1965 to plan flood control correctives. Their solution was channelization. This plan was never carried out, mainly for financial reasons. Flooding and high water tables are problems in a 170,000 foot reach of middle and uppper May Creek. More specifically, this area begins about 2,500 feet above the Highway 900 bridge over May Creek. High water problems also exist in the valley which extends southeast toward Issaquah. In this valley ponding is a frequent problem from May Creek almost to the basin divide, a distance of about 3,400 feet.

The cause of flooding in this section of the valley is simple: low channel gradient. Flooding problems end where the channel slope again increases, i.e., about 800 feet below the 143th Avenue bridge. Seasonal high water presents a