GeoEngineers

September 29, 2004

Washington State Department of Ecology
3190 160th Avenue Southeast
Bellevue, Washington 98008-5452

Attention: Brian Sato

Subject: Environmental Review and Opinion
Cedar River Trails Park
1060 Nishiwaki Lane
Renton, Washington
File No. 0693-064-00

INTRODUCTION AND EXECUTIVE SUMMARY

This letter summarizes GeoEngineers' evaluation of the potential for impacts to human health and the environment related to historic fill placed within Cedar River Trails Park (CRTP); 1060 Nishiwaki Lane (a.k.a. N. Riverside Drive) in Renton, Washington. The park is a long rectangular strip of land located in an industrial area of Renton. The park ranges in width from about 50 to 150 feet wide and is about 3,000 feet long. The Cedar River forms the west boundary of the park. The east boundary of the park is Nishiwaki Lane and the Boeing Renton manufacturing facility. The park extends to the confluence of the Cedar River and Lake Washington to the north. The generalized location of CRTP is shown in Figure 1.

Based on our review of existing site information, it is our opinion that no further remedial action is warranted by the property owner (City of Renton) at this site. The CRTP site currently is listed on the Confirmed and Suspected Contaminated Sites List (C&SCS). Contaminants of concern that have been documented at the site include: petroleum and RCRA metals in fill. VOCs have been identified in groundwater beneath a portion of the site and are related to sources and/or activities at Boeing AOC-090, former building 4-64 and other facilities located east of CRTP. Boeing is currently conducting cleanup and/or monitoring actions for the VOC contamination as part of a RCRA Corrective Action. The City entered Ecology's Voluntary Cleanup Program (VCP) with the goal of receiving a no further action determination and having the site removed from this regulatory list.

We request that Ecology provide a no further action determination for this site based on their review of the evaluation provided in this letter and the City of Renton's plan to implement appropriate institutional controls consisting of a restriction on the property deed. The deed restriction is appropriate for this site because we understand that the City has a mandate to preserve the CRTP as a park which is a key link to the King County trails system. The site also has been capped by either asphalt pavement or clean fill emplaced as part of a levee constructed along the east bank of the Cedar River. Furthermore, there are no uses of groundwater at the park. The property deed will (1) limit access to soil and use of groundwater capped beneath the park, (2) establish that the protective cap [pavement and/or fill] present at the site be maintained and (3) include a soil handling and disposal plan that will guide contractors that may need to complete additional subsurface activities at the site. These remedies are intended to be protective of human health and the environment and will mitigate human health and ecology exposure pathways.

SUMMARY OF DOCUMENTS REVIEWED

Our evaluation of the site conditions is based on characterization reports provided by the City of Renton and The Boeing Company for actions adjacent to and on the subject site. We also had several conversations with the City of Renton and Boeing. We reviewed the following specific information:

1. June 29, 2004 Seattle King County Public Health letters.
2. The City of Renton's Voluntary Cleanup Program (VCP) submittal.
3. Ecology's June 10, 1999 and March 10, 2004 letters.
4. April 2004 Boeing Renton Plant RCRA Corrective Action report.
5. October 30, 2003 Boeing Renton Groundwater Sampling Memorandum.
6. July 8, 2004 Boeing Renton Interim Action for AOC-090.
7. April 2004 Quarterly Monitoring Report, Boeing Renton Facility.
8. June 3, 1998 Bryn Mawr Sewer System Improvement Project Report.
9. U.S. Army Corps of Engineers Cedar River Levee As-Built drawings dated December 10, 1998.
10. April 15, 1998 "Oil Spill, North 6th and Riverside Drive" related to a Puget Sound Energy spill at the site. This was a limited study documenting the cleanup of a 2-gallon oil spill along the east-central perimeter of CRTP. The report documented fill impacted by petroleum hydrocarbons at concentrations less than MTCA Method A cleanup levels. This is consistent with other studies in the area that documented fill with residual hydrocarbons.

Boeing documents 4, 5, 6 and 7, the Bryn Mawr Sewer System report (document 8) and the Cedar River Levee report (document 9) provided significant information related to the contaminants of concern, magnitude, extent and cleanup actions conducted at the site. These documents are discussed in detail in the following sections.

KING COUNTY SEWER IMPROVEMENT REPORT

Based on our review of the June 3, 1998 Bryn Mawr Sewer System Improvement Project Report we identified the following:

- Cedar River Trail Park consists of an asphalt drive (Nishiwaki Lane), paved parking areas, paved trails and an earthen levee. Additionally, the pipelines occupy up to 20 feet along the east portion of the Park. The sewer pipelines are 30- and 54-inches in diameter. The pipelines extend for about 3,000 lineal feet beneath Nishiwaki Lane. The remainder of the Park (about 50 percent) consists of topsoil and grass.
- 6,660 tons of soil was excavated and transported offsite for permitted disposal in February to August 1998 as part of the installation of two sewer lines to depths down to 14 feet below ground surface (bgs).
- Groundwater was observed at a depth of 5 feet bgs according to the report.
- "Random pockets of refuse contaminated soil in an upper layer of non-native soil" were observed during excavation for the pipelines. The report also indicated that the "garbage and contaminated soil lay beneath 1 to 2 feet of brownish gravel and sand. The contaminated layer was from

1-1/2 to 2 feet thick, 2 to 4 feet below the surface. In most areas, blue clay lies beneath the layer of garbage." These observations and statements were made prior to the implementation of the earthen levee which caps the site.

- 17 soil samples from the pipeline excavation and 5 stockpile samples were obtained and tested; many for multiple chemicals of concern. The sample locations are shown on Figure 2 of the 1998 report. A breakdown of testing is:

Chemical Analytical Testing	Excavation Samples (17 total)	Stockpile Samples (5 total)
NWTPH-HCID	8	3
VOCs by EPA 8260B	5	4
RCRA Metals by EPA 6000/7000	15	1
SVOCs by EPA 8270C	6	3
PCBs by EPA 8082	6	0
OC Pesticides by EPA 8081	3	0
Chl Herbicides by EPA 8151	4	0
TCLP Metals	4	0
Gasoline-range HC by NWTPH-G/BETX	1	3
Diesel-range HC by NWTPH-Dx	1	4

- Of the 23 soil samples tested from the excavation and stockpiles, only the following samples had concentrations that exceeded MTCA Method A, unrestricted use cleanup levels and/or natural background concentrations for Puget Sound soils:

Sample Number + Location	Chemical	Concentration	Selected Cleanup Level
32+0	PCBs	7.2 mg/kg	MTCA Method A is 1.0 mg/kg
34+25	Chromium	87.5 mg/kg	Background is 48 mg/kg
34+75	Lead	261 mg/kg	MTCA Method A is 250 mg/kg
35+0	Chromium	484 mg/kg	Background is 48 mg/kg
40+25	Chromium Lead	91 mg/kg 290 mg/kg	Background is 48 mg/kg MTCA Method A is 250 mg/kg
41+20	Cadmium Oil-range HC	5.7 mg/kg 2,800 mg/kg	MTCA Method A is 2 mg/kg MTCA Method A is 2,000 mg/kg

- None of the stockpile soil samples had concentrations that exceeded MTCA Method A cleanup levels or natural background concentrations.

BOEING REPORTS AND INTERVIEW

We reviewed the following Boeing reports and also interviewed Carl Bach of the Boeing Company on August 12, 2004.

1. "Revised Recommended Corrective Action Groundwater Monitoring Well Sampling at AOC-090 (Building 4-65 Yard), dated October 20, 2003.
2. "First Quarter 2004, AOC-090" dated April 2004.
3. "Boeing Renton AOC-090 Interim Action Results" dated July 8, 2004.

The following summarizes key elements of the Boeing studies and our interview as they relate to Cedar River Trails Park.

- Petroleum and VOC contaminated soil and groundwater was identified on the Boeing site near the southwest corner of Building 4-64 (now demolished). This building, and source of these contaminants, is located northeast of the Nishiwaki Lane and North 6th Street intersection; immediately east of CRTP.
- The source of petroleum and VOCs is unknown according to Boeing, but may have been onsite prior to Boeing's purchase and occupancy of the site in 1962. Boeing indicated that the contamination could have related to historic activities and/or from imported fill. Fill was documented at the Boeing facilities and CRTP based on the information we reviewed and interviews with Boeing. Therefore it appears that fill with residual hydrocarbons and metals likely is widespread throughout the lowland area surrounding the Cedar River Valley.
- Vinyl chloride (VC) is the contaminant of concern in groundwater at the Boeing site. This VC plume extends onto the CRTP site and was identified through 12 direct push borings where discrete groundwater samples were obtained in April 2003. See Boeing Figures 1 and 2.
- Three well clusters (GW177/178, GW179/180 and GW181/182) were installed on the CRTP site in February 2004. These wells were installed to evaluate VC in shallow and deeper aquifers beneath the CRTP site. Depth to groundwater in these wells ranged from 7.5 to 11.3 feet below ground surface. Groundwater flow direction is to the west and north toward the Cedar River. See Boeing Figures 5-1 and 5-2.
- Petroleum hydrocarbons were not detected in groundwater in six wells located west (downgradient) of Building 4-64 based on July 19, 2000 and April 24, 2003 monitoring events. As a result, Boeing concluded, and we understand that Ecology concurred, that additional groundwater monitoring for petroleum hydrocarbons downgradient of the remedial excavation and within CRTP was not warranted.
- Boeing completed a remedial excavation action at the southwest corner of former Building 4-64 in May 2004 to remove VOC and petroleum impacted soil. As part of this action, molasses was added to the base of the excavation (at a depth of 7 feet bgs which also was at the top of the water table) to introduce a carbon and sulfate source to enhance anaerobic microbial activity and thus assist in bioremediation of the groundwater VC contaminant plume.
- A 450-foot-long sheet pile wall that parallels the Cedar River is present as part of the levee structure. The wall extends about 100 feet south and 350 feet north of the Nishiwaki Lane and North 6th Street intersection. The wall apparently was installed as a barrier for migration of contaminants toward the Cedar River from the sources located at the Boeing site.
- According to Boeing there are additional monitoring wells located within CRTP near the north end of the Park. There are at least four wells (GW149, GW150, GW159, GW160) that are located downgradient (west) of a former degreaser facility located in Building 4-42. Boeing indicated that the groundwater from these wells are only tested for VOCs.

- The geology/hydrogeology beneath the south portion of CRTP is well understood as a result of Boeing's study in this area. A geologic cross section shows that there is a continuous lower permeability silt located beneath CRTP that separates a shallow and deeper aquifer. The geologic cross section also shows a lower permeability silt horizon at shallow depths with an overlying silty sand (not identified, but suspected to be fill). These silt and fill horizons are consistent with references in the sewer installation reports.
- Studies show that groundwater flow direction is to the west/northwest, toward the Cedar River. See Boeing Figure 3.

AS BUILT LEVEE DRAWINGS

Based on our review of U.S. Army Corps of Engineers levee drawings and our conversations with the City of Renton, we understand that the levee was constructed shortly after the sewer improvement project was completed (circa 1998/1999). We understand that the original grade at CRTP generally was flat at about elevation 18 to 20 feet. The levee consisted of emplacement of 2 to 4 feet of fill which was then graded into the mounds and hummocks shown on the as-built plans. The highest elevation appears to be about elevation 28 feet. One other component of the levee is the presence of a sheet pile barrier wall within the southern portion of CRTP, west of former Boeing building 4-62. We understand that the sheet pile wall was installed for flood control (not remedial action) purposes. Nevertheless the sheet pile wall appears to be redirecting groundwater flow to the north in this part of the site.

SUMMARY

The purpose of this summary is to utilize the results from information provided for the CRTP and Boeing sites to evaluate the potential threats to human health and the environment at the CRTP site. There appear to be two identified threats; (1) the potential for contaminated fill and (2) the potential for impacts from offsite contamination from the Boeing facility. An evaluation of most likely pathways of concern (soil direct contact, soil to groundwater and groundwater to surface water) to impact human health and/or the environment are addressed below. As stated previously, it is the City's goal to obtain a no further action for this site.

FILL

Based on our review it is our opinion that the potential impacts to human health and the environment as a result of contaminated fill at the site is low providing that (1) the site use does not change and (2) specific institutional controls are established and maintained (i.e. deed restriction on use of groundwater, limiting significant changes in site use and establishment of a soil and groundwater handling plan for future excavations). The following supports this opinion. In order to provide a conservative remedy, we have assumed that the entire park area is underlain by fill similar in depth, thickness and type to the fill observed during construction of the sewers beneath Nishiwaki Lane. Based on the data we reviewed it also appears that the fill observed at CRTP also is present at the Boeing facilities to the east and may be present throughout a wider area of the lower Cedar River valley.

- It is likely that residual petroleum hydrocarbons remain in fill soil beneath the levee material or in unexplored areas. However, petroleum hydrocarbons were not detected in groundwater in six wells located west (downgradient) of Boeing Building 4-64 (within CRTP) based on July 2000 and April 2003 monitoring events. As a result, Boeing concluded (with Ecology's concurrence) that additional groundwater monitoring for petroleum hydrocarbons downgradient of the remedial

excavation and within CRTP was not warranted. It appears likely that similar groundwater results would be present in other portions of the CRTP site because of the similar fill observed at several locations at the Boeing facilities and at the CRTP. Therefore additional groundwater monitoring for petroleum hydrocarbons at the CRTP site also is not warranted.

- A significant volume of impacted fill (6,600 tons) was removed as part of the installation of two sewers at the site.
- Over 50 percent of the site is capped by asphalt paved trails and parking areas, Nishiwaki Lane imported fill around the sewer lines. The remainder of the site is capped by 2 to 4 feet of imported fill used to construct the Cedar River Levee and is overlain by topsoil and grass.
- A comprehensive soil testing program was completed during the sewer line replacement. Of the 23 soil samples tested during the sewer line replacement, only five contaminants (chromium, cadmium, lead, PCBs and petroleum) were detected at concentrations exceeding MTCA Method A cleanup levels or natural background concentrations. Of these five chemicals only two were detected at more than one location (chromium [3 of 16 samples] and lead [2 of 16 samples]).
  - The 3 chemicals with one exceedance represent de minimus quantities, are not statistically valid for determining risk and therefore should be discounted from further concern related to any future action.
  - The chromium results for the soil samples obtained during the sewer study did not distinguish between chromium III or chromium VI. The MTCA Method A cleanup levels for each are 2,000 mg/kg and 19 mg/kg respectively. Natural background is 48 mg/kg. The highest chromium concentration was 484 mg/kg. In our opinion, the concentrations of chromium at the subject site likely represent chromium III and the 2,000 mg/kg cleanup level should be used for evaluation of risk. This opinion is based on review of Boeing's July 8, 2004 study, where chromium type was differentiated. None of the soil samples from the Boeing study had significant detections of chromium VI, while detections of chromium III were identified. Also note that chromium VI, while more toxic, is less stable in the environment, specifically in reducing and/or anaerobic environments. Based on the information that we've received it is likely that the subsurface environment at the CRTP site is not conducive to chromium VI.
  - The concentrations for lead slightly exceeded the MTCA Method A cleanup levels. The highest lead concentration was 290 mg/kg. The two lead exceedances represent 12 percent of the samples tested for RCRA metals.

In our opinion, these chemicals of concern do not represent a threat to human health and/or the environment providing that the institutional controls represented above are established and maintained. The potential for impacts to the soil to groundwater and groundwater to surface water pathways from the 5 detected compounds are also limited because of (1) the low percentage of contaminants that exceed MTCA cleanup levels that would be protective of groundwater, (2) the presence of a lower permeability silt soil horizon at depths documented to be below the fill/garbage layer thus limiting downward migration into the underlying aquifer(s), (3) the low relative solubility and mobility rates of the five identified compounds of concern and (4) the presence of clean overburden fill used to construct the levee, and asphalt pavement that covers the site. As a result no further action is warranted at CRTP with the exception of institutional controls.

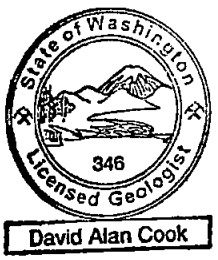
OFFSITE CONTAMINATION SOURCES

The known offsite sources consist of a VC (and other minor VOC constituents) groundwater contaminant plume that originates on the Boeing AOC-090 (former Building 4-64). The CRTP site is located immediately downgradient (west) of the Boeing AOC-090 cleanup action. Based on our review it appears that remedial actions undertaken by Boeing are adequate at the present time. Remedial excavation has occurred at the contaminant source, the groundwater contaminant plume extent is being studied and measures have been taken to reduce the plume extent (introduction of a carbon/sulfate source to enhance bioremediation and long term groundwater monitoring). Additionally, the actions completed by Boeing are under the direction of EPA and Ecology as part of a RCRA Corrective Action.

In our opinion it is prudent to include institutional control provisions in a deed restriction at the CRTP site that address the VC plume that extends beneath the Park. The proposed institutional controls established in this letter are also intended to be protective of human health and the environment relative to the VC plume, considering Boeing's ongoing source control and groundwater monitoring actions.

Yours very truly,

GeoEngineers, Inc.



David A. Cook, LG
Associate

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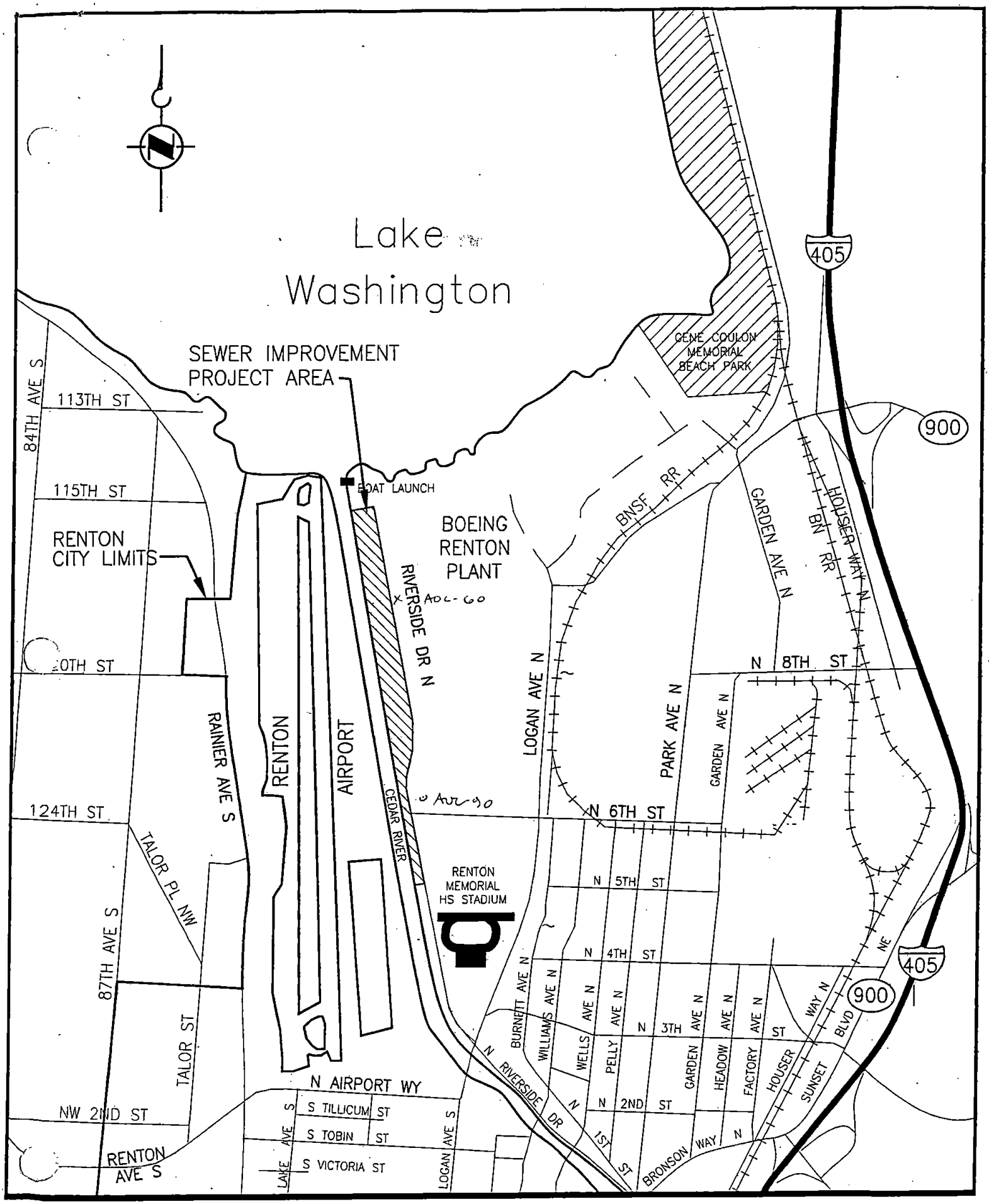
Attachments: Figure 1 – Location Map
Figure 2 – Sample Location Map
Boeing Figures 1, 2, 3, 5-1 and 5-2
U.S. Army Corps of Engineers Cedar River Levee As-Built Drawings

Two copies submitted

cc: Peter Renner
City of Renton
1055 South Grady Way, 6th Floor
Renton, Washington 98055

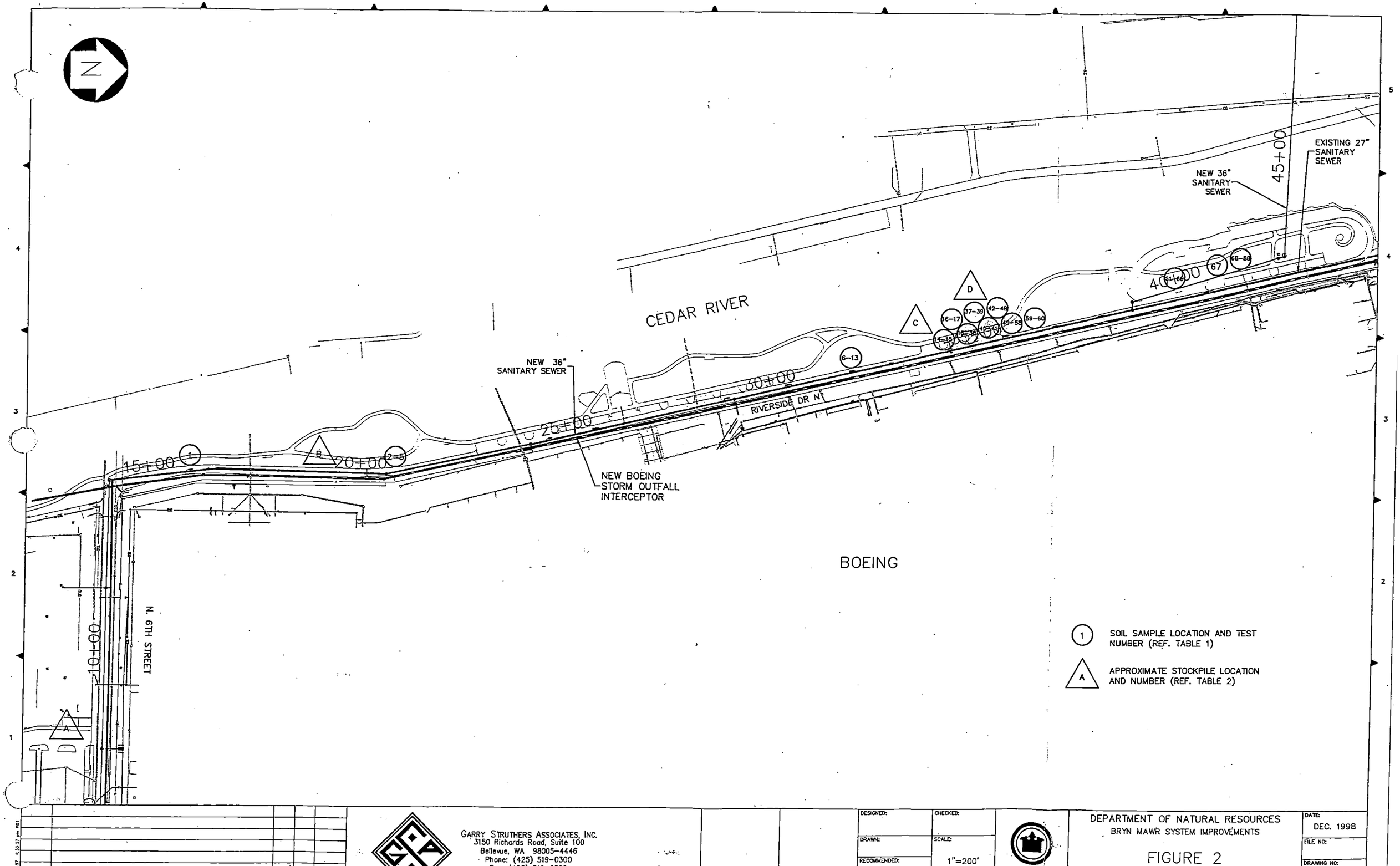
Bill Joyce
Salter Joyce Ziker
1601 Fifth Avenue, Suite 2040
Seattle, Washington 98101



LOCATION MAP

NO SCALE

FIGURE 1

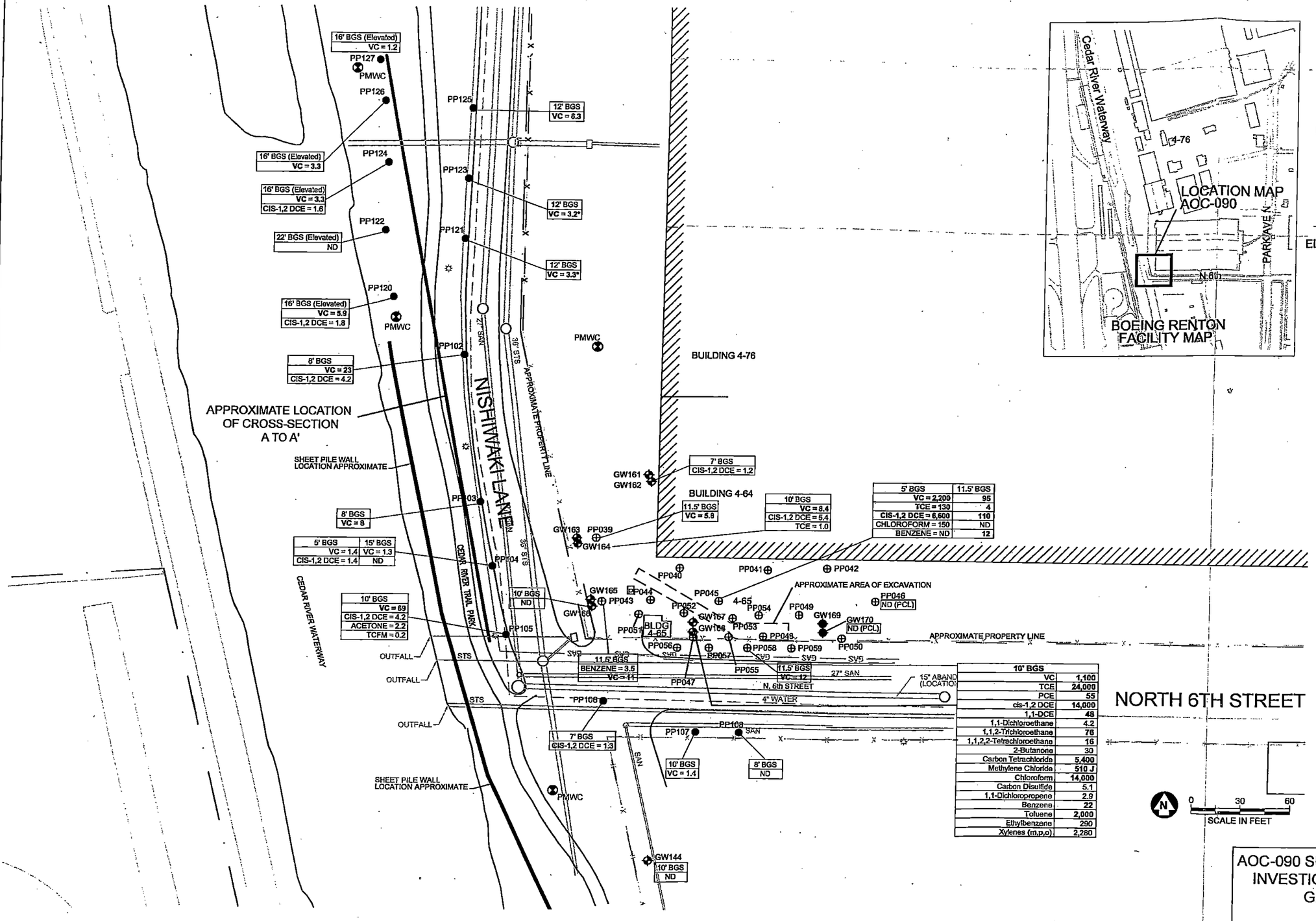


1 SOIL SAMPLE LOCATION AND TEST NUMBER (REF. TABLE 1)

A APPROXIMATE STOCKPILE LOCATION AND NUMBER (REF. TABLE 2)

GARRY STRUTHERS ASSOCIATES, INC.
3150 Richards Road, Suite 100
Bellevue, WA 98005-4446
Phone: (425) 519-0300
Fax: (425) 519-0309

DESIGNED:	CHECKED:	DEPARTMENT OF NATURAL RESOURCES	DATE: DEC. 1998
DRAWN:	SCALE: 1"=200'	BRYN MAWR SYSTEM IMPROVEMENTS	FILE NO:
RECOMMENDED:		FIGURE 2 SAMPLE LOCATION MAP	DRAWING NO:



LEGEND

- GW028 — WESTON, 2000 MONITORING WELL LOCATION
- GW170 — ABANDONED WELL
- PP042 — WESTON, 1999 PUSH PROBE LOCATION
- PP108 — SUPPLEMENTAL RI DATA COLLECTION INVESTIGATION PUSH-PROBE LOCATION
- PMWC — PROPOSED MONITORING WELL CLUSTERS (EXACT LOCATIONS TO BE DETERMINED)
- STREET LIGHT POST
- FENCE

ELEVATED: PUSH PROBE LOCATIONS NORTH OF SHEET PILE APPROXIMATELY 5' HIGHER THAN NISHIWAKI LANE

ALL CONCENTRATIONS IN µg/L

BGS = FEET BELOW GROUND SURFACE

ND = NOT DETECTED ABOVE REPORTING LIMITS

ND(PCL) = DETECTED BUT NOT ABOVE PRELIMINARY CLEANUP LEVELS

BOLD = CONCENTRATIONS EXCEEDS PCL

VC = VINYL CHLORIDE

PCE = TETRACHLOROETHENE

TCE = TRICHLOROETHENE

DCE = DICHLOROETHENE

TCFM = TRICHLOROFLOROMETHANE

* - NON-BOEING VOCs DETECTED AS WELL

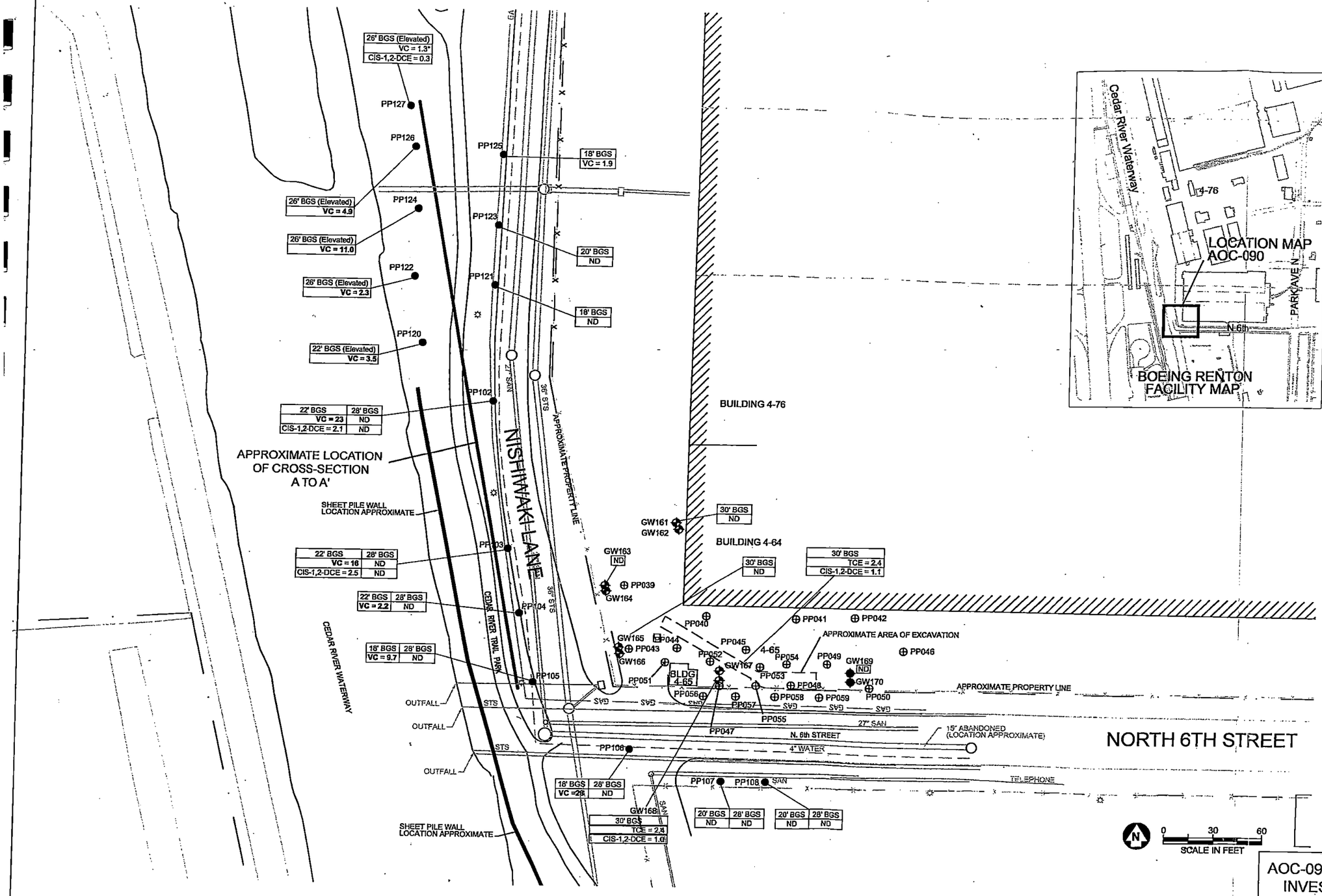
NOTES

1. HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE NAD83 (91)
   VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM (NGVD1929)
2. BASEMAP COMPILED BY DUANE HARTMAN & ASSOCIATES INC., DECEMBER, 1994
3. PUSH PROBE LOCATIONS FROM FINAL REMEDIAL INVESTIGATION REPORT (WESTON, 2001)
4. LOCATION OF UTILITIES TAKEN FROM BRYN MAWR SYSTEM IMPROVEMENT STATIONS 10+00 TO 19+00, KING COUNTY DNR AND RELATED BORING OUTFALL INTERCEPTOR DRAWINGS
5. DATA FOR PP102 TO PP127 AND GW WELL DATA FROM SUPPLEMENTAL RI INVESTIGATION.

AOC-090 SUPPLEMENTAL RI DATA COLLECTION INVESTIGATION VOC CONCENTRATIONS IN GROUNDWATER (5' to 16' BLS)

Boeing Renton Plant
Renton, Washington

GEOMATRIX	Project No.	Figure
	8888	1



LEGEND

- GW028 — WESTON, 2000 MONITORING WELL LOCATION
- GW170 — ABANDONED WELL
- PP042 — WESTON, 1999 PUSH PROBE LOCATION
- PP108 — NEWLY INSTALLED PUSH PROBE LOCATION
- STREET LIGHT POST
- FENCE

ELEVATED: PUSH PROBE LOCATIONS NORTH OF SHEET PILE APPROXIMATELY 5' HIGHER THAN NISHIWAKI LANE

ALL CONCENTRATIONS IN µg/L

BGS = FEET BELOW GROUND SURFACE

ND(PQL) = NOT DETECTED ABOVE REPORTING LIMITS

ND(PCL) = DETECTED BUT NOT ABOVE PRELIMINARY CLEANUP LEVELS

BOLD = CONCENTRATIONS EXCEEDS PCL

VC = VINYL CHLORIDE

TCE = TRICHLOROETHENE

CIS-1,2 DCE = CIS-1,2 DICHLOROETHENE

* - NON-BOEING VOCs DETECTED AS WELL

NOTES

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BOEING

AOC-090 SUPPLEMENTAL RI DATA COLLECTION INVESTIGATION VOC CONCENTRATIONS IN GROUNDWATER (18' to 30' BLS)

Boeing Renton Plant
Renton, Washington

GEOMATRIX	Project No.	Figure
	8888	2

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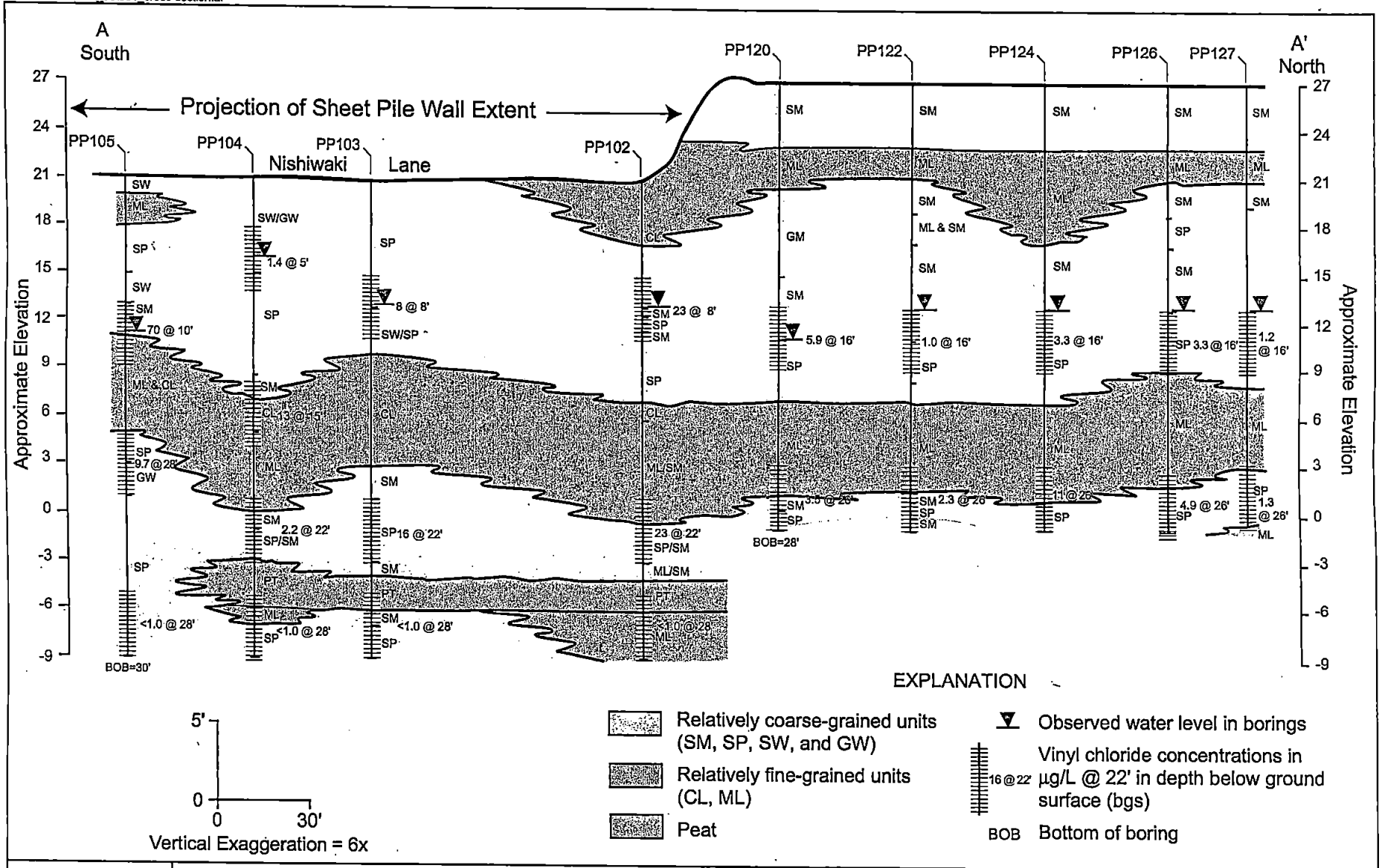
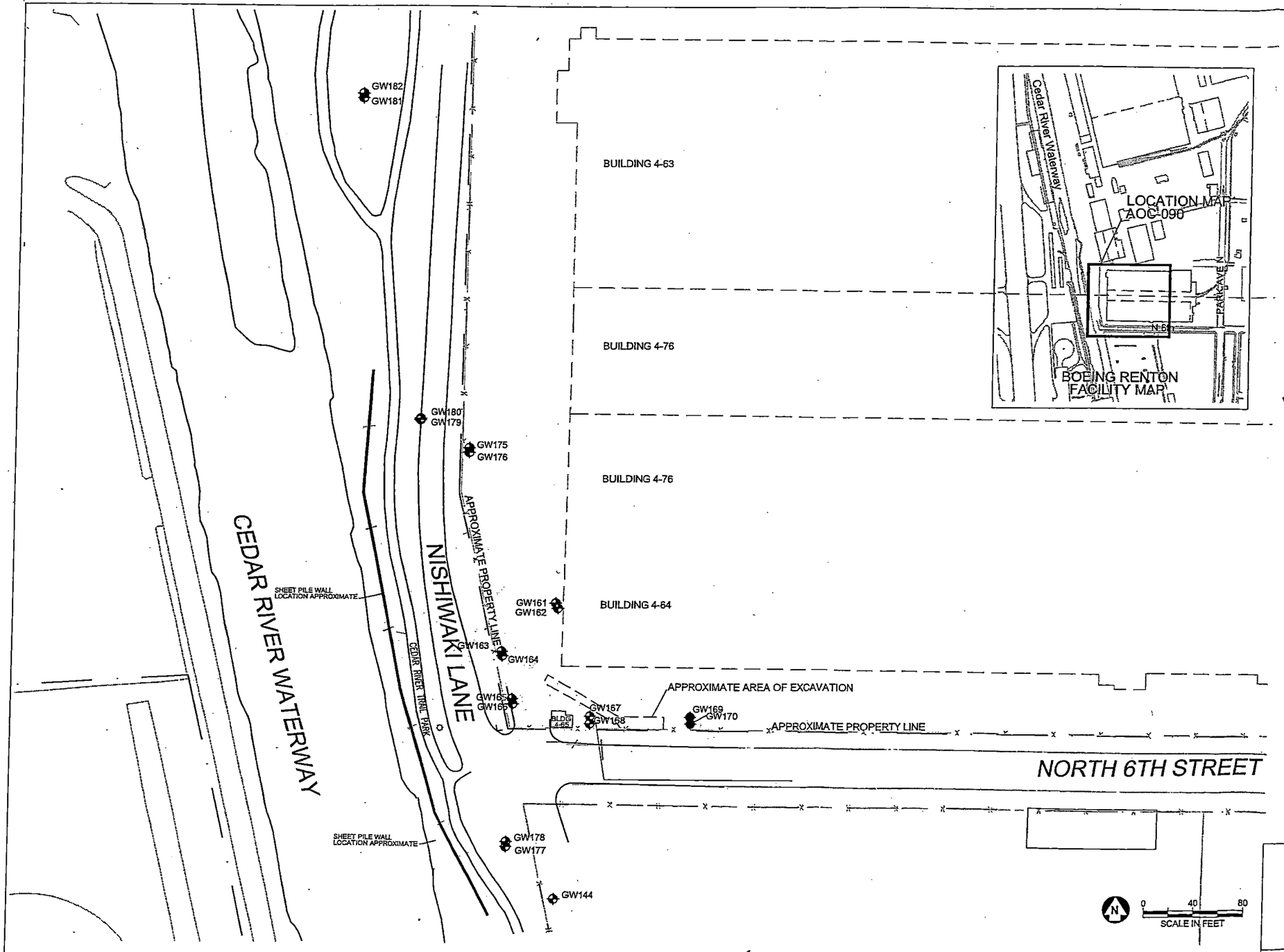


GEOMATRIX

HYDROGEOLOGIC CROSS-SECTION AND DISSOLVED VINYL CHLORIDE CONCENTRATIONS
Cedar River Trail Park
Renton, Washington

Project No.
8888

Figure
3



LEGEND

- GW028 — MONITORING WELL LOCATION
- GW170 — ABANDONED WELL
- STREET LIGHT POST
- FENCE
- FORMER OUTLINES OF BUILDINGS 4-63, 4-76, AND 4-64

NOTES

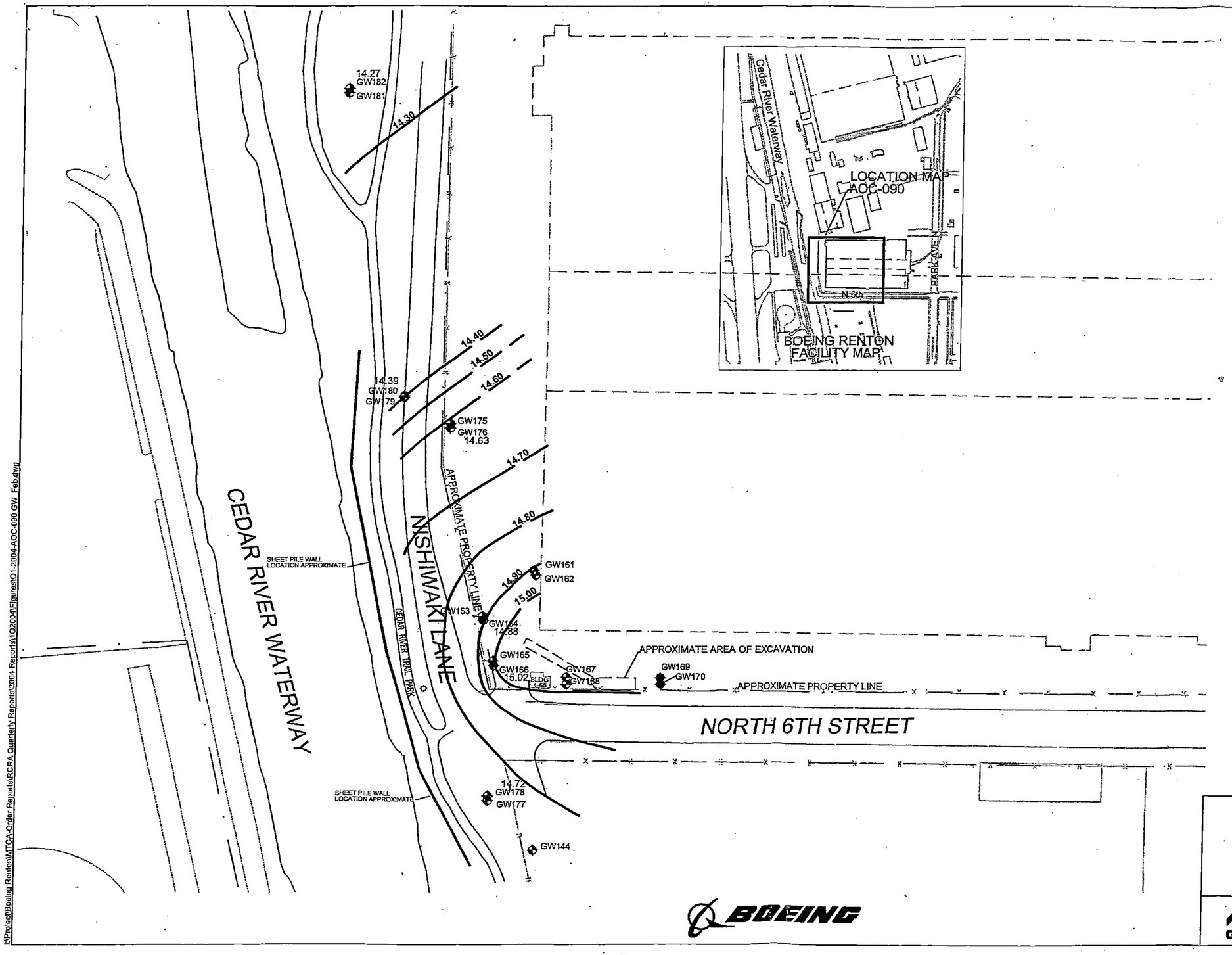
1. HORIZONTAL DATUM:
   WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE NAD83 (91)
   VERTICAL DATUM:
   NATIONAL GEODETIC VERTICAL DATUM (NGVD1929)
2. BASEMAP COMPILED BY DUANE HARTMAN & ASSOCIATES INC., DECEMBER, 1994
3. GW175 TO GW182 LOCATIONS BASED ON STATE PLANE NORTH COORDINATES FROM GPS SURVEY - WILL BE UPDATED WITH WASHINGTON STATE LICENSED SURVEY

I:\Project\Boeing Renton\MTCA-Order Reports\RCRA Quarterly Reports\2004 Reports\1Q2004\Figures\Q1-2004_AOC-090 Well Locations.dwg

BOEING

AOC - 090 (BUILDING 4-65 YARD)
MONITORING WELL LOCATIONS
BOEING RENTON PLANT
RENTON, WASHINGTON

GEOMATRIX	Project No.	Figure
	8888	5-1



LEGEND

- GW176 14.63 — MONITORING WELL LOCATION AND WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL
- GW170 — ABANDONED MONITORING WELL
- STREET LIGHT POST
- FENCE
- 14.00 — CONTOUR OF EQUAL GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL (DASHED WHERE APPROXIMATE)
- FORMER OUTLINES OF BUILDINGS 4-63, 4-76, AND 4-64

NOTES:

1. HORIZONTAL DATUM:
WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE NAD83 (91)

VERTICAL DATUM:
NATIONAL GEODETIC VERTICAL DATUM (NGVD1929)

2. BASEMAP COMPILED BY
DUANE HARTMAN & ASSOCIATES INC., DECEMBER, 1994

3. GW175 TO GW182 LOCATIONS BASED ON STATE PLANE NORTH COORDINATES FROM GPS SURVEY - WILL BE UPDATED WITH WASHINGTON STATE LICENSED SURVEY

0 40 80
FEET

BOEING

AOC - 090 (BUILDING 4-65 YARD)
GROUNDWATER ELEVATIONS
(SHALLOW WELLS) MONITORING
FEBRUARY 18 AND 19, 2004
BOEING RENTON PLANT
RENTON, WASHINGTON

GEOMATRIX	Project No. 8888	Figure 5-2

I:\Project\Boeing Renton\MTCA-Order Reports\RCRA Quarterly Reports\2004 Reports\1Q2004\Figures\Q1-2004-AOC-090 GW_Feb.dwg

REVISIONS				
SYMBOL	ZONE	DESCRIPTION	DATE	BY

US Army Corps
of Engineers
Seattle District

LOWER CEDAR RIVER FLOOD CONTROL : LEVEES AND FLOODWALLS

RENTON, WASHINGTON

VICINITY MAP
NOT TO SCALE

AS-BUILT

FY 1999

SAFETY PAYS

IF SHEET IS LESS THAN 32" X 21" IT IS A REDUCED PRINT, REDUCE SCALE ACCORDINGLY

U.S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

LOWER CEDAR RIVER FLOOD CONTROL
LEVEES & FLOODWALLS

COVER SHEET

RENTON			WASHINGTON
SIZE: D	INVITATION NO.: B-99-0017	FILE NO.: E-19-1-70	DATE: 98DEC03
DSGN: SRB	CHK: PBN	SHEET: 1 of 73	PLATE: G-1

DRAWING INDEX

SHEET NO.	PLATE NO.	TITLE
		GENERAL
1	G-1	COVER SHEET
2	G-2	DRAWING INDEX
3	G-3	LOCATION MAP
4	G-4	LEGEND AND ABBREVIATIONS
		GEOTECHNICAL
		GENERAL
5	GT-1	LOCATIONS OF EXPLORATION I
6	GT-2	LOCATIONS OF EXPLORATION II
7	GT-3	EXPLORATION LOGS I
8	GT-4	EXPLORATION LOGS II
		CIVIL
		LEVEES & FLOODWALLS
9	C-1	DEMOLITION PLAN I
10	C-2	DEMOLITION PLAN II
11	C-3	DEMOLITION PLAN III
12	C-4	DEMOLITION PLAN IV
13	C-5	DEMOLITION PLAN V
14	C-6	DEMOLITION PLAN VI
15	C-7	DEMOLITION PLAN VII
16	C-8	DEMOLITION PLAN VIII
17	C-9	DEMOLITION PLAN IX
18	C-10	LEFT BANK PLAN & PROFILE / STATION 0+00 TO 8+00
19	C-11	LEFT BANK PLAN & PROFILE / STATION 8+00 TO 17+00
20	C-12	LEFT BANK PLAN & PROFILE / STATION 17+00 TO 26+00
21	C-13	LEFT BANK PLAN & PROFILE / STATION 26+00 TO 35+20
22	C-14	LEFT BANK PLAN & PROFILE / STATION 35+20 TO 44+40
23	C-15	LEFT BANK PLAN & PROFILE / STATION 44+40 TO 51+00
24	C-16	LEFT BANK PLAN & PROFILE / STATION 51+00 TO 59+00
25	C-17	LEFT BANK PLAN & PROFILE / STATION 59+00 TO 65+40
26	C-18	LEFT BANK AIRPORT / DRAINAGE IMPROVEMENTS I
27	C-19	LEFT BANK AIRPORT / DRAINAGE IMPROVEMENTS II
28	C-20	LEFT BANK AIRPORT / DRAINAGE IMPROVEMENTS III
29	C-21	LEFT BANK AIRPORT / DRAINAGE IMPROVEMENTS IV
30	C-22	LEFT BANK AIRPORT / DRAINAGE IMPROVEMENTS V
31	C-23	LEFT BANK AIRPORT / DRAINAGE IMPROVEMENTS VI
32	C-24	RIGHT BANK PLAN & PROFILE / STATION RT10+00 TO RT16+80
33	C-25	RIGHT BANK PLAN & PROFILE / STATION RT16+80 TO RT24+40
34	C-26	RIGHT BANK PLAN & PROFILE / STATION RT24+40 TO RT32+00
35	C-27	RIGHT BANK PLAN & PROFILE / STATION RT32+00 TO RT39+40
36	C-28	RIGHT BANK PLAN & PROFILE / STATION RT39+40 TO RT46+80
37	C-29	RIGHT BANK PLAN & PROFILE / STATION RT46+80 TO RT54+40
38	C-30	RIGHT BANK PLAN & PROFILE / STATION RT54+40 TO RT61+60
39	C-31	RIGHT BANK PLAN & PROFILE / STATION RT61+60 TO RT67+20
40	C-32	RIGHT BANK PLAN & PROFILE / STATION RT67+20 TO RT73+80
41	C-33	RIGHT BANK PARK TRAIL PLAN & PROFILE I
42	C-34	RIGHT BANK PARK TRAIL PLAN & PROFILE II
43	C-35	RIHGT BANK PARK TRAIL PLAN & PROFILE III
44	C-36	RIGHT BANK PARK TRAIL PLAN & PROFILE IV
45	C-37	RIGHT BANK PARK TRAIL PLAN & PROFILE V
46	C-38	RIGHT BANK PARK TRAIL PLAN & PROFILE VI
47	C-39	RIGHT BANK PARK TRAIL PLAN & PROFILE VII
48	C-40	CIVIL DETAILS I
49	C-41	CIVIL DETAILS II
50	C-42	CIVIL DETAILS III
51	C-43	CIVIL DETAILS IV
52	C-44	CIVIL DETAILS V
53	C-45	CIVIL DETAILS VI
54	C-46	CIVIL DETAILS VII
55	C-47	CIVIL DETAILS VIII
56	C-48	CIVIL DETAILS IX
57	C-49	CIVIL DETAILS X

SHEET NO.	PLATE NO.	TITLE
		LANDSCAPE
58	L-1	PLANT LIST/LEGEND AND / GENERAL LANDSCAPE NOTES
59	L-2	LANDSCAPE PLAN I
60	L-3	LANDSCAPE PLAN II
61	L-4	LANDSCAPE PLAN III
62	L-5	LANDSCAPE PLAN IV
63	L-6	LANDSCAPE PLAN V
64	L-7	LANDSCAPE PLAN VI
65	L-8	LANDSCAPE PLAN VII
66	L-9	LANDSCAPE PLAN VIII
67	L-10	LANDSCAPE PLAN IX
68	L-11	RESTROOM AREA PLAN
69	L-12	LANDSCAPE DETAILS I
70	L-13	LANDSCAPE DETAILS II
		STRUCTURAL
71	S-1	LEVEE CLOSURE GATE DETAILS I
72	S-2	LEVEE CLOSURE GATE DETAILS II
73	S-3	FLOODWALL DETAILS
		REFERENCE DRAWINGS
		REFERENCE
74	R-1	IRRIGATION PLAN I
75	R-2	IRRIGATION PLAN II
76	R-3	IRRIGATION PLAN III
77	R-4	IRRIGATION PLAN IV
78	R-5	IRRIGATION PLAN V
79	R-6	IRRIGATION PLAN VI
80	R-7	IRRIGATION PLAN VII
81	R-8	IRRIGATION PLAN VIII

REVISIONS				
SYMBOL	ZONE	DESCRIPTION	DATE	BY

AS-BUILT

IF SHEET IS LESS THAN 32" X 21" IT IS A REDUCED PRINT, REDUCE SCALE ACCORDINGLY

U.S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

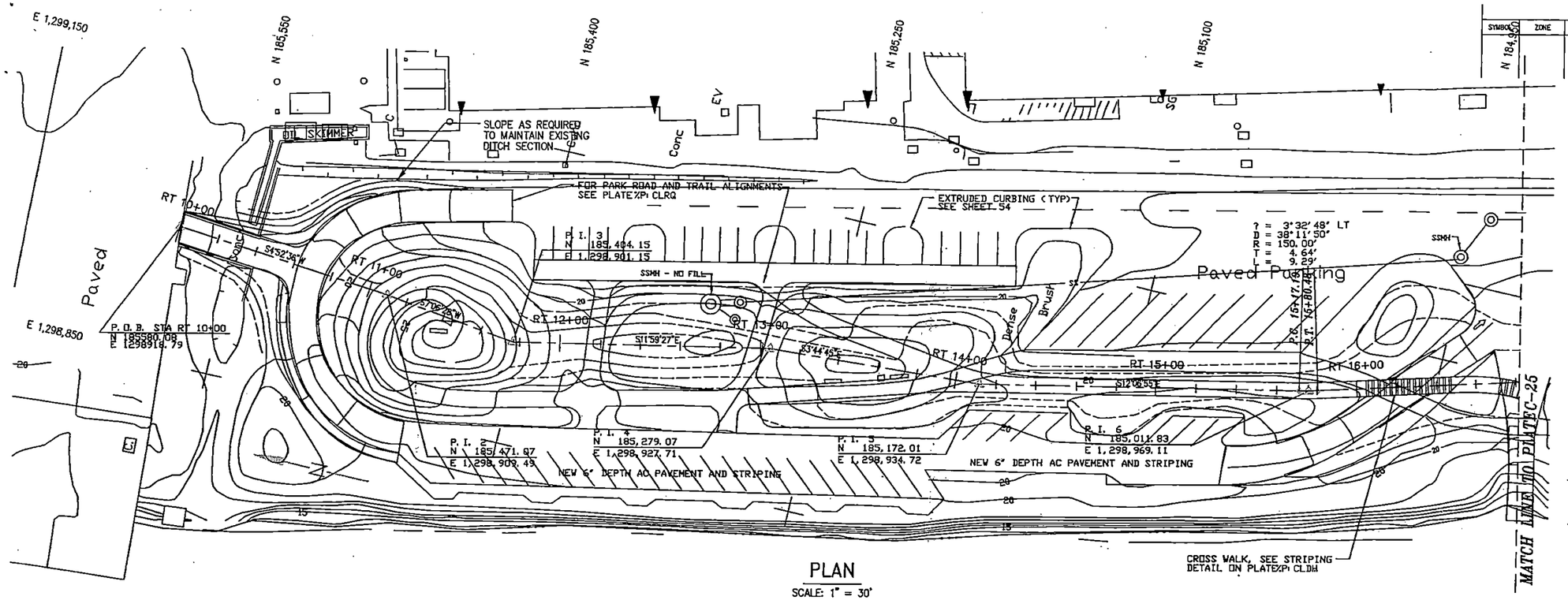
LOWER CEDAR RIVER FLOOD CONTROL
LEVEES & FLOODWALLS

DRAWING INDEX

RENTON WASHINGTON

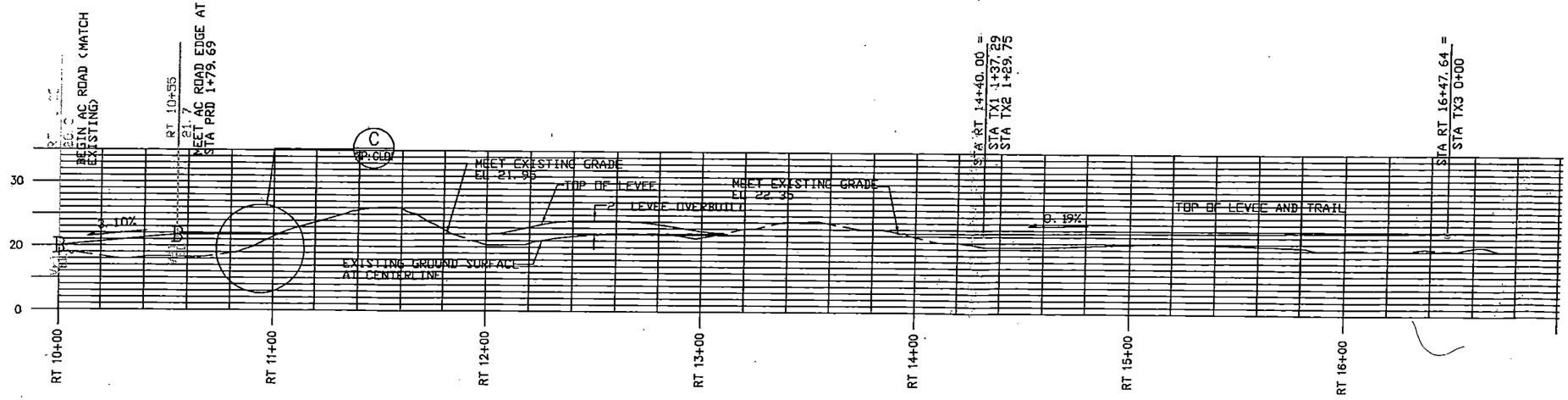
SIZE	INVITATION NO.	FILE NO.	DATE	PLATE
D	B-99-0017	E-19-1-70	98DEC03	G-2
DSGN. BRB	CHK.	SHEET 2		

REVISIONS				
SYMBOL	ZONE	DESCRIPTION	DATE	BY
		MODIFIED PER AS-BUILT INFORMATION	7/2001	JLM



PLAN

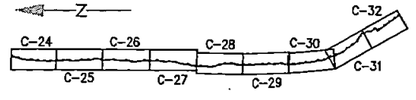
SCALE: 1" = 30'



PROFILE

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE, N. AMERICAN DATUM 1983(91). VERTICAL DATUM: NATIONAL GEODETIC VERTICAL DATUM 1929. CONTOUR INTERVAL IS ONE FOOT.
2. ROAD AND TRAIL LAYOUT INFORMATION IS SHOWN ON PLATES C-33 THROUGH C-39



KEY PLAN

NO SCALE

AS-BUILT

1" = 30' 30' 15' 0 30' 60'

IF SHEET IS LESS THAN 32" X 21" IT IS A REDUCED PRINT, REDUCE SCALE ACCORDINGLY

U.S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

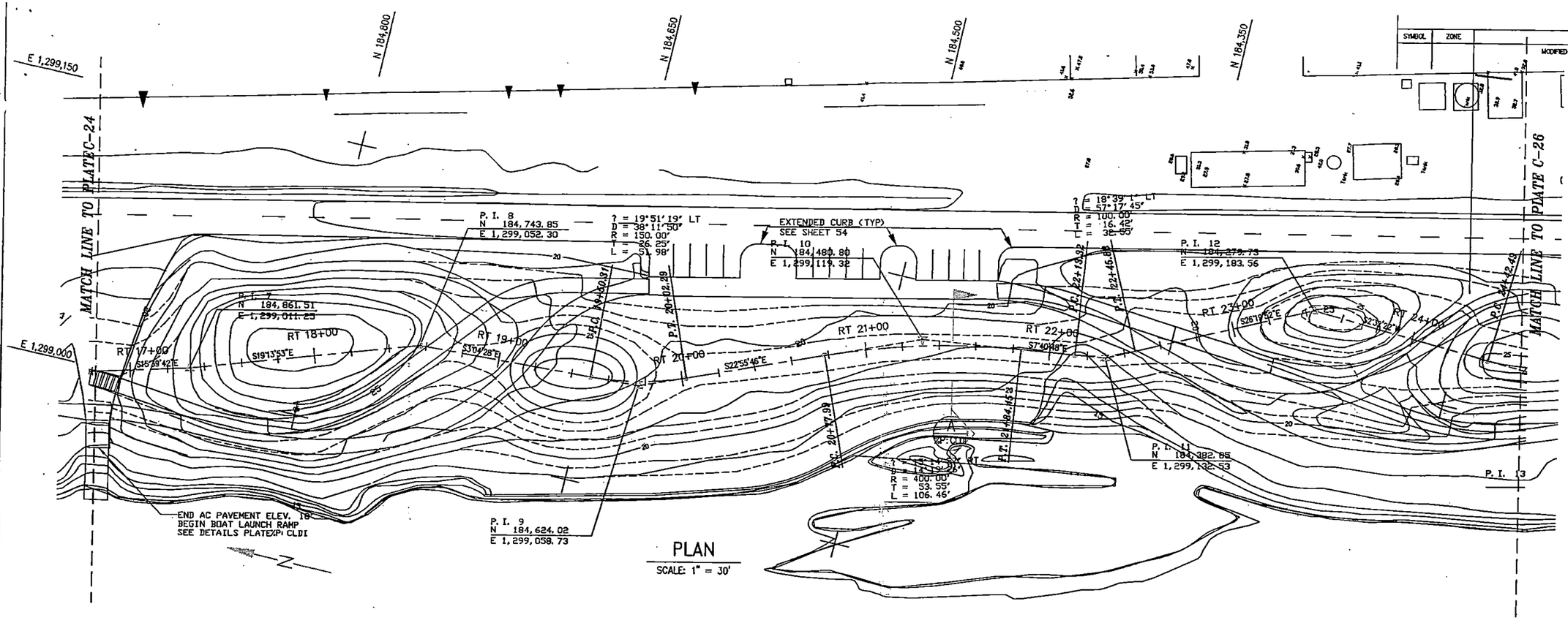
LOWER CEDAR RIVER FLOOD CONTROL
LEVEES & FLOODWALLS

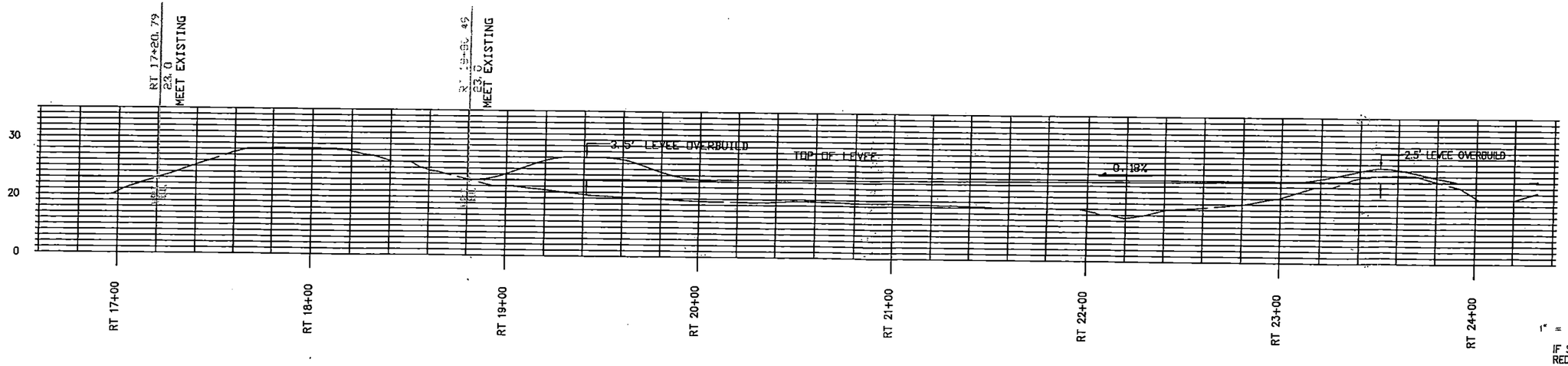
RIGHT BANK PLAN & PROFILE
STATION RT10+00 TO RT16+80

RENTON WASHINGTON

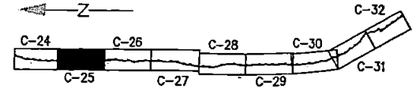
SIZE	INVITATION NO.	FILE NO.	DATE	PLATE
D	B-99-0017	E-19-1-70	98DEC03	C-24

REVISIONS				
SYMBOL	ZONE	DESCRIPTION	DATE	BY
		MODIFIED PER AS-BUILT INFORMATION	7/2001	JLM





PROFILE



KEY PLAN

AS-BUILT

1" = 30' 30' 15' 0 30' 60'

IF SHEET IS LESS THAN 32" X 21" IT IS A REDUCED PRINT, REDUCE SCALE ACCORDINGLY

U.S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

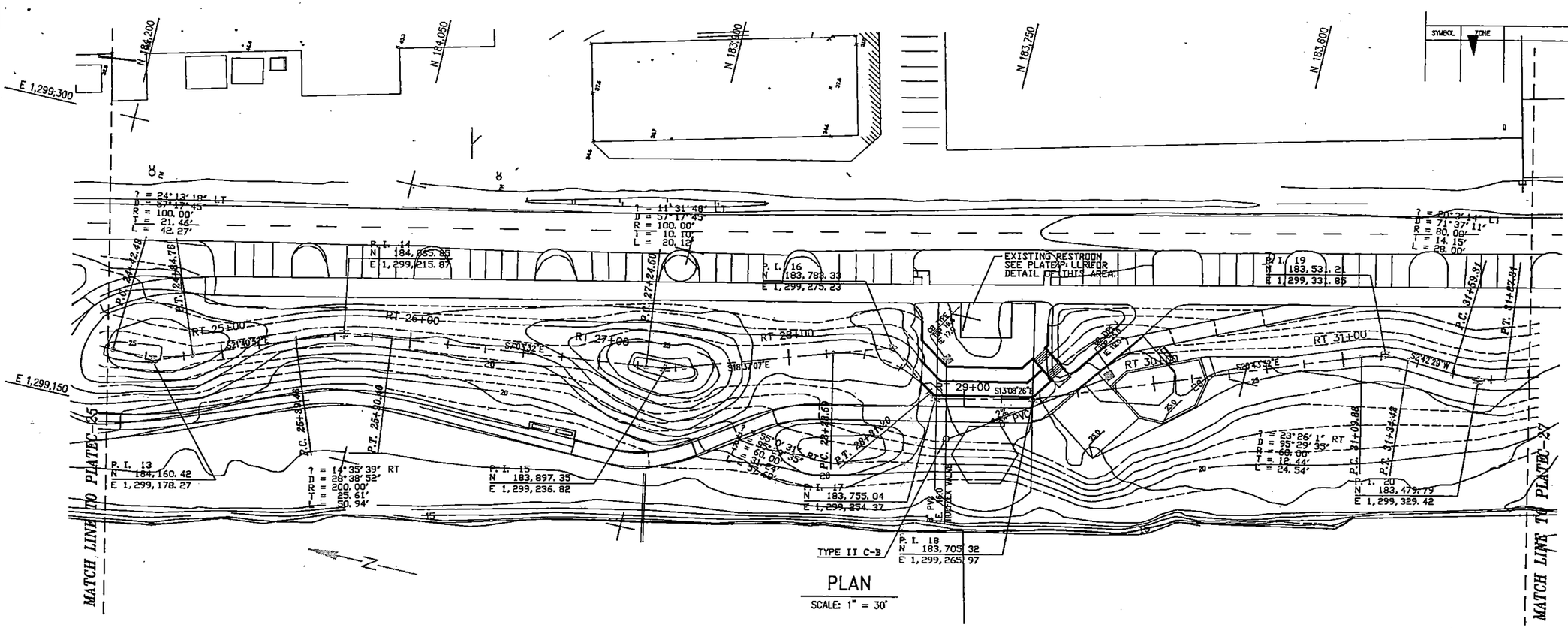
LOWER CEDAR RIVER FLOOD CONTROL
LEVEES & FLOODWALLS

RIGHT BANK PLAN & PROFILE
STATION RT16+80 TO RT24+40

RENTON WASHINGTON

SIZE	INVITATION NO.	FILE NO.	DATED	PLATE
D	B-99-0017	E-19-1-70	98DEC03	C-25

REVISIONS				
SYMBOL	ZONE	DESCRIPTION	DATE	BY
		MODIFIED PER AS-BUILT INFORMATION	7/2001	JLM

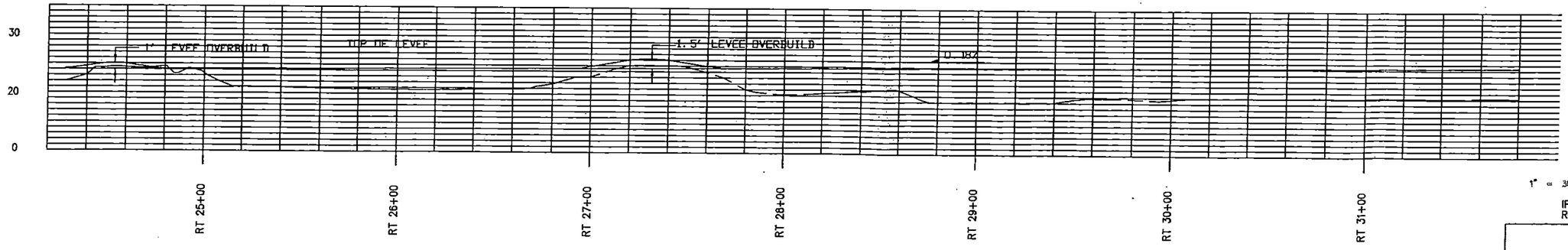


PLAN

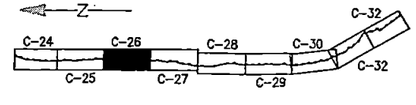
SCALE: 1" = 30'

NOTES:

1. FOR CATCH BASIN AND GRATE AT RESTROOM, USE ONE REMOVED FROM OTHER PARK LOCATION OR REPLACE WITH NEW TO MATCH EXISTING IN PARK.
2. FOR DETAIL OF RESTROOM AREA SEE PLATE . L-11



PROFILE



KEY PLAN

AS-BUILT

1" = 30' 30' 15' 0 30' 60'

IF SHEET IS LESS THAN 32" X 21" IT IS A REDUCED PRINT, REDUCE SCALE ACCORDINGLY

U.S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

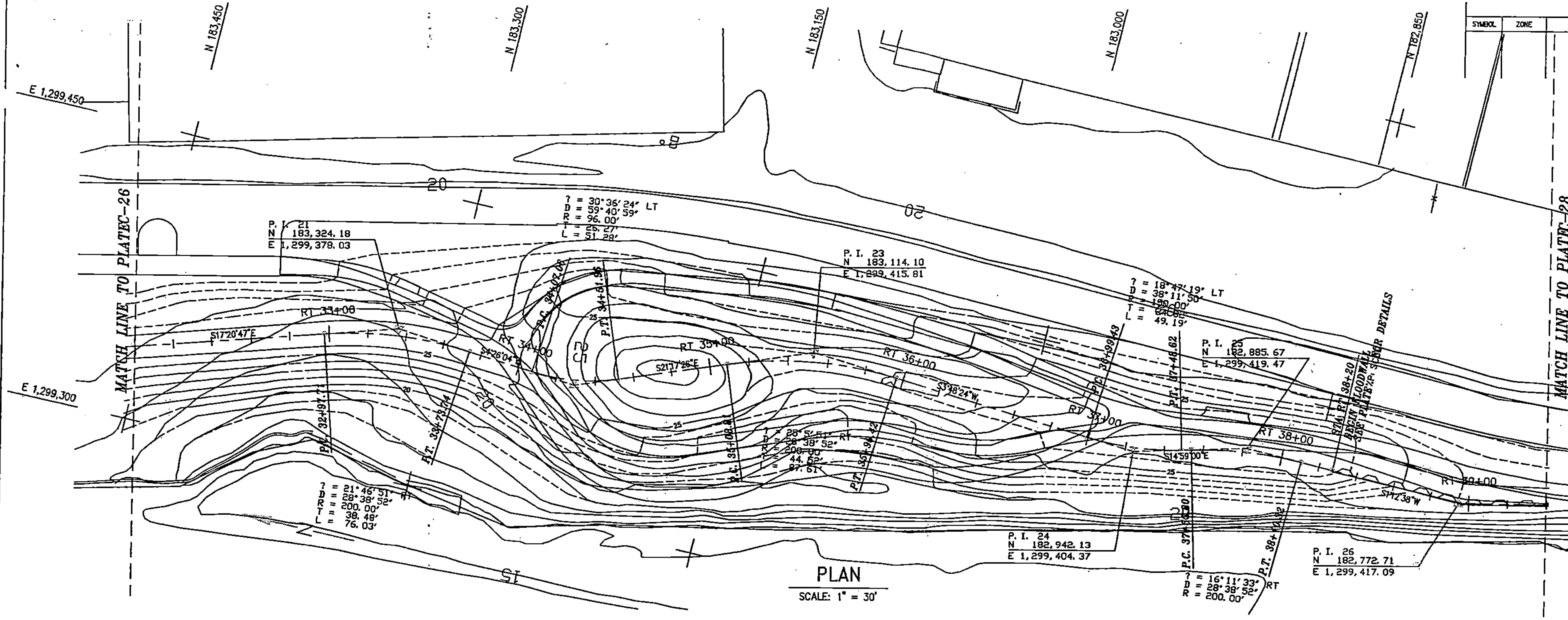
LOWER CEDAR RIVER FLOOD CONTROL
LEVEES & FLOODWALLS

RIGHT BANK PLAN & PROFILE
STATION RT24+40 TO RT32+00

RENTON WASHINGTON

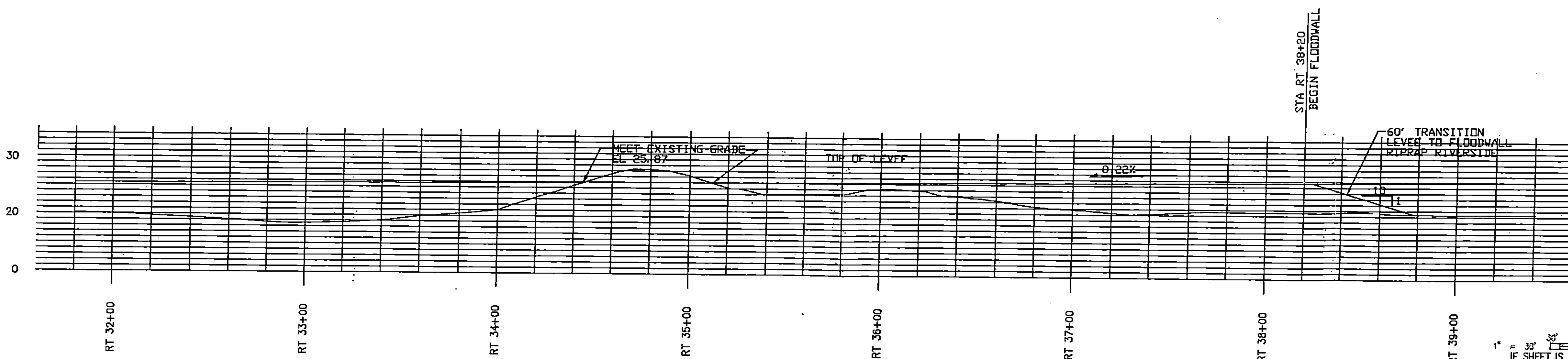
SIZE	INVITATION NO.	FILE NO.	DATE	PLATE
D	B-99-0017	E-19-1-70	98DEC03	C-26

SYMBOL	ZONE	REVISIONS DESCRIPTION	DATE	BY
		MODIFIED PER AS-BUILT INFORMATION	7/2001	JJM

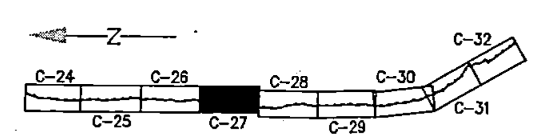


PLAN

SCALE: 1" = 30'



PROFILE



KEY PLAN

AS-BUILT

1" = 30' 30' 15' 0 30' 60'

IF SHEET IS LESS THAN 32" X 21" IT IS A REDUCED PRINT, REDUCE SCALE ACCORDINGLY

U.S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

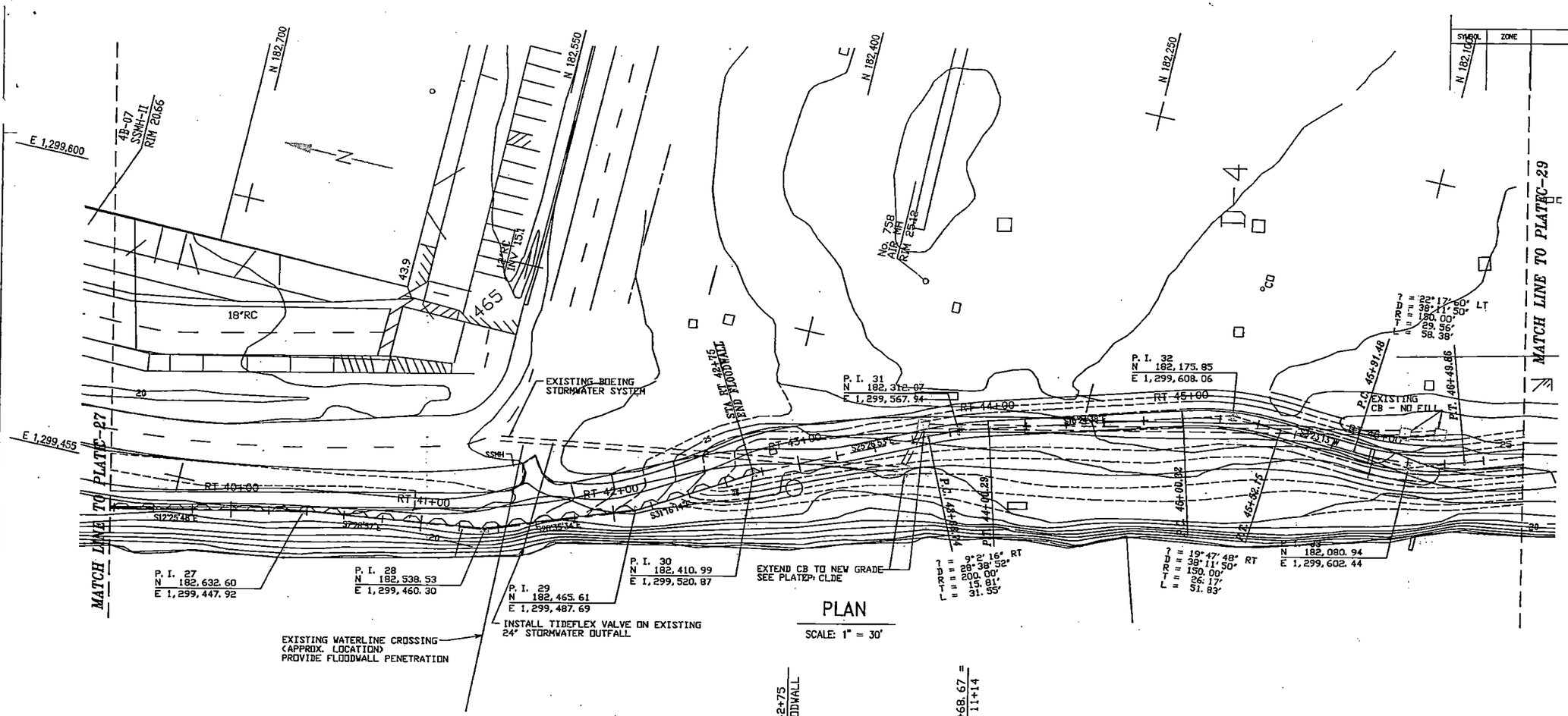
LOWER CEDAR RIVER FLOOD CONTROL
LEVEES & FLOODWALLS

RIGHT BANK PLAN & PROFILE
STATION RT32+00 TO RT39+40

RENTON WASHINGTON

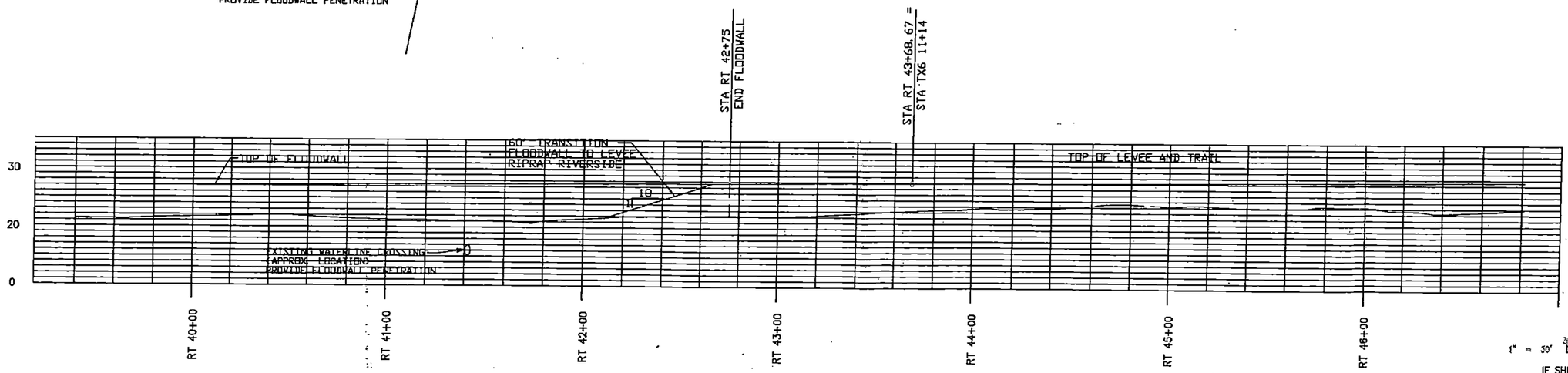
SIZE	INVITATION NO.	FILE NO.	DATE	PLATE
D	B-99-0017	E-19-1-70	98DEC03	C-27

REVISIONS				
SYMBOL	ZONE	DESCRIPTION	DATE	BY
		MODIFIED PER AS-BUILT INFORMATION	7/2001	JJM



PLAN

SCALE: 1" = 30'

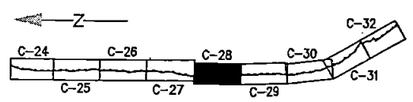


PROFILE

AS-BUILT

1" = 30'

IF SHEET IS LESS THAN 32" X 21" IT IS A REDUCED PRINT, REDUCE SCALE ACCORDINGLY



KEY PLAN

NO SCALE

U.S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

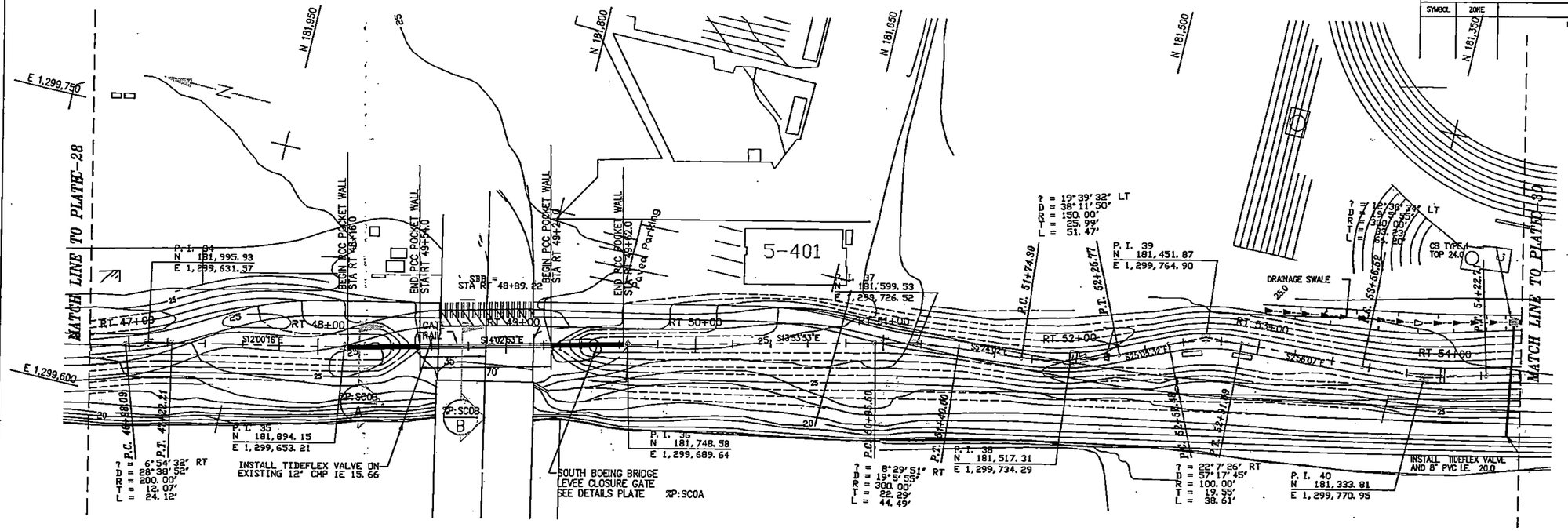
LOWER CEDAR RIVER FLOOD CONTROL
LEVEES & FLOODWALLS

RIGHT BANK PLAN & PROFILE
STATION RT39+40 TO RT46+80

RENTON WASHINGTON

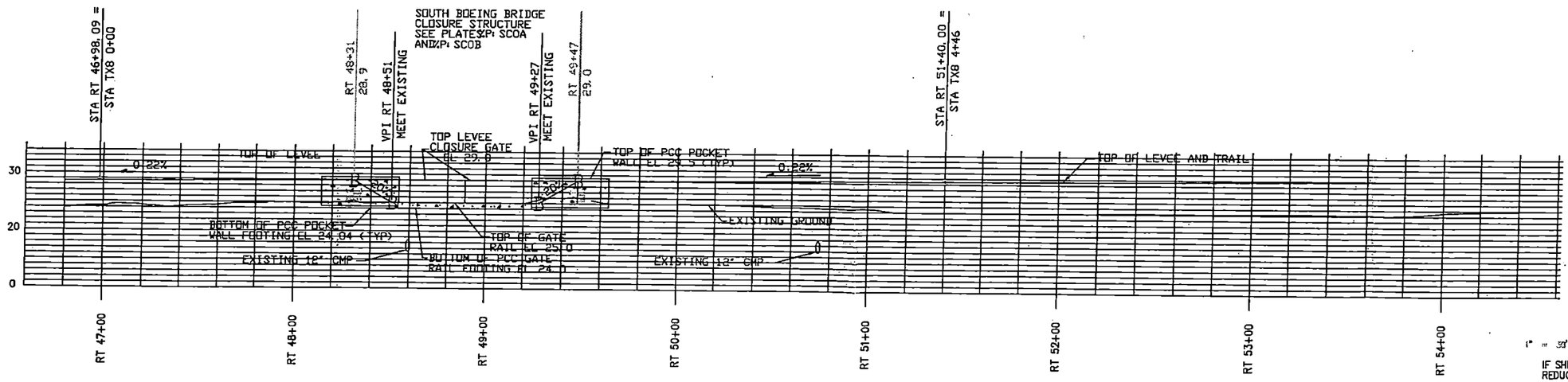
SIZE	DRAWING NO.	FILE NO.	DATE	PLATE
D	B-99-0017	E-19-1-70	98DEC03	C-28

REVISIONS			
SYMBOL	ZONE	DESCRIPTION	DATE	BY
		MODIFIED PER AS-BUILT INFORMATION	7/2001	JLM

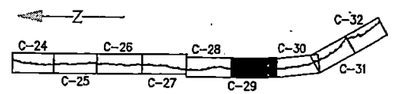


PLAN

SCALE: 1" = 30'



PROFILE



KEY PLAN

NO SCALE

AS-BUILT

1" = 30' 30' 15' 0 30' 60'

IF SHEET IS LESS THAN 32" X 21" IT IS A REDUCED PRINT, REDUCE SCALE ACCORDINGLY

U.S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

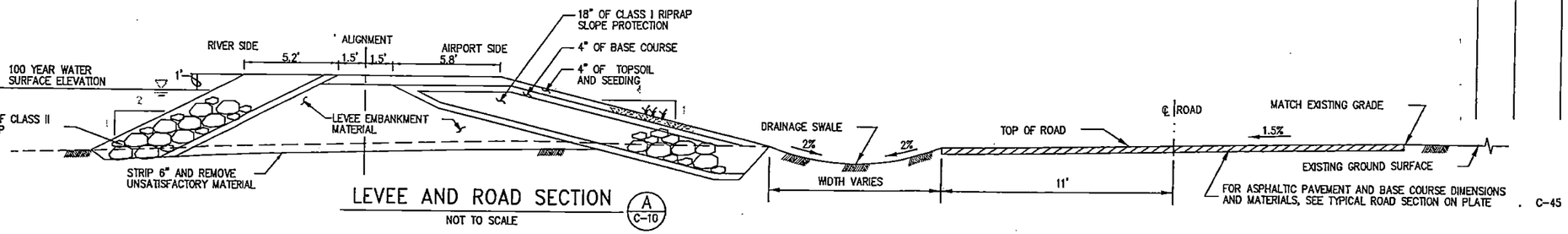
LOWER CEDAR RIVER FLOOD CONTROL
LEVEES & FLOODWALLS

RIGHT BANK PLAN & PROFILE
STATION RT46+80 TO RT54+40

RENTON WASHINGTON

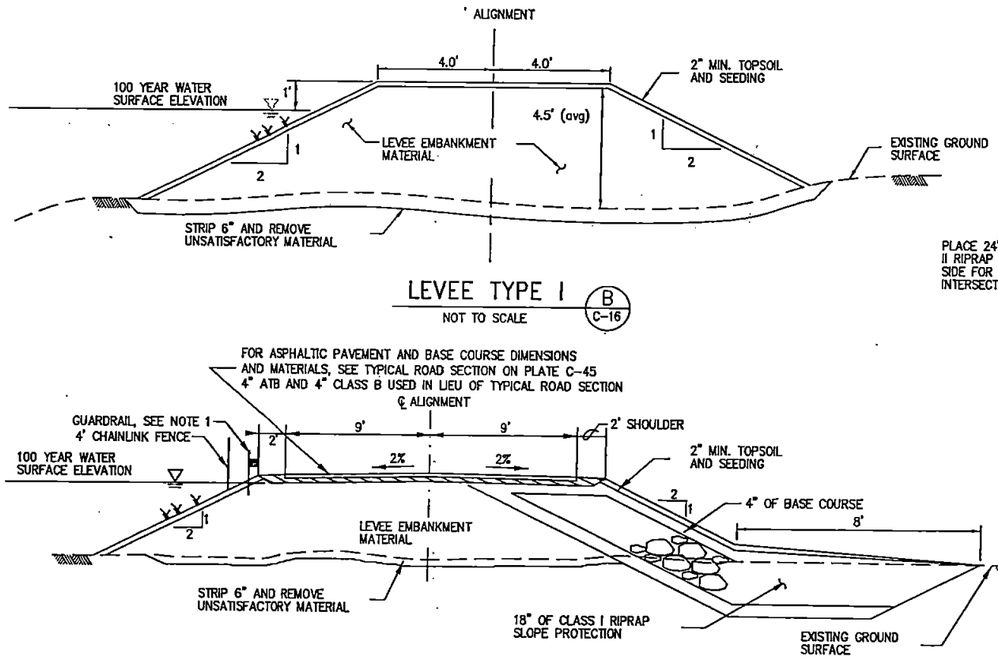
SIZE	INVITATION NO.	FILE NO.	DATE	PLATE
D	B-99-0017	E-19-1-70	98DEC03	C-29
DSGN. BRB	CHK.		SHEET 37	

REVISIONS				
SYMBOL	ZONE	DESCRIPTION	DATE	BY
		MODIFIED PER AS-BUILT INFORMATION	7/2001	JLM



LEVEE AND ROAD SECTION (A, C-10)

NOT TO SCALE



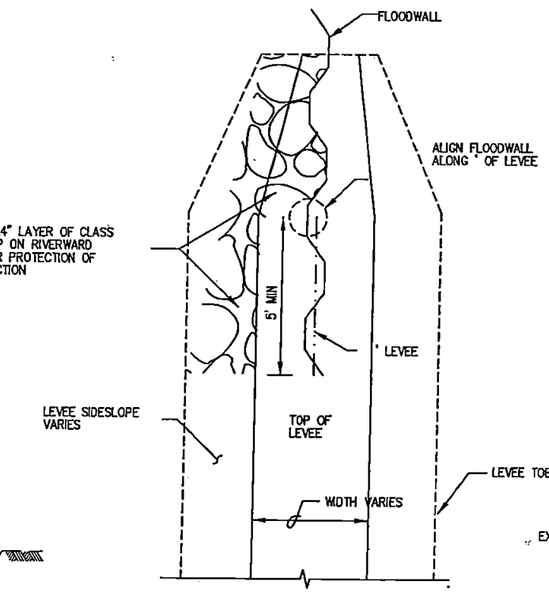
LEVEE TYPE I (B, C-16)

NOT TO SCALE

LEVEE TYPE II (C, C-13)

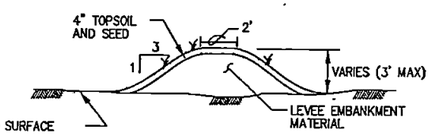
NOT TO SCALE

PLACE 24" LAYER OF CLASS II RIPRAP ON RIVERWARD SIDE FOR PROTECTION OF INTERSECTION



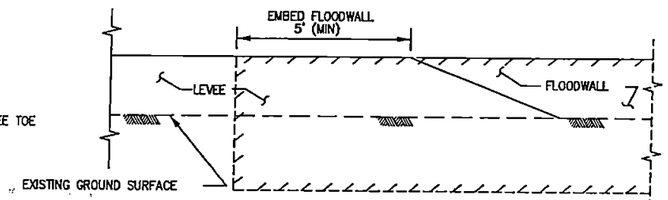
LEVEE/FLOODWALL INTERSECTION, PLAN

NOT TO SCALE



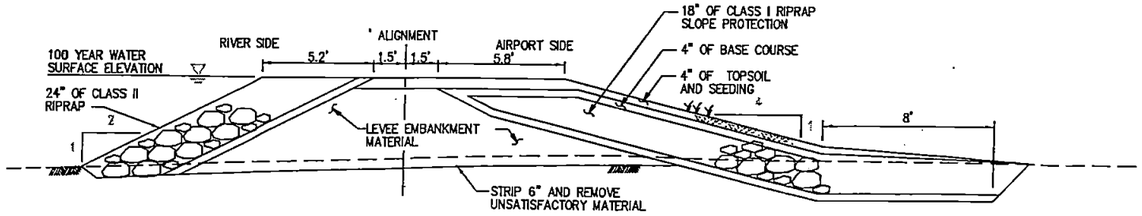
LANDSCAPE BERM SECTION (D, C-17)

NOT TO SCALE



LEVEE/FLOODWALL INTERSECTION, ELEVATION

NOT TO SCALE



LEVEE TYPE III (E, C-12)

NOT TO SCALE

NOTES:

1. FOR GUARDRAIL INSTALLATION PROCEDURES AND DETAILS, SEE DETAILS ON PLATE C-42

AS-BUILT

IF SHEET IS LESS THAN 32" X 21" IT IS A REDUCED PRINT, REDUCE SCALE ACCORDINGLY

U.S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

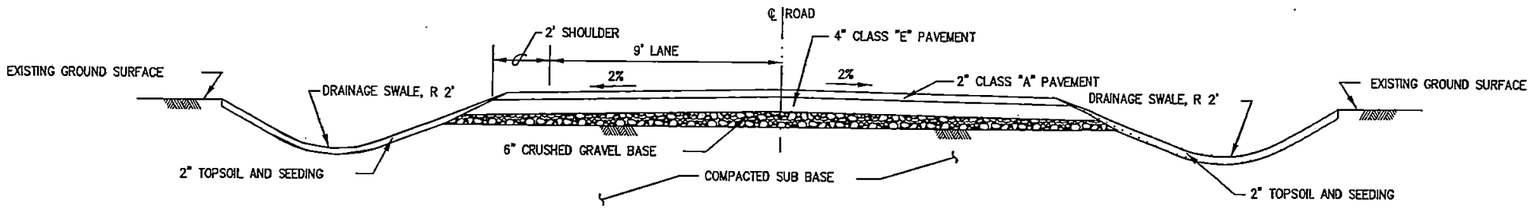
LOWER CEDAR RIVER FLOOD CONTROL
LEVEES & FLOODWALLS

CIVIL DETAILS I

RENTON WASHINGTON

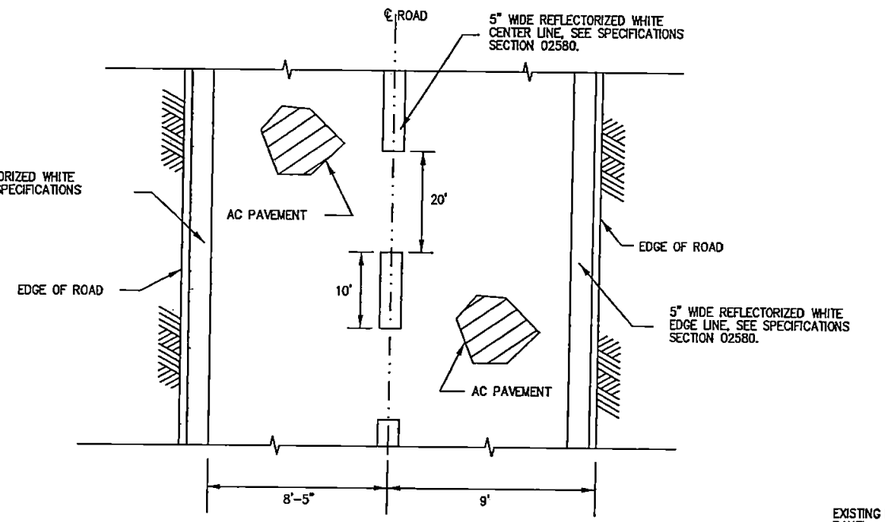
SIZE	DRAWING NO.	FILE NO.	DATE	PLATE
D	B-99-0017	E-19-1-70	98DEC03	C-40
DSGN. PWN		CHK. BRB	SHEET 48	

NOTE:
ASHPALTIC PAVEMENT MATERIALS AND CONSTRUCTION PROCEDURES TO BE PER WASHINGTON STATE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, M 41-10



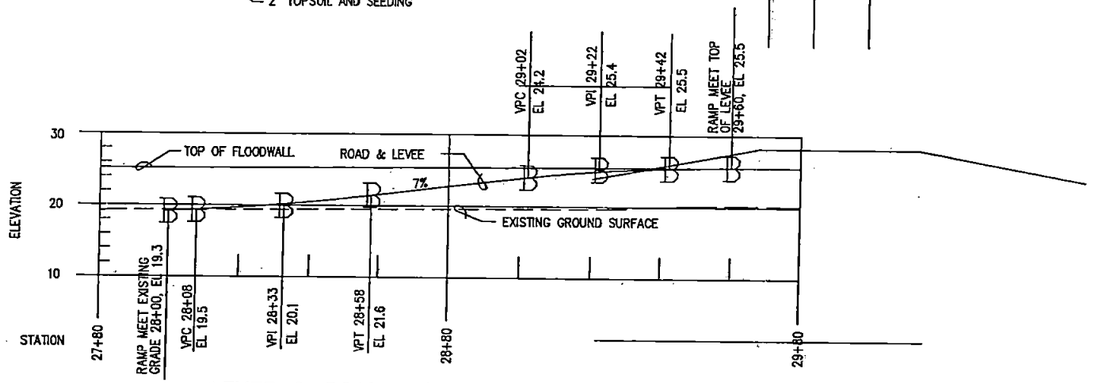
TYPICAL ROAD SECTION

NOT TO SCALE



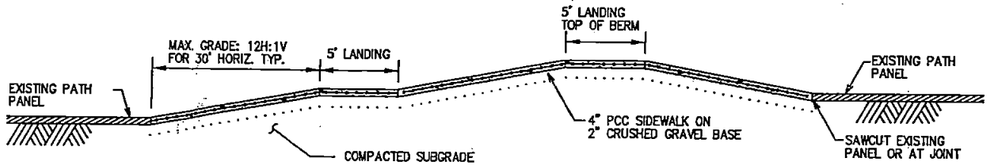
PAVEMENT MARKINGS

NOT TO SCALE



LEVEE & ROAD RAMP VERTICAL PROFILE

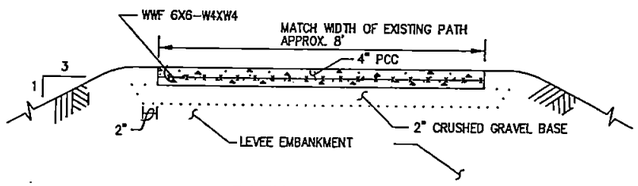
NOT TO SCALE



PATH PROFILE OVER BERM

NOT TO SCALE

NOTE: JOINTS BETWEEN PANELS TO BE EXPANSION JOINTS. SEE PLATE C-43



PATH SECTION

NOT TO SCALE

REVISIONS				
SYMBOL	ZONE	DESCRIPTION	DATE	BY

AS-BUILT

IF SHEET IS LESS THAN 32" X 21" IT IS A REDUCED PRINT, REDUCE SCALE ACCORDINGLY

U.S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

LOWER CEDAR RIVER FLOOD CONTROL
LEVEES & FLOODWALLS

CIVIL DETAILS VI

RENTON WASHINGTON

SIZE	IDENTIFICATION NO.	FILE NO.	DATE	PLATE
D	B-99-0017	E-19-1-70	98DEC03	C-45
DSGN. PWN		CHK. BRB	SHEET 53	