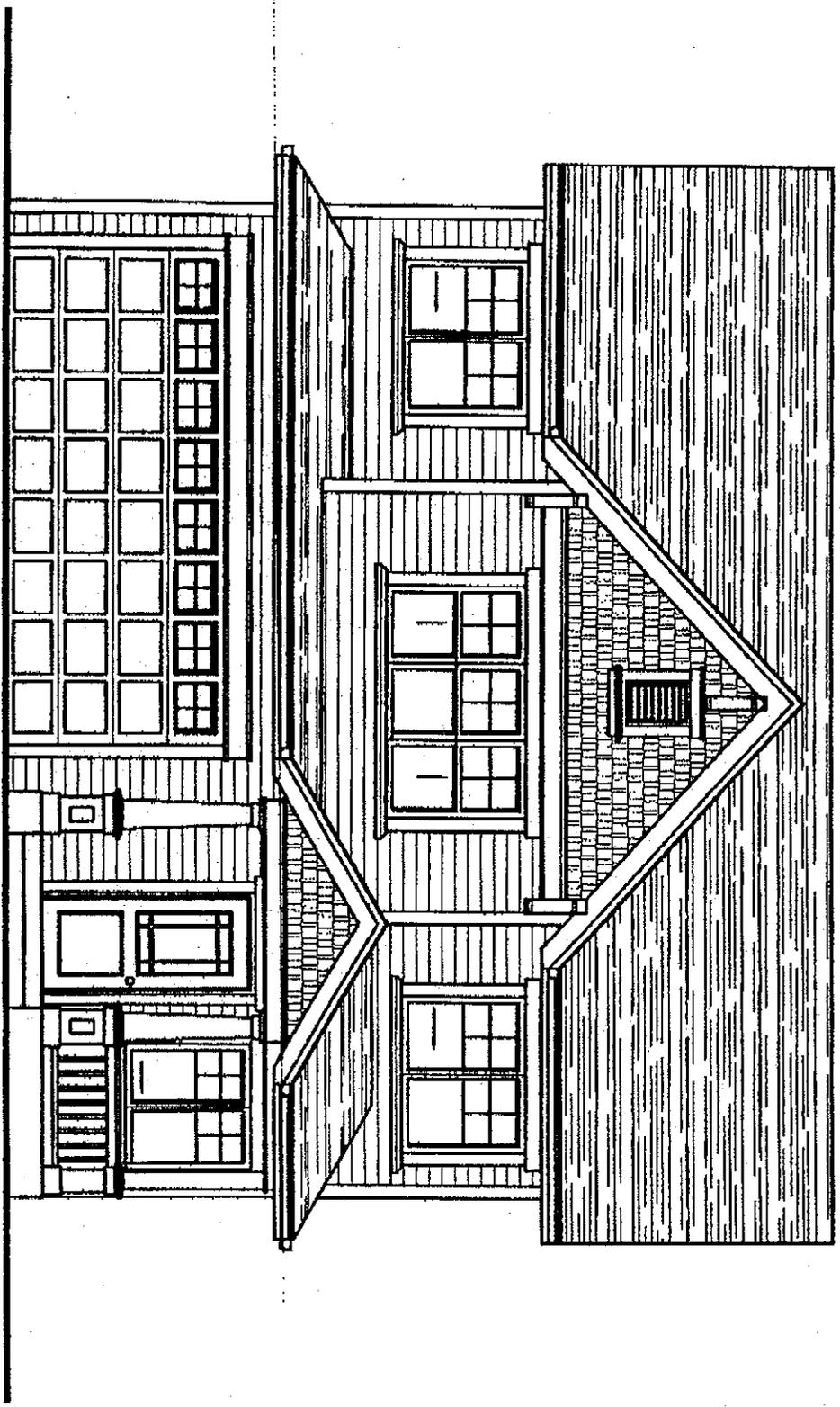
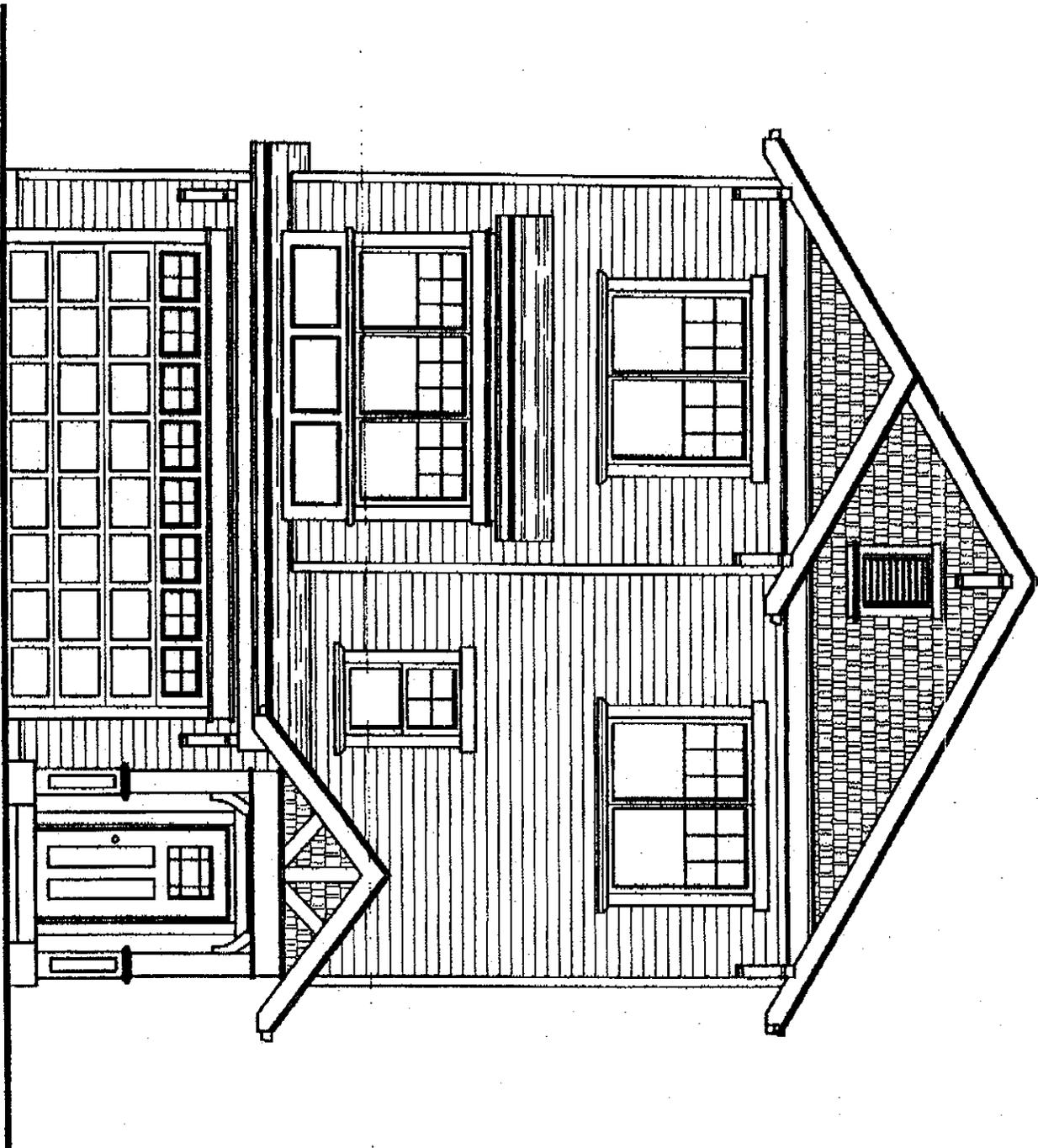


Exhibit S-4  
Streetscape and Unit Plans, Carl J. Colson, September 7, 2005

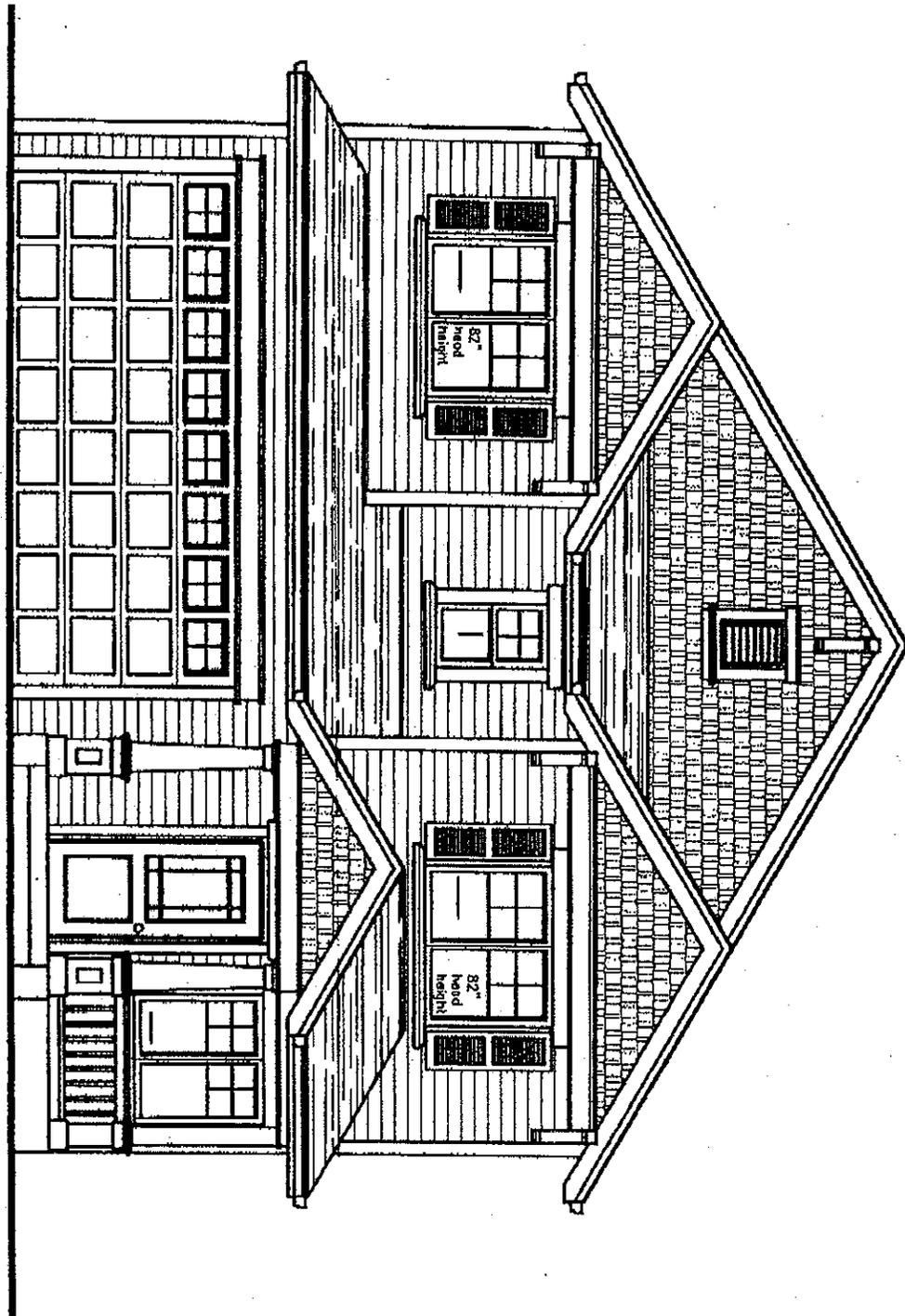
ANDERSON FARMS  
(This design subject to change)



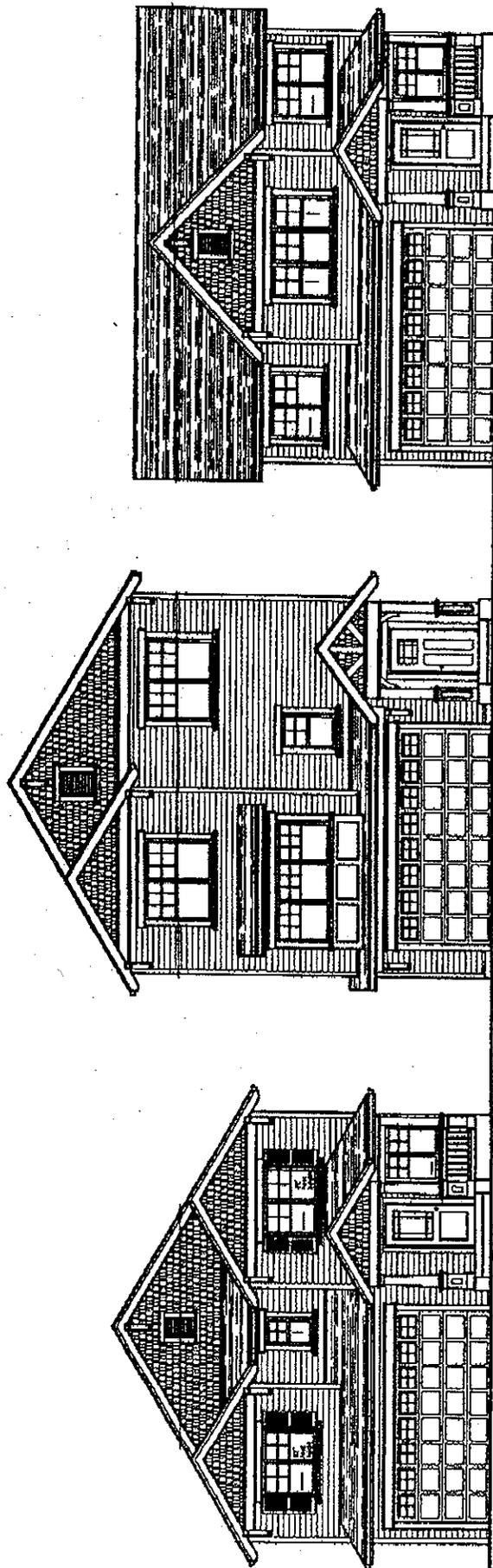
**EXHIBIT** S-4  
(Full size plans separate)  
148



ANDERSON FARMS  
(This design and building width  
subject to change)



ANDERSON FARMS  
(This design subject to change)



ANDERSON FARMS  
(These designs and building width subject to change)

Exhibit S-5  
Review of Traffic Impact Analysis for Proposed Anderson Farms Residential  
Development, Geralyn Reinart, P.E., October 13, 2005

RECEIVED

OCT 28 2005  
CITY OF SULTAN  
BUILDING DEPT.

**MEMORANDUM**

October 13, 2005

To: Rick Cisar, City Administrator/Planner  
City of Sultan

From: Geri Reinart, P.E. 

Subject: Review of Traffic Impact Analysis for Proposed Anderson Farms  
Residential Development

The purpose of this memorandum is to summarize my review and comments of the traffic impact analysis prepared by Gibson Traffic Consultants for the proposed Anderson Farms subdivision. The project is located on the west side of Sultan Basin Road bordering both sides of 135<sup>th</sup> Street SE, and will consist of 36 single-family residential lots. An existing single-family residence is currently located on the property, resulting in a net increase of 35 new residences.

Included in this memorandum is my review of the technical analysis, its adequacy/accuracy, and an assessment of the likely impacts. Not included is a detailed review of information presented for Snohomish County use, since it is not needed for City review. The following summarizes my review:

- The traffic impact analysis was prepared by Gibson Traffic Consultants (GTC), who also prepared the analyses for two other nearby developments (Timber Ridge Estates and Denali Ridge). GTC has extensive experience in the preparation of similar reports, and is therefore well qualified to provide an adequate assessment of the impacts associated with the project.
- The overall methodologies and procedures used in the preparation of the report are acceptable and typical of traffic impact analyses prepared for developments of this type.

- The trip generation is standard information from the ITE Trip Generation manual (7<sup>th</sup> Edition) based on the net number of new residences. The project could be expected to generate approximately 335 new daily trips, and 35 new PM peak hour trips using the average trips rates. (This includes the deduction for the existing residence on the site.)
- The trip distribution used for the project trips was reasonable, with one exception. A small amount of traffic was distributed onto the future east-west connector through the industrial park. I did allow GTC to assign trips to this connector on the Denali Ridge and Timber Ridge Estates project, assuming that this project was more or less moving forward. However, based on our conversation last week, it appears that this roadway may be further from reality than previously believed. As such, the routing of traffic onto this route is not reasonable at the present time, and therefore those trips should be routed to SR-2. The consequence of this is a slightly higher contribution towards the SR-2/Sultan Basin Road project.
- Capacity analyses for the existing and future conditions were completed for the intersections of SR-2/Sultan Basin Road and SR-2/Main Street. Both of these intersections are controlled by stop signs on the minor legs. The intersection of SR-2/Sultan Basin Road has been extensively analyzed and the consultant's findings are consistent with prior analyses. The intersection of SR-2/Main Street is currently operating at level of service (LOS) "C" (almost "D") during the PM peak hour, and will drop to level of service "D" in the future without the project, and LOS "E" with the project. This analysis did **not** include the re-assignment of some of the left-turns from Main Street (associated with pipeline development) to the SR-2/5<sup>th</sup> Street intersection, as noted in the analysis for the Vodnick development. (The rationale for this reassignment is the use of the new signal installation that will provide motorists with a controlled gap in traffic along SR-2. Since this re-assignment was applied only to the pipeline trips, I allowed its use as a reasonable and practical re-assignment, especially for new households to the City.) The resultant analysis from Vodnick showed an LOS "D" condition for the intersection, and included the Anderson Farms trips (and trips from several other developments that are not yet approved). Based on the more recent analysis for Vodnick, I would consider the LOS "D" condition to be the basis for Anderson Farms development. The level of service "D" condition is typical along a highway such as SR-2 and I do not consider the level of service "D" condition for the side street movement to be unacceptable.

WSDOT usually considers LOS "D" acceptable in urban areas and the City has adopted a level of service "D" for SR-2, which would be the appropriate standard to use for the intersection, rather than the City's collector standard of level of service "B". However, please be advised that the stop-controlled movement is approaching level of service "E", and the City may need to consider allowing level of service "E" for this movement in the future, otherwise signalization will need to be considered.

- There were some typographical errors in the tables, turning movement summaries, text, and capacity analyses as follows: 1) The AM peak hour trips shown in Table 1 should state a total of 26 trips (not 25) with the outbound trips totaling 20 (not 19); this error is insignificant. 2) The dollar amounts shown in Table 5 have been modified per my review comments in subsequent sections. 3) A couple of minor errors were noted for the future volumes at SR-2/ Sultan Basin Road and SR-2/Cascade View Drive which carried over into the capacity analyses. These errors are not significant. Also, the SR-2/Sultan Basin Road intersection was analyzed as unsignalized (future condition) and should probably have been analyzed as signalized. 4) Page 2 of the text notes the wrong number of trips for the AM peak hour. This error is insignificant. Page 5 states the wrong number of trips through SR-2/5<sup>th</sup> Street. This error will increase the mitigation fee at this intersection.
- The analysis reviewed/estimated the ADT's along Sultan Basin Road and Main Street for the existing and future conditions. The volumes are below the City's LOS "B" threshold of 6200 ADT.
- The easterly access on the south side of the plat is located less than 100 feet from Sultan Basin Road. This access will serve less than 10 residences and will have a small number of trips (five) entering from 135<sup>th</sup> Street SE during the PM peak hour. It appears that this access could be moved 30 to 40 feet west by re-configuring the layout. If this is possible, this relocation would be desirable so that the possibility of intersection conflicts could be decreased.
- A sight distance analysis was completed for the project accesses. The entering and stopping sight distances were noted as greater than 500 feet for the intersections, which would be applicable for the sight distance requirements to and from the west. However, the site accesses are located less than 500 feet from the controlled intersection at Sultan Basin Road and essentially all westbound traffic on 135<sup>th</sup> Street SE will turn from Sultan Basin Road. As such, the typical sight distance requirements and measurements need to consider this.

Vehicle speeds (as they turn the corner) are much lower than the posted or design speed and visibility to Sultan Basin Road is the most important factor for sight distance. Due to the lack of any roadway curvature and the lower approach speed of the turning vehicles, entering and stopping sight distance for the westerly intersections is adequate. The easterly access is located less than 100 feet from Sultan Basin Road and therefore there are inherent limitations. Stopping sight distance for a 15-mph design speed is 80 feet, which is about the distance between the easterly access and Sultan Basin Road, and 115 feet for a 20-mph design speed. As noted earlier, it would be desirable to locate this access further to the east, if all possible so that additional stopping sight distance could be provided. (Entering sight distance cannot be met.)

- The Consultant has recommended payment of the City's mitigation fee plus a proportionate share of the SR-2/5<sup>th</sup> Street and the SR-2/Sultan Basin Road improvement costs. A mitigation fee of \$1837 per PM peak hour trip has been cited for a total of \$64,295. A peak hour fee of \$125.70 per trip has been noted for the SR-2/5<sup>th</sup> Street intersection, which would total \$2138.43 for the 17 trips through this intersection. A fee of \$27.71 per daily trip is noted for the SR-2/Sultan Basin Road intersection which would total \$8,811.78 for the 318 trips through the intersection (*note: this value was adjusted for an additional 33 trips per my prior comment regarding trip distribution*). These fees do not include any adjustment for the portion of anticipated tax revenues resulting from a development as noted in SMC 16.108.090, so the fee noted may need to be adjusted, if appropriate. The project may also need to be credited for frontage improvements along Sultan Basin Road if improvements along this roadway are part of the mitigation fee.
- The UDC section 16.108.090 notes the elements that should be included in a traffic study (for concurrency purposes). Some of the elements listed were not included in the GTC submittal; however, I do not believe that any of these elements would change the results of the analysis or conclusions. Specifically, a description and analysis of **all** impacted streets was not included (however, those City streets with the greatest impacts were included), figures of the current and future ADT's were not included (the volumes were noted in the text), and volume projections for 10 years into the future were not included. I do not believe that any of the above elements would change the results or conclusions, but did want to note these items in case you or other Staff required this information for your Staff report.
- Overall, the project would have a minor impact. Based on the

information provided and my prior knowledge of this area, the analysis has reasonably assessed the impact that could be expected from the project.

These are the comments that I have at this time based on the information provided. I assume that you will forward a copy of the analysis to WSDOT and Snohomish for their review. Please give me a call if you'd like to discuss these issues in greater detail or have any questions.

Exhibit S-6  
Letter of Completeness, City of Sultan, October 11, 2005



# City of Sultan

Mr. Jake Libaire  
Higa Burkholder Associates  
1721 Hewitt Ave, Suite 401  
Everett, WA 98201

October 11, 2005

**Subject: File Number FPPUD05-003, Anderson Farm PUD  
Parcel Numbers 280832-00101100, 280832-00100600**

Dear Mr. Libaire:

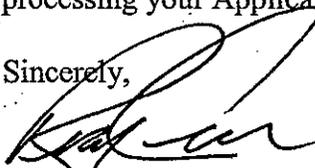
The City received the material submitted on September 15, 2005, in support of your Application for a 33-lot Planned Unit Development (PUD). Your Application is determined to be Complete in accordance with the submittal requirements identified in SMC 16.10.110. However, additional materials, as noted below, are needed prior to the Planning Department completing their review of the project and issuing a Staff Report and Recommendation.

- (1) Wetland H is shown as useable open space but the preliminary plans do not address how the wetland is useable. Please submit a revised plan identifying how Wetland H meets the definition of useable (SMC 16.10.140).
- (2) The preliminary plans show a permanent loss, or alteration, of wetlands on the site, which requires mitigation. The plans do not indicate how the altered wetlands will be replaced. In accordance with SMC 16.80.070, acreage must be replaced at a 1.5 to 1 ratio on-site or a 2 to 1 ratio off-site. A mitigation plan that shows how the wetlands will be replaced will be required in order for the City to render a decision.

The "Notice of Application" for this project will be issued on October 18, 2005. Mailing of the Notices of Application and posting of the subject property must be completed before that date. The Land Use Action signs for posting will be available on October 13, 2005. Please post two signs on each of the street frontages for the two properties. A copy of this Notice is attached for your records. Please contact Cyd Donk, Building Permit Assistant, at 360-793-2231 for detailed posting instructions.

In closing, please submit the requested information within two (2) weeks so we may continue processing your Application.

Sincerely,

  
Rick Cisar  
City Planner

319 Main Street, Suite 200 – PO Box 1199 – Sultan, WA 98294-1199  
City Hall (360) 793.2231 – Fax (360) 793.3344  
[cityhall@ci.sultan.wa.us](mailto:cityhall@ci.sultan.wa.us)  
[www.ci.sultan.wa.us](http://www.ci.sultan.wa.us)

**EXHIBIT**

S-6

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Exhibit S-7

Memorandum, Jon R. Stack, PE, City Engineer, October 17, 2005

**Plat of Anderson Farms  
Civil Plan Review  
October 17, 2005  
Jon R. Stack, P.E., City Engineer**

**Streets:**

- 1) None of the proposed street cross-sections meet City standards and are unacceptable.**
- 2) No cul-de-sacs for garbage truck turn-around are provided at any of the dead-end streets, which is unacceptable.**
- 3) The street structural section is not supported by the submitted soils report. The soils report must include a recommended structural section for the City's review or an outside expert will be retained at the developer's expense to develop a recommendation for same utilizing California Bearing Ratio test data or equivalent. Wheel rolling as an attempted means of developing design data is not acceptable since there is no standard test using rolling information.**
- 4) The full street section on 135<sup>th</sup> Street SE shall be constructed from Sultan Basin Road, easterly approximately 644 LF. Constructing only one-half of the easterly 207 LF creates a traffic safety hazard.**

**Sanitary Sewer:**

- 1) No profiles or sizing were submitted for review.**

**Water System:**

- 1) No water main sizing or looping was submitted for review.**

**Storm Drainage**

- 1) The storm drainage internal design appears adequate, however a down stream analysis of the drainage existing the site is required. (see page 3 of drainage report).**

**Environmental Checklist**

- 1) Page 3, B-1-e, grading and filling: Noted quantities are not supported by the grading plan.**
- 2) Page 3, B-1-h, erosion control: There is no mention of the Construction Stormwater Pollution Prevention Plan required under Volume II, Stormwater Manual for Western Washington, WA State Department of Ecology, February, 2005.**

**EXHIBIT**

**S-7**

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## **Lot Size**

**1) There are 33 proposed lots. Nine of which are less than 3,000 square feet, the smallest is 2,137. Twenty of the lots are less than 4,000 square feet. The City Council has a general guideline of 5,000 square feet as a minimum.**

Exhibit S-8

Letter from Graham-Bunting requesting additional information, November 9, 2005

**Graham-Bunting Associates**

Environmental &amp; Land Use Services

3643 Legg Road, Bow, WA 98232 Ph. 360.766.4441 Fx. 360.766.4443

November 9, 2005

Bill Railton  
Wetland Resources  
9505 19<sup>th</sup> Ave SE., Suite 106  
Everett, WA 98208

**RE: Anderson Farms Request for Additional Information**

Dear Mr. Railton;

I am in the process of reviewing the Critical Area Study & Mitigation Plan for Anderson Farm PUD for 33 single-family lots in the City of Sultan. I will need additional information before I can complete my staff report.

- Page 3 of 4 of the Preliminary Plans indicates ditches on the southern parcel. Please provide information regarding your analysis of the ditches and supporting evidence as to why they are not regulated.
- It is unclear to me if you have chosen to apply your mitigation plan under 16.80.100 Innovative Development Design. 16.80.080 C states that Buffers may be altered only in conjunction with applications submitted under SMC 16.80.100. If you are submitting under 16.80.100 please address 16.80.100 Criteria for Approval. While your mitigation plan speaks to an increase in function of the wetland it is also important to address an increase in buffer functions.
- The "Paper Fill" buffer design needs to at least incorporate some of the existing buffer (upland areas). It appears that your proposal does not have any upland buffer in Wetland H next to lot 14. If this is the case please address how it will effect the existing vegetation in the wetland, ie. windthrow.

I am ready to complete my staff report as soon as you submit this information. Thank you for your attention to this matter.

Sincerely,

Pat Bunting  
Wetland Ecologist

cc. Rick Cisar

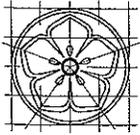
**EXHIBIT** S-8

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Exhibit S-9

Second Submittal reducing the project scope from 35 lots to 26 lots, May 4, 2006

- a) Response to preliminary submittal review comments, Higa Burkholder, May 4, 2006
- b) SEPA Checklist, signed May 5, 2006
- c) Preliminary Drainage Report, Higa Burkholder, April 28, 2006



**HIGA-BURKHOLDER**  
**ASSOCIATES, LLC**  
LAND USE PLANNING / CIVIL ENGINEERING

RECEIVED  
MAY - 4 2006

BY:.....

May 4, 2006

Mr. Rick Cisar  
City of Sultan  
P.O. Box 1199  
Sultan, WA 98294-1199

**Re: Response to File Number FPPUD05-003, Anderson Farm PUD  
Preliminary Submittal Review Comments**

Dear Rick:

We have received your letter dated October 11, 2005, transmitting staff and consultant reviews of our plan submission. The following letter has been written to provide responses to the review comments. Our responses have been numbered in accordance with the review memos.

***Planning Comments:***

- (1) *Wetland H is shown as useable open space but the preliminary plans do not address how the wetland is useable. Please submit a revised plan identifying how Wetland H meets the definition of useable (SMC 16.10.140).*

Response: Conservation open space and usable open space may be, but are not always, mutually inclusive. In the case of Wetland H, the conservation and usable open space labels are equally applicable. Wetland H has comparably dry and stable soils, making it suitable for passive recreation activities such as walking and bird watching. A bark trail is proposed around a portion of the wetland to encourage passive use of this area. This area has appropriate topography, soils, drainage, and size to be appropriate for passive recreation uses. Tract 992, which includes Wetland H, is designated as NGPA, ensuring the protection of that wetland and associated buffer during use for passive recreation.

- (2) *The preliminary plans show a permanent loss, or alteration, of wetlands on the site, which requires mitigation. The plans do not indicate how the altered wetlands will be replaced. In accordance with SMC 16.80.070, acreage must be replaced at a 1.5 to 1 ration on-site or a 2 to 1 ratio off-site. A mitigation plan the shows how the wetlands will be replaced will be required in order for the City to render a decision.*

Response: Wetland mitigation is proposed under SMC, 16.80.100. The mitigation plan addresses wetland protection and preservation in a creative manner that deviates from the standards set forth in SMC 16.80.040 and 16.80.080. Refer to the submitted critical areas study prepared by Wetland Resources Inc. Please contact Wetland Resources or Patricia Bunting if any questions arise regarding the "Innovative development design" provisions of the code.

**EXHIBIT** S-9a

1166

**Engineering Comments by City Engineer Jon R. Stack:**

- (1) *None of the proposed street cross-sections meet City standards and are unacceptable.*

Response: Based on the City of Sultan engineer's comments at a project meeting with HBA on 12/20/2005, the following road sections are proposed:

- Public plat access roads A, B, and C: Two 12 ft. travel lanes, 0.5 ft. raised curb, a 5 ft. wide sidewalk, and a 1 ft. gap to the right-of-way (ROW) line are proposed. Total ROW width for these roads is 31.5 ft.
- 135<sup>th</sup> St. SE (Bryant Rd.): This road is to be improved to meet the standards for a *collector road* per City of Sultan Design Standards & Specifications (CSDSS) 1.09.
  - Two 12 ft. travel lanes, two 8 ft. parking lanes, a 0.5 ft. raised curb, a 3 ft. planter strip, a 5 ft. sidewalk, and a 1.5 ft. gap to the ROW line are proposed.
  - Improvements to Bryant Road are proposed along the site's frontage, and along the frontage of parcel 28083200100800 (13420 Sultan Basin Rd.) based on an agreement with that property owner.
  - No improvements to Bryant Road are proposed west of the site's most westerly property line per CSDSS 1.08(5).
  - Total proposed ROW width is 60 ft. where the site has frontage on both sides of the ROW.
  - Half-width ROW improvements are proposed for the north half of Bryant Rd. for the western 207.5 ft. of the site's frontage. The site has no frontage on the south side of Bryant road in that area, and frontage improvements are not required per CSDSS 1.08(5). Improvements in this area will consist of two 10 ft. travel lanes, a 0.5 ft. raised curb, a 3 ft. planter strip, a 5 ft. sidewalk, and a 1.5 ft. gap to the ROW line. ROW half-width in this area will be 30 ft.
  - To maintain a 12 to 10 ft. westbound travel lane, the parking lane on the north side of Bryant Road will terminate approximately 22 ft. east of the proposed northern plat access road.
- Sultan Basin Road: This road is to be improved to meet the standards for a *secondary arterial* per CSDSS 1.09.
  - Proposed half-width ROW improvements are: one 12 ft. travel lane, one 3 ft. bicycle lane, one 8 ft. parking lane, a 0.5 ft. raised curb, a 3 ft. planter strip, a 5 ft. sidewalk, and a 1.5 ft. gap to the ROW line.
  - Total half-width ROW shall be 33 ft.

- (2) *No cul-de-sacs for garbage truck turn-around are provided at any of the dead-end streets, which is unacceptable.*

Response: Based on the City of Sultan engineer's comments at a project meeting with HBA on 12/20/2005, hammerhead turnarounds are proposed at the end of each plat road. All hammerheads have been designed to Snohomish County standards, and are adequate for fire and garbage truck maneuvering.

- (3) *The street structural section is not supported by the submitted soils report. The soils report must include a recommended structural section for the City's review or an outside expert will be retained at the developer's expense to develop a recommendation for same utilizing California Bearing Ratio test data or equivalent. Wheel rolling as an attempted means of developing design data is not acceptable since there is no standard test using rolling information.*

Response: Refer to pages 12 and 13 of the geotechnical report submitted with the initial project application (Associated Earth Sciences, 9/2/05), and sheet 2 of the submitted plan set.

- On page 13 of said geotech report, the geotech recommends a pavement section consisting of 2 ½ inches of asphalt surfacing above 4 inches of crushed surfacing base course (CSBC) per WSDOT standards.
  - On sheet 2 of the plan set, it is shown that all plat access roads will meet this standard.
- Also on page 13 of the geotech report, it is recommended that the 4 inches of CSBC material may be substituted with 3 inches of asphalt treated base (ATB), and covered with 2 ½ inches of asphalt surfacing.
  - On sheet 2 of the plan set, it is shown that proposed improvements to Bryant Road and Sultan Basin Road exceed the geotech's recommendations; 3 inches of asphalt surfacing are proposed over 4 inches of ATB.

- (4) *The full street section on 135<sup>th</sup> Street shall be constructed from Sultan Basin Road, easterly approximately 644 LF. Construction only one-half of the easterly 207 LF creates a traffic safety hazard.*

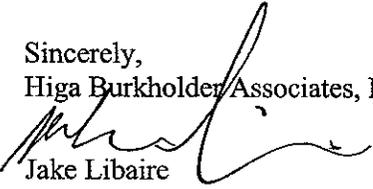
Response: Half-width ROW improvements are proposed for the north half of Bryant Rd. for the western 207.5 ft. of the site's frontage. The site has no frontage on the south side of Bryant road in that area, and frontage improvements are not required per CSDSS 1.08(5). Improvements in this area will consist of two 10 ft. travel lanes, a 0.5 ft. raised curb, a 3 ft. planter strip, a 5 ft. sidewalk, and a 1.5 ft. gap to the ROW line. ROW half-width in this area will be 30 ft.

- To maintain a 12 to 10 ft. westbound travel lane, the parking lane on the north side of Bryant Road will terminate approximately 22 ft. east of the proposed northern plat access road.

-The proposed frontage improvement design, including proposed striping, is a frequently used method of connecting half-width improvements to full-width improvements. Similar designs have been constructed throughout Washington State. The proposed improvements and striping will not pose a traffic safety hazard. When and if property west on Bryant Road is developed, full-width frontage improvements will be required of the developer(s).

This concludes our summary of responses to the concerns that were raised in your October 11, 2005 review comments. Please contact me if you have additional questions or concerns.

Sincerely,  
Higa Burkholder Associates, LLC

  
Jake Libaire

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# CITY OF SULTAN ENVIRONMENTAL CHECKLIST

## *Purpose of Checklist:*

The State Environmental Policy Act (SEPA), chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

## *Instructions for Applicants:*

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of EIS. Answer questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply". Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

## *Use of Checklist for Non-project Proposals:*

Complete this checklist for non-project proposal, even though questions may be answered "does not apply". IN ADDITION, complete the SUPPLEMENTAL SHEET FOR NON-PROJECT ACTIONS (part D).

For non-project actions, the references in the checklist to the words "project", "applicant", and "property or site" should be read as "proposal", "proposer", and "affected geographic area", respectively.

## **A. BACKGROUND**

1. *Name of proposed project, if applicable:* Anderson Farm
2. *Name of Applicant:* Grandview Inc.
3. *Address and phone number of applicant and contact person:*

APPLICANT: Grandview Inc.  
P.O. Box 159  
Arlington, WA 98223  
(360) 435-7171

REPRESENTATIVE: Jake Libaire  
Higa Burkholder Associates, LLC  
1721 Hewitt Avenue, Suite 401  
Everett, Washington 98201  
(425) 252-2826

4. *Date checklist prepared:* September 6, 2005 (revised March 20, 2006)
5. *Agency requesting checklist:* City of Sultan

6. *Proposed timing or schedule (including phasing, if applicable):*

Construction shall begin following receipt of all necessary permits.

7. *Do you have any plan for future additions, expansion, or further activity related to or connected with this proposal?*

No, there are no plans for any future additions, expansions or further activity related to or connected with this proposal.

8. *List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.*

Critical Areas Study and Wetland Mitigation Plan by Wetland Resources, Inc., Traffic Study by Gibson Traffic Consultants, Inc., Geotechnical Study performed by AES, Preliminary and Construction Plans by Higa Burkholder Associates, LLC, Drainage Report by Higa Burkholder Associates, LLC.

9. *Do you know whether applications are pending for government approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.*

There are no known applications pending for government approvals of other proposals directly affecting the property covered by this proposal.

10. *List any government approvals or permits that will be needed for your proposal, if known.*

Preliminary PUD Plat Approval, Construction Plan Approval, SEPA Determination, Final Plat Approval, Building and Occupancy Permits.

11. *Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description).*

Number of detached single-family lots proposed: 26

Gross site area: 6.47 acres

12. *Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.*

The project site is located on the west side of the intersection of Bryant Road and Sultan Basin Road, in Sec. 32, Twp., 28N, R. 8E, W.M., Snohomish County, Washington.

**B. ENVIRONMENTAL ELEMENTS**

**1. EARTH**

a. *General description of the site (underline one): flat, rolling, hilly, steep slopes, mountainous, other \_\_\_\_\_.*

b. *What is the steepest slope on the site (approximate percent slope)?*

The steepest slope onsite is approximately 3%.

c. *What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soil, specify them and note any prime farmland.*

According to the Soil Survey of Snohomish County Area, Washington the soils on the site are Pastik silt loam, 0-8% slopes.

d. *Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.*

No, there are no surface indications or history of unstable soils in the immediate vicinity of the site.

e. *Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.*

14,000 cy will be cut. 40,000 cy of material will be used for fill. Approximately 30,000 cy of fill will consist of offsite structural fill material. The remaining 10,000 cy of fill will consist of appropriate onsite cut material.

f. *Could erosion occur as a result of clearing, construction, or use? If so, generally describe.*

Yes, exposed surfaces during construction could be susceptible to erosion, though in very minor quantities.

g. *About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?*

32% of the site area will be impervious. This includes frontage improvements along Sultan Basin and Bryant Roads.

h. *Proposed measures to reduce or control erosion or other impacts to the earth, if any.*

Site grading will use best management practices (BMP's) meeting the requirements of the County, State and Federal regulations. These BMP's will be designed as part of the site development construction plan and may include such BMP's as hay bales, silt fencing, temporary access, sediment ponds or other appropriate mitigation measures.

**2. AIR**

a. *What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities, if known.*

Emissions will occur from equipment and construction dust on a temporary basis during construction. Emissions from vehicles entering and exiting the site would occur on a long-term basis.

b. *Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.*

No, there are no off-site sources of emissions or odor that may effect this proposal.

c. *Proposed measures to reduce or control emission or other impacts to air, if any:*

Dust control during construction including site watering and construction entrances will be used to mitigate the problem.

3. **WATER**

a. *Surface:*

- 1) *Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.*

Yes, there are eight wetlands located on the property. All of these wetlands are classified as Category 3 based on their size and number of wetland classes present. Please refer to the critical area mitigation plan submitted with this proposal.

- 2) *Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.*

This project will require work in and adjacent to two of the fore mentioned wetlands. Significant wetland restoration and some minor impacts are proposed. Refer to submitted critical areas mitigation plan prepared by Wetland Resources Inc, as well as the submitted plan set.

- 3) *Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.*

Three small Category 3 wetlands on the southern portion of the site, totaling 3,189 sf, will be filled. Approximately 1,893 sf of wetland area on the northern portion of the site will be impacted per Nationwide 39 permit. Refer to critical areas report.

- 4) *Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities, if known.*

No, the project will not require any surface water withdrawals or diversions.

- 5) *Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.*

No, the project does not lie within a 100-year floodplain.

- 6) *Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.*

No, the proposal does not involve any discharges of waste materials to surface waters.

b. *Ground:*

- 1) *Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities, if known.*

No groundwater will be withdrawn and no runoff will be discharged to groundwater.

- 2) *Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals: agricultural, etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) is (are) expected to serve.*

No waste materials will be discharged into the ground from septic tanks or any other sources.

c. *Water Runoff (including storm water):*

- 1) *Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.*

The development will include storm drainage from 26 single-family residential units, driveways and frontage improvements. Storm drain runoff from the site will flow from two detention ponds and from two wetland ponds. In both cases the storm water will be restricted and water quality maintained per the 2005 DOE manual. The water will flow in existing storm drain systems along Sultan Basin Road and eventually reach the Skykomish River through a system of drainage channels in ravines and tributaries.

- 2) *Could waste materials enter ground or surface waters? If so, generally describe.*

Waste materials will not enter the ground or surface waters, as each new unit will be hooked up to the City of Sultan's public sewer system.

- d. *Proposed measures to reduce or control surface, ground and runoff water impacts, if any:*

Best Management Practices will be employed during all phases of construction.

#### 4. PLANTS

- a. *Check or underline types of vegetation found on the site:*

- \_\_\_ deciduous tree: alder, maple, aspen, other:
- \_\_\_ evergreen tree: fir, cedar, pine, other
- \_\_\_ shrubs: native undergrowth
- \_\_\_ grass
- \_\_\_ pasture
- \_\_\_ crop or grain
- \_\_\_ wet soil plants: cattail, buttercup
- \_\_\_ bulrush, skunk cabbage, other:
- \_\_\_ water plants, water lily, eelgrass,
- \_\_\_ milfoil, other
- \_\_\_ other types of vegetation

- b. *What kind and amount of vegetation will be removed or altered?*

Native and non-native vegetation within proposed clearing limits would be removed as necessary to make way for site improvements.

- c. *List threatened or endangered species known to be on or near the site.*

There are no known threatened or endangered plant species on or near the site.

- d. *Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any.*

Native vegetation will be retained on the project site where possible. Wetland enhancement is proposed. The applicant or new owners may elect to install sod and extra landscaping where necessary.

#### 5. ANIMALS

- a. *Underline any birds and animals which have been observed on or near the site or are known to be on or near the site:*

- birds: hawk, heron, eagle, songbirds, other:
- mammals: deer, bear, elk, beaver, small rodents, other:
- fish: bass, salmon, trout, herring, shellfish, other:

- b. *List any threatened or endangered species known to be on or near the site.*

There are no known threatened or endangered animal species known to be on or near the project site.

- c. *Is the site part of a migration route? If so, explain.*

The entire lowlands of the Puget Sound and Western Cascades are part of the Pacific Flyway. There is no significant habitat (feeding or resting grounds) provided on this site.

- d. *Proposed measures to preserve or enhance wildlife, if any:*

None.

## 6. ENERGY AND NATURAL RESOURCES

- a. *What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.*

Electricity will be provided by the Snohomish County PUD, District #1 to meet the domestic energy demands of the completed project. Wood-stoves and/or fireplaces may be utilized as an alternative heat source.

- b. *Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.*

No, this project would not affect the potential use of solar energy by adjacent properties.

- c. *What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:*

The proposed project will be constructed in conformance with the applicable building and energy codes.

## 7. ENVIRONMENTAL HEALTH

- a. *Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.*

No, there are no environmental health hazards that could occur as a result of this proposal.

- 1) *Describe special emergency services that might be required.*

No special emergency services would be required as a result of this proposal.

- 2) *Proposed measures to reduce or control environmental health hazards, if any:*

Environmental health hazards are not expected in conjunction with the proposed development. The applicant proposes no measures to reduce or control environmental health hazards.

## b. NOISE

- 1) *What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, aircraft, other)?*

No noise exists in the area that may affect this proposed project.

- 2) *What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other). Indicate what hour noise would come from the site.*

In the short-term, construction noise will occur between the hours of 7:00 A.M. and 6:00 P.M. In the long-term, normal residential noises such as those created by televisions, radios, landscaping equipment and automobiles can be expected.

- 3) *Proposed measures to reduce or control noise impacts, if any:*

The project will comply with operational rules and regulations.

## 8. LAND AND SHORELINE USE

- a. *What is the current use of the site and adjacent properties?*

The site is currently housed with a single-family residence. The properties surrounding the site are all single-family residences or vacant.

- b. *Has the site been used for agriculture? If so, describe.*

The previous owner's of the property may have used the property for pasture purposes for their animals.

- c. *Describe any structures on the site.*

A single-family residence currently exists on the project site.

- d. *Will any structures be demolished? If so, what?*

Yes, all structures will be demolished.

- e. *What is the current zoning classification of the site?*

The site is currently zoned Moderate Development.

- f. *What is the current comprehensive plan designation of the site?*

The current comprehensive plan designation is MD (SFR & Duplex).

- g. *If applicable, what is the current shoreline master program designation of the site?*

Not Applicable.

- h. *Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.*

There are several wetlands onsite. Please refer to the critical areas study submitted for this proposal.

- i. *Approximately how many people would reside or work in the completed project?*

Assuming 3 people per household, the completed project would house a total of 78 people.

- j. *Approximately how many people would the completed project displace?*

Assuming 3 people per household, a total of three people would be displaced by the completed project.

- k. *Proposed measures to avoid or reduce displacement impacts, if any:*

None.

- l. *Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:*

The site is designed to comply with the codes and requirements of the City of Sultan. The project will be reviewed by the City of Sultan for compliance with codes and policies prior to issuance of any development permits, and prior to any site development work.

## 9. HOUSING

- a. *Approximately how many units would be provided, if any? Indicate whether high, middle, or low income housing.*

26 new middle-income single-family units will be provided.

- b. *Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low income housing.*

One middle-income housing unit will be eliminated.

- c. *Proposed measure to reduce or control housing impacts, if any:*

The applicant and future property owners will pay a proportionate share of mitigation fees and property taxes for impacts to streets, schools, parks and other potential housing impacts.

#### **10. AESTHETICS**

- a. *What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?*

All proposed structures meet the height restrictions of the City of Sultan zoning code. Principal exterior building materials will consist primarily of wood and masonry.

- b. *What views in the immediate vicinity would be altered or obstructed?*

No views in the immediate vicinity would be altered or obstructed.

- c. *Proposed measures to reduce or control aesthetic impacts, if any:*

The proposed development meets the applicable, aesthetic development regulations and comprehensive guidelines of the City of Sultan. Also, the applicant and/or future lot owners will provide ornamental landscaping typical of a residential development such as this.

#### **11. LIGHT AND GLARE**

- a. *What type of light or glare will the proposal produce? What time of day would it mainly occur?*

Light and glare will be produced by vehicle traveling along Sultan Basin Rd and Bryant Rd to the housing units. It may also be produced from the housing units and their outdoor lighting. Light and glare will also be produced in the early morning and evening hours when no natural lighting is available.

- b. *Could light or glare from the finished project be a safety hazard or interfere with views?*

No, light and glare from the finished project would not be a safety hazard or will not interfere with any views.

- c. *What existing off-site sources of light or glare may affect your proposal?*

Headlights from off-site vehicles traveling along Bryant Rd. and Sultan Basin Rd may affect this proposal. However, the affects are expected to be minimal.

- d. *Proposed measures to reduce or control light and glare impacts, if any:*

There are no proposed measures to reduce or control light and glare impacts.

#### **12. RECREATION**

- a. *What designated and informal recreational opportunities are in the immediate vicinity?*

The applicant proposes an active recreation area, as well as many passive recreation opportunities onsite.

- b. *Would the proposed project displace any existing recreational uses? If so, describe.*

No, the project would not displace any existing recreational uses.

- c. *Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:*

There are no proposed measures to reduce or control impacts on recreation.

### 13. HISTORIC AND CULTURAL PRESERVATION

- a. *Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.*

No, there are no known objects listed on or proposed for national, state or local preservation registers on or near the site.

- b. *Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.*

There are no known landmarks or evidence of historic, archaeological, scientific or cultural importance known to be on or next to the site.

- c. *Proposed measures to reduce or control impacts, if any:*

In the event that archaeological artifacts are discovered during grading of the site, activity in that area would be halted and a State Historic Preservation Officer would be contacted.

### 14. TRANSPORTATION

- a. *Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.*

The project will take access off of Bryant Road.

- b. *Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?*

The site is not currently served by public transit. The closest transit stop is located directly south of the intersection of Sultan Basin Road and Highway 2, approximately a ½ mile south of the site in the City of Sultan.

- c. *How many parking spaces would the completed project have? How many would the project eliminate?*

57 spaces are proposed. 4 spaces will be eliminated.

- d. *Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).*

Three access roads will be constructed for this project. Bryant and Sultan Basin Roads will be improved to meet City of Sultan standards.

- e. *Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.*

No, the project will not use or occur in the immediate vicinity of water, rail or air transportation.

- f. *How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.*

Assuming 9.57 ADT per unit, 249 trips per day would be generated by this completed project.

- g. *Proposed measures to reduce or control transportation impacts, if any:*

Mitigation fees will be paid to the City of Sultan as well as to other agencies with inter-local agreements with the City of Sultan.

**15. PUBLIC SERVICES**

- a. *Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.*

The project will result in an increased need for public services typical of a development of this size and type.

- b. *Proposed measures to reduce or control direct impacts on public services, if any:*

Mitigation fees will be paid as a result of the project approval process.

**16. UTILITIES**

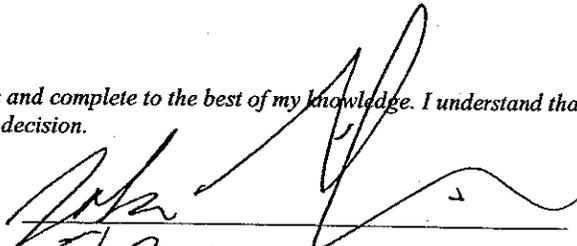
- a. *Underline utilities currently available at the site: electricity; natural gas; water; refuse service; telephone; sanitary sewer; septic system; other.*
- b. *Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.*

Electricity:	Snohomish County PUD, District #1
Water:	City of Sultan
Sewer:	City of Sultan
Telephone:	Verizon
Refuse:	Waste Management NW

**C. SIGNATURE**

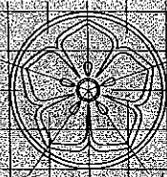
*The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.*

Signature:

  
\_\_\_\_\_

Date Submitted:

5/5/06  
\_\_\_\_\_



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

**Preliminary Drainage Report  
for the Proposed Plat of  
Anderson Farm  
Sultan, Washington**

**RECEIVED**  
MAY - 4 2006

BY: .....

Prepared for:  
Grandview Construction  
Scott Wammack  
P.O. Box 159  
Arlington, WA 98223

Prepared by:  
James A. Kresge, P. E.

April 28, 2006

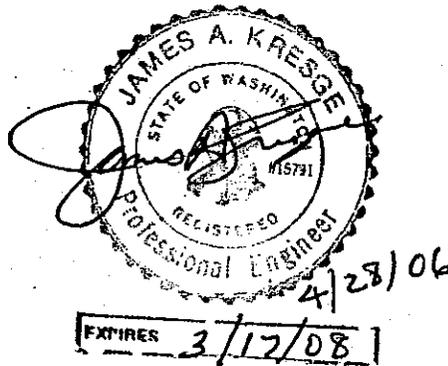
**EXHIBIT**

3-9c

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

150 North 7th Street  
Springfield, Oregon 97477  
(541) 988-1862  
Fax: (541) 988-1863

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## INTRODUCTION

Anderson Farm is a 26-lot PUD-SF plat proposed for construction on the northwest and southwest corner of the Sultan Basin Road and 135<sup>th</sup> Street Southeast intersection, in Sultan. The site is 6.47 acres and includes wetlands.

The design of the north half of the site incorporates low impact stormwater management technologies to take advantage of the site's unique critical areas.

The south half of the site will be treated with traditional detention ponds (concrete walls) and an enclosed drainage system consisting of three basins to more effectively determine the drainage for each developed area. All three basins are more fully defined in this report.

The site existing and proposed drainage will be determined and all proposed rainfall on site will be detained in detention areas and flow will be restricted to ensure the developed flow meets the existing conditions, per DOE 2005 requirements.

## EXISTING CONDITIONS

The project site is a 6.47-acres. There are 3.68 acres in the north half of the project and 2.79 acres in the south half of the project site.

An existing single-family residence with associated outbuilding, pasture, critical areas and landscape areas make up the conditions of the north half of the site (north of 135<sup>th</sup> Street S. E). The existing residence takes access from 135<sup>th</sup> Street SE (Bryant Road).

The south half of the project includes second growth forest and brush together with critical areas. No buildings or improvements exist on the south half of the site.

The site is nearly level, with 3% grades flowing southeasterly to a ditch and pipe system on the Sultan Basin Road. Critical areas also flow towards the Sultan Basin Road in a southeasterly direction. Anecdotal reports indicate that standing water accumulates in the depression areas intermittently during the rainy season, but quickly pass through the areas, leaving wet spots in the depression areas.

Drainage ditches and a drainage pipe system provide drainage flow to the south along Sultan Basin road. (See downstream report).

The SCS Soil Survey for Snohomish County identifies the predominant site soil type as Pastik, which is a type C soil. This soil tends to be deep, well drained soil that typically sits on terraces. The main area of concern is the seasonal high water table. Pastik soils commonly have subsurface infiltration rates of 0.6 to 2 inches per hour. See the Geo-Tech soils report for complete soils data, which include test pits.

## DEVELOPED CONDITIONS

The proposed project includes the creation of 26 single-family PUD-SF lots accessed from 135<sup>th</sup> Street SE by a private road system. Additional off-street parking will be provided within the plat. Frontage improvements are proposed along both 135<sup>th</sup> Street SE and Sultan Basin Road.

The site will be filled with structural material to insure that the homes' finished floors will be a minimum of 1.6 feet above the 100-year flood elevation. Portions of the site will be filled to depths of as much as five feet. In some cases, garage floors may be constructed lower than living space floors.

### Basin 1

Stormwater runoff for the developed section of the north half of the site is proposed using the 2005 Low Impact Development Technical Guideline Manual for Puget Sound, which is referred to by the 2005 DOE manual as preferred development guidelines. Basin 1 will use the wetland as a detention area that will be enhanced per an agreement with the Core of Engineers (letter is attached.) The drainage system will include a filter strip, for water quality, along the roadway which flows into a bio-retention cell as discussed in chapter 6 of the Technical Manual. Runoff from the internal road system and the developed area will be detained in the wetland detention system, will be infiltrated and treated, using the bio-retention swale system under drain. More complete information will be presented in the construction plans and full drainage report.

### Basin 2

Basin 2 consists of upstream offsite drainage that will by pass the site systems. No site drainage will enter this basin. The by-pass catch basin and pipe system will be designed during construction plan design. The system will be swale like it is today up to 135<sup>th</sup> Street SE. At 135<sup>th</sup> Street, drainage will enter a catch basin and pipe system that flows south of 135<sup>th</sup> to the south portion of the project site where it outfalls into the existing ditch system. No other change is planned for this existing drainage by-pass area.

### Basin 3

Basin 3 consists of on site drainage and part of the 135<sup>th</sup> Street SE frontage improvements area. Basin 3 will use a traditional closed catch basin/culvert/pipe and open detention pond (concrete walls), which will include a water quality pond to be approved by the city.

### Basin 4

Basin 4 will use a traditional closed catch basin/culvert/pipe/open detention pond (concrete walls), which includes a water quality pond to be approved by the city. The basin includes the frontage improvements and existing west half of Sultan Basin Road north of 135<sup>th</sup> Street SE and part of the drainage along 135<sup>th</sup> Street SE, together with the site improvement area for lots 1 thru 4.

The frontage improvements along the Sultan Basin Road, south of 135th Street SE bypasses the pond. This drainage is too low to be included in a detention pond. This frontage is included in the pond calculations for flow control from the site.

## **SITE DATA**

The internal private road system will be designed using the geotechnical report and will conform to the section shown on the plans. This section exceeds the geo-tech requirements (see geo-tech report)

Supplemental parking will be surfaced to match the off site private roadway.

During construction design, in accordance with the 2005 DOE manual, roof drains will be directed to the wetland areas directly, where possible.

Lawn and landscape areas will be enhanced with 6"-8" of topsoil with high organic content, engineered both for vigorous and deep-rooted vegetative cover, as well as retention and slow release of stormwater.

Where filling is needed to meet required elevations or to replace near-surface material determined to be unsuitable for infiltration or building support, the fill material will be free-draining structural rock or other material as specified by the project geotechnical engineer. This will ensure that there is no barrier to water movement down to the native subsoil.

Water quality treatment will be provided by natural bacterial, cation exchange and filtration processes in the topsoil, in the sandy subsoil and in the voids on the north section of the site. Water quality will be provided by water quality ponds in the detention ponds in the southern portion of the site.

These detention and drainage systems will be designed using the current 2005 DOE manual. The system will allow ½ of the existing 2-year storm and will match the 10-year and 100-year existing storm drainage requirements. The drainage design uses the Western Washington Hydrology Manual (WWHM) for 2005.

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## **UPSTREAM ANALYSIS**

The upstream area will continue to flow to the Sultan Basin Road as it has in the past. During the construction portion of the project pipe sizing along the Sultan Basin Road in the by-pass system will be evaluated to determine sizing of the system. Maintaining existing critical area storm drainage will be a part of this evaluation.

## **DOWNSTREAM ANALYSIS**

The downstream drainage flows south along the Sultan Basin Road in an existing ditch and culvert system, until it enters an enclosed drainage system in a recently developed area. The drainage flows south in the developed area until it enters an existing detention pond. From the detention pond the drainage crosses the Sultan Basin Road in a culvert and continues to flow southwesterly to an existing ravine.

## **CONCLUSIONS**

The north site proposal is an innovative approach to stormwater management. High groundwater complicates the design of conventional engineered infiltration or detention facilities.

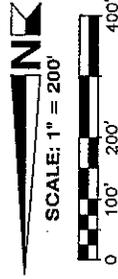
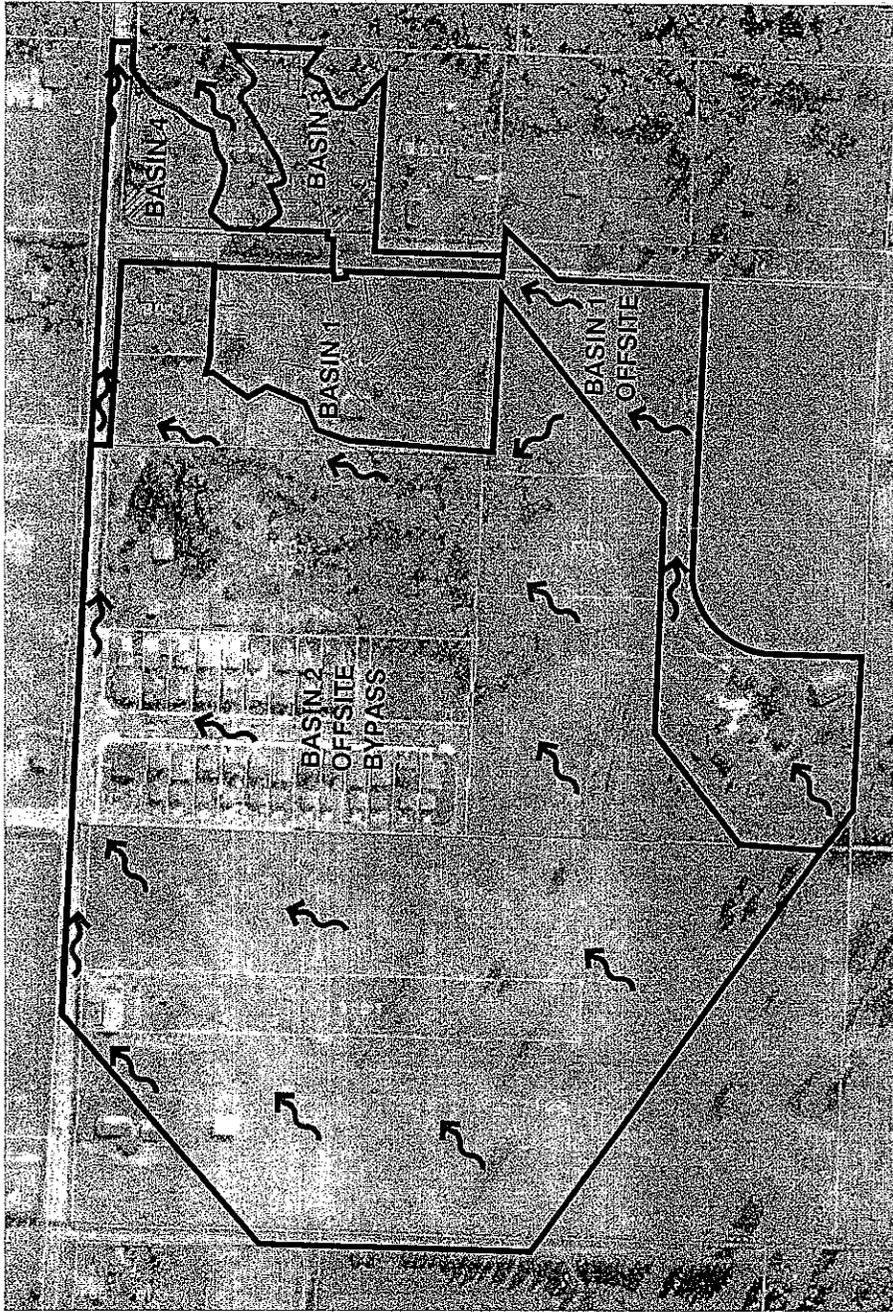
At times of intermittent high groundwater, we expect the site to respond as it does now: Water will accumulate in the depression and subsurface movement of infiltrating stormwater may be temporarily impeded. The net result will be no different than what occurs on the site currently under existing conditions. The native soils underlying the site have a demonstrated capacity to retain all rainfall on the site. Additionally, by filling the site to required elevations, we will provide greater depth to maximum groundwater elevations.

The south half of the site will use a conventional stormwater system that meets the DOE 2005 manual requirements.

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**APPENDIX**

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**ANDERSON FARM PLAT  
OFFSITE DRAINAGE  
BASIN MAP 1**

DRAWN BY: AUB  
DATE: 04-28-06

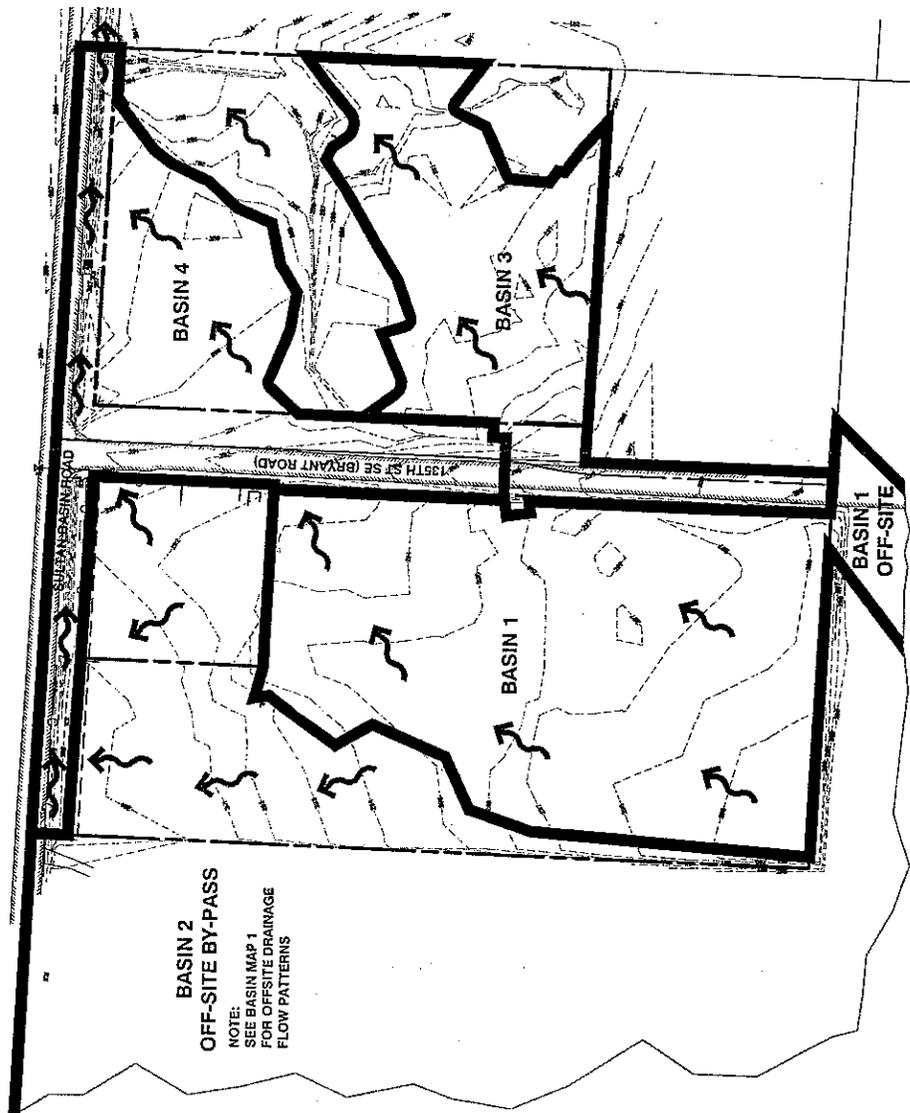
JOB NO.  
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**HIGA-BURKHOLDER  
ASSOCIATES, LLC**  
LAND USE PLANNING / CIVIL ENGINEERING  
152 North Seventh Street  
Cedar Rapids, Iowa 52401  
Phone: 319-252-2828 Fax: 319-252-2828  
www.higa-burkholder.com

H:\PROJECT FILES\ACTIVE\WAMAND\G\WAMAND.BASIN.dwg, 5/22/2006 4:28:16 PM, mpruzemski, Copyright 2006 Higa Burkholder Associates

# ANDERSON FARM PLAT PRE-DEVELOPED BASIN MAP 2

JOB NO.  
1765  
DRAWN BY: AJB  
DATE: 04-28-06

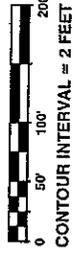


**BASIN 2  
OFF-SITE BY-PASS**  
NOTE:  
SEE BASIN MAP 1  
FOR OFFSITE DRAINAGE  
FLOW PATTERNS

NOTE:  
SEE BASIN MAP 1  
FOR OFFSITE DRAINAGE  
FLOW PATTERNS



SCALE: 1" = 100'

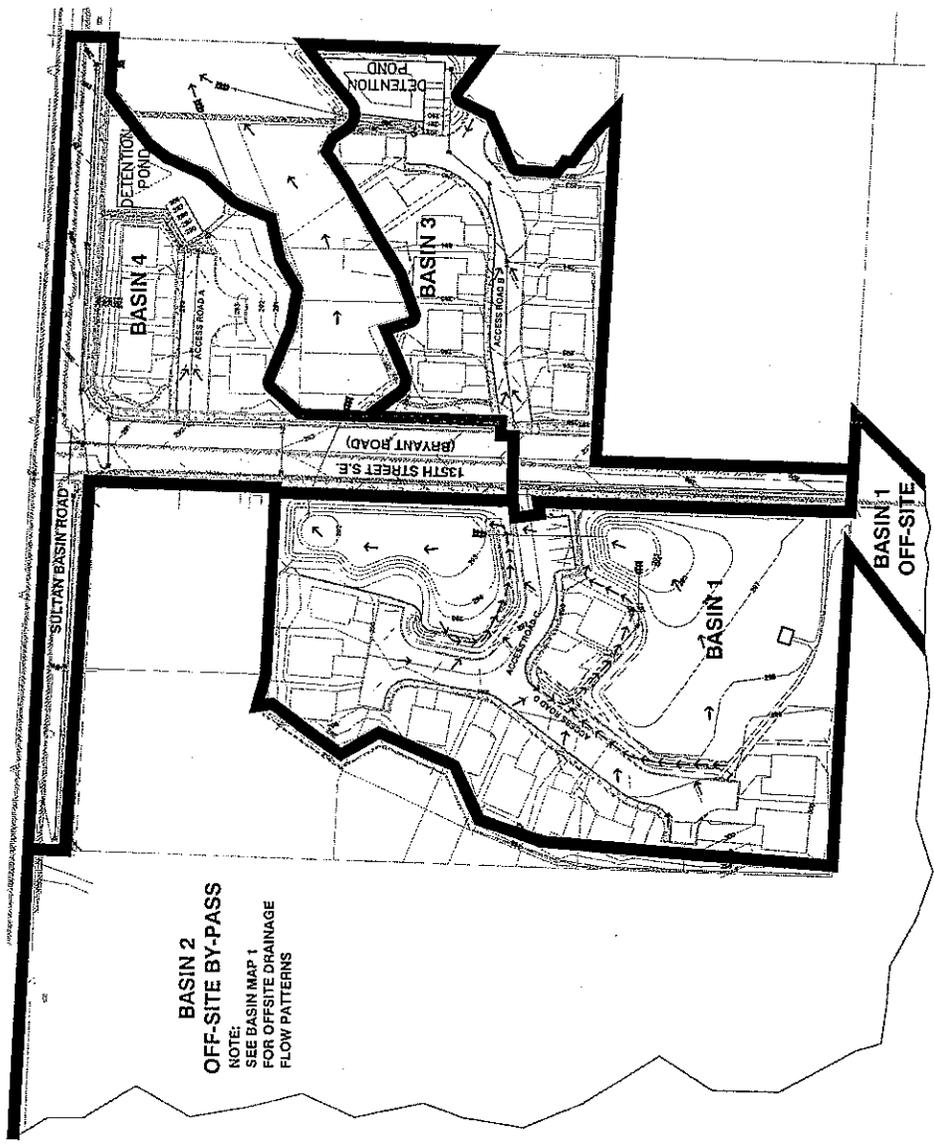


CONTOUR INTERVAL = 2 FEET

**HIGA-BURKHOLDER ASSOCIATES, LLC**  
LAND SURVEYING / CIVIL ENGINEERING  
1251 Howell Avenue, Suite 401  
Cedar Rapids, Iowa 52402  
(319) 255-0851 Fax (319) 255-1995

# ANDERSON FARM PLAT DEVELOPED BASIN MAP 3

JOB NO. 1765  
DRAWN BY: ALB  
DATE: 04-28-06



**BASIN 2  
OFF-SITE BY-PASS**  
NOTE:  
SEE BASIN MAP 1  
FOR OFFSITE DRAINAGE  
FLOW PATTERNS

NOTE:  
SEE BASIN MAP 1  
FOR OFFSITE DRAINAGE  
FLOW PATTERNS

**HIGA-BURKHOLDER  
ASSOCIATES, LLC**  
LAND USE PLANNING / CIVIL ENGINEERING  
1121 North Lincoln Street, Suite 401  
Columbus, Mississippi 39201  
(601) 257-9831 Fax  
(601) 257-9831 Fax



WESTERN WASHINGTON HYDROLOGY MODEL V2  
PROJECT REPORT

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Project Name: Anderson Farm Basin 1  
Site Address:  
City : Sultan  
Report Date : 4/24/2006  
Gage : Everett  
Data Start : 1948  
Data End : 1997  
Precip Scale: 1.60

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PREDEVELOPED LAND USE

Basin : Basin 1 upstream off site  
Flows To : Basin 1 on site  
GroundWater: No

<u>Land Use</u>	<u>Acres</u>
TILL PASTURE:	3.22
TILL GRASS:	0.12
IMPERVIOUS:	0.49

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Basin : Basin 1 on site  
Flows To : Point of Compliance  
GroundWater: No

<u>Land Use</u>	<u>Acres</u>
TILL FOREST:	2.63

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DEVELOPED LAND USE

Basin : Basin 1 up stream off site  
Flows To : Basin 1 on site  
GroundWater: No

<u>Land Use</u>	<u>Acres</u>
TILL PASTURE:	3.22
TILL GRASS:	0.12
IMPERVIOUS:	0.49

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Basin : Basin 1 on site  
Flows To : Basin pond on site  
GroundWater: No

<u>Land Use</u>	<u>Acres</u>
TILL PASTURE:	1.26
TILL GRASS:	0.38
IMPERVIOUS:	0.99

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RCHRES (POND) INFORMATION

Pond Name: Basin 1 pond on site  
 Pond Type: Detention Pond  
 Pond Flows to : Point of Compliance  
 Pond Rain / Evap is not activated.

Dimensions

Depth: 4ft.  
 Bottom Length: 57.38ft.  
 Bottom Width : 57.38ft.  
 Side slope 1: 3 To 1  
 Side slope 2: 3 To 1  
 Side slope 3: 3 To 1  
 Side slope 4: 3 To 1  
 Volume at Riser Head: 0.305 acre-ft.

Discharge Structure

Riser Height: 3 ft.  
 Riser Diameter: 18 in.  
 NotchType : Rectangular  
 Notch Width : 0.280 ft.  
 Notch Height: 1.303 ft.  
 Orifice 1 Diameter: 3.372 in. Elevation: 0 ft.

Pond Hydraulic Table

Stage(ft)	Area(acr)	Volume(acr-ft)	Dschrg(cfs)	Infilt(cfs)
0.000	0.076	0.000	0.000	0.000
0.044	0.076	0.003	0.063	0.000
0.089	0.077	0.007	0.089	0.000
0.133	0.078	0.010	0.109	0.000
0.178	0.078	0.014	0.126	0.000
0.222	0.079	0.017	0.141	0.000
0.267	0.080	0.021	0.154	0.000
0.311	0.081	0.024	0.167	0.000
0.356	0.081	0.028	0.178	0.000
0.400	0.082	0.032	0.189	0.000
0.444	0.083	0.035	0.199	0.000
0.489	0.084	0.039	0.209	0.000
0.533	0.084	0.043	0.218	0.000
0.578	0.085	0.046	0.227	0.000
0.622	0.086	0.050	0.236	0.000
0.667	0.086	0.054	0.244	0.000
0.711	0.087	0.058	0.252	0.000
0.756	0.088	0.062	0.260	0.000
0.800	0.089	0.066	0.267	0.000
0.844	0.090	0.070	0.274	0.000
0.889	0.090	0.074	0.282	0.000
0.933	0.091	0.078	0.289	0.000
0.978	0.092	0.082	0.295	0.000
1.022	0.093	0.086	0.302	0.000
1.067	0.093	0.090	0.308	0.000
1.111	0.094	0.094	0.315	0.000
1.156	0.095	0.098	0.321	0.000
1.200	0.096	0.103	0.327	0.000
1.244	0.097	0.107	0.333	0.000
1.289	0.097	0.111	0.339	0.000
1.333	0.098	0.115	0.345	0.000
1.378	0.099	0.120	0.351	0.000
1.422	0.100	0.124	0.356	0.000
1.467	0.101	0.129	0.362	0.000

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1.511	0.101	0.133	0.367	0.000
1.556	0.102	0.138	0.372	0.000
1.600	0.103	0.142	0.378	0.000
1.644	0.104	0.147	0.383	0.000
1.689	0.105	0.152	0.388	0.000
1.733	0.105	0.156	0.400	0.000
1.778	0.106	0.161	0.419	0.000
1.822	0.107	0.166	0.444	0.000
1.867	0.108	0.170	0.471	0.000
1.911	0.109	0.175	0.502	0.000
1.956	0.110	0.180	0.534	0.000
2.000	0.111	0.185	0.569	0.000
2.044	0.111	0.190	0.605	0.000
2.089	0.112	0.195	0.643	0.000
2.133	0.113	0.200	0.682	0.000
2.178	0.114	0.205	0.722	0.000
2.222	0.115	0.210	0.763	0.000
2.267	0.116	0.215	0.805	0.000
2.311	0.117	0.220	0.848	0.000
2.356	0.117	0.225	0.891	0.000
2.400	0.118	0.231	0.935	0.000
2.444	0.119	0.236	0.980	0.000
2.489	0.120	0.241	1.025	0.000
2.533	0.121	0.247	1.070	0.000
2.578	0.122	0.252	1.115	0.000
2.622	0.123	0.258	1.160	0.000
2.667	0.124	0.263	1.206	0.000
2.711	0.125	0.269	1.254	0.000
2.756	0.125	0.274	1.309	0.000
2.800	0.126	0.280	1.364	0.000
2.844	0.127	0.285	1.421	0.000
2.889	0.128	0.291	1.479	0.000
2.933	0.129	0.297	1.537	0.000
2.978	0.130	0.302	1.597	0.000
3.022	0.131	0.308	1.678	0.000
3.067	0.132	0.314	1.884	0.000
3.111	0.133	0.320	2.178	0.000
3.156	0.134	0.326	2.537	0.000
3.200	0.135	0.332	2.951	0.000
3.244	0.136	0.338	3.413	0.000
3.289	0.137	0.344	3.920	0.000
3.333	0.137	0.350	4.467	0.000
3.378	0.138	0.356	5.051	0.000
3.422	0.139	0.362	5.670	0.000
3.467	0.140	0.368	6.323	0.000
3.511	0.141	0.375	7.008	0.000
3.556	0.142	0.381	7.722	0.000
3.600	0.143	0.387	8.466	0.000
3.644	0.144	0.394	9.238	0.000
3.689	0.145	0.400	10.04	0.000
3.733	0.146	0.407	10.86	0.000
3.778	0.147	0.413	11.71	0.000
3.822	0.148	0.420	12.59	0.000
3.867	0.149	0.426	13.48	0.000
3.911	0.150	0.433	14.41	0.000
3.956	0.151	0.440	15.35	0.000
4.000	0.152	0.446	16.32	0.000

ANALYSIS RESULTS

Flow Frequency Return Periods for Predeveloped

<u>Return Period</u>	<u>Flow(cfs)</u>
2 year	0.778144
5 year	1.250253
10 year	1.635694
25 year	2.214027
50 year	2.716682
100 year	3.285676

Flow Frequency Return Periods for Developed Mitigated

<u>Return Period</u>	<u>Flow(cfs)</u>
2 year	0.247665
5 year	0.316496
10 year	0.36661
25 year	0.43522
50 year	0.490293
100 year	0.548875

Yearly Peaks for Predeveloped and Developed-Mitigated

<u>Year</u>	<u>Predeveloped</u>	<u>Developed</u>
1949	0.810	0.224
1950	1.539	0.245
1951	0.402	0.217
1952	0.661	0.192
1953	0.976	0.185
1954	1.400	0.255
1955	1.171	0.277
1956	0.520	0.297
1957	1.138	0.306
1958	2.161	0.282
1959	0.548	0.257
1960	0.783	0.271
1961	3.060	0.292
1962	1.134	0.253
1963	1.920	0.247
1964	0.528	0.223
1965	0.371	0.251
1966	0.431	0.189
1967	0.613	0.241
1968	0.874	0.303
1969	2.158	0.214
1970	0.500	0.209
1971	1.032	0.268
1972	1.963	0.266
1973	0.791	0.227
1974	0.788	0.230
1975	0.850	0.208
1976	0.645	0.250
1977	0.424	0.196
1978	0.445	0.185
1979	1.729	0.287
1980	0.491	0.211
1981	0.627	0.225
1982	0.581	0.309
1983	0.817	0.218
1984	0.706	0.285
1985	0.865	0.281

1986	1.472	0.557
1987	1.026	0.335
1988	0.572	0.250
1989	1.057	0.176
1990	0.408	0.266
1991	0.444	0.272
1992	0.636	0.229
1993	0.572	0.199
1994	0.367	0.242
1995	0.435	0.292
1996	0.835	0.305
1997	1.733	0.917

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**Ranked Yearly Peaks for Predeveloped and Developed-Mitigated**

Rank	Predeveloped	Developed
1	3.0599	0.9165
2	2.1611	0.5567
3	2.1576	0.3346
4	1.9632	0.3094
5	1.9203	0.3058
6	1.7330	0.3047
7	1.7291	0.3031
8	1.5391	0.2975
9	1.4719	0.2924
10	1.3997	0.2923
11	1.1708	0.2871
12	1.1384	0.2847
13	1.1337	0.2822
14	1.0572	0.2806
15	1.0322	0.2768
16	1.0257	0.2715
17	0.9757	0.2714
18	0.8741	0.2678
19	0.8653	0.2662
20	0.8495	0.2656
21	0.8350	0.2568
22	0.8172	0.2550
23	0.8097	0.2528
24	0.7905	0.2514
25	0.7884	0.2503
26	0.7832	0.2500
27	0.7056	0.2472
28	0.6615	0.2451
29	0.6450	0.2417
30	0.6358	0.2407
31	0.6274	0.2298
32	0.6132	0.2294
33	0.5813	0.2271
34	0.5723	0.2251
35	0.5718	0.2243
36	0.5481	0.2225
37	0.5275	0.2178
38	0.5199	0.2174
39	0.4995	0.2144
40	0.4909	0.2108
41	0.4448	0.2088
42	0.4439	0.2076
43	0.4353	0.1986
44	0.4311	0.1963
45	0.4242	0.1924

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46	0.4077	0.1895
47	0.4020	0.1847
48	0.3707	0.1846
49	0.3667	0.1759

1/2 2 year to 50 year

Flow(CFS)	Predev	Final	Percentage	Pass/Fail
0.3891	415	415	100.0	Pass
0.4126	350	320	91.0	Pass
0.4361	292	258	88.0	Pass
0.4596	259	227	87.0	Pass
0.4831	226	188	83.0	Pass
0.5066	202	167	82.0	Pass
0.5301	173	147	84.0	Pass
0.5537	151	131	86.0	Pass
0.5772	136	120	88.0	Pass
0.6007	124	104	83.0	Pass
0.6242	111	94	84.0	Pass
0.6477	102	83	81.0	Pass
0.6712	94	77	81.0	Pass
0.6947	87	73	83.0	Pass
0.7182	77	65	84.0	Pass
0.7417	71	62	87.0	Pass
0.7653	69	57	82.0	Pass
0.7888	59	52	88.0	Pass
0.8123	53	46	86.0	Pass
0.8358	50	42	84.0	Pass
0.8593	46	38	82.0	Pass
0.8828	40	35	87.0	Pass
0.9063	39	31	79.0	Pass
0.9298	38	30	78.0	Pass
0.9533	37	29	78.0	Pass
0.9769	32	25	78.0	Pass
1.0004	29	23	79.0	Pass
1.0239	28	23	82.0	Pass
1.0474	25	23	92.0	Pass
1.0709	21	21	100.0	Pass
1.0944	20	14	70.0	Pass
1.1179	19	13	68.0	Pass
1.1414	17	12	70.0	Pass
1.1649	17	11	64.0	Pass
1.1885	16	9	56.0	Pass
1.2120	15	9	60.0	Pass
1.2355	15	9	60.0	Pass
1.2590	14	7	50.0	Pass
1.2825	14	7	50.0	Pass
1.3060	12	6	50.0	Pass
1.3295	12	6	50.0	Pass
1.3530	12	6	50.0	Pass
1.3765	12	6	50.0	Pass
1.4001	11	6	54.0	Pass
1.4236	11	6	54.0	Pass
1.4471	11	6	54.0	Pass
1.4706	10	6	60.0	Pass
1.4941	9	6	66.0	Pass
1.5176	9	6	66.0	Pass
1.5411	8	6	75.0	Pass
1.5646	8	6	75.0	Pass
1.5881	8	6	75.0	Pass
1.6117	8	5	62.0	Pass

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1.6352	8	5	62.0	Pass
1.6587	8	5	62.0	Pass
1.6822	8	4	50.0	Pass
1.7057	8	4	50.0	Pass
1.7292	8	4	50.0	Pass
1.7527	6	4	66.0	Pass
1.7762	6	3	50.0	Pass
1.7997	6	3	50.0	Pass
1.8233	6	1	16.0	Pass
1.8468	6	1	16.0	Pass
1.8703	6	0	.0	Pass
1.8938	6	0	.0	Pass
1.9173	6	0	.0	Pass
1.9408	5	0	.0	Pass
1.9643	4	0	.0	Pass
1.9878	4	0	.0	Pass
2.0113	4	0	.0	Pass
2.0349	4	0	.0	Pass
2.0584	4	0	.0	Pass
2.0819	4	0	.0	Pass
2.1054	3	0	.0	Pass
2.1289	3	0	.0	Pass
2.1524	3	0	.0	Pass
2.1759	1	0	.0	Pass
2.1994	1	0	.0	Pass
2.2229	1	0	.0	Pass
2.2465	1	0	.0	Pass
2.2700	1	0	.0	Pass
2.2935	1	0	.0	Pass
2.3170	1	0	.0	Pass
2.3405	1	0	.0	Pass
2.3640	1	0	.0	Pass
2.3875	1	0	.0	Pass
2.4110	1	0	.0	Pass
2.4345	1	0	.0	Pass
2.4581	1	0	.0	Pass
2.4816	1	0	.0	Pass
2.5051	1	0	.0	Pass
2.5286	1	0	.0	Pass
2.5521	1	0	.0	Pass
2.5756	1	0	.0	Pass
2.5991	1	0	.0	Pass
2.6226	1	0	.0	Pass
2.6461	1	0	.0	Pass
2.6697	1	0	.0	Pass
2.6932	1	0	.0	Pass
2.7167	1	0	.0	Pass

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WESTERN WASHINGTON HYDROLOGY MODEL V2  
PROJECT REPORT

Project Name: Anderson Farm BASIN 2 UPSTREAM BY-PASS BASIN  
 Site Address:  
 City : SULTAN  
 Report Date : 4/26/2006  
 Gage : Everett  
 Data Start : 1948  
 Data End : 1997  
 Precip Scale: 1.40

PREDEVELOPED LAND USE

Basin : BASIN 2  
 Flows To : Point of Compliance  
 GroundWater: No

Land Use	Acres
TILL PASTURE:	18.12
TILL GRASS:	1.94
IMPERVIOUS:	2.92

Pond Hydraulic Table

Stage(ft)	Area(acr)	Volume(acr-ft)	Dschrg(cfs)	Infilt(cfs)
0.000	0.603	0.000	0.000	0.000
0.078	0.606	0.047	0.211	0.000
0.156	0.610	0.094	0.298	0.000
0.233	0.613	0.142	0.365	0.000
0.311	0.617	0.190	0.422	0.000
0.389	0.620	0.238	0.471	0.000
0.467	0.624	0.286	0.516	0.000
0.544	0.627	0.335	0.558	0.000
0.622	0.631	0.384	0.596	0.000
0.700	0.634	0.433	0.632	0.000
0.778	0.638	0.482	0.667	0.000
0.856	0.641	0.532	0.699	0.000
0.933	0.645	0.582	0.730	0.000
1.011	0.649	0.632	0.760	0.000
1.089	0.652	0.683	0.789	0.000
1.167	0.656	0.734	0.817	0.000
1.244	0.659	0.785	0.843	0.000
1.322	0.663	0.836	0.869	0.000
1.400	0.667	0.888	0.894	0.000
1.478	0.670	0.940	0.919	0.000
1.556	0.674	0.992	0.943	0.000
1.633	0.678	1.045	0.966	0.000
1.711	0.681	1.098	0.989	0.000
1.789	0.685	1.151	1.011	0.000
1.867	0.689	1.204	1.033	0.000
1.944	0.693	1.258	1.054	0.000
2.022	0.696	1.312	1.075	0.000
2.100	0.700	1.366	1.095	0.000
2.178	0.704	1.421	1.116	0.000
2.256	0.708	1.476	1.135	0.000
2.333	0.711	1.531	1.155	0.000

2.411	0.715	1.587	1.174	0.000
2.489	0.719	1.642	1.193	0.000
2.567	0.723	1.698	1.211	0.000
2.644	0.726	1.755	1.229	0.000
2.722	0.730	1.811	1.247	0.000
2.800	0.734	1.868	1.265	0.000
2.878	0.738	1.926	1.282	0.000
2.956	0.742	1.983	1.300	0.000
3.033	0.746	2.041	1.317	0.000
3.111	0.749	2.099	1.333	0.000
3.189	0.753	2.158	1.350	0.000
3.267	0.757	2.216	1.366	0.000
3.344	0.761	2.275	1.382	0.000
3.422	0.765	2.335	1.398	0.000
3.500	0.769	2.394	1.434	0.000
3.578	0.773	2.454	1.491	0.000
3.656	0.777	2.515	1.560	0.000
3.733	0.781	2.575	1.637	0.000
3.811	0.785	2.636	1.720	0.000
3.889	0.789	2.697	1.808	0.000
3.967	0.793	2.759	1.901	0.000
4.044	0.797	2.821	1.996	0.000
4.122	0.801	2.883	2.094	0.000
4.200	0.805	2.945	2.194	0.000
4.278	0.809	3.008	2.295	0.000
4.356	0.813	3.071	2.397	0.000
4.433	0.817	3.134	2.499	0.000
4.511	0.821	3.198	2.621	0.000
4.589	0.825	3.262	2.746	0.000
4.667	0.829	3.326	2.875	0.000
4.744	0.833	3.391	3.008	0.000
4.822	0.837	3.456	3.145	0.000
4.900	0.841	3.521	3.284	0.000
4.978	0.845	3.587	3.427	0.000
5.056	0.849	3.653	3.573	0.000
5.133	0.854	3.719	3.723	0.000
5.211	0.858	3.785	3.875	0.000
5.289	0.862	3.852	4.030	0.000
5.367	0.866	3.919	4.188	0.000
5.444	0.870	3.987	4.349	0.000
5.522	0.874	4.055	4.513	0.000
5.600	0.878	4.123	4.680	0.000
5.678	0.883	4.191	4.849	0.000
5.756	0.887	4.260	5.021	0.000
5.833	0.891	4.329	5.196	0.000
5.911	0.895	4.399	5.373	0.000
5.989	0.900	4.469	5.553	0.000
6.067	0.904	4.539	5.841	0.000
6.144	0.908	4.609	6.403	0.000
6.222	0.912	4.680	7.143	0.000
6.300	0.917	4.751	8.025	0.000
6.378	0.921	4.823	9.028	0.000
6.456	0.925	4.894	10.14	0.000
6.533	0.930	4.967	11.35	0.000
6.611	0.934	5.039	12.65	0.000
6.689	0.938	5.112	14.04	0.000
6.767	0.942	5.185	15.50	0.000
6.844	0.947	5.258	17.04	0.000
6.922	0.951	5.332	18.65	0.000
7.000	0.956	5.406	20.34	0.000

ANALYSIS RESULTS  
Basin 2 upstream by-pass basin.

Flow Frequency Return Periods for Predeveloped

<u>Return Period</u>	<u>Flow(cfs)</u>
2 year	2.801985
5 year	4.368297
10 year	5.59105
25 year	7.357206
50 year	8.840256
100 year	10.472591

WESTERN WASHINGTON HYDROLOGY MODEL V2  
PROJECT REPORT

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Project Name: Anderson Farm BASIN 3  
Site Address:  
City : Sultan  
Report Date : 4/26/2006  
Gage : Everett  
Data Start : 1948  
Data End : 1997  
Precip Scale: 1.40

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PREDEVELOPED LAND USE

Basin : BASIN 3  
Flows To : Point of Compliance  
GroundWater: No

<u>Land Use</u>	<u>Acres</u>
TILL FOREST:	1.14
TILL GRASS:	0.11
IMPERVIOUS:	0.13

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DEVELOPED LAND USE

Basin : Basin 1  
Flows To : Pond 3  
GroundWater: No

<u>Land Use</u>	<u>Acres</u>
TILL FOREST:	0.2
TILL GRASS:	0.29
IMPERVIOUS:	0.89

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RCHRES (POND) INFORMATION

Pond Name: Pond 3  
 Pond Type: Open Pond w/concrete walls  
 Pond Flows to : Point of Compliance  
 Pond Rain / Evap is not activated.

Dimensions

Depth: 5ft.  
 Bottom Length: 58.94ft.  
 Bottom Width : 58.94ft.  
 Side slope 1: 0.5 To 1  
 Side slope 2: 0.5 To 1  
 Side slope 3: 0.5 To 1  
 Side slope 4: 0.5 To 1  
 Volume at Riser Head: 0.341 acre-ft.

Discharge Structure

Riser Height: 4 ft.  
 Riser Diameter: 18 in.  
 NotchType : Rectangular  
 Notch Width : 0.024 ft.  
 Notch Height: 1.701 ft.  
 Orifice 1 Diameter: 1.3053544822242 in. Elevation: 0 ft.

Pond Hydraulic Table

Stage(ft)	Area(acr)	Volume(acr-ft)	Dschrg(cfs)	Infilt(cfs)
0.000	0.080	0.000	0.000	0.000
0.056	0.080	0.004	0.011	0.000
0.111	0.080	0.009	0.015	0.000
0.167	0.080	0.013	0.018	0.000
0.222	0.080	0.018	0.021	0.000
0.278	0.081	0.022	0.024	0.000
0.333	0.081	0.027	0.026	0.000
0.389	0.081	0.031	0.028	0.000
0.444	0.081	0.036	0.030	0.000
0.500	0.081	0.040	0.032	0.000
0.556	0.081	0.045	0.033	0.000
0.611	0.081	0.049	0.035	0.000
0.667	0.082	0.054	0.037	0.000
0.722	0.082	0.058	0.038	0.000
0.778	0.082	0.063	0.039	0.000
0.833	0.082	0.067	0.041	0.000
0.889	0.082	0.072	0.042	0.000
0.944	0.082	0.077	0.043	0.000
1.000	0.082	0.081	0.045	0.000
1.056	0.083	0.086	0.046	0.000
1.111	0.083	0.090	0.047	0.000
1.167	0.083	0.095	0.048	0.000
1.222	0.083	0.100	0.049	0.000
1.278	0.083	0.104	0.051	0.000
1.333	0.083	0.109	0.052	0.000
1.389	0.084	0.113	0.053	0.000
1.444	0.084	0.118	0.054	0.000
1.500	0.084	0.123	0.055	0.000
1.556	0.084	0.127	0.056	0.000
1.611	0.084	0.132	0.057	0.000
1.667	0.084	0.137	0.058	0.000
1.722	0.084	0.141	0.059	0.000
1.778	0.085	0.146	0.060	0.000
1.833	0.085	0.151	0.061	0.000
1.889	0.085	0.156	0.062	0.000
1.944	0.085	0.160	0.062	0.000

200

2.000	0.085	0.165	0.063	0.000
2.056	0.085	0.170	0.064	0.000
2.111	0.086	0.174	0.065	0.000
2.167	0.086	0.179	0.066	0.000
2.222	0.086	0.184	0.067	0.000
2.278	0.086	0.189	0.068	0.000
2.333	0.086	0.194	0.069	0.000
2.389	0.086	0.198	0.071	0.000
2.444	0.087	0.203	0.074	0.000
2.500	0.087	0.208	0.078	0.000
2.556	0.087	0.213	0.081	0.000
2.611	0.087	0.218	0.085	0.000
2.667	0.087	0.222	0.090	0.000
2.722	0.087	0.227	0.094	0.000
2.778	0.087	0.232	0.099	0.000
2.833	0.088	0.237	0.103	0.000
2.889	0.088	0.242	0.108	0.000
2.944	0.088	0.247	0.113	0.000
3.000	0.088	0.252	0.118	0.000
3.056	0.088	0.257	0.123	0.000
3.111	0.088	0.261	0.128	0.000
3.167	0.089	0.266	0.133	0.000
3.222	0.089	0.271	0.138	0.000
3.278	0.089	0.276	0.143	0.000
3.333	0.089	0.281	0.149	0.000
3.389	0.089	0.286	0.155	0.000
3.444	0.089	0.291	0.161	0.000
3.500	0.090	0.296	0.168	0.000
3.556	0.090	0.301	0.174	0.000
3.611	0.090	0.306	0.181	0.000
3.667	0.090	0.311	0.188	0.000
3.722	0.090	0.316	0.195	0.000
3.778	0.090	0.321	0.202	0.000
3.833	0.090	0.326	0.209	0.000
3.889	0.091	0.331	0.216	0.000
3.944	0.091	0.336	0.224	0.000
4.000	0.091	0.341	0.231	0.000
4.056	0.091	0.346	0.423	0.000
4.111	0.091	0.351	0.774	0.000
4.167	0.091	0.356	1.227	0.000
4.222	0.092	0.361	1.764	0.000
4.278	0.092	0.367	2.373	0.000
4.333	0.092	0.372	3.046	0.000
4.389	0.092	0.377	3.778	0.000
4.444	0.092	0.382	4.565	0.000
4.500	0.092	0.387	5.402	0.000
4.556	0.093	0.392	6.286	0.000
4.611	0.093	0.397	7.217	0.000
4.667	0.093	0.402	8.190	0.000
4.722	0.093	0.408	9.205	0.000
4.778	0.093	0.413	10.26	0.000
4.833	0.093	0.418	11.35	0.000
4.889	0.094	0.423	12.48	0.000
4.944	0.094	0.428	13.65	0.000
5.000	0.094	0.434	14.85	0.000

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ANALYSIS RESULTS

Flow Frequency Return Periods for Predeveloped

<u>Return Period</u>	<u>Flow(cfs)</u>
2 year	0.122964
5 year	0.186003
10 year	0.23411
25 year	0.30237
50 year	0.358816
100 year	0.420204

Flow Frequency Return Periods for Developed Unmitigated

<u>Return Period</u>	<u>Flow(cfs)</u>
2 year	0.514925
5 year	0.685687
10 year	0.806516
25 year	0.968332
50 year	1.095699
100 year	1.229056

Flow Frequency Return Periods for Developed Mitigated

<u>Return Period</u>	<u>Flow(cfs)</u>
2 year	0.060397
5 year	0.08056
10 year	0.095442
25 year	0.116063
50 year	0.132798
100 year	0.150756

Yearly Peaks for Predeveloped and Developed-Mitigated

<u>Year</u>	<u>Predeveloped</u>	<u>Developed</u>
1949	0.118	0.057
1950	0.231	0.058
1951	0.071	0.055
1952	0.107	0.046
1953	0.148	0.048
1954	0.208	0.059
1955	0.180	0.063
1956	0.089	0.064
1957	0.176	0.072
1958	0.286	0.060
1959	0.095	0.059
1960	0.116	0.065
1961	0.348	0.063
1962	0.178	0.059
1963	0.281	0.057
1964	0.092	0.055
1965	0.065	0.058
1966	0.063	0.049
1967	0.149	0.058
1968	0.111	0.075
1969	0.298	0.055
1970	0.078	0.050
1971	0.151	0.060
1972	0.265	0.062
1973	0.122	0.054
1974	0.112	0.053
1975	0.131	0.050
1976	0.093	0.063

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1977	0.074	0.055
1978	0.080	0.044
1979	0.262	0.068
1980	0.078	0.052
1981	0.104	0.055
1982	0.097	0.090
1983	0.125	0.058
1984	0.107	0.065
1985	0.143	0.067
1986	0.224	0.197
1987	0.126	0.094
1988	0.087	0.061
1989	0.160	0.042
1990	0.070	0.061
1991	0.075	0.063
1992	0.104	0.053
1993	0.091	0.052
1994	0.063	0.059
1995	0.076	0.065
1996	0.139	0.073
1997	0.286	0.288

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**Ranked Yearly Peaks for Predeveloped and Developed-Mitigated**

Rank	Predeveloped	Developed
1	0.3476	0.2880
2	0.2983	0.1973
3	0.2859	0.0942
4	0.2858	0.0899
5	0.2810	0.0748
6	0.2655	0.0730
7	0.2616	0.0720
8	0.2307	0.0676
9	0.2242	0.0666
10	0.2076	0.0650
11	0.1799	0.0649
12	0.1778	0.0645
13	0.1758	0.0636
14	0.1603	0.0630
15	0.1508	0.0629
16	0.1486	0.0627
17	0.1483	0.0626
18	0.1430	0.0624
19	0.1389	0.0613
20	0.1312	0.0606
21	0.1264	0.0605
22	0.1246	0.0601
23	0.1220	0.0594
24	0.1180	0.0593
25	0.1157	0.0589
26	0.1117	0.0586
27	0.1112	0.0578
28	0.1068	0.0577
29	0.1066	0.0576
30	0.1043	0.0575
31	0.1038	0.0571
32	0.0971	0.0568
33	0.0947	0.0554
34	0.0927	0.0554
35	0.0923	0.0552
36	0.0911	0.0551

37	0.0890	0.0546
38	0.0875	0.0536
39	0.0802	0.0534
40	0.0781	0.0527
41	0.0778	0.0524
42	0.0763	0.0516
43	0.0748	0.0502
44	0.0736	0.0502
45	0.0707	0.0489
46	0.0696	0.0478
47	0.0652	0.0464
48	0.0625	0.0445
49	0.0625	0.0416

1/2 2 year to 50 year

Flow(CFS)	Predev	Final	Percentage	Pass/Fail
0.0615	616	503	81.0	Pass
0.0645	520	273	52.0	Pass
0.0675	441	177	40.0	Pass
0.0705	389	135	34.0	Pass
0.0735	339	117	34.0	Pass
0.0765	302	101	33.0	Pass
0.0795	270	96	35.0	Pass
0.0825	242	91	37.0	Pass
0.0855	214	83	38.0	Pass
0.0885	191	76	39.0	Pass
0.0915	170	69	40.0	Pass
0.0945	149	63	42.0	Pass
0.0975	143	58	40.0	Pass
0.1005	129	56	43.0	Pass
0.1035	122	55	45.0	Pass
0.1065	109	53	48.0	Pass
0.1095	101	50	49.0	Pass
0.1125	94	48	51.0	Pass
0.1155	91	46	50.0	Pass
0.1185	86	46	53.0	Pass
0.1215	81	43	53.0	Pass
0.1246	76	43	56.0	Pass
0.1276	69	40	57.0	Pass
0.1306	64	40	62.0	Pass
0.1336	60	39	65.0	Pass
0.1366	57	37	64.0	Pass
0.1396	52	35	67.0	Pass
0.1426	47	33	70.0	Pass
0.1456	45	31	68.0	Pass
0.1486	43	31	72.0	Pass
0.1516	40	30	75.0	Pass
0.1546	36	27	75.0	Pass
0.1576	30	27	90.0	Pass
0.1606	30	27	90.0	Pass
0.1636	27	24	88.0	Pass
0.1666	27	24	88.0	Pass
0.1696	26	23	88.0	Pass
0.1726	26	23	88.0	Pass
0.1756	24	21	87.0	Pass
0.1786	20	20	100.0	Pass
0.1816	19	19	100.0	Pass
0.1846	18	19	105.0	Pass
0.1876	16	17	106.0	Pass
0.1906	16	17	106.0	Pass

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0.1936	15	15	100.0	Pass
0.1966	14	14	100.0	Pass
0.1996	13	11	84.0	Pass
0.2026	13	10	76.0	Pass
0.2056	13	10	76.0	Pass
0.2086	12	8	66.0	Pass
0.2117	12	8	66.0	Pass
0.2147	12	7	58.0	Pass
0.2177	12	6	50.0	Pass
0.2207	11	5	45.0	Pass
0.2237	11	5	45.0	Pass
0.2267	10	4	40.0	Pass
0.2297	9	4	44.0	Pass
0.2327	8	4	50.0	Pass
0.2357	8	4	50.0	Pass
0.2387	8	4	50.0	Pass
0.2417	8	4	50.0	Pass
0.2447	7	4	57.0	Pass
0.2477	7	3	42.0	Pass
0.2507	7	3	42.0	Pass
0.2537	7	3	42.0	Pass
0.2567	7	3	42.0	Pass
0.2597	7	3	42.0	Pass
0.2627	6	2	33.0	Pass
0.2657	6	2	33.0	Pass
0.2687	5	2	40.0	Pass
0.2717	5	2	40.0	Pass
0.2747	5	2	40.0	Pass
0.2777	5	2	40.0	Pass
0.2807	5	2	40.0	Pass
0.2837	4	2	50.0	Pass
0.2867	2	1	50.0	Pass
0.2897	2	0	.0	Pass
0.2927	2	0	.0	Pass
0.2957	2	0	.0	Pass
0.2987	2	0	.0	Pass
0.3018	1	0	.0	Pass
0.3048	1	0	.0	Pass
0.3078	1	0	.0	Pass
0.3108	1	0	.0	Pass
0.3138	1	0	.0	Pass
0.3168	1	0	.0	Pass
0.3198	1	0	.0	Pass
0.3228	1	0	.0	Pass
0.3258	1	0	.0	Pass
0.3288	1	0	.0	Pass
0.3318	1	0	.0	Pass
0.3348	1	0	.0	Pass
0.3378	1	0	.0	Pass
0.3408	1	0	.0	Pass
0.3438	1	0	.0	Pass
0.3468	1	0	.0	Pass
0.3498	0	0	.0	Pass
0.3528	0	0	.0	Pass
0.3558	0	0	.0	Pass
0.3588	0	0	.0	Pass

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WESTERN WASHINGTON HYDROLOGY MODEL V2  
PROJECT REPORT

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Project Name: Anderson Farm Basin 4  
Site Address:  
City : SULTAN  
Report Date : 4/19/2006  
Gage : Everett  
Data Start : 1948  
Data End : 1997  
Precip Scale: 1.40

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PREDEVELOPED LAND USE

Basin : Basin 4  
Flows To : Point of Compliance  
GroundWater: No

<u>Land Use</u>	<u>Acres</u>
TILL FOREST:	1.26
IMPERVIOUS:	0.35

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DEVELOPED LAND USE

Basin : Basin 4  
Flows To : Pond 4  
GroundWater: No

<u>Land Use</u>	<u>Acres</u>
TILL GRASS:	0.41
IMPERVIOUS:	1.2

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RCHRES (POND) INFORMATION

Pond Name: Pond 4  
Pond Type: Open pond w/concrete walls.  
Pond Flows to : Point of Compliance  
Pond Rain / Evap is not activated.

Dimensions

Depth: 5ft.  
Bottom Length: 58.39ft.  
Bottom Width : 58.39ft.  
Side slope 1: 0.05 To 1  
Side slope 2: 0.05 To 1  
Side slope 3: 0.05 To 1  
Side slope 4: 0.05 To 1  
Volume at Riser Head: 0.315 acre-ft.

Discharge Structure

Riser Height: 4 ft.  
Riser Diameter: 18 in.  
NotchType : Rectangular  
Notch Width : 0.034 ft.  
Notch Height: 1.917 ft.  
Orifice 1 Diameter: 1.7198886 in. Elevation: 0 ft.

Pond Hydraulic Table

Stage(ft)	Area(acr)	Volume(acr-ft)	Dschrg(cfs)	Infilt(cfs)
0.000	0.078	0.000	0.000	0.000
0.056	0.078	0.004	0.018	0.000
0.111	0.078	0.009	0.026	0.000
0.167	0.078	0.013	0.032	0.000
0.222	0.078	0.017	0.037	0.000
0.278	0.078	0.022	0.041	0.000
0.333	0.078	0.026	0.045	0.000
0.389	0.078	0.030	0.048	0.000
0.444	0.078	0.035	0.052	0.000
0.500	0.078	0.039	0.055	0.000
0.556	0.078	0.044	0.058	0.000
0.611	0.078	0.048	0.061	0.000
0.667	0.078	0.052	0.063	0.000
0.722	0.078	0.057	0.066	0.000
0.778	0.078	0.061	0.069	0.000
0.833	0.078	0.065	0.071	0.000
0.889	0.079	0.070	0.073	0.000
0.944	0.079	0.074	0.076	0.000
1.000	0.079	0.078	0.078	0.000
1.056	0.079	0.083	0.080	0.000
1.111	0.079	0.087	0.082	0.000
1.167	0.079	0.091	0.084	0.000
1.222	0.079	0.096	0.086	0.000
1.278	0.079	0.100	0.088	0.000
1.333	0.079	0.105	0.090	0.000
1.389	0.079	0.109	0.092	0.000
1.444	0.079	0.113	0.093	0.000
1.500	0.079	0.118	0.095	0.000
1.556	0.079	0.122	0.097	0.000
1.611	0.079	0.126	0.099	0.000
1.667	0.079	0.131	0.100	0.000
1.722	0.079	0.135	0.102	0.000
1.778	0.079	0.140	0.104	0.000
1.833	0.079	0.144	0.105	0.000
1.889	0.079	0.148	0.107	0.000
1.944	0.079	0.153	0.108	0.000
2.000	0.079	0.157	0.110	0.000
2.056	0.079	0.161	0.111	0.000
2.111	0.079	0.166	0.113	0.000
2.167	0.079	0.170	0.117	0.000
2.222	0.079	0.175	0.122	0.000
2.278	0.079	0.179	0.127	0.000
2.333	0.079	0.183	0.132	0.000
2.389	0.079	0.188	0.138	0.000
2.444	0.079	0.192	0.144	0.000
2.500	0.079	0.197	0.151	0.000
2.556	0.079	0.201	0.158	0.000
2.611	0.079	0.205	0.164	0.000
2.667	0.079	0.210	0.171	0.000
2.722	0.079	0.214	0.179	0.000
2.778	0.079	0.218	0.186	0.000
2.833	0.079	0.223	0.193	0.000
2.889	0.079	0.227	0.201	0.000
2.944	0.079	0.232	0.208	0.000
3.000	0.079	0.236	0.216	0.000
3.056	0.079	0.240	0.223	0.000
3.111	0.079	0.245	0.231	0.000
3.167	0.079	0.249	0.240	0.000

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3.222	0.079	0.254	0.250	0.000
3.278	0.079	0.258	0.259	0.000
3.333	0.079	0.262	0.269	0.000
3.389	0.079	0.267	0.278	0.000
3.444	0.079	0.271	0.288	0.000
3.500	0.079	0.276	0.298	0.000
3.556	0.079	0.280	0.308	0.000
3.611	0.079	0.284	0.319	0.000
3.667	0.079	0.289	0.329	0.000
3.722	0.079	0.293	0.340	0.000
3.778	0.079	0.298	0.351	0.000
3.833	0.079	0.302	0.362	0.000
3.889	0.079	0.306	0.373	0.000
3.944	0.079	0.311	0.384	0.000
4.000	0.079	0.315	0.396	0.000
4.056	0.079	0.320	0.588	0.000
4.111	0.079	0.324	0.939	0.000
4.167	0.079	0.328	1.393	0.000
4.222	0.079	0.333	1.930	0.000
4.278	0.079	0.337	2.540	0.000
4.333	0.079	0.342	3.214	0.000
4.389	0.079	0.346	3.946	0.000
4.444	0.079	0.351	4.733	0.000
4.500	0.079	0.355	5.570	0.000
4.556	0.079	0.359	6.455	0.000
4.611	0.080	0.364	7.386	0.000
4.667	0.080	0.368	8.360	0.000
4.722	0.080	0.373	9.376	0.000
4.778	0.080	0.377	10.43	0.000
4.833	0.080	0.381	11.52	0.000
4.889	0.080	0.386	12.65	0.000
4.944	0.080	0.390	13.82	0.000
5.000	0.080	0.395	15.02	0.000

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ANALYSIS RESULTS

Flow Frequency Return Periods for Predeveloped

<u>Return Period</u>	<u>Flow(cfs)</u>
2 year	0.19983
5 year	0.284331
10 year	0.345901
25 year	0.430169
50 year	0.497715
100 year	0.569414

Flow Frequency Return Periods for Developed Unmitigated

<u>Return Period</u>	<u>Flow(cfs)</u>
2 year	0.58062
5 year	0.79306
10 year	0.946335
25 year	1.154782
50 year	1.321073
100 year	1.497033

Flow Frequency Return Periods for Developed Mitigated

<u>Return Period</u>	<u>Flow(cfs)</u>
2 year	0.110423
5 year	0.146683
10 year	0.174442
25 year	0.214026
50 year	0.24698
100 year	0.283076

Yearly Peaks for Predeveloped and Developed-Mitigated

<u>Year</u>	<u>Predeveloped</u>	<u>Developed</u>
1949	0.184	0.102
1950	0.339	0.108
1951	0.174	0.104
1952	0.168	0.088
1953	0.229	0.085
1954	0.295	0.098
1955	0.273	0.125
1956	0.129	0.109
1957	0.250	0.135
1958	0.407	0.129
1959	0.158	0.105
1960	0.175	0.125
1961	0.508	0.158
1962	0.254	0.109
1963	0.398	0.110
1964	0.150	0.104
1965	0.118	0.095
1966	0.125	0.087
1967	0.359	0.108
1968	0.207	0.172
1969	0.419	0.101
1970	0.143	0.089
1971	0.233	0.104
1972	0.398	0.121
1973	0.211	0.087
1974	0.189	0.099
1975	0.210	0.094

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1976	0.164	0.116
1977	0.125	0.102
1978	0.134	0.081
1979	0.362	0.177
1980	0.129	0.098
1981	0.159	0.097
1982	0.157	0.189
1983	0.195	0.107
1984	0.188	0.110
1985	0.218	0.132
1986	0.322	0.311
1987	0.214	0.167
1988	0.173	0.106
1989	0.239	0.080
1990	0.128	0.099
1991	0.129	0.107
1992	0.166	0.090
1993	0.160	0.099
1994	0.103	0.100
1995	0.122	0.103
1996	0.200	0.162
1997	0.376	0.401

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**Ranked Yearly Peaks for Predeveloped and Developed-Mitigated**

<b>Rank</b>	<b>Predeveloped</b>	<b>Developed</b>
1	0.5076	0.4013
2	0.4190	0.3109
3	0.4066	0.1887
4	0.3977	0.1767
5	0.3976	0.1721
6	0.3760	0.1666
7	0.3622	0.1625
8	0.3588	0.1583
9	0.3390	0.1353
10	0.3219	0.1325
11	0.2948	0.1294
12	0.2733	0.1250
13	0.2541	0.1249
14	0.2500	0.1208
15	0.2385	0.1161
16	0.2335	0.1104
17	0.2292	0.1097
18	0.2182	0.1094
19	0.2139	0.1090
20	0.2110	0.1085
21	0.2101	0.1076
22	0.2072	0.1072
23	0.2002	0.1070
24	0.1953	0.1062
25	0.1890	0.1054
26	0.1877	0.1044
27	0.1837	0.1040
28	0.1747	0.1036
29	0.1742	0.1030
30	0.1731	0.1023
31	0.1676	0.1017
32	0.1660	0.1014
33	0.1641	0.1003
34	0.1600	0.0988
35	0.1589	0.0987

36	0.1585	0.0985
37	0.1575	0.0978
38	0.1500	0.0975
39	0.1432	0.0970
40	0.1343	0.0952
41	0.1290	0.0945
42	0.1289	0.0898
43	0.1288	0.0888
44	0.1278	0.0879
45	0.1254	0.0875
46	0.1247	0.0870
47	0.1217	0.0849
48	0.1180	0.0807
49	0.1029	0.0801

1/2 2 year to 50 year

Flow(CFS)	Predev	Final	Percentage	Pass/Fail
0.0999	628	589	93.0	Pass
0.1039	546	406	74.0	Pass
0.1080	483	269	55.0	Pass
0.1120	421	200	47.0	Pass
0.1160	375	163	43.0	Pass
0.1200	315	139	44.0	Pass
0.1240	275	124	45.0	Pass
0.1280	249	112	44.0	Pass
0.1321	222	101	45.0	Pass
0.1361	201	94	46.0	Pass
0.1401	184	91	49.0	Pass
0.1441	169	84	49.0	Pass
0.1481	156	78	50.0	Pass
0.1522	135	73	54.0	Pass
0.1562	123	71	57.0	Pass
0.1602	107	58	54.0	Pass
0.1642	101	57	56.0	Pass
0.1682	96	53	55.0	Pass
0.1722	86	47	54.0	Pass
0.1763	78	42	53.0	Pass
0.1803	77	41	53.0	Pass
0.1843	75	40	53.0	Pass
0.1883	67	38	56.0	Pass
0.1923	61	37	60.0	Pass
0.1964	57	34	59.0	Pass
0.2004	51	34	66.0	Pass
0.2044	50	33	66.0	Pass
0.2084	48	32	66.0	Pass
0.2124	44	32	72.0	Pass
0.2164	42	31	73.0	Pass
0.2205	40	31	77.0	Pass
0.2245	39	31	79.0	Pass
0.2285	38	28	73.0	Pass
0.2325	34	28	82.0	Pass
0.2365	30	28	93.0	Pass
0.2406	28	28	100.0	Pass
0.2446	25	27	108.0	Pass
0.2486	24	26	108.0	Pass
0.2526	22	24	109.0	Pass
0.2566	19	20	105.0	Pass
0.2606	19	19	100.0	Pass
0.2647	17	18	105.0	Pass
0.2687	17	17	100.0	Pass

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0.2727	17	15	88.0	Pass
0.2767	16	14	87.0	Pass
0.2807	16	13	81.0	Pass
0.2848	16	13	81.0	Pass
0.2888	16	12	75.0	Pass
0.2928	15	11	73.0	Pass
0.2968	12	10	83.0	Pass
0.3008	12	8	66.0	Pass
0.3048	12	8	66.0	Pass
0.3089	12	7	58.0	Pass
0.3129	12	5	41.0	Pass
0.3169	12	5	41.0	Pass
0.3209	12	5	41.0	Pass
0.3249	11	4	36.0	Pass
0.3290	11	3	27.0	Pass
0.3330	11	3	27.0	Pass
0.3370	10	3	30.0	Pass
0.3410	9	2	22.0	Pass
0.3450	9	2	22.0	Pass
0.3490	9	2	22.0	Pass
0.3531	9	2	22.0	Pass
0.3571	9	2	22.0	Pass
0.3611	8	2	25.0	Pass
0.3651	6	2	33.0	Pass
0.3691	6	2	33.0	Pass
0.3732	6	2	33.0	Pass
0.3772	5	2	40.0	Pass
0.3812	5	2	40.0	Pass
0.3852	5	1	20.0	Pass
0.3892	5	1	20.0	Pass
0.3932	5	1	20.0	Pass
0.3973	5	1	20.0	Pass
0.4013	3	1	33.0	Pass
0.4053	3	0	.0	Pass
0.4093	2	0	.0	Pass
0.4133	2	0	.0	Pass
0.4174	2	0	.0	Pass
0.4214	1	0	.0	Pass
0.4254	1	0	.0	Pass
0.4294	1	0	.0	Pass
0.4334	1	0	.0	Pass
0.4374	1	0	.0	Pass
0.4415	1	0	.0	Pass
0.4455	1	0	.0	Pass
0.4495	1	0	.0	Pass
0.4535	1	0	.0	Pass
0.4575	1	0	.0	Pass
0.4616	1	0	.0	Pass
0.4656	1	0	.0	Pass
0.4696	1	0	.0	Pass
0.4736	1	0	.0	Pass
0.4776	1	0	.0	Pass
0.4816	1	0	.0	Pass
0.4857	1	0	.0	Pass
0.4897	1	0	.0	Pass
0.4937	1	0	.0	Pass
0.4977	1	0	.0	Pass

**DOWNSTREAM PHOTOS AND NARRATIVE**

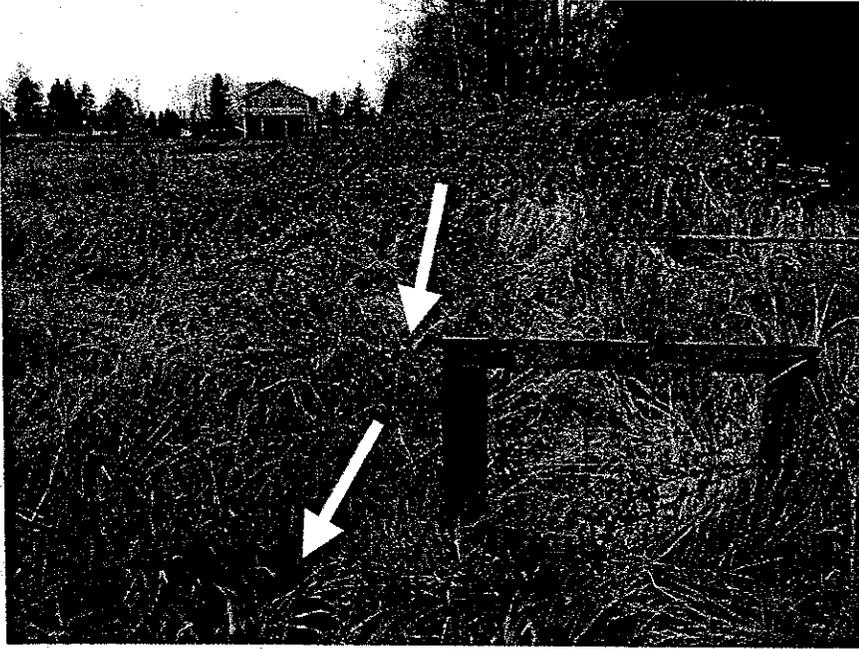


Photo 1: Looking west from Sultan Basin Road at north property line of project site. Existing ditch parallel to north property line conveys runoff from wetland northwest of north project site.

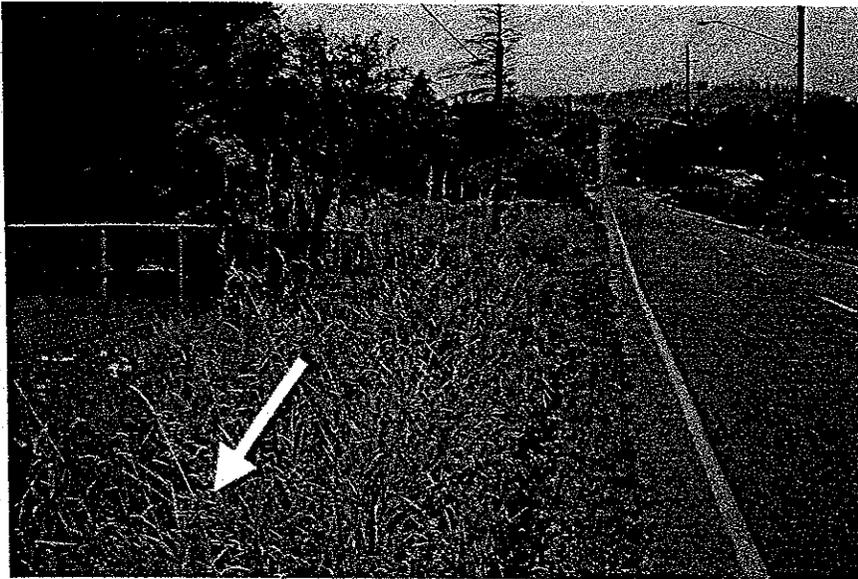


Photo 2: Looking north at drainage ditch paralleling Sultan Basin Road. Drainage flows south.

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Photo 3: Looking south along Sultan Basin road from the north side of the 135<sup>th</sup> Street SE. Drainage enters a culvert under 135<sup>th</sup> Street SE.

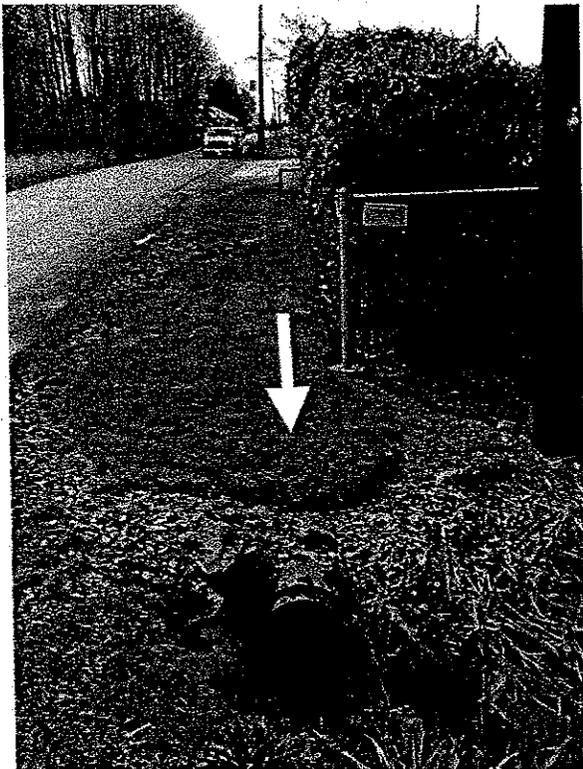


Photo 4: Outfall to Sultan Basin Road drainage, west side. Outfall comes from drainage ditch paralleling 135<sup>th</sup> Street SE. Looking west.

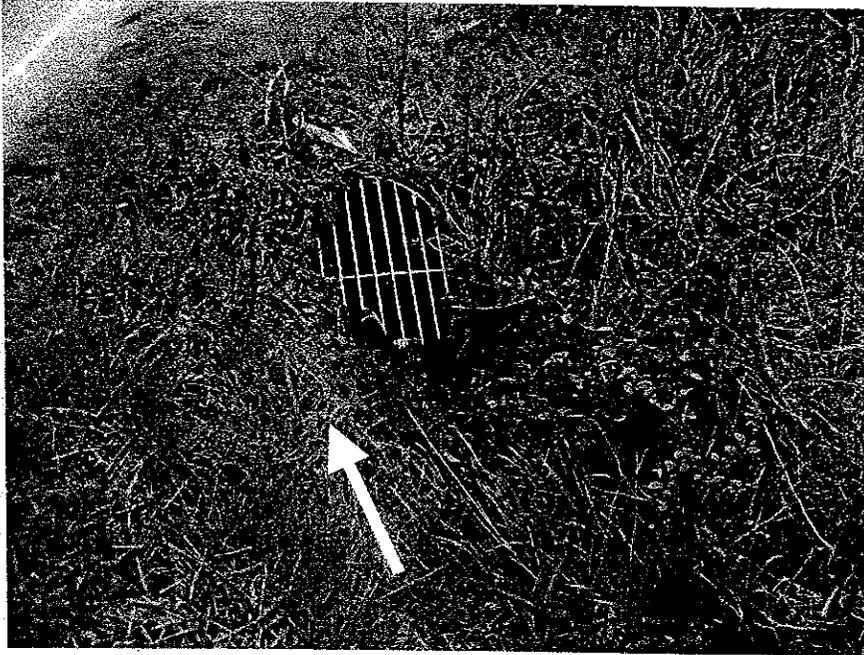


Photo 5: Shows the inlet to an existing 48" pipe with trash rack. The pipe extends to the south to a series of catch basins along Sultan Basin Road. Looking South.

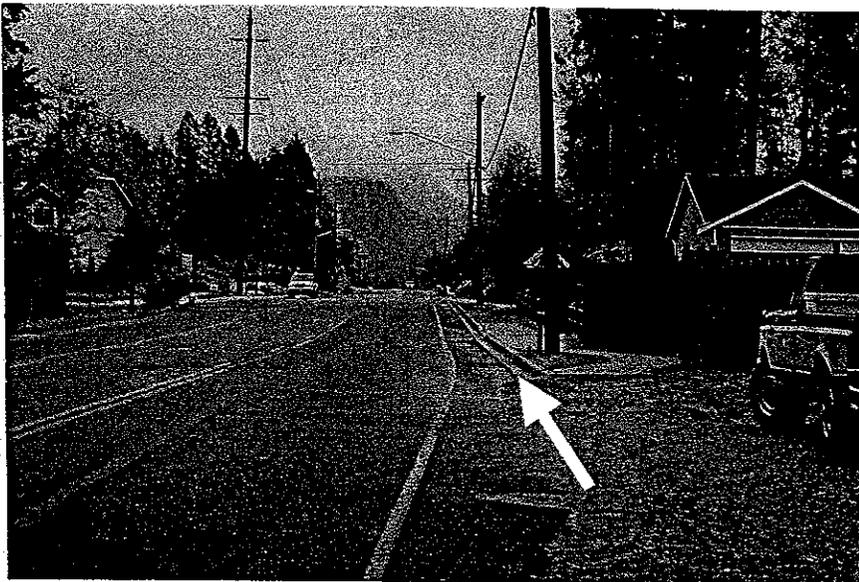
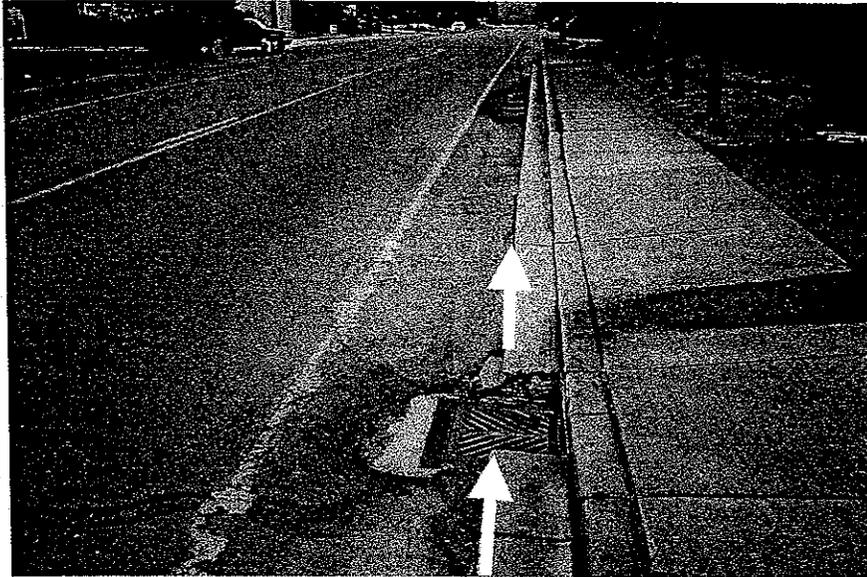


Photo 6: Looking south from culvert inlet to next catch basin located in Sultan Basin Road.



Photos 7: Downstream catch basin along Sultan Basin Road conveying runoff south.

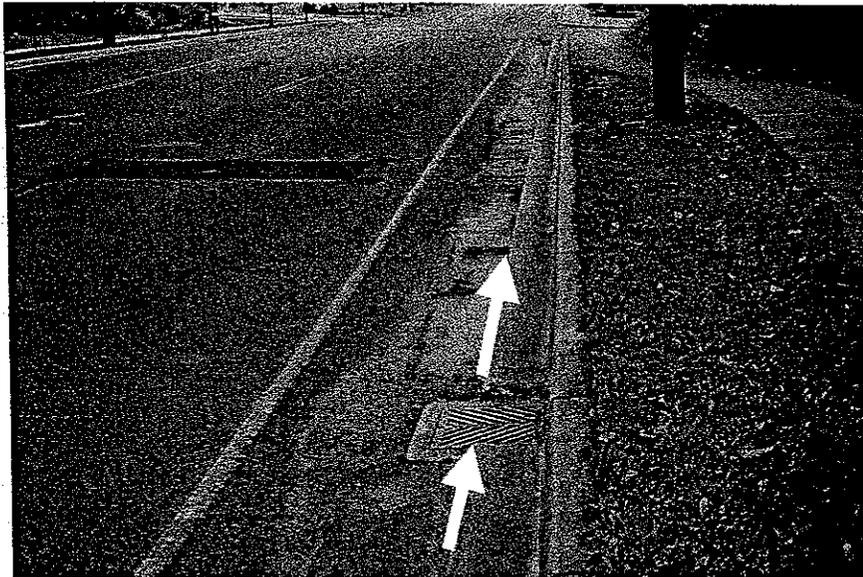


Photo 8: Downstream catch basin from photo 7 along Sultan Basin Road conveying runoff south.

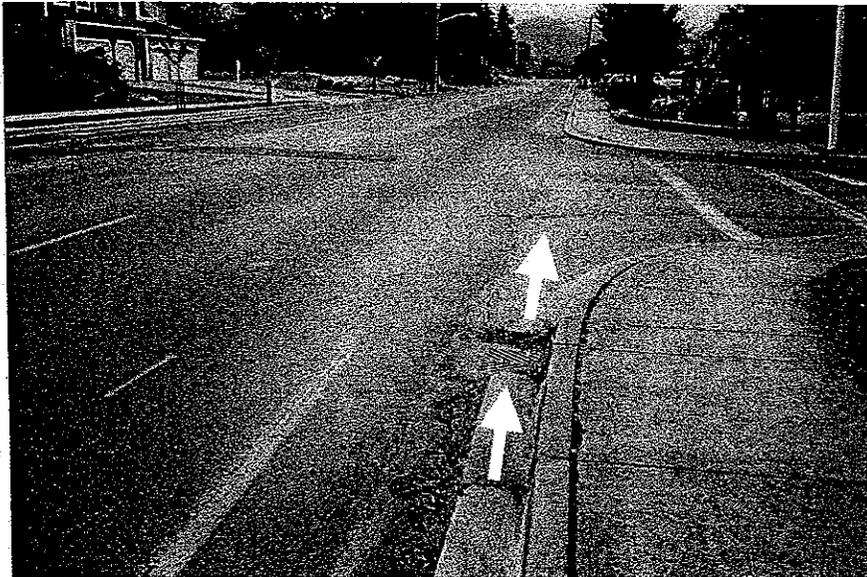


Photo 9: Downstream catch basin at the intersection of Sultan Basin Road and Kesler conveying runoff south. CB is south of CB in photo 8.

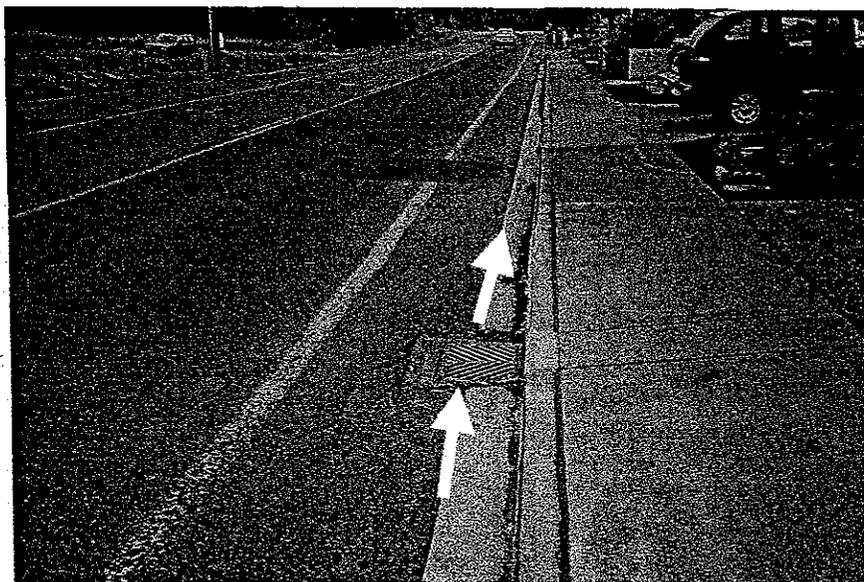


Photo 10: Downstream catch basin from photo 9 along Sultan Basin Road conveying runoff south.

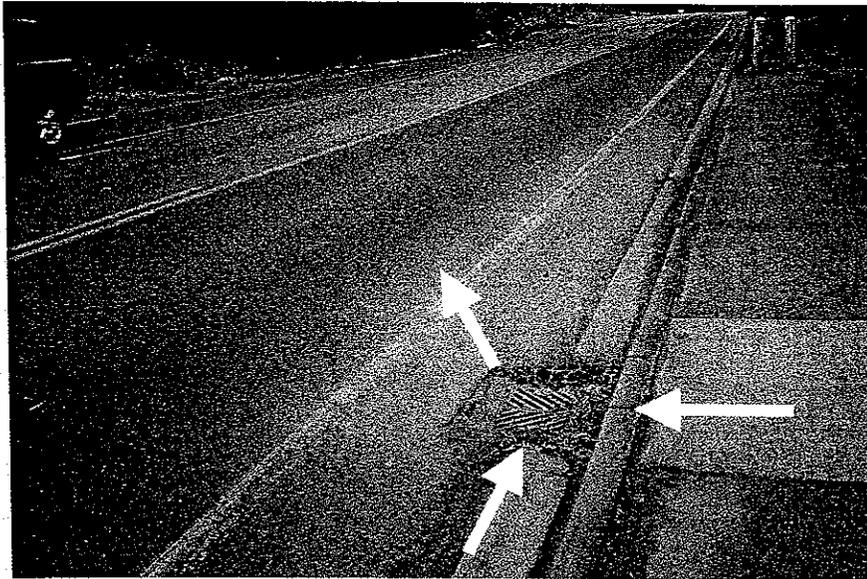


Photo 11: Downstream catch basin from photo 10. CB outfalls to the southeast crossing Sultan Basin road. Outfall to the shown catch basin is from an existing detention pond shown in photo 12.

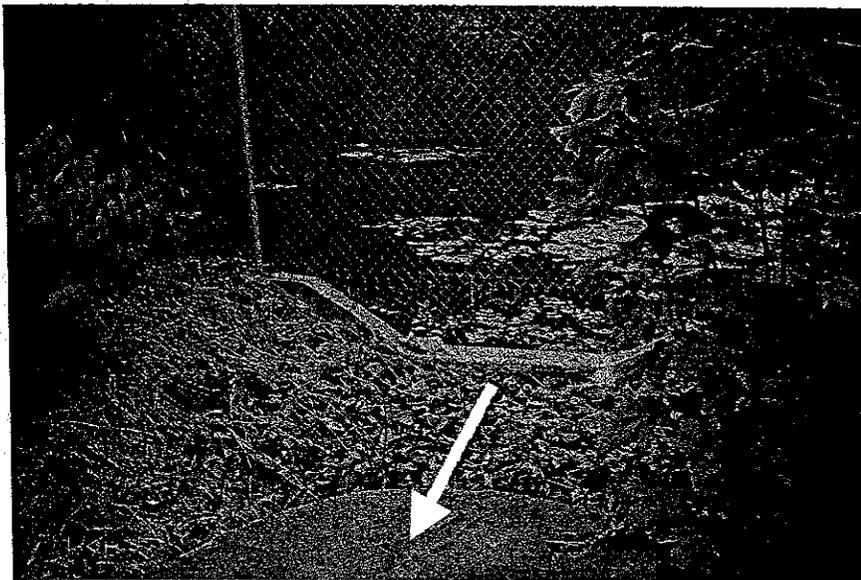


Photo 12: Existing detention pond that releases detained runoff to the existing catch basin in Photo 11.



Photo 13: outfall from catch basin shown in photo 11 flows into an existing ravine that carries runoff to the southeast.

# 1/4 - MILE DOWN STREAM PLAT OF ANDERSON FARM



## AERIAL VICINITY MAP

SCALE: 1" = 400'

Reference: Snohomish County Drainage Inventory Map April 23, 2006; SEC 32 T28N R8E

May 28, 2006  
Page 40

Higa Burkholder Associates, LLC

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RECEIVED MAR - 5 2005

REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
SEATTLE DISTRICT, CORPS OF ENGINEERS  
P.O. BOX 3755  
SEATTLE, WASHINGTON 98124-3755

MAR 3 2005

Regulatory Branch

Mr. Scott Wammack  
Post Office Box 159  
Arlington, Washington 98223

Reference: 200400949  
Wammack, Scott

Dear Mr. Wammack:

Our regulatory program utilizes a series of nationwide permits (NWP) to authorize specific categories of work that have minimal impact on the aquatic environment when conducted in accordance with the permit conditions (*Federal Register*, January 15, 2002, Vol. 67, No. 10). Based on the information you provided to us, NWP 43, *Stormwater Management Facilities*, authorizes your proposal to place fill into 0.085 acre of wetlands for the construction of a stormwater retention and water quality facility, as depicted on the enclosed drawings dated June 16, 2004. The project would occur at the intersection of Bryant and Sultan Basin Road at Sultan, Snohomish County, Washington.

In order for this NWP authorization to be valid, you must ensure that the work is performed in accordance with the enclosed *Nationwide Permit 43, Terms and Conditions*.

In order for this NWP authorization to be valid, you must obtain and comply with the conditions of an individual Water Quality Certification (WQC) and Coastal Zone Management (CZM) consistency determination concurrence from the Washington State Department of Ecology (Ecology) prior to commencing any work, unless WQC is waived by Ecology. For further information on obtaining WQC and a CZM consistency determination response for your project, please contact:

Nationwide Permit Coordinator  
Department of Ecology  
SEA Program  
Post Office Box 47600  
Olympia, Washington 98504-7600  
Telephone (360) 407-6926

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If more than 180 days pass without Ecology responding to your individual WQC and CZM consistency determination concurrence request, your requirement to obtain an individual WQC and CZM consistency determination response becomes waived. You may then proceed to construction.

We have reviewed your project pursuant to the requirements of the Endangered Species Act (ESA). We have determined that this project will not affect any species listed as threatened or endangered under the ESA (or a species proposed for such designation). As such, this project satisfies the requirements of NWP National General Condition 11.

We have reviewed your project pursuant to the requirements of the Endangered Species Act (ESA) and the Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 in regards to Essential Fish Habitat (EFH). We have determined that this project will not affect any species listed as threatened or endangered under the ESA (or a species proposed for such designation) or destroy or adversely modify the critical habitat of such species. As such, this project satisfies the requirements of NWP National General Condition 11 and will not adversely affect EFH requirements for federally managed fisheries in Washington.

Our verification of this NWP is valid for 2 years from the date of this letter unless the NWP is modified or revoked prior to that date. If the authorized work has not been completed by that date, please contact us to discuss the status of your authorization. This verification includes a preliminary jurisdictional determination that is not appealable.

If this project complies with all terms and conditions of this NWP, you will need no further authorization from us. However, you must still obtain all State and local permits that apply to your project. Also, we remind you that failure to comply with all terms and conditions of this NWP verification invalidates your authorization and could result in a violation of Section 404 of the Clean Water Act and/or Section 10 of the 1899 Rivers and Harbors Act.

Upon completing the authorized work, please fill out and return the enclosed *Certificate of Compliance with Department of the Army Permit* form to the address indicated on the form. Your signature on this form is our assurance that the completed work and any required mitigation was conducted in accordance with the terms and conditions of this NWP.

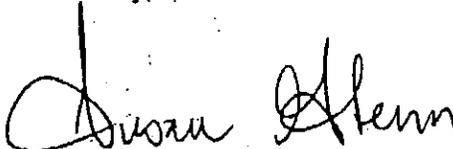
Thank you for your cooperation during the permit process. Your efforts help us protect our nation's aquatic resources, including wetlands. We are interested in your thoughts and opinions concerning your experience with our Regulatory Program and encourage you to complete a customer service survey form. This form and information about our administrative appeal process is available on our website at: [www.nws.usace.army.mil/reg.html](http://www.nws.usace.army.mil/reg.html).

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A copy of this letter with enclosures will be furnished to Mr. William Railton,  
Wetland Resources, Inc., 9505 - 19<sup>th</sup> Avenue Southeast, #106, Everett, Washington 98208. If  
you have any questions about this letter or our regulatory program, please contact me at  
(206) 764-6904 or via email at Susan.S.Glenn@usace.army.mil.

Sincerely,



Susan S. Glenn, Project Manager  
North Application Review Section

Enclosures

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Exhibit S-10

Letter from City acknowledging application resubmittal reducing the project scope from 35 lots to 26 and requesting further information on wetland mitigation, dated June 16, 2006



# City of Sultan

June 16, 2006

Jake Libaire  
Higa Burkholder Assoc.  
1721 Hewitt Ave, Suite 401  
Everett, WA 98201

**RE: File Number FPPUD05-003, Anderson Farm PUD  
Parcel Numbers 280832-00101100, 280832-00100600**

Dear Mr. Labaire:

The City received the material submitted on May 4, 2006, in support of your application for a 26 lot planned unit development (PUD). The site plan shows that the number of single family residences have been reduced from 33 to 26, however additional materials are still needed prior to the Planning Department issuing a decision.

The plan shows locations of the wetlands, enhancement areas, open space, and recreational areas. The legend on the site plan refers to wetland creation and enhancement per critical areas study but the plans do not address how each individual wetland meets the code requirements for mitigation. Please submit a revised mitigation plan identifying how Wetlands A, B, C, D, E, F, G are being replaced. This would update the information in the previous critical areas study (specifically, pages 6-10 of *Wetland Resources Critical Area Study and Mitigation Plan* dated August 11, 2005) to show exactly what is being proposed for each individual wetland. This could be buffer averaging, enhancement, etc. as long as it is tied to a code section that allows for it. Please red-line the site plan to show both the wetland and its buffer. The submitted site plan shows the locations of the wetlands and enhancement areas, but it does not show the buffers. The buffer should be separate from the enhancement areas.

The plans do not indicate how the altered wetlands will be replaced. In accordance with SMC 16.80.070, acreage must be replaced at a 1.5 to 1 ratio on-site or a 2 to 1 ratio off-site. A revised mitigation plan that shows how the wetlands will be replaced will be required in order for the city to render a decision.

Please note that if the requested information is not submitted within 180 days, the application for development will be null and void. Upon submittal of any additional information, the City will have up to 10 working days to determine if the information is sufficient for continued processing.

Sincerely,

Rick Cisar

*Administrator/Planner, City of Sultan*

cc: Pat Bunting, Wetland Resources  
City File

**EXHIBIT** S-10

Exhibit S-11

Letter to Jake Libaire regarding wetland impacts and mitigations, Graham-Bunting Associates, August 23, 2006



**Graham-Bunting Associates**  
Environmental & Land Use Services  
3643 Legg Road, Bow, WA 98232  
Ph. 360.766.4441 Fx. 360.766.4443

COPY

August 23, 2003-2006

Jake Libaire  
Higa-Burkholder Associates, LLC  
1721 Hewitt Avenue, Suite 401  
Everett, Washington 98201

Dear Jake Libaire;

Graham-Bunting & Associates have reviewed your site plans dated May 4, 2006 and Wetland Resources Inc. (WRI) Mitigation Plan dated July 17, 2006. It is my understanding that you would like to know what comments we have regarding the proposed project with regards to critical areas mitigation, prior to revising and resubmitting to the City. Below are my comments, questions and observations.

1. Wetlands A, C, E, H had upland buffers associated with the regulated wetlands on the WRI 8/11/05 proposed Mitigation Site Plan. Please revise your site plan to include upland buffers. The reduction of buffers per SMC is allowed with enhancement, but complete removal of buffers is not allowed per SMC. In order for the City to approve an Innovative Design, the functions of wetlands *and buffers* must be increased from the existing functions as reiterated below:

SMC 16.80.100 Innovative design ,

- B. Criteria for Approval. An innovative development design approval pursuant to this section shall be granted in conjunction with the decision on the underlying permit(s), if the following criteria are met:

1. The innovative design will result in a net improvement of the functional values of the stream or wetlands **and their buffers**.

2. Wetlands A, B, and C are degraded wetlands as mentioned in the WRI reports. Due to the degraded conditions of these wetlands, some areas of these wetlands as buffer ("paper buffer") may be acceptable, not *all* of the existing buffer. The required buffer for all of the regulated Category 3 wetlands is 50 feet. The method of wetland as buffer ("paper buffer") is typically acceptable where an upland buffer is limited or non-existent (DOE, Corps, EPA, March 2006) such as where wetlands are adjacent to existing roads and typically for compensatory mitigation. Andrea Bachman's letter dated 12/14/2005, addressed to me, discusses "paper fills" (buffers) for low quality wetlands, "to accommodate the minimum allowed buffer width of 25 feet". I understand this

to mean that where you will be reducing the buffer to 25 feet, a paper buffer on a low quality degraded wetland will be used. Please clarify.

3. Since paper buffers are not a widely used method in the City of Sultan, I refer to a recently published document titled Wetland Mitigation in Washington State, (DOE, CORPS, EPA, March 2006) which is the only document I know of that discusses "wetlands as buffers". This document discusses the importance of adjacent upland habitat for screening and water quality. Your design addresses water quality in the wetland but does not allow for upland screening. The DOE et al. document also discusses the need for reduced buffers in urban spaces where wildlife species may not be the main function of the wetland. This may be true for Wetlands A, B, and C. However, since wetland E and H are large, have structural diversity and are being enhanced for wildlife as a component of the mitigation plan, it will be important to include some upland buffer areas.
4. The trail in Wetland A needs to be elevated, removed or calculated in your wetland fill areas and mitigated. It is considered to be an impact and a fill in the wetland as currently designed. Also, the Corps permit did not include the trail.
5. In a letter dated June 16, 2006, Rick Cisar, Director of Planning, requested that the wetland ratios be met as required in the SMC 16.80.080 7.b;  
  
*"Up to one acre of nonriparian Category 3 wetlands can be filled per site if loss of wetland functions is mitigated at an areal replacement ratio of 1.5:1 for on-site mitigation, or a ratio of 2:1 for off-site mitigation."*
6. Please provide the following information:  
The total amount (s.f. or acre) of the existing regulated wetland area.  
The total amount (s.f. or acre) of proposed wetland area (do not include "paper buffer")  
The total amount of existing regulated buffer area.  
The total amount of proposed buffer area, (include "paper buffer").  
The proposed ratios.
7. Wetlands D, F, and G are not regulated by the SMC and will not need to be addressed.
8. The northerly buffer on Wetland E is missing on Higa's site plan. Please make sure to correct this.

## Questions

- Q1. How large are wetlands H and E when including the off site portions?

- Q2. Will the stormwater/wetland ponds need maintenance, or will the vegetation in them be native and unmaintained?
- Q3. When utilizing Innovative Design, you are required to address 16.80.090, has this been done?

Sincerely,

Patricia Bunting  
Wetland Ecologist

Cc: Rick Cisar, Director City of Sultan  
Andrea Bachman, Wetland Resources