

**Evans Creek Tributary 108 Basin-Wide Retrofitting  
Vault on 217<sup>th</sup> Avenue Northeast at Northeast 87<sup>th</sup> Place**

**Grant No. G1400026**

**2009 King County Surface Water Design Manual  
Preliminary Technical Information Report**

**Prepared By:**

**Scott Miller and Dale Nelson, Engineers  
Stormwater Services Section**

**Reviewed By:**

**Rachel Berryessa, P.E.  
Stormwater Services Section  
Capital Projects Unit**

**Approved By:**

**Claire Jonson, Project Manager, P.E.  
Stormwater Services Section  
Capital Projects Unit**

**December 2014**

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## SECTION I: PROJECT OVERVIEW

### Project Description

The project is a small basin retrofit project to install a stormwater infiltration vault in a suburban neighborhood where a downstream stormwater infiltration pond is undersized for the amount of land that drains to it.

The Ecology Stormwater Grant G1400026 funded the systematic design approach of basin wide stormwater controls in Evans Creek Tributary 108. This suburban basin within the Bear-Evans Creek watershed was selected because stream health in the basin has been degraded by development, but not to the point that restoration is impossible or improbable.

Basin wide stormwater facilities were sized based on the Ecology 8% Proposed Standard (ECY08) design scenario described in *The Stormwater Retrofit Analysis and Recommendations for Juanita Creek Basin in the Lake Washington Watershed*<sup>1</sup>. This design scenario uses bioretention facilities sized per 2009 King County Surface Water Design Manual standards to handle 80 percent of runoff from impervious surfaces. Overflow from the bioretention facilities along with all runoff from the remaining impervious and pervious surfaces is then routed through stormwater infiltration facilities.

The delineation of subbasins in the Evans Creek Tributary 108 basin and the potential volumes of stormwater facilities in the basin wide retrofit were described in email to Doug Howie, Ecology Engineer, dated January 16, 2014. The preliminary facility sizing was based on unit volumes developed for Appendix F of the Juanita Creek study.<sup>1</sup> Items sent to Doug Howie in a technical memorandum dated October 13, 2014 include methods of site prioritization for facility construction; a map of the modeled system design, which shows the location of all retrofits facilities and Low Impact Development Best Management Practices; and a spreadsheet summarizing the design specifics and planning level project costs for each site.

The project proposed in this preliminary technical information report is one of three vaults that were the highest priority and most feasible in the site prioritization, so this project was chosen for one of the three predesign reports for the grant.

The vault is proposed in existing right of way. The infiltration vault dimensions are 35.8 feet long x 35.8 feet wide x 5 feet deep. The retrofit impervious area footprint of the vault is 1,282 square feet.

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<sup>1</sup> <http://www.kingcounty.gov/environment/watersheds/cedar-river-lake-wa/documents/juanita-creek-stormwater-retrofit.aspx>

## **Project Location**

The project is a retrofit project to install a infiltration vault on 217th Avenue Northeast at Northeast 87th Place. Refer to Appendix A for a map. The construction work will be contained within the right of way. The retrofit impervious area footprint of the vault is 1,282 square feet. The project is within unincorporated King County, near Redmond, Washington.

Tributary 108 is considered an “F” type stream (formerly type 2 or 3), by the Washington State Department of Natural Resources. This classification is assigned to “streams and water bodies that are known to be used by fish, or meet the physical criteria to be potentially used by fish. Fish streams may or may not have flowing water all year; they may be perennial or seasonal” (WAC-222-16-030 2001). There are no critical areas on or near the site.

## **Pre-developed Conditions**

The intersection at 217th Avenue Northeast and Northeast 87th Place is an existing paved right of way with minimal utilities. The existing drainage system is composed of curb and gutter, catch basins and a pipe system that drains via pipe network to a infiltration pond (D92411) approximately 4,000 feet downstream designed and installed for Hunterswood Divisions 2 and 3. The existing drainage system in the right-of-way at the project site is in good condition.

The site is within an area considered by the 2009 King County Surface Water Design Manual as a Basic Water Quality Treatment Area and as a Conservation Flow Control Area.

The Natural Resources Conservation Service mapped the area that would be served by the new facility entirely as Alderwood gravelly sandy loam 6 to 15 percent slopes. Inclusions make up as much as 25 percent of this type of soil map unit, including up to 5 percent Alderwood and up to 20 percent Neilton soils. Speaking to survey crew October 13, 2014, a resident on Northeast 86<sup>th</sup> Street described soils around his lot as being a very rocky clay soil.

## **Developed Conditions**

The infiltration vault dimensions are 35.8 feet long x 35.8 feet wide x 5 feet deep. The retrofit impervious area footprint of the vault is 1,282 square feet. Drainage discharge from the project is directed via pipe network to a infiltration pond (D92411) approximately 4,000 feet downstream. Refer to Appendix C for engineering plans

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## SECTION II: CONDITIONS AND REQUIREMENTS SUMMARY

This section will address the requirements set forth by King County's 2009 Surface Water Management Design Manual (SWDM) Core and Special Requirements listed in Chapter 1 for Targeted Drainage Review. The project is a retrofit project that results in less than 2,000 square feet of replaced impervious surface and is proposing to construct or modify a drainage pipe that is 12 inches or larger. SWDM Section 1.1.2.2, Targeted drainage review project category #2 applies to this project.

### Core Requirements

**Core Requirement #1 Discharge at the natural location (1.2.1):** The proposed stormwater infiltration vault would be installed in-line with the existing stormwater conveyance system, and the discharge location will not be changed.

**Core Requirement #2 Offsite Analysis (1.2.2):** Analysis is addressed in the Offsite Analysis Section III. A downstream qualitative analyses of the project was conducted.

**Core Requirement #4 Conveyance System (1.2.4):** Design and analysis is addressed in Section V.

**Core Requirement #5 Erosion and Sedimentation Control Plan (1.2.5):** The project will need to construct a series of sediment controls related to specific conditions on the site.

**Core Requirement #6 Maintenance and Operations (1.2.6):** This is a drainage improvement project within the public right-of-way in unincorporated King County. King County will assume maintenance of all drainage facilities and systems.

**Core Requirement #7 Financial Guarantees and Liability (1.2.7):** Not applicable because King County is responsible for construction of the drainage project.

### Special Requirements

**Special Requirement #4 Source Control (1.3.4):** Not applicable because this project does not require a commercial building or commercial site development permit.

### Critical Areas Ordinance Requirements

1. **Wetlands:** Not applicable because the project is not located within or adjacent to wetlands. Wetland indicators are absent from the site.
2. **Streams and Flood Hazard Areas:** The pipe that conveys stormwater north from the project site discharges near a stream. This pipe may need to be lowered to match vault design, pending survey results. The project is otherwise not located within or adjacent to a Stream and Flood Hazard area.

3. **Erosion Hazard Areas:** The project is not located within or adjacent to an erosion hazard area.
4. **Landslide Hazard Areas:** The project is not located within or adjacent to a landslide area.
5. **Seismic Hazard Areas:** The project is not located within or adjacent to a seismic area.
6. **Coal Mine Hazard Areas:** The project is not located within or adjacent to a coal mine area.

All applicable core and special requirements from the 2009 KCSWDM have been complied with. Exemptions and exceptions regarding flow control and water quality treatment for the site are discussed in the “Flow Control and Water Quality Facility Analysis and Design” Section IV.

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## **SECTION III: OFFSITE ANALYSIS**

This section identifies the tributary basin areas downstream of the project site and evaluates the downstream drainage system problems. The intent of this section is to demonstrate that the proposed project will not create new drainage problems.

### **Basin Downstream Information**

There is one project threshold drainage basin within the project limits. See Appendix D for the drainage basin area that contributes to the infiltration vault. The intersection at 217th Avenue Northeast and Northeast 87th Place is an existing paved right of way with minimal utilities. The existing drainage system is composed of curb and gutter, catch basins and a pipe system that drains to a detention pond (D92411) approximately 4,000 feet downstream. The existing drainage system in the right-of-way is in good condition.

### **Resource Review**

The following documents and resources were reviewed and researched for existing and/or potential drainage problems. The findings of each are listed as follows:

1. FEMA maps indicated that the project is not within a Federal Emergency Management Agency (FEMA)-designated floodplain.
2. The project drains to Evans Creek Tributary 108, considered an “F” type stream (formerly type 2 or 3), by the Washington State Department of Natural Resources.
3. Analysis of King County Drainage Service Section complaints revealed no significant flooding or erosion problems in the ¼ mile downstream path.

### **Field Inspection**

A field inspection for drainage and erosion problems revealed no drainage or erosion problems within ¼ mile downstream of the site.

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## **SECTION IV: FLOW CONTROL AND WATER QUALITY FACILITY ANALYSIS AND DESIGN**

### **Basin Description-Existing and Developed Site Hydrology**

There is one project threshold drainage basin within the project limits. See Appendix D for the drainage basin area that contributes to the infiltration vault. Existing and Developed drainage basin is the same.

This project will replace existing impervious surface during installation of an infiltration vault. No new impervious surface will be added.

### **Flow Control**

The retrofit project is in the Evans Creek drainage basin and within an area considered by the 2009 King County Surface Water Design Manual (KCSWDM) as a Conservation Flow Control Area. This retrofit project does not require Flow Control because it results in less than 2,000 square feet of replaced impervious. This retrofit project is installation of a new stormwater infiltration vault where existing downstream flow control is undersized for the land area that drains to it.

Flow control for this project was sized to meet Minimum Requirements in the 2012 Washington Department of Ecology Stormwater Management Manual for Western Washington (SMMWW). Minimum Requirements No. 5 and No. 7 were applied to infiltration sizing, matching mitigated flow durations to flows from 8 percent of the predeveloped 2-year flow to 100 percent of the predeveloped 50-year flow.

The Western Washington Continuous Simulation Hydrology Model (WWHM) was used to match duration curves. The predeveloped land segments used in the model are shown in Table 1.

**Table 1. Predeveloped land segment.**

<u>Regional Calibration Segment Type</u>	<u>Acreage</u>
Outwash Forest	6.54765

In the mitigated developed condition, the drainage basin that drains to this facility is assumed to implement low impact development best management practices (LID BMPs). Soil amendments per SMMWW BMP T5.13, Post-Construction Soil Quality and Depth, are assumed to be applied to residential landscaping, and these areas are modeled as pasture per guidance in Appendix III-C of the SMMWW.

Eighty percent of the runoff from impervious surface in the basin is assumed to be routed through a bioretention facility sized per the KCSWDM. The hydrologic simulation model – FORTRAN (HSPF) was used to generate a flow time series for inflows to the infiltration vault. With the exception of the WWHM parameters for pasture, parameters from the US Geological Survey (USGS) Regional Calibration for HSPF were used for the developed condition modeling. HSPF was used for its capability to model the entire Evans Creek Tributary 108 complex of subwatersheds. Mitigated developed land segments used for the project catchment are shown in Table 2.

**Table 2. Developed land segments.**

Regional Calibration Segment Type	Acreage
Outwash Forest	1.57926
Outwash Pasture	2.93724
Impervious	2.03115
Total	6.54765

The HSPF model consisted of these land segments with 80 percent of the impervious runoff passing through a 0.57 acre bioretention facility sized per KCSWDM standards to accommodate 3 inches of the impervious runoff while infiltrating at a rate of 0.8 inches/hour in disturbed outwash soil. Overflows from the bioretention facility were routed with runoff from the pervious land and from the rest of the impervious land to an output time series. This time series was used in WWHM along with the predeveloped land segment acreages to optimize the size of the stormwater infiltration vault.

Modeled peak inflows to the infiltration vault are shown in Table 3. These flow rates reflect reduced runoff due to infiltration in bioretention facilities. The result of the WWHM retrofit infiltration vault sizing can be found in Appendix E.

**Table 3. Peak inflows to infiltration vault.**

Recurrence Interval (yr)	Inflow rate (cfs)
2	0.100
5	0.130
10	0.154
25	0.188
50	0.217
100	0.249

## **Water Quality**

The retrofit project is in the Evans Creek drainage basin and within an area considered by the 2009 King County Surface Water Design Manual (KCSWDM) as a Basic Water Quality Area. This retrofit project does not require Water Quality because it results in less than 2,000 square feet of replaced impervious surface.

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## **SECTION V: CONVEYANCE SYSTEM ANALYSIS AND DESIGN**

The existing drainage system is shown in the Record Drawings as Appendix B. The retrofit infiltration vault will be placed to convey flows and match to the existing drainage system.

## **SECTION VI: SPECIAL REPORTS AND STUDIES**

Critical areas within, adjacent to, or affected by a project require a special study unless there is a substantial showing that the project will not affect the area contrary to the goals of Sensitive Areas Ordinance 9614 [8(5)] and the Environmentally Critical Areas Code (KCC 21A.24).

The project is not within critical areas and is not proposing to affect a critical area.

## **SECTION VII: OTHER PERMITS**

This will require the following permit.

1. **Clearing and Grading Permit** from the King County Department of Permitting and Environmental Review is required for work that includes clearing and removal of vegetation, excavation, grading, and earthwork construction.
2. **Right of Way Special Use Permit** from the King County Department of Transportation is required for working in the right of way.

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## SECTION VIII: CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN ANALYSIS AND DESIGN

### Erosion and Sediment Control Analysis and Design (Part A)

The intent of the Erosion and Sedimentation Control (ESC) Plan is to minimize, to the maximum extent possible, the transport of sediment from the project site downstream to Evans Creek or any adjacent properties. The project proposes to implement all appropriate and necessary measures to minimize the extent and duration of erosion and sediment transport. ESC measures will be inspected and monitored to ensure continued performance of their intended function. Facilities and measures shall be maintained and repaired as needed.

Erosion and sediment control measures were chosen to fit the proposed condition and topography of the site. The area of the project site is a paved subdivision road.

ESC measures within the project site were chosen to emphasize erosion control rather than treatment of sediment.

#### ***Erosion and Sediment Control Standard Measures***

The following measures were selected to fit the site conditions. Selection was based on meeting the criteria set forth in the 2009 King County *Surface Water Design Manual*, Appendix D (Erosion and Sediment Control Standards). During construction, ESC plans will be revised as necessary to address changing site conditions so as to maintain the minimal extent and duration of erosion and sediment transport.

1. **Clearing Limits:** Prior to any land-disturbing activities, including clearing or grading, all clearing limits, critical areas and their buffers, and trees that are to be preserved within the construction area will be clearly marked with the use of plastic, metal, or stake wire fencing. The project also proposes to phase land-disturbing activities and work progressively from section to section, rather than clearing and grubbing the entire length of the project.
2. **Cover Measures:** Temporary and permanent cover measures will be used to protect disturbed areas that are to remain unworked for more than 7 days during the dry season and 12 hours during the wet season. The use of mulch and plastic will be extensive in that they are temporary protective devices where the intent is to minimize the extent and duration of such areas exposed. Cleared areas will be revegetated as soon as practical after grading.
3. **Perimeter Protection:** The project will install silt fencing and other types of perimeter protection measures around the site so as to minimize, to the maximum extent possible, the transport of sediment from the project site downstream to Evans Creek or any adjacent properties.

4. **Traffic Area Stabilization:** The unsurfaced entrances and roads shall be stabilized by construction of a stabilized construction entrance.
5. **Sediment Retention:** Within the project site, the chosen methods focus on collecting and conveying sediment-laden runoff to treatment facilities. The project also proposes to use filter fabric protection on storm drain inlets in support of the treatment facilities.
6. **Surface Water Controls:** At the perimeter of the site, drainage areas will be treated with perimeter protection measures.
7. **Wet Season Requirements:** Temporary and permanent cover measures will be used to protect disturbed areas that are to remain un-worked for more than 12 hours during the wet season. The wet season is from October 1 to April 30.
8. **Critical Areas Restrictions:** Critical areas and their buffers, and trees that are to be preserved within the construction area will be delineated and clearly marked with the use of plastic, metal, or stake wire fencing.
9. **Dust Control:** Water is to be used when a traffic hazard may be created or when wind-transported sediment is likely to be deposited in Evans Creek. Care will be taken to ensure that runoff will not be generated.

## **Stormwater Pollution Prevention and Spill Plan Design (Part B)**

The intent of the Stormwater Pollution Prevention and Spill (SWPPS) Plan is to identify, to the maximum extent possible, activities that could contribute pollutants to surface and storm water, Evans Creek and any adjacent properties during construction. The project proposes to implement all appropriate and necessary measures to minimize the potential of pollutants to surface and stormwater. SWPPS Plan measures will be monitored to ensure continued performance of their intended function. Activities measured shall be maintained and revised as needed to address changing site conditions.

### ***Stormwater Pollution Prevention and Spill Activity Measures***

The following activities are typically associated with construction and are addressed to the maximum extent possible herein. The bid-winning contractor will be required to develop a more in-depth SWPPS that is specific to his/her construction method or procedures and equipment. During construction, SWPPS plans will be revised as necessary to address changing site conditions so as to maintain the minimal contribution of pollutants.

1. **Storage and Handling of Liquids:** The Contractor will identify liquids he/she and his subcontractors will or intend to handle or store on the site.
2. **Storage and Stockpiling of Construction Materials and Wastes:** The Contractor will identify construction materials stockpiled and wastes that may be generated on-site. This will include the type of cover measure used to keep rainwater from contacting the materials and wastes.
3. **Fueling:** The Contractor will specify method of onsite fueling and provide a descriptive of containment methods for fuel spills.

4. **Maintenance, Repairs, and Storage of Vehicles and Equipment:** It is not anticipated that the Contractor will have maintenance and repair area. In any event of equipment failure that raises the potential of pollutant contamination, methods for containment will be employed.
5. **Concrete Saw Cutting, Slurry, and Washwater Disposal:** No truck washouts will be located in critical delineated and marked areas.
6. **Handling of pH Elevated Water:** The Contractor will provide details for treating and neutralizing water.
7. **Application of Chemicals, including Pesticides and Fertilizers:** The Contractor will provide a list of chemicals that will be used or stored on the site.

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## **SECTION IX: BOND, QUANTITIES, FACILITY SUMMARIES, AND DECLARATION OF COVENANT**

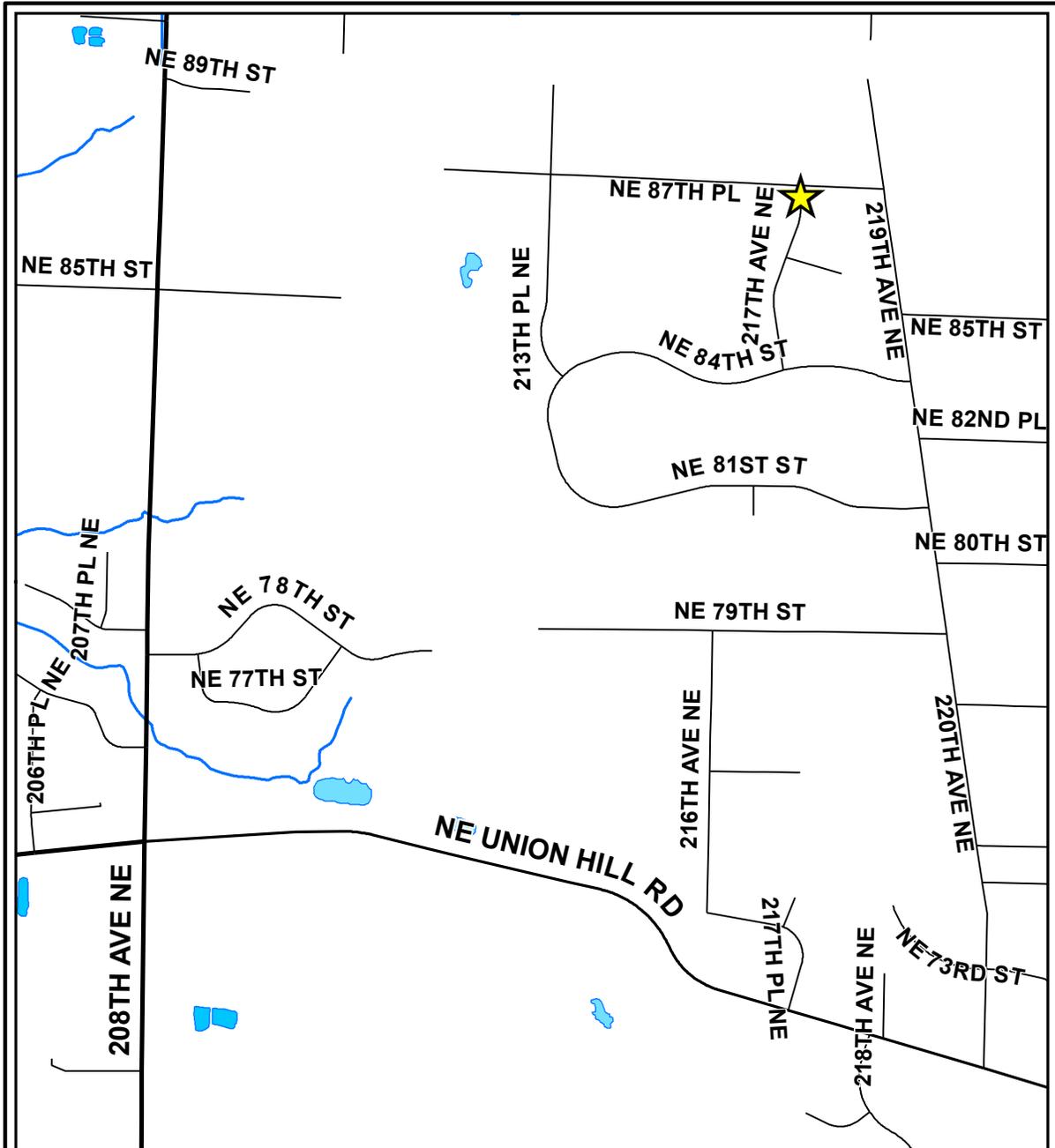
Facilities are being constructed by and for King County; therefore, no bonds will be required. See Appendix F for the preliminary total project cost estimate of \$205,176.54. This includes project management, design and procurement, construction and close out, and public involvement. See Appendix F-1 for the construction costs.

## **SECTION X: OPERATIONS AND MAINTENANCE MANUAL**

### **Standard Maintenance**

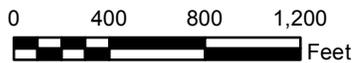
The proposed infiltration vault will be maintained by King County in accordance with the standards described in King County's 2009 *Surface Water Design Manual*, Appendix A, No. 2, Infiltration Vaults.

# Appendix A



## Site Location

 Subbasin E6



The information included on this map has been compiled by King County staff from a variety of sources and is subject to change without notice. King County makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a survey product. King County shall not be liable for any general, special, indirect, incidental, or consequential damages including, but not limited to, lost revenues or lost profits resulting from the use or misuse of the information contained on this map. Any sale of this map or information on this map is prohibited except by written permission of King County.

October 23, 2014

scott.miller@kingcounty.gov \dnrp.kingcounty\clw\krc\CIP\Share\SWS CAPITAL PROJECTS\Small Stream Basin Retrofit Siting 1117558\Evans Creek Retrofit Siting 1121161\TIR Predesign Reports\E108\_E6\_SiteLx.pdf



**King County**

Department of Natural Resources and Parks  
Water and Land Resources Division

# Evans Creek Tributary 108

## Preliminary Technical Information Report

### Appendix B

### Record Drawings

# ~~MORNING GROVE III~~

## SECTION 4, TWN. 25 N., R. 6 E., W.M.

**OWNER:**

COUNTRYWOOD HOMES  
14410 BEL-RED ROAD  
BELLEVUE, WA. 98007  
(206) 644-2465

**ENGINEER:**

DAVID EVANS AND ASSOC.  
301 116th AVE S.E. SUITE 170  
BELLEVUE, WA. 98004  
(206) 455-3571

**LEGAL DESCRIPTION**

LOT D OF KING COUNTY SHORT PLAT NO. 473088,  
LOCATED WITHIN THE SW 1/4, SEC. 4, T.25 N., R. 6 E., W.M.

CONSULTANT REVIEW  
To the best of my knowledge, this plan has been reviewed for compliance with King County Codes and Ordinances.  
Name Kenneth A. Nelson, PE  
Date 8/12/92 Phone 822-4446  
Firm CTAK, INC.

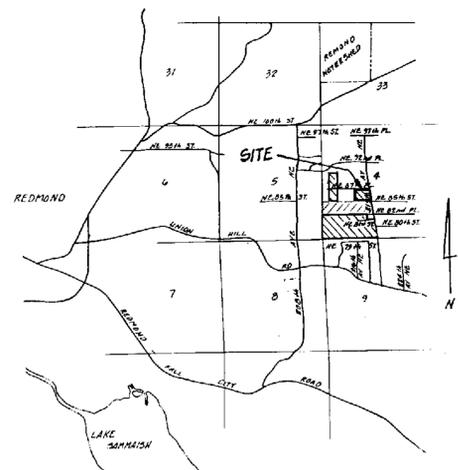
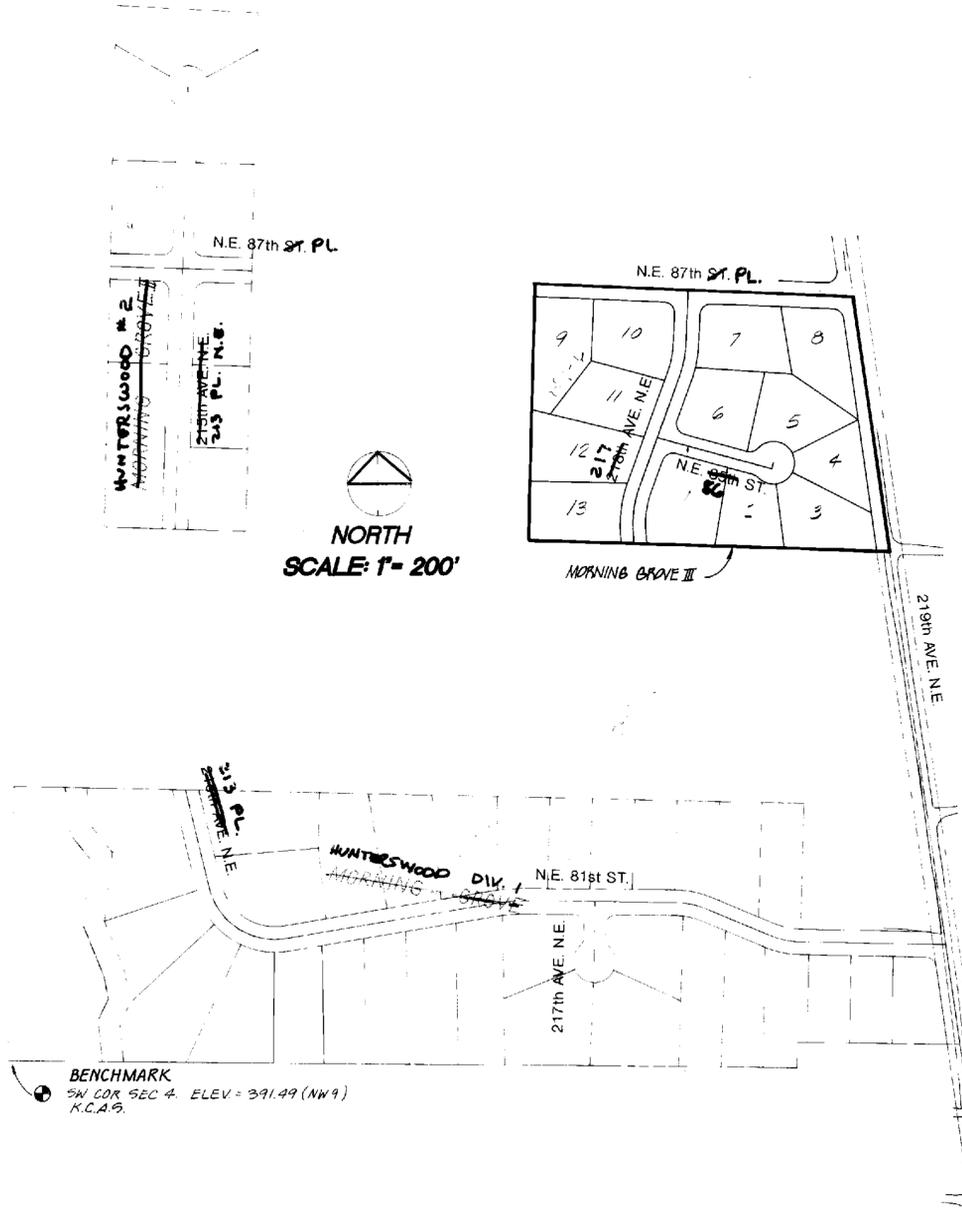
**BENCHMARK**  
TOP OF MONUMENT AT SOUTHWEST CORNER OF SECTION 4,  
TOWNSHIP 25 NORTH, RANGE 6 EAST, W.M.  
ELEVATION = 391.49 (K.C.A.S.)

**SHEET INDEX:**

DESCRIPTION	SHEET NO.
Title Sheet	1
Storm Drainage & Paving Plan	2 & 2-S
Storm Drainage & Paving Profiles	3 & 3-S
General Notes & Details	4
T.E.S.C.P. & Grading Plan	5
219th AVE. NE. IMPROVEMENTS	6 & 7

KING COUNTY  
BUILDING AND LAND DEVELOPMENT DIVISION  
FILE NO. SO 88906 Act # 200200  
APPROVAL DATE 9/29/92  
SIGNATURE [Signature]  
Screened by C. Conforti 8/14/92

U.S. POST OFFICE APPROVAL  
MAILBOX LOCATION  
[Signature] 8/2/92  
POSTMASTER, REDMOND, WA. DATE



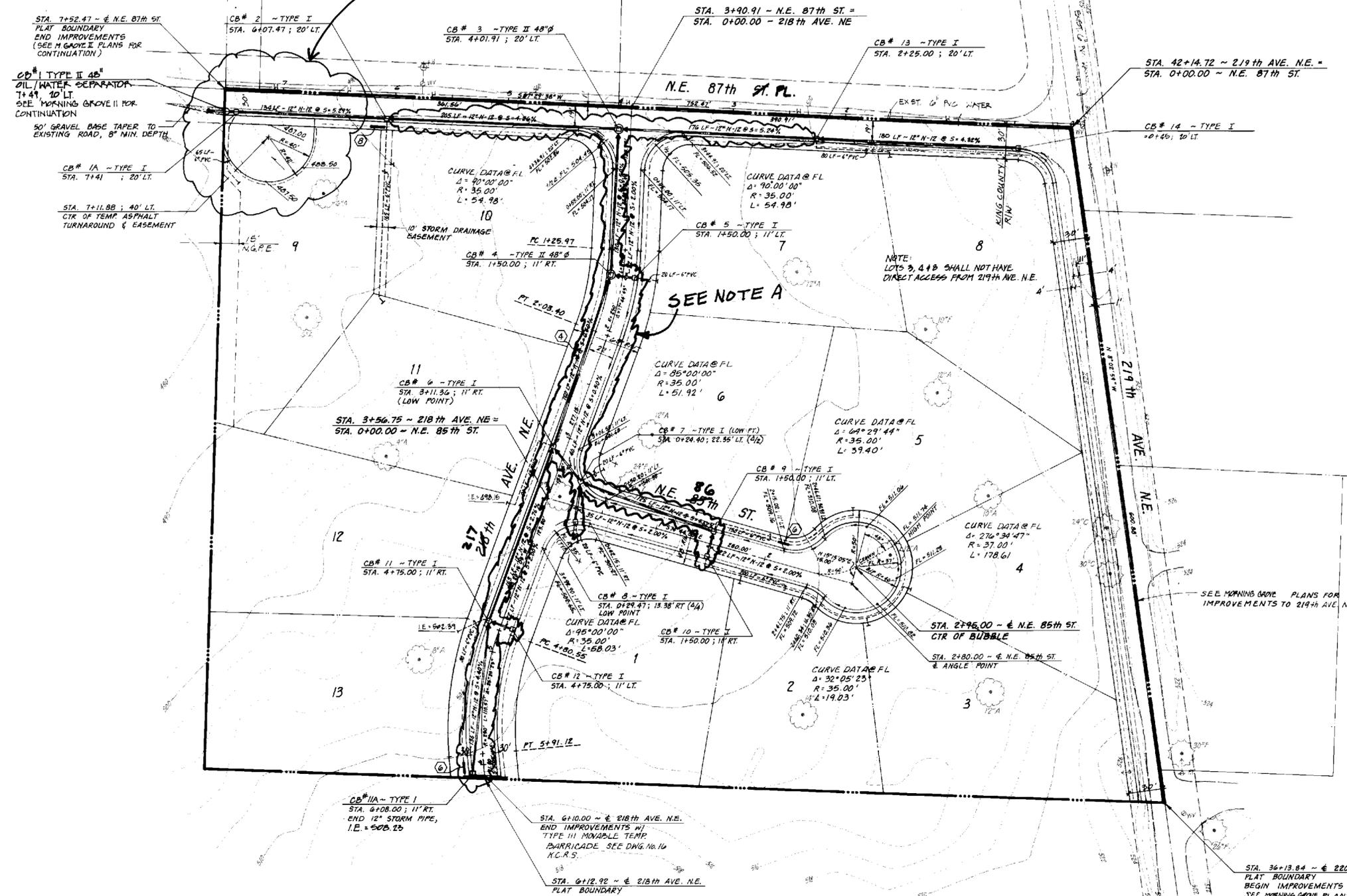
FINAL CORRECTED PLANS

PROJECT WAS ORIGINALLY CALLED "IVY RIDGE II"

TITLE SHEET  
**HUNTERSWOOD III**  
**MORNING GROVE III**  
 PACIFIC PROPERTIES, INC.  
 WASHINGTON  
 BELLEVUE, WA.  
 BALD. NO. 8897-0  
 DAVID EVANS AND ASSOCIATES, INC.  
 301-116TH AVE. S.E. BELLEVUE, WA. 98004-206/455-3571  
 1 OF SEVEN SHEETS  
 SCALE AS NOTED  
 DATE APR 10, 1990  
 FILE ENR 039-IV  
 DESIGN NKH  
 DRAWN KJV  
 CHECKED NKH  
 11-1-96 FINAL CORRECTED PLANS, COMMENT ENDS.  
 REV 6-19-92 PER KING CO. COMMENTS  
 REV 8-19-92 PER KING CO. COMMENTS  
 REV PER KING CO. COMMENTS 8-1-90  
 REVISIONS  
 P1855  
 P-1855



SEE NOTE A



- NOTES:**
1. THE DETENTION POND IN MORNING GROVE II AND THE CONNECTING CONVEYANCE PIPE MUST BE FUNCTIONING AND MORNING GROVE II RECORDED PRIOR TO RECORDING OF MORNING GROVE III.
  2. SINCE FULL WIDTH ACCESS TO MORNING GROVE III IS ACHIEVED THROUGH THE ADJACENT PLAT OF IVY RIDGE, 219th AVENUE N.E. AND THE ROADWAYS WITHIN IVY RIDGE, THESE ROADWAYS SHALL BE BUILT AND DEDICATED PRIOR TO THE RECORDING OF MORNING GROVE III.

**NOTE: A**  
 SEE SHEET 2-5 FOR  
 NEW PLAN VIEW  
 SEE SHEET 3-5 FOR  
 NEW PROFILE

**HUNTERSWOOD III  
 MORNING GROVE III**  
 PACIFIC PROPERTIES, INC.  
 BELLEVUE, WASHINGTON  
 B.A.L.D. NO. 889-6



**dea**  
 DAVID EVANS AND ASSOCIATES, INC.  
 501 1ST AVE. S.E. BELLEVUE, WA 98004 206-465-3071

100% FINAL CORRECTED PLANS, CONCEPT ENVS.  
 REV. 5-11-92 ADDED NGPPE LOT 9  
 REV. PER KING CO. COMMENTS 9-11-91  
 REV. 8-1-90 PER KING CO. COMMENTS  
 REVISED

2  
 SCALE 1" = 50'  
 DATE APR. 10, 1990  
 FILE ENW 099-II

APPROVED CHANGE ORDER #1 BY K.L.D. 3/11/92  
**KING COUNTY**  
 BUILDING AND LAND DEVELOPMENT DIVISION  
 FILE NO. \_\_\_\_\_  
 APPROVAL DATE \_\_\_\_\_  
 SIGNATURE \_\_\_\_\_  
 Screened by C. Lambert 8/14/92

**CONSULTANT REVIEW**  
 To the best of my knowledge, this plan has been reviewed for compliance with King County Codes and Ordinances.  
 Name *Sumeth A. Palomares*  
 Date 8/12/92 Phone 822-4446  
 Firm *DT&E, INC.*

1/23/97  
*AKella*

(X) = LOCATION OF MAILBOX STAND AND NUMBER OF MAILBOXES. INSTALLATION SHALL BE PER KING CO. STD. DWG. NO. 25.



**FINAL CORRECTED PLANS P1855A**

P-1855A ENW 099-II



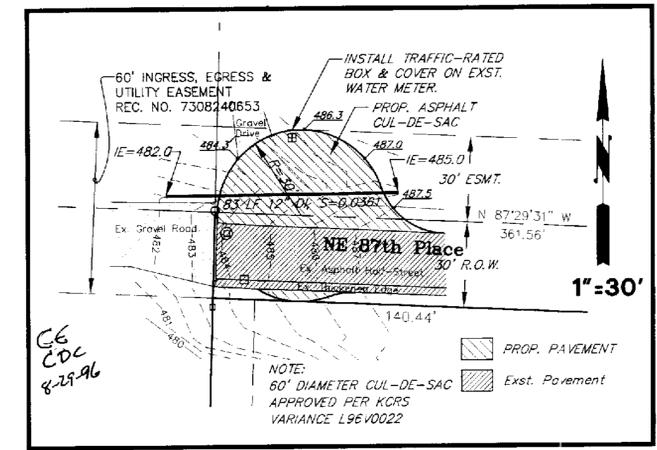
DATE	BY	REVISIONS
12-15-92	CC	REVISIONS PER 2-18-93 REDLINES
2-20-93	CC	APPROD 60' DIA. C.D.S.
8-28-96	CC	FINAL CORRECTED PLANS
11-1-96	KRS	

CONCEPT ENGINEERING, INC.  
 455 Rainier Boulevard North, Suite 200  
 Issaquah, Washington 98027  
 (206) 392-8055



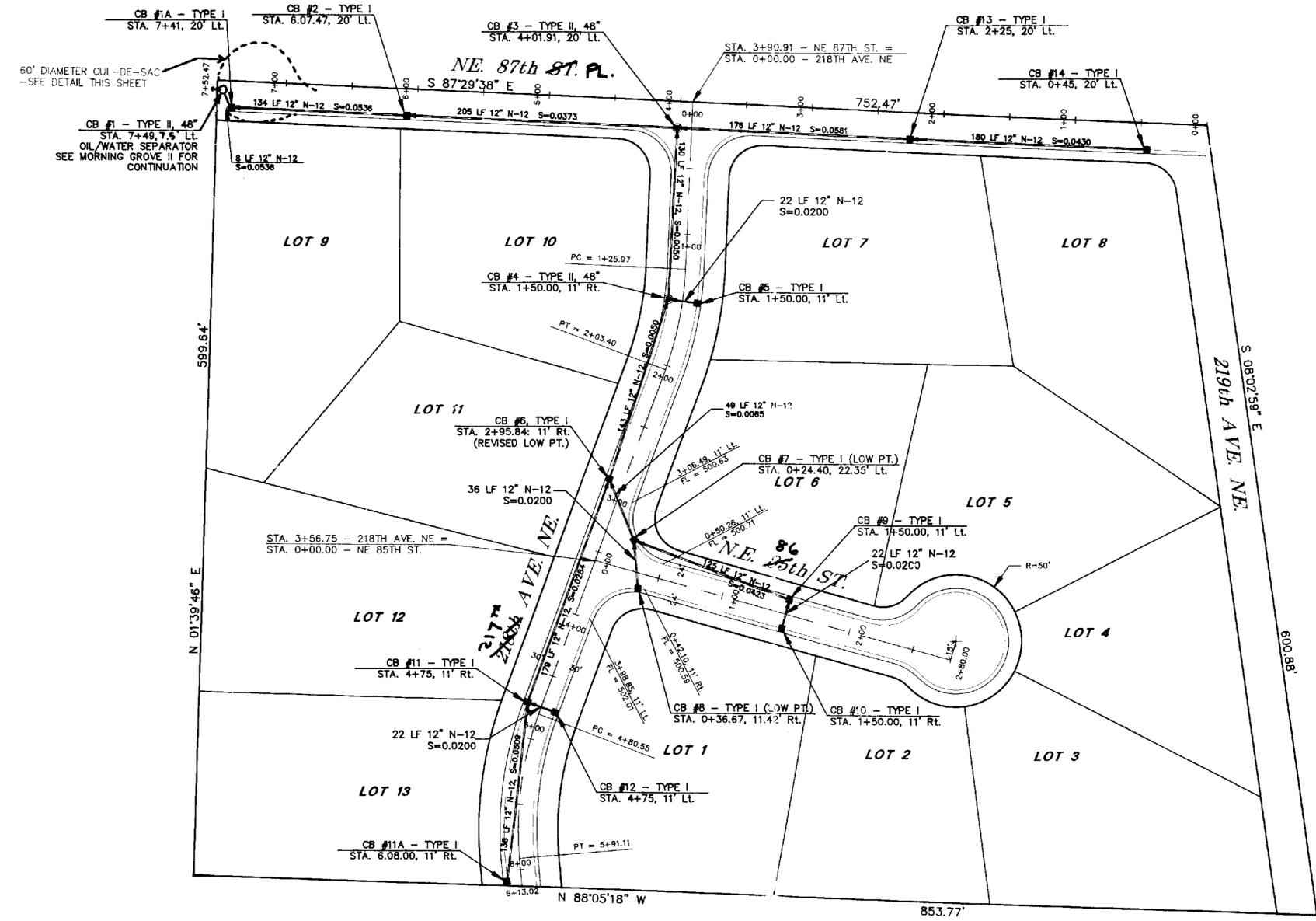
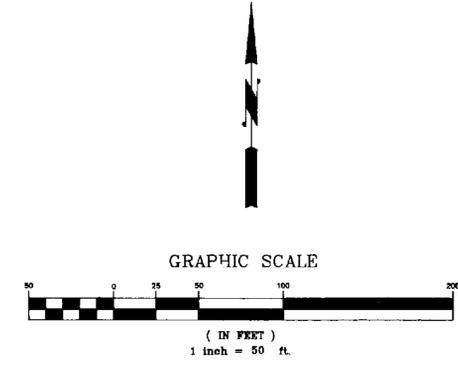
ROAD AND STORM  
 PLAN REVISIONS  
 WATERWOOD III FOR  
 MORNING GROVE DR. III  
 REVISIONS TO DEA, SHEET 2 OF 7 (8-11-92)

SHEET  
 2-5



CUL-DE-SAC DETAIL

PLAN CHANGE #3, L9600309  
 KING COUNTY DEPT. OF DEVELOPMENT  
 AND ENVIRONMENTAL SERVICES  
*Dale F. Nelson* 8/30/96  
 REVIEW ENGINEER DATE  
*W. J. R. Rb.* 8/20/96  
 DEVELOPMENT ENGINEER DATE



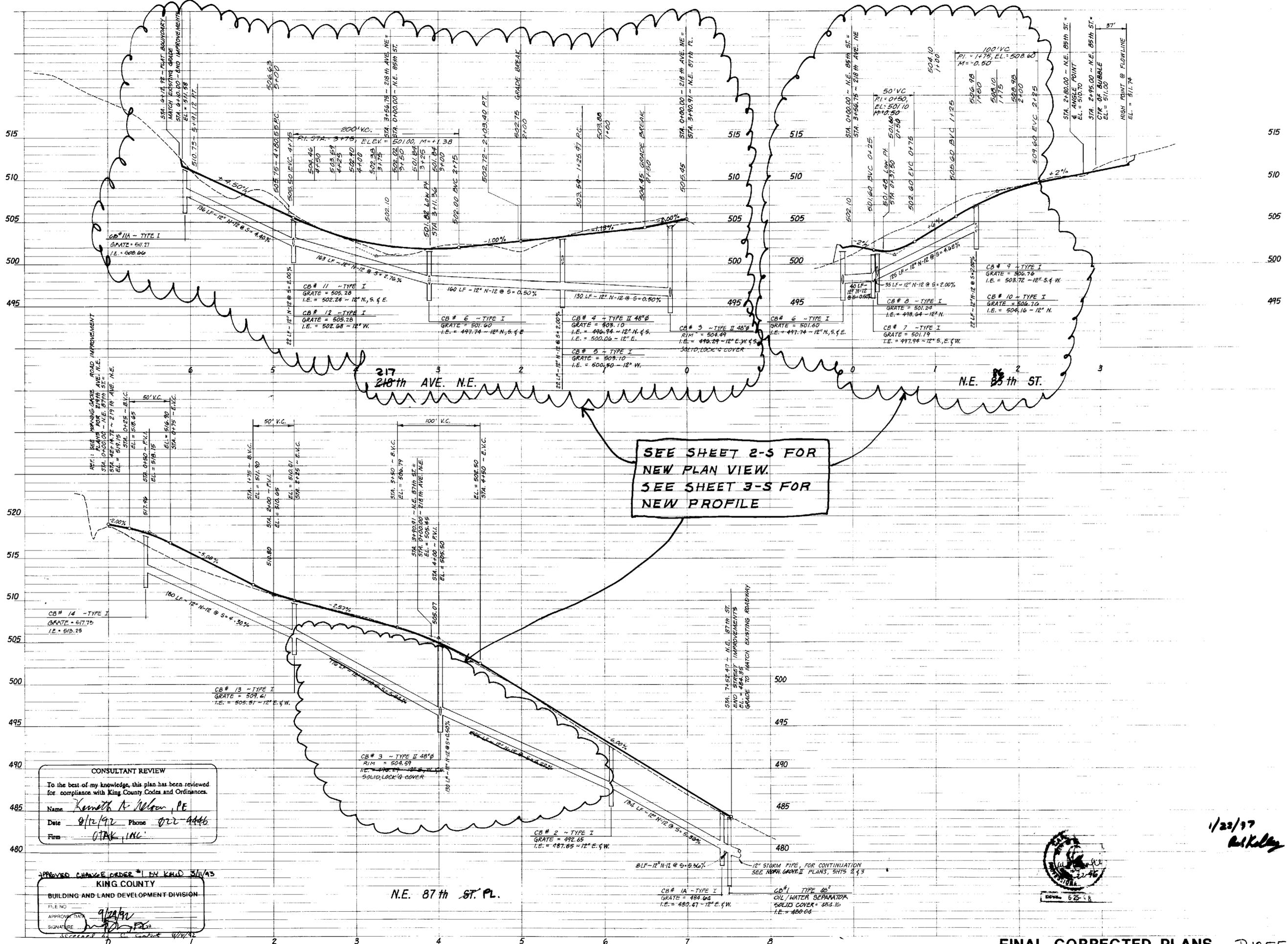
1/23/97  
*Red Kelly*

CHANGE ORDER #1  
 KING COUNTY DEPT. OF DEVELOPMENT  
 AND ENVIRONMENTAL SERVICES  
*Kenn McFowle* 2/1/95  
 REVIEW ENGINEER DATE  
*James N. Sanders* 2/1/95  
 DEVELOPMENT ENGINEER DATE



FINAL CORRECTED PLANS

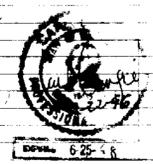
P 1855 B



SEE SHEET 2-5 FOR  
NEW PLAN VIEW.  
SEE SHEET 3-S FOR  
NEW PROFILE

**CONSULTANT REVIEW**  
To the best of my knowledge, this plan has been reviewed for compliance with King County Codes and Ordinances.  
Name: *Kenneth A. Nelson, PE*  
Date: *8/12/92* Phone: *822-4446*  
Firm: *OTAK, INC.*

APPROVED CHANGE ORDER #1 BY KMD 5/11/93  
**KING COUNTY**  
BUILDING AND LAND DEVELOPMENT DIVISION  
FILE NO: *9/24/92*  
APPROVAL DATE: *9/24/92*  
SIGNATURE: *[Signature]*  
SCHEMATIC DATE: *8/12/92*



*1/23/97*  
*Pat Kelly*

FINAL CORRECTED PLANS P1855

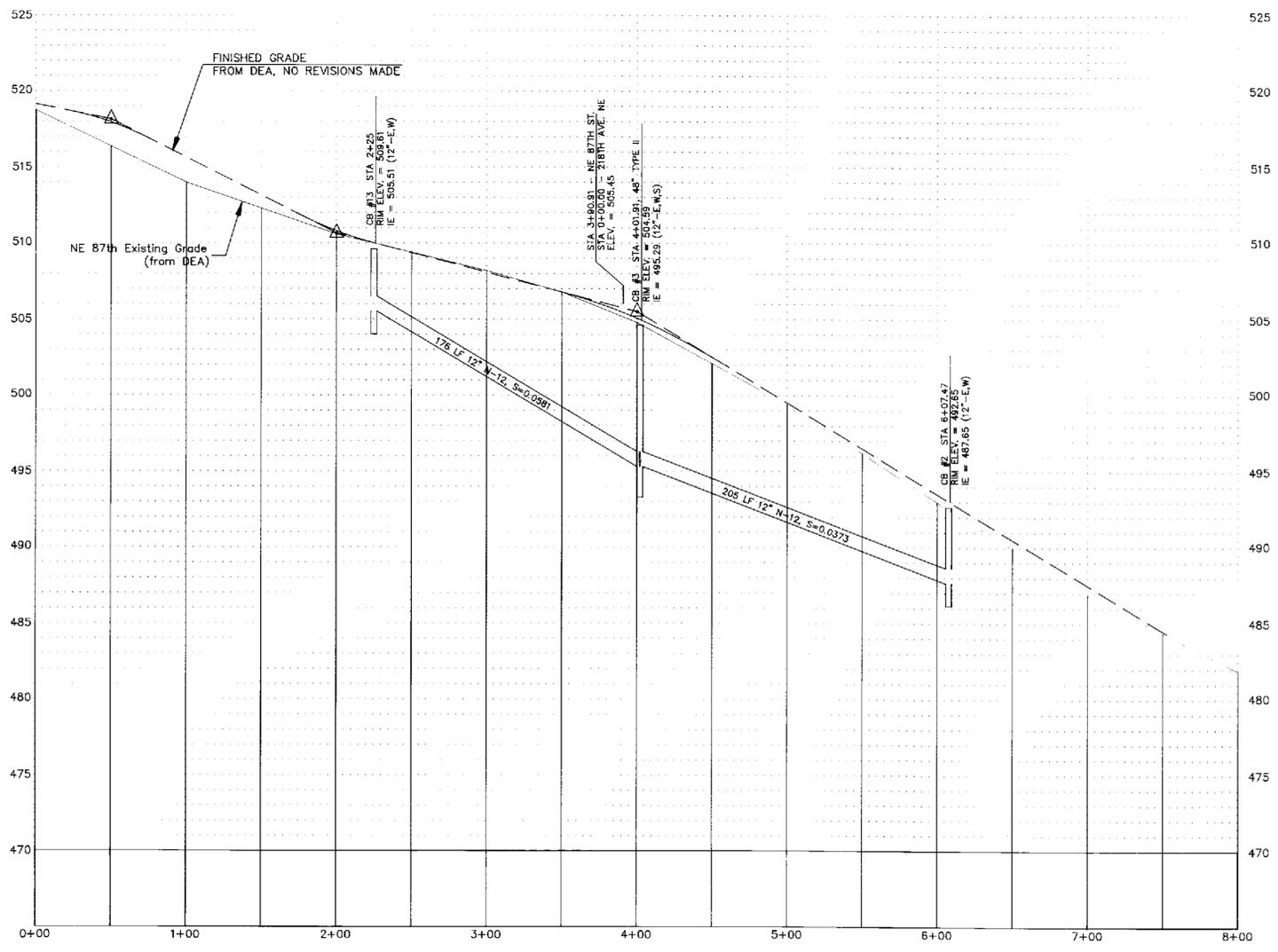
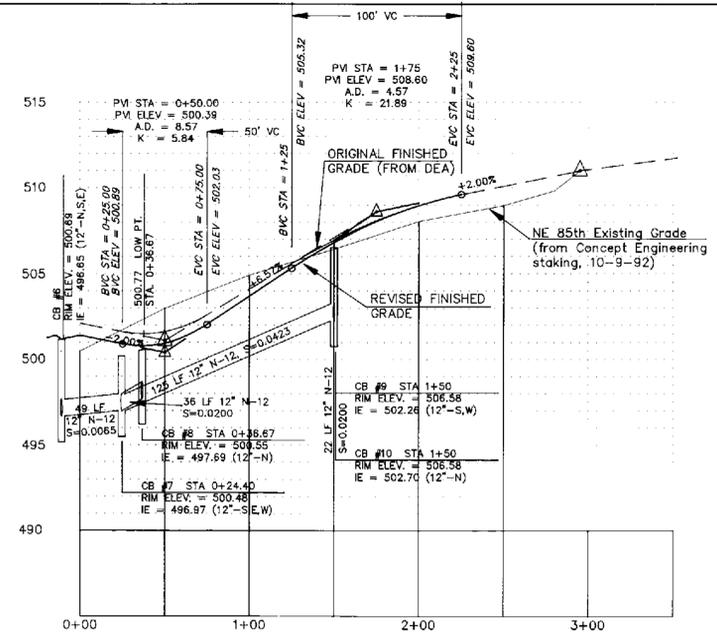
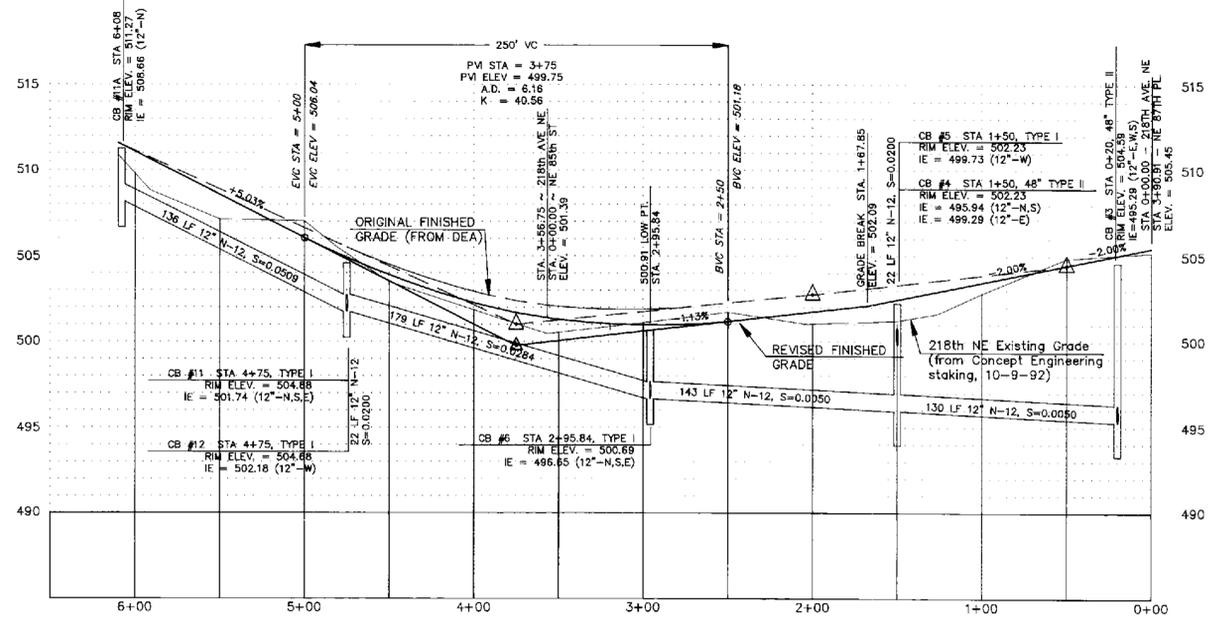
**HUNTERSWOOD III**  
**MORNING GROVE III**  
PACIFIC PROPERTIES, INC.  
BELLEVUE, WASHINGTON B.A.L.D. NO. 889-6

**SEVEN** SHEETS  
CLK  
DATE: APR 10, 1990  
FILE: ENV 037 - II

11-1-96 Final Corrected Plans, consent eng.  
REV. PER KING CO. COMMENTS 2-11-91  
REV. PER KING CO. COMMENTS 8-1-90  
REVISIONS

**3**  
SCALE: H: 1"=50' V: 1"=5'  
DATE: APR 10, 1990  
FILE: ENV 037 - II

DAVID EVANS and ASSOCIATES, INC.  
501 10TH AVE. S.E. BELLEVUE, WA 98004-2046 (206) 465-1571



CHANGE ORDER #1  
KING COUNTY DEPT. OF DEVELOPMENT  
AND ENVIRONMENTAL SERVICES  
Ken McDermott 3/11/93  
DATE  
James H. Sanders 3/11/93  
DATE  
DEVELOPMENT ENGINEER



1/23/97  
G.H. Kelley

FINAL CORRECTED PLANS



DATE	BY	REVISIONS
12-15-92	CC	REVISIONS PER 2-16-93 REDLINES
2-20-93	CC	REVISIONS PER 2-16-93 REDLINES
11-1-93	CC	FINAL CORRECTED PLANS

CONCEPT ENGINEERING, INC.  
455 Rainier Boulevard North, Suite 210  
Issaquah, Washington 98027  
2061 392-8055



ROAD AND STORM  
PROFILE REVISIONS  
HUNTERSWOOD III FOR  
MORNING GROVE DIV. III

SHEET  
3-S

**GENERAL NOTES**

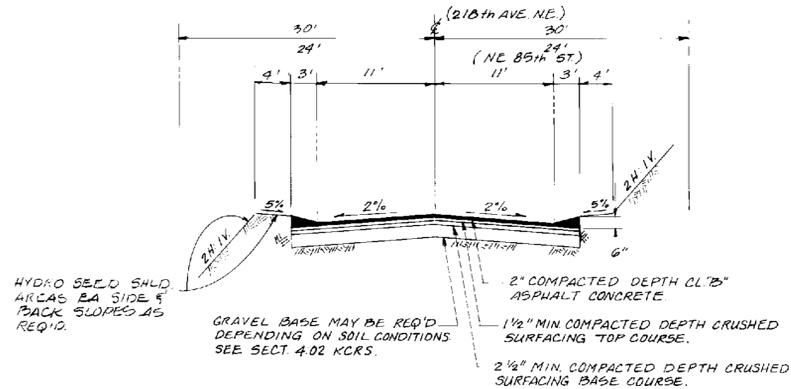
- (1) All construction shall be in accordance with the King County Code (KCC) Road Standards (KCRS), and the King County Council's conditions of preliminary subdivision approval. It shall be the sole responsibility of the applicant and the professional civil engineer to correct any error, omission, or variation from the above requirements found in these plans. All corrections shall be at no additional cost or liability to King County.
- (2) The design elements within these plans have been reviewed according to the King County BALD Division Engineering Review checklist. Some elements may have been overlooked or missed by the BALD Division plan reviewer. Any variance from adopted standards is not allowed unless specifically approved by King County, prior to construction.
- (3) Approval of this road, grading, and drainage plan does not constitute an approval of any other construction (e.g. domestic water conveyance, sewer conveyance, gas, electrical, etc.).
- (4) Before any construction or development activity a preconstruction meeting must be held between the BALD Division's Development Inspection Unit, the Applicant, and the Applicant's Construction Representative.
- (5) A copy of these approved plans must be on the job site whenever construction is in progress.
- (6) Construction noise shall be limited as per King County Code (Section 12.88); normally this is 7 a.m. to 10 p.m. weekdays and 9 a.m. to 10 p.m. on weekends.
- (7) It shall be the applicant's/contractor's responsibility to obtain all construction easements necessary before initiating off-site work within the road rights-of-way.
- (8) Franchised utilities or other installations that are not shown on these approved plans shall not be constructed unless an approved set of plans that meet all requirements of KCRS Chapter 8 are submitted to the BALD Division's Development Inspection Unit three days prior to construction.
- (9) Datum shall be KCAS unless otherwise approved by the BALD Division.
- (10) Groundwater system construction shall be within a right-of-way or appropriate drainage easement, but not underneath the roadway section. All groundwater systems must be constructed in accordance with Section B1 3.02 of the APWA Standard Specifications.
- (11) All utility trenches shall be backfilled and compacted to 95% density.
- (12) All roadway subgrade shall be backfilled and compacted to 95% density. WSDOT 2-06.3.
- (13) Open cutting of existing roadways is not allowed unless specifically approved by the BALD Division and noted on these approved plans. Any open cut shall be restored in accordance with KCRS 8.03 (B)3.
- (14) The Contractor shall be responsible for providing adequate safeguards, safety devices, protective equipment, flaggers, and any other needed actions to protect the life, health, and safety of the public, and to protect property in connection with the performance of work covered by the contractor. Any work within the traveled right-of-way that may interrupt normal traffic flow shall require at least one flagger for each lane of traffic affected. All sections of the WSDOT Standard Specifications 1-07.23 - Traffic Control, shall apply.

**DRAINAGE NOTES**

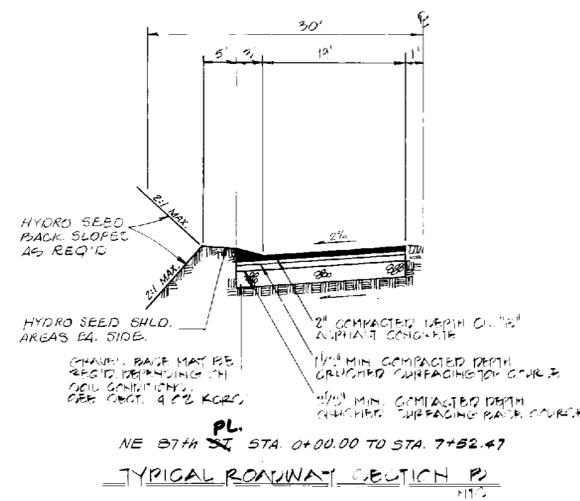
- (1) Proof of liability insurance shall be submitted to the BALD Division prior to the preconstruction meeting (KCC 9.04.100.D).
- (2) All pipe and appurtenances shall be laid on a properly prepared foundation in accordance with WSDOT 7-02.3(1). This shall include leveling and compacting the trench bottom, the top of the foundation material, and any required pipe bedding, to a uniform grade so that the entire pipe is supported by a uniformly dense unyielding base.
- (3) Steel pipe shall be galvanized and have asphalt treatment #1 or better inside and outside (KCRS 7.03).
- (4) All drainage structures, such as catch basins and manholes, not located within a traveled roadway or sidewalk, shall have solid locking lids. All drainage structures associated with a permanent retention/detention facility shall have solid locking lids (KCRS 7.03).
- (5) All catch basin grates shall conform to KCRS drawing numbers 41, 46, 47, or 48, which includes the stamping "OUTFALL TO STREAM, DUMP NO POLLUTANTS" and "Property of King County" (KCRS 7.07).
- (6) All driveway culverts located within King County right-of-way shall be of sufficient length to provide a minimum 3:1 slope from the edge of the driveway to the bottom of the ditch. Culverts shall have beveled end sections to match the side slope (KCRS 7.03(J)).
- (7) Rock for erosion protection of roadway ditches, where required, must be of sound quarry rock, placed to a depth of 1 foot and must meet the following specifications: 4"-8"/40%-70% passing; 2'-4" rock/30%-40% passing; and -2" rock/10%-20% passing. Installation shall be in accordance with KCRS drawing number 51.
- (8) Drainage outlets (stub-outs) shall be provided for each individual lot, except for those lots approved for infiltration by King County. Stub-outs shall conform to the following:
  - a) Each outlet shall be suitably located at the lowest elevation on the lot, so as to service all future roof downspouts and footing drains, driveways, yard drains, and any other surface or subsurface drains necessary to render the lots suitable for their intended use. Each outlet shall have free-flowing, positive drainage to an approved stormwater conveyance system or to an approved outfall location.
  - b) Outlets on each lot shall be located with a five-foot-high, 2" x 4" stake marked "storm" or "drain." The stake shall extend above surface level, be visible and be secured to the stub-out.
  - c) Pipe material shall conform to underdrain specifications described in KCRS 7.04 and, if non-metallic, the pipe shall contain wire or other acceptable detection.
  - d) Drainage easements are required for drainage system designed to convey flows through individual lots.
  - e) The applicant/contractor is responsible for coordinating the locations of all stub-out conveyance lines with respect to the utilities (e.g. power, gas, telephone, television).
  - f) All individual stub-outs shall be privately owned and maintained by the lot home owner.

**STRUCTURAL NOTES**

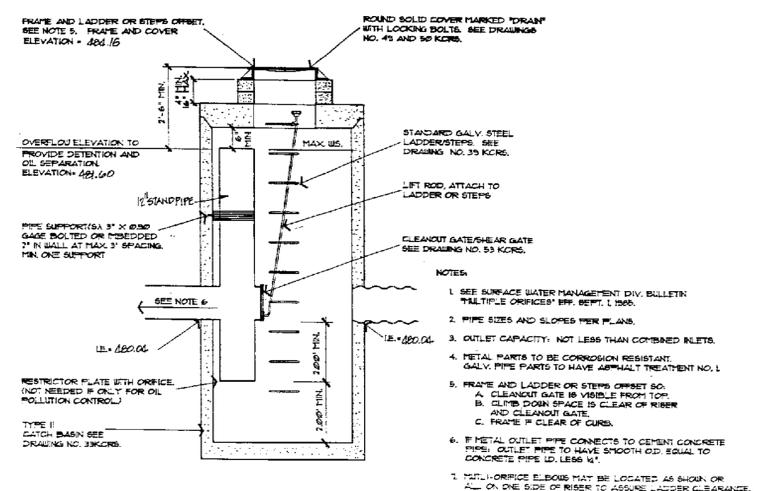
- (1) These plans are approved for standard road and drainage improvements only. Plans for structures such as bridges, vaults, and retaining walls require a separate review and approval by the BALD Division prior to construction (KCC 16.04, 16.70, 14.20).
- (2) Rockeries are considered to be a method of bank stabilization and erosion control. Rockeries shall not be constructed to serve as retaining walls. All rockeries shall be constructed in accordance with KCRS drawing numbers 19, 20, and 21.



INTERIOR PLAT ROADS ONLY  
**TYPICAL RDWY SECTION A**  
N.T.S.



NE 87th ST STA. 0+00.00 TO STA. 7+52.47  
**TYPICAL ROADWAY SECTION B**  
N.T.S.



**C.B. #1 OIL/WATER SEPARATOR**  
NO SCALE

**KING COUNTY**  
BUILDING AND LAND DEVELOPMENT DIVISION  
APPROVAL DATE: 7/22/92  
SIGNATURE: [Signature]

**CONSULTANT REVIEW**  
To the best of my knowledge, this plan has been reviewed for compliance with King County Codes and Ordinances.  
Name: Kenneth A. McLean, PE  
Date: 8/12/92 Phone: 022-4446  
Firm: OZAK, INC.



**FINAL CORRECTED PLANS** P1855E

**HUNTERS WOOD III**  
**MORNING GROVE III**  
**PACIFIC PROPERTIES, INC.**  
WASHINGTON  
BELLEVUE, WASHINGTON  
B.A.L.D. NO. 889-6

**DAVID EVANS and ASSOCIATES, INC.**  
301 NORTHVALE, BELLEVUE, WA 98004 206/485-3871

**1/1-96 FINAL CORRECTED PLANS, COMPLETE**  
REV. 5-11-92 THE RDWY SECTION  
SEE FILE #118-02-001-001-92-114  
REV. PER EUBS CO. COMMENTS/9 8/11/90  
REV. PER EUBS CO. COMMENTS/9 8/11/90

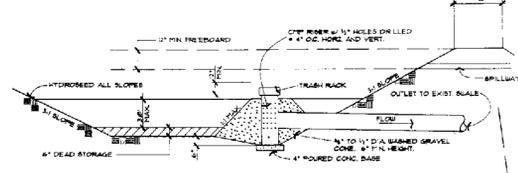
4 of SEVEN SHEETS  
SCALE AS NOTED DRAWN BY N/A/H  
DATE APR 10, 1990 CHECKED BY JUB  
DATE ENW 03-9-IV CHECKED BY N/A/H

1/23/97  
[Signature]

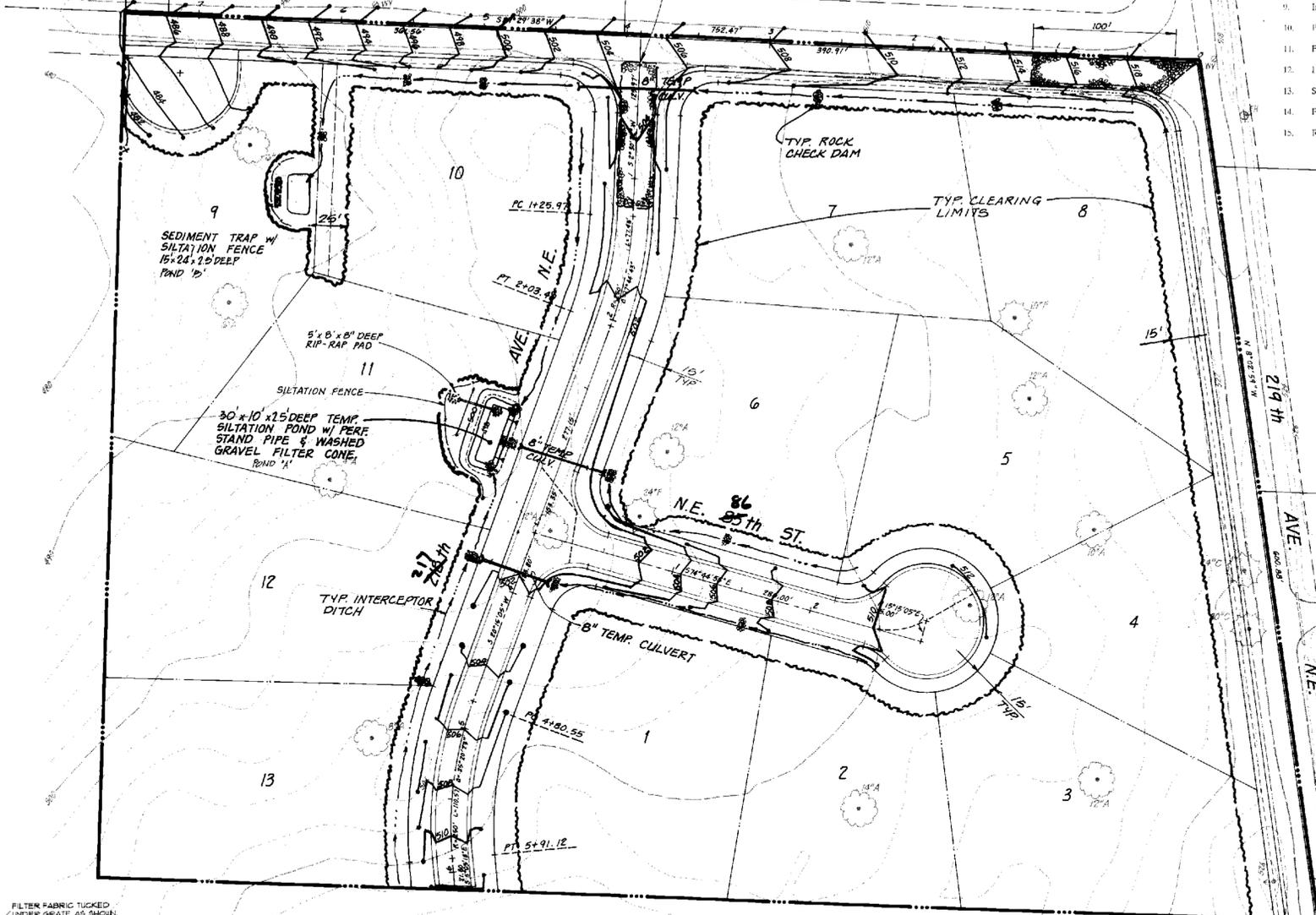
P-1855E



ROCK LINED CONSTRUCTION ENTRANCE 25' x 100' x 8" D



TEMPORARY SEDIMENT POND  
N.E. 87th ST. P.

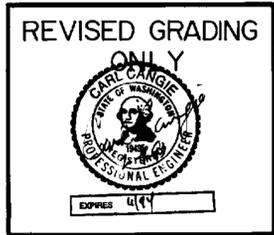


CONSTRUCTION SEQUENCE

1. Attend pre-construction meeting
2. Flag clearing limits and NGPES.
3. Install filter fence
4. Provide CB protection on all existing CB grates in immediate area.
5. Install rock construction entrance.
6. Clear for an install temporary sediment pond and appurtenances.
7. Install interceptor ditches/check dams
8. Clear entire site (grabbing, rough grading).
9. Install utilities (power, storm, sanitary, etc.)
10. Provide CB protection.
11. Final grade/pave, maintain minimal CB protection.
12. Hydroseed and mulch all exposed areas.
13. Sweep and clean all paved areas.
14. Flush storm drainage system (i.e., clean out and test system).
15. Remove all TESC facilities only when entire site is stabilized.

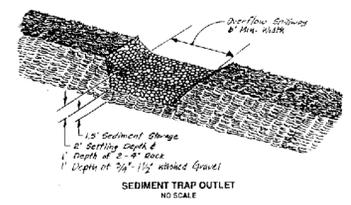
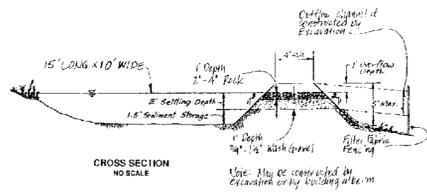
EROSION/SEDIMENTATION CONTROL NOTES

- (1) Approval of this erosion/sedimentation control (ESC) plan does not constitute an approval of permanent road or drainage design (e.g. size and location of roads, pipes, restrictions, channels, retention facilities, utilities, etc.)
- (2) The implementation of these ESC plans and the construction, maintenance, replacement, and upgrading of these ESC facilities is the responsibility of the applicant/contractor until all construction is approved.
- (3) The boundaries of the clearing limits shown on this plan shall be clearly flagged in the field prior to construction. During the construction period, no disturbance beyond the flagged clearing limits shall be permitted. The flagging shall be maintained by the applicant/contractor for the duration of construction.
- (4) The ESC facilities shown on this plan must be constructed in conjunction with all clearing and grading activities, and in such a manner as to ensure that sediment laden water does not enter the drainage system or violate applicable water standards. (KCC 9.04.020 AA, KCRS 7.09 D)
- (5) The ESC facilities shown on this plan are the minimum requirements for anticipated site conditions. During the construction period, these ESC facilities shall be upgraded (e.g. additional sumps, relocation of ditches and all fences, etc.) as needed for unexpected storm events (KCC 9.04.020 B2).
- (6) The ESC facilities shall be inspected daily by the applicant/contractor and maintained as necessary to ensure their continued functioning (KCC 9.04.090 B2).
- (7) Any area stripped of vegetation, including roadway embankments, where no further work is anticipated for a period of 15 days, shall be immediately stabilized with the approved ESC methods (e.g. seeding, mulching, netting, erosion blankets, etc.) (KCRS 7.09D).
- (8) Any area needing ESC measures, not requiring immediate attention, shall be addressed within fifteen (15) days.
- (9) The ESC facilities on inactive sites shall be inspected and maintained a minimum of once a month or within the 48 hours following a storm event.
- (10) At no time shall more than one foot of sediment be allowed to accumulate within a catch basin. All catch basins and conveyance lines shall be cleaned prior to paving. The cleaning operation shall not wash sediment laden water into the downstream system.
- (11) Stabilized construction entrances and wash pads shall be installed at the beginning of construction and maintained for the duration of the project. Additional measures may be required to ensure that all paved areas are kept clean for the duration of the project. (RCW 46.61.655).
- (12) During the time period of November 1 through March 31, all project disturbed areas greater than 5,000 square feet that are to be left unworked for more than 12 hours shall be covered by one of the following cover measures: mulch, sodding or plastic covering.
- (13) Any permanent retention/detention facility used as a temporary settling basin shall be modified with the necessary erosion control measures and shall provide adequate storage capacity. If the permanent facility is to function ultimately as an infiltration or dispersion system, the facility shall not be used as a temporary settling basin. No underground detention tanks or vaults shall be used as a temporary settling basin.
- (14) Where seeding for temporary erosion control is required, fast germinating grasses shall be applied at an appropriate rate (e.g. annual or perennial rye applied at approximately 80 pounds per acre).
- (15) Where straw mulch for temporary erosion control is required, it shall be applied at a minimum thickness of two inches.

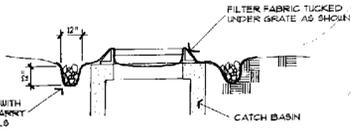


APPROVED CHANGE ORDER #1 BY KING 3/14/93  
**KING COUNTY**  
 BUILDING AND LAND DEVELOPMENT DIVISION  
 FILE NO. \_\_\_\_\_  
 APPROVAL DATE: 1/14/93  
 SIGNATURE: [Signature]  
 Screened by C. Conant 8/19/92

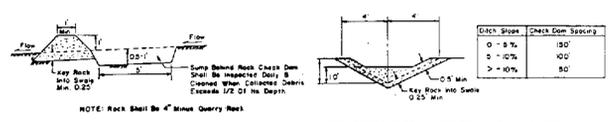
**CONSULTANT REVIEW**  
 To the best of my knowledge, this plan has been reviewed for compliance with King County Codes and Ordinances.  
 Name: Kenneth A. P. [Signature]  
 Date: 8/2/92 Phone: 822-4446  
 Firm: QAK, INC.



SEDIMENT TRAP DETAIL  
N.T.S.



CATCH BASIN PROTECTION  
NO SCALE

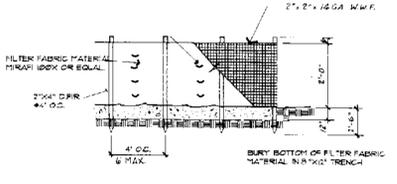


ROCK CHECK DAM X-SECTION (FRONT VIEW)

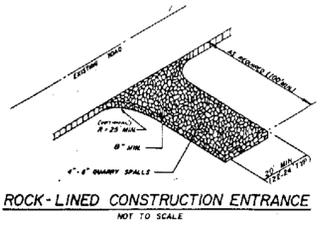


INTERCEPTOR DITCH X-SECTION @ ROCK CHECK DAM  
NO SCALE

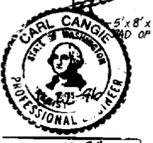
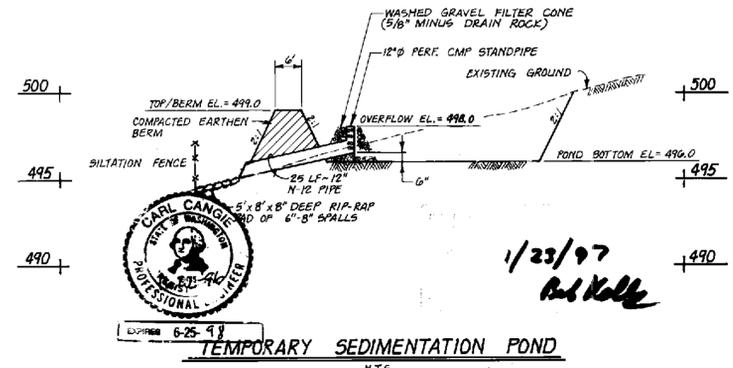
TYPICAL INTERCEPTOR DITCH WITH ROCK CHECK DAM  
NO SCALE



SILTATION FENCE DETAIL  
NO SCALE



ROCK-LINED CONSTRUCTION ENTRANCE  
NOT TO SCALE



TEMPORARY SEDIMENTATION POND  
N.T.S.

FINAL CORRECTED PLANS

P1855

T.E.S.C.P. & GRADING PLAN  
 HUNTERSWOOD III MORNING GROVE III  
 PACIFIC PROPERTIES, INC.  
 BELLEVUE, WASHINGTON  
 B.A.L.D. NO. 887-G



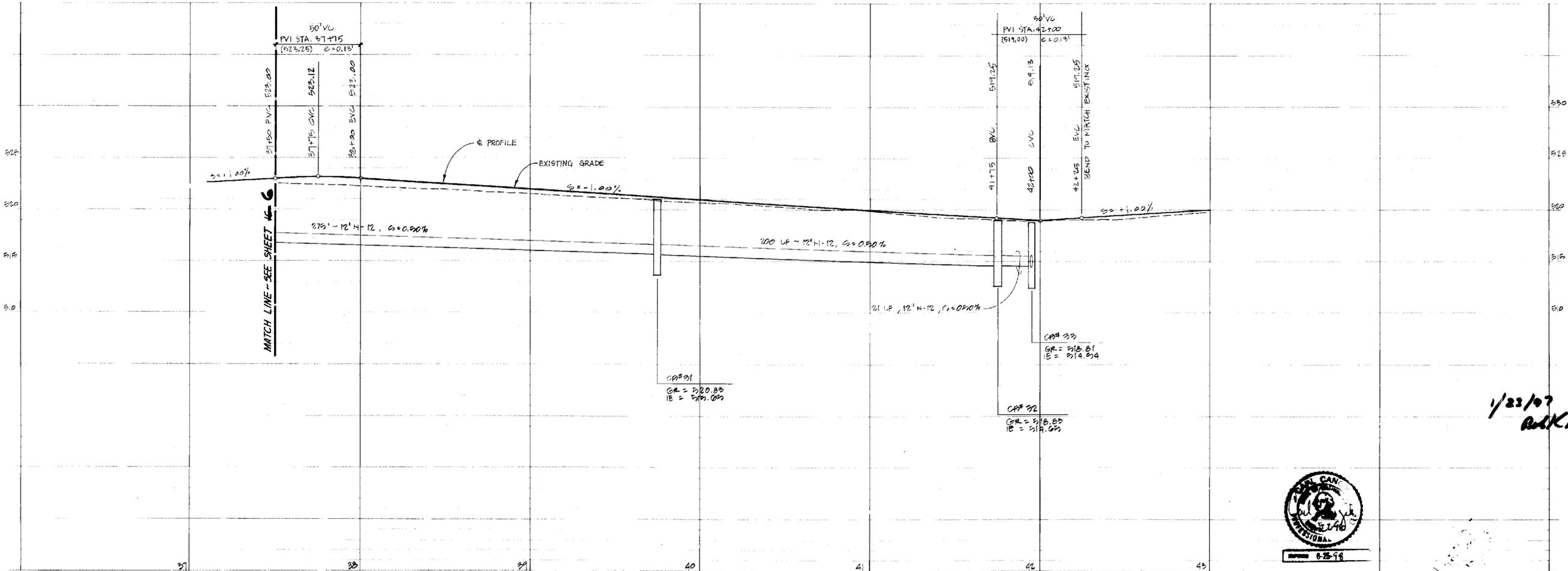
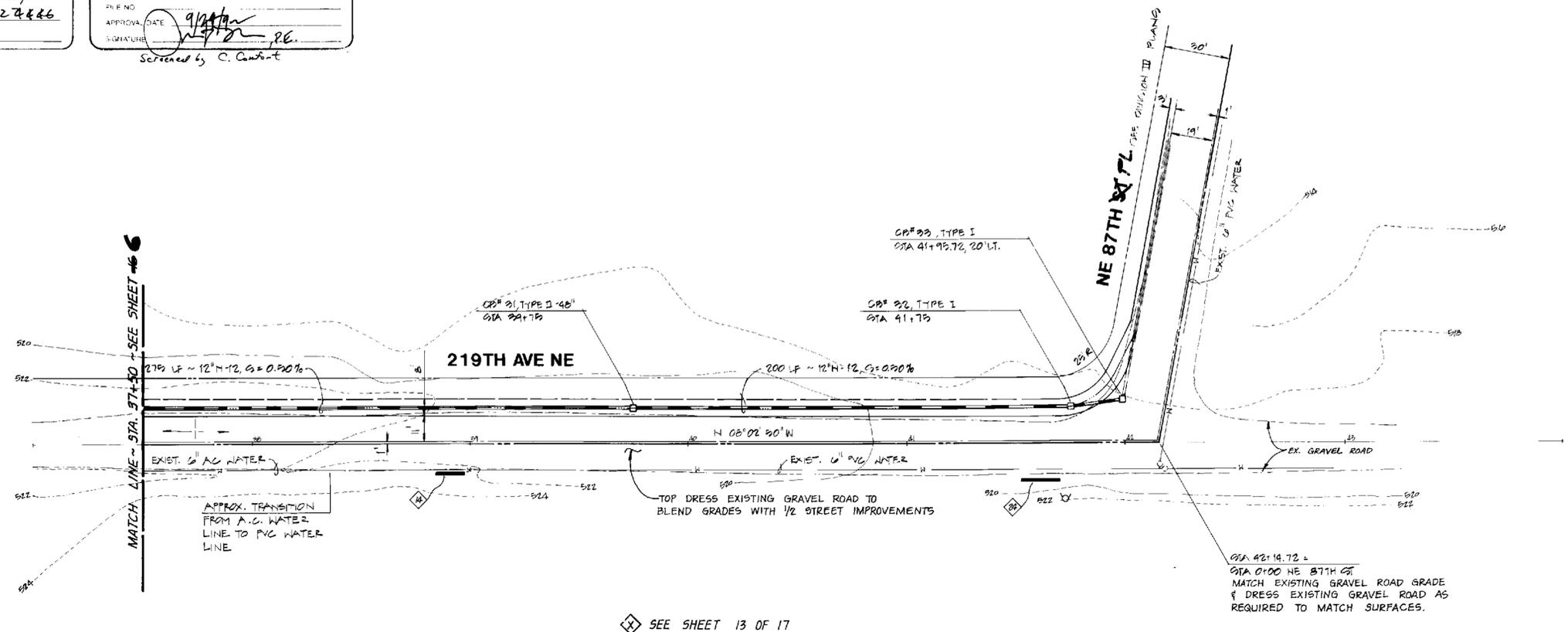
**DAEA**  
 DAVID EVANS AND ASSOCIATES, INC.  
 501 NORTHFAIR BLVD., SUITE 200, BELLEVUE, WA 98005

Revised Grading 2-7-93 - Concept 5/1/93  
 11-1-96 FINAL CORRECTED PLANS  
 SEE PER KING CO COMMENTS 3-11-91  
 REV. PER KING CO COMMENTS 8-1-90  
 OF SEVEN SHEETS  
 SHEET NO. 5  
 SCALE: 1" = 50'  
 DATE: 1/23/97  
 FILE: ENW 039-II



**CONSULTANT REVIEW**  
 To the best of my knowledge, this plan has been reviewed for compliance with King County Codes and Ordinances.  
 Name Kenneth A. McLean, PE  
 Date 8/12/92 Phone 822-4446  
 Firm OTAK, INC.

**KING COUNTY**  
 BUILDING AND LAND DEVELOPMENT DIVISION  
 FILE NO. \_\_\_\_\_  
 APPROVAL DATE 9/1/92  
 SIGNATURE [Signature]  
 Screened by C. Cant



**FINAL CORRECTED PLANS** P-1855 H

HUNTERSWOOD TRAIL  
**MORNING GROVE III**  
 PACIFIC PROPERTIES, INC.  
 BELLEVUE, WASHINGTON  
 219th AVE. N.E.  
 STREET  
 IMPROVEMENTS  
 B.A.L.D. NO. 889-6



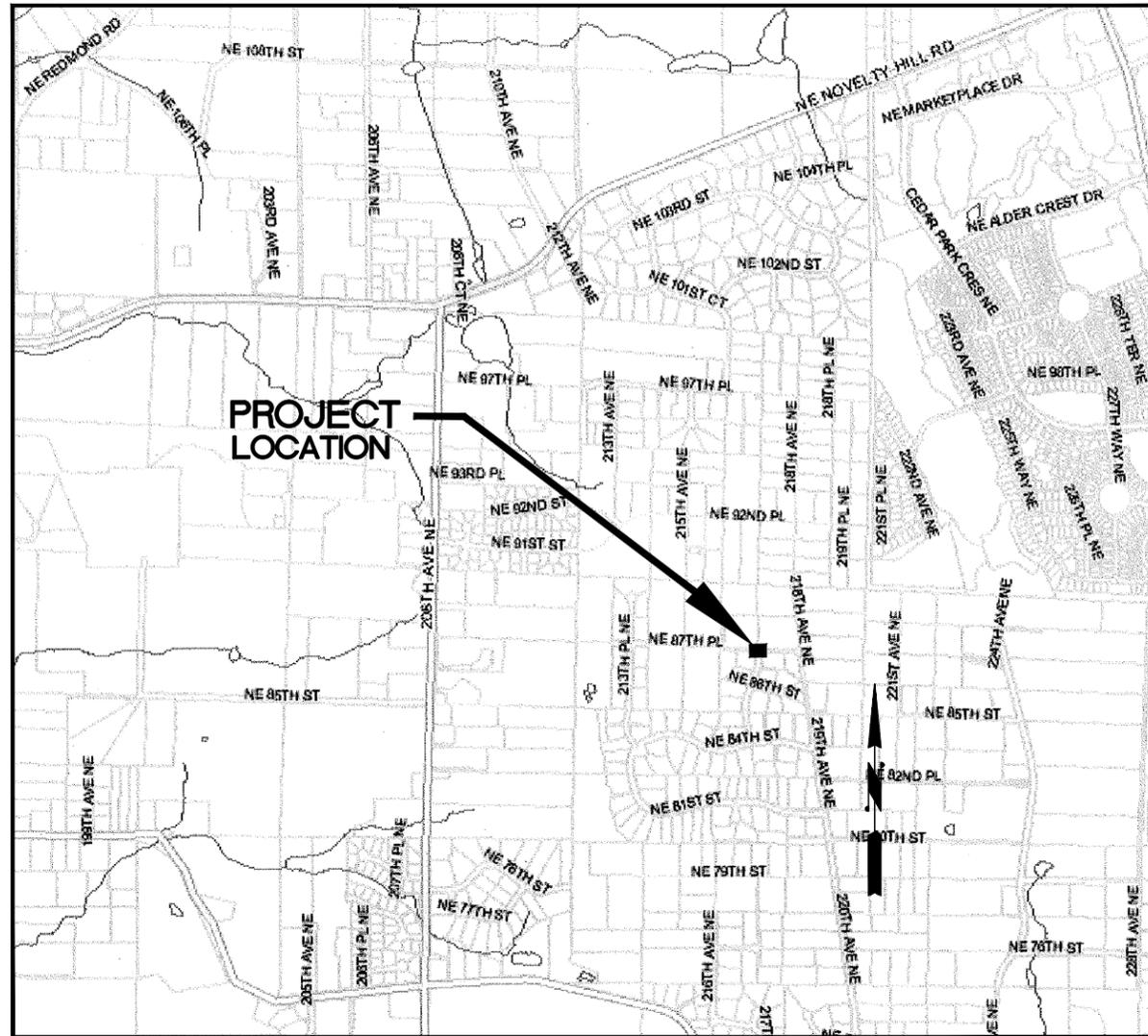
**deen**  
 DAVID EVANS AND ASSOCIATES, INC.  
 301 10TH AVENUE, BELLEVUE, WASH. 98005-3511

11/16 FINAL CORRECTED PLANS, CONCEPT ENG.  
 REV. 9-11-91 PER KING CO COMMENTS  
 KEY 7-11-90 VERTICAL CURVES  
 REV. 8-1-90 NE 87th SECTION 25' x 110'  
 REVISIONS

7 OF SEVEN SHEETS  
 DATE APRIL 10, 1990  
 BY EMM 089 / L  
 CHECKED NIKW  
 P-1855 H

Evans Creek Tributary 108  
Preliminary Technical Information Report  
Appendix C  
Preliminary Plans

VICINITY MAP



INDEX

SHEET	DESCRIPTION
1	VICINITY MAP AND SHEET INDEX
2	PLAN AND PROFILE
3	SECTIONS AND DETAILS



EVANS CREEK DETENTION VAULT  
AT NE 87TH PL

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

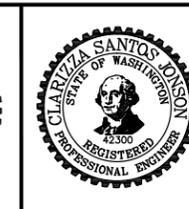
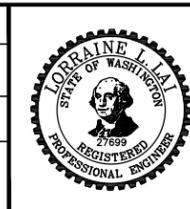
(UNDERGROUND UTILITY LOCATIONS ARE APPROX.)

FIELD BOOK:	2014-?	10-2014
SURVEYED:	BP/TZH	10-2014
SURVEY BASE MAP:	TZH	10-2014
CHECKED:	BP	10-2014

NUM.	REVISION	BY	DATE
<b>PRELIMINARY DESIGN</b> <b>PROGRESS COPY</b> <b>12/2014</b>			
NUM.	RECORD CHANGES APPROVED	BY	DATE

APPROVED: CLAIRE JONSON, P.E.	12/2014
PROJECT MANAGER: CLAIRE JONSON, P.E.	12/2014
DESIGNED: DALE NELSON	12/2014
SCOTT MILLER	12/2014
CAD DESIGN: LICA DULAN	12/2014

FUNDING SOURCE No.	
PROJECT No.	1121161
CONTRACT No.	

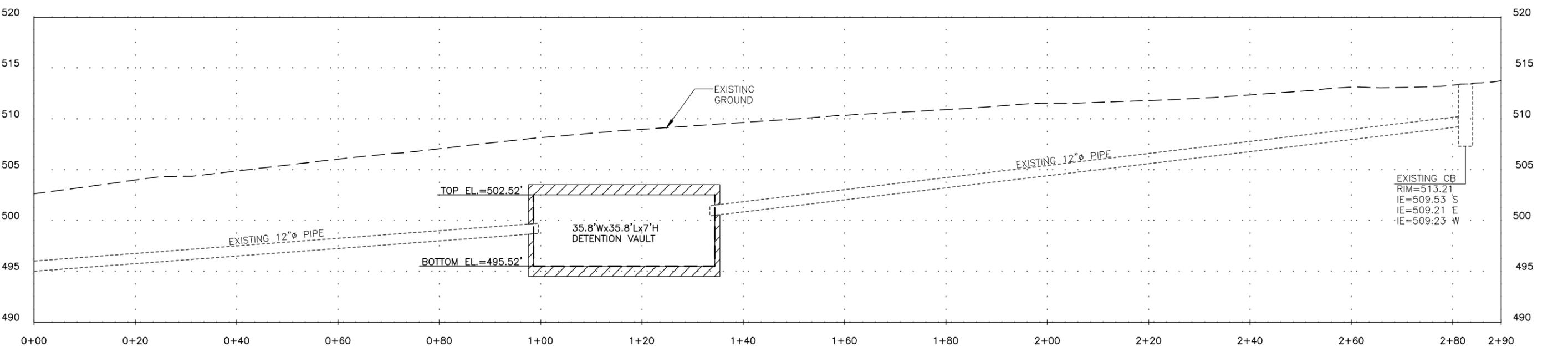
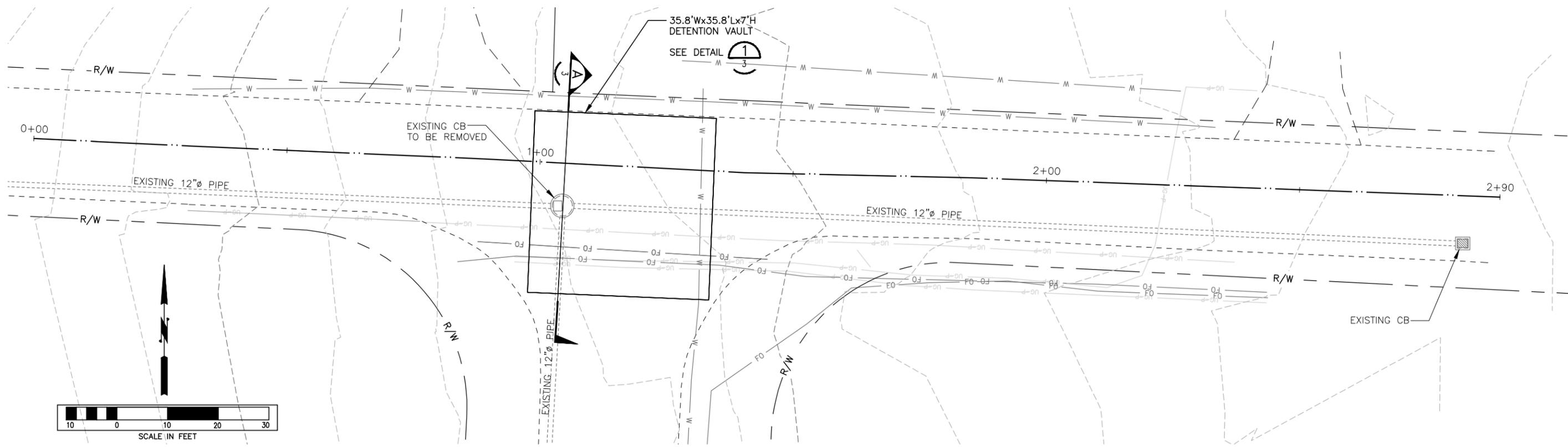


**King County**  
Department of Natural Resources and Parks  
Water and Land Resources Division  
Stormwater Services Section  
Capital Services Unit  
Christie True, Director

**EVANS CREEK DETENTION VAULT  
AT NE 87TH PL**

VICINITY MAP AND SHEET INDEX

SHEET	1
OF	3
SHEETS	
	2014-17



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

(UNDERGROUND UTILITY LOCATIONS ARE APPROX.)

FIELD BOOK:	2014-?	10-2014
SURVEYED:	BP/TZH	10-2014
SURVEY BASE MAP:	TZH	10-2014
CHECKED:	BP	10-2014

NUM.	REVISION	BY	DATE
<b>PRELIMINARY DESIGN PROGRESS COPY 12/2014</b>			
NUM.	RECORD CHANGES APPROVED	BY	DATE

APPROVED:	CLAIRE JONSON, P.E.	12/2014
PROJECT MANAGER:	CLAIRE JONSON, P.E.	12/2014
DESIGNED:	DALE NELSON	12/2014
	SCOTT MILLER	12/2014
CAD DESIGN:	LICA DULAN	12/2014

FUNDING SOURCE No.	
PROJECT No.	1121161
CONTRACT No.	



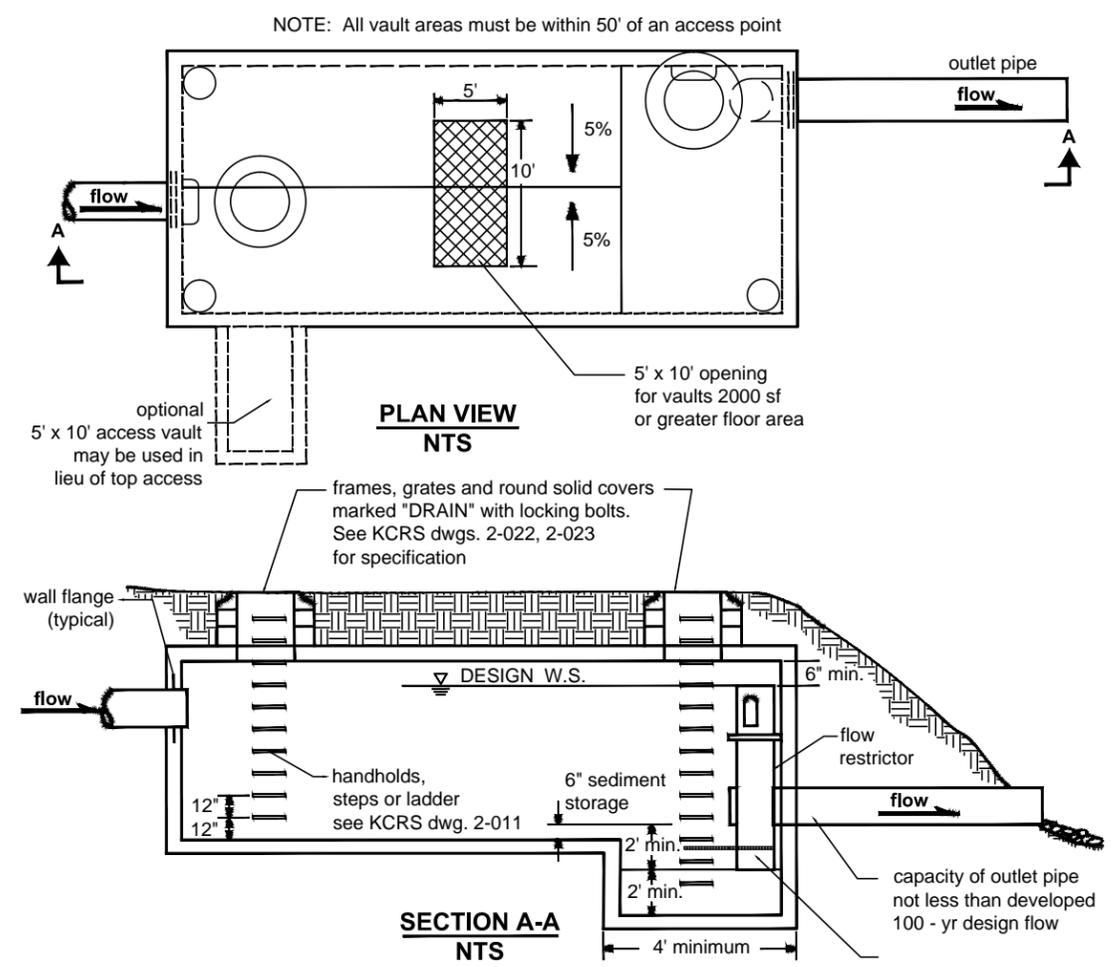
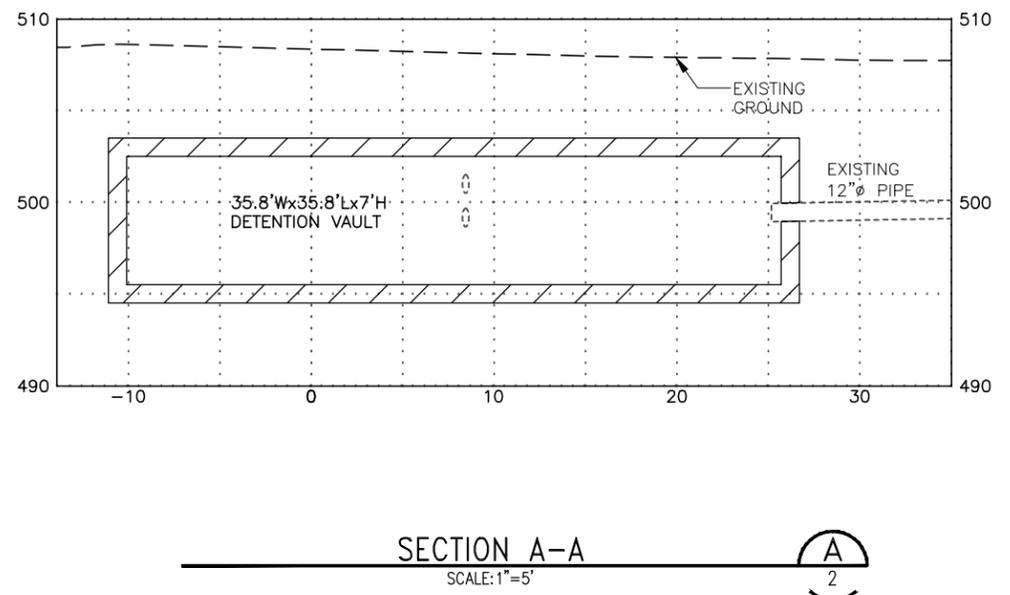
**King County**  
Department of Natural Resources and Parks  
Water and Land Resources Division  
Stormwater Services Section  
Capital Services Unit  
Christie True, Director

**EVANS CREEK DETENTION VAULT  
AT NE 87TH PL**

**PLAN AND PROFILE**

SHEET  
**2**  
OF  
**3**  
SHEETS

**2014-17**



- NOTES:**
1. All metal parts must be corrosion resistant. Steel parts must be galvanized and asphalt coated (Treatment 1 or better). Precast vaults shall have approved rubber gasket system.
  2. Provide water stop at all cast-in-place construction joints.
  3. Vaults <10' wide must use removable lids.
  4. Prefabricated vault sections may require structural modifications to support 5' x 10' opening over main vault. Alternatively, access can be provided via a side vestibule as shown.

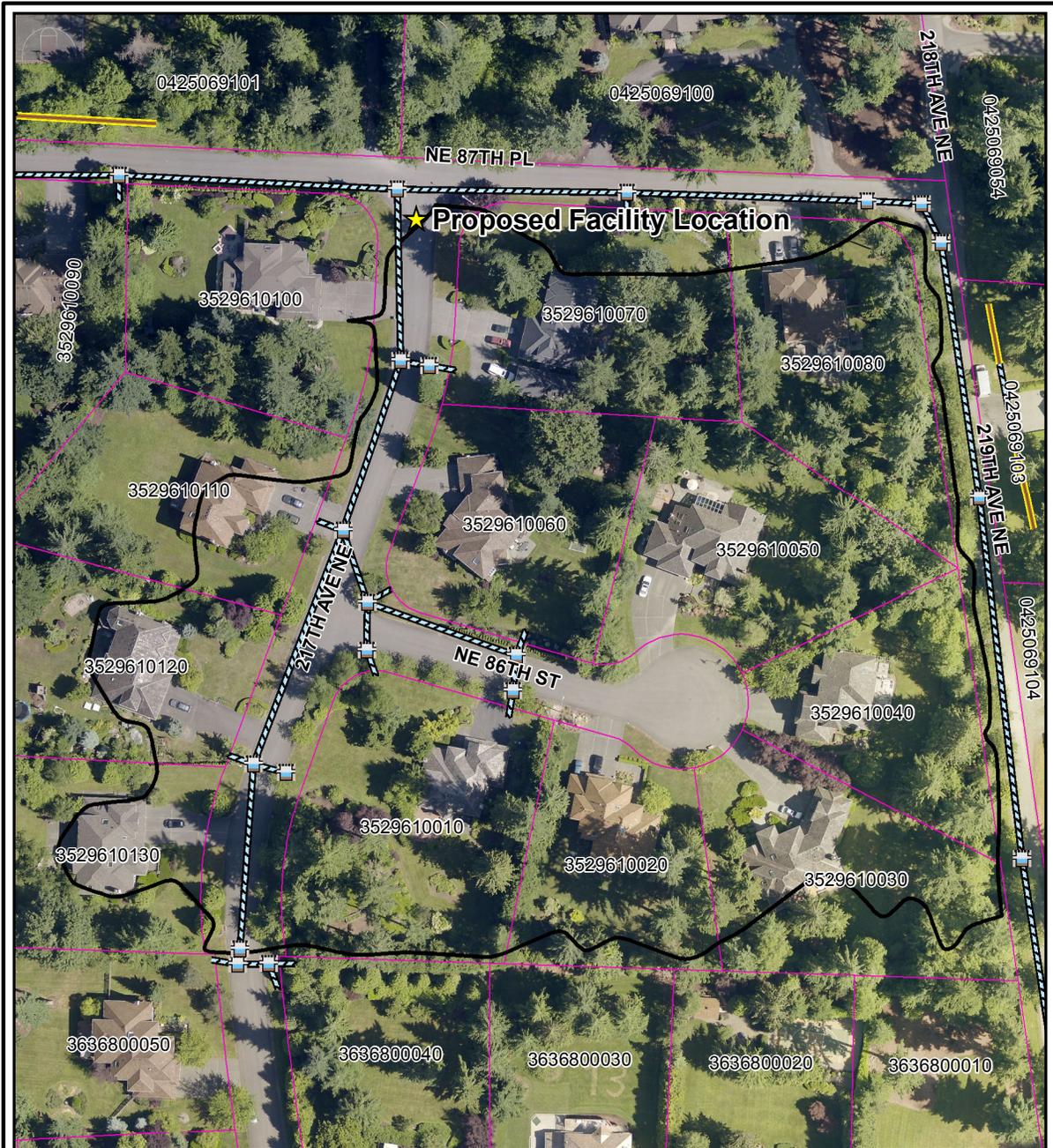
DETENTION VAULT DETAIL  
NTS

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

(UNDERGROUND UTILITY LOCATIONS ARE APPROX.)

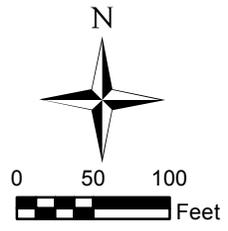
FIELD BOOK: 2014-?	10-2014	<b>PRELIMINARY DESIGN PROGRESS COPY 12/2014</b>	APPROVED: CLAIRE JONSON, P.E.	12/2014	FUNDING SOURCE No.			<b>EVANS CREEK DETENTION VAULT AT NE 87TH PL</b>  <b>SECTIONS AND DETAILS</b>	SHEET <b>3</b> OF <b>3</b> SHEETS <b>2014-17</b>
SURVEYED: BP/TZH	10-2014		PROJECT MANAGER: CLAIRE JONSON, P.E.	12/2014	PROJECT No. 1121161				
SURVEY BASE MAP: TZH	10-2014		DESIGNED: DALE NELSON	12/2014	CONTRACT No.				
CHECKED: BP	10-2014		SCOTT MILLER	12/2014					
			NUM. REVISION	BY DATE					
		NUM. RECORD CHANGES APPROVED	BY DATE						

# Appendix D



## Evans 108 E6 Subbasin

-  Existing Catch Basin
-  Existing Pipe
-  Ditch
-  Subbasin



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October 17, 2014  
 scott.miller@kingcounty.gov \dnrp.kingcounty.lclw\ksc\CIP\Share\SWS CAPITAL PROJECTS\Small Stream Basin Retrofit Siting 1117558\Evans Creek Retrofit Siting 1121161\TIR Predesign Reports\E108\_E6\_ParcelView.pdf

 **King County**  
 Department of Natural Resources and Parks  
 Water and Land Resources Division

## APPENDIX E

### WWHM2012 PROJECT REPORT

---

**Project Name:** Evans 56 V\_I  
**Site Name:** Evans 56 V\_I  
**Site Address:**  
**City** :  
**Report Date:** 10/14/2014  
**Gage** : Seatac  
**Data Start** : 1948/10/01  
**Data End** : 2009/09/30  
**Precip Scale:** 1.00  
**Version** : 2014/08/08

---

**Low Flow Threshold for POC 1** : 50 Percent of the 2 Year

---

**High Flow Threshold for POC 1:** 50 year

---

#### PREDEVELOPED LAND USE

**Name** : Basin 1  
**Bypass:** No

**GroundWater:** No

<u>Pervious Land Use</u>	<u>Acres</u>
A B, Forest, Flat	6.54765

Pervious Total	6.54765
----------------	---------

<u>Impervious Land Use</u>	<u>Acres</u>
Impervious Total	0

Basin Total	6.54765
-------------	---------

---

**Element Flows To:**  
**Surface**                      **Interflow**                      **Groundwater**

---

#### MITIGATED LAND USE

**Name** : Time Series 1  
**Time Series number 402 is connected to:**

Element Flows To:  
 Outlet 1                      Outlet 2  
 Vault 1

---

Name : Vault 1  
 Width : 35.787428936317 ft.  
 Length : 35.787428936317 ft.  
 Depth: 5 ft.  
 Infiltration On  
 Infiltration rate: 0.8  
 Infiltration safety factor: 1  
 Total Volume Infiltrated (ac-ft): 61.737  
 Total Volume Through Riser (ac-ft): 1.237  
 Total Volume Through Facility (ac-ft): 62.973  
 Percent Infiltrated: 98.04  
 Total Precip Applied to Facility: 0  
 Total Evap From Facility: 0  
Discharge Structure  
 Riser Height: 4 ft.  
 Riser Diameter: 18 in.  
 Notch Type: Rectangular  
 Notch Width: 0.015 ft.  
 Notch Height: 0.161 ft.  
 Orifice 1 Diameter: 0.2315627 in. Elevation: 0 ft.

Element Flows To:  
 Outlet 1                      Outlet 2

---

**Vault Hydraulic Table**

Stage(ft)	Area(ac)	Volume (ac-ft)	Discharge(cfs)	Infilt(cfs)
0.0000	0.029	0.000	0.000	0.000
0.0556	0.029	0.001	0.000	0.023
0.1111	0.029	0.003	0.000	0.023
0.1667	0.029	0.004	0.000	0.023
0.2222	0.029	0.006	0.000	0.023
0.2778	0.029	0.008	0.000	0.023
0.3333	0.029	0.009	0.000	0.023
0.3889	0.029	0.011	0.000	0.023
0.4444	0.029	0.013	0.000	0.023
0.5000	0.029	0.014	0.001	0.023
0.5556	0.029	0.016	0.001	0.023
0.6111	0.029	0.018	0.001	0.023
0.6667	0.029	0.019	0.001	0.023
0.7222	0.029	0.021	0.001	0.023
0.7778	0.029	0.022	0.001	0.023
0.8333	0.029	0.024	0.001	0.023
0.8889	0.029	0.026	0.001	0.023
0.9444	0.029	0.027	0.001	0.023
1.0000	0.029	0.029	0.001	0.023
1.0556	0.029	0.031	0.001	0.023
1.1111	0.029	0.032	0.001	0.023

1.1667	0.029	0.034	0.001	0.023
1.2222	0.029	0.035	0.001	0.023
1.2778	0.029	0.037	0.001	0.023
1.3333	0.029	0.039	0.001	0.023
1.3889	0.029	0.040	0.001	0.023
1.4444	0.029	0.042	0.001	0.023
1.5000	0.029	0.044	0.001	0.023
1.5556	0.029	0.045	0.001	0.023
1.6111	0.029	0.047	0.001	0.023
1.6667	0.029	0.049	0.001	0.023
1.7222	0.029	0.050	0.001	0.023
1.7778	0.029	0.052	0.001	0.023
1.8333	0.029	0.053	0.001	0.023
1.8889	0.029	0.055	0.001	0.023
1.9444	0.029	0.057	0.002	0.023
2.0000	0.029	0.058	0.002	0.023
2.0556	0.029	0.060	0.002	0.023
2.1111	0.029	0.062	0.002	0.023
2.1667	0.029	0.063	0.002	0.023
2.2222	0.029	0.065	0.002	0.023
2.2778	0.029	0.067	0.002	0.023
2.3333	0.029	0.068	0.002	0.023
2.3889	0.029	0.070	0.002	0.023
2.4444	0.029	0.071	0.002	0.023
2.5000	0.029	0.073	0.002	0.023
2.5556	0.029	0.075	0.002	0.023
2.6111	0.029	0.076	0.002	0.023
2.6667	0.029	0.078	0.002	0.023
2.7222	0.029	0.080	0.002	0.023
2.7778	0.029	0.081	0.002	0.023
2.8333	0.029	0.083	0.002	0.023
2.8889	0.029	0.084	0.002	0.023
2.9444	0.029	0.086	0.002	0.023
3.0000	0.029	0.088	0.002	0.023
3.0556	0.029	0.089	0.002	0.023
3.1111	0.029	0.091	0.002	0.023
3.1667	0.029	0.093	0.002	0.023
3.2222	0.029	0.094	0.002	0.023
3.2778	0.029	0.096	0.002	0.023
3.3333	0.029	0.098	0.002	0.023
3.3889	0.029	0.099	0.002	0.023
3.4444	0.029	0.101	0.002	0.023
3.5000	0.029	0.102	0.002	0.023
3.5556	0.029	0.104	0.002	0.023
3.6111	0.029	0.106	0.002	0.023
3.6667	0.029	0.107	0.002	0.023
3.7222	0.029	0.109	0.002	0.023
3.7778	0.029	0.111	0.002	0.023
3.8333	0.029	0.112	0.002	0.023
3.8889	0.029	0.114	0.003	0.023
3.9444	0.029	0.116	0.004	0.023
4.0000	0.029	0.117	0.005	0.023
4.0556	0.029	0.119	0.197	0.023
4.1111	0.029	0.120	0.547	0.023
4.1667	0.029	0.122	1.000	0.023
4.2222	0.029	0.124	1.536	0.023
4.2778	0.029	0.125	2.144	0.023

4.3333	0.029	0.127	2.817	0.023
4.3889	0.029	0.129	3.548	0.023
4.4444	0.029	0.130	4.334	0.023
4.5000	0.029	0.132	5.171	0.023
4.5556	0.029	0.133	6.055	0.023
4.6111	0.029	0.135	6.985	0.023
4.6667	0.029	0.137	7.958	0.023
4.7222	0.029	0.138	8.972	0.023
4.7778	0.029	0.140	10.02	0.023
4.8333	0.029	0.142	11.11	0.023
4.8889	0.029	0.143	12.24	0.023
4.9444	0.029	0.145	13.41	0.023
5.0000	0.029	0.147	14.61	0.023
5.0556	0.029	0.148	15.84	0.023
5.1111	0.000	0.000	17.11	0.000

---



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**ANALYSIS RESULTS**

**Stream Protection Duration**

---

Predeveloped Landuse Totals for POC #1  
Total Pervious Area:6.54765  
Total Impervious Area:0

---

Mitigated Landuse Totals for POC #1  
Total Pervious Area:0  
Total Impervious Area:0

---

Flow Frequency Return Periods for Predeveloped. POC #1

<u>Return Period</u>	<u>Flow(cfs)</u>
2 year	0.005555
5 year	0.008425
10 year	0.010764
25 year	0.014281
50 year	0.01735
100 year	0.020841

---

Flow Frequency Return Periods for Mitigated. POC #1

<u>Return Period</u>	<u>Flow(cfs)</u>
2 year	0.001444
5 year	0.002405
10 year	0.003266
25 year	0.004667
50 year	0.005981
100 year	0.007564

---

Stream Protection Duration

Annual Peaks for Predeveloped and Mitigated. POC #1

<u>Year</u>	<u>Predeveloped</u>	<u>Mitigated</u>
-------------	---------------------	------------------

1949	0.005	0.001
1950	0.010	0.002
1951	0.010	0.003
1952	0.005	0.001
1953	0.005	0.001
1954	0.005	0.001
1955	0.005	0.002
1956	0.005	0.001
1957	0.005	0.002
1958	0.005	0.001
1959	0.005	0.001
1960	0.005	0.002
1961	0.005	0.001
1962	0.005	0.001
1963	0.005	0.001
1964	0.005	0.001
1965	0.005	0.001
1966	0.005	0.001
1967	0.005	0.002
1968	0.005	0.001
1969	0.005	0.001
1970	0.005	0.001
1971	0.005	0.001
1972	0.027	0.002
1973	0.005	0.001
1974	0.005	0.001
1975	0.005	0.002
1976	0.005	0.001
1977	0.004	0.001
1978	0.005	0.001
1979	0.004	0.001
1980	0.005	0.002
1981	0.005	0.001
1982	0.005	0.002
1983	0.005	0.001
1984	0.005	0.001
1985	0.005	0.001
1986	0.005	0.002
1987	0.005	0.002
1988	0.005	0.001
1989	0.005	0.001
1990	0.005	0.002
1991	0.009	0.026
1992	0.005	0.001
1993	0.004	0.001
1994	0.005	0.001
1995	0.005	0.001
1996	0.037	0.003
1997	0.005	0.002
1998	0.005	0.001
1999	0.008	0.002
2000	0.005	0.001
2001	0.005	0.001
2002	0.005	0.002
2003	0.005	0.001
2004	0.005	0.014
2005	0.005	0.002

2006	0.005	0.002
2007	0.056	0.003
2008	0.005	0.003
2009	0.005	0.002

---

**Stream Protection Duration**

**Ranked Annual Peaks for Predeveloped and Mitigated. POC #1**

<b>Rank</b>	<b>Predeveloped</b>	<b>Mitigated</b>
1	0.0559	0.0256
2	0.0366	0.0141
3	0.0270	0.0028
4	0.0099	0.0027
5	0.0097	0.0026
6	0.0085	0.0026
7	0.0085	0.0024
8	0.0053	0.0022
9	0.0053	0.0022
10	0.0053	0.0021
11	0.0053	0.0021
12	0.0053	0.0021
13	0.0053	0.0020
14	0.0053	0.0020
15	0.0053	0.0019
16	0.0052	0.0018
17	0.0052	0.0018
18	0.0052	0.0017
19	0.0052	0.0017
20	0.0052	0.0017
21	0.0052	0.0016
22	0.0052	0.0016
23	0.0052	0.0015
24	0.0052	0.0015
25	0.0052	0.0015
26	0.0052	0.0014
27	0.0052	0.0014
28	0.0052	0.0014
29	0.0052	0.0014
30	0.0052	0.0014
31	0.0052	0.0014
32	0.0051	0.0014
33	0.0051	0.0013
34	0.0051	0.0013
35	0.0051	0.0012
36	0.0051	0.0012
37	0.0051	0.0012
38	0.0051	0.0012
39	0.0051	0.0012
40	0.0051	0.0012
41	0.0051	0.0012
42	0.0051	0.0012
43	0.0051	0.0012
44	0.0051	0.0012
45	0.0051	0.0012
46	0.0051	0.0011
47	0.0051	0.0011
48	0.0050	0.0011

49	0.0050	0.0011
50	0.0050	0.0011
51	0.0050	0.0010
52	0.0050	0.0010
53	0.0050	0.0010
54	0.0050	0.0010
55	0.0049	0.0010
56	0.0049	0.0010
57	0.0048	0.0010
58	0.0046	0.0010
59	0.0044	0.0009
60	0.0041	0.0008
61	0.0041	0.0008

---

**Stream Protection Duration**

**POC #1**

**The Facility PASSED**

**The Facility PASSED.**

<b>Flow(cfs)</b>	<b>Predev</b>	<b>Mit</b>	<b>Percentage</b>	<b>Pass/Fail</b>
0.0028	3031	58	1	Pass
0.0029	2704	55	2	Pass
0.0031	2385	52	2	Pass
0.0032	2136	50	2	Pass
0.0034	1902	47	2	Pass
0.0035	1678	45	2	Pass
0.0037	1469	43	2	Pass
0.0038	1320	42	3	Pass
0.0040	1163	40	3	Pass
0.0041	995	40	4	Pass
0.0042	831	38	4	Pass
0.0044	661	37	5	Pass
0.0045	545	35	6	Pass
0.0047	433	35	8	Pass
0.0048	343	32	9	Pass
0.0050	237	31	13	Pass
0.0051	114	29	25	Pass
0.0053	27	27	100	Pass
0.0054	26	26	100	Pass
0.0056	26	24	92	Pass
0.0057	26	19	73	Pass
0.0059	25	15	60	Pass
0.0060	25	14	56	Pass
0.0062	25	14	56	Pass
0.0063	25	14	56	Pass
0.0065	24	14	58	Pass
0.0066	24	14	58	Pass
0.0068	23	14	60	Pass
0.0069	22	14	63	Pass
0.0070	22	14	63	Pass
0.0072	22	14	63	Pass
0.0073	21	14	66	Pass
0.0075	21	14	66	Pass
0.0076	21	13	61	Pass
0.0078	20	13	65	Pass

0.0079	19	13	68	Pass
0.0081	19	13	68	Pass
0.0082	18	13	72	Pass
0.0084	18	13	72	Pass
0.0085	16	12	75	Pass
0.0087	16	12	75	Pass
0.0088	16	12	75	Pass
0.0090	16	12	75	Pass
0.0091	16	12	75	Pass
0.0093	15	11	73	Pass
0.0094	15	11	73	Pass
0.0095	15	11	73	Pass
0.0097	15	11	73	Pass
0.0098	14	11	78	Pass
0.0100	13	11	84	Pass
0.0101	13	11	84	Pass
0.0103	13	11	84	Pass
0.0104	13	11	84	Pass
0.0106	13	11	84	Pass
0.0107	13	11	84	Pass
0.0109	12	11	91	Pass
0.0110	12	10	83	Pass
0.0112	11	8	72	Pass
0.0113	11	8	72	Pass
0.0115	11	8	72	Pass
0.0116	11	8	72	Pass
0.0118	11	8	72	Pass
0.0119	10	7	70	Pass
0.0121	10	7	70	Pass
0.0122	9	7	77	Pass
0.0123	9	6	66	Pass
0.0125	9	6	66	Pass
0.0126	9	6	66	Pass
0.0128	9	6	66	Pass
0.0129	8	6	75	Pass
0.0131	8	6	75	Pass
0.0132	8	6	75	Pass
0.0134	8	6	75	Pass
0.0135	8	6	75	Pass
0.0137	8	6	75	Pass
0.0138	8	6	75	Pass
0.0140	8	5	62	Pass
0.0141	8	4	50	Pass
0.0143	8	4	50	Pass
0.0144	8	4	50	Pass
0.0146	8	4	50	Pass
0.0147	8	4	50	Pass
0.0148	8	4	50	Pass
0.0150	8	4	50	Pass
0.0151	8	4	50	Pass
0.0153	8	4	50	Pass
0.0154	8	4	50	Pass
0.0156	8	3	37	Pass
0.0157	8	3	37	Pass
0.0159	8	3	37	Pass
0.0160	8	3	37	Pass
0.0162	8	3	37	Pass

0.0163	8	3	37	Pass
0.0165	8	3	37	Pass
0.0166	8	3	37	Pass
0.0168	8	3	37	Pass
0.0169	8	3	37	Pass
0.0171	8	3	37	Pass
0.0172	8	3	37	Pass
0.0174	8	3	37	Pass

---

**Water Quality BMP Flow and Volume for POC #1**

On-line facility volume: 0 acre-feet

On-line facility target flow: 0 cfs.

Adjusted for 15 min: 0 cfs.

Off-line facility target flow: 0 cfs.

Adjusted for 15 min: 0 cfs.

---

**LID Report**

LID Technique	Used for	Total Volume	Volume	Infiltration	Cumulative
Percent	Water Quality	Percent	Through	Volume	Volume
Volume	Water Quality	Treatment	Facility	(ac-ft)	Infiltration
Infiltrated	Treated	(ac-ft)	(ac-ft)		Credit
Vault 1 POC	N	57.31			N
97.90					
Total Volume Infiltrated		57.31	0.00	0.00	
97.90	0.00	0%	No Treat.	Credit	
Compliance with LID Standard 8					
Duration Analysis Result = Passed					

---

**Perlnd and Implnd Changes**

No changes have been made.

---

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**Appendix F Evans Creek Tributary 108 Stormwater Retrofit Detention Vault located at NE 87th Place**

**Employee Cost Breakdown by Classification**

	Section Manager (Hrs)	Engineer 3 (Hrs)	Engineer 2 (Hrs)	Engineer 1 (Hrs)	Total Hours per Task	Total Project Salary \$	Total Benefits \$	Total Indirect \$	Grand TOTAL \$	Total Eligible Employee Cost
<b>TASK</b>										
Task 1. Project Management	20.00	80.00			100.00					
Task 2. Design and Procurement		80.00	80.00	80.00	240.00					
Task 3. Construction and Close Out		80.00	80.00	40.00	200.00					
Task 4. Public Involvement		40.00	20.00	10.00	70.00					
<b>Total Hrs per Classification</b>	20.00	280.00	180.00	130.00	610.00					
Salary Rate By Classification (\$/HR)	\$64.48	\$49.86	\$44.17	\$39.19						
Total Salary Cost (\$) by Classification	\$1,289.67	\$13,960.30	\$7,951.23	\$5,094.53		\$28,295.73				
Benefits Cost (\$) 68.08% of salary	\$878.01	\$9,504.17	\$5,413.19	\$3,468.36			\$19,263.74			
Indirect Costs (\$) 66.4% of salary	\$856.34	\$9,269.64	\$5,279.61	\$3,382.77				\$18,788.37		
<b>Total Cost (\$) by Classification</b>	\$3,024.03	\$32,734.12	\$18,644.03	\$11,945.66				\$66,347.84		\$59,449.34

NOTE: Using 2016 rates as proxy average for project spanning 2016-2018

NOTE: Using indirect and benefit multipliers from D. Hess and Salary rates.

NOTE: Assume pd is part of benefits

NOTE: Total Eligible Cost calculated as: (Total Benefits + Total Salary) times 1.25

**Total Cost Breakdown By Task**

Cost Item	Employee Salary (\$/HR)	Task 1	Task 2	Task 3	Task 4
Section Manager (Curt Crawford)	\$64.48	20.00			
Engineer 3 (Claire Jonson, Rachel Berryessa)	\$49.86	80.00	80.00	80.00	40.00
Engineer 2 (Dale Nelson, Bob Pendergast)	\$44.17		80.00	80.00	20.00
Engineer 1 (Lica Dulan)	\$39.19		80.00	40.00	10.00
<b>Total Task Hours</b>		100.00	240.00	200.00	70.00
Total Task Salary Cost		\$5,278.33	\$10,657.63	\$9,090.08	\$3,269.69
Total Task Benefit Cost@ 68.08% of salary		\$3,593.49	\$7,255.72	\$6,188.53	\$2,226.00
Total Task Indirect Cost @ 66.4% salary		\$3,504.81	\$7,076.67	\$6,035.82	\$2,171.07
Contract Work for Soils Testing			\$20,000.00		
Contract Work for Construction and Materials - see Attachment C1				\$118,828.71	
Grand Total of Each Task		\$12,376.63	\$44,990.02	\$140,143.13	\$7,666.76
Total Task Eligible Cost		\$11,089.78	\$42,391.69	\$137,926.97	\$6,869.61

610.00	<b>Total Hours</b>
\$28,295.73	<b>Total Project Salary \$</b>
\$19,263.74	<b>Total Benefits \$</b>
\$18,788.37	<b>Total Indirect \$</b>
\$20,000.00	<b>Contract Work for Soils Testing</b>
\$118,828.71	<b>Contract Work for Construction and Materials</b>
<b>\$205,176.54</b>	<b>Grand TOTAL \$</b>

