Shaping our community together

CITY OF LACEY

CITY COUNCIL
VIRGIL CLARKSON
Mayor

JASON HEARN
Deputy Mayor

JEFF GADMAN
LENNY GREENSTEIN
RON LAWSON
CYNTHIA PRATT
ANDY RYDER

CITY MANAGER
SCOTT SPENCE

LACEY CITY COUNCIL AGENDA

NOVEMBER 21, 2013
7:00 P.M.
420 COLLEGE STREET, LACEY CITY HALL

CALL TO ORDER:

1. PLEDGE OF ALLEGIANCE

2. APPROVAL OF AGENDA & CONSENT AGENDA ITEMS*

A. Council Minutes of November 7, 2013

** Items listed under the consent agenda are considered to be routine and will be enacted by one motion and one vote. There will be no separate discussion of these items. If discussion is desired, that item will be removed from the Consent Agenda and will be considered separately.*

3. PUBLIC RECOGNITIONS AND PRESENTATIONS:

A. Recognition of Ed Taylor and Bracy DiLeonardo for Retro Safety Coordinator Certification *(Roger Neal, AWC Loss Prevention Coordinator)*

4. PUBLIC COMMENT ON ITEMS NOT ON THE AGENDA*

The City Council will allow comments under this section on items **NOT already on the agenda. Where appropriate, the public will be allowed to comment on agenda items as they are addressed during the meeting.*

5. PUBLIC HEARING:

A. Final Public Hearing on 2014 Budget *(Troy Woo)*

6. PROCLAMATION:

A. Proclamation declaring November 2013 as American Diabetes Month *(Heather Berg)*

7. REFERRAL FROM PLANNING COMMISSION:

8. REFERRAL FROM HEARINGS EXAMINER:

A. Gateway Residential Division 1 Preliminary Subdivision-Project #12-239 *(Samra Seymour)*

9. RESOLUTIONS:

A. Adopt Resolution to approve Declaration of Need to Increase Ad Valorem Tax Levy *(Troy Woo)*

10. ORDINANCES:

A. Adopt Ordinance to set Ad Valorem Tax *(Troy Woo)*
B. Adopt Ordinance for Stormwater Rates *(Troy Woo)*
C. Adopt Ordinance for Wastewater Rates *(Troy Woo)*

11. MAYOR'S REPORT:

12. CITY MANAGER'S REPORT:

13. STANDING GENERAL COMMITTEE:

A. Finance & Economic Development Committee (10.28.13)
B. Utilities Committee (11.01.13)
C. Land Use Committee (11.04.13)

14. OTHER BUSINESS:

15. BOARDS, COMMISSIONS, AND COMMITTEE REPORTS:

A. *Mayor Virgil Clarkson:*
1. Intercity Transit Authority (IT)
2. Mayors' Forum
3. Thurston Regional Planning Council (TRPC)

B. *Deputy Mayor Jason Hearn*:
1. Joint Animal Services Commission (JASCOM)
2. HTPA-Human Trafficking

C. *Councilmember Cynthia Pratt*:
1. Energy Advisory Committee
2. LOTT
3. Olympic Region Clean Air Agency (ORCAA)
4. Thurston Council for Children & Youth

D. *Councilmember Andy Ryder*:
1. Business Resource Center
2. Economic Development Council (EDC)
3. Transportation Policy Board (TPB)
4. Visitor & Convention Bureau (VCB)

E. *Councilmember Ron Lawson*:
1. Community Action Council (CAC)
2. HOME Consortium
3. Solid Waste Advisory Committee (SWAC)

F. *Councilmember Jeff Gadman*
1. Health & Human Services Council (HHSC)
2. Regional Sustainability Task Force
3. Thurston County Law & Justice Council

G. *Councilmember Lenny Greenstein*
1. Emergency Medical Services (EMS)
2. TCOMM911
3. Water Resource Inventory Area 11 (WRIA)

16. ADJOURN

MINUTES OF A REGULAR MEETING OF THE LACEY CITY COUNCIL HELD THURSDAY, NOVEMBER 7, 2013, IN LACEY COUNCIL CHAMBERS.

CALL TO ORDER: Mayor Clarkson called the meeting to order at 7:00 p.m.

PLEDGE OF ALLEGIANCE: Mayor Clarkson led the pledge of allegiance.

COUNCIL PRESENT: V. Clarkson, J. Hearn, C. Pratt, J. Gadman, R. Lawson, L. Greenstein

COUNCIL EXCUSED: A. Ryder

STAFF PRESENT: S. Spence, T. Woo, D. Schneider, R. Walk, S. Egger, L. Gotelli, D. Pierpoint, L. Flemm, C. Litten, S. Seymour

APPROVAL OF AGENDA AND CONSENT AGENDA:

Consent Agenda Items:
(a) Worksession Minutes of October 3, 2013
(b) Council Minutes of October 10, 2013
(c) Worksession Minutes of October 17, 2013
(d) Council Minutes of October 24, 2013

Mayor Clarkson requested an amendment to the agenda to include an appointment to the Planning Commission.

COUNCILMEMBER GREENSTEIN MOVED TO APPROVE THE AMENDED AGENDA. COUNCILMEMBER PRATT SECONDED. MOTION CARRIED.

COUNCILMEMBER GADMAN MOVED TO APPROVE THE CONSENT AGENDA. COUNCILMEMBER GREENSTEIN SECONDED. MOTION CARRIED.

PUBLIC HEARING:

Mayor Clarkson opened the **2014 Revenue Hearing** at 7:05 p.m.

Troy Woo, Finance Director, stated the purpose of the revenue hearing is to accept public comment and for the City Council to provide guidance on the proposed 2014 revenues. The City Council is scheduled to adopt the 2014 ad valorem tax ordinance, resolution declaring substantial need, wastewater rate ordinance, and multi-year stormwater rate ordinance on November 21, 2013.

SIGNIFICANT GENERAL FUND REVENUE CHANGES

- The 2014 property tax projection includes an increase of $164,037 or 3.05 percent. The overall total assessed value is increasing $253.9 million or 6.2 percent. The new construction value increased $70.2 million. The City's regular property tax levy is estimated to be $5,534,066. The City's regular property tax levy rate is projected to decrease $0.0393 to $1.2780 per $1,000 of assessed valuation.

- Sales tax continues to be the single largest resource for the General Fund followed by service fees, utility taxes, and property taxes. The year-to-date 2013 sales tax collections have increased compared to 2012. Using a conservative approach, 2014 sales taxes are expected to increase a modest 0.91 percent.

- Overall utility tax collections are projected to increase $46,281 in 2014. Beginning in 2014, 100 percent of the utility tax will be receipted into the Current Expense Fund. The result of this change is an increase to revenues and expenses due to the additional budget necessary to make the interfund transfers.

- Service fees are projected to decrease $312,956 in 2014. The decrease is mainly due to Washington State BARS Manual (Budgeting, Accounting, and Reporting System) updates that eliminate certain interfund transactions.

- A decrease of $14,970 is expected from other taxes (business & occupation, admission, and gambling taxes).

ARTERIAL STREET FUND REVENUES

The funding sources for the Arterial Street Fund include real estate excise tax (REET), grants, motor vehicle fuel tax (MVFT), and mitigation fees. Due to the condition of the housing market, the 2014 REET projections are $1,064,764.

The transfer-in of $850,000 from the General Fund was suspended in the 2013 Budget in order to balance the 2013 General Fund Budget. This transfer funded the $1.0 million annual street overlay program. Although, this General Fund transfer continues to be suspended, the annual street overlay program will continue in 2014 through the use of City Council committed reserves.

UTILITY FUND REVENUES

Rate revenues for the Water, Wastewater, and Stormwater utilities fund both operations and capital improvement programs.

During 2012, the City's recommendations from its multi-year water rate study were adopted, so the water rates are scheduled to increase 6.5 percent annually through 2017.

The City's Wastewater Comprehensive Plan, which includes a multiple year rate recommendation, is still in the development stages. The consultant's early recommendations include a $0.82/month/equivalent residential unit (ERU) increase for 2014 and similar rate increases through the comprehensive plan time period. Significant factors in the Comprehensive Plan that will impact rate increases include a $23.9 million CIP, system reinvestment level of 50 percent of depreciation expense, and a $6.4 million debt issue in 2016. The proposed monthly rate will increase $0.82 per month. The 2014 residential rate will be $17.30 per month.

The LOTT proposed budget assumes a 3.0 percent rate increase for 2014. The 2014 LOTT residential rate will increase $1.02 to $35.01.

The 2013 Stormwater rate increase of 3.0 percent was the first rate increase since 2009. The Stormwater Comprehensive Plan proposes a $0.67 per month residential increase for 2014, similar increases for 2015 and 2016 and lower increases for the years 2017 through 2019. The significant factors contributing to the proposed rate increase include compliance with the new Phase II Western Washington Municipal Stormwater Permit, $6.1 million CIP, 25 percent of annual depreciation system reinvestment funding level, and a $1.8 million debt issue in 2018.

A written comment was received from Myrna Williams who opposes any property tax increase. She noted that tax increases for seniors on limited income causes a hardship. No other public comment was received.

Councilmember Gadman inquired about the system reinvestment funding level of 25% of annual depreciation expense. He noted that the industry standard is 100% and wants assurance that the City is not underfunded. Mr. Woo noted that staff analyzed the list of CIP to determine what projects can be delayed, and assured Council that the issue is adequately addressed.

Deputy Mayor Hearn inquired about the statutory requirement for .25% of REET tax. Mr. Woo will research the issue.

The City Council is scheduled to conduct a final budget hearing on November 21, 2013, and adopt ordinances for utility rate increases, and the ad valorem tax levy rate increase. Budget adoption is scheduled for December 5, 2013.

Mayor Clarkson closed the 2014 Revenue Hearing at 8:02 p.m.

Mayor Clarkson opened the first **2014 Proposed Budget Hearing** at 8:03 p.m.

Troy Woo, Finance Director, stated the purpose of the revenue hearing is to accept public comment and to provide staff with any guidance or direction regarding the proposed 2014 Budget. Any City Council direction will be incorporated into the budget, which is scheduled for adoption on December 5, 2013.

Mr. Woo announced three changes recommended for the 2014 Proposed Budget:

1) The property tax levy amount may be increased by $17,840 due to the allowable refund levy.
2) The amount of $3.7 million budgeted for the creation of the Tanglewilde ULID may be reduced by $1.3 million due to a reduction in the scope of the project.
3) A balancing entry of $59,000 in the 2014 Budget should have been eliminated.

As a result, staff recommends reducing the use of the Pension Reserve Fund by $76,000 towards balancing the budget.

The total Proposed 2014 Budget is $111,536,883, which is an increase of $8,154,319 compared to the amended 2013 Budget.

The total proposed General Fund Budget is $38,252,878. This is an increase of $3,091,729 or 8.8 percent compared to the amended 2013 General Fund Budget.

The proposed 2014 Budget maintains all services, provides for the successful street overlay program, and provides funding for a number of capital projects such as the 2014 street overlay program, construction of the Chambers Lake Stormwater Facility, Golf Club Road Extension, Smart Corridors (traffic controllers), Skokomish waterline replacement, well replacements, sewer lift station upgrades, and Tanglewilde East Utility Local Improvement District (ULID).

The City Council is scheduled to conduct a second and final budget hearing on November 21, 2013. Budget adoption is scheduled for December 5, 2013.

Councilmember Pratt inquired whether the pension stabilization reserve fund would be replenished. Mr. Woo stated that the fund was established to balance the budget with a ten year funding mechanism. It is anticipated that this temporary fund will not be needed in ten years.

A student from Aspire Middle School asked a question about tax rate increases. Mr. Woo responded that citizens will be most impacted by utility and property taxes increases. No other public comment was received.

Mayor Clarkson closed the 2014 Budget Hearing at 8:24 p.m.

REFERRAL FROM HEARINGS EXAMINER:

Samra Seymour, Associate Planner, stated a request was received from Verizon Wireless for approval of a conditional use permit to extend an existing 100 foot monopole by 20 feet, add low profile mounting platform and panel antennas and construct a new 15' x 30' area for associated ground equipment at the base of the pole on property zoned Light Industrial – Commercial.

The Hearings Examiner conducted a public hearing on September 30, 2013, regarding the conditional use permit request. Staff and the applicant provided testimony at the hearing. No members of the public attended the hearing. Discussion reflected those submitted in the staff report, such as compatibility with the surrounding area and height requirements.

The Hearings Examiner recommends approval of the requests for a Conditional Use Permit #13-159 application to add a 20 foot tall extension to an existing 101 foot tall monopole, with an additional 10 foot by 15 foot area for associated equipment cabinets at the tower base, on property located at 1220 Tracey Lane SE in Lacey. Conditions of

approval are necessary to mitigate specific impacts of the proposed development.

Staff is requesting Council approve the proposal including adoption of findings, and conditions as included in the October 3, 2013, Hearings Examiner's report.

COUNCILMEMBER PRATT MOVED TO APPROVE THE REQUEST FOR A CONDITIONAL USE PERMIT #13-159 BY VERIZON WIRELESS FOR AN EXTENSION OF A 100 FOOT MONOPOLE. COUNCICLMEMBER LAWSON SECONDED. MOTION CARRIED.

RESOLUTIONS:

Resolution No. 1001 authorizes the City Manager to enter into an interlocal agreement between the City of Lacey and the Association of Washington Cities Employee Benefit Trust.

Liz Gotelli, Human Resources and Public Affairs Director, stated that in 2013, the AWC Benefit Trust Board of Trustees explored the option of transitioning to a Self-Funded Health Care Program to take advantage of potential cost-savings to members. The State Risk Manager recently approved the AWC Trust's application to self insure the medical plans through Group Health and Regency Blue Shield, the Vision Service Plan, and Washington Dental Service plan effective January 1, 2014. The Trust Board of Trustees has committed to fully fund the Health Care Program reserves at the actuarial recommendation of $15,420,000.

The AWC Employee Benefit Trust transition to self-insure in 2014 will result in a 0.0% rate increase in medical, dental and vision insurance for participating cities. AWC had projected a 12% increase for medical expenses in 2014. This transition will result in a cost avoidance of approximately $360,000 for the City next year.

Impacts to employees and employers will be very minimal, resulting in the same coverage levels, same provided network, and same claim processing.

To proceed with the Board's direction, AWC is required to have an interlocal agreement and a resolution from all cities and entities that wish to continue to participate in the Trust's benefits in 2014. The resolution and interlocal agreement must be adopted no later than November 15, 2013.

COUNCILMEMBER GADMAN MOVED TO APPROVE RESOLUTION NO. 1001 TO AUTHORIZE THE CITY MANAGER TO ENTER INTO AN INTERLOCAL AGREEMENT BETWEEN THE CITY OF LACEY AND THE ASSOCIATION OF WASHINGTON CITIES EMPLOYEE BENEFIT TRUST. COUNCILMEMBER LAWSON SECONDED. MOTION CARRIED.

ORDINANCE:

Ordinance No. 1421 amends LMC 9.28.020, 9.52.010, 9.52.020, and LMC 14.40.020 to address the issue of graffiti and ease its removal from areas visible to the public.

Police Chief Pierpoint stated the ordinance would allow the City of Lacey to have a mechanism to officially deal with problem graffiti spots where the owners are absent or unwilling to assist in removing the nuisance.

The ordinance would allow courts to order restitution payable to the City of Lacey when the City takes action to clean up graffiti. Declaring graffiti a nuisance allows Code Enforcement to abate private properties that allow graffiti to be displayed to the public.

As a result, the City of Lacey should see a decrease in visible graffiti, and may recoup money from offenders to help offset the cost of labor and supplies used to remove graffiti.

The Police Department contacted the Lacey Chamber of Commerce to seek input from members. No negative comments were received concerning proposed changes.

COUNCILMEMBER GREENSTEIN MOVED TO APPROVE ORDINANCE NO. 1421 TO AMEND THE LMC TO ADDRESS GRAFFITI ISSUES. COUNCILMEMBER GADMAN SECONDED. MOTION CARRIED.

MAYOR'S REPORT:

Mayor Clarkson presented Council with a request to appoint Rebecca Lee to an unexpired term on the Planning Commission.

COUNCILMEMBER PRATT MOVED TO APPOINT REBECCA LEE TO AN UNEXPIRED TERM ON THE PLANNING COMMISSION. COUNCILMEMBER GADMAN SECONDED. MOTION CARRIED.

CITY MANAGER'S REPORT:

Scott Spence, City Manager, reported that he and Mayor Clarkson met with state legislators to discuss funding options for addressing regional transportation issues along the I-5 corridor.

STANDING GENERAL COMMITTEES:

Utilities Committee

Councilmember Gadman reported the Committee met on October 4, 2013, to discuss the utility billing brochure, a Wholesale Water Supply Agreement with Thurston PUD, and the creation of ULID 22 for Tangelwilde East and Skokomish Way.

Community Relations & Public Affairs

Councilmember Greenstein reported the Committee met on October 7, 2013, to receive an update on the plastic bag ban ordinance. Liz Gotelli, Human Resources and Public Affairs Director, reported that an open house will be held on November 12, 2013, to solicit public input on the issue. In addition, information is posted on the City website, and a comment card will be included in utilities billings at the end of the month.

Transportation Committee:
Deputy Mayor Hearn reported the Committee met on October 8, 2013, to receive an update on the 2013 State of the Streets Report, and the Street Overlay Project.

BOARDS & COMMISSIONS:

HHSC
Councilmember Gadman reported the Board discussed funding options for 2014. A new MOU will need to be drafted for review by each jurisdiction. There also was discussion about combining HHSC and United Way funds to streamline the process and improve efficiencies.

Intercity Transit
Councilmember Gadman reported the Board authorized a contract to upgrade security cameras on Marvin Road.

JASCOM
Deputy Mayor Hearn reported the Board reviewed the 2014 Budget and discussed cost of living rates for staff.

Regional Sustainable Task Force
Councilmember Gadman reported that a short course on sustainable development will be offered on November 13, 2013, at Lacey City Hall beginning at 6:30 p.m.

TCOMM911
Councilmember Greenstein and Lacey Police Chief Pierpoint will participate in the evaluation process for the Executive Director.

TRPC
Mayor Clarkson reported that TRPC presented a draft of the Regional Sustainability Plan to the Mayors Forum. Some attendees expressed concern regarding the interpretation of language in the document. Mayor Clarkson remarked the issue will come before all jurisdictions again in the near future for further discussion.

Thurston Council on Children and Youth

Councilmember Pratt reported the Board received an update on the Purple Crying Program – Click for Babies Campaign. The goal is to collect 3,000 nappie hats to be presented to new parents with an informational parenting DVD.

Discussion continued on ACES (Adverse Childhood Experiences), focusing on resiliency factors, such as social connection, parental resilience, concrete support, and the emotional competence of children.

CYS raised concerns about emerging issues in the community, especially an increase in drug use among their youth clients. A drug action team will explore the issues and solutions.

ADJOURNMENT: Mayor Clarkson adjourned the meeting at 9:20 p.m.

MAYOR: _____

ATTESTED BY CITY CLERK: _____

DATE APPROVED: _____

LACEY CITY COUNCIL MEETING
November 21, 2013

SUBJECT: **Final 2014 Budget Hearing**

RECOMMENDATION: **Conduct Budget Hearing, accept public comment, and recommend budget changes.**

STAFF CONTACT: Scott Spence, City Manager
Troy Woo, Finance Director

ORIGINATED BY: Troy Woo, Finance Department

ATTACHMENTS:

FISCAL NOTE: Total Proposed 2014 Budget - $108,865,039
Total Proposed 2014 General Fund Budget - $38,194,288

PRIOR REVIEW:

BACKGROUND:

After the tremendous efforts of the City Council and city staff, we have reached the final stages of the 2014 budget process. During early August the department directors submitted their budget proposals. During late August and early September City Manager Spence, Finance Director Woo, and Accounting Manager Pam Meredith met individually with each department director to review the budget proposals. The Finance and Economic Development Committee was presented a budget update on August 26, 2013 and discussed property tax and utility rate increases on October 28, 2013. The full Council discussed and provided guidance on key 2014 Budget issues on October 3, 2013. City Manager Spence presented a balanced 2014 Budget to the City Council on October 24, 2013. The City Council conducted a revenue hearing and the first budget hearing on November 7, 2013. The 2014 Proposed Budget considers all the City Council guidance and policy direction that has been given throughout this budget process.

The following changes have been made to the proposed 2014 Budget:

- $1,306,627 reduction of the Wastewater Capital proposed budget due to the reduced scope of the Tanglewilde IIIB utility local improvement district. The reduction also reduces the amount of anticipated debt needed in the Wastewater Debt Fund. This change decreases the overall proposed budget amount.

- The 2014 property tax projection has been increased $17,840 as a result of a delayed refund levy calculation due to changes passed during the last legislative session. This change reduces the use of the City Council established pension rate stabilization committed reserve.

- The 2014 property tax projection has been decreased $72 as a result of an updated new construction value. The latest Thurston County Assessor's Office new construction assessment. The updated new construction valuation is $70,161,929, which is slightly lower than the previous value. This change slightly increases the use of the City Council established pension rate stabilization committed reserve.

- Removal of $58,590 2013 Budget balancing figure that was inadvertently carried forward to the Proposed 2014 Budget. This change reduces the use of the City Council established pension rate stabilization committed reserve and decreases the overall proposed budget amount.

- Moved $1,650,000 Stormwater depreciation expense from the Stormwater M&O Fund to the newly established Stormwater Debt Service Fund. This change does not impact the total proposed budget amount.

The total Proposed 2014 Budget is $108,865,039. This is an increase of $5,482,475 compared to the amended 2013 Budget. The primary reasons for the increase are new utility revenue bond debt service payments, bond proceed transfers to capital funds, and utility tax receipting changes.

The total proposed General Fund Budget is $38,194,288. This is an increase of $3,033,139 or 8.6 percent compared to the amended 2013 General Fund Budget. The main reason for the General Fund increase is related to the aforementioned change to utility tax receipting. The General Fund budget is also impacted by contracted salary increases and inflationary increases.

City staff will continue to analyze the financial indicators and revenue collections. If the financial condition of the City worsens, it will be vital to react decisively and timely.

The purpose of the Final 2014 Budget Hearing is to accept public testimony and for City staff to receive final direction for any budget changes. The 2014 Budget is scheduled for adoption on Thursday, December 5, 2013.

City of Lacey
Official Proclamation

Whereas, in the United States, nearly 26 million people – including 215,000 under the age of 20 – have diabetes, a serious disease with potentially life threatening complications such as heart disease, stroke, blindness, kidney disease, and amputation; and

Whereas, one out of every three children born today will face a future of diabetes if current trends continue; and

Whereas, an increase in community awareness is necessary to put a stop to the diabetes epidemic.

Now, therefore, I, Virgil Clarkson, Mayor of the City of Lacey, do hereby proclaim November 2013, as

American Diabetes Month

in the City of Lacey, and encourage all citizens to recognize American Diabetes Month, and join the American Diabetes Association's movement to confront, fight, and most importantly, stop diabetes.

Mayor Virgil S. Clarkson
November 21, 2013

SUMMARY OF HEARINGS EXAMINER REPORT TO CITY COUNCIL

SUBJECT: Gateway Residential Division 1 Preliminary Subdivision – Project no. 12-239

DESCRIPTION OF PROPOSAL: A preliminary subdivision application submitted by Gateway 850 LLC to subdivide approximately 43 acres into 83 single family lots and one 10.9 acre parcel for future multi-family development on property zoned High Density Residential. The site is located at the northwest corner of the Britton Parkway NE and Gateway Boulevard intersection. The parcel numbers are 11803340100, 1180340000 and 11810103000 and are located in a portion of Section 3, Township 18N, Range 1W, W.M., Lacey Thurston County, Washington.

SUMMARY OF CONCLUSIONS: The public hearing was conducted on October 30, 2013. Testimony provided at the hearing covered topics such as stormwater, onsite wetlands and proximity to Eagle Creek, traffic impacts and proposed access. Testimony was given by the applicant's representatives and City staff. No members of the public presented testimony at the hearing. Comments received from the public and agencies or departments are included in the packet as exhibits.

The recommendation from the Hearings Examiner is dated November 12, 2013. The conditions of approval recommended to the City Council for the project are substantially as suggested by staff.

ACTION OPTIONS FOR CITY COUNCIL: The City Council may take one of the following actions:

1. Approve the recommendation of the Hearings Examiner.

2. Reverse the decision of the Hearings Examiner.

3. Modify the recommendation of the Hearings Examiner.

Any decision to modify or reject the Examiner's decision shall be made based on the open record hearing and supported by findings of fact and conclusions.

RECEIVED
NOV 1 2 2013
BY_____

BEFORE THE HEARINGS EXAMINER
FOR THE CITY OF LACEY

In the Matter of the Application of	)	No. 12-239
	)	
Jeff Pantier, PLS, on behalf of	)	**Gateway Division 1**
Gateway 850 LLC	)	
	)	FINDINGS, CONCLUSIONS,
For Approval of a Preliminary Plat	)	AND RECOMMENDATION

SUMMARY OF RECOMMENDATION

The Hearings Examiner recommends that a preliminary plat to subdivide approximately 43 acres into 83 single family lots and one 10.9 acre parcel for future multi-family development, at the northwest corner of the Britton Parkway NE/Gateway Boulevard intersection in Lacey, Washington, be **APPROVED.** Conditions of approval are necessary to address specific impacts of the proposed project.

SUMMARY OF RECORD

Hearing Date:
The Hearings Examiner for the City of Lacey held an open record hearing on the request on October 30, 2013.

Testimony:
The following individuals presented testimony under oath at the open record hearing:

Samra Seymour, City Associate Planner
Doug Christiansen, City Public Works, Water Resources Division
Tom Stiles, City Public Works
Martin Hoppe, City Traffic Expert
Jeff Pantier, Applicant Representative
Jeff Schramm, Applicant Traffic Engineer
Steve Hatton, P.E., Applicant Engineer

Patrick Mullaney, Attorney at Law, represented the Applicant at the hearing.

Exhibits:
The following exhibits were admitted into the record:

1. List of Exhibits
2. Staff Report, dated October 30, 2013
3. Application for Preliminary Subdivision, received February 28, 2013
4. Application for General Land Use, received February 28, 2013
5. Preliminary Site Plans

6. SEPA Environmental Checklist, received February 28, 2013
7. Preliminary Tree Protection report, Kevin McFarland, Sound Urban Forestry, dated February 19, 2013
8. Wetland and stream delineation, John Altmann, Altmann Oliver Associates, dated November 2, 2012
9. Mazama Pocket Gopher study, Curtis Wombach, Enviro Vector, dated October 10, 2012
10. Transportation Studies
    a. Transportation Impact Analysis, TENW, dated April 23, 2013
    b. TIA Addendum, TENW, dated August 15, 2013
11. Stormwater Site Plan, Hatton Godat Pantier, with Geotechnical Engineering Report, dated August 13, 2013
12. Sanitary Sewer Basin study, Hatton Godat Pantier, dated August 9, 2013
13. Stormwater Pollution Prevention Plan, Hatton Godat Pantier, dated August 12, 2013
14. Mitigated Determination of Nonsignificance, dated September 12, 2013
15. Notice of Application
16. Notice of Application published in *The Olympian*, dated April 30, 2013
17. Agency routing sheet
18. Comments received from Mike Laverty, North Thurston Public Schools, dated September 12, 2012
19. Comments received from Wade Duffy, City of Lacey Building Division, dated September 12, 2012
20. Comments received from Terry Davis, City of Lacey Fire Division, dated April 26, 2013
21. Comments received from Chun Saul, City of Lacey Finance Department, dated April 30, 2013
22. Comments received from Lori Flemm, City of Lacey Parks and Recreation, dated May 2, 2013
23. Comments received from Washington State Department of Ecology, dated May 9, 2013
24. Comments received from Kevin Hughes, Thurston County Public Works, dated May 13, 2013
25. Comments received from Brad Sangston, Thurston County Environmental Health, dated August 2, 2013
26. Comments received from Doug Christenson, City of Lacey Public Works Water Resources, dated September 6, 2013
27. Comments and traffic mitigation estimate received from Pat McGuin, City of Lacey Public Works Transportation, dated September 13, 2013
28. Comments received from Tom Stiles, City of Lacey Public Works Development Review, dated October 14, 2013
29. Notice of Hearing published in *The Olympian*, dated October 20, 2013
30. Notice of Hearing sent to adjacent property owners
31. Certification of Public Notice
32. Additional email comments from Doug Christenson, City of Lacey Public Works Water Resources, dated September 17, 2013
33. Gateway Residential Division 2 proposed Preliminary Plat Map

34. Preliminary Plat of Gateway Division 1, dated October 24, 2013
35. Letter received from Brandon Farrell, Hall Equities Group, dated October 29, 2013 with attached Letter from Jeff McInnis, P.E., dated October 18, 2013
36. Unique Conditions, Specific Transportation Improvements, and General Conditions
37. Memorandum received from Steve Hatton, P.E., dated October 30, 2013

The Hearings Examiner enters the following Findings and Conclusions based upon the testimony and exhibits admitted at the open record hearing:

FINDINGS

Application and Notice

1. Jeff Pantier, PLS, on behalf of Gateway 850 LLC (Applicant), requests a preliminary plat to subdivide approximately 43 acres into 83 single family lots and one 10.9 acre parcel for future multi-family development, at the northwest corner of the Britton Parkway NE/Gateway Boulevard intersection in Lacey, Washington.[1] *Exhibit 2, Staff Report, page 1; Exhibit 3; Exhibit 4.*

2. The City of Lacey (City) determined the application was complete on April 26, 2013. The City posted notice of the application on the property on April 26, 2013, and published notice in *The Olympian* on April 30, 2013. The City mailed notice of the open record hearing to all owners of property within 300 feet of the site on October 18, 2013, posted notice on the site on October 19, 2013, and published notice in *The Olympian* on October 20, 2013. *Exhibit 2, Staff Report, pages 8 to 9; Exhibit 14; Exhibit 15; Exhibit 16; Exhibit 29; Exhibit 30; Exhibit 31.*

State Environmental Policy Act (SEPA) Review

3. The City acted as lead agency and analyzed the environmental impact of the proposal, as required by the State Environmental Policy Act (SEPA), chapter 43.21C RCW. After reviewing an Environmental Checklist and other available information, the City determined that the proposal, with conditions, would not have a significant adverse impact upon the environment, and issued a Mitigated Determination of Nonsignificance (MDNS) on September 12, 2013. Conditions require a voluntary mitigation agreement to mitigate impacts on North Thurston County Public Schools, and traffic impact fees to mitigate impacts to Thurston County roads. *Exhibit 2, Staff Report, page 3; Exhibit 14; Exhibit 15, Exhibit 16; Exhibit 29; Exhibit 30.*

Comprehensive Plan and Zoning

4. The property is designated High Density Residential under *The City of Lacey and Thurston County Land Use Plan for the Lacey Urban Growth Area*, a joint planning document by the City and Thurston County for the Lacey Urban Growth Area

[1] The property is identified by Thurston County tax parcel numbers 11803340100, 1180340000, and 11810103000. *Exhibit 4.* A legal description of the property is included in the staff report. *Exhibit 2, Staff Report, page 1.*

(Comprehensive Plan).[2] Relevant Comprehensive Plan goals and policies encourage development in urban areas where adequate public facilities and services exist or can be provided. Goals and policies also encourage high quality, attractive, or innovative design in quality residential neighborhoods with mixed housing types and income levels, complementary land uses, attractive and functional neighborhoods, development that plans around or complements natural features, public and civic spaces and uses, interconnecting streets and alleys coordinated with City and regional transportation plans, open space, street trees and planting strips, property maintenance, perpetual maintenance of wetlands for passive recreation, traffic calming where appropriate, and linked pedestrian and bicycle pathways.[3] *Comprehensive Plan, Growth Management Act Land Use Goals and County-Wide Planning Policies, pages 3-1 to 3-3; Residential Goals and Policies, pages 6-5 to 6-6; Environmental Quality Goals and Policies pages 6-9 to 6-10; Parks and Recreation Goals and Policies page 6-10; Residential Streets Goals and Policies 6-11 to 6-12; Utilities and Capital Facilities Goals and Policies, page 6-18; Water Resources Goals and Policies, page 6-19.*

5. The subject property is located within the City's High Density Residential zoning district. The zone allows residential development, including detached single-family lots, detached and attached townhouse lots, and multi-family residential development, at a development density between 6-20 units per acre. *Lacey Municipal Code (LMC) 16.18.020.A.* At 6 units per acre, there would be 255 units. At 20 units per acre, there would be 852 units. The Applicant proposes a mix of single-family residential lots, townhouse lots, and future multi-family residential development, totaling 333 units. For single-family detached housing in this zone, minimum lot size is 2,000 square feet where alleys are utilized, and 3,500 square feet if alleys are not utilized. Attached single-family residential and multi-family residential development must be reviewed and approved through a subdivision, townhouse, planned residential development, site plan review, or building plan review process where such concepts are identified and the project is designed and conditioned subject to chapter 14.23 LMC design requirements. *LMC 16.18.035; LMC 16.18.040.A and .040.B.* Samra Seymour, City Planner, testified that the proposed densities are consistent with City code. Jeff Pantier, Applicant Representative, testified that the proposal includes 5,000 square foot lots for single-family residential development and 3,300 square foot lots for townhouse development, at two townhouses per lot. Mr.

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[2] The City of Lacey and Thurston County Land Use Plan for the Lacey Urban Growth Area is a comprehensive land use plan that encourages development in urban areas through high quality, attractive, innovative, and humanistic residential project developments of mixed housing types and connected system of community, neighborhood, and open spaces.

[3] City staff identified the following goals and policies of the Comprehensive Plan as applicable to the proposed development: Growth Management Act Land Use Goals and County-Wide Planning Policies (Section III); Residential Goals and Policies (Section VI.E) Goal 1 and Policies 1.a – 1.k; Environmental Quality (Section VI.G) Goals 1 and 2 and Policies 1.a – 1.k, 2.a, 2.c; Parks and Recreation (Section VI.H) Goal 1 and Policy 1.a; Policy 1.a – 1.i; Residential Streets Goal 1 and Policies 1.a – 1.g; Utilities and Capital Facilities (Section VI.N) Policies 1.a and 1.b; and Water Resources (Section VI.O) Policy 1.b. *Exhibit 2, Staff Report, pages 3 to 7.*

Pantier also testified that higher density residential development is intentionally planned farthest away from wetlands and agriculture land. *Exhibit 2, Staff Report, pages 2 to 3 and 11; Testimony of Ms. Seymour; Testimony of Mr. Pantier.*

6. As proposed, the property would be developed at a higher density than surrounding property. Surrounding property would be developed at similar densities over time in accord with the Comprehensive Plan. *Exhibit 2, Staff Report, page 3.*

7. The proposal is the first phase of a multi-phase residential development project. Each phase must fully comply with applicable ordinances. The proposal includes one 10.9 acre tract (Tract XX) for future multi-family development. Tract XX is currently proposed at maximum density of 250 units so the Applicant can study the development's impacts and provide for infrastructure at this maximum utilization. Mr. Pantier testified that the Applicant may later choose not to develop Tract XX at this maximum density. *Exhibit 2, Staff Report, pages 9 and 27; Testimony of Ms. Seymour; Testimony of Mr. Pantier.*

Physical Condition and Surrounding Property

8. The property is undeveloped and heavily forested. The site slopes down from a ridge, at the northeast corner of the site, to the south, at 5 percent or less grade, and to the west, at between 10 and 25 percent grade. *Exhibit 2, Staff Report, page 2.*

9. The property is located at the northwest corner of the intersection of Britton Parkway NE and Gateway Boulevard. The Applicant also owns both parcels directly north of this proposed site, which are located in Thurston County and zoned High Density Residential. For these north parcels, the Applicant has submitted a preliminary subdivision application with Thurston County for 464 lots, including 374 single-family lots and 90 multi-family lots. The parcel to the southwest is also zoned High Density Residential and currently has preliminary subdivision approval from the City for 248 single-family lots. The parcel to the east is zoned Business Park. The parcel across Britton Parkway to the south is zoned Hawks Prairie Business District. The parcel to the west is zoned Agriculture, and is located outside of the City limits within the Urban Growth Area (UGA). *Exhibit 2, Staff Report, pages 3 and 9; Exhibit 35.*

10. Three wetlands have been identified on the property. Wetland A, a Category III wetland, is located in the southwest portion of the site. An 80 foot buffer is required for this wetland. Wetlands B and C are part of a larger, Category II wetland system that extends onto the parcel to the west. This wetland system requires a 100 foot buffer. Proposed development would not occur within the wetlands or their required buffers. Under LMC 14.28.380, a common boundary between separate sensitive area tracts and the adjacent land must be identified, and the Applicant must create a separate sensitive tract or tracts containing the wetland and buffer, by short subdivision, which shall remain undeveloped in perpetuity. *Exhibit 2, Staff Report, pages 2 and 9 to 10; Exhibit 8; Testimony of Ms. Seymour.*

11. The property drains to the west into Wetland B and a stream, Eagle Creek. Eagle Creek is a tributary to the larger Woodland Creek, which is a tributary to Henderson Inlet. Eagle Creek is identified as a Washington Department of Natural Resources (WDNR) Type 3 stream and requires a 150 foot buffer. The creek and its buffer are located outside of the project area. Stormwater runoff from proposed development may potentially impact the creek. Eagle Creek is on the federal Clean Water Act Section 303(d) list for failure to meet state water quality standards for several criteria, including dissolved oxygen and bacteria. To mitigate potential hydrological impacts, proposed conditions require hydroperiod analysis and groundwater monitoring prior to City permit issuance or construction drawing approval. Should these studies identify hydrological impacts, the City may then require an administrative wetland development permit prior to grading permit or civil drawing approval. *Exhibit 2, Staff Report, pages 10 – 11; Exhibit 8.*

Landscaping and Open Space

12. LMC Title 15 sets open space requirements. Ms. Seymour testified that the proposal meets City open space requirements, although the proposal lacks details. Landscape plans showing actual physical layout of open and park spaces must be submitted prior to final plat. Mr. Pantier testified that the proposed development allocates 39 percent to open space though only 10 percent of open space is required by LMC. Eight percent of the total would be active open space. *Exhibit 2, Staff Report, pages 10 to 11; Testimony of Ms. Seymour; Testimony of Mr. Pantier.*

Access and Traffic Impacts

13. Transportation Engineering Northwest prepared a Traffic Impact Analysis and determined that development of 333 residential units would result in 219 P.M. peak hour trips. According to comments from the City's Transportation Department, the proposal requires two full access points to distribute the volumes for safety and emergency access. To meet City major collector Type II roadway standards, the Gateway Boulevard connection on the east property line must be constructed from the curb on the east side of the roadway to the full frontage improvements along the west side of the roadway. As currently proposed, this roadway is located along the property line of this project and the parcel directly to the east. The east-west collector identified as Road B on the proposed preliminary plat map must also be constructed as a major collector Type II roadway with a connection to Britton Parkway. Jeff Schramm, Applicant Traffic Engineer, testified that it is not possible for Road B to connect through the property to the south as shown on the preliminary plat. Patrick Mullaney, Applicant Attorney, stated that the Applicant proposes an alternative which would provide secondary interim access across Lots 21, 22 and Tract "H" and a permanent connection to Britton Parkway, as described in Exhibit 34. Martin Hoppe, City Traffic Engineer, testified that expressed concern about the impact of the alternative proposal on the multi-family development that would likely be constructed after the access road is installed. He stated that this is not a public safety concern, but one of private impact only. He noted that the City does not require a Traffic Impact Analysis for cumulative impacts of other projects that may develop in the area.

Even with these reservations, Mr. Hoppe accepted the alternate proposal as one that is feasible, if a condition is added that details the type of access that must occur. *Exhibit 2, Staff Report, pages 11 to 12; Testimony of Mr. Schramm; Statement of Mr. Mullaney; Exhibit 34; Testimony of Mr. Hoppe.*

Stormwater Management

14. Hatton Godat Pantier prepared a Stormwater Site Plan for proposed development, dated August 13, 2013. Steve Hatton, P.E., testified that almost all the soil on the site is Alderwood Soil Type, which is not suitable for infiltration. Mr. Hatton identified two areas on the property of Spanaway Soil Type, which do infiltrate, and testified that stormwater ponds would provide on-site infiltration in these two areas. *Exhibit 11; Testimony of Mr. Hatton.*

15. Doug Christiansen, City Public Works Water Resources Division, testified that although the 2010 Stormwater Manual requires on-site infiltration, the Applicant proposes collection and discharge of stormwater to the west which may impact the wetlands and stream. Mr. Christiansen testified that it is not possible for the Applicant to improve the water quality of Eagle Creek, and that any development would likely result in negative impacts. Mr. Christiansen identified possible conditions to mitigate those adverse impacts. *Testimony of Mr. Christiansen.*

Utilities and Services

16. Tom Stiles, City Public Works, testified that City water and sewer service are available to the proposed development. Lacey Fire District #3 would provide fire protection services, and electric power is available from Puget Sound Energy. *Exhibit 2, Staff Report, page 2; Testimony of Mr. Stiles.*

Staff Recommendation and Applicant Response

17. Ms. Seymour testified that City staff recommends approval of the preliminary subdivision request, with conditions. Proposed conditions include those intended to mitigate impacts associated with this specific application and conditions that summarize generally applicable ordinances and standards. *Exhibit 2, Staff Report, pages 12 to 29; Testimony of Ms. Seymour.*

CONCLUSIONS

Jurisdiction

The Hearings Examiner has the authority to hear requests for preliminary plats and planned residential developments (PRD), and to issue a recommendation to the City Council. *LMC 2.30.090.B; LMC 15.10.090; LMC 16.60.150.B; City Development Guidelines and Public Works Standards (DGPWS) Section 1.030(K).*

Criteria for Review

To make a recommendation on a preliminary plat application, the Hearings Examiner must give due consideration to the following criteria set forth in LMC 15.10.090:

A. To assure conformance of the proposed subdivision to the general purposes of LMC Chapter 15.10, all elements of the Comprehensive Land Use Plan and implementing legislation including the Zoning Code (LMC, Title 16), the Development Guidelines and Public Works Standards, and other applicable planning standards, specifications and policies adopted by the city council shall be considered;

B. To inquire into the public use and interest proposed to be served by the establishment of the subdivision and/or dedication, the examiner shall determine if appropriate provisions are made for, but not limited to, the following:

1. Prevention of overcrowding. Consideration shall be given to designations of the Comprehensive Land Use Plan and Zoning Code, and the requirements of the Development Guidelines and Public Works Standards in consideration of the physical characteristics of the land in relation to the number of persons, buildings or sites proposed to be located thereon, and also to the availability of public facilities such as water, sewers, fire protection, streets, schools, parks, etc., if not adequately provided for within the subdivision.
2. Conformance with the Transportation Plan and Development Guidelines and Public Works Standards to facilitate traffic circulation on the streets and highways. Proposed streets must be aligned or built in such a way as to best facilitate the movement of pedestrians and vehicles and reduce the possibility of crashes. Traffic calming techniques and other standards of the Development Guidelines and Public Works Standards will be required. Key pedestrian intersection improvements for pedestrians will be considered where so designated on the Comprehensive Land Use Plan Map.
3. Meeting requirements of the Zoning Code (Title 16 of the Lacey Municipal Code) and Design Review (Chapter 14.23 of the Lacey Municipal Code) to provide adequate light air and privacy by meeting setbacks, dimensional standards, yard areas and design principles. Assurance that the plat is arranged in such a way that all lots have adequate light, air, and opportunity for privacy.
4. Satisfying principles, goals and policies of the Comprehensive Land Use Plan and Comprehensive Plan for Outdoor Recreation for proper arrangement and provision of easements and pathways and other bicycle-pedestrian paths, etc. Adequate provisions for pathways, sidewalks and other pedestrian features connecting various parts of a subdivision shall be an emphasis of design. Goals and policies of the Comprehensive Land Use Plan for key pedestrian intersections and improvements shall be used when designing pedestrian movement and circulation. Consideration shall be given to key focus areas in every neighborhood, particularly considering local grade schools and open space, and how each subdivision relates to these areas and provides connectivity to key sites within each neighborhood. Provisions for trail systems in areas conducive to such (along creeks, rivers, scenic areas, etc.) shall also be considered.
5. Conformance with goals, policies and standards of the Comprehensive Plan for Outdoor Recreation and standards of this title for provision of adequate recreation and open space and buffers. Sufficient guaranteed open space and recreational areas shall be designed and provided to adequately serve the subdivision. Plans for connectivity between

subdivisions and throughout neighborhood areas shall be provided to residents of the subdivision and shall be implemented in the design of each subdivision. This shall include trail systems, key pedestrian intersection concepts, sensitive area buffers and corridors with trails systems and other global circulation concepts (including more than just the local circulation of the individual subdivision) for the neighborhood and community.

C. To consider the physical characteristics of the proposed subdivision site. The hearings examiner may recommend disapproval because of flood, inundation or wetland or other sensitive area conditions pursuant to the standards of Title 14 of the Lacey Municipal Code. The examiner may recommend the construction of protective improvements be required as a condition of approval, with such improvements to be noted on the final plat in order to assure that:

1. All such proposals are consistent with the need to minimize flood damage;
2. All public utilities and facilities, such as sewer, gas, electrical and water systems are located, elevated and constructed to minimize or eliminate flood damage; and
3. Adequate drainage is provided so as to reduce exposure to flood hazards;
4. Other purposes as described in the City Environmental Protection and Resource Conservation Plan and implementing legislation of Title 14 of the Lacey Municipal Code are achieved.

In addition, RCW 58.17.110(1) provides that a proposed subdivision shall not be approved unless:

> appropriate provisions are made for . . . the public health, safety, and general welfare and for such open spaces, drainage ways, streets or roads, alleys, other public ways, transit stops, potable water supplies, sanitary wastes, parks and recreation, playgrounds, schools and schoolgrounds and . . . all other relevant facts, including sidewalks and other planning features that assure safe walking conditions for students who only walk to and from school; and . . . the public interest will be served by the platting of such subdivision and dedication.

The criteria for review adopted by the Lacey City Council are designed to implement the requirement of chapter 36.70B RCW to enact the Growth Management Act. In particular, RCW 36.70B.040 mandates that local jurisdictions review proposed development to ensure consistency with City development regulations, considering the type of land use, the level of development, infrastructure, and the characteristics of development. *RCW 36.70B.040.*

<u>Conclusions Based on Findings</u>

1. **With conditions, the proposed subdivision conforms to the City of Lacey Comprehensive Land Use Plan, the City Zoning Code, and the City Development Guidelines and Public Works Standards.** The proposed subdivision is consistent with City Comprehensive Land Use Plan goals and policies, as it would consist of a mix of

single-family lots and multi-family development, open space, and interconnected road network. Single-family and multi-family residential development is allowed within the City's High Density Residential zoning district. Proposed development density is consistent with the range of densities permitted within the zone. Surrounding area is anticipated to be developed at similar densities over time, in accord with the Comprehensive Plan, and thus proposed development would be compatible with surrounding uses and development densities.

City sewer and water services are available to the site. The proposed east-west roadway, Road "B", would serve as a major collector through the site. Two full access points would be provided. Conditions are necessary to ensure traffic impact fees are assessed to mitigate impacts to Thurston County roads, and that fees are collected prior to building permit issuance. The proposal provides sufficient open space to meet LMC Title 15 requirements. Conditions are also necessary to ensure that the Applicant submits a detailed landscaping plan, enters into a voluntary agreement for school impact mitigation fees, and that the project proceeds in conformance with the plans on file and applicable City ordinances and standards. *Findings 1, 3 – 7, 9, 12 – 17.*

2. **With conditions, the proposed preliminary plat would make appropriate provision for all elements identified within RCW 58.17.110, and would serve the public use and interest.** The City provided adequate notice and opportunity to comment on the proposal. Proposed development density is consistent with density allowed within the City's High Density Residential zone. Public services, including water, sewer, and fire protection, are available. Surrounding property to the north and southwest is slated for future residential development. Surrounding property would be developed at comparable densities, consistent with the City Comprehensive Plan. Open space would be provided within the proposed development. The City determined that, with conditions, the proposal would not have a probable significant adverse impact on the environment. MDNS conditions require entry into a voluntary mitigation agreement for payment of school impact fees and payment of traffic impact fees, including safe walking to and from schools if feasible. Roads would be constructed to serve subdivision lots and connect to the surrounding road system. Some stormwater runoff would be infiltrated on site where soil conditions permit, and remaining stormwater runoff would be captured and discharged to the west. Conditions are necessary to ensure stormwater discharge does not adversely affect wetlands, groundwater, or stream water quality. Conditions are necessary to ensure that proposed development proceeds in conformance with the plans on file and applicable City ordinances and standards. *Findings 1 – 17.*

3. **With conditions, the physical characteristics of the proposed subdivision have been considered.** The site is undeveloped, heavily forested, and slopes down from a ridge in the northeast corner of the property. There are three wetlands on the property, two of which are part of a larger wetland system extending off site. A stream, Eagle Creek, and its associated buffer are located off site. Proposed development would occur outside of

the wetlands, Eagle Creek, and associated buffers. Eagle Creek is included on the federal Clean Water Act 303(d) list for impaired water quality. Conditions are necessary to ensure that stormwater discharge does not adversely affect wetlands, groundwater, or stream water quality, and that proposed development proceeds in conformance with the plans on file and applicable City ordinances and standards. *Findings 1, 8 – 11, 14, 15, 17.*

RECOMMENDATION

The Hearings Examiner recommends that the request for preliminary plat approval to subdivide approximately 43 acres into 83 single family lots and one 10.9 acre parcel for future multi-family development, at the northwest corner of the Britton Parkway NE/Gateway Boulevard intersection in Lacey, Washington, be **APPROVED,** subject to the following conditions:[4]

Conditions Unique to the Application

1. The proposal shall be developed in substantial conformance with the plans submitted on February 28, 2013, except as modified by the conditions below.

2. Tree protection on site shall follow the provisions of the preliminary Tree Protection Plan, specifically section VI "Schedule of Tree Protection Tasks", prepared for this project dated February 19, 2013. Utility and grading plans will be reviewed by City staff and Sound Urban Forestry with the intent to save and protect trees that are designated as having potential for retention (LMC 14.32).

3. Prior to construction drawing approval, an open space plan shall be submitted to the Planning Department for approval. This plan may be combined with the landscaping plan and shall show the type and location of improvements and amenities within the opens space tracts designated for active open space.

4. The developer shall meet and satisfy all conditions of the MDNS issued on September 12, 2013 and attached as Exhibit 14.

5. A Homeowner Association shall be formed to maintain the open spaces. Covenants, Conditions, and Restrictions (CC&Rs) shall also provide for an Integral Pest Management Plan to help protect water quality.

6. At least two separate and approved means of fire apparatus access shall be provided for lots 1-38 unless all buildings on these lots are provided with approved automatic fire sprinkler systems installed in accordance with NFPA 13D Standards (2007 Edition) (IFC Section 903.3.1.3).

7. This proposal is within the boundary of Local Improvement District (LID) #19. Two of the subject parcels have outstanding LID#19 assessments. Parcel no. 11803340100 is owing $70,553.24 and parcel no. 11803430000 is owing $71,787.85. Prior to final plat approval of this subdivision, the property assessment for LID 19 shall be paid in full to the City of Lacey or the

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[4] This recommendation includes conditions required to reduce project impacts as well as conditions required to meet City Code standards.

balance of the LID amount segregated proportionately between the parcels being created. Please contact Chun Saul, Senior Accountant, in the City of Lacey Finance Department at (360) 491-3212 for coordination of the LID payment or segregation.

8. Adequately sized water mains shall be extended throughout the proposed site to provide domestic water service to each individual lot/unit, to provide irrigation water service, to meet fire flow and protection requirements, to assure water quality standards are met and as necessary to satisfy the City of Lacey's Water Comprehensive Plan requirements. An overall water plan and coordination with the City of Lacey as well as adjacent property owners will be required as there are a few different ways of satisfying these requirements. Pressure reducing valve stations as well as individual pressure reducing valves will mostly likely be required as the proposed site is bisected by two water pressure zones.

9. All existing well locations (on or adjacent to the proposed site) shall be shown on the grading and civil drawings.

10. To irrigate planter strips, storm water and open space areas, provision for future reclaimed water shall be incorporated into the plat design. The irrigation system(s) shall be designed and constructed to current City of Lacey reclaimed water installation practices. At this time the system will be supplied with City of Lacey potable water; however, when reclaimed water is available the City will switch the system over to reclaimed water. Provisions to switch the systems will be incorporated into the design.

11. Adequately sanitary sewer mains shall be extended throughout the proposed site to provide sanitary sewer service to each individual lot/unit and as necessary to satisfy the city of Lacey's Sanitary Sewer Comprehensive Plan requirements.

12. No more than one lift station shall be sited to serve this plat and the proposed Division 2 located with Thurston County. The lift station shall be located to maximize the number of housing units either served entirely by gravity sewer or gravity sewer to the lift station. The lift station shall be located in Division 2 as shown on Exhibit 33. Alternate locations within Division 1 could be approved if all lift station design requirements are satisfied.

13. Surface discharge (runoff) from the proposal shall first be minimized (i.e. retained and infiltrated upsystem within the plat) to the maximum extent feasible via roof drains, drywells, rain gardens or other approved techniques per the City of Lacey's 2010 Stormwater Design Manual (SDM). If surface discharge is unavoidable as determined by the City of Lacey, it must be treated for a high level of water quality improvement (i.e. metals treatment and phosphorous control) such that further impairment of downstream waters does not occur.

14. There is potential that the existing on-site wetlands may be hydrologically impacted by the project. A hydroperiod analysis shall be performed per the 2010 SDM Core Requirement #8 to show that the wetland hydroperiod will not be adversely affected.

15. An administrative wetland development permit shall be required prior to approval of grading and/or civil drawings if the final stormwater design for the project will result in physical and/or hydrologic impacts or alterations to the on-site wetlands.

16. Groundwater monitoring shall be conducted across the site over at least one complete wet season. This information shall be included with the stormwater plans required as part of the civil drawing review.

17. Due to the challenging nature of the project area (i.e. topography, wetlands, saturated ground, surface seepage, proximity to Eagle Creek, high water table) additional analysis and design work addressing the comments in Exhibits 26 and 32 shall be required prior to approval of grading and/or civil drawings.

18. Any surface discharge shall consider metals and phosphorous menus in 2010 Stormwater Manual and comply with measures to reduce impacts to water quality.

19. Per the Transportation Comprehensive Plan, Gateway Boulevard and Road B shall both be classified as Major Collector Type II roadways.

20. The proposed east-west roadway identified as Road "B" shall be constructed from Gateway Boulevard to its on-site terminus at the southwest property line, as shown on the preliminary plat map (Exhibit 5).

21. Prior to final plat approval, a "Right-in/Right-out" access shall be constructed as a connector to the major local residential roadway within the lot proposed for multi-family development.

22. The "Gateway Boulevard" connection shall be constructed from curb to curb. On the west side of the roadway, full frontage improvements shall be installed to Major Collector Type II roadway standards.

23. Roadways connecting to Road "B" shall be constructed to Major Residential Roadway standards (see Detail 4-4.0 dated 8/27/09).

24. Frontage improvements along the property frontage of Britton Parkway (including the required stormwater treatment and infiltration facilities) shall be installed by the developer and approved by the City prior to final plat approval of this project. These improvements shall be installed to City of Lacey Boulevard standards (see Detail 4-2.1 dated 8/27/09).

25. The right angle knuckle style cul-de-sac shall meet minimum roadway radii requirements identified in the Development Guidelines and Public Works Standards manual.

26. The Transportation Comprehensive Plan identifies the need for sidewalks, bike lanes and other facilities to accommodate multi-modal transportation. The multi-modal impacts from this project shall be mitigated by construction the internal street network and frontage improvements according to Lacey's standards.

27. A traffic calming plan shall be incorporated into the internal street network to control cut through traffic for all future phases and reduce speed within the development. The traffic calming plan shall be approved by the Public Works Department.

General Conditions

1. Prior to construction drawing approval, a detailed landscaping plan shall be prepared by a licensed landscape architect, nursery person, or landscaper and submitted to the Planning Department for review and approval. The plan shall include the type, number, and location of the vegetative improvements as well as a specific time line for completion of the improvements. A separate irrigation plan must also be submitted showing the location of all irrigation lines, location of sprinkler heads, and approximate coverage areas. The plans must include a note stating that the property owner is responsible for maintaining all plants in a healthy growing condition for the life of the project. All requirements of Chapter 16.80 of the Zoning Code shall be satisfied (LMC 16.80).

2. Prior to construction drawing approval, a detailed estimate from a landscape installer must be submitted to the Planning Department. The estimate should include all costs associated with installing landscaping and irrigation as called out on the approved plans, including labor (LMC 16.80).

3. Prior to final subdivision approval, all landscaping within open spaces shall be installed or a financial security must be provided to the Planning Department in the amount of 150 percent of the above mentioned landscape estimate. The City shall release this financial security once the landscaping for the project is installed and approved by the Planning Department and a financial security is in order to ensure that all plant materials are properly maintained. This security device shall be in the amount of 20 percent of the value of the vegetative improvements and shall be held for a period of one year (LMC 16.80).

4. A note shall be placed on the face of the landscaping and irrigation plans stating that any irrigation lines placed within tree protection zones established for the project must be installed in such a manner as to not cause damage to the root protection zone, such as by cutting roots, digging trenches, operation of machinery, etc. Special care must be taken (hand digging trenches, designing lines to stay out of these areas where possible, etc.) to ensure damage to the trees does not occur. In the event damage to these areas does occur, the city may require, at their discretion, replacement of the comparable landscape value of the trees damaged or other means to make up that loss (LMC 16.80).

5. A sign permit shall be issued by the City of Lacey prior to the installation of any signs on the subject site (LMC 16.75).

6. All applicable requirements of the City Zoning Code shall be satisfied (LMC Title 16).

7. The Applicant/developer shall be responsible for obtaining all applicable permits required for the project, including National Pollutant Discharge Elimination System Permit (NPDES), Forest Practices Application, and any others. These permits will require additional review time from the appropriate agencies.

8. A Homeowners' Association shall be established to insure proper maintenance of common facilities. In order to insure proper responsibility and authority to carry out necessary maintenance activities, the Homeowners' Association shall, at a minimum, include the following provisions:

A. Membership in the Homeowners' Association will be mandatory for all lot owners.

B. The Homeowners' Association shall have the power to levy fees and dues necessary to successfully accomplish necessary activities.

C. The Homeowners' Association shall have the provision for the collection of attorney fees extended in collecting delinquent assessments from lot owners.

D. Responsibility of the Homeowners' Association in maintenance of common areas shall be specifically detailed.

Assessment of the Association dues shall initially be established by the Applicant and approved by the Department of Community Development. Protective covenants and declarations establishing the Homeowners' Association shall be approved by the Department of Community Development as adequate to satisfy the intent and the function of this condition to assure proper maintenance of common facilities.

9. Review of the civil drawings and the final plat application shall be pursuant to the provisions of Title 15, Land Division, of the Lacey Municipal Code. This specifically includes Chapter 15.10, Subdivision; 15.12, Design Standards for Subdivisions…; 15.14, Dedications…; 15.16, Improvements; and 15.22, Community Facilities (LM C Title 15).

10. The following notes shall be shown on the face of the plat:

A. "All land within the boundaries of this plat is within a Community Facilities District of the City of Lacey and all saleable lots are subject to all service fees and charges which may be levied by the City of Lacey for the maintenance, operation and improvement of any community facilities and for liens for any unpaid service fees or charges."
B. "Notice: The City of Lacey has no responsibility to build, improve, maintain or otherwise service the private roads within or providing access to property described in this plat."
C. "All open space tracts shall be owned and maintained by the Homeowners Association, in accordance with the declaration of covenants, conditions, and restrictions recorded under auditor's file no. _____."
D. "The homeowners association will be responsible for maintaining and locating all irrigation lines located in the public right-of-way."
E. "Roof drains shall have dry wells and be placed on individual lots. Dry wells shall be sized to accommodate storm runoff per the City of Lacey Development Guidelines and Public Works Standards." If site conditions cannot support dry well systems, a note must be included on the face of the plat indicating that roof and foundation drains shall be tied into the stormwater system.
F. "The homeowner's association shall be responsible for maintaining the planter strips (weeding, mowing, pruning of the street trees, etc.) in a healthy and growing manner in perpetuity and maintain stormwater facilities (as outlined in the Residential Agreement to Maintain Stormwater Facilities and to Implement a Pollution Source Control Plan)."

11. All wetlands and their associated buffers shall be identified as separate tracts on the final subdivision plat. The developer shall protect the sensitive tract by one of the following methods (LMC 14.28.380.A):

A. The developer shall dedicate to the City of Lacey or other public or non-profit entity specified by the City of Lacey, the wetland and buffer tracts for the protection of the wetland and its buffer and to ensure management of the wetland resource in the best interest of the public; or
B. The developer shall establish and record a permanent and irrevocable deed restriction on the property title and on the face of the final subdivision plat recorded with the Thurston County Auditor. Such deed restriction(s) shall prohibit in perpetuity the development of the parcel, and alteration, or disturbance of vegetation within the sensitive area tract. Unless the development, alteration or disturbance of vegetation is for purposes of habitat enhancement as part of an enhancement project, which has received prior written approval from the city of Lacey, and any other agency with jurisdiction over such activity.

12. Prior to any construction activities occurring on site, the exact boundaries of the identified wetland buffer edges, shall be clearly marked in the field with orange construction fencing and identified with temporary signs placed along the orange construction fence stating:

> "Wetland Buffer. Alteration or Disturbance is Prohibited. Please call the City of Lacey for more information 491-5642."

The fencing shall be maintained through the duration of construction activities. A detail of the fencing and signage and its location shall be clearly shown on the grading and Public Works Construction Drawings (LMC 14.28.380).

13. Prior to any construction activities occurring on site, the location of the orange construction fencing installed shall be inspected and approved by the City of Lacey Community Development Department. This information shall be displayed in note form on the grading and Public Works Construction Drawings (LMC 14.28.320).

14. All staging areas of construction equipment shall be located at the highest elevation point on the property furthest from the protected wetlands and associated buffers. All activities associated with the development permit shall not occur within the delineated wetland buffers (LMC 14.28.360.B.5).

15. Erosion control measures shall be implemented prior to any activity on the site in a manner that eliminates potential erosion and/or sediments from disturbed areas from entering the wetland buffer. Erosion control methods may be in the form of straw bales, silt fences or other forms approved by the City of Lacey. Erosion methods shall be identified on the grading and construction drawings submitted to the City of Lacey for approval (LMC 14.28.360.B.7).

16. The proposed development shall comply with all of the codes and ordinances adopted by the City of Lacey, including the 2009 International Building Code and the 2012 International Fire Code, including Appendix D (Sections D106 & D107).

17. A grading permit is required for the proposed project. Please refer to the City of Lacey Development Guidelines & Public Works Standards Section 3.085.

18. Roof and foundation drains from each individual lot shall be tight-lined to a properly engineered retention facility designed to receive this discharge (UPC Chapter 11).

19. Fire apparatus access roads shall be constructed and approved and fire hydrants shall be installed, tested and approved prior to building permit issuance. Fire access roads and fire hydrants shall be accessible and serviceable at all times during construction. Required fire hydrants shall be provided in accordance with the approved civil plans and shall be installed, tested and approved in accordance with City of Lacey Public Works Standards (IFC Sections 503.1 and 508.1).

20. Approved 20-foot wide all-weather surface fire apparatus access roads capable of handling the imposed loads of fire apparatus shall be provided to within 150-feet of all exterior portions of a building at ground level. The inside turning radius at corners along fire access roads shall be not less than 28-feet in width. Dead-end fire apparatus access roads shall be provided with approved means for the turning around of fire apparatus. Fire apparatus access roads shall be in accordance with the approved civil plans (IFC Section 503.1; LMC 14.07.015).

21. Fire apparatus access roadways shall not exceed 10% grade (IFC Section D 103.2).

22. Fire hydrants shall be provided at all intersections and at 660-foot spacing along streets in single-family residential developments. A fire hydrant shall be not more than 300-feet from any residential building in this development (LMC 14.07.015).

23. The minimum fire flow required for single-family residential developments shall be not less than 750 gpm at 20 psi residual pressure from any single fire hydrant. The City of Lacey Water Systems Engineer shall perform a fire flow model to verify the required fire flow has been met based on the water system design (IFC Section B105.1; LMC 14.07.015).

24. Approved address numbers are important for directing emergency response units to the proper location. Applicable building address numbers shall be provided at entrances to construction sites and shall be provided at conspicuous locations on the buildings prior to final occupancy approval. Said address numbers shall be placed facing the road from which the buildings are addressed. Address numbers shall be not less than 6-inches in height and shall contrast with their background (IFC Section 505.1).

25. If not existing, approved street name signs shall be provided at all intersections. Street signs shall be provided prior to issuance of building permits for any structure built on the street from which it addressed (IFC Section 505.2).

26. For Irrigation lines located in the Right-of-Way, the following shall be stated on the irrigation plans and is a condition of approval: "The Home Owner's Associated will be responsible for maintaining and locating all irrigation lines located in the public Right-of-Way" (DG&PWS, Water, Irrigation 6.210).

27. Water system improvements shall meet the requirements of the City of Lacey, the Coordinated Water System Plan (CWSP), Department of Health (DOH), City of Lacey Water System Plan,

Department of Ecology, Thurston County Environmental Health and City of Lacey Fire Code Official's standards. Actual main size, loop closures, and possible off-site improvements including the number and location of fire hydrants, will depend on the fire flows required and available to the site. Water main shall also be looped as required by the City as needed for water quality purposes (DG&PWS, Water 6.010).

28. Show all adjacent wells within 100-feet of the proposed plat with their protective radii (this will assure the proposed development will not impact any wells) (DG&PWS, Subdivisions and Short Plats, Chapter 2 – plat checklist).

29. To assure desired meters are available for your project, water meters 3-inches or larger must be ordered 10 weeks prior to being installed. Please make scheduling provisions to accommodate this lead time (DG&PWS General Notes Water Main Installation).

30. Water mains shall be extended on North or East sides of roadways or drive aisles six feet off the centerline (DG&PWS, Water 6.020).

31. Provide domestic water stubs to each lot/new building (if duplexes are utilized each side of the duplex must be metered), and appropriate connection fees must be paid. Irrigation meters with backflow prevention devices are needed for open space, landscaping, and stormwater facilities (DG&PWS, Water 6.120 F).

32. To assure adequate water is present for your project. Modeling of the water system shall occur. Please contact Brandon McAllister (491-5600) to coordinate the fire flow modeling (typical cost for this service $500.00).

33. If utility extensions are needed for the proposed project for roads that were paved in the last five years and the roads must be "cut", a disruption fee will be charged in accordance with Lacey Municipal Code 12.16.055.

34. The Builder/Applicant is required to purchase meters prior to the issuance of building permits (DG&PWS Water 6.121).

35. Any existing on-site septic tanks and drainfields shall be removed per Department of Ecology and Thurston County Department of Health.

36. All existing and proposed structures shall be connected to sanitary sewer (DG&PWS, Sewer 7A.010). Public mains with associated appurtenances shall be installed to serve the proposed plat with sewer.

37. Provide sewer stubs to each building connecting to the public main. Sewer main extensions shall be located 6-feet off the centerline of the street/drive area on the South or West side. (DG&PWS, Sewer 7A.010).

38. Sanitary sewer improvements associated with this project shall meet the requirements of the City of Lacey Comprehensive Sanitary Sewer Plan, Thurston County Health Department, Washington State Department of Health (DOH), the LOTT Clean Water Alliance and Department of Ecology. (DG&PWS, Sewer 7A.010 and Subdivisions and Short Plat 2-21).

39. Storm drainage improvements will be required in conjunction with the City of Lacey 2010 Stormwater Design Manual.

40. A final drainage report in accordance with the City of Lacey 2010 Stormwater Design Manual, shall be submitted to the City prior to Civil Plan approval. Within the report, include calculations with computer modeling showing proposed treatment and infiltration facilities have capacity for stormwater generated by this development. Also, include the modeling showing there are no downstream restrictions and the piping associated with the project is properly sized.

41. The following note shall be shown on the face of the plat, on the civil engineering drawings and is a condition for approval: "Roof drains shall have dry wells and be placed on individual lots. Dry wells shall be sized to accommodate storm runoff per the City of Lacey 2010 Stormwater Design Manual." If site conditions cannot support dry well systems, a note must be included on the face of the plat indicating that roof and foundation drains shall be tied into stormwater system (DG&PWS, Storm Sewer 8.5.13).

42. A Stormwater Pollution Prevention Plan (SWPPP) shall be submitted to and approved by the City prior to beginning construction of the project. Each of the 12 required SWPPP elements as identified in Chapter 1 of the City of Lacey 2010 Stormwater Design Manual shall be addressed and included in the construction SWPPP. If site conditions render SWPPP elements unnecessary, exemptions for each element shall be clearly justified in the narrative of the SWPPP. The SWPPP shall be submitted to and approved by the City prior to Grading permit or Civil Plan Approval.

43. A Stormwater Facility Maintenance Plan per chapter 9 of the City of Lacey 2010 Stormwater Design Manual shall be submitted to and approved by the City of Lacey. The maintenance plan shall be included in the submitted drainage report as part of the stormwater site plan. The stormwater facilities maintenance plan shall contain five main sections:

- Section 1: Owner information
- Section 2: Description of the drainage system and facilities serving the site
- Section 3: Cost estimate for long-term facilities maintenance, repair & rehabilitation
- Section 4: Site and facility management
- Section 5: Stormwater facility maintenance guide

Also, the maintenance plan shall be prepared as a stand-alone document for the post-development facility owner(s). The maintenance plan shall be submitted to and approved by the City prior to Civil drawing approval.

44. Due to the nature of the soil that may be found on this site, construction times may be limited to the "dry" season and import material may be required for all utility trenching, as determined by the City of Lacey Director of Public Works prior to final approval of the civil engineering drawings.

45. A signed and sealed copy (by the Applicant's engineer) of Appendix "4D" (Engineer's Construction Inspection Report Form) from the City of Lacey 2010 Stormwater Design Manual shall be submitted to and approved by the City prior to Final Public Works Approval. In order to

submit Appendix 4D, the project engineer must perform infiltration tests and complete Appendix 4D forms from the City of Lacey 2010 Stormwater Design Manual. Appendix "4D" shall be submitted to and approved by the City prior to Final Public Works approval.

46. Treatment and infiltration/detention facilities shall be constructed for storm associated with the site, adjacent properties currently discharging to the site and half street storm water associated with roadways adjacent to the site.

47. Existing curb ramps or other improvements that do not meet current Americans with Disability Act standards associated with the site shall be brought into conformance with the site development (DG&PWS, 4C.030 7).

48. Assure street lighting levels satisfy City of Lacey requirements for roadways and intersections. If they do not, additional street lighting shall be required for all streets associated with this project (Street lighting per City of Lacey spacing Standards). All street light designs shall be prepared by an engineering firm capable of performing such work (DG&PWS, Transportation, Illumination 4E.010).

49. As a condition of final Public Works Approval, electrical services associated with street lighting, pump stations, or other applications (for the Public benefit as agreed to by the City) shall be transferred into the City's name. In order to change service, the Applicant/Owner must provide a copy of a billing statement to the City. If service has not been established, the Applicant/Owner must provide the following information to the City to establish service: Project Name (final subdivision name), service meter's number, address of the service meter, owner's contact number and address, and the type of items are being energized by the service. All fees associated with the installation of the service shall be the responsibility of the developer. Without the information outlined above or a copy of a previous billing statement, the service will remain in the Applicant/Owner's name and they will be responsible for payment of the bills until such time as the information is received by the City.

50. Fiber optic conduit shall conform to the standards and requirements as set forth in Chapter 4 (Transportation) from the Development Guidelines & Public Works Standards (DG & PWS, Transportation 4E.035).

51. Access shall be provided to the property as determined and approved by the City. All access points shall meet minimum access spacing, minimum corner clearance, sight distance and minimum or maximum width requirements as outlined in the Development Guidelines & Public Works standards (DG & PWS, Transportation 4B.025).

52. Traffic mitigation as determined by the Traffic Impact Analysis is required. Conditions of Lacey Municipal Code 14.21 shall be satisfied.

53. Minimum intersection curb radii and centerline radius requirements must be satisfied. Please label all radii on the final plat (DG&PWS 4B.020).

54. Proposed alleys shall be constructed to the Alley standard (DG&PWS, Transportation Standard Detail DNG No. 4-5.1). Alley improvements require a 20-foot easement. The minimum alley pavement width shall be 12-feet and the maximum alley pavement width shall be 16-feet.

55. Roadway sections (public or private) cannot be constructed in saturated ground areas. If separation from the water table cannot be obtained, the site must be filled to accommodate the roadways.

56. All public streets within the City and the City's UGA boundary will be planted with trees to create a distinct and pleasant character for those roadways. The street trees located in the Development Guidelines shall be required in or along the public Right-of-Way, including medians. Contact the City for specific street and accent trees in the core area (DG&PWS, Transportation 4G.100).

57. The following is a condition for approval and shall be included on the face of the plat: "The City of Lacey has no responsibility to build, improve, maintain, or otherwise service the private roads and/or alleys within or providing access to the property described in this plat." (Lacey Municipal Code 15.32.190).

58. The structural design of the streets shall conform to City standards and requirements as set forth in the Development Guidelines & Public Works Standards. Structural sections shall be based on the actual Washington stabilometer R-value (as determined by a soils engineer licensed in the State of Washington) and may vary throughout the plat based on site specific factors such as differing soil types, wetlands, and high groundwater (DG&PWS, Transportation 4B.020 & 4B.160).

59. The following note is a condition for approval: "The Home Owner's Association shall be responsible for maintaining the private streets (along with associated parking areas) (DG&PWS, Transportation 4G.100D).

60. Utility easements are required for all mains, water and sewer located on private property. Easements shall include fire hydrants, water meters, sewer improvements and future extensions of mains to adjacent properties. Easements and stub outs shall be provided to serve adjoining properties as determined by the City. Rather than being designated as water or sewer, all easements shall be identified as "utility" easements on the civil drawings and in the easement document. Specific requirements will be determined at the of plan review. All easements shall be prepared by a licensed land surveyor and submitted prior to release of approved civil drawings (DG&PWS Chapter 3.110).

61. The City of Lacey Coordinate System shall be Washington Coordinate System, NAD 83/91 south zone. Units are expressed in feet. Horizontal and vertical control information can be obtained from the Lacey Public Works Department (DG&PWS 3.025).

62. Right-of-Way shall be dedicated for a subdivision, short subdivision, binding site plan, for a project that triggers Site Plan Review or for a conditional use permit. The requirement to dedicate Right-of-Way shall be determined by the City or Regional Transportation plans, by a Traffic Impact Analysis, or as determined by Public Works. Dedications shall be determined by a professional Land surveyor. Dedication shall be submitted and approved by the City prior to plan approval (DG&PWS, Transportation 4B.060).

63. All improvements shall satisfy City of Lacey Development Guideline Standards in place at the time of complete application is obtained (as determined by the City of Lacey Community Development Department) (LMC).

64. All Public Works improvements must be designed by an engineer licensed in the State of Washington and submitted to the City of Lacey Public Works Department for review and approval. The Applicant is responsible for all connection fees at the time of any new connection (DGPWS 3.040).

65. All structures associated with this site shall be connected to City of Lacey utilities (DG&PWS 6.010 and 7A.010).

66. Prior to civil drawing approval, two sets of mylar drawings along with digital electronic file of the drawings in AutoCAD or other approved software format shall be submitted for all approved final plans (DG&PWS Chapter 3.040, B).

67. Prior to final Public Works Construction approval, "as-built" mylar drawings along with the revised digital electronic diskette shall be submitted for all approved final plans (DG&PWS Chapter 3.040, J).

68. A 20 percent maintenance bond or financial guarantee of the engineer's estimate or approved bid estimate is required for a period of 24 months upon construction completion and approval of Public Works improvements. The financial guarantee may be released after 18 months if all conditions of approval have been satisfied. The financial guarantee applies to sewer, stormwater, water, frontage, landscaping/irrigation, roadway and street lighting improvements (LMC 14.20.025).

69. Eight sets of civil drawings and three drainage reports shall be submitted directly to the City of Lacey Public Works Department. Drawings submitted to other City departments will not satisfy this requirement (DG&PWS 3.040, B).

70. The property owner(s)/Home Owner's Association shall be responsible for maintaining the planter strip and street trees (weeding, irrigating, mowing, etc.) in a healthy and growing manner in perpetuity. If the planter strip and or trees are being maintained by another group or organization, then a maintenance agreement (or adequate documentation) that verifies the planter strip and/or trees are being (and will continue to be) maintained shall be submitted to the City for review (Development Guidelines & Public Works Standards, Transportation 4G.100D).

71. To protect the public interest on private property, utility mains located on private property shall be protected from damage. If on-site settling or other phenomenon occurs causing valve boxes, sewer manholes or other appurtenances to protrude above the driving surfaces or ground elevations, the owner will be notified and the problem shall be fixed within 30 days of notification. If the problem is not fixed within the 30 day time period, the City will fix the problem and bill the property owner/Home Owner's Association. This language shall be included on the face of the plat or easement documents submitted to the City.

72. Prior to Final Public Works approval of the project, Bill of Sale documents for water and sewer

improvements shall be submitted to and approved by the City.

Recommended this 12th day of November 2013.

THEODORE PAUL HUNTER
City of Lacey Hearings Examiner
Sound Law Center

LIST OF EXHIBITS

Project# 12-239: Gateway Residential Division 1 Preliminary Subdivision

Exhibit #	Description
1	List of Exhibits
2	Staff Report
3	Application for Preliminary Subdivision
4	Application for General Land Use
5	Preliminary site plans
6	Environmental Checklist
7	Preliminary Tree Protection report prepared by Kevin McFarland of Sound Urban Forestry, dated February 19, 2013
8	Wetland and stream delineation prepared by John Altmann of Altmann Oliver Associates, dated November 2, 2012
9	Mazama Pocket Gopher study prepared by Curtis Wombach of Enviro Vector, dated October 10, 2012
10	A)Transportation Impact Analysis, prepared by TENW, dated April 23, 2013 B) TIA addendum, prepared by TENW, dated August 15, 2013
11	Stormwater Site Plan prepared by Hatton Godat Pantier – includes as an appendix Geotechnical Engineering Report, dated August 13, 2013
12	Sanitary Sewer Basin study prepared by Hatton Godat Pantier, dated August 9, 2013
13	Stormwater Pollution Prevention Plan prepared by Hatton Godat Pantier, dated August 12, 2013
14	Mitigated Determination of Nonsignificance issued September 12, 2013
15	Notice of Application
16	Notice of Application published in The Olympian on April 30, 2013
17	Agency routing sheet
18	Comments received from Mike Laverty, North Thurston Public Schools, dated September 12, 2012
19	Comments received from Wade Duffy, City of Lacey Building Division, dated September 12, 2012
20	Comments received from Terry Davis, City of Lacey Fire Division, dated April 26, 2013
21	Comments received from Chun Saul, City of Lacey Finance Department, dated April 30, 2013
22	Comments received from Lori Flemm, City of Lacey Parks and Recreation, dated May 2, 2013
23	Comments received from Washington State Department of Ecology dated May 9, 2013
24	Comments received from Kevin Hughes, Thurston County Public Works, dated May 13, 2013

EXHIBIT

1

25 Comments received from Brad Sangston, Thurston County Environmental Health, dated August 2, 2013

26 Comments received from Doug Christenson, City of Lacey Public Works Water Resources, dated September 6, 2013

27 Comments and traffic mitigation estimate received from Pat McGuin, City of Lacey Public Works Transportation, dated September 13, 2013

28 Comments received from Tom Stiles, City of Lacey Public Works Development Review, dated October 14, 2013

29 Notice of Hearing published in The Olympian on October 20, 2013

30 Notice of Hearing sent to adjacent property owners

31 Certification of Public Notice

32 Additional email comments from Doug Christenson, City of Lacey Public Works Water Resources, dated September 17, 2013

33 Gateway Residential Division 2 proposed Preliminary Plat map

34 Proposed temporary fire access map

35 Comments rec'd from Brandon Farrell, Hall Equities Group, dated 10/29/13

36 City revised Transportation Condition

37 Comments from Steve Hatton

STAFF REPORT

Date: October 30, 2013
To: City of Lacey Hearings Examiner
From: City of Lacey Community Development Department
Subject: Project# 12-239: Gateway Residential Division 1 Preliminary Subdivision

I. GENERAL INFORMATION

A. Applicant/Property Owner: Kevin O'Brien
Gateway 850 LLC
15 Lake Bellevue, Drive, #102
Bellevue, WA 98005

B. Authorized Representative: Jeff Pantier, PLS
Hatton Godat Pantier
3910 Martin Way E, Suite B
Olympia, WA 98506

II. DESCRIPTION OF PROPOSAL

The applicant is proposing to subdivide approximately 43 acres into 83 single-family lots and one 10.9 acre parcel for multi-family development on property zoned High Density Residential. Thirty-eight (38) of the single-family lots are proposed to be attached housing. The remaining 45 lots will be single-family detached housing. The multi-family parcel is proposed for 250 units and will require further Site Plan Review approval.

III. LEGAL DESCRIPTION OF SUBJECT PARCEL

The project is located at the northwest corner of the intersection of Britton Parkway NE and Gateway Boulevard in portions of Sections 3 and 10, Township 18N, Range 1W, W.M., with the City of Lacey, Thurston County, Washington.

IV. SITE PLAN INFORMATION

Project Size: 43.18 acres
Number of Lots: 83 plus one tract for future multi-family development
Average Lot Size: 4,863 s.f.
Smallest Lot Size: 3,300 s.f.

EXHIBIT
2

Water:	City of Lacey
Sewer:	City of Lacey
Power/Natural Gas:	Puget Sound Energy
Fire Protection:	Lacey Fire District #3

Site Characteristics:
The site consists of three parcels totaling 43.18 acres. The site is undeveloped and heavily forested with Douglas fir and Big leaf maples being the dominant species on the eastern and western halves respectively. The site slopes down from a ridge at the northeast corner of the site to the south and west at gradients of 5percent or less. The grade steepens on the western portion to approximately 10 percent and continues to slope to the west on the western parcel with gradients of 10 to 25 percent.

Two wetlands have been delineated on the site. Wetland A is located in the southwestern portion of the site and was determined to meet the criteria for a Category III wetland. Wetland B/C is located on the western portion of the site and is part of a larger wetland that extends off-site to the west. On the project site, the wetland consists of two components that are hydrologically connected off-site and therefore were considered one wetland system for rating purposes. This wetland has been rated as a Category II. (See exhibit 8 for wetland details).

The property drains to the west into Eagle Creek and Wetland B.

Surrounding Land Uses:
The project site is located in a relatively undeveloped area in the northwest portion of the City. The site is surrounded by undeveloped forested parcels to the north, east and south. To the west lie several agricultural properties. Britton Parkway NE forms a portion of the southern boundary, across which is the Miles Sand and Gravel operations site. It should be noted that the parcels directly west and north are located in Thurston County within the City's Urban Growth Area (UGA).

Access:
Ultimately access to the site will be gained from Britton Parkway NE. Two new access points will be constructed: one, on the east end of the property from the roundabout at Gateway Boulevard and Britton Parkway and the second, further west, will access Britton Parkway but must gain access through an intervening property to the south. (See Section IX for further discussion.)

Zoning:
The subject parcels are zoned high density residential. This zoning district allows residential development at a density of between 6-20 units per acre. This zoning district permits a variety of housing types including detached single family; detached and attached townhouse or condominiums and multi-family residential. The minimum lot size for single-family detached housing in this zone is 2,000 square feet where alleys are utilized and 3,500 square feet if alleys are not provided.

The parcels to the north of this proposal are zoned High Density Residential and also planned as future phases of this development. The parcel to the east is zoned Business Park. The property across Britton Parkway to the south is zoned Hawks Prairie Business District. And the property on the southwest side is also zoned High Density Residential. (This parcel has preliminary subdivision approval for 248 single-family lots.) The parcel directly west is zoned Agriculture and is located outside the City Limits in the UGA.

Compatibility and Impact of Proposal on Surrounding Area/Probable Characteristics of Development:
Probable characteristics of development, as proposed, include installation of streets and urban utilities, and future construction of single family detached and attached townhouses as well as multi-family housing.

This project is compatible with the comprehensive plan designations and zoning of the surrounding area. When built, the project will be a higher density than the existing built environment immediately around the property. However, this area is anticipated to be developed in similar character to this proposal over time based on the goals of the comprehensive plan.

V. ENVIRONMENTAL EVALUATION

The Mitigated Determination of Nonsignificance (DNS) was issued on September 12, 2013. The DNS had a 15-day comment period, which ended on May 10, 2013. The City received several agency comments. These comments are attached to this report as exhibits. No appeals to the MDNS were filed. The MDNS is attached and made a part of this report (Exhibit 14).

VI. APPLICABLE COMPREHENSIVE GOALS AND POLICIES

The City of Lacey and Thurston County Land Use Plan for the Lacey Urban Growth Area: This document, known as the comprehensive land use plan, was prepared as a joint planning document by the City of Lacey and Thurston County for Lacey and the Lacey Urban Growth Area. There are other general policies in the Comprehensive Land Use Plan, which could apply, but the issues they cover are specifically detailed in the Lacey Zoning Ordinance, which is reviewed in the next section VIII. The following sections of the Comprehensive Plan apply to this proposal:

A. Growth Management Act Land Use Goals and County-Wide Planning Policies (Section III) "Encourage development in urban areas where adequate public facilities and services exist or can be provided in an efficient manner."

B. Residential Goals and Policies (Section VI.E.)

Goal 1. "Enhance appearance, quality and function of residential neighborhoods."

Policy 1.a. "High quality, attractive, or innovative design characterized by humanistic scale shall be encouraged in all residential projects. This will include specific design and performance standards that provide pedestrian and transit orientation, attractive streetscapes, open space and protection of the environment, and nuisance mitigation."

Policy 1.b. "Promote the sense of community by encouraging mixed housing types and income levels. Ensure a variety of housing types will be available to people with a range of incomes in each planning area."

Policy 1.c. "Promote the logical, orderly, attractive and functional placement of land uses of different intensities to avoid conflicts and provide smooth transitions so that land uses complement one another and provide for a more livable neighborhood."

Policy 1.d. "Require design review of all residential land uses to promote attractive and functional neighborhoods with variety, interest, individual identity, a sense of place, complementary character and enhanced livability. Design shall consider both aesthetic and functional components."

Policy 1.e. "Require development to plan around and complement natural features and resources, such as topography, wetlands, tree stands, and other natural or environmentally sensitive areas."

Policy 1.f. "Provide for and design public and civic spaces and uses such as school sites, neighborhood parks, or other public places so that they are well integrated into the development and create focal points for the neighborhood."

Policy 1.g. "Develop an interconnecting network of streets and alleys designed for narrower widths and slower speeds. Provide pedestrian-friendly streetscapes, transit and alternative forms of transportation, curbside planting strips with trees and landscaping and civic identity."

Policy 1.h. "Provide a connected system of community, neighborhood, and wildlife open spaces."

Policy 1.i. "Street trees and planting strips are integral to every residential concept. All proposals shall include plans for street trees in planting strips."

Policy 1.j. "Develop property maintenance codes to provide neighborhoods free from nuisance characteristics, such as junk cars, unmaintained buildings and structures, or unkempt yards. Design programs that promote pride in one's yard and neighborhood."

Policy 1.k.

Goal 2. "Develop residential zones with a mix of housing options, particularly in high and medium density zones. Options should include a full range of single family and multifamily opportunities to avoid concentrated areas of rental housing or housing only serving lower income groups."

Policy 2.a. "Utilize standards for subdivisions and building projects in medium and high density residential zones to provide opportunities for well-designed and properly integrated mixed residential uses."

Policy 2.c. "Utilize residential design criteria for all residential development. Design of mixed residential use developments shall consider transitions and strategies for blending of residential uses of different intensities to minimize impacts and promote integration and compatibility."

C. Environmental Quality (Section VI.G)

Goal 1. "All residential development should complement natural resources and environmentally sensitive areas."

Policy 1.a. "Development shall be consistent with the Lacey Environmental Protection and Resource Conservation Element."

D. Parks and Recreation (Section VI.H)

Policy 1.a. "Continue to require open space for residential and commercial development."

Policy 1.b. "Provide incentives for provisions of additional open space areas. Provide open space wherever extremely sensitive natural environments are found."

Policy 1.c. "Provide for public and/or private parks and playgrounds within each neighborhood."

Policy 1.d. "Require means to ensure perpetual maintenance of wetlands and priority habitat sites for passive recreational opportunities."

Policy 1.f. "Link pedestrian and bicycle pathways with greenbelts, priority habitat sites, wetlands and open spaces between neighborhoods. Open space shall be designed into a project from the outset, with sizable and meaningful pieces set aside. If shall not be left to the end, using only those restricted and small spaces that area left over. It should be designed in conjunction with school and community sites whenever possible and should provide a focus for neighborhood areas and developments."

Policy 1.g. "Open space shall be designed to define their community, to create outdoor spaces to protect wildlife habitat and the natural environment, and to create public and civic spaces."

Policy 1.h. "Where feasible, open space requirements for contiguous properties may be combined to provide more opportunities for active recreation purposes."

Policy 1.i. "Where wetlands, habitat conservation area, or other sensitive or resource lands exceed 5 acres in size or is contiguous with adjacent wetlands, the City may require dedication in conjunction with development of such sites to ease the burden and responsibility of maintenance of such sites for homeowners' associations and to actively maintain and provide for such sensitive lands for the benefit of the homeowners' of the development, as well as the community at large."

F. Residential Streets (Section VI.I.)

Goal 1. "Streets and transportation systems shall enhance the appearance, quality, and functionality of residential neighborhoods."

Policy 1.a. "Ensure coordination with the Thurston Regional Transportation Plan."

Policy 1.b. "Ensure coordination with the Lacey Transportation Element of the Comprehensive Plan."

Policy 1.c. "Residential developments shall require strong, multi-modal transportation and pedestrian orientation. Pedestrians need friendly streetscapes, sidewalks, pedestrian links, convenient covered bus stops, and buildings organized along the streets."

Policy 1.d. "Street sections shall be characterized by an interconnected network or modified grid pattern, an attractive streetscape that is inviting to pedestrians as well as vehicles, with planting strips between street and sidewalks, sidewalks on both sides of streets, street trees, pedestrian scale lighting and on-street parking. Design shall promote the safe co-existence of pedestrians and vehicles in close proximity. Streets shall have narrower widths and slower speeds, accommodations for bicycles and bike parking. Nearly all streets shall terminate to other streets. Alleys shall be designed down the center of blocks. Provisions shall be made for transit stops to accommodate attractive shelters."

Policy 1.e. "Strong emphasis on encouraging alleys down the center of blocks, except where critical areas and development site edges may preclude alleys."

Policy 1.f. "Garagescapes ought to be discouraged, garages should be located to be unobtrusive and not the predominant focus of the lot."

Policy 1.g. "Traffic calming techniques shall be used where appropriate to enhance street space and experience by reducing vehicular speed and helping to create a sense of place for streets that serve pedestrians and cyclists, as well as vehicles."

H. Utilities and Capital Facilities (Section VI.N.)

Policy 1.a. "All proposed development should be analyzed for anticipated impact on utilities and services, either as an element of the site plan review, subdivision review, or as part of the environmental impact assessment."

Policy 1.b. "Preference should normally be given to providing adequate public facilities to settled areas, rather than extending new services to sparsely settled or undeveloped areas."

I. Water Resources (Section VI.O.)

Policy 1.b. "Ensure that new development is in conformation with and requirements and standards of the 2010 Lacey Stormwater Design Manual."

VII. APPLICABLE MUNICIPAL CODE STANDARDS

The following table depicts the applicable sections of the Lacey Municipal Code and if the project complies with the standards or if the project complies with the standards once staff conditions are imposed.

Applicable Municipal Code Sections	Project Complies	Project Will Comply With Staff Conditions
Title 14 – Buildings and Construction		
LMC 14.28 Wetlands Protection		
14.28.060 Qualified professional or technical wetland consultants or scientist	✓	
14.28.090 Determination of regulatory wetland boundary	✓	
14.28.100 Wetlands rating system	✓	
14.28.110 Regulated Activities	✓	✓

14.28.280 Wetland buffers – standard buffer widths	✓	
14.28.350 Avoiding wetland impacts	✓	
14.28.370 Limited density transfer and open space credit	✓	
14.28.380 Acting on the application – Special conditions		✓
Applicable Municipal Code Sections	**Project Complies**	**Project Will Comply With Staff Conditions**
14.32 Tree and Vegetation Protection & Preservation		
14.32.020 Purpose and Permit Criteria	✓	
14.32.040 Permits	✓	
14.32.045 Class IV forest practice applications		✓
14.32.063 Conformance to Standards		✓
14.32.064 Tree tract requirements	✓	
14.32.066 Tree replacement and establishment of new trees on lots		✓
14.32.069 Revegetation Option		✓
14.32.070 Financial Security		✓
Title 15 – Subdivisions		
15.10.010 Preliminary plat presubmission conference	✓	
15.10.020 Preliminary plat review process and time limit for action	✓	
15.10.070 Preliminary plat hearing – notice procedure	✓	
Chapter 15.12 – Design Standards for Subdivisions		✓
Chapter 15.14 – Dedications – Plats, shortplats and BSPs		✓
Chapter 15.16 - Improvements		✓
Chapter 15.22 – Community Facilities		✓
Title 16 – Zoning, Chapter 16.18 High Density Residential		
16.18.020 – Permitted uses	✓	
16.18.030 Environmental performance standards		✓
16.18.035 – Individual lots required	✓	
16.18.040 – Lot area	✓	
16.18.070 – Landscaping		✓
16.18.080 – Stormwater runoff		✓

VIII. NOTIFICATION

The application for preliminary subdivision was received on February 28, 2013, and was deemed complete pursuant to RCW 36.70B.070 on April 26, 2013. The comment period for the Notice of Complete Application had a 14-day comment period that ended on May 10, 2013. A notice was

published in The Olympian and the site was posted with the notice of complete application. These notices are attached to this report as exhibits. The City received various department and agency comments. These comments are attached to this report as exhibits.

Written notice of the public hearing was sent to all property owners within 300 feet of the site on October 18, 2013, and notice was published in The Olympian on October 20, 2013, at least 10 days prior to the public hearing. Notice was posted on-site on October 19, 2013.

IX. COMMUNITY DEVELOPMENT DEPARTMENT ANALYSIS

In review of this proposal it is important to consider the goals and policies of the comprehensive plan, the required findings and general provisions of the Building and Construction, Subdivision and Zoning ordinances of the Lacey Municipal Code (LMC). There are a few items that warrant additional discussion:

Overall project site

This proposal is the first phase of a multi-phase residential development project. The applicant also owns both parcels directly north of this proposal which are located within Thurston County. The applicant has applied for preliminary subdivision approval with Thurston County for a total of 464 lots – 374 single family lots and 90 multi-family units.

Wetlands and Eagle Creek

There are three wetlands present on the site, all of which are located on the western parcel (11803340100). Wetland A is found in the southwest portion of the parcel and is part of a larger wetland that extends off-site to the south. The wetland biologist determined that this wetland met the criteria for a Category III wetland and is required a buffer of 80-feet. Wetlands B and C are actually part of the same, larger, wetland system that extends of the parcel to the west. On the site the wetland consists of two components but these are hydrologically connected off-site. This wetland was found to meet the criteria for a Category II wetland and due to its higher habitat score (21 points) is required a 100-foot buffer.

Although wetlands are present on-site the project is proposing to stay completely outside of the wetlands and their associated buffers and therefore a wetland development permit is not required at this time. (See further discussion in stormwater discussion.) To ensure protection of the wetlands and buffers throughout the course of development, conditions should be in place that require the location and details of wetland protection fencing on all construction documents, as well as field inspection prior to the beginning of site work. LMC 14.28.380.A.3 requires that the common boundary between separate sensitive area tracts and the adjacent land must be permanently identified. Conditions are in place to ensure this.

LMC 14.28.380 also requires a condition that for any approvals issued pursuant to the wetland ordinance, the applicant be required to create a separate sensitive area tract or tracts containing the wetland and wetland buffer by short subdivision. These sensitive area tracts

shall remain undeveloped in perpetuity. In order to accomplish this requirement, the applicant may choose either of the following options: Dedicate the sensitive area tract containing the wetland and associated buffer to the City of Lacey at the City's discretion; or, establish and record a permanent and irrevocable deed restriction on the property title, on the final plat creating the tract, and any associated home/lot owner's agreements.

The wetland report also identified a stream located adjacent to the project site. Stream 1, in the report is Eagle Creek, a tributary to the larger Woodland Creek which itself is a tributary to Henderson Inlet. Eagle Creek is considered a Type 3 stream based on the Washington State Department of Natural Resources Water Typing maps. It has a 150-foot buffer associated with it. Due to the location of the creek in relation to this project site the creek and its buffer are well outside the project area. The onsite wetlands and their buffers will be in closer proximity to site development.

Despite its considerable setback from Eagle Creek, this project still has the potential to impact the creek from stormwater runoff associated with the site's development. Eagle Creek is on the EPA's 303(d) list for failing to meet state water quality standards for several parameters, including dissolved oxygen and bacteria. The following comments were submitted by Doug Christenson, the City's Stormwater Engineer:

> *Eagle Creek is one of the TMDL-named sites with the highest [fecal coliform] FC bacteria reduction needed to meet state standards, and Lacey's monitoring of Eagle Creek downstream from [this] site show that the state water quality standard for fecal coliform bacteria was exceeded in 2012.*
>
> *Reducing discharges is essential to addressing the load reductions needed in Eagle Creek and downstream waters, which is part of the reason ...that runoff from [this] project must first be minimized (i.e, retained and infiltrated upsystem within the plat) to the maximum extent feasible. Runoff volume reduction is the first step in reducing pollutant loads. Then, if surface discharge of stormwater is unavoidable, it must be treated for a high level of water quality improvement such that you don't cause further impairment of downstream waters – especially since the nearest creek is known to be impaired already. – Exhibit 32*

Due to the sensitivity of the site (wetlands, proximity to Eagle Creek, slopes, saturated ground, observed groundwater seepage etc) additional study and analysis of the site is necessary prior to final stormwater plan approval. Conditions are in place that will ensure hydroperiod analysis and groundwater monitoring are completed prior to permit issuance or construction drawing approval.

It should be noted that the findings of the above mentioned studies may ultimately show hydrological impacts to the on-site wetlands. If the studies show the wetlands will be impacted then an administrative wetland development permit will be required prior to grading permit or civil drawing approval. These studies may also result in changes to the layout, design and/or size of the stormwater infrastructure which could result in a reduction in the number and/or size of lots.

Density/Housing

The High Density Residential zoning district allows for any residential use with a density between 6 and 20 units per acre. It also requires that all parcels over ten acres in size provide a mix of housing types with no less than 25% of the units designated for single family use. Although the current proposal falls within the density limits allowed by the underlying zoning, HD, LMC 14.28.370 provides for limited density transfers on parcels containing wetlands and buffers. The intent of this provision is to provide incentives for the preservation of wetlands and their buffers as well as providing applicants flexibility in designing their project. The formula for calculating the density transfer is as follows:

Buffer density credit + upland non-buffer area density

(acres in wetland buffer)(DU/acre)(Density credit) + (acres out of wetland buffer)(DU/acre)

For this proposal the density transfer equation works as follow:

(6.2 acres)(6 or 20)(.9) + (36.98)(6 or 20) = 255 - 852 units

This range reflects the range of units that would be allowed to develop on this site; 255 would be at the minimum density of 6 units/acre and 852 would be at the maximum of 20 units/acre. As proposed the application is identifying a total of 333 units – 83 single family lots proposed with this subdivision and 250 units on the 10.9 acre multi-family Tract XX. Because no specific site plan has been identified for the multi-family parcel with this proposal, the multi-family parcel will be required to obtain Site Plan Review approval prior to its development.

Open Space: The proposal meets the requirements for amount of open space according to Title 15 of the Lacey Municipal Code. However, details are lacking in the preliminary plat documents regarding amenities (playground equipment, benches, picnic tables, etc.) that the open spaces will contain and the actual physical layout of park spaces. The applicant will be required to provide details regarding the park spaces at the same time landscape plans for the open spaces are submitted. A final landscape plan should be submitted for review and approval by the City of Lacey Planning Division prior to final plat.

Traffic impacts

The Traffic Impact Analysis performed by Transportation Engineering Northwest identified the 333 total dwelling units associated with this proposal as resulting in 219 pm peak hour trips. Comments received from the City's Transportation Department indicate that the number of

proposed units will require two full access points to distribute the volumes for safety and emergency access. The Gateway Boulevard connection on the east property line shall be constructed from the curb on the east side of the roadway to the full frontage improvements along the west side of the roadway, meeting the standards of a Major collector Type II roadway. The Transportation Element indicates that this roadway is located along the property line of this project and the parcel directly to the east. The applicant has the option of working with the adjacent property owner to locate half the roadway on their property OR of fully constructing the roadway on the project site.

The east-west collector identified as Road B must be fully constructed to major Collector Type II standards with a connection made to Britton Parkway as shown on the preliminary plat map.

As proposed, staff believes the proposal is consistent with the goals and policies of the 1994 Lacey Comprehensive Plan. Care should be taken, however, to ensure that the minimum provisions of the ordinance requirements are satisfied or exceeded.

X. HEARING EXAMINER AUTHORITY

The Hearings Examiner has the responsibility and authority to recommend action to the City Council on preliminary subdivision permits. Pursuant to section 2.30.140 of the Lacey Municipal Code, the Examiner has the authority to render a decision on the application which may be to grant, deny, or grant with such conditions, limitations, modifications and restrictions as the Examiner finds necessary to make the application compatible with its environment, the comprehensive plan, other official policies and objectives and land use regulatory enactments.

XI. SUMMARY OF STAFF ANALYSIS

Staff finds that the proposed preliminary subdivision permit is consistent with the City Comprehensive Development Plan, the City Zoning Code, and other applicable codes and regulations provided that the conditions recommended below, under Section XII, are implemented.

XII. STAFF RECOMMENDATIONS CONCERNING ACTION ON THE PROPOSED PRELIMINARY SUBDIVISION

Based upon the above analysis, city staff recommends approval of the preliminary subdivision permit. The project shall proceed in substantial conformance with the plans on file, except as modified below:

Conditions Unique to the Application

The conditions below are intended to mitigate impacts associated with an approval of this application. The conditions listed to not apply to developments generally, but are necessary for this application to meet the criteria for approval of this application.

Community Development Department

Planning

1. The proposal shall be developed in substantial conformance with the plans submitted on February 28, 2013, except as modified by the conditions below.

2. Tree protection on site shall follow the provisions of the preliminary Tree Protection Plan, specifically section VI "Schedule of Tree Protection Tasks", prepared for this project dated February 19, 2013. Utility and grading plans will be reviewed by City staff and Sound Urban Forestry with the intent to save and protect trees that are designated as having potential for retention (LMC 14.32).

3. Prior to construction drawing approval, an opens space plan shall be submitted to the Planning Department for approval. This plan may be combined with the landscaping plan and shall show the type and location of improvements and amenities within the opens space tracts designated for active open space.

4. The developer shall meet and satisfy all conditions of the MDNS issued on September 12, 2013 and attached as Exhibit 14.

Building and Fire

5. At least two separate and approved means of fire apparatus access shall be provided for lots 1-38 unless all buildings on these lots are provided with approved automatic fire sprinkler systems installed in accordance with NFPA 13D Standards (2007 Edition). (IFC Section 903.3.1.3)

Finance Department

6. This proposal is within the boundary of Local Improvement District (LID) #19. Two of the subject parcels have outstanding LID#19 assessments. Parcel no. 11803340100 is owing $70,553.24 and parcel no. 11803430000 is owing $71,787.85. Prior to final plat approval of this subdivision, the property assessment for LID 19 shall be paid in full to the City of Lacey or the balance of the LID amount segregated proportionately between the parcels being created. Please contact Chun Saul, Senior Accountant, in the City of Lacey Finance Department at (360) 491-3212 for coordination of the LID payment or segregation.

Public Works Department

Specific Water Improvements

7. Adequately sized water mains shall be extended throughout the proposed site to provide domestic water service to each individual lot/unit, to provide irrigation water service, to meet fire flow and protection requirements, to assure water quality standards are met and as necessary to satisfy the City of Lacey's Water Comprehensive Plan requirements. An overall water plan and coordination with the City of Lacey as well as adjacent property owners will be required as there are a few different ways of satisfying these requirements. Pressure reducing valve stations as well as individual pressure reducing valves will mostly likely be required as the proposed site is bisected by two water pressure zones.

8. All existing well locations (on or adjacent to the proposed site) shall be shown on the grading and civil drawings.

9. To irrigate planter strips, storm water and open space areas, provision for future reclaimed water shall be incorporated into the plat design. The irrigation system(s) shall be designed and constructed to current City of Lacey reclaimed water installation practices. At this time the system will be supplied with City of Lacey potable water; however, when reclaimed water is available the City will switch the system over to reclaimed water. Provisions to switch the systems will be incorporated into the design.

Specific Sewer Improvements

10. Adequately sanitary sewer mains shall be extended throughout the proposed site to provide sanitary sewer service to each individual lot/unit and as necessary to satisfy the city of Lacey's Sanitary Sewer Comprehensive Plan requirements.

11. No more than one lift station shall be sited to serve this plat and the proposed Division 2 located with Thurston County. The lift station shall be located to maximize the number of housing units either served entirely by gravity sewer or gravity sewer to the lift station. The lift station shall be located in Division 2 as shown on Exhibit 33. Alternate locations within Division 1 could be approved if all lift station design requirements are satisfied.

Specific Stormwater Improvements

12. Surface discharge (runoff) from the proposal shall first be minimized (i.e. retained and infiltrated upsystem within the plat) to the maximum extent feasible via roof drains, drywells, rain gardens or other approved techniques per the City of Lacey's 2010 Stormwater Design Manual (SDM). If surface discharge is unavoidable as determined by the City of Lacey, it must be treated for a high level of water quality improvement (i.e. metals treatment and phosphorous control) such that further impairment of downstream waters does not occur.

13. There is potential that the existing on-site wetlands may be hydrologically impacted by the project. A hydroperiod analysis shall be performed per the 2010 SDM Core Requirement #8 to show that the wetland hydroperiod will not be adversely affected.

14. An administrative wetland development permit shall be required prior to approval of grading and/or civil drawings if the final stormwater design for the project will result in physical and/or hydrologic impacts or alterations to the on-site wetlands.

15. Groundwater monitoring shall be conducted across the site over at least one complete wet season. This information shall be included with the stormwater plans required as part of the civil drawing review.

16. Due to the challenging nature of the project area (i.e. topography, wetlands, saturated ground, surface seepage, proximity to Eagle Creek, high water table) additional analysis and design work addressing the comments in Exhibits 26 and 32 will be required prior to approval of grading and/or civil drawings.

Specific Transportation Improvements

17. Per the Transportation Comprehensive Plan, multiple Major Collector Type II roadway (see Detail 4-3.1 dated 8/27/09 attached) corridor connections will need to be accommodated throughout the proposed site. Coordination with the adjacent property owners and the City of Lacey will be required.

18. Due to the number of units associated with this project, two full access points will be required, as shown on the preliminary plat. Each connection point shall be constructed to Major Collector Type II roadway standards.

19. The "Gateway Boulevard" connection shall be constructed from curb to curb. On the west side of the roadway, full frontage improvements shall be installed to Major Collector Type II roadway standards.

20. The proposed east-west collector identified as Road "B" shall be fully constructed with the first phase of development. Road "B" shall be constructed to Major Collector Type II standards, extending from Gateway Boulevard to Britton Parkway.

21. Roadways connecting to Road "B" shall be constructed to Major Residential Roadway standards (see Detail 4-4.0 dated 8/27/09).

22. Frontage improvements along the property frontage of Britton Parkway (including the required stormwater treatment and infiltration facilities) shall be installed by the developer and approved by the City prior to final plat approval of this project. These

improvements shall be installed to City of Lacey Boulevard standards (see Detail 4-2.1 dated 8/27/09).

23. The right angle knuckle style cul-de-sac shall meet minimum roadway radii requirements identified in the Development Guidelines and Public Works Standards manual.

24. The Transportation Comprehensive Plan identifies the need for sidewalks, bike lanes and other facilities to accommodate multi-modal transportation. The multi-modal impacts from this project shall be mitigated by construction the internal street network and frontage improvements according to Lacey's standards.

25. A traffic calming plan shall be incorporated into the internal street network to control cut through traffic for all future phases and reduce speed within the development. The traffic calming plan shall be approved by the Public Works Department.

General Conditions

The conditions below are summaries of ordinances and standards that apply to approval of this application regardless of any specific impacts of this proposed development. The list is intended as a courtesy notice and not as an exhaustive list of legal requirements that may apply to an approval of the application. The list is also a summary of the legal requirement; if there is a conflict between the summary and the ordinance, the language of the ordinance controls.

Community Development Department

Planning

1. Prior to construction drawing approval, a detailed landscaping plan shall be prepared by a licensed landscape architect, nursery person, or landscaper and submitted to the Planning Department for review and approval. The plan shall include the type, number, and location of the vegetative improvements as well as a specific time line for completion of the improvements. A separate irrigation plan must also be submitted showing the location of all irrigation lines, location of sprinkler heads, and approximate coverage areas. The plans must include a note stating that the property owner is responsible for maintaining all plants in a healthy growing condition for the life of the project. All requirements of Chapter 16.80 of the Zoning Code shall be satisfied. (LMC 16.80)

2. Prior to construction drawing approval, a detailed estimate from a landscape installer must be submitted to the Planning Department. The estimate should include all costs associated with installing landscaping and irrigation as called out on the approved plans, including labor. (LMC 16.80)

3. Prior to final subdivision approval, all landscaping within open spaces shall be installed or a financial security must be provided to the Planning Department in the amount of

150 percent of the above mentioned landscape estimate. The City shall release this financial security once the landscaping for the project is installed and approved by the Planning Department and a financial security is in order to ensure that all plant materials are properly maintained. This security device shall be in the amount of 20 percent of the value of the vegetative improvements and shall be held for a period of one year. (LMC 16.80)

4. A note shall be placed on the face of the landscaping and irrigation plans stating that any irrigation lines placed within tree protection zones established for the project must be installed in such a manner as to not cause damage to the root protection zone, such as by cutting roots, digging trenches, operation of machinery, etc. Special care must be taken (hand digging trenches, designing lines to stay out of these areas where possible, etc.) to ensure damage to the trees does not occur. In the event damage to these areas does occur, the city may require, at their discretion, replacement of the comparable landscape value of the trees damaged or other means to make up that loss. (LMC 16.80)

5. A sign permit shall be issued by the City of Lacey prior to the installation of any signs on the subject site. (LMC 16.75)

6. All applicable requirements of the City Zoning Code shall be satisfied (LMC Title 16).

7. The applicant/developer shall be responsible for obtaining all applicable permits required for the project, including National Pollutant Discharge Elimination System Permit (NPDES), Forest Practices Application, and any others. These permits will require additional review time from the appropriate agencies.

8. A Homeowners' Association shall be established to insure proper maintenance of common facilities. In order to insure proper responsibility and authority to carry out necessary maintenance activities, the Homeowners' Association shall, at a minimum, include the following provisions:

    a. Membership in the Homeowners' Association will be mandatory for all lot owners.

    b. The Homeowners' Association shall have the power to levy fees and dues necessary to successfully accomplish necessary activities.

    c. The Homeowners' Association shall have the provision for the collection of attorney fees extended in collecting delinquent assessments from lot owners.

    d. Responsibility of the Homeowners' Association in maintenance of common areas shall be specifically detailed.

Assessment of the Association dues shall initially be established by the applicant and approved by the Department of Community Development. Protective covenants and declarations establishing the Homeowners' Association shall be approved by the Department of Community Development as adequate to satisfy the intent and the function of this condition to assure proper maintenance of common facilities.

9. Review of the civil drawings and the final plat application shall be pursuant to the provisions of Title 15, Land Division, of the Lacey Municipal Code. This specifically includes Chapter 15.10, Subdivision; 15.12, Design Standards for Subdivisions...; 15.14, Dedications...; 15.16, Improvements; and 15.22, Community Facilities. (Title 15, LMC)

10. The following notes shall be shown on the face of the plat:
    A. "All land within the boundaries of this plat is within a Community Facilities District of the City of Lacey and all saleable lots are subject to all service fees and charges which may be levied by the City of Lacey for the maintenance, operation and improvement of any community facilities and for liens for any unpaid service fees or charges. "
    B. "Notice: The City of Lacey has no responsibility to build, improve, maintain or otherwise service the private roads within or providing access to property described in this plat."
    C. "All open space tracts shall be owned and maintained by the Homeowners Association, in accordance with the declaration of covenants, conditions, and restrictions recorded under auditor's file no. _____."
    D. "The homeowners association will be responsible for maintaining and locating all irrigation lines located in the public right-of-way."
    E. "Roof drains shall have dry wells and be placed on individual lots. Dry wells shall be sized to accommodate storm runoff per the City of Lacey Development Guidelines and Public Works Standards." If site conditions cannot support dry well systems, a note must be included on the face of the plat indicating that roof and foundation drains shall be tied into the stormwater system.
    F. "The homeowner's association shall be responsible for maintaining the planter strips (weeding, mowing, pruning of the street trees, etc) in a healthy and growing manner in perpetuity and maintain stormwater facilities (as outlined in the Residential Agreement to Maintain Stormwater Facilities and to Implement a Pollution Source Control Plan)."

11. All wetlands and their associated buffers shall be identified as separate tracts on the final subdivision plat. The developer shall protect the sensitive tract by one of the following methods (LMC 14.28.380.A):

    a) The developer shall dedicate to the City of Lacey or other public or non-profit entity specified by the City of Lacey, the wetland and buffer tracts for the protection of the

wetland and its buffer and to ensure management of the wetland resource in the best interest of the public; or

b) The developer shall establish and record a permanent and irrevocable deed restriction on the property title and on the face of the final subdivision plat recorded with the Thurston County Auditor. Such deed restriction(s) shall prohibit in perpetuity the development of the parcel, and alteration, or disturbance of vegetation within the sensitive area tract. Unless the development, alteration or disturbance of vegetation is for purposes of habitat enhancement as part of an enhancement project, which has received prior written approval from the city of Lacey, and any other agency with jurisdiction over such activity.

12. Prior to any construction activities occurring on site, the exact boundaries of the identified wetland buffer edges, shall be clearly marked in the field with orange construction fencing and identified with temporary signs placed along the orange construction fence stating:

> "Wetland Buffer. Alteration or Disturbance is Prohibited.
> Please call the City of Lacey for more information 491-5642."

The fencing shall be maintained through the duration of construction activities and in respect to the buffer restoration area, for the length of restoration activities unless authorized to be removed by the City of Lacey. A detail of the fencing and signage and its location shall be clearly shown on the grading and Public Works Construction Drawings. (LMC 14.28.380)

13. Prior to any construction activities occurring on site, the location of the orange construction fencing installed shall be inspected and approved by the City of Lacey Community Development Department. This information shall be displayed in note form on the grading and Public Works Construction Drawings. (LMC 14.28.320)

14. All staging areas of construction equipment shall be located at the highest elevation point on the property furthest from the protected wetlands and associated buffers. All activities associated with the development permit except for those related to the trail construction, buffer restoration and compensatory wetland and buffer plan shall not occur within the delineated wetland buffers. (LMC 14.28.360.B.5.)

15. Erosion control measures shall be implemented prior to any activity on the site in a manner that eliminates potential erosion and/or sediments from disturbed areas from entering the wetland buffer. Erosion control methods may be in the form of straw bales, silt fences or other forms approved by the City of Lacey. Erosion methods shall be

identified on the grading and construction drawings submitted to the City of Lacey for approval. (LMC 14.28.360.B.7.)

Building and Fire

16. The proposed development shall comply with all of the codes and ordinances adopted by the City of Lacey, including the 2009 International Building Code and the 2012 International Fire Code, including Appendix D (Sections D106 & D107).

17. A grading permit is required for the proposed project. Please refer to the City of Lacey Development Guidelines & Public Works Standards Section 3.085.

18. Roof and foundation drains from each individual lot shall be tight-lined to a properly engineered retention facility designed to receive this discharge. (UPC Chapter 11)

19. Fire apparatus access roads shall be constructed and approved and fire hydrants shall be installed, tested and approved prior to building permit issuance. Fire access roads and fire hydrants shall be accessible and serviceable at all times during construction. Required fire hydrants shall be provided in accordance with the approved civil plans and shall be installed, tested and approved in accordance with City of Lacey Public Works Standards. IFC Sections 503.1 and 508.1

20. Approved 20-foot wide all-weather surface fire apparatus access roads capable of handling the imposed loads of fire apparatus shall be provided to within 150-feet of all exterior portions of a building at ground level. The inside turning radius at corners along fire access roads shall be not less than 28-feet in width. Dead-end fire apparatus access roads shall be provided with approved means for the turning around of fire apparatus. Fire apparatus access roads shall be in accordance with the approved civil plans. IFC Section 503.1; LMC 14.07.015

21. Fire apparatus access roadways shall not exceed 10% grade. IFC Section D 103.2

22. Fire hydrants shall be provided at all intersections and at 660-foot spacing along streets in single-family residential developments. A fire hydrant shall be not more than 300-feet from any residential building in this development. LMC 14.07.015

23. The minimum fire flow required for single-family residential developments shall be not less than 750 gpm at 20 psi residual pressure from any single fire hydrant. The City of Lacey Water Systems Engineer shall perform a fire flow model to verify the required fire flow has been met based on the water system design. IFC Section B105.1; LMC 14.07.015

24. Approved address numbers are important for directing emergency response units to the proper location. Applicable building address numbers shall be provided at entrances to construction sites and shall be provided at conspicuous locations on the buildings prior to final occupancy approval. Said address numbers shall be placed facing the road from which the buildings are addressed. Address numbers shall be not less than 6-inches in height and shall contrast with their background. IFC Section 505.1

25. If not existing, approved street name signs shall be provided at all intersections. Street signs shall be provided prior to issuance of building permits for any structure built on the street from which it addressed. IFC Section 505.2

Public Works Department

General Water Improvements

26. For Irrigation lines located in the Right-of-Way, the following shall be stated on the irrigation plans and is a condition of approval: "The Home Owner's Associated will be responsible for maintaining and locating all irrigation lines located in the public Right-of-Way". (DG&PWS, Water, Irrigation 6.210)

27. Water system improvements shall meet the requirements of the City of Lacey, the Coordinated Water System Plan (CWSP), Department of Health (DOH), City of Lacey Water System Plan, Department of Ecology, Thurston County Environmental Health and City of Lacey Fire Code Official's standards. Actual main size, loop closures, and possible off-site improvements including the number and location of fire hydrants, will depend on the fire flows required and available to the site. Water main shall also be looped as required by the City as needed for water quality purposes. (DG&PWS, Water 6.010)

28. Show all adjacent wells within 100-feet of the proposed plat with their protective radii (this will assure the proposed development will not impact any wells) (DG&PWS, Subdivisions and Short Plats, Chapter 2 – plat checklist).

29. To assure desired meters are available for your project, water meters 3-inches or larger must be ordered 10 weeks prior to being installed. Please make scheduling provisions to accommodate this lead time. (DG&PWS General Notes Water Main Installation)

30. Water mains shall be extended on North or East sides of roadways or drive aisles six feet off the centerline. (DG&PWS, Water 6.020)

31. Provide domestic water stubs to each lot/new building (if duplexes are utilized each side of the duplex must be metered), and appropriate connection fees must be paid.

Irrigation meters with backflow prevention devices are needed for open space, landscaping, and stormwater facilities. (DG&PWS, Water 6.120 F)

32. To assure adequate water is present for your project. Modeling of the water system shall occur. Please contact Brandon McAllister (491-5600) to coordinate the fire flow modeling (typical cost for this service $500.00).

33. If utility extensions are needed for the proposed project for roads that were paved in the last five years and the roads must be "cut", a disruption fee will be charged in accordance with Lacey Municipal Code 12.16.055.

34. The builder/applicant is required to purchase a meters prior to the issuance of building permits. (DG&PWS Water 6.121)

General Sewer Improvements

35. Any existing on-site septic tanks and drainfields shall be removed per Department of Ecology and Thurston County Department of Health.

36. All existing and proposed structures shall be connected to sanitary sewer. (DG&PWS, Sewer 7A.010) Public mains with associated appurtenances shall be installed to serve the proposed plat with sewer.

37. Provide sewer stubs to each building connecting to the public main. Sewer main extensions shall be located 6-feet off the centerline of the street/drive area on the South or West side. (DG&PWS, Sewer 7A.010)

38. Sanitary sewer improvements associated with this project shall meet the requirements of the City of Lacey Comprehensive Sanitary Sewer Plan, Thurston County Health Department, Washington State Department of Health (DOH), the LOTT Clean Water Alliance and Department of Ecology. (DG&PWS, Sewer 7A.010 and Subdivisions and Short Plat 2-21)

General Stormwater Improvements

39. Storm drainage improvements will be required in conjunction with the City of Lacey 2010 Stormwater Design Manual.

40. A final drainage report in accordance with the City of Lacey 2010 Stormwater Design Manual, shall be submitted to the City prior to Civil Plan approval. Within the report, include calculations with computer modeling showing proposed treatment and infiltration facilities have capacity for stormwater generated by this development. Also,

include the modeling showing there are no downstream restrictions and the piping associated with the project is properly sized.

41. The following note shall be shown on the face of the plat, on the civil engineering drawings and is a condition for approval: "Roof drains shall have dry wells and be placed on individual lots. Dry wells shall be sized to accommodate storm runoff per the City of Lacey 2010 Stormwater Design Manual" If site conditions cannot support dry well systems, a note must be included on the face of the plat indicating that roof and foundation drains shall be tied into stormwater system. (DG&PWS, Storm Sewer 8.5.13)

42. A Stormwater Pollution Prevention Plan (SWPPP) shall be submitted to and approved by the City prior to beginning construction of the project. Each of the 12 required SWPPP elements as identified in Chapter 1 of the City of Lacey 2010 Stormwater Design Manual shall be addressed and included in the construction SWPPP. If site conditions render SWPPP elements unnecessary, exemptions for each element shall be clearly justified in the narrative of the SWPPP. The SWPPP shall be submitted to and approved by the City prior to Grading permit or Civil Plan Approval.

43. A Stormwater Facility Maintenance Plan per chapter 9 of the City of Lacey 2010 Stormwater Design Manual shall be submitted to and approved by the City of Lacey. The maintenance plan shall be included in the submitted drainage report as part of the stormwater site plan. The stormwater facilities maintenance plan shall contain five main sections:

- Section 1:Owner information
- Section 2: Description of the drainage system and facilities serving the site
- Section 3: Cost estimate for long-term facilities maintenance, repair & rehabilitation
- Section 4: Site and facility management
- Section 5: Stormwater facility maintenance guide

Also, the maintenance plan shall be prepared as a stand-alone document for the post-development facility owner(s). The maintenance plan shall be submitted to and approved by the City prior to Civil drawing approval.

44. Due to the nature of the soil that may be found on this site, construction times may be limited to the "dry" season and import material may be required for all utility trenching, as determined by the City of Lacey Director of Public Works prior to final approval of the civil engineering drawings.

45. A signed and sealed copy (by the applicant's engineer) of Appendix "4D" (Engineer's Construction Inspection Report Form) from the City of Lacey 2010 Stormwater Design

Manual shall be submitted to and approved by the City prior to Final Public Works Approval. In order to submit Appendix 4D, the project engineer must perform infiltration tests and complete Appendix 4D forms from the City of Lacey 2010 Stormwater Design Manual. Appendix "4D" shall be submitted to and approved by the City prior to Final Public Works approval.

46. Treatment and infiltration/detention facilities shall be constructed for storm associated with the site, adjacent properties currently discharging to the site and half street storm water associated with roadways adjacent to the site.

General Transportation Improvements

47. Existing curb ramps or other improvements that do not meet current Americans with Disability Act standards associated with the site shall be brought into conformance with the site development. (DG&PWS, 4C.030 7.)

48. Assure street lighting levels satisfy City of Lacey requirements for roadways and intersections. If they don't, additional street lighting shall be required for all streets associated with this project (Street lighting per City of Lacey spacing Standards). All street light designs shall be prepared by an engineering firm capable of performing such work. (DG&PWS, Transportation, Illumination 4E.010)

49. As a condition of final Public Works Approval, electrical services associated with street lighting, pump stations, or other applications (for the Public benefit as agreed to by the City) shall be transferred into the City's name. In order to change service, the applicant/owner must provide a copy of a billing statement to the City. If service has not been established, the applicant/owner must provide the following information to the City to establish service: Project Name (final subdivision name), service meter's number, address of the service meter, owner's contact number and address, and the type of items are being energized by the service. All fees associated with the installation of the service shall be the responsibility of the developer. **Without the information outlined above or a copy of a previous billing statement, the service will remain in the applicant/owner's name and they will be responsible for payment of the bills until such time as the information is received by the City.**

50. Fiber optic conduit shall conform to the standards and requirements as set forth in Chapter 4 (Transportation) from the Development Guidelines & Public Works Standards (DG & PWS, Transportation 4E.035).

51. Access shall be provided to the property as determined and approved by the City. All access points shall meet minimum access spacing, minimum corner clearance, sight distance and minimum or maximum width requirements as outlined in the Development Guidelines & Public Works standards. (DG & PWS, Transportation 4B.025)

52. Traffic mitigation as determined by the Traffic Impact Analysis is required. Conditions of Lacey Municipal Code 14.21 shall be satisfied.

53. Minimum intersection curb radii and centerline radius requirements must be satisfied. Please label all radii on the final plat (DG&PWS 4B.020).

54. Proposed alleys shall be constructed to the Alley standard (DG&PWS, Transportation Standard Detail DNG No. 4-5.1). Alley improvements require a 20-foot easement. The minimum alley pavement width shall be 12-feet and the maximum alley pavement width shall be 16-feet.

55. Roadway sections (public or private) cannot be constructed in saturated ground areas. If separation from the water table cannot be obtained, the site must be filled to accommodate the roadways.

56. All public streets within the City and the City's UGA boundary will be planted with trees to create a distinct and pleasant character for those roadways. The street trees located in the Development Guidelines shall be required in or along the public Right-of-Way, including medians. Contact the City for specific street and accent trees in the core area. (DG&PWS, Transportation 4G.100)

57. The following is a condition for approval and shall be included on the face of the plat: "The City of Lacey has no responsibility to build, improve, maintain, or otherwise service the private roads and/or alleys within or providing access to the property described in this plat." (Lacey Municipal Code 15.32.190)

58. The structural design of the streets shall conform to City standards and requirements as set forth in the Development Guidelines & Public Works Standards. Structural sections shall be based on the actual Washington stabilometer R-value (as determined by a soils engineer licensed in the State of Washington) and may vary throughout the plat based on site specific factors such as differing soil types, wetlands, and high groundwater (DG&PWS, Transportation 4B.020 & 4B.160).

59. The following note is a condition for approval: "The Home Owner's Association shall be responsible for maintaining the private streets (along with associated parking areas) (DG&PWS, Transportation 4G.100D)

<u>General Surveying Requirements</u>

60. Utility easements are required for all mains, water and sewer located on private property. Easements shall include fire hydrants, water meters, sewer improvements and future extensions of mains to adjacent properties. Easements and stub outs shall be provided to serve adjoining properties as determined by the City. Rather than being designated as water or sewer, all easements shall be identified as "utility" easements on

the civil drawings and in the easement document. Specific requirements will be determined at the of plan review. All easements shall be prepared by a licensed land surveyor and submitted prior to release of approved civil drawings (DG&PWS Chapter 3.110).

61. The City of Lacey Coordinate System shall be Washington Coordinate System, NAD 83/91 south zone. Units are expressed in feet. Horizontal and vertical control information can be obtained from the Lacey Public Works Department. (DG&PWS 3.025)

62. Right-of-Way shall be dedicated for a subdivision, short subdivision, binding site plan, for a project that triggers Site Plan Review or for a conditional use permit. The requirement to dedicate Right-of-Way shall be determined by the City or Regional Transportation plans, by a Traffic Impact Analysis, or as determined by Public Works. Dedications shall be determined by a professional Land surveyor. Dedication shall be submitted and approved by the City prior to plan approval (DG&PWS, Transportation 4B.060).

Other Requirements

63. All improvements shall satisfy City of Lacey Development Guideline Standards in place at the time of complete application is obtained (as determined by the City of Lacey Community Development Department). (LMC)

64. All Public Works improvements must be designed by an engineer licensed in the State of Washington and submitted to the City of Lacey Public Works Department for review and approval. The applicant is responsible for all connection fees at the time of any new connection. (DGPWS 3.040)

65. All structures associated with this site shall be connected to City of Lacey utilities (DG&PWS 6.010 and 7A.010).

66. Prior to civil drawing approval, two sets of mylar drawings along with digital a electronic file of the drawings in AutoCAD or other approved software format shall be submitted for all approved final plans. (DG&PWS Chapter 3.040,B)

67. Prior to final Public Works Construction approval, "as-built" mylar drawings along with the revised digital electronic diskette shall be submitted for all approved final plans. (DG&PWS Chapter 3.040, J)

68. A 20 percent maintenance bond or financial guarantee of the engineer's estimate or approved bid estimate is required for a period of 24 months upon construction completion and approval of Public Works improvements. The financial guarantee may be released after 18 months if all conditions of approval have been satisfied. The

financial guarantee applies to sewer, stormwater, water, frontage, landscaping/irrigation, roadway and street lighting improvements (LMC 14.20.025).

69. Eight sets of civil drawings and three drainage reports shall be submitted directly to the City of Lacey Public Works Department. Drawings submitted to other City departments will not satisfy this requirement. (DG&PWS 3.040, B)

70. The property owner(s)/Home Owner's Association shall be responsible for maintaining the planter strip and street trees (weeding, irrigating, mowing, etc.) in a healthy and growing manner in perpetuity. If the planter strip and or trees are being maintained by another group or organization, then a maintenance agreement (or adequate documentation) that verifies the planter strip and/or trees are being (and will continue to be) maintained shall be submitted to the City for review (Development Guidelines & Public Works Standards, Transportation 4G.100D).

71. To protect the public interest on private property, utility mains located on private property shall be protected from damage. If on-site settling or other phenomenon occurs causing valve boxes, sewer manholes or other appurtenances to protrude above the driving surfaces or ground elevations, the owner will be notified and the problem shall be fixed within 30 days of notification. If the problem is not fixed within the 30 day time period, the City will fix the problem and bill the property owner/Home Owner's Association. This language shall be included on the face of the plat or easement documents submitted to the City.

72. Prior to Final Public Works approval of the project, Bill of Sale documents for water and sewer improvements shall be submitted to and approved by the City.

XIII. FINDINGS OF FACT

This recommendation is supported by the following suggested findings of fact.

1. This proposal is for subdivision of three parcels totaling 43.18 acres into 83 single family lots and one 10.9 acre tract for future multi-family development.

2. The City of Lacey and Thurston County Land Use Plan designate the subject property for the Lacey Urban Growth Area, as High Density Residential.

3. The subject property is zoned High Density Residential by the City of Lacey Zoning Ordinance, which prescribes a density of six to twenty units per acre.

4. The subject parcels are located at the northwest corner of the intersection of Britton Parkway NE and Gateway Boulevard in portions of Sections 3 and 10, Township 18N, Range 1W, W.M., with the City of Lacey, Thurston County, Washington.

5. An environmental review of the project was held on September 12, 2013. A Mitigated Determination of Nonsignificance was issued in accordance with RCW 43.21C.

6. As per the recommendations and modeling of the Sanitary Sewer Study prepared for the City of Lacey for the East Side of Woodland Creek Valley and Lacey Gateway on May 8, 2008 by Huitt Zollars Inc one lift station is necessary to serve the sewer basin.

7. Eagle Creek is located directly downslope from the subject property.

8. Eagle Creek is a tributary to Woodland Creek and Henderson Inlet and is on the 303(d) list for waters failing to meet state water quality standards including both Category 5 for dissolved oxygen and Category 4A for bacteria.

9. City of Lacey monitoring of Eagle Creek downstream from the subject site has shown that the state water quality standard for fecal coliform bacteria was exceeded in 2012.

10. The subject property and Eagle Creek are located within the Henderson Inlet Watershed. The Henderson Inlet Watershed Water Quality Improvement Project (TMDL) has been approved by the EPA. Ecology's TMDL Implementation Plan states that Eagle Creek at Woodland Creek needs a 95% reduction in fecal coliform to meet state standards, and a primary cleanup action in this watershed is improved management of stormwater discharges.

11. The adopted City of Lacey Development Guidelines, as well as Title 12 and Title 13 of the Lacey Municipal Code, set forth specific street and utility improvements applicable to the subject property.

12. In accordance with IFC Section D104.3 developments of one- and two-family dwellings where the number of dwelling units exceeds 30 shall be provided with separate and approved fire apparatus access roads unless all building are provided with approved automatic fire sprinkler systems installed in accordance with NFPA 13D Standards (2007 Edition).

13. The International Building Code adopted by the City of Lacey has specific requirements applicable to development of the subject property.

14. The International Fire Code has specific requirements applicable to the development of the subject property.

15. There are health requirements applicable to development of the subject property.

16. The Lacey cross connection control program has specific requirements applicable to the development of the subject property.

17. The City of Lacey has provisions in Title 14 of the Lacey Municipal code for the protection and preservation of trees and vegetation.

18. At the time of processing this application, adequate sanitary sewer and domestic water capacity are available. Actual guarantee of services is not secured until all applicable connection fees are paid.

19. Adequate provisions have been made for drainage ways, streets, potable water supplies, sanitary wastes, parks and recreation grounds, schools and sidewalks pursuant to RCW 58.17.110.

20. This proposal, as conditioned, is consistent with the City of Lacey and Thurston County Land Use Plan for the Lacey Urban Growth Area.

21. This proposal, as conditioned, is consistent with the City of Lacey Zoning Code, Title 16 of the LMC.

22. This proposal, as conditioned, is consistent with Title 15 "Subdivision of the LMC and RCW 58.17 "Plats-Subdivisions-Dedication."

23. This proposal, as conditioned, is consistent with the Development Guidelines and Public Works Standards adopted by the City of Lacey.

24. At the time of processing this application, adequate sanitary sewer and domestic water capacity are available. However, utility capacity is reduced as other parcels of property are connected to the services. Therefore, approval of this application does not guarantee the availability of utility services. Such assurance will not be given until all applicable connection fees are paid and accepted by the City."

25. This proposal, as conditioned, will not be detrimental to the public health, safety, and general welfare.

Shaping our community together

CITY OF LACEY

DEPARTMENT OF COMMUNITY DEVELOPMENT
420 College Street S.E. Lacey, WA 98503 (360) 491-5642

OFFICIAL USE ONLY
Date: _____
Case #: 12-239
Received By: _____
Planner: _____
Related Cases: _____

RECEIVED
FEB 28 2013
BY _____

PRELIMINARY SUBDIVISION SUPPLEMENTAL

(This form is to be accompanied by the General Land Use Application)

Name of Subdivision: Gateway Division 1

Applicant or Authorized Representative: JEFF PANTIER, PLS HATTON GODAT PANTIER

Existing Zoning: HD 6-20
Proposed Density: 8.02 du/net acre
Total Site Acreage: 43.18 acres
Number of Proposed Lots:
Single-Family: 83
Multi-Family: _____
Duplex: _____

Average Lot Size: 4,863 s.f.
Smallest Lot Size: 3,300 s.f. (townhome)
Largest Lot Size: _____
Acreage in Parks/Common Open Space: 16.76 acres
Area of Tree Tract: 7.86 acres
Critical Area Tracts: 7.86 acres

To Apply for a Preliminary Subdivision, the Following shall be Submitted:

- ☒ 25 copies of the General Land Use application
- ☒ 25 copies of the Preliminary Subdivision Supplemental Application
- ☒ 25 copies of the Preliminary Subdivision maps
- ☒ One 11" x 17" copy of the Preliminary Subdivision maps
- ☒ Environmental Checklist, with original signature and 25 copies **(must include 2 CD's containing .pdf copies of all submittal materials, including applications)**
- ☒ Plat certificate dated within 30 days of submittal
- ☐ Two (2) copies of all proposed lot owners association agreements and protective covenants
- ☒ Any additional information requested at the presubmission conference
- ☒ All application fees

The preliminary subdivision shall show specifically and clearly, all of the following features on one or more maps:

1. **General Information:**
   - ☒ Proposed name of the subdivision (a name reservation request must be made by the applicant to the County Auditor's Office; proof of the name reservation shall be submitted with the final subdivision application)
   - ☒ Plat scale, datum, north arrow and date
   - ☒ The boundary lines of the tract to be divided

EXHIBIT 3

2. **Scale and Size:**
☒ The preliminary plat shall be at a scale of not more than fifty (50) feet to the inch nor less than 200 feet to the inch
3. **Existing Conditions:**
☒ Vicinity sketch showing boundary lines of adjacent parcels, and the relationship of the proposed division to major highways, schools, parks, shopping center.
☒ If the application constitutes a re-plat, the lots, blocks and streets of the original plat shall be shown with dotted lines in their proper positions in relation to the new arrangement of the plat; the new plat being so clearly shown in solid lines so as to avoid ambiguity.
☒ The location and direction of all watercourses, lakes, streams and the location of all areas subject to flooding.
☒ Natural features such as rock outcroppings, marshes, wooded areas.
☒ Existing uses on the property, including the location of all existing structures to remain on the property after platting.
☒ The location and size of all pertinent existing sewers, water mains, culverts and other public or private underground installations within the division and immediately adjacent to, and elevations of sewers at points of probable connections.
☒ The location, widths and names of both unopened and open streets, easements and other ways within or adjacent to the proposed binding site plan. The location of other important features such as the general outline of permanent buildings, water sources, power lines, telephone lines, railroads, city boundaries, section lines and section corners.
☒ Contours of sufficient intervals to indicate the topography of the entire tract for a sufficient distance beyond the boundaries of the proposed binding site plan as follows:
a. Up to 5% slope, two-foot (2 foot) contours;
b. Five percent (5%) and over slopes, 5-foot contours.
☒ The existing monuments or other such identifying markers as required.
4. **Proposed Plan of Partitioning**
☒ Location, width, name and approximate grade and radii of curves of streets
☒ Approximate centerline grades, elevations, cuts and fills, including individual lot driveways, with extensions of these items for a reasonable distance beyond the limits of the proposed subdivision showing the finished grade of streets and the nature and extent of street construction.
☒ A proposal for domestic water supply; stating the source and a preliminary distribution system layout
☒ Proposals for sewage disposal; storm water drainage, and flood control
☒ If lot areas are to be substantially graded, a plan showing the nature of the cuts and fills and information on the character of the soil
☐ Proposals for other improvements such as electric utilities and boat docks, pathways and recreation facilities
☒ The layout of proposed street rights-of-way, alleys, easements, lots and blocks, and the approximate dimensions of each
☒ All parcels of land intended to be dedicated or temporarily reserved for public use, or to be reserved in the deeds for common use of the property owners in the subdivision with the purpose, conditions or limitations of such dedications or reservations clearly indicated
☒ Trees and natural features which are to be preserved in the subdivision
☒ A vicinity map accurate enough for the planning staff to locate the proposed subdivision without referring to the legal description, along with common language description.
5. **Adjacent Property Owners Mailing List**
☒ A mailing list, on labels, which includes the mailing addresses of the adjacent property owners within 300 feet of the exterior boundary of the property involved. The mailing list shall be obtained from a title company. Include mailing labels for the owners, applicant, engineer, and representative.

Shaping our community together

CITY OF LACEY

DEPARTMENT OF COMMUNITY DEVELOPMENT
420 College Street SE, Lacey, WA 98503 (360) 491-5642

RECEIVED
FEB 28 2013
BY

OFFICIAL USE ONLY
Date:
Case #: 12.239
Received By:
Planner:
Related Cases:

GENERAL LAND USE APPLICATION

Please Identify Supplemental Forms Accompanying This Application:

- ☐ Binding Site Plan (Preliminary)
- ☐ Binding Site Plan (Final)
- ☐ Boundary Line Adjustment
- ☐ Conditional Use Permit
- ☒ **Environmental Checklist (SEPA) (must include 2 CD's containing .pdf copies of all submittal materials, including applications)**
- ☐ Joint Aquatic Resources Permit Application (JARPA)
- ☐ Landclearing Permit/Class IV Forest Practices
- ☐ Planned Residential Development (Preliminary)
- ☐ Planned Residential Development (Final)
- ☐ Short Subdivision (Preliminary)
- ☐ Short Subdivision (Final)
- ☐ Site Plan Review
- ☒ Subdivision (Preliminary)
- ☐ Subdivision (Final)
- ☐ Townhouse Development Permit
- ☐ Wetland Development Permit

***Applicant/Property Owner Information**

Owner: Gateway 850 LLC

Mailing Address: 15 Lake Bellevue Drive #102, Bellevue WA 98005

Phone Number(s): (425) 869-1300

E-mail Address: craig@taylordev.com

Signature:

** For projects with multiple owners, attach a separate sheet with above owner information and signatures.*

Applicant: Taylor Development / Gateway 850, LLC

Mailing Address: 15 Lake Bellevue Drive #102, Bellevue, WA 98005

Phone Number(s): (425) 869-1300

E-mail Address:

*Authorized Representative: Jeff S. Pantier, PLS Hatton Godat Pantier

Mailing Address: 3910 Martin Way E., Suite B Olympia, WA 98506

Phone Number(s): (360) 943-1599

E-mail Address: JeffP@hattonpantier.com

**The authorized representative will be the primary staff contact for all project related questions and correspondence.*

EXHIBIT 4

Project Information

Project Name: Gateway Division 1

Project Description: Proposed subdivision of 43.18 acres into 83 residential lots. The site includes 1.31 acres of wetland area and 16.76 acres of open space. Total dwelling units proposed is 333.

Property Description

Site Address: (unassigned) Britton Parkway NE

Full Legal Description of Subject Property (attached ☒):

Section(s): 3 and 10 Township: 18 North Range: 1 West

Assessor Tax Parcel Number(s): 11803340100, 1180340000, 11810103000

Zoning District: HD 6-20

Shoreline Designation (if applicable): N/A

Area of Project Site (in square feet if less than 1 acre; in acres if greater): 43.18 acre

Critical Areas on or near Site (show areas on site plan):

- ☐ None
- ☐ Creek or stream (name): _____
- ☐ Lake or pond (name): _____
- ☐ Endangered or threatened species (identify): _____
- ☐ Encumbrances, such as wells with radius, and easements: _____
- ☒ Wetland
- ☐ Steep slopes/draw/gully/ravine
- ☐ Historic site or structure
- ☐ Flood hazard area, provide FEMA flood zone and map number: Zone C "Minimal Flooding" PANEL #5301880183C

Utilities (Existing and Proposed)

Water: Existing _____ Proposed City of Lacey

Sewer: Existing _____ Proposed City of Lacey

Access (name of street(s) from which access will be gained): Britton Parkway NE

I affirm, under penalty of perjury, that all answers, statements, and information submitted with this application are correct and accurate to the best of my knowledge. I also affirm that I am the owner of the subject site or am duly authorized by the owner to act with respect to this application. Further, I grant permission from the owner to any and all employees and representatives of the City of Lacey and other governmental agencies to enter upon and inspect said property as reasonably necessary to process this application. I agree to pay all fees of the City that apply to this application.

Jeffrey E Hamilton, CFO — **Print Name**

Signature

2-21-2013 — **Date**

Please attach all applicable supplemental forms

PRELIMINARY PLAT OF GATEWAY DIVISION 1

SITE DATA:

PARCEL NO.'S:	11803340100, 11803430000, 11810103000		
ZONING:	HD 9-20		
TOTAL AREA:	43.18 acres		
WETLAND AREA:	1.31 acres	ROADWAY LENGTH (A,B,C)	2,203 l.f.
NET AREA:	41.87 acres	ROADWAY AREA (A,B,C)	2.2 acres
TOTAL DWELLING UNITS:	333 d.u.	ROADWAY LENGTH (OTHERS)	2,079 l.f.
DENSITY:	8.02 d.u. / net acre	ROADWAY AREA (OTHERS)	3.5 acres
		SMALLEST LOT (DETACHED FRONT LOAD)	5,000 s.f.
TOTAL OPEN SPACE:	16.78 acres (39% OF SITE AREA)	SMALLEST LOT (DETACHED REAR LOAD)	4,000 s.f.
STORM DRAINAGE	6.3 acres	SMALLEST LOT ATTACHED (TOWNHOMES)	3,300 s.f.
WETLANDS / TREE TRACTS	1.3 acres	AVERAGE LOT AREA	4,863 s.f.
BUFFERS / TREE TRACTS	5.2 acres	SANITARY SEWER	CITY OF LACEY
LANDSCAPE / ACTIVE RECREATION	3.6 acres	WATER	CITY OF LACEY

LEGEND

EX. POWER POLE	EX. WATERMETER	NEW WATERMETER
EX. POWER VAULT	EX. HYDRANT	NEW HYDRANT
EX. POWER TRANSFORMER	EX. VALVE	NEW VALVE
EX. POWER PEDESTAL	EX. BLOWOFF	NEW BLIND FLANGE
EX. PVC RISER	EX. WATER LINE	NEW BLOCKING
EX. OVERHEAD POWER	EX. SEWER CLEANOUT	NEW WATERMAIN
EX. UNDER GROUND POWER	EX. SEWER MANHOLE	NEW CATCHBASIN TYPE 1
EX. TELEPHONE PEDESTAL	EX. SEWER LINE	NEW CATCHBASIN TYPE 2-48
EX. TELEPHONE MANHOLE	EX. CONCRETE	NEW STORM CATCHBASIN W/ SOLID LID
EX. CABLE PEDESTAL	EX. EDGE OF PAVEMENT	NEW STORM MAIN LINE
EX. TELEPHONE LINE	EX. MAJOR CONTOUR	NEW LOT DRAINAGE LINE
EX. GAS VALVE	EX. MINOR CONTOUR	NEW SEWER CLEANOUT
EX. GAS LINE	FINISH MAJOR CONTOUR	NEW SEWER MANHOLE
EX. POWER JUNCTION BOX	FINISH MINOR CONTOUR	NEW GRAVITY SEWER LINE
EX. CATCHBASIN TYPE 1	NEW ROCK WALL	NEW PIGG LAUNCH PORT
EX. STORM MAIN LINE	NEW PEDESTRIAN STREET LIGHT	NEW SEWER FORCEMAIN
EX. CULVERT	NEW HIGH MAST W/ PED SCALE LIGHT	
EX. SIGNS	NEW LIGHTING J BOX	
EX. FENCE	NEW TRANSFROMER & SERVICE DISCONNECT	

CITY OF LACEY

VERTICAL DATUM	MERIDIAN HORIZONTAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1083 FOUND CASED MONUMENT AT THE INTERSECTION OF CALLISON ROAD AND BRITTON PARKWAY ELEVATION = 216.42	CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111152 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°36'41" WEST

SCALE: 1" = 100'

LEGAL DESCRIPTION

THE SOUTH HALF OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTH HALF OF THE SOUTHWEST QUARTER WEST HALF OF THE SOUTHEAST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST OF THE W.M.;
EXCEPT BRITTON PARKWAY;

ALSO THAT PORTION OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST OF THE W.M., LYING NORTHERLY OF BRITTON PARKWAY;

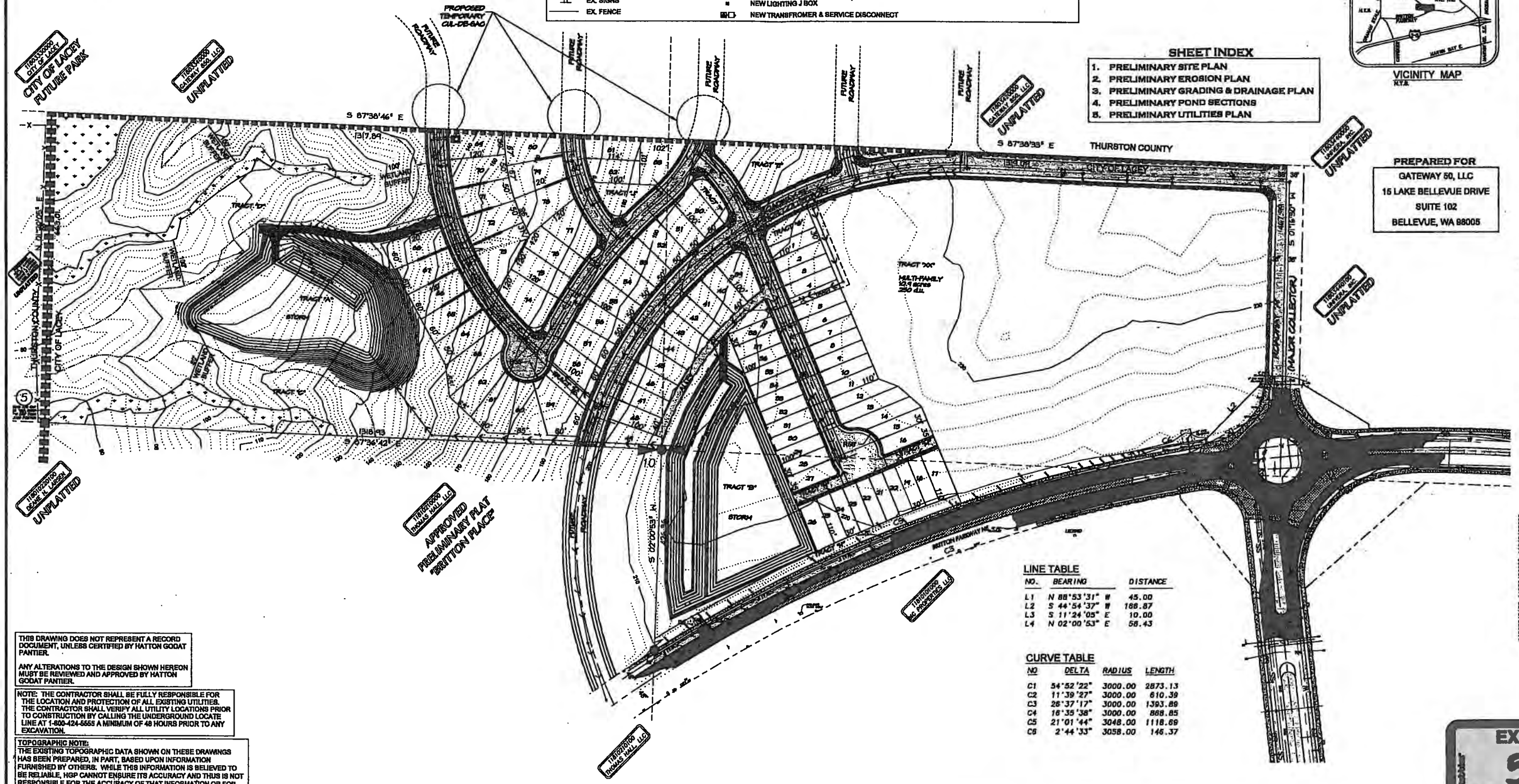
IN THURSTON COUNTY, WASHINGTON

VICINITY MAP
N.T.S.

SHEET INDEX

1. PRELIMINARY SITE PLAN
2. PRELIMINARY EROSION PLAN
3. PRELIMINARY GRADING & DRAINAGE PLAN
4. PRELIMINARY POND SECTIONS
5. PRELIMINARY UTILITIES PLAN

PREPARED FOR
GATEWAY 50, LLC
15 LAKE BELLEVUE DRIVE
SUITE 102
BELLEVUE, WA 98005



LINE TABLE

NO.	BEARING	DISTANCE
L1	N 88°53'31" W	45.00
L2	S 44°54'37" W	166.87
L3	S 11°24'05" E	10.00
L4	N 02°00'53" E	58.43

CURVE TABLE

NO	DELTA	RADIUS	LENGTH
C1	54°52'22"	3000.00	2873.13
C2	11°39'27"	3000.00	610.39
C3	26°37'17"	3000.00	1393.89
C4	16°35'38"	3000.00	868.85
C5	21°01'44"	3048.00	1118.69
C6	2°44'33"	3058.00	146.37

THIS DRAWING DOES NOT REPRESENT A RECORD DOCUMENT, UNLESS CERTIFIED BY HATTON GODAT PANTIER.

ANY ALTERATIONS TO THE DESIGN SHOWN HEREON MUST BE REVIEWED AND APPROVED BY HATTON GODAT PANTIER.

NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

TOPOGRAPHIC NOTE:
THE EXISTING TOPOGRAPHIC DATA SHOWN ON THESE DRAWINGS HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, HGP CANNOT ENSURE ITS ACCURACY AND THUS IS NOT RESPONSIBLE FOR THE ACCURACY OF THAT INFORMATION OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

DESIGNED BY: DS
DRAWN BY: MK
CHECKED BY: SDK
DATE: FEB 2022
SCALE: H
V

HATTON GODAT PANTIER
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DATE
REVISIONS

11803340100, 11803430000, 11810103000

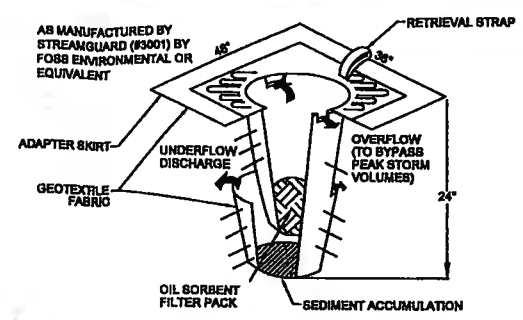
GATEWAY DIVISION 1
PRELIMINARY PLAT

PRELIMINARY SITE PLAN

EXHIBIT
5

GENERAL EROSION CONTROL NOTES:

1. A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL) IS REQUIRED FOR ALL CONSTRUCTION PROJECTS. THE NAMED PERSON OR FIRM SHALL BE ON-SITE OR ON-CALL AT ALL TIMES. FOR THIS SITE, THE PERSON / FIRM IS __TBD__ AND THEIR OFFICE TELEPHONE NUMBER IS __TBD__
2. APPROVAL OF THIS EROSION / SEDIMENTATION CONTROL (ESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.).
3. THE IMPLEMENTATION OF THESE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE APPLICATION CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION LANDSCAPING IS ESTABLISHED.
4. THE CLEARING LIMIT BOUNDARIES SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE APPLICANT/CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
5. THE ESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT-LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM, ROADWAYS, OR VIOLATE APPLICABLE SURFACE WATER, GROUND WATER , OR DISCHARGE STANDARDS.
6. THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE.
7. THE ESC FACILITIES ON ACTIVE SITES SHALL BE INSPECTED DAILY BY THE APPLICANT/CONTRACTOR -AND MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY -TO ENSURE THEIR CONTINUED FUNCTIONING.
8. THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED MONTHLY, OR WITHIN 48 HOURS FOLLOWING A MAJOR STORM EVEN, BY THE APPLICANT/CONTRACTOR -AND MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY -TO ENSURE THEIR CONTINUED FUNCTIONING.
9. STORM INLETS OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT STORMWATER RUNOFF DOES NOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR TREATED TO REMOVE SEDIMENT. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO PROJECT COMPLETION AND ACCEPTANCE. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT-LADEN WATER OFFSITE WITHOUT TREATMENT.
10. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF THE CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
11. ROADS SHALL BE CLEANED THOROUGHLY AS NEEDED TO PROTECT DOWNSTREAM WATER RESOURCES OR STORMWATER INFRASTRUCTURE. SEDIMENT SHALL BE REMOVED FROM ROADS BY SHOVELING OR PICKUP SWEEPING AND SHALL BE TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.
12. FROM OCTOBER 15 THROUGH APRIL 1, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN 2 DAYS. FROM APRIL 2 TO OCTOBER 14, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN 7 DAYS. SOILS SHALL BE STABILIZED AT THE END OF THE SHIFT BEFORE A HOLIDAY OR WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. LINEAR CONSTRUCTION ACTIVITIES, SUCH AS RIGHT OF WAY AND EASEMENT CLEARING, ROADWAY DEVELOPMENT, PIPELINE, AND TRENCHING FOR UTILITIES, SHALL COMPLY WITH THESE REQUIREMENTS. THESE STABILIZATION REQUIREMENTS APPLY TO ALL SOILS ON SITE, WHEATHER AT FINAL GRADE OR NOT. THE LOCAL PERMITTING AUTHORITY MAY ADJUST THESE TIME LIMITS IF IT CAN BE SHOWN THAT A DEVELOPMENT SITE'S EROSION OR RUNOFF POTENTIAL JUSTIFIES A DIFFERENT STANDARD.
13. FROM OCTOBER 15 THROUGH APRIL 1, CLEARING, GRADING AND OTHER SOIL-DISTURBING ACTIVITIES SHALL ONLY BE PERMITTED IF SHOWN TO THE SATISFACTION OF THE LOCAL PERMITTING AUTHORITY THAT THE TRANSPORT OF SEDIMENT FROM THE CONSTRUCTION SITE TO RECEIVING WATER WILL BE PREVENTED.
14. SOIL STOCKPILES MUST BE STABILIZED AND PROTECTED WITH SEDIMENT-TRAPPING MEASURES.
15. ALL POLLUTANTS, INCLUDING WASTE MATERIALS AND DEMOLITION DEBRIS, THAT OCCUR ON SITE DURING CONSTRUCTION SHALL BE HANDLED AND DISPOSED OF IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF STORMWATER. WOODY DEBRIS MAY BE CHOPPED AND SPREAD ON SITE.
16. MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES AND OTHER ACTIVITIES WHICH MAY RESULT IN DISCHARGE OF SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORMWATER RUNOFF MUST BE CONDUCTED USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. REPORT ALL SPILLS TO 911.
17. WATER FROM MOST DEWATERING OPERATION SHALL BE DISCHARGED INTO A SEDIMENT TRAP OR POND. CLEAN, NON-TURBID WATER MAY BE DISCHARGED TO STATED SURFACE WATERS, PROVIDED THE DISCHARGE DOES NOT CAUSE EROSION OR FLOODING. HIGHLY TURBID OR CONTAMINATED DEWATERING WATER FROM CONSTRUCTION EQUIPMENT OPERATION, CLAMSHELL DIGGING, CONCRETE TREMIE POUR, OR WORK INSIDE A COFFERDAM SHALL BE HANDLED SEPARATELY FROM STORMWATER AND PROPERLY DISPOSED.

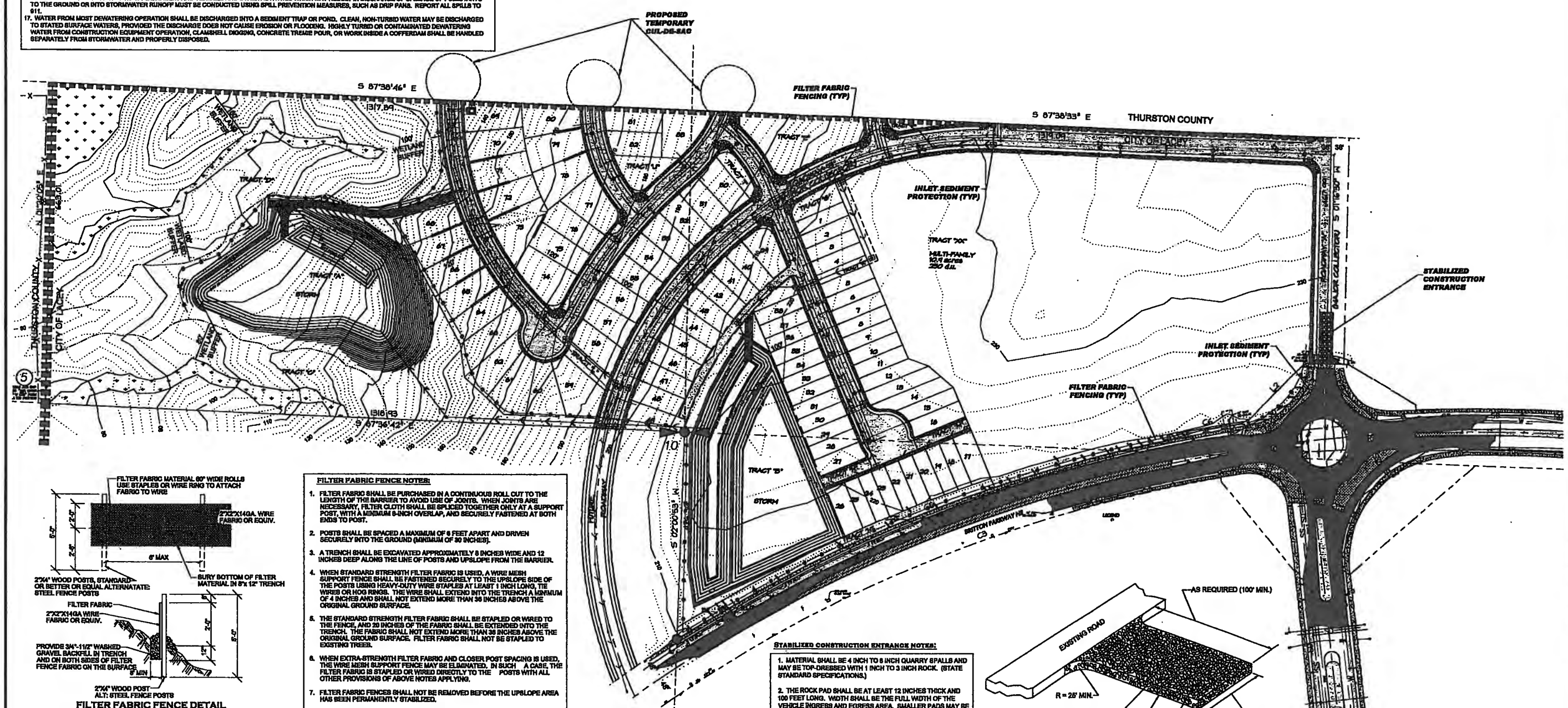


1. INSTALL INSERT PER THE MANUFACTURER'S SPECIFICATIONS
2. MAINTAIN AND REPLACE INSERTS AS RECOMMENDED BY THE MANUFACTURER, AS REQUIRED BY THE INSPECTOR OR PROJECT ENGINEER, AND AS OTHERWISE NECESSARY.

INLET SEDIMENT PROTECTION

CITY OF LACEY	
VERTICAL DATUM	MERIDIAN HORIZONTAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1083 FOUND CASED MONUMENT AT THE INTERSECTION OF CALLISON ROAD AND BRITTON PARKWAY ELEVATION = 218.42	CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111152 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°36'41" WEST

100 50 0 100 200
SCALE: 1" = 100'



FILTER FABRIC FENCE DETAIL

FILTER FABRIC FENCE NOTES:

1. FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6-INCH OVERLAP, AND SECURELY FASTENED AT BOTH ENDS TO POST.
2. POSTS SHALL BE SPACED A MAXIMUM OF 6 FEET APART AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 30 INCHES).
3. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 8 INCHES WIDE AND 12 INCHES DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER.
4. WHEN STANDARD STRENGTH FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY WIRE STAPLES AT LEAST 1 INCH LONG, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 4 INCHES AND SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
5. THE STANDARD STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 20 INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
6. WHEN EXTRA-STRENGTH FILTER FABRIC AND CLOSER POST SPACING IS USED, THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED. IN SUCH A CASE, THE FILTER FABRIC IS STAPLED OR WIRED DIRECTLY TO THE POSTS WITH ALL OTHER PROVISIONS OF ABOVE NOTES APPLYING.
7. FILTER FABRIC FENCES SHALL NOT BE REMOVED BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
8. FILTER FABRIC FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.

TOPOGRAPHIC NOTE:

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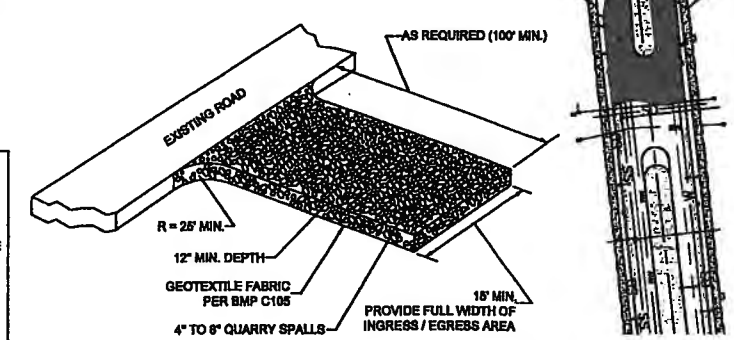
NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

STABILIZED CONSTRUCTION ENTRANCE NOTES:

1. MATERIAL SHALL BE 4 INCH TO 8 INCH QUARRY SPALLS AND MAY BE TOP-DRESSED WITH 1 INCH TO 3 INCH ROCK. (STATE STANDARD SPECIFICATIONS.)
2. THE ROCK PAD SHALL BE AT LEAST 12 INCHES THICK AND 100 FEET LONG. WIDTH SHALL BE THE FULL WIDTH OF THE VEHICLE INGRESS AND EGRESS AREA. SMALLER PADS MAY BE APPROVED FOR SINGLE-FAMILY RESIDENTIAL AND SMALL COMMERCIAL SITES.
3. ADDITIONAL ROCK SHALL BE ADDED PERIODICALLY TO MAINTAIN PROPER FUNCTION OF THE PAD.
4. IF THE PAD DOES NOT ADEQUATELY REMOVE THE MUD FROM THE VEHICLE WHEELS, THE WHEELS SHALL BE HOSED OFF BEFORE THE VEHICLE ENTERS A PAVED STREET. THE WASHING SHALL BE DONE ON AN AREA COVERED WITH CRUSHED ROCK AND WASH WATER SHALL DRAIN TO A SEDIMENT RETENTION FACILITY OR THROUGH A SILT FENCE.



STABILIZED CONSTRUCTION ENTRANCE

DESIGNED BY: DS
DRAWN BY: MK
CHECKED BY: SGH
DATE: FEB 2014
SCALE: N

SEVEN D. HATTON
34193
REGISTERED PROFESSIONAL ENGINEER
2/13/14

HATTON GODAT PANTIER
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REVISIONS: DATE:

GATEWAY DIVISION 1

PRELIMINARY PLAT

EOSION CONTROL PLAN

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M.

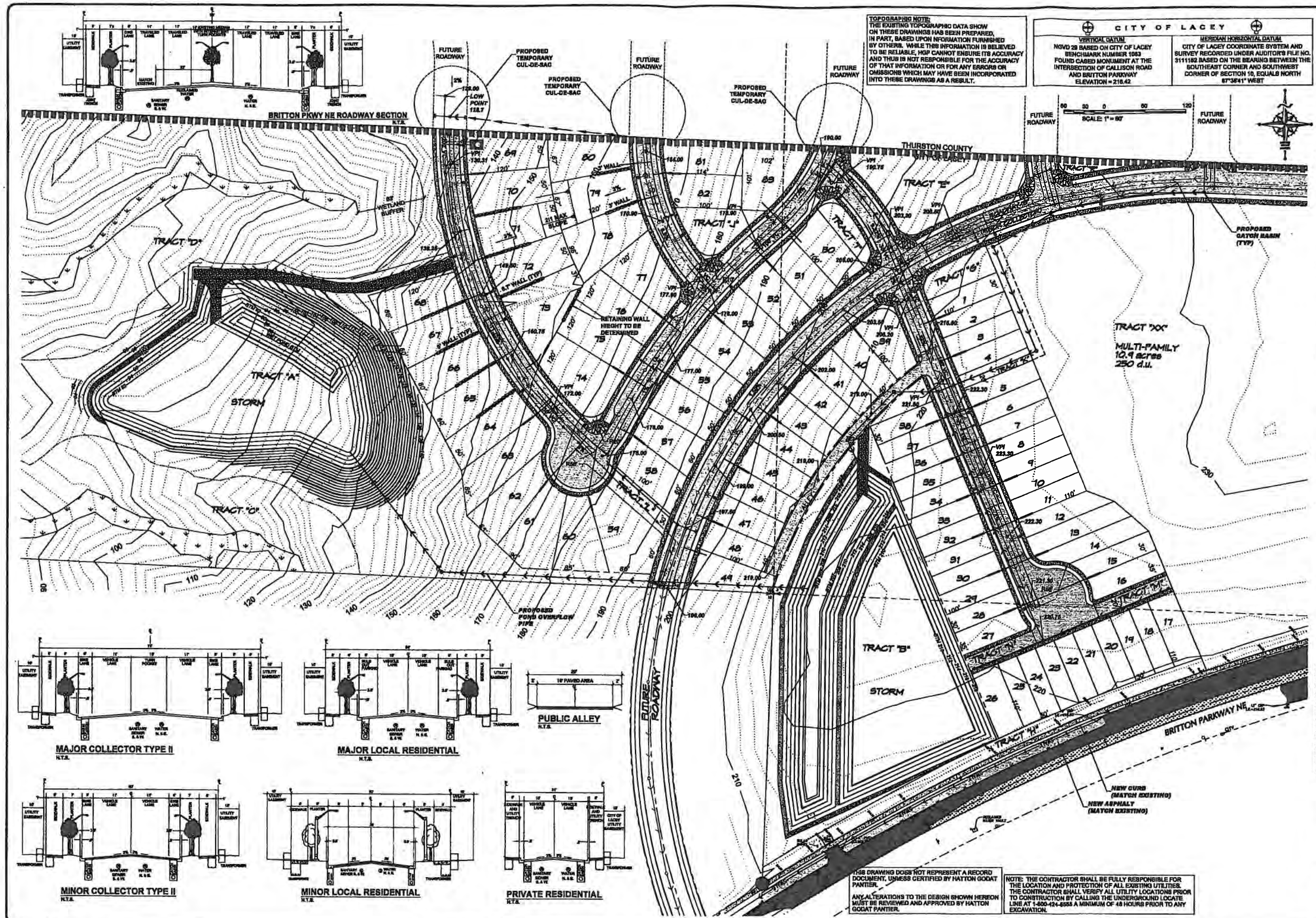
11803340100, 11803430000, 11810101300

AGENCY NO.
SHEET 2 OF 5
12-052(12-052)Preliminary PAG
INDEX 12-052pre-ec.dwg
JOB: 12-052

TOPOGRAPHIC NOTE:
THE EXISTING TOPOGRAPHIC DATA SHOW ON THESE DRAWINGS HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, HGP CANNOT ENSURE ITS ACCURACY AND THUS IS NOT RESPONSIBLE FOR THE ACCURACY OF THAT INFORMATION OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

CITY OF LACEY

VERTICAL DATUM	MERIDIAN HORIZONTAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1083 FOUND CASED MONUMENT AT THE INTERSECTION OF CALLISON ROAD AND BRITTON PARKWAY ELEVATION = 216.42	CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111182 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°36'41" WEST



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NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

DESIGNED BY: DS
DRAWN BY: MM
CHECKED BY: TMH
DATE: FEB 2012
SCALE: H 1" V

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REVISION	DATE

GATEWAY DIVISION 1

PRELIMINARY PLAT

PRELIMINARY GRADING AND DRAINAGE

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M.

11803340100, 11803420000, 11801010300

AGENCY NO.
SHEET: 3 OF 5
12-052Prelimary Plat
INDEX 12-052Area-pre-dra.dwg
JOB: 12-052

TOPOGRAPHIC NOTE:
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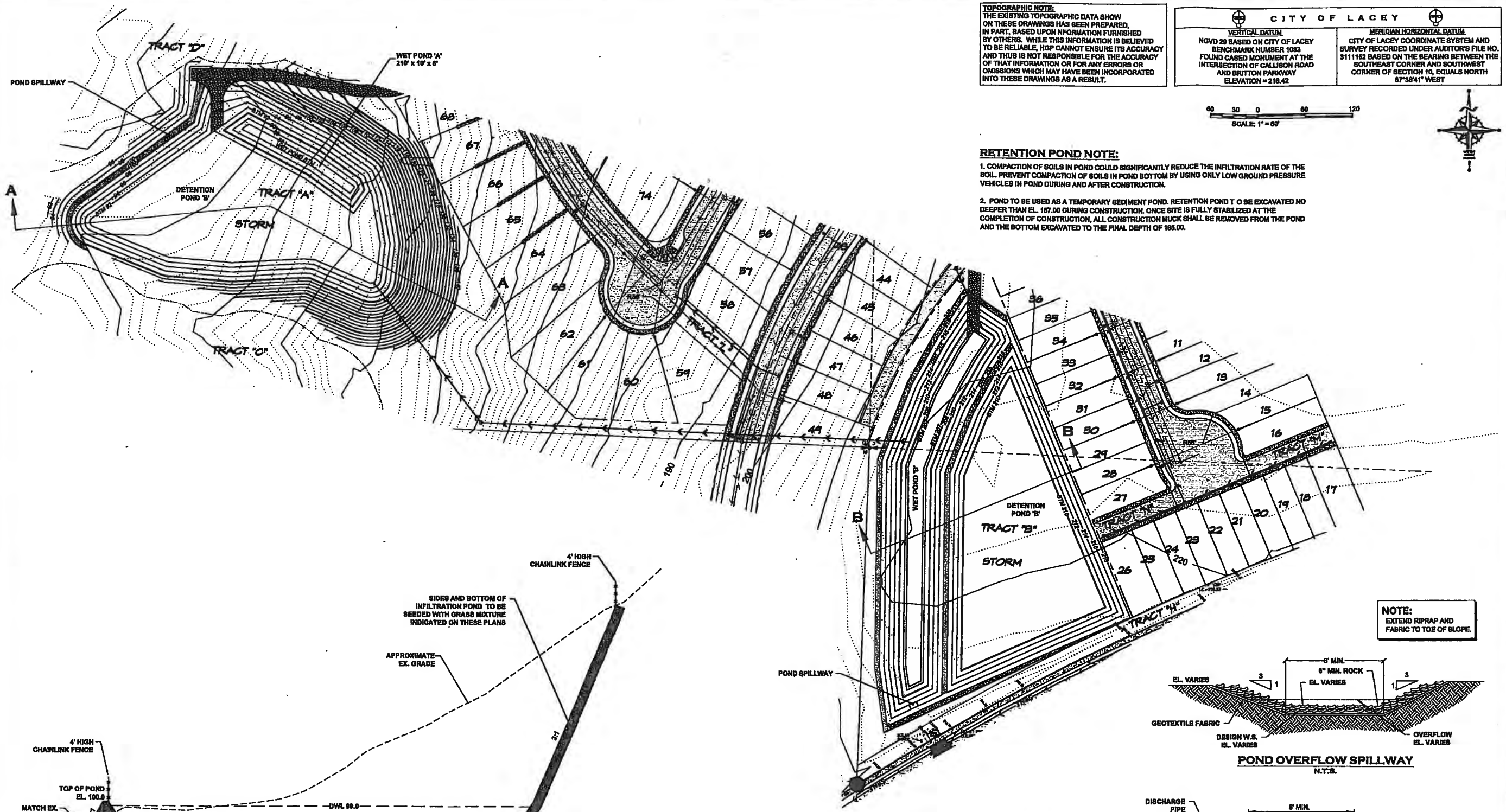
CITY OF LACEY

VERTICAL DATUM	MERIDIAN HORIZONTAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1093 FOUND CASED MONUMENT AT THE INTERSECTION OF CALLISON ROAD AND BRITTON PARKWAY ELEVATION = 216.42	CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111162 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°36'41" WEST

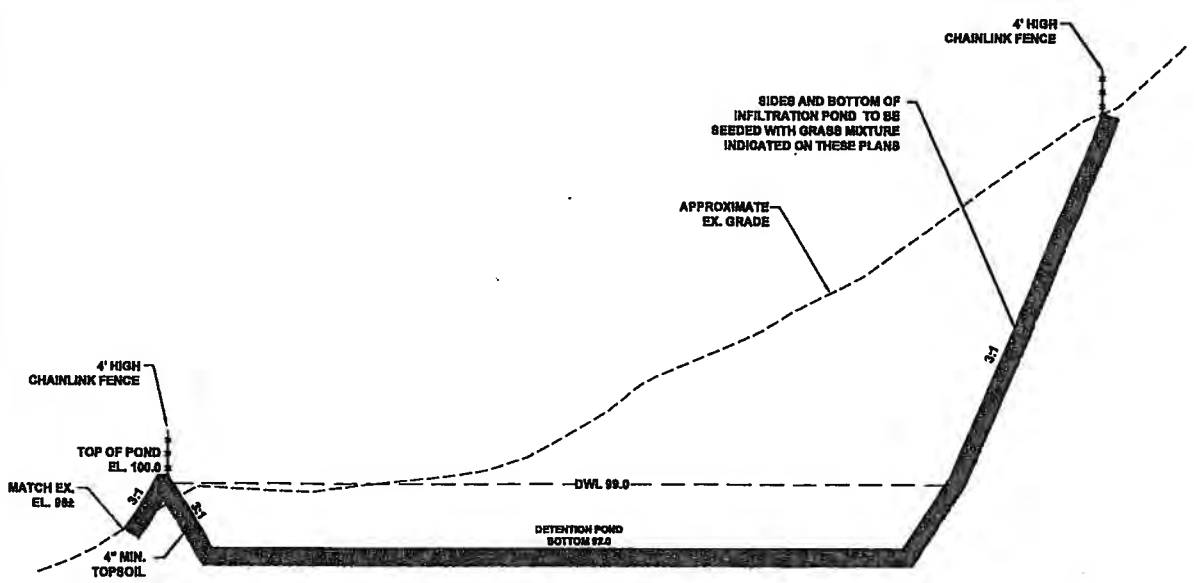
60 30 0 60 120
SCALE: 1" = 60'



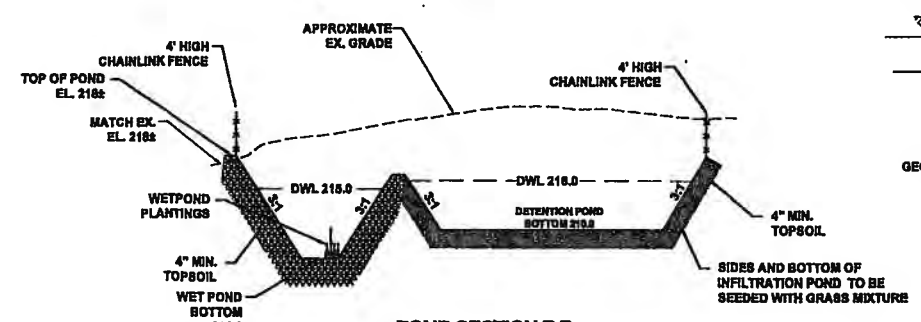
RETENTION POND NOTE:

1. COMPACTION OF SOILS IN POND COULD SIGNIFICANTLY REDUCE THE INFILTRATION RATE OF THE SOIL. PREVENT COMPACTION OF SOILS IN POND BOTTOM BY USING ONLY LOW GROUND PRESSURE VEHICLES IN POND DURING AND AFTER CONSTRUCTION.

2. POND TO BE USED AS A TEMPORARY SEDIMENT POND. RETENTION POND T O BE EXCAVATED NO DEEPER THAN EL. 187.00 DURING CONSTRUCTION. ONCE SITE IS FULLY STABILIZED AT THE COMPLETION OF CONSTRUCTION, ALL CONSTRUCTION MUCK SHALL BE REMOVED FROM THE POND AND THE BOTTOM EXCAVATED TO THE FINAL DEPTH OF 185.00.



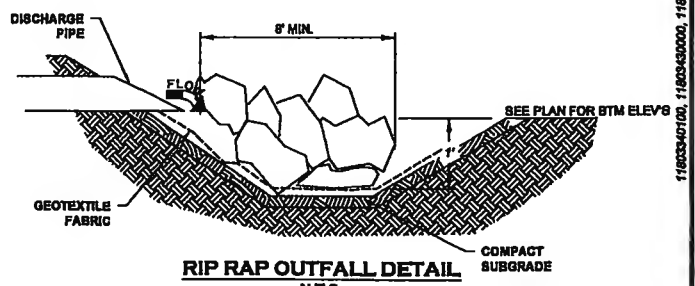
POND SECTION A-A
N.T.S.



POND SECTION B-B
N.T.S.

NOTE:
EXTEND RIPRAP AND FABRIC TO TOE OF SLOPE.

POND OVERFLOW SPILLWAY
N.T.S.



RIP RAP OUTFALL DETAIL
N.T.S.

RIP RAP NOTE:
Riprap shall conform with Section 9-13.1 of the Standard Specifications

Rip rap shall be a reasonably well graded assortment of rock with the Following gradation:

Maximum Stone Size..... 12-Inches
Median Stone Size 8-Inches
Minimum Stone Size 2-Inches

ARMOR POND A MIN. OF 6' IN EACH SIDE OF OUTFALL.

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DESIGNED BY: DS
DRAWN BY: MK
CHECKED BY: SDK
DATE: FEB 2013
SCALE: H 1" V

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hattonpantier.com

REVISIONS	DATE

GATEWAY DIVISION 1

PRELIMINARY PLAT

PRELIMINARY POND SECTIONS

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTHWEST HALF OF THE SOUTH EAST QUARTER OF SECTION 3
AND A PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M.

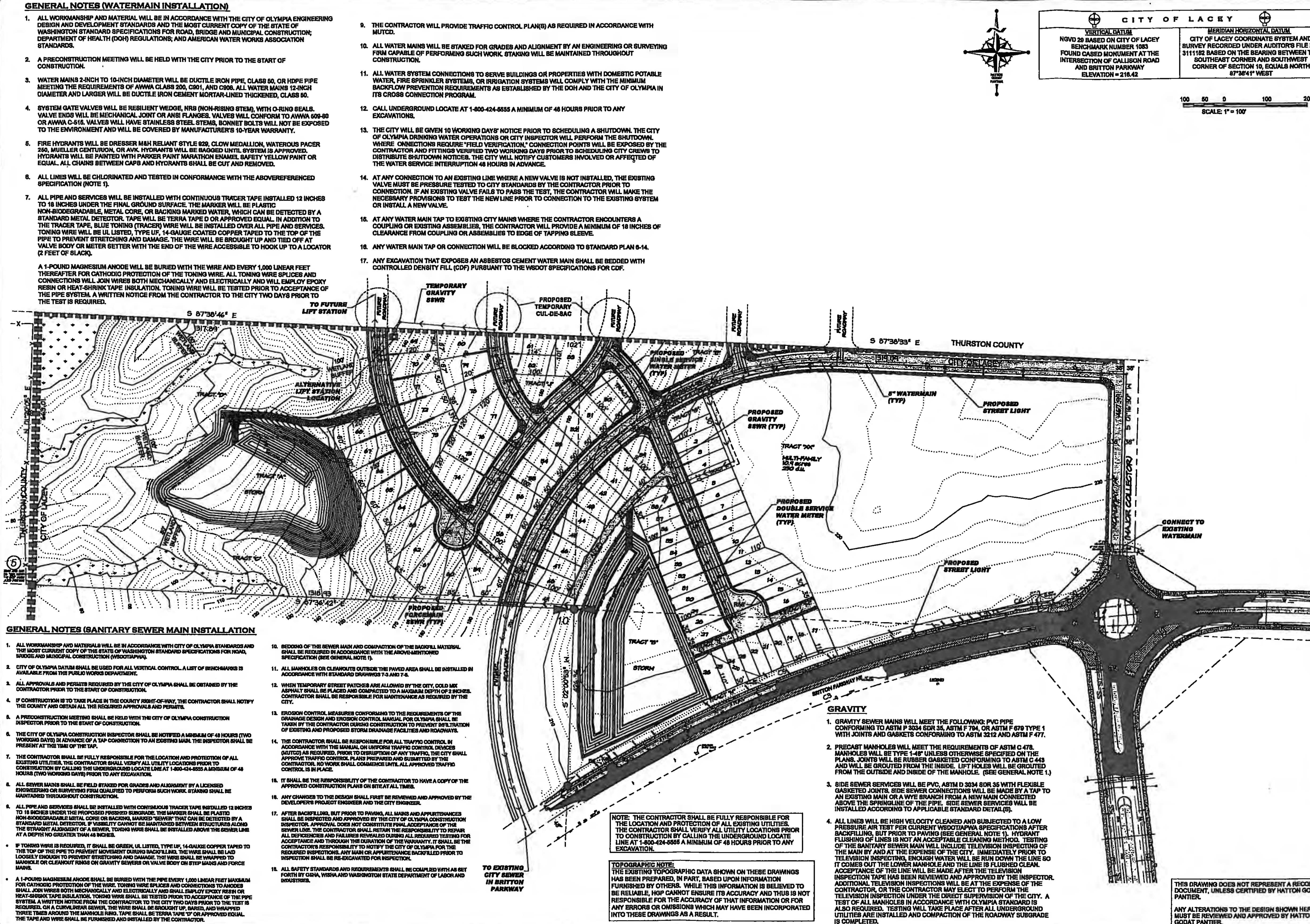
118033040100, 118034340000, 118101103000

AGENCY NO.
SHEET 4 OF 5
INDEX (12-052)12-052Preliminary Plat0
INDEX 12-052Annexation.dwg
JOB: 12-052

GENERAL NOTES (WATERMAIN INSTALLATION)

1. ALL WORKMANSHIP AND MATERIAL WILL BE IN ACCORDANCE WITH THE CITY OF OLYMPIA ENGINEERING DESIGN AND DEVELOPMENT STANDARDS AND THE MOST CURRENT COPY OF THE STATE OF WASHINGTON STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION; DEPARTMENT OF HEALTH (DOH) REGULATIONS; AND AMERICAN WATER WORKS ASSOCIATION STANDARDS.
2. A PRECONSTRUCTION MEETING WILL BE HELD WITH THE CITY PRIOR TO THE START OF CONSTRUCTION.
3. WATER MAINS 2-INCH TO 10-INCH DIAMETER WILL BE DUCTILE IRON PIPE, CLASS 50, OR HDPE PIPE MEETING THE REQUIREMENTS OF AWWA CLASS 200, C901, AND C906. ALL WATER MAINS 12-INCH DIAMETER AND LARGER WILL BE DUCTILE IRON CEMENT MORTAR-LINED THICKENED, CLASS 50.
4. SYSTEM GATE VALVES WILL BE RESILIENT WEDGE, NRS (NON-RISING STEM), WITH O-RING SEALS. VALVE ENDS WILL BE MECHANICAL JOINT OR ANSI FLANGES. VALVES WILL CONFORM TO AWWA 509-80 OR AWWA C-515. VALVES WILL HAVE STAINLESS STEEL STEMS, BONNET BOLTS WILL NOT BE EXPOSED TO THE ENVIRONMENT AND WILL BE COVERED BY MANUFACTURER'S 10-YEAR WARRANTY.
5. FIRE HYDRANTS WILL BE DRESSER M&H RELIANT STYLE 929, CLOW MEDALLION, WATEROUS PACER 250, MUELLER CENTURION, OR AVK. HYDRANTS WILL BE BAGGED UNTIL SYSTEM IS APPROVED. HYDRANTS WILL BE PAINTED WITH PARKER PAINT MARATHON ENAMEL SAFETY YELLOW PAINT OR EQUAL. ALL CHAINS BETWEEN CAPS AND HYDRANTS SHALL BE CUT AND REMOVED.
6. ALL LINES WILL BE CHLORINATED AND TESTED IN CONFORMANCE WITH THE ABOVEREFERENCED SPECIFICATION (NOTE 1).
7. ALL PIPE AND SERVICES WILL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12 INCHES TO 18 INCHES UNDER THE FINAL GROUND SURFACE. THE MARKER WILL BE PLASTIC NON-BIODEGRADABLE, METAL CORE, OR BACKING MARKED WATER, WHICH CAN BE DETECTED BY A STANDARD METAL DETECTOR. TAPE WILL BE TERRA TAPE D OR APPROVED EQUAL. IN ADDITION TO THE TRACER TAPE, BLUE TONING (TRACER) WIRE WILL BE INSTALLED OVER ALL PIPE AND SERVICES. TONING WIRE WILL BE UL LISTED, TYPE UF, 14-GAUGE COATED COPPER TAPED TO THE TOP OF THE PIPE TO PREVENT STRETCHING AND DAMAGE. THE WIRE WILL BE BROUGHT UP AND TIED OFF AT VALVE BODY OR METER SETTER WITH THE END OF THE WIRE ACCESSIBLE TO HOOK UP TO A LOCATOR (2 FEET OF SLACK).

   A 1-POUND MAGNESIUM ANODE WILL BE BURIED WITH THE WIRE AND EVERY 1,000 LINEAR FEET THEREAFTER FOR CATHODIC PROTECTION OF THE TONING WIRE. ALL TONING WIRE SPLICES AND CONNECTIONS WILL JOIN WIRES BOTH MECHANICALLY AND ELECTRICALLY AND WILL EMPLOY EPOXY RESIN OR HEAT-SHRINK TAPE INSULATION. TONING WIRE WILL BE TESTED PRIOR TO ACCEPTANCE OF THE PIPE SYSTEM. A WRITTEN NOTICE FROM THE CONTRACTOR TO THE CITY TWO DAYS PRIOR TO THE TEST IS REQUIRED.
9. THE CONTRACTOR WILL PROVIDE TRAFFIC CONTROL PLAN(S) AS REQUIRED IN ACCORDANCE WITH MUTCD.
10. ALL WATER MAINS WILL BE STAKED FOR GRADES AND ALIGNMENT BY AN ENGINEERING OR SURVEYING FIRM CAPABLE OF PERFORMING SUCH WORK. STAKING WILL BE MAINTAINED THROUGHOUT CONSTRUCTION.
11. ALL WATER SYSTEM CONNECTIONS TO SERVE BUILDINGS OR PROPERTIES WITH DOMESTIC POTABLE WATER, FIRE SPRINKLER SYSTEMS, OR IRRIGATION SYSTEMS WILL COMPLY WITH THE MINIMUM BACKFLOW PREVENTION REQUIREMENTS AS ESTABLISHED BY THE DOH AND THE CITY OF OLYMPIA IN ITS CROSS CONNECTION PROGRAM.
12. CALL UNDERGROUND LOCATE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATIONS.
13. THE CITY WILL BE GIVEN 10 WORKING DAYS' NOTICE PRIOR TO SCHEDULING A SHUTDOWN. THE CITY OF OLYMPIA DRINKING WATER OPERATIONS OR CITY INSPECTOR WILL PERFORM THE SHUTDOWN. WHERE CONNECTIONS REQUIRE "FIELD VERIFICATION," CONNECTION POINTS WILL BE EXPOSED BY THE CONTRACTOR AND FITTINGS VERIFIED TWO WORKING DAYS PRIOR TO SCHEDULING CITY CREWS TO DISTRIBUTE SHUTDOWN NOTICES. THE CITY WILL NOTIFY CUSTOMERS INVOLVED OR AFFECTED OF THE WATER SERVICE INTERRUPTION 48 HOURS IN ADVANCE.
14. AT ANY CONNECTION TO AN EXISTING LINE WHERE A NEW VALVE IS NOT INSTALLED, THE EXISTING VALVE MUST BE PRESSURE TESTED TO CITY STANDARDS BY THE CONTRACTOR PRIOR TO CONNECTION. IF AN EXISTING VALVE FAILS TO PASS THE TEST, THE CONTRACTOR WILL MAKE THE NECESSARY PROVISIONS TO TEST THE NEW LINE PRIOR TO CONNECTION TO THE EXISTING SYSTEM OR INSTALL A NEW VALVE.
15. AT ANY WATER MAIN TAP TO EXISTING CITY MAINS WHERE THE CONTRACTOR ENCOUNTERS A COUPLING OR EXISTING ASSEMBLIES, THE CONTRACTOR WILL PROVIDE A MINIMUM OF 18 INCHES OF CLEARANCE FROM COUPLING OR ASSEMBLIES TO EDGE OF TAPPING SLEEVE.
16. ANY WATER MAIN TAP OR CONNECTION WILL BE BLOCKED ACCORDING TO STANDARD PLAN 6-14.
17. ANY EXCAVATION THAT EXPOSES AN ASBESTOS CEMENT WATER MAIN SHALL BE BEDDED WITH CONTROLLED DENSITY FILL (CDF) PURSUANT TO THE WSDOT SPECIFICATIONS FOR CDF.



GENERAL NOTES (SANITARY SEWER MAIN INSTALLATION

1. ALL WORKMANSHIP AND MATERIALS WILL BE IN ACCORDANCE WITH CITY OF OLYMPIA STANDARDS AND THE MOST CURRENT COPY OF THE STATE OF WASHINGTON STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION (WSDOT/APWA).
2. CITY OF OLYMPIA DATUM SHALL BE USED FOR ALL VERTICAL CONTROL. A LIST OF BENCHMARKS IS AVAILABLE FROM THE PUBLIC WORKS DEPARTMENT.
3. ALL APPROVALS AND PERMITS REQUIRED BY THE CITY OF OLYMPIA SHALL BE OBTAINED BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.
4. IF CONSTRUCTION IS TO TAKE PLACE IN THE COUNTY RIGHT-OF-WAY, THE CONTRACTOR SHALL NOTIFY THE COUNTY AND OBTAIN ALL THE REQUIRED APPROVALS AND PERMITS.
5. A PRECONSTRUCTION MEETING SHALL BE HELD WITH THE CITY OF OLYMPIA CONSTRUCTION INSPECTOR PRIOR TO THE START OF CONSTRUCTION.
6. THE CITY OF OLYMPIA CONSTRUCTION INSPECTOR SHALL BE NOTIFIED A MINIMUM OF 48 HOURS (TWO WORKING DAYS) IN ADVANCE OF A TAP CONNECTION TO AN EXISTING MAIN. THE INSPECTOR SHALL BE PRESENT AT THE TIME OF THE TAP.
7. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS (TWO WORKING DAYS) PRIOR TO ANY EXCAVATION.
8. ALL SEWER MAINS SHALL BE FIELD STAKED FOR GRADES AND ALIGNMENT BY A LICENSED ENGINEERING OR SURVEYING FIRM QUALIFIED TO PERFORM SUCH WORK. STAKING SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION.
9. ALL PIPE AND SERVICES SHALL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12 INCHES TO 18 INCHES UNDER THE PROPOSED FINISHED SUBGRADE. THE MARKER SHALL BE PLASTIC NON-BIODEGRADABLE METAL CORE OR BACKING, MARKED "SEWER" THAT CAN BE DETECTED BY A STANDARD METAL DETECTOR. IF VISIBILITY CANNOT BE MAINTAINED BETWEEN STRUCTURES ALONG THE STRAIGHT ALIGNMENT OF A SEWER, TONING WIRE SHALL BE INSTALLED ABOVE THE SEWER LINE AT A DEPTH NO GREATER THAN 48 INCHES.

- IF TONING WIRE IS REQUIRED, IT SHALL BE GREEN, UL LISTED, TYPE UF, 14-GAUGE COPPER TAPED TO THE TOP OF THE PIPE TO PREVENT MOVEMENT DURING BACKFILLING. THE WIRE SHALL BE LAID LOOSELY ENOUGH TO PREVENT STRETCHING AND DAMAGE. THE WIRE SHALL BE WRAPPED TO MANHOLE OR CLEANOUT RINGS ON GRAVITY SEWERS OR VALVE BODY ON STEP MAINS AND FORCE MAINS.
- A 1-POUND MAGNESIUM ANODE SHALL BE BURIED WITH THE PIPE EVERY 1,000 LINEAR FEET MAXIMUM FOR CATHODIC PROTECTION OF THE WIRE. TONING WIRE SPLICES AND CONNECTIONS TO ANODES SHALL JOIN WIRES BOTH MECHANICALLY AND ELECTRICALLY AND SHALL EMPLOY EPOXY RESIN OR HEAT-SHRINK TAPE INSULATION. TONING WIRE SHALL BE TESTED PRIOR TO ACCEPTANCE OF THE PIPE SYSTEM. A WRITTEN NOTICE FROM THE CONTRACTOR TO THE CITY TWO DAYS PRIOR TO THE TEST IS REQUIRED. ON A CURVILINEAR SEWER, THE WIRE SHALL BE BROUGHT UP, BARED, AND WRAPPED THREE TIMES AROUND THE MANHOLE RING. TAPE SHALL BE TERRA TAPE "D" OR APPROVED EQUAL. THE TAPE AND WIRE SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.

10. BEDDING OF THE SEWER MAIN AND COMPACTION OF THE BACKFILL MATERIAL SHALL BE REQUIRED IN ACCORDANCE WITH THE ABOVE-MENTIONED SPECIFICATION (SEE GENERAL NOTE 1).
11. ALL MANHOLES OR CLEANOUTS OUTSIDE THE PAVED AREA SHALL BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWINGS 7-3 AND 7-5.
12. WHEN TEMPORARY STREET PATCHES ARE ALLOWED BY THE CITY, COLD MIX ASPHALT SHALL BE PLACED AND COMPACTED TO A MAXIMUM DEPTH OF 2 INCHES. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE AS REQUIRED BY THE CITY.
13. EROSION CONTROL MEASURES CONFORMING TO THE REQUIREMENTS OF THE DRAINAGE DESIGN AND EROSION CONTROL MANUAL FOR OLYMPIA SHALL BE TAKEN BY THE CONTRACTOR DURING CONSTRUCTION TO PREVENT INFILTRATION OF EXISTING AND PROPOSED STORM DRAINAGE FACILITIES AND ROADWAYS.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AS REQUIRED. PRIOR TO DISRUPTION OF ANY TRAFFIC, THE CITY SHALL APPROVE TRAFFIC CONTROL PLANS PREPARED AND SUBMITTED BY THE CONTRACTOR. NO WORK SHALL COMMENCE UNTIL ALL APPROVED TRAFFIC CONTROL IS IN PLACE.
15. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE A COPY OF THE APPROVED CONSTRUCTION PLANS ON SITE AT ALL TIMES.
16. ANY CHANGES TO THE DESIGN SHALL FIRST BE REVIEWED AND APPROVED BY THE DEVELOPER'S PROJECT ENGINEER AND THE CITY ENGINEER.
17. AFTER BACKFILLING, BUT PRIOR TO PAVING, ALL MAINS AND APPURTENANCES SHALL BE INSPECTED AND APPROVED BY THE CITY OF OLYMPIA CONSTRUCTION INSPECTOR. APPROVAL DOES NOT CONSTITUTE FINAL ACCEPTANCE OF THE SEWER LINE. THE CONTRACTOR SHALL RETAIN THE RESPONSIBILITY TO REPAIR ALL DEFICIENCIES AND FAILURES REVEALED DURING ALL REQUIRED TESTING FOR ACCEPTANCE AND THROUGH THE DURATION OF THE WARRANTY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE CITY OF OLYMPIA FOR THE REQUIRED INSPECTIONS. ANY MAIN OR APPURTENANCE BACKFILLED PRIOR TO INSPECTION SHALL BE RE-EXCAVATED FOR INSPECTION.
18. ALL SAFETY STANDARDS AND REQUIREMENTS SHALL BE COMPLIED WITH AS SET FORTH BY OSHA, WISHA AND WASHINGTON STATE DEPARTMENT OF LABOR AND INDUSTRIES.

NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

TOPOGRAPHIC NOTE:
THE EXISTING TOPOGRAPHIC DATA SHOWN ON THESE DRAWINGS HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, HGP CANNOT ENSURE ITS ACCURACY AND THUS IS NOT RESPONSIBLE FOR THE ACCURACY OF THAT INFORMATION OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

GRAVITY

1. GRAVITY SEWER MAINS WILL MEET THE FOLLOWING: PVC PIPE CONFORMING TO ASTM P 3034 SDR 35, ASTM F 794, OR ASTM F 679 TYPE 1 WITH JOINTS AND GASKETS CONFORMING TO ASTM 3212 AND ASTM F 477.
2. PRECAST MANHOLES WILL MEET THE REQUIREMENTS OF ASTM C 478. MANHOLES WILL BE TYPE 1-48" UNLESS OTHERWISE SPECIFIED ON THE PLANS. JOINTS WILL BE RUBBER GASKETED CONFORMING TO ASTM C 443 AND WILL BE GROUTED FROM THE INSIDE. LIFT HOLES WILL BE GROUTED FROM THE OUTSIDE AND INSIDE OF THE MANHOLE. (SEE GENERAL NOTE 1.)
3. SIDE SEWER SERVICES WILL BE PVC, ASTM D 3034 SDR 35 WITH FLEXIBLE GASKETED JOINTS. SIDE SEWER CONNECTIONS WILL BE MADE BY A TAP TO AN EXISTING MAIN OR A WYE BRANCH FROM A NEW MAIN CONNECTED ABOVE THE SPRINGLINE OF THE PIPE. SIDE SEWER SERVICES WILL BE INSTALLED ACCORDING TO APPLICABLE STANDARD DETAIL(S).
4. ALL LINES WILL BE HIGH VELOCITY CLEANED AND SUBJECTED TO A LOW PRESSURE AIR TEST PER CURRENT WSDOT/APWA SPECIFICATIONS AFTER BACKFILLING, BUT PRIOR TO PAVING (SEE GENERAL NOTE 1). HYDRANT FLUSHING OF LINES IS NOT AN ACCEPTABLE CLEANING METHOD. TESTING OF THE SANITARY SEWER MAIN WILL INCLUDE TELEVISION INSPECTING OF THE MAIN BY AND AT THE EXPENSE OF THE CITY. IMMEDIATELY PRIOR TO TELEVISION INSPECTING, ENOUGH WATER WILL BE RUN DOWN THE LINE SO IT COMES OUT THE LOWER MANHOLE AND THE LINE IS FLUSHED CLEAN. ACCEPTANCE OF THE LINE WILL BE MADE AFTER THE TELEVISION INSPECTION TAPE HAS BEEN REVIEWED AND APPROVED BY THE INSPECTOR. ADDITIONAL TELEVISION INSPECTIONS WILL BE AT THE EXPENSE OF THE CONTRACTOR, OR THE CONTRACTOR MAY ELECT TO PERFORM THE TELEVISION INSPECTION UNDER THE DIRECT SUPERVISION OF THE CITY. A TEST OF ALL MANHOLES IN ACCORDANCE WITH OLYMPIA STANDARD IS ALSO REQUIRED. TESTING WILL TAKE PLACE AFTER ALL UNDERGROUND UTILITIES ARE INSTALLED AND COMPACTION OF THE ROADWAY SUBGRADE IS COMPLETED.

THIS DRAWING DOES NOT REPRESENT A RECORD DOCUMENT, UNLESS CERTIFIED BY HATTON GODAT PANTIER.

ANY ALTERATIONS TO THE DESIGN SHOWN HEREON MUST BE REVIEWED AND APPROVED BY HATTON GODAT PANTIER.

11803340100, 11803430000, 11810103000

GATEWAY DIVISION 1

PRELIMINARY PLAT

PRELIMINARY UTILITY PLAN

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTHWEST HALF OF THE SOUTH EAST QUARTER OF SECTION 3 AND A PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M.

REVISIONS: DATE:

HATTON GODAT PANTIER
ENGINEERS AND SURVEYORS
3910 MARTIN WAY E, SUITE B
OLYMPIA, WA 98506
TEL: 360.943.1599 FAX: 360.357.6299
hattonpantier.com

DESIGNED BY: DS
DRAWN BY: MM
CHECKED BY: SDH
DATE: FEB 2013
SCALE: H: ___ V: ___

AGENCY NO.
SHEET: 5 OF 5
(12-000/12-052/Preliminary Plat)
INDEX: 12-052pre-utils.dwg
JOB: 12-052

CITY OF LACEY
Community Development Department
420 College Street SE
Lacey, WA 98503
(360) 491-5642

ORIGINAL

RECEIVED
FEB 28 2013
BY

OFFICIAL USE ONLY

Case Number: 12-239
Date Received: _____
By: _____

Related Case Numbers:
_____
_____

RCW 197-11-960
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 an EIS. Answer the 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 impacts.

USE OF CHECKLIST FOR NONPROJECT PROPOSALS:

Complete this checklist for nonproject proposals, even though questions may be answered "does not apply." IN ADDITION, complete the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D).

For nonproject 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.

EXHIBIT
6

A. BACKGROUND (to be completed by applicant)

1. Name of proposed project, if applicable:

   Gateway Division 1

2. Name of applicant:

   Gateway 850, LLC

3. Address and phone number of applicant and contact person:

   Kevin O'Brien, 15 Lake Bellevue Drive, Bellevue, WA 98005, (425)869-1300

4. Date checklist prepared:

   February 26, 2013

5. Agency requesting checklist:

   City of Lacey

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

   Construct plat improvements summer 2014. Single family homes will be constructed between 2014 and 2018. The multifamily parcel will develop further as the market dictates but is expected to be fully occupied by 2018 as well.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

   Future divisions of Gateway will occur on the property to the north of this project. Those future divisions will extend public roads and utilities constructed with Division 1. That property is located in Thurston County, Lacey Urban Growth Area. Water service in this area is not available at this time.

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

   Geotechnical report, wetland study, traffic impact analysis, urban forester report, and reconnaissance level review of the property for the MAzama Pocket Gopher.

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

   None known

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

    The project will require a threshold determination under the State Environmental Policy Act, Preliminary and Final Plat Approval through the Hearing Examiner and Council Action within the City of Lacey, grading and utility permits from the City of Lacey, an NPDES General Permit for Construction from the State of Washington Department of Ecology, and future building permits also from the City of Lacey.

11. Give a 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.

    The proposed project is a subdivision of approximately 43 acres into 83 single family lots and one 11.4 acre multifamily site. Nearly 17 acres of the project will be set aside as open space containing wetlands, wetland buffers, stormwater tracts, and other green spaces. The single family homes will be a mixture of townhomes, smaller single family lots, and larger single family lots.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, 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 is located at the northwest corner of the intersection of Britton Parkway NE and Gateway Boulevard in portions of Sections 3 and 10, Township 18 North, Range 1 West, W.M., within the City of Lacey. The attached site plan shows the extents of the proposed project as well as a Vicinity Map for the project location.

B. ENVIRONMENTAL ELEMENTS (to be completed by applicant)

1. EARTH

a. General description of the site (check one): ☐ flat ☐ rolling ☒ hilly ☒ steep slopes ☐ mountainous ☐ other (specify):

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

Most of the site slopes at 5%-10%. The steepest slope is about 25%.

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 soils, specify them and note any prime farmland.

The majority of the site is a mixture of Alderwood gravelly sandy loam and Everett gravelly sand. Soils are much finer textured in and around the wetland areas containing silts and some clay. No soils are agricultural types.

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

No

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

Some 100,000 cubic yards of material is expected to be moved onsite to create building pads for future homesites. This total volume is expected to split evenly between excavation and embankment. No significant volume of either export or imported material is anticipated for this project.

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

Disturbed areas which will be voided of vegetation and top soil would be subjected to precipitation. As a result, erosion of the exposed soils would be expected during construction of the plat improvements as well as individual homesites.

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

Approximately 36% of the total site will be covered with impervious surfaces once all infrastructure and building construction is complete, including full development of the multifamily acreage.

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

During construction, Best Management Practices will be employed in accordance with both City of Lacey Development Standards and the NPDES Permit for Construction. These BMPs may include stabilized construction entries, straw mulch stabilization, erosion control fencing, temporary sediment ponds, and other effective means. Upon completion of construction, all disturbed soils will be protected against erosion by being covered with vegetation or other stabilization techniques.

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.

During construction, dust will be generated by equipment that disturbs soils during the drier summer months. Construction equipment will also generate some exhaust as will automobiles used on the completed public streets after the project is finished.

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

None known

c. Proposed measures to reduce or control emissions or other impacts, if any:

Dust control will be employed during construction in accordance with applicable City standards as well as per the NPDES permit required for this project.

3. WATER

a. Surface water:

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, wetland)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

There are two wetlands located on the project property that drain eventually into Woodland Creek.

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

Yes, some grading and filling for the stormwater ponds, public street and utility construction, and single family home construction will all occur within 200 feet of the wetlands onsite. None of this construction will occur within 1,000 feet of Woodland Creek.

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.

None

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

No

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

No

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

b. Ground water:

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

No

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) are expected to serve.

None

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 water? If so describe.

Runoff will be generated on this project from precipitation falling on impervious surfaces such as asphalt, concrete, and roof tops. The runoff will flow from east to west down the slope of the property and ultimately reach the wetlands located at the westerly edge of the property. The project will intercept this runoff in one of three different stormwater management facilities that will remove pollutants from the runoff, if any, and either detain and release the runoff at pre-development rates or fully infiltrate runoff into the ground.

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

Stormwater runoff in urban settings often contains sediments and petroleum products that if left unmanaged could potentially reach ground or surface waters.

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

This project will construct stormwater management systems in accordance with the City of Lacey Stormwater Manual that will mitigate both water quality and runoff quantity impacts from stormwater runoff. The project proposes an onsite detention system with pre-treatment for the multifamily project site. This facility will be designed and detailed during development of the multifamily site. A second stormwater retention pond with pre-treatment is proposed in the middle of the project site that will collect runoff from portions of the upland area. A third stormwater treatment and detention pond will collect, treat, and slowly release stormwater runoff from the balance of the project.

4. PLANTS

a. Check types of vegetation found on the site:

☒ Deciduous trees: ***alder, maple***, aspen, other
☒ Evergreen tree: ***fir, cedar***, pine, other
☒ Shrubs
☐ Grasses
☐ Pasture
☐ Crops or grains
☒ Wet soil plants: ***cattail, buttercup, bulrush, skunk cabbage***, other
☐ Water plants: water lily, eelgrass, milfoil, other
☐ Other types of vegetation (list):

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

Due to the necessary grading required for this project, virtually all of the vegetation in the developed portions of the site will be removed or significantly altered.

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

None known

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

Wherever possible, native vegetation including trees will be retained in accordance with the City of Lacey Tree Protection Ordiance. Additionally, the City of Lacey Subdivision Code requires supplemental plantings and landscaping including landscaping of stormwater ponds and street trees. Undisturbed buffer areas around the onsite wetlands will retain all vegetation over much of the project site.

5. ANIMALS

a. Check 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 (list):
Mammals: ☒ deer ☐ bear ☐ elk ☐ beaver ☐ other (list):
Fish: ☐ salmon ☐ trout ☐ herring ☐ shellfish ☐ other (list):

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

None known

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

No

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

Protect native vegetation in the wetlands and associated buffers.

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.

The project will utilize electricity, natural gas in the structures. In addition, electricity will be used to provide street lights and operate a sewage lift station and irrigation systems within the public streets and selected open space areas.

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

No

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:

All structures will be constructed to the current Washington State Building Code including Energy Codes associated therewith.

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

1) Describe special emergency services that might be required:

None

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

None proposed

b. Noise

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

None

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 hours noise would come from the site.

Temporary construction noise will be associated with development of the streets and infrastructure as well as building construction. The completed project will generate typical residential area noise including traffic, children at play, and other neighborhood type noise.

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

None proposed

8. LAND AND SHORELINE USE

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

The project site is vacant as are the surrounding properties. The property to the west is owned by the City of Lacey and is proposed for further development as a City Park. The property to the south has been granted preliminary approval as a single family subdivision and also contains a regional sewage lift station.

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

No

c. Describe any structures on the site.

None

d. Will any structures be demolished? If so what?

No

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

High Density, 6-20 Dwelling Units per Acre

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

Residential

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 two wetlands on the property.

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

An estimated 900 persons will reside in the proposed 333 dwelling units contained in the project. No permanent workers are expected in the completed project although it may be expected that up to 100 jobs will be created onsite during construction of the various improvements and structures.

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

None

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

None proposed

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

The project will comply with all applicable comprehensive plans, zoning codes, and other applicable development guidelines and ordinances.

9. HOUSING

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

333 middle income housing units are proposed in this project.

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

No units will be eliminated.

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

None proposed

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.

Details for future structure development are not known at this time. However, it is expected that single family homes will not exceed 35 feet in total height. Exterior materials will be typical siding for single family homes. The multifamily project will undergo more detailed review at the time a project is proposed on the 11.43 acre parcel in this subdivision. Those structures are expected to be three stories or approximately 50 feet to the ridge line. Exterior materials are unknown at this time.

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

Existing views in this vicinity for the most part will be only experienced by drivers in vehicles traversing along Britton Parkway NE. Those views will change forested land to a developed residential neighborhood. No obstruction of existing views is expected to occur as a result of this project.

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

Retain native vegetation wherever practical; use of landscaping and street-scaping in accordance with City code; construction of homes and future multifamily buildings in an aesthetically pleasing and unobtrusive way.

11. LIGHT AND GLARE

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

The project will generate light from porch and garage lighting at night associated with individual home construction. Street lights will also be installed along public roads. The multifamily site will also provide lighting for their parking lot. All of this lighting will occur after dark. No source of glare is anticipated with this project.

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

No

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

None known

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

All lighting will be constructed in accordance with City of Lacey standards including use of cut-off lenses on street and parking lot lighting.

12. RECREATION

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

City of Lacey Cuio Park is located on Carpenter Road a short distance away via Britton Parkway and just west and north of this project.

SS- Cuoio Park is undeveloped and currently has no recreational opportunities.

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

No

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

The project will have access to passive recreational opportunities in the open spaces contained within the project along with a small pocket park for children living within the project.

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.

None known

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

None known

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

None proposed

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 site is served by Britton Parkway NE. Britton Parkway NE carries traffic to one of three main north-south arterials: Marvin Road, Carpenter Road, and Sleater-Kinney Road.

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

Yes

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

Each townhome site will have a single car garage as well as room for another parking space in the driveway. Other single family homes will have two car garages and a double wide driveway to provide parking for the residents. The multifamily parcel will receive additional review once a specific project is proposed for that 11.43 acres. Parking in compliance with applicable City code will be provided at that time.

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

The project will construct several new public roads throughout the development as well as two short private roads that will provide access to a few of the townhome lots.

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

No

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

Some 2,350 vehicle trips per day are anticipated as a result of full buildout of both the single family lots within this project as well as the future development of the 11.43 acre multifamily project. Of these trips, it is estimated that about 220 will occur during the afternoon weekday peak hour of travel.

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

Specific mitigation measures for transportation impacts, if any, have yet to be determined. However, at a minimum the project will pay mitigation fees in accordance with City of Lacey Ordinance that establishes fees for City projects that are paid on a pro rata basis by proposals that add traffic to the various City projects.

15. PUBLIC SERVICES

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

The project will require police and fire protection and will contain school age children as well. Health care including emergency medical will also be needed.

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

All accesses to the site will be constructed so as to be capable of supporting emergency services. Increase general tax revenue from developed properties will provide funding for those services as well. Impacts to public schools will be mitigated in a voluntary agreement to be negotiated with North Thurston Public Schools.

16. UTILITIES

a. Check utilities currently available at the site: ☒ electricity ☒ natural gas ☒ water ☒ refuse service ☒ telephone ☒ sanitary sewer ☐ septic system ☒ other (list): **Cable**

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.

The utilities listed above are located in Britton Parkway NE adjacent to the site. The project will require extension of those services by the purveyors listed below.

Electricity and natural gas: Puget Sound Energy
Water and sewer service: City of Lacey
Refuse service: Waste Management
Telephone: Century Link
Cable: Comcast

C. SIGNATURE

I swear, under penalty of perjury, 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: _____

Steven D. Hatton
(Print Name)

Date submitted: February 26, 2013

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FEB 28 2013
BY 12-239

SUF

SOUND URBAN FORESTRY, LLC
Appraisals, Planning, Urban Landscape Design and Management

Gateway Division 1
Case #12-239
Lacey, WA

Preliminary Tree Protection Professional Report

Prepared for: Gateway 850
C/o Kevin O'Brien
15 Lake Bellevue Drive
Bellevue, WA 89005

Samra Seymour
City of Lacey, Associate Planner

Prepared by: Kevin M. McFarland, SUF
City of Lacey, Tree Protection Professional

Date: 2/19/13

Introduction

Upon the request of the City and the applicant, I have conducted a site visit of the proposed Gateway residential development within the City of Lacey. The purpose of the visit was to gather preliminary information on the existing trees and associated vegetation within the parcels and determine the potential for retention in order to fulfill the City's Municipal Code Chapter 14.32 Tree and Vegetation Protection and Preservation.

EXHIBIT
7

I. Site Description

The evaluated site consists of 3 tax parcels: #118033401, 11803430000 and 11810103000 for a total of 42.68 acres. The area is currently undeveloped and forested with a mixture of vegetation types.

II. Trees and Associated Vegetation

As mentioned, the site is a mixture of different vegetation types which I have divided into 3 groups: Types I, II and III (please reference Appendix 1). They are described as follows:

Type I:

The dominant tree species is Douglas fir with diameters ranging 10-24" and averaging 16". The trees are in overall good condition with the exception of a few identified Laminated Root Rot (LRR) pockets. Bigleaf maples are also found within this type with diameters ranging 2-21", in good condition. Understory vegetation mostly consists of beaked hazelnut and salal.

Type II.

Douglas fir is the dominant tree species with diameters ranging 4-43" and averaging 20". The firs are larger within this type due to their spacing and the more open environment. Western red cedar with diameters ranging 2-28" are found at the western edge of the area, before the site drops down to vegetation Type III. Bigleaf maples measuring 10-28 are also present. All of the trees are in overall good condition. Understory vegetation includes beaked hazelnut, salal, tall mahonia and oceanspray.

Type III.

This type is more typical of wetter soils and is dominated by bigleaf maples measuring 2-60" and averaging 24". They are in overall good condition. Western hemlock ranging 2-22" in fair condition, western red cedar ranging 2-36" in good condition, Douglas fir ranging 6-20" in fair condition and red alder ranging 4-16 in good condition are also present. Understory vegetation includes low mahonia, pacific yew, pacific dogwood, sword fern, beaked hazelnut and salmonberry.

Historic Trees

No trees were identified within the parcel that would be considered historic.

Specimen Trees

I did not identify any trees within the site that could potentially be considered a specimen tree.

Off-Site Trees

There is the potential of impact to off-site trees along the northern perimeter of the site. Considering the predominant wind direction and sudden exposure, wind throw is possible.

III. Potential for Retention

Overall, the entire site is appropriate for tree retention. However, due to the close proximity of the Douglas fir to each other within Type 1, this area would not be the most favorable. The trees are very co-dependent upon each other and would not be wind firm if suddenly exposed. Types II and III are ideal and offer a diversity of species.

IV. Tree Tract

As stated in the LMC, this proposed land development is required to designate a tree tract or tracts that cover 5% of the total site. It is also stated that this requirement may be met within an open space area. This project will fulfill this requirement through the wetland buffers within the western portion of the site.

Required 5% Tree Tract (.05 x 42.68 acres) = 2.1 acres

The opportunity to retain trees within Tract "E", along the northern perimeter has been discussed with the applicant and will be decided once the area is staked and the grading impacts are identified.

V. Tree Protection

Since the trees that are to be retained are within critical area buffers and are located outside of the majority of the construction activities, protection measures will be minimal. The silt fencing that will be required for the critical areas protection will likely be sufficient. If trees within Tract "E" are to be retained, the following guidelines should be taken into account. Following tree removal or logging, tree protection fencing should be installed according to the determined critical root zone of the retained tree(s).

Critical Root Zones:
The trees to be retained within the site will be drawn to scale and located on the site, grading and erosion control plans. A fence detail will be presented within construction notes; site plan, grading and erosion control plans. If a tree is identified for retention and root pruning is approved, then the following should apply.

Specifications for Root Pruning

- SUF shall review removal of roots greater than 4 inches in diameter. The recommended review will insure that the stability and health of the tree is assessed.
- Preserve the root bark ridge (similar in structure and function to branch bark ridge). Directional Root Pruning is the recommended technique and should be used during hand excavation around tree roots. With Directional Root Pruning, objectionable and severely injured roots are properly cut to a lateral root that is growing downward or in a favorable direction.
- All roots requiring pruning or removal shall be cut cleanly with sharp hand tools. It is recommended that hand pruners, loppers and/ or an appropriate handsaw be utilized for appropriate pruning. No wound dressings shall be used.

VI. Schedule of Tree Protection Tasks

The following recommendations will aid staff, applicant, contractors and the Lacey Tree Protection Professional in achieving the intended goal of tree retention during construction.

1. Provide Lacey Tree Protection Professional (Sound Urban Forestry) a current proposed site plan with existing elevations and grading.
2. Sound Urban Forestry will then field mark trees for potential retention.
3. The applicant will either survey individual trees or areas that contain potential save trees to enable Sound Urban Forestry to further evaluate for project incorporation.
4. The final tree protection plan can be developed with maintenance and retention recommendations.
5. Following site plan approval, install tree protection fencing around all individual trees and groups of trees to be saved as per Sound Urban Forestry recommendations. Fencing should be installed prior to clearing and grading.
6. Contact Sound Urban Forestry to schedule a pre-construction meeting prior to site work.
7. Complete site clearing, grading, demolition, and construction.
8. Contact Sound Urban Forestry if unplanned or unforeseen site development work potentially impacts trees before damage occurs. Maintenance options can then be determined as per the situation.
9. After construction is complete Sound Urban Forestry will be contacted to evaluate protected trees for damage or potential hazards.
10. During the 1st year, following site development, annual hazard tree evaluation should be conducted to determine effects on protected trees (This would be contracted by the Gateway Division 1 homeowners association.

X. Pruning

If any of the retained trees within this development should require pruning for clearance or risk issues, applications should conform to ANSI 300 Standard for Proper Pruning. All pruning should be conducted by an ISA Certified Arborist.

Crown cleaning, or cleaning out, is the removal of dead, dying, diseased, crowded, weakly attached, low-vigor branches, and watersprouts from a tree's crown. Do not remove more than 1/3 of the canopy within a growing season.

Crown raising is described as removing the lower branches of a tree in order to provide clearance for vehicles and pedestrians. Furthermore, visibility is a consideration for safety as well. Do not remove more than 1/3 of the canopy within a growing season.

Branches that are damaged due to machinery should be correctly pruned. When removing a live branch, pruning cuts should be made just outside of the branch bark ridge and collar. Pruning cuts should be made to a lateral branch. Do not leave stubs or broken branches.

XI. Monitoring

Site clearing should be monitored by a Sound Urban Forestry representative to insure that tree felling, log extraction, clearing and other protection activities are within standards and expectations.

Hazard tree inspections should be conducted after completed construction for the retained trees and protection areas. Furthermore, annual inspections and inspections after major storm events should be conducted by a certified arborist or professional forester.

Professionally submitted,

Kevin M. McFarland

Kevin M. McFarland, SUF
ISA Certified Arborist #373, ISA Certified Tree Risk Assessor #862

Appendix 1. Vegetation Types

Case #12-239

Altmann Oliver Associates, LLC

PO Box 578 Carnation, WA 98014 Office (425) 333-4535 Fax (425) 333-4509

AOA

Environmental Planning & Landscape Architecture

RECEIVED

FEB 28 2013

BY 12.239

November 2, 2012

AOA-4245

Craig Sears
Gateway 850 LLC
15 Lake Bellevue Drive, Suite 102
Bellevue, WA 98005

SUBJECT: **Wetland and Stream Delineation for Lacey, WA Property Parcels 1180334-0000, 1180334-0100, 1180343-0000, 1181013-0000**

Dear Craig:

On September 7, 2012 I conducted a wetland and stream reconnaissance on the subject parcels utilizing the methodology outlined in the 2010 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0).* Parcel 1180334-0000 is currently located in the unincorporated Thurston County, while the remaining three parcels are located in the City of Lacey. All four parcels are currently undeveloped and forested (**Figure 1**).

Four wetland areas (Wetlands A, B, C, and D) and one stream (Stream 1) were identified on the site during the reconnaissance and were delineated during field investigations conducted in September 2012 (**Table 1**).

Table 1: Critical Area Summary

Critical Area	Category	Buffer In Feet (High Intensity)
Wetland A	III	80
Wetland B	II	100*
Wetland C	II	100*
Wetland D	III	Exempt**
Stream 1	Type Ns	150**

*Per both City of Lacey and Thurston County
**Per Thurston County

EXHIBIT 8

All of the wetland and stream boundaries were subsequently surveyed by Hatton Godat Pantier and are depicted on **Figure 2**. **Attachment A** contains data sheets prepared for representative locations in both the upland and wetland. These data sheets document the vegetation, soils, and hydrology information that aided in the wetland boundary delineation.

Each of the critical areas is described below.

Wetland A

Wetland A is located in the southwestern portion of the site and is part of a larger wetland that extends off-site to the south. The portion of the wetland located on the site consists of a forested swale that conveys seasonal or intermittent seepage west into a shallow depression located near the southwest property corner.

Vegetation within the on-site portion of the wetland included western red cedar (*Thuja plicata*), red alder (*Alnus rubra*), black cottonwood (*Populus trichocarpa*), big-leaf maple (*Acer macrophyllum*), salmonberry (*Rubus spectabilis*), lady fern (*Athyrium filix-femina*), stinging nettle (Urtica dioica), skunk cabbage (*Lysichiton americanum*), and youth-on-age (*Tolmiea menziesii*). Soils throughout the wetland were dry at the time of the delineation and wetland hydrology was necessarily assumed based on the presence of low chroma hydric soils and hydrophytic plant species.

Wetland A appears to meet the criteria for a Category III wetland with 16 Habitat Points (**Attachment B**). Category III wetlands with 16 Habitat Points require a standard 80-foot buffer adjacent high intensity land uses per Table 8C-5 in 8C.2.3 of the *Department of Ecology's Wetlands in Washington State Volume 2 – Protecting and Managing Wetlands*.

Wetland B/C

Wetland B/C is located in the western portion of the site and is part of a larger wetland that extends off-site to the west. On the project site, the wetland consists of two components that are hydrologically connected off-site and thus were considered one wetland system for rating purposes. Wetland Area B on the site consists primarily of a large forested shallow topographic depression that was dominated by red alder, salmonberry, skunk cabbage, lady fern, and slough sedge (*Carex obnupta*).

Wetland Area C consists of a seasonal or intermittent forested swale that included western red cedar, big-leaf maple, red alder, salmonberry, red elderberry (*Sambucus racemosa*), stinging nettle, and youth-on-age. Due to the very dry time of year that the delineation was conducted, the boundary of this portion of the wetland was necessarily based on the presence of scattered patches of surface staining and hydric soils (somewhat marginal in places).

Wetland Area B is located within both the City of Lacey and unincorporated Thurston County, while Wetland Area C is located entirely within the City. Wetland B/C appears to meet the criteria for a Category II wetland with 21 Habitat Points (**Attachment B**).

In the City of Lacey, Category II wetlands with 21 Habitat Points require a standard 100-foot buffer per adjacent high intensity land uses per Alternative 3A of Appendix 8-C of the *Department of Ecology's Wetlands in Washington State Volume 2 – Protecting and Managing Wetlands*. Category II wetlands with 21 Habitat Points in unincorporated Thurston County also require a 100-foot buffer per TMC 24.30.045.

Wetland D

Wetland D consists of a very small (212 s.f.) isolated topographic depression in the northwestern portion of the site. Vegetation within the wetland consisted of one red alder tree, salmonberry, and youth-on-age. Although dry at the time of the site visit, the wetland appears to contain shallow seasonal ponding.

Wetland D is located within unincorporated Thurston County. Isolated wetlands less than 1,000 s.f. in size that meet any of the criteria outlined in TMC 24.30.015.A are exempt from regulation. Since Wetland D does not provide essential habitat for priority wildlife species, it would be exempt from Thurston County regulation per TMC 24.30.015.A.3. However, although Wetland D would not require a buffer, it is located within the buffer of Wetland B/C.

Stream 1

Stream 1 is located in the northwest portion of the site and drains down from off-site into Wetland Area B. At the time of the delineation, the dry stream bed averaged less than two feet wide and was not well defined in places. Stream 1 appears to meet the requirements for a Type Ns stream and would likely require a standard buffer of 150 feet per TMC 24.25.020.

If you have any questions regarding the wetland delineation or ratings, please give me a call.

Sincerely,

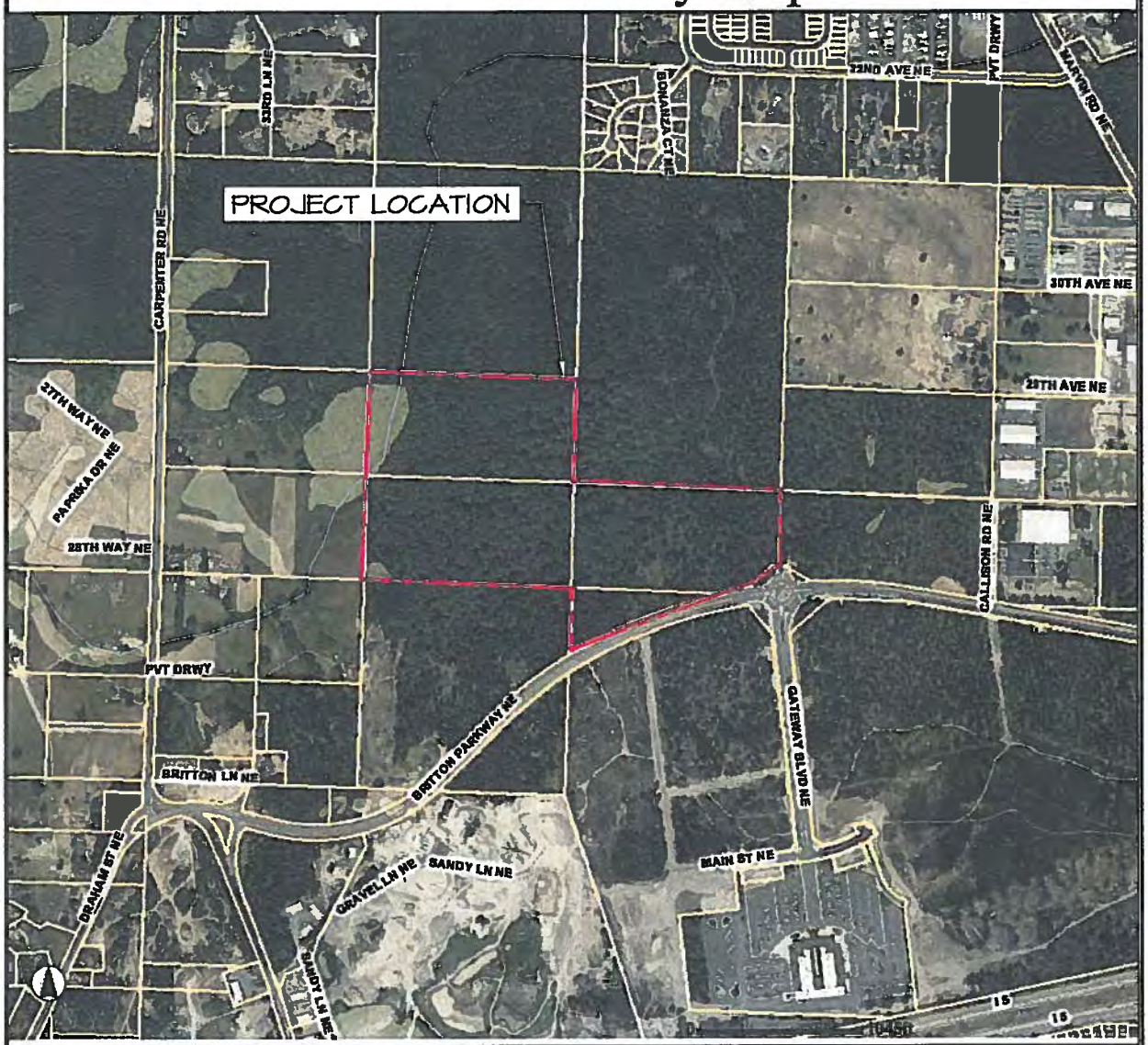
ALTMANN OLIVER ASSOCIATES, LLC

John Altmann

John Altmann
Ecologist

Attachments

Thurston County Map



Disclaimer: Thurston County makes every effort to ensure that this map is a true and accurate representation of the work of County government. However, the County and all related personnel make no warranty, expressed or implied, regarding the accuracy, completeness or convenience of any information disclosed on this map. Nor does the County accept liability for any damage or injury caused by the use of this map.
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Thurston GeoData Center

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929 Lakeridge Drive SW, Suite 216, 3rd Floor
Olympia, WA 98502-6031

LEGEND

- Major Roads
- Roads
- Streams
- Contours
- Wetlands
- Wetland Buffers
- Flood Zones
- Water Bodies
- Zoning
- Cities
- Parcels

SOURCE: THURSTON COUNTY GEODATA CENTER, 2012

Altmann Oliver Associates, LLC | AOA
PO Box 578 Carnation, WA 98014 Office (425) 333-4535 Fax (425) 333-4509
Environmental Planning & Landscape Architecture

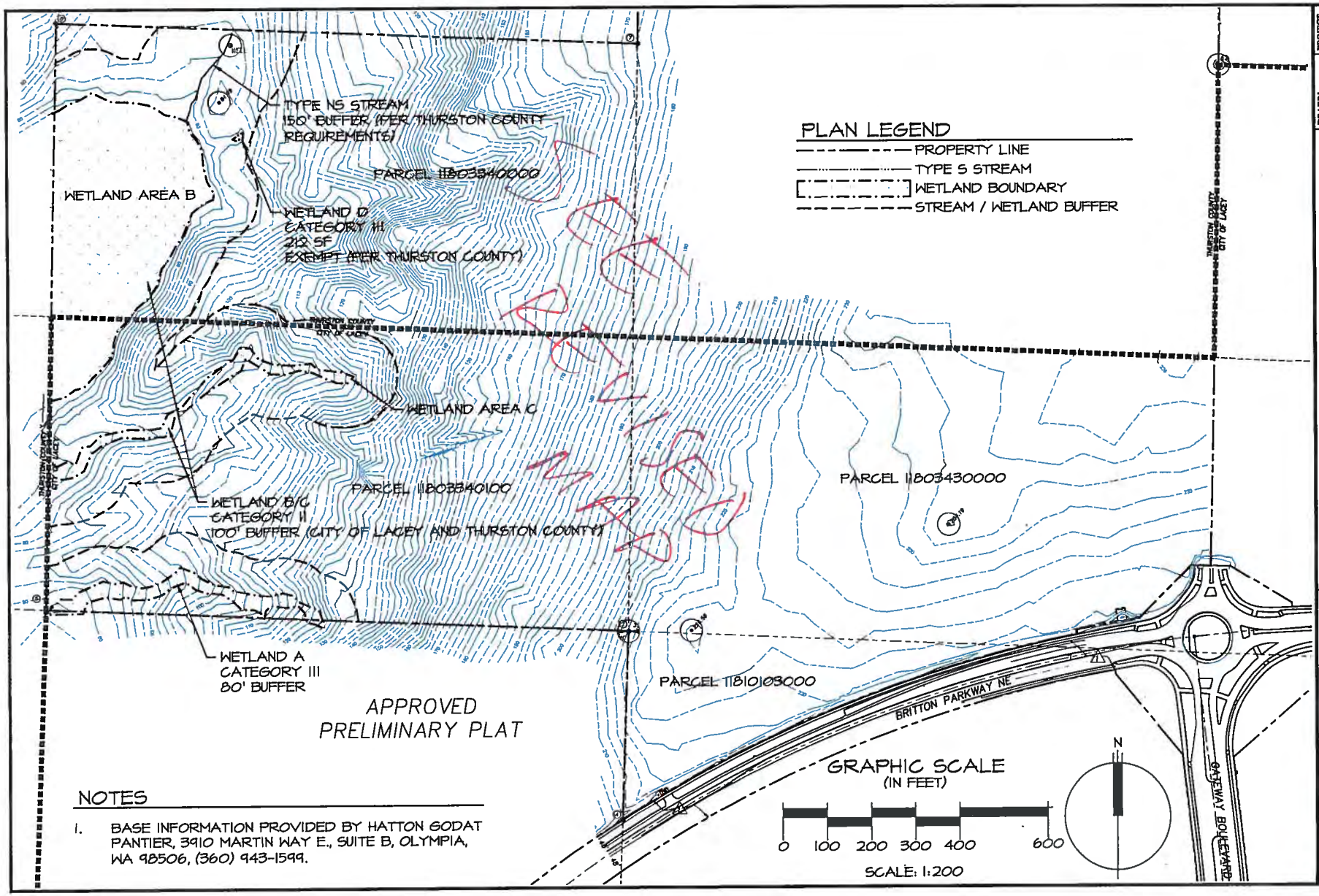
FIGURE 1: THURSTON COUNTY WETLAND MAP
GATEWAY 850 LLC
LACEY, WASHINGTON
PARCELS 11803340000, 11803340100, 11803430000, 118101030000

DRAWN	PROJECT
SO	4245
SCALE NTS	
DATE 11-02-12	1/2
REVISED	

4245-MTT-11-02-12.dwg

ATTACHMENT A

DATA SHEETS



NOTES

1. BASE INFORMATION PROVIDED BY HATTON GODAT PANTIER, 3910 MARTIN WAY E., SUITE B, OLYMPIA, WA 98506, (360) 943-1599.

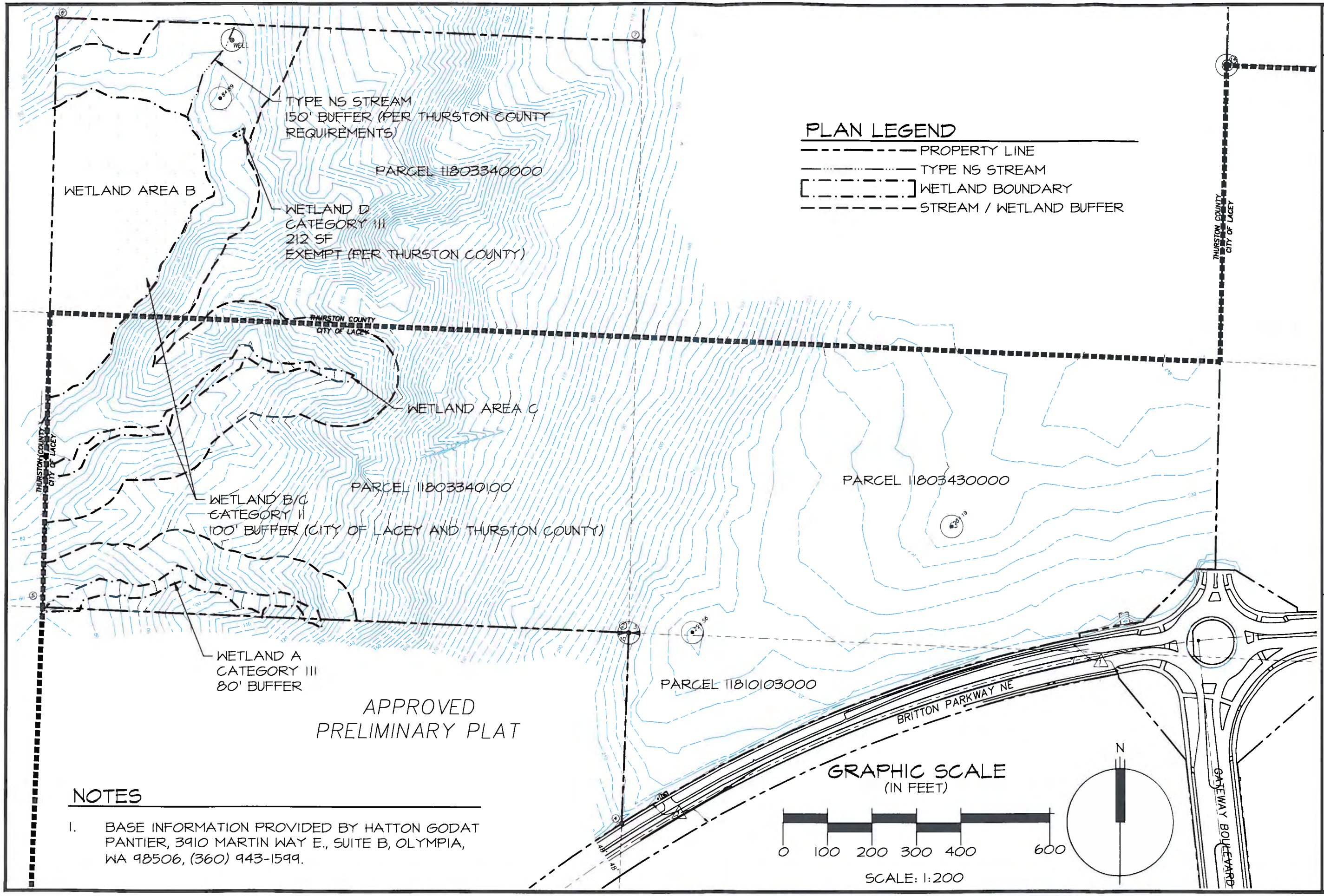
DRAWN	SO
SCALE	AS NOTED
DATE	11-02-12
REVISED	
PROJECT	4245

2/2

FIGURE 2: CRITICAL AREAS MAP
GATEWAY 850 LLC
LACEY, WASHINGTON
PARCELS 11803340000, 11803340100, 11803430000, 11810103000

Altmann Oliver Associates, LLC
AOA
Environmental Planning & Landscape Architecture

4245-MXT-11-02-12.dwg



NOTES

1. BASE INFORMATION PROVIDED BY HATTON GODAT PANTIER, 3910 MARTIN WAY E., SUITE B, OLYMPIA, WA 98506, (360) 943-1599.

PROJECT 4245
DRAWN SO
SCALE AS NOTED
DATE 10-16-13
REVISED
2/2

FIGURE 2: CRITICAL AREAS MAP REVISED
GATEWAY 850 LLC
LACEY, WASHINGTON
PARCELS 11803340000, 11803340100, 11803430000, 11810103000

Altmann Oliver Associates, LLC
AOA
Environmental Planning & Landscape Architecture
PO Box 378 Carnation, WA 98014 Office (425) 333-4535 Fax (425) 333-4509

4245-MIT-11-02-12.dwg

TP #1 ~20' INTO WETLAND AT #52

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: BRITTON PKWY City/County: LACEY / THURSTON CO Sampling Date: 9/7/12

Applicant/Owner: GATEWAY 850 LLC State: WA Sampling Point: TP #1

Investigator(s): ALTMANN Section, Township, Range: SEC 3, T18N, R1W W.M.

Landform (hillslope, terrace, etc.): SLOPE Local relief (concave, convex, none): CONCAVE Slope (%): ____

Subregion (LRR): A Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes ____	No ____	

Remarks: ASSUMED

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 20' R)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2. ALL TREES ROOTED OUTSIDE			
3. OF WETLAND IN PLOT			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: ~20' R)			
1. Rubus spectabilis	70	Y	FAC
2. Sambucus racemosa	10	N	FACU
3. Polystichum munitum	10	N	FACU
4.			
5.			
	90 = Total Cover		
Herb Stratum (Plot size: ~20' R)			
1. Athyrium filix-femina	35	Y	FAC
2. Urtica dioica	35	Y	FAC
3. Tolmiea menziesii	20	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	90 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

SOIL

Sampling Point: TP #1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/1	100					Clayloam	
5-15	2.5Y 6/2	80	VARIOUS	20			SILTY CLAY	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (except MLRA 1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (LRR A)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (LRR A)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: ASSUMED DUE TO DRY TIME OF YEAR - PRESENCE OF HYDRIC SOILS AND HYDROPHYTIC VEGETATION

TP #2 20' INTO UPLAND AT A-5

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: BRITTON PKWY City/County: LACEY / THURSTON CO Sampling Date: 9/7/12

Applicant/Owner: GATEWAY 850 LLC State: WA Sampling Point: TP#2

Investigator(s): ALTMANN Section, Township, Range: S3, T18N, R1W W.M.

Landform (hillslope, terrace, etc.): SLOPE Local relief (concave, convex, none): CONCAVE Slope (%): ____

Subregion (LRR): A Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X
Hydric Soil Present?	Yes ____	No X
Wetland Hydrology Present?	Yes ____	No X

Is the Sampled Area within a Wetland? Yes ____ No X

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ~20'R)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer macrophyllum	45	Y	FACU
2. Thuja plicata	45	Y	FAC
3.			
4.			
	90 = Total Cover		

Sapling/Shrub Stratum (Plot size: ~20'R)			
1. Rubus spectabilis	40	Y	FAC
2. Corylus cornuta	20	Y	FACU
3. Polystichum munitum	20	Y	FACU
4.			
5.			
	80 = Total Cover		

Herb Stratum (Plot size: ~10'R)			
1. Urtica dioica	20	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	20 = Total Cover		

Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species	105	x 3 =	315
FACU species	85	x 4 =	340
UPL species		x 5 =	
Column Totals:	190 (A)		655 (B)

Prevalence Index = B/A = 3.4

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

SOIL

Sampling Point: TP #2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 5/4	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (except MLRA 1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (LRR A)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (LRR A)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

TP #3 5' INTO WETLAND AT B 6

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: BRITTON PKWY City/County: LACEY / THURSTON CO Sampling Date: 9/7/12

Applicant/Owner: GATEWAY ESG State: WA Sampling Point: TP #3

Investigator(s): ALTMANN Section, Township, Range: SEC 3 TWP 18N R1W W.M.

Landform (hillslope, terrace, etc.): SLOPE Local relief (concave, convex, none): CONCAVE Slope (%): ____

Subregion (LRR): A Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ~20 R)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	80	Y	FAC
2.			
3.			
4.			
	80 = Total Cover		
Sapling/Shrub Stratum (Plot size: ~20' R)			
1. Rubus spectabilis	70	Y	FAC
2.			
3.			
4.			
5.			
	70 = Total Cover		
Herb Stratum (Plot size: ~10' R)			
1. Athyrium filix-femina	40	Y	FAC
2. Lysichiton americanum	40	Y	OBL
3. Maianthemum dilatatum	10	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	90 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

SOIL

Sampling Point: TP #3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 2/1	100						HISTIC EPIPEDON
13-17	10YR 3/1	80	10YR 3/3	20			SILTY CLAY	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- X Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (except MLRA 1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: CLAY

Depth (inches): 13"

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (LRR A)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (LRR A)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): SURFACE

Water Table Present? Yes X No ___ Depth (inches): SURFACE

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): SURFACE

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

TP #4 15' INTO UPLAND AT B 26

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: BRITTON PKWY City/County: LACEY / THURSTON CO Sampling Date: 9/7/12

Applicant/Owner: GATEWAY 850 State: WA Sampling Point: TP #4

Investigator(s): ALTMANN Section, Township, Range: SEC 3 T 18N R 1W W.M.

Landform (hillslope, terrace, etc.): SLOPE Local relief (concave, convex, none): CONCAVE Slope (%): ____

Subregion (LRR): A Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ~30' R)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pseudotsuga menziesii	40	Y	FACU
2. Acer macrophyllum	40	Y	FACU
3. Tsuga heterophylla	20	Y	FACU
4.			
	100	= Total Cover	

Sapling/Shrub Stratum (Plot size: ~20' R)			
1. Polystichum munitum	50	Y	FACU
2. Corylus cornuta	20	Y	FACU
3. Mahonia aquifolium	20	Y	FACU
4.			
5.			
	90	= Total Cover	

Herb Stratum (Plot size: ~10' R)			
1. Maianthemum dilatatum	20	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	____	= Total Cover	

Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____	= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 14 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

SOIL

Sampling Point: TP#4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-15	7.5YR 4/4	100					Silty clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (except MLRA 1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (LRR A)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (LRR A)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

TP #5 5' INTO WETLAND AT CC 7

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: BRITTON PKWY City/County: LACEY / THURSTON Co Sampling Date: 9/12/12

Applicant/Owner: GATEWAY BSO State: WA Sampling Point: TP #5

Investigator(s): ALTMANN Section, Township, Range: SEC 3 T18N R1W W.M.

Landform (hillslope, terrace, etc.): SLOPE Local relief (concave, convex, none): CONCAVE Slope (%): ____

Subregion (LRR): A Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes ____	No ____	

Remarks: ASSUMED

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ~20' R)	Absolute % Cover	Dominant Species?	Indicator Status
1. Rhamnus purshiana	60	Y	FAC
2.			
3.			
4.			
	60 = Total Cover		
Sapling/Shrub Stratum (Plot size: ~20' R)			
1. Corylus Cornuta	20	Y	FACU
2. Rubus spectabilis	10	Y	FAC
3.			
4.			
5.			
	30 = Total Cover		
Herb Stratum (Plot size: ~20' R)			
1. Tolmiea menziesii	20	Y	FAC
2. Urtica dioica	20	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	40 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 60

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

SOIL

Sampling Point: TP#5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	90	VARIOUS	10			SILT LOAM	
5-15	10YR 5/2	80	VARIOUS	20			CLAY LOAM	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (except MLRA 1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (LRR A)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (LRR A)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: ASSUMED DUE TO DRY TIME OF YEAR - PRESENCE OF HYDRIC SOILS

TP #6 ~[illegible]' INTO UPLAND AT CC-1[illegible]

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: BRITTON PKWY City/County: LACEY/THURSTON Sampling Date: 9/12/12

Applicant/Owner: GATEWAY 850 State: WA Sampling Point: TP #6

Investigator(s): ALTMANN Section, Township, Range: SEC 3 T18N R1W WM

Landform (hillslope, terrace, etc.): SLOPE Local relief (concave, convex, none): CONCAVE Slope (%): ____

Subregion (LRR): A Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ~20' R)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer macrophyllum	80	Y	FACU
2.			
3.			
4.			
	80 = Total Cover		
Sapling/Shrub Stratum (Plot size: ~20' R)			
1. Corylus cornuta	25	Y	FACU
2. Polystichum munitum	25	Y	FACU
3. Rubus spectabilis	5	N	FAC
4.			
5.			
	55 = Total Cover		
Herb Stratum (Plot size: ~20' R)			
1. Urtica dioica	75	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	75 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

SOIL

Sampling Point: TP #6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR 5/3	100					loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (except MLRA 1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (LRR A)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (LRR A)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

ATTACHMENT B

WETLAND RATINGS

Wetland name or number A

WETLAND RATING FORM – WESTERN WASHINGTON

Version 2 - Updated July 2006 to increase accuracy and reproducibility among users
Updated Oct 2008 with the new WDFW definitions for priority habitats

Name of wetland (if known): PARCEL 1180334 0100 Date of site visit: 9/7/12

Rated by ALTMANN Trained by Ecology? Yes X No___ Date of training 03/08

SEC: 3 TWNSHP: 18N RNGE: 1W Is S/T/R in Appendix D? Yes___ No X

Map of wetland unit: Figure ____ Estimated size _____

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I___ II___ III X IV___

Category I = Score >=70
Category II = Score 51-69
Category III = Score 30-50
Category IV = Score < 30

Score for Water Quality Functions	13
Score for Hydrologic Functions	10
Score for Habitat Functions	16
TOTAL score for Functions	39

Category based on SPECIAL CHARACTERISTICS of wetland

I___ II___ **Does not Apply** X

Final Category (choose the "highest" category from above) III

Summary of basic information about the wetland unit

Wetland Unit has Special Characteristics		Wetland HGM Class used for Rating	
Estuarine		Depressional	X
Natural Heritage Wetland		Riverine	
Bog		Lake-fringe	
Mature Forest		Slope	X
Old Growth Forest		Flats	
Coastal Lagoon		Freshwater Tidal	
Interdunal			
None of the above	X	Check if unit has multiple HGM classes present	X

Wetland name or number A

	D. Depressional and Flats Wetlands WATER QUALITY FUNCTIONS - Indicators that the wetland unit functions to improve water quality	Points (only 1 score per box)
D	**D 1. Does the wetland unit have the potential to improve water quality?**	(see p.38)
D	D 1.1 Characteristics of surface water flows out of the wetland: Unit is a depression with no surface water leaving it (no outlet) points = 3 Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) points = 1 Unit is a "flat" depression (Q. 7 on key), or in the Flats class, with permanent surface outflow **and no obvious natural outlet** and/or outlet is a man-made ditch points = 1 (*If ditch is not permanently flowing treat unit as "intermittently flowing"*) Provide photo or drawing	Figure 2
D	S 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic *(use NRCS definitions)* YES points = 4 NO points = 0	4
D	D 1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest Cowardin class) Wetland has persistent, ungrazed, vegetation >= 95% of area points = 5 Wetland has persistent, ungrazed, vegetation >= 1/2 of area points = 3 Wetland has persistent, ungrazed vegetation >= 1/10 of area points = 1 Wetland has persistent, ungrazed vegetation <1/10 of area points = 0 Map of Cowardin vegetation classes	Figure 5
D	D1.4 Characteristics of seasonal ponding or inundation. *This is the area of the wetland unit that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 yrs.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0 Map of Hydroperiods	Figure 2
D	**Total for D 1** *Add the points in the boxes above*	13
D	**D 2. Does the wetland unit have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* — Grazing in the wetland or within 150 ft — Untreated stormwater discharges to wetland — Tilled fields or orchards within 150 ft of wetland — A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging — Residential, urban areas, golf courses are within 150 ft of wetland — Wetland is fed by groundwater high in phosphorus or nitrogen — Other_____ **YES** multiplier is 2 **NO** multiplier is 1	(see p. 44) multiplier 1
D	**TOTAL - Water Quality Functions** Multiply the score from D1 by D2 *Add score to table on p. 1*	13

Wetland name or number A

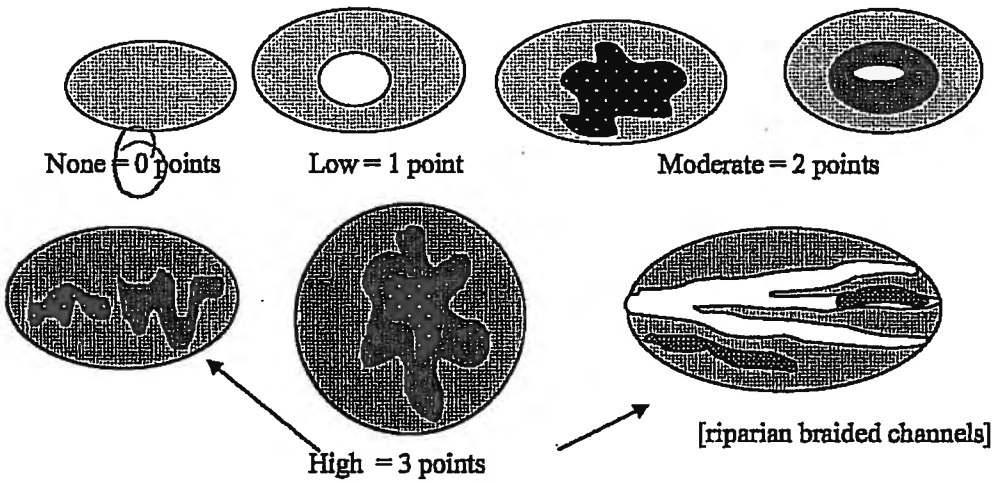
D Depressional and Flats Wetlands HYDROLOGIC FUNCTIONS - indicators that the wetland unit functions to reduce flooding and stream degradation	Points (only 1 score per box)
D 3. Does the wetland unit have the potential to reduce flooding and erosion?	*(see p. 46)*
D 3.1 Characteristics of surface water flows out of the wetland unit Unit is a depression with no surface water leaving it (no outlet) points = 4 Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 Unit is a "flat" depression (Q. 7 on key), or in the Flats class, with permanent surface outflow and no obvious natural outlet and/or outlet is a man-made ditch points = 1 *(If ditch is not permanently flowing treat unit as "intermittently flowing")* Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) points = 0	2
D 3.2 Depth of storage during wet periods *Estimate the height of ponding above the bottom of the outlet. For units with no outlet measure from the surface of permanent water or deepest part (if dry).* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 The wetland is a "headwater" wetland" points = 5 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 Unit is flat (yes to Q. 2 or Q. 7 on key) but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft points = 0	0
D 3.3 Contribution of wetland unit to storage in the watershed *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* The area of the basin is less than 10 times the area of unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 Entire unit is in the FLATS class points = 5	3
Total for D 3 *Add the points in the boxes above*	5
D 4. Does the wetland unit have the opportunity to reduce flooding and erosion? Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. Answer NO if the water coming into the wetland is controlled by a structure such as flood gate, tide gate, flap valve, reservoir etc. OR you estimate that more than 90% of the water in the wetland is from groundwater in areas where damaging groundwater flooding does not occur. *Note which of the following indicators of opportunity apply.* — Wetland is in a headwater of a river or stream that has flooding problems ✗ Wetland drains to a river or stream that has flooding problems — Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems — Other_____ **YES** multiplier is 2 **NO** multiplier is 1	*(see p. 49)* multiplier 2
TOTAL - Hydrologic Functions Multiply the score from D 3 by D 4 ***Add score to table on p. 1***	10

Wetland name or number A

These questions apply to wetlands of all HGM classes. HABITAT FUNCTIONS – Indicators that unit functions to provide important habitat	Points (only 1 score per box)
H 1. Does the wetland unit have the potential to provide habitat for many species?	
H 1.1 Vegetation structure *(see p. 72)* *Check the types of vegetation classes present (as defined by Cowardin)- Size threshold for each class is ¼ acre or more than 10% of the area if unit is smaller than 2.5 acres.* ____Aquatic bed ____Emergent plants ____Scrub/shrub (areas where shrubs have >30% cover) _X_ Forested (areas where trees have >30% cover) *If the unit has a forested class check if:* _X_ The forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the forested polygon *Add the number of vegetation structures that qualify. If you have:* 4 structures or more — points = 4 3 structures — points = 2 2 structures — points = 1 1 structure — points = 0 Map of Cowardin vegetation classes	Figure 1
H 1.2. Hydroperiods *(see p. 73)* *Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ acre to count. (see text for descriptions of hydroperiods)* ____Permanently flooded or inundated _X_ Seasonally flooded or inundated ____Occasionally flooded or inundated _X_ Saturated only 4 or more types present — points = 3 3 types present — points = 2 2 types present — point = 1 1 type present — points = 0 ____Permanently flowing stream or river in, or adjacent to, the wetland ____Seasonally flowing stream in, or adjacent to, the wetland ____***Lake-fringe wetland* = 2 points** ____***Freshwater tidal wetland* = 2 points** Map of hydroperiods	Figure 1
H 1.3. Richness of Plant Species *(see p. 75)* Count the number of plant species in the wetland that cover at least 10 ft^2. (*different patches of the same species can be combined to meet the size threshold)* *You do not have to name the species.* *Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle* If you counted: > 19 species — points = 2 5 - 19 species — points = 1 < 5 species — points = 0 *List species below if you want to:*	1

Total for page 3

Wetland name or number A

	Figure
H 1.4. Interspersion of habitats *(see p. 76)* Decide from the diagrams below whether interspersion between Cowardin vegetation classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.  None = 0 points Low = 1 point Moderate = 2 points High = 3 points [riparian braided channels] NOTE: If you have four or more classes or three vegetation classes and open water the rating is always "high". Use map of Cowardin vegetation classes	0
H 1.5. Special Habitat Features: *(see p. 77)* *Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.* X Large, downed, woody debris within the wetland (>4in. diameter and 6 ft long). X Standing snags (diameter at the bottom > 4 inches) in the wetland ____ Undercut banks are present for at least 6.6 ft (2m) and/or overhanging vegetation extends at least 3.3 ft (1m) over a stream (or ditch) in, or contiguous with the unit, for at least 33 ft (10m) ____ Stable steep banks of fine material that might be used by beaver or muskrat for denning (>30degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet turned grey/brown)* ____ At least ¼ acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* X Invasive plants cover less than 25% of the wetland area in each stratum of plants *NOTE: The 20% stated in early printings of the manual on page 78 is an error.*	3
H 1. TOTAL Score - potential for providing habitat *Add the scores from H1.1, H1.2, H1.3, H1.4, H1.5*	6

Comments

Wetland name or number A

H 2. Does the wetland unit have the opportunity to provide habitat for many species?	
H 2.1 Buffers *(see p. 80)* *Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed."* — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference. No structures are within the undisturbed part of buffer. (relatively undisturbed also means no-grazing, no landscaping, no daily human use) **Points = 5** — 100 m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference. **Points = 4** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference. **Points = 4** — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference, . **Points = 3** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference. **Points = 3** **If buffer does not meet any of the criteria above** — No paved areas (except paved trails) or buildings within 25 m (80ft) of wetland > 95% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — No paved areas or buildings within 50m of wetland for >50% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — Heavy grazing in buffer. **Points = 1** — Vegetated buffers are <2m wide (6.6ft) for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland **Points = 0.** — Buffer does not meet any of the criteria above. **Points = 1** Aerial photo showing buffers	Figure 4
H 2.2 Corridors and Connections *(see p. 81)* H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft wide, has at least 30% cover of shrubs, forest or native undisturbed prairie, that connects to estuaries, other wetlands or undisturbed uplands that are at least 250 acres in size? *(dams in riparian corridors, heavily used gravel roads, paved roads, are considered breaks in the corridor)* YES = **4 points** *(go to H 2.3)* NO = go to H 2.2.2 H 2.2.2 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 50ft wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands or undisturbed uplands that are at least 25 acres in size? **OR a Lake-fringe** wetland, if it does not have an undisturbed corridor as in the question above? YES = **2 points** *(go to H 2.3)* NO = H 2.2.3 H 2.2.3 Is the wetland: within 5 mi (8km) of a brackish or salt water estuary OR within 3 mi of a large field or pasture (>40 acres) OR within 1 mi of a lake greater than 20 acres? YES = **1 point** NO = **0 points**	2

Total for page 6

Wetland name or number A

H 2.3 Near or adjacent to other priority habitats listed by WDFW *(see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report http://wdfw.wa.gov/hab/phslist.htm)*

Which of the following priority habitats are within 330ft (100m) of the wetland unit? *NOTE: the connections do not have to be relatively undisturbed.*

____**Aspen Stands:** Pure or mixed stands of aspen greater than 0.4 ha (1 acre).

____**Biodiversity Areas and Corridors:** Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report p. 152*).

____**Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

____**Old-growth/Mature forests:** (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. (Mature forests) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest.

____**Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158*).

____**Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

____**Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161*).

X **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

____**Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report: pp. 167-169 and glossary in Appendix A).*

____**Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

____**Cliffs:** Greater than 7.6 m (25 ft) high and occurring below 5000 ft.

____**Talus:** Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

____**Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long.

If wetland has **3 or more** priority habitats = **4 points**
If wetland has **2** priority habitats = **3 points**
If wetland has **1** priority habitat = **1 point** No habitats = 0 points

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)

1

Wetland name or number A

H 2.4 Wetland Landscape *(choose the one description of the landscape around the wetland that best fits)* ***(see p. 84)*** There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development. points = 5 The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within ½ mile points = 5 There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed points = 3 The wetland is Lake-fringe on a lake **with** disturbance and there are 3 other lake-fringe wetland within ½ mile points = 3 There is at least 1 wetland within ½ mile. points = 2 There are no wetlands within ½ mile. points = 0	3
H 2. TOTAL Score - opportunity for providing habitat *Add the scores from H2.1,H2.2, H2.3, H2.4*	10
TOTAL for H 1 from page 14	6
Total Score for Habitat Functions – add the points for H 1, H 2 and record the result on p. 1	16

Wetland name or number B/C

WETLAND RATING FORM – WESTERN WASHINGTON
Version 2 - Updated July 2006 to increase accuracy and reproducibility among users
Updated Oct 2008 with the new WDFW definitions for priority habitats

Name of wetland (if known): PARCELS 1180334 0000 + -0100 Date of site visit: 9/12/12

Rated by ALTMANN Trained by Ecology? Yes X No___ Date of training 03/08

SEC: 3 TWNSHP: 18N RNGE: 1W Is S/T/R in Appendix D? Yes___ No X

Map of wetland unit: Figure ____ Estimated size _____

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I___ II X III___ IV___

Category I = Score >=70
Category II = Score 51-69
Category III = Score 30-50
Category IV = Score < 30

Score for Water Quality Functions	30
Score for Hydrologic Functions	16
Score for Habitat Functions	21
TOTAL score for Functions	67

Category based on SPECIAL CHARACTERISTICS of wetland

I___ II___ Does not Apply X

Final Category (choose the "highest" category from above) II

Summary of basic information about the wetland unit

Wetland Unit has Special Characteristics		Wetland HGM Class used for Rating		
Estuarine		Depressional	X	
Natural Heritage Wetland		Riverine	X	-OFF-SITE
Bog		Lake-fringe		
Mature Forest		Slope	X	
Old Growth Forest		Flats		
Coastal Lagoon		Freshwater Tidal		
Interdunal				
None of the above	X	Check if unit has multiple HGM classes present	X	

Wetland name or number B/C

D	Depressional and Flats Wetlands WATER QUALITY FUNCTIONS - Indicators that the wetland unit functions to improve water quality	Points (only score per box)
D	**D 1. Does the wetland unit have the potential to improve water quality?**	*(see p.38)*
D	D 1.1 Characteristics of surface water flows out of the wetland: Unit is a depression with no surface water leaving it (no outlet) points = 3 Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) points = 1 Unit is a "flat" depression (Q. 7 on key), or in the Flats class, with permanent surface outflow and **no obvious natural outlet** and/or outlet is a man-made ditch points = 1 (*If ditch is not permanently flowing treat unit as "intermittently flowing"*) Provide photo or drawing	Figure 2
D	S 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic *(use NRCS definitions)* YES points = 4 NO points = 0	4
D	D 1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest Cowardin class) Wetland has persistent, ungrazed, vegetation >= 95% of area points = 5 Wetland has persistent, ungrazed, vegetation >= 1/2 of area points = 3 Wetland has persistent, ungrazed vegetation >= 1/10 of area points = 1 Wetland has persistent, ungrazed vegetation <1/10 of area points = 0 Map of Cowardin vegetation classes	Figure 5
D	D1.4 Characteristics of seasonal ponding or inundation. *This is the area of the wetland unit that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 yrs.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0 Map of Hydroperiods	Figure 4
D	**Total for D 1** *Add the points in the boxes above*	15
D	**D 2. Does the wetland unit have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* — Grazing in the wetland or within 150 ft — Untreated stormwater discharges to wetland — Tilled fields or orchards within 150 ft of wetland X A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging — Residential, urban areas, golf courses are within 150 ft of wetland — Wetland is fed by groundwater high in phosphorus or nitrogen — Other_____ **YES** multiplier is 2 **NO** multiplier is 1	*(see p. 44)* multiplier 2
D	**TOTAL - Water Quality Functions** Multiply the score from D1 by D2 *Add score to table on p. 1*	30

Wetland name or number B/C

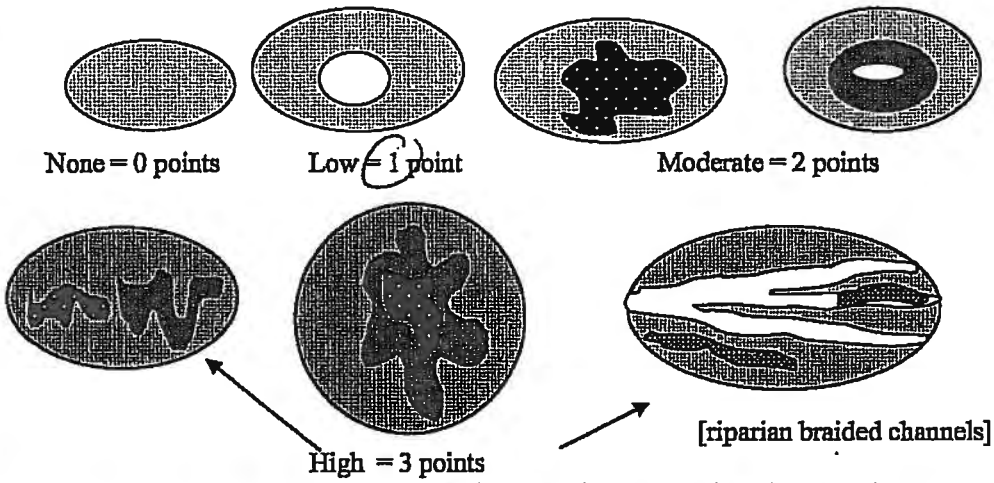
D	Depressional and Flats Wetlands HYDROLOGIC FUNCTIONS – Indicators that the wetland unit functions to reduce flooding and stream degradation	Points (only 1 score per box)
	D 3. Does the wetland unit have the potential to reduce flooding and erosion?	*(see p.46)*
D	D 3.1 Characteristics of surface water flows out of the wetland unit Unit is a depression with no surface water leaving it (no outlet) points = 4 Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 Unit is a "flat" depression (Q. 7 on key), or in the Flats class, with permanent surface outflow and **no obvious natural** outlet and/or outlet is a man-made ditch points = 1 *(If ditch is not permanently flowing treat unit as "intermittently flowing")* Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) points = 0	2
D	D 3.2 Depth of storage during wet periods *Estimate the height of ponding above the bottom of the outlet. For units with no outlet measure from the surface of permanent water or deepest part (if dry).* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 The wetland is a "headwater" wetland" points = 5 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 Unit is flat (yes to Q. 2 or Q. 7 on key) but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft points = 0	3
D	D 3.3 Contribution of wetland unit to storage in the watershed *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* The area of the basin is less than 10 times the area of unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 Entire unit is in the FLATS class points = 5	3
D	**Total for D 3** *Add the points in the boxes above*	8
D	**D 4. Does the wetland unit have the opportunity to reduce flooding and erosion?** Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. Answer NO if the water coming into the wetland is controlled by a structure such as flood gate, tide gate, flap valve, reservoir etc. OR you estimate that more than 90% of the water in the wetland is from groundwater in areas where damaging groundwater flooding does not occur. *Note which of the following indicators of opportunity apply.* — Wetland is in a headwater of a river or stream that has flooding problems X Wetland drains to a river or stream that has flooding problems — Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems — Other_____ **YES** multiplier is 2 **NO** multiplier is 1	*(see p. 49)* multiplier 2
D	**TOTAL - Hydrologic Functions** Multiply the score from D 3 by D 4 ***Add score to table on p. 1***	16

Wetland name or number B/C

These questions apply to wetlands of all HGM classes. HABITAT FUNCTIONS - Indicators that unit functions to provide important habitat	Points (only score one option)
H 1. Does the wetland unit have the potential to provide habitat for many species?	
H 1.1 Vegetation structure *(see p. 72)* *Check the types of vegetation classes present (as defined by Cowardin)- Size threshold for each class is ¼ acre or more than 10% of the area if unit is smaller than 2.5 acres.* ___ Aquatic bed X Emergent plants ___ Scrub/shrub (areas where shrubs have >30% cover) X Forested (areas where trees have >30% cover) *If the unit has a forested class check if:* X The forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the forested polygon *Add the number of vegetation structures that qualify. If you have:* 4 structures or more — points = 4 3 structures — points = 2 2 structures — points = 1 1 structure — points = 0 Map of Cowardin vegetation classes	Figure 2
H 1.2. Hydroperiods *(see p. 73)* *Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ acre to count. (see text for descriptions of hydroperiods)* ___ Permanently flooded or inundated — 4 or more types present — points = 3 X Seasonally flooded or inundated — 3 types present — points = 2 ___ Occasionally flooded or inundated — 2 types present — point = 1 X Saturated only — 1 type present — points = 0 X Permanently flowing stream or river in, or adjacent to, the wetland X Seasonally flowing stream in, or adjacent to, the wetland ___ ***Lake-fringe wetland*** **= 2 points** ___ ***Freshwater tidal wetland*** **= 2 points** Map of hydroperiods	Figure 2
H 1.3. Richness of Plant Species *(see p. 75)* Count the number of plant species in the wetland that cover at least 10 ft^2. *(different patches of the same species can be combined to meet the size threshold)* *You do not have to name the species.* *Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle* If you counted: > 19 species — points = 2 5 - 19 species — points = 1 < 5 species — points = 0 *List species below if you want to:*	2

Total for page 6

Wetland name or number B/C

	Figure
H 1.4. Interspersion of habitats *(see p. 76)* Decide from the diagrams below whether interspersion between Cowardin vegetation classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.  None = 0 points Low = 1 point Moderate = 2 points High = 3 points [riparian braided channels] NOTE: If you have four or more classes or three vegetation classes and open water the rating is always "high". Use map of Cowardin vegetation classes	1
H 1.5. Special Habitat Features: *(see p. 77)* *Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.* X Large, downed, woody debris within the wetland (>4in. diameter and 6 ft long). X Standing snags (diameter at the bottom > 4 inches) in the wetland X Undercut banks are present for at least 6.6 ft (2m) and/or overhanging vegetation extends at least 3.3 ft (1m) over a stream (or ditch) in, or contiguous with the unit, for at least 33 ft (10m) ___ Stable steep banks of fine material that might be used by beaver or muskrat for denning (>30degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet turned grey/brown)* X At least ¼ acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* ___ Invasive plants cover less than 25% of the wetland area in each stratum of plants *NOTE: The 20% stated in early printings of the manual on page 78 is an error.*	4
H 1. TOTAL Score - potential for providing habitat *Add the scores from H1.1, H1.2, H1.3, H1.4, H1.5*	11

Comments

Wetland name or number B/C

H 2. Does the wetland unit have the opportunity to provide habitat for many species?	
H 2.1 Buffers *(see p. 80)* *Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed."* — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference. No structures are within the undisturbed part of buffer. (relatively undisturbed also means no-grazing, no landscaping, no daily human use) **Points = 5** — 100 m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference. **Points = 4** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference. **Points = 4** — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference, . **Points = 3** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference. **Points = 3** **If buffer does not meet any of the criteria above** — No paved areas (except paved trails) or buildings within 25 m (80ft) of wetland > 95% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — No paved areas or buildings within 50m of wetland for >50% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — Heavy grazing in buffer. **Points = 1** — Vegetated buffers are <2m wide (6.6ft) for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland **Points = 0.** — Buffer does not meet any of the criteria above. **Points = 1** Aerial photo showing buffers	Figure 4
H 2.2 Corridors and Connections *(see p. 81)* H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft wide, has at least 30% cover of shrubs, forest or native undisturbed prairie, that connects to estuaries, other wetlands or undisturbed uplands that are at least 250 acres in size? *(dams in riparian corridors, heavily used gravel roads, paved roads, are considered breaks in the corridor)* YES = **4 points** *(go to H 2.3)* NO = go to H 2.2.2 H 2.2.2 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 50ft wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands or undisturbed uplands that are at least 25 acres in size? **OR a Lake-fringe** wetland, if it does not have an undisturbed corridor as in the question above? YES = **2 points** *(go to H 2.3)* NO = H 2.2.3 H 2.2.3 Is the wetland: within 5 mi (8km) of a brackish or salt water estuary OR within 3 mi of a large field or pasture (>40 acres) OR within 1 mi of a lake greater than 20 acres? YES = **1 point** NO = **0 points**	2

Total for page 6

Wetland name or number B/C

H 2.3 Near or adjacent to other priority habitats listed by WDFW *(see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report http://wdfw.wa.gov/hab/phslist.htm)* Which of the following priority habitats are within 330ft (100m) of the wetland unit? *NOTE: the connections do not have to be relatively undisturbed.* ____**Aspen Stands:** Pure or mixed stands of aspen greater than 0.4 ha (1 acre). ____**Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report p. 152*). ____**Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock. ____**Old-growth/Mature forests:** (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. (Mature forests) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest. ____**Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158*). ____**Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other. ____**Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161*). X **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources. ____**Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report: pp. 167-169 and glossary in Appendix A).* ____**Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human. ____**Cliffs:** Greater than 7.6 m (25 ft) high and occurring below 5000 ft. ____**Talus:** Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs. ____**Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long. If wetland has **3 or more** priority habitats = **4 points** If wetland has **2** priority habitats = **3 points** If wetland has **1** priority habitat = **1 point** No habitats = 0 points *Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)*	1

Wetland name or number B/C

H 2.4 Wetland Landscape *(choose the one description of the landscape around the wetland that best fits)* *(see p. 84)* There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development. points = 5 The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within ½ mile points = 5 There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed points = 3 The wetland is Lake-fringe on a lake with disturbance and there are 3 other lake-fringe wetland within ½ mile points = 3 There is at least 1 wetland within ½ mile. points = 2 There are no wetlands within ½ mile. points = 0	3
H 2. TOTAL Score - opportunity for providing habitat *Add the scores from H2.1,H2.2, H2.3, H2.4*	10
TOTAL for H 1 from page 14	11
Total Score for Habitat Functions – add the points for H 1, H 2 and record the result on p. 1	21

Wetland name or number D

WETLAND RATING FORM – WESTERN WASHINGTON

Version 2 - Updated July 2006 to increase accuracy and reproducibility among users
Updated Oct 2008 with the new WDFW definitions for priority habitats

Name of wetland (if known): PARCEL 1180334 0000 Date of site visit: 9/12/12

Rated by ALTMANN Trained by Ecology? Yes X No___ Date of training 03/08

SEC: 3 TWNSHP: 18N RNGE: 1W Is S/T/R in Appendix D? Yes___ No X

Map of wetland unit: Figure ____ Estimated size _____

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I___ II___ III X IV___

Category I = Score >=70
Category II = Score 51-69
Category III = Score 30-50
Category IV = Score < 30

Score for Water Quality Functions	12
Score for Hydrologic Functions	14
Score for Habitat Functions	14
TOTAL score for Functions	40

Category based on SPECIAL CHARACTERISTICS of wetland

I___ II___ Does not Apply X

Final Category (choose the "highest" category from above) III

Summary of basic information about the wetland unit

Wetland Unit has Special Characteristics		Wetland HGM Class used for Rating	
Estuarine		Depressional	X
Natural Heritage Wetland		Riverine	
Bog		Lake-fringe	
Mature Forest		Slope	
Old Growth Forest		Flats	
Coastal Lagoon		Freshwater Tidal	
Interdunal			
None of the above	X	Check if unit has multiple HGM classes present	

Wetland name or number D

	D. Depressional and Flats Wetlands WATER QUALITY FUNCTIONS - Indicators that the wetland unit functions to improve water quality	Points (only 1 score per box)
D	**D 1. Does the wetland unit have the potential to improve water quality?**	*(see p.38)*
D	D 1.1 Characteristics of surface water flows out of the wetland: Unit is a depression with no surface water leaving it (no outlet) points = 3 Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) points = 1 Unit is a "flat" depression (Q. 7 on key), or in the Flats class, with permanent surface outflow **and no obvious natural outlet** and/or outlet is a man-made ditch points = 1 (*If ditch is not permanently flowing treat unit as "intermittently flowing"*) Provide photo or drawing	Figure 3
D	S 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic *(use NRCS definitions)* YES points = 4 NO points = 0	0
D	D 1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest Cowardin class) Wetland has persistent, ungrazed, vegetation >= 95% of area points = 5 Wetland has persistent, ungrazed, vegetation >= 1/2 of area points = 3 Wetland has persistent, ungrazed vegetation >= 1/10 of area points = 1 Wetland has persistent, ungrazed vegetation <1/10 of area points = 0 Map of Cowardin vegetation classes	Figure 5
D	D1.4 Characteristics of seasonal ponding or inundation. *This is the area of the wetland unit that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 yrs.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0 Map of Hydroperiods	Figure 4
D	**Total for D 1** *Add the points in the boxes above*	12
D	**D 2. Does the wetland unit have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* — Grazing in the wetland or within 150 ft — Untreated stormwater discharges to wetland — Tilled fields or orchards within 150 ft of wetland — A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging — Residential, urban areas, golf courses are within 150 ft of wetland — Wetland is fed by groundwater high in phosphorus or nitrogen — Other_____ YES multiplier is 2 NO multiplier is 1	*(see p. 44)* multiplier 1
D	**TOTAL - Water Quality Functions** Multiply the score from D1 by D2 *Add score to table on p. 1*	12

Wetland name or number D

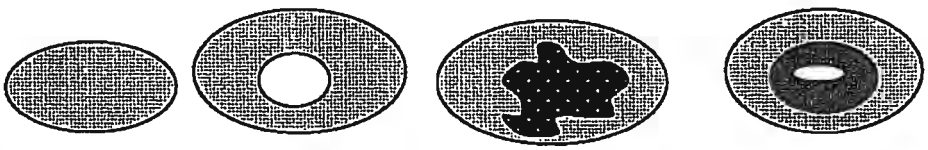
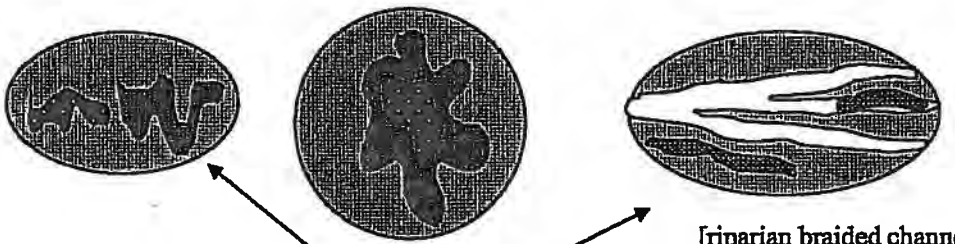
	D. Depressional and Flats Wetlands HYDROLOGIC FUNCTIONS - Indicators that the wetland unit functions to reduce flooding and stream degradation	Points (only 1 score per box)
	D 3. Does the wetland unit have the potential to reduce flooding and erosion?	*(see p. 46)*
D	D 3.1 Characteristics of surface water flows out of the wetland unit Unit is a depression with no surface water leaving it (no outlet) points = 4 Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 Unit is a "flat" depression (Q. 7 on key), or in the Flats class, with permanent surface outflow **and no obvious natural outlet** and/or outlet is a man-made ditch points = 1 *(If ditch is not permanently flowing treat unit as "intermittently flowing")* Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) points = 0	4
D	D 3.2 Depth of storage during wet periods *Estimate the height of ponding above the bottom of the outlet. For units with no outlet measure from the surface of permanent water or deepest part (if dry).* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 The wetland is a "headwater" wetland" points = 5 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 Unit is flat (yes to Q. 2 or Q. 7 on key) but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft points = 0	0
D	D 3.3 Contribution of wetland unit to storage in the watershed *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* The area of the basin is less than 10 times the area of unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 Entire unit is in the FLATS class points = 5	3
D	**Total for D 3** *Add the points in the boxes above*	7
D	**D 4. Does the wetland unit have the opportunity to reduce flooding and erosion?** Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. Answer NO if the water coming into the wetland is controlled by a structure such as flood gate, tide gate, flap valve, reservoir etc. OR you estimate that more than 90% of the water in the wetland is from groundwater in areas where damaging groundwater flooding does not occur. *Note which of the following indicators of opportunity apply.* — Wetland is in a headwater of a river or stream that has flooding problems — Wetland drains to a river or stream that has flooding problems — Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems — Other_____ **YES** multiplier is 2 **NO** multiplier is 1	*(see p. 49)* multiplier 2
D	**TOTAL - Hydrologic Functions** Multiply the score from D 3 by D 4 ***Add score to table on p. 1***	14

Wetland name or number D

These questions apply to wetlands of all HGM classes. HABITAT FUNCTIONS - Indicators that unit functions to provide important habitat	Points (only 1 score per box)
H 1. Does the wetland unit have the potential to provide habitat for many species?	
H 1.1 Vegetation structure *(see p. 72)* *Check the types of vegetation classes present (as defined by Cowardin)- Size threshold for each class is ¼ acre or more than 10% of the area if unit is smaller than 2.5 acres.* ____Aquatic bed ____Emergent plants ____Scrub/shrub (areas where shrubs have >30% cover) __X__Forested (areas where trees have >30% cover) *If the unit has a forested class check if:* __X__The forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the forested polygon *Add the number of vegetation structures that qualify. If you have:* 4 structures or more — points = 4 3 structures — points = 2 2 structures — points = 1 1 structure — points = 0 Map of Cowardin Vegetation classes	Figure ____ 1
H 1.2. Hydroperiods *(see p. 73)* *Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ acre to count. (see text for descriptions of hydroperiods)* ____Permanently flooded or inundated — 4 or more types present — points = 3 ____Seasonally flooded or inundated — 3 types present — points = 2 __X__Occasionally flooded or inundated — 2 types present — point = 1 __X__Saturated only — 1 type present — points = 0 ____Permanently flowing stream or river in, or adjacent to, the wetland ____Seasonally flowing stream in, or adjacent to, the wetland ____***Lake-fringe wetland*** **= 2 points** ____***Freshwater tidal wetland*** **= 2 points** Map of hydroperiods	Figure ____ 1
H 1.3. Richness of Plant Species *(see p. 75)* Count the number of plant species in the wetland that cover at least 10 ft^2. *(different patches of the same species can be combined to meet the size threshold)* *You do not have to name the species.* *Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle* If you counted: > 19 species — points = 2 5 - 19 species — points = 1 < 5 species — points = 0 *List species below if you want to:*	0

Total for page 2

Wetland name or number D

	Figure
H 1.4. Interspersion of habitats *(see p. 76)* Decide from the diagrams below whether interspersion between Cowardin vegetation classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.  None = 0 points Low = 1 point Moderate = 2 points  High = 3 points [riparian braided channels] NOTE: If you have four or more classes or three vegetation classes and open water the rating is always "high". Use map of Cowardin vegetation classes	0
H 1.5. Special Habitat Features: *(see p. 77)* *Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.* ____Large, downed, woody debris within the wetland (>4in. diameter and 6 ft long). ____Standing snags (diameter at the bottom > 4 inches) in the wetland ____Undercut banks are present for at least 6.6 ft (2m) and/or overhanging vegetation extends at least 3.3 ft (1m) over a stream (or ditch) in, or contiguous with the unit, for at least 33 ft (10m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (>30degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet turned grey/brown)* ____At least ¼ acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* X Invasive plants cover less than 25% of the wetland area in each stratum of plants *NOTE: The 20% stated in early printings of the manual on page 78 is an error.*	1
H 1. TOTAL Score - potential for providing habitat *Add the scores from H1.1, H1.2, H1.3, H1.4, H1.5*	3

Comments

Wetland name or number D

H 2. Does the wetland unit have the opportunity to provide habitat for many species?	
H 2.1 Buffers *(see p. 80)* *Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed."* — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference. No structures are within the undisturbed part of buffer. (relatively undisturbed also means no-grazing, no landscaping, no daily human use) **Points = 5** — 100 m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference. **Points = 4** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference. **Points = 4** — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference, . **Points = 3** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference. **Points = 3** **If buffer does not meet any of the criteria above** — No paved areas (except paved trails) or buildings within 25 m (80ft) of wetland > 95% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — No paved areas or buildings within 50m of wetland for >50% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — Heavy grazing in buffer. **Points = 1** — Vegetated buffers are <2m wide (6.6ft) for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland **Points = 0.** — Buffer does not meet any of the criteria above. **Points = 1** Aerial photo showing buffers	Figure 5
H 2.2 Corridors and Connections *(see p. 81)* H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft wide, has at least 30% cover of shrubs, forest or native undisturbed prairie, that connects to estuaries, other wetlands or undisturbed uplands that are at least 250 acres in size? *(dams in riparian corridors, heavily used gravel roads, paved roads, are considered breaks in the corridor)* YES = **4 points** *(go to H 2.3)* NO = go to H 2.2.2 H 2.2.2 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 50ft wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands or undisturbed uplands that are at least 25 acres in size? **OR a Lake-fringe** wetland, if it does not have an undisturbed corridor as in the question above? YES = **2 points** *(go to H 2.3)* NO = H 2.2.3 H 2.2.3 Is the wetland: within 5 mi (8km) of a brackish or salt water estuary OR within 3 mi of a large field or pasture (>40 acres) OR within 1 mi of a lake greater than 20 acres? YES = **1 point** NO = **0 points**	2

Total for page 7

Wetland name or number D

H 2.3 Near or adjacent to other priority habitats listed by WDFW *(see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report http://wdfw.wa.gov/hab/phslist.htm)* Which of the following priority habitats are within 330ft (100m) of the wetland unit? *NOTE: the connections do not have to be relatively undisturbed.* ____**Aspen Stands:** Pure or mixed stands of aspen greater than 0.4 ha (1 acre). ____**Biodiversity Areas and Corridors:** Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report p. 152*). ____**Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock. ____**Old-growth/Mature forests:** (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. (Mature forests) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest. ____**Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158*). ____**Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other. ____**Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161*). _X_**Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources. ____**Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report: pp. 167-169 and glossary in Appendix A).* ____**Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human. ____**Cliffs:** Greater than 7.6 m (25 ft) high and occurring below 5000 ft. ____**Talus:** Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs. ____**Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long. If wetland has **3 or more** priority habitats = **4 points** If wetland has **2** priority habitats = **3 points** If wetland has **1** priority habitat = **1 point** No habitats = 0 points *Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)*	1

Wetland name or number D

H 2.4 Wetland Landscape *(choose the one description of the landscape around the wetland that best fits) (see p. 84)* There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development. points = 5 The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within ½ mile points = 5 There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed points = 3 The wetland is Lake-fringe on a lake with disturbance and there are 3 other lake-fringe wetland within ½ mile points = 3 There is at least 1 wetland within ½ mile. points = 2 There are no wetlands within ½ mile. points = 0	3
H 2. TOTAL Score - opportunity for providing habitat *Add the scores from H2.1,H2.2, H2.3, H2.4*	11
TOTAL for H 1 from page 14	3
Total Score for Habitat Functions – add the points for H 1, H 2 and record the result on p. 1	14

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10 October 2012

RECEIVED
FEB 28 2013
BY 12-239

Jeff Pantier, PLS
Sr. Vice President
Hatton Godat Pantier
3910 Martin Way E, Suite B
Olympia, WA 98506

Reference: Britton Parkway Property
Subject: Mazama Pocket Gopher Study

Dear Mr. Pantier:

At your request, EnviroVector has performed a Mazama pocket gopher study on the 125-acre subject property (11810103000, 11803430000, 11803420000, 11803340000 and 11803340100) located on Britton Parkway NE, Olympia, Thurston County, Washington in Section 10, Township 18 North, Range 01 West, Willamette Meridian.

The Mazama pocket gopher study had been performed on the 28 September 2012 to evaluate the possible presence of Mazama pocket gopher activity on the subject property. The Mazama pocket gopher survey protocol has been implemented in compliance with the Revised March 2011 Washington Department of Fish and Wildlife (WDFW) Mazama Pocket Gopher Management Recommendations. The search pattern had been performed along 10-foot transects, including in brushy and treed areas to seek evidence of mounding activity created by the Mazama pocket gopher.

Results:

Mazama Pocket Gopher Survey. No positive confirmation of Mazama pocket gopher mounds had been determined on the subject property during the site evaluation. Four mounds characteristic of the common mole were identified on a forested trail. These mounds were conical shaped and positioned within a straight line. No crescent-shaped mounds typical of the Mazama pocket gopher were identified on the subject property or in the immediate vicinity of the subject property. No mounds were identified in the right-of-way or adjacent to Britton

EXHIBIT
9

Parkway. The site is primarily forested with small isolated areas that are partially cleared of native vegetation and dominated by dense thickets of Scotch broom.

Mazama Pocket Gopher Habitat:
No significant habitat occurs on the subject property. Only very marginal habitat occurs in small isolated clearings dominated by Scotch broom (**Appendix B, photos 2 & 3**). These small clearings are located within large areas of dense forest. Dense forest covers the majority of the subject property (**Appendix A, Map of Subject Property; Appendix B, Photos 4-6**). The Mazama pocket gopher prefers prairie habitat, which does not occur on the subject property. No mounds were found in grassy areas adjacent to Britton Parkway (**Appendix B, Photo 1**).

Soils on the site are identified by the NRCS as:

Soil Types	Gopher Soil
Gillis Silt Loam	No
Alderwood Gravelly Sandy Loam	No
Indianola Loamy Sand	Yes
Bellingham Clay Loam	No
Everett Very Gravelly Sandy Loam	Yes
Spanaway Gravelly Sandy loam	Yes

Several of the identified soil types on the subject property are consistent with that occurring in habitat preferable by the Mazama pocket gopher. However, these areas are forested and contain no pocket gopher habitat of significance.

No prairie habitat was found on the subject property. The entire property is forested, other than small clearings of Scotch broom.

Conclusion:
The entire subject property had been evaluated for the Mazama pocket gopher in accordance with the Revised March 2011 WDFW Mazama Pocket Gopher Management Recommendations. No mounds characteristic of that created by the Mazama pocket gopher have been identified on the subject property or in the immediate vicinity. No significant Mazama pocket gopher habitat occurs on the subject property. The entire subject property is heavily forested other than small, isolated patches dominated by Scotch broom. Although several prairie soil types occur on the subject property, these areas are dominated by dense forest. No prairie habitat had been identified on the subject property.

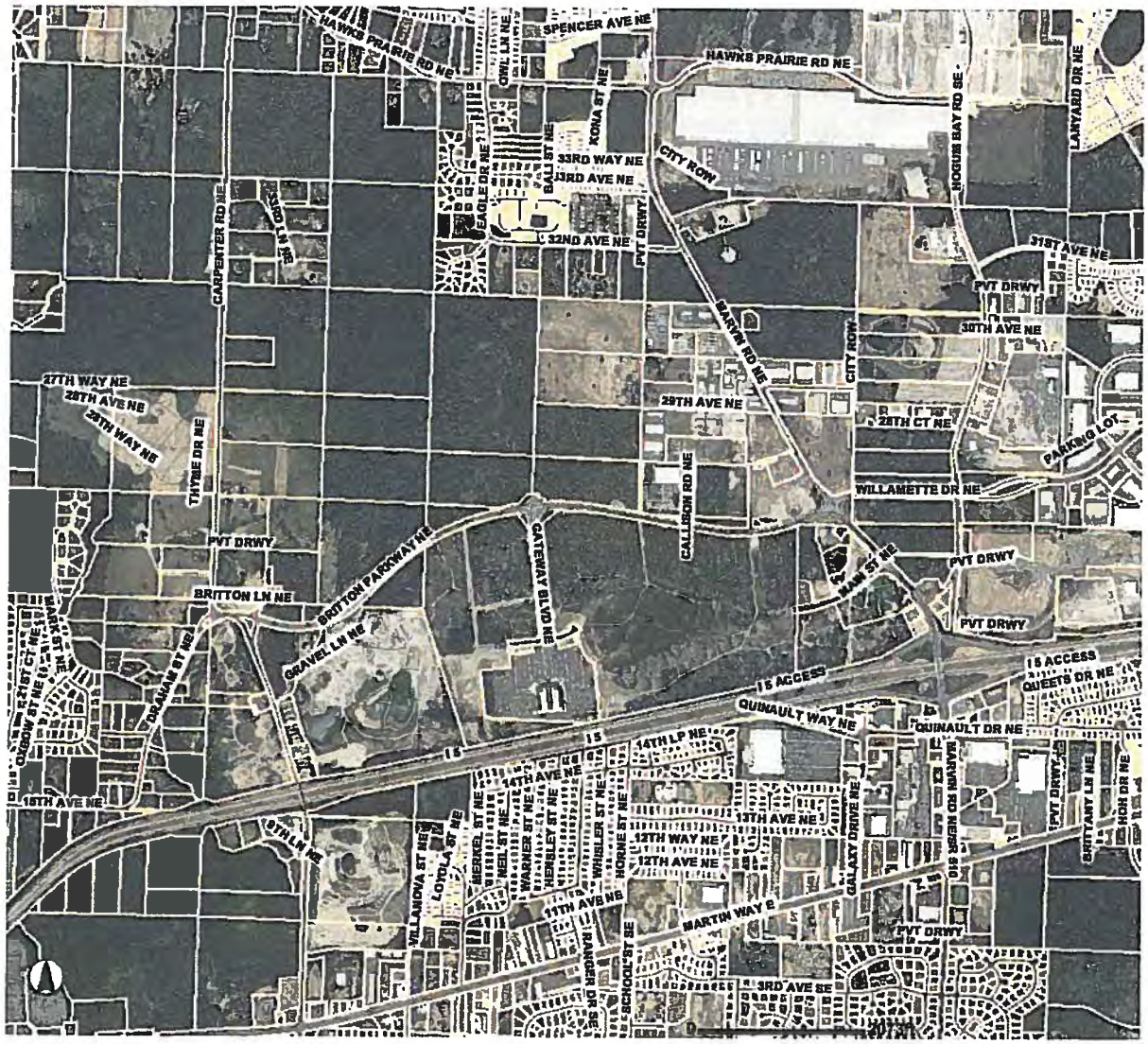
If you have any questions, you can contact me at (360) 790-1559.

Sincerely,

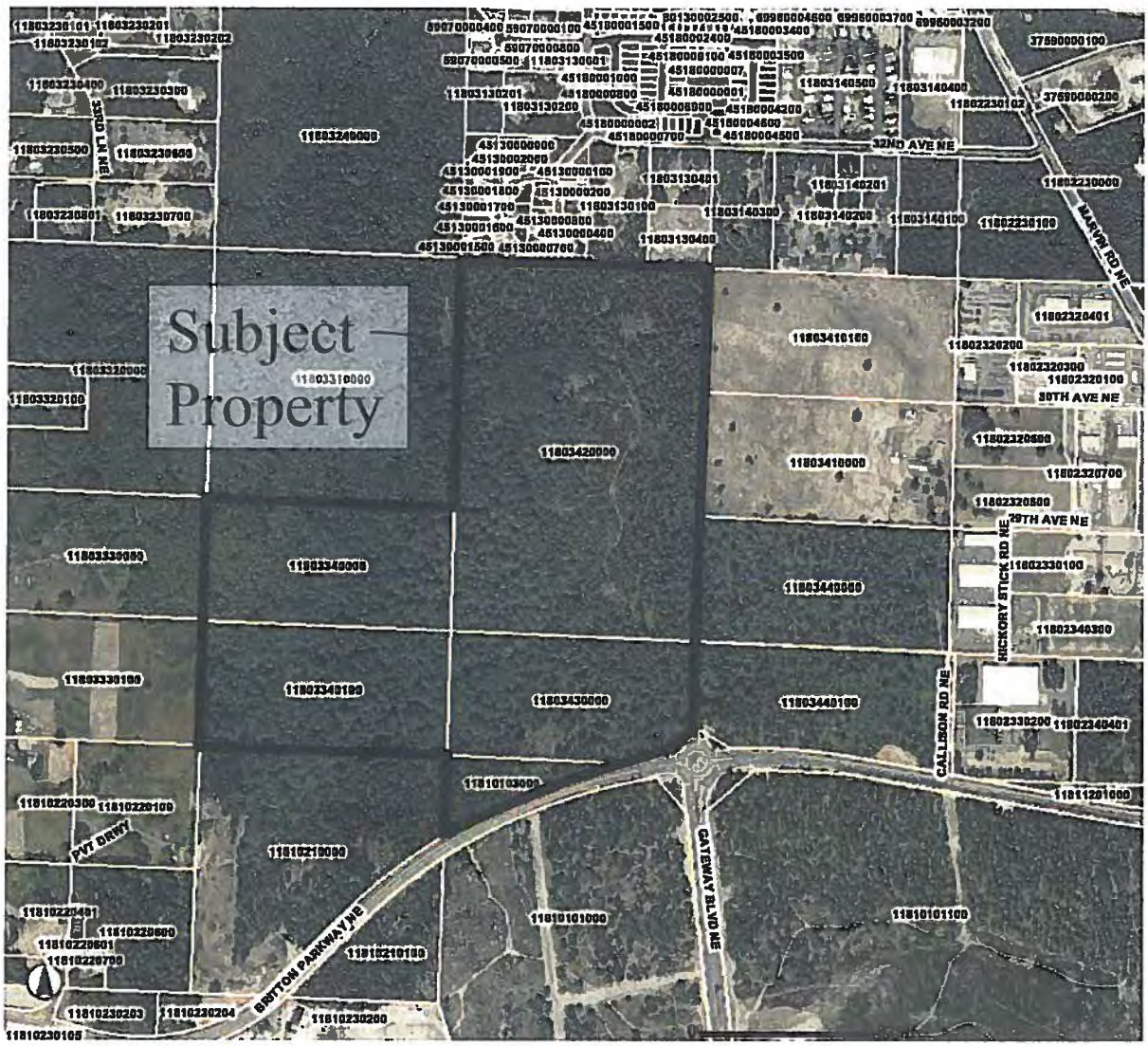
Curtis Wambach, M.S.
Senior Biologist and Principal
EnviroVector

Appendix: B

Maps



Vicinity Map



Subject Property

Appendix: B

Photographs

Photo 1. Britton Parkway

Photo 2. Small Isolated clearings dominated by Scotch broom

Photo 3. Small isolated clearings dominated by grass & Scotch broom

Photo 4. Dense forest typical of E portion of subject property

Photo 5. Dense forest typical of N portion of Subject Property

Photo 6. Dense forest typical of W portion of subject property

Lacey Gateway Residential Phase 1

Transportation Impact Study

April 23, 2013

Prepared for:

Gateway 850 LLC
15 Lake Bellevue Drive
Suite 102
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Prepared by:

TENW

Transportation Engineering NorthWest

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Table of Contents

EXECUTIVE SUMMARY 1

INTRODUCTION 2

Traffic Scoping Report 2

Project Approach 2

Primary Data and Information Sources 2

TRAFFIC IMPACT ANALYSIS 3

1. Prospectus 3
2. Existing Conditions 6
3. Development Traffic 8
4. Trip Generation 8
5. Trip Distribution 9
6. Future Traffic Conditions 9
7. Traffic Operations 13
8. Access Management 16
9. Traffic Calming 16
10. Alternate Modes of Transportation 16
11. Mitigation 16
12. Concurrency 17

Appendices

Appendix A – City Lacey Traffic Scope Letter

Appendix B – Existing Traffic Counts

Appendix C – Level of Service (LOS) Worksheets

Appendix D – TAZ 239 Model Distribution Plot

List of Figures and Tables

Figure 1 Project Site Vicinity 4

Figure 2 Preliminary Site Plan 5

Figure 3 Year 2013 Existing PM Peak Hour Traffic Volumes 7

Figure 4. Project Trip Assignment – PM Peak Hour 10

Figure 5 Year 2016 Future Without-Project PM Peak Hour Traffic Volumes 11

Figure 6 Year 2016 Future With-Project PM Peak Hour Traffic Volumes 12

Table 1 Lacey Gateway Phase 1 Residential – Trip Generation 8

Table 2 2013 Existing Peak Hour Level of Service Summary 14

Table 3 2016 Future With and Without-Project PM Peak Hour LOS Summary 15

EXECUTIVE SUMMARY

Project Proposal. The proposed project would include the first of several phases of the Lacey Gateway residential development. This first phase is fully located within the Lacey city limits and would include 86 single-family residential units and up to 250 multi-family residential units. The project is located on the north side of Britton Parkway and northwest of the Britton Parkway roundabout intersection with Gateway Boulevard. Primary vehicle access for Phase 1 is proposed via the extension Gateway Boulevard from the existing roundabout at Britton Parkway north about 660 feet to the new intersection with proposed Road B. A secondary access would be created in the future with a new road connection to the Britton Place development to the south with an eventual intersection connection to Britton Parkway.

Trip Generation. Phase 1 is estimated to generate a total of about 2,341 trips per day with 177 occurring during the weekday AM peak hour and 219 during the PM peak hour.

Lacey LOS Impacts & Concurrency. Based on scoping comments provided by City of Lacey, Thurston County, and WSDOT, future year 2016 PM peak hour LOS analyses were conducted at 14 study intersections to determine traffic impacts of the project. The results of the LOS analyses indicate that several of the study intersections are expected to operate at LOS E or F with or without the proposed project. However, all of these intersections are located on one of the City's established Strategy Corridors, and are exempt from the City's LOS standards. The following measures are proposed to mitigate impacts to City intersections these *strategy corridor* consistent with the City's adopted Concurrency standards:

(1) Develop roads with integrated bicycle and pedestrian facilities.

(2) Complete and connect street grid roads identified in the City's 6-year TIP.

(3) Develop road grid consistent with City Access Management requirements.

(4) Identify parking management measures.

(5) Implement improvements designed to encourage pedestrian use.

Lacey Mitigation Costs. Based on City of Lacey Municipal Code 14.21.040, the proposed project will be required to pay a transportation mitigation cost. The mitigation cost calculation is provided by the City Transportation Department, and is based on the number of PM peak hour trips generated by the proposed project affecting the current City TIP project list.

Thurston County Mitigation. To mitigate impacts to the Thurston County roadway system, a pro-rata share estimate will be calculated by the County based on 219 PM peak hour trips distributed to the current County TIP project list.

WSDOT Impacts. City of Lacey collects transportation mitigation costs for impacts to the Marvin Road interchange with I-5. Payment of the City's transportation mitigation cost is anticipated to mitigate impacts of the proposed Lacey Gateway Phase 1 development to WSDOT facilities, namely the Marvin Road interchange.

INTRODUCTION

Section 4B.030 of the City of Lacey Development Guidelines and Public Works Standards, Chapter 4 – Transportation, identifies a standardized format for a Traffic Impact Analysis (TIA). A TIA is a specialized study of the impacts that a proposed development project will have on the transportation system.

It is the intent of this report to follow the City of Lacey TIA requirements in preparing this report. Impacts to Thurston County roads are also included, where appropriate.

The proposed project would include the first of several phases of the Lacey Gateway residential development. This first phase is fully located within the Lacey city limits and would include 86 single-family residential units and up to 250 multi-family residential units.

Traffic Scoping Report

The scope of work for this TIA was established based on comments received by City of Lacey, Thurston County, and WSDOT from the City's Traffic Scoping letter dated March 26, 2013. A total of 14 study intersections were identified for evaluation during future weekday PM peak hour conditions in year 2016. A copy of the City's Traffic Scoping letter is provided in Appendix A.

Project Approach

To analyze the traffic impacts of the Lacey Gateway Phase 1 Residential Development, the following tasks were undertaken consistent with City of Lacey TIA guidelines:

1. Prospectus
2. Existing Conditions
3. Development Traffic
4. Trip Generation
5. Trip Distribution
6. Future Traffic Conditions
7. Traffic Operations
8. Access Management
9. Traffic Calming
10. Alternate Modes of Transportation
11. Mitigation
12. Concurrency

Primary Data and Information Sources

- TENW Traffic Scoping Letter – dated February 14, 2013
- City of Lacey Traffic Scoping Letter – dated March 26, 2013.
- ITE *Trip Generation Manual*, 9th Edition, 2012.
- *Highway Capacity Manual*, TRB, Year 2010 Edition.
- Year 2013 PM Peak Hour Traffic Volumes; source: TCC.
- City of Lacey 2030 Transportation Plan, adopted December 2012
- City of Lacey 2013-2018 TIP.

TRAFFIC IMPACT ANALYSIS

1. Prospectus

a) The Lacey Gateway residential project is located on the north side of Britton Parkway and northwest of the Britton Parkway roundabout intersection with Gateway Boulevard as show in the Figure 1 vicinity map. The site is located in the City of Lacey, and all of the adjacent roads are located within the City of Lacey.

b) A preliminary site plan concept is provided in Figure 2. Primary vehicle access for Phase 1 is proposed via the extension Gateway Boulevard from the existing roundabout at Britton Parkway north about 660 feet to the new intersection with proposed Road B. A secondary access would be created in the future with a new road connection to the Britton Place development to the south with an eventual intersection connection to Britton Parkway. All project-generated trips for Phase 1 were assumed to access the City road system via the extension of Gateway Boulevard. As shown in the Figure 2 Site Plan, three stub roads to the north are anticipated to provide access to future phases of the Lacey Gateway residential development.

c) The proposed project would include the first of several phases of residential development; this first phase is fully located within the Lacey city limits. Phase 1 would include 86 single-family residential units and up to 250 multi-family residential units.

d) The Phase 1 development is expected to be complete and occupied by year 2016. The horizon year for this Traffic Impact Analysis is 2016.

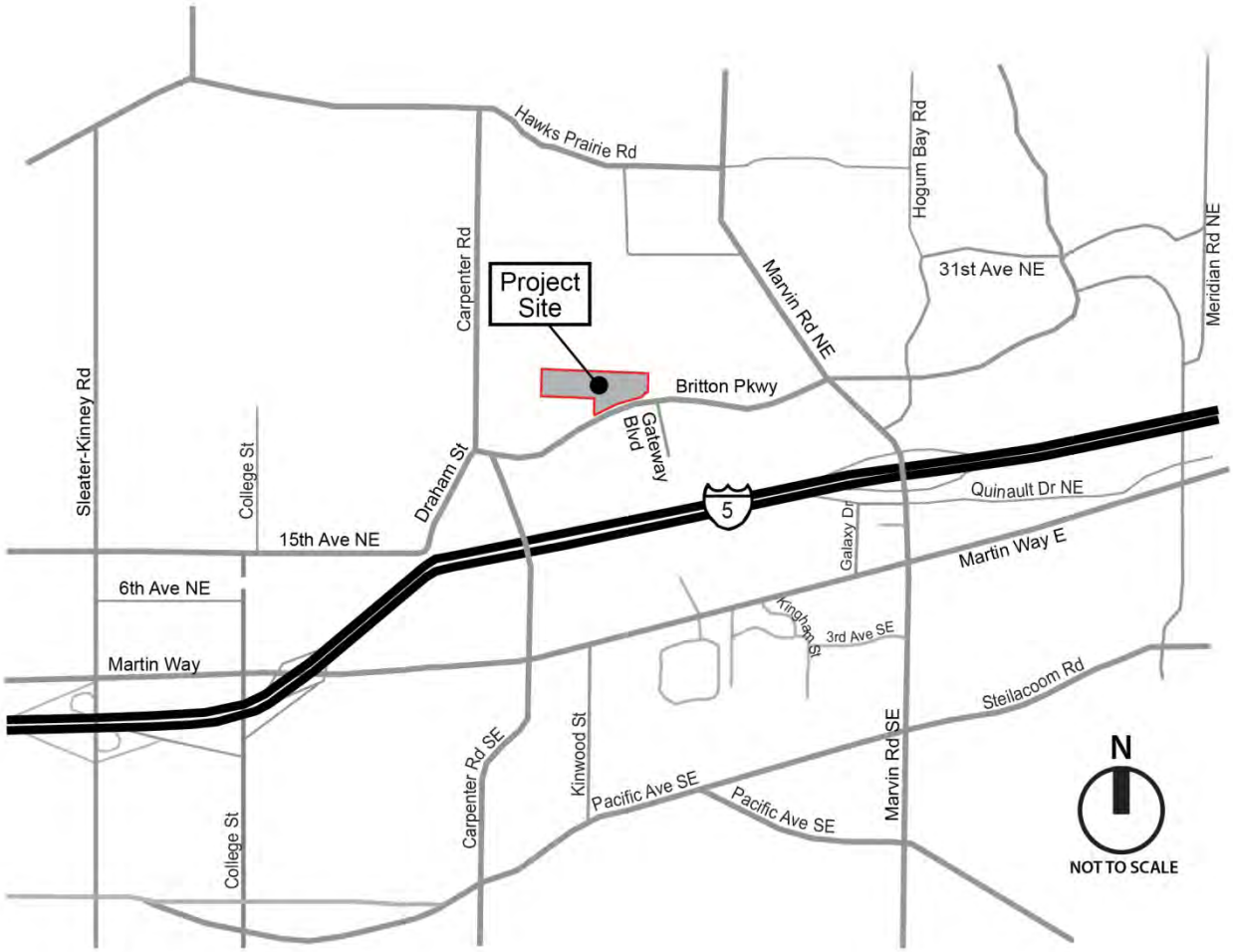
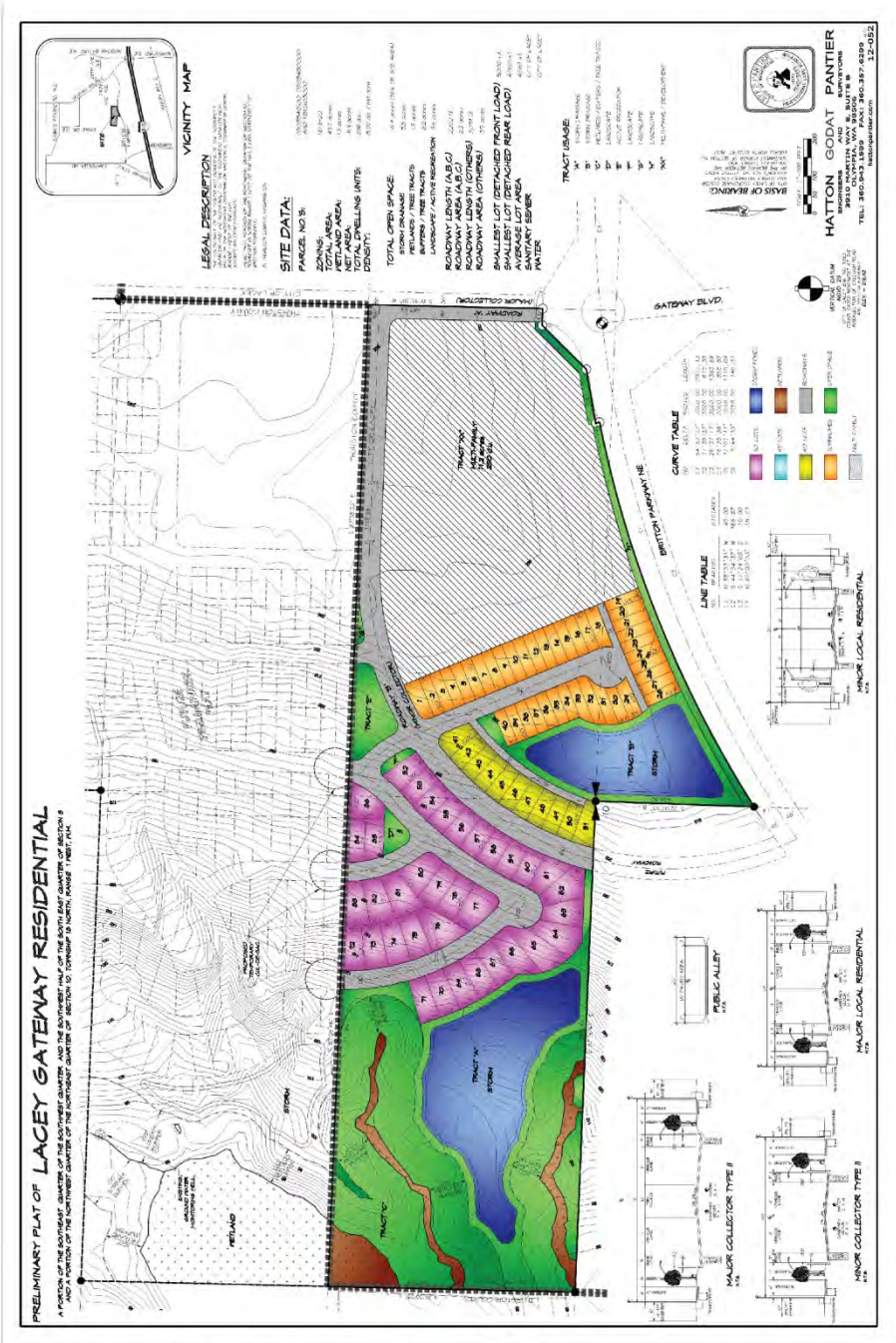


Figure 1: Site Vicinity



Preliminary site plan provided by Taylor Development January 18, 2013.

Figure 2: Preliminary Site Plan

2. Existing Conditions

a) The following describes existing transportation system conditions in the study area, including an inventory of existing roads, existing traffic volumes, and public transportation services.

Britton Parkway is a four-lane east-west major arterial with a 40 mph post speed east of Gateway Boulevard; two lanes exist on Britton east of Gateway Boulevard. Curb, gutter, and sidewalks exist on both sides. A center median exists with openings at major driveways and intersections.

Gateway Boulevard is a four-lane north-south arterial with a 30 mph post speed limit and curb/gutter/sidewalk on both sides between Britton Parkway and Cabellas.

Marvin Road is a four-lane north-south major arterial with a center median and roundabouts or signals at major intersections. Curb, gutter, and sidewalks exist on both sides of the street which has a posted speed of 35 mph.

Martin Way is a five-lane east-west major arterial with two travel lanes in each direction and center turn lane. Posted speed limit is 35 mph. Major intersections are signalized, and curb/gutter/sidewalk exist on both side of the road.

Carpenter Road is a 2-lane road with no sidewalks and a posted speed limit of 35 mph in proximity to Britton Parkway.

b) Weekday PM peak hour trips from approved pipeline projects were provided by the City, and included in future background traffic projections.

c) Non-motorized facilities in the project vicinity include striped bicycle lanes on Britton Parkway, Gateway Boulevard, Marvin Road, and Martin Way. In the site vicinity, pedestrian facilities include sidewalks on Britton Parkway and Gateway Boulevard.

d) The City of Lacey provided PM peak hour traffic volumes at several of the study intersections; counts conducted in 2012 were increased by 4 percent to estimate year 2013 existing conditions. Additionally, some new traffic counts were conducted in March of 2013 at study intersections where the City did not have recent counts.

e) The PM peak hour traffic count data sheets for each of the study intersections are provided in Appendix B.

f) Figure 3 illustrates the existing PM peak hour turning movements at the 14 study area intersections. The weekday PM peak hour traffic volumes represent the highest hourly volume of vehicles traveling through an intersection during a typical 4:00 to 6:00 p.m. peak period.

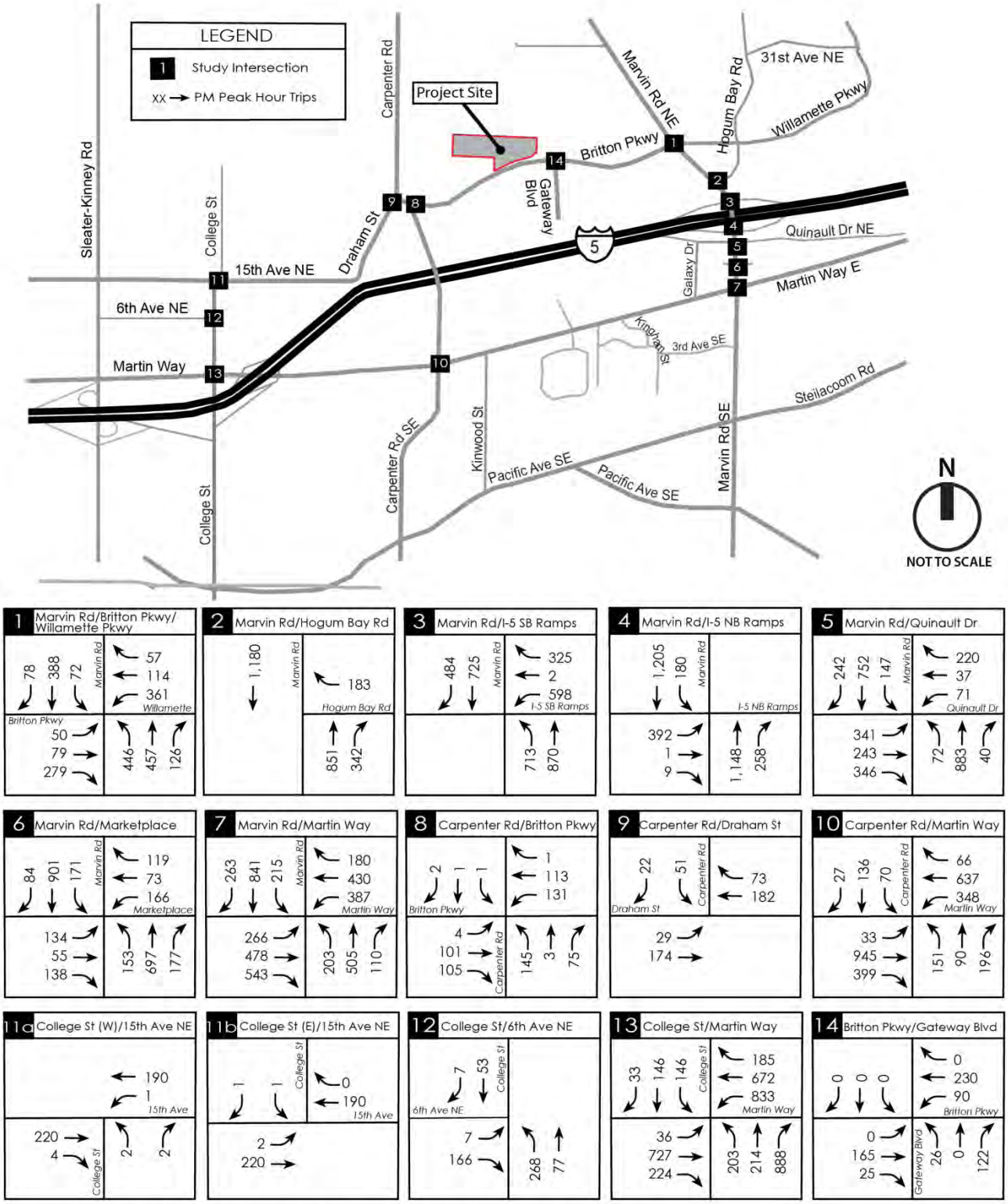


Figure 3: 2013 Existing PM Peak Hour Traffic Volumes

3. Development Traffic

Based on comments provided by the City of Lacey, which were also reviewed by Thurston County and WSDOT, a total of 14 study intersections were identified for evaluation in this traffic impact analysis. The following is a list of the 14 study intersections.

1. Marvin Road / Britton Pkwy / Willamette Dr Roundabout
2. Marvin Road / Hogum Bay Road Stop Controlled
3. Marvin Road / I-5 SB Ramps SIGNAL
4. Marvin Road / I-5 NB Ramps SIGNAL
5. Marvin Road / Quinault Drive SIGNAL
6. Marvin Road / Lacey Marketplace SIGNAL
7. Marvin Road / Martin Way SIGNAL
8. Carpenter Road / Britton Pkwy Stop Controlled
9. Carpenter Road / Draham Street Stop Controlled
10. Carpenter Road / Martin Way SIGNAL
11. College Street NE / 15th Ave NE Stop Controlled
12. College Street NE / 6th Ave NE Stop Controlled
13. College Street / Martin Way SIGNAL
14. Britton Parkway NE / Gateway Blvd Roundabout

Each of these intersections was included in the study area for PM peak hour analysis and potential mitigation.

4. Trip Generation

The weekday daily, AM and PM peak hour trip generation estimates for the first phase of the proposed Lacey Gateway residential development were based on trip equations provided in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 9th edition, using Land use code (LUC) 210. The trip generation estimates are summarized in Table 1.

Table 1
Lacey Gateway Phase 1 Residential – Trip Generation

Time Period	In	Out	Total
Weekday Daily	1,170	1,171	2,341
Weekday AM Peak Hour	35	142	177
Weekday PM Peak Hour	143	76	219

As shown, Phase 1 would generate a total of about 2,341 trips per day with 177 occurring during the weekday AM peak hour and 219 during the PM peak hour.

5. Trip Distribution

The trip distribution of phase 1 residential trips during the PM peak hour for the Gateway project was estimated based on the TRPC model distribution for Zone 239, which was provided by the City of Lacey. A summary of the model's PM peak hour trip distribution is provided in Appendix D. The PM peak hour assignment of project trips for Phase 1 is shown in Figure 4 at each of the 14 study intersections impacted by 20 or more PM peak hour project trips. All project-generated trips for Phase 1 were assumed to access the City road system via the extension of Gateway Boulevard.

6. Future Traffic Conditions

Future weekday PM peak hour traffic volumes without the proposed Phase 1 Gateway Residential project were estimated for future year 2016 conditions. Future traffic volumes at the study intersections were developed based on existing PM peak hour traffic counts increased to account for background growth and anticipated pipeline project developments. A four (4) percent annual growth rate was used to account for general traffic growth in the area in addition to known pipeline developments. The weekday PM peak hour traffic volumes for year 2016 without the project are shown on Figure 5. All future pipeline project traffic volumes were provided by the City.

Adding the project-generated PM peak hour trips (shown in Figure 4) to the future without-project traffic volumes (Figure 5), results in future with-project traffic volumes, as shown in Figure 6.

Future year 2016 traffic volumes at the 6th Avenue NE and 15th Avenue NE study intersections on College Street were developed assuming the City's planned extension of College Street between 6th Avenue NE and 15th Avenue NE. Weekday PM peak period traffic counts were conducted at the intersections of Enterprise Drive/15th Avenue NE, Enterprise Drive/6th Avenue NE, and Midway Drive/6th Avenue NE to estimate existing traffic and potential cut-through traffic through that adjacent neighborhood. A total of 23 southbound trips and 37 northbound trips were shifted from Enterprise Drive and Midway Drive to College Road between 15th Avenue NE and 6th Avenue NE to estimate future year 2016 traffic volumes using the new College Road extension.

There are several planned transportation improvement projects identified in the *City of Lacey Six-Year 2013-2018 Transportation Improvement Program (TIP)* which are located in the site vicinity. Only the College Street NE Extension project was assumed to be complete by year 2016 for the purpose of establishing future no-action conditions.

- Hogum Bay Road Truck Route
- College Street NE Extension
- Marvin Road and Britton Parkway Intersection Improvements
- Martin Way / Marvin Road Interchange Justification Report
- Marvin Road Widening from Britton Parkway to Columbia Drive
- Carpenter Road Widening from Martin Way to Britton Parkway
- Britton Parkway and Carpenter Road Intersection Improvements
- Britton Parkway Phase II Widening from Gateway Boulevard to Carpenter Road
- Marvin Road Interchange Phase 2
- Lacey Hawks Prairie Business District Commercial Corridors

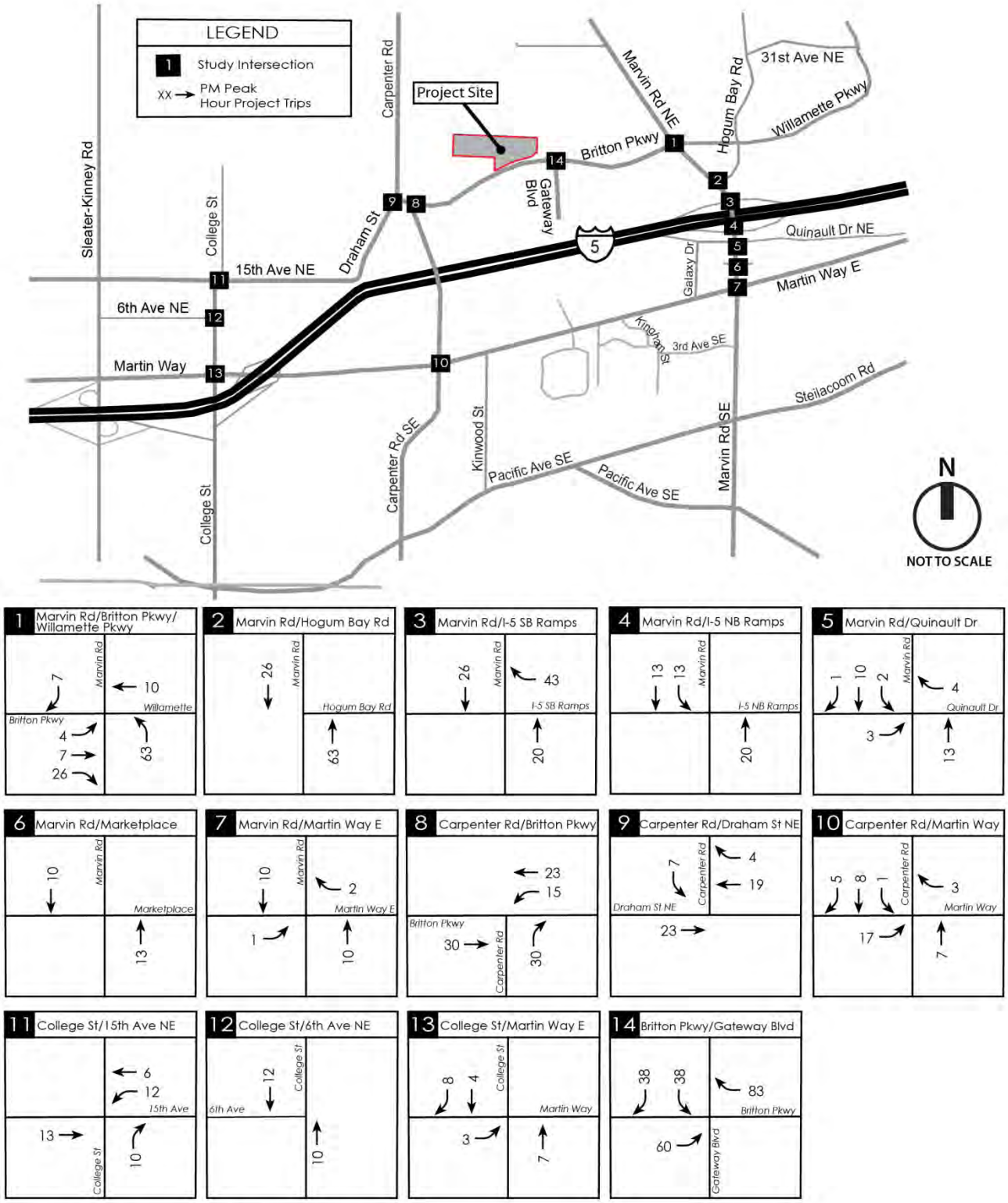


Figure 4: Project Trip Assignment

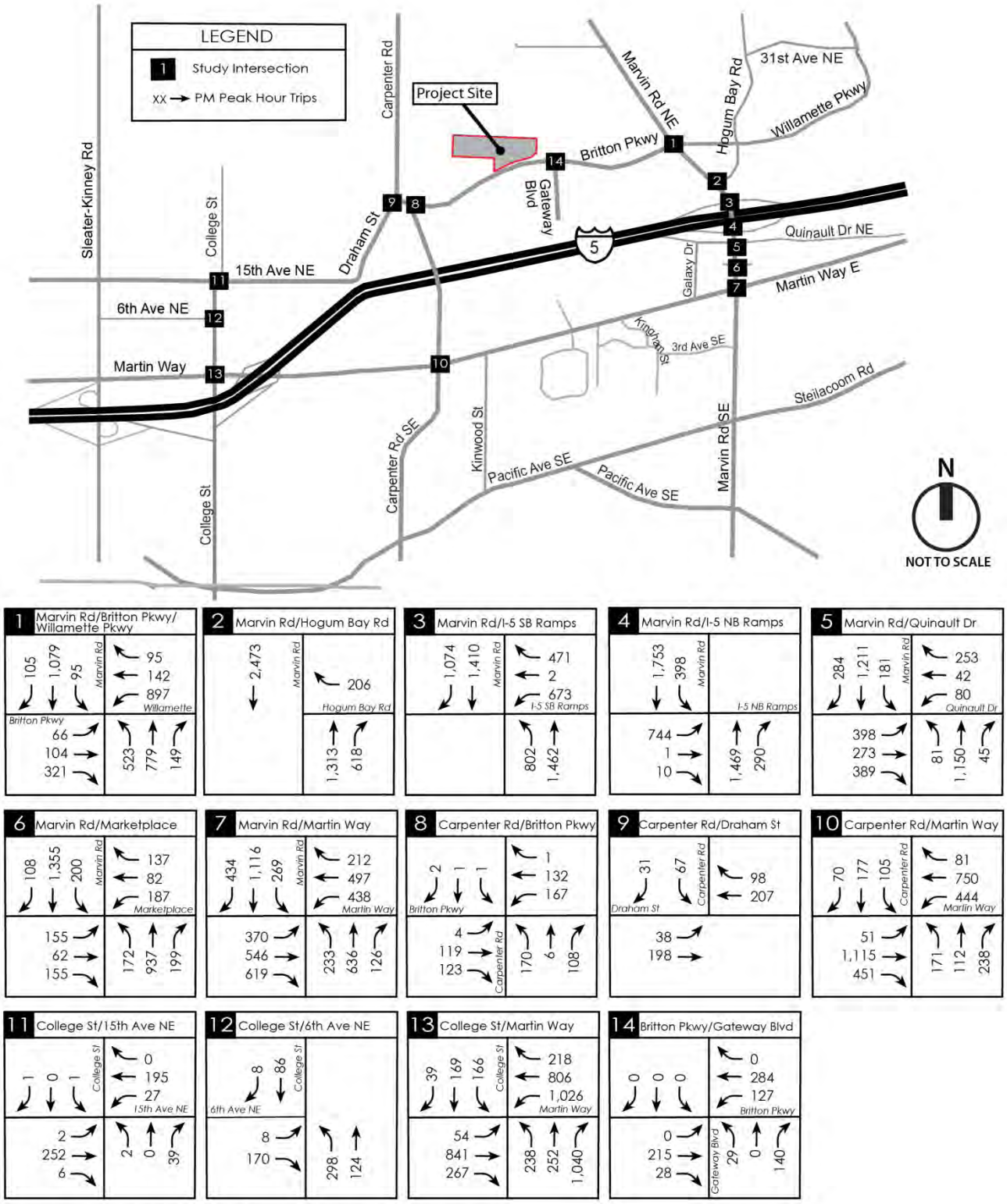


Figure 5: 2016 No Action Traffic Volumes

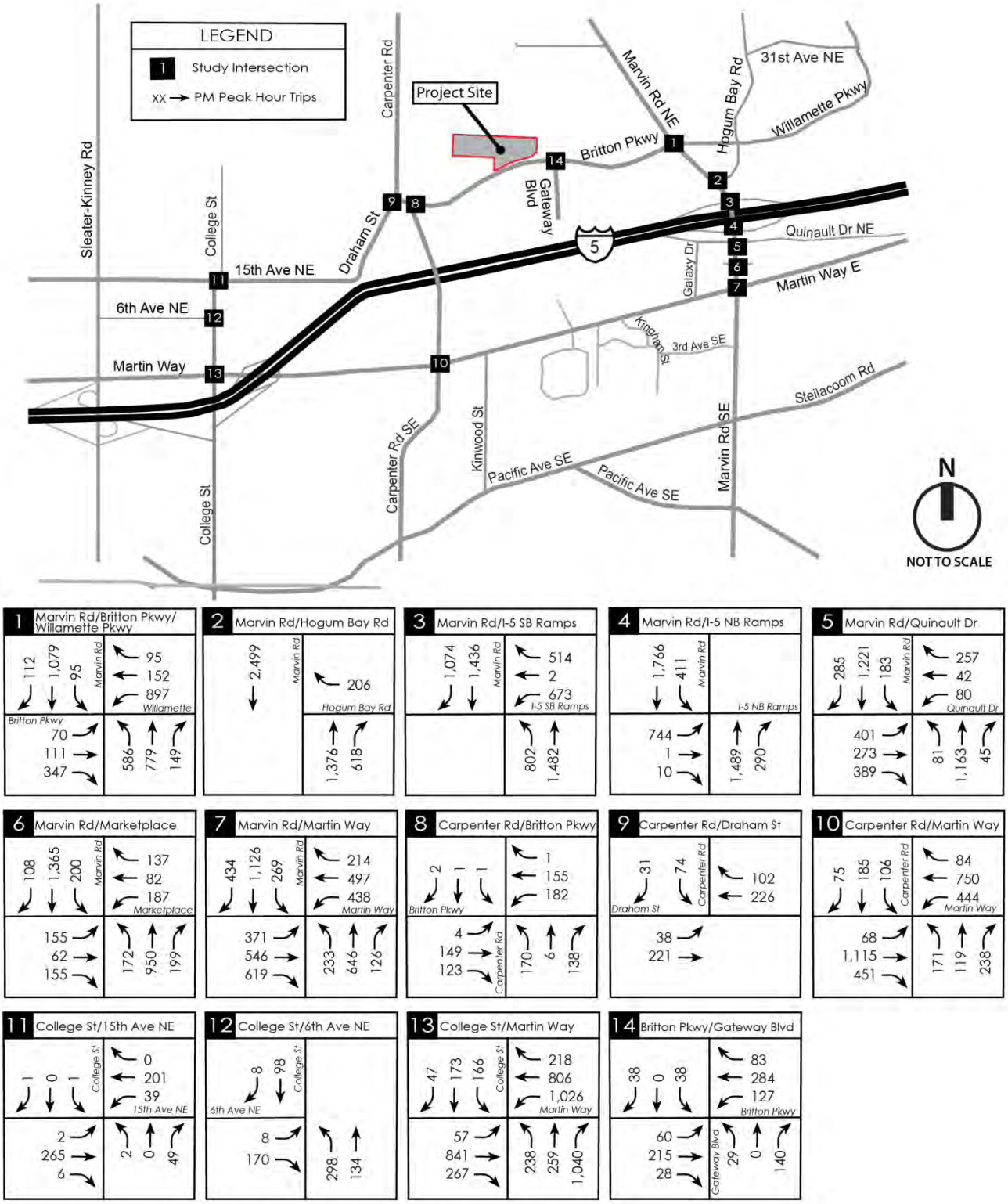


Figure 6: 2016 With-Project Traffic Volumes

7. Traffic Operations

Weekday PM peak hour level of service (LOS) analyses were conducted at the 14 study intersections for the following three conditions: (1) 2013 existing, (2) 2016 future without-project, and (3) 2016 future with-project.

The signal timing data used at the signalized study intersections was based on data provided by the City of Lacey. Existing weekday PM peak hour LOS analysis results for the 14 study intersections are summarized in Table 2. Table 3 summarizes the future intersection LOS with and without the proposed Phase 1 Lacey Gateway residential project. Detailed LOS worksheets are provided in Appendix C.

Intersection LOS are established based on the methodology and procedures outlined in the 2010 *Highway Capacity Manual*, Special Report 209, Transportation Research Board. Intersection LOS were determined using the *TEAPAC Complete 2010* program for the signalized study intersections, the *SIDRA Intersection 6* program for roundabouts, and the *Synchro 8* program for the unsignalized intersections.

The City of Lacey intersection LOS standard is LOS D outside Lacey Core Area, and LOS E for intersections within the Lacey Core Area. The study intersections located on Marvin Road and Martin Way are located on one of the City's *Strategy Corridors*, which are exempt from the City's LOS standards.

The results of the LOS analyses shown in Table 3 indicate that several of the study intersections are expected to operate at LOS E or F with or without the proposed Phase 1 Lacey Gateway residential development. However, all of these intersections are located either the Marvin Road or Martin Way Strategy Corridor, and are exempt from the City's LOS standards. The following mitigation has been identified consistent with the City's concurrency requirements for impacts to intersections on a strategy corridor:

(1) Develop roads with integrated bicycle and pedestrian facilities.

(2) Complete and connect street grid roads identified in the City's 6-year TIP.

(3) Develop road grid consistent with City Access Management requirements.

(4) Identify parking management measures.

(5) Implement improvements designed to encourage pedestrian use.

Table 2
2013 Existing Peak Hour Level of Service Summary

Study Intersection (approach movement)		LOS[1]	Delay (sec)	V/C[2]
Roundabouts:				
1. Marvin Road / Britton Pkwy *	overall	C	16.7	0.77
Northbound		B	12.7	0.61
Southbound		C	18.6	0.57
Eastbound		B	13.8	0.53
Westbound		C	25.0	0.77
14. Britton Pkwy / Gateway Blvd	overall	A	4.7	0.16
Northbound		A	4.7	0.14
Eastbound		A	4.5	0.11
Westbound		A	4.8	0.16
Signalized:				
3. Marvin Road / I-5 SB Ramps *		F	89.4	0.85
4. Marvin Road / I-5 NB Ramps *		C	23.6	0.57
5. Marvin Road / Quinault Drive *		E	67.5	0.73
6. Marvin Road / Lacey Marketplace *		D	44.8	0.70
7. Marvin Road / Martin Way *		E	60.6	0.75
10. Carpenter Road / Martin Way E *		E	60.1	0.70
13. College Street / Martin Way E *		E	76.2	0.78
Stop Controlled:				
2. Marvin Road / Hogum Bay Road NE *				
WB Right-Turn		C	15.7	0.38
8. Carpenter Road / Britton Parkway NE				
NB Left-Turn		C	18.5	0.29
WB Left-Turn		A	8.0	0.11
9. Carpenter Road / Draham Street NE				
SB Turns		B	12.2	0.14
EB Left-Turn		A	7.9	0.03
11. College Street / 15th Ave NE				
NB Turns		B	10.5	0.01
WB Left-Turn		A	7.7	0.00
12. College Street / 6th Ave NE				
SB Left-Turn		B	13.9	0.13
SB Right-Turn		A	9.5	0.01
EB Left-Turn		A	8.1	0.01

1. LOS = Level of Service, reported as intersection average for signalized intersections and by movement for RAB and stop sign controlled intersections.
2. V/C = Volume/Capacity ratio.
* Intersection is part of a Strategy Corridor as defined by the City of Lacey.

Table 3
2016 Future With and Without-Project PM Peak Hour LOS Summary

Study Intersection	(approach movement)	Year 2016 Without-Project LOS[1]	Delay (sec)	V/C[2]	Year 2016 Without-Project LOS	Delay (sec)	V/C
Roundabouts:							
1. Marvin Road / Britton Pkwy *	overall	F	>100	2.67	F	>100	2.81
Northbound		D	29.6	0.88	E	36.1	0.93
Southbound		F	>100	1.45	F	>100	1.53
Eastbound		D	29.2	0.79	D	30.1	0.81
Westbound		F	>100	2.66	F	>100	2.81
14. Britton Pkwy / Gateway Blvd	overall	A	5.2	0.21	A	5.9	0.27
Northbound		A	5.1	0.16	A	5.3	0.17
Southbound		-	-	-	A	5.7	0.11
Eastbound		A	5.1	0.14	A	5.7	0.18
Westbound		A	5.3	0.21	A	6.2	0.29
Signalized:							
3. Marvin Road / I-5 SB Ramps *		F	>100	1.27	F	>100	1.29
4. Marvin Road / I-5 NB Ramps *		E	68.6	0.85	E	69.3	0.86
5. Marvin Road / Quinault Drive *		F	94.4	0.94	F	96.8	0.95
6. Marvin Road / Lacey Marketplace *		E	60.3	0.90	E	60.8	0.90
7. Marvin Road / Martin Way *		F	92.5	0.94	F	96.4	0.94
10. Carpenter Road / Martin Way E *		F	81.4	0.83	F	81.8	0.83
13. College Street / Martin Way E *		F	>100	0.94	F	>100	0.94
Stop Controlled:							
2. Marvin Road / Hogum Bay Road NE *							
WB Right-Turn		D	29.7	0.62	D	33.2	0.66
8. Carpenter Road / Britton Parkway NE							
NB Left-Turn		D	26.2	0.43	D	33.0	0.51
WB Left-Turn		A	8.3	0.15	A	8.5	0.16
9. Carpenter Road / Draham Street NE							
SB Turns		B	13.6	0.21	B	14.7	0.24
EB Left-Turn		A	8.1	0.04	A	8.1	0.04
11. College Street / 15th Ave NE							
NB Left-Turn		B	13.4	0.00	B	14.1	0.00
NB Thru-Right		B	10.5	0.06	B	10.3	0.08
WB Left-Turn		A	7.9	0.02	A	7.9	0.03
12. College Street / 6th Ave NE							
NB Left-Turn		A	8.1	0.23	A	8.2	0.23
EB Left-Turn		C	21.4	0.04	C	22.1	0.04
EB Right-Turn		A	9.7	0.21	A	9.8	0.21

1. LOS = Level of Service, reported as intersection average for signalized intersections and by movement for RAB and stop sign controlled intersections.
2. V/C = Volume/Capacity ratio.

* Intersection is part of a Strategy Corridor as defined by the City of Lacey.

8. Access Management

Primary vehicle access for Phase 1 is proposed via the extension Gateway Boulevard from the existing roundabout at Britton Parkway north about 600 feet to the new intersection with proposed Road B. A secondary access would be created in the future with a new road connection to the Britton Place development to the south with an eventual intersection connection to Britton Parkway. As shown previously in the Figure 2 Site Plan, three stub roads to the north are also anticipated to provide access to future phases of the Lacey Gateway residential development.

The primary access onto the Gateway Boulevard will include a new half-street road extension of Gateway Boulevard north of Britton Parkway, and appropriate design a roundabout intersection approach that meets the City's design standards. The new intersection of the site Roadway B onto Gateway Boulevard is approximately 660 feet north of the Britton Parkway intersection, which is consistent with the City's access spacing standards for an arterial road.

The secondary access for the Phase 1 Lacey Gateway development would be created in the future with an eventual new road connection to the Britton Place development. This new road connection, shown on the Site Plan as Roadway B, would be a major collector type II street consistent with City of Lacey roadway standards. The intersection of this future roadway onto Britton Parkway meets the City's intersection spacing standards of 1,320 feet from the Gateway Boulevard intersection.

9. Traffic Calming

City development guidelines require that internal traffic calming be incorporated into all developments to control cut-through traffic and reduce speed within the development.

Phase 1 of the Lacey Gateway residential project will provide a series of roads that will be compatible with future phases of the overall Lacey Gateway residential development. If necessary, a formal Traffic Calming Plan can be adopted to identify specific locations and features to help control potential cut-through traffic and reduce travel speeds.

10. Alternate Modes of Transportation

The City of Lacey TIA guidelines encourage alternate modes of transportation. New developments are encouraged to implement Transportation Demand Management (TDM) practices. Sidewalks will be provided on all new roadways, and bicycle lanes on the section of Gateway Boulevard that will be extended north from the current intersection with Britton Parkway to the Roadway B intersection. Connectivity to future project phases will also help to buildout the City's planned *Lacey Hawks Prairie Business District Commercial Corridors*.

It is also anticipated that as future development of the Lacey Gateway development and other projects occurs that Intercity Transit would increase service to the area neighborhoods.

11. Mitigation

Lacey Mitigation Costs. Based on City of Lacey Municipal Code 14.21.040, the proposed project will be required to pay a transportation mitigation cost. The mitigation cost calculation will be provided by the City Transportation Department, and is based on the number of PM peak hour trips generated by the proposed project affecting the current City TIP project list.

Thurston County Mitigation. To mitigate impacts to the Thurston County roadway system, a pro-rata share estimate will be calculated by the County based on 219 PM peak hour trips distributed to the current County TIP project list.

Lacey LOS Impacts. The following mitigation has been identified consistent with the City's concurrency requirements for impacts to intersections on a strategy corridor:

(1) Develop roads with integrated bicycle and pedestrian facilities.
(2) Complete and connect street grid roads identified in the City's 6-year TIP.
(3) Develop road grid consistent with City Access Management requirements.
(4) Identify parking management measures.
(5) Implement improvements designed to encourage pedestrian use.

WSDOT Impacts. City of Lacey collects transportation mitigation costs for impacts to the Marvin Road interchange with I-5. Payment of the City's transportation mitigation cost is anticipated to mitigate impacts of the proposed Lacey Gateway Phase 1 development to WSDOT facilities, namely the Marvin Road interchange; no additional mitigation is anticipated.

12. Concurrency

A new development cannot be approved if traffic generated by such development, when added to the background traffic volumes, causes the LOS on a transportation facility to decline below the LOS standard set forth in LMC 14.21.010(H), unless transportation improvements or strategies to cure such decline are made concurrent with the development. One such strategy is implementation of mitigations set forth in LMC 14.21.010(M) to be constructed or instituted for impacts to City-established *Strategy Corridors*.

Strategy Corridors are those streets or intersections which typically have been constructed or improved to 4 or 5 lanes in width between intersections, or are streets or intersections bounded by existing land use or environmental features that preclude further widening. Such Strategy Corridors are in areas where growth is encouraged and typically coincides with the designation of a High Density Corridor, City Centers, Core Areas or Activity Centers where a concentration of commercial and other uses is desired, especially when that growth increases densities and proximity of different types of land use. Peak hour vehicular congestion in these corridors is likely to exceed levels of service which would otherwise be acceptable within the transportation system. Strategy Corridors are identified in the City's 2030 Transportation Plan and are exempt from the City's LOS standards.

The following measures are proposed to address the City's Concurrency requirements and to mitigate the transportation impacts of the proposed Phase 1 Lacey Gateway residential development at study intersections along the Marvin Road and Martin Way strategy corridors.

(1) Develop roads with integrated bicycle and pedestrian facilities.
(2) Complete and connect street grid roads identified in the City's 6-year TIP.
(3) Develop road grid consistent with City Access Management requirements.
(4) Identify parking management measures.
(5) Implement improvements designed to encourage pedestrian use.

Appendix A

Traffic Scoping Report – March 26, 2013

Shaping
our community
together

CITY OF LACEY

420 COLLEGE STREET SE
LACEY, WA 98503-1238

CITY COUNCIL

VIRGIL CLARKSON
Mayor

JASON HEARN
Deputy Mayor

JEFF GADMAN
LENNY GREENSTEIN
RON LAWSON
CYNTHIA PRATT
ANDY RYDER

CITY MANAGER
SCOTT H. SPENCE

March 26, 2013

Jeff Schramm
TENW
816 – 6th Street South
Kirkland, WA 98033

SUBJECT: Lacey Gateway Residential Traffic Scoping Approval, H.T.E. # 12-239

Dear Jeff:

We have reviewed the Traffic Scoping report submitted for this project and have determined there is transportation impact that requires a Traffic Impact Analysis. The methodology for completing a Traffic Impact Analysis is identified in Chapter 4 of the City of Lacey Development Guidelines and Public Works Standards, and mitigation and concurrency measures are identified in Lacey Municipal Code Chapter 14.21. Based on the review of the scoping document there are just a few issues that need modified and addressed in the Traffic Impact Analysis.

The intersection of Sleater Kinney Road and Martin Way E is not required to be analyzed since it is in Olympia's jurisdiction. The intersection of Marvin Road and Lacey Marketplace will need to be analyzed. I have made some comments on TAZ 239 worksheet showing some differences in the trips assigned at some of the intersections. The marked-up trip distribution sheet is provided and my comments are in blue.

The scoping identified 14 intersections impacted by 20 or more trips. I have removed one and added one additional intersection for a total of 14 intersections and they are listed below:

1. Britton Parkway NE / Gateway Boulevard NE (RAB)
2. Marvin Road NE / Britton Parkway NE / Willamette Drive NE (RAB)
3. Marvin Road NE / Hogum Bay Road NE (STOP)
4. Marvin Road NE / I-5 SB Ramps (SIGNAL)
5. Marvin Road NE / I-5 NB Ramps (SIGNAL)
6. Marvin Road NE / Quinault Drive NE (SIGNAL)
7. Marvin Road NE / Lacey Marketplace (SIGNAL) *
8. Marvin Road / Martin Way E (SIGNAL)
9. Carpenter Road NE Britton Parkway NE (STOP)
10. Carpenter Road / Draham Street NE (STOP)

11. Carpenter Road / Martin Way E (SIGNAL)
12. College Street NE / 15th Avenue NE (STOP)
13. College Street NE / 6th Avenue NE (STOP)
14. College Street / Martin Way E (SIGNAL)
    Note: * represents added intersection.

Included are the pipeline trips and signal databases for the intersection analysis. The printed intersection volume diagrams depict the approved cumulative pipeline projects at each intersection. These volumes must be included in the analysis of each intersection to determine if any concurrency issues arise.

Please provide 5 signed and stamped Traffic Impact Analysis for distribution for the review as this provides information necessary to evaluate this project. Please call me if you have any questions.

Sincerely,

Patrick D. McGuin

Pat McGuin
Transportation Engineer

cc: Samra Seymour, Associate Planner
Joey Etter, Development Review Engineer
Project File

Appendix B

Existing PM Peak Hour Traffic Counts

Prepared for: **Transportation Solutions, Inc.**

Traffic Count Consultants, Inc.

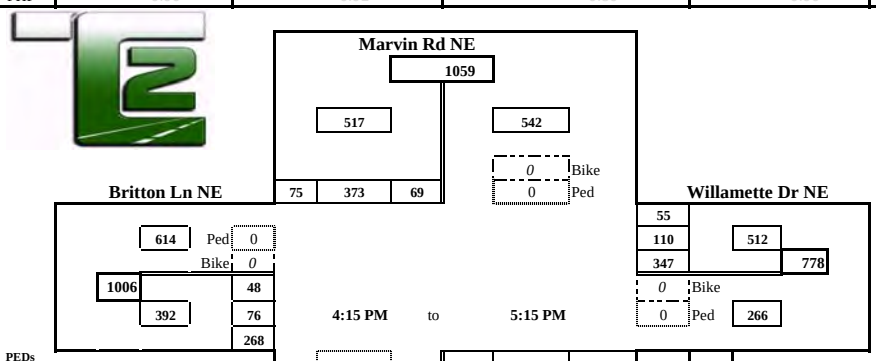
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Marvin Rd NE & Willamette Dr NE/Britton Ln NE **Date of Count:** Thurs 2/16/2012

Location: Lacey, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Marvin Rd NE				From South on (NB) Marvin Rd NE				From East on (WB) Willamette Dr NE				From West on (EB) Britton Ln NE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	12	136	16	7	74	89	28	2	68	17	15	6	16	23	46	540
4:30 P	4	23	87	23	8	87	106	34	4	78	31	12	1	16	26	46	569
4:45 P	1	20	103	20	6	103	91	24	1	92	33	8	1	10	19	64	587
5:00 P	2	18	90	9	7	115	127	31	3	84	15	15	1	12	18	79	613
5:15 P	1	8	93	23	1	124	115	32	1	93	31	20	1	10	13	79	641
5:30 P	2	10	70	9	2	127	85	28	2	75	18	15	0	15	23	69	544
5:45 P	0	5	63	13	2	106	99	24	2	88	29	6	0	9	17	63	522
6:00 P	0	2	77	11	1	113	124	26	1	60	5	2	0	18	22	51	511
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	11	98	719	124	34	849	836	227	16	638	179	93	10	106	161	497	4527
Peak Hour: 4:15 PM to 5:15 PM																	
Total	8	69	373	75	22	429	439	121	9	347	110	55	4	48	76	268	2410
Approach	517				989				512				392				2410
%HV	1.5%				2.2%				1.8%				1.0%				1.8%
PHF	0.90				0.91				0.89				0.90				0.94



PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

2564 *1.0 PHF Peak Hour Volume*

		PHF	%HV
		EB	0.90	1.0%
Check		WB	0.89	1.8%
In:	2410	NB	0.91	2.2%
Out:	2410	SB	0.90	1.5%
		T Int.	0.94	1.8%

Bicycles From:	N	S	E	W		N U's	S U's	E U's	W U's
INT 01					0	1	0	0	0
INT 02					0	0	1	0	0
INT 03					0	1	0	0	1
INT 04					0	0	2	1	0
INT 05					0	1	0	0	0
INT 06		1			1	1	0	1	0
INT 07					0	0	1	0	0
INT 08					0	0	1	0	0
INT 09					0				
INT 10					0				
INT 11					0				
INT 12					0				
	0	1	0	0	1	4	5	2	1

TSI12015M_07p

Prepared for: **Transportation Solutions, Inc.**

Traffic Count Consultants, Inc.

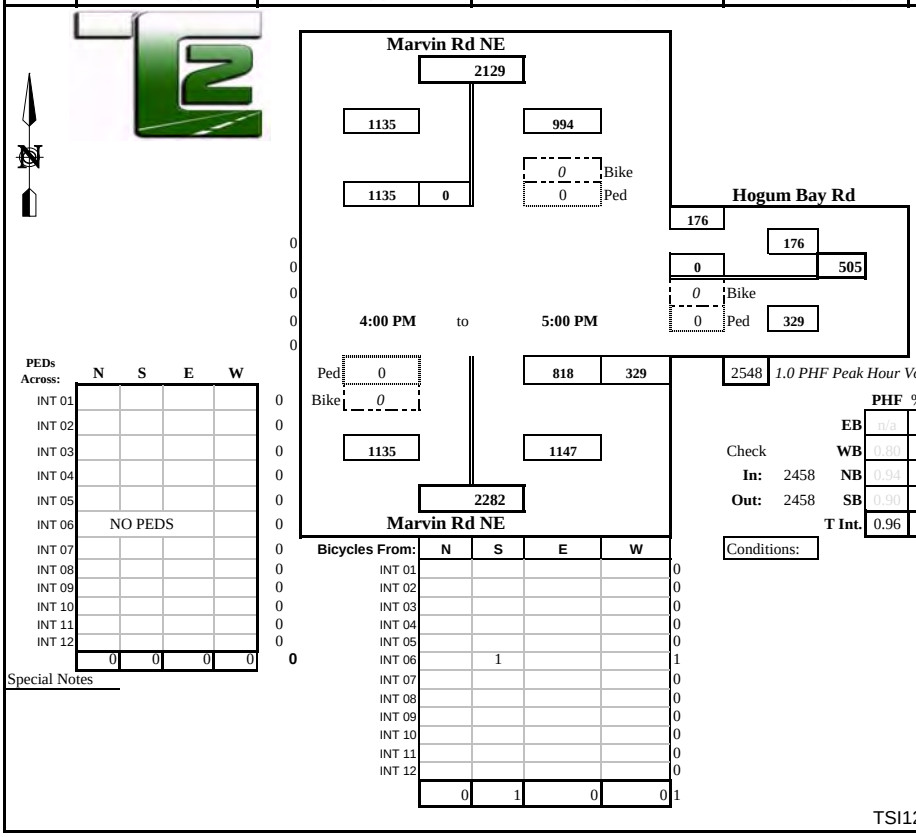
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Marvin Rd NE & Hogum Bay Rd NE **Date of Count:** Thurs 2/16/2012

Location: Lacey, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) Marvin Rd NE				From South on (NB) Marvin Rd NE				From East on (WB) Hogum Bay Rd				From West on (EB) 0				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	4	0	314	0	10	0	195	88	0	0	0	40	0	0	0	0	637
4:30 P	8	0	253	0	11	0	206	83	1	0	0	39	0	0	0	0	581
4:45 P	1	0	296	0	10	0	192	79	0	0	0	55	0	0	0	0	622
5:00 P	3	0	272	0	15	0	225	79	0	0	0	42	0	0	0	0	618
5:15 P	1	0	309	0	5	0	223	72	0	0	0	29	0	0	0	0	633
5:30 P	6	0	230	0	3	0	188	86	0	0	0	25	0	0	0	0	529
5:45 P	2	0	242	0	4	0	215	64	0	0	0	27	0	0	0	0	548
6:00 P	0	0	203	0	4	0	225	75	0	0	0	15	0	0	0	0	518
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	25	0	2119	0	62	0	1669	626	1	0	0	272	0	0	0	0	4686
Peak Hour:	4:00 PM				to		5:00 PM										
Total	16	0	1135	0	46	0	818	329	1	0	0	176	0	0	0	0	2458
Approach	1135				1147				176				0				2458
%HV	1.4%				4.0%				0.6%				n/a				2.6%
PHF	0.90				0.94				0.80				n/a				0.96



PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06		1			1
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	1	0	0	1

		PHF	%HV
	EB	n/a	n/a
Check	WB	0.80	0.6%
In: 2458	NB	0.94	4.0%
Out: 2458	SB	0.90	1.4%
	T Int.	0.96	2.6%

Conditions:

TSI12015M_09p

City of Lacey

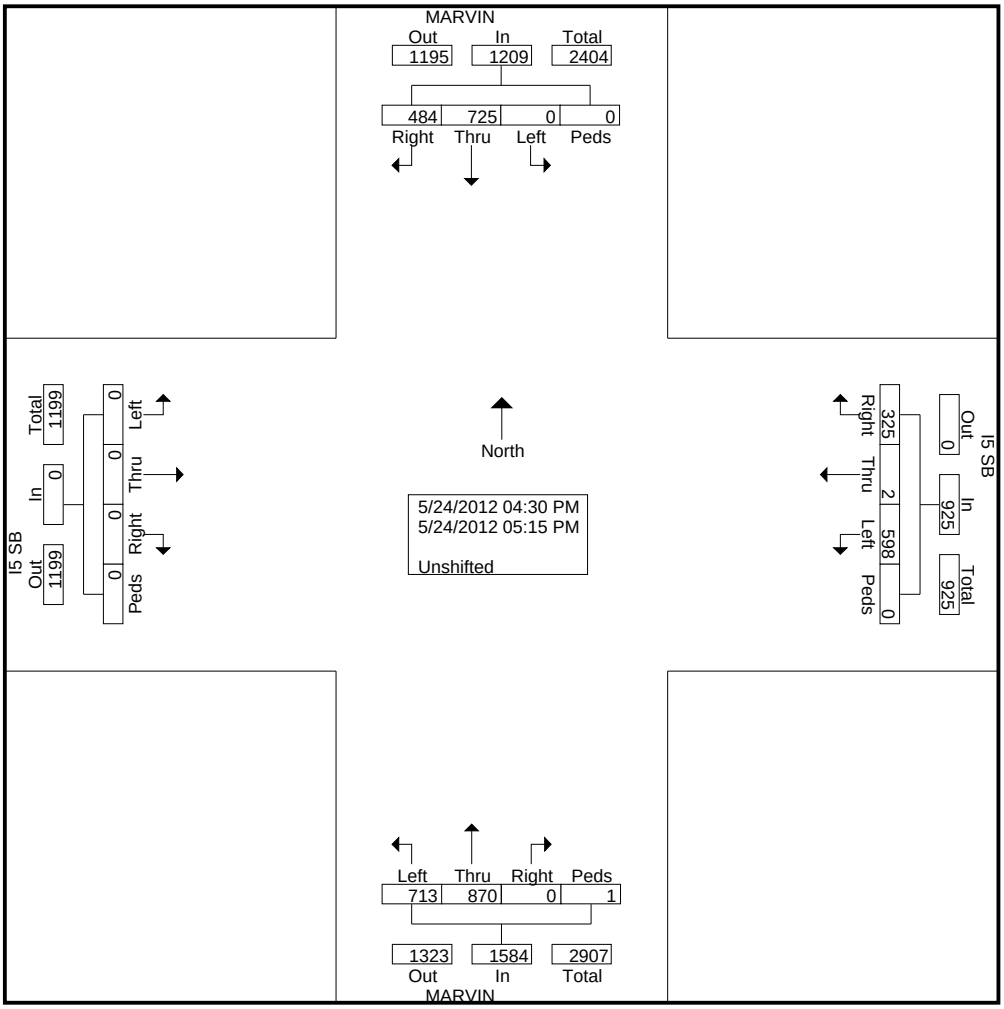
Transportation Engineering
Turning Movement Report

Counter: T-1642
Counted by: J Miller
Weather: Clear

File Name : Marvin Rd NE and I-5 SB Ramp 2012 PM
Site Code : 350
Start Date : 5/24/2012
Page No : 1

Groups Printed- Unshifted

	MARVIN From North					I5 SB From East					MARVIN From South					I5 SB From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:30 PM	113	184	0	0	297	81	1	165	0	247	0	195	177	0	372	0	0	0	0	0	916
04:45 PM	126	190	0	0	316	77	1	159	0	237	0	230	187	0	417	0	0	0	0	0	970
Total	239	374	0	0	613	158	2	324	0	484	0	425	364	0	789	0	0	0	0	0	1886
05:00 PM	139	201	0	0	340	81	0	127	0	208	0	227	165	1	393	0	0	0	0	0	941
05:15 PM	106	150	0	0	256	86	0	147	0	233	0	218	184	0	402	0	0	0	0	0	891
Grand Total	484	725	0	0	1209	325	2	598	0	925	0	870	713	1	1584	0	0	0	0	0	3718
Apprch %	40	60	0	0		35.1	0.2	64.6	0		0	54.9	45	0.1		0	0	0	0		
Total %	13	19.5	0	0	32.5	8.7	0.1	16.1	0	24.9	0	23.4	19.2	0	42.6	0	0	0	0	0	



City of Lacey

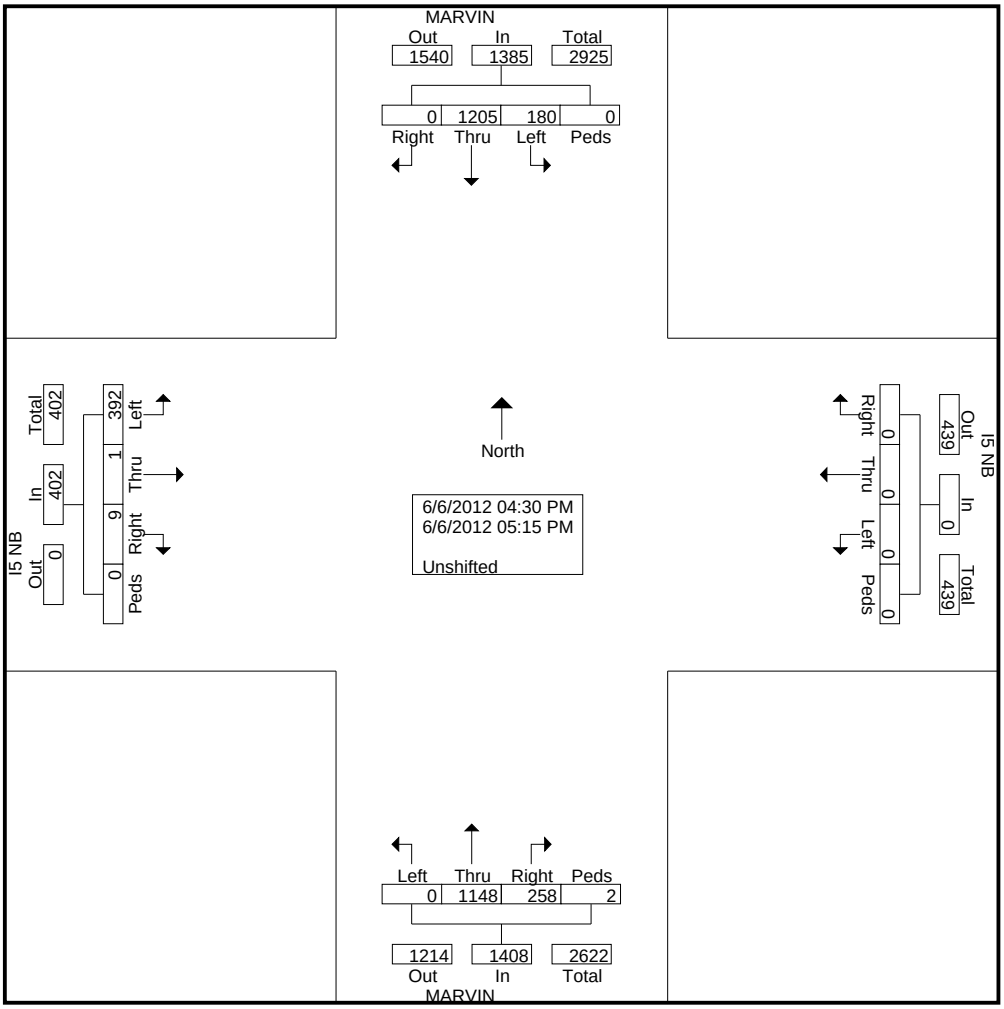
Transportation Engineering
Turning Movement Report

Counter: T-1642
Counted by: J Miller
Weather: Overcast

File Name : Marvin Rd NE and I-5 NB Ramp 2012 PM
Site Code : 330
Start Date : 6/6/2012
Page No : 1

Groups Printed- Unshifted

	MARVIN From North					I5 NB From East					MARVIN From South					I5 NB From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:30 PM	0	305	49	0	354	0	0	0	0	0	55	328	0	0	383	1	0	79	0	80	817
04:45 PM	0	303	39	0	342	0	0	0	0	0	60	264	0	1	325	5	1	112	0	118	785
Total	0	608	88	0	696	0	0	0	0	0	115	592	0	1	708	6	1	191	0	198	1602
05:00 PM	0	331	46	0	377	0	0	0	0	0	76	312	0	1	389	1	0	93	0	94	860
05:15 PM	0	266	46	0	312	0	0	0	0	0	67	244	0	0	311	2	0	108	0	110	733
Grand Total	0	1205	180	0	1385	0	0	0	0	0	258	1148	0	2	1408	9	1	392	0	402	3195
Apprch %	0	87	13	0		0	0	0	0		18.3	81.5	0	0.1		2.2	0.2	97.5	0		
Total %	0	37.7	5.6	0	43.3	0	0	0	0	0	8.1	35.9	0	0.1	44.1	0.3	0	12.3	0	12.6	



City of Lacey

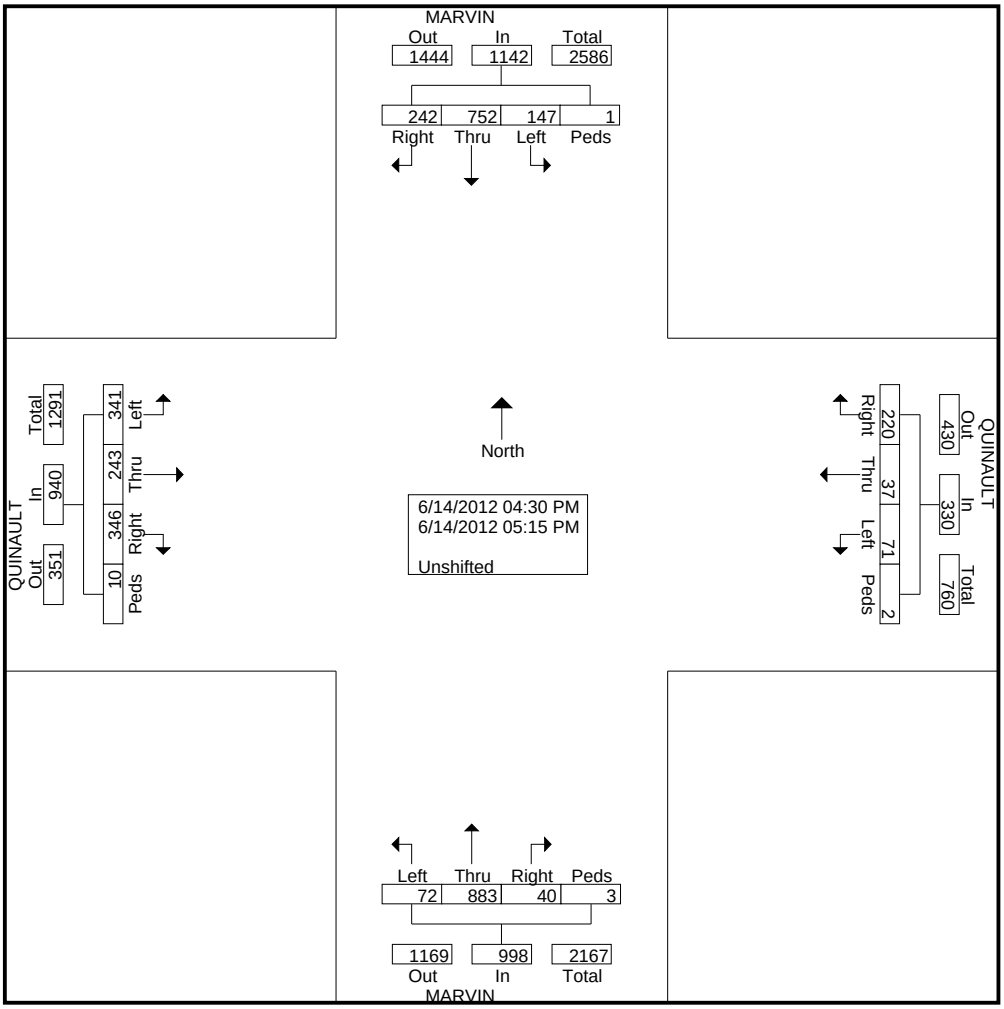
Transportation Engineering
Turning Movement Report

Counter: T-1642
Counted by: J Miller
Weather: Overcast

File Name : Marvin Rd NE and Quinault Dr 2012 PM
Site Code : 410
Start Date : 6/14/2012
Page No : 1

Groups Printed- Unshifted

	MARVIN From North					QUINAULT From East					MARVIN From South					QUINAULT From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:30 PM	50	157	33	1	241	49	8	11	0	68	10	215	19	0	244	77	48	90	0	215	768
04:45 PM	65	208	35	0	308	55	8	14	0	77	11	222	14	0	247	82	67	72	2	223	855
Total	115	365	68	1	549	104	16	25	0	145	21	437	33	0	491	159	115	162	2	438	1623
05:00 PM	72	194	34	0	300	62	7	27	2	98	10	202	20	2	234	87	66	99	5	257	889
05:15 PM	55	193	45	0	293	54	14	19	0	87	9	244	19	1	273	100	62	80	3	245	898
Grand Total	242	752	147	1	1142	220	37	71	2	330	40	883	72	3	998	346	243	341	10	940	3410
Apprch %	21.2	65.8	12.9	0.1		66.7	11.2	21.5	0.6		4	88.5	7.2	0.3		36.8	25.9	36.3	1.1		
Total %	7.1	22.1	4.3	0	33.5	6.5	1.1	2.1	0.1	9.7	1.2	25.9	2.1	0.1	29.3	10.1	7.1	10	0.3	27.6	



City of Lacey

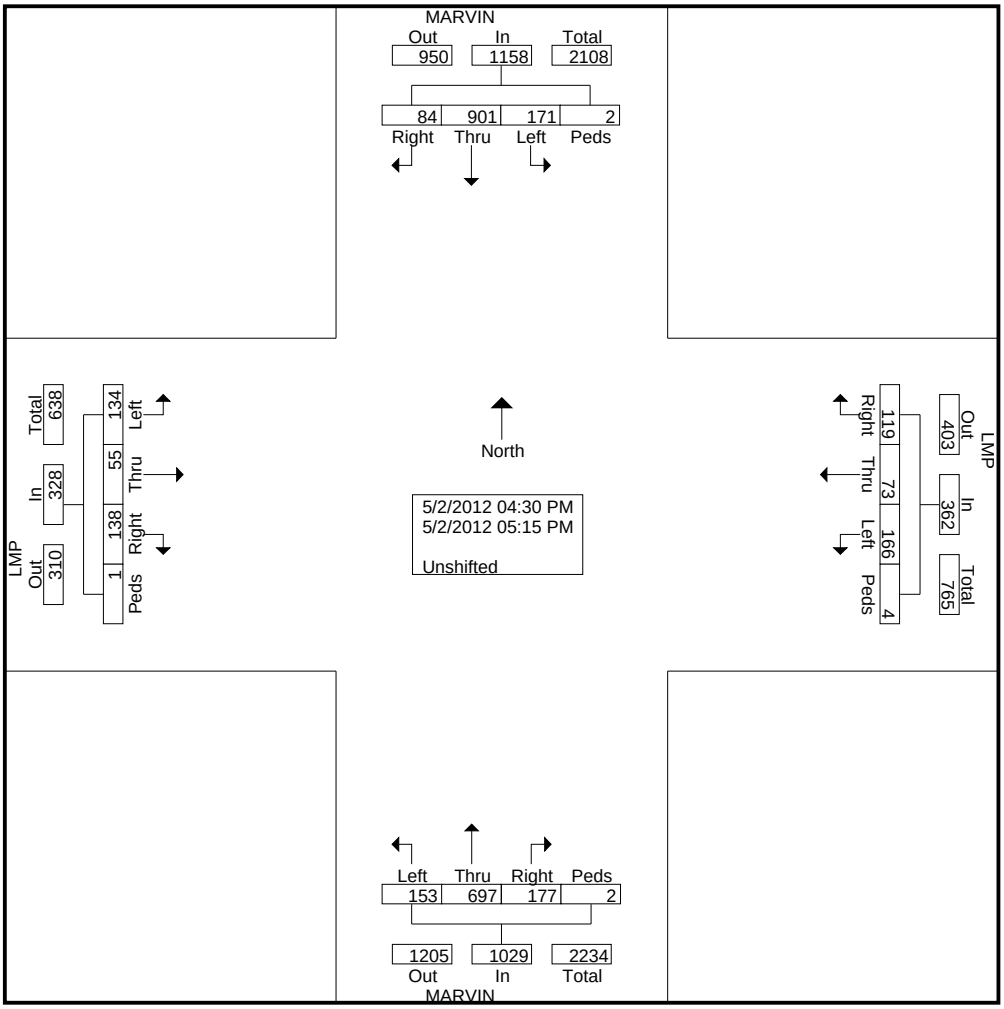
Transportation Engineering
Turning Movement Report

Counter: T-1642
Counted by: J Miller
Weather: Cloudy

File Name : Marvin Rd NE & Lacey Marketplace
Site Code : 430
Start Date : 5/2/2012
Page No : 1

Groups Printed- Unshifted

	MARVIN From North					LMP From East					MARVIN From South					LMP From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:30 PM	17	219	47	0	283	31	14	30	1	76	43	186	40	0	269	30	9	25	1	65	693
04:45 PM	26	234	35	0	295	29	22	37	0	88	45	177	37	1	260	30	18	32	0	80	723
Total	43	453	82	0	578	60	36	67	1	164	88	363	77	1	529	60	27	57	1	145	1416
05:00 PM	23	214	44	1	282	23	18	41	3	85	48	175	45	0	268	35	15	44	0	94	729
05:15 PM	18	234	45	1	298	36	19	58	0	113	41	159	31	1	232	43	13	33	0	89	732
Grand Total	84	901	171	2	1158	119	73	166	4	362	177	697	153	2	1029	138	55	134	1	328	2877
Apprch %	7.3	77.8	14.8	0.2		32.9	20.2	45.9	1.1		17.2	67.7	14.9	0.2		42.1	16.8	40.9	0.3		
Total %	2.9	31.3	5.9	0.1	40.3	4.1	2.5	5.8	0.1	12.6	6.2	24.2	5.3	0.1	35.8	4.8	1.9	4.7	0	11.4	



Prepared for: **TENW**

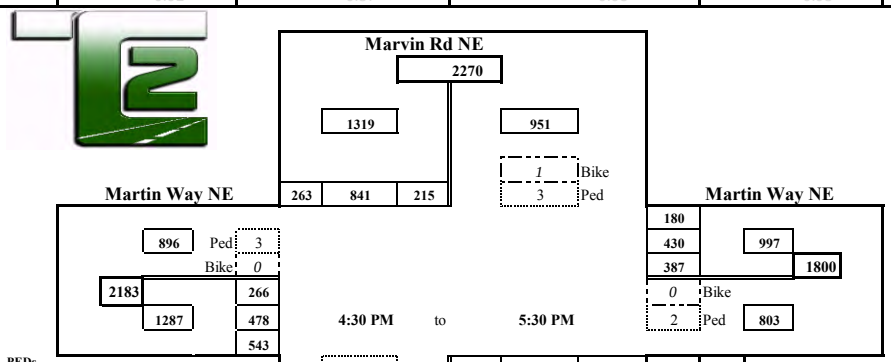
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Marvin Rd NE & Martin Way NE
Location: Lacey, Washington
Date of Count: Thurs 03/28/2013
Checked By: Jess

Time Interval Ending at	From North on (SB) Marvin Rd NE				From South on (NB) Marvin Rd NE				From East on (WB) Martin Way NE				From West on (EB) Martin Way NE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	3	60	172	50	2	42	130	24	2	89	108	50	3	72	122	115	1034
4:30 P	5	58	176	58	3	48	138	28	1	98	110	48	4	76	118	121	1077
4:45 P	4	53	172	54	1	45	131	33	2	95	104	53	2	74	121	117	1052
5:00 P	7	64	233	67	5	70	140	26	2	75	114	55	7	73	115	140	1172
5:15 P	3	58	220	70	6	48	122	25	2	89	110	40	4	68	120	142	1112
5:30 P	3	40	216	72	3	40	112	26	1	128	102	32	3	51	122	144	1085
5:45 P	3	51	199	60	2	53	124	46	1	82	123	20	3	56	104	125	1043
6:00 P	5	59	194	62	3	62	141	44	1	98	122	34	6	69	130	98	1113
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	33	443	1582	493	25	408	1038	252	12	754	893	332	32	539	952	1002	8688
Peak Hour:	4:30 PM to 5:30 PM																
Total	17	215	841	263	15	203	505	110	7	387	430	180	16	266	478	543	4421
Approach	1319				818				997				1287				4421
%HV	1.3%				1.8%				0.7%				1.2%				1.2%
PHF	0.91				0.87				0.95				0.98				0.94



4688 *1.0 PHF Peak Hour Volume*

		PHF	%HV
	EB	0.98	1.2%
Check	WB	0.95	0.7%
In: 4421	NB	0.87	1.8%
Out: 4421	SB	0.91	1.3%
	T Int.	0.94	1.2%

Conditions:

PEDs Across:	N	S	E	W	
INT 01	1		1		2
INT 02		1		1	2
INT 03					0
INT 04	2	1	1	2	6
INT 05					0
INT 06	1	2	1	1	5
INT 07					0
INT 08		1	2	2	5
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	4	5	5	6	20

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03	1				1
INT 04					0
INT 05		1			1
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	1	0	0	2

TENW13052M_08p

Prepared for: **TENW**

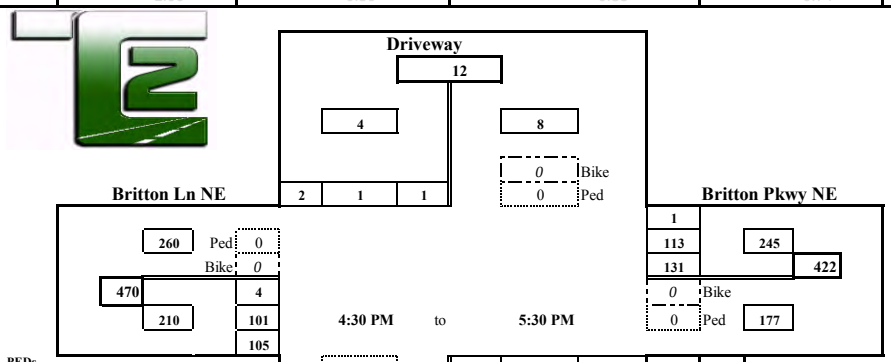
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Carpenter Rd NE & Britton Pkwy NE
Location: Lacey, Washington
Date of Count: Thurs 03/28/2013
Checked By: Jess

Time Interval Ending at	From North on (SB) Driveway				From South on (NB) Carpenter Rd NE				From East on (WB) Britton Pkwy NE				From West on (EB) Britton Ln NE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	0	0	0	1	20	0	25	2	31	39	0	0	0	25	13	153
4:30 P	0	0	0	0	3	19	1	11	0	14	36	0	0	0	25	32	138
4:45 P	0	1	0	0	0	40	0	18	3	29	21	0	4	1	24	10	144
5:00 P	0	0	1	0	2	26	0	29	1	28	28	0	0	1	25	45	183
5:15 P	0	0	0	1	0	42	2	21	1	41	32	1	0	2	17	32	191
5:30 P	0	0	0	1	1	37	1	7	2	33	32	0	0	0	35	18	164
5:45 P	0	0	1	1	1	17	0	19	3	14	38	0	2	0	32	18	140
6:00 P	0	1	0	0	0	31	0	16	2	24	33	4	2	0	23	15	147
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	2	2	3	8	232	4	146	14	214	259	5	8	4	206	183	1260
Peak Hour: 4:30 PM to 5:30 PM																	
Total	0	1	1	2	3	145	3	75	7	131	113	1	4	4	101	105	682
Approach	4				223				245				210				682
%HV	n/a				1.3%				2.9%				1.9%				2.1%
PHF	1.00				0.86				0.83				0.74				0.89



764 *1.0 PHF Peak Hour Volume*

		PHF	%HV
	EB	0.74	1.9%
Check	WB	0.83	2.9%
In: 682	NB	0.86	1.3%
Out: 682	SB	1.00	n/a
	T Int.	0.89	2.1%

Conditions:

PEDs Across:

	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

Bicycles From:

	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO BIKES				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

TENW13052M_09p

Prepared for: **TENW**

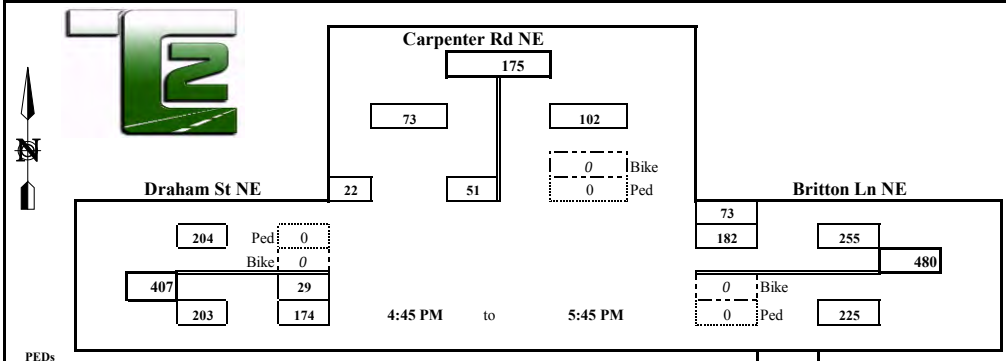
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Carpenter Rd NE & Britton Ln NE/Draham St NE
Location: Lacey, Washington
Date of Count: Thurs 03/28/2013
Checked By: Jess

Time Interval Ending at	From North on (SB) Carpenter Rd NE				From South on (NB) 0				From East on (WB) Britton Ln NE				From West on (EB) Draham St NE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	11	0	7	0	0	0	0	2	0	49	10	0	5	27	0	109
4:30 P	0	13	0	5	0	0	0	0	1	0	33	22	0	5	44	0	122
4:45 P	0	7	0	5	0	0	0	0	0	0	45	16	0	7	28	0	108
5:00 P	0	19	0	5	0	0	0	0	0	0	38	16	2	9	52	0	139
5:15 P	0	9	0	10	0	0	0	0	1	0	53	22	1	8	42	0	144
5:30 P	0	10	0	3	0	0	0	0	0	0	51	19	0	8	43	0	134
5:45 P	0	13	0	4	0	0	0	0	1	0	40	16	0	4	37	0	114
6:00 P	1	7	0	6	0	0	0	0	0	0	52	13	0	5	31	0	114
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	1	89	0	45	0	0	0	0	5	0	361	134	3	51	304	0	984
	Peak Hour: 4:45 PM to 5:45 PM																
Total	0	51	0	22	0	0	0	0	2	0	182	73	3	29	174	0	531
Approach	73				0				255				203				531
%HV	n/a				n/a				0.8%				1.5%				0.9%
PHF	0.76				n/a				0.85				0.83				0.92



576 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.83	1.5%
WB	0.85	0.8%
NB	n/a	n/a
SB	0.76	n/a
T Int.	0.92	0.9%

Check
In: 531
Out: 531

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO BIKES				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Prepared for: **TENW**

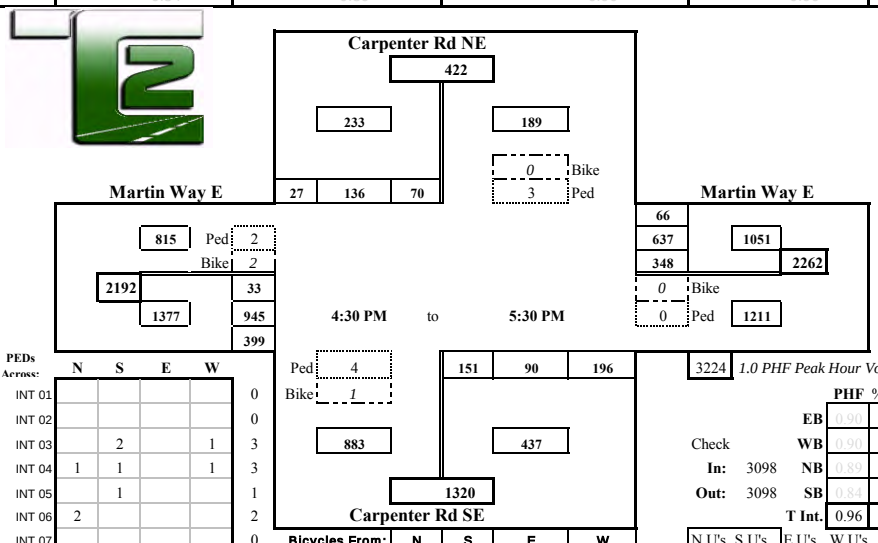
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Carpenter Rd NE/SE & Martin Way E
Location: Lacey, Washington
Date of Count: Thurs 03/28/2013
Checked By: Jess

Time Interval Ending at	From North on (SB) Carpenter Rd NE				From South on (NB) Carpenter Rd SE				From East on (WB) Martin Way E				From West on (EB) Martin Way E				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	11	23	12	0	28	14	35	3	59	180	15	1	7	195	97	676
4:30 P	1	11	25	12	1	34	21	42	2	72	167	15	1	5	203	101	708
4:45 P	0	14	22	4	1	35	20	47	2	99	175	17	0	7	211	102	753
5:00 P	1	19	34	6	2	41	24	58	4	66	157	17	4	7	277	100	806
5:15 P	0	19	39	7	1	37	23	54	3	78	165	20	2	11	221	116	790
5:30 P	0	18	41	10	1	38	23	37	2	105	140	12	2	8	236	81	749
5:45 P	0	14	27	6	0	28	18	42	1	97	142	16	7	12	225	80	707
6:00 P	1	8	40	5	0	25	15	49	2	88	135	11	5	12	205	68	661
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	4	114	251	62	6	266	158	364	19	664	1261	123	22	69	1773	745	5850
Peak Hour: 4:30 PM to 5:30 PM																	
Total	1	70	136	27	5	151	90	196	11	348	637	66	8	33	945	399	3098
Approach	233				437				1051				1377				3098
%HV	0.4%				1.1%				1.0%				0.6%				0.8%
PHF	0.84				0.89				0.90				0.90				0.96



3224 *1.0 PHF Peak Hour Volume*

		PHF	%HV
	EB	0.90	0.6%
Check	WB	0.90	1.0%
In: 3098	NB	0.89	1.1%
Out: 3098	SB	0.84	0.4%
	T Int.	0.96	0.8%

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03		2		1	3
INT 04	1	1		1	3
INT 05		1			1
INT 06	2				2
INT 07					0
INT 08		2			2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	3	6	0	2	11

Special Notes

Bicycles From:	N	S	E	W		N U's	S U's	E U's	W U's
INT 01					0				0
INT 02					0				0
INT 03					0				0
INT 04					0				2
INT 05				2	2				0
INT 06		1			1				0
INT 07	1			2	3				1
INT 08					0				1
INT 09					0				
INT 10					0				
INT 11					0				
INT 12					0				
	1	1	0	4	6	0	0	0	4

TENW13052M_11p

Prepared for: **TENW**

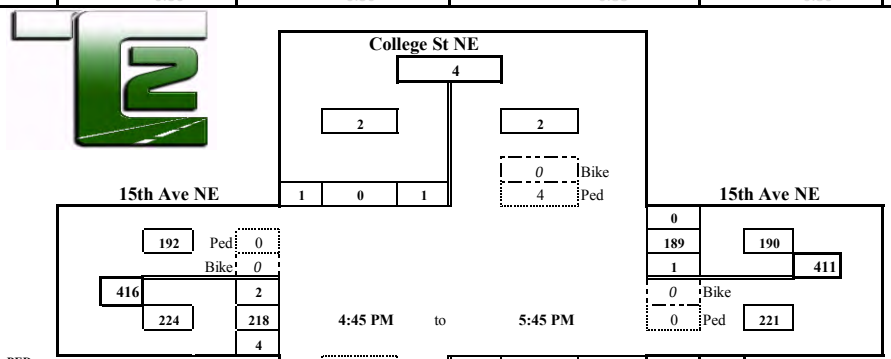
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: College St NE & 15th Ave NE
Location: Lacey, Washington
Date of Count: Thurs 03/28/2013
Checked By: Jess

Time Interval Ending at	From North on (SB) College St NE				From South on (NB) College Ln NE				From East on (WB) 15th Ave NE				From West on (EB) 15th Ave NE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	1	0	1	0	2	2	0	3	0	46	0	0	2	41	0	95
4:30 P	0	0	0	0	0	0	0	0	0	0	49	1	0	1	43	1	95
4:45 P	0	1	0	0	0	1	0	1	0	0	48	0	1	0	46	1	98
5:00 P	0	1	0	0	0	0	0	1	0	1	37	0	4	1	64	0	105
5:15 P	0	0	0	0	0	0	0	0	0	0	48	0	1	0	47	0	95
5:30 P	0	0	0	0	0	1	0	1	0	0	54	0	0	1	51	2	110
5:45 P	0	0	0	1	0	1	0	0	0	0	50	0	0	0	56	2	110
6:00 P	0	0	0	1	0	0	0	0	1	0	41	1	0	1	42	1	87
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	3	0	3	0	5	2	3	4	1	373	2	6	6	390	7	795
Peak Hour: 4:45 PM to 5:45 PM																	
Total	0	1	0	1	0	2	0	2	0	1	189	0	5	2	218	4	420
Approach	2				4				190				224				420
%HV	n/a				n/a				n/a				2.2%				1.2%
PHF	0.50				0.50				0.88				0.86				0.95



440 *1.0 PHF Peak Hour Volume*

		PHF	%HV
	EB	0.86	2.2%
Check	WB	0.88	n/a
In: 420	NB	0.50	n/a
Out: 420	SB	0.50	n/a
	T Int.	0.95	1.2%

Conditions:

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05	4				4
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	4	0	0	0	4

Special Notes

Bicycles From:	N	S	E	W	
INT 01		5			5
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	5	0	0	5

TENW13052M_12p

Prepared for: **TENW**

Traffic Count Consultants, Inc.

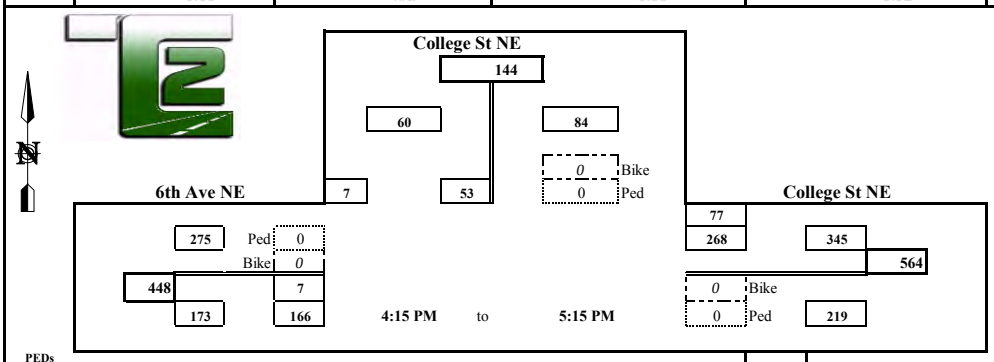
Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: College St NE & College St NE/6th Ave NE **Date of Count:** Thurs 03/28/2013

Location: Lacey, Washington **Checked By:** Jess

Time Interval Ending at	From North on (SB) College St NE				From South on (NB) 0				From East on (WB) College St NE				From West on (EB) 6th Ave NE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	16	0	0	0	0	0	0	1	0	56	17	0	1	37	0	127
4:30 P	1	15	0	1	0	0	0	0	1	0	64	17	1	1	45	0	143
4:45 P	2	8	0	2	0	0	0	0	1	0	65	14	1	3	37	0	129
5:00 P	0	11	0	1	0	0	0	0	0	0	68	19	0	3	37	0	139
5:15 P	0	19	0	3	0	0	0	0	1	0	71	27	0	0	47	0	167
5:30 P	0	16	0	1	0	0	0	0	0	0	59	14	0	1	45	0	136
5:45 P	0	8	0	0	0	0	0	0	0	0	50	10	0	4	47	0	119
6:00 P	0	12	0	3	0	0	0	0	0	0	74	13	0	0	40	0	142
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	3	105	0	11	0	0	0	0	4	0	507	131	2	13	335	0	1102
Peak Hour: 4:15 PM to 5:15 PM																	
Total	3	53	0	7	0	0	0	0	3	0	268	77	2	7	166	0	578
Approach	60				0				345				173				578
%HV	5.0%				n/a				0.9%				1.2%				1.4%
PHF	0.68				n/a				0.88				0.92				0.87



668 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

Bicycles From:	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO BIKES				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Check			PHF	%HV
		EB	0.92	1.2%
		WB	0.88	0.9%
In:	578	NB	n/a	n/a
Out:	578	SB	0.68	5.0%
		T Int.	0.87	1.4%

Conditions:

TENW13052M_13p

City of Lacey

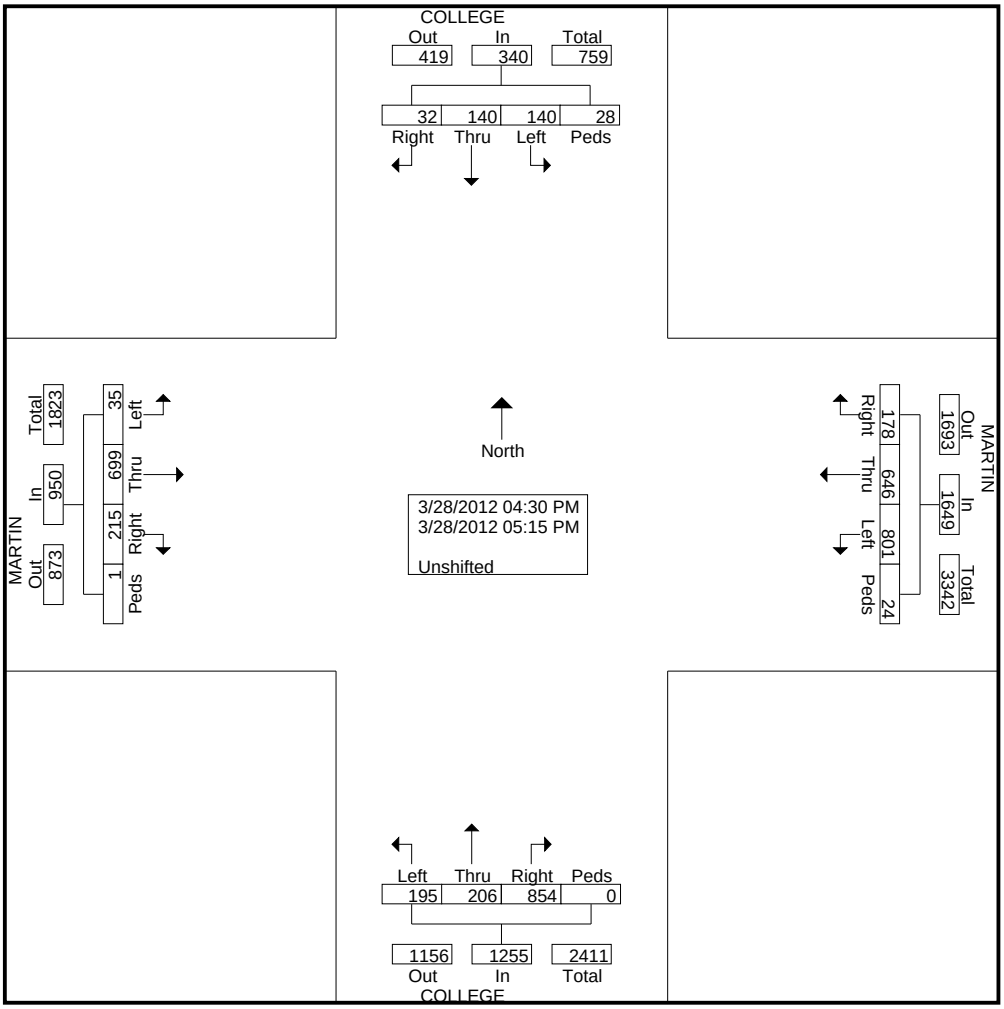
Transportation Engineering
Turning Movement Report

Counter: T-1642
Counted by: J Miller
Weather: Overcast

File Name : College St SE & Martin Way 2012 PM
Site Code : 190
Start Date : 3/28/2012
Page No : 1

Groups Printed- Unshifted

	COLLEGE From North					MARTIN From East					COLLEGE From South					MARTIN From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
04:30 PM	6	33	34	7	80	37	159	211	7	414	207	43	44	0	294	50	173	11	0	234	1022
04:45 PM	7	33	29	8	77	35	165	194	4	398	189	53	55	0	297	68	173	8	0	249	1021
Total	13	66	63	15	157	72	324	405	11	812	396	96	99	0	591	118	346	19	0	483	2043
05:00 PM	7	31	43	12	93	45	155	216	8	424	231	49	48	0	328	59	173	11	1	244	1089
05:15 PM	12	43	34	1	90	61	167	180	5	413	227	61	48	0	336	38	180	5	0	223	1062
Grand Total	32	140	140	28	340	178	646	801	24	1649	854	206	195	0	1255	215	699	35	1	950	4194
Apprch %	9.4	41.2	41.2	8.2		10.8	39.2	48.6	1.5		68	16.4	15.5	0		22.6	73.6	3.7	0.1		
Total %	0.8	3.3	3.3	0.7	8.1	4.2	15.4	19.1	0.6	39.3	20.4	4.9	4.6	0	29.9	5.1	16.7	0.8	0	22.7	



Prepared for: **TENW**

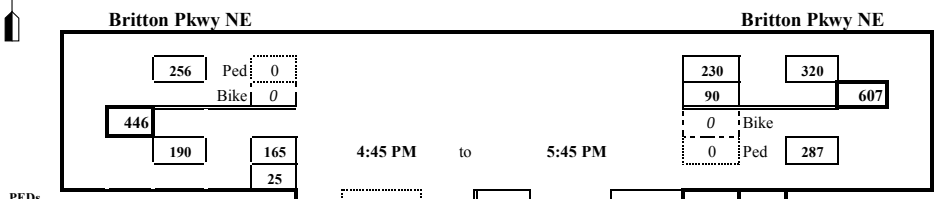
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Gateway Blvd NE & Britton Pkwy NE
Location: Lacey, Washington
Date of Count: Thurs 03/28/2013
Checked By: Jess

Time Interval Ending at	From North on (SB) 0				From South on (NB) Gateway Blvd NE				From East on (WB) Britton Pkwy NE				From West on (EB) Britton Pkwy NE				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	0	0	0	2	8	0	45	0	29	62	0	0	0	31	10	185
4:30 P	0	0	0	0	0	11	0	30	0	29	35	0	1	0	42	4	151
4:45 P	0	0	0	0	1	5	0	28	3	14	45	0	1	0	36	7	135
5:00 P	0	0	0	0	0	7	0	44	0	24	49	0	3	0	51	5	180
5:15 P	0	0	0	0	0	6	0	30	0	32	70	0	0	0	30	8	176
5:30 P	0	0	0	0	0	7	0	24	1	16	58	0	0	0	38	6	149
5:45 P	0	0	0	0	0	6	0	24	0	18	53	0	0	0	46	6	153
6:00 P	0	0	0	0	0	4	0	29	2	27	60	0	0	0	36	6	162
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	0	0	0	0	3	54	0	254	6	189	432	0	5	0	310	52	1291
Peak Hour: 4:45 PM to 5:45 PM																	
Total	0	0	0	0	0	26	0	122	1	90	230	0	3	0	165	25	658
Approach	0				148				320				190				658
%HV	n/a				n/a				0.3%				1.6%				0.6%
PHF	n/a				0.73				0.78				0.85				0.91



PEDs Across:

	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

Ped 0
Bike 0
26
122
115
148
263
Gateway Blvd NE

740 *1.0 PHF Peak Hour Volume*

		PHF	%HV
	EB	0.85	1.6%
Check	WB	0.78	0.3%
In: 658	NB	0.73	n/a
Out: 658	SB	n/a	n/a
	T Int.	0.91	0.6%

Conditions:

Bicycles From:

	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO BIKES				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

TENW13052M_01p

Appendix C

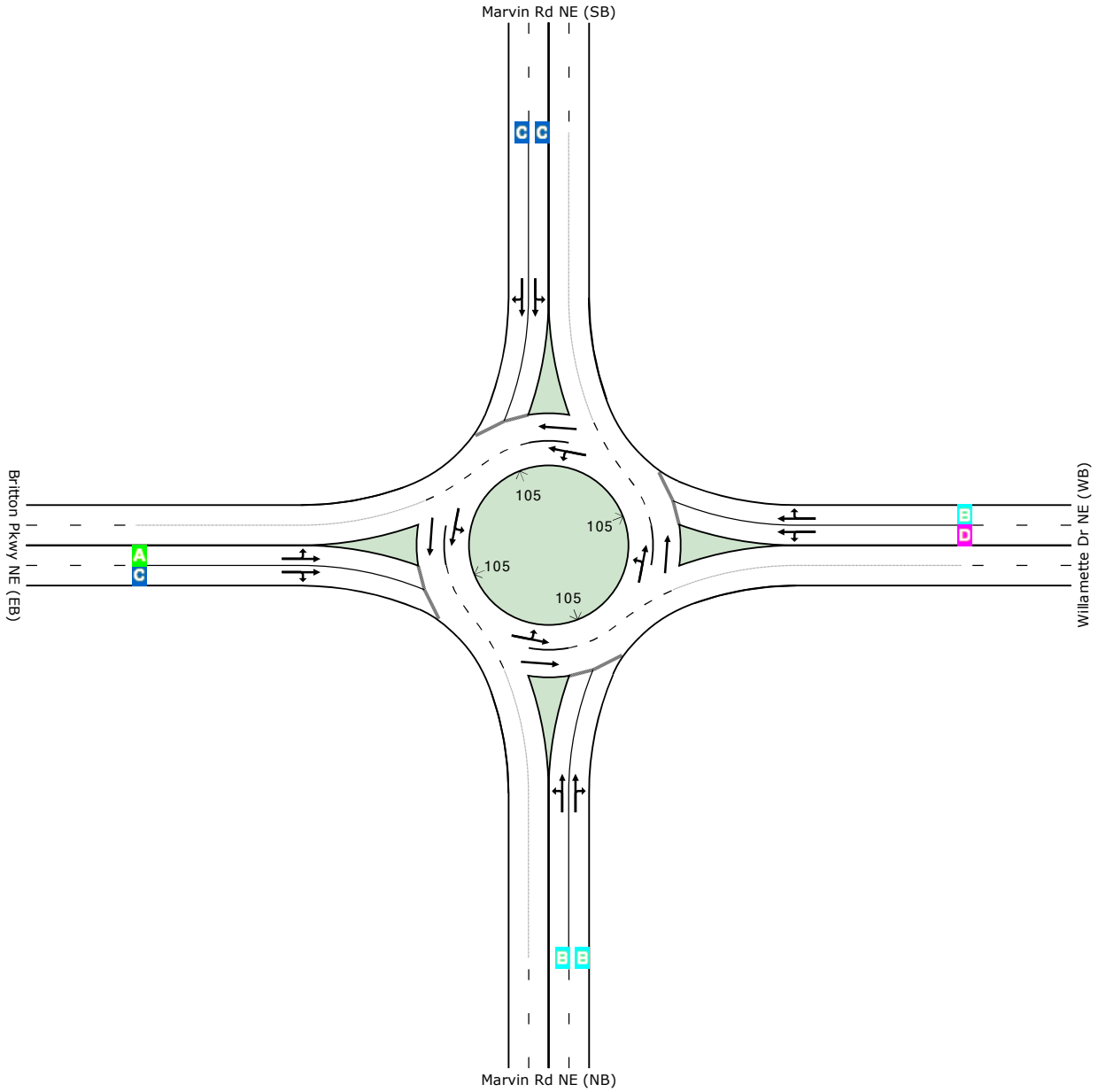
Intersection LOS Results

2013 Existing

LEVEL OF SERVICE

Site: 2013 Existing PM Peak

Lacey Gateway
Marvin Rd NE / Britton Pkwy NE
Roundabout



	South	East	North	West	Intersection
LOS	B	C	C	B	C

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

MOVEMENT SUMMARY

Site: 2013 Existing PM Peak

Lacey Gateway
Marvin Rd NE / Britton Pkwy NE
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Marvin Rd NE (NB)											
3	L2	496	2.2	0.609	12.7	LOS B	3.4	86.1	0.48	0.83	24.4
8	T1	508	2.2	0.609	12.6	LOS B	3.4	86.1	0.46	0.79	26.2
18	R2	140	2.2	0.609	12.6	LOS B	3.2	81.4	0.46	0.78	26.6
Approach		1143	2.2	0.609	12.7	LOS B	3.4	86.1	0.47	0.40	25.4
East: Willamette Dr NE (WB)											
1	L2	401	1.8	0.770	30.3	LOS D	4.1	103.4	0.82	1.89	19.1
6	T1	127	1.8	0.385	13.7	LOS B	1.3	32.2	0.67	1.39	26.0
16	R2	63	1.8	0.385	13.7	LOS B	1.3	32.2	0.67	1.39	26.0
Approach		591	1.8	0.770	25.0	LOS C	4.1	103.4	0.77	0.87	20.8
North: Marvin Rd NE (SB)											
7	L2	80	1.5	0.572	19.0	LOS C	2.3	59.3	0.73	1.58	23.4
4	T1	431	1.5	0.572	18.6	LOS C	2.3	59.3	0.72	1.56	23.7
14	R2	87	1.5	0.572	18.2	LOS C	2.3	57.4	0.71	1.54	24.1
Approach		598	1.5	0.572	18.6	LOS C	2.3	59.3	0.72	0.78	23.7
West: Britton Pkwy NE (EB)											
5	L2	56	1.0	0.257	9.9	LOS A	0.8	19.0	0.57	1.15	26.8
2	T1	88	1.0	0.257	9.9	LOS A	0.8	19.0	0.57	1.15	26.8
12	R2	310	1.0	0.530	15.5	LOS C	2.1	52.3	0.66	1.41	24.8
Approach		453	1.0	0.530	13.8	LOS B	2.1	52.3	0.63	0.66	25.4
All Vehicles		2786	1.8	0.770	16.7	LOS C	4.1	103.4	0.62	0.62	23.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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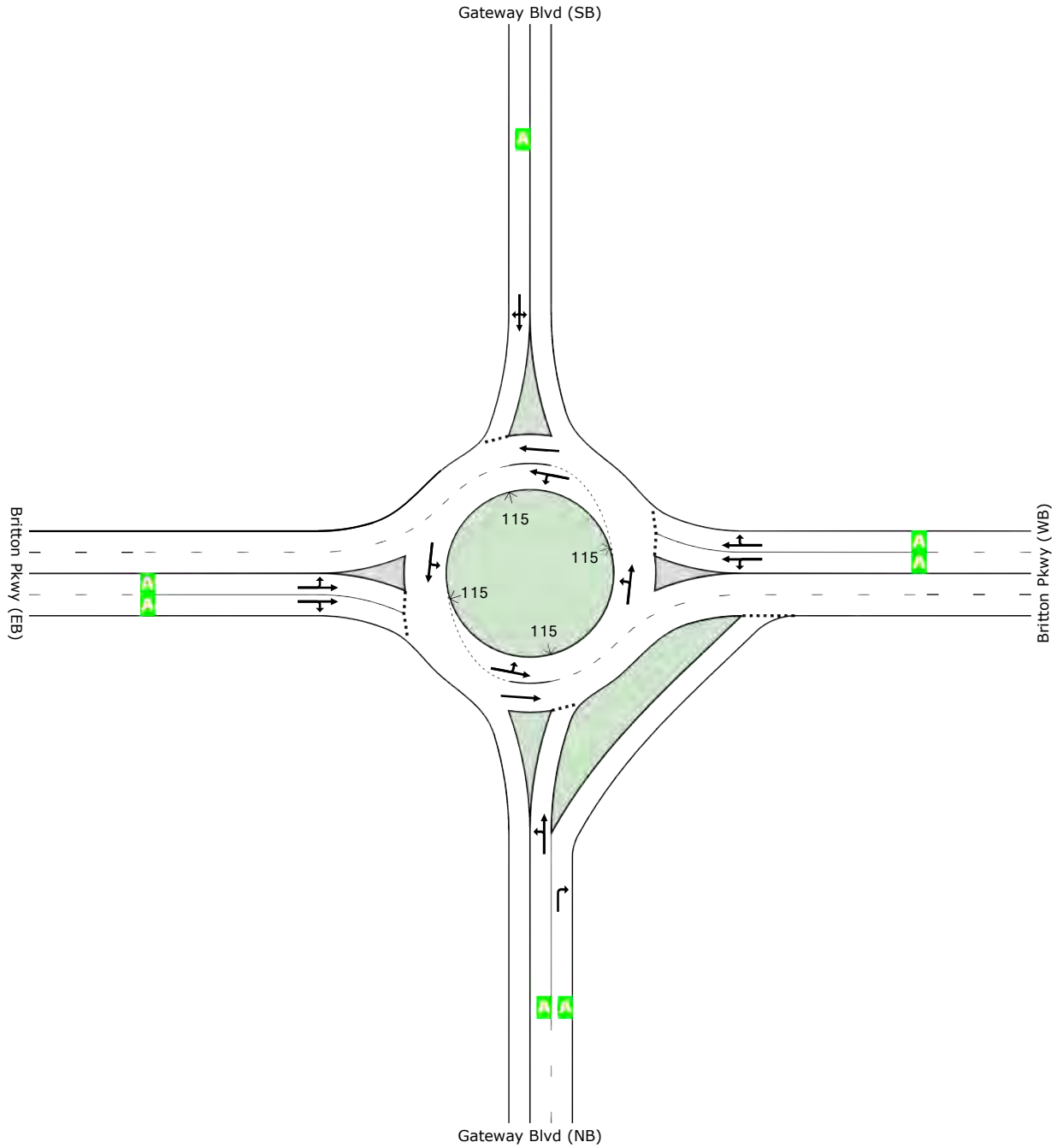
LEVEL OF SERVICE

Site: 2013 Existing PM Peak

Lacey Gateway
Gateway Blvd / Britton Pkwy
Roundabout



	South	East	North	West	Intersection
LOS	A	A	A	A	A

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

MOVEMENT SUMMARY

Site: 2013 Existing PM Peak

Lacey Gateway
Gateway Blvd / Britton Pkwy
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Gateway Blvd (NB)											
3	L2	29	0.0	0.030	3.9	LOS A	0.1	1.8	0.21	0.24	28.0
8	T1	1	0.0	0.030	3.9	LOS A	0.1	1.8	0.21	0.24	28.0
18	R2	134	0.0	0.135	4.9	LOS A	0.4	9.2	0.23	0.30	30.6
Approach		164	0.0	0.135	4.7	LOS A	0.4	9.2	0.23	0.15	30.0
East: Britton Pkwy (WB)											
1	L2	99	1.0	0.163	4.8	LOS A	0.6	16.2	0.12	0.08	29.0
6	T1	253	1.0	0.163	4.8	LOS A	0.6	16.2	0.12	0.08	30.7
16	R2	1	1.0	0.163	4.8	LOS A	0.6	16.2	0.12	0.08	31.5
Approach		353	1.0	0.163	4.8	LOS A	0.6	16.2	0.12	0.04	30.2
North: Gateway Blvd (SB)											
7	L2	1	2.0	0.004	4.3	LOS A	0.0	0.2	0.30	0.36	30.0
4	T1	1	2.0	0.004	4.3	LOS A	0.0	0.2	0.30	0.36	30.0
14	R2	1	2.0	0.004	4.3	LOS A	0.0	0.2	0.30	0.36	30.0
Approach		3	2.0	0.004	4.3	LOS A	0.0	0.2	0.30	0.18	30.0
West: Britton Pkwy (EB)											
5	L2	1	2.0	0.105	4.5	LOS A	0.4	9.6	0.22	0.23	31.6
2	T1	181	2.0	0.105	4.5	LOS A	0.4	9.6	0.22	0.23	31.5
12	R2	27	2.0	0.105	4.5	LOS A	0.4	9.6	0.22	0.23	31.3
Approach		210	2.0	0.105	4.5	LOS A	0.4	9.6	0.22	0.11	31.4
All Vehicles		730	1.1	0.163	4.7	LOS A	0.6	16.2	0.17	0.09	30.5

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

484	725	0
12.0	24.0	0.0
1	2	0

325	12.0	1
2	12.0	1
598	12.0	1

0	0.0	0
0	0.0	0
0	0.0	0

713	870	0
24.0	24.0	0.0
2	2	0

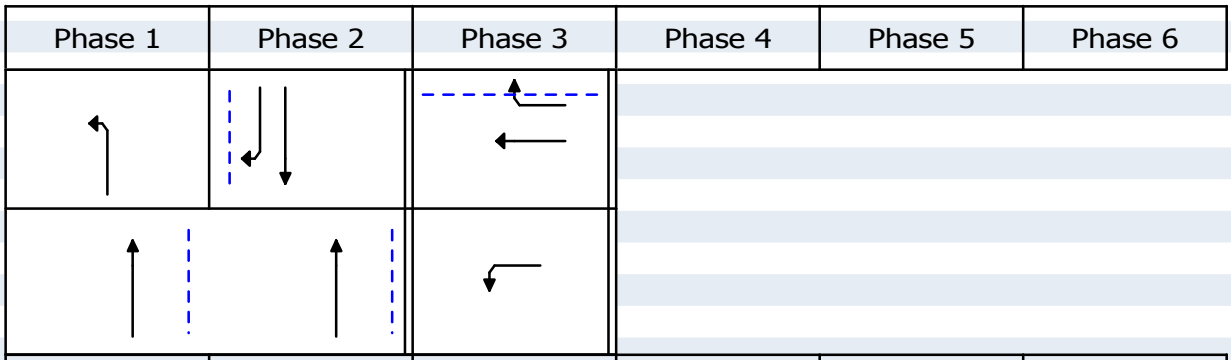
North

Phasing:

SEQUENCE	31
PERMSV	N N N N
OVERLP	N N N N
LEADLAG	LD LD

	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		0			0			1			0	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 31
/



C=120"	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
	G= 37.0"	G= 35.0"	G= 33.0"	G= 0.0"	G= 0.0"	G= 0.0"
	Y+R= 5.0"	Y+R= 5.0"	Y+R= 5.0"	Y+R= 0.0"	Y+R= 0.0"	Y+R= 0.0"

Lacey Gateway
Marvin Rd / I-5 SB Ramps
2013 Existing PM Peak (1)

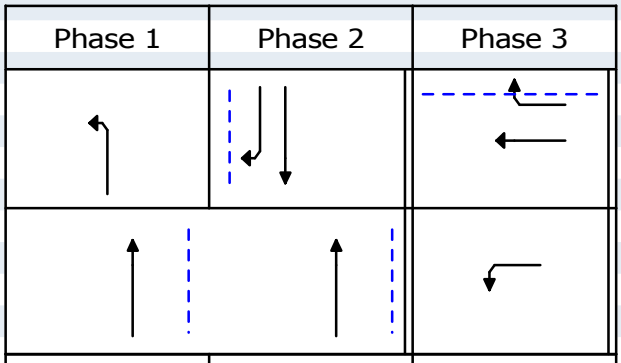
04/17/13
17:36:10

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.848 (Critical V/C 1.079) Control Delay 89.4 Level of Service F

Sq 31
/

North



Cmax= 120" Cavg= 120"	Phase 1	Phase 2	Phase 3
	Gmax= 37.0" Gavg= 29.1" Y+Rc= 5.0"	Gmax= 35.0" Gavg= 48.9" Y+Rc= 5.0"	Gmax= 33.0" Gavg= 27.0" Y+Rc= 5.0"
	Gmax= 27.0" Gavg= 83.0" Y+Rc= 5.0"		Gmax= 33.0" Gavg= 27.0" Y+Rc= 5.0"

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								32.8	C	
RT	12/1			1583	645	538	0.834	40.7	D+	636 ft
TH	24/2	0.292	0.407	3636	1444	806	0.558	27.6	C	460 ft
NB Approach								30.4	C	
TH	24/2	0.225	0.692	3636	2453	967	0.394	7.9	A	538 ft
LT	24/2	0.308	0.243	3445	836	792	0.947	57.9	E+	497 ft
WB Approach								264.5	F	
RT	12/1			1583	356	361	1.013	97.6	F	566 ft
TH	12/1	0.275	0.225	1863	419	2	0.005	36.1	D+	3 ft
LT	12/1	0.275	0.225	1774	399	664	1.663	356.0	F	1772 ft

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

			0	1205	180							
			0.0	24.0	24.0							
			0	2	2							
								0	0.0	0		
								0	0.0	0		
392	12.0	1			+			0	0.0	0		
1	12.0	1										
9	0.0	0										
					0	1148	258					
					0.0	24.0	12.0					
					0	2	1					

North

Phasing: SEQUENCE 21
PERMSV N N N N
OVERLP N N N N
LEADLAG LD LD

	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		0			0			2			0	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 21 **/**	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
C=120"	G= 17.0" Y+R= 5.0"	G= 61.0" Y+R= 5.0"	G= 27.0" Y+R= 5.0"	G= 0.0" Y+R= 0.0"	G= 0.0" Y+R= 0.0"	G= 0.0" Y+R= 0.0"

North

Lacey Gateway
Marvin Rd / I-5 NB Ramps
2013 Existing PM Peak (1)

04/17/13
17:42:14

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.569 (Critical V/C 0.630) Control Delay 23.6 Level of Service C+

Sq 21
/

North

Phase 1	Phase 2	Phase 3
Gmax= 63.0" Gavg= 83.0" Y+Rc= 5.0"		Gmax= 27.0" Gavg= 27.0" Y+Rc= 5.0"
Gmax= 17.0" Gavg= 8.8" Y+Rc= 5.0"	Gmax= 61.0" Gavg= 69.2" Y+Rc= 5.0"	Gmax= 27.0" Gavg= 27.0" Y+Rc= 5.0"

Cmax= 120"
Cavg= 120"

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								15.5	B	
TH	24/2	0.525	0.692	3636	2453	1339	0.546	9.3	A	718 ft
LT	24/2	0.142	0.074	3445	254	200	0.788	56.7	E+	146 ft
NB Approach								16.5	B	
RT	12/1			1581	911	287	0.315	13.2	B+	343 ft
TH	24/2	0.508	0.576	3636	2044	1276	0.624	17.3	B	691 ft
EB Approach								76.5	E	
RT+TH+LT	12/1-	0.225	0.225	1605	361	229	0.030	36.3	D+	17 ft
LT	12/1+	0.225	0.225	1774	399	218	1.092	118.7	F	724 ft

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

	242	752	147			
	12.0	24.0	12.0			
	1	2	1			
				220	0.0	0
				37	12.0	1
341	12.0	1	+	71	12.0	1
243	12.0	1				
346	12.0	1				
			72	883	40	
			12.0	24.0	0.0	
			1	2	0	

North

Phasing: SEQUENCE 56
PERMSV N N N N
OVERLP N N N N
LEADLAG LD LD

	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		1			2			3			10	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 56
/

North

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
C=120"	G= 10.0" Y+R= 5.0"	G= 0.0" Y+R= 5.0"	G= 47.0" Y+R= 5.0"	G= 13.0" Y+R= 4.0"	G= 12.0" Y+R= 4.0"	G= 10.5" Y+R= 4.5"

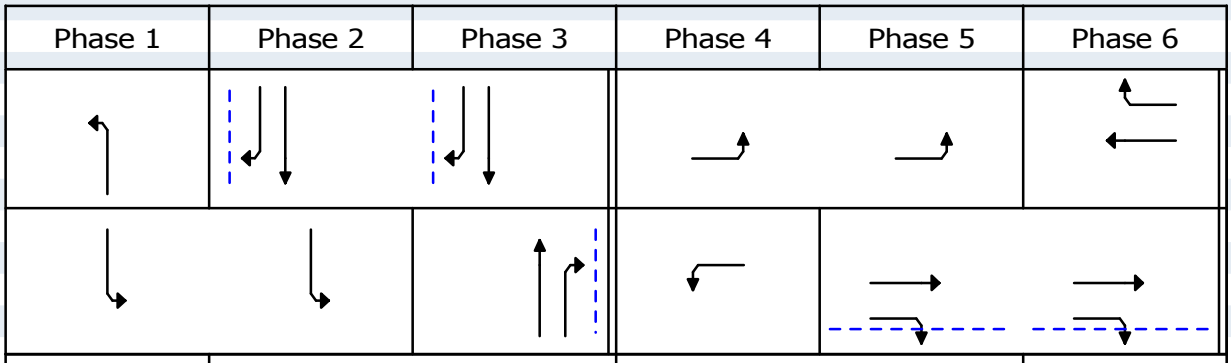
Lacey Gateway
Marvin Rd / Quinault
2013 Existing PM Peak (1)

04/17/13
17:44:40

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.733 (Critical V/C 0.864) Control Delay 67.5 Level of Service E

Sq 56
/



Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
Gmax= 10.0" Gavg= 6.8" Y+Rc= 5.0"	Gmax= 52.0" Gavg= 55.2" Y+Rc= 5.0"		Gmax= 29.0" Gavg= 27.2" Y+Rc= 4.0"		Gmax= 10.5" Gavg= 12.3" Y+Rc= 4.5"
Gmax= 15.0" Gavg= 12.8" Y+Rc= 5.0"		Gmax= 47.0" Gavg= 49.2" Y+Rc= 5.0"	Gmax= 13.0" Gavg= 6.8" Y+Rc= 4.0"	Gmax= 26.5" Gavg= 32.7" Y+Rc= 4.5"	

Cmax= 120"
Cavg= 120"

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								29.9	C	
RT	12/1	0.033	0.460	1582	727	158	0.217	19.5	B	298 ft
TH	24/2	0.433	0.460	3547	1630	836	0.513	23.0	C+	474 ft
LT	12/1	0.125	0.107	1774	189	163	0.862	75.1	E	250 ft
NB Approach								34.0	C	
RT+TH	24/2	0.392	0.410	3608	1480	1025	0.693	31.5	C	1159 ft
LT	12/1	0.083	0.057	1774	101	80	0.792	65.5	E+	130 ft
WB Approach								330.9	F	
RT+TH	12/1	0.087	0.102	1610	165	285	1.728	405.7	F	823 ft
LT	12/1	0.108	0.056	1774	100	79	0.791	61.1	E+	124 ft
EB Approach								51.5	D	
RT	12/1	0.033	0.273	1566	427	304	0.711	44.1	D+	594 ft
TH+LT	12/1-	0.221	0.273	1863	508	333	0.531	37.7	D+	327 ft
LT	12/1+	0.242	0.227	1774	402	316	0.942	73.4	E	526 ft

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

			84	901	171						
			0.0	24.0	12.0						
			0	2	1						
							119	0.0	0		
							73	12.0	1		
134	12.0	1		+			166	12.0	1		North
55	12.0	1									
138	0.0	0									
				153	697	177					
				12.0	24.0	0.0					
				1	2	0					

Phasing:

SEQUENCE				55
PERMSV	N	N	N	N
OVERLP	N	N	N	N
LEADLAG			LD	LD

	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		2			4			2			1	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 55
/

North

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
C=120"	G= 19.0" Y+R= 4.0"	G= -4.0" Y+R= 4.0"	G= 53.5" Y+R= 4.5"	G= 11.0" Y+R= 4.0"	G= -4.0" Y+R= 4.0"	G= 20.0" Y+R= 4.0"

Lacey Gateway
Marvin Rd / Lacey Marketplace
2013 Existing PM Peak (1)

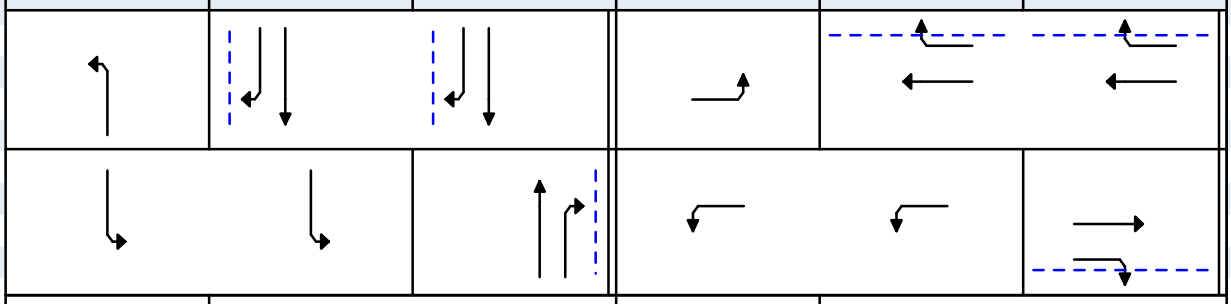
04/17/13
17:46:55

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.698 (Critical V/C 0.736) Control Delay 44.8 Level of Service D+

Sq 55
/

North



Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
Gmax= 19.0" Gavg= 13.3" Y+Rc= 4.0"	Gmax= 53.5" Gavg= 59.3" Y+Rc= 4.5"		Gmax= 11.0" Gavg= 11.0" Y+Rc= 4.0"	Gmax= 20.0" Gavg= 20.0" Y+Rc= 4.0"	
Gmax= 19.0" Gavg= 14.6" Y+Rc= 4.0"		Gmax= 53.5" Gavg= 57.9" Y+Rc= 4.5"	Gmax= 11.0" Gavg= 11.0" Y+Rc= 4.0"		Gmax= 20.0" Gavg= 20.0" Y+Rc= 4.0"

Cmax= 120"
Cavg= 120"

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								30.1	C	
RT+TH	24/2	0.446	0.494	3582	1768	1094	0.619	23.1	C+	1212 ft
LT	12/1	0.158	0.122	1774	216	190	0.879	70.2	E	276 ft
NB Approach								29.2	C	
RT+TH	24/2	0.446	0.483	3509	1693	971	0.574	22.8	C+	1087 ft
LT	12/1	0.158	0.111	1774	196	170	0.867	65.8	E+	243 ft
WB Approach								107.8	F	
RT+TH	12/1	0.167	0.167	1671	278	213	0.765	58.6	E+	292 ft
LT	12/1	0.092	0.092	1774	163	184	1.131	164.8	F	385 ft
EB Approach								76.4	E	
RT+TH	12/1	0.167	0.167	1652	275	214	0.778	60.0	E+	296 ft
LT	12/1	0.092	0.092	1774	163	149	0.916	100.1	F	264 ft

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

	263	841	215					
	12.0	24.0	12.0					
	1	2	1					
					180	12.0	1	
					430	24.0	2	
266	24.0	2		+	387	24.0	2	
478	24.0	2						
543	12.0	1						
			203	505	110			
			12.0	24.0	0.0			
			1	2	0			

North

Phasing:

SEQUENCE	55
PERMSV	N N N N
OVERLP	N N N N
LEADLAG	LD LD

	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	1.3	1.3	1.3	.7	.7	.7	1.8	1.8	1.8	1.2	1.2	1.2
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		3			2			3			3	
Bike vol, vbic		1			0			1			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 55 **/**	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
North						
C=120"	G= 19.0" Y+R= 4.0"	G= -3.0" Y+R= 4.0"	G= 36.5" Y+R= 4.5"	G= 20.0" Y+R= 4.0"	G= -4.0" Y+R= 4.0"	G= 26.0" Y+R= 5.0"

Lacey Gateway
Marvin Rd / Martin Rd
2013 Existing PM Peak (1)

04/17/13
17:48:49

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.754 (Critical V/C 0.962) Control Delay 60.6 Level of Service E+

Sq 55 **/**	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
North						
Cmax= 120" Cavg= 120"	Gmax= 19.0" Gavg= 17.0" Y+Rc= 4.0"	Gmax= 37.5" Gavg= 39.5" Y+Rc= 4.5"		Gmax= 20.0" Gavg= 12.1" Y+Rc= 4.0"	Gmax= 26.0" Gavg= 33.9" Y+Rc= 5.0"	
	Gmax= 20.0" Gavg= 17.8" Y+Rc= 4.0"		Gmax= 36.5" Gavg= 38.7" Y+Rc= 4.5"	Gmax= 20.0" Gavg= 16.5" Y+Rc= 4.0"		Gmax= 26.0" Gavg= 29.5" Y+Rc= 5.0"

17.0"	39.5"		12.1"	33.9"		
17.8"	38.7"		16.5"	29.5"		

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								45.1	D	
RT	12/1	0.033	0.329	1570	517	181	0.350	30.7	C	357 ft
TH	24/2	0.313	0.329	3571	1176	934	0.794	40.1	D+	536 ft
LT	12/1	0.167	0.148	1786	265	239	0.903	75.7	E	349 ft
NB Approach								45.6	D	
RT+TH	24/2	0.304	0.323	3521	1136	683	0.601	35.4	D+	805 ft
LT	12/1	0.158	0.142	1778	252	226	0.898	76.3	E	334 ft
WB Approach								47.6	D	
RT	12/1			1600	453	89	0.197	32.8	C	201 ft
TH	24/2	0.217	0.283	3592	1016	478	0.470	35.7	D+	291 ft
LT	24/2	0.167	0.138	3490	481	430	0.894	63.8	E+	292 ft
EB Approach								96.8	F	
RT	12/1	0.033	0.245	1590	390	492	1.260	181.6	F	1298 ft
TH	24/2	0.217	0.245	3575	878	531	0.605	41.0	D+	322 ft
LT	24/2	0.167	0.100	3472	349	296	0.848	55.9	E+	200 ft

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

			27	136	70						
			0.0	24.0	12.0						
			0	2	1						
							66	0.0	0		
							637	24.0	2		
33	12.0	1			+		348	24.0	2		North
945	24.0	2									
399	12.0	1									
				151	90	196					
				12.0	12.0	12.0					
				1	1	1					

Phasing:

SEQUENCE	65
PERMSV	N N N N
OVERLP	N N Y Y
LEADLAG	LD LD

	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	.4	.4	.4	1.0	1.0	1.0	1.1	1.1	1.1	.6	.6	.6
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		3			0			4			2	
Bike vol, vbic		0			0			1			2	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 65 **/**	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
North						
C=120"	G= 6.0" Y+R= 5.0"	G= -5.0" Y+R= 5.0"	G= 36.0" Y+R= 5.0"	G= 5.5" Y+R= 5.5"	G= 3.5" Y+R= 5.5"	G= 42.5" Y+R= 5.5"

Lacey Gateway
Carpenter Rd / Martin Way
2013 Existing PM Peak (1)

04/17/13
17:51:01

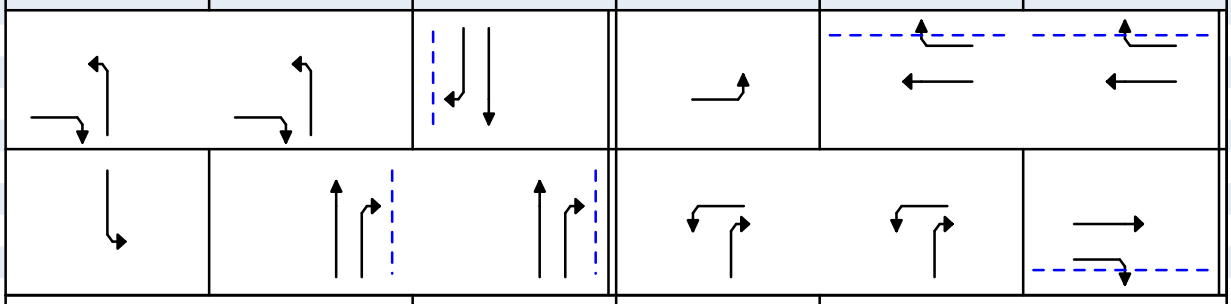
TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.699 (Critical V/C 0.664) Control Delay 60.1 Level of Service E+

Sq 65
/

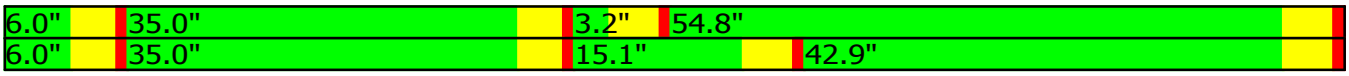
North

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6



Cmax= 120"
Cavg= 120"

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
Gmax= 6.0" Gavg= 6.0" Y+Rc= 5.0"		Gmax= 36.0" Gavg= 35.0" Y+Rc= 5.0"	Gmax= 5.5" Gavg= 3.2" Y+Rc= 5.5"	Gmax= 51.5" Gavg= 54.8" Y+Rc= 5.5"	
Gmax= 6.0" Gavg= 6.0" Y+Rc= 5.0"	Gmax= 36.0" Gavg= 35.0" Y+Rc= 5.0"		Gmax= 14.5" Gavg= 15.1" Y+Rc= 5.5"		Gmax= 42.5" Gavg= 42.9" Y+Rc= 5.5"



Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								54.9	D	
RT+TH	24/2	0.300	0.292	3589	1047	181	0.173	31.8	C	263 ft
LT	12/1	0.050	0.050	1802	90	78	0.866	108.6	F	161 ft
NB Approach								186.9	F	
RT	12/1			1571	659	218	0.331	23.7	C+	399 ft
TH	12/1	0.300	0.292	1879	548	100	0.182	31.9	C	143 ft
LT	12/1	0.050	0.050	1790	89	168	1.877	490.9	F	534 ft
WB Approach								38.0	D+	
RT+TH	24/2	0.429	0.457	3613	1651	781	0.473	22.7	C+	889 ft
LT	24/2	0.121	0.126	3479	439	387	0.882	68.9	E	277 ft
EB Approach								37.6	D+	
RT	12/1	0.033	0.357	1581	645	443	0.686	31.8	C	758 ft
TH	24/2	0.354	0.357	3596	1285	1050	0.817	39.0	D+	593 ft
LT	12/1	0.046	0.026	1799	47	37	0.782	68.0	E	62 ft

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

			33	146	146							
			0.0	24.0	12.0							
			0	2	1							
								185	12.0	1		
								672	24.0	2		
36	12.0	1			+			833	24.0	2		
727	24.0	2										
224	12.0	1										
					203	214	888					
					12.0	12.0	24.0					
					1	1	2					

North

Phasing:

SEQUENCE	65
PERMSV	N N N N
OVERLP	N N Y N
LEADLAG	LD LD

	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		28			24			0			1	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 65
/

North

C=110"

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
G= 16.0"	G= -5.0"	G= 23.0"	G= 7.0"	G= 10.5"	G= 29.5"
Y+R= 4.0"	Y+R= 5.0"	Y+R= 5.0"	Y+R= 4.0"	Y+R= 5.5"	Y+R= 5.5"

Lacey Gateway
College St / Martin Way
2013 Existing PM Peak (1)

04/17/13
17:52:55

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.780 (Critical V/C 0.788) Control Delay 76.2 Level of Service E

Sq 65
/

North

Cmax= 110"
Cavg= 110"

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
Gmax= 15.0" Gavg= 15.0" Y+Rc= 5.0"		Gmax= 23.0" Gavg= 23.0" Y+Rc= 5.0"	Gmax= 7.0" Gavg= 3.1" Y+Rc= 4.0"	Gmax= 45.5" Gavg= 49.4" Y+Rc= 5.5"	
Gmax= 16.0" Gavg= 11.8" Y+Rc= 4.0"	Gmax= 23.0" Gavg= 27.2" Y+Rc= 5.0"		Gmax= 21.5" Gavg= 21.5" Y+Rc= 5.5"		Gmax= 30.0" Gavg= 29.5" Y+Rc= 5.5"

15.0" 23.0" 3.2" 49.4"
11.8" 27.2" 21.5" 29.5"

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								48.2	D	
RT+TH	24/2	0.209	0.209	3493	730	199	0.272	36.6	D+	268 ft
LT	12/1	0.145	0.107	1774	190	162	0.852	62.4	E+	221 ft
NB Approach								39.7	D+	
RT	24/2			2802	1241	987	0.795	29.7	C	767 ft
TH	12/1	0.209	0.247	1863	461	238	0.516	36.2	D+	273 ft
LT	12/1	0.136	0.136	1774	242	226	0.934	86.7	F	342 ft
WB Approach								126.5	F	
RT	12/1	0.036	0.449	1541	691	94	0.136	17.8	B	181 ft
TH	24/2	0.414	0.449	3547	1591	747	0.469	21.3	C+	398 ft
LT	24/2	0.195	0.195	3445	673	926	1.375	222.4	F	983 ft
EB Approach								45.7	D	
TH	24/2	0.273	0.268	5160	1384	809	0.585	44.9	D+	455 ft
LT	12/1	0.064	0.029	1774	51	40	0.787	62.7	E+	62 ft

Intersection	
Intersection Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	183	851	342	0	1180
Conflicting Peds, #/hr	1	1	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None
Storage Length	0	0		0	0	
Median Width	0		0			0
Grade, %	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	1	1	4	4	1	1
Mvmt Flow	0	203	946	380	0	1311
Number of Lanes	0	1	2	1	0	3

Major/Minor			Major 1		Major 2	
Conflicting Flow All	1471	474	0	0	947	0
Stage 1	947	-	-	-	-	-
Stage 2	524	-	-	-	-	-
Follow-up Headway	3.66	3.31	-	-	2.21	-
Pot Capacity-1 Maneuver	146	539	-	-	727	-
Stage 1	331	-	-	-	-	-
Stage 2	528	-	-	-	-	-
Time blocked-Platoon, %	0	0	-	-	0	-
Mov Capacity-1 Maneuver	146	539	-	-	727	-
Mov Capacity-2 Maneuver	146	-	-	-	-	-
Stage 1	331	-	-	-	-	-
Stage 2	528	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.7	0	0
HCM LOS	C	-	-

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Cap, veh/h	-	-	539	727	-
HCM Control Delay, s	-	-	15.7	0	-
HCM Lane V/C Ratio	-	-	0.38	-	-
HCM Lane LOS	-	-	C	A	-
HCM 95th-tile Q, veh	-	-	1.7	0.0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	6.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	101	105	131	113	1	145	3	75	1	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	100		0	100		0	100		0	0		0
Median Width		12			12			12			12	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	3	3	3	1	1	1	0	0	0
Mvmt Flow	4	113	118	147	127	1	163	3	84	1	1	2
Number of Lanes	1	1	0	1	1	0	1	1	0	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 2		
Conflicting Flow All	128	0	0	231	0	0	605	603	172	647	662	128
Stage 1	-	-	-	-	-	-	181	181	-	422	422	-
Stage 2	-	-	-	-	-	-	424	422	-	225	240	-
Follow-up Headway	2.218	-	-	2.227	-	-	3.509	4.009	3.309	3.5	4	3.3
Pot Capacity-1 Maneuver	1458	-	-	1331	-	-	411	414	874	387	385	927
Stage 1	-	-	-	-	-	-	823	752	-	613	592	-
Stage 2	-	-	-	-	-	-	610	590	-	782	711	-
Time blocked-Platoon, %	0	-	-	0	-	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	1458	-	-	1331	-	-	374	367	874	317	342	927
Mov Capacity-2 Maneuver	-	-	-	-	-	-	374	367	-	317	342	-
Stage 1	-	-	-	-	-	-	821	750	-	611	527	-
Stage 2	-	-	-	-	-	-	540	525	-	701	709	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	4.3	15.7	12.5
HCM LOS	-	-	C	B

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Cap, veh/h	374	566	1458	-	-	1331	-	-	486
HCM Control Delay, s	18.5	13.5	7.477	-	-	8.041	-	-	12.5
HCM Lane V/C Ratio	0.29	0.25	0.00	-	-	0.11	-	-	0.01
HCM Lane LOS	C	B	A	-	-	A	-	-	B
HCM 95th-tile Q, veh	1.2	1.0	0.0	-	-	0.4	-	-	0.0

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	29	174	182	73	51	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	100			0	0	0
Median Width		12	12		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	32	193	202	81	57	24
Number of Lanes	1	1	1	0	1	0

Major/Minor	Major 1		Major 2			
Conflicting Flow All	283	0	-	0	501	243
Stage 1	-	-	-	-	243	-
Stage 2	-	-	-	-	258	-
Follow-up Headway	2.218	-	-	-	3.5	3.3
Pot Capacity-1 Maneuver	1279	-	-	-	533	801
Stage 1	-	-	-	-	802	-
Stage 2	-	-	-	-	790	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1279	-	-	-	520	801
Mov Capacity-2 Maneuver	-	-	-	-	520	-
Stage 1	-	-	-	-	802	-
Stage 2	-	-	-	-	770	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	12.2
HCM LOS	-	-	B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1279	-	-	-	581
HCM Control Delay, s	7.887	-	-	-	12.2
HCM Lane V/C Ratio	0.03	-	-	-	0.14
HCM Lane LOS	A	-	-	-	B
HCM 95th-tile Q, veh	0.1	-	-	-	0.5

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	220	4	1	190	2	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length		0	0		0	0
Median Width	0			0	12	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	0	0	0	0
Mvmt Flow	244	4	1	211	2	2
Number of Lanes	1	0	0	1	1	0

Major/Minor	Major 1			Major 2		
Conflicting Flow All	0	0	249	0	460	247
Stage 1	-	-	-	-	247	-
Stage 2	-	-	-	-	213	-
Follow-up Headway	-	-	2.2	-	3.5	3.3
Pot Capacity-1 Maneuver	-	-	1328	-	563	797
Stage 1	-	-	-	-	799	-
Stage 2	-	-	-	-	827	-
Time blocked-Platoon, %	-	-	0	-	0	0
Mov Capacity-1 Maneuver	-	-	1328	-	562	797
Mov Capacity-2 Maneuver	-	-	-	-	562	-
Stage 1	-	-	-	-	799	-
Stage 2	-	-	-	-	826	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.5
HCM LOS	-	-	B

Minor Lane / Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Cap, veh/h	659	-	-	1328	-
HCM Control Delay, s	10.5	-	-	7.713	0
HCM Lane V/C Ratio	0.01	-	-	0.00	-
HCM Lane LOS	B	-	-	A	A
HCM 95th-tile Q, veh	0.0	-	-	0.0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	2	220	190	0	1	1
Conflicting Peds, #/hr	0	0	0	0	4	4
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		0	0		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	0	0	0	0
Mvmt Flow	2	244	211	0	1	1
Number of Lanes	0	1	1	0	1	0

Major/Minor	Major 1		Major 2			
Conflicting Flow All	215	0	-	0	464	215
Stage 1	-	-	-	-	215	-
Stage 2	-	-	-	-	249	-
Follow-up Headway	2.218	-	-	-	3.5	3.3
Pot Capacity-1 Maneuver	1355	-	-	-	560	830
Stage 1	-	-	-	-	826	-
Stage 2	-	-	-	-	797	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1355	-	-	-	555	827
Mov Capacity-2 Maneuver	-	-	-	-	555	-
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	793	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	10.4
HCM LOS	-	-	B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1355	-	-	-	664
HCM Control Delay, s	7.661	0	-	-	10.4
HCM Lane V/C Ratio	0.00	-	-	-	0.00
HCM Lane LOS	A	A	-	-	B
HCM 95th-tile Q, veh	0.0	-	-	-	0.0

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	7	166	268	77	53	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	0			0	0	0
Median Width		12	12		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles, %	1	1	1	1	5	5
Mvmt Flow	8	191	308	89	61	8
Number of Lanes	1	1	2	0	1	1

Major/Minor	Major 1		Major 2			
Conflicting Flow All	397	0	-	0	559	198
Stage 1	-	-	-	-	352	-
Stage 2	-	-	-	-	207	-
Follow-up Headway	2.21	-	-	-	3.5475	3.3475
Pot Capacity-1 Maneuver	1165	-	-	-	468	802
Stage 1	-	-	-	-	676	-
Stage 2	-	-	-	-	819	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1165	-	-	-	465	802
Mov Capacity-2 Maneuver	-	-	-	-	465	-
Stage 1	-	-	-	-	676	-
Stage 2	-	-	-	-	813	-

Approach	EB	WB	SB
HCM Control Delay, s	0.3	0	13.4
HCM LOS	-	-	B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Cap, veh/h	1165	-	-	-	465	802
HCM Control Delay, s	8.112	-	-	-	13.9	9.5
HCM Lane V/C Ratio	0.01	-	-	-	0.13	0.01
HCM Lane LOS	A	-	-	-	B	A
HCM 95th-tile Q, veh	0.0	-	-	-	0.4	0.0

Notes

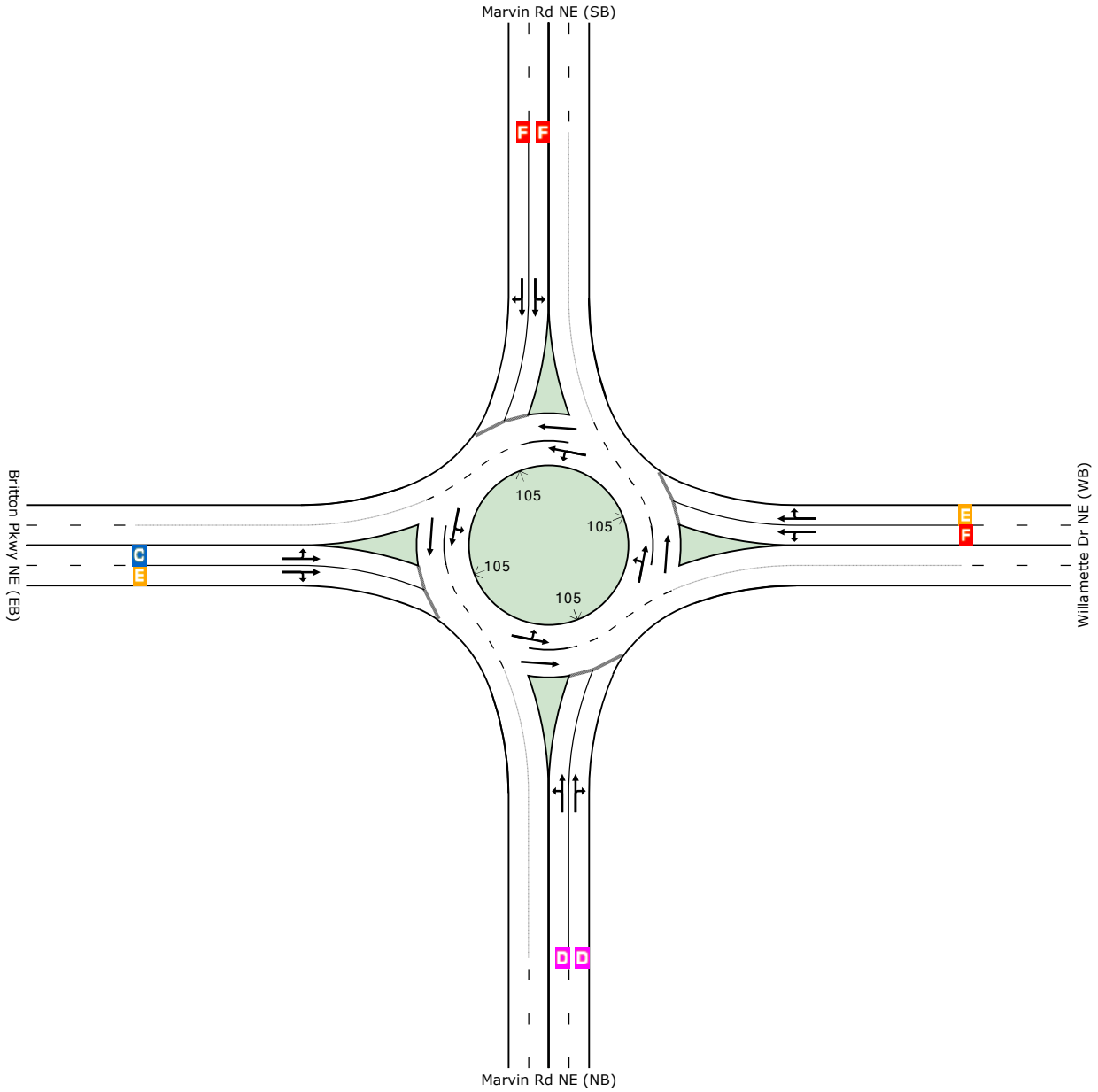
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

2016 Without Project

LEVEL OF SERVICE

Site: 2016 Without Project PM Peak

Lacey Gateway
Marvin Rd NE / Britton Pkwy NE
Roundabout



	South	East	North	West	Intersection
LOS	D	F	F	D	F

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

MOVEMENT SUMMARY

Site: 2016 Without Project PM Peak

Lacey Gateway
Marvin Rd NE / Britton Pkwy NE
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Marvin Rd NE (NB)											
3	L2	581	2.2	0.883	29.7	LOS D	11.6	294.9	0.90	1.86	19.5
8	T1	866	2.2	0.883	29.5	LOS D	11.6	294.9	0.88	1.81	20.1
18	R2	166	2.2	0.883	29.5	LOS D	11.1	281.7	0.87	1.79	20.3
Approach		1612	2.2	0.883	29.6	LOS D	11.6	294.9	0.89	0.91	19.9
East: Willamette Dr NE (WB)											
1	L2	997	1.8	2.662	777.6	LOS F	203.9	5170.6	1.00	11.74	1.9
6	T1	158	1.8	0.760	40.6	LOS E	3.4	86.1	0.90	2.07	17.5
16	R2	106	1.8	0.760	40.6	LOS E	3.4	86.1	0.90	2.07	17.5
Approach		1260	1.8	2.662	623.6	LOS F	203.9	5170.6	0.98	4.86	2.3
North: Marvin Rd NE (SB)											
7	L2	106	1.5	1.453	238.5	LOS F	75.1	1900.9	1.00	7.64	5.2
4	T1	1199	1.5	1.453	237.8	LOS F	79.0	1997.8	1.00	7.80	5.2
14	R2	117	1.5	1.453	237.0	LOS F	79.0	1997.8	1.00	7.95	5.2
Approach		1421	1.5	1.453	237.8	LOS F	79.0	1997.8	1.00	3.90	5.2
West: Britton Pkwy NE (EB)											
5	L2	73	1.0	0.445	17.3	LOS C	1.5	38.0	0.75	1.58	23.7
2	T1	116	1.0	0.445	17.3	LOS C	1.5	38.0	0.75	1.58	23.7
12	R2	357	1.0	0.788	35.5	LOS E	4.0	101.4	0.87	2.02	18.5
Approach		546	1.0	0.788	29.2	LOS D	4.0	101.4	0.83	0.93	20.1
All Vehicles		4839	1.8	2.662	245.4	LOS F	203.9	5170.6	0.94	2.82	5.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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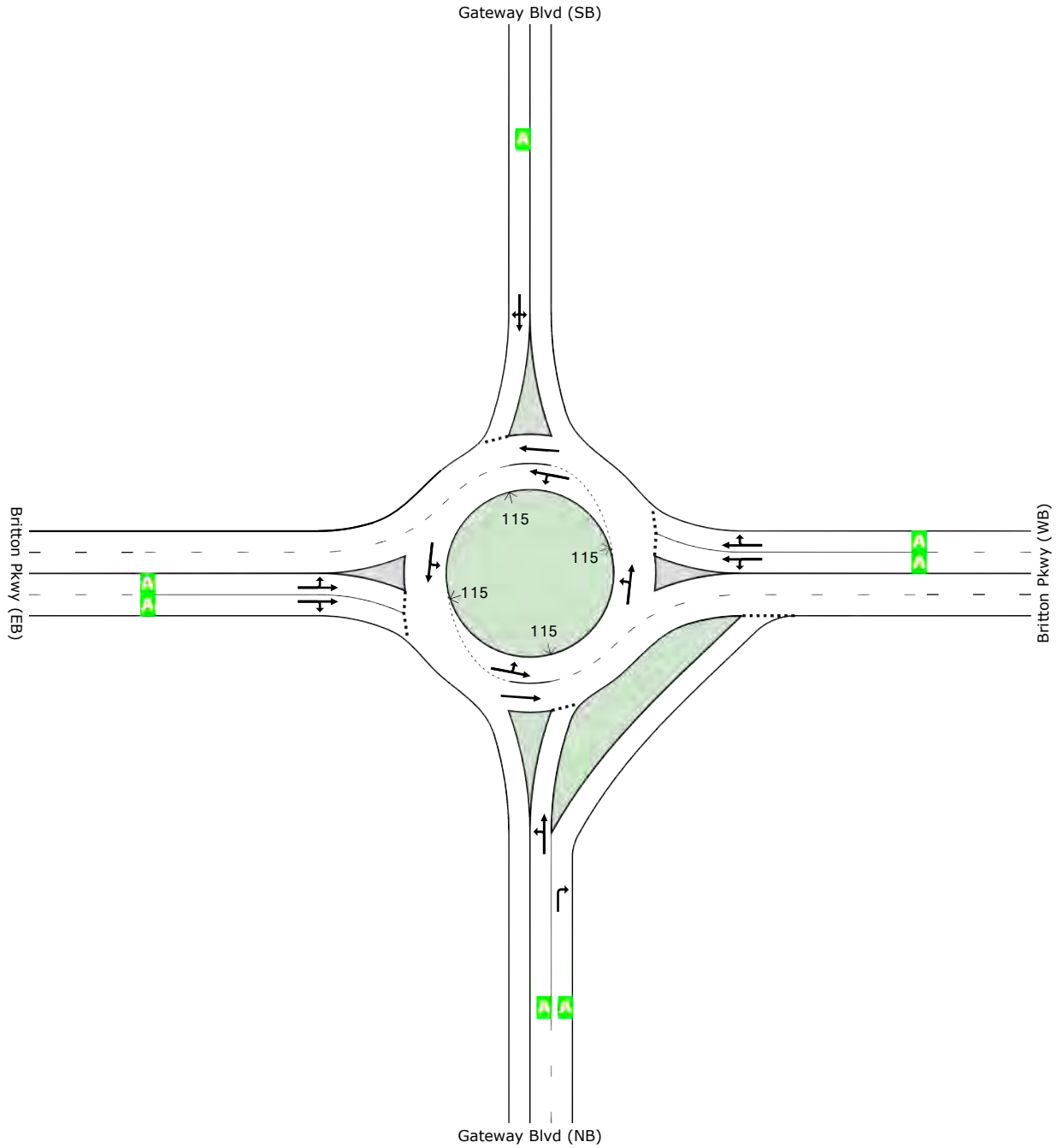
LEVEL OF SERVICE

Site: 2016 Without Project PM Peak

Lacey Gateway
Gateway Blvd / Britton Pkwy
Roundabout



	South	East	North	West	Intersection
LOS	A	A	A	A	A

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

MOVEMENT SUMMARY

Site: 2016 Without Project PM Peak

Lacey Gateway
Gateway Blvd / Britton Pkwy
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Gateway Blvd (NB)											
3	L2	32	0.0	0.035	4.1	LOS A	0.1	2.1	0.24	0.31	27.9
8	T1	1	0.0	0.035	4.1	LOS A	0.1	2.1	0.24	0.31	27.9
18	R2	154	0.0	0.161	5.3	LOS A	0.4	11.2	0.27	0.40	30.3
Approach		187	0.0	0.161	5.1	LOS A	0.4	11.2	0.27	0.19	29.8
East: Britton Pkwy (WB)											
1	L2	140	1.0	0.209	5.3	LOS A	0.9	22.0	0.13	0.10	28.6
6	T1	312	1.0	0.209	5.3	LOS A	0.9	22.0	0.13	0.10	30.4
16	R2	1	1.0	0.209	5.3	LOS A	0.9	22.0	0.13	0.10	31.2
Approach		453	1.0	0.209	5.3	LOS A	0.9	22.0	0.13	0.05	29.8
North: Gateway Blvd (SB)											
7	L2	1	2.0	0.004	4.6	LOS A	0.0	0.3	0.34	0.45	29.8
4	T1	1	2.0	0.004	4.6	LOS A	0.0	0.3	0.34	0.45	29.8
14	R2	1	2.0	0.004	4.6	LOS A	0.0	0.3	0.34	0.45	29.8
Approach		3	2.0	0.004	4.6	LOS A	0.0	0.3	0.34	0.23	29.8
West: Britton Pkwy (EB)											
5	L2	1	2.0	0.140	5.1	LOS A	0.5	13.2	0.28	0.33	31.2
2	T1	236	2.0	0.140	5.1	LOS A	0.5	13.2	0.28	0.33	31.1
12	R2	31	2.0	0.140	5.1	LOS A	0.5	13.2	0.28	0.33	31.0
Approach		268	2.0	0.140	5.1	LOS A	0.5	13.2	0.28	0.17	31.1
All Vehicles		911	1.1	0.209	5.2	LOS A	0.9	22.0	0.20	0.11	30.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

1074	1410	0
12.0	24.0	0.0
1	2	0

471	12.0	1
2	12.0	1
673	12.0	1

0	0.0	0
0	0.0	0
0	0.0	0

+

North

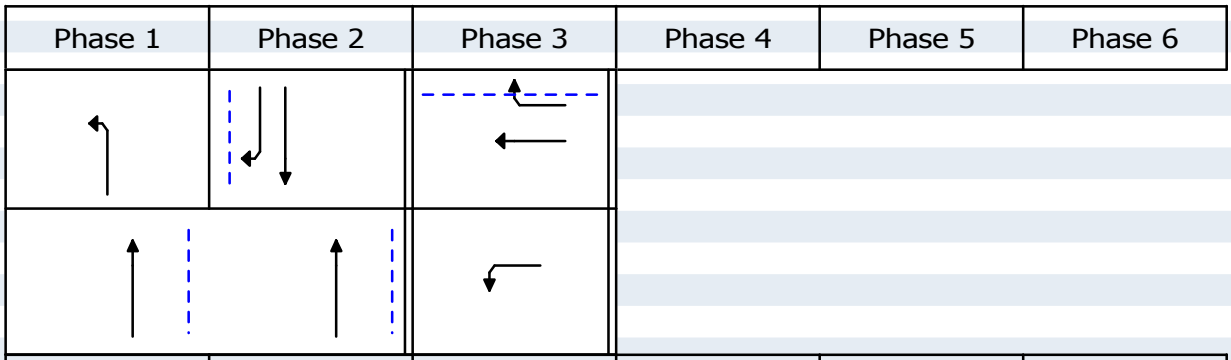
802	1462	0
24.0	24.0	0.0
2	2	0

Phasing:

SEQUENCE	31
PERMSV	N N N N
OVERLP	N N N N
LEADLAG	LD LD

	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		0			0			1			0	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 31 **/**



	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
C=120"	G= 37.0" Y+R= 5.0"	G= 35.0" Y+R= 5.0"	G= 33.0" Y+R= 5.0"	G= 0.0" Y+R= 0.0"	G= 0.0" Y+R= 0.0"	G= 0.0" Y+R= 0.0"

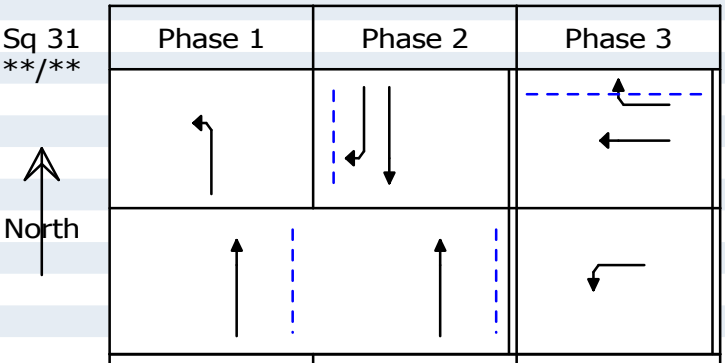
Lacey Gateway
Marvin Rd / I-5 SB Ramps
2016 Without Project PM Peak (128)

04/17/13
17:39:51

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 1.267 (Critical V/C 1.639) Control Delay 201.5 Level of Service F

Sq 31
/



Cmax= 120"
Cavg= 120"

Phase 1	Phase 2	Phase 3
Gmax= 37.0" Gavg= 32.5" Y+Rc= 5.0"	Gmax= 35.0" Gavg= 45.5" Y+Rc= 5.0"	Gmax= 33.0" Gavg= 27.0" Y+Rc= 5.0"
Gmax= 27.0" Gavg= 83.0" Y+Rc= 5.0"		Gmax= 33.0" Gavg= 27.0" Y+Rc= 5.0"

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								279.1	F	
RT	12/1			1583	600	1193	1.988	487.8	F	3679 ft
TH	24/2	0.292	0.379	3636	1344	1567	1.166	120.3	F	1283 ft
NB Approach								28.0	C	
TH	24/2	0.225	0.692	3636	2453	1624	0.662	11.1	B+	858 ft
LT	24/2	0.308	0.271	3445	934	891	0.954	59.0	E+	561 ft
WB Approach								375.7	F	
RT	12/1			1583	356	523	1.468	271.9	F	1258 ft
TH	12/1	0.275	0.225	1863	419	2	0.005	36.1	D+	3 ft
LT	12/1	0.275	0.225	1774	399	748	1.874	449.2	F	2184 ft

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

			0	1753	398						
			0.0	24.0	24.0						
			0	2	2						
							0	0.0	0		
							0	0.0	0		
744	12.0	1		+			0	0.0	0		North
1	12.0	1									
10	0.0	0									
			0	1469	290						
			0.0	24.0	12.0						
			0	2	1						

Phasing: SEQUENCE 21
PERMSV N N N N
OVERLP N N N N
LEADLAG LD LD

	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		0			0			2			0	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 21 **/**	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
North						
C=120"	G= 17.0" Y+R= 5.0"	G= 61.0" Y+R= 5.0"	G= 27.0" Y+R= 5.0"	G= 0.0" Y+R= 0.0"	G= 0.0" Y+R= 0.0"	G= 0.0" Y+R= 0.0"

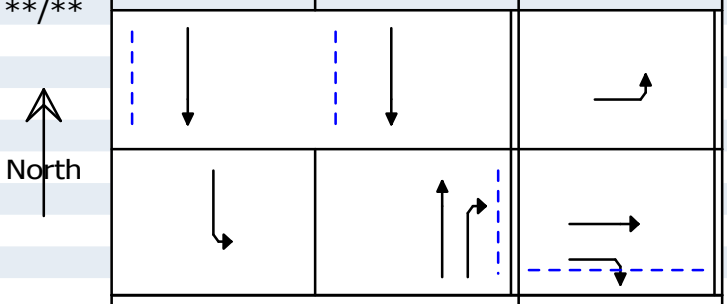
Lacey Gateway
Marvin Rd / I-5 NB Ramps
2016 Without Project PM Peak (128)

04/17/13
17:42:54

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.852 (Critical V/C 0.966) Control Delay 68.6 Level of Service E

Sq 21
/



Cmax= 120"
Cavg= 120"

Phase 1	Phase 2	Phase 3
Gmax= 63.0" Gavg= 83.0" Y+Rc= 5.0"		Gmax= 27.0" Gavg= 27.0" Y+Rc= 5.0"
Gmax= 17.0" Gavg= 17.0" Y+Rc= 5.0"	Gmax= 61.0" Gavg= 61.0" Y+Rc= 5.0"	Gmax= 27.0" Gavg= 27.0" Y+Rc= 5.0"

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								24.8	C+	
TH	24/2	0.525	0.692	3636	2453	1948	0.794	14.4	B+	1022 ft
LT	24/2	0.142	0.142	3445	488	442	0.906	70.6	E	316 ft
NB Approach								31.1	C	
RT	12/1			1580	803	322	0.401	18.3	B	378 ft
TH	24/2	0.508	0.508	3636	1803	1632	0.905	33.7	C	905 ft
EB Approach								280.6	F	
RT+TH+LT	12/1-	0.225	0.225	1603	361	430	0.033	36.3	D+	18 ft
LT	12/1+	0.225	0.225	1774	399	409	2.072	537.4	F	2569 ft

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

	284	1211	181					
	12.0	24.0	12.0					
	1	2	1					
					253	0.0	0	
					42	12.0	1	
398	12.0	1	+		80	12.0	1	
273	12.0	1						
389	12.0	1						
			81	1150	45			
			12.0	24.0	0.0			
			1	2	0			

North

Phasing: SEQUENCE 56
PERMSV N N N N
OVERLP N N N N
LEADLAG LD LD

	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		1			2			3			10	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 56 **/**

North

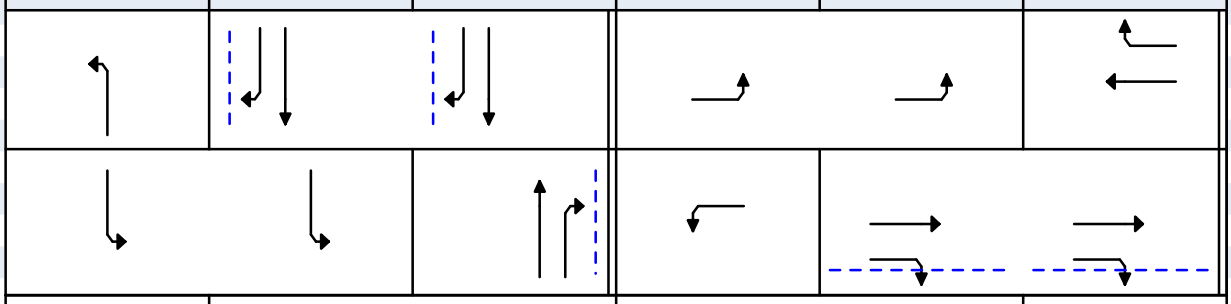
	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
C=120"	G= 10.0" Y+R= 5.0"	G= 0.0" Y+R= 5.0"	G= 47.0" Y+R= 5.0"	G= 13.0" Y+R= 4.0"	G= 12.0" Y+R= 4.0"	G= 10.5" Y+R= 4.5"

Lacey Gateway
Marvin Rd / Quinault
2016 Without Project PM Peak (128)

04/17/13
17:45:15

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.944 (Critical V/C 1.052) Control Delay 94.4 Level of Service F

Sq 56 **/**	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
North						
Cmax= 120" Cavg= 120"	Gmax= 10.0" Gavg= 7.6" Y+Rc= 5.0"	Gmax= 52.0" Gavg= 54.4" Y+Rc= 5.0"		Gmax= 29.0" Gavg= 29.0" Y+Rc= 4.0"		Gmax= 10.5" Gavg= 10.5" Y+Rc= 4.5"
	Gmax= 15.0" Gavg= 15.0" Y+Rc= 5.0"		Gmax= 47.0" Gavg= 47.0" Y+Rc= 5.0"	Gmax= 13.0" Gavg= 7.5" Y+Rc= 4.0"	Gmax= 26.5" Gavg= 32.0" Y+Rc= 4.5"	

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								37.6	D+	
RT	12/1	0.033	0.453	1582	717	204	0.285	20.7	C+	371 ft
TH	24/2	0.433	0.453	3547	1608	1346	0.837	32.7	C	745 ft
LT	12/1	0.125	0.125	1774	222	201	0.906	87.2	F	321 ft
NB Approach								56.2	E+	
RT+TH	24/2	0.392	0.392	3611	1414	1328	0.939	55.2	E+	1649 ft
LT	12/1	0.083	0.063	1774	112	90	0.800	70.8	E	148 ft
WB Approach								543.9	F	
RT+TH	12/1	0.087	0.087	1608	141	328	2.331	675.2	F	1100 ft
LT	12/1	0.108	0.063	1774	111	89	0.799	60.4	E+	136 ft
EB Approach								63.2	E+	
RT	12/1	0.033	0.266	1566	417	342	0.820	52.8	D	682 ft
TH+LT	12/1-	0.221	0.266	1863	496	382	0.611	40.2	D+	365 ft
LT	12/1+	0.242	0.242	1774	429	363	1.031	97.1	F	676 ft

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

			108	1355	200						
			0.0	24.0	12.0						
			0	2	1						
							137	0.0	0		
							82	12.0	1		
155	12.0	1		+			187	12.0	1		North
62	12.0	1									
155	0.0	0									
				172	937	199					
				12.0	24.0	0.0					
				1	2	0					

Phasing: SEQUENCE 55
PERMSV N N N N
OVERLP N N N N
LEADLAG LD LD

	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		2			4			2			1	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 55
/

North

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
C=120"	G= 19.0" Y+R= 4.0"	G= -4.0" Y+R= 4.0"	G= 53.5" Y+R= 4.5"	G= 11.0" Y+R= 4.0"	G= -4.0" Y+R= 4.0"	G= 20.0" Y+R= 4.0"

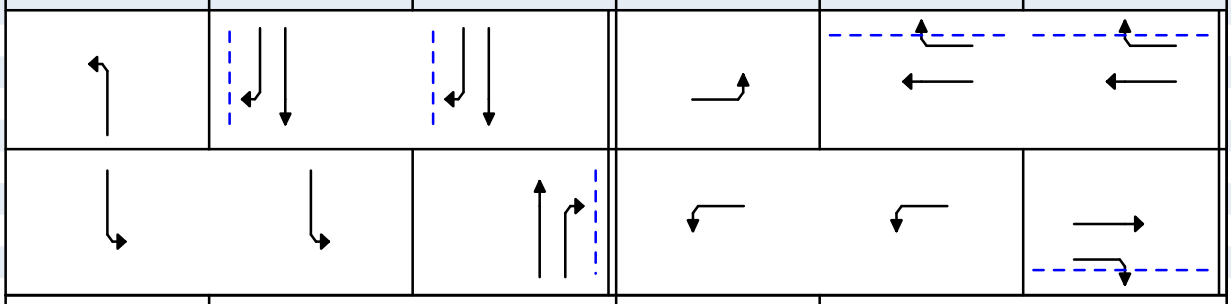
Lacey Gateway
Marvin Rd / Lacey Marketplace
2016 Without Project PM Peak (128)

04/17/13
17:47:30

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.898 (Critical V/C 0.955) Control Delay 60.3 Level of Service E+

Sq 55
/



	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
Cmax= 120" Cavg= 120"	Gmax= 19.0" Gavg= 14.7" Y+Rc= 4.0"	Gmax= 53.5" Gavg= 57.8" Y+Rc= 4.5"		Gmax= 11.0" Gavg= 11.0" Y+Rc= 4.0"	Gmax= 20.0" Gavg= 20.0" Y+Rc= 4.0"	
	Gmax= 19.0" Gavg= 16.8" Y+Rc= 4.0"		Gmax= 53.5" Gavg= 55.7" Y+Rc= 4.5"	Gmax= 11.0" Gavg= 11.0" Y+Rc= 4.0"		Gmax= 20.0" Gavg= 20.0" Y+Rc= 4.0"

14.7"	57.8"		11.0"	20.0"	
16.8"	55.7"		11.0"	20.0"	

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								50.5	D	
RT+TH	24/2	0.446	0.482	3589	1729	1626	0.940	47.1	D	1947 ft
LT	12/1	0.158	0.140	1774	248	222	0.896	75.8	E	328 ft
NB Approach								36.1	D+	
RT+TH	24/2	0.446	0.465	3526	1638	1262	0.770	30.9	C	1414 ft
LT	12/1	0.158	0.122	1774	217	191	0.880	70.4	E	278 ft
WB Approach								140.2	F	
RT+TH	12/1	0.167	0.167	1670	278	243	0.874	72.9	E	354 ft
LT	12/1	0.092	0.092	1774	163	208	1.279	218.8	F	481 ft
EB Approach								101.6	F	
RT+TH	12/1	0.167	0.167	1652	275	241	0.875	73.4	E	353 ft
LT	12/1	0.092	0.092	1774	163	172	1.058	141.2	F	343 ft

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

	434	1116	269					
	12.0	24.0	12.0					
	1	2	1					
					212	12.0	1	
					497	24.0	2	
370	24.0	2		+	438	24.0	2	
546	24.0	2						
619	12.0	1						
			233	636	126			
			12.0	24.0	0.0			
			1	2	0			

North

Phasing:

SEQUENCE	55
PERMSV	N N N N
OVERLP	N N N N
LEADLAG	LD LD

	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	1.3	1.3	1.3	.7	.7	.7	1.8	1.8	1.8	1.2	1.2	1.2
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		3			2			3			3	
Bike vol, vbic		1			0			1			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 55
/

North

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
C=120"	G= 19.0" Y+R= 4.0"	G= -3.0" Y+R= 4.0"	G= 36.5" Y+R= 4.5"	G= 20.0" Y+R= 4.0"	G= -4.0" Y+R= 4.0"	G= 26.0" Y+R= 5.0"

Lacey Gateway
Marvin Rd / Martin Rd
2016 Without Project PM Peak (128)

04/17/13
17:49:35

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.937 (Critical V/C 1.165) Control Delay 92.5 Level of Service F

Sq 55 **/**	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
North						
Cmax= 120" Cavg= 120"	Gmax= 19.0" Gavg= 19.0" Y+Rc= 4.0"	Gmax= 37.5" Gavg= 37.5" Y+Rc= 4.5"		Gmax= 20.0" Gavg= 16.0" Y+Rc= 4.0"	Gmax= 26.0" Gavg= 30.0" Y+Rc= 5.0"	
	Gmax= 20.0" Gavg= 20.0" Y+Rc= 4.0"		Gmax= 36.5" Gavg= 36.5" Y+Rc= 4.5"	Gmax= 20.0" Gavg= 18.5" Y+Rc= 4.0"		Gmax= 26.0" Gavg= 27.5" Y+Rc= 5.0"

19.0"	37.5"	16.0"	30.0"
20.0"	36.5"	18.5"	27.5"

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								92.1	F	
RT	12/1	0.033	0.312	1570	490	371	0.756	43.1	D+	696 ft
TH	24/2	0.313	0.312	3571	1116	1240	1.111	104.1	F	947 ft
LT	12/1	0.167	0.167	1786	298	299	1.004	103.3	F	484 ft
NB Approach								54.1	D	
RT+TH	24/2	0.304	0.304	3529	1074	847	0.789	45.4	D	1019 ft
LT	12/1	0.158	0.158	1778	281	259	0.920	82.6	F	391 ft
WB Approach								51.0	D	
RT	12/1			1600	400	124	0.310	36.7	D+	268 ft
TH	24/2	0.217	0.250	3592	899	552	0.614	40.8	D+	332 ft
LT	24/2	0.167	0.154	3490	537	487	0.907	66.3	E+	333 ft
EB Approach								149.9	F	
RT	12/1	0.033	0.229	1590	365	577	1.582	320.9	F	1804 ft
TH	24/2	0.217	0.229	3575	820	607	0.740	46.1	D	368 ft
LT	24/2	0.167	0.133	3472	462	411	0.890	63.0	E+	280 ft

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

			70	177	105						
			0.0	24.0	12.0						
			0	2	1						
							81	0.0	0		
							750	24.0	2		
51	12.0	1		+			444	24.0	2		
1115	24.0	2									
451	12.0	1									
				171	112	238					
				12.0	12.0	12.0					
				1	1	1					

North

Phasing: SEQUENCE 65
PERMSV N N N N
OVERLP N N Y Y
LEADLAG LD LD

	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	.4	.4	.4	1.0	1.0	1.0	1.1	1.1	1.1	.6	.6	.6
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		3			0			4			2	
Bike vol, vbic		0			0			1			2	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 65
/

North

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
C=120"	G= 6.0" Y+R= 5.0"	G= -5.0" Y+R= 5.0"	G= 36.0" Y+R= 5.0"	G= 5.5" Y+R= 5.5"	G= 3.5" Y+R= 5.5"	G= 42.5" Y+R= 5.5"

Lacey Gateway
Carpenter Rd / Martin Way
2016 Without Project PM Peak (128)

04/17/13
17:51:40

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.831 (Critical V/C 0.813) Control Delay 81.4 Level of Service F

Sq 65 **/**	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
North						
Cmax= 120" Cavg= 120"	Gmax= 6.0" Gavg= 6.0" Y+Rc= 5.0"		Gmax= 36.0" Gavg= 35.0" Y+Rc= 5.0"	Gmax= 5.5" Gavg= 4.9" Y+Rc= 5.5"	Gmax= 51.5" Gavg= 53.1" Y+Rc= 5.5"	
	Gmax= 6.0" Gavg= 6.0" Y+Rc= 5.0"	Gmax= 36.0" Gavg= 35.0" Y+Rc= 5.0"		Gmax= 14.5" Gavg= 15.5" Y+Rc= 5.5"		Gmax= 42.5" Gavg= 42.5" Y+Rc= 5.5"

6.0"		35.0"				4.9"		53.1"			
6.0"		35.0"				15.5"			42.5"		

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								98.0	F	
RT+TH	24/2	0.300	0.292	3519	1026	275	0.268	32.8	C	368 ft
LT	12/1	0.050	0.050	1802	90	117	1.298	251.3	F	308 ft
NB Approach								214.6	F	
RT	12/1			1571	664	264	0.397	24.3	C+	470 ft
TH	12/1	0.300	0.292	1879	548	124	0.226	32.3	C	170 ft
LT	12/1	0.050	0.050	1790	89	190	2.123	597.9	F	632 ft
WB Approach								59.8	E+	
RT+TH	24/2	0.429	0.442	3610	1597	923	0.578	25.7	C+	1034 ft
LT	24/2	0.121	0.129	3479	449	493	1.097	123.6	F	429 ft
EB Approach								52.0	D	
RT	12/1	0.033	0.354	1581	640	501	0.782	36.9	D+	863 ft
TH	24/2	0.354	0.354	3596	1274	1239	0.973	57.1	E+	759 ft
LT	12/1	0.046	0.041	1799	74	57	0.775	74.1	E	102 ft

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

		39	169	166							
		0.0	24.0	12.0							
		0	2	1							
							218	12.0	1		
							806	24.0	2		
54	12.0	1		+			1026	24.0	2		
841	24.0	2									
267	12.0	1									
				238	252	1040					
				12.0	12.0	24.0					
				1	1	2					

North

Phasing:

SEQUENCE	65
PERMSV	N N N N
OVERLP	N N Y N
LEADLAG	LD LD

	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		28			24			0			1	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 65
/

North

C=110"

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
G= 16.0"	G= -5.0"	G= 23.0"	G= 7.0"	G= 10.5"	G= 29.5"
Y+R= 4.0"	Y+R= 5.0"	Y+R= 5.0"	Y+R= 4.0"	Y+R= 5.5"	Y+R= 5.5"

Lacey Gateway
College St / Martin Way
2016 Without Project PM Peak (128)

04/19/13
09:26:01

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.941 (Critical V/C 0.936) Control Delay 118.0 Level of Service F

Sq 65
/

North

Cmax= 110"
Cavg= 110"

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
Gmax= 15.0" Gavg= 15.0" Y+Rc= 5.0"		Gmax= 23.0" Gavg= 23.0" Y+Rc= 5.0"	Gmax= 7.0" Gavg= 4.8" Y+Rc= 4.0"	Gmax= 45.5" Gavg= 47.7" Y+Rc= 5.5"	
Gmax= 16.0" Gavg= 13.2" Y+Rc= 4.0"	Gmax= 23.0" Gavg= 25.8" Y+Rc= 5.0"		Gmax= 21.5" Gavg= 21.5" Y+Rc= 5.5"		Gmax= 30.0" Gavg= 29.5" Y+Rc= 5.5"

15.0" 23.0" 4.8" 47.7"
13.2" 25.8" 21.5" 29.5"

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								50.4	D	
RT+TH	24/2	0.209	0.209	3493	730	231	0.316	37.0	D+	301 ft
LT	12/1	0.145	0.120	1774	212	184	0.867	67.2	E+	256 ft
NB Approach								59.2	E+	
RT	24/2			2802	1206	1156	0.958	47.1	D	951 ft
TH	12/1	0.209	0.235	1863	438	280	0.640	40.3	D+	320 ft
LT	12/1	0.136	0.136	1774	242	264	1.091	131.9	F	466 ft
WB Approach								201.8	F	
RT	12/1	0.036	0.434	1540	668	131	0.196	19.3	B	240 ft
TH	24/2	0.414	0.434	3547	1539	896	0.582	24.0	C+	468 ft
LT	24/2	0.195	0.195	3445	673	1140	1.693	362.5	F	1500 ft
EB Approach								64.1	E+	
TH	24/2	0.273	0.268	5160	1384	935	0.676	64.2	E+	579 ft
LT	12/1	0.064	0.043	1774	77	60	0.779	62.4	E+	93 ft

Intersection	
Intersection Delay, s/veh	1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	206	1313	618	0	2473
Conflicting Peds, #/hr	1	1	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None
Storage Length	0	0		0	0	
Median Width	0		0			0
Grade, %	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	1	1	4	4	1	1
Mvmt Flow	0	229	1459	687	0	2748
Number of Lanes	0	1	2	1	0	3

Major/Minor			Major 1			Major 2
Conflicting Flow All	2559	730	0	0	1460	0
Stage 1	1460	-	-	-	-	-
Stage 2	1099	-	-	-	-	-
Follow-up Headway	3.66	3.31	-	-	2.21	-
Pot Capacity-1 Maneuver	32	367	-	-	464	-
Stage 1	178	-	-	-	-	-
Stage 2	260	-	-	-	-	-
Time blocked-Platoon, %	0	0	-	-	0	-
Mov Capacity-1 Maneuver	32	367	-	-	464	-
Mov Capacity-2 Maneuver	32	-	-	-	-	-
Stage 1	178	-	-	-	-	-
Stage 2	260	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	29.7	0	0
HCM LOS	D	-	-

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Cap, veh/h	-	-	367	464	-
HCM Control Delay, s	-	-	29.7	0	-
HCM Lane V/C Ratio	-	-	0.62	-	-
HCM Lane LOS	-	-	D	A	-
HCM 95th-tile Q, veh	-	-	4.0	0.0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	8.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	119	123	167	132	1	170	6	108	1	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	100		0	100		0	100		0	0		0
Median Width		12			12			12			12	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	3	3	3	1	1	1	0	0	0
Mvmt Flow	4	134	138	188	148	1	191	7	121	1	1	2
Number of Lanes	1	1	0	1	1	0	1	1	0	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 2		
Conflicting Flow All	149	0	0	272	0	0	738	737	203	800	805	149
Stage 1	-	-	-	-	-	-	212	212	-	524	524	-
Stage 2	-	-	-	-	-	-	526	525	-	276	281	-
Follow-up Headway	2.218	-	-	2.227	-	-	3.509	4.009	3.309	3.5	4	3.3
Pot Capacity-1 Maneuver	1432	-	-	1286	-	-	335	347	840	306	318	903
Stage 1	-	-	-	-	-	-	792	729	-	540	533	-
Stage 2	-	-	-	-	-	-	537	531	-	735	682	-
Time blocked-Platoon, %	0	-	-	0	-	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	1432	-	-	1286	-	-	295	295	840	228	271	903
Mov Capacity-2 Maneuver	-	-	-	-	-	-	295	295	-	228	271	-
Stage 1	-	-	-	-	-	-	790	727	-	538	455	-
Stage 2	-	-	-	-	-	-	456	453	-	621	680	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	4.6	20.4	14.4
HCM LOS	-	-	C	B

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Cap, veh/h	295	500	1432	-	-	1286	-	-	389
HCM Control Delay, s	26.2	16.6	7.522	-	-	8.277	-	-	14.4
HCM Lane V/C Ratio	0.43	0.38	0.00	-	-	0.15	-	-	0.01
HCM Lane LOS	D	C	A	-	-	A	-	-	B
HCM 95th-tile Q, veh	2.1	1.8	0.0	-	-	0.5	-	-	0.0

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	2.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	38	198	207	98	67	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	100			0	0	0
Median Width		12	12		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	42	220	230	109	74	34
Number of Lanes	1	1	1	0	1	0

Major/Minor	Major 1		Major 2			
Conflicting Flow All	339	0	-	0	588	284
Stage 1	-	-	-	-	284	-
Stage 2	-	-	-	-	304	-
Follow-up Headway	2.218	-	-	-	3.5	3.3
Pot Capacity-1 Maneuver	1220	-	-	-	475	760
Stage 1	-	-	-	-	769	-
Stage 2	-	-	-	-	753	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1220	-	-	-	459	760
Mov Capacity-2 Maneuver	-	-	-	-	459	-
Stage 1	-	-	-	-	769	-
Stage 2	-	-	-	-	727	-

Approach	EB	WB	SB
HCM Control Delay, s	1.3	0	13.6
HCM LOS	-	-	B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1220	-	-	-	525
HCM Control Delay, s	8.057	-	-	-	13.6
HCM Lane V/C Ratio	0.04	-	-	-	0.21
HCM Lane LOS	A	-	-	-	B
HCM 95th-tile Q, veh	0.1	-	-	-	0.8

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	252	6	27	195	0	2	0	39	1	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	100		0	100		0	100		0	100		0
Median Width		12			12			12			12	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.96	0.90
Heavy Vehicles, %	2	2	2	0	0	0	0	0	0	0	0	0
Mvmt Flow	2	280	7	30	217	0	2	0	43	1	0	1
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 2		
Conflicting Flow All	217	0	0	287	0	0	565	565	283	586	568	217
Stage 1	-	-	-	-	-	-	288	288	-	277	277	-
Stage 2	-	-	-	-	-	-	277	277	-	309	291	-
Follow-up Headway	2.218	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1353	-	-	1287	-	-	439	437	761	425	435	828
Stage 1	-	-	-	-	-	-	724	677	-	734	685	-
Stage 2	-	-	-	-	-	-	734	685	-	705	675	-
Time blocked-Platoon, %	0	-	-	0	-	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	1353	-	-	1287	-	-	430	426	761	393	424	828
Mov Capacity-2 Maneuver	-	-	-	-	-	-	430	426	-	393	424	-
Stage 1	-	-	-	-	-	-	723	676	-	733	669	-
Stage 2	-	-	-	-	-	-	716	669	-	664	674	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1	10.2	11.8
HCM LOS	-	-	B	B

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Cap, veh/h	430	751	1353	-	-	1287	-	-	393	649
HCM Control Delay, s	13.4	10.1	7.665	-	-	7.864	-	-	14.2	10.6
HCM Lane V/C Ratio	0.00	0.06	0.00	-	-	0.02	-	-	0.00	0.00
HCM Lane LOS	B	B	A	-	-	A	-	-	B	B
HCM 95th-tile Q, veh	0.0	0.2	0.0	-	-	0.1	-	-	0.0	0.0

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	6.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	8	170	298	124	86	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None
Storage Length	0	0	100			0
Median Width	12			12	12	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles, %	1	1	1	1	5	5
Mvmt Flow	9	195	343	143	99	9
Number of Lanes	1	1	1	1	1	0

Major/Minor				Major 1	Major 2	
Conflicting Flow All	931	103	108	0	-	0
Stage 1	103	-	-	-	-	-
Stage 2	828	-	-	-	-	-
Follow-up Headway	3.509	3.309	2.209	-	-	-
Pot Capacity-1 Maneuver	297	955	1489	-	-	-
Stage 1	924	-	-	-	-	-
Stage 2	431	-	-	-	-	-
Time blocked-Platoon, %	0	0	0	-	-	-
Mov Capacity-1 Maneuver	229	955	1489	-	-	-
Mov Capacity-2 Maneuver	229	-	-	-	-	-
Stage 1	924	-	-	-	-	-
Stage 2	332	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.2	5.7	0
HCM LOS	B	-	-

Minor Lane / Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Cap, veh/h	1489	-	229	955	-	-
HCM Control Delay, s	8.139	-	21.4	9.7	-	-
HCM Lane V/C Ratio	0.23	-	0.04	0.21	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th-tile Q, veh	0.9	-	0.1	0.8	-	-

Notes

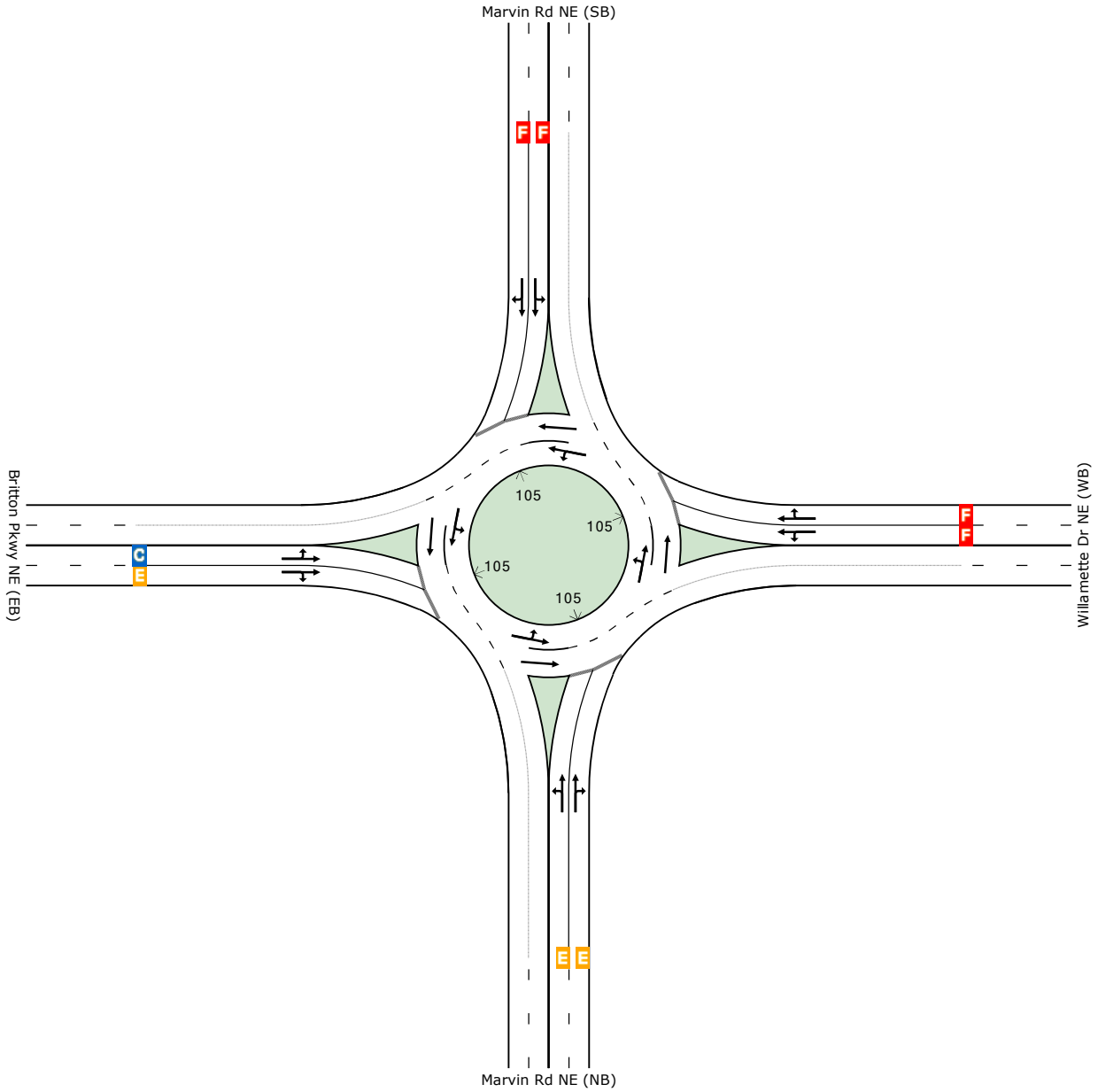
~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

2016 With Project

LEVEL OF SERVICE

Site: 2016 With Project PM Peak

Lacey Gateway
Marvin Rd NE / Britton Pkwy NE
Roundabout



	South	East	North	West	Intersection
LOS	E	F	F	D	F

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

MOVEMENT SUMMARY

Site: 2016 With Project PM Peak

Lacey Gateway
Marvin Rd NE / Britton Pkwy NE
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Marvin Rd NE (NB)											
3	L2	651	2.2	0.927	36.3	LOS E	15.1	385.2	1.00	2.19	18.0
8	T1	866	2.2	0.927	36.0	LOS E	15.1	385.2	1.00	2.17	18.5
18	R2	166	2.2	0.927	36.0	LOS E	14.5	369.8	1.00	2.16	18.7
Approach		1682	2.2	0.927	36.1	LOS E	15.1	385.2	1.00	1.09	18.3
East: Willamette Dr NE (WB)											
1	L2	997	1.8	2.808	844.0	LOS F	210.1	5328.6	1.00	11.67	1.8
6	T1	169	1.8	0.839	52.9	LOS F	4.3	107.9	0.93	2.26	15.3
16	R2	106	1.8	0.839	52.9	LOS F	4.3	107.9	0.93	2.26	15.3
Approach		1271	1.8	2.808	673.2	LOS F	210.1	5328.6	0.99	4.82	2.2
North: Marvin Rd NE (SB)											
7	L2	106	1.5	1.530	272.4	LOS F	82.7	2092.2	1.00	8.06	4.7
4	T1	1199	1.5	1.530	271.6	LOS F	87.2	2207.0	1.00	8.24	4.7
14	R2	124	1.5	1.530	270.8	LOS F	87.2	2207.0	1.00	8.42	4.7
Approach		1429	1.5	1.530	271.6	LOS F	87.2	2207.0	1.00	4.12	4.7
West: Britton Pkwy NE (EB)											
5	L2	78	1.0	0.451	16.8	LOS C	1.6	39.3	0.73	1.55	23.9
2	T1	123	1.0	0.451	16.8	LOS C	1.6	39.3	0.73	1.55	23.9
12	R2	386	1.0	0.813	37.1	LOS E	4.5	113.6	0.87	2.06	18.1
Approach		587	1.0	0.813	30.1	LOS D	4.5	113.6	0.83	0.94	19.8
All Vehicles		4969	1.8	2.808	266.1	LOS F	210.1	5328.6	0.98	2.90	4.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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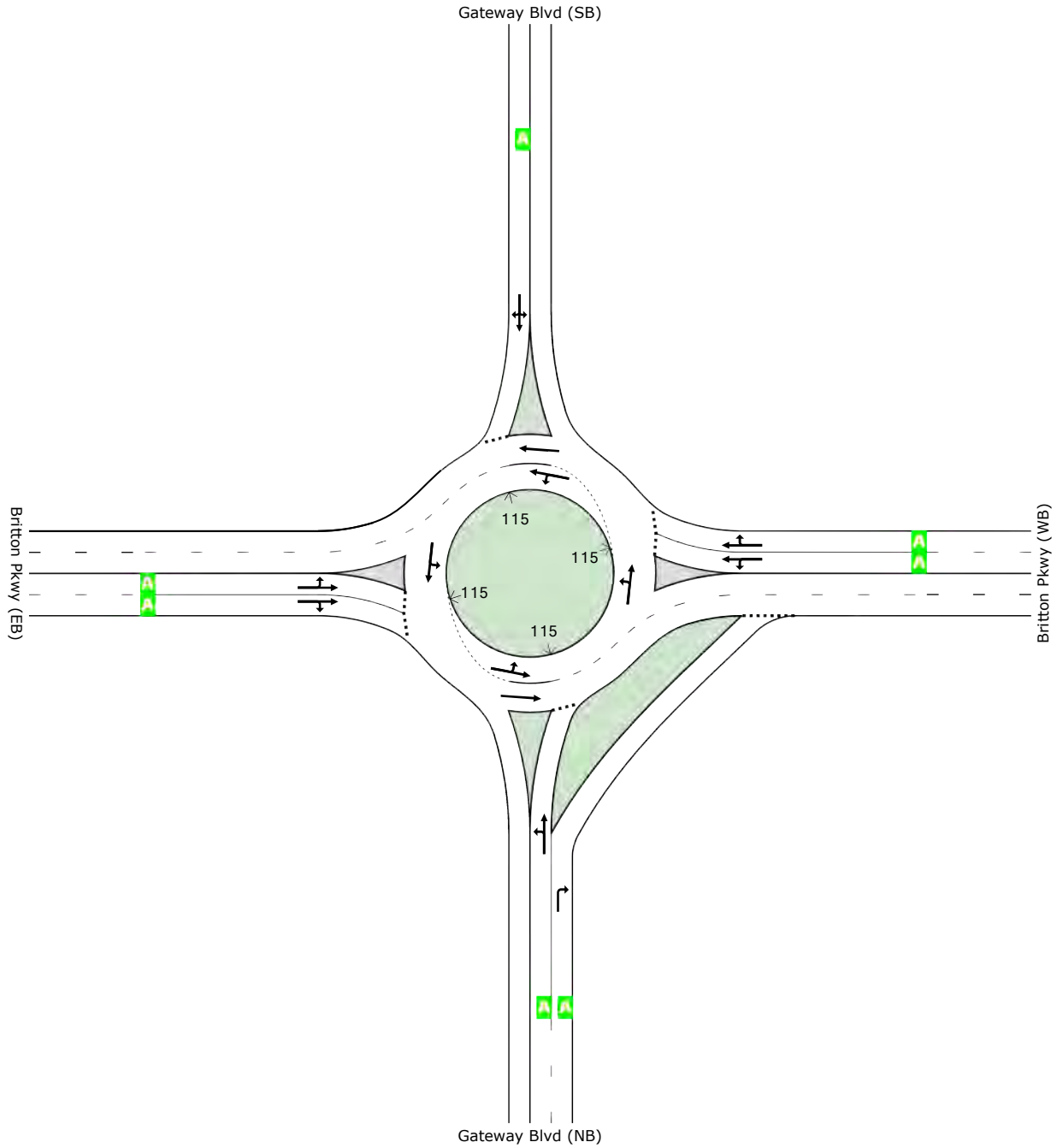
LEVEL OF SERVICE

Site: 2016 With Project PM Peak

Lacey Gateway
Gateway Blvd / Britton Pkwy
Roundabout



	South	East	North	West	Intersection
LOS	A	A	A	A	A

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

MOVEMENT SUMMARY

Site: 2016 With Project PM Peak

Lacey Gateway
Gateway Blvd / Britton Pkwy
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: Gateway Blvd (NB)											
3	L2	32	0.0	0.037	4.4	LOS A	0.1	2.3	0.30	0.43	27.8
8	T1	1	0.0	0.037	4.4	LOS A	0.1	2.3	0.30	0.43	27.8
18	R2	154	0.0	0.166	5.5	LOS A	0.5	11.6	0.30	0.47	30.2
Approach		187	0.0	0.166	5.3	LOS A	0.5	11.6	0.30	0.23	29.7
East: Britton Pkwy (WB)											
1	L2	140	1.0	0.268	6.2	LOS A	1.2	29.4	0.26	0.29	28.4
6	T1	312	1.0	0.268	6.2	LOS A	1.2	29.4	0.26	0.29	29.4
16	R2	90	1.0	0.268	6.2	LOS A	1.2	29.4	0.26	0.29	30.2
Approach		542	1.0	0.268	6.2	LOS A	1.2	29.4	0.26	0.15	29.2
North: Gateway Blvd (SB)											
7	L2	41	2.0	0.106	5.7	LOS A	0.3	7.0	0.37	0.67	28.5
4	T1	1	2.0	0.106	5.7	LOS A	0.3	7.0	0.37	0.67	28.5
14	R2	41	2.0	0.106	5.7	LOS A	0.3	7.0	0.37	0.67	28.5
Approach		84	2.0	0.106	5.7	LOS A	0.3	7.0	0.37	0.34	28.5
West: Britton Pkwy (EB)											
5	L2	65	2.0	0.180	5.7	LOS A	0.7	17.5	0.33	0.45	29.2
2	T1	236	2.0	0.180	5.7	LOS A	0.7	17.5	0.33	0.45	30.0
12	R2	31	2.0	0.180	5.7	LOS A	0.7	17.5	0.33	0.45	30.7
Approach		332	2.0	0.180	5.7	LOS A	0.7	17.5	0.33	0.22	29.9
All Vehicles		1145	1.2	0.268	5.9	LOS A	1.2	29.4	0.29	0.20	29.4

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Lacey Gateway
Marvin Rd / I-5 SB Ramps
2016 With Project PM Peak (255)

04/17/13
17:40:40

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

1074	1436	0
12.0	24.0	0.0
1	2	0

514	12.0	1
2	12.0	1
673	12.0	1

0	0.0	0
0	0.0	0
0	0.0	0

+

North

802	1482	0
24.0	24.0	0.0
2	2	0

Phasing:

SEQUENCE	31
PERMSV	N N N N
OVERLP	N N N N
LEADLAG	LD LD

	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		0			0			1			0	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 31
/

North

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
C=120"	G= 37.0" Y+R= 5.0"	G= 35.0" Y+R= 5.0"	G= 33.0" Y+R= 5.0"	G= 0.0" Y+R= 0.0"	G= 0.0" Y+R= 0.0"	G= 0.0" Y+R= 0.0"

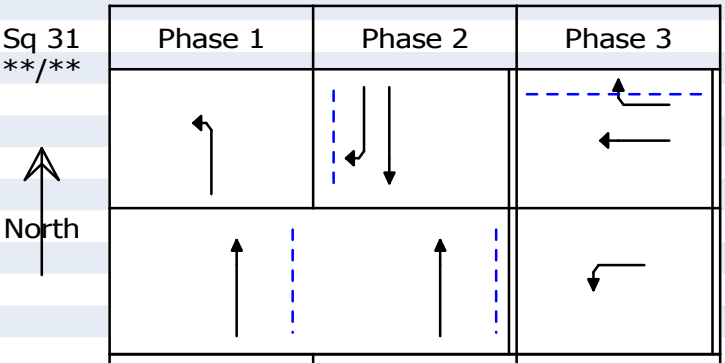
Lacey Gateway
Marvin Rd / I-5 SB Ramps
2016 With Project PM Peak (255)

04/17/13
17:40:40

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 1.285 (Critical V/C 1.639) Control Delay 208.2 Level of Service F

Sq 31
/



Cmax= 120" Cavg= 120"	Phase 1	Phase 2	Phase 3
	Gmax= 37.0" Gavg= 32.5" Y+Rc= 5.0"	Gmax= 35.0" Gavg= 45.5" Y+Rc= 5.0"	Gmax= 33.0" Gavg= 27.0" Y+Rc= 5.0"
	Gmax= 27.0" Gavg= 83.0" Y+Rc= 5.0"		Gmax= 33.0" Gavg= 27.0" Y+Rc= 5.0"

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								282.6	F	
RT	12/1			1583	600	1193	1.988	487.8	F	3679 ft
TH	24/2	0.292	0.379	3636	1344	1596	1.187	129.3	F	1349 ft
NB Approach								28.0	C	
TH	24/2	0.225	0.692	3636	2453	1647	0.671	11.2	B+	869 ft
LT	24/2	0.308	0.271	3445	934	891	0.954	59.0	E+	561 ft
WB Approach								397.3	F	
RT	12/1			1583	356	571	1.603	330.6	F	1492 ft
TH	12/1	0.275	0.225	1863	419	2	0.005	36.1	D+	3 ft
LT	12/1	0.275	0.225	1774	399	748	1.874	449.2	F	2184 ft

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

			0	1766	411						
			0.0	24.0	24.0						
			0	2	2						
							0	0.0	0		
							0	0.0	0		
744	12.0	1			+		0	0.0	0		
1	12.0	1									
10	0.0	0									
					0	1489	290				
					0.0	24.0	12.0				
					0	2	1				

North

Phasing: SEQUENCE 21
PERMSV N N N N
OVERLP N N N N
LEADLAG LD LD

	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		0			0			2			0	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 21 **/**	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
North						
C=120"	G= 17.0" Y+R= 5.0"	G= 61.0" Y+R= 5.0"	G= 27.0" Y+R= 5.0"	G= 0.0" Y+R= 0.0"	G= 0.0" Y+R= 0.0"	G= 0.0" Y+R= 0.0"

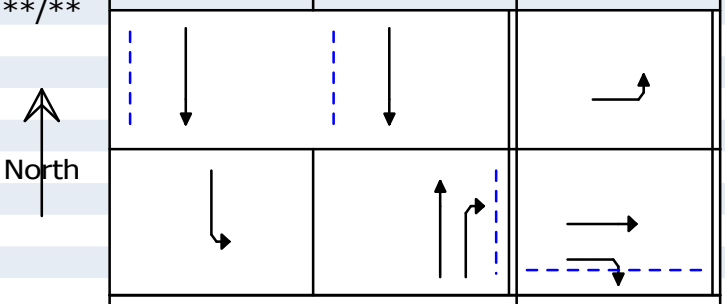
Lacey Gateway
Marvin Rd / I-5 NB Ramps
2016 With Project PM Peak (255)

04/17/13
17:43:51

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.861 (Critical V/C 0.978) Control Delay 69.3 Level of Service E

Sq 21
/



Phase 1	Phase 2	Phase 3
Gmax= 63.0" Gavg= 83.0" Y+Rc= 5.0"		Gmax= 27.0" Gavg= 27.0" Y+Rc= 5.0"
Gmax= 17.0" Gavg= 17.0" Y+Rc= 5.0"	Gmax= 61.0" Gavg= 61.0" Y+Rc= 5.0"	Gmax= 27.0" Gavg= 27.0" Y+Rc= 5.0"

Cmax= 120"
Cavg= 120"

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								26.3	C+	
TH	24/2	0.525	0.692	3636	2453	1962	0.800	14.6	B+	1029 ft
LT	24/2	0.142	0.142	3445	488	457	0.936	76.4	E	335 ft
NB Approach								32.2	C	
RT	12/1			1580	803	322	0.401	18.3	B	378 ft
TH	24/2	0.508	0.508	3636	1803	1654	0.917	35.0	C	922 ft
EB Approach								280.6	F	
RT+TH+LT	12/1-	0.225	0.225	1603	361	430	0.033	36.3	D+	18 ft
LT	12/1+	0.225	0.225	1774	399	409	2.072	537.4	F	2569 ft

Lacey Gateway
Marvin Rd / Quinault
2016 With Project PM Peak (255)

04/17/13
17:46:02

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

			285	1221	183						
			12.0	24.0	12.0						
			1	2	1						
							257	0.0	0		
							42	12.0	1		
401	12.0	1		+			80	12.0	1		North
273	12.0	1									
389	12.0	1									
				81	1163	45					
				12.0	24.0	0.0					
				1	2	0					

Phasing: SEQUENCE 56
PERMSV N N N N
OVERLP N N N N
LEADLAG LD LD

	SB RT	SB TH	SB LT	WB RT	WB TH	WB LT	NB RT	NB TH	NB LT	EB RT	EB TH	EB LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		1			2			3			10	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 56
/

North

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
C=120"	G= 10.0" Y+R= 5.0"	G= 0.0" Y+R= 5.0"	G= 47.0" Y+R= 5.0"	G= 13.0" Y+R= 4.0"	G= 12.0" Y+R= 4.0"	G= 10.5" Y+R= 4.5"

Lacey Gateway
Marvin Rd / Quinault
2016 With Project PM Peak (255)

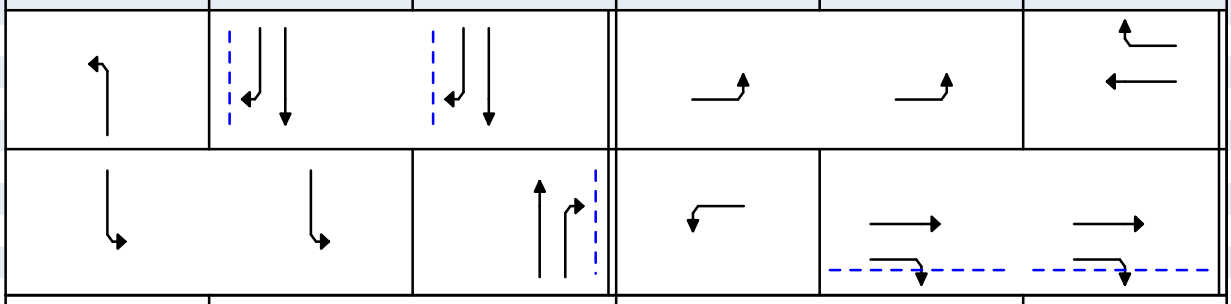
04/17/13
17:46:02

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.953 (Critical V/C 1.063) Control Delay 96.8 Level of Service F

Sq 56
/

North



Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
Gmax= 10.0" Gavg= 7.6" Y+Rc= 5.0"	Gmax= 52.0" Gavg= 54.4" Y+Rc= 5.0"		Gmax= 29.0" Gavg= 29.0" Y+Rc= 4.0"		Gmax= 10.5" Gavg= 10.5" Y+Rc= 4.5"
Gmax= 15.0" Gavg= 15.0" Y+Rc= 5.0"		Gmax= 47.0" Gavg= 47.0" Y+Rc= 5.0"	Gmax= 13.0" Gavg= 7.5" Y+Rc= 4.0"	Gmax= 26.5" Gavg= 32.0" Y+Rc= 4.5"	

Cmax= 120"
Cavg= 120"

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								38.1	D+	
RT	12/1	0.033	0.453	1582	717	206	0.287	20.7	C+	375 ft
TH	24/2	0.433	0.453	3547	1608	1357	0.844	33.1	C	752 ft
LT	12/1	0.125	0.125	1774	222	203	0.915	89.3	F	327 ft
NB Approach								58.1	E+	
RT+TH	24/2	0.392	0.392	3612	1415	1342	0.949	57.2	E+	1683 ft
LT	12/1	0.083	0.063	1774	112	90	0.800	70.8	E	148 ft
WB Approach								558.2	F	
RT+TH	12/1	0.087	0.087	1608	141	333	2.367	691.3	F	1123 ft
LT	12/1	0.108	0.063	1774	111	89	0.799	60.4	E+	136 ft
EB Approach								64.1	E+	
RT	12/1	0.033	0.266	1566	417	342	0.820	52.8	D	682 ft
TH+LT	12/1-	0.221	0.266	1863	496	384	0.611	40.2	D+	365 ft
LT	12/1+	0.242	0.242	1774	429	365	1.040	99.8	F	689 ft

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

	108	1365	200					
	0.0	24.0	12.0					
	0	2	1					
					137	0.0	0	
					82	12.0	1	
155	12.0	1	+		187	12.0	1	North
62	12.0	1						
155	0.0	0						
			172	950	199			
			12.0	24.0	0.0			
			1	2	0			

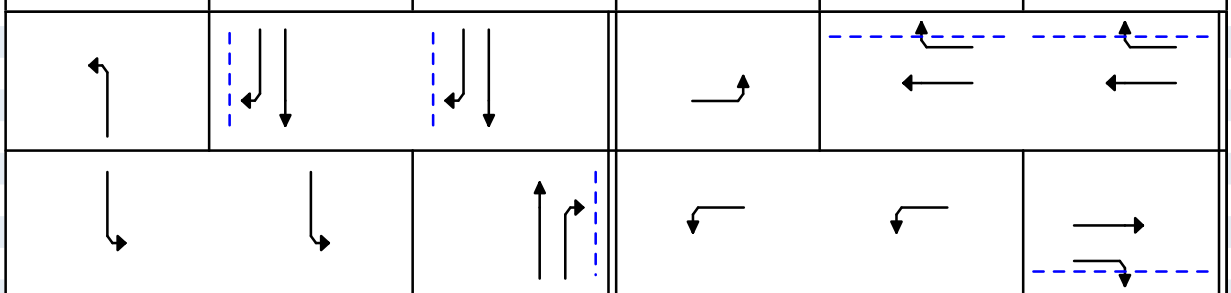
Phasing:

SEQUENCE	55			
PERMSV	N	N	N	N
OVERLP	N	N	N	N
LEADLAG	LD	LD		

	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		2			4			2			1	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 55
/

North



	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
C=120"	G= 19.0" Y+R= 4.0"	G= -4.0" Y+R= 4.0"	G= 53.5" Y+R= 4.5"	G= 11.0" Y+R= 4.0"	G= -4.0" Y+R= 4.0"	G= 20.0" Y+R= 4.0"

Lacey Gateway
Marvin Rd / Lacey Marketplace
2016 With Project PM Peak (255)

04/17/13
17:48:03

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.903 (Critical V/C 0.959) Control Delay 60.8 Level of Service E+

Sq 55
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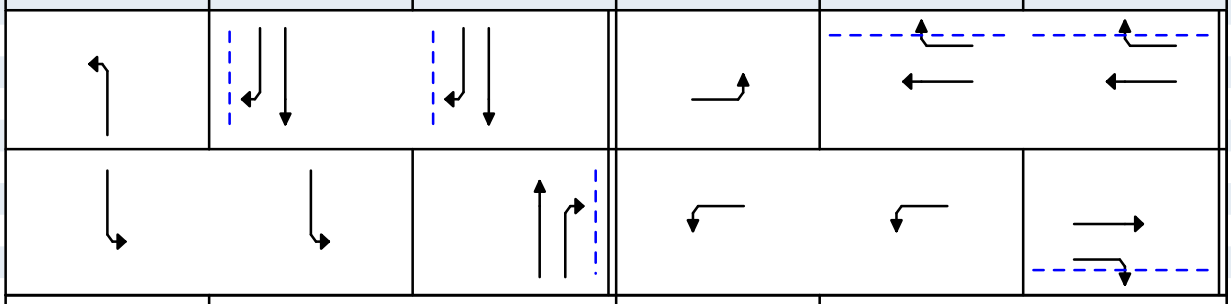


	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
Cmax= 120" Cavg= 120"	Gmax= 19.0" Gavg= 14.7" Y+Rc= 4.0"	Gmax= 53.5" Gavg= 57.8" Y+Rc= 4.5"		Gmax= 11.0" Gavg= 11.0" Y+Rc= 4.0"	Gmax= 20.0" Gavg= 20.0" Y+Rc= 4.0"	
	Gmax= 19.0" Gavg= 16.8" Y+Rc= 4.0"		Gmax= 53.5" Gavg= 55.7" Y+Rc= 4.5"	Gmax= 11.0" Gavg= 11.0" Y+Rc= 4.0"		Gmax= 20.0" Gavg= 20.0" Y+Rc= 4.0"

14.7"	57.8"		11.0"	20.0"	
16.8"	55.7"		11.0"	20.0"	

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								51.6	D	
RT+TH	24/2	0.446	0.482	3589	1730	1637	0.946	48.3	D	1972 ft
LT	12/1	0.158	0.140	1774	248	222	0.896	75.8	E	328 ft
NB Approach								36.5	D+	
RT+TH	24/2	0.446	0.465	3527	1639	1277	0.779	31.4	C	1433 ft
LT	12/1	0.158	0.122	1774	217	191	0.880	70.4	E	278 ft
WB Approach								140.2	F	
RT+TH	12/1	0.167	0.167	1670	278	243	0.874	72.9	E	354 ft
LT	12/1	0.092	0.092	1774	163	208	1.279	218.8	F	481 ft
EB Approach								101.6	F	
RT+TH	12/1	0.167	0.167	1652	275	241	0.875	73.4	E	353 ft
LT	12/1	0.092	0.092	1774	163	172	1.058	141.2	F	343 ft

Lacey Gateway
Marvin Rd / Martin Rd
2016 With Project PM Peak (255)

04/17/13
17:50:06

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

	434	1126	269					
	12.0	24.0	12.0					
	1	2	1					
					214	12.0	1	
					497	24.0	2	
371	24.0	2		+	438	24.0	2	
546	24.0	2						
619	12.0	1						
			233	646	126			
			12.0	24.0	0.0			
			1	2	0			

North

Phasing:

SEQUENCE	55
PERMSV	N N N N
OVERLP	N N N N
LEADLAG	LD LD

	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	1.3	1.3	1.3	.7	.7	.7	1.8	1.8	1.8	1.2	1.2	1.2
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		3			2			3			3	
Bike vol, vbic		1			0			1			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

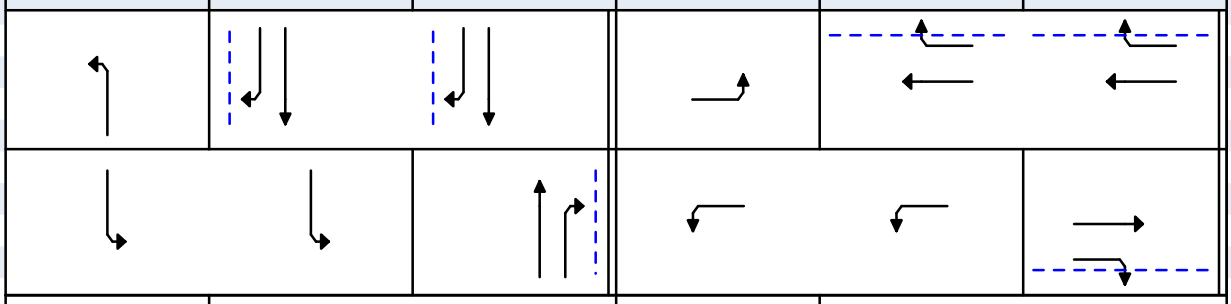
Sq 55 **/**	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
North						
C=120"	G= 19.0" Y+R= 4.0"	G= -3.0" Y+R= 4.0"	G= 36.5" Y+R= 4.5"	G= 20.0" Y+R= 4.0"	G= -4.0" Y+R= 4.0"	G= 26.0" Y+R= 5.0"

Lacey Gateway
Marvin Rd / Martin Rd
2016 With Project PM Peak (255)

04/17/13
17:50:06

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.941 (Critical V/C 1.169) Control Delay 93.4 Level of Service F

Sq 55 **/**	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
North						
Cmax= 120" Cavg= 120"	Gmax= 19.0" Gavg= 19.0" Y+Rc= 4.0"	Gmax= 37.5" Gavg= 37.5" Y+Rc= 4.5"		Gmax= 20.0" Gavg= 16.0" Y+Rc= 4.0"	Gmax= 26.0" Gavg= 30.0" Y+Rc= 5.0"	
	Gmax= 20.0" Gavg= 20.0" Y+Rc= 4.0"		Gmax= 36.5" Gavg= 36.5" Y+Rc= 4.5"	Gmax= 20.0" Gavg= 18.5" Y+Rc= 4.0"		Gmax= 26.0" Gavg= 27.5" Y+Rc= 5.0"

19.0"		37.5"				16.0"		30.0"		
20.0"		36.5"				18.5"		27.5"		

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								94.7	F	
RT	12/1	0.033	0.312	1570	490	371	0.756	43.1	D+	696 ft
TH	24/2	0.313	0.312	3571	1116	1251	1.121	107.9	F	970 ft
LT	12/1	0.167	0.167	1786	298	299	1.004	103.3	F	484 ft
NB Approach								54.6	D	
RT+TH	24/2	0.304	0.304	3531	1074	858	0.799	46.1	D	1035 ft
LT	12/1	0.158	0.158	1778	281	259	0.920	82.6	F	391 ft
WB Approach								51.0	D	
RT	12/1			1600	400	127	0.318	36.8	D+	274 ft
TH	24/2	0.217	0.250	3592	898	552	0.615	40.8	D+	332 ft
LT	24/2	0.167	0.154	3490	537	487	0.907	66.3	E+	333 ft
EB Approach								149.8	F	
RT	12/1	0.033	0.229	1590	365	577	1.582	320.9	F	1804 ft
TH	24/2	0.217	0.229	3575	820	607	0.740	46.1	D	368 ft
LT	24/2	0.167	0.133	3472	463	412	0.890	63.0	E+	281 ft

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

			75	185	106						
			0.0	24.0	12.0						
			0	2	1						
							84	0.0	0		
							750	24.0	2		
68	12.0	1		+			444	24.0	2		
1115	24.0	2									
451	12.0	1									
				171	119	238					
				12.0	12.0	12.0					
				1	1	1					

North

Phasing:

SEQUENCE	65
PERMSV	N N N N
OVERLP	N N Y Y
LEADLAG	LD LD

	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	.4	.4	.4	1.0	1.0	1.0	1.1	1.1	1.1	.6	.6	.6
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		3			0			4			2	
Bike vol, vbic		0			0			1			2	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 65
/

North

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
C=120"	G= 6.0" Y+R= 5.0"	G= -5.0" Y+R= 5.0"	G= 36.0" Y+R= 5.0"	G= 5.5" Y+R= 5.5"	G= 3.5" Y+R= 5.5"	G= 42.5" Y+R= 5.5"

Lacey Gateway
Carpenter Rd / Martin Way
2016 With Project PM Peak (255)

04/17/13
17:52:14

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

Intersection Averages for Int # 1 -
V/C 0.834 (Critical V/C 0.818) Control Delay 81.8 Level of Service F

Sq 65
/

North

Cmax= 120"
Cavg= 120"

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
Gmax= 6.0" Gavg= 6.0" Y+Rc= 5.0"		Gmax= 36.0" Gavg= 35.0" Y+Rc= 5.0"	Gmax= 5.5" Gavg= 6.5" Y+Rc= 5.5"	Gmax= 51.5" Gavg= 51.5" Y+Rc= 5.5"	
Gmax= 6.0" Gavg= 6.0" Y+Rc= 5.0"	Gmax= 36.0" Gavg= 35.0" Y+Rc= 5.0"		Gmax= 14.5" Gavg= 15.5" Y+Rc= 5.5"		Gmax= 42.5" Gavg= 42.5" Y+Rc= 5.5"

6.0"	35.0"	6.5"	51.5"		
6.0"	35.0"	15.5"	42.5"		

Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								97.5	F	
RT+TH	24/2	0.300	0.292	3516	1026	289	0.282	32.9	C	383 ft
LT	12/1	0.050	0.050	1802	90	118	1.309	255.5	F	312 ft
NB Approach								212.1	F	
RT	12/1			1571	664	264	0.397	24.3	C+	470 ft
TH	12/1	0.300	0.292	1879	548	132	0.241	32.5	C	179 ft
LT	12/1	0.050	0.050	1790	89	190	2.123	597.9	F	632 ft
WB Approach								60.7	E+	
RT+TH	24/2	0.429	0.430	3608	1550	926	0.597	27.2	C+	1040 ft
LT	24/2	0.121	0.129	3479	449	493	1.097	123.6	F	429 ft
EB Approach								52.8	D	
RT	12/1	0.033	0.354	1581	640	501	0.782	36.9	D+	863 ft
TH	24/2	0.354	0.354	3596	1274	1239	0.973	57.1	E+	759 ft
LT	12/1	0.046	0.054	1799	97	76	0.786	86.9	F	143 ft

TEAPAC[Ver 8.55.01] - HCM Input Worksheet

Intersection # 1 - Area Location Type: NONCBD

Key: VOLUMES → WIDTHS ↓ LANES

		47	173	166							
		0.0	24.0	12.0							
		0	2	1							
							218	12.0	1		
							806	24.0	2		
57	12.0	1		+			1026	24.0	2		
841	24.0	2									
267	12.0	1									
				238	259	1040					
				12.0	12.0	24.0					
				1	1	2					

North

Phasing:

SEQUENCE	65
PERMSV	N N N N
OVERLP	N N Y N
LEADLAG	LD LD

	SB			WB			NB			EB		
	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
Heavy veh, %HV	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Pk-hr fact, PHF	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90	.90
Pretimed or Act	A	A	A	A	A	A	A	A	A	A	A	A
Strtup lost, l1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Ext eff grn, e	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival typ, AT	3	3	3	3	3	3	3	3	3	3	3	3
Ped vol, vped		28			24			0			1	
Bike vol, vbic		0			0			0			0	
Parking locatns		NO			NO			NO			NO	
Park mnvrs, Nm		0			0			0			0	
Bus stops, NB		0			0			0			0	
Grade, %G		.0			.0			.0			.0	

Sq 65
/

North

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
C=110"	G= 16.0" Y+R= 4.0"	G= -5.0" Y+R= 5.0"	G= 23.0" Y+R= 5.0"	G= 7.0" Y+R= 4.0"	G= 10.5" Y+R= 5.5"	G= 29.5" Y+R= 5.5"

Lacey Gateway
College St / Martin Way
2016 With Project PM Peak (255)

04/17/13
17:54:23

TEAPAC[Ver 8.55.01] - Capacity Analysis Summary (HCM 2010)

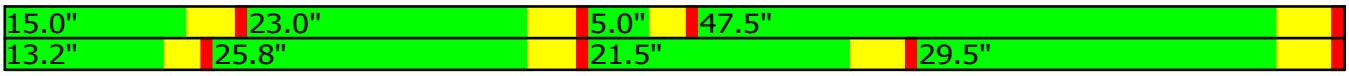
Intersection Averages for Int # 1 -
V/C 0.941 (Critical V/C 0.942) Control Delay 117.7 Level of Service F

Sq 65
/

North

Cmax= 110"
Cavg= 110"

Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6
Gmax= 15.0" Gavg= 15.0" Y+Rc= 5.0"		Gmax= 23.0" Gavg= 23.0" Y+Rc= 5.0"	Gmax= 7.0" Gavg= 5.0" Y+Rc= 4.0"	Gmax= 45.5" Gavg= 47.5" Y+Rc= 5.5"	
Gmax= 16.0" Gavg= 13.2" Y+Rc= 4.0"	Gmax= 23.0" Gavg= 25.8" Y+Rc= 5.0"		Gmax= 21.5" Gavg= 21.5" Y+Rc= 5.5"		Gmax= 30.0" Gavg= 29.5" Y+Rc= 5.5"



Lane Group	Width/ Lanes	g/C Max	g/C Avg	SatFlo	Capcty	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
SB Approach								50.1	D	
RT+TH	24/2	0.209	0.209	3473	726	244	0.336	37.2	D+	315 ft
LT	12/1	0.145	0.120	1774	212	184	0.867	67.2	E+	256 ft
NB Approach								59.2	E+	
RT	24/2			2802	1206	1156	0.958	47.1	D	951 ft
TH	12/1	0.209	0.235	1863	438	288	0.658	41.0	D+	329 ft
LT	12/1	0.136	0.136	1774	242	264	1.091	131.9	F	466 ft
WB Approach								201.9	F	
RT	12/1	0.036	0.432	1539	665	131	0.197	19.5	B	240 ft
TH	24/2	0.414	0.432	3547	1531	896	0.585	24.2	C+	468 ft
LT	24/2	0.195	0.195	3445	673	1140	1.693	362.5	F	1500 ft
EB Approach								64.2	E+	
TH	24/2	0.273	0.268	5160	1384	935	0.676	64.2	E+	579 ft
LT	12/1	0.064	0.046	1774	81	63	0.780	65.0	E+	101 ft

Intersection	
Intersection Delay, s/veh	1.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	206	1376	618	0	2499
Conflicting Peds, #/hr	1	1	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None
Storage Length	0	0		0	0	
Median Width	0		0			0
Grade, %	0%		0%			0%
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	1	1	4	4	1	1
Mvmt Flow	0	229	1529	687	0	2777
Number of Lanes	0	1	2	1	0	3

Major/Minor			Major 1			Major 2
Conflicting Flow All	2641	765	0	0	1530	0
Stage 1	1530	-	-	-	-	-
Stage 2	1111	-	-	-	-	-
Follow-up Headway	3.66	3.31	-	-	2.21	-
Pot Capacity-1 Maneuver	28	348	-	-	436	-
Stage 1	163	-	-	-	-	-
Stage 2	256	-	-	-	-	-
Time blocked-Platoon, %	0	0	-	-	0	-
Mov Capacity-1 Maneuver	28	348	-	-	436	-
Mov Capacity-2 Maneuver	28	-	-	-	-	-
Stage 1	163	-	-	-	-	-
Stage 2	256	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	33.2	0	0
HCM LOS	D	-	-

Minor Lane / Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Cap, veh/h	-	-	348	436	-
HCM Control Delay, s	-	-	33.2	0	-
HCM Lane V/C Ratio	-	-	0.66	-	-
HCM Lane LOS	-	-	D	A	-
HCM 95th-tile Q, veh	-	-	4.4	0.0	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	9.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	149	123	182	155	1	170	6	138	1	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	100		0	100		0	100		0	0		0
Median Width		12			12			12			12	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles, %	2	2	2	3	3	3	1	1	1	0	0	0
Mvmt Flow	4	167	138	204	174	1	191	7	155	1	1	2
Number of Lanes	1	1	0	1	1	0	1	1	0	0	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 2		
Conflicting Flow All	175	0	0	306	0	0	831	830	237	910	899	175
Stage 1	-	-	-	-	-	-	246	246	-	584	584	-
Stage 2	-	-	-	-	-	-	585	584	-	326	315	-
Follow-up Headway	2.218	-	-	2.227	-	-	3.509	4.009	3.309	3.5	4	3.3
Pot Capacity-1 Maneuver	1401	-	-	1249	-	-	290	307	804	258	281	874
Stage 1	-	-	-	-	-	-	760	704	-	501	501	-
Stage 2	-	-	-	-	-	-	499	500	-	691	659	-
Time blocked-Platoon, %	0	-	-	0	-	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	1401	-	-	1249	-	-	252	256	804	178	234	874
Mov Capacity-2 Maneuver	-	-	-	-	-	-	252	256	-	178	234	-
Stage 1	-	-	-	-	-	-	758	702	-	500	419	-
Stage 2	-	-	-	-	-	-	415	418	-	551	657	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	4.5	24.1	16.1
HCM LOS	-	-	C	C

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Cap, veh/h	252	478	1401	-	-	1249	-	-	328
HCM Control Delay, s	33	19.1	7.578	-	-	8.446	-	-	16.1
HCM Lane V/C Ratio	0.51	0.47	0.00	-	-	0.16	-	-	0.01
HCM Lane LOS	D	C	A	-	-	A	-	-	C
HCM 95th-tile Q, veh	2.6	2.5	0.0	-	-	0.6	-	-	0.0

Notes

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Intersection	
Intersection Delay, s/veh	2.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	38	221	226	102	74	31
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	None	None	None	None	None	None
Storage Length	100			0	0	0
Median Width		12	12		12	
Grade, %		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	42	246	251	113	82	34
Number of Lanes	1	1	1	0	1	0

Major/Minor	Major 1		Major 2			
Conflicting Flow All	364	0	-	0	638	308
Stage 1	-	-	-	-	308	-
Stage 2	-	-	-	-	330	-
Follow-up Headway	2.218	-	-	-	3.5	3.3
Pot Capacity-1 Maneuver	1195	-	-	-	444	737
Stage 1	-	-	-	-	750	-
Stage 2	-	-	-	-	733	-
Time blocked-Platoon, %	0	-	-	-	0	0
Mov Capacity-1 Maneuver	1195	-	-	-	428	737
Mov Capacity-2 Maneuver	-	-	-	-	428	-
Stage 1	-	-	-	-	750	-
Stage 2	-	-	-	-	707	-

Approach	EB	WB	SB
HCM Control Delay, s	1.2	0	14.7
HCM LOS	-	-	B

Minor Lane / Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Cap, veh/h	1195	-	-	-	488
HCM Control Delay, s	8.123	-	-	-	14.7
HCM Lane V/C Ratio	0.04	-	-	-	0.24
HCM Lane LOS	A	-	-	-	B
HCM 95th-tile Q, veh	0.1	-	-	-	0.9

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	1.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	265	6	39	201	0	2	0	49	1	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	None	None	None	None	None	None	None	None	None	None	None	None
Storage Length	100		0	100		0	100		0	100		0
Median Width		12			12			12			12	
Grade, %		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.96	0.90
Heavy Vehicles, %	2	2	2	0	0	0	0	0	0	0	0	0
Mvmt Flow	2	294	7	43	223	0	2	0	54	1	0	1
Number of Lanes	1	1	0	1	1	0	1	1	0	1	1	0

Major/Minor	Major 1			Major 2			Minor 1			Minor 2		
Conflicting Flow All	223	0	0	301	0	0	613	612	298	639	616	223
Stage 1	-	-	-	-	-	-	302	302	-	310	310	-
Stage 2	-	-	-	-	-	-	311	310	-	329	306	-
Follow-up Headway	2.218	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Capacity-1 Maneuver	1346	-	-	1272	-	-	408	411	746	392	409	822
Stage 1	-	-	-	-	-	-	712	668	-	705	663	-
Stage 2	-	-	-	-	-	-	704	663	-	688	665	-
Time blocked-Platoon, %	0	-	-	0	-	-	0	0	0	0	0	0
Mov Capacity-1 Maneuver	1346	-	-	1272	-	-	396	397	746	354	395	822
Mov Capacity-2 Maneuver	-	-	-	-	-	-	396	397	-	354	395	-
Stage 1	-	-	-	-	-	-	711	667	-	704	641	-
Stage 2	-	-	-	-	-	-	679	641	-	637	664	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.3	10.4	12.3
HCM LOS	-	-	B	B

Minor Lane / Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Cap, veh/h	396	737	1346	-	-	1272	-	-	354	618
HCM Control Delay, s	14.1	10.3	7.679	-	-	7.93	-	-	15.2	10.8
HCM Lane V/C Ratio	0.00	0.08	0.00	-	-	0.03	-	-	0.00	0.00
HCM Lane LOS	B	B	A	-	-	A	-	-	C	B
HCM 95th-tile Q, veh	0.0	0.2	0.0	-	-	0.1	-	-	0.0	0.0

Notes

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Intersection	
Intersection Delay, s/veh	6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	8	170	298	134	98	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None
Storage Length	0	0	100			0
Median Width	12			12	12	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles, %	1	1	1	1	5	5
Mvmt Flow	9	195	343	154	113	9
Number of Lanes	1	1	1	1	1	0

Major/Minor				Major 1	Major 2	
Conflicting Flow All	956	117	122	0	-	0
Stage 1	117	-	-	-	-	-
Stage 2	839	-	-	-	-	-
Follow-up Headway	3.509	3.309	2.209	-	-	-
Pot Capacity-1 Maneuver	287	938	1472	-	-	-
Stage 1	911	-	-	-	-	-
Stage 2	426	-	-	-	-	-
Time blocked-Platoon, %	0	0	0	-	-	-
Mov Capacity-1 Maneuver	220	938	1472	-	-	-
Mov Capacity-2 Maneuver	220	-	-	-	-	-
Stage 1	911	-	-	-	-	-
Stage 2	327	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.4	5.6	0
HCM LOS	B	-	-

Minor Lane / Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Cap, veh/h	1472	-	220	938	-	-
HCM Control Delay, s	8.186	-	22.1	9.8	-	-
HCM Lane V/C Ratio	0.23	-	0.04	0.21	-	-
HCM Lane LOS	A	-	C	A	-	-
HCM 95th-tile Q, veh	0.9	-	0.1	0.8	-	-

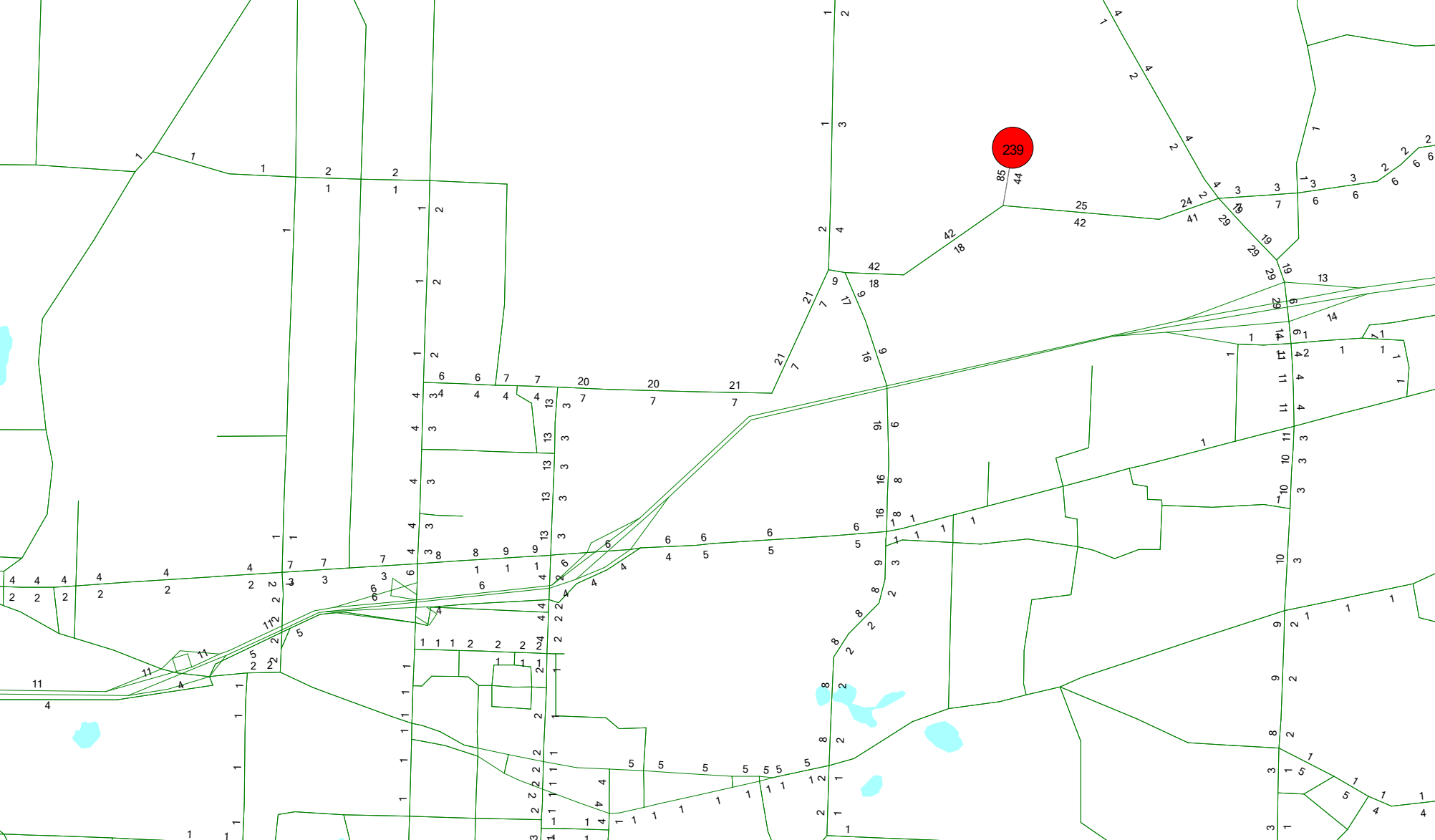
Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Appendix D

TAZ 239 Model Distribution Plot

(3/26/2013, City of Lacey)


239

TENW
Transportation Engineering NorthWest

TRANSPORTATION ADDENDUM

DATE: August 15, 2013

TO: Martin Hoppe, Pat McGuin
City of Lacey

FROM: Jeff Schramm
TENW

SUBJECT: Transportation Addendum
GATEWAY RESIDENTIAL – DIVISIONS 1 AND 2
TENW Project No. 4765

This document is an addendum to the Transportation Impact Study dated April 23, 2013 which was prepared for the Gateway Residential Division 1 project. The purpose of this addendum is to provide supplemental traffic assessment requested by the City to consider the trip generation, distribution, and future road connections anticipated for Division 2 of the project (full buildout).

Project Description

Division 1 (also called Phase 1), which is fully located within the Lacey city limits, includes 86 single-family residential units and 250 multi-family residential units. Primary vehicle access for Division 1 is proposed via the extension Gateway Boulevard (a Major Collector Type 2) as a half-street on the property frontage from the existing roundabout at Britton Parkway north about 660 feet to the new intersection with proposed Road B (a Minor Collector Type 2). Secondary access would be created in the future with a new road connection to the Britton Place development to the south with an eventual intersection connection to Britton Parkway.

Division 2 is located outside the Lacey city limits in Thurston County, directly north of Division 1. Division 2 anticipates approximately 330 single-family residential units and 134 multi-family units, which represents minimum density buildout far less than the zoning allowed on the site and anticipated in the City's 2030 Transportation Plan.

Vehicle access for Division 2 would include the extension of Gateway Boulevard (a Major Collector Type 2) north of the Road B intersection and extending to the north property edge as a half-street along the property frontage. Secondary access would be provided by connection to several road stubs planned within the development for Division 1. The right-of-way for a new east/west Major Collector Type 2 road would also be provided along the northern property edge to accommodate the City's 2030 Transportation Plan to build an eventual east-west road connection between Marvin Road and Carpenter Road.

Trip Generation

Trip generation estimates for both Divisions 1 and 2 of the Gateway Residential project were based on trip equations provided in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 9th edition, using Land use code (LUC) 210 for single-family and LUC 230 for multi-family units.

EXHIBIT
ID B

The weekday daily, AM and PM peak hour trip generation estimates for both Divisions are summarized in Table 1. The detailed trip generation calculations are provided in Attachment 1.

Table 1
Gateway Residential Trip Generation Summary

Time Period	Division 1	Division 2	Total
Weekday Daily	2,341	3,980	6,321
Weekday AM Peak Hour	177	306	483
Weekday PM Peak Hour	219	384	603

Trip Distribution and Road Connections

The distribution of traffic generated by the Gateway Residential development was estimated from the TRPC model distribution for Zone 239. The trip distribution of Gateway Division 2 residential trips during the PM peak hour is provided in Attachment 2. The number of project-generated PM peak hour trips for Division 2 is shown in red at each of the intersections impacted by 20 or more PM peak hour project trips.

All project-generated trips are assumed to access the City road system via the extension of Gateway Boulevard north of Britton Parkway. With the development of Division 2, Gateway Boulevard would be extended as a half-street Major Collector Type 2 from the Road B intersection (Division 1) to the north property edge as shown in the Attachment 1 site plan concept. The Gateway Boulevard Road extension is consistent with the City's recently adopted 2030 Transportation Plan. Attachment 3 provides a map of the City's 2030 Transportation Plan and description of the road plans (project #30).

A full 72-foot right-of-way would also be provided along the northern property edge for an eventual east/west Major Collector Type 2, which is consistent with the City's 2030 Transportation Plan for a new east-west connection between Marvin Road and Carpenter Road as shown in Attachment 4 (project #20).

cc: Rick Walk – City of Lacey Community Development Director
Kevin O'Brien – Gateway 850 LLC
Jeff Pantier – Hatton Godat Pantier

Attachments:
1. Trip Generation Calculations for Division 2
2. Trip Distribution Estimate for Division 2 (TAZ 239 Model Distribution Plot)
3. City of Lacey Transportation Plan for Road Connections

ATTACHMENT 1

Trip Generation Calculations for Division 2

Attachment 1

Trip Generation Summary

Lacey Gateway - Division 2

Land Use	Size	Units [1]	ITE LUC [2]	Directional Distribution In	Directional Distribution Out	Trip Rate	Trips Generated In	Trips Generated Out	Trips Generated Total
Daily									
Single Family	330	DU	210	50%	50%	equation	1,575	1,575	3,150
Towhomes/Condos	134	DU	230	50%	50%	equation	415	415	830
						Total Daily Trips =	**1,990**	**1,990**	**3,980**
AM Peak Hour									
Single Family	330	DU	210	25%	75%	equation	60	181	241
Towhomes/Condos	134	DU	230	17%	83%	equation	11	54	65
						Total AM Peak Hour Trips =	**71**	**235**	**306**
PM Peak Hour									
Single Family	330	DU	210	63%	37%	equation	194	114	308
Towhomes/Condos	134	DU	230	67%	33%	equation	51	25	76
						Total PM Peak Hour Trips =	**245**	**139**	**384**

Notes:

[1] DU = Dwelling Units

[2] Institute of Transportation Engineers, Trip Generation Manual, 9th edition Land Use Code.

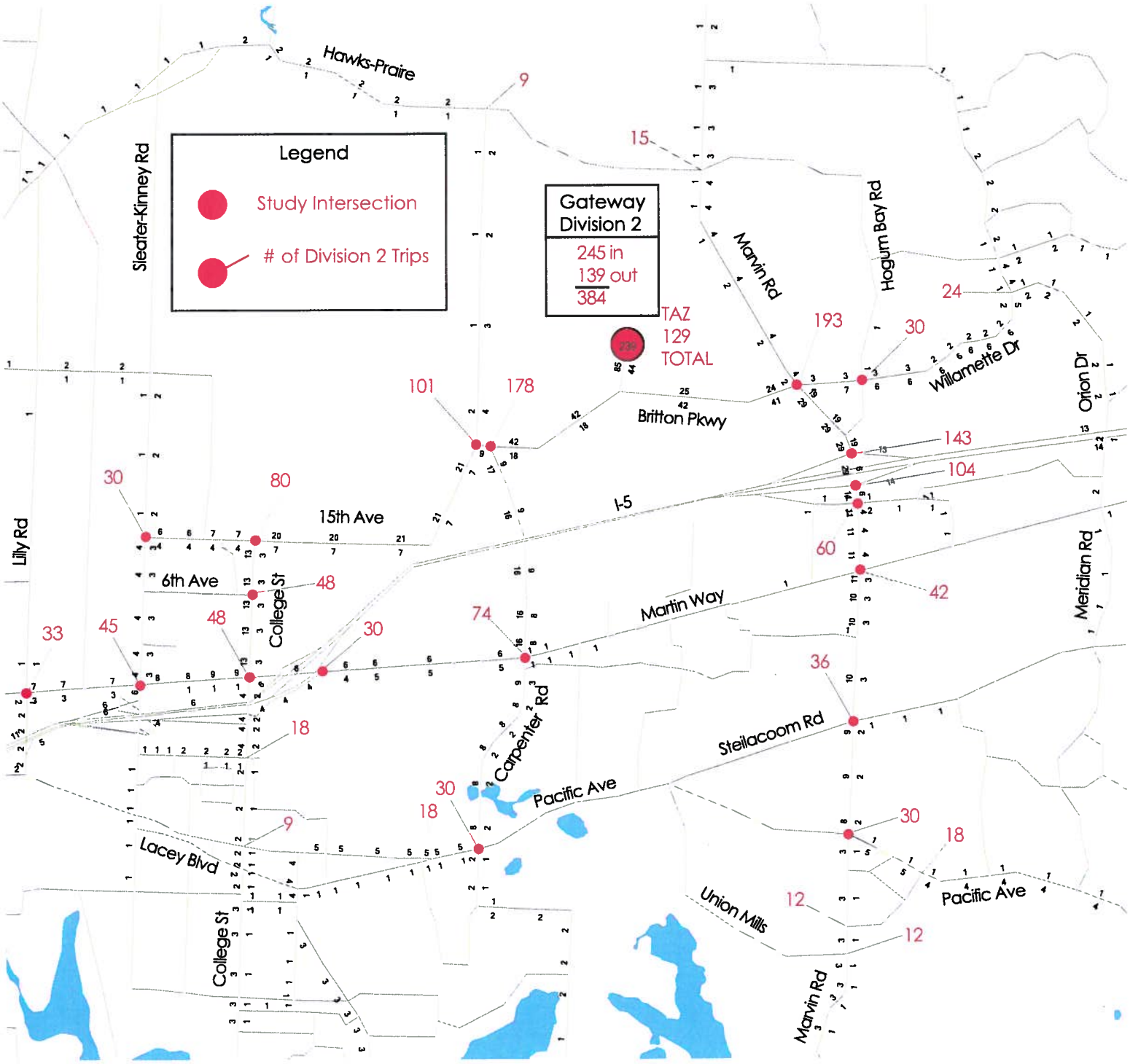
Lacey Gateway - Division 1

Land Use	Size	Units [1]	ITE LUC [2]	Directional Distribution In	Directional Distribution Out	Trip Rate	Trips Generated In	Trips Generated Out	Trips Generated Total
Daily									
Single Family	86	DU	210	50%	50%	equation	457	457	914
Towhomes	250	DU	230	50%	50%	equation	713	714	1,427
						Total Daily Trips =	**1,170**	**1,171**	**2,341**
AM Peak Hour									
Single Family	86	DU	210	25%	75%	equation	17	53	70
Towhomes	250	DU	230	17%	83%	equation	18	89	107
						Total AM Peak Hour Trips =	**35**	**142**	**177**
PM Peak Hour									
Single Family	86	DU	210	63%	37%	equation	58	34	92
Towhomes	250	DU	230	67%	33%	equation	85	42	127
						Total PM Peak Hour Trips =	**143**	**76**	**219**

ATTACHMENT 2

Trip Distribution Estimate for Division 2

(from TAZ 239 Model Distribution Plot)


Legend
Study Intersection
# of Division 2 Trips
Gateway Division 2
245 in
139 out
384
TAZ 129 TOTAL
Hawks-Prairie
Slater-Kinney Rd
Marvin Rd
Hogum Bay Rd
Willamette Dr
Orion Dr
Britton Pkwy
I-5
15th Ave
6th Ave
College St
Lilly Rd
Martin Way
Meridian Rd
Carpenter Rd
Steilacoom Rd
Pacific Ave
Lacey Blvd
Union Mills
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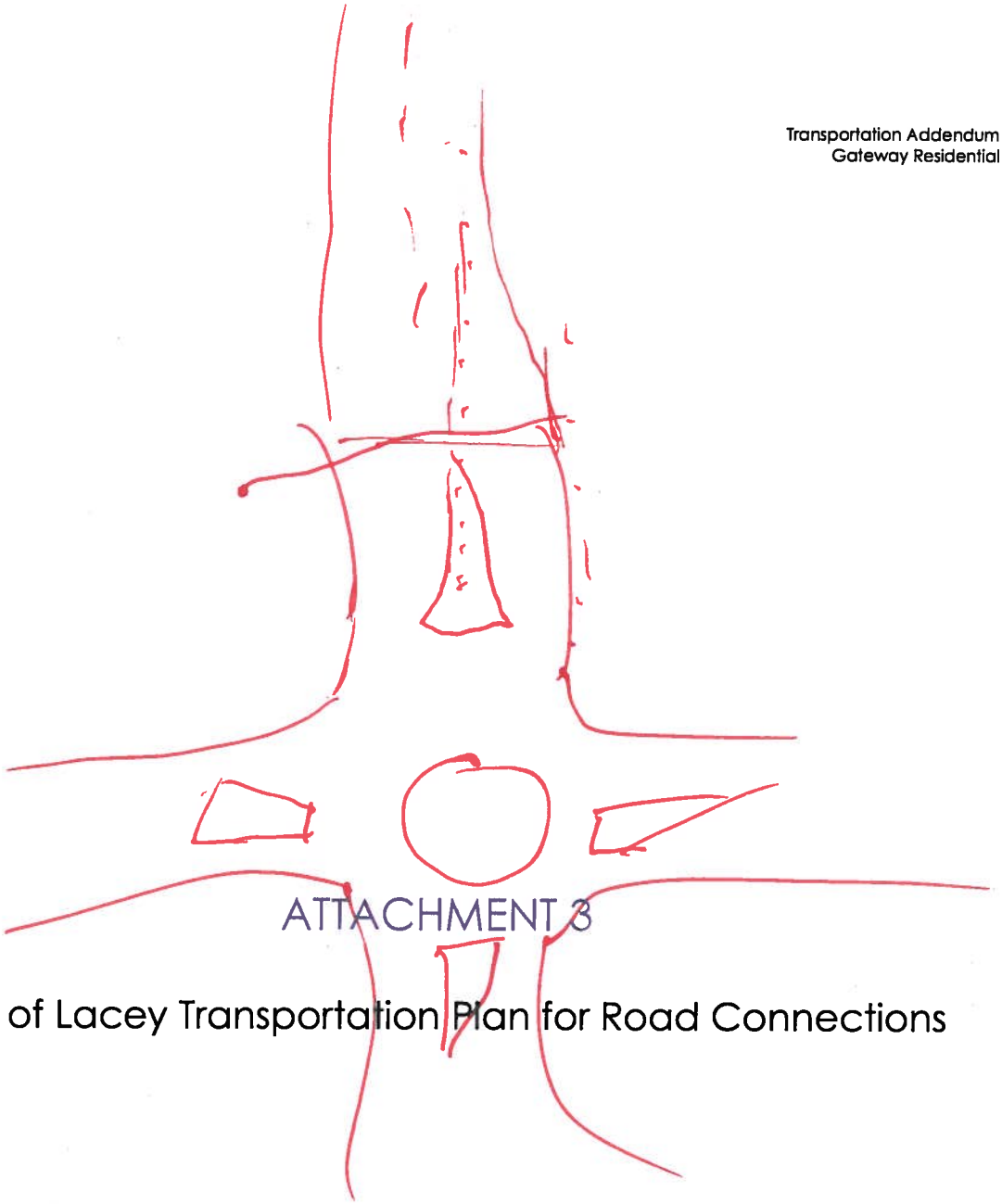
33
45
74
36
18
12



ATTACHMENT 3

City of Lacey Transportation Plan for Road Connections

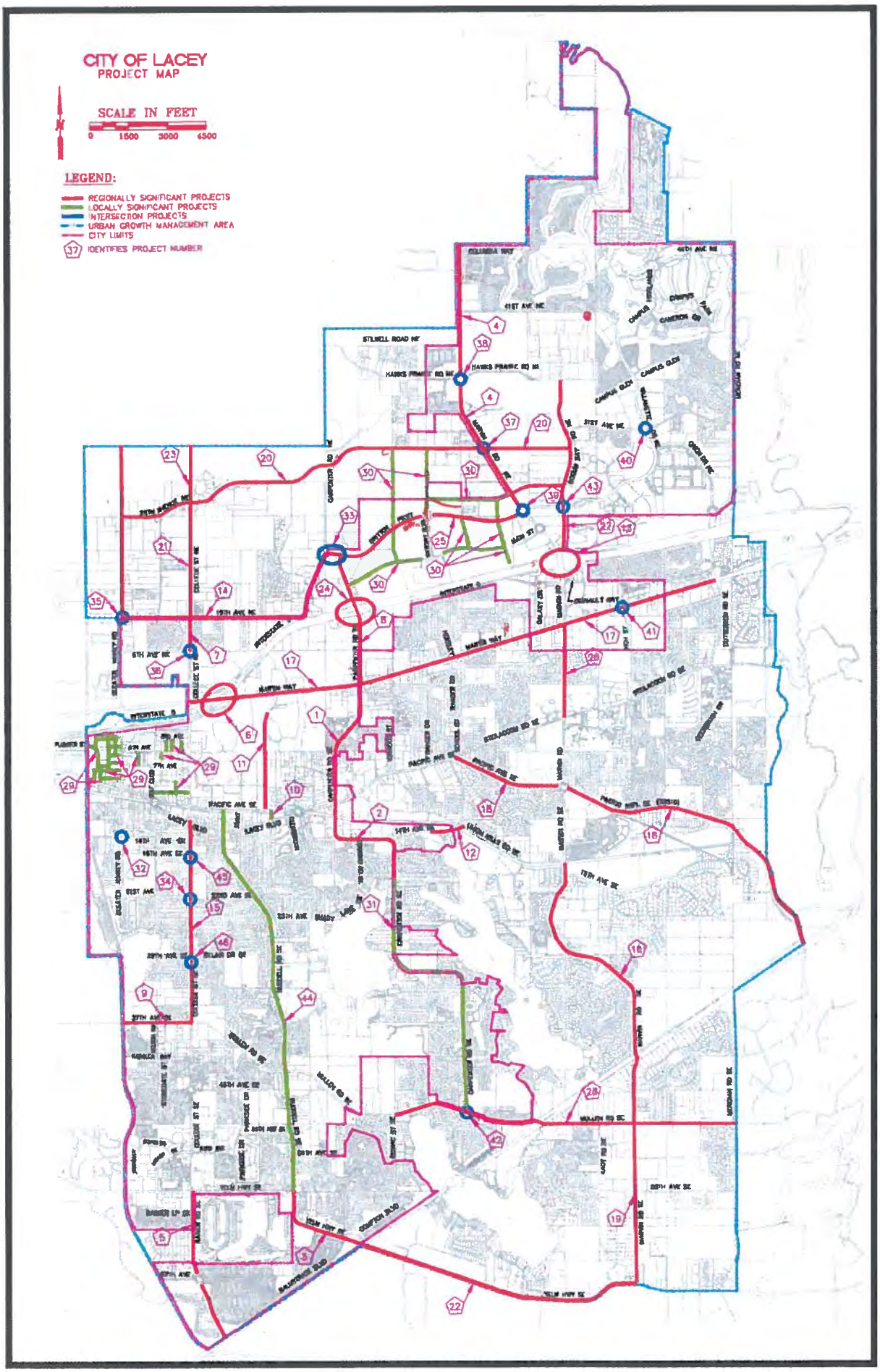

CITY OF LACEY
PROJECT MAP
SCALE IN FEET
0 1500 3000 6000
LEGEND:
REGIONALLY SIGNIFICANT PROJECTS
LOCALLY SIGNIFICANT PROJECTS
INTERSECTION PROJECTS
URBAN GROWTH MANAGEMENT AREA
CITY LIMITS
IDENTIFIES PROJECT NUMBER

Table 4. Project List

Project #	Road	Limits	Improvement	Improvement Type: Capacity	Safety	Circulation	Bicycle	Pedestrian	Estimated Cost ($1,000s)	Planning Area(s)
Regionally Significant Projects										
1	Carpenter Road	Pacific Avenue to Martin Way	Widen to 4/5 lanes	✓	✓	✓	✓	✓	$13,000	Central, Tanglewilde/ Thompson Place
2	Carpenter Road	Pacific Avenue to Shady Lane	Widen with center turn lane	✓	✓	✓	✓	✓	$3,500	Lakes, Central
3	Yelm Highway	Ruddell Road to Compton Blvd	Widen to arterial standards	✓	✓	✓	✓	✓	$4,000	Horizons, Lakes
4	Marvin Road	Britton Parkway to Columbia Way NE	Widen with center turn lane	✓	✓	✓	✓	✓	$12,400	Hawks Prairie
5	Rainier Road	Yelm Hwy to 66th Ave SE	Widen to arterial standards	✓	✓		✓	✓	$2,300	Horizons
6	Martin Way	Martin Way/I-5	Interchange Improvements Phase 2	✓	✓	✓	✓	✓	$5,200	Central
7	College Street NE	Martin Way to 15th Ave NE	Channelization improvements and new connection		✓	✓	✓	✓	$2,600	Pleasant Glade
8	Carpenter Road	Martin Way to Britton Parkway	Widen to 4/5 lanes	✓	✓		✓	✓	$15,000	Hawks Prairie
9	37th Ave SE	College St to west City limits	Widen to collector standards	✓	✓	✓	✓	✓	$1,400	Central, Horizons
11	Desmond Drive SE Extension	Desmond Drive to Pacific Avenue	Engineering study for new connection(s)	✓	✓	✓	✓	✓	$50	Central

Project #	Road	Limits	Improvement	Improvement Type					Estimated Cost ($1,000s)	Planning Area(s)
				Capacity	Safety	Circulation	Bicycle	Pedestrian		
12	14th Avenue Extension	Carpenter Road to Union Mills Road	Engineering study for new connection		✓	✓	✓	✓	$150	Tanglewilde/ Thompson Place
13	Marvin Road	Marvin Road/I-5	Interchange improvements Phase 2	✓	✓	✓	✓	✓	$25,000	Hawks Prairie, Meadows, Tanglewilde/ Thompson Place
14	15th Ave NE/ Draham Road	Sleater-Kinney Road to Carpenter Road	Widen to 4/5 lanes	✓	✓	✓	✓	✓	$8,000	Pleasant Glade, Hawks Prairie
15	College Street SE	Lacey Boulevard to 37th Avenue SE/ Mullen Road	Study Area – Corridor improvements	✓	✓	✓	✓	✓	$30,000	Central
16	Marvin Road	Union Mills Road to Mullen Road	Engineering Corridor Study, Reserve ROW for future arterial	✓	✓		✓	✓	$1,000	Lakes, Seasons, Tanglewilde/ Thompson Place, Meadows
17	Martin Way	College St to Meridian Road	Study area – Enhancements to be determined	✓	✓		✓	✓	Strategy Area	Central, Tanglewilde/ Thompson Place, Meadows
18	Pacific Avenue	Union Mills Road to Lacey UGA	Widen to 4/5 lanes	✓	✓		✓	✓	$5,500	Tanglewilde/ Thompson Meadows
19	Marvin Road Extension	Mullen Road to Yelm Hwy	Corridor Study, Reserve ROW for future arterial		✓	✓	✓	✓	$100	Seasons
20	26th Avenue NE Extension	Hogum Bay Rd NE to Sleater-Kinney Rd	New connection		✓	✓	✓	✓	$7,250	Hawks Prairie, Pleasant Glade
21	College Street NE Extension	15th Ave NE to 26th Ave Connector	New connection		✓	✓	✓	✓	$800	Pleasant Glade
22	Yelm Highway	Compton Blvd to Marvin Rd Extension	Corridor Study, Reserve ROW for future widening	✓	✓	✓	✓	✓	$100	Seasons, Lakes, Horizons

Project #	Road	Limits	Improvement	Improvement Type					Estimated Cost ($1,000s)	Planning Area(s)
				Capacity	Safety	Circulation	Bicycle	Pedestrian		
23	College Street NE Extension	26th Avenue NE to Hawks Prairie Road	New connection		✓	✓	✓	✓	$500	Pleasant Glade
24	Carpenter Road	Carpenter Road/I-5	Interchange Justification Report	✓	✓	✓	✓	✓	$500	Central, Pleasant Glade
25	Britton Parkway (Phase II)	Carpenter Road to Gateway Boulevard	Widen to 4/5 lane section	✓	✓		✓	✓	$2,000	Hawks Prairie
26	Marvin Road NE	Steilacoom Road to Martin Way	Study area – Enhancements to be determined		✓				Strategy Area	Tanglewilde/ Thompson Place, Meadows
27	Hogum Bay Road NE	Marvin Road to Hawks Prairie Road	Widen roadway		✓	✓	✓	✓	$12,000	Hawks Prairie
28	Mullen Road	Rumac Road to Kagy Street SE	Widen roadway	✓	✓		✓	✓	7,900	Lakes
Locally Significant Projects										
10	New Connect-ion	Between Pacific Avenue and Lacey Boulevard	Connection at Lebanon St	✓	✓	✓	✓	✓	$500	Central
29	New Connect-ions	Lacey down-town	Connecting streets		✓	✓	✓	✓	Development funded	Central
30	New Connect-ions	Hawks Prairie Area	New inter-connecting roadways	✓		✓	✓	✓	Development funded	Hawks Prairie
31	Carpenter Road	Shady Lane to Mullen Road	Safety and Capacity Improvements		✓		✓	✓	$6,000	Lakes
44	Ruddell Road Corridor Study	Pacific Avenue to Yelm Hwy	Study area – Enhancements to be determined		✓		✓	✓	$200	Horizons
Intersection Projects										
32	Sleater-Kinney Rd/ 14th Ave SE	Intersection	Safety and capacity improvements		✓				$700	Central

Project #	Road	Limits	Improvement	Improvement Type					Estimated Cost ($1,000s)	Planning Area(s)
				Capacity	Safety	Circulation	Bicycle	Pedestrian		
33	Britton Parkway/ Carpenter Road	Intersection	Realignment		✓	✓			$500	Hawks Prairie
34	College St. SE/ 22nd Ave SE	Intersection	Safety and capacity improvements		✓				$2,500	Central
35	Sleater Kinney Rd/ 15th Ave NE	Intersection	Assess intersection		✓				Evaluate	Pleasant Glade
36	College St NE/6th Ave NE	Intersection	Assess intersection		✓				Evaluate	Pleasant Glade
37	Marvin Road/31st Avenue NE	Intersection	Assess intersection		✓				Evaluate	Hawks Prairie
38	Hawks Prairie Rd/ Marvin Road	Intersection	Assess intersection		✓				Evaluate	Hawks Prairie
39	Marvin Road/ Britton Parkway	Intersection	Safety improvements		✓				$300	Hawks Prairie
40	Willamette Dr./ 31st Ave NE	Intersection	Safety improvements		✓				$750	Hawks Prairie
41	Martin Way/Hoh St. NE	Intersection	Safety improvements		✓				$600	Meadows
42	Carpenter Rd/ Mullen Road	Intersection	Safety improvements	✓	✓		✓	✓	$950	Lakes
43	Willamette Dr./ Hogum Bay Road	Intersection	Safety improvements	✓	✓		✓	✓	Funded	Hawks Prairie
45	College St. SE/ 16th Ave SE	Intersection	Safety and capacity improvements		✓				$2,500	Central
46	College St. SE/ 29th Ave SE	Intersection	Safety and capacity improvements		✓				$2,500	Central
47	Willamette Dr./ Campus Glen Dr.	Intersection	Safety and capacity improvements	✓	✓	✓	✓	✓	$1,500	Hawks Prairie

Gateway Division 1

Preliminary
Stormwater Site Plan

Prepared for:

Gateway 850, LLC
15 Lake Bellevue Drive
Bellevue, WA 98005

(425) 869-8433

August 13, 2013

Prepared by: David W Spiller, PE

Reviewed by: Steven D. Hatton, PE
HATTON GODAT PANTIER
3910 Martin Way E, Suite B
Olympia, WA 98506
(360) 943-1599

Project No: 12-052A
Project Name: Gateway Division 1
E:\office\JOBS\2012\12-052A Gateway Division 1\LAND USE\RPT- Stormwater Site Plan-08.13.13.doc

I hereby certify that this Stormwater Site Plan for **Gateway Division 1, 46th Avenue NE, Lacey**, Washington, has been prepared by me or under my direct supervision and meets minimum standards of **the City of Lacey** and normal standards of engineering practice. I hereby acknowledge and agree that **the City of Lacey** does not and will not assume liability for the sufficiency, suitability or performance of drainage facilities designed by me.

Signature

8/13/13

Date

Seal

TABLE OF CONTENTS

TITLE PAGE

PROJECT INFORMATION SHEET

Section 1 Overall Project Summary....4
Section 2 Conditions and Requirements....7
Section 3 Site and Vicinity Analysis....11
Section 4 Construction Erosion and Sediment Summary....14
Section 5 Conveyance System Analysis and Design....15
Section 6 Flow Control Facilities Analysis and Design....15
Section 7 Water Quality Facilities Analysis and Design....16
Section 8 Stormwater Pollution Prevention and Source Control....17
Section 9 Stormwater Facilities Operation and Maintenance Summary....17
Section 10 Agreement and Guarantees....18

APPENDICES

Appendix 1 Stormwater Facility Summary Forms
Appendix 2 Site Stormwater Drainage Plans & Details
Appendix 3 Drainage Calculation
Appendix 4 Supplemental Reports and Information (Soils Report)
Appendix 5 Stormwater Maintenance Plan

Section 1 Overall Project Summary

The Gateway Division One preliminary plat proposing to create 333 dwelling units on approximately 41.87 acres a density of 8.02 units per acre, located within the City of Lacey. This project includes the construction of access roads to future development north of the site. The project will also construct regional storm facilities, for the site and possible development to the north of the site.

The project occupies the northwest corner of the intersection of Britton Parkway NE and Gateway Boulevard. Project location lies within the City limits of the City of Lacey, on tax parcel numbers 11803340100, 11803430000, and 11810103000, in Section 10, Township 18 North, Range 1 West, W.M. For further information, see the Site Location Map in this section.

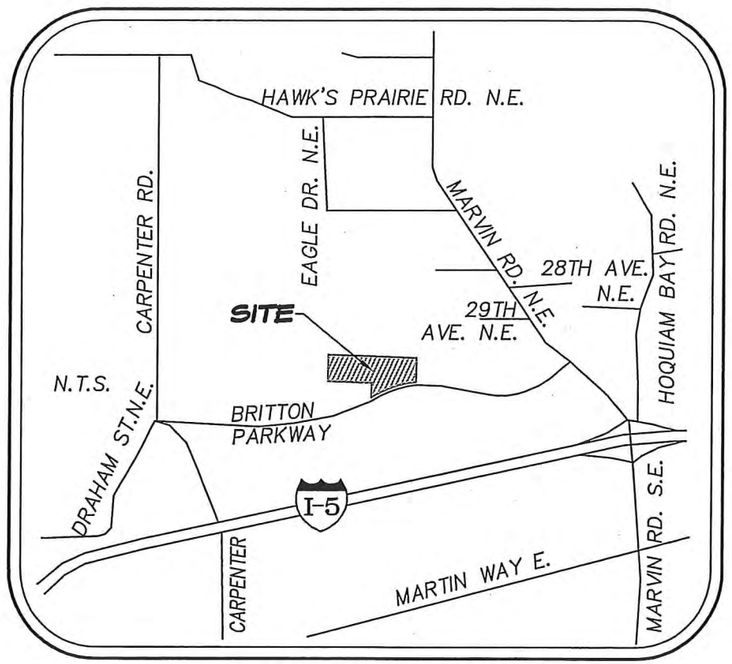
The existing site is fully forested and topography is rolling to hilly. The site generally slopes from east to west with high elevations in the 230's located on the east side of the project, and low elevations ranging from the 80's on the west side of the site.

Construction include extending Gateway Boulevard approximately 470 lineal feet north along the easterly site boundary, widening of the north side of Britton Parkway along the south property line and installing associated utilities and building storm water facilities including two regional storm ponds. Gateway Boulevard is classified as a minor collector road by the City's compressive plans with a 60-foot right-of-way, (1) 14-foot travel lane and (1) 5-foot bike lane in each direction. Each side of the road way will also have a 5-foot sidewalk and a 6-foot planter strip. The completed Britton Parkway frontage improvements include two 11-foot travel lanes a 5-foot bike lane curb and gutter. The existing street section includes a sidewalk.

Installation of utilities include street lighting, dry utilities, sewer and water. Roughly, the easterly half of the site will be served by a gravity sewer system connected to an existing sewer system in Britton Parkway. The remainder of the sewer will gravity flow down to a newly constructed liftstation on to be constructed either with in this plat or north of the proposed plat. A forcemain will carry sewage from the lift station to the gravity system install for the rest of the site. Street trees along frontage improvements, landscaping in open areas and around the ponds and irrigation for the street trees and landscaping will also be installed during this phase.

On site road construction includes one minor Collector and four Major Local Residential, one Minor Local Residential Street, one public alley, and one private resident road with associated utilities and roadside features.

Once complete the plat will create impervious surfaces covering approximately 80% of the area contributing to the drainage ponds. Area not being developed will remain in an existing forested condition and retain existing flow patterns. No impervious areas currently exist on-site, how ever a portion of the existing Britton Parkway NE may contribute runoff to the Tract A pond. A summary of existing and proposed pervious and impervious areas is included in the tables below.



VICINITY MAP

N.T.S.

Gateway Division 1
Vicinity Map

Table 1.1 Basins Draining to Ponds This Phase - Existing Area Summary

(Areas measured in acres)	Tract A Basin	Tract B Basin
Forest	20.30	15.70

Table 1.2 Basins Draining to Ponds - Developed Area Summary

(Areas measured in acres)	Tract A Basin	Tract B Basin
Pervious	16.72	11.14
Impervious	3.58	4.56
Total Tributary to Pond	20.30	15.70
% Impervious estimated	17.7%	29.1%

Prior to development, stormwater runoff from sheet flowed to either wetlands located on the west side of the site or Britton Parkway NE. Further discussion of the existing site conditions can be found in Section 3 of this report.

Post development stormwater runoff from both basins will sheet flow over lawns and driveways and from road crowns to roadside curb and gutter, where it will be collected in catch basins and conveyed through piping to regional stormwater facilities where water quality treatment and flow control requirements will be met. Water quality treatment for will be provided by wet ponds. Flow control for Track A will be met using a metered release. Flow control for Track B will be met by infiltration.

Table 1.5 Regional Facility Summary

Facility	WWHM Required Volume Base Area (sf)	Provided Base Area (sf)	100-YR Predeveloped Flow (CFS)	100-YR Developed Flow (CFS)
Tract A Basin	32,695	38,657	7.11	0
Tract B Basin	23,799	47,050	7.66	5.93

Table 1.6 Water Quality Treatment Summary

Facility	WWHM Required Volume (ac-ft)	Provided Volume (ac-ft)
Tract A Basin	1.41	2.13
Tract B Basin	1.12*	2.77

*** WWHM Volume Times 1.5 for Large Wet Pond Volume**

Stormwater conveyance will be through storm sewer piping. Storm sewers were chosen over the preferred open channel conveyance because the City of Lacey road sections do not provide an area for open channel conveyance. Storm sewers were rough sized for preliminary plat submittal. The final sizing will be included in the construction permit application for the 25-year, 24-hour event using the Santa Barbara Urban Hydrograph method in the Hydra ® modeling program.

Per Core Requirement #5 the plat design will employ the following Low Impact Development BMPs: Protect and or Restore Native Vegetation BMP LID-01, Post Construction Soil Quality and Depth BMP LID-09. Other BMPs may be added during construct plan preparation.

Native vegetation will be preserved along the west side of the development. The amount of vegetation preserved and/or restored will be in compliance with City of Lacey Municipal Code.

All lawn and landscaped areas will include imported topsoil/soil amendments meeting the requirements of BMP LID-09 to encourage lawn and vegetation growth.

Above ground stormwater facilities have been, to the maximum extent feasible under site and plat constraints, shaped to be aesthetically pleasing. All above ground stormwater facilities will be seeded upon completion. Additional landscaping shall also be provided throughout the project in conformance with the approved landscaping and tree restoration plan, as applicable, and as otherwise required by the approving authority.

Section 2 Conditions and Requirements

Full drainage review is required for all projects that result in greater than 5,000 sf of new impervious area. Under full drainage all core requirements must be met and the drainage report must address all sections. At full build Gateway Division 1 plats will result in approximately 33 acres of new impervious area, so full drainage review is required.

Core Requirement #1: Preparation of Stormwater Site Plan and Reports

This Stormwater Site Plan has been prepared to meet the requirements of Core Requirement #1. This includes a Drainage Report, a Soils Report, a Maintenance Plan, a Construction Stormwater Pollution Prevention Plan, a Source Control & Pollution Prevention Plan, Drainage Plans, and other supporting information.

Core Requirement #2: Construction Stormwater Pollution Prevention

Projects in which the new, replace, or new plus replaced impervious surfaces total 2,000 square feet or more, or disturb 7,000 square feet or more of land, must prepare a Construction Stormwater Pollution Prevention Plan (SWPPP) as part of the Stormwater Site Plan. Each of the twelve elements of the SWPPP must be considered and included in the SWPPP unless site conditions render the element unnecessary and the exemption from that element is clearly justified in the narrative of the SWPPP. The twelve elements are:

1. Mark Clearing Limits
2. Establish and Maintain Construction Access
3. Control Flow Rates
4. Install sediment Controls
5. Stabilize Soils
6. Protect Slopes
7. Protect Drains Inlets
8. Stabilize Channels and Outlets
9. Control Pollution
10. Control Dewatering
11. Maintain BMPs
12. Manage the Project

In addition to the SWPPP, project sites greater than 1 acre in size must obtain coverage under Ecology's NPDES Stormwater Construction Permit.

This project exceeds the above mentioned threshold requirements. Notice of Intent (NOI) & the SWPPP will be provided as part of construction plan submittals and will address the twelve elements.

Core Requirement #3: Source Control of Pollutants

Source control BMPs are used to prevent stormwater from coming in contact with pollutants and are used as a cost effective means of reducing pollutants in stormwater. The selection of permanent source control BMPs is based on the activities likely to occur on the site and the pollutants associated with those activities.

Based on a check of the Stormwater Pollution Source Control worksheet, found in Chapter 8 of the 2010 City of Lacey Stormwater Design Manual, the applicable post construction activities with required Source Control BMPs on this site, indicated on the work sheet, and methods to address source control of pollution from these activities are provided in a Source Control Plan to be provided during construction permit plan phase. Construction source control BMPs will be addressed in the SWPPP.

Core Requirement #4: Preservation of Natural Drainage Systems and Outfalls

To provide the maximum amount of aquifer recharge, infiltration will be implemented on this site to the maximum extent feasible. The metered release from Tract B Pond will be released to wetlands located along the west side of the plat. Tract A Pond will infiltrate stormwater. Emergency overflow routes will be provided from all ponds terminating at the current discharge point for their respective basins. Offsite drainage, mainly from Britton Parkway NE, has been included in pond and conveyance sizing calculations.

Native vegetation will be preserved along the west side of the development. The amount of vegetation preserved and/or restored will be in compliance with City of Lacey Municipal Code.

All lawn and landscaped areas will include imported topsoil/soil amendments meeting the requirements of BMP LID-09 to encourage lawn and vegetation growth.

Core Requirement #5: Onsite Stormwater Management

Projects shall employ Onsite Stormwater Management BMP's to convey, infiltrate, disperse, and retain stormwater runoff onsite to the maximum extent feasible without causing flooding or erosion impacts.

The plat design will employ the following Low Impact Development BMPs: Protect and or Restore Native Vegetation BMP LID-01, Post Construction Soil Quality and Depth BMP LID-09. Other BMPs may be added during construct plan preparation.

Native vegetation will be preserved along the backs of all lots which front the tree tracts and open spaces located through out both plats. The amount of vegetation preserved and/or restored will be in compliance with City of Lacey Municipal Code, as outlined in the Staff Report and stated in the Tree Plan for the site.

All lawn and landscaped areas will include imported topsoil/soil amendments meeting the requirements of BMP LID-09 to encourage lawn and vegetation growth.

Core Requirement #6: Treatment Requirements

Threshold requirements for providing stormwater treatment facilities are shown in Table 1.2 from the City of Lacey 2010 Stormwater Design Manual and included below.

Table 1.2 Treatment Requirements by Threshold Discharge Area

	<¾ acres of PGPS	≥¾ acres of PGPS	<5,000 sf of PGIS	≥5,000 sf of PGIS
Treatment Facilities		√		√
Onsite Stormwater BMPs	√	√	√	√

PGPS = pollution-generating pervious surfaces
PGIS = pollution-generating impervious surfaces
sf = square feet

This site will exceed these thresholds and treatment is required for runoff from pollution generating surfaces.

Treatment facilities must be sized to treat either the 91st percentile, 24-hour runoff volume (Water Quality Volume (WQV)) as predicted using the most current version of WWHM with Thurston County Enhancements or the Water Quality Flow Rate (WQFL). The WQFL when preceding detention facilities or when detention facilities are not required is 91 percent of the runoff volume as estimated by the most current version of WWHM with Thurston County Enhancements. The WQFL when treatment facilities are located downstream of detention facilities is the full 2-year release rate from the detention facility as estimated by the most current version of WWHM with Thurston County Enhancements.

Treatment facilities on this site have been selected and designed in accordance with these criteria and the criteria located in Chapter 7 of the City of Lacey 2010 Stormwater Design Manual. The treatment facilities associated with this site will be maintained in accordance with Chapter 9 of the City of Lacey 2010 Stormwater Design.

Further discussion on the analysis and design of the water quality facilities proposed for this project is included in Section 7 of this document.

Core Requirement #7: Flow Control

Threshold requirements for providing flow control are shown in Table 1.3 from the City of Lacey 2010 Stormwater Design Manual and included below.

Table 1.3 Flow Control Requirements by Threshold Discharge Area

	Flow Control Facilities	Onsite Stormwater Management BMPs
<¾ acres conversion to lawn/landscape, or <2.5 acres to pasture		√
≥¾ acres conversion to lawn/landscape, or ≥2.5 acres to pasture	√	√

<10,000 square feet of effective impervious area		√
≥10,000 square feet of effective impervious area	√	√
≥0.1 cubic feet per second increase in the 100-year flood frequency	√	√

This site will exceed these thresholds and flow control is required.

To meet the flow control requirements of the City of Lacey 2010 Stormwater Design Manual, developed discharge durations from the site shall match predeveloped discharge durations for the range of predeveloped discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow, and for ground water recharge, the average annual infiltration volume of stormwater from the developed site shall match or exceed the predeveloped average annual infiltration volume from the site. Runoff and volume calculations shall be provided by the most current version of WWHM with Thurston County Enhancements. The predeveloped land cover used in the WWHM model shall be a forested condition unless historic information is provided indicating the site was prairie prior to settlement.

Infiltration of stormwater is feasible only near the south central area of the site. This area is up gradient from most of the site. Infiltration has been incorporated to the maximum extent possible and the large multifamily, town homes, and possible future development will be able to infiltrate in the stormpond.

Further discussion on the analysis and design of the flow control facilities proposed for this project is included in Section 6 of this document.

Core Requirement #8: Wetland Protection

Discharges to wetlands shall maintain the hydrologic conditions, hydrophytic vegetation, and substrate characteristics necessary to support existing and designated uses and functions. Any hydrologic modification of a wetland must be in accordance with Lacey Municipal Code, Title 14, Chapter 14.28.

The discharge from Tract B Pond will maintain existing flow rates per core requirement 7 and in addition the infiltration pond in Tract A will help maintain hydroperiod. Final design will have additional information on infiltration rates and future development to the north. WWHM 2012 will be used to estimate the recharge volume. During construction plan preparation roof runoff from selected parcels may be routed to the wetland to maintain hydrologic conditions. The detention pond will be a combination detention/large wet pond/treatment wetland to treat runoff for metals and phosphorus.

Core Requirement #9: Operation and Maintenance

A project specific operation and maintenance manual is required for all projects based on Chapter 9 of the Lacey Stormwater Design Manual and is included in Appendix 5.

Core Requirement #10: Agreements and Financial Guarantees

Maintenance and/or operational bonding or other appropriate financial guarantees are required for all projects to ensure construction and functionality of drainage facilities in compliance with applicable standards. These guarantees are to be consistent with the most recent edition of the

City of Lacey Development Guidelines and Public Works Standards. A 2-year maintenance bond for 20% of the drainage infrastructure costs will be provided to meet Core Requirement #10.

For the infiltration facilities on this site an additional operation bond will be required. This bond will be held by the City of Lacey until operational testing as described in Chapter 6 of the City of Lacey 2010 Stormwater Design Manual has adequately demonstrated that the operational infiltration rate is at least 90% of the design infiltration rates contained in this document.

Additional information on these agreements and guarantees is included in Section 10 of this document.

An off-site analysis is provided in Section 3 of this report. There are no know areas of flooding downstream of the site in the predeveloped condition. In the developed condition, this project will release less stormwater runoff than in the predeveloped condition.

Section 3 Site and Vicinity Analysis

Site Analysis

The study area for the project is the Gateway Division 1 Preliminary Plat. The project occupies the northwest corner of the intersection of Britton Parkway NE and Gateway Boulevard. The site includes parcels 11803340100, 11803430000, and 11810103000. Refer to the vicinity map provided in this section.

Preliminary Drainage Analysis

The existing site is comprised of forested land and undeveloped. Topography on the site is rolling to hilly, sloping largely from east to west with high elevations in the 230's located east side of the plat and low elevations ranging from the 80's. A ridge runs along Britton Parkway NE. Existing stormwater flows south of this ridge drain to Britton Parkway NE. An existing conveyance system in Britton Parkway NE connects to an existing regional storm facility located adjacent to Britton Parkway NE west of the project plats. In the current condition, stormwater runoff from a majority the areas of the plat sheet flow through the forested areas into wetlands located on the west side of the site.

Tract A Basin This basin encompasses areas east of the ridge. The basin in its existing condition contributes runoff to the wetlands west of the site and to Britton Parkway NE. The drainage flowing to Britton Parkway NE flow to the west in a ditch behind the sidewalk and eventually to the same wetland system as the rest of the site. This area will consists of future single family, multi-family, and associated roadways. Stormwater runoff from this basin will be treated and infiltrated.

Tract B Basin This basin encompasses most of the area north of the ridge and contributing to the wetlands west of the site. This area will consist of future single family and associated roadways. Stormwater runoff from this basin will be detained and metered released to the wetlands.

The soil survey of Thurston County by the US SCS indicates onsite soils are Alderwood gravelly sandy loam, and Everett very gravelly sand loam (see attached Thurston County Geodata map). Alderwood series soils are described as moderately deep, moderately well drained soils on glacial till plains.

A geotechnical engineering study was performed by The Riley Group, Inc for Gateway Division One and findings were presented in a report dated December 14, 2012. The study consisted of 15 test pit excavations across the site. Grain size analysis was performed on soils from 14 selected soil samples. Findings from this study indicate that soils vary across the site. The soils on the eastern third of the site, consists of loose to very dense silty sand with variable amounts of silt and gravel.

The middle third of the site soils consist of 1 to 2 feet of loose silty sand underlain by sandy gravel and sand with variable amounts of silt and gravel. Occasional lenses of silty sand and sandy slit were encountered and the sand and gravel is underlain by silty sand or silt in most locations. The depth to the silt or silty sand varied from about 6 feet in the north to 14 feet in the south.

The western third of the site contains soils with 2 to 5 feet of loose to medium dense silty sand underlain by medium dense sand with variable amounts of grave, stiff silt, sand with silt, and gravelly sand with silt.

Soils suitable for infiltration were encountered in the south central third of the site. Field infiltration tests were performed in general accordance with the falling head infiltration test procedure. In addition, the report includes the results of sieve analysis performed and grain size distribution curves are included in the soils report. Preliminary infiltration pond sizing was based on an infiltration rate of 4.50 inch/hour based on analysis of the soil gradation. See Section 6 and Appendix 4 for additional information.

Records at Thurston County and the Department of Ecology were searched in order to locate wells and septic systems that may be located within the setback distances from the stormwater pond or ponds. In addition, the Project Engineer, or someone under his direct supervision, has visited the site to verify the presence or absence of wells and septic systems as best can be done visually without trespassing onto other properties. No wells or septic systems found to be located within the setback distances from the stormwater facilities have been shown on the plans.

Records at Thurston County and the Department of Ecology were searched in order to locate the presence of above and below ground fuel storage tanks that may be located within the setback distances from the stormwater facilities. In addition, the Project Engineer, or someone under his direct supervision, has visited the site to verify the presence or absence of fuel tanks as best can be done visually without trespassing onto other properties. No fuel tanks were found to be located within the setback distances from the stormwater facilities have been shown on the plans.

Three wetlands have been identified on the on the site. All three wetlands are located on the westerly third of the site. The southerly most of the wetlands is a Category III wetland. The other two wetlands are Category II wetlands.

This project uses low impact development techniques and infiltration BMP's to reduce stormwater runoff and recharge ground water aquifers and retain stormwater runoff onsite to the maximum extent possible. All lawn and landscaped areas will include imported topsoil/soil amendments meeting the requirements of BMP LID-09 to encourage lawn and vegetation growth increase soil porosity and reduce stormwater runoff from lawn/landscaped areas as much as possible. Native vegetation will be preserved along the west side of the plat. The amount of vegetation preserved and/or restored will be in compliance with City of Lacey Municipal Code. Other BMPs may be added during construct plan preparation.

Vicinity (Off-Site) Analysis

The study area for the vicinity analysis includes the wetlands at the edge of the site, Eagle Creek from the wetlands to the existing culvert under Carpenter Road. Slightly more than a ¼ mile required by the City of Lacey 2010 Stormwater Design Manual. Refer to the vicinity map provided in this section.

The area is not located within the travel times of any well head protection areas. The Federal Emergency Management Agency prepares maps for all areas within Thurston County, including the incorporated cities therein. Panel # 530188 205 C depicts the areas, if any, subjected to flooding in the vicinity of this proposal. By inspection of this map, this proposal appears to be located in Zone C, an area of minimal flooding. This area, therefore, is not located within the 100-year flood plain.

The field investigation(s) involved verification of the information on various maps and photos. Eagle Creek passes through a meadow like area with trees and shrubs along the stream, and passes through a large CMP culvert.

The stream bank along this portion of Eagle Creek was found to be well vegetated with no signs of erosion, scouring, bank sloughing or sedimentation to indicated the presences of existing drainage problems. Like wise the existing large culvert under Carpenter Road showed no evidence of existing problems.

The proposed drainage system will incorporate infiltration for the areas able to gravity flow to the infiltration pond. All of the single family homes are located in an area of soils incapable of infiltration so no roof infiltration is proposed. The remainder of the site will be conveyed to the detention pond where water quality and flow control requirements of the City of Lacey 2010 Stormwater Design Manual will be met. The water quality in the detention pond will be provided by a combination detention/large wet pond/ treatment wet pond meeting the requirements for metal and phosphorus treatment. In the developed condition, this project will release less stormwater runoff than in the predeveloped condition and is not expected to cause any negative down stream impacts.

Section 4 Construction Erosion and Sediment Summary

Based on the City of Lacey Stormwater Design Manual and the project thresholds requirements, Core Requirement #2 Construction Stormwater Pollution Prevention must be addressed with a construction phase Temporary Erosion and Sediment Control Plan (TESC) and a SWPPP. The SWPPP is a stand alone document that fully covers every aspect of construction stormwater pollution prevention and is attached in Appendix 5. This document fully addresses the requirements of this section and should be referenced rather than reproducing that information here.

The City of Lacey is limiting the time for the construction-related activities to May 1 through September 30. The site will be fully stabilized prior to October 1, and clearing, grading, and other soil disturbing activities will be prohibited on site from October 1 to April 30.

Much of the site has shallow hard pan with perched ground water above the hard pan. As recommended in the soils report; retaining wall designs will include drains, footings will have drains, a under drain will likely be installed above the cut slope for the detention pond, and the occasional yard drain where we have cut slopes in rear yards may also be required. We are mindful of it and will be addressing those types of things during final design.

A summary of the BMP elements chosen for construction erosion control on this site is included in the following table.

Elements	BMP's
#1. Marking Clearing Limits.	BMP C101 Preserving Natural Vegetation BMP C103 High Visibility Plastic Fencing.
#2. Establish Construction Access.	BMP C105 Stabilized Construction Entrance.
#3. Control Flow Rate.	Onsite ponds will be left shallow and used to construction flow rates.
#4. Install Sediment Control.	BMP 233 Silt Fence.
#5. Stabilize Soils.	BMP C120 Temporary and Permanent Seeding; BMP C121 Mulching.
#6. Protect Slopes.	BMP C120 Temporary and Permanent Seeding; BMP C130 Surface Roughening.
#7. Protect Drain Inlet.	BMP C220 Storm Drain Inlet Protection.
#8. Stabilized Channel & Outlets.	BMP C209 Outlet Protection.
#9. Control Pollutants.	BMP C151 Concrete Handling.
#10. Control De-watering.	No dewatering practices are planned or proposed fro the project site.
#11. Maintain BMP.	All BMP shall be maintained and repaired as needed to assure continued performance of their intended function All maintenance and repair will comply with BMP specifications.
#12. Manage the Project.	A certified erosion and sediment control person will be designated for BMP inspection and monitoring.

Section 5 Conveyance System Analysis and Design

Stormwater conveyance will be through storm sewer piping. Storm sewers were chosen over the preferred open channel conveyance because the City of Lacey road sections do not provide an area for open channel conveyance. Storm sewers were rough sized for preliminary plat submittal. The final sizing will be included in the construction permit application for the 25-year, 24-hour event using the Santa Barbara Urban Hydrograph method in the Hydra ® modeling program.

Section 6 Flow Control Facilities Analysis and Design

To meet the flow control requirements of the City of Lacey 2010 Stormwater Design Manual, developed discharge durations from the site shall match predeveloped discharge durations for the range of predeveloped discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow, and for ground water recharge, the average annual infiltration volume of stormwater from the developed site shall match or exceed the predeveloped average annual infiltration volume from the site. Runoff and volume calculations shall be provided by the most current version of WWHM with Thurston County Enhancements. The predeveloped land cover used in the WWHM model shall be a forested condition unless historic information is provided indicating the site was prairie prior to settlement. Post developed land cover has been measured from the electronic drawings for the current proposed extension of the plat.

Table 6.1 Basins Draining to Ponds - Developed Area Summary

(Areas measured in acres)	Tract A Basin	Tract B Basin
Pervious	16.72	11.14
Impervious	3.58	4.56
Total Tributary to Pond	20.30	15.70
% Impervious estimated	17.7%	29.1%

Post development stormwater runoff from both basins will sheet flow over lawns and driveways and from road crowns to roadside curb and gutter, where it will be collected in catch basins and conveyed through piping to regional stormwater facilities where water quality treatment and flow control requirements will be met. Water quality treatment for will be provided by wet ponds. Flow control for Track A will be met using infiltration. Flow control for Track B will be met by detention and treatment will be a large wet pond/treatment wetland.

To determine the required WWHM volume for the ponds, the developed areas from the basin (previously described in the conveyance section of this report) were placed into WWHM and runoff from the developed area was connected to a hypothetical pond with a bottom area equivalent to the measured bottom area.

Track A Basin

A WWHM model was developed to route predicted runoff from Tract A Basin through the pond and compare it to the existing runoff estimated by WWHM for compliance with the Lacey 2010 Stormwater Design Manual.

Track B Basin

This basin includes area not included in this project. Ultimate plan includes an on-site system for the multi-family (10.9) acres. The off-site future area will likely consist of residential development. Total on site area contributing as part of this preliminary plat is approximately 20.80 acres. For the purpose of sizing the pond, the basin was set at 25 acres.

Based on gradation testing results and the reduction factors required by the Lacey 2010, the soils report provided the gradation for the soil encountered in the pits. The soils in the area of the pond have a D_{10} greater than 0.4 and per the manual would a long-term rate of 9 in/hr and a correction factor of 1. The manual also states that applying a factor of 0.5 would eliminate the need for testing after construction.

Based on the information in the soils report, Lacey 2010 Stormwater Design Manual, and lack of sufficient test pits, an infiltration rate of 4.5 in/hr was selected. As recommended in the soils report additional testing will be performed and incorporated into the final design.

The following table summarizes facility sizing giving WWHM required volumes, 100-year predeveloped flows, 100-year developed mitigated flows and the volume provided based on calculations from the above mentioned excel spreadsheets.

Table 6.2 Regional Facility Summary

Facility	WWHM Required Volume Base Area (sf)	Provided Base Area (sf)	100-YR Predeveloped Flow (CFS)	100-YR Developed Flow (CFS)
Tract A Basin	32,695	38,657	7.11	0
Tract B Basin	23,799	47,050	7.66	5.93

The excel spread sheets and output files from WWHM for the above Basins and Ponds are included in Appendix 3.

Section 7 Water Quality Facilities Analysis and Design

Treatment facilities must be sized to treat either the 91st percentile, 24-hour runoff volume (Water Quality Volume (WQV)) as predicted using the most current version of WWHM with Thurston County Enhancements or the Water Quality Flow Rate (WQFL). The WQFL when preceding detention facilities or when detention facilities are not required is 91 percent of the runoff volume as estimated by the most current version of WWHM with Thurston County Enhancements. The WQFL when treatment facilities are located downstream of detention facilities is the full 2-year release rate from the detention facility as estimated by the most current version of WWHM with Thurston County Enhancements.

The treatment standard for the project is basic treatment for the infiltration and enhanced (phosphorus and metals) for the detention pond. The project is not in a wellhead protection area or Category I critical aquifer recharge area so does not require treatment for phosphorus. The site is not a high use site and does not require treatment for oil control. The project is not one of the project types in the metal control menu and does not require treatment for metal.

The soils below the proposed Tract A Pond are conducive to infiltration but not infiltration treatment. The method of treatment for providing basic treatment at this pond was chosen to be basic water quality option 4 wet pond. The designed wet pond a length to width ratio of at least 3:1, a low permeability liner and 6 feet deep with an additional 1 foot for sediment storage. The following

The soils below the proposed Tract B Pond are not conducive to infiltration or infiltration treatment. The method of treatment for providing enhanced treatment is a combination large wet pond and treatment wetland. The designed large wet pond provides a volume 1.5 times the normal treatment volume for a wet pond with a configuration meeting the requirements for a treatment wetland. Large wet ponds treat for metals by the length of time water stays in the treatment pond. The treatment wetland provides phosphorus treatment. The pond shown on the preliminary plan has sufficient area for the wetland configuration.

The following Table summarize facility sizing giving WWHM required volumes, provided volumes, basin depths and length to width ratios.

Table 7.1 Water Quality Treatment Summary

Facility	WWHM Required Volume (ac-ft)	Provided Volume (ac-ft)
Tract A Basin	1.41	2.13
Tract B Basin	1.12*	2.77

*** WWHM Volume Times 1.5 for Large Wet Pond Volume**

Section 8 Stormwater Pollution Prevention and Source Control

Source control BMPs are used to prevent stormwater from coming in contact with pollutants and are used as a cost effective means of reducing pollutants in stormwater. The selection of permanent source control BMPs is based on the activities likely to occur on the site and the pollutants associated with those activities.

To be addressed as part of the construction permit set of plans and reports.

Section 9 Stormwater Facilities Operation and Maintenance Summary

The Stormwater Facilities Maintenance Plan contains five main sections:

Section 1: Owner Information

Section 2: Description of the Drainage System and Facilities serving the site

Section 3: Cost Estimate for long-term facilities maintenance, repair & rehabilitation

Section 4: Site and Facility Management

Section 5: Stormwater Facility Maintenance Guide

The stormwater facilities include conveyance, water quality and flow control facilities. Conveyance systems, piping and catch basin, should be inspected for sediment and cleaned as required. Inspection after major storm events, quarterly and annually are required.

Water quality facilities, wet ponds, detention and infiltration ponds, should be inspected quarterly for trash and debris, noxious or poisonous plants, presence of polluting of fire hazard chemicals, rodent holes and insects and annually for erosion, overgrown plants and sediment buildup and cleaned as required. The annual inspection should also check for slow draining (overflow). Corrective action for trash, debris, overgrown, noxious or poisonous plants, rodents and insects is to remove from the pond. Sediment buildup should be removed from the pond. Corrective action for slow draw down of the infiltration treatment ponds includes aeration of facility or replacement of the treatment liner.

Flow control infiltration ponds should be inspected quarterly for trash and debris, noxious or poisonous plants, presence of polluting of fire hazard chemicals, rodent holes and insects and annually for erosion, overgrown plants and sediment buildup and cleaned as required. The annual inspection should also check for slow draining (overflow). Corrective action for trash, debris, overgrown, noxious or poisonous plants, rodents and insects is to remove from the pond. Sediment buildup should be removed from the pond. Corrective action for slow draw down of the infiltration treatment ponds includes aeration of facility or replacement of the treatment liner.

Appendix 5 includes a Preliminary Stormwater Facilities Maintenance Plan.

Section 10 Agreement and Guarantees

Agreements

The project Owner is required to enter into a Residential Agreement to Maintain Stormwater Facilities and implement a Pollution Source Control Plan. The document is a standard form document to be sign by the owner and City of Lacey and recorded. Document is as follows.

City of Lacey Appendix Q Agreement (see Appendix 6)

Any easements required for Stormwater Facilities will be noted on the final plat documents along with Utility Easements and recorded. The Utility Easement Form is required by the Development Guideline and will be recorded as a separate document as follows.

City of Lacey Watermain and Sewer Easement (to be provided)

Financial Guarantees

The Owner is required to provide a Performance Guarantee to the City in the amount of 150% of the estimated cost of onsite drainage systems and Public Utilities (sidewalk, planter strip, sewer and watermain) construction for any items not constructed prior to requesting final plat for the

above projects. A Stormwater Maintenance Guarantee in the amount of 20% of the estimate cost of stormwater improvements for two years is required for maintenance and repair of drainage facilities.

Bond Quantities Worksheet

The worksheet indicates cost to comply with the above noted Guarantees. The worksheet will be provided prior to permitting.

APPENDIX 1 – Stormwater Facility Summary Forms

TO BE PROVIDED AS PART OF CONSTRUCTION PERMIT PLANS.

APPENDIX 2 – Site Stormwater Drainage Plans & Details

APPENDIX 3 – Design Calculations

APPENDIX 4 – Supplemental Reports and Information (Soils Report)

I. STORMWATER MAINTENANCE PLAN

GATEWAY DIV 1

August 13, 2013

TABLE OF CONTENTS

I. MAINTENANCE AGREEMENT 27

II. STORMWATER FACILITY MAINTENANCE GUIDE 28

Introduction.....29
Your Stormwater Facilities 30
Facility Key.....30
Site Plan 31
Quick List.....32
Maintenance Checklists 33
Resource Listing 42
Log Sheet.....43

III. POLLUTION SOURCE CONTROL PROGRAM..... 45

I. MAINTENANCE AGREEMENT

WILL BE PROVIDED WITH CONSTRUCTION DOCUMENTS

Attachment "A"
Stormwater Facilities Maintenance Program

II. STORMWATER FACILITY MAINTENANCE GUIDE

Introduction

What Is Stormwater Runoff?

When urban and suburban development covers the land with buildings, streets and parking lots, much of the native topsoil, duff, trees, shrubs and grass are replaced by asphalt and concrete. Rainfall that would have soaked directly into the ground instead stays on the surface as *stormwater runoff* making its way into storm drains (including man-made pipes, ditches or swale networks), stormwater ponds, surface and groundwater and, eventually, to Puget Sound.

What Is a Storm Drain System and How Does It Work?

The storm drain system for most developments includes measures to *carry, store, cleanse and release* the stormwater. Components work together to reduce the impacts of development on the environment. Impacts can include *flooding* that results in property damage and blocked emergency routes, *erosion* that can cause damage to salmon spawning habitat and *pollution* that harms fish and/or drinking water supplies.

The storm drain system provides a safe method to carry stormwater to the treatment and storage area. Swales and ponds filter pollutants from the stormwater by *physically* settling out particles, *chemically* binding pollutants to pond sediments and *biologically* converting pollutants to less harmful compounds. Ponds also store treated water, releasing it gradually to a nearby stream or to groundwater.

What Does Stormwater Runoff Have to Do With Water Quality?

Stormwater runoff must be treated because it carries litter, oil, gasoline, fertilizers, pesticides, pet wastes, sediments and anything else that can float, dissolve or be swept along by moving water. Left untreated, polluted stormwater can reach nearby waterways where it can harm and even kill aquatic life. It can also pollute groundwater to the extent that it requires treatment before it is suitable for drinking. Nationally, stormwater is recognized as a major threat to water quality. Remember to keep everything out of stormwater systems except the rainwater they are designed to collect.

Stormwater Facilities

Different types of ponds are designed for different purposes. For example, wet ponds primarily provide treatment of stormwater. Dry ponds or infiltration ponds are designed to provide storage for stormwater and allow for its gradual release downstream or into the ground.

Who Is Responsible for Maintaining Stormwater Facilities?

All stormwater facilities require maintenance. Regular maintenance ensures proper functioning and preserves visual appeal. This Stormwater Facility Maintenance Guide was designed to explain how stormwater facilities work and provide user-friendly, straightforward guidance on facility maintenance. You are responsible for regularly maintaining privately owned ponds, catch basins,

pipes and other drainage facilities on your property. Stormwater facilities located in public rights-of-way are maintained by local governments.

How to Use the Stormwater Facility Maintenance Guide

This Maintenance Guide includes a Site Plan specific to your development and a Facility Key that identifies the private stormwater facilities you are responsible for maintaining. A "Quick List" of maintenance activities has also been included to help you identify the more routine needs of your facility.

Included in This Guide

- Comprehensive Maintenance Checklists that provide specific details on required maintenance
- Pollution Prevention Tips that list ways to protect water quality and keep storm drain systems functioning smoothly
- Resources to provide more information and technical assistance

A Regional Approach to Stormwater Management

The Cities of Lacey, Olympia and Tumwater together with Thurston County are taking steps to educate and involve area residents in water quality issues and stormwater management. Stormwater runoff is a widespread cause of water quality impairment and stream degradation. The jurisdictions are working together with residents, businesses, community groups and schools to address this problem. This guide focuses on providing information on ways that you can reduce stormwater impacts through pollution prevention and proper facility maintenance.

Your Stormwater Facilities

This section consists of two parts that are to be used together: the ***Facility Key*** and the ***Site Plan***. Review the site plan and identify the numbers denoting a feature of the system. Then check the facility key for the feature type and checklist name.

Facility Key

The stormwater facility in your neighborhood is comprised of the following elements:

Type of Feature and Checklist Name	Location on Site Plan
Ponds	1
Catch Basins, Manholes and Inlets	2
Fencing, Shrubbery Screens and Gates	3
Conveyance Pipes, Ditches and Swales	4
Grounds and Landscaping	5
Access Roads and Easements	6
Drywells, French Drains or Downspouts	See individual lot site plan.

Site Plan

Quick List

The following is an abbreviated checklist of the most common types of maintenance required. Please go over this checklist after heavy rains. The list represents minimum maintenance to be performed and should be completed in conjunction with the other checklists for an effective maintenance program.

- ❑ Inspect catch basin grates to see that they are not clogged or broken. Remove twigs, leaves or other blockages. Contact the local jurisdiction to replace the grate if it is broken.
- ❑ Inspect inlet and outlet pipes for blockages. Clear all blockages.
- ❑ Inspect filter strip, swale and pond walls for erosion or caved in areas.
- ❑ Inspect riprap (rocks) at the inlets and outlets of culverts and other pipes. If they are silted in or eroded away, replace them.

Maintenance Checklists

The Maintenance Checklists in this packet are for your use when inspecting the stormwater facilities on your property. This packet has been customized so that only the checklists for your facilities are included. If you feel you are missing a checklist, or you have additional facilities not identified or addressed in this packet, please contact your local jurisdiction.

The checklists are in tabular format for ease of use. Each describes the area to inspect, inspection frequency, what to look for and what action to take. A log sheet is included toward the end of the chapter to help you track maintenance of your storm drainage system.

Although it is not intended for the maintenance survey to involve anything too difficult or strenuous, there are a few tools that will make the job easier and safer including:

- A flashlight
- A long pole or broom handle
- Some kind of pry bar or lifting tool for pulling manhole and grate covers
- Gloves

A resource list is included in the next chapter. There you will find the phone numbers of the agencies referenced in the tables, as well as the contractors and consultants who designed and constructed your facilities.

SAFETY WARNING: In keeping with OSHA regulations, you should never stick your head or any part of your body into a manhole or other type of confined space. When looking into a manhole or catch basin, stand above it and use the flashlight to help you see. Use a long pole or broom handle to check sediment depths in confined spaces. *NO PART OF YOUR BODY SHOULD BREAK THE PLANE OF* THE *OPEN HOLE.*

Ponds

There are essentially three kinds of ponds: treatment ponds, infiltration ponds and detention ponds. Although each pond has unique maintenance requirements, there are also many things they have in common. Your facilities are combination wet/detention and wet/infiltration ponds.

Inspection Area	Frequency	Look For	Action
Entire Pond	Quarterly	Yard waste such as grass clippings and branches in basin; presence of glass, plastic, metal, foam or coated paper.	Remove trash and debris and dispose of properly.
Entire Pond	Quarterly	Vegetation that may constitute a public hazard, e.g., tansy ragwort, poison oak, stinging nettles, devilsclub.	Remove invasive or noxious vegetation. Do not spray chemicals on vegetation without obtaining guidance from WSU Cooperative Extension and approval from City or County.
Entire Pond	Quarterly	Presence of chemicals (e.g., natural gas, oil or gasoline), noxious odor or sludge.	First, attempt to locate source of pollution; then call Moderate Risk Waste program at Thurston County Environmental Health to report the hazard.
Entire Pond	Quarterly	Sparse, weedy or overgrown grass in grassy (dry/infiltration) ponds; presence of invasive species or sparse growth of plants in wet ponds.	Grassy ponds: selectively thatch, aerate and re-seed ponds. Grass should be kept less than 8 inches high. Wet ponds: hand-plant nursery-grown wetland plants in bare areas. Contact WSU Cooperative Extension for guidance on invasive species. Pond bottoms should have uniform dense coverage of desired plant species.
Entire Pond	Quarterly	Evidence of rodent holes if facility is a dam or berm. Water should not flow through rodent holes.	Destroy rodents and repair dam or berm. Contact Thurston County Health Department for guidance.
Entire Pond	Quarterly	Nuisance insects such as wasps, hornets or mosquitoes that may interfere with maintenance.	Destroy or remove insects. Contact WSU Cooperative Extension for guidance.

Checklist continues on next page.

Ponds Checklist, Continued

Inspection Area	Frequency	Look For	Action
Entire Pond	Annually	Confirmation that trees are not interfering with maintenance (i.e., mowing, silt removal or access).	Prune tree limbs to allow for maintenance. Some trees may be cut.
Inlet	Annually	Confirmation that the riprap under the inlet pipe is intact and that no native soil is exposed. Also, look for accumulations of sediment greater than half the height of the rocks.	Replace rocks and/or remove sediment.
Outlet	Quarterly	A free-flowing overflow that is clear of debris.	Replace riprap if missing. Remove trash or debris and dispose of properly.
Side Slopes	Annually	Signs of erosion around inlets and outlets. Inspect berms for signs of sliding or settling. Take action if eroded damage is over 2 inches deep and where there is potential for continued erosion.	Attempt to determine the cause of erosion and repair it. Stabilize slopes by reinforcing with rock, planting grass, or compacting soil. Contact WSU Cooperative Extension for guidance on slope reinforcement.
Storage Area	Annually	Sediment build-up on pond bottom. A buried or partially buried outlet structure or very slow infiltration rate may indicate significant sediment deposits.	Remove the sediment and re-seed the pond if necessary to improve infiltration and control erosion.
Dikes	Annually	Significant settling of any part of dike.	Build dike back to the original elevation.
Emergency Overflow/ Spillway	Annually	Intact riprap protective area. Repair if any native soil is exposed.	Replace rocks so all native soil is covered.
Trench Drain	Quarterly	Confirmation that the grate is clear of debris and that the drain is not plugged.	Remove debris from grate, clean drain.

Catch Basins, Manholes and Inlets

These structures are typically located in the streets and public rights-of-way. Local jurisdictions are responsible for routine maintenance of the pipes and catch basins in rights-of-way, whereas homeowners are responsible for keeping the grates clear of debris in all areas as well as pipes and catch basins in private areas.

Inspection Area	Frequency	Look For	Action
Catch Basin Opening	During and after major storms	Accumulation of trash or debris in front of catch basin opening that prevents water from flowing in.	Remove blocking trash or debris with a rake and clean off the grate.
Catch basin	Quarterly	Sediment or debris in the basin. No more than half the depth from the bottom of the pipe to the bottom of the basin should be allowed to accumulate. Use a long stick or broom handle to poke into sediment and determine depth.	Remove debris from catch basin.
Inlet and Outlet Pipes	Quarterly	Trash or debris in the pipes that has exceeded 1/5 of their height. Ensure there are not tree roots or other vegetation growing in the pipes.	Remove trash or debris from inlet and outlet pipes.
Inlet and Outlet Pipe Joints	Annually	Cracks wider than ½ inch and longer than 12 inches at the joint of any inlet or outlet pipe. Also check for evidence of sediment entering the catch basin through cracks.	Repair cracks or replace the joints.
Grate	Quarterly	Cracks longer than 2 inches or multiple cracks.	Replace grate if necessary.
Frame	Quarterly	Confirmation that the frame is sitting flush on top of the concrete structure (slab). A separation of more than ¾ inch between the frame and the slab should be corrected.	Repair or replace the frame so it is flush with the slab.
Catch Basin	Annually	Cracks wider than ½ inch and longer than 3 feet. Also check for any evidence of sediment entering the catch basin through cracks. Determine whether or not the structure is sound.	Replace or repair the basin. Contact a professional engineer for evaluation.

Checklist continues on next page.

Catch Basins, Manholes and Inlets Checklist, Continued

Inspection Area	Frequency	Look For	Action
Catch Basin	Quarterly	Chemicals (such as natural gas, oil and gasoline) that may have entered the catch basin. Check for noxious odor or oily sludge.	Clean out catch basin. Contact your local jurisdiction or Thurston County Environmental Health if you detect a color, odor or oily sludge.
Oil/Water Separator (downturned elbow or "T" in Catch Basin)	Quarterly	Significant sludge, oil, grease or scum layer covering all or most of the water surface.	Remove the catch basin lid and skim off oil layer. Pour oil into a disposable container, seal container, wrap securely in newspaper, and place it in the trash. Water surface should be clear of oily layer.
Pipe Elbow	Quarterly	Damage to top or bottom of pipe; determine whether pipe is plumb.	If pipe is broken, replace pipe in accordance with approved plans on file with your local jurisdiction.

Fencing, Shrubbery Screens and Gates

Fences and shrubbery screens aren't typically required for stormwater ponds. If the slopes of the sides are too steep, usually some kind of barricade is constructed.

Inspection Area	Frequency	Look For	Action
Fence or Shrubbery Screen	Quarterly	Inspect the fence or screen to ensure that it blocks easy entry to the facility. Make sure erosion hasn't created an opening under fence.	Mend the fence, repair erosion, or replace the shrubs to form a solid barrier.
Shrubbery Screen	Quarterly	Confirm that shrubbery is not growing out-of-control or that it is not infested with weeds.	Trim and weed shrubbery to provide appealing aesthetics. Do not use chemicals to control weeds.
Wire Fences	Annually	Confirmation that fence is still in alignment.	Straighten posts and rails if necessary.
Wire Fences	Annually	Missing or loose tension wire.	Replace or repair tension wire so it holds fabric.
Wire Fences	Annually	Missing, loose or sagging barbed wire.	Replace or repair barbed wire so that it doesn't sag between posts.
Wire Fences	Annually	Rust or scaling.	Paint or coat rusting or scaling parts with a protective coating.
Wire Fences	Quarterly	Confirm that there are no holes in the fabric or fencing.	Repair holes so that there are no openings in the fabric or fencing.
Gate	Quarterly	Confirm that the gate is not broken, jammed or missing and that it opens easily.	Repair or replace the gate to allow entry of maintenance people and equipment. If a lock is used, make sure you have a key.

Conveyance Pipes, Ditches and Swales

Inspection Area	Frequency	Look For	Action
Pipes	Annually	Confirmation that accumulated sediment has not exceeded 20% of the diameter of the pipe and that vegetation has not reduced free movement of water through pipes. Ensure that the protective coating is not damaged and rusted. Dents should not significantly impede flow. Pipe should not have major cracks or tears allowing water to leak out.	Clean pipes of all sediment and debris. Remove all vegetation so that water flows freely through pipes. Repair or replace pipe as necessary.
Open Ditches	Quarterly	Yard waste or litter in the ditch.	Remove trash and debris and dispose of properly.
Open Ditches	Annually	Confirmation that accumulated sediment has not exceeded 20% of the depth of the ditch.	Clean ditch of all sediment and debris.
Open Ditches and Swales	Annually	Vegetation (e.g., weedy shrubs or saplings) that reduces the free movement of water through ditches or swales.	Clear blocking vegetation so that water flows freely through ditches. Grassy vegetation should be left alone.
Open Ditches and Swales	Quarterly	Signs of erosion. Inspect slopes for signs of sloughing or settling. Action is needed where eroded damage is over 2 inches deep and where potential for continued erosion exists.	Eliminate causes of erosion. Stabilize slopes by using appropriate erosion control measures (e.g., reinforce with rock, plant grass, compact soil).
Open Ditches and Swales	Annually	Adequate rock placement in splash pad, check dam or lining. Native soil should not be visible.	Replace rocks to design standard.
Swales	Quarterly	Adequate grass coverage. Take action if coverage is sparse and weedy, or areas are overgrown with woody vegetation.	Aerate soils, reseed and mulch bare areas. Keep grass less than 8 inches high. Remove woody growths, regrade and reseed as necessary.
Swales	Quarterly	Confirmation that swale has not been filled in or blocked by structures, shrubbery, etc.	If possible, speak with homeowner and request that the swale area be restored.
Swales	Annually	Standing water in swale or very slow flow velocity. Stagnation.	A survey may be needed to verify grades. Grades should be between 1 % and 5 %.

Grounds and Landscaping

Inspection Area	Frequency	Look For	Action
Landscaped Areas	Quarterly	Uncontrolled weed growth in landscaped areas.	If possible, pull weeds by hand to avoid using chemical weed controls.
Landscaped Areas	Quarterly	Presence of poison ivy or other poisonous vegetation or insect nests.	Remove poisonous vegetation or insect nests.
Landscaped Areas	Quarterly	Yard waste or litter.	Remove and dispose of properly.
Landscaped Areas	Quarterly	Noticeably visible rills in landscaped areas.	Identify the causes of erosion and take steps to slow down or disperse the water. Fill in contour; seed area.
Trees and Shrubs	Annually	Split, broken or otherwise damaged tree parts and shrubs.	Trim trees and shrubs to restore shape. Replace severely damaged trees and shrubs.
Trees and Shrubs	Annually	Blown down or knocked over trees or shrubs.	Replant trees or shrubs, inspecting for injury to stem or roots. Replace if severely damaged.
Trees and Shrubs	Annually	Exposed roots, inadequate support, severe leaning.	Place stakes and rubber-coated ties around young trees/shrubs for support.

Access Roads and Easements

Inspection Area	Frequency	Look For	Action
General	One Time	Adequate access to your stormwater facilities for maintenance vehicles.	If there is not enough access, check with your local jurisdiction to determine whether an easement exists. If so, a maintenance road may need to be constructed.
Access Road	Quarterly	Debris that could damage vehicle tires (glass or metal).	Clear all potentially damaging debris.
Access Road	Annually	Any obstructions that reduce clearance above and along the road to less than 14 feet.	Clear along and over roadway so there is enough clearance.
Road Surface	Annually	Potholes, ruts, mushy spots or woody debris that limits access by maintenance vehicles.	Add gravel or remove wood as necessary.
Shoulders and Ditches	Annually	Erosion along the roadway.	Repair erosion with additional soil or gravel.

Resource Listing

If you suspect a problem exists, please contact your local jurisdiction at one of the numbers below and ask for Technical Assistance.

Contact Numbers

City of Lacey (Storm & Surface Water)	(360) 491-5600
WSU Cooperative Extension	(360) 786-5445

Developer Information

Gateway 850, LLC
15 Lake Bellevue Drive, Suite 102
Bellevue, WA 98005

Engineer's Information

HATTON GODAT PANTIER
3910 Martin Way E, Suite B
Olympia, WA 98506
(360) 943-1599

Log Sheet

Use log sheets to track maintenance checks and what items, if any, are repaired or altered. Make copies of this page; use a fresh copy for each inspection. The completed sheets will serve as a record of maintenance activity and will provide valuable information about how your facilities are operating. Log sheets should be kept in a dry, readily accessible place.

INSPECTION DATE: _____

PERFORMED BY: _____

PHONE NUMBER: _____ **ADDRESS:** _____

POSITION ON HOA: _____ **CITY, ST, ZIP:** _____

PART OF FACILITY INSPECTED	OBSERVATIONS (LIST REQUIRED MAINTENANCE ACTIVITIES)	ACTION TAKEN	DATE OF ACTION

Attachment "B"
Pollution Source Control Plan

III. POLLUTION SOURCE CONTROL PROGRAM

Purpose

Many products and practices commonly used in and around the home are hazardous to both the environment and us. Many of these products can end up in our stormwater systems and groundwater. This document gives alternatives, where possible, for those types of products and practices. The Best Management Practices (BMPs) described here include "good housekeeping" practices that everyone can use.

Recommended Pollution Control Practices For Homeowners

It has been said that the average home today contains more chemicals than the average chemical lab of 100 years ago. When many of these chemicals are used industrially, they can be subject to various health and safety standards; yet these same substances are used freely and often carelessly in our homes.

The BMPs in this section are divided into four categories: **Household Hazardous Wastes**, **Pesticides**, **Remodeling** and **Septic Maintenance**. Each section includes information on available alternatives.

Household Hazardous Wastes

Many of the cleaning agents, solvents, polishes, etc. commonly used in the home are considered hazardous. These products may be toxic, corrosive, reactive, flammable and/or carcinogenic. It is critical that these products are handled with care and are disposed of properly. A list of common household hazardous materials is presented in Table 1.

In addition, many hazardous household chemicals persist for long periods of time in the environment. Manufacturers may truthfully state that a product is "biodegradable"; most products are biodegradable, but what is important is the rate at which they are broken down and the products into which they are broken down. The term "biodegradable" on its own is misleading at best, unless the product is rapidly degraded into harmless substances.

It is important to note here that the term "biodegradable" currently has no legal definition in this state. This means that any product can use this term according to the manufacturer's own definition. This definition may not be at all similar to the consumer's perception. The following ideas will help you reduce the risks of stormwater and groundwater contamination from many household products.

Household Product Management

1. Read product labels before purchasing. Toxic product labels will carry many warnings. Either bypass such products or purchase in small quantities. If you cannot use the entire product, try to give it away instead of disposing of it. Thurston County periodically facilitates product exchanges for leftover paints and other hazardous wastes. Call the Thurston County Health Department at (360) 754-4111 for more information.

2. Buy only those detergents that contain little or no phosphorus. Phosphorus can cause algae blooms if washed into lakes or streams. Most detergents that are low in phosphates or phosphate free are labeled as such.

3. Use no more than the manufacturer's suggested amount of any cleanser. More is not necessarily better.

4. Products such as oven cleanser, floor wax, furniture polish, drain cleaners and spot removers often contain toxic chemicals. Buy the least toxic product available or use a non-toxic substitute if one can be found. For example, ovens can be cleaned by applying table salt to spills then scrubbing with a solution of baking soda and water. Table 2 lists substitutes for many commonly used household products.

   If it is necessary to use a product that contains toxic chemicals, use the product only as directed. Do not combine products, as they may become more dangerous when mixed (e.g., mixing chlorine bleach and ammonia produces dangerous gases). Use eye protection and rubber gloves as appropriate.

   Contact the Hazardous Substance Hotline at 1-800-633-7585 if you have any questions regarding disposal of a product or empty container. The County has both hazardous waste collection days and permanent facilities where residents can bring hazardous wastes. Call the Thurston County Health Department at (360) 754-4111 for more information.

5. Chemicals left over from activities such as photography and auto repair are hazardous and should not be flushed down the sink. This is especially important if your home is hooked up to a septic system. Toxic chemicals can kill the beneficial bacteria in the tank used to treat sewage and can pollute water supply wells.

6. Be sure all containers are clearly labeled.

7. Common batteries (not automobile) are one of the largest sources of heavy metals (such as lead, nickel, cadmium and mercury) found in landfills. Instead of throwing them away, dispose of them at a hazardous waste collection site.

Automotive Usage, Care and Maintenance

From a waste management standpoint, automobile maintenance is best done by professionals at facilities designed to handle, store and dispose of the waste products properly. Many of these facilities do an excellent job of dealing with waste oils, antifreezes, other fluids, batteries and tires. They often charge a small fee to cover the added expenses, but it's worth it. However, if you repair your car at home, please consider these helpful tips

1. Cars should be serviced regularly. Leaky lines or valves should be replaced.

2. Dumping oil, degreasers, antifreeze and other automotive liquids into a stream or a storm drain violates city, county and state laws or ordinances. Do not dump them onto the ground because they will end up in stormwater runoff or in groundwater. Do not use oil to reduce dust levels on unpaved areas. Instead, recycle used oil and antifreeze. Keep them in separate containers. Call the Recycling Hotline at 1-800-RECYCLE or call the Thurston County Health Department for the location of the nearest recycling center, or inquire

whether your local automotive service center recycles oil. Some may also take used oil filters.

3. Wrap empty oil or antifreeze containers in several layers of newspaper, tie securely and place in a covered trashcan. Antifreeze is sweet tasting but poisonous to people, fish, pets and wildlife.

4. Sweep your driveway instead of hosing it down. Fluids and heavy metals associated with automobiles can build up on driveway surfaces and be washed into local surface or groundwater when driveways are hosed down.

5. When washing vehicles, do so over your lawn or where you can direct soapsuds onto the lawn or another vegetated area to keep the soap from washing into the storm drain system or local surface water. Your stormwater pond cannot cleanse soapy water.

6. Small spills of oil and other fluids can be absorbed with materials such as kitty litter or sawdust. Wrap the used absorbent and any contaminated soil in a plastic bag and place in the garbage.

   If a spill reaches surface water, you must notify the nearest regional office of the Department of Ecology immediately! The Southwest Regional Office phone number is (360) 407-6300, or call 911. There are fines for failure to notify the appropriate agency when a spill occurs.

7. De-icing chemicals (various types of salt) can harm concrete less than three years of age, burn vegetation and be corrosive to cars and other metal objects. De-icing chemicals and their additives can be toxic. (Cyanide is formed from the breakdown of a common anti-caking agent used in de-icing chemicals.)

   Urea salts are an alternative to other types of salt de-icers, but great care must be used in applying them. These salts contain large quantities of nitrogen, which can severely burn plants and encourage algae growth if over-applied.

   The use of these chemicals should be minimized or avoided. Instead, shovel walks clear and apply a dusting of sand to improve footing.

Table 1 Hazardous Household Substances List

Auto, Boat and Equipment Maintenance	Repair and Remodeling	Cleansing Agents
Batteries	Adhesives, glues, cements	Oven cleaners
Waxes and cleansers	Roof coatings, sealants	Degreasers and spot removers
Paints, solvents and thinners	Caulking and sealants	Toilet, drain and septic tank cleaners
Additives	Epoxy resins	Polishes, waxes and strippers
Gasoline	Solvent-based paints	Deck, patio and chimney cleaners
Flushes	Solvents and thinners	Solvent cleaning fluids
Auto repair materials	Paint removers and strippers	
Motor oil		
Diesel oil		
Antifreeze		
Pesticides	**Hobby and Recreation**	**Miscellaneous**
Insecticides	Paints, thinners and solvents	Ammunition
Fungicides	Chemicals (photo and pool)	Asbestos
Rodenticides	Glues and cements	Fireworks
Molluscicides	Inks and dyes	
Wood preservatives	Glazes	
Moss retardants	Chemistry sets	
Herbicides	Bottled gas	
Fertilizers	White gas	
	Charcoal starter fluid	

Source: Guidelines for Local Hazardous Waste Planning, Ecology, No. 87-18 1987.

Table 2. Non- or Less Toxic Alternatives to Toxic Products

Hazardous Product	Alternative(s)
Air fresheners	Set out a dish of vinegar; simmer cinnamon or cloves in water; set out herbal bouquets or potpourri in open dishes; burn scented candles.
Bleach	Borax or oxygen bleaches or reduce bleach by ½ and add ¼ - ½ C baking soda; line dry clothes.
Brass polish	Worcestershire sauce
Chrome polish	Apple cider vinegar; a paste of baking soda and water; a lemon
Coffee pot cleaner	Vinegar; remove coffee stains with moist salt paste.
Copper cleaner	Mixture of lemon juice and salt or tomato catsup.
Drain cleaner	Use a plunger followed by ½ C baking soda mixed with ½ C vinegar. Let sit 15 minutes; pour into drain followed by 2 qt. boiling water.
Furniture polish	Linseed, olive or almond oils; a mixture of 3 parts olive oil to 1 part white vinegar; a mixture of 1 T lemon oil and 1 pint mineral oil
Garbage disposal deodorizer	Lemon rind or baking soda.
Glass cleaner	Mixture of 2 T vinegar and 1 quart water
Grease remover	Paste of borax and water on damp cloth
Ink stain remover	Spray with non-aerosol hairspray before washing.
Laundry soap	Borax; baking soda; washing soda
Linoleum floor cleaner	Mixture of 1 C white vinegar and 2 gallons water
Mildew remover	Equal parts vinegar and salt
Mothballs	Cedar chips or blocks; dried tansy, lavender or peppercorns
Oil spills	Kitty litter; sawdust
Oil stain remover	White chalk rubbed into stain prior to washing
Oven cleaner	Cover fresh spills with salt; scrape off after the oven cools. A soda water solution will cut grease. Paint ammonia on spills with a paintbrush, then rinse off.
Paint brush softener	Hot vinegar
Paint stripper	Use mechanical sanding instead of chemical strippers.
Paint or grease remover	Wear gloves or try baby oil
Pet odor remover	Cider vinegar
Pitch or sap remover	Butter, margarine or vegetable shortening.
Porcelain stain remover	Baking soda
Refrigerator deodorizer	Open box of baking soda
Rug/carpet cleaner	(General) Use a soap-based non-aerosol rug shampoo; vacuum when dry. (Spots) Pour club soda or sprinkle cornmeal or cornstarch on the rug; let sit for at least 30 minutes; vacuum.
Rust remover	Lemon juice and sunlight
Rusty bolt remover	Carbonated beverage
Scorch mark remover	Grated onion
Scouring powder	Baking soda or non-chlorine scouring powder.
Silver polish	Soak silver in warm water with 1 T soda, 1 T salt and a piece of aluminum foil.
Stainless steel polish	Mineral oil
Toilet bowl cleaner	Paste mixture of borax and lemon juice
Tub and tile cleaner	¼ C soda and ½ C white vinegar mixed with warm water
Upholstery spot remover	Club soda
Water mark remover	Toothpaste

Pesticides[1] and Fertilizers

Pesticides and fertilizers are commonly used by homeowners in their quest for bigger, healthier plants and greener, lusher lawns. These chemicals are often overused and misapplied. These chemicals are easily introduced into stormwater runoff and can cause algae blooms (fertilizers) or kill off aquatic organisms (pesticides).

Fertilizer Management

Fertilizing a lawn can be done in an environmentally sensitive manner. Here are some ideas.

1. Before fertilizing, test your soil's pH by using a readily available kit or through tests provided by WSU Cooperative Extension. Use only the recommended amount of fertilizer and any soil amendments, such as lime, that are recommended in your test results.
2. Use fertilizers that are appropriate for your area and for the types of plants you are growing. Work the fertilizer into the soil directly around the plant's drip line. By incorporating the fertilizer in the soil, there will be less likelihood of contaminated runoff. Contact the Thurston Conservation District for more information.
3. Water before fertilizing. Water enough to dampen the ground thoroughly but not enough to cause surface runoff. Dampening the soil prevents fertilizer from being washed from the surface of dry soil in the first rain or watering after application.
4. Many soils can benefit from the use of organic fertilizers such as compost or peat. Not only do these substances add nutrients to soil; they also increase the porosity of the soil and increase its ability to hold water.
5. Slow release fertilizers (which are generally resin-coated) can be used in addition to organic fertilizers. They are not mobile in the soil and are applied only once.

Integrated Pest Management

Rather than bringing out the sprayer whenever a pest infestation occurs in the garden, consider using Integrated Pest Management (also known as IPM). IPM emphasizes the evaluation of all factors including environmental effects before chemicals are applied. Pesticides should only be used as a last resort. Some of the tactics that can be used to decrease or eliminate the use of pesticides include:

1. Use of Natural Predators or Pathogens: Because chemical sprays generally kill many beneficial insects instead of just the target pest, it may be necessary to introduce natural predators back into the garden. Ladybugs, lacewings, predatory wasps and nematodes are all commercially available. Garter snakes and toads are also predators and should not be eliminated from the garden.

   There are some bacteria, viruses and insect parasites that are specific to pests and will not harm other insects or animals. A commonly used bacterium in the Puget Sound area is *Bacillus thuringiensis* (Bt), which is intended to control infestations of tent caterpillars. Products containing Bt are available at your nursery.

[1] As used here, the word pesticide can mean any herbicide, insecticide, rodenticide, miticide or other chemicals used in a similar manner.

2. Habitat Changes: Many times a change of habitat can control pest infestations. Removal of old tires can cut down on the mosquito population by removing a convenient water-filled location for them to breed in. Crop rotation, even in a small garden, can reduce the number of pest infestations. Removing last year's leaves from under rose bushes can cut down on the incidence of mildew and blackspot, as these fungi overwinter in dead leaves.
3. Timing: Crops that can overwinter (such as leeks or carrots) should be planted in the fall. This gives them time to become established before pests arrive in the spring.
4. Mechanical: Many eggs, larvae, cocoons and adult insects can be removed by hand. Be sure that the insect is properly identified prior to removing it so those beneficial insects are not destroyed in error. Drowning insects in plain water or spraying them with soapy water are alternatives to squashing them.
5. Resistant Plants: Plants that are native to this area are often more resistant to pests and tolerant of the climate than are introduced plants. Many plant cultivars have been developed which are resistant to such diseases as verticilium wilt and peach leaf curl. Grass seed mixes are also available for lawns that need much less watering, mowing and chemical use.
6. Growing Conditions: Plants, such as hostas, that require some shade are more susceptible to pests when they are growing in the sun. Improperly fertilized or watered plants are less vigorous in growth and tend to attract pests. Plants that prefer an acid soil, such as azaleas, will perform better and be less susceptible to pests when they are grown in soil with the proper pH.
7. Chemicals: Chemicals are a small part of the IPM plan and should be applied only as needed after reviewing all other alternatives.

Pesticide Management

When use of a chemical is the best or only option, follow these simple guidelines:

1. Know your target pest before spraying. Use the pesticide according to the manufacturer's instructions, and buy only the needed quantity. Many pesticides have a limited shelf life and may be useless or degrade into even more toxic compounds if stored for extended periods of time.
2. Do not apply more than the specified amount. Overuse can be dangerous to your health as well as the health of wildlife and the environment. If more than one chemical can be used to control the pest, choose the least toxic. The word "caution" on the label means that the chemical is less toxic than one that is labeled "warning".
3. Do not spray on windy days, in the morning of what will be a very hot day or when rain is likely. Herbicides can drift and injure valuable ornamental plants. Do not water heavily after application. Plants should be lightly watered before application to prevent burning of the foliage and to help evenly spread the chemical.
4. Never apply pesticides near streams, ponds or wetlands (exception: approved applications for aquatic weeds). Do not apply pesticides to bare eroded ground (exception: use of low toxicity herbicides such as Round-Up to allow growth of desired planting in small areas).

Many pesticides bind to soil particles and can be easily carried into a stream or storm drain.

5. Pesticides should be stored well away from living areas. Ideally, the storage area should have a cement floor and be insulated from temperature extremes. Always keep pesticides in their original containers with labels in tact. Labels often corrode and become illegible in this climate and may have to be taped onto the container.
6. Federal law now requires that all pesticides be labeled with the appropriate disposal method. Leftovers should never be dumped anywhere, including a landfill. Take unwanted pesticides to the County's hazardous waste collection days or Hazo House at the landfill.
7. Empty containers should be triple-rinsed and the rinse water used as spray. Once containers are triple-rinsed, they are not considered hazardous waste and may be disposed of in most landfills. However, call your local landfill before putting the container in the garbage.
8. If a pesticide is spilled onto pavement, it can be absorbed using kitty litter or sawdust. The contaminated absorbent should be bagged, labeled and taken to Hazo House.
9. If the pesticide is spilled onto dirt, dig up the dirt, place it in a plastic bag and take it to Hazo House.
10. Many pest control companies and licensed applicators have access to pesticides that are more toxic than those available to the consumer. Check with the company before they spray indoors or outdoors to find out what spray they will be using and what precautions, if any, are necessary after the operator leaves.

Home Remodeling

Remodeling uses some of the most toxic substances found in the home. Paints, preservatives, strippers, brush cleaners and solvents all contain a wide range of chemicals, some of which are suspected to be carcinogenic (cancer causing). These products should never be dumped in a landfill or put down a sewer or septic system.

1. When building a deck consider using wood or wood alternatives such as recycled wood/plastic decking instead of concrete. Wood decking allows rainwater to drip onto the ground below, keeping it from becoming surface runoff
2. Decks and sidewalks can also be built out of brick interlocking pavers or modular concrete. If these surfaces are placed on a bed of well-drained soil gravel or sand, rainwater can infiltrate into the ground around them.
3. To reduce disposal problems, buy only the needed amount. Used turpentine or brush cleaner can be filtered and reused. Paint cans should be allowed to dry and then be disposed of during a hazardous waste collection day or at Hazo House.
4. Leftover paint can be given away, for example to a theater group. Contact the Thurston County Health Department at (360) 754-4111 for other options.

5. Roof downspouts can be adjusted to infiltrate runoff to a well drained area. The runoff from them can enter a gravel bed where it can infiltrate into the ground. For design criteria, see your jurisdiction's drainage manual.
6. When gardening on slopes, reduce the potential for surface runoff by using terraces across the face of the hill. These can be as simple as little soil "bumps" or more elaborate using timbers, masonry or rock walls.

Septic System Care and Management

Although septic systems do not seem to have a direct relationship with stormwater runoff, they can in some instances be related.

1. Roof drains and stormwater runoff should be diverted away from drainfields. Excess water reduces the capacity of the drainfield to absorb effluent from the septic tank
2. Water from hot tubs should not be drained into a septic system all at once. They are not designed to handle large volumes of chlorinated water. Either use the water on plants in the yard, or drain the hot tub slowly over a period of days.
3. Septic tanks should be pumped regularly. Ponded water, damp places in the yard, foul odors and/or a dark gray or black soil color may indicate septic drain field failure. Effluent from a malfunctioning septic can cause disease and nitrate problems in groundwater. For septic system assistance, contact the Thurston County Health Department at (360) 786-5490.

References

Puget Sound Water Quality Authority, Managing Nonpoint Pollution - An Action Plan for Puget Sound Watersheds, 88-31, June 1989.

Washington State Dept. of Ecology, Water Quality Guide - Recommended Pollution Control Practices for Homeowners and Small Farm Operators 87-30, revised June 1991.

Washington State Dept. of Ecology, Hazardous Waste Pesticides, 89-41, August 1989.

IV. GLOSSARY

BEST MANAGEMENT PRACTICE (BMP) - Structures, conservation practices or regulations that improve quality of runoff or reduce the impact of development on the quantity of runoff.

BIOFILTER (SWALE) - A wider and flatter vegetated version of a ditch over which runoff flows at uniform depth and velocity. Biofilters perform best when vegetation has a thick mat of roots, leaves and stems at the soil interface (such as grass).

BIOFILTRATION - The process through which pollutant concentrations in runoff are reduced by filtering runoff through vegetation.

BUFFER - The zone that protects aquatic resources by providing protection of slope stability, attenuation of runoff and reduction of landslide hazards. An integral part of a stream or wetland ecosystem, it provides shading, input of organic debris and coarse sediments to streams. It also allows room for variation in stream or wetland boundaries, habitat for wildlife and protection from harmful intrusion.

CATCH BASIN - An inlet for stormwater set into the ground, usually rectangular, made of concrete and capped with a grate that allows stormwater to enter.

CHECK DAM - A dam (e.g., rock, earthen, log) used in channels to reduce water velocities, promote sediment deposition and/or enhance infiltration.

COMPOST STORMWATER FILTER - A treatment facility that removes sediment and pollutants from stormwater by percolating water through a layer of specially prepared big leaf maple compost.

CONSTRUCTED WETLAND - A wet pond with dead storage at varied depths and planted with wetland plants to enhance its treatment capabilities.

CONTROL STRUCTURE (FLOW RESTRICTOR) - A manhole and/or pipe structure with a flow-regulating or metering device such as a weir or plates with small holes known as orifices. This structure controls the rate at which water leaves the pond.

CONVEYANCE - A mechanism or device for transporting water including pipes, channels (natural and man-made), culverts, gutters, manholes, etc.

CRITICAL AREA – Areas, such as wetlands, streams and steep slopes, defined by ordinance or resolution of the jurisdiction. Also known as "environmentally sensitive areas."

CULVERT - A conveyance device (e.g., concrete box, pipe) that conveys water from a ditch, swale or stream under (usually across) a roadway or embankment.

DEAD STORAGE - The volume of storage in a pond below the outlet that does not drain after a storm event. This storage area provides treatment of the stormwater by allowing sediments to settle out.

DETENTION FACILITY - A facility (e.g., pond, vault, pipe) in which surface and stormwater is temporarily stored.

DETENTION POND - A detention facility in the form of an open pond.

DISPERSION TRENCH - An open-top trench filled with riprap or gravel that takes the discharge from a pond, spreads it out and spills (bubbles) the flow out along its entire length. Dispersion

trenches are used to simulate "sheet flow" of stormwater from an area and are often used to protect sensitive adjacent areas, such as wetlands.

DRAINAGE SYSTEM - The combination of Best Management Practices (BMPs), conveyances, treatment, retention, detention and outfall features or structures on a project.

DROP STRUCTURE - A structure for dropping water to a lower elevation and/or dissipating energy. A drop may be vertical or inclined.

DRY POND - A detention facility that drains completely after a storm. This type of pond has a pipe outlet at the bottom.

EASEMENT - A right afforded a person to make limited use of another's real property. Typical easements are for pipes or access to ponds; they may be 15 to 20 feet wide.

EMERGENCY OVERFLOW OR SPILLWAY - An area on the top edge of the pond that is slightly lower in elevation than areas around it. This area is normally lined with riprap. The emergency overflow is used only if the primary and secondary outlets of the pond fail, in the event of extreme storms or if the infiltration capability of the pond becomes significantly diminished. If the emergency overflow ever comes into play, it may indicate the pond needs to be upgraded.

ENERGY DISSIPATER - A rock pad at an outlet designed to slow the water's velocity, spread out the water leaving the pipe or channel and reduce the potential for erosion.

FREEBOARD - The vertical distance between the design high water mark and the elevation of the top of the pond. Most ponds have one to two feet of freeboard to prevent them from overflowing.

INFILTRATION - The soaking of water through the soil surface into the ground (percolation). (Many ponds are designed to fully infiltrate stormwater and thus do not have a regularly used discharge pipe.)

INFILTRATION FACILITY (or STRUCTURE) - A facility (pond or trench) that retains and percolates stormwater into the ground, having no discharge (to any surface water) under normal operating conditions.

JUNCTION - Point where two or more drainage pipes or channels converge (e.g., a manhole).

JURISDICTION - Olympia, Lacey, Tumwater or Thurston County (as applicable).

LINED POND or CONVEYANCE - A facility, the bottom and sides of which have been made impervious (using, for example, a plastic liner or clay/silt soil layer) to the transmission of liquids.

LIVE STORAGE - The volume of storage in a pond above the outlet that drains after a storm event. This storage area provides flood control and habitat protection for nearby streams.

MANHOLE - A larger version of a catch basin, often round, with a solid lid. Manholes allow access to underground stormwater pipes for maintenance.

NATURAL CHANNEL - Stream, creek, river, lake, wetland, estuary, gully, swale, ravine or any open conduit where water will concentrate and flow intermittently or continuously.

OIL-WATER SEPARATOR - A structure or device used to remove oil and greasy solids from water. They operate by using gravity separation of liquids that have different densities. Many catch basins have a downturned elbow that provides some oil-water separation.

OUTFALL - The point where water flows from a man-made conduit, channel or drain into a water body or other natural drainage feature.

RETENTION FACILITY - An infiltration facility.

RETENTION POND - A retention facility that is an open pond.

REVETMENTS - Materials such as rock or keystones used to sustain an embankment, such as in a retaining wall.

RIPRAP - Broken rock, cobbles or boulders placed on earth surfaces, such as on top of a berm for the emergency overflow, along steep slopes or at the outlet of a pipe, for protection against the action of water. Also used for entrances to construction sites.

RUNOFF - Stormwater.

SAND FILTER - A treatment facility that removes sediment and pollutants from stormwater by percolating water through a layer of sand.

STORMWATER - That portion of precipitation that falls on property and that does not naturally percolate into the ground or evaporate but flows via overland flow, channels or pipes into a defined surface water channel or a constructed infiltration facility. Stormwater includes washdown water and other wastewater that enters the drainage system.

SWALE - A shallow drainage conveyance with relatively gentle side slopes, generally with flow depths less than one foot. This term is used interchangeably with "BIOFILTER".

TRASH RACK or BAR SCREEN - A device (usually a screen or bars) that fits over a pipe opening to prevent large debris such as rocks or branches from entering and partially blocking the pipe.

WET POND - A stormwater treatment pond designed with a dead storage area to maintain a continuous or seasonal static water level below the pond outlet elevation

APPENDIX 1 – Stormwater Facility Summary Forms

TO BE PROVIDED AS PART OF CONSTRUCTION PERMIT PLANS.

APPENDIX 2 – Site Stormwater Drainage Plans & Details

PRELIMINARY PLAT OF GATEWAY DIVISION 1

SITE DATA:

PARCEL NO.'S:	11803340100, 11803430000, 11810103000
ZONING:	HD 6-20
TOTAL AREA:	43.18 acres
WETLAND AREA:	1.31 acres
NET AREA:	41.87 acres
TOTAL DWELLING UNITS:	333 d.u.
DENSITY:	8.02 d.u. / net acre
TOTAL OPEN SPACE:	16.76 acres (39% OF SITE AREA)
STORM DRAINAGE	5.3 acres
WETLANDS / TREE TRACTS	1.3 acres
BUFFERS / TREE TRACTS	6.2 acres
LANDSCAPE / ACTIVE RECREATION	3.6 acres

ROADWAY LENGTH (A,B,C)	2,202 l.f.
ROADWAY AREA (A,B,C)	2.2 acres
ROADWAY LENGTH (OTHERS)	2,079 l.f.
ROADWAY AREA (OTHERS)	3.5 acres
SMALLEST LOT (DETACHED FRONT LOAD)	5,000 s.f.
SMALLEST LOT (DETACHED REAR LOAD)	4,000 s.f.
SMALLEST LOT ATTACHED (TOWNHOMES)	3,300 s.f.
AVERAGE LOT AREA	4,863 s.f.
SANITARY SEWER	CITY OF LACEY
WATER	CITY OF LACEY

LEGEND

EX. POWER POLE	EX. WATERMETER	NEW WATERMETER
EX. POWER VAULT	EX. HYDRANT	NEW HYDRANT
EX. POWER TRANSFORMER	EX. VALVE	NEW VALVE
EX. POWER PEDESTAL	EX. BLOWOFF	NEW BLIND FLANGE
EX. PVC RISER	EX. WATER LINE	NEW BLOCKING
EX. OVERHEAD POWER	EX. SEWER CLEANOUT	NEW WATERMAIN
EX. UNDER GROUND POWER	EX. SEWER MANHOLE	NEW CATCHBASIN TYPE 1
EX. TELEPHONE PEDESTAL	EX. SEWER LINE	NEW CATCHBASIN TYPE 2-48
EX. TELEPHONE MANHOLE	EX. CONCRETE	NEW STORM CATCHBASIN W/ SOLID LID
EX. CABLE PEDESTAL	EX. EDGE OF PAVEMENT	NEW STORM MAIN LINE
EX. TELEPHONE LINE	EX. MAJOR CONTOUR	NEW LOT DRAINAGE LINE
EX. GAS VALVE	EX. MINOR CONTOUR	NEW SEWER CLEANOUT
EX. GAS LINE	FINISH MAJOR CONTOUR	NEW SEWER MANHOLE
EX. POWER JUNCTION BOX	FINISH MINOR CONTOUR	NEW GRAVITY SEWER LINE
EX. CATCHBASIN TYPE 1	NEW ROCK WALL	NEW LATERAL SERVICE LINE
EX. STORM MAIN LINE	NEW PEDESTRIAN STREET LIGHT	NEW PIGG LAUNCH PORT
EX. CULVERT	NEW HIGH MAST W/ PED SCALE LIGHT	NEW SEWER FORCEMAIN
EX. SIGNS	NEW LIGHTING J BOX	SOIL TEST PIT LOCATION
EX. FENCE	NEW TRANSFROMER & SERVICE DISCONNECT	

KATON GODAT PANTIER

CITY OF LACEY	
VERTICAL DATUM	MERIDIAN HORIZONTAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1083 FOUND CASED MONUMENT AT THE INTERSECTION OF CALLISON ROAD AND BRITTON PARKWAY ELEVATION = 216.42	CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111152 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°36'41" WEST

100 50 0 100 200
SCALE: 1" = 100'

LEGAL DESCRIPTION

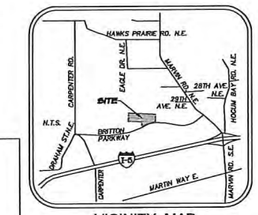
THE SOUTH HALF OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTH HALF OF THE SOUTHWEST QUARTER WEST HALF OF THE SOUTHEAST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST OF THE W.M.;
EXCEPT BRITTON PARKWAY;

ALSO THAT PORTION OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST OF THE W.M., LYING NORTHERLY OF BRITTON PARKWAY;

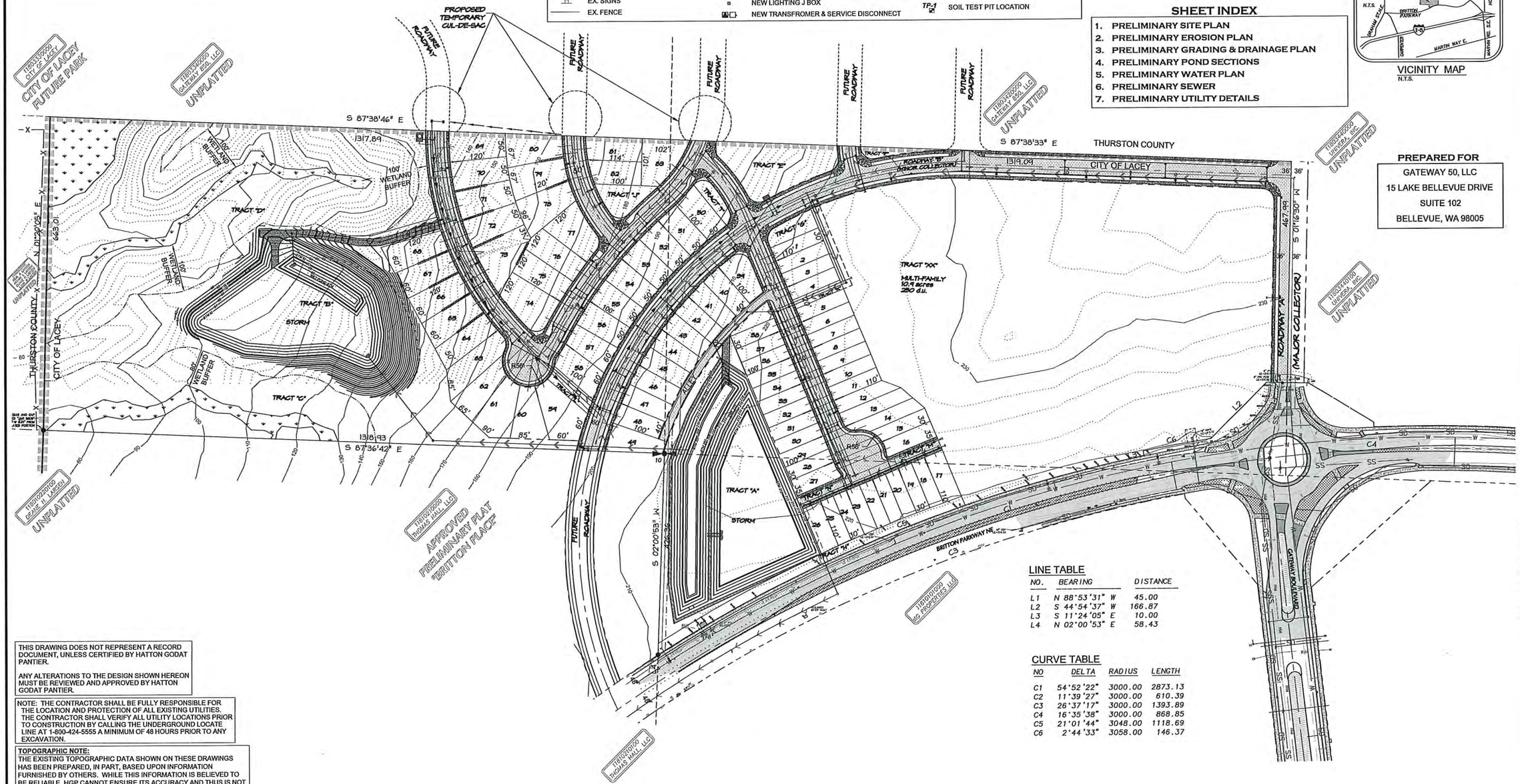
IN THURSTON COUNTY, WASHINGTON

SHEET INDEX

1. PRELIMINARY SITE PLAN
2. PRELIMINARY EROSION PLAN
3. PRELIMINARY GRADING & DRAINAGE PLAN
4. PRELIMINARY POND SECTIONS
5. PRELIMINARY WATER PLAN
6. PRELIMINARY SEWER
7. PRELIMINARY UTILITY DETAILS



VICINITY MAP
N.T.S.



LINE TABLE

NO.	BEARING	DISTANCE
L1	N 88°53'31" W	45.00
L2	S 44°54'37" W	166.87
L3	S 11°24'05" E	10.00
L4	N 02°00'53" E	58.43

CURVE TABLE

NO	DELTA	RADIUS	LENGTH
C1	54°52'22"	3000.00	2873.13
C2	11°39'27"	3000.00	610.39
C3	26°37'17"	3000.00	1393.89
C4	16°35'38"	3000.00	868.85
C5	21°01'44"	3048.00	1118.69
C6	2°44'33"	3058.00	146.37

PREPARED FOR
GATEWAY 50, LLC
15 LAKE BELLEVUE DRIVE
SUITE 102
BELLEVUE, WA 98005

THIS DRAWING DOES NOT REPRESENT A RECORD DOCUMENT, UNLESS CERTIFIED BY HATTON GODAT PANTIER.

ANY ALTERATIONS TO THE DESIGN SHOWN HEREON MUST BE REVIEWED AND APPROVED BY HATTON GODAT PANTIER.

NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

TOPOGRAPHIC NOTE:
THE EXISTING TOPOGRAPHIC DATA SHOWN ON THESE DRAWINGS HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, HGP CANNOT ENSURE ITS ACCURACY AND THUS IS NOT RESPONSIBLE FOR THE ACCURACY OF THAT INFORMATION OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

DESIGNED BY: DS
DRAWN BY: MM
CHECKED BY: SDH
DATE: FEB 2013
SCALE: H 1" V

STEVEN D. HATTON
STATE OF WASHINGTON
24193
REGISTERED PROFESSIONAL ENGINEER

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REVISIONS: DATE:

11803340100, 11803430000, 11810103000

GATEWAY DIVISION 1
PRELIMINARY PLAT

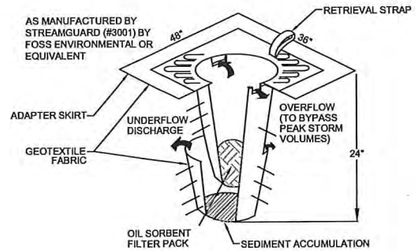
PRELIMINARY SITE PLAN

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTHWEST HALF OF THE SOUTHEAST QUARTER OF SECTION 3 AND A PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M.

AGENCY NO.
SHEET: 1 OF 7
INDEX: (12-000/12-052/Preliminary Plat) 12-052pre-cov.dwg
JOB: 12-052

GENERAL EROSION CONTROL NOTES:

1. A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL) IS REQUIRED FOR ALL CONSTRUCTION PROJECTS. THE NAMED PERSON OR FIRM SHALL BE ON-SITE OR ON-CALL AT ALL TIMES. FOR THIS SITE, THE PERSON / FIRM IS TBD AND THEIR OFFICE TELEPHONE NUMBER IS TBD .
2. APPROVAL OF THIS EROSION / SEDIMENTATION CONTROL (ESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.).
3. THE IMPLEMENTATION OF THESE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE APPLICATION CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION LANDSCAPING IS ESTABLISHED.
4. THE CLEARING LIMIT BOUNDARIES SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE APPLICANT/CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
5. THE ESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM, ROADWAYS, OR VIOLATE APPLICABLE SURFACE WATER, GROUND WATER , OR DISCHARGE STANDARDS.
6. THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE.
7. THE ESC FACILITIES ON ACTIVE SITES SHALL BE INSPECTED DAILY BY THE APPLICANT/CONTRACTOR–AND MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY–TO ENSURE THEIR CONTINUED FUNCTIONING.
8. THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED MONTHLY, OR WITHIN 48 HOURS FOLLOWING A MAJOR STORM EVEN, BY THE APPLICANT/CONTRACTOR–AND MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY -TO ENSURE THEIR CONTINUED FUNCTIONING.
9. STORM INLETS OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT STORMWATER RUNOFF DOES NOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR TREATED TO REMOVE SEDIMENT. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEARED PPRIOR TO PROJECT COMPLETION AND ACCEPTANCE. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT-LADEN WATER OFFSITE WITHOUT TREATMENT.
10. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF THE CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
11. ROADS SHALL BE CLEANED THOROUGHLY AS NEEDED TO PROTECT DOWNSTREAM WATER RESOURCES OR STORMWATER INFRASTRUCTURE. SEDIMENT SHALL BE REMOVED FROM ROADS BY SHOVELING OR PICKUP SWEEPING AND SHALL BE TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.
12. FROM OCTOBER 15 THROUGH APRIL 1, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN 2 DAYS. FROM APRIL 2 TO OCTOBER 14, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN 7 DAYS. SOILS SHALL BE STABILIZED AT THE END OF THE SHIFT BEFORE A HOLIDAY OR WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. LINEAR CONSTRUCTION ACTIVITIES, SUCH AS RIGHT OF WAY AND EASEMENT CLEARING, ROADWAY DEVELOPMENT, PIPELINE, AND TRENCHING FOR UTILITIES, SHALL COMPLY WITH THESE REQUIREMENTS. THESE STABILIZATION REQUIREMENTS APPLY TO ALL SOILS ON SITE, WHEATHER AT FINAL GRADE OR NOT. THE LOCAL PERMITTING AUTHORITY MAY ADJUST THESE TIME LIMITS IF IT CAN BE SHOWN THAT A DEVELOPMENT SITE'S EROSION OR RUNOFF POTENTIAL JUSTIFIES A DIFFERENT STANDARD.
13. FROM OCTOBER 15 THROUGH APRIL 1, CLEARING, GRADING AND OTHER SOIL-DISTURBING ACTIVITIES SHALL ONLY BE PERMITTED IF SHOWN TO THE SATISFACTION OF THE LOCAL PERMITTING AUTHORITY THAT THE TRANSPORT OF SEDIMENT FROM THE CONSTRUCTION SITE TO RECEIVING WATER WILL BE PREVENTED.
14. SOIL STOCKPILES MUST BE STABILIZED AND PROTECTED WITH SEDIMENT-TRAPPING MEASURES.
15. ALL POLLUTANTS, INCLUDING WASTE MATERIALS AND DEMOLITION DEBRIS, THAT OCCUR ON SITE DURING CONSTRUCTION SHALL BE HANDLED AND DISPOSED OF IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF STORMWATER. WOODY DEBRIS MAY BE CHOPPED AND SPREAD ON SITE.
16. MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES AND OTHER ACTIVITIES WHICH MAY RESULT IN DISCHARGE OF SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORMWATER RUNOFF MUST BE CONDUCTED USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. REPORT ALL SPILLS TO 911.
17. WATER FROM MOST DEWATERING OPERATION SHALL BE DISCHARGED INTO A SEDIMENT TRAP OR POND. CLEAN, NON-TURBID WATER MAY BE DISCHARGED TO STATED SURFACE WATERS, PROVIDED THE DISCHARGE DOES NOT CAUSE EROSION OR FLOODING. HIGHLY TURBID OR CONTAMINATED DEWATERING WATER FROM CONSTRUCTION EQUIPMENT OPERATION, CLAMSHELL DIGGING, CONCRETE TREMIE POUR, OR WORK INSIDE A COFFERDAM SHALL BE HANDLED SEPARATELY FROM STORMWATER AND PROPERLY DISPOSED.

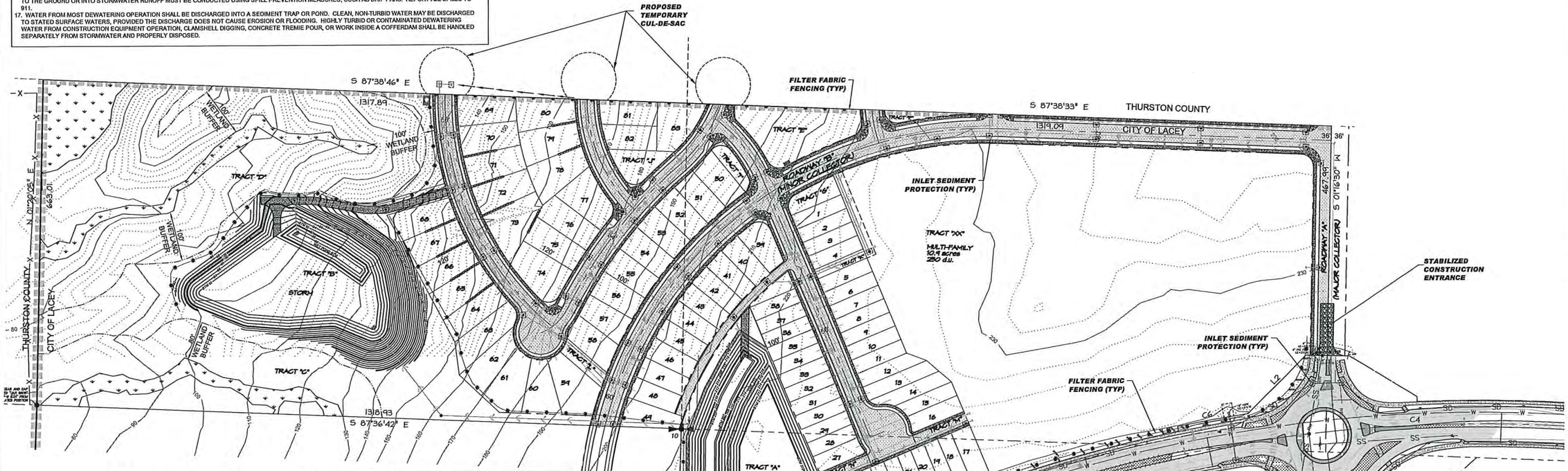


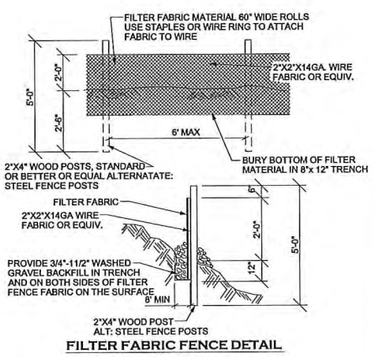
1. INSTALL INSERT PER THE MANUFACTURER'S SPECIFICATIONS
2. MAINTAIN AND REPLACE INSERTS AS RECOMMENDED BY THE MANUFACTURER, AS REQUIRED BY THE INSPECTOR OR PROJECT ENGINEER, AND AS OTHERWISE NECESSARY.

INLET SEDIMENT PROTECTION

CITY OF LACEY	
VERTICAL DATUM	MERIDIAN HORIZONTAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1083 FOUND CASED MONUMENT AT THE INTERSECTION OF CALLISON ROAD AND BRITTON PARKWAY ELEVATION = 216.42	CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111152 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°36'41" WEST

100 50 0 100 200
SCALE: 1" = 100'

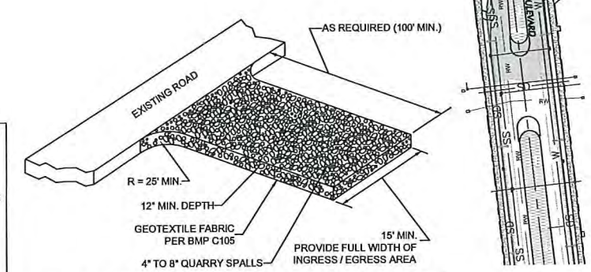




FILTER FABRIC FENCE DETAIL

FILTER FABRIC FENCE NOTES:

1. FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6-INCH OVERLAP, AND SECURELY FASTENED AT BOTH ENDS TO POST.
2. POSTS SHALL BE SPACED A MAXIMUM OF 6 FEET APART AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 30 INCHES).
3. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 8 INCHES WIDE AND 12 INCHES DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER.
4. WHEN STANDARD STRENGTH FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY WIRE STAPLES AT LEAST 1 INCH LONG, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 4 INCHES AND SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
5. THE STANDARD STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 20 INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE. FILTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
6. WHEN EXTRA-STRENGTH FILTER FABRIC AND CLOSER POST SPACING IS USED, THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED. IN SUCH A CASE, THE FILTER FABRIC IS STAPLED OR WIRED DIRECTLY TO THE POSTS WITH ALL OTHER PROVISIONS OF ABOVE NOTES APPLYING.
7. FILTER FABRIC FENCES SHALL NOT BE REMOVED BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.
8. FILTER FABRIC FENCES SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.



STABILIZED CONSTRUCTION ENTRANCE

STABILIZED CONSTRUCTION ENTRANCE NOTES:

1. MATERIAL SHALL BE 4 INCH TO 8 INCH QUARRY SPALLS AND MAY BE TOP-DRESSED WITH 1 INCH TO 3 INCH ROCK. (STATE STANDARD SPECIFICATIONS.)
2. THE ROCK PAD SHALL BE AT LEAST 12 INCHES THICK AND 100 FEET LONG. WIDTH SHALL BE THE FULL WIDTH OF THE VEHICLE INGRESS AND EGRESS AREA. SMALLER PADS MAY BE APPROVED FOR SINGLE-FAMILY RESIDENTIAL AND SMALL COMMERCIAL SITES.
3. ADDITIONAL ROCK SHALL BE ADDED PERIODICALLY TO MAINTAIN PROPER FUNCTION OF THE PAD.
4. IF THE PAD DOES NOT ADEQUATELY REMOVE THE MUD FROM THE VEHICLE WHEELS, THE WHEELS SHALL BE HOSED OFF BEFORE THE VEHICLE ENTERS A PAVED STREET. THE WASHING SHALL BE DONE ON AN AREA COVERED WITH CRUSHED ROCK AND WASH WATER SHALL DRAIN TO A SEDIMENT RETENTION FACILITY OR THROUGH A SILT FENCE.

TOPOGRAPHIC NOTE:

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NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

DESIGNED BY: DS
DRAWN BY: MM
CHECKED BY: SDH
DATE: FEB 2013
SCALE: H
V

STEVEN D. HATTON — STATE OF WASHINGTON — 24193 — REGISTERED PROFESSIONAL ENGINEER

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OLYMPIA, WA 98506
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hattonpantier.com

REVISIONS: DATE:

GATEWAY DIVISION 1

PRELIMINARY PLAT

PRELIMINARY EOSION CONTROL PLAN

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTHWEST HALF OF THE SOUTH EAST QUARTER OF SECTION 3 AND A PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST, WM.

11803340100, 11803430000, 11810103000

AGENCY NO.
SHEET: 2 OF 7
(12-000/12-052/Preliminary Plat)
INDEX: 12-052pre-ec.dwg
JOB: 12-052

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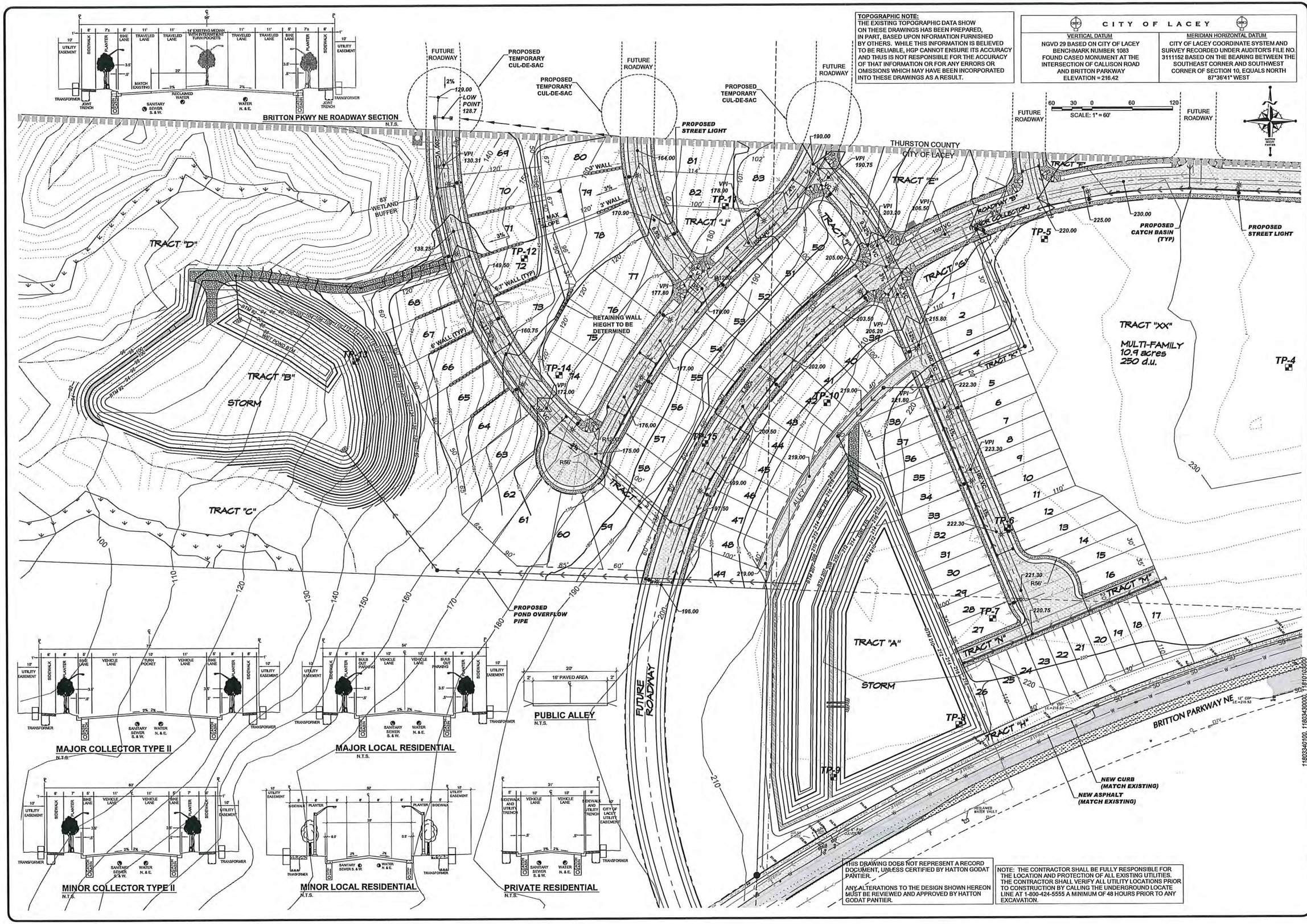
CITY OF LACEY

VERTICAL DATUM	MERIDIAN HORIZONTAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1083 FOUND CASED MONUMENT AT THE INTERSECTION OF CALLISON ROAD AND BRITTON PARKWAY ELEVATION = 216.42	CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111152 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°36'41" WEST



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DESIGNED BY: DS
DRAWN BY: MM
CHECKED BY: SDH
DATE: FEB 2013
SCALE: H / V

STEVEN D. HATTON — STATE OF WASHINGTON — 24193 — REGISTERED PROFESSIONAL ENGINEER

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hattonpantier.com

REVISIONS: DATE:

GATEWAY DIVISION 1

PRELIMINARY PLAT

PRELIMINARY GRADING AND DRAINAGE

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTHWEST HALF OF THE SOUTH EAST QUARTER OF SECTION 3 AND A PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M.

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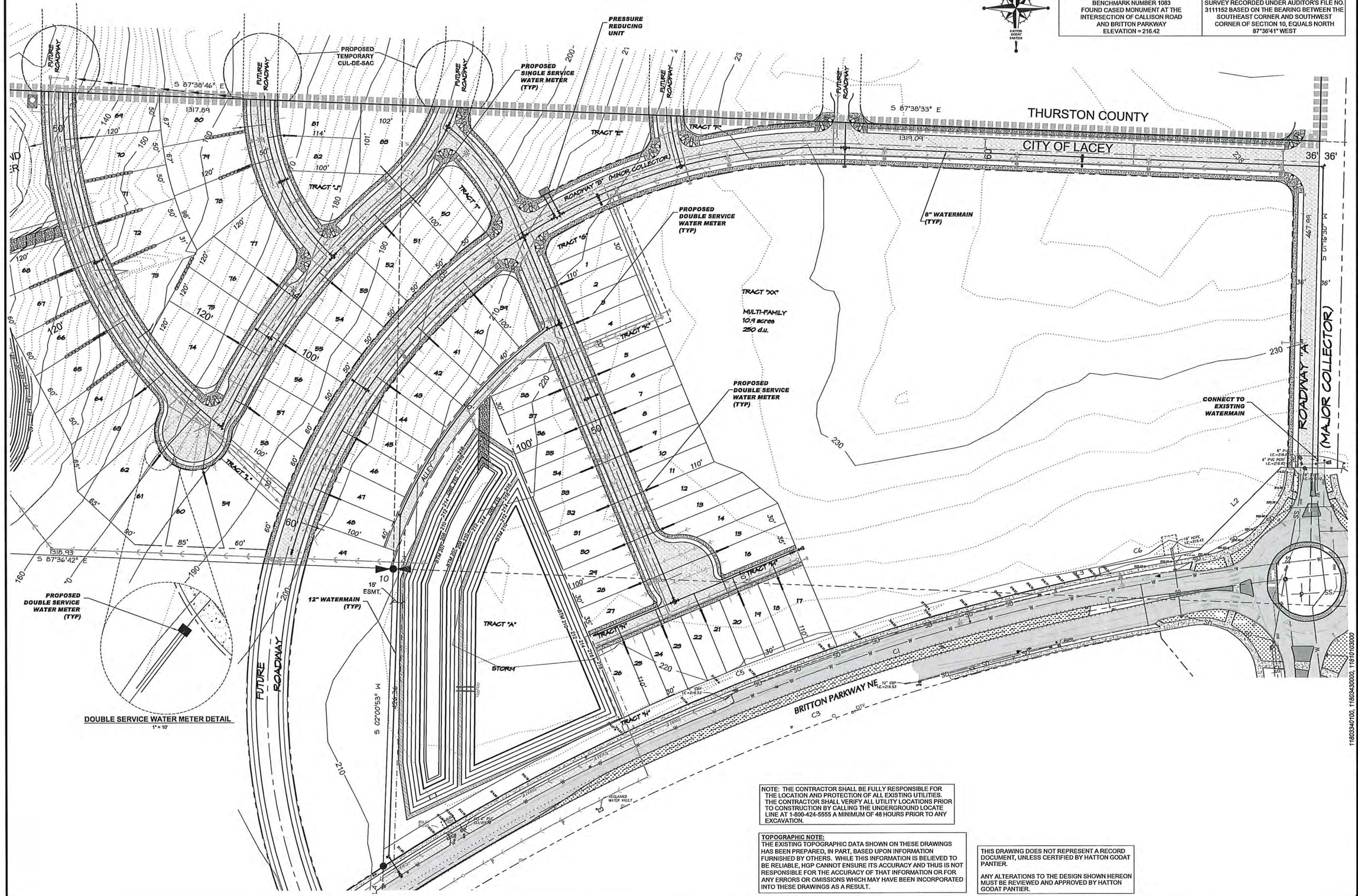
AGENCY NO.
SHEET: 3 OF 7
(12-000/12-052/Preliminary Plat)
INDEX: 12-052Apre-grd-drn.dwg
JOB: 12-052

SCALE: 1" = 60'

CITY OF LACEY	
VERTICAL DATUM	MERIDIAN HORIZONTAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1083 FOUND CASED MONUMENT AT THE INTERSECTION OF CALLISON ROAD AND BRITTON PARKWAY ELEVATION = 216.42	CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111152 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°36'41" WEST



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DRAWN BY: MM
CHECKED BY: SDH
DATE: FEB 2013
SCALE: H / V

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REVISIONS: DATE:

GATEWAY DIVISION 1

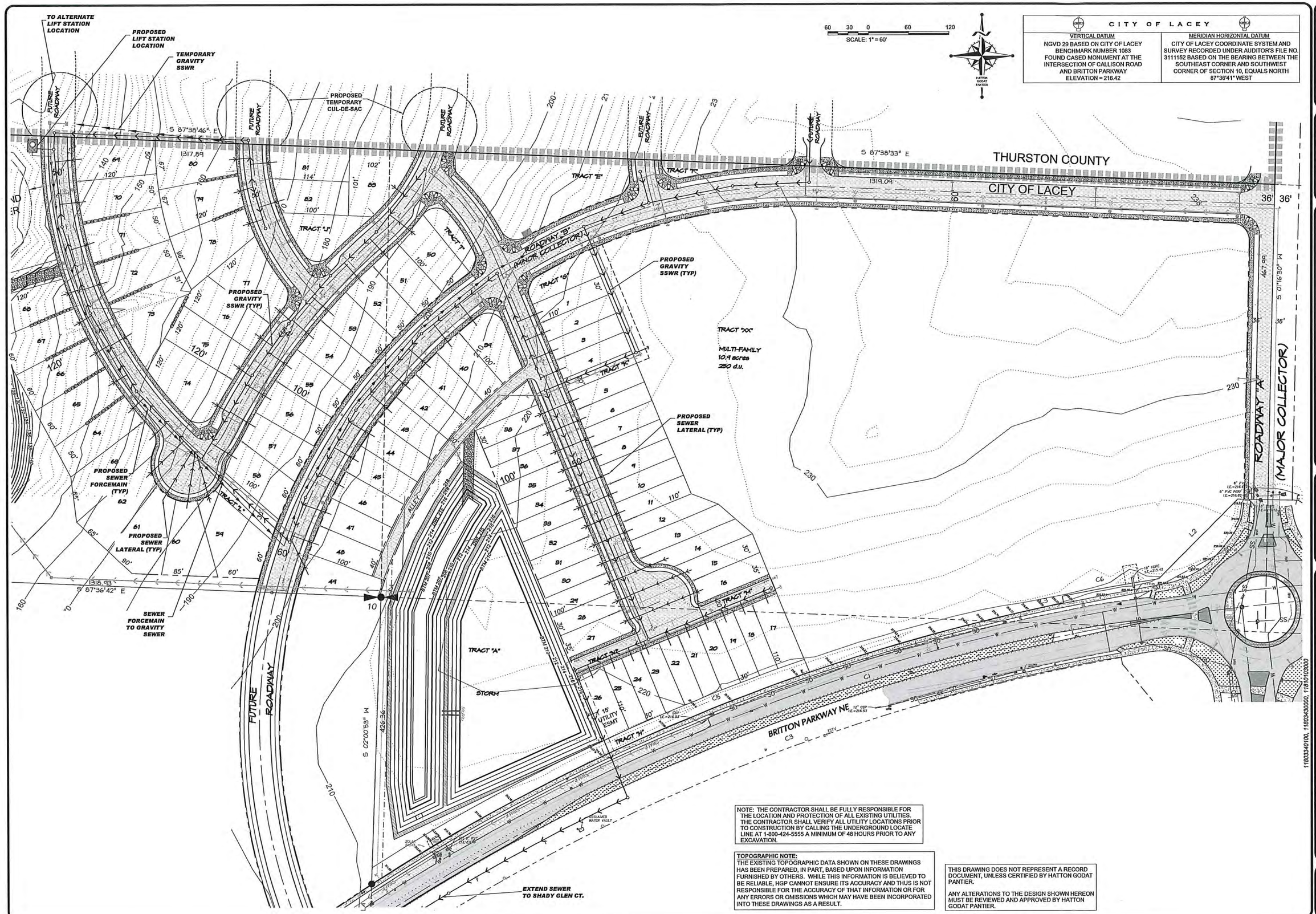
PRELIMINARY PLAT

PRELIMINARY WATER PLAN

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTHWEST HALF OF THE SOUTH EAST QUARTER OF SECTION 3 AND A PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M.

11803040100, 11803430000, 11810103000

AGENCY NO.
SHEET: 5 OF 7
(12-000/12-052/Preliminary Plat)
INDEX: 12-052pre-wtr.dwg
JOB: 12-052



SCALE: 1" = 60'

CITY OF LACEY	
VERTICAL DATUM	MERIDIAN HORIZONTAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1083 FOUND CASED MONUMENT AT THE INTERSECTION OF CALLISON ROAD AND BRITTON PARKWAY ELEVATION = 216.42	CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111152 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°36'41" WEST

NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

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DESIGNED BY: DS
DRAWN BY: MM
CHECKED BY: SDH
DATE: FEB 2013
SCALE: H ___ V ___

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REVISIONS: DATE:

GATEWAY DIVISION 1

PRELIMINARY PLAT

PRELIMINARY SANITARY SEWER PLAN

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTHWEST HALF OF THE SOUTH EAST QUARTER OF SECTION 3 AND A PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M.

1180334/100, 1180343000, 1181010300

AGENCY NO. ___
SHEET: 6 OF 7
INDEX: (12-000/12-052/Preliminary Plat) 12-052pre-sur.dwg
JOB: 12-052

GENERAL NOTES (SANITARY SEWER MAIN INSTALLATION

1. ALL WORKMANSHIP AND MATERIALS WILL BE IN ACCORDANCE WITH CITY OF OLYMPIA STANDARDS AND THE MOST CURRENT COPY OF THE STATE OF WASHINGTON STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION (WSDOT/APWA).
2. CITY OF OLYMPIA DATUM SHALL BE USED FOR ALL VERTICAL CONTROL. A LIST OF BENCHMARKS IS AVAILABLE FROM THE PUBLIC WORKS DEPARTMENT.
3. ALL APPROVALS AND PERMITS REQUIRED BY THE CITY OF OLYMPIA SHALL BE OBTAINED BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.
4. IF CONSTRUCTION IS TO TAKE PLACE IN THE COUNTY RIGHT-OF-WAY, THE CONTRACTOR SHALL NOTIFY THE COUNTY AND OBTAIN ALL THE REQUIRED APPROVALS AND PERMITS.
5. A PRECONSTRUCTION MEETING SHALL BE HELD WITH THE CITY OF OLYMPIA CONSTRUCTION INSPECTOR PRIOR TO THE START OF CONSTRUCTION.
6. THE CITY OF OLYMPIA CONSTRUCTION INSPECTOR SHALL BE NOTIFIED A MINIMUM OF 48 HOURS (TWO WORKING DAYS) IN ADVANCE OF A TAP CONNECTION TO AN EXISTING MAIN. THE INSPECTOR SHALL BE PRESENT AT THE TIME OF THE TAP.
7. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS (TWO WORKING DAYS) PRIOR TO ANY EXCAVATION.
8. ALL SEWER MAINS SHALL BE FIELD STAKED FOR GRADES AND ALIGNMENT BY A LICENSED ENGINEERING OR SURVEYING FIRM QUALIFIED TO PERFORM SUCH WORK. STAKING SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION.
9. ALL PIPE AND SERVICES SHALL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12 INCHES TO 18 INCHES UNDER THE PROPOSED FINISHED SUBGRADE. THE MARKER SHALL BE PLASTIC NON-BIODEGRADABLE METAL CORE OR BACKING, MARKED "SEWER" THAT CAN BE DETECTED BY A STANDARD METAL DETECTOR. IF VISIBILITY CANNOT BE MAINTAINED BETWEEN STRUCTURES ALONG THE STRAIGHT ALIGNMENT OF A SEWER, TONING WIRE SHALL BE INSTALLED ABOVE THE SEWER LINE AT A DEPTH NO GREATER THAN 48 INCHES.
   - IF TONING WIRE IS REQUIRED, IT SHALL BE GREEN, UL LISTED, TYPE UF, 14-GAUGE COPPER TAPED TO THE TOP OF THE PIPE TO PREVENT MOVEMENT DURING BACKFILLING. THE WIRE SHALL BE LAID LOOSELY ENOUGH TO PREVENT STRETCHING AND DAMAGE. THE WIRE SHALL BE WRAPPED TO MANHOLE OR CLEANOUT RINGS ON GRAVITY SEWERS OR VALVE BODY ON STEP MAINS AND FORCE MAINS.
   - A 1-POUND MAGNESIUM ANODE SHALL BE BURIED WITH THE PIPE EVERY 1,000 LINEAR FEET MAXIMUM FOR CATHODIC PROTECTION OF THE WIRE. TONING WIRE SPLICES AND CONNECTIONS TO ANODES SHALL JOIN WIRES BOTH MECHANICALLY AND ELECTRICALLY AND SHALL EMPLOY EPOXY RESIN OR HEAT-SHRINK TAPE INSULATION. TONING WIRE SHALL BE TESTED PRIOR TO ACCEPTANCE OF THE PIPE SYSTEM. A WRITTEN NOTICE FROM THE CONTRACTOR TO THE CITY TWO DAYS PRIOR TO THE TEST IS REQUIRED. ON A CURVILINEAR SEWER, THE WIRE SHALL BE BROUGHT UP, BARED, AND WRAPPED THREE TIMES AROUND THE MANHOLE RING. TAPE SHALL BE TERRA TAPE "D" OR APPROVED EQUAL. THE TAPE AND WIRE SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.
10. BEDDING OF THE SEWER MAIN AND COMPACTION OF THE BACKFILL MATERIAL SHALL BE REQUIRED IN ACCORDANCE WITH THE ABOVE-MENTIONED SPECIFICATION (SEE GENERAL NOTE 1).
11. ALL MANHOLES OR CLEANOUTS OUTSIDE THE PAVED AREA SHALL BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWINGS 7-3 AND 7-5.
12. WHEN TEMPORARY STREET PATCHES ARE ALLOWED BY THE CITY, COLD MIX ASPHALT SHALL BE PLACED AND COMPACTED TO A MAXIMUM DEPTH OF 2 INCHES. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE AS REQUIRED BY THE CITY.
13. EROSION CONTROL MEASURES CONFORMING TO THE REQUIREMENTS OF THE DRAINAGE DESIGN AND EROSION CONTROL MANUAL FOR OLYMPIA SHALL BE TAKEN BY THE CONTRACTOR DURING CONSTRUCTION TO PREVENT INFILTRATION OF EXISTING AND PROPOSED STORM DRAINAGE FACILITIES AND ROADWAYS.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AS REQUIRED. PRIOR TO DISRUPTION OF ANY TRAFFIC, THE CITY SHALL APPROVE TRAFFIC CONTROL PLANS PREPARED AND SUBMITTED BY THE CONTRACTOR. NO WORK SHALL COMMENCE UNTIL ALL APPROVED TRAFFIC CONTROL IS IN PLACE.
15. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE A COPY OF THE APPROVED CONSTRUCTION PLANS ON SITE AT ALL TIMES.
16. ANY CHANGES TO THE DESIGN SHALL FIRST BE REVIEWED AND APPROVED BY THE DEVELOPER'S PROJECT ENGINEER AND THE CITY ENGINEER.
17. AFTER BACKFILLING, BUT PRIOR TO PAVING, ALL MAINS AND APPURTENANCES SHALL BE INSPECTED AND APPROVED BY THE CITY OF OLYMPIA CONSTRUCTION INSPECTOR. APPROVAL DOES NOT CONSTITUTE FINAL ACCEPTANCE OF THE SEWER LINE. THE CONTRACTOR SHALL RETAIN THE RESPONSIBILITY TO REPAIR ALL DEFICIENCIES AND FAILURES REVEALED DURING ALL REQUIRED TESTING FOR ACCEPTANCE AND THROUGH THE DURATION OF THE WARRANTY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE CITY OF OLYMPIA FOR THE REQUIRED INSPECTIONS. ANY MAIN OR APPURTENANCE BACKFILLED PRIOR TO INSPECTION SHALL BE RE-EXCAVATED FOR INSPECTION.
18. ALL SAFETY STANDARDS AND REQUIREMENTS SHALL BE COMPLIED WITH AS SET FORTH BY OSHA, WISHA AND WASHINGTON STATE DEPARTMENT OF LABOR AND INDUSTRIES.

GENERAL NOTES (WATERMAIN INSTALLATION)

1. ALL WORKMANSHIP AND MATERIAL WILL BE IN ACCORDANCE WITH THE CITY OF OLYMPIA ENGINEERING DESIGN AND DEVELOPMENT STANDARDS AND THE MOST CURRENT COPY OF THE STATE OF WASHINGTON STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION; DEPARTMENT OF HEALTH (DOH) REGULATIONS; AND AMERICAN WATER WORKS ASSOCIATION STANDARDS.
2. A PRECONSTRUCTION MEETING WILL BE HELD WITH THE CITY PRIOR TO THE START OF CONSTRUCTION.
3. WATER MAINS 2-INCH TO 10-INCH DIAMETER WILL BE DUCTILE IRON PIPE, CLASS 50, OR HDPE PIPE MEETING THE REQUIREMENTS OF AWWA CLASS 200, C901, AND C906. ALL WATER MAINS 12-INCH DIAMETER AND LARGER WILL BE DUCTILE IRON CEMENT MORTAR-LINED THICKENED, CLASS 50.
4. SYSTEM GATE VALVES WILL BE RESILIENT WEDGE, NRS (NON-RISING STEM), WITH O-RING SEALS. VALVE ENDS WILL BE MECHANICAL JOINT OR ANSI FLANGES. VALVES WILL CONFORM TO AWWA 509-80 OR AWWA C-515. VALVES WILL HAVE STAINLESS STEEL STEMS, BONNET BOLTS WILL NOT BE EXPOSED TO THE ENVIRONMENT AND WILL BE COVERED BY MANUFACTURER'S 10-YEAR WARRANTY.
5. FIRE HYDRANTS WILL BE DRESSER M&H RELIANT STYLE 929, CLOW MEDALLION, WATEROUS PACER 250, MUELLER CENTURION, OR AVK. HYDRANTS WILL BE BAGGED UNTIL SYSTEM IS APPROVED. HYDRANTS WILL BE PAINTED WITH PARKER PAINT MARATHON ENAMEL SAFETY YELLOW PAINT OR EQUAL. ALL CHAINS BETWEEN CAPS AND HYDRANTS SHALL BE CUT AND REMOVED.
6. ALL LINES WILL BE CHLORINATED AND TESTED IN CONFORMANCE WITH THE ABOVEREFERENCED SPECIFICATION (NOTE 1).
7. ALL PIPE AND SERVICES WILL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12 INCHES TO 18 INCHES UNDER THE FINAL GROUND SURFACE. THE MARKER WILL BE PLASTIC NON-BIODEGRADABLE, METAL CORE, OR BACKING MARKED WATER, WHICH CAN BE DETECTED BY A STANDARD METAL DETECTOR. TAPE WILL BE TERRA TAPE D OR APPROVED EQUAL. IN ADDITION TO THE TRACER TAPE, BLUE TONING (TRACER) WIRE WILL BE INSTALLED OVER ALL PIPE AND SERVICES. TONING WIRE WILL BE UL LISTED, TYPE UF, 14-GAUGE COATED COPPER TAPED TO THE TOP OF THE PIPE TO PREVENT STRETCHING AND DAMAGE. THE WIRE WILL BE BROUGHT UP AND TIED OFF AT VALVE BODY OR METER SETTER WITH THE END OF THE WIRE ACCESSIBLE TO HOOK UP TO A LOCATOR (2 FEET OF SLACK).

   A 1-POUND MAGNESIUM ANODE WILL BE BURIED WITH THE WIRE AND EVERY 1,000 LINEAR FEET THEREAFTER FOR CATHODIC PROTECTION OF THE TONING WIRE. ALL TONING WIRE SPLICES AND CONNECTIONS WILL JOIN WIRES BOTH MECHANICALLY AND ELECTRICALLY AND WILL EMPLOY EPOXY RESIN OR HEAT-SHRINK TAPE INSULATION. TONING WIRE WILL BE TESTED PRIOR TO ACCEPTANCE OF THE PIPE SYSTEM. A WRITTEN NOTICE FROM THE CONTRACTOR TO THE CITY TWO DAYS PRIOR TO THE TEST IS REQUIRED.
9. THE CONTRACTOR WILL PROVIDE TRAFFIC CONTROL PLAN(S) AS REQUIRED IN ACCORDANCE WITH MUTCD.
10. ALL WATER MAINS WILL BE STAKED FOR GRADES AND ALIGNMENT BY AN ENGINEERING OR SURVEYING FIRM CAPABLE OF PERFORMING SUCH WORK. STAKING WILL BE MAINTAINED THROUGHOUT CONSTRUCTION.
11. ALL WATER SYSTEM CONNECTIONS TO SERVE BUILDINGS OR PROPERTIES WITH DOMESTIC POTABLE WATER, FIRE SPRINKLER SYSTEMS, OR IRRIGATION SYSTEMS WILL COMPLY WITH THE MINIMUM BACKFLOW PREVENTION REQUIREMENTS AS ESTABLISHED BY THE DOH AND THE CITY OF OLYMPIA IN ITS CROSS CONNECTION PROGRAM.
12. CALL UNDERGROUND LOCATE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATIONS.
13. THE CITY WILL BE GIVEN 10 WORKING DAYS' NOTICE PRIOR TO SCHEDULING A SHUTDOWN. THE CITY OF OLYMPIA DRINKING WATER OPERATIONS OR CITY INSPECTOR WILL PERFORM THE SHUTDOWN. WHERE ONNECTIONS REQUIRE "FIELD VERIFICATION," CONNECTION POINTS WILL BE EXPOSED BY THE CONTRACTOR AND FITTINGS VERIFIED TWO WORKING DAYS PRIOR TO SCHEDULING CITY CREWS TO DISTRIBUTE SHUTDOWN NOTICES. THE CITY WILL NOTIFY CUSTOMERS INVOLVED OR AFFECTED OF THE WATER SERVICE INTERRUPTION 48 HOURS IN ADVANCE.
14. AT ANY CONNECTION TO AN EXISTING LINE WHERE A NEW VALVE IS NOT INSTALLED, THE EXISTING VALVE MUST BE PRESSURE TESTED TO CITY STANDARDS BY THE CONTRACTOR PRIOR TO CONNECTION. IF AN EXISTING VALVE FAILS TO PASS THE TEST, THE CONTRACTOR WILL MAKE THE NECESSARY PROVISIONS TO TEST THE NEW LINE PRIOR TO CONNECTION TO THE EXISTING SYSTEM OR INSTALL A NEW VALVE.
15. AT ANY WATER MAIN TAP TO EXISTING CITY MAINS WHERE THE CONTRACTOR ENCOUNTERS A COUPLING OR EXISTING ASSEMBLIES, THE CONTRACTOR WILL PROVIDE A MINIMUM OF 18 INCHES OF CLEARANCE FROM COUPLING OR ASSEMBLIES TO EDGE OF TAPPING SLEEVE.
16. ANY WATER MAIN TAP OR CONNECTION WILL BE BLOCKED ACCORDING TO STANDARD PLAN 6-14.
17. ANY EXCAVATION THAT EXPOSES AN ASBESTOS CEMENT WATER MAIN SHALL BE BEDDED WITH CONTROLLED DENSITY FILL (CDF) PURSUANT TO THE WSDOT SPECIFICATIONS FOR CDF.

GRAVITY SEWER NOTES:

1. GRAVITY SEWER MAINS WILL MEET THE FOLLOWING: PVC PIPE CONFORMING TO ASTM P 3034 SDR 35, ASTM F 794, OR ASTM F 679 TYPE 1 WITH JOINTS AND GASKETS CONFORMING TO ASTM 3212 AND ASTM F 477.
2. PRECAST MANHOLES WILL MEET THE REQUIREMENTS OF ASTM C 478. MANHOLES WILL BE TYPE 1-48" UNLESS OTHERWISE SPECIFIED ON THE PLANS. JOINTS WILL BE RUBBER GASKETED CONFORMING TO ASTM C 443 AND WILL BE GROUTED FROM THE INSIDE. LIFT HOLES WILL BE GROUTED FROM THE OUTSIDE AND INSIDE OF THE MANHOLE. (SEE GENERAL NOTE 1.)
3. SIDE SEWER SERVICES WILL BE PVC, ASTM D 3034 SDR 35 WITH FLEXIBLE GASKETED JOINTS. SIDE SEWER CONNECTIONS WILL BE MADE BY A TAP TO AN EXISTING MAIN OR A WYE BRANCH FROM A NEW MAIN CONNECTED ABOVE THE SPRINGLINE OF THE PIPE. SIDE SEWER SERVICES WILL BE INSTALLED ACCORDING TO APPLICABLE STANDARD DETAIL(S).
4. ALL LINES WILL BE HIGH VELOCITY CLEANED AND SUBJECTED TO A LOW PRESSURE AIR TEST PER CURRENT WSDOT/APWA SPECIFICATIONS AFTER BACKFILLING, BUT PRIOR TO PAVING (SEE GENERAL NOTE 1). HYDRANT FLUSHING OF LINES IS NOT AN ACCEPTABLE CLEANING METHOD. TESTING OF THE SANITARY SEWER MAIN WILL INCLUDE TELEVISION INSPECTING OF THE MAIN BY AND AT THE EXPENSE OF THE CITY. IMMEDIATELY PRIOR TO TELEVISION INSPECTING, ENOUGH WATER WILL BE RUN DOWN THE LINE SO IT COMES OUT THE LOWER MANHOLE AND THE LINE IS FLUSHED CLEAN. ACCEPTANCE OF THE LINE WILL BE MADE AFTER THE TELEVISION INSPECTION TAPE HAS BEEN REVIEWED AND APPROVED BY THE INSPECTOR. ADDITIONAL TELEVISION INSPECTIONS WILL BE AT THE EXPENSE OF THE CONTRACTOR, OR THE CONTRACTOR MAY ELECT TO PERFORM THE TELEVISION INSPECTION UNDER THE DIRECT SUPERVISION OF THE CITY. A TEST OF ALL MANHOLES IN ACCORDANCE WITH OLYMPIA STANDARD IS ALSO REQUIRED. TESTING WILL TAKE PLACE AFTER ALL UNDERGROUND UTILITIES ARE INSTALLED AND COMPACTION OF THE ROADWAY SUBGRADE IS COMPLETED.

NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

TOPOGRAPHIC NOTE:
THE EXISTING TOPOGRAPHIC DATA SHOWN ON THESE DRAWINGS HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, HGP CANNOT ENSURE ITS ACCURACY AND THUS IS NOT RESPONSIBLE FOR THE ACCURACY OF THAT INFORMATION OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

THIS DRAWING DOES NOT REPRESENT A RECORD DOCUMENT, UNLESS CERTIFIED BY HATTON GODAT PANTIER.

ANY ALTERATIONS TO THE DESIGN SHOWN HEREON MUST BE REVIEWED AND APPROVED BY HATTON GODAT PANTIER.

HATTON GODAT PANTIER

CITY OF LACEY

VERTICAL DATUM	MERIDIAN HORIZONTAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1083 FOUND CASED MONUMENT AT THE INTERSECTION OF CALLISON ROAD AND BRITTON PARKWAY ELEVATION = 216.42	CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111152 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°36'41" WEST

GENERAL NOTES (STREET LIGHT CONSTRUCTION)

1. ALL WORKMANSHIP, MATERIALS AND TESTING SHALL BE IN ACCORDANCE WITH THE MOST CURRENT WSDOT/APWA STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION, NATIONAL ELECTRICAL CODE AND CITY OF LACEY DEVELOPMENT GUIDELINES UNLESS OTHERWISE SPECIFIED BELOW. IN CASES OF CONFLICT THE MOST STRINGENT STANDARD SHALL APPLY. WHEN THE MOST STRINGENT STANDARD IS NOT CLEAR, THE CITY ENGINEER WILL MAKE THE DETERMINATION. THE ELECTRICAL CONTRACTOR SHALL BE FAMILIAR WITH ALL ABOVE STATED PUBLICATIONS AND GUIDELINES AS THEY WILL BE STRICTLY ENFORCED BY THE CITY.
2. THE CONTRACTOR SHALL BE IN COMPLIANCE WITH ALL SAFETY STANDARDS AND REQUIREMENTS AS SET FORTH BY OSHA, WISHA AND THE STATE OF WASHINGTON, DEPARTMENT OF LABOR AND INDUSTRIES.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL IN ACCORDANCE WITH THE WSDOT/APWA STANDARD PLANS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION (ALL APPLICABLE "K" PLANS) AND/OR THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). PRIOR TO DISRUPTION OF ANY TRAFFIC, A TRAFFIC CONTROL PLAN SHALL BE PREPARED AND SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL. NO WORK SHALL COMMENCE UNTIL ALL APPROVED TRAFFIC CONTROL IS IN PLACE.
4. ALL APPROVALS AND PERMITS REQUIRED BY THE CITY OF LACEY SHALL BE OBTAINED BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.
5. IF CONSTRUCTION IS TO TAKE PLACE IN THE COUNTY RIGHT-OF-WAY, THE CONTRACTOR SHALL NOTIFY THE COUNTY AND OBTAIN ALL THE REQUIRED APPROVALS AND PERMITS.
6. ELECTRICAL PERMITS AND INSPECTIONS ARE REQUIRED FOR ALL STREET LIGHTING INSTALLATIONS. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING SAID PERMITS PRIOR TO ANY TYPE OF ACTUAL CONSTRUCTION.
7. A PRE-CONSTRUCTION MEETING SHALL BE HELD WITH THE CITY OF LACEY CONSTRUCTION AND ELECTRICAL INSPECTORS PRIOR TO THE START OF CONSTRUCTION.
8. PRIOR TO INSTALLATION OF ANY MATERIALS THE ELECTRICAL CONTRACTOR SHALL SUBMIT FOR APPROVAL BY THE CITY THREE COPIES OF MATERIAL CATALOG CUTS, SPECIFICATIONS, SHOP DRAWINGS AND/OR WIRING DIAGRAMS. ANY MATERIALS PURCHASED OR LABOR PERFORMED PRIOR TO SUCH APPROVAL SHALL BE AT THE CONTRACTOR'S RISK. MOUNTING HEIGHTS, ARM LENGTH, POWER SOURCE, LUMINAIRE TYPE AND BOLT PATTERNS SHALL FOLLOW CITY OF LACEY DEVELOPMENT GUIDELINES CHAPTER 4E.020. MODIFICATIONS OF ANY PORTION OF THE LIGHTING SYSTEM WILL NOT BE ALLOWED WITHOUT PRIOR APPROVAL BY THE CITY. SUBMITTALS SHALL INCLUDE PROJECT NAME, NAME OF ELECTRICAL CONTRACTOR, DATE AND VENDOR NAME.
9. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE A COPY OF AN APPROVED SET OF PLANS ON THE CONSTRUCTION SITE AT ALL TIMES.
10. ALL SURVEYING AND STAKING SHALL BE PERFORMED PER THE CORRESPONDING CHAPTER OF THE CITY OF LACEY DEVELOPMENT GUIDELINES AND PUBLIC WORKS STANDARDS.
11. TEMPORARY EROSION CONTROL/WATER POLLUTION MEASURES SHALL BE REQUIRED IN ACCORDANCE WITH SECTION 1-07.15 OF THE WSDOT/APWA STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION AND THE DRAINAGE DESIGN AND EROSION CONTROL MANUAL FOR LACEY. AT NO TIME WILL SILTS AND DEBRIS BE ALLOWED TO DRAIN INTO AN EXISTING OR NEWLY INSTALLED FACILITY UNLESS SPECIAL PROVISIONS HAVE BEEN DESIGNED.
12. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION. THE CONTRACTOR WILL ALSO BE RESPONSIBLE FOR MAINTAINING ALL LOCATE MARKS ONCE THE UTILITIES HAVE BEEN LOCATED.
13. A 500 VOLT MEGGER TEST WILL BE PERFORMED BY THE CITY ON EACH CIRCUIT BETWEEN CONDUCTOR AND GROUND PRIOR TO ACCEPTANCE OF THE LIGHTING SYSTEM. THE INSULATION RESISTANCE SHALL NOT BE LESS THAN 6 MEGAOHMS TO GROUND FOR RUNS OVER 2,500 FEET NOR LESS THAN 8 MEGAOHMS FOR RUNS UNDER 2,500 FEET. A FUNCTIONAL TEST WILL BE PERFORMED BY THE CITY IN WHICH IT IS DEMONSTRATED THAT EACH AND EVERY PART OF THE SYSTEM FUNCTIONS AS SPECIFIED OR INTENDED HEREIN. (WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION 8-20.3(11).
14. ALL LIGHTING POLES SHALL BE AS SPECIFIED IN CHAPTER 4E.020 OF THE DEVELOPMENT GUIDELINES. THE SONOTUBE FORM SHALL BE REMOVED TO BELOW GROUND LEVEL. POLE BASES SHALL BE GROUTED AND ALL LUMINAIRE HEADS SHALL BE PLUMB AND LEVEL.
15. CEMENT CONCRETE BASES SHALL FOLLOW CITY OF LACEY DEVELOPMENT GUIDELINES LUMINAIRE FOUNDATION DETAIL.
16. ANY MODIFICATION TO APPROVED LIGHTING PLANS SHALL BE REVIEWED AND APPROVED BY THE CITY PRIOR TO INSTALLATION. ANY APPROVED MODIFICATIONS SHALL BE SHOWN ON A MYLAR ASBUILT SUPPLIED TO THE CITY AFTER THE LIGHTING INSTALLATION IS COMPLETED AND BEFORE FINAL ACCEPTANCE. IT SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO ENSURE THESE AS-BUILTS ARE PROVIDED TO THE CITY.
17. PRIVATE UTILITIES REQUIRE A 10 FOOT "CLEAR ZONE" FROM THE STREET LIGHT TO THE PRIVATE UTILITY LOCATED ABOVE GROUND ON PRIVATE UTILITY POLES. THE "CLEAR ZONE" SEPARATION SHALL BE INCORPORATED INTO THE STREET LIGHTING DESIGN TO ASSURE THE REQUIRED SEPARATION IS PROVIDED.
18. A MAXIMUM OF THREE CIRCUITS SHALL BE ASSOCIATED PER CONDUIT. ALSO, A MAXIMUM OF SEVEN (7) #8 CONDUCTORS OR FIVE (5) #4 CONDUCTORS SHALL BE PERMITTED IN A 2 INCH CONDUIT. ADDITIONAL CONDUITS WILL BE REQUIRED FOR ADDITIONAL CONDUCTORS OVER THIS STANDARD. THE 2 INCH SPARE CONDUIT SHALL NOT BE UTILIZED FOR THIS APPLICATION IT IS RESERVED FOR CITY COMMUNICATIONS.
19. ON ROADS CLASSIFIED AS ARTERIALS, BOULEVARDS OR COLLECTORS, THE STREET LIGHTING SHALL BE SEPARATED INTO TWO CIRCUITS. THERE SHALL BE A SEPARATE CIRCUIT FOR THE RIGHT AND LEFT SIDE OF THE ROAD.

REVISED: 09/2009

11803340100, 11803430000, 11810103000

GATEWAY DIVISION 1

PRELIMINARY PLAT

PRELIMINARY UTILITY DETAILS

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTHWEST HALF OF THE SOUTH EAST QUARTER OF SECTION 3 AND A PORTION OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M.

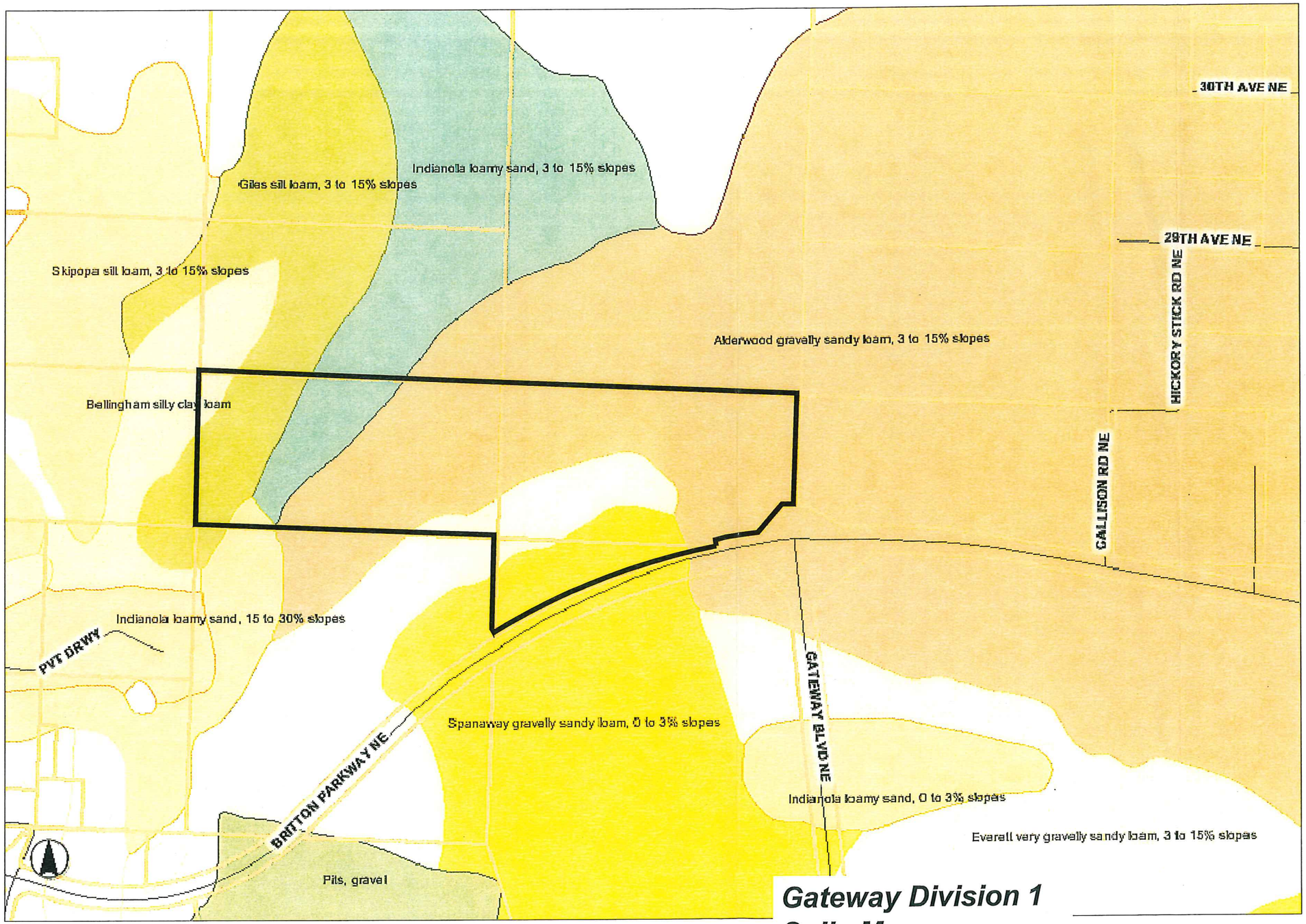
DESIGNED BY: DS
DRAWN BY: MM
CHECKED BY: SDH
DATE: FEB 2013
SCALE: H ___ V ___

STEVEN D. HATTON — STATE OF WASHINGTON — 24193 — REGISTERED PROFESSIONAL ENGINEER

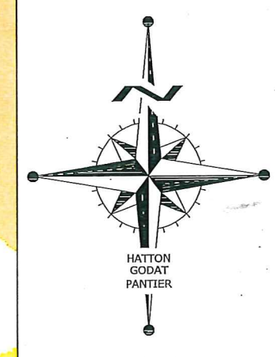
HATTON GODAT PANTIER
ENGINEERS AND SURVEYORS
3910 MARTIN WAY E, SUITE B
OLYMPIA, WA 98506
TEL: 360.943.1599 FAX: 360.357.6299
hattonpantier.com

REVISIONS: DATE:

AGENCY NO. ___
SHEET: 7 OF 7
INDEX: (12-000/12-052/Preliminary Plat) 12-052pre-det.dwg
JOB: 12-052

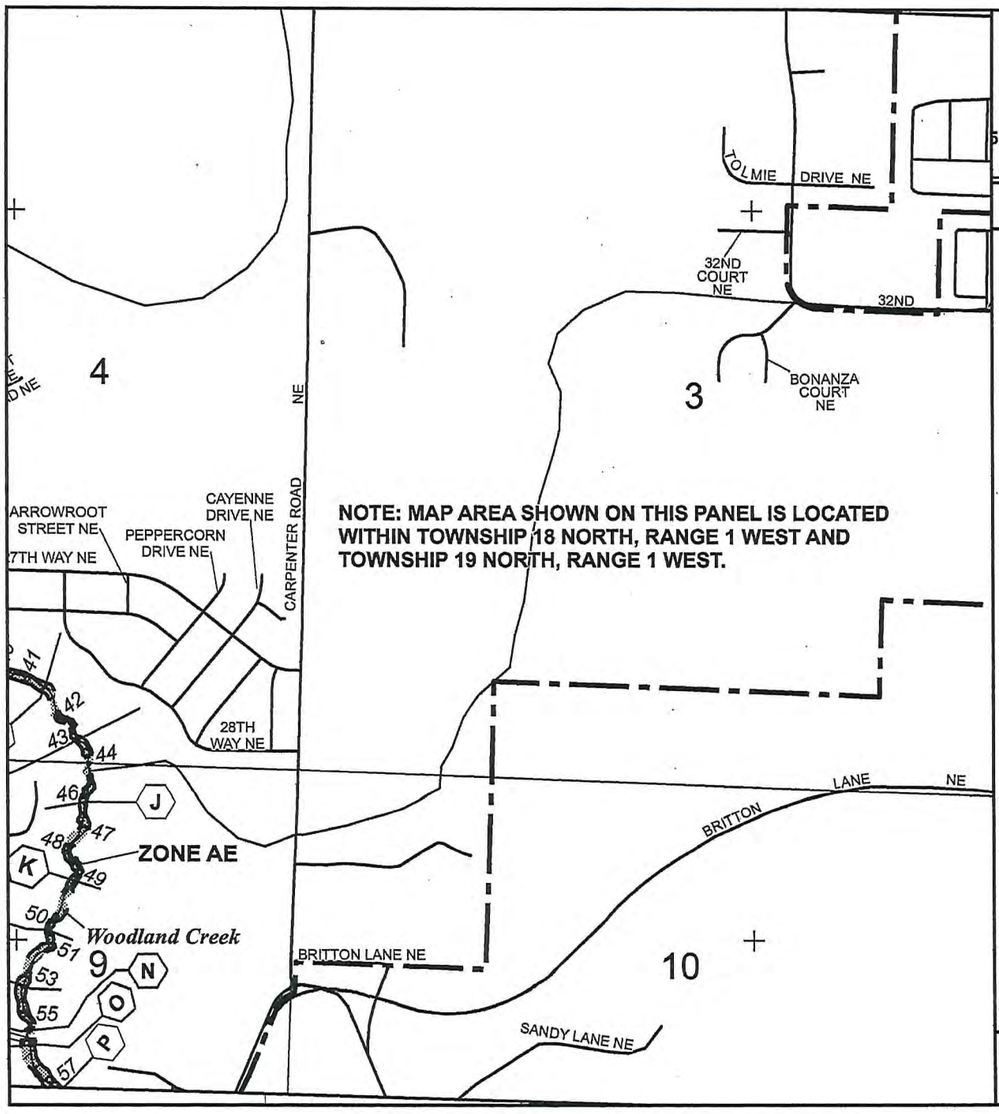


Gateway Division 1
Soils Map



N.T.S.

APPENDIX 3 – Design Calculations



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0185E

FIRM

FLOOD INSURANCE RATE MAP

THURSTON COUNTY, WASHINGTON

AND INCORPORATED AREAS

PANEL 185 OF 625

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LACEY, CITY OF	530190	0185	E
THURSTON COUNTY	530188	0185	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
53067C0185E

EFFECTIVE DATE
OCTOBER 16, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

TON
DAT
NTIER
TON COUNTY
LACEY
36'
36'
M 01°16'30" W
4697.99
S
ROADWAY A
(MAJOR COLLECTOR)
TRACT 'D'
WETLAND BUFFER
100'
N 01°30'05" E
663.01
THURSTON COUNTY
CITY OF LACEY
STORM
230
TRACT 'C'
80
90
100
110
120
5
DRAW 200 CUT
BY 200 FROM
AND PUSHED
L2
C4
W
SS
CATEWAY BOULEVARD

Gateway Division1

Drainage Calculation - Div one only

Area	Total Area (sq ft)	Total Acreage	Total SF Roof Tops	Total TH Roof Tops	Infiltrated Roof Tops	Alley Length	50' R/W Length	54' R/W Length	Roadway A Length	Roadway C Length	Impervious Roadway Area		Driveway Area SF	Driveway Area ac	Roof Area SF	Roof Area ac	infiltrated roofs ac	Net Impervious	Net Pervious	Net Acreage	Percent Impervious	Total Impervious	Total Pervious
A	161,429	4	14				550				20,900	0	4,480	0	28,000	1	0	1.23	2.48	3.71	33.1%	1.23	2.48
B	42,695	0.98	5								0	0.00	1,600	0.04	10,000	0.23	0.00	0.27	0.71	0.98	27.2%	0.27	0.71
C	348,375	8.00	16				325	600		840	37,550	0.86	5,120	0.12	32,000	0.73	0.00	1.71	6.28	8.00	21.4%	1.71	6.28
pond water surface	59,081	1.36									0	0.00	0	0.00	0	0.00	0.00	1.36	0.00	1.36	100.0%	0.00	1.36
pond side slopes	72,196	1.66									0	0.00	0	0.00	0	0.00	0.00	0.00	1.66	1.66	0.0%	0.00	1.66
total contributing area	683,776	15.70	35	0	0	0	875	600	0	840	58,450	1.34	11,200	0.26	70,000	1.61	0.00	4.56	11.14	15.70	29%	3.21	12.49
future	638,765	14.66					set to 30% impervious											4.40	10.26	14.66	30.0%		
D	884,319	20.30		34			510		440	930	38,740	0.89	10,880	0.25	40,800	0.94	0.00	2.08	18.23	20.30	10.2%	2.08	18.23
pond water surface	65668	1.51										0.00		0.00		0.00		1.51	0.00	1.51	100%	1.51	0.00
Sub Total	1,588,752	36.47	0	34	0	0	510	0	440	930	38,740	0.89	10,880	0.25	40,800	0.94	0.00	7.98	28.49	36.47	21.9%	3.58	18.23

Total Acres = Mapped sub-basin
Impervious Area = Non-infiltrate Roof Area + Measured Road Area + Driveways
Pervious Acres = Total Acres - Roof Area - Impervious Area

Assumed SF Roof Area =	2000	sf
Assumed TH Roof Area =	1200	sf
Assumed Driveway Area =	320	sf

Road Sections:	Pvmt Width	Sidewalk	Planter	Swale	R/W Width	% Impervious
Road Way A	32	12	16	0	72	61.1%

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	volumes infil.12.052a
Site Name:	Tract A - infitration Pnd
Site Address:	
City:	
Report Date:	8/13/2013
Gage:	Fairgrounds (Kaiser)
Data Start:	1955/10/01
Data End:	2011/09/30
Timestep:	15 Minute
Precip Scale:	1.00
Version:	2013/06/26

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Forest, Flat	36.47
Pervious Total	36.47
Impervious Land Use	Acres
Impervious Total	0
Basin Total	36.47

Includes On-site AND Possible Future

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Forest, Flat	11.2
C, Lawn, Flat	7.03
Pervious Total	18.23
Impervious Land Use	Acres
ROADS FLAT	2.07
POND	1.51
Impervious Total	3.58
Basin Total	21.81

ON-SITE Developed AREAS

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Basin 2

Bypass:	No
GroundWater:	No

Pervious Land Use	Acres
C, Lawn, Flat	10.26
Pervious Total	10.26

Impervious Land Use	Acres
ROADS FLAT	4.4
Impervious Total	4.4
Basin Total	14.66

Future Development from North
w/ Estimated 30% Impervious

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Mitigated Routing

Trapezoidal Pond 1

Bottom Length:	35.23 ft.
Bottom Width:	927.11 ft.
Depth:	8 ft.
Volume at riser head:	8.6291 acre-ft.
Infiltration On	
Infiltration rate:	4.25
Infiltration safety factor:	1
Side slope 1:	3 To 1
Side slope 2:	3 To 1
Side slope 3:	3 To 1
Side slope 4:	3 To 1
Discharge Structure	
Riser Height:	7 ft.
Riser Diameter:	24 in.
Element Flows To:	
Outlet 1	Outlet 2

32,662 SF Bottom Area Smaller than Pond Shown on Plans

Infiltration Based on GRADATION

Pond Hydraulic Table

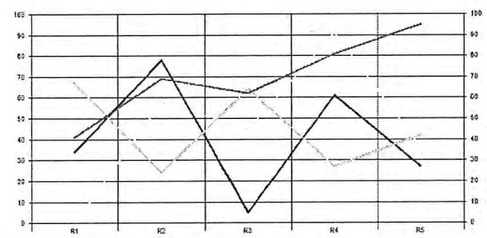
Stage(ft)	Area(ac)	Volume(ac-ft)	Discharge(cfs)	Infilt(cfs)
0.0000	0.749	0.000	0.000	0.000
0.0889	0.761	0.067	0.000	3.213
0.1778	0.773	0.135	0.000	3.213
0.2667	0.785	0.204	0.000	3.213
0.3556	0.797	0.275	0.000	3.213
0.4444	0.808	0.346	0.000	3.213
0.5333	0.820	0.418	0.000	3.213
0.6222	0.832	0.492	0.000	3.213
0.7111	0.844	0.566	0.000	3.213
0.8000	0.856	0.642	0.000	3.213
0.8889	0.868	0.719	0.000	3.213
0.9778	0.880	0.796	0.000	3.213
1.0667	0.892	0.875	0.000	3.213
1.1556	0.904	0.955	0.000	3.213
1.2444	0.916	1.036	0.000	3.213
1.3333	0.928	1.118	0.000	3.213
1.4222	0.940	1.201	0.000	3.213
1.5111	0.952	1.285	0.000	3.213
1.6000	0.964	1.370	0.000	3.213
1.6889	0.976	1.456	0.000	3.213
1.7778	0.988	1.544	0.000	3.213
1.8667	1.000	1.632	0.000	3.213
1.9556	1.012	1.721	0.000	3.213
2.0444	1.024	1.812	0.000	3.213
2.1333	1.036	1.903	0.000	3.213
2.2222	1.048	1.996	0.000	3.213
2.3111	1.060	2.090	0.000	3.213
2.4000	1.072	2.185	0.000	3.213
2.4889	1.084	2.281	0.000	3.213
2.5778	1.097	2.378	0.000	3.213
2.6667	1.109	2.476	0.000	3.213
2.7556	1.121	2.575	0.000	3.213
2.8444	1.133	2.675	0.000	3.213

2.9333	1.145	2.776	0.000	3.213
3.0222	1.158	2.879	0.000	3.213
3.1111	1.170	2.982	0.000	3.213
3.2000	1.182	3.087	0.000	3.213
3.2889	1.194	3.192	0.000	3.213
3.3778	1.207	3.299	0.000	3.213
3.4667	1.219	3.407	0.000	3.213
3.5556	1.231	3.516	0.000	3.213
3.6444	1.243	3.626	0.000	3.213
3.7333	1.256	3.737	0.000	3.213
3.8222	1.268	3.849	0.000	3.213
3.9111	1.280	3.963	0.000	3.213
4.0000	1.293	4.077	0.000	3.213
4.0889	1.305	4.192	0.000	3.213
4.1778	1.318	4.309	0.000	3.213
4.2667	1.330	4.427	0.000	3.213
4.3556	1.342	4.546	0.000	3.213
4.4444	1.355	4.665	0.000	3.213
4.5333	1.367	4.787	0.000	3.213
4.6222	1.380	4.909	0.000	3.213
4.7111	1.392	5.032	0.000	3.213
4.8000	1.405	5.156	0.000	3.213
4.8889	1.417	5.282	0.000	3.213
4.9778	1.430	5.408	0.000	3.213
5.0667	1.442	5.536	0.000	3.213
5.1556	1.455	5.665	0.000	3.213
5.2444	1.467	5.795	0.000	3.213
5.3333	1.480	5.926	0.000	3.213
5.4222	1.492	6.058	0.000	3.213
5.5111	1.505	6.191	0.000	3.213
5.6000	1.518	6.325	0.000	3.213
5.6889	1.530	6.461	0.000	3.213
5.7778	1.543	6.598	0.000	3.213
5.8667	1.555	6.735	0.000	3.213
5.9556	1.568	6.874	0.000	3.213
6.0444	1.581	7.014	0.000	3.213
6.1333	1.593	7.155	0.000	3.213
6.2222	1.606	7.298	0.000	3.213
6.3111	1.619	7.441	0.000	3.213
6.4000	1.632	7.585	0.000	3.213
6.4889	1.644	7.731	0.000	3.213
6.5778	1.657	7.878	0.000	3.213
6.6667	1.670	8.026	0.000	3.213
6.7556	1.683	8.175	0.000	3.213
6.8444	1.695	8.325	0.000	3.213
6.9333	1.708	8.476	0.000	3.213
7.0222	1.721	8.629	0.064	3.213
7.1111	1.734	8.782	0.721	3.213
7.2000	1.747	8.937	1.742	3.213
7.2889	1.759	9.093	3.024	3.213
7.3778	1.772	9.250	4.522	3.213
7.4667	1.785	9.408	6.209	3.213
7.5556	1.798	9.567	8.065	3.213
7.6444	1.811	9.728	10.07	3.213
7.7333	1.824	9.889	12.23	3.213
7.8222	1.837	10.05	14.52	3.213
7.9111	1.850	10.21	16.94	3.213
8.0000	1.863	10.38	19.47	3.213

8.0889	1.876	10.54	22.13	3.213

Analysis Results

POC 1



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 36.47
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 28.49
Total Impervious Area: 7.98

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	1.094869
5 year	1.973252
10 year	2.790767
25 year	4.163383
50 year	5.48363
100 year	7.107422

← Existing Flow RATES

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

← 100% Infiltration

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	1.390	0.000
1957	2.431	0.000
1958	0.602	0.000
1959	0.898	0.000
1960	1.374	0.000
1961	0.996	0.000
1962	0.409	0.000
1963	3.141	0.000
1964	1.042	0.000
1965	1.054	0.000

1966	0.582	0.000
1967	1.079	0.000
1968	0.833	0.000
1969	0.548	0.000
1970	0.913	0.000
1971	1.189	0.000
1972	1.675	0.000
1973	1.015	0.000
1974	0.683	0.000
1975	0.763	0.000
1976	1.312	0.000
1977	0.508	0.000
1978	1.523	0.000
1979	0.906	0.000
1980	1.491	0.000
1981	1.555	0.000
1982	1.566	0.000
1983	1.624	0.000
1984	1.087	0.000
1985	0.464	0.000
1986	1.773	0.000
1987	1.433	0.000
1988	0.744	0.000
1989	0.805	0.000
1990	2.027	0.000
1991	4.558	0.000
1992	12.300	0.000
1993	1.356	0.000
1994	0.599	0.000
1995	1.352	0.000
1996	1.962	0.000
1997	5.887	0.000
1998	2.649	0.000
1999	1.092	0.000
2000	0.618	0.000
2001	0.223	0.000
2002	1.162	0.000
2003	0.838	0.000
2004	1.530	0.000
2005	0.588	0.000
2006	1.028	0.000
2007	0.852	0.000
2008	1.258	0.000
2009	1.791	0.000
2010	1.500	0.000
2011	1.017	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	12.3004	0.0000
2	5.8865	0.0000
3	4.5584	0.0000
4	3.1414	0.0000
5	2.6494	0.0000
6	2.4310	0.0000
7	2.0269	0.0000
8	1.9621	0.0000

9	1.7911	0.0000
10	1.7733	0.0000
11	1.6751	0.0000
12	1.6243	0.0000
13	1.5663	0.0000
14	1.5550	0.0000
15	1.5303	0.0000
16	1.5229	0.0000
17	1.4996	0.0000
18	1.4911	0.0000
19	1.4333	0.0000
20	1.3901	0.0000
21	1.3742	0.0000
22	1.3565	0.0000
23	1.3522	0.0000
24	1.3121	0.0000
25	1.2582	0.0000
26	1.1891	0.0000
27	1.1621	0.0000
28	1.0920	0.0000
29	1.0872	0.0000
30	1.0794	0.0000
31	1.0540	0.0000
32	1.0415	0.0000
33	1.0280	0.0000
34	1.0171	0.0000
35	1.0145	0.0000
36	0.9961	0.0000
37	0.9129	0.0000
38	0.9058	0.0000
39	0.8979	0.0000
40	0.8515	0.0000
41	0.8376	0.0000
42	0.8330	0.0000
43	0.8048	0.0000
44	0.7633	0.0000
45	0.7440	0.0000
46	0.6835	0.0000
47	0.6176	0.0000
48	0.6022	0.0000
49	0.5986	0.0000
50	0.5885	0.0000
51	0.5820	0.0000
52	0.5478	0.0000
53	0.5078	0.0000
54	0.4643	0.0000
55	0.4094	0.0000
56	0.2233	0.0000

Duration Flows
The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.5474	17340	0	0	Pass
0.5973	13725	0	0	Pass
0.6472	10884	0	0	Pass
0.6970	8809	0	0	Pass
0.7469	7198	0	0	Pass
0.7967	5859	0	0	Pass
0.8466	4793	0	0	Pass
0.8965	3900	0	0	Pass
0.9463	3275	0	0	Pass
0.9962	2741	0	0	Pass
1.0460	2309	0	0	Pass
1.0959	1912	0	0	Pass
1.1458	1625	0	0	Pass
1.1956	1359	0	0	Pass
1.2455	1176	0	0	Pass
1.2953	1012	0	0	Pass
1.3452	859	0	0	Pass
1.3951	766	0	0	Pass
1.4449	667	0	0	Pass
1.4948	600	0	0	Pass
1.5446	522	0	0	Pass
1.5945	451	0	0	Pass
1.6444	395	0	0	Pass
1.6942	346	0	0	Pass
1.7441	296	0	0	Pass
1.7939	261	0	0	Pass
1.8438	236	0	0	Pass
1.8937	211	0	0	Pass
1.9435	190	0	0	Pass
1.9934	158	0	0	Pass
2.0433	146	0	0	Pass
2.0931	142	0	0	Pass
2.1430	139	0	0	Pass
2.1928	136	0	0	Pass
2.2427	133	0	0	Pass
2.2926	130	0	0	Pass
2.3424	126	0	0	Pass
2.3923	120	0	0	Pass
2.4421	115	0	0	Pass
2.4920	111	0	0	Pass
2.5419	107	0	0	Pass
2.5917	105	0	0	Pass
2.6416	101	0	0	Pass
2.6914	97	0	0	Pass
2.7413	95	0	0	Pass
2.7912	91	0	0	Pass
2.8410	87	0	0	Pass
2.8909	83	0	0	Pass
2.9407	81	0	0	Pass
2.9906	76	0	0	Pass
3.0405	66	0	0	Pass
3.0903	60	0	0	Pass
3.1402	54	0	0	Pass

3.1900	38	0	0	Pass
3.2399	26	0	0	Pass
3.2898	18	0	0	Pass
3.3396	16	0	0	Pass
3.3895	13	0	0	Pass
3.4393	13	0	0	Pass
3.4892	13	0	0	Pass
3.5391	13	0	0	Pass
3.5889	13	0	0	Pass
3.6388	13	0	0	Pass
3.6886	12	0	0	Pass
3.7385	12	0	0	Pass
3.7884	11	0	0	Pass
3.8382	11	0	0	Pass
3.8881	10	0	0	Pass
3.9380	10	0	0	Pass
3.9878	10	0	0	Pass
4.0377	10	0	0	Pass
4.0875	10	0	0	Pass
4.1374	9	0	0	Pass
4.1873	9	0	0	Pass
4.2371	9	0	0	Pass
4.2870	8	0	0	Pass
4.3368	8	0	0	Pass
4.3867	8	0	0	Pass
4.4366	8	0	0	Pass
4.4864	8	0	0	Pass
4.5363	8	0	0	Pass
4.5861	7	0	0	Pass
4.6360	7	0	0	Pass
4.6859	6	0	0	Pass
4.7357	6	0	0	Pass
4.7856	6	0	0	Pass
4.8354	6	0	0	Pass
4.8853	6	0	0	Pass
4.9352	6	0	0	Pass
4.9850	6	0	0	Pass
5.0349	6	0	0	Pass
5.0847	6	0	0	Pass
5.1346	6	0	0	Pass
5.1845	6	0	0	Pass
5.2343	6	0	0	Pass
5.2842	6	0	0	Pass
5.3340	6	0	0	Pass
5.3839	6	0	0	Pass
5.4338	6	0	0	Pass
5.4836	6	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	2.3529 acre-feet
On-line facility target flow:	1.279 cfs.
Adjusted for 15 min:	1.279 cfs.
Off-line facility target flow:	0.7215 cfs.
Adjusted for 15 min:	0.7215 cfs.

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

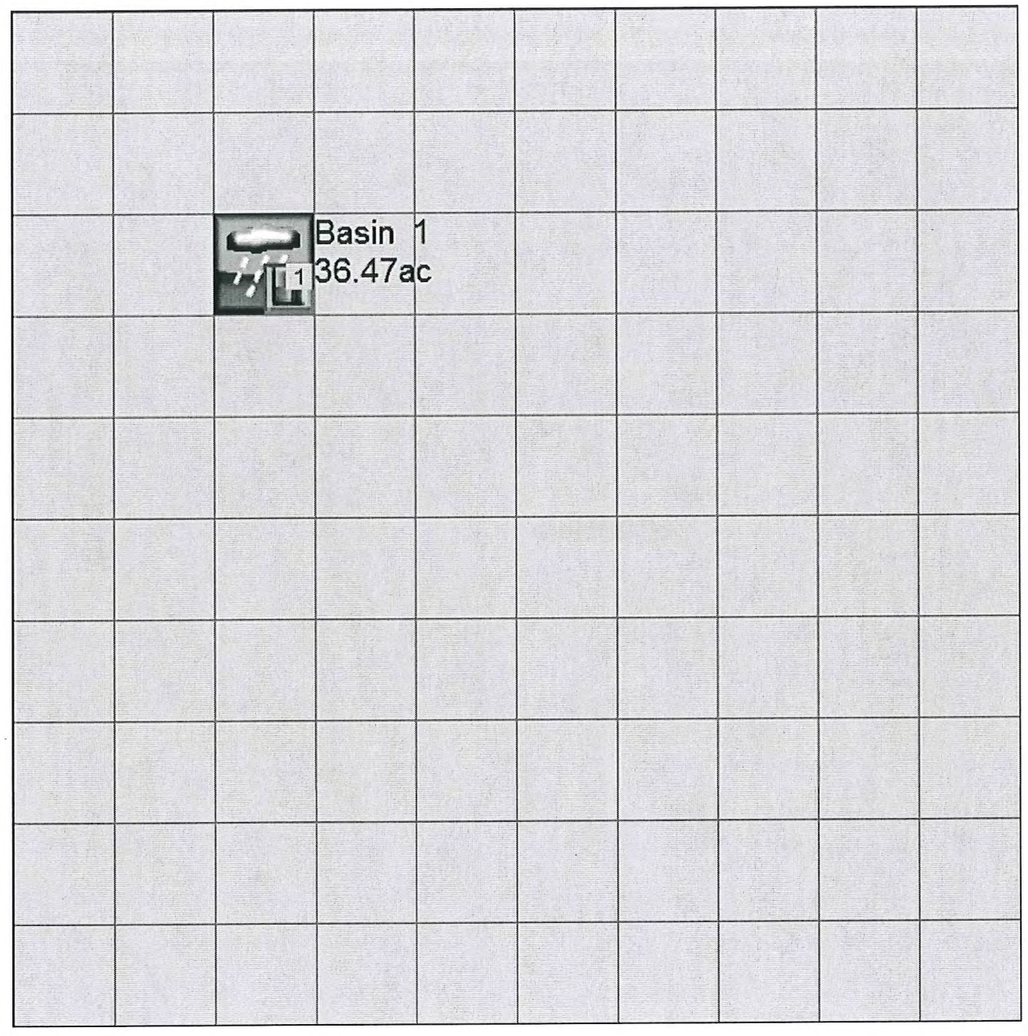
No PERLND changes have been made.

IMPLND Changes

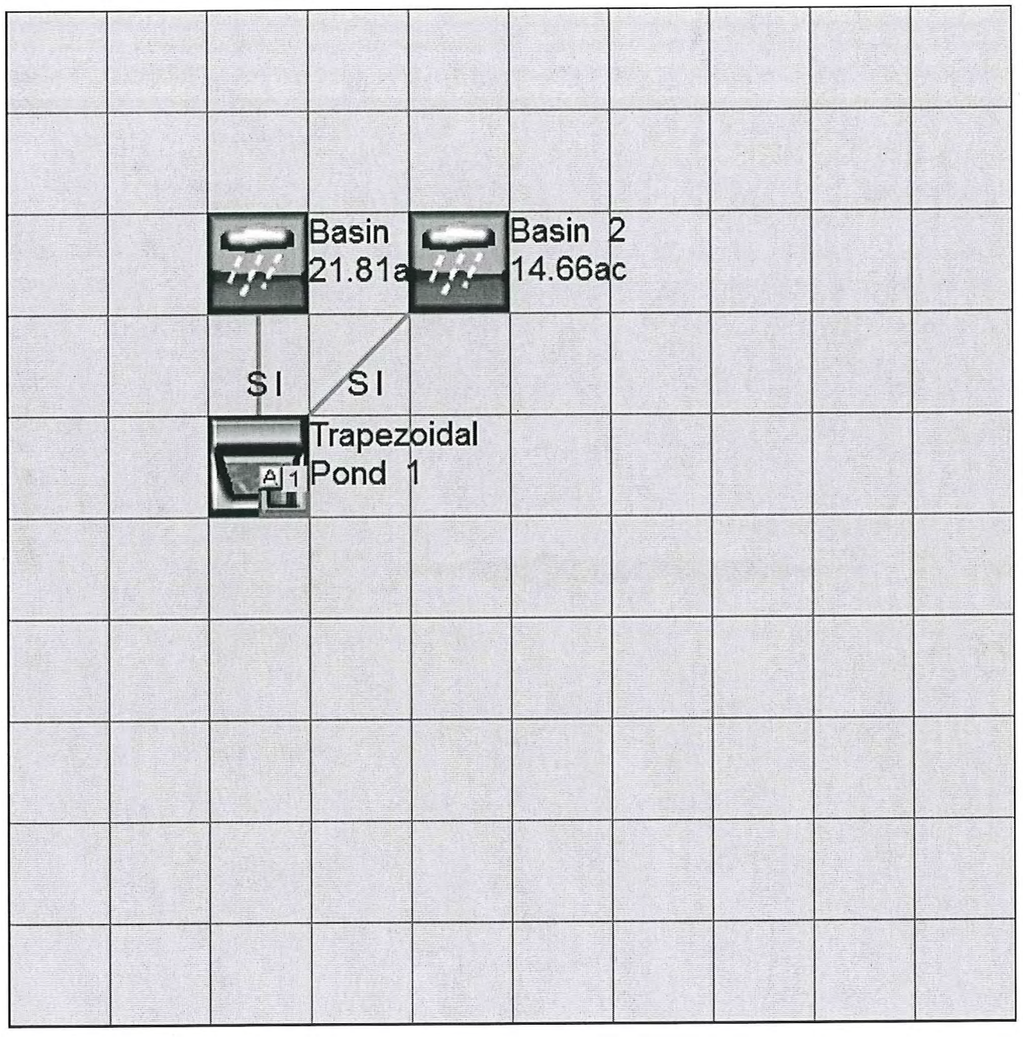
No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01        END    2011 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                               ***
WDM        26   volumes infil.12.052a.wdm
MESSU      25   Prevolumes infil.12.052a.MES
           27   Prevolumes infil.12.052a.L61
           28   Prevolumes infil.12.052a.L62
           30   POCvolumes infil.12.052a1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      10
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                        User  t-series Engl Metr ***
                                         in  out           ***
   10     C, Forest, Flat         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   10         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   10         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -   # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   10         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2          ***
    # -   # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   10              0       4.5      0.08       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3          ***
    # -   # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   10              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -   #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   10            0.2       0.5      0.35         6       0.5       0.7
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
             ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -   # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   10              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -   #                     User  t-series Engl Metr ***
                                       in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -   # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -   # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -   # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2          ***
    # -   # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3          ***
    # -   # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -   # ***  RETS      SURS
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  10                       36.47     COPY   501     12
PERLND  10                       36.47     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1


<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                          in  out                            ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><-------><-------><-------><-------><-------><-------><------->     ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
```

```
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01        END    2011 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                               ***
WDM        26   volumes infil.12.052a.wdm
MESSU      25   Mitvolumes infil.12.052a.MES
           27   Mitvolumes infil.12.052a.L61
           28   Mitvolumes infil.12.052a.L62
           30   POCvolumes infil.12.052a1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      10
      PERLND      16
      IMPLND       1
      IMPLND      14
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Trapezoidal Pond  1         MAX                   1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                         User  t-series Engl Metr ***
                                          in  out           ***
   10     C, Forest, Flat         1    1    1    1   27    0
   16     C, Lawn, Flat           1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   10         0    0    1    0    0    0    0    0    0    0    0    0
   16         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
```

```
PRINT-INFO
  <PLS > ***************** Print-flags **************************** PIVL  PYR
  # -   # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
 10         0    0    4    0    0    0    0    0    0    0    0    0    1    9
 16         0    0    4    0    0    0    0    0    0    0    0    0    1    9
END PRINT-INFO

PWAT-PARM1
  <PLS >  PWATER variable monthly parameter value flags  ***
  # -   # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
 10         0    0    0    0    0    0    0    0    0    0    0
 16         0    0    0    0    0    0    0    0    0    0    0
END PWAT-PARM1

PWAT-PARM2
  <PLS >      PWATER input info: Part 2          ***
  # -   # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
 10              0       4.5      0.08       400      0.05       0.5     0.996
 16              0       4.5      0.03       400      0.05       0.5     0.996
END PWAT-PARM2

PWAT-PARM3
  <PLS >      PWATER input info: Part 3          ***
  # -   # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
 10              0         0         2         2         0         0         0
 16              0         0         2         2         0         0         0
END PWAT-PARM3
PWAT-PARM4
  <PLS >     PWATER input info: Part 4                                  ***
  # -   #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
 10            0.2       0.5      0.35         6       0.5       0.7
 16            0.1      0.25      0.25         6       0.5      0.25
END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
             ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -   # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   10              0         0         0         0       2.5         1         0
   16              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -   #                    User  t-series Engl Metr ***
                                      in  out           ***
    1       ROADS/FLAT             1    1    1   27    0
   14       POND                   1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -   # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
   14         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -   # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
   14         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
```

```
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -   # CSNO RTOP  VRS  VNN RTLI     ***
    1         0    0    0    0    0
   14         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -   # ***  LSUR     SLSUR      NSUR     RETSC
    1            400      0.01       0.1       0.1
   14            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -   # ***PETMAX    PETMIN
    1              0         0
   14              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -   # ***  RETS      SURS
    1              0         0
   14              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  10                        11.2     RCHRES   1      2
PERLND  10                        11.2     RCHRES   1      3
PERLND  16                        7.03     RCHRES   1      2
PERLND  16                        7.03     RCHRES   1      3
IMPLND   1                        2.07     RCHRES   1      5
IMPLND  14                        1.51     RCHRES   1      5
Basin  2***
PERLND  16                       10.26     RCHRES   1      2
PERLND  16                       10.26     RCHRES   1      3
IMPLND   1                         4.4     RCHRES   1      5

******Routing******
PERLND  10                        11.2     COPY     1     12
PERLND  16                        7.03     COPY     1     12
IMPLND   1                        2.07     COPY     1     15
IMPLND  14                        1.51     COPY     1     15
PERLND  10                        11.2     COPY     1     13
PERLND  16                        7.03     COPY     1     13
PERLND  16                       10.26     COPY     1     12
IMPLND   1                         4.4     COPY     1     15
PERLND  16                       10.26     COPY     1     13
RCHRES   1                           1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1


<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
```

```
  RCHRES       Name        Nexits   Unit Systems   Printer                 ***
  # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                        in  out                             ***
  1     Trapezoidal Pond-005    2    1    1    1   28    0    1
END GEN-INFO
*** Section RCHRES***

ACTIVITY
  <PLS > ************ Active Sections ****************************
  # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  1        1    0    0    0    0    0    0    0    0    0
END ACTIVITY

PRINT-INFO
  <PLS > ***************** Print-flags ****************** PIVL  PYR
  # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  1        4    0    0    0    0    0    0    0    0    0    1    9
END PRINT-INFO

HYDR-PARM1
  RCHRES  Flags for each HYDR Section                                      ***
  # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
         FG FG FG FG  possible  exit  *** possible  exit      possible  exit
          *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
  1       0  1  0  0    4  5  0  0  0       0  0  0  0  0        2  2  2  2  2
END HYDR-PARM1

HYDR-PARM2
  # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
<------><--------><--------><--------><--------><--------><-------->       ***
  1              1      0.01       0.0       0.0       0.5       0.0
END HYDR-PARM2
HYDR-INIT
  RCHRES  Initial conditions for each HYDR section                         ***
  # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
        *** ac-ft     for each possible exit        for each possible exit
<------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  1         0            4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   91    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)    (acres) (acre-ft)   (cfs)     (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.749828  0.000000  0.000000  0.000000
  0.088889  0.761617  0.067175  0.000000  3.213323
  0.177778  0.773419  0.135399  0.000000  3.213323
  0.266667  0.785234  0.204673  0.000000  3.213323
  0.355556  0.797062  0.274997  0.000000  3.213323
  0.444444  0.808904  0.346373  0.000000  3.213323
  0.533333  0.820758  0.418803  0.000000  3.213323
  0.622222  0.832626  0.492286  0.000000  3.213323
  0.711111  0.844506  0.566825  0.000000  3.213323
  0.800000  0.856400  0.642421  0.000000  3.213323
  0.888889  0.868307  0.719075  0.000000  3.213323
  0.977778  0.880226  0.796787  0.000000  3.213323
  1.066667  0.892159  0.875560  0.000000  3.213323
  1.155556  0.904105  0.955394  0.000000  3.213323
  1.244444  0.916064  1.036291  0.000000  3.213323
  1.333333  0.928036  1.118250  0.000000  3.213323
  1.422222  0.940021  1.201275  0.000000  3.213323
  1.511111  0.952019  1.285366  0.000000  3.213323
  1.600000  0.964030  1.370524  0.000000  3.213323
  1.688889  0.976054  1.456750  0.000000  3.213323
  1.777778  0.988091  1.544045  0.000000  3.213323
  1.866667  1.000142  1.632411  0.000000  3.213323
```

1.955556	1.012205	1.721848	0.000000	3.213323
2.044444	1.024282	1.812359	0.000000	3.213323
2.133333	1.036371	1.903944	0.000000	3.213323
2.222222	1.048474	1.996603	0.000000	3.213323
2.311111	1.060589	2.090339	0.000000	3.213323
2.400000	1.072718	2.185153	0.000000	3.213323
2.488889	1.084860	2.281045	0.000000	3.213323
2.577778	1.097015	2.378018	0.000000	3.213323
2.666667	1.109182	2.476071	0.000000	3.213323
2.755556	1.121363	2.575206	0.000000	3.213323
2.844444	1.133557	2.675425	0.000000	3.213323
2.933333	1.145764	2.776728	0.000000	3.213323
3.022222	1.157984	2.879117	0.000000	3.213323
3.111111	1.170218	2.982593	0.000000	3.213323
3.200000	1.182464	3.087156	0.000000	3.213323
3.288889	1.194723	3.192809	0.000000	3.213323
3.377778	1.206995	3.299552	0.000000	3.213323
3.466667	1.219281	3.407387	0.000000	3.213323
3.555556	1.231579	3.516314	0.000000	3.213323
3.644444	1.243891	3.626335	0.000000	3.213323
3.733333	1.256215	3.737450	0.000000	3.213323
3.822222	1.268553	3.849662	0.000000	3.213323
3.911111	1.280904	3.962972	0.000000	3.213323
4.000000	1.293268	4.077379	0.000000	3.213323
4.088889	1.305644	4.192886	0.000000	3.213323
4.177778	1.318034	4.309494	0.000000	3.213323
4.266667	1.330437	4.427204	0.000000	3.213323
4.355556	1.342853	4.546017	0.000000	3.213323
4.444444	1.355282	4.665934	0.000000	3.213323
4.533333	1.367724	4.786957	0.000000	3.213323
4.622222	1.380180	4.909086	0.000000	3.213323
4.711111	1.392648	5.032323	0.000000	3.213323
4.800000	1.405129	5.156668	0.000000	3.213323
4.888889	1.417623	5.282124	0.000000	3.213323
4.977778	1.430131	5.408691	0.000000	3.213323
5.066667	1.442651	5.536370	0.000000	3.213323
5.155556	1.455185	5.665163	0.000000	3.213323
5.244444	1.467732	5.795070	0.000000	3.213323
5.333333	1.480291	5.926093	0.000000	3.213323
5.422222	1.492864	6.058234	0.000000	3.213323
5.511111	1.505450	6.191492	0.000000	3.213323
5.600000	1.518049	6.325870	0.000000	3.213323
5.688889	1.530660	6.461368	0.000000	3.213323
5.777778	1.543285	6.597988	0.000000	3.213323
5.866667	1.555923	6.735730	0.000000	3.213323
5.955556	1.568575	6.874597	0.000000	3.213323
6.044444	1.581239	7.014588	0.000000	3.213323
6.133333	1.593916	7.155706	0.000000	3.213323
6.222222	1.606606	7.297952	0.000000	3.213323
6.311111	1.619309	7.441326	0.000000	3.213323
6.400000	1.632026	7.585830	0.000000	3.213323
6.488889	1.644755	7.731464	0.000000	3.213323
6.577778	1.657498	7.878231	0.000000	3.213323
6.666667	1.670253	8.026131	0.000000	3.213323
6.755556	1.683022	8.175166	0.000000	3.213323
6.844444	1.695804	8.325336	0.000000	3.213323
6.933333	1.708598	8.476642	0.000000	3.213323
7.022222	1.721406	8.629087	0.064525	3.213323
7.111111	1.734227	8.782671	0.721407	3.213323
7.200000	1.747061	8.937395	1.742165	3.213323
7.288889	1.759908	9.093260	3.024410	3.213323
7.377778	1.772768	9.250268	4.522712	3.213323
7.466667	1.785641	9.408419	6.209470	3.213323
7.555556	1.798527	9.567716	8.065580	3.213323
7.644444	1.811426	9.728158	10.07680	3.213323
7.733333	1.824339	9.889748	12.23197	3.213323
7.822222	1.837264	10.05249	14.52206	3.213323
7.911111	1.850202	10.21637	16.93953	3.213323
8.000000	1.863154	10.38141	19.47800	3.213323

END FTABLE 1

```
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1001 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      2 1        1      WDM   1002 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1003 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
RCHRES     OFLOW  OVOL   1                 COPY           INPUT  MEAN
  END MASS-LINK   17


END MASS-LINK

END RUN
```

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WWHM2012

PROJECT REPORT

General Model Information

Project Name:	default
Site Name:	Tract B Pond
Site Address:	
City:	
Report Date:	8/13/2013
Gage:	Fairgrounds (Kaiser)
Data Start:	1955/10/01
Data End:	2011/09/30
Timestep:	15 Minute
Precip Scale:	1.00
Version:	2013/06/26

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Forest, Steep	15.7
Pervious Total	15.7
Impervious Land Use	Acres
Impervious Total	0
Basin Total	15.7

PREDEVELOPED AREAS

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	Acres
C, Lawn, Flat	9.58
C, Pasture, Steep	1.66
Pervious Total	11.24

Developed AREAS

Impervious Land Use	Acres
ROADS FLAT	1.6
ROADS STEEP	1.6
POND	1.36
Impervious Total	4.56
Basin Total	15.8

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Mitigated Routing

Trapezoidal Pond 1

Bottom Length:	158.11 ft.
Bottom Width:	158.11 ft.
Depth:	7 ft.
Volume at riser head:	4.3447 acre-ft.
Side slope 1:	3 To 1
Side slope 2:	3 To 1
Side slope 3:	3 To 1
Side slope 4:	3 To 1
Discharge Structure	
Riser Height:	6 ft.
Riser Diameter:	18 in.
Orifice 1 Diameter:	2.81 in. Elevation:0 ft.
Orifice 2 Diameter:	7.34 in. Elevation:4.002 ft.
Orifice 3 Diameter:	4.44 in. Elevation:4.5 ft.
Element Flows To:	
Outlet 1	Outlet 2

Design Pond Configuration

Pond Hydraulic Table

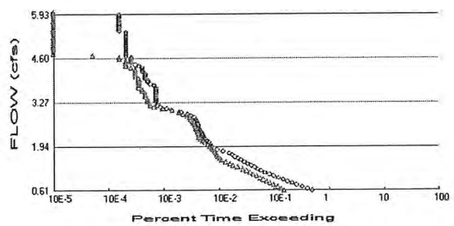
Stage(ft)	Area(ac)	Volume(ac-ft)	Discharge(cfs)	Infilt(cfs)
0.0000	0.573	0.000	0.000	0.000
0.0778	0.577	0.044	0.057	0.000
0.1556	0.580	0.089	0.081	0.000
0.2333	0.584	0.135	0.100	0.000
0.3111	0.587	0.180	0.115	0.000
0.3889	0.591	0.226	0.129	0.000
0.4667	0.594	0.272	0.141	0.000
0.5444	0.597	0.319	0.153	0.000
0.6222	0.601	0.365	0.163	0.000
0.7000	0.604	0.412	0.173	0.000
0.7778	0.608	0.459	0.182	0.000
0.8556	0.611	0.507	0.191	0.000
0.9333	0.615	0.554	0.200	0.000
1.0111	0.618	0.602	0.208	0.000
1.0889	0.622	0.651	0.216	0.000
1.1667	0.625	0.699	0.224	0.000
1.2444	0.629	0.748	0.231	0.000
1.3222	0.632	0.797	0.238	0.000
1.4000	0.636	0.846	0.245	0.000
1.4778	0.640	0.896	0.252	0.000
1.5556	0.643	0.946	0.258	0.000
1.6333	0.647	0.996	0.265	0.000
1.7111	0.650	1.047	0.271	0.000
1.7889	0.654	1.097	0.277	0.000
1.8667	0.658	1.148	0.283	0.000
1.9444	0.661	1.200	0.289	0.000
2.0222	0.665	1.251	0.294	0.000
2.1000	0.669	1.303	0.300	0.000
2.1778	0.672	1.355	0.306	0.000
2.2556	0.676	1.408	0.311	0.000
2.3333	0.680	1.461	0.316	0.000
2.4111	0.683	1.514	0.322	0.000
2.4889	0.687	1.567	0.327	0.000

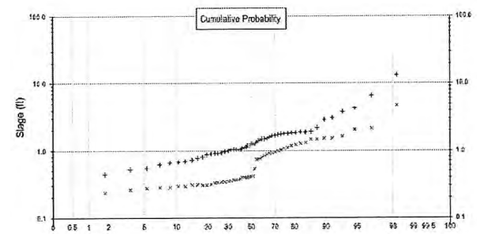
2.5667	0.691	1.621	0.332	0.000
2.6444	0.694	1.675	0.337	0.000
2.7222	0.698	1.729	0.342	0.000
2.8000	0.702	1.783	0.347	0.000
2.8778	0.706	1.838	0.351	0.000
2.9556	0.709	1.893	0.356	0.000
3.0333	0.713	1.948	0.361	0.000
3.1111	0.717	2.004	0.365	0.000
3.1889	0.721	2.060	0.370	0.000
3.2667	0.725	2.116	0.374	0.000
3.3444	0.728	2.173	0.379	0.000
3.4222	0.732	2.230	0.383	0.000
3.5000	0.736	2.287	0.388	0.000
3.5778	0.740	2.344	0.392	0.000
3.6556	0.744	2.402	0.396	0.000
3.7333	0.748	2.460	0.400	0.000
3.8111	0.751	2.518	0.404	0.000
3.8889	0.755	2.577	0.409	0.000
3.9667	0.759	2.636	0.413	0.000
4.0444	0.763	2.695	0.708	0.000
4.1222	0.767	2.755	0.911	0.000
4.2000	0.771	2.814	1.054	0.000
4.2778	0.775	2.875	1.172	0.000
4.3556	0.779	2.935	1.274	0.000
4.4333	0.783	2.996	1.366	0.000
4.5111	0.787	3.057	1.504	0.000
4.5889	0.791	3.118	1.682	0.000
4.6667	0.795	3.180	1.813	0.000
4.7444	0.799	3.242	1.926	0.000
4.8222	0.803	3.304	2.030	0.000
4.9000	0.807	3.367	2.127	0.000
4.9778	0.811	3.430	2.218	0.000
5.0556	0.815	3.493	2.304	0.000
5.1333	0.819	3.557	2.386	0.000
5.2111	0.823	3.621	2.465	0.000
5.2889	0.827	3.685	2.542	0.000
5.3667	0.831	3.749	2.615	0.000
5.4444	0.835	3.814	2.686	0.000
5.5222	0.839	3.879	2.755	0.000
5.6000	0.843	3.945	2.822	0.000
5.6778	0.847	4.010	2.887	0.000
5.7556	0.852	4.077	2.951	0.000
5.8333	0.856	4.143	3.013	0.000
5.9111	0.860	4.210	3.074	0.000
5.9889	0.864	4.277	3.133	0.000
6.0667	0.868	4.344	3.443	0.000
6.1444	0.872	4.412	4.051	0.000
6.2222	0.876	4.480	4.835	0.000
6.3000	0.881	4.548	5.760	0.000
6.3778	0.885	4.617	6.806	0.000
6.4556	0.889	4.686	7.959	0.000
6.5333	0.893	4.755	9.209	0.000
6.6111	0.898	4.825	10.55	0.000
6.6889	0.902	4.895	11.97	0.000
6.7667	0.906	4.965	13.47	0.000
6.8444	0.910	5.036	15.05	0.000
6.9222	0.915	5.107	16.70	0.000
7.0000	0.919	5.178	18.42	0.000

7.0778	0.923	5.250	20.21	0.000

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 15.7
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 11.24
Total Impervious Area: 4.56

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	1.21191
5 year	2.166262
10 year	3.048917
25 year	4.523112
50 year	5.934516
100 year	7.663957

Predev Flows

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.565103
5 year	1.057945
10 year	1.509366
25 year	2.25251
50 year	2.952372
100 year	3.796506

Dev Flows

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	1.587	0.783
1957	2.903	0.762
1958	0.668	0.276
1959	1.073	0.399
1960	1.488	1.634
1961	0.985	0.400
1962	0.438	0.282
1963	3.803	1.007
1964	1.034	0.396
1965	1.260	0.353

1966	0.616	0.307
1967	1.245	0.382
1968	0.969	0.342
1969	0.551	0.308
1970	0.922	0.408
1971	1.404	0.903
1972	1.734	1.478
1973	1.036	1.185
1974	0.763	0.412
1975	0.888	0.309
1976	1.323	1.290
1977	1.038	0.235
1978	1.778	0.997
1979	1.040	0.318
1980	1.700	0.871
1981	1.805	0.753
1982	1.855	0.730
1983	1.894	0.396
1984	1.170	0.360
1985	0.523	0.306
1986	1.897	1.216
1987	1.502	1.506
1988	0.808	0.362
1989	0.904	0.296
1990	2.192	2.147
1991	4.336	4.700
1992	13.401	1.534
1993	1.519	0.368
1994	0.693	0.262
1995	1.246	1.083
1996	1.900	2.060
1997	6.649	0.836
1998	3.035	0.341
1999	1.127	1.311
2000	0.670	0.333
2001	0.256	0.214
2002	1.180	0.952
2003	0.907	0.293
2004	1.828	0.538
2005	0.723	0.280
2006	1.101	0.362
2007	0.876	1.096
2008	1.414	0.932
2009	1.797	1.488
2010	1.662	0.325
2011	1.026	0.407

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	13.4006	4.7002
2	6.6492	2.1473
3	4.3359	2.0602
4	3.8030	1.6341
5	3.0349	1.5335
6	2.9034	1.5059
7	2.1923	1.4877
8	1.8996	1.4782

9	1.8969	1.3113
10	1.8945	1.2904
11	1.8545	1.2156
12	1.8275	1.1854
13	1.8046	1.0960
14	1.7973	1.0830
15	1.7783	1.0068
16	1.7345	0.9966
17	1.7000	0.9520
18	1.6619	0.9323
19	1.5868	0.9026
20	1.5189	0.8707
21	1.5016	0.8363
22	1.4885	0.7829
23	1.4139	0.7618
24	1.4042	0.7533
25	1.3232	0.7303
26	1.2598	0.5377
27	1.2464	0.4119
28	1.2448	0.4083
29	1.1805	0.4072
30	1.1696	0.4000
31	1.1268	0.3988
32	1.1012	0.3963
33	1.0730	0.3955
34	1.0404	0.3822
35	1.0376	0.3682
36	1.0361	0.3623
37	1.0339	0.3618
38	1.0259	0.3604
39	0.9852	0.3526
40	0.9689	0.3416
41	0.9221	0.3410
42	0.9073	0.3330
43	0.9042	0.3250
44	0.8885	0.3176
45	0.8759	0.3094
46	0.8078	0.3085
47	0.7631	0.3070
48	0.7228	0.3060
49	0.6926	0.2957
50	0.6699	0.2933
51	0.6679	0.2825
52	0.6162	0.2805
53	0.5511	0.2761
54	0.5231	0.2617
55	0.4376	0.2350
56	0.2557	0.2139

Duration Flows
The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.6060	9576	2963	30	Pass
0.6598	7792	2621	33	Pass
0.7136	6321	2299	36	Pass
0.7674	5037	1909	37	Pass
0.8213	4127	1653	40	Pass
0.8751	3438	1417	41	Pass
0.9289	2863	1241	43	Pass
0.9827	2329	1086	46	Pass
1.0365	1903	951	49	Pass
1.0904	1591	808	50	Pass
1.1442	1333	716	53	Pass
1.1980	1130	618	54	Pass
1.2518	981	527	53	Pass
1.3057	853	423	49	Pass
1.3595	751	349	46	Pass
1.4133	644	307	47	Pass
1.4671	563	259	46	Pass
1.5210	489	217	44	Pass
1.5748	431	205	47	Pass
1.6286	380	190	50	Pass
1.6824	337	181	53	Pass
1.7363	302	172	56	Pass
1.7901	234	163	69	Pass
1.8439	183	153	83	Pass
1.8977	158	145	91	Pass
1.9516	144	135	93	Pass
2.0054	137	124	90	Pass
2.0592	128	108	84	Pass
2.1130	118	100	84	Pass
2.1668	108	90	83	Pass
2.2207	104	87	83	Pass
2.2745	102	85	83	Pass
2.3283	96	83	86	Pass
2.3821	93	80	86	Pass
2.4360	89	78	87	Pass
2.4898	86	75	87	Pass
2.5436	84	72	85	Pass
2.5974	83	70	84	Pass
2.6513	80	67	83	Pass
2.7051	78	64	82	Pass
2.7589	75	61	81	Pass
2.8127	70	59	84	Pass
2.8666	60	52	86	Pass
2.9204	52	44	84	Pass
2.9742	41	38	92	Pass
3.0280	27	28	103	Pass
3.0819	22	19	86	Pass
3.1357	17	13	76	Pass
3.1895	15	11	73	Pass
3.2433	15	11	73	Pass
3.2971	14	10	71	Pass
3.3510	14	10	71	Pass
3.4048	14	10	71	Pass

3.4586	14	9	64	Pass
3.5124	14	9	64	Pass
3.5663	14	9	64	Pass
3.6201	14	8	57	Pass
3.6739	14	8	57	Pass
3.7277	14	7	50	Pass
3.7816	13	7	53	Pass
3.8354	11	7	63	Pass
3.8892	10	7	70	Pass
3.9430	10	7	70	Pass
3.9969	9	7	77	Pass
4.0507	9	6	66	Pass
4.1045	9	6	66	Pass
4.1583	9	6	66	Pass
4.2122	8	6	75	Pass
4.2660	8	6	75	Pass
4.3198	8	5	62	Pass
4.3736	7	4	57	Pass
4.4274	6	4	66	Pass
4.4813	5	4	80	Pass
4.5351	5	4	80	Pass
4.5889	5	3	60	Pass
4.6427	5	3	60	Pass
4.6966	4	1	25	Pass
4.7504	4	0	0	Pass
4.8042	4	0	0	Pass
4.8580	4	0	0	Pass
4.9119	4	0	0	Pass
4.9657	4	0	0	Pass
5.0195	4	0	0	Pass
5.0733	4	0	0	Pass
5.1272	4	0	0	Pass
5.1810	4	0	0	Pass
5.2348	4	0	0	Pass
5.2886	4	0	0	Pass
5.3425	4	0	0	Pass
5.3963	4	0	0	Pass
5.4501	3	0	0	Pass
5.5039	3	0	0	Pass
5.5577	3	0	0	Pass
5.6116	3	0	0	Pass
5.6654	3	0	0	Pass
5.7192	3	0	0	Pass
5.7730	3	0	0	Pass
5.8269	3	0	0	Pass
5.8807	3	0	0	Pass
5.9345	3	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.7406 acre-feet
On-line facility target flow:	0.3743 cfs.
Adjusted for 15 min:	0.3743 cfs.
Off-line facility target flow:	0.2426 cfs.
Adjusted for 15 min:	0.2426 cfs.

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

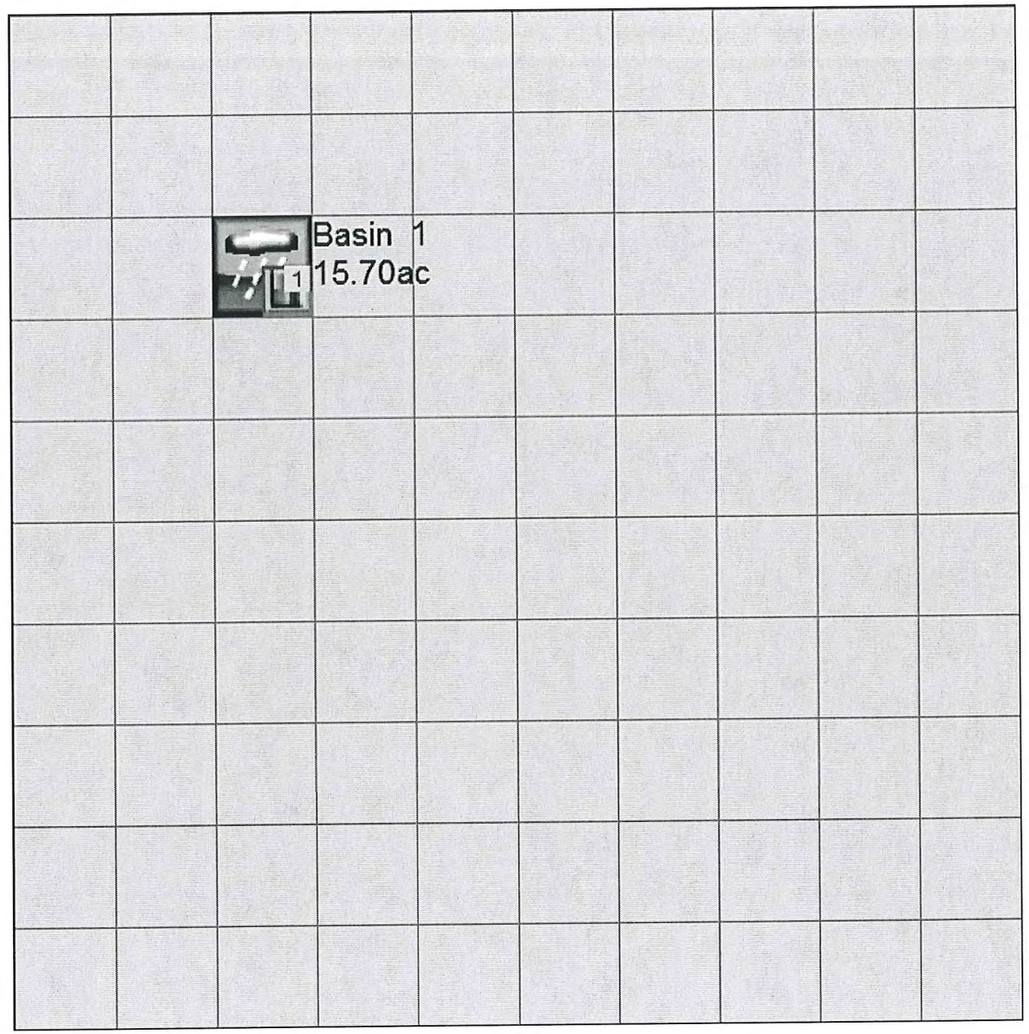
No PERLND changes have been made.

IMPLND Changes

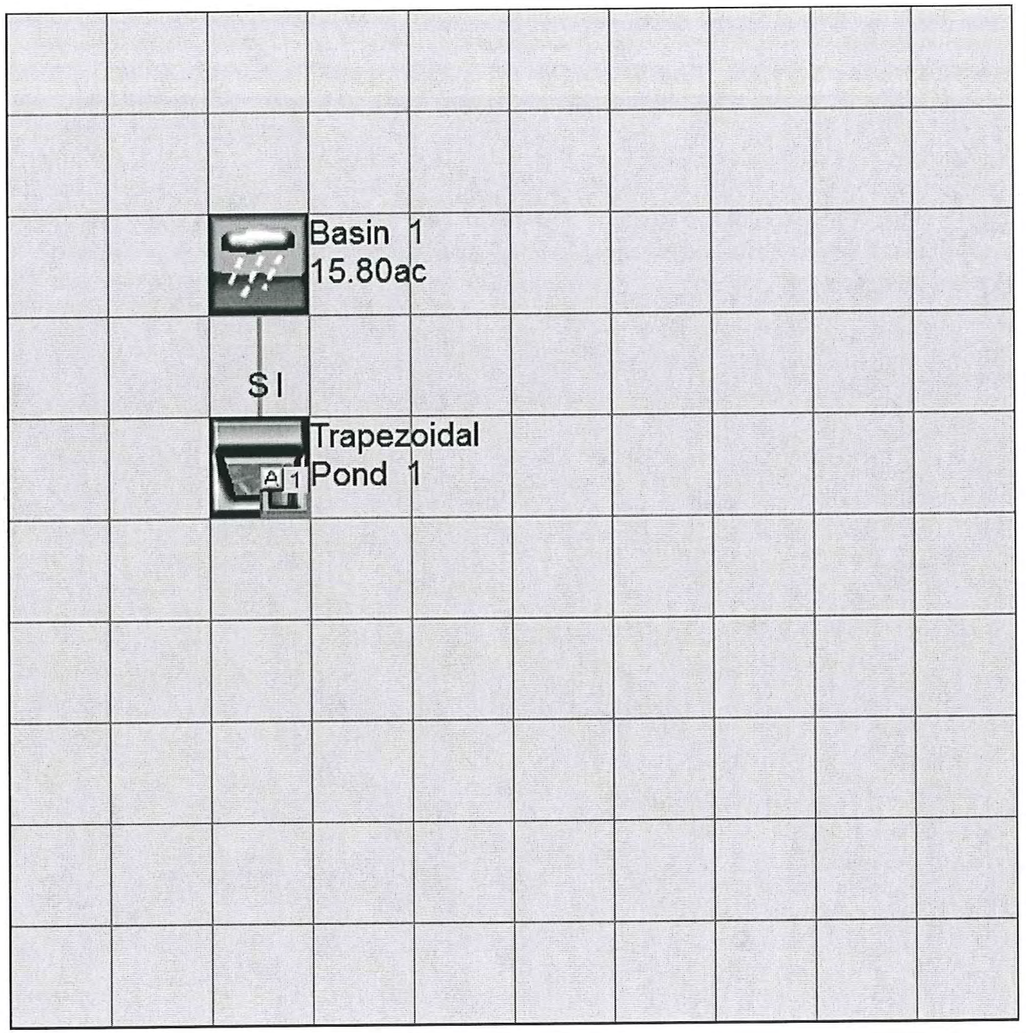
No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01        END    2011 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                               ***
WDM        26   default.wdm
MESSU      25   Predefault.MES
           27   Predefault.L61
           28   Predefault.L62
           30   POCdefault1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      12
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -   #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                   MAX                     1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -   #  NPT   NMN ***
    1         1     1
  501         1     1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #     # OPCD ***
  END OPCODE
  PARM
    #     #          K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -   #                          User  t-series Engl Metr ***
                                            in  out            ***
   12      C, Forest, Steep        1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -   # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   12         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -   # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   12         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   12         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2          ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   12             0       4.5      0.08       400      0.15       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3          ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   12             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   12           0.2       0.3      0.35         6       0.3       0.7
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
             ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   12             0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                       in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2          ***
    # -  # ***  LSUR      SLSUR      NSUR     RETSC
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3          ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                    <--Area-->     <-Target->   MBLK   ***
<Name>   #                    <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  12                          15.7     COPY   501     12
PERLND  12                          15.7     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1


<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                        in  out                              ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1                                                              ***
    RCHRES  Flags for each HYDR Section
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><-------><-------><-------><-------><-------><------->             ***
  END HYDR-PARM2
  HYDR-INIT                                                               ***
    RCHRES  Initial conditions for each HYDR section
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
```

```
WDM       1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM       1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01        END    2011 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                               ***
WDM        26   default.wdm
MESSU      25   Mitdefault.MES
           27   Mitdefault.L61
           28   Mitdefault.L62
           30   POCdefault1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      16
      PERLND      15
      IMPLND       1
      IMPLND       3
      IMPLND      14
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Trapezoidal Pond  1         MAX                   1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out            ***
   16     C, Lawn, Flat           1    1    1    1   27    0
   15     C, Pasture, Steep       1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   16         0    0    1    0    0    0    0    0    0    0    0    0
   15         0    0    1    0    0    0    0    0    0    0    0    0
```

```
END ACTIVITY

PRINT-INFO
  <PLS > ***************** Print-flags ***************************** PIVL  PYR
  # -   # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
 16         0    0    4    0    0    0    0    0    0    0    0    0    1    9
 15         0    0    4    0    0    0    0    0    0    0    0    0    1    9
END PRINT-INFO

PWAT-PARM1
  <PLS >  PWATER variable monthly parameter value flags  ***
  # -   # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
 16         0    0    0    0    0    0    0    0    0    0    0
 15         0    0    0    0    0    0    0    0    0    0    0
END PWAT-PARM1

PWAT-PARM2
  <PLS >       PWATER input info: Part 2          ***
  # -   # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
 16              0       4.5      0.03       400      0.05       0.5     0.996
 15              0       4.5      0.06       400      0.15       0.5     0.996
END PWAT-PARM2

PWAT-PARM3
  <PLS >       PWATER input info: Part 3          ***
  # -   # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
 16              0         0         2         2         0         0         0
 15              0         0         2         2         0         0         0
END PWAT-PARM3
PWAT-PARM4
  <PLS >      PWATER input info: Part 4                                  ***
  # -   #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
 16            0.1      0.25      0.25         6       0.5      0.25
 15           0.15      0.25       0.3         6       0.3       0.4
END PWAT-PARM4

PWAT-STATE1
  <PLS > *** Initial conditions at start of simulation
            ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
  # -   # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
 16              0         0         0         0       2.5         1         0
 15              0         0         0         0       2.5         1         0
END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -   #                    User  t-series Engl Metr ***
                                      in  out           ***
    1       ROADS/FLAT             1    1    1   27    0
    3       ROADS/STEEP            1    1    1   27    0
   14       POND                   1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -   # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
    3         0    0    1    0    0    0
   14         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -   # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
    3         0    0    4    0    0    0    1    9
```

```
 14          0    0    4    0    0    0    1    9
END PRINT-INFO

IWAT-PARM1
  <PLS >  IWATER variable monthly parameter value flags  ***
  # -  # CSNO RTOP  VRS  VNN RTLI     ***
  1          0    0    0    0    0
  3          0    0    0    0    0
 14          0    0    0    0    0
END IWAT-PARM1

IWAT-PARM2
  <PLS >      IWATER input info: Part 2          ***
  # -  # ***  LSUR     SLSUR      NSUR     RETSC
  1            400      0.01       0.1       0.1
  3            400       0.1       0.1      0.05
 14            400      0.01       0.1       0.1
END IWAT-PARM2

IWAT-PARM3
  <PLS >      IWATER input info: Part 3          ***
  # -  # ***PETMAX    PETMIN
  1              0         0
  3              0         0
 14              0         0
END IWAT-PARM3

IWAT-STATE1
  <PLS > *** Initial conditions at start of simulation
  # -  # ***  RETS      SURS
  1              0         0
  3              0         0
 14              0         0
END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Basin  1***
PERLND  16                        9.58     RCHRES   1      2
PERLND  16                        9.58     RCHRES   1      3
PERLND  15                        1.66     RCHRES   1      2
PERLND  15                        1.66     RCHRES   1      3
IMPLND   1                         1.6     RCHRES   1      5
IMPLND   3                         1.6     RCHRES   1      5
IMPLND  14                        1.36     RCHRES   1      5

******Routing******
PERLND  16                        9.58     COPY     1     12
PERLND  15                        1.66     COPY     1     12
IMPLND   1                         1.6     COPY     1     15
IMPLND   3                         1.6     COPY     1     15
IMPLND  14                        1.36     COPY     1     15
PERLND  16                        9.58     COPY     1     13
PERLND  15                        1.66     COPY     1     13
RCHRES   1                           1     COPY   501     16
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1


<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK
```

```
RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                          in  out                            ***
    1     Trapezoidal Pond-005    1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
    1        0  1  0  0    4  0  0  0  0       0  0  0  0  0        2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH      STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->         ***
    1              1      0.03        0.0        0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1         0            4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   91    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)    (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.573893  0.000000  0.000000
  0.077778  0.577286  0.044768  0.057836
  0.155556  0.580688  0.089800  0.081793
  0.233333  0.584101  0.135098  0.100175
  0.311111  0.587524  0.180661  0.115672
  0.388889  0.590956  0.226491  0.129326
  0.466667  0.594399  0.272588  0.141669
  0.544444  0.597852  0.318953  0.153020
  0.622222  0.601315  0.365587  0.163585
  0.700000  0.604787  0.412491  0.173508
  0.777778  0.608270  0.459666  0.182894
  0.855556  0.611763  0.507112  0.191821
  0.933333  0.615265  0.554829  0.200350
  1.011111  0.618778  0.602820  0.208531
  1.088889  0.622301  0.651084  0.216403
  1.166667  0.625834  0.699623  0.223998
  1.244444  0.629376  0.748436  0.231345
  1.322222  0.632929  0.797526  0.238465
  1.400000  0.636492  0.846892  0.245378
```

1.477778	0.640064	0.896536	0.252102
1.555556	0.643647	0.946458	0.258651
1.633333	0.647240	0.996660	0.265039
1.711111	0.650843	1.047141	0.271276
1.788889	0.654455	1.097902	0.277372
1.866667	0.658078	1.148945	0.283338
1.944444	0.661711	1.200270	0.289181
2.022222	0.665353	1.251878	0.294908
2.100000	0.669006	1.303770	0.300525
2.177778	0.672669	1.355946	0.306040
2.255556	0.676341	1.408408	0.311457
2.333333	0.680024	1.461155	0.316782
2.411111	0.683717	1.514190	0.322018
2.488889	0.687420	1.567512	0.327171
2.566667	0.691132	1.621122	0.332243
2.644444	0.694855	1.675021	0.337240
2.722222	0.698588	1.729211	0.342163
2.800000	0.702330	1.783691	0.347017
2.877778	0.706083	1.838463	0.351804
2.955556	0.709846	1.893527	0.356526
3.033333	0.713618	1.948884	0.361187
3.111111	0.717401	2.004534	0.365788
3.188889	0.721194	2.060480	0.370332
3.266667	0.724996	2.116720	0.374821
3.344444	0.728809	2.173257	0.379257
3.422222	0.732632	2.230091	0.383642
3.500000	0.736464	2.287223	0.387977
3.577778	0.740307	2.344653	0.392264
3.655556	0.744160	2.402382	0.396505
3.733333	0.748023	2.460411	0.400701
3.811111	0.751895	2.518741	0.404853
3.888889	0.755778	2.577373	0.408963
3.966667	0.759671	2.636307	0.413033
4.044444	0.763573	2.695544	0.708578
4.122222	0.767486	2.755086	0.911672
4.200000	0.771409	2.814931	1.054635
4.277778	0.775341	2.875083	1.171996
4.355556	0.779284	2.935540	1.274163
4.433333	0.783237	2.996305	1.365957
4.511111	0.787199	3.057378	1.504662
4.588889	0.791172	3.118759	1.682612
4.666667	0.795155	3.180449	1.812964
4.744444	0.799147	3.242450	1.926923
4.822222	0.803150	3.304761	2.030799
4.900000	0.807163	3.367385	2.127396
4.977778	0.811185	3.430320	2.218310
5.055556	0.815218	3.493569	2.304581
5.133333	0.819261	3.557132	2.386939
5.211111	0.823313	3.621010	2.465929
5.288889	0.827376	3.685204	2.541969
5.366667	0.831448	3.749714	2.615396
5.444444	0.835531	3.814541	2.686480
5.522222	0.839624	3.879686	2.755449
5.600000	0.843726	3.945149	2.822491
5.677778	0.847839	4.010932	2.887770
5.755556	0.851962	4.077036	2.951426
5.833333	0.856094	4.143460	3.013579
5.911111	0.860237	4.210206	3.074337
5.988889	0.864390	4.277275	3.133794
6.066667	0.868552	4.344667	3.443494
6.144444	0.872725	4.412384	4.051099
6.222222	0.876908	4.480425	4.835490
6.300000	0.881100	4.548792	5.760584
6.377778	0.885303	4.617485	6.806246
6.455556	0.889516	4.686506	7.959125
6.533333	0.893738	4.755855	9.209520
6.611111	0.897971	4.825532	10.54997
6.688889	0.902213	4.895540	11.97451
6.766667	0.906466	4.965877	13.47823
6.844444	0.910729	5.036546	15.05698

```
  6.922222  0.915001  5.107546  16.70721
  7.000000  0.919284  5.178880  18.42583
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1001 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        3
PERLND     PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

  MASS-LINK       15
IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       16
RCHRES     ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK   16


END MASS-LINK

END RUN
```

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APPENDIX 4 – Supplemental Reports and Information (Soils Report)

Altmann Oliver Associates, LLC

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AOA

Environmental Planning & Landscape Architecture

November 2, 2012

AOA-4245

Craig Sears
Gateway 850 LLC
15 Lake Bellevue Drive, Suite 102
Bellevue, WA 98005

SUBJECT: **Wetland and Stream Delineation for Lacey, WA Property Parcels 1180334-0000, 1180334-0100, 1180343-0000, 1181013-0000**

Dear Craig:

On September 7, 2012 I conducted a wetland and stream reconnaissance on the subject parcels utilizing the methodology outlined in the 2010 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)*. Parcel 1180334-0000 is currently located in the unincorporated Thurston County, while the remaining three parcels are located in the City of Lacey. All four parcels are currently undeveloped and forested (**Figure 1**).

Four wetland areas (Wetlands A, B, C, and D) and one stream (Stream 1) were identified on the site during the reconnaissance and were delineated during field investigations conducted in September 2012 (**Table 1**).

Table 1: Critical Area Summary

Critical Area	Category	Buffer In Feet (High Intensity)
Wetland A	III	80
Wetland B	II	100*
Wetland C	II	100*
Wetland D	III	Exempt**
Stream 1	Type Ns	150**

*Per both City of Lacey and Thurston County
**Per Thurston County

All of the wetland and stream boundaries were subsequently surveyed by Hatton Godat Pantier and are depicted on **Figure 2**. **Attachment A** contains data sheets prepared for representative locations in both the upland and wetland. These data sheets document the vegetation, soils, and hydrology information that aided in the wetland boundary delineation.

Each of the critical areas is described below.

Wetland A

Wetland A is located in the southwestern portion of the site and is part of a larger wetland that extends off-site to the south. The portion of the wetland located on the site consists of a forested swale that conveys seasonal or intermittent seepage west into a shallow depression located near the southwest property corner.

Vegetation within the on-site portion of the wetland included western red cedar (*Thuja plicata*), red alder (*Alnus rubra*), black cottonwood (*Populus trichocarpa*), big-leaf maple (*Acer macrophyllum*), salmonberry (*Rubus spectabilis*), lady fern (*Athyrium filix-femina*), stinging nettle (Urtica dioica), skunk cabbage (*Lysichiton americanum*), and youth-on-age (*Tolmiea menziesii*). Soils throughout the wetland were dry at the time of the delineation and wetland hydrology was necessarily assumed based on the presence of low chroma hydric soils and hydrophytic plant species.

Wetland A appears to meet the criteria for a Category III wetland with 16 Habitat Points (**Attachment B**). Category III wetlands with 16 Habitat Points require a standard 80-foot buffer adjacent high intensity land uses per Table 8C-5 in 8C.2.3 of the *Department of Ecology's Wetlands in Washington State Volume 2 – Protecting and Managing Wetlands.*

Wetland B/C

Wetland B/C is located in the western portion of the site and is part of a larger wetland that extends off-site to the west. On the project site, the wetland consists of two components that are hydrologically connected off-site and thus were considered one wetland system for rating purposes. Wetland Area B on the site consists primarily of a large forested shallow topographic depression that was dominated by red alder, salmonberry, skunk cabbage, lady fern, and slough sedge (*Carex obnupta*).

Wetland Area C consists of a seasonal or intermittent forested swale that included western red cedar, big-leaf maple, red alder, salmonberry, red elderberry (*Sambucus racemosa*), stinging nettle, and youth-on-age. Due to the very dry time of year that the delineation was conducted, the boundary of this portion of the wetland was necessarily based on the presence of scattered patches of surface staining and hydric soils (somewhat marginal in places).

Wetland Area B is located within both the City of Lacey and unincorporated Thurston County, while Wetland Area C is located entirely within the City. Wetland B/C appears to meet the criteria for a Category II wetland with 21 Habitat Points **(Attachment B)**.

In the City of Lacey, Category II wetlands with 21 Habitat Points require a standard 100-foot buffer per adjacent high intensity land uses per Alternative 3A of Appendix 8-C of the *Department of Ecology's Wetlands in Washington State Volume 2 – Protecting and Managing Wetlands*. Category II wetlands with 21 Habitat Points in unincorporated Thurston County also require a 100-foot buffer per TMC 24.30.045.

Wetland D

Wetland D consists of a very small (212 s.f.) isolated topographic depression in the northwestern portion of the site. Vegetation within the wetland consisted of one red alder tree, salmonberry, and youth-on-age. Although dry at the time of the site visit, the wetland appears to contain shallow seasonal ponding.

Wetland D is located within unincorporated Thurston County. Isolated wetlands less than 1,000 s.f. in size that meet any of the criteria outlined in TMC 24.30.015.A are exempt from regulation. Since Wetland D does not provide essential habitat for priority wildlife species, it would be exempt from Thurston County regulation per TMC 24.30.015.A.3. However, although Wetland D would not require a buffer, it is located within the buffer of Wetland B/C.

Stream 1

Stream 1 is located in the northwest portion of the site and drains down from off-site into Wetland Area B. At the time of the delineation, the dry stream bed averaged less than two feet wide and was not well defined in places. Stream 1 appears to meet the requirements for a Type Ns stream and would likely require a standard buffer of 150 feet per TMC 24.25.020.

If you have any questions regarding the wetland delineation or ratings, please give me a call.

Sincerely,

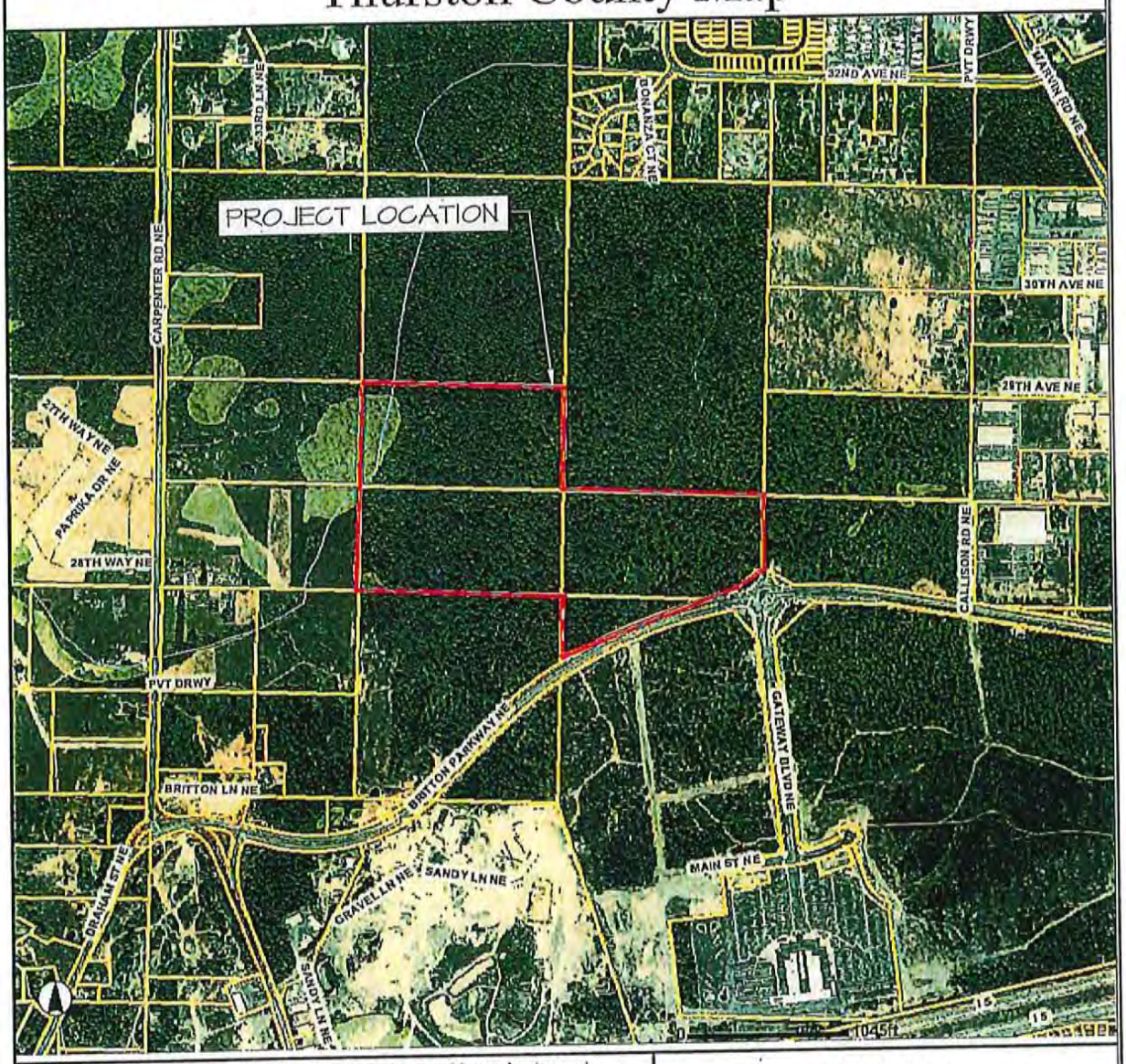
ALTMANN OLIVER ASSOCIATES, LLC

John Altmann

John Altmann
Ecologist

Attachments

Thurston County Map



Disclaimer: Thurston County makes every effort to ensure that this map is a true and accurate representation of the work of County government. However, the County and all related personnel make no warranty, expressed or implied, regarding the accuracy, completeness or convenience of any information disclosed on this map. Nor does the County accept liability for any damage or injury caused by the use of this map.
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Thurston GeoData Center
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929 Lakeridge Drive SW, Suite 216, 3rd Floor
Olympia, WA 98502-6031

LEGEND

- Major Roads
- Roads
- Streams
- Contours
- Wetlands
- Wetland Buffers
- Flood Zones
- Water Bodies
- Zoning
- Cities
- Parcels

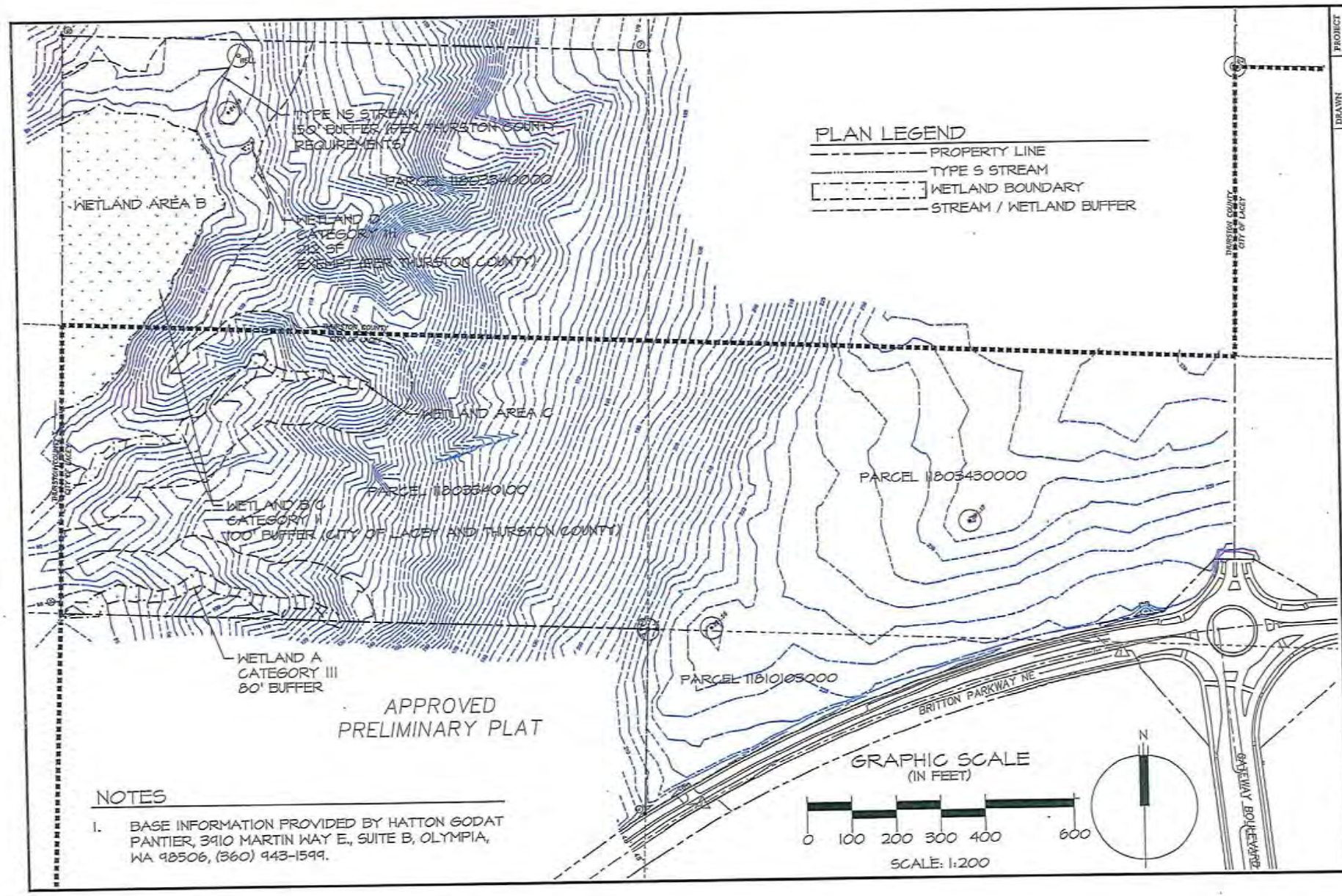
SOURCE: THURSTON COUNTY GEODATA CENTER, 2012

Altmann Oliver Associates, LLC
AOA
Environmental Planning & Landscape Architecture
PO Box 578 Cle Elum, WA 98014 Office (425) 333-4535 Fax (425) 333-4509

FIGURE 1: THURSTON COUNTY WETLAND MAP
GATEWAY 850 LLC
LACEY, WASHINGTON
PARCELS 11803340000, 11803340100, 11803430000, 118101030000

DRAWN	PROJECT
SO	4245
SCALE NTS	
DATE 11-02-12	1/2
REVISED	

4245-MIT-11-02-12.dwg



NOTES

1. BASE INFORMATION PROVIDED BY HATTON GODAT PANTIER, 3910 MARTIN WAY E., SUITE B, OLYMPIA, WA 98506, (360) 943-1599.

PROJECT 4245
DRAWN SO
SCALE AS NOTED
DATE 11-02-12
REVISED
2/2

FIGURE 2: CRITICAL AREAS MAP
GATEWAY 850 LLC
LACEY, WASHINGTON
PARCELS 11803340000, 11803340100, 11803430000, 11810103000

AOA Altmann Oliver Associates, LLC
Engineering Planning & Surveying Architecture
PORTLAND Cascade, WASHINGTON 503-223-5158 FAX 503-223-5159

4245-MIT-11-02-12.dwg

ATTACHMENT A

DATA SHEETS

TP #1 ~20' INTO WETLAND AT A-52

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: BRITTON PKWY City/County: LACEY / THURSTON CO Sampling Date: 9/7/12

Applicant/Owner: GATEWAY 850 LLC State: WA Sampling Point: TP#1

Investigator(s): ALTMANN Section, Township, Range: SEC 3, T18N, R1W W.M.

Landform (hillslope, terrace, etc.): SLOPE Local relief (concave, convex, none): CONCAVE Slope (%): ____

Subregion (LRR): A Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes ____	No ____	

Remarks: ASSUMED

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 20' R)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2. ALL TREES ROOTED OUTSIDE			
3. OF WETLAND IN PLOT			
4.			
	____ = Total Cover		

Sapling/Shrub Stratum (Plot size: ~20' R)	Absolute % Cover	Dominant Species?	Indicator Status
1. Rubus spectabilis	70	Y	FAC
2. Sambucus racemosa	10	N	FACU
3. Polystichum munitum	10	N	FACU
4.			
5.			
	90 = Total Cover		

Herb Stratum (Plot size: ~20' R)	Absolute % Cover	Dominant Species?	Indicator Status
1. Athyrium filix-femina	35	Y	FAC
2. Urtica dioica	35	Y	FAC
3. Tolmiea menziesii	20	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	90 = Total Cover		

Woody Vine Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x1 = ____
FACW species ____	x2 = ____
FAC species ____	x3 = ____
FACU species ____	x4 = ____
UPL species ____	x5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

SOIL

Sampling Point: TP #1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/1	100					Clay loam	
5-15	2.5Y 6/2	80	VARIOUS	20			SILTY CLAY	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (except MLRA 1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (LRR A)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (LRR A)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: ASSUMED DUE TO DRY TIME OF YEAR - PRESENCE OF HYDRIC SOILS AND HYDROPHYTIC VEGETATION

TP #2 ~20' INTO UPLAND AT A-52

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: BRITTON PKWY City/County: LACEY / THURSTON CO Sampling Date: 9/7/12

Applicant/Owner: GATEWAY 850 LLC State: WA Sampling Point: TP#2

Investigator(s): ALTMANN Section, Township, Range: S3, T18N, R1W W.M.

Landform (hillslope, terrace, etc.): SLOPE Local relief (concave, convex, none): CONCAVE Slope (%): ____

Subregion (LRR): A Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ~20' R)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer macrophyllum	45	Y	FACU
2. Thuja plicata	45	Y	FAC
3.			
4.			
	90	= Total Cover	

Sapling/Shrub Stratum (Plot size: ~20' R)			
1. Rubus spectabilis	40	Y	FAC
2. Corylus cornuta	20	Y	FACU
3. Polystichum munitum	20	Y	FACU
4.			
5.			
	80	= Total Cover	

Herb Stratum (Plot size: ~10' R)			
1. Urtica dioica	20	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	20	= Total Cover	

Woody Vine Stratum (Plot size: ____)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x1 =
FACW species		x2 =
FAC species	105	x3 = 315
FACU species	85	x4 = 340
UPL species		x5 =
Column Totals:	190 (A)	655 (B)

Prevalence Index = B/A = 3.4

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- ____ 2 - Dominance Test is >50%
- ____ 3 - Prevalence Index is ≤3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ 5 - Wetland Non-Vascular Plants[1]
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

SOIL

Sampling Point: TP #2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 5/4	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (except MLRA 1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (LRR A)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (LRR A)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

TP #3 ~5' INTO WETLAND AT B-26

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: BRITTON PKWY City/County: LACEY / THURSTON CO Sampling Date: 9/7/12

Applicant/Owner: GATEWAY ESG State: WA Sampling Point: TP #3

Investigator(s): ALTMANN Section, Township, Range: SEC 3 TWP 18N R1W W.M.

Landform (hillslope, terrace, etc.): SLOPE Local relief (concave, convex, none): CONCAVE Slope (%): ____

Subregion (LRR): A Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	Is the Sampled Area within a Wetland? Yes X No ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ~20 R)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	80	Y	FAC
2.			
3.			
4.			
	80 = Total Cover		
Sapling/Shrub Stratum (Plot size: ~20' R)			
1. Rubus spectabilis	70	Y	FAC
2.			
3.			
4.			
5.			
	70 = Total Cover		
Herb Stratum (Plot size: ~10' R)			
1. Athyrium filix-femina	40	Y	FAC
2. Lysichiton americanum	40	Y	OBL
3. Maianthemum dilatatum	10	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	90 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

SOIL

Sampling Point: TP #3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 2/1	100						HISTIC EPIPEDON
13-17	10YR 3/1	80	10YR 3/3	20			SILTY CLAY	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- X Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (except MLRA 1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: CLAY

Depth (inches): 13"

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (LRR A)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (LRR A)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): SURFACE

Water Table Present? Yes X No ___ Depth (inches): SURFACE

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): SURFACE

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

TP #4 ~15' INTO UPLAND AT B-26

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: BRITTON PKWY City/County: LACEY / THURSTON CO Sampling Date: 9/7/12

Applicant/Owner: GATEWAY 850 State: WA Sampling Point: TP #4

Investigator(s): ALTMANN Section, Township, Range: SEC 3 T 18N R 1W W.M.

Landform (hillslope, terrace, etc.): SLOPE Local relief (concave, convex, none): CONCAVE Slope (%): ____

Subregion (LRR): A Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ~30' R)	Absolute % Cover	Dominant Species?	Indicator Status
1. Pseudotsuga menziesii	40	Y	FACU
2. Acer macrophyllum	40	Y	FACU
3. Tsuga heterophylla	20	Y	FACU
4.			
	100	= Total Cover	

Sapling/Shrub Stratum (Plot size: ~20' R)			
1. Polystichum munitum	50	Y	FACU
2. Corylus cornuta	20	Y	FACU
3. Mahonia aquifolium	20	Y	FACU
4.			
5.			
	90	= Total Cover	

Herb Stratum (Plot size: ~10' R)			
1. Maianthemum dilatatum	20	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
		= Total Cover	

Woody Vine Stratum (Plot size: ____)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 14 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

SOIL

Sampling Point: TP-#4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-15	7.5YR 4/4	100					Silty Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (except MLRA 1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (LRR A)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (LRR A)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

TP #5 ~15' INTO WETLAND AT CC-17

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: BRITTON PKWY City/County: LACEY / THURSTON Co Sampling Date: 9/12/12

Applicant/Owner: GATEWAY 850 State: WA Sampling Point: TP #5

Investigator(s): A UTMANN Section, Township, Range: SEC. 3 T18N R1W W.M.

Landform (hillslope, terrace, etc.): SLOPE Local relief (concave, convex, none): CONCAVE Slope (%): ____

Subregion (LRR): A Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No ____	Is the Sampled Area within a Wetland?	Yes X No ____
Hydric Soil Present?	Yes X No ____		
Wetland Hydrology Present?	Yes ____ No ____		

Remarks: ASSUMED

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ~20' R)	Absolute % Cover	Dominant Species?	Indicator Status
1. Rhamnus purshiana	60	Y	FAC
2.			
3.			
4.			
	60 = Total Cover		
Sapling/Shrub Stratum (Plot size: ~20' R)			
1. Corylus Cornuta	20	Y	FACU
2. Rubus spectabilis	10	Y	FAC
3.			
4.			
5.			
	30 = Total Cover		
Herb Stratum (Plot size: ~20' R)			
1. Tolmiea menziesii	20	Y	FAC
2. Urtica dioica	20	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	40 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum 60

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x1 = ____
FACW species ____	x2 = ____
FAC species ____	x3 = ____
FACU species ____	x4 = ____
UPL species ____	x5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

SOIL

Sampling Point: TP#5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	90	VARIOUS	10			SILT LOAM	
5-15	10YR 5/2	80	VARIOUS	20			CLAY LOAM	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (except MLRA 1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (LRR A)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (LRR A)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: ASSUMED DUE TO DRY TIME OF YEAR - PRESENCE OF HYDRIC SOILS

TP #6 ~10' INTO UPLAND AT CC-17

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: BRITTON PKWY City/County: LACEY / THURSTON Sampling Date: 9/12/12

Applicant/Owner: GATEWAY 850 State: WA Sampling Point: TP #6

Investigator(s): ALTMANN Section, Township, Range: SEC 3 T 18N R 1W W.M.

Landform (hillslope, terrace, etc.): SLOPE Local relief (concave, convex, none): CONCAVE Slope (%): ____

Subregion (LRR): A Lat: ____ Long: ____ Datum: ____

Soil Map Unit Name: ____ NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ~20' R)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer macrophyllum	80	Y	FACU
2.			
3.			
4.			
	80 = Total Cover		
Sapling/Shrub Stratum (Plot size: ~20' R)			
1. Corylus cornuta	25	Y	FACU
2. Polystichum munitum	25	Y	FACU
3. Rubus spectabilis	5	N	FAC
4.			
5.			
	55 = Total Cover		
Herb Stratum (Plot size: ~20' R)			
1. Urtica dioica	75	Y	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	75 = Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 25 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ____	x 1 = ____
FACW species ____	x 2 = ____
FAC species ____	x 3 = ____
FACU species ____	x 4 = ____
UPL species ____	x 5 = ____
Column Totals: ____ (A)	____ (B)

Prevalence Index = B/A = ____

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ___ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

SOIL

Sampling Point: TP #6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-15	10YR 5/3	100					loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (except MLRA 1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (LRR A)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (LRR A)
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

ATTACHMENT B
WETLAND RATINGS

Wetland name or number A

WETLAND RATING FORM – WESTERN WASHINGTON

Version 2 - Updated July 2006 to increase accuracy and reproducibility among users
Updated Oct 2008 with the new WDFW definitions for priority habitats

Name of wetland (if known): PARCEL 1180334 0100 Date of site visit: 9/7/12

Rated by ALTMANN Trained by Ecology? Yes X No___ Date of training 03/08

SEC: 3 TWNSHP: 18N RNGE: 1W Is S/T/R in Appendix D? Yes___ No X

Map of wetland unit: Figure ____ Estimated size _____

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I___ II___ III X IV___

Category I = Score >=70
Category II = Score 51-69
Category III = Score 30-50
Category IV = Score < 30

Score for Water Quality Functions	13
Score for Hydrologic Functions	10
Score for Habitat Functions	16
TOTAL score for Functions	39

Category based on SPECIAL CHARACTERISTICS of wetland

I___ II___ Does not Apply X

Final Category (choose the "highest" category from above) III

Summary of basic information about the wetland unit

Wetland Unit has Special Characteristics		Wetland HGM Class used for Rating	
Estuarine		**Depressional**	X
Natural Heritage Wetland		**Riverine**	
Bog		**Lake-fringe**	
Mature Forest		**Slope**	X
Old Growth Forest		**Flats**	
Coastal Lagoon		**Freshwater Tidal**	
Interdunal			
None of the above	X	Check if unit has multiple HGM classes present	X

Wetland name or number A

D	Depressional and Flats Wetlands WATER QUALITY FUNCTIONS - Indicators that the wetland unit functions to improve water quality	Points (only 1 score per box)
D	**D 1. Does the wetland unit have the potential to improve water quality?**	*(see p.38)*
D	D 1.1 Characteristics of surface water flows out of the wetland: Unit is a depression with no surface water leaving it (no outlet) points = 3 Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) points = 1 Unit is a "flat" depression (Q. 7 on key), or in the Flats class, with permanent surface outflow and **no obvious natural outlet** and/or outlet is a man-made ditch points = 1 (*If ditch is not permanently flowing treat unit as "intermittently flowing"*) Provide photo or drawing	Figure 2
D	S 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic *(use NRCS definitions)* YES points = 4 NO points = 0	4
D	D 1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest Cowardin class) Wetland has persistent, ungrazed, vegetation >= 95% of area points = 5 Wetland has persistent, ungrazed, vegetation >= 1/2 of area points = 3 Wetland has persistent, ungrazed vegetation >= 1/10 of area points = 1 Wetland has persistent, ungrazed vegetation <1/10 of area points = 0 Map of Cowardin vegetation classes	Figure 5
D	D1.4 Characteristics of seasonal ponding or inundation. *This is the area of the wetland unit that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 yrs.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0 Map of hydroperiods	Figure 2
D	**Total for D 1** *Add the points in the boxes above*	13
D	**D 2. Does the wetland unit have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* — Grazing in the wetland or within 150 ft — Untreated stormwater discharges to wetland — Tilled fields or orchards within 150 ft of wetland — A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging — Residential, urban areas, golf courses are within 150 ft of wetland — Wetland is fed by groundwater high in phosphorus or nitrogen — Other_____ **YES** multiplier is **2** **NO** multiplier is **1**	*(see p. 44)* multiplier 1
D	**TOTAL - Water Quality Functions** Multiply the score from D1 by D2 *Add score to table on p. 1*	13

Wetland name or number A

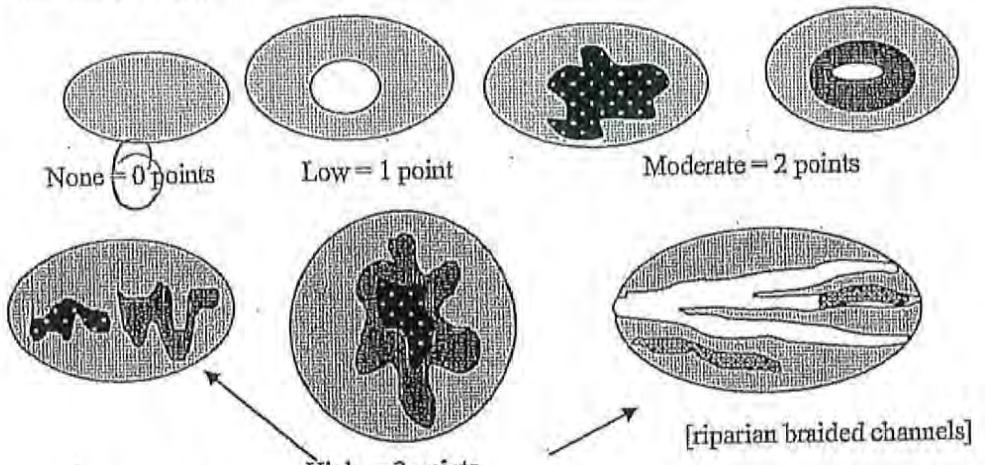
	Depressional and Flats Wetlands HYDROLOGIC FUNCTIONS - Indicators that the wetland unit functions to reduce flooding and stream degradation	Points (only 1 score per box)
	D 3. Does the wetland unit have the potential to reduce flooding and erosion?	*(see p.46)*
D	D 3.1 Characteristics of surface water flows out of the wetland unit Unit is a depression with no surface water leaving it (no outlet) points = 4 Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 Unit is a "flat" depression (Q. 7 on key), or in the Flats class, with permanent surface outflow and **no obvious natural outlet** and/or outlet is a man-made ditch points = 1 *(If ditch is not permanently flowing treat unit as "intermittently flowing")* Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) points = 0	2
D	D 3.2 Depth of storage during wet periods *Estimate the height of ponding above the bottom of the outlet. For units with no outlet measure from the surface of permanent water or deepest part (if dry).* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 The wetland is a "headwater" wetland" points = 5 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 Unit is flat (yes to Q. 2 or Q. 7 on key) but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft points = 0	0
D	D 3.3 Contribution of wetland unit to storage in the watershed *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* The area of the basin is less than 10 times the area of unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 Entire unit is in the FLATS class points = 5	3
D	**Total for D 3** *Add the points in the boxes above*	5
D	**D 4. Does the wetland unit have the opportunity to reduce flooding and erosion?** Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. Answer NO if the water coming into the wetland is controlled by a structure such as flood gate, tide gate, flap valve, reservoir etc. OR you estimate that more than 90% of the water in the wetland is from groundwater in areas where damaging groundwater flooding does not occur. *Note which of the following indicators of opportunity apply.* — Wetland is in a headwater of a river or stream that has flooding problems X Wetland drains to a river or stream that has flooding problems — Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems — Other_____ **YES** multiplier is **2** **NO** multiplier is 1	*(see p. 49)* multiplier 2
D	**TOTAL - Hydrologic Functions** Multiply the score from D 3 by D 4 ***Add score to table on p. 1***	10

Wetland name or number A

These questions apply to wetlands of all HGM classes. HABITAT FUNCTIONS – Indicators that unit functions to provide important habitat	Points (only 1 score per box)
H 1. Does the wetland unit have the potential to provide habitat for many species?	
H 1.1 Vegetation structure *(see p. 72)* *Check the types of vegetation classes present (as defined by Cowardin)- Size threshold for each class is ¼ acre or more than 10% of the area if unit is smaller than 2.5 acres.* ____ Aquatic bed ____ Emergent plants ____ Scrub/shrub (areas where shrubs have >30% cover) X Forested (areas where trees have >30% cover) *If the unit has a forested class check if:* X The forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the forested polygon *Add the number of vegetation structures that qualify. If you have:* 4 structures or more — points = 4 3 structures — points = 2 2 structures — points = 1 1 structure — points = 0 Map of Cowardin vegetation classes	Figure 1
H 1.2. Hydroperiods *(see p. 73)* *Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ acre to count. (see text for descriptions of hydroperiods)* ____ Permanently flooded or inundated — 4 or more types present — points = 3 X Seasonally flooded or inundated — 3 types present — points = 2 ____ Occasionally flooded or inundated — 2 types present — point = 1 X Saturated only — 1 type present — points = 0 ____ Permanently flowing stream or river in, or adjacent to, the wetland ____ Seasonally flowing stream in, or adjacent to, the wetland ____ ***Lake-fringe wetland* = 2 points** ____ ***Freshwater tidal wetland* = 2 points** Map of hydroperiods	Figure 1
H 1.3. Richness of Plant Species *(see p. 75)* Count the number of plant species in the wetland that cover at least 10 ft². *(different patches of the same species can be combined to meet the size threshold)* *You do not have to name the species.* *Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle* If you counted: > 19 species — points = 2 5 - 19 species — points = 1 < 5 species — points = 0 *List species below if you want to:*	1

Total for page 3

Wetland name or number A

	Figure
H 1.4. Interspersion of habitats *(see p. 76)* Decide from the diagrams below whether interspersion between Cowardin vegetation classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.  NOTE: If you have four or more classes or three vegetation classes and open water the rating is always "high". Use map of Cowardin vegetation classes.	0
H 1.5. Special Habitat Features: *(see p. 77)* *Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.* X Large, downed, woody debris within the wetland (>4in. diameter and 6 ft long). X Standing snags (diameter at the bottom > 4 inches) in the wetland ____ Undercut banks are present for at least 6.6 ft (2m) and/or overhanging vegetation extends at least 3.3 ft (1m) over a stream (or ditch) in, or contiguous with the unit, for at least 33 ft (10m) ____ Stable steep banks of fine material that might be used by beaver or muskrat for denning (>30degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet turned grey/brown)* ____ At least ¼ acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* X Invasive plants cover less than 25% of the wetland area in each stratum of plants *NOTE: The 20% stated in early printings of the manual on page 78 is an error.*	3
H 1. TOTAL Score - potential for providing habitat *Add the scores from H1.1, H1.2, H1.3, H1.4, H1.5*	6

Comments

Wetland name or number A

H 2. Does the wetland unit have the opportunity to provide habitat for many species?	Figure
H 2.1 Buffers *(see p. 80)* *Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed."* — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference. No structures are within the undisturbed part of buffer. (relatively undisturbed also means no-grazing, no landscaping, no daily human use) **Points = 5** — 100 m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference. **Points = 4** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference. **Points = 4** — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference, . **Points = 3** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference. **Points = 3** **If buffer does not meet any of the criteria above** — No paved areas (except paved trails) or buildings within 25 m (80ft) of wetland > 95% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — No paved areas or buildings within 50m of wetland for >50% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — Heavy grazing in buffer. **Points = 1** — Vegetated buffers are <2m wide (6.6ft) for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland **Points = 0.** — Buffer does not meet any of the criteria above. **Points = 1** Aerial photo showing buffers	4
H 2.2 Corridors and Connections *(see p. 81)* H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft wide, has at least 30% cover of shrubs, forest or native undisturbed prairie, that connects to estuaries, other wetlands or undisturbed uplands that are at least 250 acres in size? *(dams in riparian corridors, heavily used gravel roads, paved roads, are considered breaks in the corridor)* YES = **4 points** *(go to H 2.3)* NO = go to H 2.2.2 H 2.2.2 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 50ft wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands or undisturbed uplands that are at least 25 acres in size? **OR** a **Lake-fringe** wetland, if it does not have an undisturbed corridor as in the question above? YES = **2 points** *(go to H 2.3)* NO = H 2.2.3 H 2.2.3 Is the wetland: within 5 mi (8km) of a brackish or salt water estuary OR within 3 mi of a large field or pasture (>40 acres) OR within 1 mi of a lake greater than 20 acres? YES = **1 point** NO = **0 points**	2

Total for page 6

Wetland name or number A

H 2.3 Near or adjacent to other priority habitats listed by WDFW *(see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report http://wdfw.wa.gov/hab/phslist.htm)*

Which of the following priority habitats are within 330ft (100m) of the wetland unit? *NOTE: the connections do not have to be relatively undisturbed.*

____**Aspen Stands:** Pure or mixed stands of aspen greater than 0.4 ha (1 acre).

____**Biodiversity Areas and Corridors:** Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report p. 152*).

____**Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

____**Old-growth/Mature forests:** (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. (Mature forests) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest.

____**Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158*).

____**Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

____**Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161*).

X **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

____**Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report: pp. 167-169 and glossary in Appendix A).*

____**Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

____**Cliffs:** Greater than 7.6 m (25 ft) high and occurring below 5000 ft.

____**Talus:** Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

____**Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long.

If wetland has **3 or more** priority habitats = **4 points**
If wetland has **2** priority habitats = **3 points**
If wetland has **1** priority habitat = **1 point** No habitats = 0 points

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)

Wetland name or number A

H 2.4 Wetland Landscape *(choose the **one** description of the landscape around the wetland that best fits) (see p. 84)* There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development. points = 5 The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within ½ mile points = 5 There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed points = 3 The wetland is Lake-fringe on a lake with disturbance and there are 3 other lake-fringe wetland within ½ mile points = 3 There is at least 1 wetland within ½ mile. points = 2 There are no wetlands within ½ mile. points = 0	3
H 2. TOTAL Score - opportunity for providing habitat *Add the scores from H2.1,H2.2, H2.3, H2.4*	10
TOTAL for H 1 from page 14	6
Total Score for Habitat Functions – add the points for H 1, H 2 and record the result on p. 1	16

Wetland name or number B/C

WETLAND RATING FORM – WESTERN WASHINGTON

Version 2 - Updated July 2006 to increase accuracy and reproducibility among users
Updated Oct 2008 with the new WDFW definitions for priority habitats

Name of wetland (if known): PARCELS 1180334 0000 + -0100 Date of site visit: 9/12/12

Rated by ALTMANN Trained by Ecology? Yes ✓ No___ Date of training 03/08

SEC: 3 TWNSHP: 18N RNGE: 1W Is S/T/R in Appendix D? Yes___ No X

Map of wetland unit: Figure ____ Estimated size _____

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I___ II X III___ IV___

Category I = Score >=70
Category II = Score 51-69
Category III = Score 30-50
Category IV = Score <30

Score for Water Quality Functions	30
Score for Hydrologic Functions	16
Score for Habitat Functions	21
TOTAL score for Functions	67

Category based on SPECIAL CHARACTERISTICS of wetland

I___ II___ Does not Apply X

Final Category (choose the "highest" category from above) **II**

Summary of basic information about the wetland unit

Wetland Unit has Special Characteristics		Wetland HGM Class used for Rating	
Estuarine		Depressional	X
Natural Heritage Wetland		Riverine	X -OFF-SITE
Bog		Lake-fringe	
Mature Forest		Slope	X
Old Growth Forest		Flats	
Coastal Lagoon		Freshwater Tidal	
Interdunal			
None of the above	X	Check if unit has multiple HGM classes present	X

Wetland name or number B/C

D	Depressional and Flats Wetlands WATER QUALITY FUNCTIONS - Indicators that the wetland unit functions to improve water quality	Points (only score per box)
D	**D 1. Does the wetland unit have the potential to improve water quality?**	*(see p.38)*
D	D 1.1 Characteristics of surface water flows out of the wetland: Unit is a depression with no surface water leaving it (no outlet) points = 3 Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) points = 1 Unit is a "flat" depression (Q. 7 on key), or in the Flats class, with permanent surface outflow **and no obvious natural outlet** and/or outlet is a man-made ditch points = 1 *(If ditch is not permanently flowing treat unit as "intermittently flowing")* Provide photo or drawing	Figure 2
D	S 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic *(use NRCS definitions)* YES points = 4 NO points = 0	4
D	D 1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest Cowardin class) Wetland has persistent, ungrazed, vegetation > = 95% of area points = 5 Wetland has persistent, ungrazed, vegetation > = 1/2 of area points = 3 Wetland has persistent, ungrazed vegetation > = 1/10 of area points = 1 Wetland has persistent, ungrazed vegetation <1/10 of area points = 0 Map of Cowardin vegetation classes	Figure 5
D	D1.4 Characteristics of seasonal ponding or inundation. *This is the area of the wetland unit that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 yrs.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0 Map of Hydroperiods	Figure 4
D	**Total for D 1** *Add the points in the boxes above*	15
D	**D 2. Does the wetland unit have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* — Grazing in the wetland or within 150 ft — Untreated stormwater discharges to wetland — Tilled fields or orchards within 150 ft of wetland X A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging — Residential, urban areas, golf courses are within 150 ft of wetland — Wetland is fed by groundwater high in phosphorus or nitrogen — Other_____ YES multiplier is 2 NO multiplier is 1	*(see p. 44)* multiplier 2
D	**TOTAL - Water Quality Functions** Multiply the score from D1 by D2 *Add score to table on p. 1*	30

Wetland name or number B/C

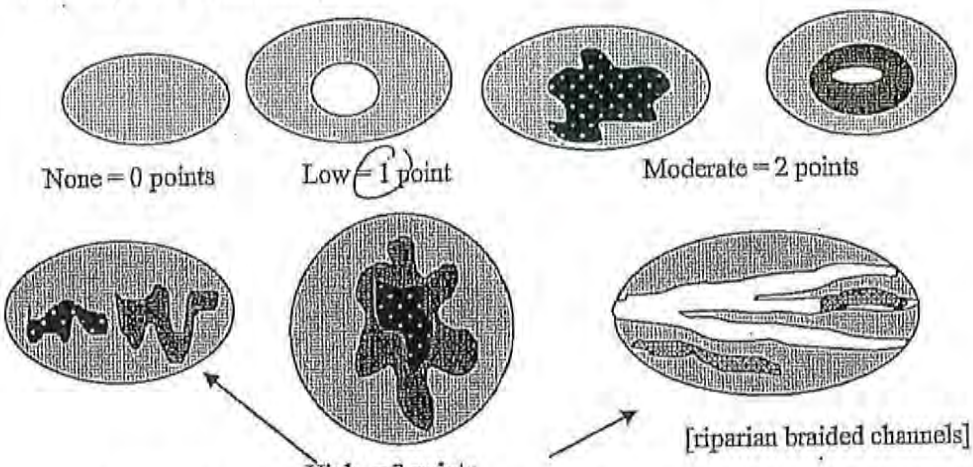
D	**Depressional and Flats Wetlands** HYDROLOGIC FUNCTIONS – Indicators that the wetland unit functions to reduce flooding and stream degradation	**Points** (only 1 score per box)
	D 3. Does the wetland unit have the potential to reduce flooding and erosion?	*(see p.40)*
D	D 3.1 Characteristics of surface water flows out of the wetland unit Unit is a depression with no surface water leaving it (no outlet) points = 4 Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 Unit is a "flat" depression (Q. 7 on key), or in the Flats class, with permanent surface outflow and **no obvious natural** outlet and/or outlet is a man-made ditch points = 1 *(If ditch is not permanently flowing treat unit as "intermittently flowing")* Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) points = 0	2
D	D 3.2 Depth of storage during wet periods *Estimate the height of ponding above the bottom of the outlet. For units with no outlet measure from the surface of permanent water or deepest part (if dry).* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 The wetland is a "headwater" wetland" points = 5 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 Unit is flat (yes to Q. 2 or Q. 7 on key) but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft points = 0	3
D	D 3.3 Contribution of wetland unit to storage in the watershed *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* The area of the basin is less than 10 times the area of unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 Entire unit is in the FLATS class points = 5	3
D	**Total for D 3** *Add the points in the boxes above*	8
D	**D 4. Does the wetland unit have the opportunity to reduce flooding and erosion?** Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. Answer NO if the water coming into the wetland is controlled by a structure such as flood gate, tide gate, flap valve, reservoir etc. OR you estimate that more than 90% of the water in the wetland is from groundwater in areas where damaging groundwater flooding does not occur. *Note which of the following indicators of opportunity apply.* — Wetland is in a headwater of a river or stream that has flooding problems X Wetland drains to a river or stream that has flooding problems — Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems — Other_____ **YES** multiplier is 2 **NO** multiplier is 1	*(see p. 49)* multiplier 2
D	**TOTAL - Hydrologic Functions** Multiply the score from D 3 by D 4 *Add score to table on p. 1*	16

Wetland name or number B/C

These questions apply to wetlands of all HGM classes: HABITAT FUNCTIONS - Indicators that unit functions to provide important habitat	Points (only score per box)
H 1. Does the wetland unit have the potential to provide habitat for many species?	
H 1.1 Vegetation structure *(see p. 72)* *Check the types of vegetation classes present (as defined by Cowardin)- Size threshold for each class is ¼ acre or more than 10% of the area if unit is smaller than 2.5 acres.* __ Aquatic bed X Emergent plants __ Scrub/shrub (areas where shrubs have >30% cover) X Forested (areas where trees have >30% cover) *If the unit has a forested class check if:* X The forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the forested polygon *Add the number of vegetation structures that qualify. If you have:* 4 structures or more — points = 4 3 structures — points = 2 2 structures — points = 1 1 structure — points = 0 Map of Cowardin vegetation classes	Figure 2
H 1.2. Hydroperiods *(see p. 73)* *Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ acre to count. (see text for descriptions of hydroperiods)* __ Permanently flooded or inundated X Seasonally flooded or inundated __ Occasionally flooded or inundated X Saturated only X Permanently flowing stream or river in, or adjacent to, the wetland X Seasonally flowing stream in, or adjacent to, the wetland __ ***Lake-fringe wetland* = 2 points** __ ***Freshwater tidal wetland* = 2 points** 4 or more types present — points = 3 3 types present — points = 2 2 types present — point = 1 1 type present — points = 0 Map of hydroperiods	Figure 2
H 1.3. Richness of Plant Species *(see p. 75)* Count the number of plant species in the wetland that cover at least 10 ft². *(different patches of the same species can be combined to meet the size threshold)* *You do not have to name the species.* *Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle* If you counted: > 19 species — points = 2 5 - 19 species — points = 1 < 5 species — points = 0 *List species below if you want to:*	2

Total for page 6

Wetland name or number B/C

	Figure
H 1.4. Interspersion of habitats *(see p. 76)* Decide from the diagrams below whether interspersion between Cowardin vegetation classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.  None = 0 points Low = 1 point Moderate = 2 points High = 3 points [riparian braided channels] NOTE: If you have four or more classes or three vegetation classes and open water the rating is always "high". Use map of Cowardin vegetation classes	1
H 1.5. Special Habitat Features: *(see p. 77)* *Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.* X Large, downed, woody debris within the wetland (>4in. diameter and 6 ft long). X Standing snags (diameter at the bottom > 4 inches) in the wetland X Undercut banks are present for at least 6.6 ft (2m) and/or overhanging vegetation extends at least 3.3 ft (1m) over a stream (or ditch) in, or contiguous with the unit, for at least 33 ft (10m) ___ Stable steep banks of fine material that might be used by beaver or muskrat for denning (>30degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet turned grey/brown)* X At least ¼ acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* ___ Invasive plants cover less than 25% of the wetland area in each stratum of plants *NOTE: The 20% stated in early printings of the manual on page 78 is an error.*	4
H 1. TOTAL Score - potential for providing habitat *Add the scores from H1.1, H1.2, H1.3, H1.4, H1.5*	11

Comments

Wetland name or number B/C

H 2. Does the wetland unit have the opportunity to provide habitat for many species?	Figure
H 2.1 Buffers *(see p. 80)* *Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed."* — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference. No structures are within the undisturbed part of buffer. (relatively undisturbed also means no-grazing, no landscaping, no daily human use) **Points = 5** — 100 m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference. **Points = 4** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference. **Points = 4** — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference, . **Points = 3** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference. **Points = 3** **If buffer does not meet any of the criteria above** — No paved areas (except paved trails) or buildings within 25 m (80ft) of wetland > 95% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — No paved areas or buildings within 50m of wetland for >50% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — Heavy grazing in buffer. **Points = 1** — Vegetated buffers are <2m wide (6.6ft) for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland **Points = 0.** — Buffer does not meet any of the criteria above. **Points = 1** Aerial photo showing buffers	4
H 2.2 Corridors and Connections *(see p. 81)* H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft wide, has at least 30% cover of shrubs, forest or native undisturbed prairie, that connects to estuaries, other wetlands or undisturbed uplands that are at least 250 acres in size? *(dams in riparian corridors, heavily used gravel roads, paved roads, are considered breaks in the corridor)* YES = **4 points** *(go to H 2.3)* NO = go to H 2.2.2 H 2.2.2 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 50ft wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands or undisturbed uplands that are at least 25 acres in size? **OR a Lake-fringe** wetland, if it does not have an undisturbed corridor as in the question above? YES = **2 points** *(go to H 2.3)* NO = H 2.2.3 H 2.2.3 Is the wetland: within 5 mi (8km) of a brackish or salt water estuary OR within 3 mi of a large field or pasture (>40 acres) OR within 1 mi of a lake greater than 20 acres? YES = **1 point** NO = **0 points**	2

Total for page 6

Wetland name or number B/C

H 2.3 Near or adjacent to other priority habitats listed by WDFW *(see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report http://wdfw.wa.gov/hab/phslist.htm)* Which of the following priority habitats are within 330ft (100m) of the wetland unit? *NOTE: the connections do not have to be relatively undisturbed.* ____**Aspen Stands:** Pure or mixed stands of aspen greater than 0.4 ha (1 acre). ____**Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife *(full descriptions in WDFW PHS report p. 152)*. ____**Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock. ____**Old-growth/Mature forests:** (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. (Mature forests) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest. ____**Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important *(full descriptions in WDFW PHS report p. 158)*. ____**Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other. ____**Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie *(full descriptions in WDFW PHS report p. 161)*. X **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources. ____**Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. *(full descriptions of habitats and the definition of relatively undisturbed are in WDFW report: pp. 167-169 and glossary in Appendix A)*. ____**Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human. ____**Cliffs:** Greater than 7.6 m (25 ft) high and occurring below 5000 ft. ____**Talus:** Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs. ____**Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long. If wetland has **3 or more** priority habitats = **4 points** If wetland has **2** priority habitats = **3 points** If wetland has **1** priority habitat = **1 point** No habitats = 0 points *Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)*	

Wetland name or number B/C

H 2.4 Wetland Landscape *(choose the one description of the landscape around the wetland that best fits) (see p. 84)* There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development. points = 5 The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within ½ mile points = 5 There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed points = 3 The wetland is Lake-fringe on a lake **with** disturbance and there are 3 other lake-fringe wetland within ½ mile points = 3 There is at least 1 wetland within ½ mile. points = 2 There are no wetlands within ½ mile. points = 0	3
H 2. TOTAL Score - opportunity for providing habitat *Add the scores from H2.1, H2.2, H2.3, H2.4*	10
TOTAL for H 1 from page 14	11
Total Score for Habitat Functions – add the points for H 1, H 2 and record the result on p. 1	21

Wetland name or number D

WETLAND RATING FORM – WESTERN WASHINGTON

Version 2 - Updated July 2006 to increase accuracy and reproducibility among users
Updated Oct 2008 with the new WDFW definitions for priority habitats

Name of wetland (if known): PARCEL 1180334 0000 Date of site visit: 9/12/12

Rated by ALTMANN Trained by Ecology? Yes X No___ Date of training 03/08

SEC: 3 TWNSHP: 18N RNGE: 1W Is S/T/R in Appendix D? Yes___ No X

Map of wetland unit: Figure ____ Estimated size _____

SUMMARY OF RATING

Category based on FUNCTIONS provided by wetland

I___ II___ III X IV___

Category I = Score >=70
Category II = Score 51-69
Category III = Score 30-50
Category IV = Score < 30

Score for Water Quality Functions	12
Score for Hydrologic Functions	14
Score for Habitat Functions	14
TOTAL score for Functions	40

Category based on SPECIAL CHARACTERISTICS of wetland

I___ II___ Does not Apply X

Final Category (choose the "highest" category from above) **III**

Summary of basic information about the wetland unit

Wetland Unit has Special Characteristics		Wetland HGM Class used for Rating	
Estuarine		Depressional	X
Natural Heritage Wetland		Riverine	
Bog		Lake-fringe	
Mature Forest		Slope	
Old Growth Forest		Flats	
Coastal Lagoon		Freshwater Tidal	
Interdunal			
None of the above	X	Check if unit has multiple HGM classes present	

Wetland name or number D

	Depressional and Flats Wetlands WATER QUALITY FUNCTIONS - Indicators that the wetland unit functions to improve water quality	Points (only 1 score per box)
D	**D 1. Does the wetland unit have the potential to improve water quality?**	*(see p.38)*
D	D 1.1 Characteristics of surface water flows out of the wetland: Unit is a depression with no surface water leaving it (no outlet) points = 3 Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) points = 1 Unit is a "flat" depression (Q. 7 on key), or in the Flats class, with permanent surface outflow **and no obvious natural outlet** and/or outlet is a man-made ditch points = 1 *(If ditch is not permanently flowing treat unit as "intermittently flowing")* Provide photo or drawing	Figure 3
D	S 1.2 The soil 2 inches below the surface (or duff layer) is clay or organic *(use NRCS definitions)* YES points = 4 NO points = 0	0
D	D 1.3 Characteristics of persistent vegetation (emergent, shrub, and/or forest Cowardin class) Wetland has persistent, ungrazed, vegetation >= 95% of area points = 5 Wetland has persistent, ungrazed, vegetation >= 1/2 of area points = 3 Wetland has persistent, ungrazed vegetation >= 1/10 of area points = 1 Wetland has persistent, ungrazed vegetation <1/10 of area points = 0 Map of Cowardin vegetation classes	Figure 5
D	D1.4 Characteristics of seasonal ponding or inundation. *This is the area of the wetland unit that is ponded for at least 2 months, but dries out sometime during the year. Do not count the area that is permanently ponded. Estimate area as the average condition 5 out of 10 yrs.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0 Map of Hydroperiods	Figure 4
D	**Total for D 1** *Add the points in the boxes above*	12
D	**D 2. Does the wetland unit have the opportunity to improve water quality?** Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. *Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.* — Grazing in the wetland or within 150 ft — Untreated stormwater discharges to wetland — Tilled fields or orchards within 150 ft of wetland — A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging — Residential, urban areas, golf courses are within 150 ft of wetland — Wetland is fed by groundwater high in phosphorus or nitrogen — Other_____ YES multiplier is 2 NO multiplier is 1	*(see p. 44)* multiplier 1
D	**TOTAL - Water Quality Functions** Multiply the score from D1 by D2 *Add score to table on p. 1*	12

Wetland name or number D

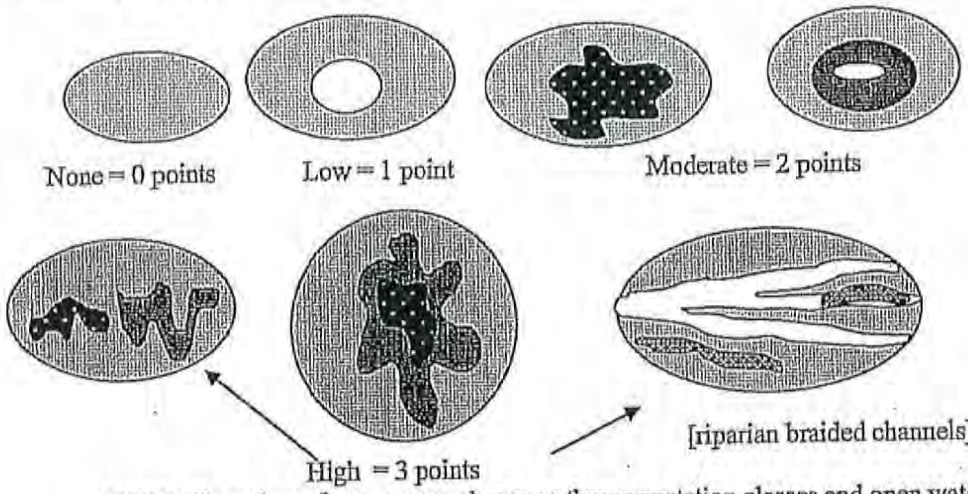
	D Depressional and Flats Wetlands HYDROLOGIC FUNCTIONS - Indicators that the wetland unit functions to reduce flooding and stream degradation	Points (only 1 score per box)
	D 3. Does the wetland unit have the potential to reduce flooding and erosion?	*(see p.46)*
D	D 3.1 Characteristics of surface water flows out of the wetland unit Unit is a depression with no surface water leaving it (no outlet) points = 4 Unit has an intermittently flowing, OR highly constricted permanently flowing outlet points = 2 Unit is a "flat" depression (Q. 7 on key), or in the Flats class, with permanent surface outflow and **no obvious natural outlet** and/or outlet is a man-made ditch points = 1 *(If ditch is not permanently flowing treat unit as "intermittently flowing")* Unit has an unconstricted, or slightly constricted, surface outlet (*permanently flowing*) points = 0	4
D	D 3.2 Depth of storage during wet periods *Estimate the height of ponding above the bottom of the outlet. For units with no outlet measure from the surface of permanent water or deepest part (if dry).* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 The wetland is a "headwater" wetland" points = 5 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 Unit is flat (yes to Q. 2 or Q. 7 on key) but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft points = 0	0
D	D 3.3 Contribution of wetland unit to storage in the watershed *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* The area of the basin is less than 10 times the area of unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 Entire unit is in the FLATS class points = 5	3
D	**Total for D 3** *Add the points in the boxes above*	7
D	**D 4. Does the wetland unit have the opportunity to reduce flooding and erosion?** Answer YES if the unit is in a location in the watershed where the flood storage, or reduction in water velocity, it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. Answer NO if the water coming into the wetland is controlled by a structure such as flood gate, tide gate, flap valve, reservoir etc. OR you estimate that more than 90% of the water in the wetland is from groundwater in areas where damaging groundwater flooding does not occur. *Note which of the following indicators of opportunity apply.* — Wetland is in a headwater of a river or stream that has flooding problems — Wetland drains to a river or stream that has flooding problems — Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems — Other_____ **YES** multiplier is 2 **NO** multiplier is 1	*(see p. 49)* multiplier 2
D	**TOTAL - Hydrologic Functions** Multiply the score from D 3 by D 4 ***Add score to table on p. 1***	14

Wetland name or number D

These questions apply to wetlands of all HGM classes. HABITAT FUNCTIONS - Indicators that unit functions to provide important habitat	Points (only 1 score per box)
H 1. Does the wetland unit have the potential to provide habitat for many species?	
H 1.1 Vegetation structure *(see p. 72)* *Check the types of vegetation classes present (as defined by Cowardin)- Size threshold for each class is ¼ acre or more than 10% of the area if unit is smaller than 2.5 acres.* ____ Aquatic bed ____ Emergent plants ____ Scrub/shrub (areas where shrubs have >30% cover) X Forested (areas where trees have >30% cover) *If the unit has a forested class check if:* X The forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the forested polygon *Add the number of vegetation structures that qualify. If you have:* 4 structures or more — points = 4 3 structures — points = 2 2 structures — points = 1 1 structure — points = 0 Map of Cowardin vegetation classes	Figure 1
H 1.2. Hydroperiods *(see p. 73)* *Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ acre to count. (see text for descriptions of hydroperiods)* ____ Permanently flooded or inundated ____ Seasonally flooded or inundated X Occasionally flooded or inundated X Saturated only ____ Permanently flowing stream or river in, or adjacent to, the wetland ____ Seasonally flowing stream in, or adjacent to, the wetland ____ ***Lake-fringe wetland* = 2 points** ____ ***Freshwater tidal wetland* = 2 points** 4 or more types present — points = 3 3 types present — points = 2 2 types present — point = 1 1 type present — points = 0 Map of hydroperiods	Figure 1
H 1.3. Richness of Plant Species *(see p. 75)* Count the number of plant species in the wetland that cover at least 10 ft². *(different patches of the same species can be combined to meet the size threshold)* *You do not have to name the species.* *Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Canadian Thistle* If you counted: > 19 species — points = 2 5 - 19 species — points = 1 < 5 species — points = 0 *List species below if you want to:*	0

Total for page 2

Wetland name or number D

	Figure
H 1.4. Interspersion of habitats *(see p. 76)* Decide from the diagrams below whether interspersion between Cowardin vegetation classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.  None = 0 points Low = 1 point Moderate = 2 points High = 3 points [riparian braided channels] NOTE: If you have four or more classes or three vegetation classes and open water the rating is always "high". Use map of Cowardin vegetation classes	0
H 1.5. Special Habitat Features: *(see p. 77)* *Check the habitat features that are present in the wetland. The number of checks is the number of points you put into the next column.* ____Large, downed, woody debris within the wetland (>4in. diameter and 6 ft long). ____Standing snags (diameter at the bottom > 4 inches) in the wetland ____Undercut banks are present for at least 6.6 ft (2m) and/or overhanging vegetation extends at least 3.3 ft (1m) over a stream (or ditch) in, or contiguous with the unit, for at least 33 ft (10m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (>30degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet turned grey/brown)* ____At least ¼ acre of thin-stemmed persistent vegetation or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* X Invasive plants cover less than 25% of the wetland area in each stratum of plants *NOTE: The 20% stated in early printings of the manual on page 78 is an error.*	1
H 1. TOTAL Score - potential for providing habitat *Add the scores from H1.1, H1.2, H1.3, H1.4, H1.5*	3

Comments

Wetland name or number D

H 2. Does the wetland unit have the opportunity to provide habitat for many species?	Figure
H 2.1 Buffers *(see p. 80)* *Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed."* — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% of circumference. No structures are within the undisturbed part of buffer. (relatively undisturbed also means no-grazing, no landscaping, no daily human use) **Points = 5** — 100 m (330 ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 50% circumference. **Points = 4** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water >95% circumference. **Points = 4** — 100 m (330ft) of relatively undisturbed vegetated areas, rocky areas, or open water > 25% circumference, . **Points = 3** — 50 m (170ft) of relatively undisturbed vegetated areas, rocky areas, or open water for > 50% circumference. **Points = 3** **If buffer does not meet any of the criteria above** — No paved areas (except paved trails) or buildings within 25 m (80ft) of wetland > 95% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — No paved areas or buildings within 50m of wetland for >50% circumference. Light to moderate grazing, or lawns are OK. **Points = 2** — Heavy grazing in buffer. **Points = 1** — Vegetated buffers are <2m wide (6.6ft) for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland **Points = 0.** — Buffer does not meet any of the criteria above. **Points = 1** Aerial photo showing buffers	5
H 2.2 Corridors and Connections *(see p. 81)* H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 150 ft wide, has at least 30% cover of shrubs, forest or native undisturbed prairie, that connects to estuaries, other wetlands or undisturbed uplands that are at least 250 acres in size? *(dams in riparian corridors, heavily used gravel roads, paved roads, are considered breaks in the corridor)* YES = **4 points** *(go to H 2.3)* NO = go to H 2.2.2 H 2.2.2 Is the wetland part of a relatively undisturbed and unbroken vegetated corridor (either riparian or upland) that is at least 50ft wide, has at least 30% cover of shrubs or forest, and connects to estuaries, other wetlands or undisturbed uplands that are at least 25 acres in size? **OR** a **Lake-fringe** wetland, if it does not have an undisturbed corridor as in the question above? YES = **2 points** *(go to H 2.3)* NO = H 2.2.3 H 2.2.3 Is the wetland: within 5 mi (8km) of a brackish or salt water estuary OR within 3 mi of a large field or pasture (>40 acres) OR within 1 mi of a lake greater than 20 acres? YES = **1 point** NO = **0 points**	2

Total for page 7

Wetland name or number D

H 2.3 Near or adjacent to other priority habitats listed by WDFW *(see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report http://wdfw.wa.gov/hab/phslist.htm)*

Which of the following priority habitats are within 330ft (100m) of the wetland unit? *NOTE: the connections do not have to be relatively undisturbed.*

____**Aspen Stands:** Pure or mixed stands of aspen greater than 0.4 ha (1 acre).

____**Biodiversity Areas and Corridors:** Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report p. 152*).

____**Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

____**Old-growth/Mature forests:** (Old-growth west of Cascade crest) Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 20 trees/ha (8 trees/acre) > 81 cm (32 in) dbh or > 200 years of age. (Mature forests) Stands with average diameters exceeding 53 cm (21 in) dbh; crown cover may be less that 100%; crown cover may be less that 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80 - 200 years old west of the Cascade crest.

____**Oregon white Oak:** Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158*).

____**Riparian:** The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

____**Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161*).

_X_**Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

____**Nearshore:** Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report: pp. 167-169 and glossary in Appendix A).*

____**Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

____**Cliffs:** Greater than 7.6 m (25 ft) high and occurring below 5000 ft.

____**Talus:** Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

____**Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 51 cm (20 in) in western Washington and are > 2 m (6.5 ft) in height. Priority logs are > 30 cm (12 in) in diameter at the largest end, and > 6 m (20 ft) long.

If wetland has **3 or more** priority habitats = **4 points**
If wetland has **2** priority habitats = **3 points**
If wetland has **1** priority habitat = **1 point** No habitats = 0 points

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in question H 2.4)

Wetland name or number D

H 2.4 Wetland Landscape *(choose the **one** description of the landscape around the wetland that best fits) (see p. 84)* There are at least 3 other wetlands within ½ mile, and the connections between them are relatively undisturbed (light grazing between wetlands OK, as is lake shore with some boating, but connections should NOT be bisected by paved roads, fill, fields, or other development. points = 5 The wetland is Lake-fringe on a lake with little disturbance and there are 3 other lake-fringe wetlands within ½ mile points = 5 There are at least 3 other wetlands within ½ mile, BUT the connections between them are disturbed points = 3 The wetland is Lake-fringe on a lake **with** disturbance and there are 3 other lake-fringe wetland within ½ mile points = 3 There is at least 1 wetland within ½ mile. points = 2 There are no wetlands within ½ mile. points = 0	3
H 2. TOTAL Score - opportunity for providing habitat *Add the scores from H2.1,H2.2, H2.3, H2.4*	11
TOTAL for H 1 from page 14	3
Total Score for Habitat Functions – add the points for H 1, H 2 and record the result on p. 1	14

The Riley Group, Inc.

GEOTECHNICAL ENGINEERING REPORT

PREPARED BY:

THE RILEY GROUP, INC.
17522 BOTHELL WAY NORTHEAST
BOTHELL, WASHINGTON 98011

PREPARED FOR:

GATEWAY 850, LLC
15 LAKE BELLEVUE DRIVE, SUITE 102
BELLEVUE, WASHINGTON 98005

RGI PROJECT NO. 2012-545

GEOTECHNICAL ENGINEERING REPORT

GATEWAY RESIDENTIAL
BRITTON PARKWAY NORTHEAST
AND GATEWAY BOULEVARD
LACEY, WASHINGTON

DECEMBER 14, 2012

The Riley Group, Inc.

December 14, 2012

Mr. Kevin O'Brien
Gateway 850, LLC
15 Lake Bellevue Drive, Suite 102
Bellevue, Washington 98005

Subject: **Geotechnical Engineering Report**
Gateway Residential
Britton Parkway Northeast and Gateway Boulevard
Lacey, Washington
Project No. 2012-545

Dear Mr. O'Brien:

As requested, The Riley Group, Inc. (RGI) has performed a Geotechnical Engineering Report (GER) for the Gateway Residential located at Britton Parkway Northeast and Gateway Boulevard, Lacey, Washington. Our services were completed in accordance with our proposal PRP2012-366 dated October 31, 2012 and authorized on November 15, 2012. The information in this GER is based on our understanding of the proposed construction, and the soil and groundwater conditions encountered in the test pits completed by RGI at the site on December 4, 2012.

RGI recommends that you submit the project plans and specifications to RGI for a general review so that we may confirm that the recommendations in this GER are interpreted and implemented properly in the construction documents. RGI also recommends that a representative of our firm be present on site during portions of the project construction to confirm that the soil and groundwater conditions are consistent with those that form the basis for the engineering recommendations in this GER.

If you have any questions or require additional information, please contact us.

Respectfully submitted,

THE RILEY GROUP, INC.

State of Washington
2698
Licensed Geologist
ERIC L. WOODS
12/14/12

Eric L. Woods, LG
Project Geologist

KRISTINA MARIE WELLER
STATE OF WASHINGTON
33182
REGISTERED
PROFESSIONAL ENGINEER
12/14/12

Kristina M. Weller, PE
Senior Project Engineer

TABLE OF CONTENTS

1.0 INTRODUCTION **1**

2.0 PROJECT DESCRIPTION **1**

3.0 FIELD EXPLORATION AND LABORATORY TESTING **1**
3.1 FIELD EXPLORATION 1
3.2 LABORATORY TESTING 2

4.0 SITE CONDITIONS **2**
4.1 SURFACE 2
4.2 GEOLOGY 2
4.3 SOIL MAPS 3
4.4 SOILS 3
4.5 GROUNDWATER 3
4.6 SEISMIC CONSIDERATIONS 4
4.7 GEOLOGICALLY SENSITIVE AREAS 5

5.0 DISCUSSION AND RECOMMENDATIONS **5**
5.1 GEOTECHNICAL CONSIDERATIONS 5
5.2 EARTHWORK 5
5.2.1 Erosion and Sediment Control 5
5.2.2 Stripping 6
5.2.3 Excavations 6
5.2.4 Site Preparation 7
5.2.5 Structural Fill 8
5.2.6 Cut and Fill Slopes 9
5.2.7 Wet Weather Construction Considerations 10
5.3 FOUNDATIONS 10
5.4 RETAINING WALLS 11
5.5 ROCKERY WALLS 12
5.6 SLAB-ON-GRADE CONSTRUCTION 12
5.7 DRAINAGE 12
5.7.1 Surface 12
5.7.2 Subsurface 12
5.7.3 Infiltration 12
5.8 UTILITIES 13
5.9 PAVEMENTS 13

6.0 ADDITIONAL SERVICES **14**

7.0 LIMITATIONS **14**

LIST OF FIGURES AND APPENDICES

Figure 1 ..... *Site Vicinity Map*
Figure 2 ..... *Geotechnical Exploration Plan*
Figure 3 ..... *Typical Retaining Wall Drainage Detail*
Figure 4 ..... *Typical Footing Drain Detail*

Appendix A ..... *Field Exploration and Laboratory Testing*

Executive Summary

This Executive Summary should be used in conjunction with the entire Geotechnical Engineering Report (GER) for design and/or construction purposes. It should be recognized that specific details were not included or fully developed in this section, and the GER must be read in its entirety for a comprehensive understanding of the items contained herein. Section 7.0 should be read for an understanding of limitations.

RGI's geotechnical scope of work included the advancement of 15 test pits to approximate depths of 5 to 15 feet below existing site grades.

Based on the information obtained from our subsurface exploration, the site is suitable for development of the proposed project. The following geotechnical considerations were identified:

Soil Conditions: The soils encountered during our field exploration vary across the site. The soils on the eastern quarter of the site in test pit TP-1 through TP-4 consist of loose to very dense silty sand with variable amounts of gravel. The soils in the central portion of the site in test pits TP-5 through TP-10 consist of one to two feet of loose silty sand underlain by sandy gravel and sand with variable amounts of silt and gravel. Occasional lenses of silty sand and sandy silt were encountered and the sand and gravel is underlain by silty sand or silt in most locations. The depth to the silt or silty sand varied from about 6 feet in test pit TP-5 to 14 feet in test pits TP-7 and TP-9. The soils encountered on the western sloped portion of the site in test pits TP-11 through TP-15 consist of 2 to 5 feet of loose to medium dense silty sand underlain by medium dense sand with variable amounts of gravel, stiff silt, sand with silt, and gravelly sand with silt.

Groundwater: Light to moderate groundwater seepage was encountered from the surface to 4.5 feet below the surface during our subsurface investigation over most of the site. On the south portion in test pits TP-6 and TP-8 moderate seepage or wet soil were encountered at 7.5 to 14 feet below grade. Groundwater was not encountered in test pits TP-7, TP-9, TP-10, TP-14 and TP-15 to the depth of the test pits at 8 to 10 feet, however, we expect groundwater will be encountered in these areas at 10 to 14 feet below grade. The groundwater is perched over the top of less permeable till layers across the site.

Foundations: Foundations for the proposed residential buildings may be supported on conventional spread footings bearing on medium dense to dense native soil or structural fill.

Slab-on-grade: Slab-on-grade floors and slabs for the proposed buildings can be supported on medium dense to dense native soil or structural fill.

Storm water: Soils suitable for infiltration were encountered in the south central portion of the site. Shallow seepage was encountered over the other areas of the site.

Pavements: The following paving sections are specified in the City of Lacey development guidelines. These sections may be modified based on site specific design and testing.

- **For site roadways classified as Major Local Residential**: 4 inches of asphalt concrete (AC) over 2 inches of crushed surfacing top course (CSTC) and 15 inches of crushed rock base (CRB)
- **For site roadways classified as Minor Local Residential and Private**: 4 inches of AC over 2 inches of CSTC and 9 inches of CRB

1.0 Introduction

This Geotechnical Engineering Report (GER) presents the results of the geotechnical engineering services provided for the Gateway Residential in Lacey, Washington. The purpose of this evaluation is to assess subsurface conditions and provide geotechnical recommendations for the construction of a residential plat including single and multi-family buildings and associated infrastructure. Our scope of services included field explorations, laboratory testing, engineering analyses, and preparation of this GER.

The recommendations in the following sections of this GER are based upon our current understanding of the proposed site development as outlined below. If actual features vary or changes are made, RGI should review them in order to modify our recommendations as required. In addition, RGI requests to review the site grading plan, final design drawings and specifications when available to verify that our project understanding is correct and that our recommendations have been properly interpreted and incorporated into the project design and construction.

2.0 Project description

The project site is located northwest of the intersection of Britton Parkway Northeast and Gateway Boulevard in Lacey, Washington. The approximate location of the site is shown on Figure 1.

The site is currently undeveloped. RGI understands it is proposed to develop the site with a mix of multi and single family residences. Mass grading of the site and infrastructure consisting of roadways, underground utilities and stormwater facilities will completed prior to building construction.

At the time of preparing this GER, development plans were not available for our review. Based on our experience with similar construction, RGI anticipates that the proposed building will be supported on perimeter walls with bearing loads of 2 to 4 kips per linear foot, and a series of columns with a maximum load up to 50 kips. Slab-on-grade floor loading of 150 to 250 pounds per square foot (psf) are expected.

3.0 Field Exploration and Laboratory Testing

3.1 Field Exploration

On December 4, 2012, RGI observed the excavation of 15 test pits. The approximate exploration locations are shown on Figure 2.

Field logs of each exploration were prepared by the geologist that continuously observed the excavation. These logs included visual classifications of the materials encountered during excavation as well as our interpretation of the subsurface conditions between samples. The test pits logs included in Appendix A represent an interpretation of the field

logs and include modifications based on laboratory observation and analysis of the samples.

3.2 LABORATORY TESTING

During the field investigation, a representative portion of each recovered sample was sealed in containers and transported to our laboratory for further visual and laboratory examination. Selected samples retrieved from the test pits were tested for moisture content and grain size analysis to aid in soil classification and provide input for the recommendations provided in this GER. The results and descriptions of the laboratory tests are enclosed in Appendix A.

4.0 Site Conditions

4.1 SURFACE

The subject site is consists of three parcels and is approximately 22.6 acres in size. The site is bound to the north and east by undeveloped land, to the west by residential property, and to the south by Britton Parkway Northeast and undeveloped property.

The existing site is undeveloped and covered by trees and associated underbrush. The site slopes down from the northeast corner of the site to the east and south. The eastern two parcels slope off to the south and west from a ridge that extends from the northeast corner to the southwest at gradients of 5 percent or less. The grade steepens on the western portion to approximately 10 percent. The grade continues to slope to the west on the western parcel with gradients of 10 to 25 percent.

Two wetlands are mapped extending on to the site from the western boundary in the low areas of the sloping ground. The wetlands and the topography are shown on Figure 2.

4.2 GEOLOGY

Review of the *Geologic Map of the Lacey 7.5 Minute Quadrangle, Thurston County, Washington,* by Robert L. Logan, etc. (2003) indicates that the soil on the majority of the site and surrounding areas is mapped as Vashon till (Qgt), which is a highly compacted mixture of clay, silt, sand, and gravel deposited directly by the glacier ice. The soil is generally gray where fresh and light yellowish brown where stained, unsorted and in most exposures of very low permeability.

Vashon recessional outwash is mapped to the south and east of the site and may extend on to the southeast portion of the site. Latest Vashon recessional sand and minor silt (Qgos) is mapped on the western portion of the site. These descriptions are generally similar to the findings in our field explorations.

4.3 SOIL MAPS

The *Soil Survey of Thurston County Washington* prepared by the United States Department of Agriculture Soil Conservation Service mapping of the site includes Alderwood gravelly sandy loam, 3 to 15 percent over the majority of the central and eastern portion of the site. Everett very gravelly sandy loam, 3 to 15 percent slopes and Spanaway gravelly sandy loam, 0 to 3 percent slopes are also mapped on the southern portion of the site adjacent to Britton Parkway. The western side of the site is mapped as Indianola loamy sand, 3 to 15 percent slopes; Giles silt loam, 3 to 15 percent slope; and Bellingham silty clay loam. The runoff is slow and the erosion hazard is slight for the mapped soils.

4.4 SOILS

The soils encountered during our field exploration vary across the site. The soils on the eastern quarter of the site in test pit TP-1 though TP-4 consist of loose to very dense silty sand with variable amounts of gravel. The soils in the central portion of the site in test pits TP-5 through TP-10 consist of 1 to 2 feet of loose silty sand underlain by sandy gravel and sand with variable amounts of silt and gravel. Occasional lenses of silty sand and sandy silt were encountered and the sand and gravel is underlain by silty sand or silt in most locations. The depth to the silt or silty sand varied from about 6 feet in test pit TP-5 to 14 feet in test pits TP-7 and TP-9.

The soils encountered on the western sloped portion of the site in test pits TP-11 through TP-15 consist of 2 to 5 feet of loose to medium dense silty sand underlain by medium dense sand with variable amounts of gravel, stiff silt, sand with silt, and gravelly sand with silt. The loose condition and shallow groundwater prevented exploration in the lower portions of the slope on the western end of the site.

More detailed descriptions of the subsurface conditions encountered are presented in the test pits included in Appendix A. Sieve analysis was performed on 14 selected soil samples. Grain size distribution curves are included in Appendix A.

4.5 GROUNDWATER

Light to moderate groundwater seepage was encountered from the surface to 4.5 feet below the surface during our subsurface investigation over most of the site. On the south portion in test pits TP-6 and TP-8 moderate seepage or wet soil were encountered at 7.5 to 14 feet below grade. Groundwater was not encountered in test pits TP-7, TP-9, TP-10, TP-14 and TP-15 to the depth of the test pits at 8 to 10 feet, however, we expect groundwater will be encountered in these areas at 10 to 14 feet below grade. The groundwater is perched over the top of less permeable till layers across the site.

Surface water ponding was observed in the low areas on the western portion of the site in the vicinity of the existing wetlands. Approximately 3 inches of rainfall was received in the Lacey area in the 5 days prior to our explorations.

It should be recognized that fluctuations of the groundwater table will occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the explorations were performed. In addition, perched water can develop within seams and layers contained in fill soils or higher permeability soils overlying less permeable soils following periods of heavy or prolonged precipitation. Therefore, groundwater levels during construction or at other times in the future may be higher or lower than the levels indicated on the logs. Groundwater level fluctuations should be considered when developing the design and construction plans for the project.

4.6 SEISMIC CONSIDERATIONS

Based on the 2009 International Building Code (IBC), RGI recommends the following seismic parameters for design.

Table 1 2009 IBC Seismic Design

Parameter	Value
Site Soil Class[1]	D[2]
Site Latitude	47.06689
Site Longitude	122.7916
Short Period Spectral Response Acceleration, S_s (percent g)	1.172
1-Second Period Spectral Response Acceleration, S_1 (percent g)	0.426
Seismic Coefficient, F_A	1.031
Seismic Coefficient, F_V	1.574

1. Note: In general accordance with the *2009 International Building Code,* Table 1613.5.2. IBC Site Class is based on the average characteristics of the upper 100 feet of the subsurface profile.

2. Note: The 2009 IBC requires a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope of our services does not include the required 100-foot soil profile determination. Test pits extended to a maximum depth of 15 feet, and this seismic site class definition considers that very dense soil continues below the maximum depth of the subsurface exploration. Additional exploration to deeper depths would be required to confirm the conditions below the current depth of exploration.

Liquefaction is a phenomenon where there is a reduction or complete loss of soil strength due to an increase in water pressure induced by vibrations from a seismic event. Liquefaction mainly affects geologically recent deposits of fine-grained sands that are below the groundwater table. Soils of this nature derive their strength from intergranular friction. The generated water pressure or pore pressure essentially separates the soil grains and eliminates this intergranular friction, thus reducing or eliminating the soil's strength.

RGI reviewed the results of the field and laboratory testing and assessed the potential for liquefaction of the site's soil during an earthquake. Since the site is underlain by glacial till or dense granular soils, RGI considers that the possibility of liquefaction during an earthquake is minimal.

4.7 GEOLOGICALLY SENSITIVE AREAS

Regulated geologically hazardous areas include erosion, sliding, earthquake, or other geological hazards. Based on the definition in the Lacey Municipal Code, the site does not contain geologically sensitive areas. The site does contain wetlands on the western portion of the site. A wetland and stream delineation report has been prepared by Altmann Oliver Associates, LLC.

5.0 Discussion and Recommendations

5.1 GEOTECHNICAL CONSIDERATIONS

Based on our study, the site is suitable for the proposed construction from a geotechnical standpoint. Foundations for the proposed residential buildings can be supported on conventional spread footings bearing on medium dense to dense native soil or structural fill. Slab-on-grade and pavements can be similarly supported.

Detailed recommendations regarding the above issues and other geotechnical design considerations are provided in the following sections. These recommendations should be incorporated into the final design drawings and construction specifications.

5.2 EARTHWORK

The earthwork is expected to include mass grading of the site to create building pads, roadways and storm water facilities. Utilities including water, sewer, storm and franchise utilities will be installed in the proposed road right-of-ways. The soils encountered over the majority of the site are moisture sensitive and were over the optimum moisture content at the time of our explorations. RGI recommends earthwork take place in the drier summer and fall months (July through September).

5.2.1 EROSION AND SEDIMENT CONTROL

Potential sources or causes of erosion and sedimentation depend on construction methods, slope length and gradient, amount of soil exposed and/or disturbed, soil type, construction sequencing and weather. The impacts on erosion-prone areas can be reduced by implementing an erosion and sedimentation control plan. The plan should be designed in accordance with applicable city and/or county standards.

RGI recommends the following erosion control Best Management Practices (BMPs):

- Scheduling site preparation and grading for the drier summer and early fall months and undertaking activities that expose soil during periods of little or no rainfall
- Retaining existing vegetation whenever feasible
- Establishing a quarry spall construction entrance
- Installing siltation control fencing or anchored straw or coir wattles on the downhill side of work areas

- Covering soil stockpiles with anchored plastic sheeting
- Revegetating or mulching exposed soils with a minimum 3-inch thickness of straw if surfaces will be left undisturbed for more than one day during wet weather or one week in dry weather
- Directing runoff away from exposed soils and slopes
- Minimizing the length and steepness of slopes with exposed soils and cover excavation surfaces with anchored plastic sheeting (Graded and disturbed slopes should be tracked in place with the equipment running perpendicular to the slope contours so that the track marks provide a texture to help resist erosion and channeling. Some sloughing and raveling of slopes with exposed or disturbed soil should be expected.)
- Decreasing runoff velocities with check dams, straw bales or coir wattles
- Confining sediment to the project site
- Inspecting and maintaining erosion and sediment control measures frequently (The contractor should be aware that inspection and maintenance of erosion control BMPs is critical toward their satisfactory performance. Repair and/or replacement of dysfunctional erosion control elements should be anticipated.)

Permanent erosion protection should be provided by reestablishing vegetation using hydroseeding and/or landscape planting. Until the permanent erosion protection is established, site monitoring should be performed by qualified personnel to evaluate the effectiveness of the erosion control measures. Provisions for modifications to the erosion control system based on monitoring observations should be included in the erosion and sedimentation control plan.

5.2.2 STRIPPING

Stripping efforts should include removal of pavements, vegetation, organic materials, and deleterious debris from areas slated for building, pavement, and utility construction. The test pits encountered 4 to 6 inches of topsoil and rootmass. Deeper areas of stripping may be required in forested or heavily vegetated areas of the site.

5.2.3 EXCAVATIONS

All temporary cut slopes associated with the site and utility excavations should be adequately inclined to prevent sloughing and collapse. The site soils consist of silty sand with gravel or sand and gravel soils.

Accordingly, for excavations more than 4 feet but less than 20 feet in depth, the temporary side slopes should be laid back with a minimum slope inclination of 1.5H:1V (Horizontal:Vertical). Steeper slopes may be possible in the dense silty sand soils but will depend on conditions encountered during construction. If there is insufficient room to complete the excavations in this manner, or excavations greater than 20 feet in depth are planned, using temporary shoring to support the excavations should be considered. For open cuts at the site, RGI recommends:

- No traffic, construction equipment, stockpiles or building supplies are allowed at the top of cut slopes within a distance of at least 5 feet from the top of the cut
- Exposed soil along the slope is protected from surface erosion using waterproof tarps and/or plastic sheeting
- Construction activities are scheduled so that the length of time the temporary cut is left open is minimized
- Surface water is diverted away from the excavation
- The general condition of slopes should be observed periodically by a geotechnical engineer to confirm adequate stability and erosion control measures

In all cases, however, appropriate inclinations will depend on the actual soil and groundwater conditions encountered during earthwork. Ultimately, the site contractor must be responsible for maintaining safe excavation slopes that comply with applicable OSHA or WISHA guidelines.

5.2.4 Site Preparation

RGI anticipates that some areas of loose or soft soil will be exposed upon completion of stripping and grubbing. Proofrolling and subgrade verification should be considered an essential step in site preparation. After stripping, grubbing, and prior to placement of structural fill, RGI recommends proofrolling building and pavement subgrades and areas to receive structural fill. These areas should be proofrolled under the observation of RGI and compacted to a firm and unyielding condition in order to achieve a minimum compaction level of 95 percent of the modified proctor maximum dry density as determined by the American Society of Testing and Materials D1557-09 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (ASTM D1557).

Proofrolling and adequate subgrade compaction can only be achieved when the soils are within approximately ± 2 percent moisture content of the optimum moisture content. Soils that appear firm after stripping and grubbing may be proofrolled with a heavy compactor, loaded double-axle dump truck, or other heavy equipment under the observation of an RGI representative. This observer will assess the subgrade conditions prior to filling. The need for or advisability of proofrolling due to soil moisture conditions should be determined at the time of construction. In wet areas it may be necessary to hand probe the exposed subgrades in lieu of proofrolling with mechanical equipment.

If fill is placed in areas of the site where existing slopes are steeper than 5:1 (Horizontal:Vertical), the area should be benched to reduce the potential for slippage between existing slopes and fills. Benches should be wide enough to accommodate compaction and earth moving equipment, and to allow placement of horizontal lifts of fill.

Subgrade soils that become disturbed due to elevated moisture conditions should be overexcavated to reveal firm, non-yielding, non-organic soils and backfilled with compacted structural fill. In order to maximize utilization of site soils as structural fill, RGI recommends that the earthwork portion of this project be completed during extended

periods of warm and dry weather if possible. If earthwork is completed during the wet season (typically November through May) it will be necessary to take extra precautionary measures to protect subgrade soils. Wet season earthwork will require additional mitigative measures beyond that which would be expected during the drier summer and fall months.

5.2.5 STRUCTURAL FILL

Once stripping, clearing and other preparing operations are complete, cuts and fills can be made to establish desired site grades. Prior to placing fill, RGI recommends proof-rolling as described above.

RGI recommends fill below the foundation and floor slab, behind retaining walls, and below pavement and hardscape surfaces be placed in accordance with the following recommendations for structural fill. The structural fill should be placed after completion of site preparation procedures as described above.

RGI recommends placing structural fill in lifts not exceeding 12 inches in loose thickness and thoroughly compacted to at least 95 percent of the maximum dry density (MDD) as determined by ASTM D1557. The suitability of excavated site soils and import soils for compacted structural fill use will depend on the gradation and moisture content of the soil when it is placed. As the amount of fines (that portion passing the U.S. No. 200 sieve) increases, soil becomes increasingly sensitive to small changes in moisture content and adequate compaction becomes more difficult or impossible to achieve. Soils containing more than about 5 percent fines cannot be consistently compacted to a dense, non-yielding condition when the moisture content is more than 2 percent above or below optimum. Optimum moisture content is that moisture that results in the greatest compacted dry density with a specified compactive effort.

Non-organic site soils are only considered suitable for structural fill provided that their moisture content is within about two percent of the optimum moisture level as determined by ASTM D1557. Excavated site soils may not be suitable for re-use as structural fill depending on the moisture content and weather conditions at the time of construction. If soils are stockpiled for future reuse and wet weather is anticipated, the stockpile should be protected with plastic sheeting that is securely anchored. Even during dry weather, moisture conditioning (such as, windrowing and drying) of site soils to be reused as structural fill may be required. Even during the summer, delays in grading can occur due to excessively high moisture conditions of the soils or due to precipitation. If wet weather occurs, the upper wetted portion of the site soils may need to be scarified and allowed to dry prior to further earthwork, or may need to be wasted from the site.

If on-site soils are or become unusable, it may become necessary to import clean, granular soils to complete site work that meet the grading requirements listed in Table 2 to be used as structural fill.

Table 2 Structural Fill Gradation

U.S. Sieve Size	Percent Passing
3 inches	100
No. 4 sieve	75 percent
No. 200 sieve	5 percent *

*Based on minus 3/4 inch fraction.

Prior to use, an RGI representative should observe and test all materials imported to the site for use as structural fill. Structural fill materials should be placed in uniform loose layers not exceeding 12 inches and compacted as specified in Table 2. The soil's maximum density and optimum moisture should be determined by ASTM D1557.

Table 3 Structural Fill Compaction ASTM D1557

Location	Material Type	Minimum Compaction Percentage	Moisture Content Range	
Foundations	On-site granular or approved imported fill soils:	95	+2	-2
Retaining Wall Backfill	On-site granular or approved imported fill soils:	92	+2	-2
Slab-on-grade	On-site granular or approved imported fill soils:	95	+2	-2
General Fill (non-structural areas)	On-site soils or approved imported fill soils:	90	+3	-2
Pavement – Subgrade and Base Course	On-site granular or approved imported fill soils:	95	+2	-2

Placement and compaction of structural fill should be observed by RGI. A representative number of in-place density tests should be performed as the fill is being placed to confirm that the recommended level of compaction is achieved.

5.2.6 Cut and Fill Slopes

All permanent cut and fill slopes (except interior slopes of detention pond) should be graded with a finished inclination no greater than 2H:1V. The interior slopes of the detention pond must be graded with a slope gradient no steeper than 3H:1V. Upon completion of construction, the slope face should be trackwalked, compacted and vegetated, or provided with other physical means to guard against erosion.

Final grades at the top of the slopes must promote surface drainage away from the slope crest. Water must not be allowed to flow in an uncontrolled fashion over the slope face. If it is necessary to direct surface runoff towards the slope, it should be controlled at the top

of the slope, piped in a closed conduit installed on the slope face, and taken to an appropriate point of discharge beyond the toe of the slope.

All fill placed for slope construction should meet the structural fill requirements as described in Section 5.2.5.

5.2.7 WET WEATHER CONSTRUCTION CONSIDERATIONS

RGI recommends that preparation for site grading and construction include procedures intended to drain ponded water, control surface water runoff, and to collect shallow subsurface seepage zones in excavations where encountered. It will not be possible to successfully compact the subgrade or utilize on-site soils as structural fill if accumulated water is not drained prior to grading or if drainage is not controlled during construction. Attempting to grade the site without adequate drainage control measures will reduce the amount of on-site soil effectively available for use, increase the amount of select import fill materials required, and ultimately increase the cost of the earthwork phases of the project. Free water should not be allowed to pond on the subgrade soils. RGI anticipates that the use of berms and shallow drainage ditches, with sumps and pumps in utility trenches, will be required for surface water control during wet weather and/or wet site conditions.

5.3 FOUNDATIONS

Following site preparation and grading, the proposed residential building foundations can be supported on conventional spread footings bearing on medium dense to dense native soil or structural fill. Loose, organic, or other unsuitable soils will be encountered in the proposed building footprint or parking lot. If unsuitable soils are encountered, they should be overexcavated and backfilled with structural fill. Perimeter foundations exposed to weather should be at a minimum depth of 18 inches below final exterior grades. Interior foundations can be constructed at any convenient depth below the floor slab. Finished grade is defined as the lowest adjacent grade within 5 feet of the foundation for perimeter (or exterior) footings and finished floor level for interior footings.

Table 4 Foundation Design

Design Parameter	Value
Allowable Bearing Capacity - Structural Fill Dense native soils	2,500 psf[1] 4,000 psf
Friction Coefficient	0.30
Passive pressure (equivalent fluid pressure)	250 pcf[2]
Minimum foundation dimensions	Columns: 24 inches Walls: 16 inches

1. psf = pounds per square foot
2. pcf = pounds per cubic foot

The allowable foundation bearing pressures apply to dead loads plus design live load conditions. For short-term loads, such as wind and seismic, a 1/3 increase in this allowable capacity may be used. At perimeter locations, RGI recommends not including the upper 12 inches of soil in the computation of passive pressures because they can be affected by weather or disturbed by future grading activity. The passive pressure value assumes the foundation will be constructed neat against competent soil or backfilled with structural fill as described in Section 5.2.5. The recommended base friction and passive resistance value includes a safety factor of about 1.5.

With spread footing foundations designed in accordance with the recommendations in this section, maximum total and differential post-construction settlements of 1 inch and 1/2 inch, respectively, should be expected.

5.4 RETAINING WALLS

If retaining walls are needed for the residential structures, free-standing walls in ponds, or for vault structures, RGI recommends cast-in-place concrete walls be used. The magnitude of earth pressure development on retaining walls will partly depend on the quality of the wall backfill. RGI recommends placing and compacting wall backfill as structural fill. Wall drainage will be needed behind the wall face. A typical retaining wall drainage detail is shown on Figure 3.

With wall backfill placed and compacted as recommended, and drainage properly installed, RGI recommends using the values in the following table for design.

Table 5 Retaining Wall Design

Design Parameter	Value
Allowable Bearing Capacity - Structural Fill Dense native soils	2,500 psf 4,000 psf
Active Earth Pressure (unrestrained walls)	35 pcf
At-rest Earth Pressure (restrained walls)	50 pcf

For seismic design, an additional uniform load of 7 times the wall height (H) for unrestrained walls and 14H for restrained walls should be applied to the wall surface. Friction at the base of foundations and passive earth pressure will provide resistance to these lateral loads. Values for these parameters are provided in Section 5.3.

If retaining walls are necessary for grade changes outside of pond areas, cast in place or modular block walls may be used. The design parameters provided above should be used for cast in place walls. RGI can provide design and construction recommendations for modular block walls once the location and height of the walls has been determined.

5.5 ROCKERY WALLS

Rockeries may be used on the site for grade changes, however, rockeries are not retaining walls and do require periodic maintenance. RGI can provide supplemental information for the construction of rockeries once the location and height of the walls has been determined.

5.6 SLAB-ON-GRADE CONSTRUCTION

Once site preparation has been completed as described in Section 5.2, suitable support for slab-on-grade construction should be provided. RGI recommends that the concrete slab be placed on top of medium dense native soil or structural fill. Immediately below the floor slab, RGI recommends placing a 4-inch-thick capillary break layer of clean, free-draining sand or gravel that has less than five percent passing the U.S. No. 200 sieve. This material will reduce the potential for upward capillary movement of water through the underlying soil and subsequent wetting of the floor slab.

Where moisture by vapor transmission is undesirable, an 8- to 10-millimeter-thick plastic membrane should be placed on a 4-inch thick layer of clean gravel. For the anticipated floor slab loading, we estimate post-construction floor settlements of 1/4- to 1/2-inch.

5.7 DRAINAGE

5.7.1 SURFACE

Final exterior grades should promote free and positive drainage away from the building area. Water must not be allowed to pond or collect adjacent to foundations or within the immediate building area. For non-pavement locations, RGI recommends providing a minimum drainage gradient of 3 percent for a minimum distance of 10 feet from the building perimeter. In paved locations, a minimum gradient of 1 percent should be provided unless provisions are included for collection and disposal of surface water adjacent to the structure.

5.7.2 SUBSURFACE

RGI recommends installing perimeter foundation drains for the buildings. A typical footing drain detail is shown on Figure 4. The foundation drains and roof downspouts should be tightlined separately to an approved discharge facility. Subsurface drains must be laid with a gradient sufficient to promote positive flow to a controlled point of approved discharge.

5.7.3 INFILTRATION

RGI understands that infiltration systems are being considered for the on-site disposal of stormwater run-off in various areas of the site. In order to provide preliminary infiltration design and feasibility, infiltration testing and textural analysis in appropriate locations was completed. The results of our textural analysis in included in Appendix A. Field infiltration tests were performed in general accordance with the falling head percolation test procedure

(*Onsite Wastewater Treatment and Disposal Systems*, EPA, 1980) in the following test pits.

Table 6 Measured Infiltration Rates

Test Location	Test Depth (feet)	Measured Rate (inches/hour)
TP-7	3	>20
TP-8	3	>20
TP-9	3	>20

Soils suitable for infiltration were encountered in the south central portion of the site. Shallow seepage was encountered over the other areas of the site. Additional infiltration testing should be completed once the location and depth of facilities has been determined.

5.8 UTILITIES

Utility pipes should be bedded and backfilled in accordance with American Public Works Association (APWA) specifications. For site utilities located within the right-of-ways, bedding and backfill should be completed in accordance with City of Lacey specifications. At a minimum, trench backfill should be placed and compacted as structural fill, as described in Section 5.2.5. Where utilities occur below unimproved areas, the degree of compaction can be reduced to a minimum of 90 percent of the soil's maximum density as determined by the referenced ASTM D1557. Depending on the time of year and the location on site, soils excavated from utility trenches may not be suitable for use as backfill material. Imported structural fill meeting the gradation provided in Table 2 should be used for trench backfill.

5.9 PAVEMENTS

Pavement subgrades should be prepared as described in Section 5.2 and as discussed below. Regardless of the relative compaction achieved, the subgrade must be firm and relatively unyielding before paving. The subgrade should be proofrolled with heavy construction equipment to verify this condition.

With the pavement subgrade prepared as described above, the following paving sections are specified in the City of Lacey development guidelines. These sections may be modified based on site specific design and testing.

- **For site roadways classified as Major Local Residential**: 4 inches of asphalt concrete (AC) over 2 inches of crushed surfacing top course (CSTC) and 15 inches of crushed rock base (CRB)

- **For site roadways classified as Minor Local Residential and Private:** 4 inches of asphalt concrete (AC) over 2 inches of crushed surfacing top course (CSTC) and 9 inches of crushed rock base (CRB)

The asphalt paving materials used should conform to the Washington State Department of Transportation (WSDOT) specifications for Hot Mix Asphalt Class 1/2 inch and CSTC and CRB surfacing.

Long-term pavement performance will depend on surface drainage. A poorly-drained pavement section will be subject to premature failure as a result of surface water infiltrating into the subgrade soils and reducing their supporting capability.

For optimum pavement performance, surface drainage gradients of no less than 2 percent are recommended. Also, some degree of longitudinal and transverse cracking of the pavement surface should be expected over time. Regular maintenance should be planned to seal cracks when they occur.

6.0 Additional Services

RGI is available to provide further geotechnical consultation throughout the design phase of the project. RGI should review the final design and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and incorporated into project design and construction.

RGI is also available to provide geotechnical engineering and construction monitoring services during construction. The integrity of the earthwork and construction depends on proper site preparation and procedures. In addition, engineering decisions may arise in the field in the event that variations in subsurface conditions become apparent. Construction monitoring services are not part of this scope of work. If these services are desired, please let us know and we will prepare a cost proposal.

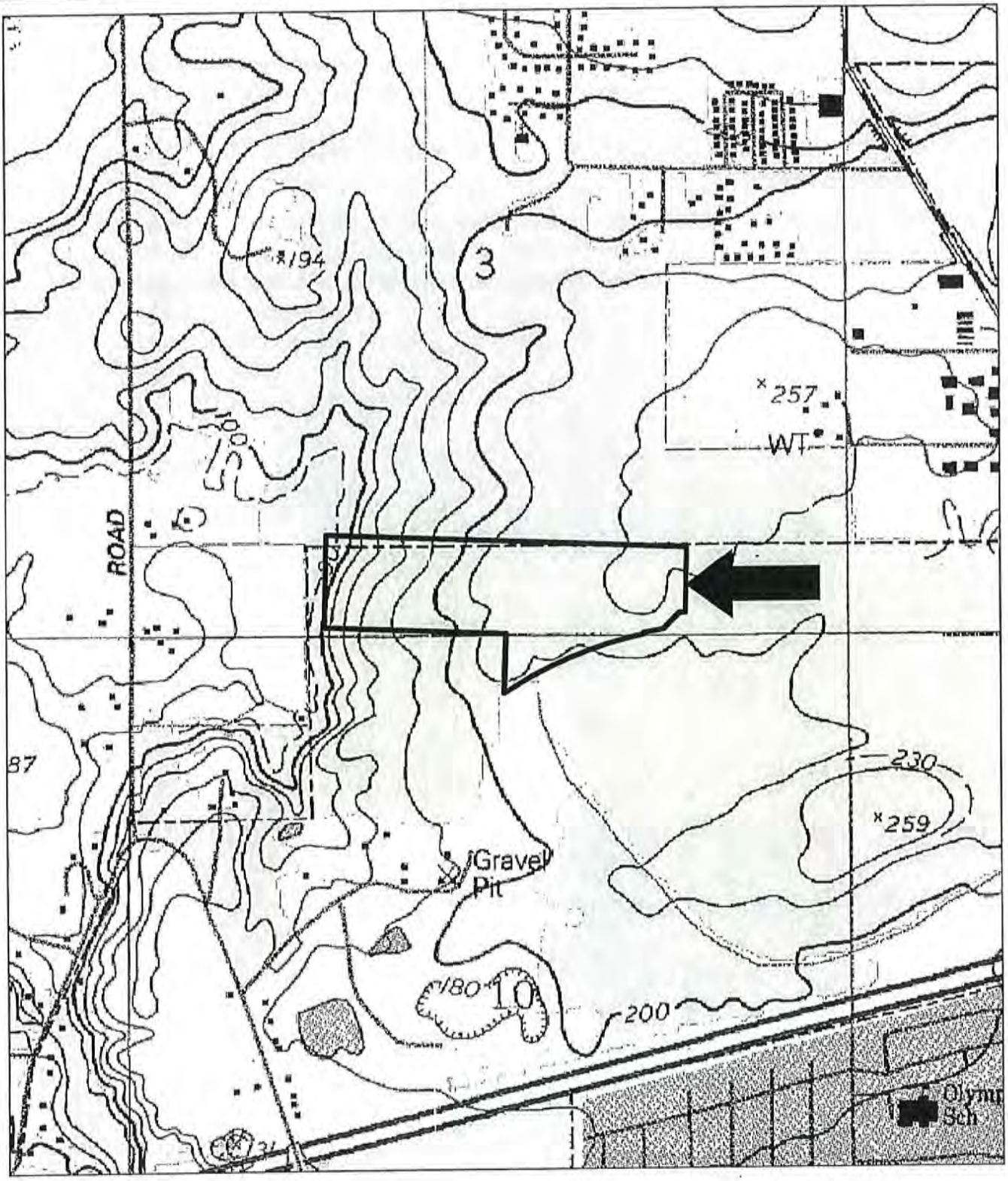
7.0 Limitations

This GER is the property of RGI, Gateway 850, LLC, and its designated agents. Within the limits of the scope and budget, this GER was prepared in accordance with generally accepted geotechnical engineering practices in the area at the time this GER was issued. This GER is intended for specific application to the Gateway Residential project in Lacey, Washington, and for the exclusive use of Gateway 850, LLC and its authorized representatives. No other warranty, expressed or implied, is made. Site safety, excavation support, and dewatering requirements are the responsibility of others.

The scope of services for this project does not include either specifically or by implication any environmental or biological (for example, mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, we can provide a proposal for these services.

The analyses and recommendations presented in this GER are based upon data obtained from the test exploration performed on site. Variations in soil conditions can occur, the nature and extent of which may not become evident until construction. If variations appear evident, RGI should be requested to reevaluate the recommendations in this GER prior to proceeding with construction.

It is the clients responsibility to see that all parties to the project, including the designers, contractors, subcontractors, are made aware of this GER in its entirety. The use of information contained in this GER for bidding purposes should be done at the contractor's option and risk.



USGS, 1994, Lacey, Washington
7.5-Minute Quadrangle

Approximate Scale: 1"=1000'

0 500 1000 2000

N

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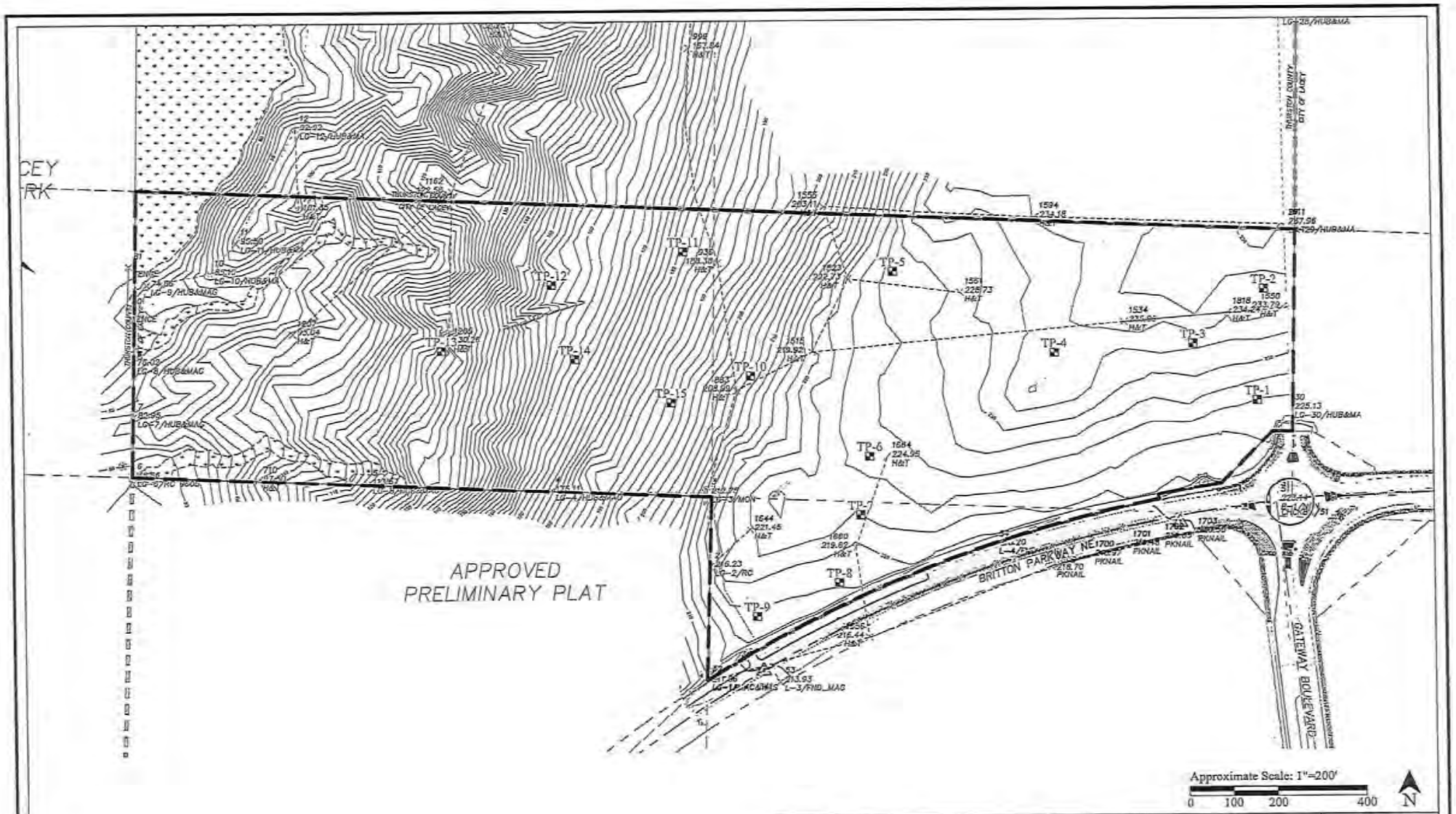
Phone: 425.415.0551 ♦ Fax: 425.415.0311

Gateway Residential		Figure 1
RGI Project Number 2012-545	Site Vicinity Map	Date Drawn: 12/2012
Address: Britton Parkway Northeast and Gateway Boulevard, Lacey, Washington		



= Test Pits by RGI on 12/04/12

= Site Boundary

Drawn from Hatton Godat Pantier Engineers and Surveyors, ALTA/ACSM Land Title Survey, Sheet 2 of 3.

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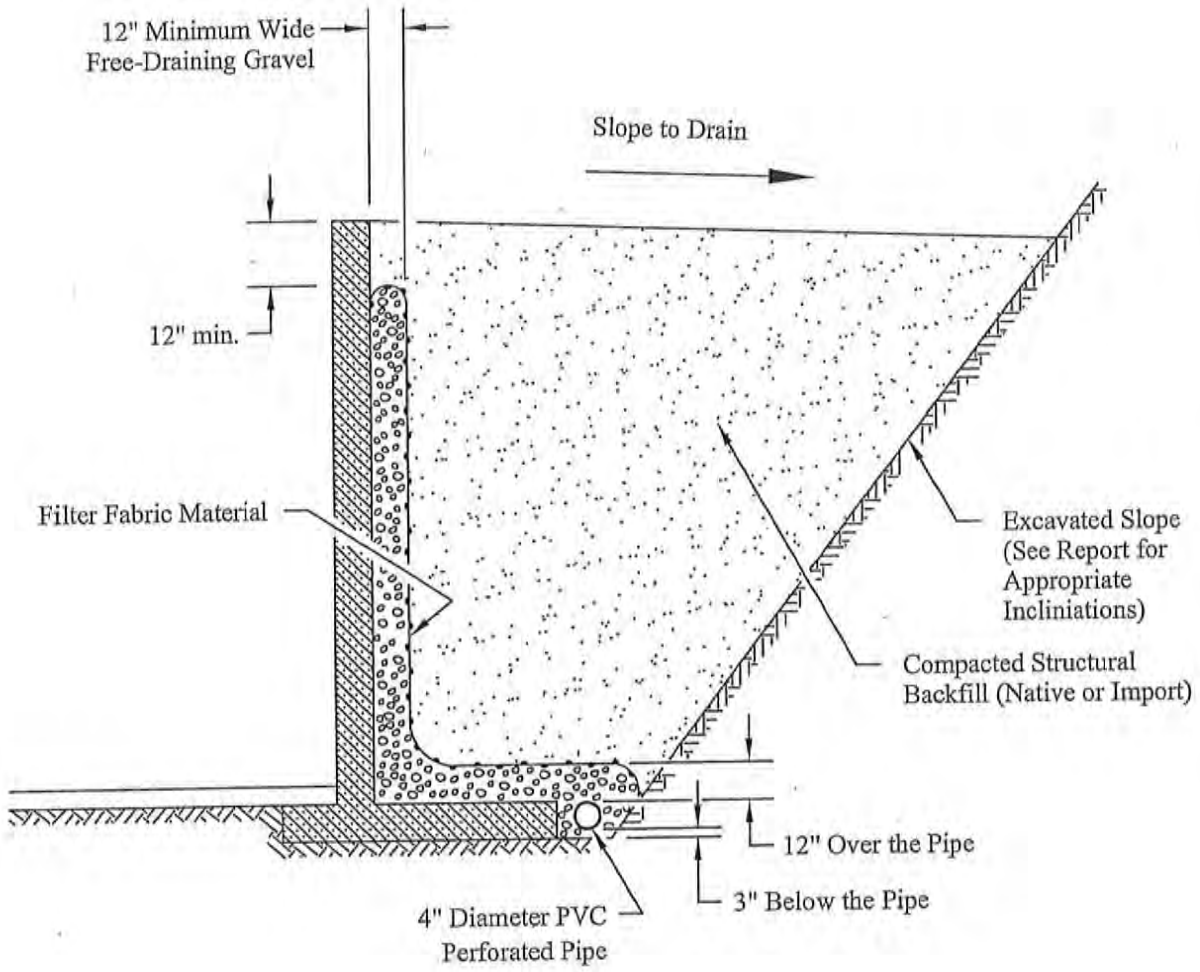
Gateway Residential		Figure 2
RGI Project Number 2012-545	Geotechnical Exploration Plan	Date Drawn: 12/2012
Address: Britton Parkway Northeast and Gateway Boulevard, Lacey, Washington		



Not to Scale

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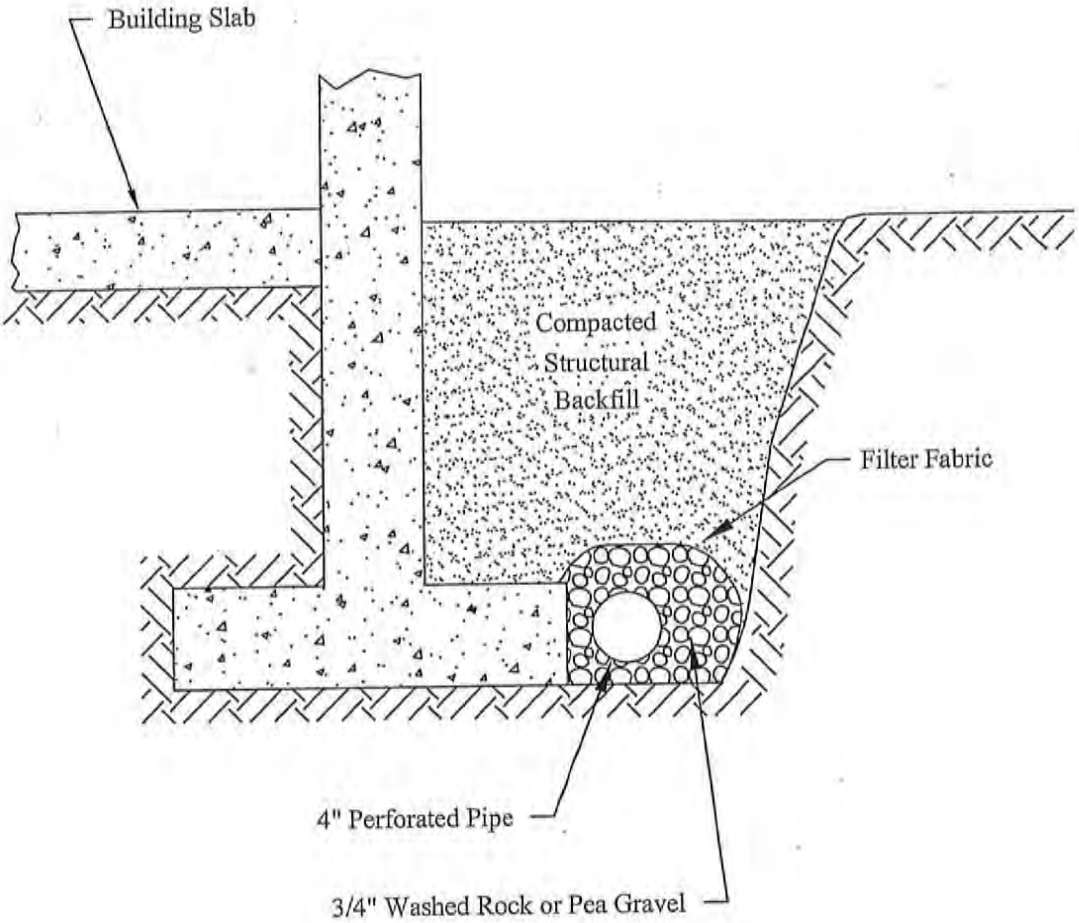
Gateway Residential		Figure 3
RGI Project Number 2012-545	Retaining Wall Drainage Detail	Date Drawn: 12/2012
Address: Britton Parkway Northeast and Gateway Boulevard, Lacey, Washington		



Not to Scale

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Gateway Residential		Figure 4
RGI Project Number 2012-545	Typical Footing Drain Detail	Date Drawn: 12/2012
Address: Britton Parkway Northeast and Gateway Boulevard, Lacey, Washington		

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING

On December 4, 2012, RGI performed field explorations using a tracked excavator. We explored subsurface soil conditions at the site by observing the excavation of 15 test pits to a maximum depth of 12 feet below existing grade. The test pits locations are shown on Figure 2. The test pits locations were approximately determined by hand held GPS and measurements from survey points marked in the field.

A geologist from our office conducted the field exploration and classified the soil conditions encountered, maintained a log of each test exploration, obtained representative soil samples, and observed pertinent site features. All soil samples were visually classified in accordance with the Unified Soil Classification System (USCS).

Representative soil samples obtained from the explorations were placed in closed containers and taken to our laboratory for further examination and testing. As a part of the laboratory testing program, the soil samples were classified in our in house laboratory based on visual observation, texture, plasticity, and the limited laboratory testing described below.

Moisture Content Determinations

Moisture content determinations were performed in accordance with ASTM D2216-10 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass (ASTM D2216) on representative samples obtained from the exploration in order to aid in identification and correlation of soil types. The moisture content of typical sample was measured and is reported on the test pit logs.

Grain Size Analysis

A grain size analysis indicates the range in diameter of soil particles included in a particular sample. Grain size analyses for the greater than 75 micrometer portion of the samples were performed in accordance with ASTM D422 Standard Test Method for Particle-Size Analysis of Soils (ASTM D422) on 14 of the samples.

Project Name: **Gateway Residential**
Project Number: **2012-545**
Client: **Gateway 850, LLC**

Test Pit No.: TP-1
Sheet 1 of 1

Date(s) Excavated: **12/4/12**	Logged By **ELW**	Surface Conditions: **Mixed brush**
Excavation Method: **Excavator**	Bucket Size: **N/A**	Total Depth of Excavation: **5 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **Harbor Point Excavating**	Approximate Surface Elevation **226**
Groundwater Level and Date Measured **2'**	Sampling Method(s) **Grab**	Compaction Method **Excavator Bucket**
Test Pit Backfill: **Cuttings**	Location **Britton Parkway NE & Gateway Boulevard, Lacey, WA**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
226	0			TPSL		6" Topsoil	
				SM		Brown silty SAND with some gravel, loose, moist to wet	
						Becomes wet	24% moisture
						Light groundwater seepage at 2', becomes medium dense, water bearing	
				SM		Gray silty SAND with some gravel, very dense, moist (Glacial Till)	13% moisture
221	5					Test Pit terminated at 5'	
216	10						
211	15						

Project Name: **Gateway Residential** Project Number: **2012-545** Client: **Gateway 850, LLC**	Test Pit No.: TP-2 **Sheet 1 of 1**

Date(s) Excavated: **12/4/12**	Logged By **ELW**	Surface Conditions: **Mixed brush**
Excavation Method: **Excavator**	Bucket Size: **N/A**	Total Depth of Excavation: **6 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **Harbor Point Excavating**	Approximate Surface Elevation **235**
Groundwater Level and Date Measured **3'**	Sampling Method(s) **Grab**	Compaction Method **Excavator Bucket**
Test Pit Backfill: **Cuttings**	Location **Britton Parkway NE & Gateway Boulevard, Lacey, WA**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
235	0			TPSL		6" Topsoil	
				SM		Brown silty SAND with gravel, loose, moist to wet	
				SM		Brown silty gravelly SAND, medium dense, wet, light groundwater seepage at 3'	29% moisture
230	5			SM		Tan silty SAND with some gravel, very dense, moist (Glacial Till) Iron oxide staining Becomes gray	14% moisture
						Test Pit terminated at 6'	
225	10						
220	15						

Project Name: **Gateway Residential** Project Number: **2012-545** Client: **Gateway 850, LLC**	Test Pit No.: TP-3 **Sheet 1 of 1**

Date(s) Excavated: **12/4/12**	Logged By **ELW**	Surface Conditions: **Mixed brush**
Excavation Method: **Excavator**	Bucket Size: **N/A**	Total Depth of Excavation: **5 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **Harbor Point Excavating**	Approximate Surface Elevation **233**
Groundwater Level and Date Measured **2.5'**	Sampling Method(s) **Grab**	Compaction Method **Excavator Bucket**
Test Pit Backfill: **Cuttings**	Location **Britton Parkway NE & Gateway Boulevard, Lacey, WA**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
233	0			TPSL		4" Topsoil	
				SM		Brown silty SAND with some gravel, loose, moist to wet	
							15% moisture
				GP-GM		Brown sandy GRAVEL with some silt, medium dense, water bearing, moderate groundwater seepage at 2.5 - 3'	23% moisture
				SM		Gray silty SAND with gravel, very dense, moist (Glacial Till)	
228	5					Test Pit terminated at 5'	
223	10						
218	15						

Project Name: **Gateway Residential**
Project Number: **2012-545**
Client: **Gateway 850, LLC**

Test Pit No.: TP-4
Sheet 1 of 1

Date(s) Excavated: **12/4/12**	Logged By **ELW**	Surface Conditions: **Mixed brush**
Excavation Method: **Excavator**	Bucket Size: **N/A**	Total Depth of Excavation: **4.5 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **Harbor Point Excavating**	Approximate Surface Elevation **233**
Groundwater Level and Date Measured **2.5'**	Sampling Method(s) **Grab**	Compaction Method **Excavator Bucket**
Test Pit Backfill: **Cuttings**	Location **Britton Parkway NE & Gateway Boulevard, Lacey, WA**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
233	0			TPSL		4" Topsoil	
				SM		Reddish brown silty SAND with some gravel, loose, moist Becomes loose to medium dense	17% moisture
				GP-GM		Brown sandy GRAVEL with some silt, medium dense, water bearing, moderate groundwater seepage from 2.5 - 3'	
				SM		Tan silty SAND with some gravel, very dense, moist (Glacial Till)	18% moisture
						Test Pit terminated at 4.5'	
228	5						
223	10						
218	15						

Project Name: **Gateway Residential** Project Number: **2012-545** Client: **Gateway 850, LLC**	Test Pit No.: TP-5 **Sheet 1 of 1**

Date(s) Excavated: **12/4/12**	Logged By **ELW**	Surface Conditions: **Mixed brush**
Excavation Method: **Excavator**	Bucket Size: **N/A**	Total Depth of Excavation: **6.5 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **Harbor Point Excavating**	Approximate Surface Elevation **226**
Groundwater Level and Date Measured **4.5'**	Sampling Method(s) **Grab**	Compaction Method **Excavator Bucket**
Test Pit Backfill: **Cuttings**	Location **Britton Parkway NE & Gateway Boulevard, Lacey, WA**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
226	0			TPSL		2" Topsoil	
				SM		Brown silty SAND with some gravel, loose to medium dense, moist	
				GP		Brown sandy GRAVEL with trace silt, medium dense, moist	
						Becomes water bearing, moderate seepage at 4.5'	
221	5						
				SM		Gray silty SAND with some gravel, very dense, moist (Glacial Till)	9% moisture
						Test Pit terminated at 6.5'	
216	10						
211	15						

Project Name: **Gateway Residential** Project Number: **2012-545** Client: **Gateway 850, LLC**	Test Pit No.: TP-6 **Sheet 1 of 1**

Date(s) Excavated: **12/4/12**	Logged By **ELW**	Surface Conditions: **Moss**
Excavation Method: **Excavator**	Bucket Size: **N/A**	Total Depth of Excavation: **9 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **Harbor Point Excavating**	Approximate Surface Elevation **225**
Groundwater Level and Date Measured **7.5'**	Sampling Method(s)	Compaction Method **Excavator Bucket**
Test Pit Backfill: **Cuttings**	Location **Britton Parkway NE & Gateway Boulevard, Lacey, WA**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
225	0			TPSL		4" Topsoil	
				Fill		Dark brown silty SAND with some gravel, loose to medium dense, moist to wet, contains organics (Fill)	
				SP		Tan SAND with some gravel and trace silt, medium dense, moist	
220	5						
				GP		Tan sandy GRAVEL with trace silt, medium dense, moist	
						Becomes water bearing, moderate groundwater seepage at 7.5' - 8'	
				SM		Gray silty SAND with some gravel, very dense, moist (Glacial Till)	
						Test Pit terminated at 9'	
215	10						
210	15						

Project Name: **Gateway Residential**
Project Number: **2012-545**
Client: **Gateway 850, LLC**

Test Pit No.: TP-7
Sheet 1 of 1

Date(s) Excavated: **12/4/12**	Logged By **ELW**	Surface Conditions: **Mixed brush**
Excavation Method: **Excavator**	Bucket Size: **N/A**	Total Depth of Excavation: **15 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **Harbor Point Excavating**	Approximate Surface Elevation **222**
Groundwater Level and Date Measured **Not encountered**	Sampling Method(s) **Grab**	Compaction Method **Excavator Bucket**
Test Pit Backfill: **Cuttings**	Location **Britton Parkway NE & Gateway Boulevard, Lacey, WA**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
222	0			TPSL		4" Topsoil	
				Fill		Dark brown silty SAND with some gravel, loose, moist to wet, contains organics	
				SM		Brown silty SAND with some gravel, loose to medium dense, moist	
				SP		Gray medium to coarse gravelly SAND with trace silt, medium dense, moist	4% moisture
217	5			GW		Gray sandy GRAVEL with trace silt, medium dense, moist	4% moisture 5% moisture
				SP		Gray fine to medium SAND with trace silt, medium dense, moist	
212	10					Contains occasional interbeds of silty sand	11% moisture
				SP		Gray SAND with trace silt and gravel, medium dense, moist	
				SM		Gray silty SAND with some gravel, dense, moist (Glacial Till)	6% moisture
207	15					Test Pit t	

Project Name: **Gateway Residential**
Project Number: **2012-545**
Client: **Gateway 850, LLC**

Test Pit No.: TP-8
Sheet 1 of 1

Date(s) Excavated: **12/4/12**	Logged By **ELW**	Surface Conditions: **Moss, brush**
Excavation Method: **Excavator**	Bucket Size: **N/A**	Total Depth of Excavation: **14.5 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **Harbor Point Excavating**	Approximate Surface Elevation **218**
Groundwater Level and Date Measured **14'**	Sampling Method(s) **Grab**	Compaction Method **Excavator Bucket**
Test Pit Backfill: **Cuttings**	Location **Britton Parkway NE & Gateway Boulevard, Lacey, WA**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
218	0			TPSL		4" Topsoil	
				SM		Brown silty SAND with some gravel, loose, moist to wet	
				GW		Brown GRAVEL with some sand, medium dense, moist	4% moisture
						Becomes gray	
213	5						4% moisture
				SW		Brown gravelly SAND, medium dense, moist	4% moisture
				SM-ML		Gray silty fine SAND to sandy SILT, medium dense/very stiff, moist	28% moisture
208	10			GW		Gray GRAVEL with some sand, medium dense, moist	
							4% moisture
						Becomes water bearing, moderate groundwater seepage at 14'	
						Test Pit terminated at 14.5'	
203	15						

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Project Name: **Gateway Residential**
Project Number: **2012-545**
Client: **Gateway 850, LLC**

Test Pit No.: TP-9
Sheet 1 of 1

Date(s) Excavated: **12/4/12**	Logged By **ELW**	Surface Conditions: **Ferns, brush**
Excavation Method: **Excavator**	Bucket Size: **N/A**	Total Depth of Excavation: **14.5 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **Harbor Point Excavating**	Approximate Surface Elevation **218**
Groundwater Level and Date Measured **Not encountered**	Sampling Method(s) **Grab**	Compaction Method **Excavator Bucket**
Test Pit Backfill: **Cuttings**	Location **Britton Parkway NE & Gateway Boulevard, Lacey, WA**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
218	0			TPSL		6" Topsoil	
				SM		Brown silty SAND with some gravel, loose, moist to wet Becomes medium dense	
				GW		Brown GRAVEL with some sand, medium dense, moist	
							4% moisture
213	5					Becomes gray	2% moisture
				GP		Gray GRAVEL with some sand and trace silt, medium dense, moist	4% moisture
208	10						
				ML		Tan SILT, very stiff, moist to wet	36% moisture
						Test Pit terminated at 14.5'	
203	15						

Project Name: **Gateway Residential**
Project Number: **2012-545**
Client: **Gateway 850, LLC**

Test Pit No.: TP-10
Sheet 1 of 1

Date(s) Excavated: **12/4/12**	Logged By **ELW**	Surface Conditions: **Ferns**
Excavation Method: **Excavator**	Bucket Size: **N/A**	Total Depth of Excavation: **10 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **Harbor Point Excavating**	Approximate Surface Elevation **207**
Groundwater Level and Date Measured **Not encountered**	Sampling Method(s)	Compaction Method **Excavator Bucket**
Test Pit Backfill: **Cuttings**	Location **Britton Parkway NE & Gateway Boulevard, Lacey, WA**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
207	0			TPSL		6" Topsoil	
				SM		Brown silty SAND with some gravel, loose, moist to wet	
						Becomes medium dense	
				SP		Brown SAND with some gravel, medium dense, moist	
						Becomes gray	
202	5						
197	10					Test Pit terminated at 10'	
192	15						

Project Name: **Gateway Residential**
Project Number: **2012-545**
Client: **Gateway 850, LLC**

Test Pit No.: TP-11
Sheet 1 of 1

Date(s) Excavated: **12/4/12**	Logged By **ELW**	Surface Conditions: **Ferns**
Excavation Method: **Excavator**	Bucket Size: **N/A**	Total Depth of Excavation: **10 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **Harbor Point Excavating**	Approximate Surface Elevation **181**
Groundwater Level and Date Measured **3'**	Sampling Method(s) **Grab**	Compaction Method **Excavator Bucket**
Test Pit Backfill: **Cuttings**	Location **Britton Parkway NE & Gateway Boulevard, Lacey, WA**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
181	0			TPSL		4" Topsoil	
				SM		Brown silty SAND with some gravel, loose, moist	
				SM		Brown SAND with some silt to silty fine SAND with trace gravel, medium dense, wet Light groundwater seepage at 3'	29% moisture
				SM		Gray silty fine SAND, medium dense, moist Contains sand and silt interbeds	26% moisture
176	5						
				ML		Tan mottled SILT, stiff, moist	41% moisture
171	10					Test Pit terminated at 10'	
166	15						

Project Name: **Gateway Residential**
Project Number: **2012-545**
Client: **Gateway 850, LLC**

Test Pit No.: TP-12
Sheet 1 of 1

Date(s) Excavated: **12/4/12**	Logged By **ELW**	Surface Conditions: **Ferns**
Excavation Method: **Excavator**	Bucket Size: **N/A**	Total Depth of Excavation: **7 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **Harbor Point Excavating**	Approximate Surface Elevation **154**
Groundwater Level and Date Measured **0.5'**	Sampling Method(s) **Grab**	Compaction Method **Excavator Bucket**
Test Pit Backfill: **Cuttings**	Location **Britton Parkway NE & Gateway Boulevard, Lacey, WA**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
154	0			TPSL		6" Topsoil	
				SM		Brown silty SAND with some gravel, loose, wet to saturated, moderate groundwater seepage at 0.5'	41% moisture
				SM		Tan silty SAND with trace gravel, medium dense, moist Iron oxide staining Lightly cemented	19% moisture
149	5						
						Test Pit terminated at 7'	
144	10						
139	15						

Project Name: **Gateway Residential**
Project Number: **2012-545**
Client: **Gateway 850, LLC**

Test Pit No.: TP-13
Sheet 1 of 1

Date(s) Excavated: **12/4/12**	Logged By **ELW**	Surface Conditions: **Ferns**
Excavation Method: **Excavator**	Bucket Size: **N/A**	Total Depth of Excavation: **6.5 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **Harbor Point Excavating**	Approximate Surface Elevation **122**
Groundwater Level and Date Measured **2.5'**	Sampling Method(s) **Grab**	Compaction Method **Excavator Bucket**
Test Pit Backfill: **Cuttings**	Location **Britton Parkway NE & Gateway Boulevard, Lacey, WA**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
122	0			TPSL		4" Topsoil	
				Fill		Brown silty gravelly SAND, loose, moist to wet (Fill)	
				SM		Reddish brown silty SAND with some gravel, loose to medium dense, wet	
						Heavy groundwater seepage at 2.5'	17% moisture
				SM		Brown silty SAND with some gravel, medium dense, moist	13% moisture
						Lightly cemented	
117	5						
						Test Pit terminated at 6.5'	
112	10						
107	15						

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Project Name: **Gateway Residential** Project Number: **2012-545** Client: **Gateway 850, LLC**	Test Pit No.: TP-14 **Sheet 1 of 1**

Date(s) Excavated: **12/4/12**	Logged By **ELW**	Surface Conditions: **Ferns**
Excavation Method: **Excavator**	Bucket Size: **N/A**	Total Depth of Excavation: **8 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **Harbor Point Excavating**	Approximate Surface Elevation **164**
Groundwater Level and Date Measured **2'**	Sampling Method(s) **Grab**	Compaction Method **Excavator Bucket**
Test Pit Backfill: **Cuttings**	Location **Britton Parkway NE & Gateway Boulevard, Lacey, WA**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
164	0			TPSL		5" Topsoil	
				SM		Reddish brown silty SAND with trace gravel, loose, moist	
						Becomes tan, loose to medium dense, wet	
						Light groundwater seepage at 2'	20% moisture
				ML		Tan mottled SILT, stiff, moist	28% moisture
				ML		Gray mottled sandy SILT, stiff, moist	28% moisture
159	5						
				SP-SM		Gray gravelly SAND with some silt, medium dense, wet	9% moisture
						Test Pit terminated at 8'	
154	10						
149	15						

Project Name: **Gateway Residential**
Project Number: **2012-545**
Client: **Gateway 850, LLC**

Test Pit No.: TP-15
Sheet 1 of 1

Date(s) Excavated: **12/4/12**	Logged By **ELW**	Surface Conditions: **Ferns**
Excavation Method: **Excavator**	Bucket Size: **N/A**	Total Depth of Excavation: **8 feet bgs**
Excavator Type: **Tracked Excavator**	Excavating Contractor: **Harbor Point Excavating**	Approximate Surface Elevation **193**
Groundwater Level and Date Measured **Not encountered**	Sampling Method(s) **Grab**	Compaction Method **Excavator Bucket**
Test Pit Backfill: **Cuttings**	Location **Britton Parkway NE & Gateway Boulevard, Lacey, WA**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
193	0			TPSL		6" Topsoil	
				SM		Brown silty SAND with trace gravel, loose, moist	
						Becomes medium dense	
							13% moisture
188	5			SM		Gray silty SAND, medium dense, moist	
						Lightly cemented	
				SP-SM		Gray SAND with some silt, medium dense, wet	22% moisture
						Test Pit terminated at 8'	
183	10						
178	15						

Project Name: **Gateway Residential**
Project Number: **2012-545**
Client: **Gateway 850, LLC**

Key to Logs

Sheet 1 of 1

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8

COLUMN DESCRIPTIONS

1 Elevation (feet): Elevation (MSL, feet).
2 Depth (feet): Depth in feet below the ground surface.
3 Sample Type: Type of soil sample collected at the depth interval shown.
4 Sample Number: Sample identification number.
5 USCS Symbol: USCS symbol of the subsurface material.
6 Graphic Log: Graphic depiction of the subsurface material encountered.
7 MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
8 REMARKS AND OTHER TESTS: Comments and observations regarding drilling or sampling made by driller or field personnel.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

Silty SAND (SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Auger sampler
Bulk Sample
3-inch-OD California w/ brass rings
CME Sampler
Grab Sample
2.5-inch-OD Modified California w/ brass liners
Pitcher Sample
2-inch-OD unlined split spoon (SPT)
Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Gateway Residential	SAMPLE ID/TYPE	TP-15 grab
PROJECT NO.	2012-545	SAMPLE DEPTH	7 feet
TECH/TEST DATE	HR 12/07/12	DATE RECEIVED	12/3/12

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	618.90
Wt Dry Soil & Tare (gm)	(w2)	510.70
Weight of Tare (gm)	(w3)	14.00
Weight of Water (gm)	(w4=w1-w2)	108.20
Weight of Dry Soil (gm)	(w5=w2-w3)	496.70
Moisture Content (%)	(w4/w5)*100	21.78

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

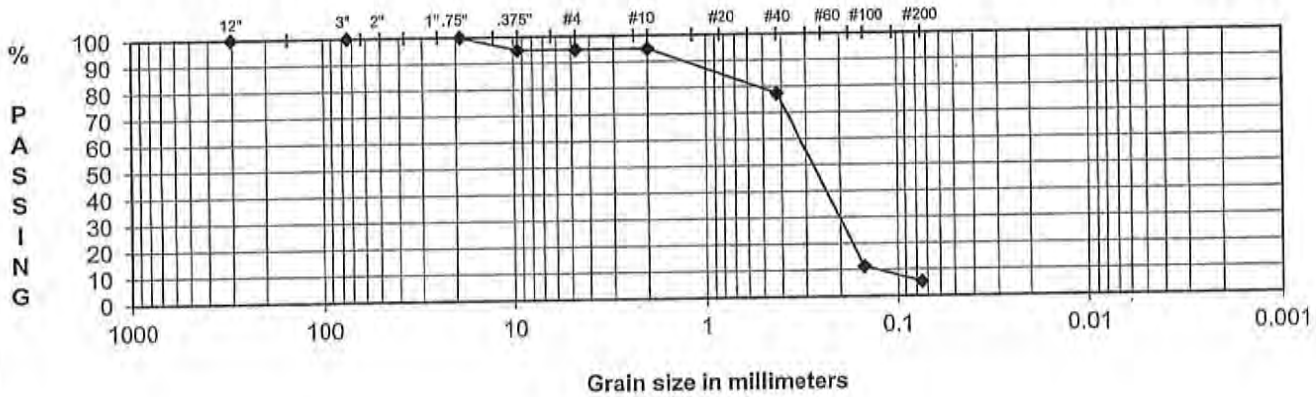
	Weight Of Sample (gm)	510.70
	Tare Weight (gm)	14.00
(W6)	Total Dry Weight (gm)	496.70

% COBBLES	0.00
% C GRAVEL	0.00
% F GRAVEL	5.05
% C SAND	0.02
% M SAND	17.56
% F SAND	71.91
% FINES	5.46
% TOTAL	100.00

D10 (mm)	0.14
D30 (mm)	0.2
D60 (mm)	0.32
Cu	2.3
Cc	0.9

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	14.00	0.00	0.00	100.00	cobbles
3.0"	14.00	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	14.00	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	14.00	0.00	0.00	100.00	fine gravel
0.50"					fine gravel
0.375"	39.10	25.10	5.05	94.95	fine gravel
#4	39.10	25.10	5.05	94.95	coarse sand
#10	39.20	25.20	5.07	94.93	medium sand
#20					medium sand
#40	126.40	112.40	22.63	77.37	fine sand
#60					fine sand
#100	454.60	440.60	88.71	11.29	fine sand
#200	483.60	469.60	94.54	5.46	fines
PAN	510.70	496.70	100.00	0.00	silt/clay



DESCRIPTION: Poorly graded fine SAND with silt

USCS: SP-SM

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Gateway Residential	SAMPLE ID/TYPE	TP-7 grab
PROJECT NO.	2012-545	SAMPLE DEPTH	3 feet
TECH/TEST DATE	HR 12/07/12	DATE RECEIVED	12/03/12

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	480.50
Wt Dry Soil & Tare (gm)	(w2)	461.90
Weight of Tare (gm)	(w3)	14.20
Weight of Water (gm)	(w4=w1-w2)	18.60
Weight of Dry Soil (gm)	(w5=w2-w3)	447.70
Moisture Content (%)	(w4/w5)*100	4.15

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

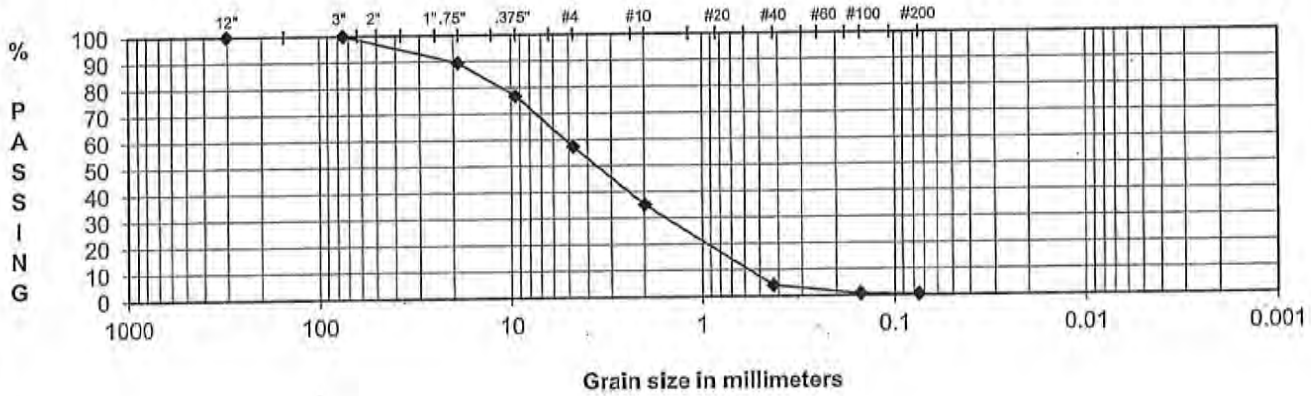
	Weight Of Sample (gm)	461.90
	Tare Weight (gm)	14.20
(W6)	Total Dry Weight (gm)	447.70

% COBBLES	0.00
% C GRAVEL	10.41
% F GRAVEL	32.23
% C SAND	22.25
% M SAND	30.98
% F SAND	3.75
% FINES	0.38
% TOTAL	100.00

D10 (mm)	0.56
D30 (mm)	1.6
D60 (mm)	5.1
Cu	9.1
Cc	0.9

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	14.20	0.00	0.00	100.00	cobbles
3.0"	14.20	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	14.20	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	60.80	46.60	10.41	89.59	fine gravel
0.50"					fine gravel
0.375"	118.00	103.80	23.19	76.81	fine gravel
#4	205.10	190.90	42.64	57.36	coarse sand
#10	304.70	290.50	64.89	35.11	medium sand
#20					medium sand
#40	443.40	429.20	95.87	4.13	fine sand
#60					fine sand
#100	458.60	444.40	99.26	0.74	fine sand
#200	460.20	446.00	99.62	0.38	fines
PAN	461.90	447.70	100.00	0.00	silt/clay



DESCRIPTION	Poorly graded medium to coarse gravelly SAND
USCS	SP

THE RILEY GROUP, INC.
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GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Gateway Residential	SAMPLE ID/TYPE	TP-7 grab
PROJECT NO.	2012-545	SAMPLE DEPTH	5 feet
TECH/TEST DATE	HR 12/07/12	DATE RECEIVED	12/3/12

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	816.00
Wt Dry Soil & Tare (gm)	(w2)	784.20
Weight of Tare (gm)	(w3)	14.00
Weight of Water (gm)	(w4=w1-w2)	31.80
Weight of Dry Soil (gm)	(w5=w2-w3)	770.20
Moisture Content (%)	(w4/w5)*100	4.13

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

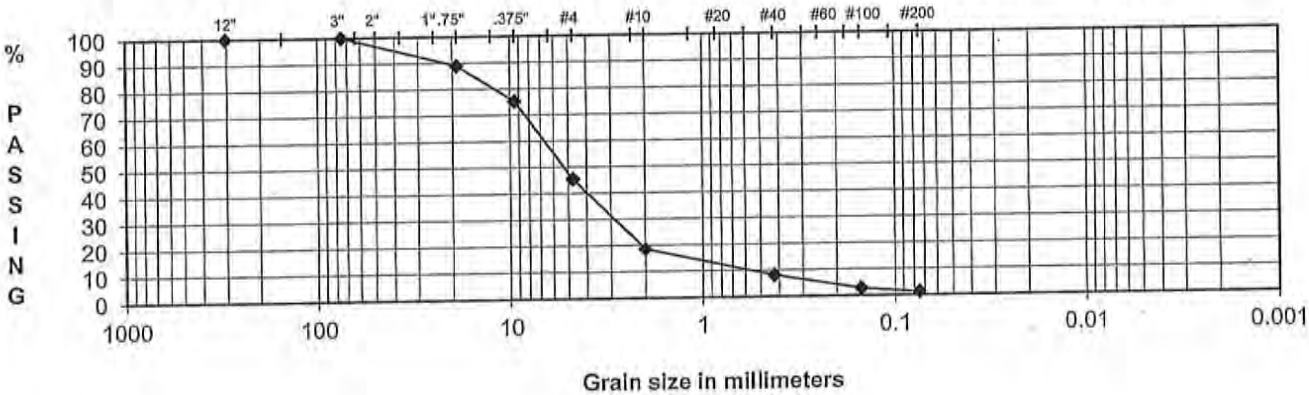
Weight Of Sample (gm)	784.20
Tare Weight (gm)	14.00
(W6) Total Dry Weight (gm)	770.20

% COBBLES	0.00
% C GRAVEL	11.02
% F GRAVEL	43.44
% C SAND	26.94
% M SAND	10.46
% F SAND	6.89
% FINES	1.23
% TOTAL	100.00

D10 (mm)	0.6
D30 (mm)	2.9
D60 (mm)	6.5
Cu	10.8
Cc	2.2

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) ((wt ret/w6)*100)	% PASS (100-%ret)	
12.0"	14.00	0.00	0.00	100.00	cobbles
3.0"	14.00	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	14.00	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	98.90	84.90	11.02	88.98	fine gravel
0.50"					fine gravel
0.375"	204.60	190.60	24.75	75.25	fine gravel
#4	433.50	419.50	54.47	45.53	coarse sand
#10	641.00	627.00	81.41	18.59	medium sand
#20					medium sand
#40	721.60	707.60	91.87	8.13	fine sand
#60					fine sand
#100	762.70	748.70	97.21	2.79	fine sand
#200	774.70	760.70	98.77	1.23	fines
PAN	784.20	770.20	100.00	0.00	silt/clay



DESCRIPTION	Well graded sandy GRAVEL with trace silt
USCS	GW

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

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GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Gateway Residential	SAMPLE ID/TYPE	TP-7 grab
PROJECT NO.	2012-545	SAMPLE DEPTH	7 feet
TECH/TEST DATE	HR 12/07/12	DATE RECEIVED	12/3/12

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	773.70
Wt Dry Soil & Tare (gm)	(w2)	740.60
Weight of Tare (gm)	(w3)	14.00
Weight of Water (gm)	(w4=w1-w2)	33.10
Weight of Dry Soil (gm)	(w5=w2-w3)	726.60
Moisture Content (%)	(w4/w5)*100	4.56

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

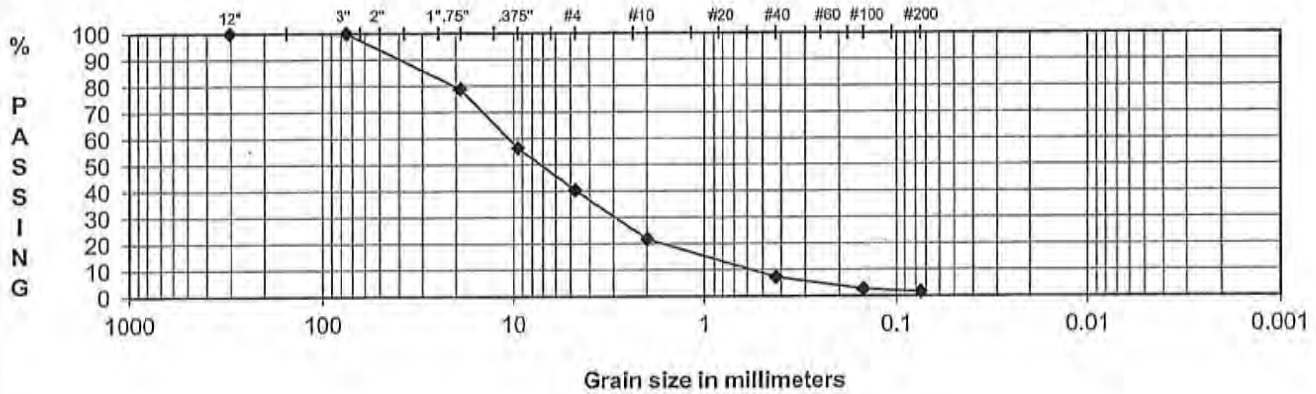
	Weight Of Sample (gm)	740.60
	Tare Weight (gm)	14.00
(W6)	Total Dry Weight (gm)	726.60

% COBBLES	0.00
% C GRAVEL	21.18
% F GRAVEL	38.40
% C SAND	18.65
% M SAND	14.48
% F SAND	5.62
% FINES	1.68
% TOTAL	100.00

D10 (mm)	0.6
D30 (mm)	2.9
D60 (mm)	10.5
Cu	17.5
Cc	1.3

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) ((wt ret/w6)*100)	% PASS (100-%ret)	
12.0"	14.00	0.00	0.00	100.00	cobbles
3.0"	14.00	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	14.00	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	167.90	153.90	21.18	78.82	fine gravel
0.50"					fine gravel
0.375"	330.60	316.60	43.57	56.43	fine gravel
#4	446.90	432.90	59.58	40.42	coarse sand
#10	582.40	568.40	78.23	21.77	medium sand
#20					medium sand
#40	687.60	673.60	92.71	7.29	fine sand
#60					fine sand
#100	721.20	707.20	97.33	2.67	fine sand
#200	728.40	714.40	98.32	1.68	fines
PAN	740.60	726.60	100.00	0.00	silt/clay



DESCRIPTION	Well graded sandy GRAVEL with trace silt
USCS	GW

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Gateway Residential	SAMPLE ID/TYPE	TP-7 grab
PROJECT NO.	2012-545	SAMPLE DEPTH	10 feet
TECH/TEST DATE	HR 12/07/12	DATE RECEIVED	12/3/12

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	585.30
Wt Dry Soil & Tare (gm)	(w2)	530.60
Weight of Tare (gm)	(w3)	14.10
Weight of Water (gm)	(w4=w1-w2)	54.70
Weight of Dry Soil (gm)	(w5=w2-w3)	516.50
Moisture Content (%)	(w4/w5)*100	10.59

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

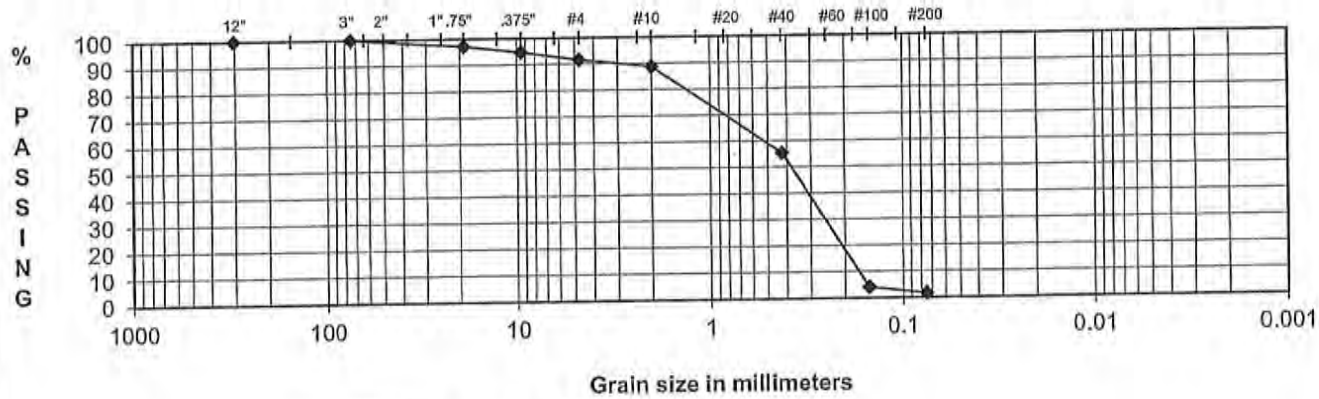
	Weight Of Sample (gm)	530.60
	Tare Weight (gm)	14.10
(W6)	Total Dry Weight (gm)	516.50

% COBBLES	0.00
% C GRAVEL	2.77
% F GRAVEL	5.58
% C SAND	2.88
% M SAND	33.36
% F SAND	53.75
% FINES	1.67
% TOTAL	100.00

D10 (mm)	0.17
D30 (mm)	0.26
D60 (mm)	0.17
Cu	3.1
Cc	0.8

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) ((wt.ret/w6)*100)	% PASS (100-%ret)	
12.0"	14.10	0.00	0.00	100.00	cobbles
3.0"	14.10	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	14.10	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	28.40	14.30	2.77	97.23	fine gravel
0.50"					fine gravel
0.375"	41.30	27.20	5.27	94.73	fine gravel
#4	57.20	43.10	8.34	91.66	coarse sand
#10	72.10	58.00	11.23	88.77	medium sand
#20					medium sand
#40	244.40	230.30	44.59	55.41	fine sand
#60					fine sand
#100	509.50	495.40	95.91	4.09	fine sand
#200	522.00	507.90	98.33	1.67	fines
PAN	530.60	516.50	100.00	0.00	silt/clay



DESCRIPTION: Poorly graded fine to medium SAND and trace silt and gravel

USCS: SP

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Gateway Residential	SAMPLE ID/TYPE	TP-8 grab
PROJECT NO.	2012-545	SAMPLE DEPTH	2 feet
TECH/TEST DATE	HR 12/07/12	DATE RECEIVED	12/3/12

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	735.20
Wt Dry Soil & Tare (gm)	(w2)	711.00
Weight of Tare (gm)	(w3)	14.30
Weight of Water (gm)	(w4=w1-w2)	24.20
Weight of Dry Soil (gm)	(w5=w2-w3)	696.70
Moisture Content (%)	(w4/w5)*100	3.47

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

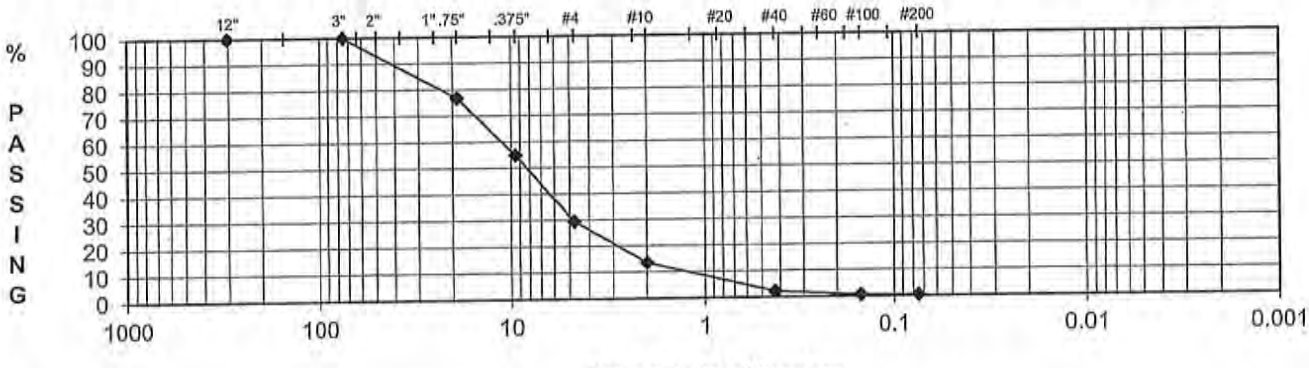
	Weight Of Sample (gm)	711.00
	Tare Weight (gm)	14.30
(W6)	Total Dry Weight (gm)	696.70

% COBBLES	0.00
% C GRAVEL	23.21
% F GRAVEL	47.29
% C SAND	15.89
% M SAND	11.44
% F SAND	1.78
% FINES	0.39
% TOTAL	100.00

D10 (mm)	1.3
D30 (mm)	4.8
D60 (mm)	12
Cu	9.2
Cc	1.5

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	14.30	0.00	0.00	100.00	cobbles
3.0"	14.30	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	14.30	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	176.00	161.70	23.21	76.79	fine gravel
0.50"					fine gravel
0.375"	328.10	313.80	45.04	54.96	fine gravel
#4	505.50	491.20	70.50	29.50	coarse sand
#10	616.20	601.90	86.39	13.61	medium sand
#20					medium sand
#40	695.90	681.60	97.83	2.17	fine sand
#60					fine sand
#100	706.90	692.60	99.41	0.59	fine sand
#200	708.30	694.00	99.61	0.39	fines
PAN	711.00	696.70	100.00	0.00	silt/clay



DESCRIPTION	Well graded GRAVEL with some sand
USCS	GW

THE RILEY GROUP, INC.
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Bothell, WA 98011

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FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Gateway Residential	SAMPLE ID/TYPE	TP-8 grab
PROJECT NO.	2012-545	SAMPLE DEPTH	5 feet
TECH/TEST DATE	HR 12/07/12	DATE RECEIVED	12/3/12

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	751.70
Wt Dry Soil & Tare (gm)	(w2)	722.10
Weight of Tare (gm)	(w3)	14.20
Weight of Water (gm)	(w4=w1-w2)	29.60
Weight of Dry Soil (gm)	(w5=w2-w3)	707.90
Moisture Content (%)	(w4/w5)*100	4.18

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

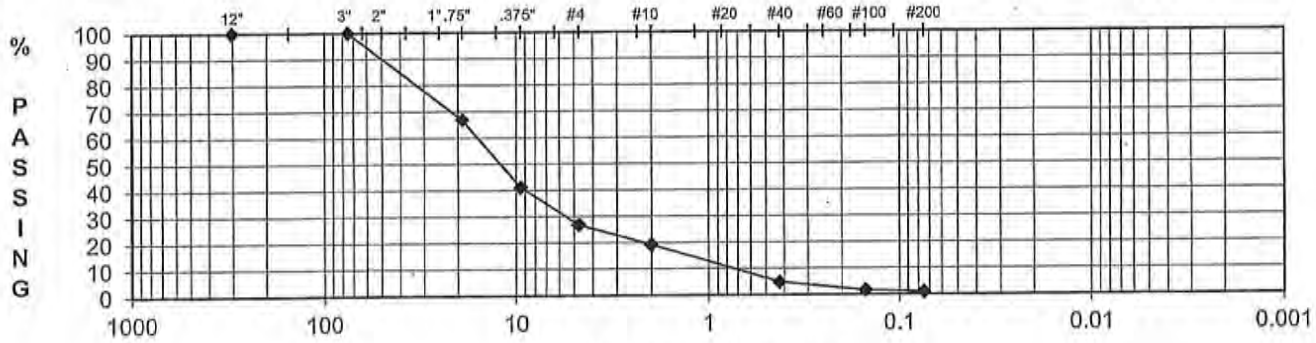
	Weight Of Sample (gm)	722.10
	Tare Weight (gm)	14.20
(W6)	Total Dry Weight (gm)	707.90

% COBBLES	0.00
% C GRAVEL	33.10
% F GRAVEL	39.96
% C SAND	7.70
% M SAND	14.37
% F SAND	3.84
% FINES	1.03
% TOTAL	100.00

D10 (mm)	0.75
D30 (mm)	5.6
D60 (mm)	16.5
Cu	22.0
Cc	2.5

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) ((wt ret/w6)*100)	% PASS (100-%ret)	
12.0"	14.20	0.00	0.00	100.00	cobbles
3.0"	14.20	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	14.20	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	248.50	234.30	33.10	66.90	fine gravel
0.50"					fine gravel
0.375"	431.00	416.80	58.88	41.12	fine gravel
#4	531.40	517.20	73.06	26.94	coarse sand
#10	585.90	571.70	80.76	19.24	medium sand
#20					medium sand
#40	687.60	673.40	95.13	4.87	fine sand
#60					fine sand
#100	710.50	696.30	98.36	1.64	fine sand
#200	714.80	700.60	98.97	1.03	fines
PAN	722.10	707.90	100.00	0.00	silt/clay



DESCRIPTION	Well graded GRAVEL with some sand and trace silt
USCS	GW

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GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Gateway Residential	SAMPLE ID/TYPE	TP-8 grab
PROJECT NO.	2012-545	SAMPLE DEPTH	7 feet
TECH/TEST DATE	HR 12/07/12	DATE RECEIVED	12/3/12

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	689.50
Wt Dry Soil & Tare (gm)	(w2)	663.00
Weight of Tare (gm)	(w3)	14.10
Weight of Water (gm)	(w4=w1-w2)	26.50
Weight of Dry Soil (gm)	(w5=w2-w3)	648.90
Moisture Content (%)	(w4/w5)*100	4.08

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

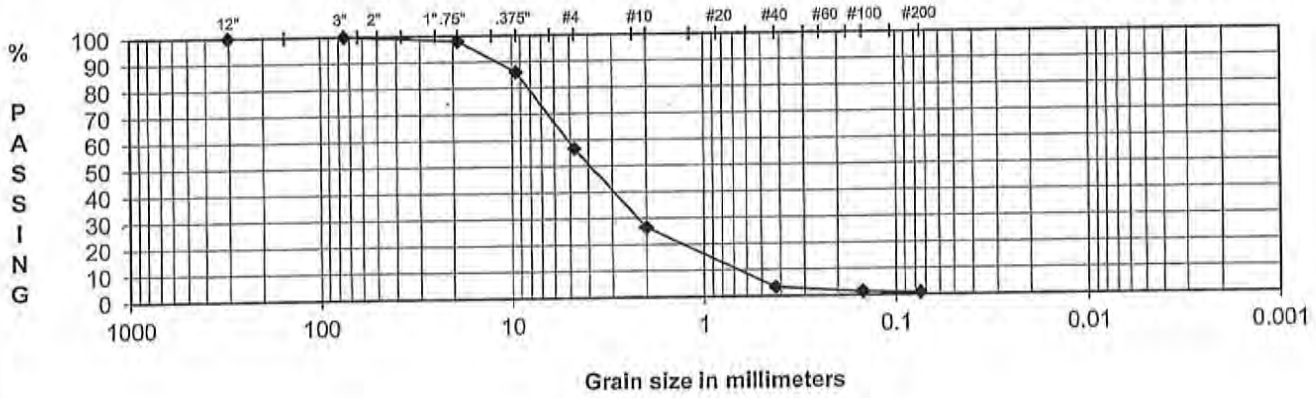
	Weight Of Sample (gm)	663.00
	Tare Weight (gm)	14.10
(W6)	Total Dry Weight (gm)	648.90

% COBBLES	0.00
% C GRAVEL	1.94
% F GRAVEL	41.29
% C SAND	30.24
% M SAND	23.13
% F SAND	2.57
% FINES	0.83
% TOTAL	100.00

D10 (mm)	0.65
D30 (mm)	2.3
D60 (mm)	5.1
Cu	7.9
Cc	1.6

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) ((wt ret/w6)*100)	% PASS (100-%ret)	
12.0"	14.10	0.00	0.00	100.00	cobbles
3.0"	14.10	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	14.10	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	26.70	12.60	1.94	98.06	fine gravel
0.50"					fine gravel
0.375"	104.70	90.60	13.96	86.04	fine gravel
#4	294.60	280.50	43.23	56.77	coarse sand
#10	490.80	476.70	73.46	26.54	medium sand
#20					medium sand
#40	640.90	626.80	96.59	3.41	fine sand
#60					fine sand
#100	653.60	639.50	98.55	1.45	fine sand
#200	657.60	643.50	99.17	0.83	fines
PAN	663.00	648.90	100.00	0.00	silt/clay



DESCRIPTION	Well graded gravelly SAND
USCS	SW

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Gateway Residential	SAMPLE ID/TYPE	TP-8 grab
PROJECT NO.	2012-545	SAMPLE DEPTH	11 feet
TECH/TEST DATE	HR 12/07/12	DATE RECEIVED	12/3/12

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	939.00
Wt Dry Soil & Tare (gm)	(w2)	904.80
Weight of Tare (gm)	(w3)	14.10
Weight of Water (gm)	(w4=w1-w2)	34.20
Weight of Dry Soil (gm)	(w5=w2-w3)	890.70
Moisture Content (%)	(w4/w5)*100	3.84

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

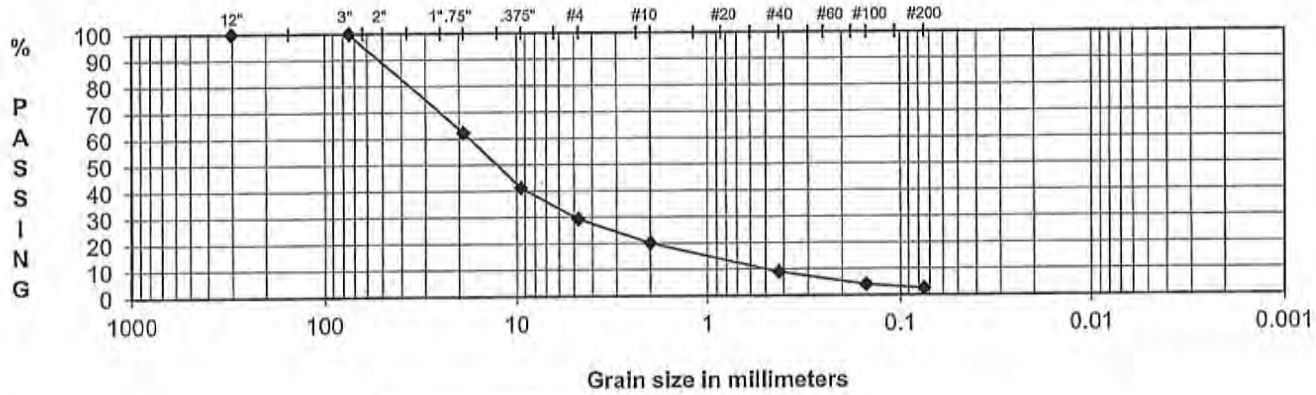
Weight Of Sample (gm)	904.80
Tare Weight (gm)	14.10
(W6) Total Dry Weight (gm)	890.70

% COBBLES	0.00
% C GRAVEL	37.70
% F GRAVEL	32.99
% C SAND	9.16
% M SAND	11.10
% F SAND	6.50
% FINES	2.55
% TOTAL	100.00

D10 (mm)	0.47
D30 (mm)	4.8
D60 (mm)	17
Cu	36.2
Cc	2.9

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) ((wt ret/w6)*100)	% PASS (100-%ret)	
12.0"	14.10	0.00	0.00	100.00	cobbles
3.0"	14.10	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	14.10	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	349.90	335.80	37.70	62.30	fine gravel
0.50"					fine gravel
0.375"	537.30	523.20	58.74	41.26	fine gravel
#4	643.70	629.60	70.69	29.31	coarse sand
#10	725.30	711.20	79.85	20.15	medium sand
#20					medium sand
#40	824.20	810.10	90.95	9.05	fine sand
#60					fine sand
#100	868.00	853.90	95.87	4.13	fine sand
#200	882.10	868.00	97.45	2.55	fines
PAN	904.80	890.70	100.00	0.00	silt/clay



DESCRIPTION	Well graded GRAVEL with some sand
USCS	GW

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Gateway Residential	SAMPLE ID/TYPE	TP-9 grab
PROJECT NO.	2012-545	SAMPLE DEPTH	3 feet
TECH/TEST DATE	HR 12/07/12	DATE RECEIVED	12/3/12

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	910.90
Wt Dry Soil & Tare (gm)	(w2)	878.10
Weight of Tare (gm)	(w3)	14.00
Weight of Water (gm)	(w4=w1-w2)	32.80
Weight of Dry Soil (gm)	(w5=w2-w3)	864.10
Moisture Content (%)	(w4/w5)*100	3.80

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

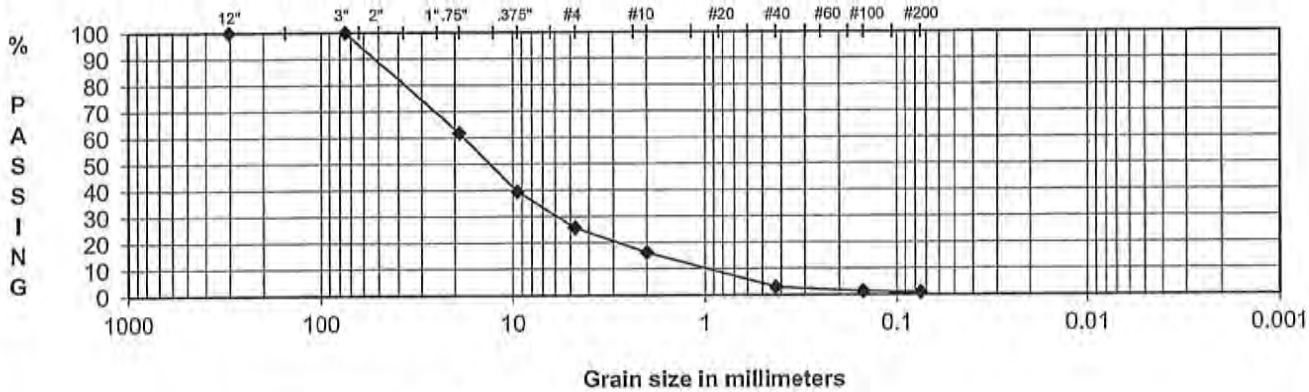
Weight Of Sample (gm)	878.10
Tare Weight (gm)	14.00
(W6) Total Dry Weight (gm)	864.10

% COBBLES	0.00
% C GRAVEL	38.26
% F GRAVEL	36.05
% C SAND	9.40
% M SAND	13.27
% F SAND	2.06
% FINES	0.96
% TOTAL	100.00

D10 (mm)	1
D30 (mm)	5.8
D60 (mm)	18.5
Cu	18.5
Cc	1.8

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) ((wt ret/w6)*100)	% PASS (100-%ret)	
12.0"	14.00	0.00	0.00	100.00	cobbles
3.0"	14.00	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	14.00	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	344.60	330.60	38.26	61.74	fine gravel
0.50"					fine gravel
0.375"	536.30	522.30	60.44	39.56	fine gravel
#4	656.10	642.10	74.31	25.69	coarse sand
#10	737.30	723.30	83.71	16.29	medium sand
#20					medium sand
#40	852.00	838.00	96.98	3.02	fine sand
#60					fine sand
#100	866.00	852.00	98.60	1.40	fine sand
#200	869.80	855.80	99.04	0.96	fines
PAN	878.00	864.00	99.99	0.01	silt/clay



DESCRIPTION	Well graded GRAVEL with some sand
USCS	GW

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Gateway Residential	SAMPLE ID/TYPE	TP-9 grab
PROJECT NO.	2012-545	SAMPLE DEPTH	5 feet
TECH/TEST DATE	HR 12/07/12	DATE RECEIVED	12/3/12

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	936.30
Wt Dry Soil & Tare (gm)	(w2)	915.40
Weight of Tare (gm)	(w3)	14.20
Weight of Water (gm)	(w4=w1-w2)	20.90
Weight of Dry Soil (gm)	(w5=w2-w3)	901.20
Moisture Content (%)	(w4/w5)*100	2.32

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

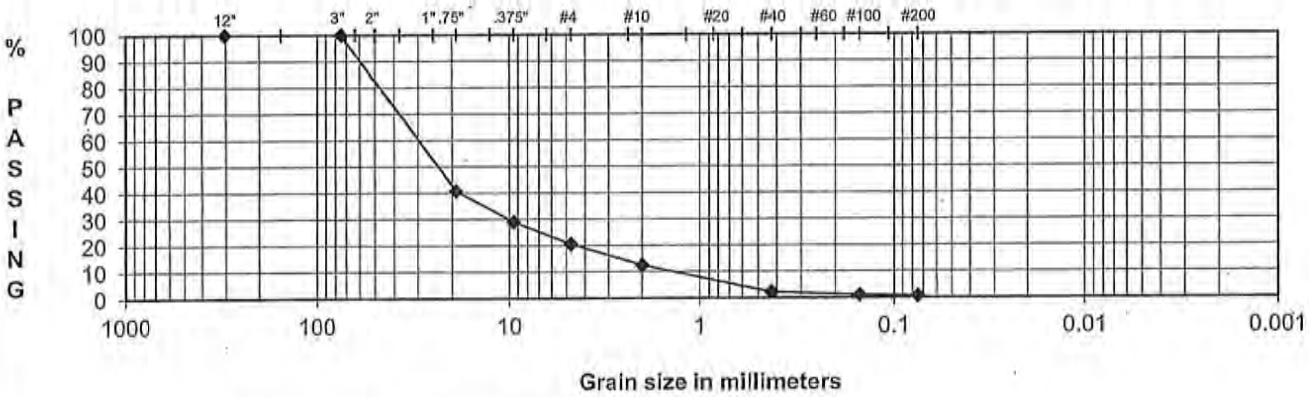
Weight Of Sample (gm)	915.40
Tare Weight (gm)	14.20
(W6) Total Dry Weight (gm)	901.20

% COBBLES	0.00
% C GRAVEL	59.20
% F GRAVEL	20.20
% C SAND	8.13
% M SAND	10.24
% F SAND	1.52
% FINES	0.71
% TOTAL	100.00

D10 (mm)	1.6
D30 (mm)	10
D60 (mm)	29
Cu	18.1
Cc	2.2

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) {(wt ret/w6)*100}	% PASS (100-%ret)	
12.0"	14.20	0.00	0.00	100.00	cobbles
3.0"	14.20	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	256.20	242.00	26.85	73.15	coarse gravel
1.0"					coarse gravel
0.75"	547.70	533.50	59.20	40.80	fine gravel
0.50"					fine gravel
0.375"	654.00	639.80	70.99	29.01	fine gravel
#4	729.70	715.50	79.39	20.61	coarse sand
#10	803.00	788.80	87.53	12.47	medium sand
#20					medium sand
#40	895.30	881.10	97.77	2.23	fine sand
#60					fine sand
#100	906.10	891.90	98.97	1.03	fine sand
#200	909.00	894.80	99.29	0.71	fines
PAN	915.40	901.20	100.00	0.00	silt/clay



DESCRIPTION	Well graded GRAVEL with some sand
USCS	GW

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Gateway Residential	SAMPLE ID/TYPE	TP-9 grab
PROJECT NO.	2012-545	SAMPLE DEPTH	8 feet
TECH/TEST DATE	HR 12/07/12	DATE RECEIVED	12/3/12

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	873.90
Wt Dry Soil & Tare (gm)	(w2)	840.40
Weight of Tare (gm)	(w3)	14.00
Weight of Water (gm)	(w4=w1-w2)	33.50
Weight of Dry Soil (gm)	(w5=w2-w3)	826.40
Moisture Content (%)	(w4/w5)*100	4.05

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

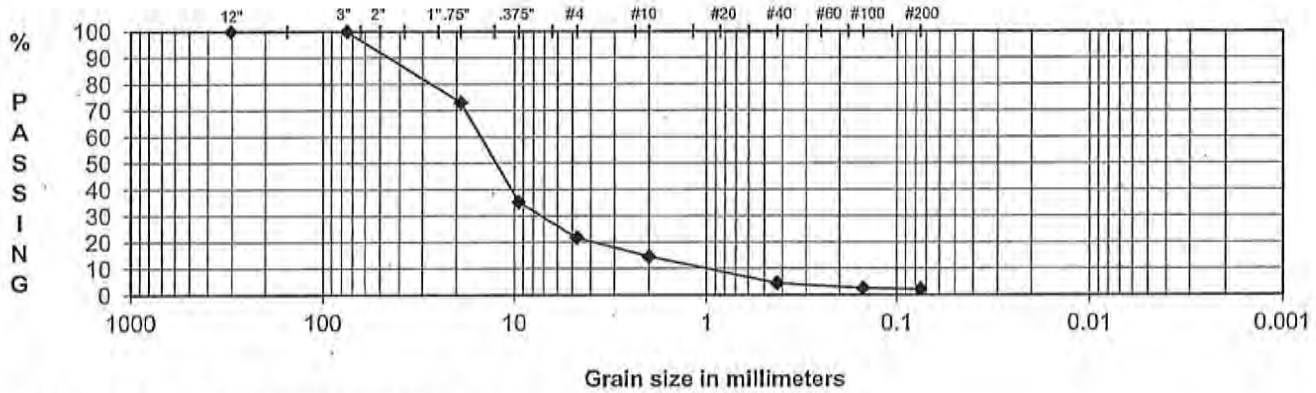
	Weight Of Sample (gm)	840.40
	Tare Weight (gm)	14.00
(W6)	Total Dry Weight (gm)	826.40

% COBBLES	0.00
% C GRAVEL	26.92
% F GRAVEL	51.31
% C SAND	7.19
% M SAND	10.12
% F SAND	2.31
% FINES	2.15
% TOTAL	100.00

D10 (mm)	0.98
D30 (mm)	7.3
D60 (mm)	15.5
Cu	15.8
Cc	3.5

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) ((wt ret/w6)*100)	% PASS (100-%ret)	
12.0"	14.00	0.00	0.00	100.00	cobbles
3.0"	14.00	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	14.00	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	236.50	222.50	26.92	73.08	fine gravel
0.50"					fine gravel
0.375"	548.90	534.90	64.73	35.27	fine gravel
#4	660.50	646.50	78.23	21.77	coarse sand
#10	719.90	705.90	85.42	14.58	medium sand
#20					medium sand
#40	803.50	789.50	95.53	4.47	fine sand
#60					fine sand
#100	819.50	805.50	97.47	2.53	fine sand
#200	822.60	808.60	97.85	2.15	fines
PAN	840.40	826.40	100.00	0.00	silt/clay



DESCRIPTION	Poorly graded GRAVEL with some sand and trace silt
USCS	GP

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Gateway Residential	SAMPLE ID/TYPE	TP-11 grab
PROJECT NO.	2012-545	SAMPLE DEPTH	4.5 feet
TECH/TEST DATE	HR 12/07/12	DATE RECEIVED	12/3/12

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	547.90
Wt Dry Soil & Tare (gm)	(w2)	439.50
Weight of Tare (gm)	(w3)	13.90
Weight of Water (gm)	(w4=w1-w2)	108.40
Weight of Dry Soil (gm)	(w5=w2-w3)	425.60
Moisture Content (%)	(w4/w5)*100	25.47

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

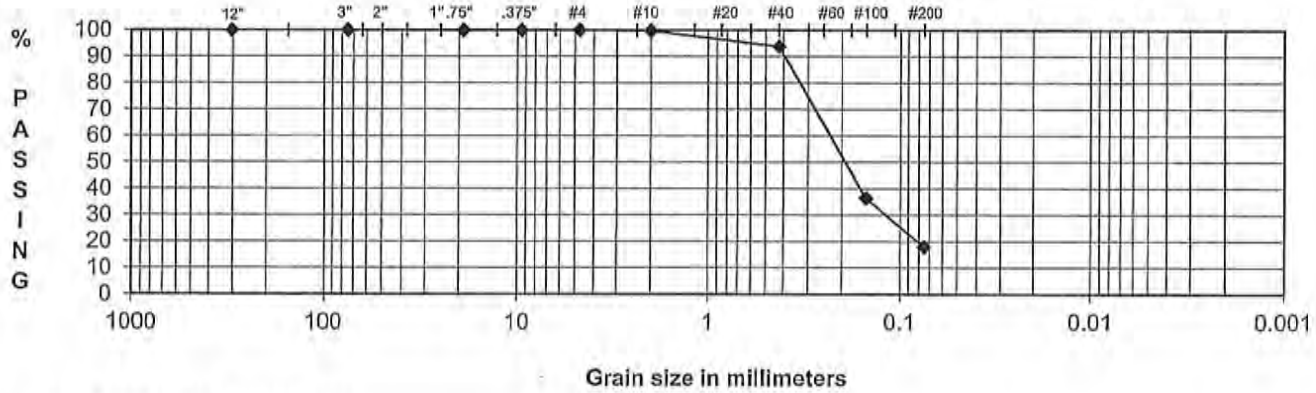
	Weight Of Sample (gm)	439.50
	Tare Weight (gm)	13.90
(W6)	Total Dry Weight (gm)	425.60

% COBBLES	0.00
% C GRAVEL	0.00
% F GRAVEL	0.00
% C SAND	0.23
% M SAND	5.92
% F SAND	75.87
% FINES	17.97
% TOTAL	100.00

D10 (mm)	NA
D30 (mm)	0.13
D60 (mm)	0.23
Cu	NA
Cc	NA

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) ((wt ret/w6)*100)	% PASS (100-%ret)	
12.0"	13.90	0.00	0.00	100.00	cobbles
3.0"	13.90	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	13.90	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	13.90	0.00	0.00	100.00	fine gravel
0.50"					fine gravel
0.375"	13.90	0.00	0.00	100.00	fine gravel
#4	13.90	0.00	0.00	100.00	coarse sand
#10	14.90	1.00	0.23	99.77	medium sand
#20					medium sand
#40	40.10	26.20	6.16	93.84	fine sand
#60					fine sand
#100	284.50	270.60	63.58	36.42	fine sand
#200	363.00	349.10	82.03	17.97	fines
PAN	439.50	425.60	100.00	0.00	silt/clay



DESCRIPTION	Silty fine SAND
USCS	SM

THE RILEY GROUP, INC.
17522 Bothell Way NE
Bothell, WA 98011

PHONE: (425) 415-0551
FAX: (425) 415-0311

GRAIN SIZE ANALYSIS
ASTM D421, D422, D1140, D2487, D6913

PROJECT TITLE	Gateway Residential	SAMPLE ID/TYPE	TP-14 grab
PROJECT NO.	2012-545	SAMPLE DEPTH	4 feet
TECH/TEST DATE	HR 12/07/12	DATE RECEIVED	12/3/12

WATER CONTENT (Delivered Moisture)

Wt Wet Soil & Tare (gm)	(w1)	577.20
Wt Dry Soil & Tare (gm)	(w2)	455.40
Weight of Tare (gm)	(w3)	14.00
Weight of Water (gm)	(w4=w1-w2)	121.80
Weight of Dry Soil (gm)	(w5=w2-w3)	441.40
Moisture Content (%)	(w4/w5)*100	27.59

Total Weight Of Sample Used For Sieve Corrected For Hygroscopic Moisture

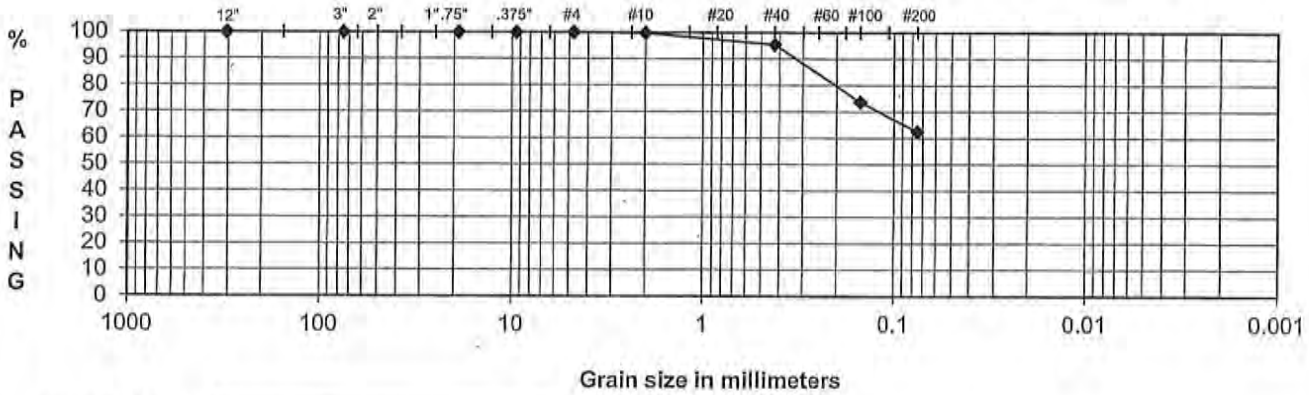
	Weight Of Sample (gm)	455.40
	Tare Weight (gm)	14.00
(W6)	Total Dry Weight (gm)	441.40

% COBBLES	0.00
% C GRAVEL	0.00
% F GRAVEL	0.00
% C SAND	0.25
% M SAND	4.35
% F SAND	32.90
% FINES	62.51
% TOTAL	100.00

D10 (mm)	NA
D30 (mm)	NA
D60 (mm)	NA
Cu	NA
Cc	NA

SIEVE ANALYSIS

	Wt Ret +Tare	(Wt-Tare)	Cumulative (%Retained) ((wt ret/w6)*100)	% PASS (100-%ret)	
12.0"	14.00	0.00	0.00	100.00	cobbles
3.0"	14.00	0.00	0.00	100.00	coarse gravel
2.5"					coarse gravel
2.0"					coarse gravel
1.5"	14.00	0.00	0.00	100.00	coarse gravel
1.0"					coarse gravel
0.75"	14.00	0.00	0.00	100.00	fine gravel
0.50"					fine gravel
0.375"	14.00	0.00	0.00	100.00	fine gravel
#4	14.00	0.00	0.00	100.00	coarse sand
#10	15.10	1.10	0.25	99.75	medium sand
#20					medium sand
#40	34.30	20.30	4.60	95.40	fine sand
#60					fine sand
#100	130.10	116.10	26.30	73.70	fine sand
#200	179.50	165.50	37.49	62.51	fines
PAN	455.40	441.40	100.00	0.00	silt/clay



DESCRIPTION	Sandy SILT
USCS	ML

I. STORMWATER MAINTENANCE PLAN

GATEWAY DIV 1

August 12, 2013

TABLE OF CONTENTS

I. MAINTENANCE AGREEMENT 27

II. STORMWATER FACILITY MAINTENANCE GUIDE 28

Introduction 29
Your Stormwater Facilities 30
Facility Key 30
Site Plan 31
Quick List 32
Maintenance Checklists 33
Resource Listing 42
Log Sheet 43

III. POLLUTION SOURCE CONTROL PROGRAM 45

I. MAINTENANCE AGREEMENT

WILL BE PROVIDED WITH CONSTRUCTION DOCUMENTS

Attachment "A"
Stormwater Facilities Maintenance Program

II. STORMWATER FACILITY MAINTENANCE GUIDE

Introduction

What Is Stormwater Runoff?

When urban and suburban development covers the land with buildings, streets and parking lots, much of the native topsoil, duff, trees, shrubs and grass are replaced by asphalt and concrete. Rainfall that would have soaked directly into the ground instead stays on the surface as *stormwater runoff* making its way into storm drains (including man-made pipes, ditches or swale networks), stormwater ponds, surface and groundwater and, eventually, to Puget Sound.

What Is a Storm Drain System and How Does It Work?

The storm drain system for most developments includes measures to *carry, store, cleanse and release* the stormwater. Components work together to reduce the impacts of development on the environment. Impacts can include *flooding* that results in property damage and blocked emergency routes, *erosion* that can cause damage to salmon spawning habitat and *pollution* that harms fish and/or drinking water supplies.

The storm drain system provides a safe method to carry stormwater to the treatment and storage area. Swales and ponds filter pollutants from the stormwater by *physically* settling out particles, *chemically* binding pollutants to pond sediments and *biologically* converting pollutants to less harmful compounds. Ponds also store treated water, releasing it gradually to a nearby stream or to groundwater.

What Does Stormwater Runoff Have to Do With Water Quality?

Stormwater runoff must be treated because it carries litter, oil, gasoline, fertilizers, pesticides, pet wastes, sediments and anything else that can float, dissolve or be swept along by moving water. Left untreated, polluted stormwater can reach nearby waterways where it can harm and even kill aquatic life. It can also pollute groundwater to the extent that it requires treatment before it is suitable for drinking. Nationally, stormwater is recognized as a major threat to water quality. Remember to keep everything out of stormwater systems except the rainwater they are designed to collect.

Stormwater Facilities

Different types of ponds are designed for different purposes. For example, wet ponds primarily provide treatment of stormwater. Dry ponds or infiltration ponds are designed to provide storage for stormwater and allow for its gradual release downstream or into the ground.

Who Is Responsible for Maintaining Stormwater Facilities?

All stormwater facilities require maintenance. Regular maintenance ensures proper functioning and preserves visual appeal. This Stormwater Facility Maintenance Guide was designed to explain how stormwater facilities work and provide user-friendly, straightforward guidance on facility maintenance. You are responsible for regularly maintaining privately owned ponds, catch basins,

pipes and other drainage facilities on your property. Stormwater facilities located in public rights-of-way are maintained by local governments.

How to Use the Stormwater Facility Maintenance Guide

This Maintenance Guide includes a Site Plan specific to your development and a Facility Key that identifies the private stormwater facilities you are responsible for maintaining. A "Quick List" of maintenance activities has also been included to help you identify the more routine needs of your facility.

Included in This Guide

- Comprehensive Maintenance Checklists that provide specific details on required maintenance
- Pollution Prevention Tips that list ways to protect water quality and keep storm drain systems functioning smoothly
- Resources to provide more information and technical assistance

A Regional Approach to Stormwater Management

The Cities of Lacey, Olympia and Tumwater together with Thurston County are taking steps to educate and involve area residents in water quality issues and stormwater management. Stormwater runoff is a widespread cause of water quality impairment and stream degradation. The jurisdictions are working together with residents, businesses, community groups and schools to address this problem. This guide focuses on providing information on ways that you can reduce stormwater impacts through pollution prevention and proper facility maintenance.

Your Stormwater Facilities

This section consists of two parts that are to be used together: the ***Facility Key*** and the ***Site Plan***. Review the site plan and identify the numbers denoting a feature of the system. Then check the facility key for the feature type and checklist name.

Facility Key

The stormwater facility in your neighborhood is comprised of the following elements:

Type of Feature and Checklist Name	Location on Site Plan
Ponds	1
Catch Basins, Manholes and Inlets	2
Fencing, Shrubbery Screens and Gates	3
Conveyance Pipes, Ditches and Swales	4
Grounds and Landscaping	5
Access Roads and Easements	6
Drywells, French Drains or Downspouts	See individual lot site plan.

Site Plan

Quick List

The following is an abbreviated checklist of the most common types of maintenance required. Please go over this checklist after heavy rains. The list represents minimum maintenance to be performed and should be completed in conjunction with the other checklists for an effective maintenance program.

- ☐ Inspect catch basin grates to see that they are not clogged or broken. Remove twigs, leaves or other blockages. Contact the local jurisdiction to replace the grate if it is broken.
- ☐ Inspect inlet and outlet pipes for blockages. Clear all blockages.
- ☐ Inspect filter strip, swale and pond walls for erosion or caved in areas.
- ☐ Inspect riprap (rocks) at the inlets and outlets of culverts and other pipes. If they are silted in or eroded away, replace them.

Maintenance Checklists

The Maintenance Checklists in this packet are for your use when inspecting the stormwater facilities on your property. This packet has been customized so that only the checklists for your facilities are included. If you feel you are missing a checklist, or you have additional facilities not identified or addressed in this packet, please contact your local jurisdiction.

The checklists are in tabular format for ease of use. Each describes the area to inspect, inspection frequency, what to look for and what action to take. A log sheet is included toward the end of the chapter to help you track maintenance of your storm drainage system.

Although it is not intended for the maintenance survey to involve anything too difficult or strenuous, there are a few tools that will make the job easier and safer including:

- A flashlight
- A long pole or broom handle
- Some kind of pry bar or lifting tool for pulling manhole and grate covers
- Gloves

A resource list is included in the next chapter. There you will find the phone numbers of the agencies referenced in the tables, as well as the contractors and consultants who designed and constructed your facilities.

SAFETY WARNING: In keeping with OSHA regulations, you should never stick your head or any part of your body into a manhole or other type of confined space. When looking into a manhole or catch basin, stand above it and use the flashlight to help you see. Use a long pole or broom handle to check sediment depths in confined spaces. *NO PART OF YOUR BODY SHOULD BREAK THE PLANE OF* THE *OPEN HOLE.*

Ponds

There are essentially three kinds of ponds: treatment ponds, infiltration ponds and detention ponds. Although each pond has unique maintenance requirements, there are also many things they have in common. Your facilities are combination wet/detention and wet/infiltration ponds.

Inspection Area	Frequency	Look For	Action
Entire Pond	Quarterly	Yard waste such as grass clippings and branches in basin; presence of glass, plastic, metal, foam or coated paper.	Remove trash and debris and dispose of properly.
Entire Pond	Quarterly	Vegetation that may constitute a public hazard, e.g., tansy ragwort, poison oak, stinging nettles, devilsclub.	Remove invasive or noxious vegetation. Do not spray chemicals on vegetation without obtaining guidance from WSU Cooperative Extension and approval from City or County.
Entire Pond	Quarterly	Presence of chemicals (e.g., natural gas, oil or gasoline), noxious odor or sludge.	First, attempt to locate source of pollution; then call Moderate Risk Waste program at Thurston County Environmental Health to report the hazard.
Entire Pond	Quarterly	Sparse, weedy or overgrown grass in grassy (dry/infiltration) ponds; presence of invasive species or sparse growth of plants in wet ponds.	Grassy ponds: selectively thatch, aerate and re-seed ponds. Grass should be kept less than 8 inches high. Wet ponds: hand-plant nursery-grown wetland plants in bare areas. Contact WSU Cooperative Extension for guidance on invasive species. Pond bottoms should have uniform dense coverage of desired plant species.
Entire Pond	Quarterly	Evidence of rodent holes if facility is a dam or berm. Water should not flow through rodent holes.	Destroy rodents and repair dam or berm. Contact Thurston County Health Department for guidance.
Entire Pond	Quarterly	Nuisance insects such as wasps, hornets or mosquitoes that may interfere with maintenance.	Destroy or remove insects. Contact WSU Cooperative Extension for guidance.

Checklist continues on next page.

Ponds Checklist, Continued

Inspection Area	Frequency	Look For	Action
Entire Pond	Annually	Confirmation that trees are not interfering with maintenance (i.e., mowing, silt removal or access).	Prune tree limbs to allow for maintenance. Some trees may be cut.
Inlet	Annually	Confirmation that the riprap under the inlet pipe is intact and that no native soil is exposed. Also, look for accumulations of sediment greater than half the height of the rocks.	Replace rocks and/or remove sediment.
Outlet	Quarterly	A free-flowing overflow that is clear of debris.	Replace riprap if missing. Remove trash or debris and dispose of properly.
Side Slopes	Annually	Signs of erosion around inlets and outlets. Inspect berms for signs of sliding or settling. Take action if eroded damage is over 2 inches deep and where there is potential for continued erosion.	Attempt to determine the cause of erosion and repair it. Stabilize slopes by reinforcing with rock, planting grass, or compacting soil. Contact WSU Cooperative Extension for guidance on slope reinforcement.
Storage Area	Annually	Sediment build-up on pond bottom. A buried or partially buried outlet structure or very slow infiltration rate may indicate significant sediment deposits.	Remove the sediment and re-seed the pond if necessary to improve infiltration and control erosion.
Dikes	Annually	Significant settling of any part of dike.	Build dike back to the original elevation.
Emergency Overflow/ Spillway	Annually	Intact riprap protective area. Repair if any native soil is exposed.	Replace rocks so all native soil is covered.
Trench Drain	Quarterly	Confirmation that the grate is clear of debris and that the drain is not plugged.	Remove debris from grate, clean drain.

Catch Basins, Manholes and Inlets

These structures are typically located in the streets and public rights-of-way. Local jurisdictions are responsible for routine maintenance of the pipes and catch basins in rights-of-way, whereas homeowners are responsible for keeping the grates clear of debris in all areas as well as pipes and catch basins in private areas.

Inspection Area	Frequency	Look For	Action
Catch Basin Opening	During and after major storms	Accumulation of trash or debris in front of catch basin opening that prevents water from flowing in.	Remove blocking trash or debris with a rake and clean off the grate.
Catch basin	Quarterly	Sediment or debris in the basin. No more than half the depth from the bottom of the pipe to the bottom of the basin should be allowed to accumulate. Use a long stick or broom handle to poke into sediment and determine depth.	Remove debris from catch basin.
Inlet and Outlet Pipes	Quarterly	Trash or debris in the pipes that has exceeded 1/5 of their height. Ensure there are not tree roots or other vegetation growing in the pipes.	Remove trash or debris from inlet and outlet pipes.
Inlet and Outlet Pipe Joints	Annually	Cracks wider than ½ inch and longer than 12 inches at the joint of any inlet or outlet pipe. Also check for evidence of sediment entering the catch basin through cracks.	Repair cracks or replace the joints.
Grate	Quarterly	Cracks longer than 2 inches or multiple cracks.	Replace grate if necessary.
Frame	Quarterly	Confirmation that the frame is sitting flush on top of the concrete structure (slab). A separation of more than ¾ inch between the frame and the slab should be corrected.	Repair or replace the frame so it is flush with the slab.
Catch Basin	Annually	Cracks wider than ½ inch and longer than 3 feet. Also check for any evidence of sediment entering the catch basin through cracks. Determine whether or not the structure is sound.	Replace or repair the basin. Contact a professional engineer for evaluation.

Checklist continues on next page.

Catch Basins, Manholes and Inlets Checklist, Continued

Inspection Area	Frequency	Look For	Action
Catch Basin	Quarterly	Chemicals (such as natural gas, oil and gasoline) that may have entered the catch basin. Check for noxious odor or oily sludge.	Clean out catch basin. Contact your local jurisdiction or Thurston County Environmental Health if you detect a color, odor or oily sludge.
Oil/Water Separator (downturned elbow or "T" in Catch Basin)	Quarterly	Significant sludge, oil, grease or scum layer covering all or most of the water surface.	Remove the catch basin lid and skim off oil layer. Pour oil into a disposable container, seal container, wrap securely in newspaper, and place it in the trash. Water surface should be clear of oily layer.
Pipe Elbow	Quarterly	Damage to top or bottom of pipe; determine whether pipe is plumb.	If pipe is broken, replace pipe in accordance with approved plans on file with your local jurisdiction.

Fencing, Shrubbery Screens and Gates

Fences and shrubbery screens aren't typically required for stormwater ponds. If the slopes of the sides are too steep, usually some kind of barricade is constructed.

Inspection Area	Frequency	Look For	Action
Fence or Shrubbery Screen	Quarterly	Inspect the fence or screen to ensure that it blocks easy entry to the facility. Make sure erosion hasn't created an opening under fence.	Mend the fence, repair erosion, or replace the shrubs to form a solid barrier.
Shrubbery Screen	Quarterly	Confirm that shrubbery is not growing out-of-control or that it is not infested with weeds.	Trim and weed shrubbery to provide appealing aesthetics. Do not use chemicals to control weeds.
Wire Fences	Annually	Confirmation that fence is still in alignment.	Straighten posts and rails if necessary.
Wire Fences	Annually	Missing or loose tension wire.	Replace or repair tension wire so it holds fabric.
Wire Fences	Annually	Missing, loose or sagging barbed wire.	Replace or repair barbed wire so that it doesn't sag between posts.
Wire Fences	Annually	Rust or scaling.	Paint or coat rusting or scaling parts with a protective coating.
Wire Fences	Quarterly	Confirm that there are no holes in the fabric or fencing.	Repair holes so that there are no openings in the fabric or fencing.
Gate	Quarterly	Confirm that the gate is not broken, jammed or missing and that it opens easily.	Repair or replace the gate to allow entry of maintenance people and equipment. If a lock is used, make sure you have a key.

Conveyance Pipes, Ditches and Swales

Inspection Area	Frequency	Look For	Action
Pipes	Annually	Confirmation that accumulated sediment has not exceeded 20% of the diameter of the pipe and that vegetation has not reduced free movement of water through pipes. Ensure that the protective coating is not damaged and rusted. Dents should not significantly impede flow. Pipe should not have major cracks or tears allowing water to leak out.	Clean pipes of all sediment and debris. Remove all vegetation so that water flows freely through pipes. Repair or replace pipe as necessary.
Open Ditches	Quarterly	Yard waste or litter in the ditch.	Remove trash and debris and dispose of properly.
Open Ditches	Annually	Confirmation that accumulated sediment has not exceeded 20% of the depth of the ditch.	Clean ditch of all sediment and debris.
Open Ditches and Swales	Annually	Vegetation (e.g., weedy shrubs or saplings) that reduces the free movement of water through ditches or swales.	Clear blocking vegetation so that water flows freely through ditches. Grassy vegetation should be left alone.
Open Ditches and Swales	Quarterly	Signs of erosion. Inspect slopes for signs of sloughing or settling. Action is needed where eroded damage is over 2 inches deep and where potential for continued erosion exists.	Eliminate causes of erosion. Stabilize slopes by using appropriate erosion control measures (e.g., reinforce with rock, plant grass, compact soil).
Open Ditches and Swales	Annually	Adequate rock placement in splash pad, check dam or lining. Native soil should not be visible.	Replace rocks to design standard.
Swales	Quarterly	Adequate grass coverage. Take action if coverage is sparse and weedy, or areas are overgrown with woody vegetation.	Aerate soils, reseed and mulch bare areas. Keep grass less than 8 inches high. Remove woody growths, regrade and reseed as necessary.
Swales	Quarterly	Confirmation that swale has not been filled in or blocked by structures, shrubbery, etc.	If possible, speak with homeowner and request that the swale area be restored.
Swales	Annually	Standing water in swale or very slow flow velocity. Stagnation.	A survey may be needed to verify grades. Grades should be between 1 % and 5 %.

Grounds and Landscaping

Inspection Area	Frequency	Look For	Action
Landscaped Areas	Quarterly	Uncontrolled weed growth in landscaped areas.	If possible, pull weeds by hand to avoid using chemical weed controls.
Landscaped Areas	Quarterly	Presence of poison ivy or other poisonous vegetation or insect nests.	Remove poisonous vegetation or insect nests.
Landscaped Areas	Quarterly	Yard waste or litter.	Remove and dispose of properly.
Landscaped Areas	Quarterly	Noticeably visible rills in landscaped areas.	Identify the causes of erosion and take steps to slow down or disperse the water. Fill in contour; seed area.
Trees and Shrubs	Annually	Split, broken or otherwise damaged tree parts and shrubs.	Trim trees and shrubs to restore shape. Replace severely damaged trees and shrubs.
Trees and Shrubs	Annually	Blown down or knocked over trees or shrubs.	Replant trees or shrubs, inspecting for injury to stem or roots. Replace if severely damaged.
Trees and Shrubs	Annually	Exposed roots, inadequate support, severe leaning.	Place stakes and rubber-coated ties around young trees/shrubs for support.

Access Roads and Easements

Inspection Area	Frequency	Look For	Action
General	One Time	Adequate access to your stormwater facilities for maintenance vehicles.	If there is not enough access, check with your local jurisdiction to determine whether an easement exists. If so, a maintenance road may need to be constructed.
Access Road	Quarterly	Debris that could damage vehicle tires (glass or metal).	Clear all potentially damaging debris.
Access Road	Annually	Any obstructions that reduce clearance above and along the road to less than 14 feet.	Clear along and over roadway so there is enough clearance.
Road Surface	Annually	Potholes, ruts, mushy spots or woody debris that limits access by maintenance vehicles.	Add gravel or remove wood as necessary.
Shoulders and Ditches	Annually	Erosion along the roadway.	Repair erosion with additional soil or gravel.

Resource Listing

If you suspect a problem exists, please contact your local jurisdiction at one of the numbers below and ask for Technical Assistance.

CONTACT NUMBERS

City of Lacey (Storm & Surface Water)	(360) 491-5600
WSU Cooperative Extension	(360) 786-5445

DEVELOPER INFORMATION

Gateway 850, LLC
15 Lake Bellevue Drive, Suite 102
Bellevue, WA 98005

ENGINEER'S INFORMATION

HATTON GODAT PANTIER
3910 Martin Way E, Suite B
Olympia, WA 98506
(360) 943-1599

Log Sheet

Use log sheets to track maintenance checks and what items, if any, are repaired or altered. Make copies of this page; use a fresh copy for each inspection. The completed sheets will serve as a record of maintenance activity and will provide valuable information about how your facilities are operating. Log sheets should be kept in a dry, readily accessible place.

INSPECTION DATE: _____

PERFORMED BY: _____

PHONE NUMBER: _____ **ADDRESS:** _____

POSITION ON HOA: _____ **CITY, ST, ZIP:** _____

PART OF FACILITY INSPECTED	OBSERVATIONS (LIST REQUIRED MAINTENANCE ACTIVITIES)	ACTION TAKEN	DATE OF ACTION

Attachment "B"
Pollution Source Control Plan

III. POLLUTION SOURCE CONTROL PROGRAM

Purpose

Many products and practices commonly used in and around the home are hazardous to both the environment and us. Many of these products can end up in our stormwater systems and groundwater. This document gives alternatives, where possible, for those types of products and practices. The Best Management Practices (BMPs) described here include "good housekeeping" practices that everyone can use.

Recommended Pollution Control Practices For Homeowners

It has been said that the average home today contains more chemicals than the average chemical lab of 100 years ago. When many of these chemicals are used industrially, they can be subject to various health and safety standards; yet these same substances are used freely and often carelessly in our homes.

The BMPs in this section are divided into four categories: **Household Hazardous Wastes**, **Pesticides**, **Remodeling** and **Septic Maintenance**. Each section includes information on available alternatives.

Household Hazardous Wastes

Many of the cleaning agents, solvents, polishes, etc. commonly used in the home are considered hazardous. These products may be toxic, corrosive, reactive, flammable and/or carcinogenic. It is critical that these products are handled with care and are disposed of properly. A list of common household hazardous materials is presented in Table 1.

In addition, many hazardous household chemicals persist for long periods of time in the environment. Manufacturers may truthfully state that a product is "biodegradable"; most products are biodegradable, but what is important is the rate at which they are broken down and the products into which they are broken down. The term "biodegradable" on its own is misleading at best, unless the product is rapidly degraded into harmless substances.

It is important to note here that the term "biodegradable" currently has no legal definition in this state. This means that any product can use this term according to the manufacturer's own definition. This definition may not be at all similar to the consumer's perception. The following ideas will help you reduce the risks of stormwater and groundwater contamination from many household products.

Household Product Management

1. Read product labels before purchasing. Toxic product labels will carry many warnings. Either bypass such products or purchase in small quantities. If you cannot use the entire product, try to give it away instead of disposing of it. Thurston County periodically facilitates product exchanges for leftover paints and other hazardous wastes. Call the Thurston County Health Department at (360) 754-4111 for more information.

2. Buy only those detergents that contain little or no phosphorus. Phosphorus can cause algae blooms if washed into lakes or streams. Most detergents that are low in phosphates or phosphate free are labeled as such.

3. Use no more than the manufacturer's suggested amount of any cleanser. More is not necessarily better.

4. Products such as oven cleanser, floor wax, furniture polish, drain cleaners and spot removers often contain toxic chemicals. Buy the least toxic product available or use a non-toxic substitute if one can be found. For example, ovens can be cleaned by applying table salt to spills then scrubbing with a solution of baking soda and water. Table 2 lists substitutes for many commonly used household products.

   If it is necessary to use a product that contains toxic chemicals, use the product only as directed. Do not combine products, as they may become more dangerous when mixed (e.g., mixing chlorine bleach and ammonia produces dangerous gases). Use eye protection and rubber gloves as appropriate.

   Contact the Hazardous Substance Hotline at 1-800-633-7585 if you have any questions regarding disposal of a product or empty container. The County has both hazardous waste collection days and permanent facilities where residents can bring hazardous wastes. Call the Thurston County Health Department at (360) 754-4111 for more information.

5. Chemicals left over from activities such as photography and auto repair are hazardous and should not be flushed down the sink. This is especially important if your home is hooked up to a septic system. Toxic chemicals can kill the beneficial bacteria in the tank used to treat sewage and can pollute water supply wells.

6. Be sure all containers are clearly labeled.

7. Common batteries (not automobile) are one of the largest sources of heavy metals (such as lead, nickel, cadmium and mercury) found in landfills. Instead of throwing them away, dispose of them at a hazardous waste collection site.

Automotive Usage, Care and Maintenance

From a waste management standpoint, automobile maintenance is best done by professionals at facilities designed to handle, store and dispose of the waste products properly. Many of these facilities do an excellent job of dealing with waste oils, antifreezes, other fluids, batteries and tires. They often charge a small fee to cover the added expenses, but it's worth it. However, if you repair your car at home, please consider these helpful tips

1. Cars should be serviced regularly. Leaky lines or valves should be replaced.

2. Dumping oil, degreasers, antifreeze and other automotive liquids into a stream or a storm drain violates city, county and state laws or ordinances. Do not dump them onto the ground because they will end up in stormwater runoff or in groundwater. Do not use oil to reduce dust levels on unpaved areas. Instead, recycle used oil and antifreeze. Keep them in separate containers. Call the Recycling Hotline at 1-800-RECYCLE or call the Thurston County Health Department for the location of the nearest recycling center, or inquire

whether your local automotive service center recycles oil. Some may also take used oil filters.

3. Wrap empty oil or antifreeze containers in several layers of newspaper, tie securely and place in a covered trashcan. Antifreeze is sweet tasting but poisonous to people, fish, pets and wildlife.

4. Sweep your driveway instead of hosing it down. Fluids and heavy metals associated with automobiles can build up on driveway surfaces and be washed into local surface or groundwater when driveways are hosed down.

5. When washing vehicles, do so over your lawn or where you can direct soapsuds onto the lawn or another vegetated area to keep the soap from washing into the storm drain system or local surface water. Your stormwater pond cannot cleanse soapy water.

6. Small spills of oil and other fluids can be absorbed with materials such as kitty litter or sawdust. Wrap the used absorbent and any contaminated soil in a plastic bag and place in the garbage.

   If a spill reaches surface water, you must notify the nearest regional office of the Department of Ecology immediately! The Southwest Regional Office phone number is (360) 407-6300, or call 911. There are fines for failure to notify the appropriate agency when a spill occurs.

7. De-icing chemicals (various types of salt) can harm concrete less than three years of age, burn vegetation and be corrosive to cars and other metal objects. De-icing chemicals and their additives can be toxic. (Cyanide is formed from the breakdown of a common anti-caking agent used in de-icing chemicals.)

   Urea salts are an alternative to other types of salt de-icers, but great care must be used in applying them. These salts contain large quantities of nitrogen, which can severely burn plants and encourage algae growth if over-applied.

   The use of these chemicals should be minimized or avoided. Instead, shovel walks clear and apply a dusting of sand to improve footing.

Table 1 Hazardous Household Substances List

Auto, Boat and Equipment Maintenance	Repair and Remodeling	Cleansing Agents
Batteries	Adhesives, glues, cements	Oven cleaners
Waxes and cleansers	Roof coatings, sealants	Degreasers and spot removers
Paints, solvents and thinners	Caulking and sealants	Toilet, drain and septic tank cleaners
Additives	Epoxy resins	Polishes, waxes and strippers
Gasoline	Solvent-based paints	Deck, patio and chimney cleaners
Flushes	Solvents and thinners	Solvent cleaning fluids
Auto repair materials	Paint removers and strippers	
Motor oil		
Diesel oil		
Antifreeze		
Pesticides	**Hobby and Recreation**	**Miscellaneous**
Insecticides	Paints, thinners and solvents	Ammunition
Fungicides	Chemicals (photo and pool)	Asbestos
Rodenticides	Glues and cements	Fireworks
Molluscicides	Inks and dyes	
Wood preservatives	Glazes	
Moss retardants	Chemistry sets	
Herbicides	Bottled gas	
Fertilizers	White gas	
	Charcoal starter fluid	

Source: Guidelines for Local Hazardous Waste Planning, Ecology, No. 87-18 1987.

Table 2. Non- or Less Toxic Alternatives to Toxic Products

Hazardous Product	Alternative(s)
Air fresheners	Set out a dish of vinegar; simmer cinnamon or cloves in water; set out herbal bouquets or potpourri in open dishes; burn scented candles.
Bleach	Borax or oxygen bleaches or reduce bleach by ½ and add ¼ - ½ C baking soda; line dry clothes.
Brass polish	Worcestershire sauce
Chrome polish	Apple cider vinegar; a paste of baking soda and water; a lemon
Coffee pot cleaner	Vinegar; remove coffee stains with moist salt paste.
Copper cleaner	Mixture of lemon juice and salt or tomato catsup.
Drain cleaner	Use a plunger followed by ½ C baking soda mixed with ½ C vinegar. Let sit 15 minutes; pour into drain followed by 2 qt. boiling water.
Furniture polish	Linseed, olive or almond oils; a mixture of 3 parts olive oil to 1 part white vinegar; a mixture of 1 T lemon oil and 1 pint mineral oil
Garbage disposal deodorizer	Lemon rind or baking soda.
Glass cleaner	Mixture of 2 T vinegar and 1 quart water
Grease remover	Paste of borax and water on damp cloth
Ink stain remover	Spray with non-aerosol hairspray before washing.
Laundry soap	Borax; baking soda; washing soda
Linoleum floor cleaner	Mixture of 1 C white vinegar and 2 gallons water
Mildew remover	Equal parts vinegar and salt
Mothballs	Cedar chips or blocks; dried tansy, lavender or peppercorns
Oil spills	Kitty litter; sawdust
Oil stain remover	White chalk rubbed into stain prior to washing
Oven cleaner	Cover fresh spills with salt; scrape off after the oven cools. A soda water solution will cut grease. Paint ammonia on spills with a paintbrush, then rinse off.
Paint brush softener	Hot vinegar
Paint stripper	Use mechanical sanding instead of chemical strippers.
Paint or grease remover	Wear gloves or try baby oil
Pet odor remover	Cider vinegar
Pitch or sap remover	Butter, margarine or vegetable shortening.
Porcelain stain remover	Baking soda
Refrigerator deodorizer	Open box of baking soda
Rug/carpet cleaner	(General) Use a soap-based non-aerosol rug shampoo; vacuum when dry. (Spots) Pour club soda or sprinkle cornmeal or cornstarch on the rug; let sit for at least 30 minutes; vacuum.
Rust remover	Lemon juice and sunlight
Rusty bolt remover	Carbonated beverage
Scorch mark remover	Grated onion
Scouring powder	Baking soda or non-chlorine scouring powder.
Silver polish	Soak silver in warm water with 1 T soda, 1 T salt and a piece of aluminum foil.
Stainless steel polish	Mineral oil
Toilet bowl cleaner	Paste mixture of borax and lemon juice
Tub and tile cleaner	¼ C soda and ½ C white vinegar mixed with warm water
Upholstery spot remover	Club soda
Water mark remover	Toothpaste

Pesticides[1] and Fertilizers

Pesticides and fertilizers are commonly used by homeowners in their quest for bigger, healthier plants and greener, lusher lawns. These chemicals are often overused and misapplied. These chemicals are easily introduced into stormwater runoff and can cause algae blooms (fertilizers) or kill off aquatic organisms (pesticides).

Fertilizer Management

Fertilizing a lawn can be done in an environmentally sensitive manner. Here are some ideas.

1. Before fertilizing, test your soil's pH by using a readily available kit or through tests provided by WSU Cooperative Extension. Use only the recommended amount of fertilizer and any soil amendments, such as lime, that are recommended in your test results.
2. Use fertilizers that are appropriate for your area and for the types of plants you are growing. Work the fertilizer into the soil directly around the plant's drip line. By incorporating the fertilizer in the soil, there will be less likelihood of contaminated runoff. Contact the Thurston Conservation District for more information.
3. Water before fertilizing. Water enough to dampen the ground thoroughly but not enough to cause surface runoff. Dampening the soil prevents fertilizer from being washed from the surface of dry soil in the first rain or watering after application.
4. Many soils can benefit from the use of organic fertilizers such as compost or peat. Not only do these substances add nutrients to soil; they also increase the porosity of the soil and increase its ability to hold water.
5. Slow release fertilizers (which are generally resin-coated) can be used in addition to organic fertilizers. They are not mobile in the soil and are applied only once.

Integrated Pest Management

Rather than bringing out the sprayer whenever a pest infestation occurs in the garden, consider using Integrated Pest Management (also known as IPM). IPM emphasizes the evaluation of all factors including environmental effects before chemicals are applied. Pesticides should only be used as a last resort. Some of the tactics that can be used to decrease or eliminate the use of pesticides include:

1. Use of Natural Predators or Pathogens: Because chemical sprays generally kill many beneficial insects instead of just the target pest, it may be necessary to introduce natural predators back into the garden. Ladybugs, lacewings, predatory wasps and nematodes are all commercially available. Garter snakes and toads are also predators and should not be eliminated from the garden.

   There are some bacteria, viruses and insect parasites that are specific to pests and will not harm other insects or animals. A commonly used bacterium in the Puget Sound area is *Bacillus thuringiensis* (Bt), which is intended to control infestations of tent caterpillars. Products containing Bt are available at your nursery.

[1] As used here, the word pesticide can mean any herbicide, insecticide, rodenticide, miticide or other chemicals used in a similar manner.

2. Habitat Changes: Many times a change of habitat can control pest infestations. Removal of old tires can cut down on the mosquito population by removing a convenient water-filled location for them to breed in. Crop rotation, even in a small garden, can reduce the number of pest infestations. Removing last year's leaves from under rose bushes can cut down on the incidence of mildew and blackspot, as these fungi overwinter in dead leaves.
3. Timing: Crops that can overwinter (such as leeks or carrots) should be planted in the fall. This gives them time to become established before pests arrive in the spring.
4. Mechanical: Many eggs, larvae, cocoons and adult insects can be removed by hand. Be sure that the insect is properly identified prior to removing it so those beneficial insects are not destroyed in error. Drowning insects in plain water or spraying them with soapy water are alternatives to squashing them.
5. Resistant Plants: Plants that are native to this area are often more resistant to pests and tolerant of the climate than are introduced plants. Many plant cultivars have been developed which are resistant to such diseases as verticilium wilt and peach leaf curl. Grass seed mixes are also available for lawns that need much less watering, mowing and chemical use.
6. Growing Conditions: Plants, such as hostas, that require some shade are more susceptible to pests when they are growing in the sun. Improperly fertilized or watered plants are less vigorous in growth and tend to attract pests. Plants that prefer an acid soil, such as azaleas, will perform better and be less susceptible to pests when they are grown in soil with the proper pH.
7. Chemicals: Chemicals are a small part of the IPM plan and should be applied only as needed after reviewing all other alternatives.

Pesticide Management

When use of a chemical is the best or only option, follow these simple guidelines:

1. Know your target pest before spraying. Use the pesticide according to the manufacturer's instructions, and buy only the needed quantity. Many pesticides have a limited shelf life and may be useless or degrade into even more toxic compounds if stored for extended periods of time.
2. Do not apply more than the specified amount. Overuse can be dangerous to your health as well as the health of wildlife and the environment. If more than one chemical can be used to control the pest, choose the least toxic. The word "caution" on the label means that the chemical is less toxic than one that is labeled "warning".
3. Do not spray on windy days, in the morning of what will be a very hot day or when rain is likely. Herbicides can drift and injure valuable ornamental plants. Do not water heavily after application. Plants should be lightly watered before application to prevent burning of the foliage and to help evenly spread the chemical.
4. Never apply pesticides near streams, ponds or wetlands (exception: approved applications for aquatic weeds). Do not apply pesticides to bare eroded ground (exception: use of low toxicity herbicides such as Round-Up to allow growth of desired planting in small areas).

Many pesticides bind to soil particles and can be easily carried into a stream or storm drain.

5. Pesticides should be stored well away from living areas. Ideally, the storage area should have a cement floor and be insulated from temperature extremes. Always keep pesticides in their original containers with labels in tact. Labels often corrode and become illegible in this climate and may have to be taped onto the container.
6. Federal law now requires that all pesticides be labeled with the appropriate disposal method. Leftovers should never be dumped anywhere, including a landfill. Take unwanted pesticides to the County's hazardous waste collection days or Hazo House at the landfill.
7. Empty containers should be triple-rinsed and the rinse water used as spray. Once containers are triple-rinsed, they are not considered hazardous waste and may be disposed of in most landfills. However, call your local landfill before putting the container in the garbage.
8. If a pesticide is spilled onto pavement, it can be absorbed using kitty litter or sawdust. The contaminated absorbent should be bagged, labeled and taken to Hazo House.
9. If the pesticide is spilled onto dirt, dig up the dirt, place it in a plastic bag and take it to Hazo House.
10. Many pest control companies and licensed applicators have access to pesticides that are more toxic than those available to the consumer. Check with the company before they spray indoors or outdoors to find out what spray they will be using and what precautions, if any, are necessary after the operator leaves.

Home Remodeling

Remodeling uses some of the most toxic substances found in the home. Paints, preservatives, strippers, brush cleaners and solvents all contain a wide range of chemicals, some of which are suspected to be carcinogenic (cancer causing). These products should never be dumped in a landfill or put down a sewer or septic system.

1. When building a deck consider using wood or wood alternatives such as recycled wood/plastic decking instead of concrete. Wood decking allows rainwater to drip onto the ground below, keeping it from becoming surface runoff
2. Decks and sidewalks can also be built out of brick interlocking pavers or modular concrete. If these surfaces are placed on a bed of well-drained soil gravel or sand, rainwater can infiltrate into the ground around them.
3. To reduce disposal problems, buy only the needed amount. Used turpentine or brush cleaner can be filtered and reused. Paint cans should be allowed to dry and then be disposed of during a hazardous waste collection day or at Hazo House.
4. Leftover paint can be given away, for example to a theater group. Contact the Thurston County Health Department at (360) 754-4111 for other options.

5. Roof downspouts can be adjusted to infiltrate runoff to a well drained area. The runoff from them can enter a gravel bed where it can infiltrate into the ground. For design criteria, see your jurisdiction's drainage manual.
6. When gardening on slopes, reduce the potential for surface runoff by using terraces across the face of the hill. These can be as simple as little soil "bumps" or more elaborate using timbers, masonry or rock walls.

Septic System Care and Management

Although septic systems do not seem to have a direct relationship with stormwater runoff, they can in some instances be related.

1. Roof drains and stormwater runoff should be diverted away from drainfields. Excess water reduces the capacity of the drainfield to absorb effluent from the septic tank
2. Water from hot tubs should not be drained into a septic system all at once. They are not designed to handle large volumes of chlorinated water. Either use the water on plants in the yard, or drain the hot tub slowly over a period of days.
3. Septic tanks should be pumped regularly. Ponded water, damp places in the yard, foul odors and/or a dark gray or black soil color may indicate septic drain field failure. Effluent from a malfunctioning septic can cause disease and nitrate problems in groundwater. For septic system assistance, contact the Thurston County Health Department at (360) 786-5490.

References

Puget Sound Water Quality Authority, Managing Nonpoint Pollution - An Action Plan for Puget Sound Watersheds, 88-31, June 1989.

Washington State Dept. of Ecology, Water Quality Guide - Recommended Pollution Control Practices for Homeowners and Small Farm Operators 87-30, revised June 1991.

Washington State Dept. of Ecology, Hazardous Waste Pesticides, 89-41, August 1989.

IV. GLOSSARY

BEST MANAGEMENT PRACTICE (BMP) - Structures, conservation practices or regulations that improve quality of runoff or reduce the impact of development on the quantity of runoff.

BIOFILTER (SWALE) - A wider and flatter vegetated version of a ditch over which runoff flows at uniform depth and velocity. Biofilters perform best when vegetation has a thick mat of roots, leaves and stems at the soil interface (such as grass).

BIOFILTRATION - The process through which pollutant concentrations in runoff are reduced by filtering runoff through vegetation.

BUFFER - The zone that protects aquatic resources by providing protection of slope stability, attenuation of runoff and reduction of landslide hazards. An integral part of a stream or wetland ecosystem, it provides shading, input of organic debris and coarse sediments to streams. It also allows room for variation in stream or wetland boundaries, habitat for wildlife and protection from harmful intrusion.

CATCH BASIN - An inlet for stormwater set into the ground, usually rectangular, made of concrete and capped with a grate that allows stormwater to enter.

CHECK DAM - A dam (e.g., rock, earthen, log) used in channels to reduce water velocities, promote sediment deposition and/or enhance infiltration.

COMPOST STORMWATER FILTER - A treatment facility that removes sediment and pollutants from stormwater by percolating water through a layer of specially prepared big leaf maple compost.

CONSTRUCTED WETLAND - A wet pond with dead storage at varied depths and planted with wetland plants to enhance its treatment capabilities.

CONTROL STRUCTURE (FLOW RESTRICTOR) - A manhole and/or pipe structure with a flow-regulating or metering device such as a weir or plates with small holes known as orifices. This structure controls the rate at which water leaves the pond.

CONVEYANCE - A mechanism or device for transporting water including pipes, channels (natural and man-made), culverts, gutters, manholes, etc.

CRITICAL AREA – Areas, such as wetlands, streams and steep slopes, defined by ordinance or resolution of the jurisdiction. Also known as "environmentally sensitive areas."

CULVERT - A conveyance device (e.g., concrete box, pipe) that conveys water from a ditch, swale or stream under (usually across) a roadway or embankment.

DEAD STORAGE - The volume of storage in a pond below the outlet that does not drain after a storm event. This storage area provides treatment of the stormwater by allowing sediments to settle out.

DETENTION FACILITY - A facility (e.g., pond, vault, pipe) in which surface and stormwater is temporarily stored.

DETENTION POND - A detention facility in the form of an open pond.

DISPERSION TRENCH - An open-top trench filled with riprap or gravel that takes the discharge from a pond, spreads it out and spills (bubbles) the flow out along its entire length. Dispersion

trenches are used to simulate "sheet flow" of stormwater from an area and are often used to protect sensitive adjacent areas, such as wetlands.

DRAINAGE SYSTEM - The combination of Best Management Practices (BMPs), conveyances, treatment, retention, detention and outfall features or structures on a project.

DROP STRUCTURE - A structure for dropping water to a lower elevation and/or dissipating energy. A drop may be vertical or inclined.

DRY POND - A detention facility that drains completely after a storm. This type of pond has a pipe outlet at the bottom.

EASEMENT - A right afforded a person to make limited use of another's real property. Typical easements are for pipes or access to ponds; they may be 15 to 20 feet wide.

EMERGENCY OVERFLOW OR SPILLWAY - An area on the top edge of the pond that is slightly lower in elevation than areas around it. This area is normally lined with riprap. The emergency overflow is used only if the primary and secondary outlets of the pond fail, in the event of extreme storms or if the infiltration capability of the pond becomes significantly diminished. If the emergency overflow ever comes into play, it may indicate the pond needs to be upgraded.

ENERGY DISSIPATER - A rock pad at an outlet designed to slow the water's velocity, spread out the water leaving the pipe or channel and reduce the potential for erosion.

FREEBOARD - The vertical distance between the design high water mark and the elevation of the top of the pond. Most ponds have one to two feet of freeboard to prevent them from overflowing.

INFILTRATION - The soaking of water through the soil surface into the ground (percolation). (Many ponds are designed to fully infiltrate stormwater and thus do not have a regularly used discharge pipe.)

INFILTRATION FACILITY (or STRUCTURE) - A facility (pond or trench) that retains and percolates stormwater into the ground, having no discharge (to any surface water) under normal operating conditions.

JUNCTION - Point where two or more drainage pipes or channels converge (e.g., a manhole).

JURISDICTION - Olympia, Lacey, Tumwater or Thurston County (as applicable).

LINED POND or CONVEYANCE - A facility, the bottom and sides of which have been made impervious (using, for example, a plastic liner or clay/silt soil layer) to the transmission of liquids.

LIVE STORAGE - The volume of storage in a pond above the outlet that drains after a storm event. This storage area provides flood control and habitat protection for nearby streams.

MANHOLE - A larger version of a catch basin, often round, with a solid lid. Manholes allow access to underground stormwater pipes for maintenance.

NATURAL CHANNEL - Stream, creek, river, lake, wetland, estuary, gully, swale, ravine or any open conduit where water will concentrate and flow intermittently or continuously.

OIL-WATER SEPARATOR - A structure or device used to remove oil and greasy solids from water. They operate by using gravity separation of liquids that have different densities. Many catch basins have a downturned elbow that provides some oil-water separation.

OUTFALL - The point where water flows from a man-made conduit, channel or drain into a water body or other natural drainage feature.

RETENTION FACILITY - An infiltration facility.

RETENTION POND - A retention facility that is an open pond.

REVETMENTS - Materials such as rock or keystones used to sustain an embankment, such as in a retaining wall.

RIPRAP - Broken rock, cobbles or boulders placed on earth surfaces, such as on top of a berm for the emergency overflow, along steep slopes or at the outlet of a pipe, for protection against the action of water. Also used for entrances to construction sites.

RUNOFF - Stormwater.

SAND FILTER - A treatment facility that removes sediment and pollutants from stormwater by percolating water through a layer of sand.

STORMWATER - That portion of precipitation that falls on property and that does not naturally percolate into the ground or evaporate but flows via overland flow, channels or pipes into a defined surface water channel or a constructed infiltration facility. Stormwater includes washdown water and other wastewater that enters the drainage system.

SWALE - A shallow drainage conveyance with relatively gentle side slopes, generally with flow depths less than one foot. This term is used interchangeably with "BIOFILTER".

TRASH RACK or BAR SCREEN - A device (usually a screen or bars) that fits over a pipe opening to prevent large debris such as rocks or branches from entering and partially blocking the pipe.

WET POND - A stormwater treatment pond designed with a dead storage area to maintain a continuous or seasonal static water level below the pond outlet elevation

Gateway Residential Subdivision

Sanitary Sewer Basin Study

Prepared for:

Kevin O'Brien
Gateway 850, LLC
15 Lake Bellevue Drive
Bellevue, WA 98005

August 9, 2013

Prepared by:

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(360) 943-1599

Project No: 12-052A
Project Name: Gateway Division 1
E:\office\JOBS\2012\12-052A Gateway Division 1\LAND USE\RPT-Sewer_Basin_Study-08.09.13.doc

TABLE OF CONTENTS

I. **Project Engineer's Certification**.....3

II. **Project Description**.....4

III. **System Design**.....6

List of Figures

Figure 1 – Vicinity Map and Overall Site Plan

Figure 2 – Division 2 Conceptual Layout

Figure 3 – Hewitt-Zollar City Sewer Study Exhibit

Figure 4 – Sewer Basin Exhibit

I. PROJECT ENGINEER'S CERTIFICATION

"I hereby certify that this **Sanitary Sewer Basin Study** for **the Gateway 850 Property Lift Station, Britton Parkway, City of Lacey** was prepared under the supervision and direction of the undersigned, whose seal as a licensed professional engineer of the State of Washington is affixed below."

Signature

8/9/13
Date

Seal

II. PROJECT DESCRIPTION

A. Background

The proposed project is an 83 lot residential subdivision on approximately 43 acres that also includes an 11 acre tract that will be created for future development of a 250 dwelling unit multifamily project. The property is located inside the City of Lacey, north of Britton Parkway, west of Gateway Boulevard and east of Shady Glen Court. Figure 1 includes a Vicinity Map and Overall Site Plan for the project.

The subject property is owned by Gateway 850, LLC who also owns approximately 80 acres located in Thurston County, contiguous to and north of this parcel. While specific development plans are not available for the 80 acres to the north, a concept for that property is shown on Figure 2.

The City has constructed a regional sewage lift station at 2365 Shady Glen Court SE which is indicated on Figure 3. This Lift Station is noted as "Lift Station A" on *Figure B.2-1, ESWCV & Gateway Basin Delineation*, excerpted from a *Sanitary Sewer Study for the City of Lacey*, by Hewitt-Zollars. This figure also identifies "Lift Station D" located on the 80 acre county property (Division 2) which is intended to serve the Gateway Residential properties (Labeled as "HD(A)" on the Huitt-Zollars exhibit). Property labeled as "MD(A1)" and "MD(A2)" were previously considered to be future single family homes. That property is now owned by the City of Lacey as Cuoio Park.

The H-Z exhibit indicates that the Gateway properties would be served partially by gravity sewer in Britton Parkway and partially by Lift Station D. That concept is consistent with the findings of this study as the appropriate and preferred method of providing sewer service to this area. More detailed evaluation is provided later in this report.

The proposed lift station to serve Gateway Residential, Division 1 is shown on Figure 4 which is only slightly different from the location of Lift Station D in the Huitt-Zollars study. An alternative location on the Division 2 property is also indicated on Figure 4. Both lift station locations are viable and acceptable to the applicant. Timing makes the Division 1 location the preferred location. However, due to topography the Division 1 location would result in a lift station approximately 10 feet deeper than one located in Division 2. Though deeper, the total depth of the lift station is still acceptable, being only approximately 26 feet in total depth. See Part III – System Design for more information.

B. Service Area

As discussed above, the service area for the existing City lift station on Shady Glen Court is shown on Figure B.2-1 by Huitt-Zollars. The service area includes the Gateway Residential properties. Service to the lift station is both via direct gravity connection as well as via a second lift station, identified as Lift Station D on Figure B.2-1. Figure 4 is a topographic map of the Gateway Residential properties with the preliminary plat of Gateway Division 1 and includes a line of demarcation where gravity service is available from Britton Parkway. This will service approximately two-thirds of the total 123 acres.

The maximum sewer depth is estimated at approximately 20 feet and would occur about mid-point east west and some 200 feet north of Division 1. This gravity service area serves ~65% of the property including the 250 DU multifamily tract. The remaining 50 single family homes as well as roughly 30 acres in the Division 2 property are too low topographically to be served by gravity sewer in Britton Parkway. The proposal is to service these 250 +/- homes with Lift Station D. Additional discussion of the evaluation of alternatives is provided hereafter.

C. Alternatives Analysis

We evaluated three different alternatives in arriving at the preferred alternative proposed with this application. Alternative 1 is the proposed alternative. Alternative 2 is similar to #1 but ties all gravity sewer into the proposed preliminary plat on the Hall Property (Britton Place) located south west of Division

1. Alternative 3 connects all sewer via gravity directly to the City's Lift Station on Shady Glen Court (northwesterly area of the Hall Property). Discussion of Alternatives 2 and 3 is provided below.

Alternate 2 – Gravity Service through Hall Plat: This alternative is a minor variation of the preferred alternative. If the Hall and Gateway properties develop on similar timelines Alternative 2 could be a preferred alternative. At this time, however, Alternative 2 was rejected for two reasons. First, it requires easement or concurrent development schedules, neither of which can be assured. Second, this alternative only serves an additional 11 lots in Division 1. Consequently, there is little to gain by tying this project into the schedule of an adjacent property. There are no other advantages of Alternative 2 over the preferred alternative.

Alternative 3 – Gravity Service Directly to City of Lacey Lift Station A: The City has an operating lift station located at 2365 Shady Glen Court SE. This lift station is located near the northwesterly area of the Hall Property which is near the southwest corner of the Gateway Division 1 property. See Figure 4. The lift station is located topographically at approximately Elevation 100.

Lift Station A is roughly 10 feet lower in elevation than the lowest prospective service in Division 2 and some 20 feet lower in elevation from the lower prospective service in Division 1. The City of Lacey prefers to reduce the number of City owned lift stations whenever possible and, therefore, would prefer that both Divisions 1 and 2 be serviced through gravity sewers connecting directly to Lift Station A. Based on topography it would appear that this is physically possible to do. However, as determined by this study and apparently concluded in the Huitt-Zollars study as well, other factors dictate the need for a second lift station in this area, namely Lift Station D.

As indicated on Figure 4, the route of sewer connection required to fit existing topography, follows a line roughly southwesterly from the north end of Division 2 to the City's existing lift station. This line would follow a topographic line of approximately Elevation 110 across the future Division 2 along the route of a probable future roadway. However, as the sewer enters the Division 1 property, the terrain begins to increase in elevation rapidly. Within 100 feet, the existing topography is near Elevation 130 which would result in a sewer flowline some 30 feet deep. Consequently, the sewer will need to turn more southwesterly across Division 1 in order to fit the existing terrain. This creates two challenges.

First, the required route across Division 1 to the City Lift Station A will cross two delineated mapped wetlands. It may be possible to avoid one of the wetlands themselves but the sewer main will encroach significantly into the wetland buffer. The second wetland and buffer will both be impacted. The method for crossing a critical area will almost certainly be via a directional bore. Directional boring is challenging at best with gravity sewer and presents significant ongoing maintenance and access issues in perpetuity.

The gravity sewer along this route would also have a significant impact on the proposed, and frankly only available location for the stormwater management system for the property. If a bored critical area crossing were acceptable to the City, the storm pond area could also be bored to create a seamless and inlet free length of sewer. This however again complicates future maintenance.

Another challenge that faces a direct connection from the north is that there is no easement in place from the lift station to the north line. Not along any alignment that can be utilized by the Gateway 850 properties. Utility connections proposed in the Hall Plat do not provide sufficient depth to serve the Gateway properties therefore, a new point of connection, across critical areas both on Gateway and Hall properties, with required access and utility easements would be required.

For all of the reasons noted above, Alternative 1, a combination of gravity service and a new lift station consistent with that proposed in 2007 by the City, is the preferred alternative.

III. SYSTEM DESIGN

A. Service Area Flow Calculation

Based on the conceptual layout analysis discussed above, the service areas for conveyance and the proposed lift station can be summarized as follows:

Gravity Sewer to Britton Parkway:

250 multifamily units Division 1 (200 ERUs)
34 single family homes Division 1
100 multifamily units Division 2 (+/-80 ERUs)
250 single family homes Division 2, +/-
564 ERUs

Population = 564 * 2.7 persons/ERU
= 1,523 people

Peaking Factor = $(18 + \sqrt{1.523})/(4 + \sqrt{1.523})$ = 3.67

Design Flow = 100 gpdc * 1,523 persons * 3.67 = 0.56 mgd
= 0.87 cfs

Capacity of 12-inch PVC sewer at 0.5% slope = 2.52 cfs → Okay

Proposed Lift Station D:

49 single family homes Division 1
200 single family homes Division 2, +/-
249 ERUs

Population = 249 * 2.7 persons/ERU
= 672 people

Peaking Factor = $(18 + \sqrt{0.672})/(4 + \sqrt{0.672})$ = 3.90

Design Flow = 100 gpdc * 672 persons * 3.90 = 0.26 mgd
= 0.40 cfs
= 182 gpm

Capacity of 8-inch PVC sewer at 0.5% slope = 0.86 cfs → Okay

B. Lift Station Pump Design

1. End of forcemain conditions: Gravity sewer on Britton Parkway, approx elevation 210.

2. Vertical lift:

Pump Station Finish Grade	= 120	*(Division 1 location)*
Wet Well Flowline In	= 100	*(El 110 – 7' min depth – 700' @ 0.43%)*
Pump "OFF" Elevation	= 98	
Pump "ON" Elevation	= 100	
Lift Station Base Elevation	= 94	

Ground Elevation @ Discharge	= 210
Flowline at discharge	= 203
Required Vertical Lift	= 203 – 98
	= 105 ft

3. Forcemain Sizing:

Pump flow rate	= 182 gpm
Minimum flow velocity	= 3 feet per second (fps)
Maximum flow velocity	= 6 fps
Forcemain diameter	= 4-inch, nominal diameter
Calculated design velocity	= **4.66 fps** → Okay

4. Pipe Friction:

Transport Friction Loss, $h_f = (Q/C)^{1.85} * 10.44(L)/d^{4.87}$

Q = Design flow, gpm
C = Manning's Friction Coefficient (130 – dirty pipe, 150 – clean PVC). **Use 120**
L = Forcemain Length + Equivalent Pipe Length for Fittings
d = Forcemain diameter, inches

Forcemain Diameter	= 4-in nominal
Forcemain length	= 1,300 ft
Fittings Equivalent Length	= 100 ft (estimated for valves and fittings)
Pumping Flow Rate	= 182 gpm
Friction coefficient, C	= 120
Friction Loss, h_f	= $(180\ gpm/120)^{1.85} * 10.44\ (1{,}300\ lf + 100\ lf)/(4")^{4.87}$
	= 37 ft

4. Pump Selection:

Total Dynamic Head, TDH	= Transport Friction Loss + Vertical Lift
	= 37 ft + 105 ft
	= 142 ft TDH
Pump Design Point	= 182 gpm @ 142 ft TDH
Pump Selection	= **30 hp, 460v sewage pump**

→ The total depth of the lift station, length of forcemain, and size of sewage pump with resultant head is consistent with similar lift station installations and is appropriate for this location. Conceptually the proposed lift station is viable.

Figure 1 – Vicinity Map and Overall Site Plan

PRELIMINARY PLAT OF GATEWAY DIVISION 1

SITE DATA:

PARCEL NO.'S:	11803340100, 11803430000, 11810103000		
ZONING:	HD 6-20		
TOTAL AREA:	43.18 acres		
WETLAND AREA:	1.31 acres	ROADWAY LENGTH (A,B,C)	2,202 l.f.
NET AREA:	41.87 acres	ROADWAY AREA (A,B,C)	2.2 acres
TOTAL DWELLING UNITS:	333 d.u.	ROADWAY LENGTH (OTHERS)	2,079 l.f.
DENSITY:	8.02 d.u. / net acre	ROADWAY AREA (OTHERS)	3.5 acres
		SMALLEST LOT (DETACHED FRONT LOAD)	5,000 s.f.
TOTAL OPEN SPACE:	16.76 acres (39% OF SITE AREA)	SMALLEST LOT (DETACHED REAR LOAD)	4,000 s.f.
STORM DRAINAGE	5.3 acres	SMALLEST LOT ATTACHED (TOWNHOMES)	3,300 s.f.
WETLANDS / TREE TRACTS	1.3 acres	AVERAGE LOT AREA	4,863 s.f.
BUFFERS / TREE TRACTS	6.2 acres	SANITARY SEWER	CITY OF LACEY
LANDSCAPE / ACTIVE RECREATION	3.6 acres	WATER	CITY OF LACEY

LEGEND

EX. POWER POLE	EX. WATERMETER	NEW WATERMETER
EX. POWER VAULT	EX. HYDRANT	NEW HYDRANT
EX. POWER TRANSFORMER	EX. VALVE	NEW VALVE
EX. POWER PEDESTAL	EX. BLOWOFF	NEW BLIND FLANGE
EX. PVC RISER	EX. WATER LINE	NEW BLOCKING
EX. OVERHEAD POWER	EX. SEWER CLEANOUT	NEW WATERMAIN
EX. UNDER GROUND POWER	EX. SEWER MANHOLE	NEW CATCHBASIN TYPE 1
EX. TELEPHONE PEDESTAL	EX. SEWER LINE	NEW CATCHBASIN TYPE 2-48
EX. TELEPHONE MANHOLE	EX. CONCRETE	NEW STORM CATCHBASIN W/ SOLID LID
EX. CABLE PEDESTAL	EX. EDGE OF PAVEMENT	NEW STORM MAIN LINE
EX. TELEPHONE LINE	EX. MAJOR CONTOUR	NEW LOT DRAINAGE LINE
EX. GAS VALVE	EX. MINOR CONTOUR	NEW SEWER CLEANOUT
EX. GAS LINE	FINISH MAJOR CONTOUR	NEW SEWER MANHOLE
EX. POWER JUNCTION BOX	FINISH MINOR CONTOUR	NEW GRAVITY SEWER LINE
EX. CATCHBASIN TYPE 1	NEW ROCK WALL	NEW PIGG LAUNCH PORT
EX. STORM MAIN LINE	NEW PEDESTRIAN STREET LIGHT	NEW SEWER FORCEMAIN
EX. CULVERT	NEW HIGH MAST W/ PED SCALE LIGHT	
EX. SIGNS	NEW LIGHTING J BOX	
EX. FENCE	NEW TRANSFROMER & SERVICE DISCONNECT	

CITY OF LACEY

VERTICAL DATUM	MERIDIAN HORIZONTAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1083 FOUND CASED MONUMENT AT THE INTERSECTION OF CALLISON ROAD AND BRITTON PARKWAY ELEVATION = 216.42	CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111152 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°36'41" WEST

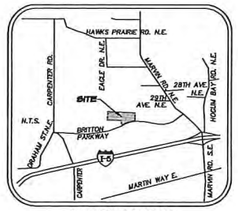
SCALE: 1" = 100'

LEGAL DESCRIPTION

THE SOUTH HALF OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTH HALF OF THE SOUTHWEST QUARTER WEST HALF OF THE SOUTHEAST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST OF THE W.M.; EXCEPT BRITTON PARKWAY;

ALSO THAT PORTION OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST OF THE W.M., LYING NORTHERLY OF BRITTON PARKWAY;

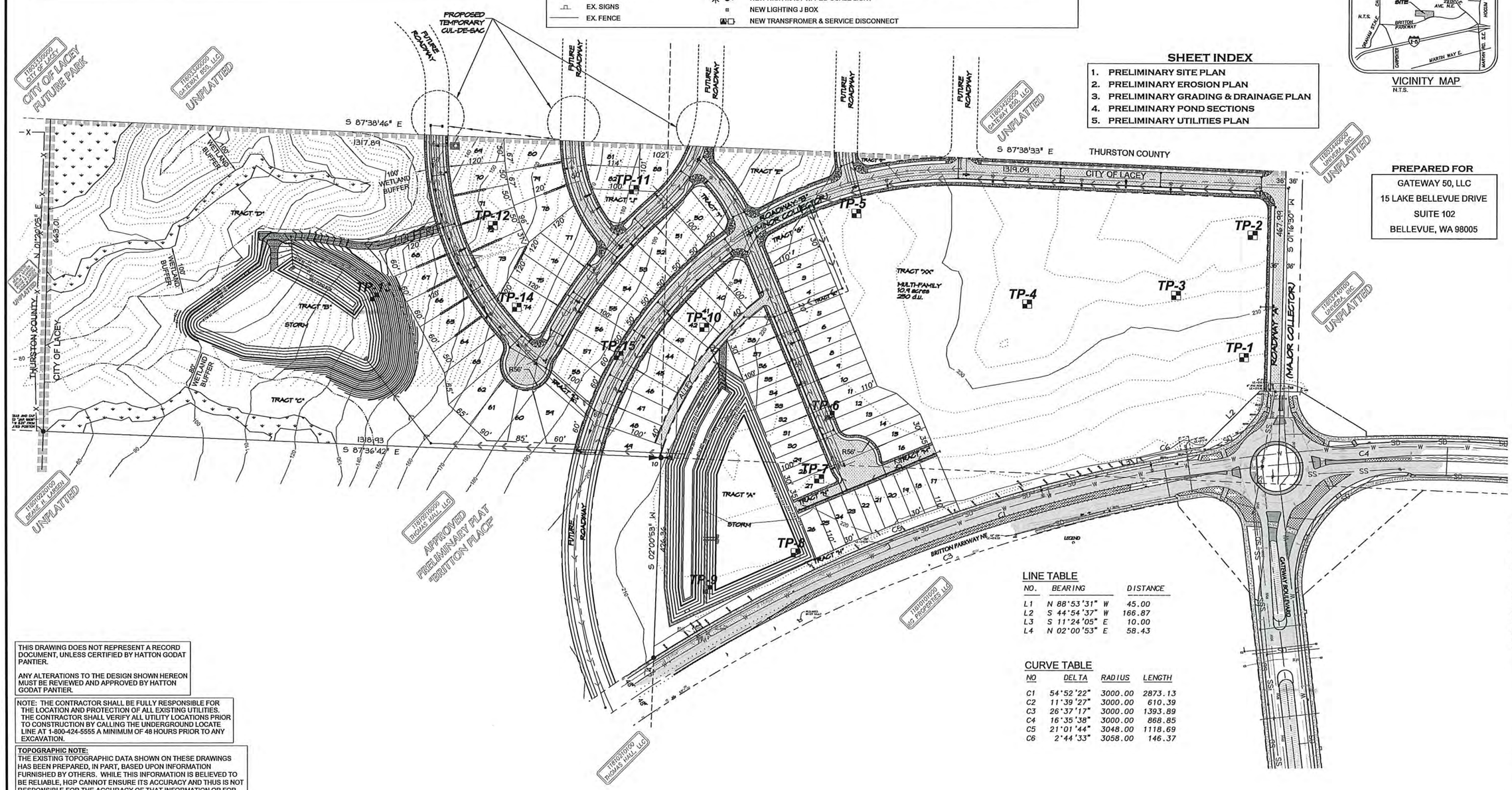
IN THURSTON COUNTY, WASHINGTON



VICINITY MAP
N.T.S.

SHEET INDEX

1. PRELIMINARY SITE PLAN
2. PRELIMINARY EROSION PLAN
3. PRELIMINARY GRADING & DRAINAGE PLAN
4. PRELIMINARY POND SECTIONS
5. PRELIMINARY UTILITIES PLAN



LINE TABLE

NO.	BEARING	DISTANCE
L1	N 88°53'31" W	45.00
L2	S 44°54'37" W	166.87
L3	S 11°24'05" E	10.00
L4	N 02°00'53" E	58.43

CURVE TABLE

NO	DELTA	RADIUS	LENGTH
C1	54°52'22"	3000.00	2873.13
C2	11°39'27"	3000.00	610.39
C3	26°37'17"	3000.00	1393.89
C4	16°35'38"	3000.00	868.85
C5	21°01'44"	3048.00	1118.69
C6	2°44'33"	3058.00	146.37

THIS DRAWING DOES NOT REPRESENT A RECORD DOCUMENT, UNLESS CERTIFIED BY HATTON GODAT PANTIER.

ANY ALTERATIONS TO THE DESIGN SHOWN HEREON MUST BE REVIEWED AND APPROVED BY HATTON GODAT PANTIER.

NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

TOPOGRAPHIC NOTE:
THE EXISTING TOPOGRAPHIC DATA SHOWN ON THESE DRAWINGS HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, HGP CANNOT ENSURE ITS ACCURACY AND THUS IS NOT RESPONSIBLE FOR THE ACCURACY OF THAT INFORMATION OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

PREPARED FOR
GATEWAY 50, LLC
15 LAKE BELLEVUE DRIVE
SUITE 102
BELLEVUE, WA 98005

DESIGNED BY: DS
DRAWN BY: MM
CHECKED BY: SDH
DATE: FEB 2013
SCALE: H / V

STEVEN D. HATTON — STATE OF WASHINGTON — 24193 — REGISTERED PROFESSIONAL ENGINEER

HATTON GODAT PANTIER
ENGINEERS AND SURVEYORS
3910 MARTIN WAY E, SUITE B
OLYMPIA, WA 98506
TEL: 360.943.1599 FAX: 360.357.6299
hattonpantier.com

REVISIONS: DATE:

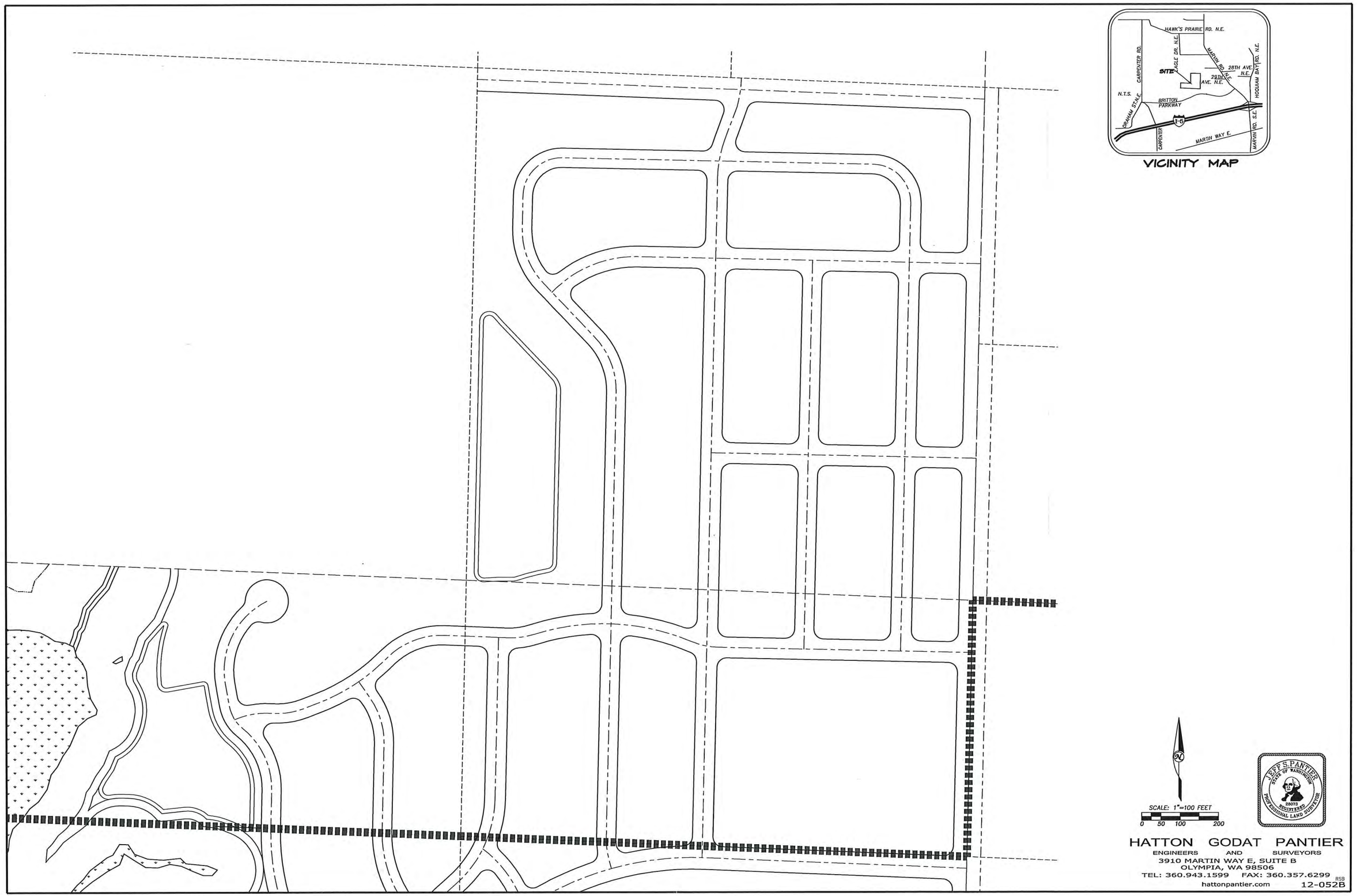
GATEWAY DIVISION 1
PRELIMINARY PLAT
Figure 1
PRELIMINARY SITE PLAN

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTHWEST HALF OF THE SOUTHEAST QUARTER OF SECTION 3 AND A PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M.

11803340100, 11803430000, 11810103000

AGENCY NO.
SHEET: 1 OF 5
(12-000/12-052/Preliminary Plat)
INDEX: 12-052pre-cov.dwg
JOB: 12-052

Figure 2 – Division 2 Conceptual Layout


HAWK'S PRAIRIE RD. N.E.
EAGLE DR. N.E.
MARVIN RD. N.E.
28TH AVE. N.E.
SITE
29TH AVE. N.E.
CARPENTER RD.
HOGUIAM BAY RD. N.E.
N.T.S.
BRITTON PARKWAY
I-5
GRAHAM ST. N.E.
CARPENTER
MARVIN RD. S.E.
MARTIN WAY E.
VICINITY MAP
SCALE: 1"=100 FEET
0 50 100 200
JEFF S. PANTIER
STATE OF WASHINGTON
28073
REGISTERED
PROFESSIONAL LAND SURVEYOR
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hattonpantier.com
RSB
12-052B

Figure 3 – Huitt-Zollar City Sewer Study Exhibit

FIGURE 3

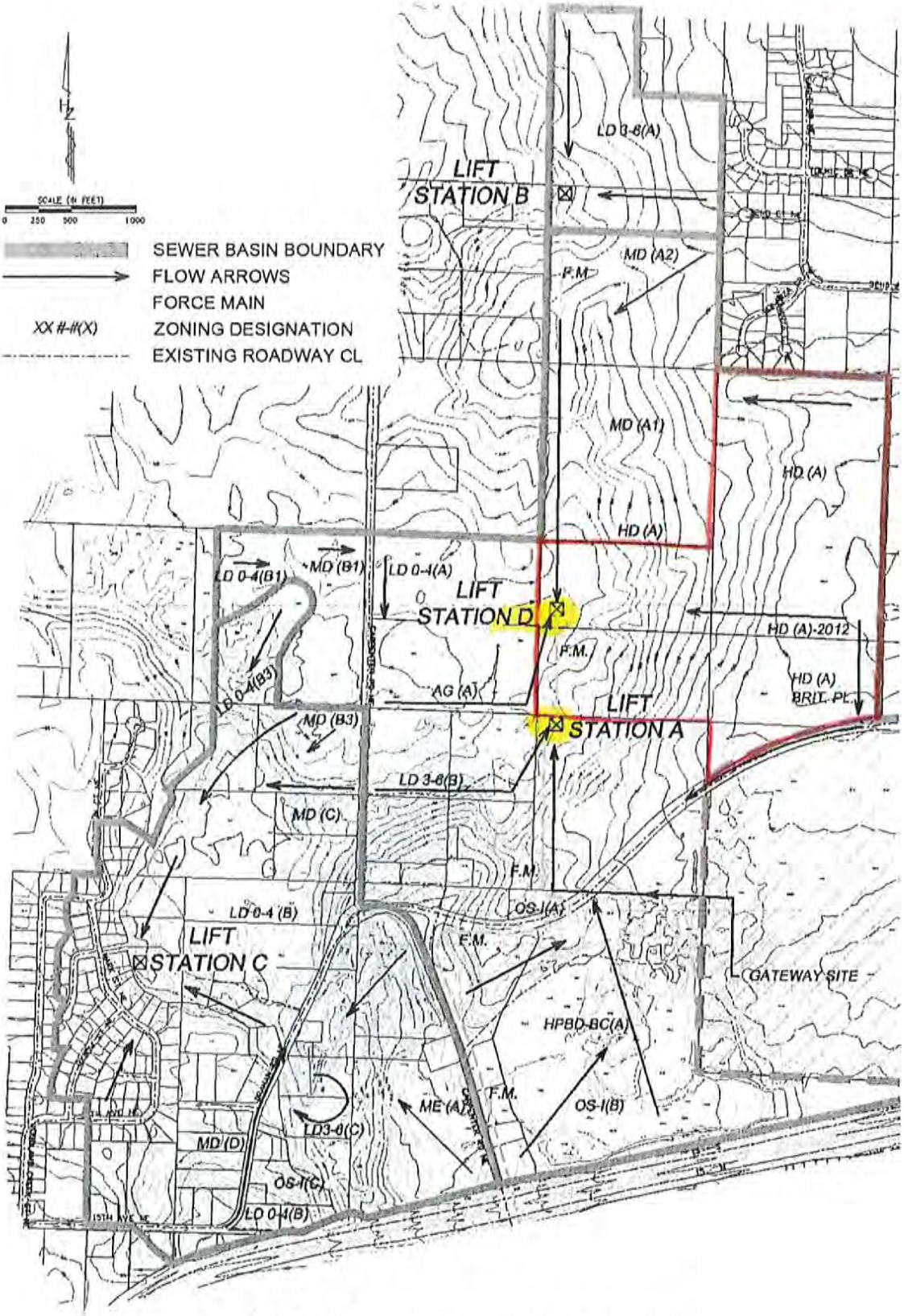

Figure B.2-1 ESWCV & Gateway Basin Delineation

12-035

Figure 4 – Sewer Basin Exhibit

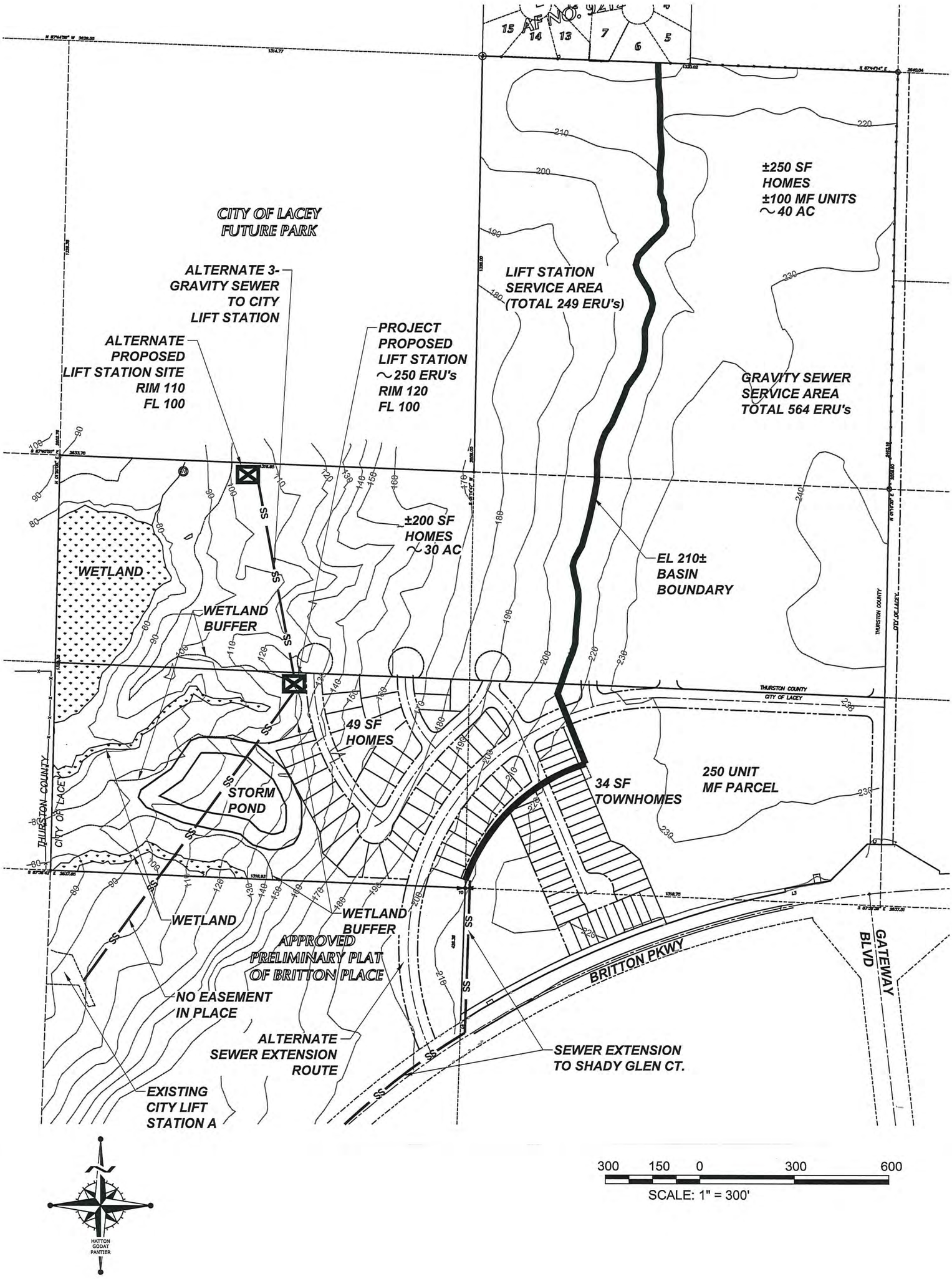

Figure 4
Gateway Division 1
Sanitary Sewer Basin Study
12-052A

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Stormwater Pollution Prevention Plan

For
Gateway Divison 1

Prepared For
Northwest Regional Office
3190 - 160th Avenue SE
Bellevue, WA 98008-5452
425-649-7000

Owner	Developer	Operator/Contractor
Gateway 850, LLC	Same as Owner	To Be Determined
15 Lake Bellevue Drive	~	~
Bellevue, WA 98506	~	~

Project Site Location
Lacey, Washington

Certified Erosion and Sediment Control Lead
To Be Determined
~

SWPPP Prepared By
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David W Spiller, Senior Project Engineer

SWPPP Preparation Date
August 12, 2013

Approximate Project Construction Dates
To Be Determined
To Be Determined

Contents

1.0 Introduction....1

2.0 Site Description....3

2.1 Existing Conditions....3
2.2 Proposed Construction Activities....3

3.0 Construction Stormwater BMPs....5

3.1 The 12 BMP Elements....5
3.1.1 Element #1 – Mark Clearing Limits....5
3.1.2 Element #2 – Establish Construction Access....6
3.1.3 Element #3 – Control Flow Rates....7
3.1.4 Element #4 – Install Sediment Controls....9
3.1.5 Element #5 – Stabilize Soils....12
3.1.6 Element #6 – Protect Slopes....14
3.1.7 Element #7 – Protect Drain Inlets....17
3.1.8 Element #8 – Stabilize Channels and Outlets....17
3.1.9 Element #9 – Control Pollutants....18
3.1.10 Element #10 – Control Dewatering....19
3.1.11 Element #11 – Maintain BMPs....20
3.1.12 Element #12 – Manage the Project....21
3.2 Site Specific BMPs....23
3.3 Additional Advanced BMPs....23

5.0 Pollution Prevention Team....25

5.1 Roles and Responsibilities....25
5.2 Team Members....26

6.0 Site Inspections and Monitoring....27

6.1 Site Inspection....27
6.1.1 Site Inspection Frequency....27
6.1.2 Site Inspection Documentation....28
6.2 Stormwater Quality Monitoring....28
The proposed site development has a specific water quality requiremennts because the site discharges to a water body listed as impaired under Section 303(d) of the Clean Water Act. The following text desctribes the site specific monitoring for the proposed development....28
6.2.1 Turbidity Sampling....28

7.0 Reporting and Recordkeeping....31

7.1 Recordkeeping....31
7.1.1 Site Log Book....31
7.1.2 Records Retention....31

7.1.3 Access to Plans and Records....31
7.1.4 Updating the SWPPP....31
7.2 Reporting....32
7.2.1 Discharge Monitoring Reports....32
7.2.2 Notification of Noncompliance....32
7.2.3 Permit Application and Changes....33

Appendix A Site plans
- Vicinity map (with all discharge points)
- Site plan with TESC measures

Appendix B Construction BMPs
- Possibly reference in BMPs, but likely it will be a consolidated list so that the applicant can photocopy from the list from the SWMM.

Appendix C Alternative Construction BMP list
- List of BMPs not selected, but can be referenced if needed in each of the 12 elements

Appendix D General Permit

Appendix E Site Log and Inspection Forms

Appendix F Engineering Calculations (if necessary)
- Flows, ponds, etc…

1.0 Introduction

This Stormwater Pollution Prevention Plan (SWPPP) has been prepared as part of the NPDES stormwater permit requirements for the Gateway Division 1 construction project in Lacey, Washington. The site is located on the north side of Britton Parkway,west of 46th Avenue. The existing site is a 43.18-acre site with no existing development. The proposed development consists of constructinig roads and utilities for approximately 330 single family residentional units.

Construction activities will include excavation, grading, extending services/utilities, and construction of stormwater facilities. The purpose of this SWPPP is to describe the proposed construction activities and all temporary and permanent erosion and sediment control (TESC) measures, pollution prevention measures, inspection/monitoring activities, and recordkeeping that will be implemented during the proposed construction project. The objectives of the SWPPP are to:

1. Implement Best Management Practices (BMPs) to prevent erosion and sedimentation, and to identify, reduce, eliminate or prevent stormwater contamination and water pollution from construction activity.

2. Prevent violations of surface water quality, ground water quality, or sediment management standards.

3. Prevent, during the construction phase, adverse water quality impacts including impacts on beneficial uses of the receiving water by controlling peak flow rates and volumes of stormwater runoff at the Permittee's outfalls and downstream of the outfalls.

This SWPPP was prepared using the Ecology SWPPP Template downloaded from the Ecology website on July 2, 2005. This SWPPP was prepared based on the requirements set forth in the Construction Stormwater General Permit, Stormwater Management Manual for Western Washington (SWMMWW 2005) and in the Stormwater Management Manual for Eastern Washington (SWMMEW 2004). The report is divided into seven main sections with several appendices that include stormwater related reference materials. The topics presented in the each of the main sections are:

- Section 1 – INTRODUCTION. This section provides a summary description of the project, and the organization of the SWPPP document.

- Section 2 – SITE DESCRIPTION. This section provides a detailed description of the existing site conditions, proposed construction activities, and calculated stormwater flow rates for existing conditions and post–construction conditions.

- Section 3 – CONSTRUCTION BMPs. This section provides a detailed description of the BMPs to be implemented based on the 12 required elements of the SWPPP (SWMMEW 2004).

- Section 4 – CONSTRUCTION PHASING AND BMP IMPLEMENTATION. This section provides a description of the timing of the BMP implementation in relation to the project schedule.

- Section 5 – POLLUTION PREVENTION TEAM. This section identifies the appropriate contact names (emergency and non-emergency), monitoring personnel, and the onsite temporary erosion and sedimentation control inspector

- Section 6 – INSPECTION AND MONITORING. This section provides a description of the inspection and monitoring requirements such as the parameters of concern to be monitored, sample locations, sample frequencies, and sampling methods for all stormwater discharge locations from the site.

- Section 7 – RECORDKEEPING. This section describes the requirements for documentation of the BMP implementation, site inspections, monitoring results, and changes to the implementation of certain BMPs due to site factors experienced during construction.

Supporting documentation and standard forms are provided in the following Appendices:

Appendix A – Site plans
Appendix B – Construction BMPs
Appendix C – Alternative Construction BMP list
Appendix D – General Permit
Appendix E – Site Log and Inspection Forms
Appendix F – Engineering Calculations

2.0 Site Description

2.1 Existing Conditions

The proposed site is located north of Britton Parkway and west of 46th Avenue NE in Lacey, Washington. A site vicinity map and coordinates are provided in Appendix A. The site is 41 acres in size and is currently forested. The topography of the site and surrounding properties gently slopes to the northwest. Surficial soils consist of 3 feet of silty sandy loam underlain by a hardpan. The south central portion of the site has sandy loam underlain by gravel outwash. The site is poorly drained and groundwater perches above the glacial till. The south central area i well drained and ground water is approximately 16 feet below the surface.

Runoff from the site generally drains from east to west to a wetland located along the western boundary of the site. The wetland conveys runoff to Eagle Creek. The creek is listed under the State's Clean Water Act Section 303(d) list due to category 5 dissolved oxygen, category 4A for bacteria, and category 2 for PH.

The only critical area on the site is the wetland located along the western boundary. No other critical areas have been located on the site such as high erosion risk areas, wetlands, streams, or steep slopes. There is a stream approximately 400 feet west of the site.).

2.2 Proposed Construction Activities

The proposed development includes the construction of a plat with approximately 330 units. A combined stormwater detention and treatment pond will be constructed in the southwest corner (low drainage spot) of the site. An infiltration pond will be constructed in the south central area of the site to infiltrate run off. New sanitary, electrical, gas, and storm drain utilities will also be constructed.

Construction activities will include site preparation, TESC installation, excavation for the utilities, site-wide grading, conctrete curbs and sidewalks and asphalt paving. The schedule and phasing of BMPs during construction is provided in Section 4.0.

Stormwater runoff volumes were calculated using the Western Washington Hydrology Model (WWHM). A temporary sedimentation pond may be used during construction. The pond will be using the 2-year storm event since construction will not occur over a long time-frame (approximately one year). The combined detention and treatment pond was designed using WWHM where the treatment sump was sized using the 6-month treatment volume and the live storage detention volume was designed by matching pre and post construction flows and durations for 50 percent of the 2-year flow and the 50-year flow. The infiltration pond was designed using the WWHM program to infiltrate 100 percent of the runoff.

The following summarizes details regarding site areas:

▪ Total site area:	43.18 acres
▪ Percent impervious area before construction:	0 %
▪ Percent impervious area after construction:	27 %
▪ Disturbed area during construction:	40.93 acres
▪ Disturbed area that is characterized as impervious (i.e., access roads, staging, parking):	8.14 acres
▪ 2-year stormwater runoff peak flow prior to construction (existing):	2.53 cfs
▪ 10-year stormwater runoff peak flow prior to construction (existing):	6.56 cfs
▪ 2-year stormwater runoff peak flow during construction:	0.57 cfs
▪ 10-year stormwater runoff peak flow during construction:	1.06 cfs
▪ 2-year stormwater runoff peak flow after construction:	0.57 cfs
▪ 10-year stormwater runoff peak flow after construction:	1.06 cfs

All stormwater flow calculations are provided in Appendix F.

3.0 Construction Stormwater BMPs

3.1 The 12 BMP Elements

3.1.1 Element #1 – Mark Clearing Limits

To protect adjacent properties and to reduce the area of soil exposed to construction, the limits of construction will be clearly marked before land-disturbing activities begin. Trees that are to be preserved, as well as all sensitive areas and their buffers, shall be clearly delineated, both in the field and on the plans. In general, natural vegetation and native topsoil shall be retained in an undisturbed state to the maximum extent possible. The BMPs relevant to marking the clearing limits that will be applied for this project include:

- Preserving Natural Vegetation (BMP C101)
- High Visibility Plastic or Metal Fence (BMP C103)
- Stake and Wire Fence (BMP C104)

BMP C101: Preserving Natural Vegetation

Purpose: The main purpose of preserving natural vegetation is to reduce erosion wherever practicable. Limiting site disturbance is the single most effective method for reducing erosion, and native vegetation and soils are the most efficient means for managing stormwater quantity and quality. For example, conifers can hold up to about 50 percent of all rain that falls during a storm. Up to 20-30 percent of this rain may never reach the ground but is taken up by the tree or evaporates. Another benefit is that the rain held in the tree can be released slowly to the ground after the storm.

Conditions of Use: Natural vegetation should be preserved on steep slopes, near perennial and intermittent watercourses or swales, and on building sites in wooded areas.

Location on site: The westerly most portion of the site consists of wetlands and wetland buffers. The shape of the wetlands and existing grades make much of this area not desirable for development and will remain in a natural state.

BMP C103: High Visibility Plastic or Metal Fence

Purpose: Fencing is intended to: (1) restrict clearing to approved limits; (2) prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed; (3) limit construction traffic to designated construction entrances or roads; and, (4) protect areas where marking with survey tape may not provide adequate protection.

Conditions of Use: To establish clearing limits, plastic or metal fence may be used (subject to approval by the City of Lacey):

Location on site: At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared, and as necessary to control vehicle access to and on the site.

BMP C104: Stake and Wire Fence

Purpose: Fencing is intended to: (1) restrict clearing to approved limits; (2) prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed;

(3) limit construction traffic to designated construction entrances or roads; and, (4) protect any areas where marking with survey tape may not provide adequate protection.
Conditions of Use: To establish clearing limits, stake or wire fence may be used:
At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared and as necessary to control vehicle access to and on the site.
Location on site: At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared, and as necessary to control vehicle access to and on the site.

Alternate BMPs for marking clearing limits are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

3.1.2 Element #2 – Establish Construction Access

Construction access or activities occurring on unpaved areas shall be minimized, yet where necessary, access points shall be stabilized to minimize the tracking of sediment onto public roads, and wheel washing, street sweeping, and street cleaning shall be employed to prevent sediment from entering state waters. All wash wastewater shall be controlled on site. The specific BMPs related to establishing construction access that will be used on this project include:

- Stabilized Construction Entrance (BMP C105)

BMP C105: Stabilized Construction Entrance

Purpose: Construction entrances are stabilized to reduce the amount of sediment transported onto paved roads by vehicles or equipment by constructing a stabilized pad of quarry spalls at entrances to construction sites.
Conditions of Use: Construction entrances shall be stabilized wherever traffic will be leaving a construction site and traveling on paved roads or other paved areas within 1,000 feet of the site.
Location: to be installed at site access point.

Alternate construction access BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

3.1.3 Element #3 – Control Flow Rates

In order to protect the properties and waterways downstream of the project site, stormwater discharges from the site will be controlled. The specific BMPs for flow control that shall be used on this project include:

- Sediment Trap (BMP C240)
- Temporary Sediment Pond (BMP C241)
- Detention Pond or Vault

Sediment Trap (BMP C240)

Purpose: A sediment trap is a small temporary ponding area with a gravel outlet used to collect and store sediment from sites cleared and/or graded during construction. Sediment traps, along with other perimeter controls, shall be installed before any land disturbance takes place in the drainage area.

Conditions of Use:

- Prior to leaving a construction site, stormwater runoff must pass through a sediment pond or trap or other appropriate sediment removal best management practice. Non-engineered sediment traps may be used on-site prior to an engineered sediment trap or sediment pond to provide additional sediment removal capacity.
- It is intended for use on sites where the tributary drainage area is less than 3 acres, with no unusual drainage features, and a projected build-out time of six months or less. The sediment trap is a temporary measure (with a design life of approximately 6 months) and shall be maintained until the site area is permanently protected against erosion by vegetation and/or structures.
- Sediment traps and ponds are only effective in removing sediment down to about the medium silt size fraction. Runoff with sediment of finer grades (fine silt and clay) will pass through untreated, emphasizing the need to control erosion to the maximum extent first.
- Whenever possible, sediment-laden water shall be discharged into onsite, relatively level, vegetated areas (see BMP C234 – Vegetated Strip). This is the only way to effectively remove fine particles from runoff unless chemical treatment or filtration is used. This can be particularly useful after initial treatment in a sediment trap or pond. The areas of release must be evaluated on a site-by-site basis in order to determine appropriate locations for and methods of releasing runoff. Vegetated wetlands shall not be used for this purpose. Frequently, it may be possible to pump water from the collection point at the downhill end of the site to an upslope vegetated area. Pumping shall only augment the treatment system, not replace it, because of the possibility of pump failure or runoff volume in excess of pump capacity.

- All projects that are constructing permanent facilities for runoff quantity control should use the rough-graded or final-graded permanent facilities for traps and ponds. This includes combined facilities and infiltration facilities. When permanent facilities are used as temporary sedimentation facilities, the surface area requirement of a sediment trap or pond must be met. If the surface area requirements are larger than the surface area of the permanent facility, then the trap or pond shall be enlarged to comply with the surface area requirement. The permanent pond shall also be divided into two cells as required for sediment ponds.
- Either a permanent control structure or the temporary control structure (described in BMP C241, Temporary Sediment Pond) can be used. If a permanent control structure is used, it may be advisable to partially restrict the lower orifice with gravel to increase residence time while still allowing dewatering of the pond. A shut-off valve may be added to the control structure to allow complete retention of stormwater in emergency situations. In this case, an emergency overflow weir must be added.
- A skimmer may be used for the sediment trap outlet if approved by the City of Lacey.

Temporary Sediment Pond (BMP C241)

Purpose: Sediment ponds remove sediment from runoff originating from disturbed areas of the site. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm). Consequently, they usually reduce turbidity only slightly.

Conditions of Use:

- Prior to leaving a construction site, stormwater runoff must pass through a sediment pond or other appropriate sediment removal best management practice.
- A sediment pond shall be used where the contributing drainage area is 3 acres or more. Ponds must be used in conjunction with erosion control practices to reduce the amount of sediment flowing into the basin.

Alternate flow control BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

The project site is located west of the Cascade Mountain Crest. As such, the project must comply with Minimum Requirement 7 (Ecology 2005).

In general, discharge rates of stormwater from the site will be controlled where increases in impervious area or soil compaction during construction could lead to downstream erosion, or where necessary to meet local agency stormwater discharge requirements (e.g. discharge to combined sewer systems).

3.1.4 Element #4 – Install Sediment Controls

All stormwater runoff from disturbed areas shall pass through an appropriate sediment removal BMP before leaving the construction site or prior to being discharged to an infiltration facility. The specific BMPs to be used for controlling sediment on this project include:

- Silt Fence (BMP C233)
- Vegetated Strip (BMP C234)
- Straw Wattles (BMP C235)
- Sediment Trap (BMP C240)
- Detention Pond Or Vault

Silt Fence (BMP C233)

Purpose: Use of a silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow. See Figure 4.15 for details on silt fence construction.
Conditions of Use: Silt fence may be used downslope of all disturbed areas.

Straw Wattles (BMP C235)

Purpose: Straw wattles are temporary erosion and sediment control barriers consisting of straw that is wrapped in biodegradable tubular plastic or similar encasing material. They reduce the velocity and can spread the flow of rill and sheet runoff, and can capture and retain sediment. Straw wattles are typically 8 to 10 inches in diameter and 25 to 30 feet in

length. The wattles are placed in shallow trenches and staked along the contour of disturbed or newly constructed slopes. See Figure 4.17 for typical construction details.

Conditions of Use:

- Disturbed areas that require immediate erosion protection.
- Exposed soils during the period of short construction delays, or over winter months.
- On slopes requiring stabilization until permanent vegetation can be established.
- Straw wattles are effective for three to six months.
- If conditions are appropriate, wattles can be staked to the ground using willow cuttings for added revegetation.
- Rilling can occur beneath wattles if not properly entrenched and water can pass between wattles if not tightly abutted together.

Sediment Trap (BMP C240)

Purpose: A sediment trap is a small temporary ponding area with a gravel outlet used to collect and store sediment from sites cleared and/or graded during construction. Sediment traps, along with other perimeter controls, shall be installed before any land disturbance takes place in the drainage area.

Conditions of Use:

- Prior to leaving a construction site, stormwater runoff must pass through a sediment pond or trap or other appropriate sediment removal best management practice. Non-engineered sediment traps may be used on-site prior to an engineered sediment trap or sediment pond to provide additional sediment removal capacity.
- It is intended for use on sites where the tributary drainage area is less than 3 acres, with no unusual drainage features, and a projected build-out time of six months or less. The sediment trap is a temporary measure (with a design life of approximately 6 months) and shall be maintained until the site area is permanently protected against erosion by vegetation and/or structures.
- Sediment traps and ponds are only effective in removing sediment down to about the medium silt size fraction. Runoff with sediment of finer grades (fine silt and clay) will pass through untreated, emphasizing the need to control erosion to the maximum extent first.
- Whenever possible, sediment-laden water shall be discharged into onsite, relatively level, vegetated areas (see BMP C234 – Vegetated Strip). This is the only way to effectively remove fine particles from runoff unless chemical treatment or filtration is used. This can be particularly useful after initial treatment in a sediment trap or pond. The areas of release must be evaluated on a site-by-site basis in order to determine appropriate locations for and methods of releasing runoff. Vegetated wetlands shall not be used for this purpose. Frequently, it may be possible to pump water from the collection point at the downhill end of the site to an upslope vegetated area. Pumping shall only augment the treatment system, not replace it, because of the possibility of pump failure or runoff volume in excess of pump capacity.

- All projects that are constructing permanent facilities for runoff quantity control should use the rough-graded or final-graded permanent facilities for traps and ponds. This includes combined facilities and infiltration facilities. When permanent facilities are used as temporary sedimentation facilities, the surface area requirement of a sediment trap or pond must be met. If the surface area requirements are larger than the surface area of the permanent facility, then the trap or pond shall be enlarged to comply with the surface area requirement. The permanent pond shall also be divided into two cells as required for sediment ponds.
- Either a permanent control structure or the temporary control structure (described in BMP C241, Temporary Sediment Pond) can be used. If a permanent control structure is used, it may be advisable to partially restrict the lower orifice with gravel to increase residence time while still allowing dewatering of the pond. A shut-off valve may be added to the control structure to allow complete retention of stormwater in emergency situations. In this case, an emergency overflow weir must be added.
- A skimmer may be used for the sediment trap outlet if approved by the City of Lacey.

Alternate sediment control BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

In addition, sediment will be removed from paved areas in and adjacent to construction work areas manually or using mechanical sweepers, as needed, to minimize tracking of sediments on vehicle tires away from the site and to minimize washoff of sediments from adjacent streets in runoff.

Whenever possible, sediment laden water shall be discharged into onsite, relatively level, vegetated areas (BMP C240 paragraph 5, page 4-102).

In some cases, sediment discharge in concentrated runoff can be controlled using permanent stormwater BMPs (e.g., infiltration swales, ponds, trenches). Sediment loads can limit the effectiveness of some permanent stormwater BMPs, such as those used for infiltration or biofiltration; however, those BMPs designed to remove solids by settling (wet ponds or detention ponds) can be used during the construction phase. When permanent stormwater BMPs will be used to control sediment discharge during construction, the structure will be protected from excessive sedimentation with adequate erosion and sediment control BMPs. Any accumulated sediment shall be removed after construction is complete and the permanent stormwater BMP will be restabilized with vegetation per applicable design requirements once the remainder of the site has been stabilized.

The following BMPs will be implemented as end-of-pipe sediment controls as required to meet permitted turbidity limits in the site discharge(s). Prior to the implementation of these technologies, sediment sources and erosion control and soil stabilization BMP efforts will be maximized to reduce the need for end-of-pipe sedimentation controls.

- Temporary Sediment Pond (BMP C241)
- Construction Stormwater Filtration (BMP C251)
- Construction Stormwater Chemical Treatment (BMP C 250) (implemented only with prior written approval from Ecology).

3.1.5 Element #5 – Stabilize Soils

Exposed and unworked soils shall be stabilized with the application of effective BMPs to prevent erosion throughout the life of the project. The specific BMPs for soil stabilization that shall be used on this project include:

- Temporary and Permanent Seeding (BMP C120)
- Mulching (BMP C121)
- Plastic Covering (BMP C123)
- Surface Roughening (BMP C130)
- Dust Control (BMP C140)

BMP C120: Temporary and Permanent Seeding

Intended to reduce erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Conditions of Use: Seeding may be used throughout the project on disturbed areas that have reached final grade or that will remain unworked for more than 30 days

BMP C121: Mulching

Purpose: The purpose of mulching soils is to provide immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture, holding fertilizer, seed, and topsoil in place, and moderating soil temperatures. There is an enormous variety of mulches that can be used. Only the most common types are discussed in this section.

Conditions of Use: As a temporary cover measure, mulch should be used:

On disturbed areas that require cover measures for less than 30 days. As a cover for seed during the wet season and during the hot summer months. During the wet season on slopes steeper than 3H:1V with more than 10 feet of vertical relief. Mulch may be applied at any time of the year and must be refreshed periodically.

BMP C123: Plastic Covering

Purpose: Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

Conditions of Use: Plastic covering may be used on disturbed areas that require cover measures for less than 30 days, except as stated below.

- Plastic is particularly useful for protecting cut and fill slopes and stockpiles. Note: The relatively rapid breakdown of most polyethylene sheeting makes it unsuitable for long-term (greater than six months) applications.
- Clear plastic sheeting can be used over newly-seeded areas to create a greenhouse effect and encourage grass growth if the hydroseed was installed too late in the season to establish 75 percent grass cover, or if the wet season started earlier than normal. Clear plastic should not be used for this purpose during the summer months because the resulting high temperatures can kill the grass.
- Due to rapid runoff caused by plastic sheeting, this method shall not be used upslope of areas that might be adversely impacted by concentrated runoff. Such areas include steep and/or unstable slopes.
- Whenever plastic is used to protect slopes, water collection measures must be installed at the base of the slope. These measures include plastic-covered berms, channels, and pipes used to convey clean rainwater away from bare soil and disturbed areas. At no time is clean runoff from a plastic covered slope to be mixed with dirty runoff from a project.
- Other uses for plastic include:
  - Temporary ditch liner;
  - Pond liner in temporary sediment pond;
  - Liner for bermed temporary fuel storage area if plastic is not reactive to the type of fuel being stored;
  - Emergency slope protection during heavy rains; and,
  - Temporary drainpipe ("elephant trunk") used to direct water.

BMP C130: Surface Roughening

Purpose: Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface. Horizontal depressions are created by operating a tiller or other suitable equipment on the contour or by leaving slopes in a roughened condition by not fine grading them.

Conditions of Use

- All slopes steeper than 3:1 and greater than 5 vertical feet require surface roughening.

- Areas with grades steeper than 3:1 should be roughened to a depth of 2 to 4 inches prior to seeding.
- Areas that will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.
- Slopes with a stable rock face do not require roughening.
- Slopes where mowing is planned should not be excessively roughened.

BMP C140: Dust Control

Purpose: Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, drainage ways, and surface waters.

Conditions of Use: In areas (including roadways) subject to surface and air movement of dust where on-site and off-site impacts to roadways, drainage ways, or surface waters are likely.

Alternate soil stabilization BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

The project site is located west of the Cascade Mountain Crest. As such, no soils shall remain exposed and unworked for more than 7 days during the dry season (May 1 to September 30) and 2 days during the wet season (October 1 to April 30). Regardless of the time of year, all soils shall be stabilized at the end of the shift before a holiday or weekend if needed based on weather forecasts.

In general, cut and fill slopes will be stabilized as soon as possible and soil stockpiles will be temporarily covered with plastic sheeting. All stockpiled soils shall be stabilized from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.

3.1.6 Element #6 – Protect Slopes

All cut and fill slopes will be designed, constructed, and protected in a manner than minimizes erosion. The following specific BMPs will be used to protect slopes for this project:

- Temporary and Permanent Seeding (BMP C120)
- Surface Roughening (BMP C130))
- Pipe Slope Drains (BMP C204)
- Straw Wattles (BMP C235)

BMP C120: Temporary and Permanent Seeding

Intended to reduce erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Conditions of Use: Seeding may be used throughout the project on disturbed areas that have reached final grade or that will remain unworked for more than 30 days

BMP C130: Surface Roughening

Purpose: Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface. Horizontal depressions are created by operating a tiller or other suitable equipment on the contour or by leaving slopes in a roughened condition by not fine grading them.

Conditions of Use

- All slopes steeper than 3:1 and greater than 5 vertical feet require surface roughening.
- Areas with grades steeper than 3:1 should be roughened to a depth of 2 to 4 inches prior to seeding.
- Areas that will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.
- Slopes with a stable rock face do not require roughening.
- Slopes where mowing is planned should not be excessively roughened.

Straw Wattles (BMP C235)

Purpose: Straw wattles are temporary erosion and sediment control barriers consisting of straw that is wrapped in biodegradable tubular plastic or similar encasing material. They reduce the velocity and can spread the flow of rill and sheet runoff, and can capture and retain sediment. Straw wattles are typically 8 to 10 inches in diameter and 25 to 30 feet in length. The wattles are placed in shallow trenches and staked along the contour of disturbed or newly constructed slopes. See Figure 4.17 for typical construction details.

Conditions of Use:

- Disturbed areas that require immediate erosion protection.
- Exposed soils during the period of short construction delays, or over winter months.
- On slopes requiring stabilization until permanent vegetation can be established.
- Straw wattles are effective for three to six months.
- If conditions are appropriate, wattles can be staked to the ground using willow cuttings for added revegetation.
- Rilling can occur beneath wattles if not properly entrenched and water can pass between wattles if not tightly abutted together.

BMP C204: Pipe Slope Drains:

Purpose: To use a pipe to convey stormwater anytime water needs to be diverted away from or over bare soil to prevent gullies, channel erosion, and saturation of slide-prone soils.

Conditions of Use: Pipe slope drains should be used

- When a temporary or permanent stormwater conveyance is needed to move the water down a steep slope to avoid erosion (Figure 4.11).
- On highway projects, at bridge ends to collect runoff and pipe it to the base of the fill slopes along bridge approaches. Another use on road projects is to collect runoff from pavement and pipe it away from side slopes. These are useful because there is generally a time lag between having the first lift of asphalt installed and the curbs, gutters, and permanent drainage installed. Used in conjunction with sand bags, or other temporary diversion devices, these will prevent massive amounts of sediment from leaving a project.
- Where water can be collected, channeled with sand bags, Triangular Silt Dikes, berms, or other material, and piped to temporary sediment ponds.

Pipe slope drains can be:

- Connected to new catch basins and used temporarily until all permanent piping is installed;
- Used to drain water collected from aquifers exposed on cut slopes and take it to the base of the slope;
- Used to collect clean runoff from plastic sheeting and direct it away from exposed soil;
- Installed in conjunction with silt fence to drain collected water to a controlled area;
- Used to divert small seasonal streams away from construction. They have been used successfully on culvert replacement and extension jobs. Large flex pipe can be used on larger streams during culvert removal, repair, or replacement; and,
- Connected to existing down spouts and roof drains and used to divert water away from work areas during building renovation, demolition, and construction projects.

There are now several commercially available collectors that are attached to the pipe inlet and help prevent erosion at the inlet.

Alternate slope protection BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

3.1.7 Element #7 – Protect Drain Inlets

All storm drain inlets and culverts made operable during construction shall be protected to prevent unfiltered or untreated water from entering the drainage conveyance system. However, the first priority is to keep all access roads clean of sediment and keep street wash water separate from entering storm drains until treatment can be provided. Storm Drain Inlet Protection (BMP C220) will be implemented for all drainage inlets and culverts that could potentially be impacted by sediment-laden runoff on and near the project site. The following inlet protection measures will be applied on this project:

- Excavated Drop Inlet Protection
- Block and Gravel Drop Inlet Protection
- Gravel and Wire Drop Inlet Protection
- Catch Basin Filters
- Alternative BMP not included in the SWMMWW (2005) or SWMMEW (2004)

- Culvert Inlet Sediment Trap
- Alternative BMP not included in the SWMMWW (2005) or SWMMEW (2004)

If the BMP options listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D), or if no BMPs are listed above but deemed necessary during construction, the Certified Erosion and Sediment Control Lead shall implement one or more of the alternative BMP inlet protection options listed in Appendix C.

3.1.8 Element #8 – Stabilize Channels and Outlets

Where site runoff is to be conveyed in channels, or discharged to a stream or some other natural drainage point, efforts will be taken to prevent downstream erosion. The specific BMPs for channel and outlet stabilization that shall be used on this project include:

- Level Spreader (BMP C206)
- Outlet Protection (BMP C209)

BMP C209: Outlet Protection

Purpose: Outlet protection prevents scour at conveyance outlets and minimizes the potential for downstream erosion by reducing the velocity of concentrated stormwater flows.

Conditions of Use: Outlet protection is required at the outlets of all ponds, pipes, ditches, or other conveyances, and where runoff is conveyed to a natural or manmade drainage feature such as a stream, wetland, lake, or ditch.

Alternate channel and outlet stabilization BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

The project site is located west of the Cascade Mountain Crest. As such, all temporary on-site conveyance channels shall be designed, constructed, and stabilized to prevent erosion from the expected peak 10 minute velocity of flow from a Type 1A, 10-year, 24-hour recurrence interval storm for the developed condition. Alternatively, the 10-year, 1-hour peak flow rate indicated by an approved continuous runoff simulation model, increased by a factor of 1.6, shall be used. Stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent streambanks, slopes, and downstream reaches shall be provided at the outlets of all conveyance systems.

3.1.9 Element #9 – Control Pollutants

All pollutants, including waste materials and demolition debris, that occur onsite shall be handled and disposed of in a manner that does not cause contamination of stormwater. Good housekeeping and preventative measures will be taken to ensure that the site will be kept clean, well organized, and free of debris. If required, BMPs to be implemented to control specific sources of pollutants are discussed below.

Vehicles, construction equipment, and/or petroleum product storage/dispensing:

- All vehicles, equipment, and petroleum product storage/dispensing areas will be inspected regularly to detect any leaks or spills, and to identify maintenance needs to prevent leaks or spills.

- On-site fueling tanks and petroleum product storage containers shall include secondary containment.

- Spill prevention measures, such as drip pans, will be used when conducting maintenance and repair of vehicles or equipment.

- In order to perform emergency repairs on site, temporary plastic will be placed beneath and, if raining, over the vehicle.

- Contaminated surfaces shall be cleaned immediately following any discharge or spill incident.

The facility does not require a Spill Prevention, Control, and Countermeasure (SPCC) Plan under the Federal regulations of the Clean Water Act (CWA).

3.1.10 Element #10 – Control Dewatering

All dewatering water from open cut excavation, tunneling, foundation work, trench, or underground vaults shall be discharged into a controlled conveyance system prior to discharge to a sediment trap or sediment pond. Channels will be stabilized, per Element #8. Clean, non-turbid dewatering water will not be routed through stormwater sediment ponds, and will be discharged to systems tributary to the receiving waters of the State in a manner that does not cause erosion, flooding, or a violation of State water quality standards in the receiving water. Highly turbid dewatering water from soils known or suspected to be contaminated, or from use of construction equipment, will require additional monitoring and treatment as required for the specific pollutants based on the receiving waters into which the discharge is occurring. Such monitoring is the responsibility of the contractor.

However, the dewatering of soils known to be free of contamination will trigger BMPs to trap sediment and reduce turbidity. At a minimum, geotextile fabric socks/bags/cells will be used to filter this material. Other BMPs to be used for sediment trapping and turbidity reduction include the following:

- Concrete Handling (BMP C151)

- Temporary Sediment Pond (BMP C241)

- Infiltration

- Use of a sedimentation bag, with outfall to a ditch or swale for small volumes of localized dewatering.

Concrete Handeling (BMP C151)

Purpose: Concrete work can generate process water and slurry that contain fine particles and high pH, both of which can violate water quality standards in the receiving water. This BMP is intended to minimize and eliminate concrete process water and slurry from entering waters of the state.

Conditions of Use: Any time concrete is used, these management practices shall be utilized. Concrete construction projects include, but are not limited to, the following:

- Curbs
- Sidewalks

- Roads
- Bridges
- Foundations
- Floors
- Runways

Temporary Sediment Pond (BMP C241)

Purpose: Sediment ponds remove sediment from runoff originating from disturbed areas of the site. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm). Consequently, they usually reduce turbidity only slightly.

Conditions of Use:

- Prior to leaving a construction site, stormwater runoff must pass through a sediment pond or other appropriate sediment removal best management practice.
- A sediment pond shall be used where the contributing drainage area is 3 acres or more. Ponds must be used in conjunction with erosion control practices to reduce the amount of sediment flowing into the basin.

Construction Stormwater Chemical Treatment (BMP C250)

Purpose: Sediment ponds are typically designed Sediment ponds remove sediment from runoff originating from disturbed areas of the to remove sediment no smaller than medium silt (0.02 mm). Consequently, they usually reduce turbidity only slightly.

Conditions of Use:

- Prior to leaving a construction site, stormwater runoff must pass through a sediment pond or other appropriate sediment removal best management practice.
- A sediment pond shall be used where the contributing drainage area is 3 acres or more. Ponds must be used in conjunction with erosion control practices to reduce the amount of sediment flowing into the basin.

Alternate dewatering control BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

3.1.11 Element #11 – Maintain BMPs

All temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with each particular BMP's specifications. Visual monitoring of the BMPs will be conducted at least once every calendar week and within 24 hours

of any rainfall event that causes a discharge from the site. If the site becomes inactive, and is temporarily stabilized, the inspection frequency will be reduced to once every month.

All temporary erosion and sediment control BMPs shall be removed within 30 days after the final site stabilization is achieved or after the temporary BMPs are no longer needed. Trapped sediment shall be removed or stabilized on site. Disturbed soil resulting from removal of BMPs or vegetation shall be permanently stabilized.

3.1.12 Element #12 – Manage the Project

Erosion and sediment control BMPs for this project have been designed based on the following principles:

- Design the project to fit the existing topography, soils, and drainage patterns.
- Emphasize erosion control rather than sediment control.
- Minimize the extent and duration of the area exposed.
- Keep runoff velocities low.
- Retain sediment on site.
- Thoroughly monitor site and maintain all ESC measures.
- Schedule major earthwork during the dry season.

In addition, project management will incorporate the key components listed below:

As this project site is located west of the Cascade Mountain Crest, the project will be managed according to the following key project components:

Phasing of Construction

- The construction project is being phased to the extent practicable in order to prevent soil erosion, and, to the maximum extent possible, the transport of sediment from the site during construction.
- Revegetation of exposed areas and maintenance of that vegetation shall be an integral part of the clearing activities during each phase of construction, per the Scheduling BMP (C 162).

Seasonal Work Limitations

- From October 1 through April 30, clearing, grading, and other soil disturbing activities shall only be permitted if shown to the satisfaction of the local permitting authority that silt-laden runoff will be prevented from leaving the site through a combination of the following:
  - Site conditions including existing vegetative coverage, slope, soil type, and proximity to receiving waters; and
  - Limitations on activities and the extent of disturbed areas; and
  - Proposed erosion and sediment control measures.
- Based on the information provided and/or local weather conditions, the local permitting authority may expand or restrict the seasonal limitation on site disturbance.
- The following activities are exempt from the seasonal clearing and grading limitations:
  - Routine maintenance and necessary repair of erosion and sediment control BMPs;
  - Routine maintenance of public facilities or existing utility structures that do not expose the soil or result in the removal of the vegetative cover to soil; and
  - Activities where there is 100 percent infiltration of surface water runoff within the site in approved and installed erosion and sediment control facilities.

Coordination with Utilities and Other Jurisdictions

- Care has been taken to coordinate with utilities, other construction projects, and the local jurisdiction in preparing this SWPPP and scheduling the construction work.

Inspection and Monitoring

- All BMPs shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Site inspections shall be conducted by a person who is knowledgeable in the principles and practices of erosion and sediment control. This person has the necessary skills to:

- Assess the site conditions and construction activities that could impact the quality of stormwater, and
- Assess the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.

- A Certified Erosion and Sediment Control Lead shall be on-site or on-call at all times.
- Whenever inspection and/or monitoring reveals that the BMPs identified in this SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, appropriate BMPs or design changes shall be implemented as soon as possible.

Maintaining an Updated Construction SWPPP

- This SWPPP shall be retained on-site or within reasonable access to the site.
- The SWPPP shall be modified whenever there is a change in the design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the state.
- The SWPPP shall be modified if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The SWPPP shall be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP shall be completed within seven (7) days following the inspection.

3.2 Site Specific BMPs

Site specific BMPs are shown on the TESC Plan Sheets and Details in Appendix A. These site specific plan sheets will be updated annually.

3.3 Additional Advanced BMPs

The BMP implementation schedule will be driven by the construction schedule. The following provides a sequential list of the proposed construction schedule milestones and the corresponding BMP implementation schedule. The list contains key milestones such as wet season construction.

The BMP implementation schedule listed below is keyed to proposed phases of the construction project, and reflects differences in BMP installations and inspections that relate to wet season construction. The project site is located west of the Cascade Mountain Crest. As such, the dry season is considered to be from May 1 to September 30 and the wet season is considered to be from October 1 to April 30.

- Mobilize equipment on site: To Be Determined
- Mobilize and store all ESC and soil stabilization products: To Be Determined
- Install ESC measures: To Be Determined
- Install stabilized construction entrance: To Be Determined
- Begin clearing and grubbing: To Be Determined

- All construction activities to be determined
-
-
-
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-
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-

5.0 Pollution Prevention Team

5.1 Roles and Responsibilities

The pollution prevention team consists of personnel responsible for implementation of the SWPPP, including the following:

- Certified Erosion and Sediment Control Lead (CESCL) – primary contractor contact, responsible for site inspections (BMPs, visual monitoring, sampling, etc.); to be called upon in case of failure of any ESC measures.
- Resident Engineer – For projects with engineered structures only (sediment ponds/traps, sand filters, etc.): site representative for the owner that is the project's supervising engineer responsible for inspections and issuing instructions and drawings to the contractor's site supervisor or representative
- Emergency Ecology Contact – individual to be contacted at Ecology in case of emergency.
- Emergency Owner Contact – individual that is the site owner or representative of the site owner to be contacted in the case of an emergency.
- Non-Emergency Ecology Contact – individual that is the site owner or representative of the site owner than can be contacted if required.
- Monitoring Personnel – personnel responsible for conducting water quality monitoring; for most sites this person is also the Certified Erosion and Sediment Control Lead.

5.2 Team Members

Names and contact information for those identified as members of the pollution prevention team are provided in the following table.

Title	Name(s)	Phone Number
Certified Erosion and Sediment Control Lead (CESCL)	To Be Determined	~
Resident Engineer	To Be Determined	~
Emergency Ecology Contact	To Be Determined	~
Emergency Owner Contact	To Be Determined	~
Non-Emergency Ecology Contact	To Be Determined	~
Monitoring Personnel	To Be Determined	~

6.0 Site Inspections and Monitoring

Monitoring includes visual inspection, monitoring for water quality parameters of concern, and documentation of the inspection and monitoring findings in a site log book. A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements;
- Site inspections; and,
- Stormwater quality monitoring.

For convenience, the inspection form and water quality monitoring forms included in this SWPPP include the required information for the site log book. This SWPPP may function as the site log book if desired, or the forms may be separated and included in a separate site log book. However, if separated, the site log book but must be maintained on-site or within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

6.1 Site Inspection

All BMPs will be inspected, maintained, and repaired as needed to assure continued performance of their intended function. The inspector will be a Certified Erosion and Sediment Control Lead (CESCL) per BMP C160. The name and contact information for the CESCL is provided in Section 5 of this SWPPP.

Site inspection will occur in all areas disturbed by construction activities and at all stormwater discharge points. Stormwater will be examined for the presence of suspended sediment, turbidity, discoloration, and oily sheen. The site inspector will evaluate and document the effectiveness of the installed BMPs and determine if it is necessary to repair or replace any of the BMPs to improve the quality of stormwater discharges. All maintenance and repairs will be documented in the site log book or forms provided in this document. All new BMPs or design changes will be documented in the SWPPP as soon as possible.

6.1.1 Site Inspection Frequency

Site inspections will be conducted at least once a week and within 24 hours following any discharge from the site. For sites with temporary stabilization measures, the site inspection frequency can be reduced to once every month if the site operator has successfully applied for inactive status for the site using the Permit Fee Activity Status Change Form, which can be found at the following web site.
http://www.ecy.wa.gov/programs/wq/permits/permit_fees/ConstructionActivityStatusChangeForm.pdf

6.1.2 Site Inspection Documentation

The site inspector will record each site inspection using the site log inspection forms provided in Appendix E. The site inspection log forms may be separated from this SWPPP document, but will be maintained on-site or within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

6.2 Stormwater Quality Monitoring

The proposed site development has a specific water quality requiremennts because the site discharges to a water body listed as impaired under Section 303(d) of the Clean Water Act. The following text desctribes the site specific monitoring for the proposed development.

6.2.1 Turbidity Sampling

Monitoring requirements for the proposed project will include either turbidity or water transparency sampling to monitor site discharges for water quality compliance with the 2005 Construction Stormwater General Permit (Appendix D). Sampling will be conducted at all discharge points at least once per calendar week.

Turbidity or transparency monitoring will follow the analytical methodologies described in Section S4 of the 2005 Construction Stormwater General Permit (Appendix D). The key benchmark values that require action are 25 NTU for turbidity (equivalent to 32 cm transparency). If the 25 NTU benchmark for turbidity (equivalent to 32 cm transparency) is exceeded, the following steps will be conducted:

1. Ensure all BMPs specified in this SWPPP are installed and functioning as intended.

2. Assess whether additional BMPs should be implemented and document revisions to the SWPPP as necessary.

3. Sample Discharge location daily until the analysis results are less than 25 NTU (turbidity) or greatere than 32 cm (transparency).

If the turbidity is greater then 25 NTU (or transparncy is less than 32 cm) but less than 250 NTU (transparency greater than 6 cm) for more than 3 days, additional treatment BMPs will be implemented within 24 hours of the third consectutive sampel that exceeded the benchmark value. Additional treatment BMPs to be considered will include, but are not limited to off-site treatment, infiltration, filtration and chemical treatment.

If the 250 NTU benchmark for turbidity (or less than 6 cm transparency) is exceeded at any time, the following steps will be condtucted:

1. Notify ecology by phone within 24 hours of analysis (see section 5.0 of this SWPPP for contact information).

2. Continue daily sampling until the trubidity is less than 25 NTU (or transparencey is greater tahn 32 cm)

3. Initiate additional treatment BMPs such as off-site treatment, infiltration, filtration, and chemical treatment within 24 hours of the first 250 NTU exceedence.

4. Implement additional treatment BMPs as soon as possible, but within 7 days of the first 250 NTU exceedance.

5. Describe inspection results and remedial action taken in the site log book and in monthly discharge monitoring reports as described in Section 7.0 of this SWPPP.

6.2.2 pH Sampling

Stormwater runoff will be monitored for pH starting on the first day of any activity that includes more than 40 yards of poured or recycled concrete or after application of "Engineered Soils" such as Portand Cement Treated Base, cement kiln dust, or fly ash. This does not include fertilizers. For Conctrete work, pH monitoring will start the first day concrete is poured and continue until 3 weeks after the last pour. For engineered soils, the pH monitoring period begins when engineered soils first exposed to precipitation and continue until the area is fully stabilized.

Stormwater samples will be collected daily from all points of discharge from the site and measured for pH using a calibrated pH meter, pH test kit, or wide range pH indicator paper. if the measured pH is 8.5 or greater the following steps will be conducted.

1. Prevent the high pH water from entering storm drains or surface water.

2. Adjust or neutralize the high pH water if necessary using appropriate technology such as CO2 sparging (liquid or dry ice).

3. Contact Ecology if chemical treatment other than CO2 spargin is planned.

7.0 Reporting and Recordkeeping

7.1 Recordkeeping

7.1.1 Site Log Book

A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements;
- Site inspections; and,
- Stormwater quality monitoring.

For convenience, the inspection form and water quality monitoring forms included in this SWPPP include the required information for the site log book.

7.1.2 Records Retention

Records of all monitoring information (site log book, inspection reports/checklists, etc.), this Stormwater Pollution Prevention Plan, and any other documentation of compliance with permit requirements will be retained during the life of the construction project and for a minimum of three years following the termination of permit coverage in accordance with permit condition S5.C.

7.1.3 Access to Plans and Records

The SWPPP, General Permit, Notice of Authorization letter, and Site Log Book will be retained on site or within reasonable access to the site and will be made immediately available upon request to Ecology or the local jurisdiction. A copy of this SWPPP will be provided to Ecology within 14 days of receipt of a written request for the SWPPP from Ecology. Any other information requested by Ecology will be submitted within a reasonable time. A copy of the SWPPP or access to the SWPPP will be provided to the public when requested in writing in accordance with permit condition S5.G.

7.1.4 Updating the SWPPP

In accordance with Conditions S3, S4.B, and S9.B.3 of the General Permit, this SWPPP will be modified if the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site or there has been a change in design, construction, operation, or maintenance at the site that has a significant effect on the discharge, or potential for discharge, of pollutants to the waters of the State. The SWPPP will be modified within seven days of

determination based on inspection(s) that additional or modified BMPs are necessary to correct problems identified, and an updated timeline for BMP implementation will be prepared.

7.2 Reporting

7.2.1 Discharge Monitoring Reports

If cumulative soil disturbance is 5 acres or larger: Discharge Monitoring Reports (DMRs) will be submitted to Ecology monthly. Of there was no discharge during a given monitoring period, the Permittee shall submit the form as required, with the words "No discharge" entered in the place of monitoring results. The DMR due date is 15 days following the end of each month.

Water quality sampling results will be submitted to Ecology monthly on Discharge Monitoring Report (DMR) forms in accordance with permit condition S5.B. If there was no discharge during a given monitoring period, the form will be submitted with the words "no discharge" entered in place of the monitoring results. If a benchmark was exceeded, a brief summary of inspection results and remedial actions taken will be included. If sampling could not be performed during a monitoring period, a DMR will be submitted with an explanation of why sampling could not be performed.

7.2.2 Notification of Noncompliance

If any of the terms and conditions of the permit are not met, and it causes a threat to human health or the environment, the following steps will be taken in accordance with permit section S5.F:

1. Ecology will be immediately notified of the failure to comply.

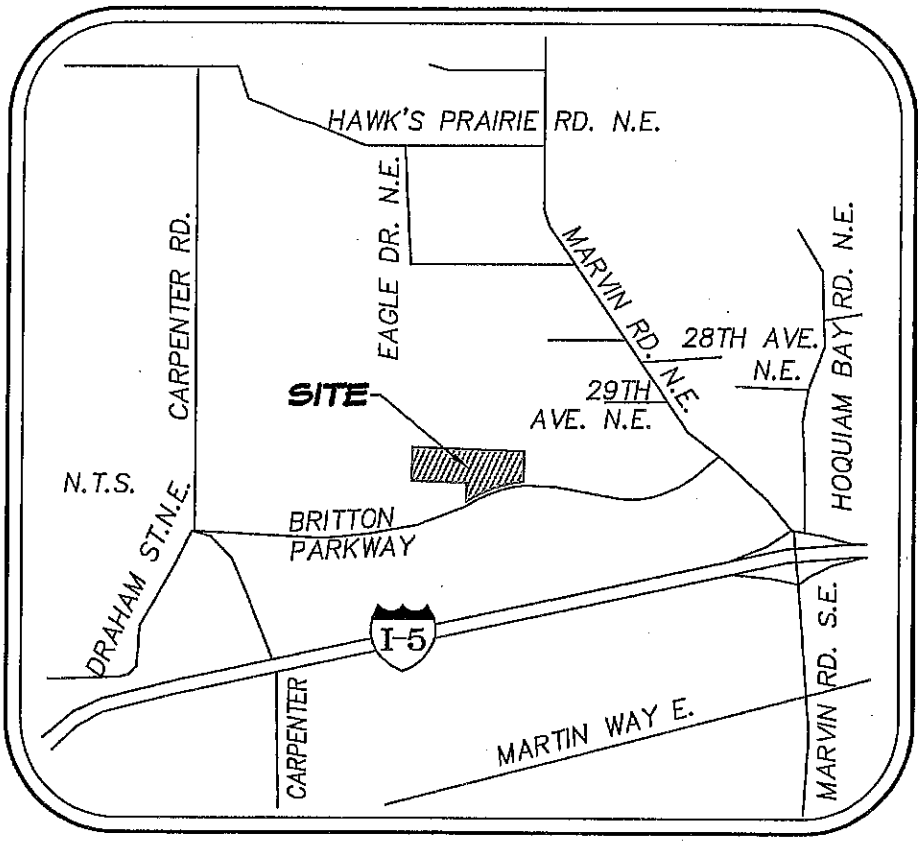
2. Immediate action will be taken to control the noncompliance issue and to correct the problem. If applicable, sampling and analysis of any noncompliance will be repeated immediately and the results submitted to Ecology within five (5) days of becoming aware of the violation.

3. A detailed written report describing the noncompliance will be submitted to Ecology within five (5) days, unless requested earlier by Ecology.

Any time turbidity sampling indicates turbidity is 250 nephelometric turbidity units (NTU) or greater or water transparency is 6 centimeters or less, the Ecology regional office will be notified by phone within 24 hours of analysis as required by permit condition S5.A (see Section 5.0 of this SWPPP for contact information).

In accordance with permit condition S4.F.6.b, the Ecology regional office will be notified if chemical treatment other than CO_2 sparging is planned for adjustment of high pH water (see Section 5.0 of this SWPPP for contact information).

Appendix A – Site Plans



VICINITY MAP

N.T.S.

Gateway Division 1
Vicinity Map

PRELIMINARY PLAT OF GATEWAY DIVISION 1

SITE DATA:

PARCEL NO.'S:	11803340100, 11803430000, 11810103000
ZONING:	HD 6-20
TOTAL AREA:	43.18 acres
WETLAND AREA:	1.31 acres
NET AREA:	41.87 acres
TOTAL DWELLING UNITS:	333 d.u.
DENSITY:	8.02 d.u. / net acre
TOTAL OPEN SPACE:	16.76 acres (39% OF SITE AREA)
STORM DRAINAGE	5.3 acres
WETLANDS / TREE TRACTS	1.3 acres
BUFFERS / TREE TRACTS	6.2 acres
LANDSCAPE / ACTIVE RECREATION	3.6 acres

ROADWAY LENGTH (A,B,C)	2,202 l.f.
ROADWAY AREA (A,B,C)	2.2 acres
ROADWAY LENGTH (OTHERS)	2,079 l.f.
ROADWAY AREA (OTHERS)	3.5 acres
SMALLEST LOT (DETACHED FRONT LOAD)	5,000 s.f.
SMALLEST LOT (DETACHED REAR LOAD)	4,000 s.f.
SMALLEST LOT ATTACHED (TOWNHOMES)	3,300 s.f.
AVERAGE LOT AREA	4,863 s.f.
SANITARY SEWER	CITY OF LACEY
WATER	CITY OF LACEY

LEGEND

EX. POWER POLE	EX. WATERMETER	NEW WATERMETER
EX. POWER VAULT	EX. HYDRANT	NEW HYDRANT
EX. POWER TRANSFORMER	EX. VALVE	NEW VALVE
EX. POWER PEDESTAL	EX. BLOWOFF	NEW BLIND FLANGE
EX. PVC RISER	EX. WATER LINE	NEW BLOCKING
EX. OVERHEAD POWER	EX. SEWER CLEANOUT	NEW WATERMAIN
EX. UNDER GROUND POWER	EX. SEWER MANHOLE	NEW CATCHBASIN TYPE 1
EX. TELEPHONE PEDESTAL	EX. SEWER LINE	NEW CATCHBASIN TYPE 2-48
EX. TELEPHONE MANHOLE	EX. CONCRETE	NEW STORM CATCHBASIN W/ SOLID LID
EX. CABLE PEDESTAL	EX. EDGE OF PAVEMENT	NEW STORM MAIN LINE
EX. TELEPHONE LINE	EX. MAJOR CONTOUR	NEW LOT DRAINAGE LINE
EX. GAS VALVE	EX. MINOR CONTOUR	NEW SEWER CLEANOUT
EX. GAS LINE	FINISH MAJOR CONTOUR	NEW SEWER MANHOLE
EX. POWER JUNCTION BOX	FINISH MINOR CONTOUR	NEW GRAVITY SEWER LINE
EX. CATCHBASIN TYPE 1	NEW ROCK WALL	NEW LATERAL SERVICE LINE
EX. STORM MAIN LINE	NEW PEDESTRIAN STREET LIGHT	NEW PIGG LAUNCH PORT
EX. CULVERT	NEW HIGH MAST W/ PED SCALE LIGHT	NEW SEWER FORCEMAIN
EX. SIGNS	NEW LIGHTING J BOX	SOIL TEST PIT LOCATION
EX. FENCE	NEW TRANSFROMER & SERVICE DISCONNECT	

CITY OF LACEY

VERTICAL DATUM	MERIDIAN HORIZONTAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1083 FOUND CASED MONUMENT AT THE INTERSECTION OF CALLISON ROAD AND BRITTON PARKWAY ELEVATION = 216.42	CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111182 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°36'41" WEST

100 50 0 100 200
SCALE: 1" = 100'

LEGAL DESCRIPTION

THE SOUTH HALF OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTH HALF OF THE SOUTHWEST QUARTER WEST HALF OF THE SOUTHEAST QUARTER OF SECTION 3, TOWNSHIP 18 NORTH, RANGE 1 WEST OF THE W.M.; EXCEPT BRITTON PARKWAY;

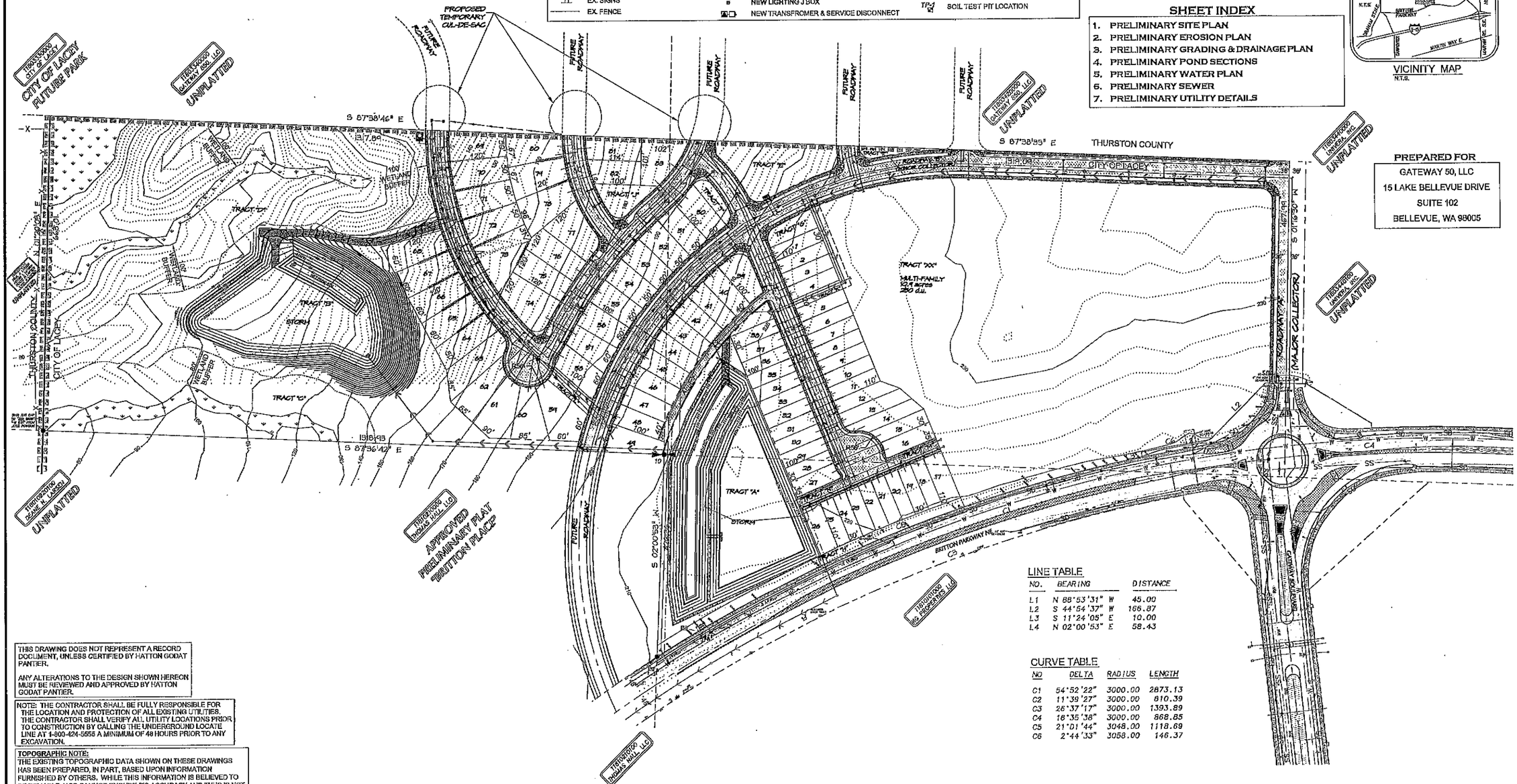
ALSO THAT PORTION OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST OF THE W.M., LYING NORTHERLY OF BRITTON PARKWAY;

IN THURSTON COUNTY, WASHINGTON

SHEET INDEX

1. PRELIMINARY SITE PLAN
2. PRELIMINARY EROSION PLAN
3. PRELIMINARY GRADING & DRAINAGE PLAN
4. PRELIMINARY POND SECTIONS
5. PRELIMINARY WATER PLAN
6. PRELIMINARY SEWER
7. PRELIMINARY UTILITY DETAILS

VICINITY MAP
N.T.S.



LINE TABLE

NO.	BEARING	DISTANCE
L1	N 88°53'31" W	45.00
L2	S 44°54'37" W	166.87
L3	S 11°24'05" E	10.00
L4	N 02°00'53" E	58.43

CURVE TABLE

NO	DELTA	RADIUS	LENGTH
C1	54°52'22"	3000.00	2873.13
C2	11°39'27"	3000.00	610.39
C3	26°37'17"	3000.00	1393.89
C4	18°35'38"	3000.00	868.85
C5	21°01'44"	3048.00	1118.69
C6	2°44'33"	3058.00	146.37

PREPARED FOR
GATEWAY 50, LLC
15 LAKE BELLEVUE DRIVE
SUITE 102
BELLEVUE, WA 98005

THIS DRAWING DOES NOT REPRESENT A RECORD DOCUMENT, UNLESS CERTIFIED BY HATTON GODAT PANTIER.

ANY ALTERATIONS TO THE DESIGN SHOWN HEREON MUST BE REVIEWED AND APPROVED BY HATTON GODAT PANTIER.

NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

TOPOGRAPHIC NOTE:
THE EXISTING TOPOGRAPHIC DATA SHOWN ON THESE DRAWINGS HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, HGP CANNOT ENSURE ITS ACCURACY AND THUS IS NOT RESPONSIBLE FOR THE ACCURACY OF THAT INFORMATION OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

DESIGNED BY: DS
DRAWN BY: MM
CHECKED BY: SDH
DATE: FEB 2013
SCALE: H 1" = V 1"

STEVEN D. HATTON
STATE OF WASHINGTON
24183
REGISTERED
PROFESSIONAL ENGINEER

HATTON GODAT PANTIER
ENGINEERS AND SURVEYORS
3910 MARTIN WAY E, SUITE B
OLYMPIA, WA 98506
TEL: 360.943.1599 FAX: 360.357.6299
hattongodatpantier.com

REVISIONS:	DATE:

GATEWAY DIVISION 1
PRELIMINARY PLAT
PRELIMINARY SITE PLAN

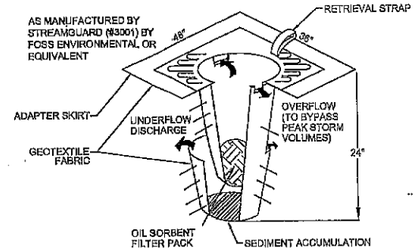
11803340100, 11803430000, 11810103000

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER, AND THE SOUTH WEST HALF OF THE SOUTH EAST QUARTER OF SECTION 3, AND A PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M.

AGENCY NO.
SHEET: 1 OF 7
(12-08/03-052/Preliminary Plat)
INDEX: 12-Plans-site.dwg
JOB: 12-052

GENERAL EROSION CONTROL NOTES:

1. A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL) IS REQUIRED FOR ALL CONSTRUCTION PROJECTS. THE NAMED PERSON OR FIRM SHALL BE ON-SITE OR ON-CALL AT ALL TIMES. FOR THIS SITE, THE PERSON / FIRM IS TBD AND THEIR OFFICE TELEPHONE NUMBER IS TBD.
2. APPROVAL OF THIS EROSION / SEDIMENTATION CONTROL (ESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.).
3. THE IMPLEMENTATION OF THESE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE APPLICATION CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION LANDSCAPING IS ESTABLISHED.
4. THE CLEARING LIMIT BOUNDARIES SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE APPLICANT/CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
5. THE ESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM, ROADWAYS, OR VIOLATE APPLICABLE SURFACE WATER, GROUND WATER , OR DISCHARGE STANDARDS.
6. THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE.
7. THE ESC FACILITIES ON ACTIVE SITES SHALL BE INSPECTED DAILY BY THE APPLICANT/CONTRACTOR--AND MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY--TO ENSURE THEIR CONTINUED FUNCTIONING.
8. THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED MONTHLY, OR WITHIN 48 HOURS FOLLOWING A MAJOR STORM EVEN, BY THE APPLICANT/CONTRACTOR--AND MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY -TO ENSURE THEIR CONTINUED FUNCTIONING.
9. STORM INLETS OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT STORMWATER RUNOFF DOES NOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR TREATED TO REMOVE SEDIMENT. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEARED PRIOR TO PROJECT COMPLETION AND ACCEPTANCE. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT-LADEN WATER OFFSITE WITHOUT TREATMENT.
10. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF THE CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
11. ROADS SHALL BE CLEANED THOROUGHLY AS NEEDED TO PROTECT DOWNSTREAM WATER RESOURCES OR STORMWATER INFRASTRUCTURE. SEDIMENT SHALL BE REMOVED FROM ROADS BY SHOVELING OR PICKUP SWEEPING AND SHALL BE TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.
12. FROM OCTOBER 16 THROUGH APRIL 1, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN 2 DAYS. FROM APRIL 2 TO OCTOBER 14, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN 7 DAYS. SOILS SHALL BE STABILIZED AT THE END OF THE SHIFT BEFORE A HOLIDAY OR WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. LINEAR CONSTRUCTION ACTIVITIES, SUCH AS RIGHT OF WAY AND EASEMENT CLEARING, ROADWAY DEVELOPMENT, PIPELINE, AND TRENCHING FOR UTILITIES, SHALL COMPLY WITH THESE REQUIREMENTS. THESE STABILIZATION REQUIREMENTS APPLY TO ALL SOILS ON SITE, WHEATHER AT FINAL GRADE OR NOT. THE LOCAL PERMITTING AUTHORITY MAY ADJUST THESE TIME LIMITS IF IT CAN BE SHOWN THAT A DEVELOPMENT SITE'S EROSION OR RUNOFF POTENTIAL JUSTIFIES A DIFFERENT STANDARD.
13. FROM OCTOBER 16 THROUGH APRIL 1, CLEARING, GRADING AND OTHER SOIL-DISTURBING ACTIVITIES SHALL ONLY BE PERMITTED IF SHOWN TO THE SATISFACTION OF THE LOCAL PERMITTING AUTHORITY THAT THE TRANSPORT OF SEDIMENT FROM THE CONSTRUCTION SITE TO RECEIVING WATER WILL BE PREVENTED.
14. SOIL STOCKPILES MUST BE STABILIZED AND PROTECTED WITH SEDIMENT-TRAPPING MEASURES.
15. ALL POLLUTANTS, INCLUDING WASTE MATERIALS AND DEMOLITION DEBRIS, THAT OCCUR ON SITE DURING CONSTRUCTION SHALL BE HANDLED AND DISPOSED OF IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF STORMWATER. WOODY DEBRIS MAY BE CHOPPED AND SPREAD ON SITE.
16. MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES AND OTHER ACTIVITIES WHICH MAY RESULT IN DISCHARGE OF SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORMWATER RUNOFF MUST BE CONDUCTED USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. REPORT ALL SPILLS TO 911.
17. WATER FROM MOST DEWATERING OPERATION SHALL BE DISCHARGED INTO A SEDIMENT TRAP OR POND. CLEAN, NON-TURBID WATER MAY BE DISCHARGED TO STATED SURFACE WATERS, PROVIDED THE DISCHARGE DOES NOT CAUSE EROSION OR FLOODING. HIGHLY TURBID OR CONTAMINATED DEWATERING WATER FROM CONSTRUCTION EQUIPMENT OPERATION, CLAMSHELL DIGGING, CONCRETE TREMIE POUR, OR WORK INSIDE A COFFERDAM SHALL BE HANDLED SEPARATELY FROM STORMWATER AND PROPERLY DISPOSED.



1. INSTALL INSERT PER THE MANUFACTURER'S SPECIFICATIONS
2. MAINTAIN AND REPLACE INSERTS AS RECOMMENDED BY THE MANUFACTURER, AS REQUIRED BY THE INSPECTOR OR PROJECT ENGINEER, AND AS OTHERWISE NECESSARY.

INLET SEDIMENT PROTECTION

CITY OF LACEY	
VERTICAL DATUM	MERIDIAN HORIZONTAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1053 FOUND CASED MONUMENT AT THE INTERSECTION OF CALUSON ROAD AND BRITTON PARKWAY ELEVATION = 216.42	CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111152 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°36'41" WEST

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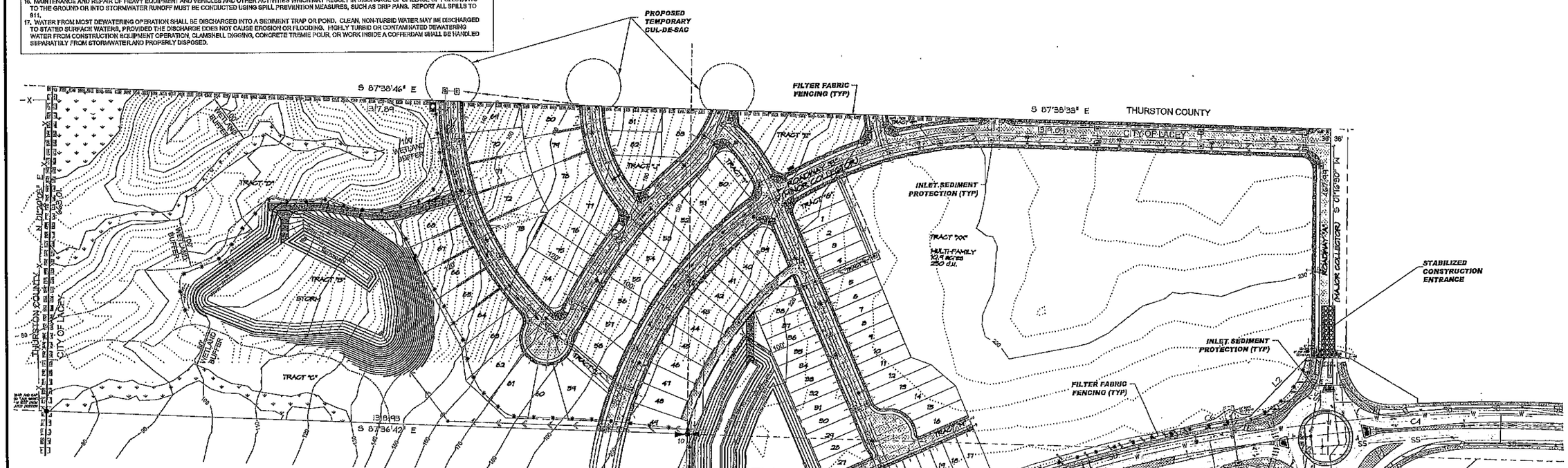
SCALE: 1" = 100'


PROPOSED TEMPORARY CUL-DE-SAC
FILTER FABRIC FENCING (TYP)
S 87°38'46" E
S 87°36'33" E
THURSTON COUNTY
CITY OF LACEY
INLET SEDIMENT PROTECTION (TYP)
STABILIZED CONSTRUCTION ENTRANCE
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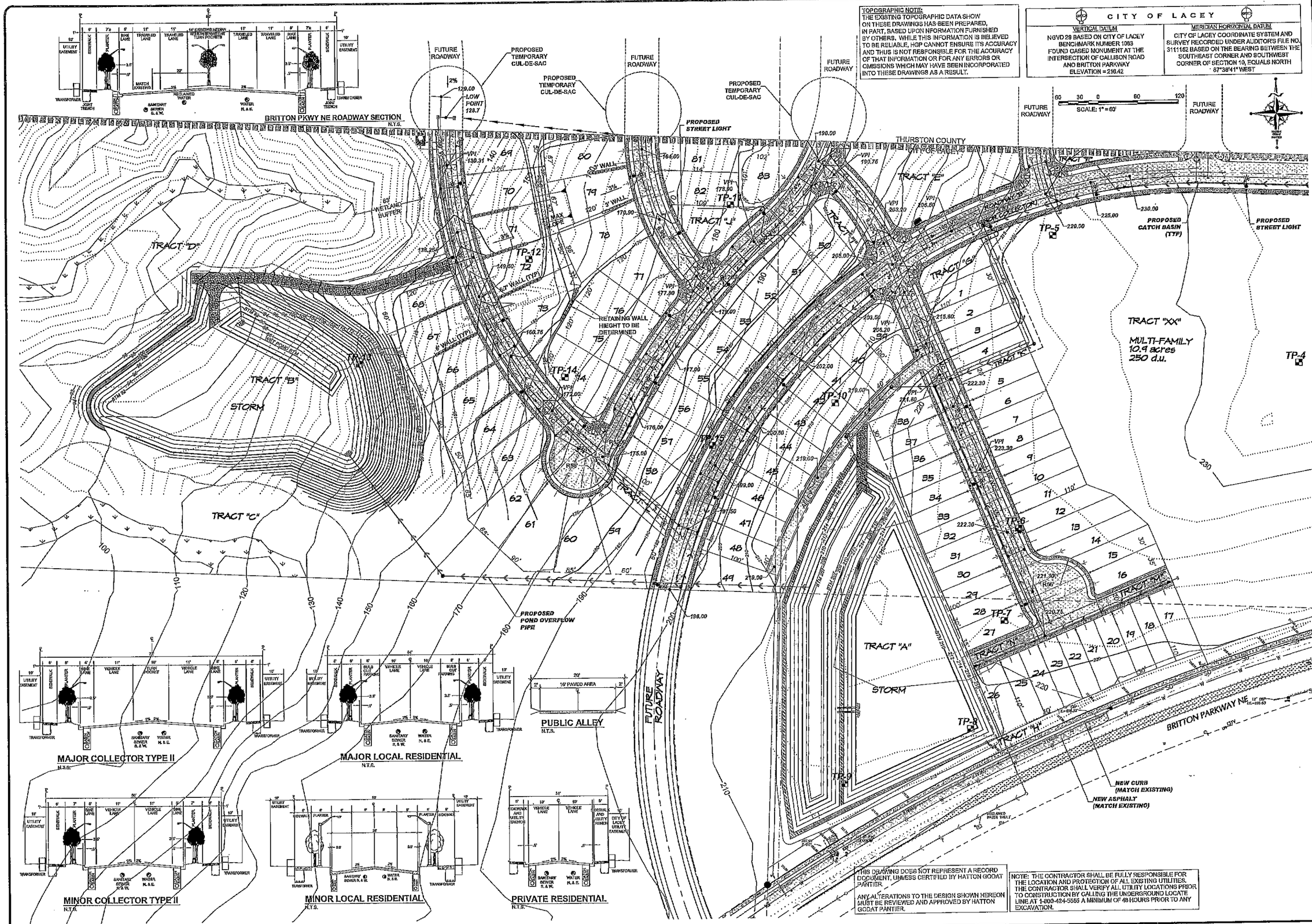
CITY OF LACEY

VERTICAL DATUM	MERIDIAN HORIZONTAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1083 FOUND CASED MONUMENT AT THE INTERSECTION OF GALLISON ROAD AND BRITTON PARKWAY ELEVATION = 216.42	CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111152 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°38'41" WEST



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DESIGNED BY: DS
DRAWN BY: MM
CHECKED BY: SDH
DATE: FEB 2012
SCALE: H 1" V

STEVEN D. HATTON
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REVISIONS: DATE:

GATEWAY DIVISION 1

PRELIMINARY PLAT

PRELIMINARY GRADING AND DRAINAGE

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER, AND THE SOUTHWEST HALF OF THE SOUTH EAST QUARTER OF SECTION 3 AND A PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M.

AGENCY NO.
SHEET: 3 OF 7
(12-000/12-052/Preliminary Plat)
INDEX 12-052pp-gr-dr-ds.dwg
JOB: 12-052

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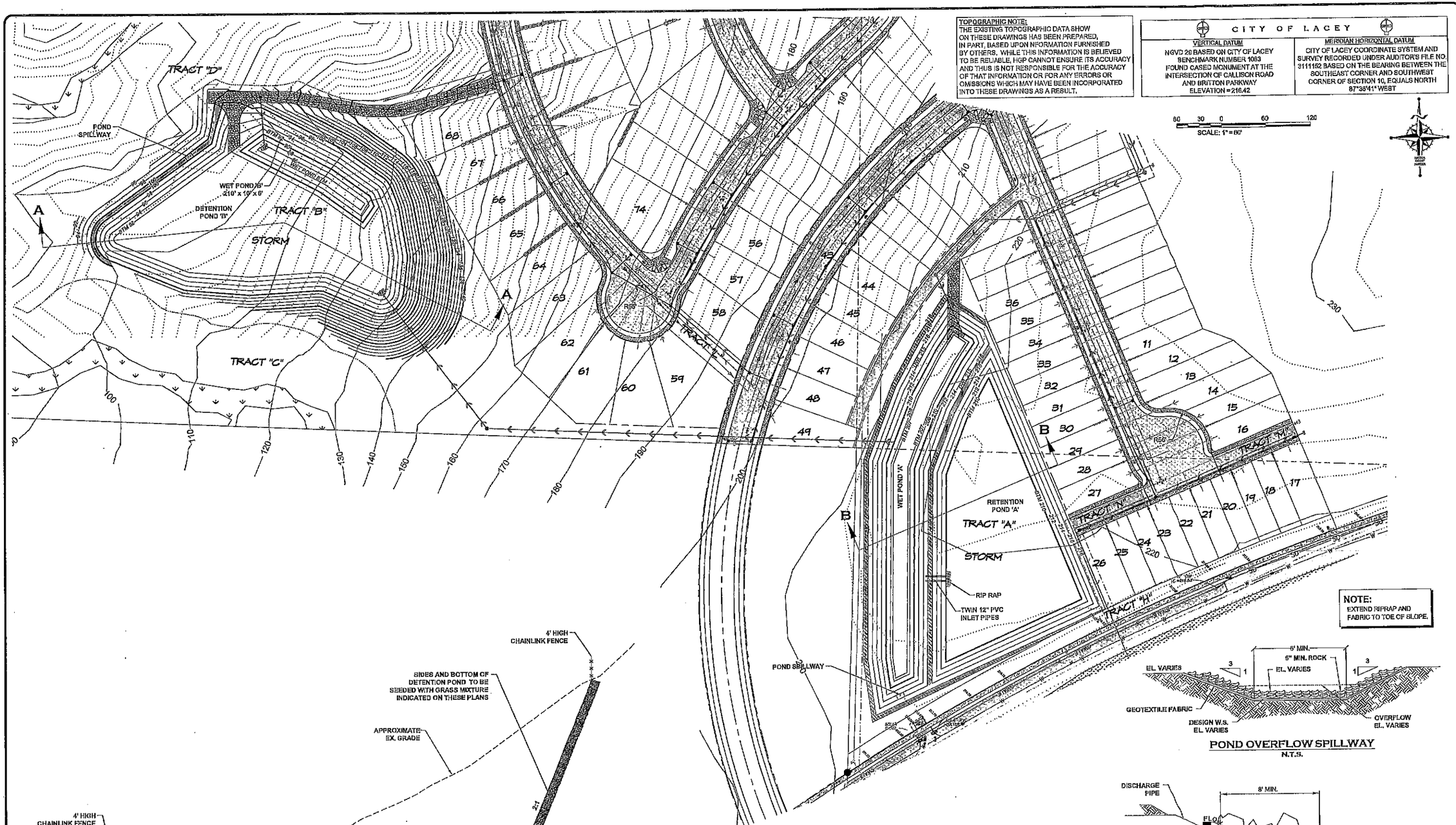
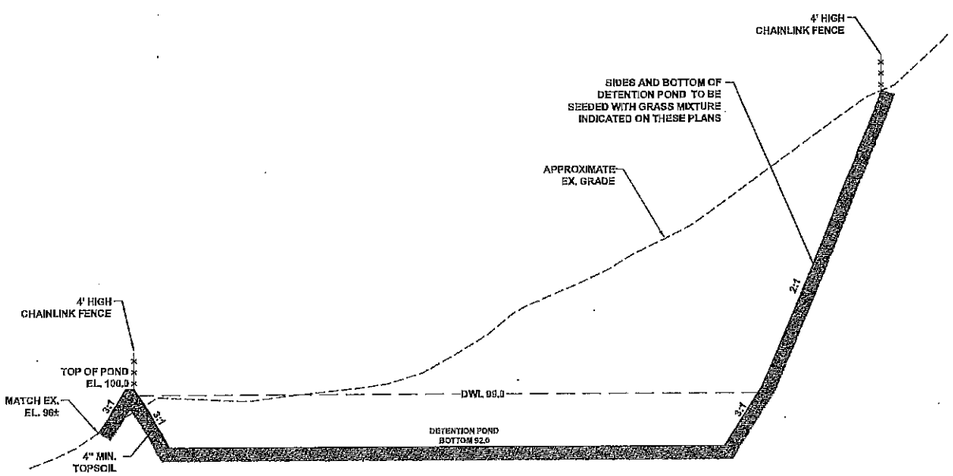
CITY OF LACEY

VERTICAL DATUM	MERIDIAN HORIZONTAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1063 FOUND CASED MONUMENT AT THE INTERSECTION OF CALLISON ROAD AND BRITTON PARKWAY ELEVATION = 216.42	CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111152 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°38'41" WEST

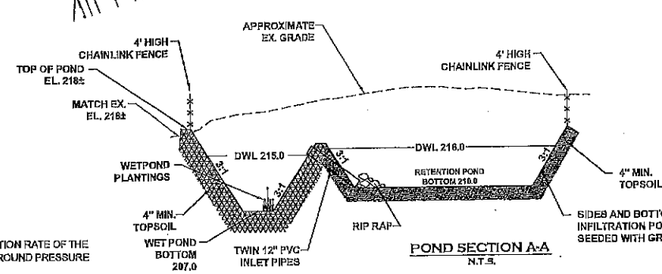


NOTE:
EXTEND RIPRAP AND FABRIC TO TOE OF SLOPE.

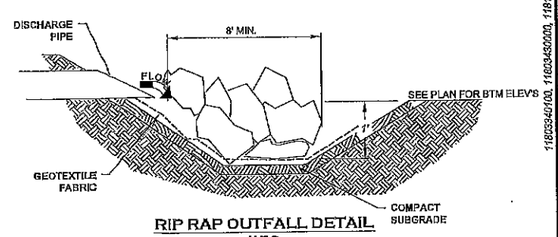
POND OVERFLOW SPILLWAY
N.T.S.



POND SECTION B-B
N.T.S.



POND SECTION A-A
N.T.S.



RIP RAP OUTFALL DETAIL
N.T.S.

RIP RAP NOTE:
Riprap shall conform with Section 9-13.1 of the Standard Specifications

Rip rap shall be a reasonably well graded assortment of rock with the Following gradation:

Maximum Stone Size 12-Inches
Median Stone Size 8-Inches
Minimum Stone Size 2-Inches

ARMOR POND A MIN. OF 6' IN EACH SIDE OF OUTFALL

RETENTION POND NOTE:

1. COMPACTION OF SOILS IN POND COULD SIGNIFICANTLY REDUCE THE INFILTRATION RATE OF THE SOIL. PREVENT COMPACTION OF SOILS IN POND BOTTOM BY USING ONLY LOW GROUND PRESSURE VEHICLES IN POND DURING AND AFTER CONSTRUCTION.

2. POND TO BE USED AS A TEMPORARY SEDIMENT POND. RETENTION POND T O BE EXCAVATED NO DEEPER THAN EL. 187.00 DURING CONSTRUCTION. ONCE SITE IS FULLY STABILIZED AT THE COMPLETION OF CONSTRUCTION, ALL CONSTRUCTION MUCK SHALL BE REMOVED FROM THE POND AND THE BOTTOM EXCAVATED TO THE FINAL DEPTH OF 185.00.

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DESIGNED BY: DS
DRAWN BY: KGM
CHECKED BY: SGH
DATE: FEB 2013
SCALE: H
V

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34193
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REVISIONS:	DATE:

GATEWAY DIVISION 1

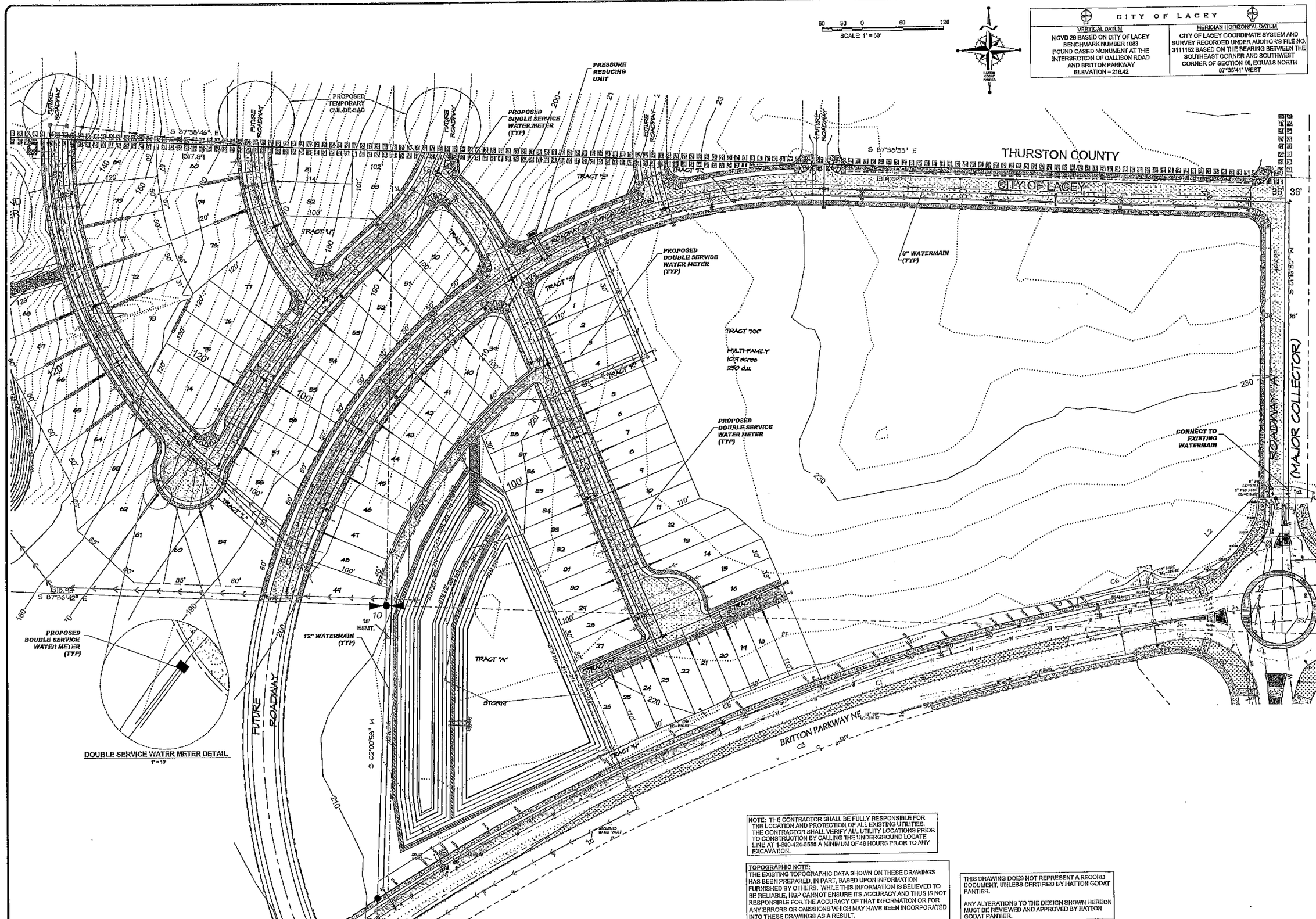
PRELIMINARY PLAT

PRELIMINARY POND SECTIONS

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTHWEST HALF OF THE SOUTH EAST QUARTER OF SECTION 3 AND A PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M.

11803340100, 11803430000, 11810105000

AGENCY NO.
SHEET: 6 OF 7
(12-030/12-051/Preliminary Plat)
INDEX: 12-052/prepanel.dwg
JOB: 12-052



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DESIGNED BY: DS
DRAWN BY: MM
CHECKED BY: SDH
DATE: FEB 2013
SCALE: H
V

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24193
REGISTERED
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hattonpantier.com

REVISIONS: DATE:

GATEWAY DIVISION 1

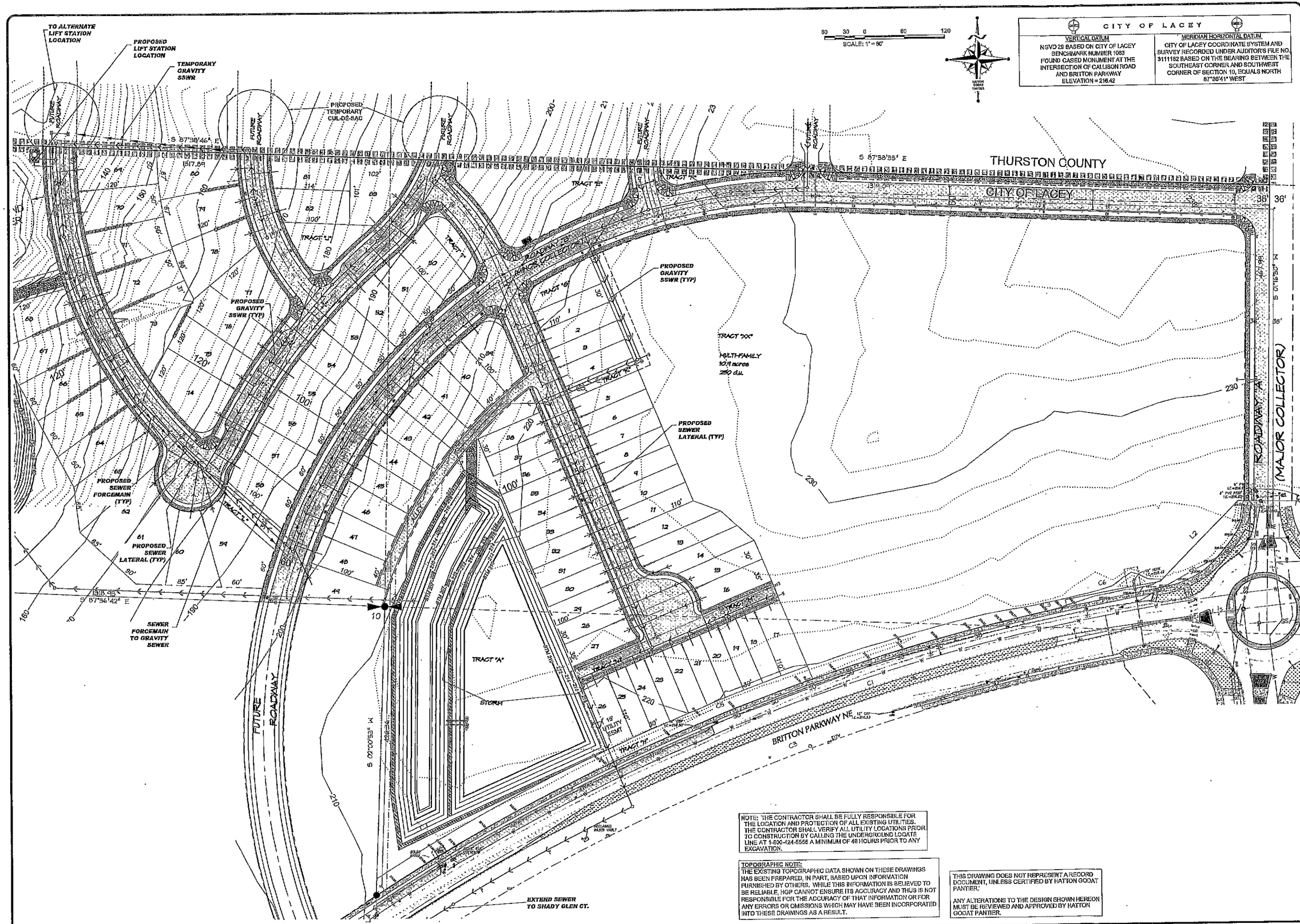
PRELIMINARY PLAT

PRELIMINARY WATER PLAN

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER, AND THE SOUTHWEST HALF OF THE SOUTH EAST QUARTER OF SECTION 3 AND A PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M.

118030400100, 118030400200, 118010100300

AGENCY NO.
SHEET: 5 OF 7
(12-009/12-052/Preliminary Plat)
INDEX: 12-052pre-wtr.dwg
JOB: 12-052



CITY OF LACEY	
VERTICAL DATUM	MERIDIAN HORIZONTAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1083 FOUND CASED MONUMENT AT THE INTERSECTION OF CALLISON ROAD AND BRITTON PARKWAY ELEVATION = 216.42	CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111152 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°36'41" WEST

NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

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DESIGNED BY: DS
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DATE: FEB 2013
SCALE: H
V

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hattonpantier.com

REVISIONS: DATE:

GATEWAY DIVISION 1

PRELIMINARY PLAT

PRELIMINARY SANITARY SEWER PLAN

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER, AND THE SOUTHWEST HALF OF THE SOUTHEAST QUARTER OF SECTION 3
AND A PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 15, TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M.

AGENCY NO.
SHEET: 6 OF 7
(12-010/12-052/Preliminary Plat)
INDEX: 12-052pre-san.dwg
JOB: 12-052

CITY OF LACEY

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GENERAL NOTES (SANITARY SEWER MAIN INSTALLATION

1. ALL WORKMANSHIP AND MATERIALS WILL BE IN ACCORDANCE WITH CITY OF OLYMPIA STANDARDS AND THE MOST CURRENT COPY OF THE STATE OF WASHINGTON STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION (WSDOT/APWA).
2. CITY OF OLYMPIA DATUM SHALL BE USED FOR ALL VERTICAL CONTROL. A LIST OF BENCHMARKS IS AVAILABLE FROM THE PUBLIC WORKS DEPARTMENT.
3. ALL APPROVALS AND PERMITS REQUIRED BY THE CITY OF OLYMPIA SHALL BE OBTAINED BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.
4. IF CONSTRUCTION IS TO TAKE PLACE IN THE COUNTY RIGHT-OF-WAY, THE CONTRACTOR SHALL NOTIFY THE COUNTY AND OBTAIN ALL THE REQUIRED APPROVALS AND PERMITS.
5. A PRECONSTRUCTION MEETING SHALL BE HELD WITH THE CITY OF OLYMPIA CONSTRUCTION INSPECTOR PRIOR TO THE START OF CONSTRUCTION.
6. THE CITY OF OLYMPIA CONSTRUCTION INSPECTOR SHALL BE NOTIFIED A MINIMUM OF 48 HOURS (TWO WORKING DAYS) IN ADVANCE OF A TAP CONNECTION TO AN EXISTING MAIN. THE INSPECTOR SHALL BE PRESENT AT THE TIME OF THE TAP.
7. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS (TWO WORKING DAYS) PRIOR TO ANY EXCAVATION.
8. ALL SEWER MAINS SHALL BE FIELD STAKED FOR GRADES AND ALIGNMENT BY A LICENSED ENGINEERING OR SURVEYING FIRM QUALIFIED TO PERFORM SUCH WORK. STAKING SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION.
9. ALL PIPE AND SERVICES SHALL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12 INCHES TO 18 INCHES UNDER THE PROPOSED FINISHED SUBGRADE. THE MARKER SHALL BE PLASTIC NON-BIODEGRADABLE METAL CORE OR BACKING, MARKED "SEWER" THAT CAN BE DETECTED BY A STANDARD METAL DETECTOR. IF VISIBILITY CANNOT BE MAINTAINED BETWEEN STRUCTURES ALONG THE STRAIGHT ALIGNMENT OF A SEWER, TONING WIRE SHALL BE INSTALLED ABOVE THE SEWER LINE AT A DEPTH NO GREATER THAN 48 INCHES.

- IF TONING WIRE IS REQUIRED, IT SHALL BE GREEN, UL LISTED, TYPE UF, 14-GAUGE COPPER TAPED TO THE TOP OF THE PIPE TO PREVENT MOVEMENT DURING BACKFILLING. THE WIRE SHALL BE LAID LOOSELY ENOUGH TO PREVENT STRETCHING AND DAMAGE. THE WIRE SHALL BE WRAPPED TO MANHOLE OR CLEANOUT RINGS ON GRAVITY SEWERS OR VALVE BODY ON STEP MAINS AND FORCE MAINS.
- A 1-POUND MAGNESIUM ANODE SHALL BE BURIED WITH THE PIPE EVERY 1,000 LINEAR FEET MAXIMUM FOR CATHODIC PROTECTION OF THE WIRE. TONING WIRE SPLICES AND CONNECTIONS TO ANODES SHALL JOIN WIRES BOTH MECHANICALLY AND ELECTRICALLY AND SHALL EMPLOY EPOXY RESIN OR HEAT-SHRINK TAPE INSULATION. TONING WIRE SHALL BE TESTED PRIOR TO ACCEPTANCE OF THE PIPE SYSTEM. A WRITTEN NOTICE FROM THE CONTRACTOR TO THE CITY TWO DAYS PRIOR TO THE TEST IS REQUIRED. ON A CURVILINEAR SEWER, THE WIRE SHALL BE BROUGHT UP, BARED, AND WRAPPED THREE TIMES AROUND THE MANHOLE RING. TAPE SHALL BE TERRA TAPE "D" OR APPROVED EQUAL. THE TAPE AND WIRE SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR.

10. BEDDING OF THE SEWER MAIN AND COMPACTION OF THE BACKFILL MATERIAL SHALL BE REQUIRED IN ACCORDANCE WITH THE ABOVE-MENTIONED SPECIFICATION (SEE GENERAL NOTE 1).
11. ALL MANHOLES OR CLEANOUTS OUTSIDE THE PAVED AREA SHALL BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWINGS 7-3 AND 7-5.
12. WHEN TEMPORARY STREET PATCHES ARE ALLOWED BY THE CITY, COLD MIX ASPHALT SHALL BE PLACED AND COMPACTED TO A MAXIMUM DEPTH OF 2 INCHES. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTENANCE AS REQUIRED BY THE CITY.
13. EROSION CONTROL MEASURES CONFORMING TO THE REQUIREMENTS OF THE DRAINAGE DESIGN AND EROSION CONTROL MANUAL FOR OLYMPIA SHALL BE TAKEN BY THE CONTRACTOR DURING CONSTRUCTION TO PREVENT INFILTRATION OF EXISTING AND PROPOSED STORM DRAINAGE FACILITIES AND ROADWAYS.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL IN ACCORDANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) AS REQUIRED. PRIOR TO DISRUPTION OF ANY TRAFFIC, THE CITY SHALL APPROVE TRAFFIC CONTROL PLANS PREPARED AND SUBMITTED BY THE CONTRACTOR. NO WORK SHALL COMMENCE UNTIL ALL APPROVED TRAFFIC CONTROL IS IN PLACE.
15. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE A COPY OF THE APPROVED CONSTRUCTION PLANS ON SITE AT ALL TIMES.
16. ANY CHANGES TO THE DESIGN SHALL FIRST BE REVIEWED AND APPROVED BY THE DEVELOPER'S PROJECT ENGINEER AND THE CITY ENGINEER.
17. AFTER BACKFILLING, BUT PRIOR TO PAVING, ALL MAINS AND APPURTENANCES SHALL BE INSPECTED AND APPROVED BY THE CITY OF OLYMPIA CONSTRUCTION INSPECTOR. APPROVAL DOES NOT CONSTITUTE FINAL ACCEPTANCE OF THE SEWER LINE. THE CONTRACTOR SHALL RETAIN THE RESPONSIBILITY TO REPAIR ALL DEFICIENCIES AND FAILURES REVEALED DURING ALL REQUIRED TESTING FOR ACCEPTANCE AND THROUGH THE DURATION OF THE WARRANTY. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE CITY OF OLYMPIA FOR THE REQUIRED INSPECTIONS. ANY MAIN OR APPURTENANCE BACKFILLED PRIOR TO INSPECTION SHALL BE RE-EXCAVATED FOR INSPECTION.
18. ALL SAFETY STANDARDS AND REQUIREMENTS SHALL BE COMPLIED WITH AS SET FORTH BY OSHA, WISHA AND WASHINGTON STATE DEPARTMENT OF LABOR AND INDUSTRIES.

GRAVITY SEWER NOTES:

1. GRAVITY SEWER MAINS WILL MEET THE FOLLOWING: PVC PIPE CONFORMING TO ASTM P 3034 SDR 35, ASTM F 794, OR ASTM F 679 TYPE 1 WITH JOINTS AND GASKETS CONFORMING TO ASTM 3212 AND ASTM F 477.
2. PRECAST MANHOLES WILL MEET THE REQUIREMENTS OF ASTM C 478. MANHOLES WILL BE TYPE 1-48" UNLESS OTHERWISE SPECIFIED ON THE PLANS. JOINTS WILL BE RUBBER GASKETED CONFORMING TO ASTM C 443 AND WILL BE GROUTED FROM THE INSIDE. LIFT HOLES WILL BE GROUTED FROM THE OUTSIDE AND INSIDE OF THE MANHOLE. (SEE GENERAL NOTE 1.)
3. SIDE SEWER SERVICES WILL BE PVC, ASTM D 3034 SDR 35 WITH FLEXIBLE GASKETED JOINTS. SIDE SEWER CONNECTIONS WILL BE MADE BY A TAP TO AN EXISTING MAIN OR A WYE BRANCH FROM A NEW MAIN CONNECTED ABOVE THE SPRINGLINE OF THE PIPE. SIDE SEWER SERVICES WILL BE INSTALLED ACCORDING TO APPLICABLE STANDARD DETAIL(S).
4. ALL LINES WILL BE HIGH VELOCITY CLEANED AND SUBJECTED TO A LOW PRESSURE AIR TEST PER CURRENT WSDOT/APWA SPECIFICATIONS AFTER BACKFILLING, BUT PRIOR TO PAVING (SEE GENERAL NOTE 1). HYDRANT FLUSHING OF LINES IS NOT AN ACCEPTABLE CLEANING METHOD. TESTING OF THE SANITARY SEWER MAIN WILL INCLUDE TELEVISION INSPECTING OF THE MAIN BY AND AT THE EXPENSE OF THE CITY. IMMEDIATELY PRIOR TO TELEVISION INSPECTING, ENOUGH WATER WILL BE RUN DOWN THE LINE SO IT COMES OUT THE LOWER MANHOLE AND THE LINE IS FLUSHED CLEAN. ACCEPTANCE OF THE LINE WILL BE MADE AFTER THE TELEVISION INSPECTION TAPE HAS BEEN REVIEWED AND APPROVED BY THE INSPECTOR. ADDITIONAL TELEVISION INSPECTIONS WILL BE AT THE EXPENSE OF THE CONTRACTOR, OR THE CONTRACTOR MAY ELECT TO PERFORM THE TELEVISION INSPECTION UNDER THE DIRECT SUPERVISION OF THE CITY. A TEST OF ALL MANHOLES IN ACCORDANCE WITH OLYMPIA STANDARD IS ALSO REQUIRED. TESTING WILL TAKE PLACE AFTER ALL UNDERGROUND UTILITIES ARE INSTALLED AND COMPACTION OF THE ROADWAY SUBGRADE IS COMPLETED.

GENERAL NOTES (STREET LIGHT CONSTRUCTION)

1. ALL WORKMANSHIP, MATERIALS AND TESTING SHALL BE IN ACCORDANCE WITH THE MOST CURRENT WSDOT/APWA STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION, NATIONAL ELECTRICAL CODE AND CITY OF LACEY DEVELOPMENT GUIDELINES UNLESS OTHERWISE SPECIFIED BELOW. IN CASES OF CONFLICT THE MOST STRINGENT STANDARD SHALL APPLY. WHEN THE MOST STRINGENT STANDARD IS NOT CLEAR, THE CITY ENGINEER WILL MAKE THE DETERMINATION. THE ELECTRICAL CONTRACTOR SHALL BE FAMILIAR WITH ALL ABOVE STATED PUBLICATIONS AND GUIDELINES AS THEY WILL BE STRICTLY ENFORCED BY THE CITY.
2. THE CONTRACTOR SHALL BE IN COMPLIANCE WITH ALL SAFETY STANDARDS AND REQUIREMENTS AS SET FORTH BY OSHA, WISHA AND THE STATE OF WASHINGTON, DEPARTMENT OF LABOR AND INDUSTRIES.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL IN ACCORDANCE WITH THE WSDOT/APWA STANDARD PLANS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION (ALL APPLICABLE "K" PLANS) AND/OR THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). PRIOR TO DISRUPTION OF ANY TRAFFIC, A TRAFFIC CONTROL PLAN SHALL BE PREPARED AND SUBMITTED TO THE CITY FOR REVIEW AND APPROVAL. NO WORK SHALL COMMENCE UNTIL ALL APPROVED TRAFFIC CONTROL IS IN PLACE.
4. ALL APPROVALS AND PERMITS REQUIRED BY THE CITY OF LACEY SHALL BE OBTAINED BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.
5. IF CONSTRUCTION IS TO TAKE PLACE IN THE COUNTY RIGHT-OF-WAY, THE CONTRACTOR SHALL NOTIFY THE COUNTY AND OBTAIN ALL THE REQUIRED APPROVALS AND PERMITS.
6. ELECTRICAL PERMITS AND INSPECTIONS ARE REQUIRED FOR ALL STREET LIGHTING INSTALLATIONS. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING SAID PERMITS PRIOR TO ANY TYPE OF ACTUAL CONSTRUCTION.
7. A PRE-CONSTRUCTION MEETING SHALL BE HELD WITH THE CITY OF LACEY CONSTRUCTION AND ELECTRICAL INSPECTORS PRIOR TO THE START OF CONSTRUCTION.
8. PRIOR TO INSTALLATION OF ANY MATERIALS THE ELECTRICAL CONTRACTOR SHALL SUBMIT FOR APPROVAL BY THE CITY THREE COPIES OF MATERIAL CATALOG CUTS, SPECIFICATIONS, SHOP DRAWINGS AND/OR WIRING DIAGRAMS. ANY MATERIALS PURCHASED OR LABOR PERFORMED PRIOR TO SUCH APPROVAL SHALL BE AT THE CONTRACTOR'S RISK. MOUNTING HEIGHTS, ARM LENGTH, POWER SOURCE, LUMINAIRE TYPE AND BOLT PATTERNS SHALL FOLLOW CITY OF LACEY DEVELOPMENT GUIDELINES CHAPTER 4E.020. MODIFICATIONS OF ANY PORTION OF THE LIGHTING SYSTEM WILL NOT BE ALLOWED WITHOUT PRIOR APPROVAL BY THE CITY. SUBMITTALS SHALL INCLUDE PROJECT NAME, NAME OF ELECTRICAL CONTRACTOR, DATE AND VENDOR NAME.
9. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE A COPY OF AN APPROVED SET OF PLANS ON THE CONSTRUCTION SITE AT ALL TIMES.
10. ALL SURVEYING AND STAKING SHALL BE PERFORMED PER THE CORRESPONDING CHAPTER OF THE CITY OF LACEY DEVELOPMENT GUIDELINES AND PUBLIC WORKS STANDARDS.
11. TEMPORARY EROSION CONTROL/WATER POLLUTION MEASURES SHALL BE REQUIRED IN ACCORDANCE WITH SECTION 1-07.15 OF THE WSDOT/APWA STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION AND THE DRAINAGE DESIGN AND EROSION CONTROL MANUAL FOR LACEY. AT NO TIME WILL SILTS AND DEBRIS BE ALLOWED TO DRAIN INTO AN EXISTING OR NEWLY INSTALLED FACILITY UNLESS SPECIAL PROVISIONS HAVE BEEN DESIGNED.
12. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION. THE CONTRACTOR WILL ALSO BE RESPONSIBLE FOR MAINTAINING ALL LOCATE MARKS ONCE THE UTILITIES HAVE BEEN LOCATED.
13. A 500 VOLT MEGGER TEST WILL BE PERFORMED BY THE CITY ON EACH CIRCUIT BETWEEN CONDUCTOR AND GROUND PRIOR TO ACCEPTANCE OF THE LIGHTING SYSTEM. THE INSULATION RESISTANCE SHALL NOT BE LESS THAN 6 MEGAOHMS TO GROUND FOR RUNS OVER 2,500 FEET NOR LESS THAN 8 MEGAOHMS FOR RUNS UNDER 2,500 FEET. A FUNCTIONAL TEST WILL BE PERFORMED BY THE CITY IN WHICH IT IS DEMONSTRATED THAT EACH AND EVERY PART OF THE SYSTEM FUNCTIONS AS SPECIFIED OR INTENDED HEREIN. (WSDOT STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION 8-20.3(11).
14. ALL LIGHTING POLES SHALL BE AS SPECIFIED IN CHAPTER 4E.020 OF THE DEVELOPMENT GUIDELINES. THE SONOTUBE FORM SHALL BE REMOVED TO BELOW GROUND LEVEL. POLE BASES SHALL BE GROUTED AND ALL LUMINAIRE HEADS SHALL BE PLUMB AND LEVEL.
15. CEMENT CONCRETE BASES SHALL FOLLOW CITY OF LACEY DEVELOPMENT GUIDELINES LUMINAIRE FOUNDATION DETAIL.
16. ANY MODIFICATION TO APPROVED LIGHTING PLANS SHALL BE REVIEWED AND APPROVED BY THE CITY PRIOR TO INSTALLATION. ANY APPROVED MODIFICATIONS SHALL BE SHOWN ON A MYLAR ASBUILT SUPPLIED TO THE CITY AFTER THE LIGHTING INSTALLATION IS COMPLETED AND BEFORE FINAL ACCEPTANCE. IT SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO ENSURE THESE AS-BUILTS ARE PROVIDED TO THE CITY.
17. PRIVATE UTILITIES REQUIRE A 10 FOOT "CLEAR ZONE" FROM THE STREET LIGHT TO THE PRIVATE UTILITY LOCATED ABOVE GROUND ON PRIVATE UTILITY POLES. THE "CLEAR ZONE" SEPARATION SHALL BE INCORPORATED INTO THE STREET LIGHTING DESIGN TO ASSURE THE REQUIRED SEPARATION IS PROVIDED.
18. A MAXIMUM OF THREE CIRCUITS SHALL BE ASSOCIATED PER CONDUIT. ALSO, A MAXIMUM OF SEVEN (7) #8 CONDUCTORS OR FIVE (5) #4 CONDUCTORS SHALL BE PERMITTED IN A 2 INCH CONDUIT. ADDITIONAL CONDUITS WILL BE REQUIRED FOR ADDITIONAL CONDUCTORS OVER THIS STANDARD. THE 2 INCH SPARE CONDUIT SHALL NOT BE UTILIZED FOR THIS APPLICATION IT IS RESERVED FOR CITY COMMUNICATIONS.
19. ON ROADS CLASSIFIED AS ARTERIALS, BOULEVARDS OR COLLECTORS, THE STREET LIGHTING SHALL BE SEPARATED INTO TWO CIRCUITS. THERE SHALL BE A SEPARATE CIRCUIT FOR THE RIGHT AND LEFT SIDE OF THE ROAD.

REVISED: 09/2009

GENERAL NOTES (WATERMAIN INSTALLATION)

1. ALL WORKMANSHIP AND MATERIAL WILL BE IN ACCORDANCE WITH THE CITY OF OLYMPIA ENGINEERING DESIGN AND DEVELOPMENT STANDARDS AND THE MOST CURRENT COPY OF THE STATE OF WASHINGTON STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION; DEPARTMENT OF HEALTH (DOH) REGULATIONS; AND AMERICAN WATER WORKS ASSOCIATION STANDARDS.
2. A PRECONSTRUCTION MEETING WILL BE HELD WITH THE CITY PRIOR TO THE START OF CONSTRUCTION.
3. WATER MAINS 2-INCH TO 10-INCH DIAMETER WILL BE DUCTILE IRON PIPE, CLASS 50, OR HDPE PIPE MEETING THE REQUIREMENTS OF AWWA CLASS 200, C901, AND C906. ALL WATER MAINS 12-INCH DIAMETER AND LARGER WILL BE DUCTILE IRON CEMENT MORTAR-LINED THICKENED, CLASS 50.
4. SYSTEM GATE VALVES WILL BE RESILIENT WEDGE, NRS (NON-RISING STEM), WITH O-RING SEALS. VALVE ENDS WILL BE MECHANICAL JOINT OR ANSI FLANGES. VALVES WILL CONFORM TO AWWA 509-80 OR AWWA C-515. VALVES WILL HAVE STAINLESS STEEL STEMS, BONNET BOLTS WILL NOT BE EXPOSED TO THE ENVIRONMENT AND WILL BE COVERED BY MANUFACTURER'S 10-YEAR WARRANTY.
5. FIRE HYDRANTS WILL BE DRESSER M&H RELIANT STYLE 929, CLOW MEDALLION, WATEROUS PACER 250, MUELLER CENTURION, OR AVK. HYDRANTS WILL BE BAGGED UNTIL SYSTEM IS APPROVED. HYDRANTS WILL BE PAINTED WITH PARKER PAINT MARATHON ENAMEL SAFETY YELLOW PAINT OR EQUAL. ALL CHAINS BETWEEN CAPS AND HYDRANTS SHALL BE CUT AND REMOVED.
6. ALL LINES WILL BE CHLORINATED AND TESTED IN CONFORMANCE WITH THE ABOVEREFERENCED SPECIFICATION (NOTE 1).
7. ALL PIPE AND SERVICES WILL BE INSTALLED WITH CONTINUOUS TRACER TAPE INSTALLED 12 INCHES TO 18 INCHES UNDER THE FINAL GROUND SURFACE. THE MARKER WILL BE PLASTIC NON-BIODEGRADABLE, METAL CORE, OR BACKING MARKED WATER, WHICH CAN BE DETECTED BY A STANDARD METAL DETECTOR. TAPE WILL BE TERRA TAPE D OR APPROVED EQUAL. IN ADDITION TO THE TRACER TAPE, BLUE TONING (TRACER) WIRE WILL BE INSTALLED OVER ALL PIPE AND SERVICES. TONING WIRE WILL BE UL LISTED, TYPE UF, 14-GAUGE COATED COPPER TAPED TO THE TOP OF THE PIPE TO PREVENT STRETCHING AND DAMAGE. THE WIRE WILL BE BROUGHT UP AND TIED OFF AT VALVE BODY OR METER SETTER WITH THE END OF THE WIRE ACCESSIBLE TO HOOK UP TO A LOCATOR (2 FEET OF SLACK).

   A 1-POUND MAGNESIUM ANODE WILL BE BURIED WITH THE WIRE AND EVERY 1,000 LINEAR FEET THEREAFTER FOR CATHODIC PROTECTION OF THE TONING WIRE. ALL TONING WIRE SPLICES AND CONNECTIONS WILL JOIN WIRES BOTH MECHANICALLY AND ELECTRICALLY AND WILL EMPLOY EPOXY RESIN OR HEAT-SHRINK TAPE INSULATION. TONING WIRE WILL BE TESTED PRIOR TO ACCEPTANCE OF THE PIPE SYSTEM. A WRITTEN NOTICE FROM THE CONTRACTOR TO THE CITY TWO DAYS PRIOR TO THE TEST IS REQUIRED.

9. THE CONTRACTOR WILL PROVIDE TRAFFIC CONTROL PLAN(S) AS REQUIRED IN ACCORDANCE WITH MUTCD.
10. ALL WATER MAINS WILL BE STAKED FOR GRADES AND ALIGNMENT BY AN ENGINEERING OR SURVEYING FIRM CAPABLE OF PERFORMING SUCH WORK. STAKING WILL BE MAINTAINED THROUGHOUT CONSTRUCTION.
11. ALL WATER SYSTEM CONNECTIONS TO SERVE BUILDINGS OR PROPERTIES WITH DOMESTIC POTABLE WATER, FIRE SPRINKLER SYSTEMS, OR IRRIGATION SYSTEMS WILL COMPLY WITH THE MINIMUM BACKFLOW PREVENTION REQUIREMENTS AS ESTABLISHED BY THE DOH AND THE CITY OF OLYMPIA IN ITS CROSS CONNECTION PROGRAM.
12. CALL UNDERGROUND LOCATE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATIONS.
13. THE CITY WILL BE GIVEN 10 WORKING DAYS' NOTICE PRIOR TO SCHEDULING A SHUTDOWN. THE CITY OF OLYMPIA DRINKING WATER OPERATIONS OR CITY INSPECTOR WILL PERFORM THE SHUTDOWN. WHERE ONNECTIONS REQUIRE "FIELD VERIFICATION," CONNECTION POINTS WILL BE EXPOSED BY THE CONTRACTOR AND FITTINGS VERIFIED TWO WORKING DAYS PRIOR TO SCHEDULING CITY CREWS TO DISTRIBUTE SHUTDOWN NOTICES. THE CITY WILL NOTIFY CUSTOMERS INVOLVED OR AFFECTED OF THE WATER SERVICE INTERRUPTION 48 HOURS IN ADVANCE.
14. AT ANY CONNECTION TO AN EXISTING LINE WHERE A NEW VALVE IS NOT INSTALLED, THE EXISTING VALVE MUST BE PRESSURE TESTED TO CITY STANDARDS BY THE CONTRACTOR PRIOR TO CONNECTION. IF AN EXISTING VALVE FAILS TO PASS THE TEST, THE CONTRACTOR WILL MAKE THE NECESSARY PROVISIONS TO TEST THE NEW LINE PRIOR TO CONNECTION TO THE EXISTING SYSTEM OR INSTALL A NEW VALVE.
15. AT ANY WATER MAIN TAP TO EXISTING CITY MAINS WHERE THE CONTRACTOR ENCOUNTERS A COUPLING OR EXISTING ASSEMBLIES, THE CONTRACTOR WILL PROVIDE A MINIMUM OF 18 INCHES OF CLEARANCE FROM COUPLING OR ASSEMBLIES TO EDGE OF TAPPING SLEEVE.
16. ANY WATER MAIN TAP OR CONNECTION WILL BE BLOCKED ACCORDING TO STANDARD PLAN 6-14.
17. ANY EXCAVATION THAT EXPOSES AN ASBESTOS CEMENT WATER MAIN SHALL BE BEDDED WITH CONTROLLED DENSITY FILL (CDF) PURSUANT TO THE WSDOT SPECIFICATIONS FOR CDF.

NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

TOPOGRAPHIC NOTE:
THE EXISTING TOPOGRAPHIC DATA SHOWN ON THESE DRAWINGS HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, HGP CANNOT ENSURE ITS ACCURACY AND THUS IS NOT RESPONSIBLE FOR THE ACCURACY OF THAT INFORMATION OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

THIS DRAWING DOES NOT REPRESENT A RECORD DOCUMENT, UNLESS CERTIFIED BY HATTON GODAT PANTIER.

ANY ALTERATIONS TO THE DESIGN SHOWN HEREON MUST BE REVIEWED AND APPROVED BY HATTON GODAT PANTIER.

DESIGNED BY: DS
DRAWN BY: MM
CHECKED BY: SDH
DATE: FEB 2013
SCALE: H: V:

STEVEN D. HATTON, STATE OF WASHINGTON, 24193, REGISTERED PROFESSIONAL ENGINEER

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GATEWAY DIVISION 1
PRELIMINARY PLAT
PRELIMINARY UTILITY DETAILS

AGENCY NO.
SHEET: 7 OF 7
INDEX:
JOB: 12-052

Appendix B – Construction BMPs

Preserving Natural Vegetation (BMP C101)

High Visibility Plastic or Metal Fence (BMP C103)

Stake and Wire Fence (BMP C104)

Stabilized Construction Entrance (BMP C105)

Sediment Trap (BMP C240)

Temporary Sediment Pond (BMP C241)

Detention Pond or Vault

Silt Fence (BMP C233)

Vegetated Strip (BMP C234)

Straw Wattles (BMP C235)

Sediment Trap (BMP C240)

Detention Pond Or Vault

Temporary and Permanent Seeding (BMP C120)

Mulching (BMP C121)

Plastic Covering (BMP C123)

Surface Roughening (BMP C130)

Dust Control (BMP C140)

Temporary and Permanent Seeding (BMP C120)

Surface Roughening (BMP C130))

Pipe Slope Drains (BMP C204)

Straw Wattles (BMP C235)

BMP C101: Preserving Natural Vegetation

Purpose

The main purpose of preserving natural vegetation is to reduce erosion wherever practicable. Limiting site disturbance is the single most effective method for reducing erosion, and native vegetation and soils are the most efficient means for managing stormwater quantity and quality. For example, conifers can hold up to about 50 percent of all rain that falls during a storm. Up to 20-30 percent of this rain may never reach the ground but is taken up by the tree or evaporates. Another benefit is that the rain held in the tree can be released slowly to the ground after the storm.

Conditions of Use

- Natural vegetation should be preserved on steep slopes, near perennial and intermittent watercourses or swales, and on building sites in wooded areas.
- As required by Lacey Municipal Code 14.32 Tree and Vegetation Protection and Preservation, and other potential requirements or recommendations pertaining to natural vegetation and trees.

Design and Installation Specifications

Natural vegetation can be preserved in natural clusters or as individual trees, shrubs and vines.

The preservation of individual plants is more difficult because heavy equipment is generally used to remove unwanted vegetation. The points to remember when attempting to save individual plants are:

- Tree preservation and protection on site shall meet the requirements of Lacey Municipal Code 14.32 Tree and Vegetation Protection and Preservation, and shall follow the recommendations of the City of Lacey Tree Protection Professional and approved tree protection plan.
- Tree protection fencing shall be placed around the trees that are to be saved. Tree protection fencing shall be inspected by the City of Lacey Tree Protection Professional prior to land clearing activities.
- Consider the location, species, size, age, vigor, and the work involved.
- Fence or clearly mark areas around trees that are to be saved. It is required to keep ground disturbance away from the trees at least as far out as the dripline or distance shown on approved clearing and grading plans, or per the City of Lacey Tree Protection Professional.

Plants need protection from three kinds of injuries:

- *Construction Equipment* - This injury can be above or below the ground level. Damage results from scarring, cutting of roots, and compaction of the soil. Placing a fenced buffer zone around plants to be saved prior to construction can prevent construction equipment injuries.

- *Grade Changes* - Changing the natural ground level will alter grades, which affects the plant's ability to obtain the necessary air, water, and minerals. Minor fills usually do not cause problems although sensitivity between species does vary and should be checked. Trees can tolerate fill of 6 inches or less. For shrubs and other plants, the fill should be less.

  When there are major changes in grade, it may become necessary to supply air to the roots of plants. This can be done by placing a layer of gravel and a tile system over the roots before the fill is made. A tile system protects a tree from a raised grade. The tile system should be laid out on the original grade leading from a dry well around the tree trunk. The system should then be covered with small stones to allow air to circulate over the root area.

  Lowering the natural ground level can seriously damage trees and shrubs. The highest percentage of the plant roots are in the upper 12 inches of the soil and cuts of only 2-3 inches can cause serious injury. To protect the roots it may be necessary to terrace the immediate area around the plants to be saved. If roots are exposed, construction of retaining walls may be needed to keep the soil in place. Plants can also be preserved by leaving them on an undisturbed, gently sloping mound. To increase the chances for survival, it is best to limit grade changes and other soil disturbances to areas outside the dripline of the plant.

- *Excavations* - Protect trees and other plants when excavating for drainfields, power, water, and sewer lines. Where possible, the trenches should be routed around trees and large shrubs. When this is not possible, it is best to tunnel under them. This can be done with hand tools or with power augers. If it is not possible to route the trench around plants to be saved, then the following should be observed:

  Cut as few roots as possible. When you have to cut, cut clean. Paint cut root ends with a wood dressing like asphalt base paint.

  Backfill the trench as soon as possible.

  Tunnel beneath root systems as close to the center of the main trunk to preserve most of the important feeder roots.

Some problems that can be encountered with a few specific trees are:

- Maple, Dogwood, Red alder, Western hemlock, Western red cedar, and Douglas fir do not readily adjust to changes in environment and special care should be taken to protect these trees.

- The windthrow hazard of Pacific silver fir and madrona is high, while that of Western hemlock is moderate. The danger of windthrow increases where dense stands have been thinned. Other species (unless they are on shallow, wet soils less than 20 inches deep) have a low windthrow hazard.
- Cottonwoods, maples, and willows have water-seeking roots. These can cause trouble in sewer lines and infiltration fields. On the other hand, they thrive in high moisture conditions where other trees would not.
- Thinning operations in pure or mixed stands of Grand fir, Pacific silver fir, Noble fir, Sitka spruce, Western red cedar, Western hemlock, Pacific dogwood, and Red alder can cause serious disease problems. Disease can become established through damaged limbs, trunks, roots, and freshly cut stumps. Diseased and weakened trees are also susceptible to insect attack.

Maintenance Standards

- Inspect flagged and/or fenced areas regularly to make sure flagging or fencing has not been removed or damaged. If the flagging or fencing has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.
- If tree roots have been exposed or injured, "prune" cleanly with an appropriate pruning saw or lopers directly above the damaged roots and recover with native soils. Treatment of sap flowing trees (fir, hemlock, pine, soft maples) is not advised as sap forms a natural healing barrier.

BMP C102: Buffer Zones

Purpose

An undisturbed area or strip of natural vegetation or an established suitable planting that will provide a living filter to reduce soil erosion and runoff velocities.

Conditions of Use

Natural buffer zones are used along streams, wetlands and other bodies of water that need protection from erosion and sedimentation. Vegetative buffer zones can be used to protect natural swales and can be incorporated into the natural landscaping of an area.

Critical-areas buffer zones should not be used as sediment treatment areas. These areas shall remain completely undisturbed. The City of Lacey may expand the buffer widths temporarily to allow the use of the expanded area for removal of sediment, per Lacey Municipal Code Title 14.

Design and Installation Specifications

- Preserving natural vegetation or plantings in clusters, blocks, or strips is generally the easiest and most successful method.
- Leave all unstable steep slopes in natural vegetation.
- Mark clearing limits and keep all equipment and construction debris out of the natural areas. Steel construction fencing is the most effective method in protecting sensitive areas and buffers. Alternatively, wire-backed silt fence on steel posts is marginally effective. Flagging alone is typically not effective.
- Keep all excavations outside the dripline of trees and shrubs.
- Do not push debris or extra soil into the buffer zone area because it will cause damage from burying and smothering.
- Vegetative buffer zones for streams, lakes or other waterways shall be established by the local permitting authority or other state or federal permits or approvals.

Maintenance Standards

- Inspect the area frequently to make sure flagging remains in place and the area remains undisturbed.

BMP C103: High Visibility Plastic or Metal Fence

Purpose

Fencing is intended to: (1) restrict clearing to approved limits; (2) prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed; (3) limit construction traffic to designated construction entrances or roads; and, (4) protect areas where marking with survey tape may not provide adequate protection.

Conditions of Use

To establish clearing limits, plastic or metal fence may be used (subject to approval by the City of Lacey):

- At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared.
- As necessary to control vehicle access to and on the site.

Design and Installation Specifications

- High visibility plastic fence shall be composed of a high-density polyethylene material and shall be at least four feet in height. Posts for the fencing shall be steel or wood and placed every 6 feet on center (maximum) or as needed to ensure rigidity. The fencing shall be fastened to the post every six inches with a polyethylene tie. On long continuous lengths of fencing, a tension wire or rope shall be used as a top stringer to prevent sagging between posts. The fence color shall be high visibility orange. The fence tensile strength shall be 360 lbs./ft. using the ASTM D4595 testing method.
- Metal fences shall be designed and installed according to the manufacturer's specifications.
- Metal fences shall be at least 3 feet high and must be highly visible.
- Fences shall not be wired or stapled to trees.

Maintenance Standards

- If the fence has been damaged or its visibility reduced, it shall be repaired or replaced immediately and visibility restored.

BMP C104: Stake and Wire Fence

Purpose

Fencing is intended to: (1) restrict clearing to approved limits; (2) prevent disturbance of sensitive areas, their buffers, and other areas required to be left undisturbed; (3) limit construction traffic to designated construction entrances or roads; and, (4) protect any areas where marking with survey tape may not provide adequate protection.

Conditions of Use

To establish clearing limits, stake or wire fence may be used:

- At the boundary of sensitive areas, their buffers, and other areas required to be left uncleared.
- As necessary, to control vehicle access to and on the site.

Design and Installation Specifications

- See Figure 4.1 for details.
- More substantial fencing shall be used if the fence does not prevent encroachment into those areas that are not to be disturbed.

Maintenance Standards

- If the fence has been damaged or its visibility reduced, it shall be repaired or replaced immediately and visibility restored.

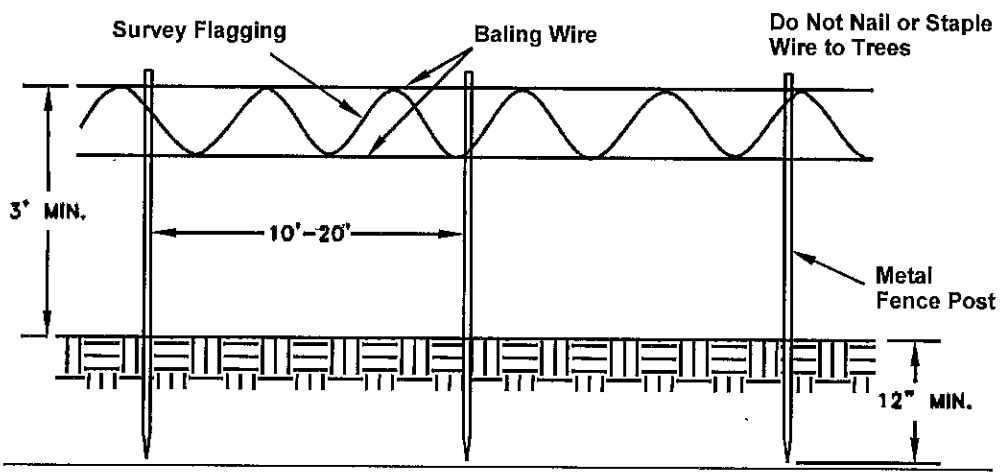


Figure 4.1 – Stake and Wire Fence

BMP C105: Stabilized Construction Entrance

Purpose

Construction entrances are stabilized to reduce the amount of sediment transported onto paved roads by vehicles or equipment by constructing a stabilized pad of quarry spalls at entrances to construction sites.

Conditions of Use

Construction entrances shall be stabilized wherever traffic will be leaving a construction site and traveling on paved roads or other paved areas within 1,000 feet of the site.

On large commercial, highway, and road projects, the designer shall include enough extra materials (such as through a force account) in the contract to allow for additional stabilized entrances not shown in the initial Construction SWPPP. It is difficult to determine exactly where access to these projects will take place; additional materials will enable the contractor to install them where needed.

Design and Installation Specifications

- See Figure 4.2 for details.
- A separation geotextile shall be placed under the spalls to prevent fine sediment from pumping up into the rock pad. The geotextile shall meet the following standards:

Grab Tensile Strength (ASTM D4751)	200 psi min.
Grab Tensile Elongation (ASTM D4632)	30% max.
Mullen Burst Strength (ASTM D3786-80a)	400 psi min.
AOS (ASTM D4751)	20-45 (U.S. standard sieve size)

- Consider early installation of the first lift of asphalt in areas that will be paved; this can be used as a stabilized entrance. Also consider the installation of excess concrete as a stabilized entrance. During large concrete pours, excess concrete is often available for this purpose.
- Fencing (see BMPs C103 and C104) shall be installed as necessary to restrict traffic to the construction entrance.
- Whenever possible, the entrance shall be constructed on a firm, compacted subgrade. This can substantially increase the effectiveness of the pad and reduce the need for maintenance.

Maintenance Standards

- Quarry spalls shall be added if the pad is no longer in accordance with the specifications.
- If the entrance is not preventing sediment from being tracked onto pavement, then alternative measures to keep the streets free of sediment shall be used. This may include street sweeping, an increase in the dimensions of the entrance, or the installation of a wheel wash.
- Any sediment that is tracked onto pavement shall be removed by shoveling or street sweeping. The sediment collected by sweeping

shall be removed or stabilized on site. The pavement shall not be cleaned by washing down the street, except when sweeping is ineffective and there is a threat to public safety. If it is necessary to wash the streets, the construction of a small sump shall be considered. The sediment would then be washed into the sump where it can be controlled.

- Any quarry spalls that are loosened from the pad, which end up on the roadway shall be removed immediately.
- If vehicles are entering or exiting the site at points other than the construction entrance(s), fencing (see BMPs C103 and C104) shall be installed to control traffic.
- Upon project completion and site stabilization, all construction accesses intended as permanent access for maintenance shall be permanently stabilized

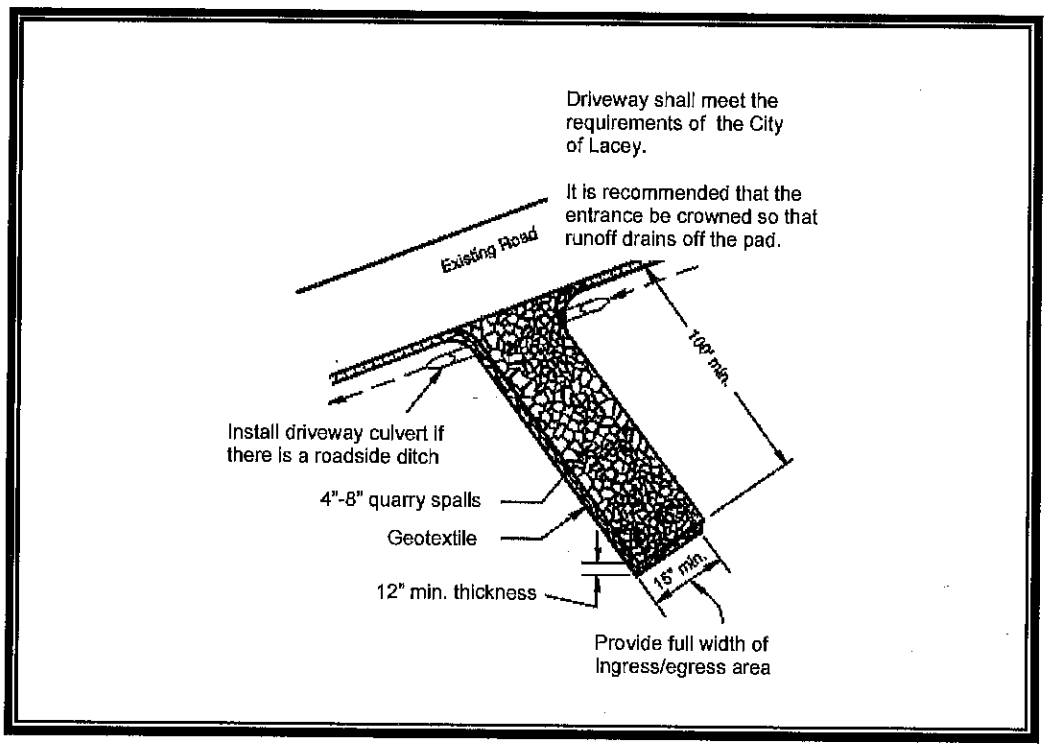


Figure 4.2 - Stabilized Construction Entrance

BMP C120: Temporary and Permanent Seeding

Purpose

Seeding is intended to reduce erosion by stabilizing exposed soils. A well-established vegetative cover is one of the most effective methods of reducing erosion.

Conditions of Use

- Seeding may be used throughout the project on disturbed areas that have reached final grade or that will remain unworked for more than 30 days.
- Channels that will be vegetated should be installed before major earthwork and hydroseeded with a Bonded Fiber Matrix. The vegetation should be well established (i.e., 75 percent cover) before water is allowed to flow in the ditch. With channels that will have high flows, erosion control blankets should be installed over the hydroseed. If vegetation cannot be established from seed before water is allowed in the ditch, sod should be installed in the bottom of the ditch over hydromulch and blankets.
- Retention/detention ponds should be seeded as required.
- Mulch is required at all times because it protects seeds from heat, moisture loss, and transport due to runoff.
- All disturbed areas shall be reviewed in late August to early September and all seeding should be completed by the end of September. Otherwise, vegetation will not establish itself enough to provide more than average protection.
- At final site stabilization, all disturbed areas not otherwise vegetated or stabilized shall be seeded and mulched. Final stabilization means the completion of all soil disturbing activities at the site and the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures (such as pavement, riprap, gabions or geotextiles) which will prevent erosion.

Design and Installation Specifications

- The optimum seeding windows for western Washington are April 1 through June 30 and September 1 through October 1. Seeding that occurs between July 1 and August 30 will require irrigation until 75 percent grass cover is established. Seeding that occurs between October 1 and March 30 will require a mulch or plastic cover until 75 percent grass cover is established.
- To prevent seed from being washed away, confirm that all required surface water control measures have been installed.
- The seedbed should be firm and rough. All soil should be roughened no matter what the slope. If compaction is required for engineering purposes, slopes must be track walked before seeding. Backblading or smoothing of slopes greater than 4:1 is not allowed if they are to be seeded.

- New and more effective restoration-based landscape practices rely on deeper incorporation than that provided by a simple single-pass rototilling treatment. Wherever practical the subgrade should be initially ripped to improve long-term permeability, infiltration, and water inflow qualities. At a minimum, permanent areas shall use soil amendments to achieve organic matter and permeability performance defined in engineered soil/landscape systems. For systems that are deeper than 8 inches the rototilling process should be done in multiple lifts, or the prepared soil system shall be prepared properly and then placed to achieve the specified depth.
- Organic matter is the most appropriate form of "fertilizer" because it provides nutrients (including nitrogen, phosphorus, and potassium) in the least water-soluble form. A natural system typically releases 2-10 percent of its nutrients annually. Chemical fertilizers have since been formulated to simulate what organic matter does naturally.
- In general, 10-4-6 N-P-K (nitrogen-phosphorus-potassium) fertilizer can be used at a rate of 90 pounds per acre. Slow-release fertilizers should always be used because they are more efficient and have fewer environmental impacts. It is recommended that areas being seeded for final landscaping conduct soil tests to determine the exact type and quantity of fertilizer needed. This will prevent the over-application of fertilizer. Fertilizer should not be added to the hydromulch machine and agitated more than 20 minutes before it is to be used. If agitated too much, the slow-release coating is destroyed.
- There are numerous products available on the market that take the place of chemical fertilizers. These include several with seaweed extracts that are beneficial to soil microbes and organisms. If 100 percent cottonseed meal is used as the mulch in hydroseed, chemical fertilizer may not be necessary. Cottonseed meal is a good source of long-term, slow-release, available nitrogen.
- Hydroseed applications shall include a minimum of 1,500 pounds per acre of mulch with 3 percent tackifier. Mulch may be made up of 100 percent: cottonseed meal; fibers made of wood, recycled cellulose, hemp, and kenaf; compost; or blends of these. Tackifier shall be plant-based, such as guar or alpha plantago, or chemical-based such as polyacrylamide or polymers. Any mulch or tackifier product used shall be installed per manufacturer's instructions. Generally, mulches come in 40-50 pound bags. Seed and fertilizer are added at time of application.
- Mulch is always required for seeding. Mulch can be applied on top of the seed or simultaneously by hydroseeding.
- On steep slopes, Bonded Fiber Matrix (BFM) or Mechanically Bonded Fiber Matrix (MBFM) products should be used. BFM/MBFM products are applied at a minimum rate of 3,000 pounds per acre of

mulch with approximately 10 percent tackifier. Application is made so that a minimum of 95 percent soil coverage is achieved. Numerous products are available commercially and should be installed per manufacturer's instructions. Most products require 24-36 hours to cure before a rainfall and cannot be installed on wet or saturated soils. Generally, these products come in 40-50 pound bags and include all necessary ingredients except for seed and fertilizer.

In most cases, the shear strength of blankets is not a factor when used on slopes, only when used in channels. BFMs and MBFMs are good alternatives to blankets in most situations where vegetation establishment is the goal.

- When installing seed via hydroseeding operations, only about 1/3 of the seed actually ends up in contact with the soil surface. This reduces the ability to establish a good stand of grass quickly. One way to overcome this is to increase seed quantities by up to 50 percent.
- Vegetation establishment can also be enhanced by dividing the hydromulch operation into two phases:
  1. Phase 1- Install all seed and fertilizer with 25-30 percent mulch and tackifier onto soil in the first lift;
  2. Phase 2- Install the rest of the mulch and tackifier over the first lift.

An alternative is to install the mulch, seed, fertilizer, and tackifier in one lift. Then, spread or blow straw over the top of the hydromulch at a rate of about 800-1000 pounds per acre. Hold straw in place with a standard tackifier. Both of these approaches will increase cost moderately but will greatly improve and enhance vegetative establishment. The increased cost may be offset by the reduced need for:

1. Irrigation
2. Reapplication of mulch
3. Repair of failed slope surfaces

This technique works with standard hydromulch (1,500 pounds per acre minimum) and BFM/MBFMs (3,000 pounds per acre minimum).

- Areas to be permanently landscaped shall provide a healthy topsoil that reduces the need for fertilizers, improves overall topsoil quality, provides for better vegetal health and vitality, improves hydrologic characteristics, and reduces the need for irrigation. This can be accomplished in a number of ways:

  Recent research has shown that the best method to improve till soils is to amend these soils with compost. The optimum mixture is approximately two parts soil to one part compost. This equates to 4 inches of compost mixed to a depth of 12 inches in till soils. Increasing

the concentration of compost beyond this level can have negative effects on vegetal health, while decreasing the concentrations can reduce the benefits of amended soils. Please note: The compost should meet specifications for Grade A quality compost in Ecology Publication 94-038.

Other soils, such as gravel or cobble outwash soils, may require different approaches. Organics and fines easily migrate through the loose structure of these soils. Therefore, the importation of at least 6 inches of quality topsoil, underlain by some type of filter fabric to prevent the migration of fines, may be more appropriate for these soils.

Areas that already have good topsoil, such as undisturbed areas, do not require soil amendments.

- Areas that will be seeded only and not landscaped may need compost or meal-based mulch included in the hydroseed in order to establish vegetation. Native topsoil should be re-installed on the disturbed soil surface before application.
- Seed that is installed as a temporary measure may be installed by hand if it will be covered by straw, mulch, or topsoil. Seed that is installed as a permanent measure may be installed by hand on small areas (usually less than 1 acre) that will be covered with mulch, topsoil, or erosion blankets. The seed mixes listed below include recommended mixes for both temporary and permanent seeding. These mixes, with the exception of the wetland mix, shall be applied at a rate of 120 pounds per acre. This rate can be reduced if soil amendments or slow-release fertilizers are used. Local suppliers or the local conservation district should be consulted for their recommendations because the appropriate mix depends on a variety of factors, including location, exposure, soil type, slope, and expected foot traffic. Alternative seed mixes approved by the local authority may be used.

  Table 4.1 represents the standard mix for those areas where just a temporary vegetative cover is required.

Table 4.1
Temporary Erosion Control Seed Mix

	% Weight	% Purity	% Germination
Chewings or annual blue grass *Festuca rubra var. commutata* or *Poa anna*	40	98	90
Perennial rye - *Lolium perenne*	50	98	90
Redtop or colonial bentgrass *Agrostis alba* or *Agrostis tenuis*	5	92	85
White dutch clover *Trifolium repens*	5	98	90

Table 4.2 provides just one recommended possibility for landscaping seed. Also recommended for soil-amended areas, or where low water and low pesticide use are being emphasized, is the ProTime 705 PDX Ecology Seed Mixture, manufactured by ProTime Lawn Seed. (http://www.protimelawnseed.com/pt_705.html). It produces a green cover without supplemental irrigation and normally requires no fertilizer after establishment.

Table 4.2
Landscaping Seed Mix

	% Weight	% Purity	% Germination
Perennial rye blend *Lolium perenne*	70	98	90
Chewings and red fescue blend *Festuca rubra var. commutata* or *Festuca rubra*	30	98	90

This turf seed mix in Table 4.3 is for dry situations where there is no need for much water. The advantage is that this mix requires very little maintenance.

Table 4.3
Low-Growing Turf Seed Mix

	% Weight	% Purity	% Germination
Dwarf tall fescue (several varieties) *Festuca arundinacea var.*	45	98	90
Dwarf perennial rye (Barclay) *Lolium perenne var. barclay*	30	98	90
Red fescue *Festuca rubra*	20	98	90
Colonial bentgrass *Agrostis tenuis*	5	98	90

Table 4.4 presents a mix recommended for bioswales and other intermittently wet areas.

Table 4.4
Bioswale Seed Mix*

	% Weight	% Purity	% Germination
Tall or meadow fescue *Festuca arundinacea* or *Festuca elatior*	75-80	98	90
Seaside/Creeping bentgrass *Agrostis palustris*	10-15	92	85
Redtop bentgrass *Agrostis alba* or *Agrostis gigantea*	5-10	90	80

* *Modified Briargreen, Inc. Hydroseeding Guide Wetlands Seed Mix*

The seed mix shown in Table 4.5 is a recommended low-growing, relatively non-invasive seed mix appropriate for very wet areas that are not regulated wetlands. Other mixes may be appropriate, depending on the soil type and hydrology of the area. Recent research suggests that bentgrass (agrostis sp.) should be emphasized in wet-area seed mixes. Apply this mixture at a rate of 60 pounds per acre.

Table 4.5 Wet Area Seed Mix*			
	% Weight	% Purity	% Germination
Tall or meadow fescue *Festuca arundinacea* or *Festuca elatior*	60-70	98	90
Seaside/Creeping bentgrass *Agrostis palustris*	10-15	98	85
Meadow foxtail *Alepocurus pratensis*	10-15	90	80
Alsike clover *Trifolium hybridum*	1-6	98	90
Redtop bentgrass *Agrostis alba*	1-6	92	85

* *Modified Briargreen, Inc. Hydroseeding Guide Wetlands Seed Mix*

The meadow seed mix in Table 4.6 is recommended for areas that will be maintained infrequently or not at all and where colonization by native plants is desirable. Likely applications include rural road and utility right-of-way. Seeding should take place in September or very early October in order to obtain adequate establishment prior to the winter months. The appropriateness of clover in the mix may need to be considered, as this can be a fairly invasive species. If the soil is amended, the addition of clover may not be necessary.

Table 4.6 Meadow Seed Mix			
	% Weight	% Purity	% Germination
Redtop or Oregon bentgrass *Agrostis alba* or *Agrostis oregonensis*	20	92	85
Red fescue *Festuca rubra*	70	98	90
White dutch clover *Trifolium repens*	10	98	90

Maintenance Standards

- Any seeded areas that fail to establish at least 80 percent cover (100 percent cover for areas that receive sheet or concentrated flows) shall be reseeded. If reseeding is ineffective, an alternate method, such as sodding, mulching, or nets/blankets, shall be used. If winter weather prevents adequate grass growth, this time limit may be relaxed at the discretion of the local authority when sensitive areas would otherwise be protected.
- After adequate cover is achieved, any areas that experience erosion shall be reseeded and protected by mulch. If the erosion problem is drainage related, the problem shall be fixed and the eroded area reseeded and protected by mulch.
- Seeded areas shall be supplied with adequate moisture, but not watered to the extent that it causes runoff.

BMP C121: Mulching

Purpose

The purpose of mulching soils is to provide immediate temporary protection from erosion. Mulch also enhances plant establishment by conserving moisture, holding fertilizer, seed, and topsoil in place, and moderating soil temperatures. There is an enormous variety of mulches that can be used. Only the most common types are discussed in this section.

Conditions of Use

As a temporary cover measure, mulch should be used:

- On disturbed areas that require cover measures for less than 30 days.
- As a cover for seed during the wet season and during the hot summer months.
- During the wet season on slopes steeper than 3H:1V with more than 10 feet of vertical relief.
- Mulch may be applied at any time of the year and must be refreshed periodically.

Design and Installation Specifications

For mulch materials, application rates, and specifications, see Table 4.7. Note: Thicknesses may be increased for disturbed areas in or near sensitive areas or other areas highly susceptible to erosion.

Mulch used within the ordinary high-water mark of surface waters should be selected to minimize potential flotation of organic matter. Composted organic materials have higher specific gravities (densities) than straw, wood, or chipped material.

Maintenance Standards

- The thickness of the cover must be maintained.
- Any areas that experience erosion shall be remulched and/or protected with a net or blanket. If the erosion problem is drainage related, then the problem shall be fixed and the eroded area remulched.

Table 4.7
Mulch Standards and Guidelines

Mulch Material	Quality Standards	Application Rates	Remarks
Straw	Air-dried; free from undesirable seed and coarse material.	2"-3" thick; 5 bales per 1000 sf or 2-3 tons per acre	Cost-effective protection when applied with adequate thickness. Hand-application generally requires greater thickness than blown straw. The thickness of straw may be reduced by half when used in conjunction with seeding. In windy areas straw must be held in place hy crimping, using a tackifier, or covering with netting. Blown straw always has to be held in place with a tackifier as even light winds will blow it away. Straw, however, has several deficiencies that should be considered when selecting mulch materials. It often introduces and/or encourages the propagation of weed species and it has no significant long-term benefits. Straw should be used only if mulches with long-term benefits are unavailable locally. It should also not be used within the ordinary high-water elevation of surface waters (due to flotation).
Hydromulch	No growth inhibiting factors.	Approx. 25-30 lbs per 1000 sf or 1500 - 2000 lbs per acre	Shall be applied with hydromulcher. Shall not be used without seed and tackifier unless the application rate is at least doubled. Fibers longer than about ¾-1 inch clog hydromulch equipment. Fibers should be kept to less than ¾ inch.
Composted Mulch and Compost	No visible water or dust during handling. Must be purchased from supplier with Solid Waste Handling Permit (unless exempt).	2" thick min.; approx. 100 tons per acre (approx. 800 lbs per yard)	More effective control can be obtained by increasing thickness to 3". Excellent mulch for protecting final grades until landscaping because it can be directly seeded or tilled into soil as an amendment. Composted mulch has a coarser size gradation than compost. It is more stable and practical to use in wet areas and during rainy weather conditions.
Chipped Site Vegetation	Average size shall be several inches. Gradations from fines to 6 inches in length for texture, variation, and interlocking properties.	2" minimum thickness	This is a cost-effective way to dispose of dehris from clearing and grubbing, and it eliminates the problems associated with burning. Generally, it should not be used on slopes above approx. 10% because of its tendency to be transported hy runoff. It is not recommended within 200 feet of surface waters. If seeding is expected shortly after mulch, the decomposition of the chipped vegetation may tie up nutrients important to grass establishment.
Wood-based Mulch	No visible water or dust during handling. Must be purchased from a supplier with a Solid Waste Handling Permit or one exempt from solid waste regulations.	2" thick; approx. 100 tons per acre (approx. 800 lbs. per cubic yard)	This material is often called "hog or hogged fuel." The use of mulch ultimately improves the organic matter in the soil. Special cantion is advised regarding the source and composition of wood-based mulches. Its preparation typically does not provide any weed seed control, so evidence of residual vegetation in its composition or known inclusion of weed plants or seeds should be monitored and prevented (or minimized).

BMP C123: Plastic Covering

Purpose

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

Conditions of Use

- Plastic covering may be used on disturbed areas that require cover measures for less than 30 days, except as stated below.
- Plastic is particularly useful for protecting cut and fill slopes and stockpiles. Note: The relatively rapid breakdown of most polyethylene sheeting makes it unsuitable for long-term (greater than six months) applications.
- Clear plastic sheeting can be used over newly-seeded areas to create a greenhouse effect and encourage grass growth if the hydroseed was installed too late in the season to establish 75 percent grass cover, or if the wet season started earlier than normal. Clear plastic should not be used for this purpose during the summer months because the resulting high temperatures can kill the grass.
- Due to rapid runoff caused by plastic sheeting, this method shall not be used upslope of areas that might be adversely impacted by concentrated runoff. Such areas include steep and/or unstable slopes.
- Whenever plastic is used to protect slopes, water collection measures must be installed at the base of the slope. These measures include plastic-covered berms, channels, and pipes used to convey clean rainwater away from bare soil and disturbed areas. At no time is clean runoff from a plastic covered slope to be mixed with dirty runoff from a project.
- Other uses for plastic include:
  1. Temporary ditch liner;
  2. Pond liner in temporary sediment pond;
  3. Liner for bermed temporary fuel storage area if plastic is not reactive to the type of fuel being stored;
  4. Emergency slope protection during heavy rains; and,
  5. Temporary drainpipe ("elephant trunk") used to direct water.

Design and Installation Specifications

- Plastic slope cover must be installed as follows:
  1. Run plastic up and down slope, not across slope;
  2. Plastic may be installed perpendicular to a slope if the slope length is less than 10 feet;
  3. Minimum of 8-inch overlap at seams;
  4. On long or wide slopes, or slopes subject to wind, all seams should be taped;
  5. Place plastic into a small (12-inch wide by 6-inch deep) slot trench at the top of the slope and backfill with soil to keep water from flowing underneath;
  6. Place sand filled burlap or geotextile bags every 3 to 6 feet along seams and pound a wooden stake through each to hold them in place;
  7. Inspect plastic for rips, tears, and open seams regularly and repair immediately. This prevents high velocity runoff from contacting bare soil which causes extreme erosion;
  8. Sandbags may be lowered into place tied to ropes. However, all sandbags must be staked in place.
- Plastic sheeting shall have a minimum thickness of 0.06 millimeters.
- If erosion at the toe of a slope is likely, a gravel berm, riprap, or other suitable protection shall be installed at the toe of the slope in order to reduce the velocity of runoff.

Maintenance Standards

- Torn sheets must be replaced and open seams repaired.
- If the plastic begins to deteriorate due to ultraviolet radiation, it must be completely removed and replaced.
- When the plastic is no longer needed, it shall be completely removed.
- Dispose of old tires appropriately.

BMP C130: Surface Roughening

Purpose

Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface. Horizontal depressions are created by operating a tiller or other suitable equipment on the contour or by leaving slopes in a roughened condition by not fine grading them.

Conditions of Use

- All slopes steeper than 3:1 and greater than 5 vertical feet require surface roughening.
- Areas with grades steeper than 3:1 should be roughened to a depth of 2 to 4 inches prior to seeding.
- Areas that will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.
- Slopes with a stable rock face do not require roughening.
- Slopes where mowing is planned should not be excessively roughened.

Design and Installation Specifications

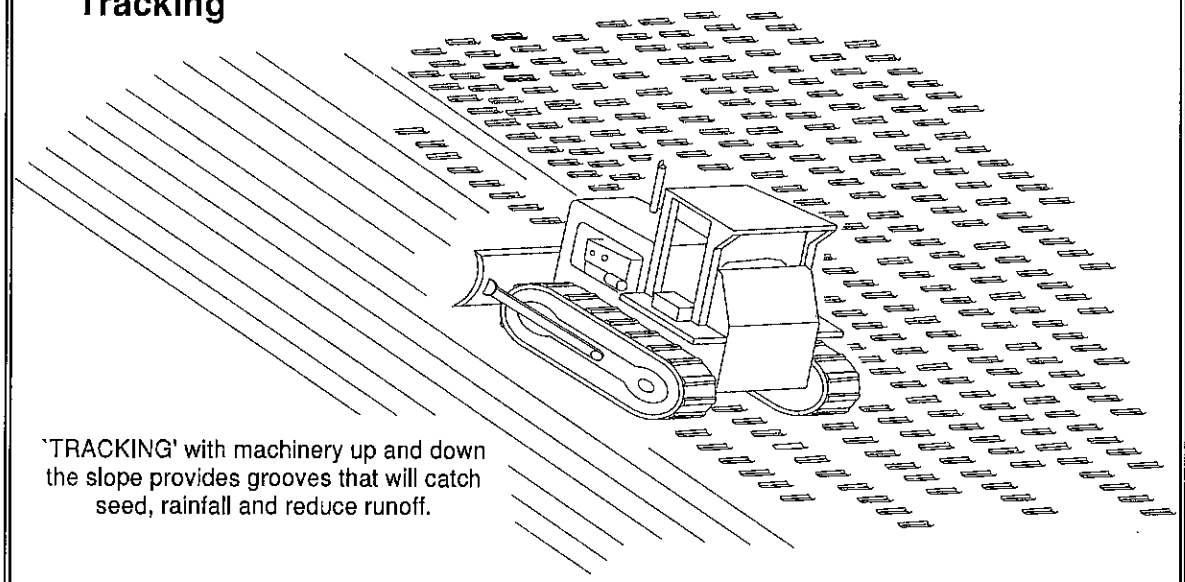
There are different methods for achieving a roughened soil surface on a slope, and the selection of an appropriate method depends upon the type of slope. Roughening methods include stair-step grading, grooving, contour furrows, and tracking. See Figure 4.7 for tracking and contour furrows. Factors to be considered in choosing a method are slope steepness, mowing requirements, and whether the slope is formed by cutting or filling.

- Disturbed areas that will not require mowing may be stair-step graded, grooved, or left rough after filling.
- Stair-step grading is particularly appropriate in soils containing large amounts of soft rock. Each "step" catches material that sloughs from above, and provides a level site where vegetation can become established. Stairs should be wide enough to work with standard earth moving equipment. Stair steps must be on contour or gullies will form on the slope.
- Areas that will be mowed (these areas should have slopes less steep than 3:1) may have small furrows left by disking, harrowing, raking, or seed-planting machinery operated on the contour.
- Graded areas with slopes greater than 3:1 but less than 2:1 should be roughened before seeding. This can be accomplished in a variety of ways, including "track walking," or driving a crawler tractor up and down the slope, leaving a pattern of cleat imprints parallel to slope contours.
- Tracking is done by operating equipment up and down the slope to leave horizontal depressions in the soil.

Maintenance Standards

- Areas that are graded in this manner should be seeded as quickly as possible.
- Regular inspections should be made of the area. If rills appear, they should be re-graded and re-seeded immediately.

Tracking



'TRACKING' with machinery up and down the slope provides grooves that will catch seed, rainfall and reduce runoff.

Contour Furrows

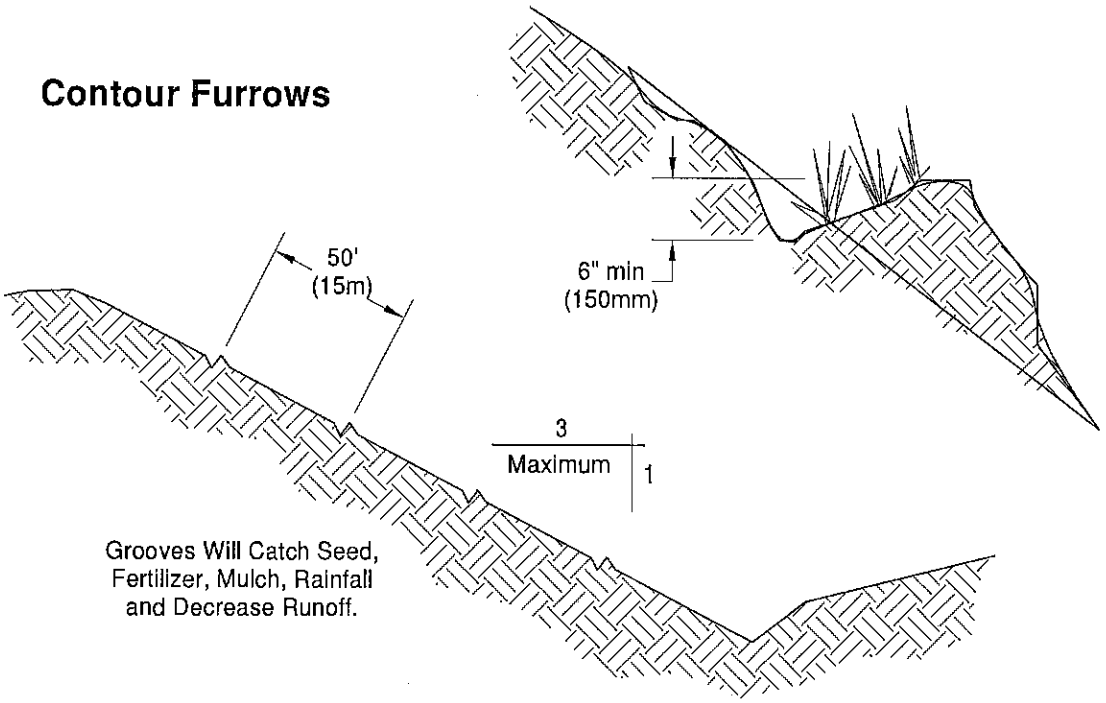


Figure 4.7 – Surface Roughening by Tracking and Contour Furrows

BMP C140: Dust Control

Purpose

Dust control prevents wind transport of dust from disturbed soil surfaces onto roadways, drainage ways, and surface waters.

Conditions of Use

- In areas (including roadways) subject to surface and air movement of dust where on-site and off-site impacts to roadways, drainage ways, or surface waters are likely.

Design and Installation Specifications

- Vegetate or mulch areas that will not receive vehicle traffic. In areas where planting, mulching, or paving is impractical, apply gravel or landscaping rock.
- Limit dust generation by clearing only those areas where immediate activity will take place, leaving the remaining area(s) in the original condition, if stable. Maintain the original ground cover as long as practical.
- Construct natural or artificial windbreaks or windscreens. These may be designed as enclosures for small dust sources.
- Sprinkle the site with water until surface is wet. Repeat as needed. To prevent carryout of mud onto street, refer to Stabilized Construction Entrance (BMP C105).
- Irrigation water can be used for dust control. Irrigation systems should be installed as a first step on sites where dust control is a concern.
- Spray exposed soil areas with a dust palliative, following the manufacturer's instructions and cautions regarding handling and application. Used oil is prohibited from use as a dust suppressant. Local governments may approve other dust palliatives such as calcium chloride or PAM.
- PAM (BMP C126) added to water at a rate of 0.5 lbs. per 1,000 gallons of water per acre and applied from a water truck is more effective than water alone. This is due to the increased infiltration of water into the soil and reduced evaporation. In addition, small soil particles are bonded together and are not as easily transported by wind. Adding PAM may actually reduce the quantity of water needed for dust control, especially in eastern Washington. Since the wholesale cost of PAM is about $ 4.00 per pound, this is an extremely cost-effective dust control method.

Techniques that can be used for unpaved roads and lots include:

- Lower speed limits. High vehicle speed increases the amount of dust stirred up from unpaved roads and lots.
- Upgrade the road surface strength by improving particle size, shape, and mineral types that make up the surface and base materials.

- Add surface gravel to reduce the source of dust emission. Limit the amount of fine particles (those smaller than .075 mm) to 10 to 20 percent.
- Use geotextile fabrics to increase the strength of new roads or roads undergoing reconstruction.
- Encourage the use of alternate, paved routes, if available.
- Restrict use by tracked vehicles and heavy trucks to prevent damage to road surface and base.
- Apply chemical dust suppressants using the admix method, blending the product with the top few inches of surface material. Suppressants may also be applied as surface treatments.
- Pave unpaved permanent roads and other trafficked areas.
- Use vacuum street sweepers.
- Remove mud and other dirt promptly so it does not dry and then turn into dust.
- Limit dust-causing work on windy days.
- Contact your local Air Pollution Control Authority for guidance and training on other dust control measures. Compliance with the local Air Pollution Control Authority constitutes compliance with this BMP.

Maintenance Standards

Respray area as necessary to keep dust to a minimum.

BMP C204: Pipe Slope Drains

Purpose

To use a pipe to convey stormwater anytime water needs to be diverted away from or over bare soil to prevent gullies, channel erosion, and saturation of slide-prone soils.

Conditions of Use

Pipe slope drains should be used

- When a temporary or permanent stormwater conveyance is needed to move the water down a steep slope to avoid erosion (Figure 4.11).
- On highway projects, at bridge ends to collect runoff and pipe it to the base of the fill slopes along bridge approaches. Another use on road projects is to collect runoff from pavement and pipe it away from side slopes. These are useful because there is generally a time lag between having the first lift of asphalt installed and the curbs, gutters, and permanent drainage installed. Used in conjunction with sand bags, or other temporary diversion devices, these will prevent massive amounts of sediment from leaving a project.
- Where water can be collected, channeled with sand bags, Triangular Silt Dikes, berms, or other material, and piped to temporary sediment ponds.

Pipe slope drains can be:

- Connected to new catch basins and used temporarily until all permanent piping is installed;
- Used to drain water collected from aquifers exposed on cut slopes and take it to the base of the slope;
- Used to collect clean runoff from plastic sheeting and direct it away from exposed soil;
- Installed in conjunction with silt fence to drain collected water to a controlled area;
- Used to divert small seasonal streams away from construction. They have been used successfully on culvert replacement and extension jobs. Large flex pipe can be used on larger streams during culvert removal, repair, or replacement; and,
- Connected to existing down spouts and roof drains and used to divert water away from work areas during building renovation, demolition, and construction projects.

There are now several commercially available collectors that are attached to the pipe inlet and help prevent erosion at the inlet.

Design and Installation Specifications

- Size the pipe to convey the flow. The capacity for temporary drains shall be sufficient to handle the peak flow from a 10-year, 24-hour storm event. Permanent pipe slope drains shall be sized for the 25-year, 24-hour peak flow.
- Use care in clearing vegetated slopes for installation.
- Re-establish cover immediately on areas disturbed by installation.
- Use temporary drains on new cut or fill slopes.
- Use diversion dikes or swales to collect water at the top of the slope.
- Ensure that the entrance area is stable and large enough to direct flow into the pipe.
- Piping of water through the berm at the entrance area is a common failure mode.
- The entrance shall consist of a standard flared end section for culverts 12 inches and larger with a minimum 6-inch metal toe plate to prevent runoff from undercutting the pipe inlet. The slope of the entrance shall be at least 3 percent. Sand bags may also be used at pipe entrances as a temporary measure.
- The soil around and under the pipe and entrance section shall be thoroughly compacted to prevent undercutting.
- The flared inlet section shall be securely connected to the slope drain and have watertight connecting bands.
- Slope drain sections shall be securely fastened together, fused or have gasketed watertight fittings, and shall be securely anchored into the soil.
- Thrust blocks should be installed anytime 90 degree bends are utilized. Depending on size of pipe and flow, these can be constructed with sand bags, straw bales staked in place, "t" posts and wire, or ecology blocks.
- Pipe needs to be secured along its full length to prevent movement. This can be done with steel "t" posts and wire. A post is installed on each side of the pipe and the pipe is wired to them. This should be done every 10-20 feet of pipe length or so, depending on the size of the pipe and quantity of water to diverted.
- Interceptor dikes shall be used to direct runoff into a slope drain. The height of the dike shall be at least 1 foot higher at all points than the top of the inlet pipe.
- The area below the outlet must be stabilized with a riprap apron (see BMP C209 Outlet Protection, for the appropriate outlet material).

- If the pipe slope drain is conveying sediment-laden water, direct all flows into the sediment trapping facility.
- Materials specifications for any permanent piped system shall be set by the local government.

Maintenance Standards

- Check inlet and outlet points regularly, especially after storms.
- The inlet should be free of undercutting, and no water should be going around the point of entry. If there are problems, the headwall should be reinforced with compacted earth or sand bags.
- The outlet point should be free of erosion and installed with appropriate outlet protection.
- For permanent installations, inspect pipe periodically for vandalism and physical distress such as slides and wind-throw.
- Normally the pipe slope is so steep that clogging is not a problem with smooth wall pipe, however, debris may become lodged in the pipe.

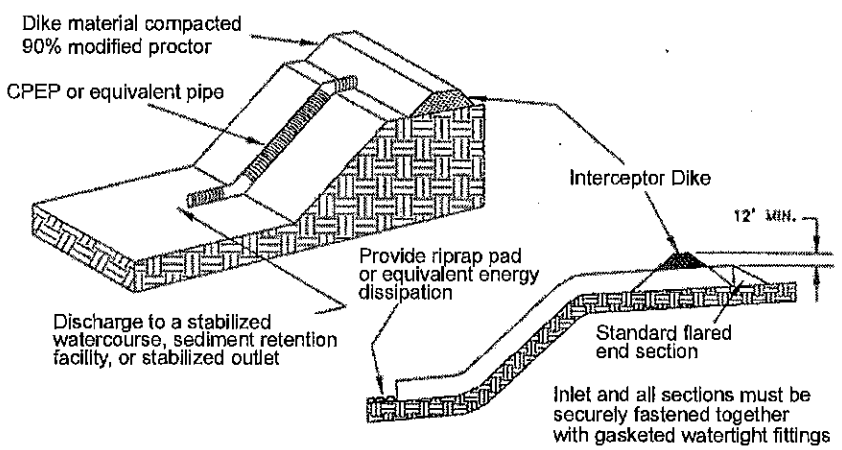


Figure 4.11 - Pipe Slope Drain

BMP C209: Outlet Protection

Purpose

Outlet protection prevents scour at conveyance outlets and minimizes the potential for downstream erosion by reducing the velocity of concentrated stormwater flows.

Conditions of use

Outlet protection is required at the outlets of all ponds, pipes, ditches, or other conveyances, and where runoff is conveyed to a natural or manmade drainage feature such as a stream, wetland, lake, or ditch.

Design and Installation Specifications

- The receiving channel at the outlet of a culvert shall be protected from erosion by rock lining a minimum of 6 feet downstream and extending up the channel sides a minimum of 1–foot above the maximum tailwater elevation or 1-foot above the crown, whichever is higher. For large pipes (more than 18 inches in diameter), the outlet protection lining of the channel is lengthened to four times the diameter of the culvert.
- Standard wingwalls, and tapered outlets and paved channels should also be considered when appropriate for permanent culvert outlet protection. (See WSDOT Hydraulic Manual, available through WSDOT Engineering Publications).
- Organic or synthetic erosion blankets, with or without vegetation, are usually more effective than rock, cheaper, and easier to install. Materials can be chosen using manufacturer product specifications. ASTM test results are available for most products and the designer can choose the correct material for the expected flow.
- With low flows, vegetation (including sod) can be effective.
- The following guidelines shall be used for riprap outlet protection:
  1. If the discharge velocity at the outlet is less than 5 fps (pipe slope less than 1 percent), use 2-inch to 8-inch riprap. Minimum thickness is 1-foot.
  2. For 5 to 10 fps discharge velocity at the outlet (pipe slope less than 3 percent), use 24-inch to 4-foot riprap. Minimum thickness is 2 feet.
  3. For outlets at the base of steep slope pipes (pipe slope greater than 10 percent), an engineered energy dissipater shall be used.
- Filter fabric or erosion control blankets should always be used under riprap to prevent scour and channel erosion.
- New pipe outfalls can provide an opportunity for low-cost fish habitat improvements. For example, an alcove of low-velocity water can be created by constructing the pipe outfall and associated energy dissipater back from the stream edge and digging a channel, over-widened to the upstream side, from the outfall. Overwintering juvenile

and migrating adult salmonids may use the alcove as shelter during high flows. Bank stabilization, bioengineering, and habitat features may be required for disturbed areas. See Volume V for more information on outfall system design.

Maintenance Standards

- Inspect and repair as needed.
- Add rock as needed to maintain the intended function.
- Clean energy dissipater if sediment builds up.

BMP C235: Straw Wattles

Purpose

Straw wattles are temporary erosion and sediment control barriers consisting of straw that is wrapped in biodegradable tubular plastic or similar encasing material. They reduce the velocity and can spread the flow of rill and sheet runoff, and can capture and retain sediment. Straw wattles are typically 8 to 10 inches in diameter and 25 to 30 feet in length. The wattles are placed in shallow trenches and staked along the contour of disturbed or newly constructed slopes. See Figure 4.17 for typical construction details.

Conditions of Use

- Disturbed areas that require immediate erosion protection.
- Exposed soils during the period of short construction delays, or over winter months.
- On slopes requiring stabilization until permanent vegetation can be established.
- Straw wattles are effective for three to six months.
- If conditions are appropriate, wattles can be staked to the ground using willow cuttings for added revegetation.
- Rilling can occur beneath wattles if not properly entrenched and water can pass between wattles if not tightly abutted together.

Design Criteria

- It is critical that wattles are installed perpendicular to the flow direction and parallel to the slope contour.
- Narrow trenches should be dug across the slope on contour to a depth of 3 to 5 inches on clay soils and soils with gradual slopes. On loose soils, steep slopes, and areas with high rainfall, the trenches should be dug to a depth of 5 to 7 inches, or 1/2 to 2/3 of the thickness of the wattle.
- Start building trenches and installing wattles from the base of the slope and work up. Excavated material should be spread evenly along the uphill slope and compacted using hand tamping or other methods.
- Construct trenches at contour intervals of 3 to 30 feet apart depending on the steepness of the slope, soil type, and rainfall. The steeper the slope the closer together the trenches.
- Install the wattles snugly into the trenches and abut tightly end to end. Do not overlap the ends.
- Install stakes at each end of the wattle, and at 4-foot centers along entire length of wattle.
- If required, install pilot holes for the stakes using a straight bar to drive holes through the wattle and into the soil.
- At a minimum, wooden stakes should be approximately 3/4 x 3/4 x 24 inches. Willow cuttings or 3/8-inch rebar can also be used for stakes.

- Stakes should be driven through the middle of the wattle, leaving 2 to 3 inches of the stake protruding above the wattle.

Maintenance Standards

- Wattles may require maintenance to ensure they are in contact with soil and thoroughly entrenched, especially after significant rainfall on steep sandy soils.
- Inspect the slope after significant storms and repair any areas where wattles are not tightly abutted or water has scoured beneath the wattles.

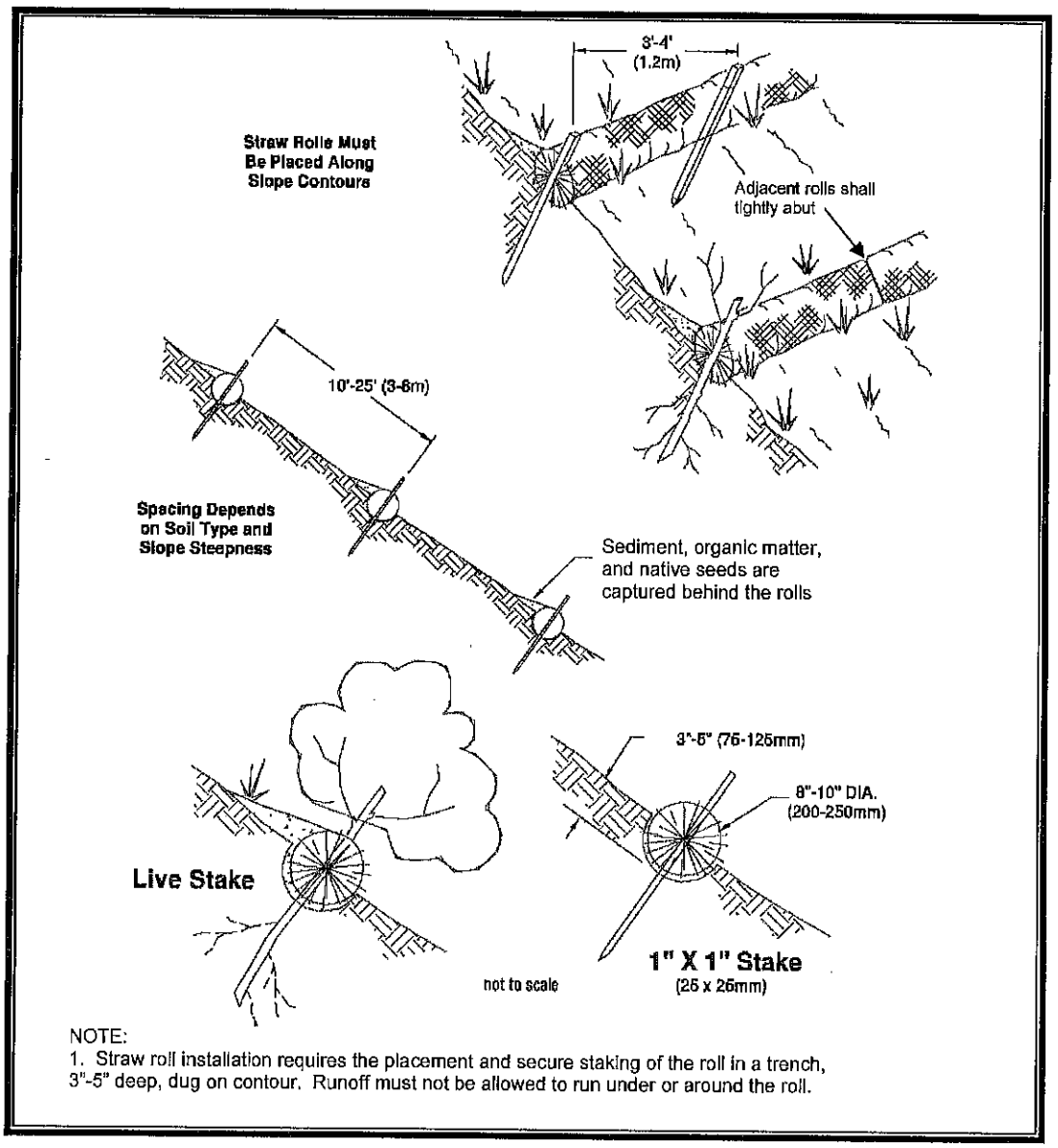


Figure 4.17 – Straw Wattles

BMP C240: Sediment Trap

Purpose

A sediment trap is a small temporary ponding area with a gravel outlet used to collect and store sediment from sites cleared and/or graded during construction. Sediment traps, along with other perimeter controls, shall be installed before any land disturbance takes place in the drainage area.

Conditions of Use:

- Prior to leaving a construction site, stormwater runoff must pass through a sediment pond or trap or other appropriate sediment removal best management practice. Non-engineered sediment traps may be used on-site prior to an engineered sediment trap or sediment pond to provide additional sediment removal capacity.
- It is intended for use on sites where the tributary drainage area is less than 3 acres, with no unusual drainage features, and a projected build-out time of six months or less. The sediment trap is a temporary measure (with a design life of approximately 6 months) and shall be maintained until the site area is permanently protected against erosion by vegetation and/or structures.
- Sediment traps and ponds are only effective in removing sediment down to about the medium silt size fraction. Runoff with sediment of finer grades (fine silt and clay) will pass through untreated, emphasizing the need to control erosion to the maximum extent first.
- Whenever possible, sediment-laden water shall be discharged into onsite, relatively level, vegetated areas (see BMP C234 – Vegetated Strip). This is the only way to effectively remove fine particles from runoff unless chemical treatment or filtration is used. This can be particularly useful after initial treatment in a sediment trap or pond. The areas of release must be evaluated on a site-by-site basis in order to determine appropriate locations for and methods of releasing runoff. Vegetated wetlands shall not be used for this purpose. Frequently, it may be possible to pump water from the collection point at the downhill end of the site to an upslope vegetated area. Pumping shall only augment the treatment system, not replace it, because of the possibility of pump failure or runoff volume in excess of pump capacity.
- All projects that are constructing permanent facilities for runoff quantity control should use the rough-graded or final-graded permanent facilities for traps and ponds. This includes combined facilities and infiltration facilities. When permanent facilities are used as temporary sedimentation facilities, the surface area requirement of a sediment trap or pond must be met. If the surface area requirements are larger than the surface area of the permanent facility, then the trap or pond shall be enlarged to comply with the surface area requirement.

The permanent pond shall also be divided into two cells as required for sediment ponds.

- Either a permanent control structure or the temporary control structure (described in BMP C241, Temporary Sediment Pond) can be used. If a permanent control structure is used, it may be advisable to partially restrict the lower orifice with gravel to increase residence time while still allowing dewatering of the pond. A shut-off valve may be added to the control structure to allow complete retention of stormwater in emergency situations. In this case, an emergency overflow weir must be added.

- A skimmer may be used for the sediment trap outlet if approved by the City of Lacey.

Design and Installation Specifications

- See Figures 4.18 and 4.19 for details.
- If permanent runoff control facilities are part of the project, they should be used for sediment retention.
- To determine the sediment trap geometry, first calculate the design surface area (SA) of the trap, measured at the invert of the weir. Use the following equation:

$$SA = FS(Q_2/V_S)$$

where

Q_2 = Design inflow based on the peak discharge from the developed 2-year runoff event from the contributing drainage area as computed in the hydrologic analysis. The 10-year peak flow shall be used if the project size, expected timing and duration of construction, or downstream conditions warrant a higher level of protection. If no hydrologic analysis is required, the Rational Method may be used.

V_S = The settling velocity of the soil particle of interest. The 0.02 mm (medium silt) particle with an assumed density of 2.65 g/cm^3 has been selected as the particle of interest and has a settling velocity (V_S) of 0.00096 ft/sec.

FS = A safety factor of 2 to account for non-ideal settling.

Therefore, the equation for computing surface area becomes:

$$SA = 2 \times Q_2/0.00096 \text{ or } 2080 \text{ square feet per cfs of inflow}$$

Note: Even if permanent facilities are used, they must still have a surface area that is at least as large as that derived from the above formula. If they do not, the pond must be enlarged.

- To aid in determining sediment depth, all sediment traps shall have a staff gauge with a prominent mark 1-foot above the bottom of the trap.
- Sediment traps may not be feasible on utility projects due to the limited work space or the short-term nature of the work. Portable tanks may be used in place of sediment traps for utility projects.

Maintenance Standards

- Sediment shall be removed from the trap when it reaches 1-foot in depth.
- Any damage to the pond embankments or slopes shall be repaired.

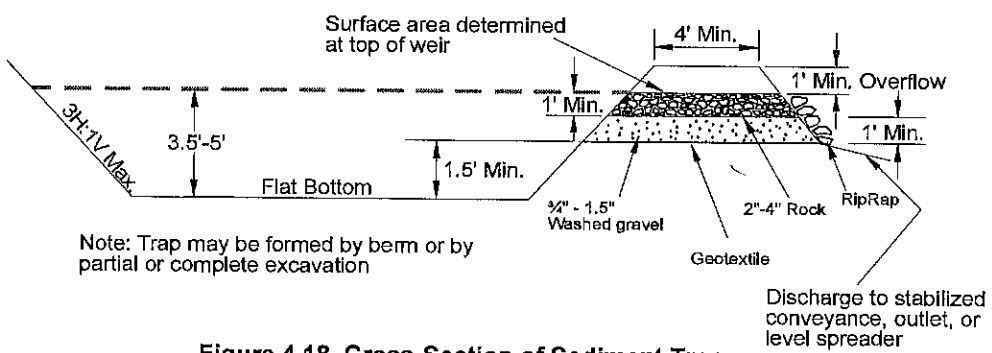


Figure 4.18 Cross-Section of Sediment Trap

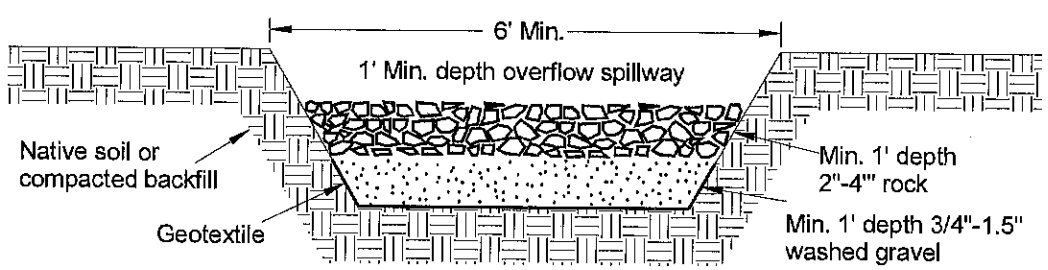


Figure 4.19 Sediment Trap Outlet

BMP C241: Temporary Sediment Pond

Purpose

Sediment ponds remove sediment from runoff originating from disturbed areas of the site. Sediment ponds are typically designed to remove sediment no smaller than medium silt (0.02 mm). Consequently, they usually reduce turbidity only slightly.

Conditions of Use:

- Prior to leaving a construction site, stormwater runoff must pass through a sediment pond or other appropriate sediment removal best management practice.
- A sediment pond shall be used where the contributing drainage area is 3 acres or more. Ponds must be used in conjunction with erosion control practices to reduce the amount of sediment flowing into the basin.

Design and Installation Specifications

- Sediment basins must be installed only on sites where failure of the structure would not result in loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities. Also, sediment traps and ponds are attractive to children and can be very dangerous. Compliance with local ordinances regarding health and safety must be addressed. If fencing of the pond is required, the type of fence and its location shall be shown on the ESC plan.
- Structures having a maximum storage capacity at the top of the dam of 10 acre-ft (435,600 ft^3) or more are subject to the Washington Dam Safety Regulations (Chapter 173-175 WAC).
- See Figure 4.20, Figure 4.21, and Figure 4.22 for details.
- If permanent runoff control facilities are part of the project, they should be used for sediment retention. The surface area requirements of the sediment basin must be met. This may require enlarging the permanent basin to comply with the surface area requirements. If a permanent control structure is used, it may be advisable to partially restrict the lower orifice with gravel to increase residence time while still allowing dewatering of the basin.
- Use of infiltration facilities for sedimentation basins during construction tends to clog the soils and reduce their capacity to infiltrate. If infiltration facilities are to be used, the sides and bottom of the facility must only be rough excavated to a minimum of 2 feet above final grade. Final grading of the infiltration facility shall occur only when all contributing drainage areas are fully stabilized. The infiltration pretreatment facility should be fully constructed and used with the sedimentation basin to help prevent clogging.

- Determining Pond Geometry

  Obtain the discharge from the hydrologic calculations of the peak flow for the 2-year runoff event (Q_2). The 10-year peak flow shall be used if the project size, expected timing and duration of construction, or downstream conditions warrant a higher level of protection. If no hydrologic analysis is required, the Rational Method may be used.

  Determine the required surface area at the top of the riser pipe with the equation:

  $$SA = 2 \times Q_2/0.00096 \text{ or } 2080 \text{ square feet per cfs of inflow}$$

  See BMP C240 for more information on the derivation of the surface area calculation.

  The basic geometry of the pond can now be determined using the following design criteria:

- Required surface area SA (from Step 2 above) at top of riser.
- Minimum 3.5-foot depth from top of riser to bottom of pond.
- Maximum 3:1 interior side slopes and maximum 2:1 exterior slopes. The interior slopes can be increased to a maximum of 2:1 if fencing is provided at or above the maximum water surface.
- One foot of freeboard between the top of the riser and the crest of the emergency spillway.
- Flat bottom.
- Minimum 1-foot deep spillway.
- Length-to-width ratio between 3:1 and 6:1.
- Sizing of Discharge Mechanisms.

  The outlet for the basin consists of a combination of principal and emergency spillways. These outlets must pass the peak runoff expected from the contributing drainage area for a 100-year storm. If, due to site conditions and basin geometry, a separate emergency spillway is not feasible, the principal spillway must pass the entire peak runoff expected from the 100-year storm. However, an attempt to provide a separate emergency spillway should always be made. The runoff calculations should be based on the site conditions during construction. The flow through the dewatering orifice cannot be utilized when calculating the 100-year storm elevation because of its potential to become clogged; therefore, available spillway storage must begin at the principal spillway riser crest.

The principal spillway designed by the procedures contained in this standard will result in some reduction in the peak rate of runoff. However, the riser outlet design will not adequately control the basin discharge to the predevelopment discharge limitations as stated in Core Requirement #7: Flow Control. However, if the basin for a permanent stormwater detention pond is used for a temporary sedimentation basin, the control structure for the permanent pond can be used to maintain predevelopment discharge limitations. The size of the basin, the expected life of the construction project, the anticipated downstream effects and the anticipated weather conditions during construction, should be considered to determine the need of additional discharge control. See Figure 4.23 for riser inflow curves.

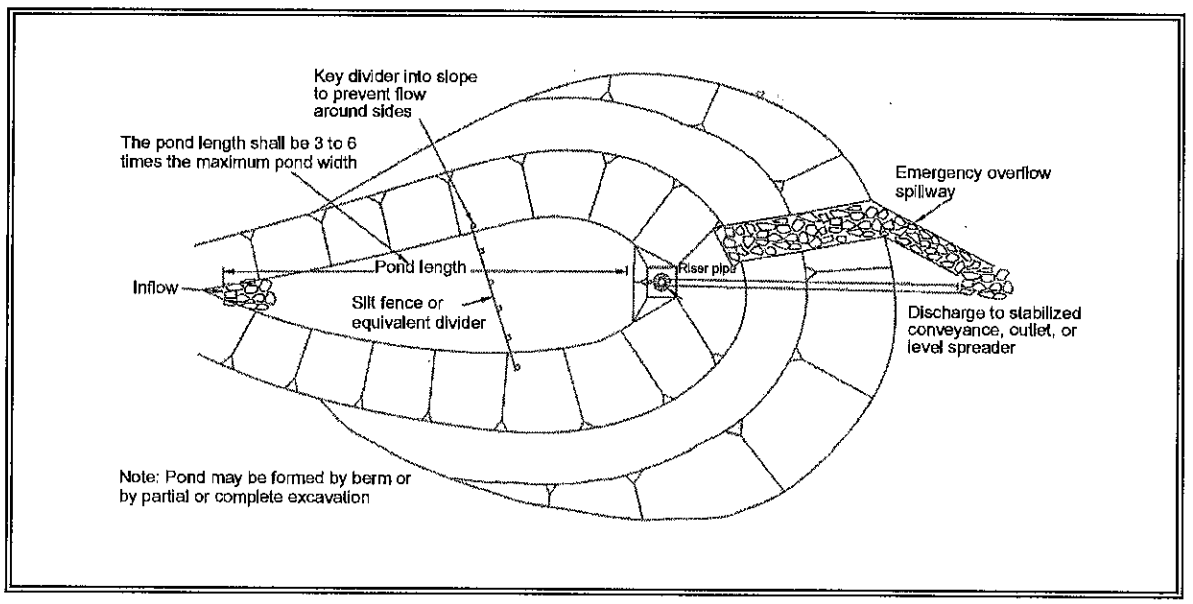


Figure 4.20 – Sediment Pond Plan View

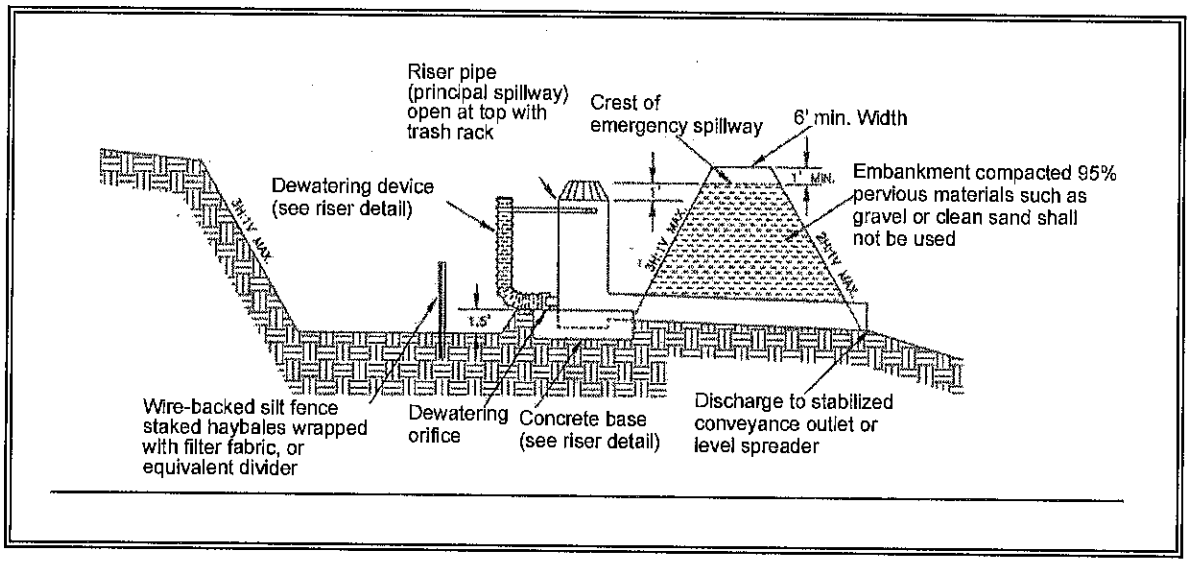


Figure 4.21 – Sediment Pond Cross Section

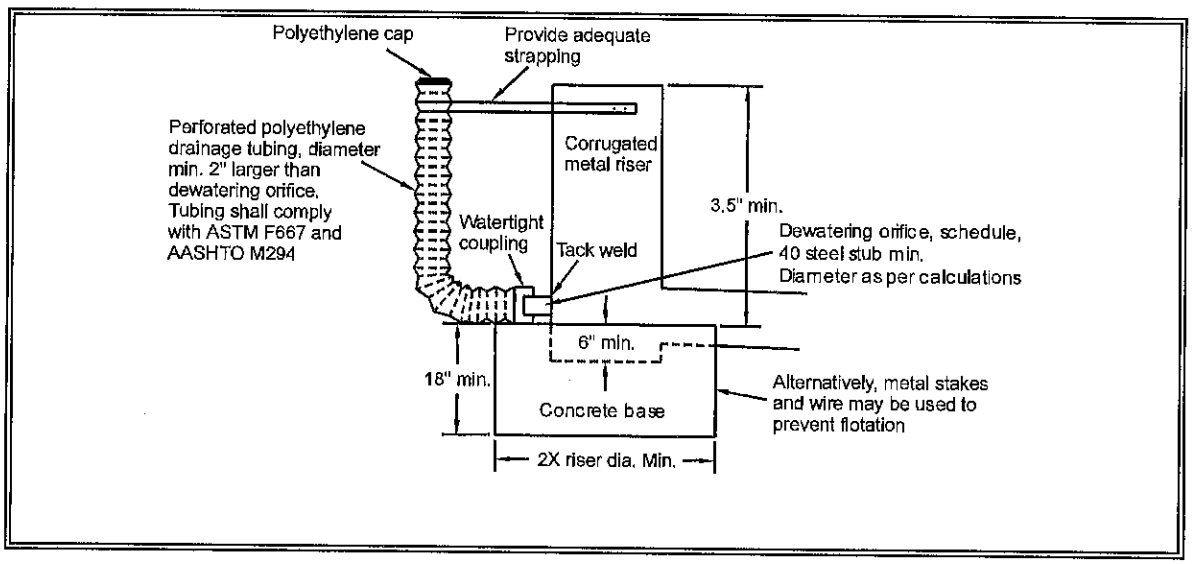


Figure 4.22 – Sediment Pond Riser Detail

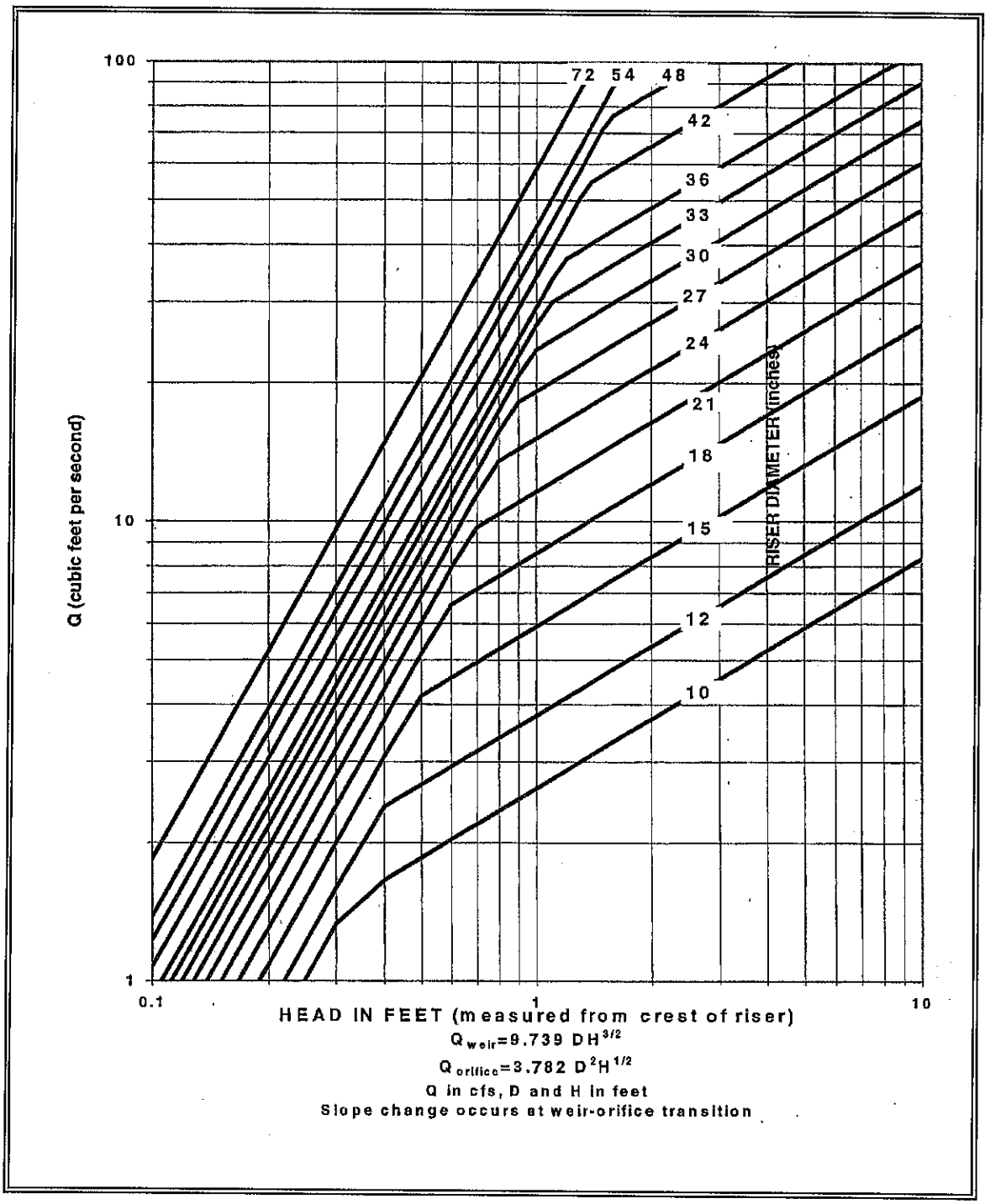


Figure 4.23 – Riser Inflow Curves

Principal Spillway: Determine the required diameter for the principal spillway (riser pipe). The diameter shall be the minimum necessary to pass the pre-developed 10-year peak flow (Q_{10}). Use Figure 4.23 to determine this diameter (h = 1-foot). *Note: A permanent control structure may be used instead of a temporary riser.*

Emergency Overflow Spillway: Determine the required size and design of the emergency overflow spillway for the developed 100-year peak flow using the method contained in Volume III.

Dewatering Orifice: Determine the size of the dewatering orifice(s) (minimum 1-inch diameter) using a modified version of the discharge equation for a vertical orifice and a basic equation for the area of a circular orifice. Determine the required area of the orifice with the following equation:

$$A_o = \frac{A_s (2h)^{0.5}}{0.6\text{x}3600Tg^{0.5}}$$

where	A_O	=	orifice area (square feet)
	A_S	=	pond surface area (square feet)
	h	=	head of water above orifice (height of riser in feet)
	T	=	dewatering time (24 hours)
	g	=	acceleration of gravity (32.2 feet/second^2)

Convert the required surface area to the required diameter D of the orifice:

$$D = 24\text{x}\sqrt{\frac{A_o}{\pi}} = 13.54\text{x}\sqrt{A_o}$$

The vertical, perforated tubing connected to the dewatering orifice must be at least 2 inches larger in diameter than the orifice to improve flow characteristics. The size and number of perforations in the tubing should be large enough so that the tubing does not restrict flow. The orifice should control the flow rate.

- Additional Design Specifications

  The pond shall be divided into two roughly equal volume cells by a permeable divider that will reduce turbulence while allowing movement of water between cells. The divider shall be at least one-half the height of the riser and a minimum of one foot below the top of the riser. Wire-backed, 2- to 3-foot high, extra strength filter fabric supported by treated 4"x 4"s can be used as a divider. Alternatively, staked straw bales wrapped with filter fabric (geotextile) may be used. If the pond is more than 6 feet deep, a different mechanism must be proposed. A riprap embankment is one acceptable method of separation for deeper ponds. Other designs that satisfy the intent of

this provision are allowed as long as the divider is permeable, structurally sound, and designed to prevent erosion under or around the barrier.

To aid in determining sediment depth, one-foot intervals shall be prominently marked on the riser.

If an embankment of more than 6 feet is proposed, the pond must comply with the criteria contained in Volume III of the 2005 *Stormwater Management Manual for Western Washington* regarding dam safety for detention BMPs.

- The most common structural failure of sedimentation basins is caused by piping. Piping refers to two phenomena: (1) water seeping through fine-grained soil, eroding the soil grain by grain and forming pipes or tunnels; and, (2) water under pressure flowing upward through a granular soil with a head of sufficient magnitude to cause soil grains to lose contact and capability for support.

  The most critical construction sequences to prevent piping will be:

  - Tight connections between riser and barrel and other pipe connections.
  - Proper soil compaction of the embankment and riser footing.
  - Proper construction of anti-seep devices.

Maintenance Standards

- Sediment shall be removed from the pond when it reaches 1–foot in depth.
- Any damage to the pond embankments or slopes shall be repaired.

Appendix C – Alternative BMPs

The following includes a list of possible alternative BMPs for each of the 12 elements not described in the main SWPPP text. This list can be referenced in the event a BMP for a specific element is not functioning as designed and an alternative BMP needs to be implemented.

Element #1 - Mark Clearing Limits
BMP C102 Buffer Zones

Element #2 - Establish Construction Access
BMP C106 Wheel Wash
BMP C107 Construction Road/Parking Area Stabilization
Element #3 - Control Flow Rates
Add Additional Traps or Ponds

Element #4 - Install Sediment Controls
BMP C234 Vegetated Strip
BMP C241 Temporary Sediment Pond
Advanced BMPs:
BMP C250 Construction Stormwater Chemical Treatment
BMP C251 Construction Stormwater Filtration
Element #5 - Stabilize Soils
BMP C122 Nets and Blankets
BMP C124 Sodding
BMP C125 Topsoiling
BMP C126 Poluacrylamed for soil Erosion Protection
BMP C131 Gradient Terraces
Element #6 - Protect Slopes
BMP C131 Gradient Terraces
BMP C200 Interceptor Dike Swale
BMP C201 Grass Linded Swales
BMP C204 Pipe Slope Drains
BMP C205 Subface Drains
BMP C206 Level Spreaders
BMP C207 Check D_____
BMP C208 Triangular Silt Dike
Element #8 - Stabilize Channels and Outlets
BMP C202 Channel Lining

Additional Advanced BMPs to Control Dewatering:

Appendix D – General Permit

DEPARTMENT OF ECOLOGY
State of Washington

NOTICE OF INTENT (NOI) APPLICATION FORM

Construction Stormwater General Permit

Check if applicable:
☐ **Change or Update Permit Information**
☐ **Modification of Permit Coverage**
Permit #WAR_____

Please print or type all sections of this application. All fields are required unless otherwise marked.

I. Operator/Permittee (Party with operational control over plans and specifications or day-to-day operational control of activities which ensure compliance with Stormwater Pollution Prevention Plan (SWPPP) and permit conditions. Ecology will send correspondence and permit fee invoices to the permittee on record.)

Name:		Company:		
Business Phone:	Ext.	Unified Business Identifier (UBI): *(UBI is a nine-digit number used to identify a business entity.* ***Write "none" if you do not have a UBI number.)***		
Cell Phone (Optional):	Fax (Optional):			
E-mail:				
Mailing Address:		City:	State:	Zip + 4:

II. Property Owner (The party listed on the County Assessor's records as owner and taxpayer of the parcel[s] for which permit coverage is requested. Ecology will not send correspondence and permit fee invoices to the Property Owner. The Property Owner information will be used for emergency contact purposes.)

Name:		Company (if applicable):		
Business Phone:	Ext.	Unified Business Identifier (UBI): *(UBI is a nine-digit number used to identify a business entity.* ***Write "none" if you do not have a UBI number.)***		
Cell Phone (Optional):	Fax (Optional):			
E-mail:				
Mailing Address:		City:	State:	Zip + 4:

III. On-site Contact Person (Typically the Certified Erosion & Sediment Control Lead or Operator/Permittee)

Name:		Company:		
Business Phone:	Ext.	Mailing Address:		
Cell Phone (Optional)	Fax (Optional):	City:	State:	Zip + 4:
E-mail:				

IV. WebDMR (Electronic Discharge Monitoring Reporting)

You must submit monthly discharge monitoring reports using Ecology's WebDMR system. To sign up for WebDMR, or to register a new site, go to www.ecy.wa.gov/stormwater, and click on the "Construction Stormwater" link. You will find information on WebDMR under the "WebDMR and PARIS" link on the right-hand side. If you are unable to submit your DMRs electronically, you may contact Ecology to request a waiver. Ecology will generally only grant waiver requests to those permittees without internet access. Only a permittee or representative, designated in writing, may request access to or a waiver from WebDMR. To have the ability to use the system immediately, **you must submit the Electronic Signature Agreement with your application**. If you have questions on this process, contact Ecology's WebDMR staff at WAWebDMR-Stormwater@ecy.wa.gov or 360-407-7097.

V. Site Information

Site or Project Name

Street Address or Location Description (*If the site lacks a street address, list its specific location. For example, Intersection of Highway 61 and 34.*)

_____

Parcel ID#: _____ *(Optional)*

Type of Construction Activity (*check all that apply*):

- ☐ Residential
- ☐ Commercial
- ☐ Industrial
- ☐ Highway or Road (city ,county, state)
- ☐ Utilities (specify): _____.
- ☐ Other (specify):_____.

Site Acreage

Total size of your site/project (that you own/control): _____acres.

Total area of soil disturbance (grading and/or excavating) for your site/project over the life of the project: _____acres. *(Note: 1 acre = 43,560 ft².)*

Concrete / Engineered Soils

How many yards of concrete will be poured over the life of the project? _____yd³ (estimate)

How many yards of recycled concrete will be used over the life of the project? _____yd³ (estimate)

Will any engineered soils be used? (For example: cement treated base, cement kiln dust, etc.)

☐ Yes ☐ No

City (or nearest city):	Zip Code:	Estimated project start-up date (mm/dd/yy):
County:		Estimated project completion date (mm/dd/yy):

Record the latitude and longitude of the *main entrance* to the site or the approximate center of site.

Latitude: _____°N Longitude: _____°W

For assistance with latitude and longitude, refer to the following website: ***http://www.getlatlon.com.*** *Convert all latitude and longitude coordinates into degrees, minutes, seconds format. For help with this process go to:* **http://transition.fcc.gov/mb/audio/bickel/DDDMMSS-decimal.html**

VI. Existing Site Conditions

1. Are you aware of contaminated soils present on the site? ☐ Yes ☐ No
2. Are you aware of groundwater contamination located within the site boundary? ☐ Yes ☐ No
3. If you answered yes to questions 1 or 2, will any contaminated soils be disturbed or will any contaminated groundwater be discharged due to the proposed construction activity? ☐ Yes ☐ No

["Contaminated" and "contamination" here mean containing any hazardous substance (as defined in WAC 173-340-200) that does not occur naturally or occurs at greater than natural background levels.]

If you answered yes to Question 3, please explain below or on a separate paper in detail the locations, contaminants, and concentrations, and pollution prevention and/or treatment BMPs proposed to control the discharge of soil/groundwater contaminants. Ecology may request a copy of your SWPPP.

VII. Stormwater Pollution Prevention Plan (SWPPP)

You must develop a SWPPP prior to starting construction. Do **not** submit your SWPPP with your application. The exception is that Ecology may request a copy of your SWPPP if you answered yes to the questions in Part VI.

VIII. Best Management Practices (BMPs)

You must use the BMPs listed in the Stormwater Management Manual for Western Washington or the Stormwater Management Manual for Eastern Washington or other manuals approved by Ecology. Alternatively, you may use demonstrably equivalent BMPs on the basis of permit condition S9.C.4. If you intend to use a BMP at your site that is not included in these manuals, but that you believe meets the definition of a *demonstrably equivalent* BMP, you must notify the appropriate regional office. (See Definitions in the Construction Stormwater General Permit).*

http://www.ecy.wa.gov/programs/wq/stormwater/construction/contacts.html

**Note that if you receive permit coverage without indicating the preference for a demonstrably equivalent BMP and later decide to use one, you must provide Ecology with notice of the selection of an equivalent BMP no less than 60 days before the intended use of the equivalent BMP.*

IX. Discharge/Receiving Water Information

Indicate whether your site's stormwater and/or dewatering water could enter surface waters, **directly** and/or **indirectly**:

☐ Water will discharge directly or indirectly (through a storm drain system or roadside ditch) into one or more surface waterbodies (wetlands, creeks, lakes, and all other surface waters and water courses).

If your discharge is to a storm sewer system, provide the name of the operator of the storm sewer system:

(e.g., City of Tacoma): _____

(NOTE: If your stormwater discharges to a storm sewer system operated by the City of Seattle, King County, Snohomish County, City of Tacoma, Pierce County, or Clark County, you must **also** submit a copy of this NOI to the appropriate jurisdiction.)

☐ Water will discharge to ground with 100% infiltration, with no potential to reach surface waters under any conditions.

If your project includes dewatering, you **must** include dewatering plans and discharge locations in your site Stormwater Pollution Prevention Plan.

Location of Discharge into Surface Waterbody

Enter the waterbody name and latitude/longitude of the point(s) where the site has the potential to discharge into a waterbody (enter all locations).

- Include the names and locations of both direct and indirect discharges to surface waterbodies, even if the risk of discharge is low or limited to periods of extreme weather.
- Some large construction projects (for example, subdivisions, roads, or pipelines) may discharge into several waterbodies.
- If the creek or tributary is unnamed, use a format such as "unnamed tributary to Deschutes River."
- **Attach a separate list if necessary.**

Surface Waterbody Name	Latitude Decimal Degrees	Longitude Decimal Degrees
	° N	° W
	° N	° W
	° N	° W
	° N	° W

If your site discharges to a waterbody that is on the impaired waterbodies list (i.e., 303[d] list) for turbidity, fine sediment, high pH, or phosphorus, Ecology will require additional documentation before issuing permit coverage and these sites will be subject to additional sampling and numeric effluent limits (per Permit Condition S8). Ecology will notify you if any additional sampling requirements apply. Information on impaired waterbodies is available online at http://www.ecy.wa.gov/programs/wq/303d/2008/index.html.

X. State Environmental Policy Act (SEPA)

This Notice of Intent (NOI) is incomplete and cannot be approved until the applicable SEPA requirements under Chapter 197-11 WAC are met.

Who is the SEPA lead agency on your site? _____.

Has the SEPA lead agency issued a final decision on your checklist? ☐**No** ☐**Yes** ☐ **Exempt***

If No: The NOI is incomplete. Ecology will hold the application until a final SEPA decision is made or the Construction Stormwater NOI public comment period ends, whichever is later. **You must notify Ecology once the lead agency has issued a determination.**

If Yes: Type of SEPA decision issued: ☐ Determination of Non-Significance (DNS) ☐ Mitigated DNS (MDNS) ☐ Determination of Significance (DS) ☐ Final Environmental Impact Statement (EIS) ☐ Other:_____

- Date of final SEPA decision:_____.
- If a supplemental EIS, SEPA addendum, or some other type of additional SEPA review was required, please attach and submit with this form.
- Date when all SEPA-related comment & appeal periods are exhausted: _____.

***If Exempt:** Attach written documentation, check type of exemption below, and proceed to Section VII.

☐ Watershed Restoration & Fish Habitat Enhancement Exemption (RCW 43.21C.0382).

☐ Infill Development Exemption (RCW 43.21C.229).

☐ Planned Action Exemption (RCW 43.21C.031).

☐ Categorical Exemption. Under what section of the SEPA Rule (WAC 197-11-800) is it exempt? _____ (for example, WAC 197-11-800(1) Minor New Construction)

More SEPA information is available at: http://www.ecy.wa.gov/programs/sea/sepa/e-review.html.

XI. Public Notice

You must publish a public notice at least **once** a week for **two** consecutive weeks with **seven days** between publications, in at least a **single** newspaper of general circulation in the county in which the construction is to take place. Ecology cannot grant permit coverage sooner than the end of the 30-day public comment period, which begins on the date of the **second** public notice.

Mail or fax (360-407-6426) the NOI to Ecology on or **before** the **first** public notice date. If you fax the public notice to Ecology, you must also mail a hard copy. Failure to do so may delay the issuance of your permit.

Provide the **exact** dates (mm/dd/yy) that the first and second public notices will appear in the newspaper(s):

First notice: _____/_____/_____

Second notice: _____/_____/_____ (Begins 30-day public comment period.)

For example: First notice: 01/01/10

Second notice: 01/08/10

Name of the newspaper(s) publishing the notices: _____

PUBLIC NOTICE TEMPLATE

Complete this template using project-specific information and submit to a local newspaper with general circulation within the county where the project is located. The **bold** language is required by WAC 173-226-130 and must be included in its entirety. (Either use the fill-in template below or **attach on a separate sheet of paper, if necessary.**)

(Note: This section is unprotected so you can delete text in parentheses)

_____ *(Name of operator/permittee)*, _____ *(address of operator/permittee)*, **is seeking coverage under the Washington State Department of Ecology's Construction Stormwater NPDES and State Waste Discharge General Permit.**

The proposed project, _____,*(project name)* **is located at** _____ *(street address, intersection, crossroads, or other descriptive site location)* in _____ *(name of nearest city)*, in _____*(County)*.

This project involves _____**acres of soil disturbance for** _____**construction activities.**

(List all construction activities, for example, residential, commercial, industrial, highway, utility).

Stormwater will be discharged to _____*(List all named and un-named surface waterbodies, or ground water if applicable, waters identified in section IX).*

Any persons desiring to present their views to the Washington State Department of Ecology regarding this application, or interested in Ecology's action on this application, may notify Ecology in writing no later than 30 days of the last date of publication of this notice. Ecology reviews public comments and considers whether discharges from this project would cause a measurable change in receiving water quality, and, if so, whether the project is necessary and in the overriding public interest according to Tier II antidegradation requirements under WAC 173-201A-320.

Comments can be submitted to:
Department of Ecology
Attn: Water Quality Program, Construction Stormwater
P.O. Box 47696, Olympia, WA 98504-7696

XII. Certification of Permittees

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

_____ / _____ _____.
Printed Name / Company (operator/permittee only) Title

_____ _____.
Signature of Operator/Permittee* Date

*** Federal regulations require this application is signed by one of the following:**

A. For a corporation: By a principal executive officer of at least the level of vice president.
B. For a partnership or sole proprietorship: By a general partner or the proprietor, respectively.
C. For a municipality, state, federal, or other public facility: By either a principal executive officer or ranking elected official.

Please sign and return this document to the following address:

Washington Department of Ecology - Stormwater
P.O. Box 47696
Olympia, WA 98504-7696

DO NOT SUBMIT THIS PAGE WITH YOUR APPLICATION

If you have questions about this form, contact the following Ecology staff:			
Location	**Contact Name**	**Phone**	**E-mail**
City of Seattle, and Kitsap, Pierce, and Thurston counties	Josh Klimek	360-407-7451	josh.klimek@ecy.wa.gov
Island, King, and San Juan counties	Clay Keown	360-407-6048	clay.keown@ecy.wa.gov
Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Skagit, Snohomish, Spokane, Stevens, Walla, Whatcom, and Whitman counties.	Shawn Hopkins	360-407-6442	shawn.hopkins@ecy.wa.gov
Benton, Chelan, Clallam, Clark, Cowlitz, Douglas, Grays Harbor, Jefferson, Kittitas, Klickitat, Lewis, Mason, Okanogan, Pacific, Skamania, Wahkiakum, and Yakima counties.	Joyce Smith	360-407-6858	joyce.smith@ecy.wa.gov
If you have questions about WebDMR, contact the following Ecology staff:			
Permittees must submit discharge monitoring reports (DMRs) each month using Ecology's secure online system, WebDMR. To have the ability to use the system immediately, you must submit the Electronic Signature Agreement with your application. If you have questions on this process, contact Ecology's WebDMR staff at WAWebDMR-Stormwater@ecy.wa.gov or 360-407-7097.			

More information is available at: ***http://www.ecy.wa.gov/programs/wq/stormwater/construction/.***

If you need this document in a version for the visually impaired, call the Water Quality Program at 360-407-6401. Persons with hearing loss, call 711 for Washington Relay Service. Persons with a speech disability, call 877-833-6341.

Appendix E – Site Inspection Forms (and Site Log)

The results of each inspection shall be summarized in an inspection report or checklist that is entered into or attached to the site log book. It is suggested that the inspection report or checklist be included in this appendix to keep monitoring and inspection information in one document, but this is optional. However, it is mandatory that this SWPPP and the site inspection forms be kept onsite at all times during construction, and that inspections be performed and documented as outlined below.

At a minimum, each inspection report or checklist shall include:

a. Inspection date/times

b. Weather information: general conditions during inspection, approximate amount of precipitation since the last inspection, and approximate amount of precipitation within the last 24 hours.

c. A summary or list of all BMPs that have been implemented, including observations of all erosion/sediment control structures or practices.

d. The following shall be noted:

   i. locations of BMPs inspected,

   ii. locations of BMPs that need maintenance,

   iii. the reason maintenance is needed,

   iv. locations of BMPs that failed to operate as designed or intended, and

   v. locations where additional or different BMPs are needed, and the reason(s) why

e. A description of stormwater discharged from the site. The presence of suspended sediment, turbid water, discoloration, and/or oil sheen shall be noted, as applicable.

f. A description of any water quality monitoring performed during inspection, and the results of that monitoring.

g. General comments and notes, including a brief description of any BMP r repairs, maintenance or installations made as a result of the inspection.

h. A statement that, in the judgment of the person conducting the site inspection, the site is either in compliance or out of compliance with the terms and conditions of the SWPPP and the NPDES permit. If the site inspection indicates that the site is out of compliance, the inspection report shall include a summary of the

remedial actions required to bring the site back into compliance, as well as a schedule of implementation.

i. Name, title, and signature of person conducting the site inspection; and the following statement: "I certify under penalty of law that this report is true, accurate, and complete, to the best of my knowledge and belief".

When the site inspection indicates that the site is not in compliance with any terms and conditions of the NPDES permit, the Permittee shall take immediate action(s) to: stop, contain, and clean up the unauthorized discharges, or otherwise stop the noncompliance; correct the problem(s); implement appropriate Best Management Practices (BMPs), and/or conduct maintenance of existing BMPs; and achieve compliance with all applicable standards and permit conditions. In addition, if the noncompliance causes a threat to human health or the environment, the Permittee shall comply with the Noncompliance Notification requirements in Special Condition S5.F of the permit.

Site Inspection Form

General Information

Project Name:
Inspector Name: **Title:**
CESCL # :
Date: **Time:**
Inspection Type:
- ☐ After a rain event
- ☐ Weekly
- ☐ Turbidity/transparency benchmark exceedance
- ☐ Other

Weather
Precipitation Since last inspection In last 24 hours
Description of General Site Conditions:

Inspection of BMPs

Element 1: Mark Clearing Limits

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 2: Establish Construction Access

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 3: Control Flow Rates

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 4: Install Sediment Controls

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 5: Stabilize Soils

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 6: Protect Slopes

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 7: Protect Drain Inlets

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 8: Stabilize Channels and Outlets

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 9: Control Pollutants

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 10: Control Dewatering

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Stormwater Discharges From the Site			
	Observed? Y	N	Problem/Corrective Action
Location			
Turbidity			
Discoloration			
Sheen			
Location			
Turbidity			
Discoloration			
Sheen			

Water Quality Monitoring
Was any water quality monitoring conducted? ☐ Yes ☐ No If water quality monitoring was conducted, record results here:
If water quality monitoring indicated turbidity 250 NTU or greater; or transparency 6 cm or less, was Ecology notified by phone within 24 hrs? ☐ Yes ☐ No
If Ecology was notified, indicate the date, time, contact name and phone number below: Date: Time: Contact Name: Phone #:
General Comments and Notes Include BMP repairs, maintenance, or installations made as a result of the inspection.
Were Photos Taken? ☐ Yes ☐ No If photos taken, describe photos below:

Appendix F – Engineering Calculations

Gateway Division1

Drainage Calculation - Div one only

Area	Total Area (sq ft)	Total Acreage	Total SF Roof Tops	Total TH Roof Tops	Infiltrated Roof Tops	Alley Length	50' R/W Length	54' R/W Length	Roadway A Length	Roadway C Length	Impervious Roadway Area		Driveway Area SF	Driveway Area ac	Roof Area SF	Roof Area ac	Infiltrated roofs ac	Net Impervious	Net Pervious	Net Acreage	Percent Impervious	Total Impervious	Total Pervious
A	161,429	4	14				550				20,900	0	4,480	0	28,000	1	0	1.23	2.48	3.71	33.1%	1.23	2.48
B	42,695	0.98	5								0	0.00	1,600	0.04	10,000	0.23	0.00	0.27	0.71	0.98	27.2%	0.27	0.71
C	348,375	8.00	16				325	600		840	37,550	0.86	5,120	0.12	32,000	0.73	0.00	1.71	6.28	8.00	21.4%	1.71	6.28
pond water surface	59,081	1.36									0	0.00	0	0.00	0	0.00	0.00	1.36	0.00	1.36	100.0%	0.00	1.36
pond side slopes	72,196	1.66									0	0.00	0	0.00	0	0.00	0.00	0.00	1.66	1.66	0.0%	0.00	1.66
total contributing area	683,776	15.70	35	0	0	0	875	600	0	840	58,450	1.34	11,200	0.26	70,000	1.61	0.00	4.36	11.14	15.70	29%	3.21	12.49
future	638,765	14.66					set to 30% impervious											4.40	10.26	14.66	30.0%		
D	884,319	20.30		34			510		440	930	38,740	0.89	10,880	0.25	40,800	0.94	0.00	2.08	18.23	20.30	10.2%	2.08	18.23
pond water surface	65868	1.51										0.00		0.00		0.00		1.51	0.00	1.51	100%	1.51	0.00
Sub Total	1,588,752	36.47	0	34	0	0	510	0	440	930	38,740	0.89	10,880	0.25	40,800	0.94	0.00	7.98	28.49	36.47	21.9%	3.58	18.23

Total Acres = Mapped sub-basin
Impervious Area = Non-infiltrate Roof Area + Measured Road Area + Driveways
Pervious Acres = Total Acres - Roof Area - Impervious Area

Assumed SF Roof Area =	2000	sf
Assumed TH Roof Area =	1200	sf
Assumed Driveway Area =	320	sf

Road Sections:	Pvmt Width	Sidewalk	Planter	Swale	R/W Width	% Impervious
Road Way A	32	12	16	0	72	51.1%

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	volumes infil.12.052a
Site Name:	Tract A - infitration Pnd
Site Address:	
City:	
Report Date:	8/13/2013
Gage:	Fairgrounds (Kaiser)
Data Start:	1955/10/01
Data End:	2011/09/30
Timestep:	15 Minute
Precip Scale:	1.00
Version:	2013/06/26

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data
Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Forest, Flat	36.47
Pervious Total	36.47
Impervious Land Use	Acres
Impervious Total	0
Basin Total	36.47

Includes On-site AND Possible Future

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Forest, Flat	11.2
C, Lawn, Flat	7.03
Pervious Total	18.23
Impervious Land Use	Acres
ROADS FLAT	2.07
POND	1.51
Impervious Total	3.58
Basin Total	21.81

ON-SITE Developed AREAS

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Basin 2

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Lawn, Flat	10.26
Pervious Total	10.26
Impervious Land Use	Acres
ROADS FLAT	4.4
Impervious Total	4.4
Basin Total	14.66

Future Development from North w/ Estimated 30% Impervious

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length:	35.23 ft. ← 32,662 SF Bottom Area
Bottom Width:	927.11 ft. Smaller than Pond Shown
Depth:	8 ft.
Volume at riser head:	8.6291 acre-ft. on Plans
Infiltration On	
Infiltration rate:	4.25 ← Infiltration Based on GRADATION
Infiltration safety factor:	1
Side slope 1:	3 To 1
Side slope 2:	3 To 1
Side slope 3:	3 To 1
Side slope 4:	3 To 1
Discharge Structure	
Riser Height:	7 ft.
Riser Diameter:	24 in.
Element Flows To:	
Outlet 1	Outlet 2

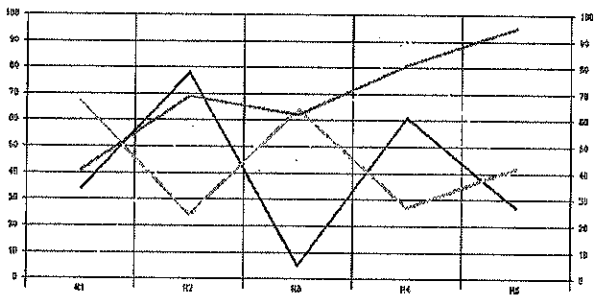
Pond Hydraulic Table

Stage(ft)	Area(ac)	Volume(ac-ft)	Discharge(cfs)	Infilt(cfs)
0.0000	0.749	0.000	0.000	0.000
0.0889	0.761	0.067	0.000	3.213
0.1778	0.773	0.135	0.000	3.213
0.2667	0.785	0.204	0.000	3.213
0.3556	0.797	0.275	0.000	3.213
0.4444	0.808	0.346	0.000	3.213
0.5333	0.820	0.418	0.000	3.213
0.6222	0.832	0.492	0.000	3.213
0.7111	0.844	0.566	0.000	3.213
0.8000	0.856	0.642	0.000	3.213
0.8889	0.868	0.719	0.000	3.213
0.9778	0.880	0.796	0.000	3.213
1.0667	0.892	0.875	0.000	3.213
1.1556	0.904	0.955	0.000	3.213
1.2444	0.916	1.036	0.000	3.213
1.3333	0.928	1.118	0.000	3.213
1.4222	0.940	1.201	0.000	3.213
1.5111	0.952	1.285	0.000	3.213
1.6000	0.964	1.370	0.000	3.213
1.6889	0.976	1.456	0.000	3.213
1.7778	0.988	1.544	0.000	3.213
1.8667	1.000	1.632	0.000	3.213
1.9556	1.012	1.721	0.000	3.213
2.0444	1.024	1.812	0.000	3.213
2.1333	1.036	1.903	0.000	3.213
2.2222	1.048	1.996	0.000	3.213
2.3111	1.060	2.090	0.000	3.213
2.4000	1.072	2.185	0.000	3.213
2.4889	1.084	2.281	0.000	3.213
2.5778	1.097	2.378	0.000	3.213
2.6667	1.109	2.476	0.000	3.213
2.7556	1.121	2.575	0.000	3.213
2.8444	1.133	2.675	0.000	3.213

2.9333	1.145	2.776	0.000	3.213
3.0222	1.158	2.879	0.000	3.213
3.1111	1.170	2.982	0.000	3.213
3.2000	1.182	3.087	0.000	3.213
3.2889	1.194	3.192	0.000	3.213
3.3778	1.207	3.299	0.000	3.213
3.4667	1.219	3.407	0.000	3.213
3.5556	1.231	3.516	0.000	3.213
3.6444	1.243	3.626	0.000	3.213
3.7333	1.256	3.737	0.000	3.213
3.8222	1.268	3.849	0.000	3.213
3.9111	1.280	3.963	0.000	3.213
4.0000	1.293	4.077	0.000	3.213
4.0889	1.305	4.192	0.000	3.213
4.1778	1.318	4.309	0.000	3.213
4.2667	1.330	4.427	0.000	3.213
4.3556	1.342	4.546	0.000	3.213
4.4444	1.355	4.665	0.000	3.213
4.5333	1.367	4.787	0.000	3.213
4.6222	1.380	4.909	0.000	3.213
4.7111	1.392	5.032	0.000	3.213
4.8000	1.405	5.156	0.000	3.213
4.8889	1.417	5.282	0.000	3.213
4.9778	1.430	5.408	0.000	3.213
5.0667	1.442	5.536	0.000	3.213
5.1556	1.455	5.665	0.000	3.213
5.2444	1.467	5.795	0.000	3.213
5.3333	1.480	5.926	0.000	3.213
5.4222	1.492	6.058	0.000	3.213
5.5111	1.505	6.191	0.000	3.213
5.6000	1.518	6.325	0.000	3.213
5.6889	1.530	6.461	0.000	3.213
5.7778	1.543	6.598	0.000	3.213
5.8667	1.555	6.735	0.000	3.213
5.9556	1.568	6.874	0.000	3.213
6.0444	1.581	7.014	0.000	3.213
6.1333	1.593	7.155	0.000	3.213
6.2222	1.606	7.298	0.000	3.213
6.3111	1.619	7.441	0.000	3.213
6.4000	1.632	7.585	0.000	3.213
6.4889	1.644	7.731	0.000	3.213
6.5778	1.657	7.878	0.000	3.213
6.6667	1.670	8.026	0.000	3.213
6.7556	1.683	8.175	0.000	3.213
6.8444	1.695	8.325	0.000	3.213
6.9333	1.708	8.476	0.000	3.213
7.0222	1.721	8.629	0.064	3.213
7.1111	1.734	8.782	0.721	3.213
7.2000	1.747	8.937	1.742	3.213
7.2889	1.759	9.093	3.024	3.213
7.3778	1.772	9.250	4.522	3.213
7.4667	1.785	9.408	6.209	3.213
7.5556	1.798	9.567	8.065	3.213
7.6444	1.811	9.728	10.07	3.213
7.7333	1.824	9.889	12.23	3.213
7.8222	1.837	10.05	14.52	3.213
7.9111	1.850	10.21	16.94	3.213
8.0000	1.863	10.38	19.47	3.213

8.0889	1.876	10.54	22.13	3.213

Analysis Results
POC 1



+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 36.47
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 28.49
Total Impervious Area: 7.98

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	1.094869
5 year	1.973252
10 year	2.790767
25 year	4.163383
50 year	5.48363
100 year	7.107422

← Existing Flow RATES

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

← 100% Infiltration

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	1.390	0.000
1957	2.431	0.000
1958	0.602	0.000
1959	0.898	0.000
1960	1.374	0.000
1961	0.996	0.000
1962	0.409	0.000
1963	3.141	0.000
1964	1.042	0.000
1965	1.054	0.000

1966	0.582	0.000
1967	1.079	0.000
1968	0.833	0.000
1969	0.548	0.000
1970	0.913	0.000
1971	1.189	0.000
1972	1.675	0.000
1973	1.015	0.000
1974	0.683	0.000
1975	0.763	0.000
1976	1.312	0.000
1977	0.508	0.000
1978	1.523	0.000
1979	0.906	0.000
1980	1.491	0.000
1981	1.555	0.000
1982	1.566	0.000
1983	1.624	0.000
1984	1.087	0.000
1985	0.464	0.000
1986	1.773	0.000
1987	1.433	0.000
1988	0.744	0.000
1989	0.805	0.000
1990	2.027	0.000
1991	4.558	0.000
1992	12.300	0.000
1993	1.356	0.000
1994	0.599	0.000
1995	1.352	0.000
1996	1.962	0.000
1997	5.887	0.000
1998	2.649	0.000
1999	1.092	0.000
2000	0.618	0.000
2001	0.223	0.000
2002	1.162	0.000
2003	0.838	0.000
2004	1.530	0.000
2005	0.588	0.000
2006	1.028	0.000
2007	0.852	0.000
2008	1.258	0.000
2009	1.791	0.000
2010	1.500	0.000
2011	1.017	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	12.3004	0.0000
2	5.8865	0.0000
3	4.5584	0.0000
4	3.1414	0.0000
5	2.6494	0.0000
6	2.4310	0.0000
7	2.0269	0.0000
8	1.9621	0.0000

9	1.7911	0.0000
10	1.7733	0.0000
11	1.6751	0.0000
12	1.6243	0.0000
13	1.5663	0.0000
14	1.5550	0.0000
15	1.5303	0.0000
16	1.5229	0.0000
17	1.4996	0.0000
18	1.4911	0.0000
19	1.4333	0.0000
20	1.3901	0.0000
21	1.3742	0.0000
22	1.3565	0.0000
23	1.3522	0.0000
24	1.3121	0.0000
25	1.2582	0.0000
26	1.1891	0.0000
27	1.1621	0.0000
28	1.0920	0.0000
29	1.0872	0.0000
30	1.0794	0.0000
31	1.0540	0.0000
32	1.0415	0.0000
33	1.0280	0.0000
34	1.0171	0.0000
35	1.0145	0.0000
36	0.9961	0.0000
37	0.9129	0.0000
38	0.9058	0.0000
39	0.8979	0.0000
40	0.8515	0.0000
41	0.8376	0.0000
42	0.8330	0.0000
43	0.8048	0.0000
44	0.7633	0.0000
45	0.7440	0.0000
46	0.6835	0.0000
47	0.6176	0.0000
48	0.6022	0.0000
49	0.5986	0.0000
50	0.5885	0.0000
51	0.5820	0.0000
52	0.5478	0.0000
53	0.5078	0.0000
54	0.4643	0.0000
55	0.4094	0.0000
56	0.2233	0.0000

Duration Flows
The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.5474	17340	0	0	Pass
0.5973	13725	0	0	Pass
0.6472	10884	0	0	Pass
0.6970	8809	0	0	Pass
0.7469	7198	0	0	Pass
0.7967	5859	0	0	Pass
0.8466	4793	0	0	Pass
0.8965	3900	0	0	Pass
0.9463	3275	0	0	Pass
0.9962	2741	0	0	Pass
1.0460	2309	0	0	Pass
1.0959	1912	0	0	Pass
1.1458	1625	0	0	Pass
1.1956	1359	0	0	Pass
1.2455	1176	0	0	Pass
1.2953	1012	0	0	Pass
1.3452	859	0	0	Pass
1.3951	766	0	0	Pass
1.4449	667	0	0	Pass
1.4948	600	0	0	Pass
1.5446	522	0	0	Pass
1.5945	451	0	0	Pass
1.6444	395	0	0	Pass
1.6942	346	0	0	Pass
1.7441	296	0	0	Pass
1.7939	261	0	0	Pass
1.8438	236	0	0	Pass
1.8937	211	0	0	Pass
1.9435	190	0	0	Pass
1.9934	158	0	0	Pass
2.0433	146	0	0	Pass
2.0931	142	0	0	Pass
2.1430	139	0	0	Pass
2.1928	136	0	0	Pass
2.2427	133	0	0	Pass
2.2926	130	0	0	Pass
2.3424	126	0	0	Pass
2.3923	120	0	0	Pass
2.4421	115	0	0	Pass
2.4920	111	0	0	Pass
2.5419	107	0	0	Pass
2.5917	105	0	0	Pass
2.6416	101	0	0	Pass
2.6914	97	0	0	Pass
2.7413	95	0	0	Pass
2.7912	91	0	0	Pass
2.8410	87	0	0	Pass
2.8909	83	0	0	Pass
2.9407	81	0	0	Pass
2.9906	76	0	0	Pass
3.0405	66	0	0	Pass
3.0903	60	0	0	Pass
3.1402	54	0	0	Pass

3.1900	38	0	0	Pass
3.2399	26	0	0	Pass
3.2898	18	0	0	Pass
3.3396	16	0	0	Pass
3.3895	13	0	0	Pass
3.4393	13	0	0	Pass
3.4892	13	0	0	Pass
3.5391	13	0	0	Pass
3.5889	13	0	0	Pass
3.6388	13	0	0	Pass
3.6886	12	0	0	Pass
3.7385	12	0	0	Pass
3.7884	11	0	0	Pass
3.8382	11	0	0	Pass
3.8881	10	0	0	Pass
3.9380	10	0	0	Pass
3.9878	10	0	0	Pass
4.0377	10	0	0	Pass
4.0875	10	0	0	Pass
4.1374	9	0	0	Pass
4.1873	9	0	0	Pass
4.2371	9	0	0	Pass
4.2870	8	0	0	Pass
4.3368	8	0	0	Pass
4.3867	8	0	0	Pass
4.4366	8	0	0	Pass
4.4864	8	0	0	Pass
4.5363	8	0	0	Pass
4.5861	7	0	0	Pass
4.6360	7	0	0	Pass
4.6859	6	0	0	Pass
4.7357	6	0	0	Pass
4.7856	6	0	0	Pass
4.8354	6	0	0	Pass
4.8853	6	0	0	Pass
4.9352	6	0	0	Pass
4.9850	6	0	0	Pass
5.0349	6	0	0	Pass
5.0847	6	0	0	Pass
5.1346	6	0	0	Pass
5.1845	6	0	0	Pass
5.2343	6	0	0	Pass
5.2842	6	0	0	Pass
5.3340	6	0	0	Pass
5.3839	6	0	0	Pass
5.4338	6	0	0	Pass
5.4836	6	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	2.3529 acre-feet
On-line facility target flow:	1.279 cfs.
Adjusted for 15 min:	1.279 cfs.
Off-line facility target flow:	0.7215 cfs.
Adjusted for 15 min:	0.7215 cfs.

Model Default Modifications

Total of 0 changes have been made.

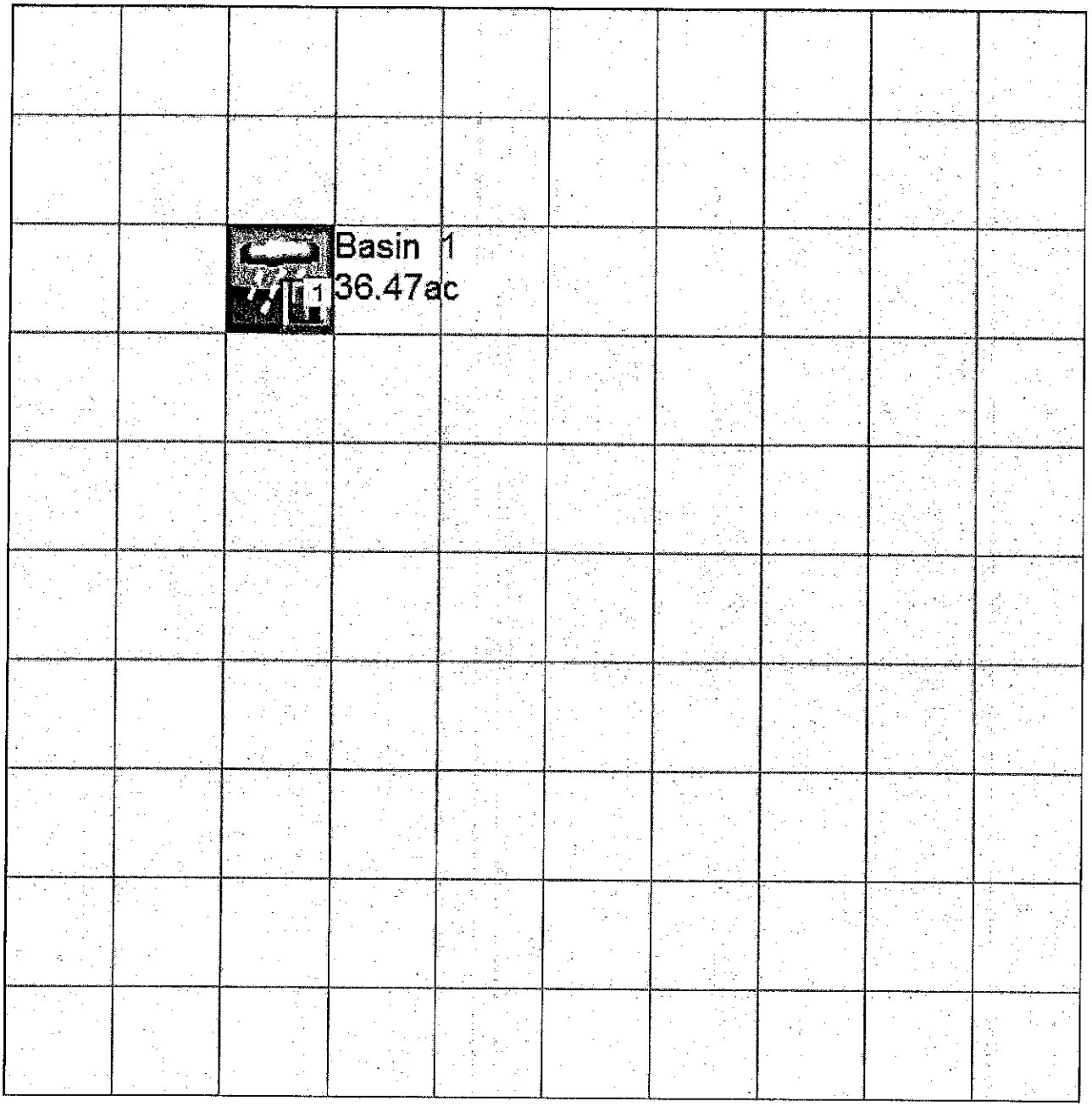
PERLND Changes

No PERLND changes have been made.

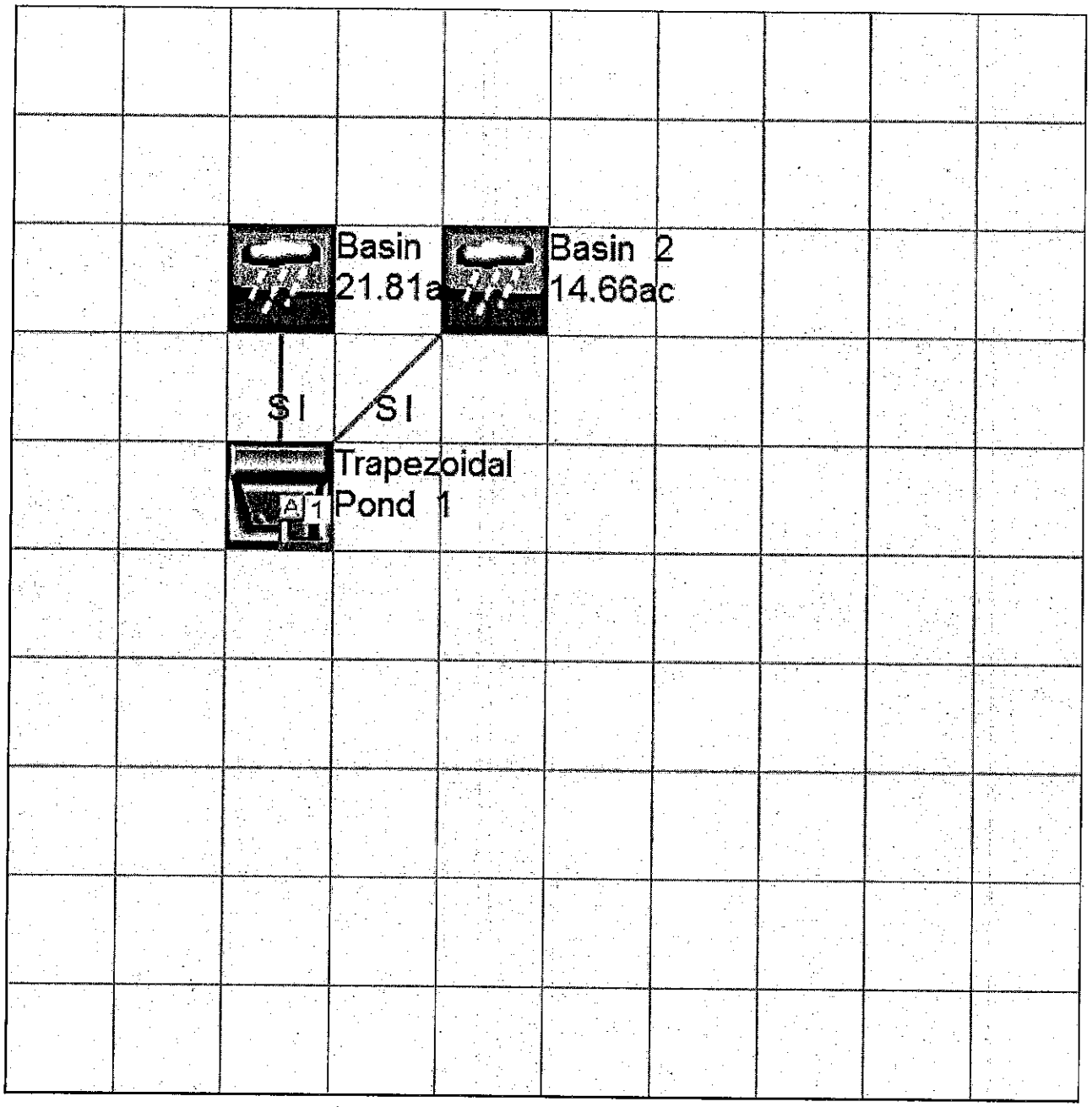
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01         END    2011 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                               ***
WDM        26   volumes infil.12.052a.wdm
MESSU      25   Prevolumes infil.12.052a.MES
           27   Prevolumes infil.12.052a.L61
           28   Prevolumes infil.12.052a.L62
           30   POCvolumes infil.12.052a1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      10
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Basin  1                    MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #          K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                           in  out           ***
   10     C, Forest, Flat         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   10         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   10         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -   # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   10          0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >       PWATER input info: Part 2          ***
    # -   # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   10                0       4.5      0.08       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >       PWATER input info: Part 3          ***
    # -   # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   10                0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >      PWATER input info: Part 4                                  ***
    # -   #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   10             0.2       0.5      0.35         6       0.5       0.7
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -   # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   10                0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -   #                     User  t-series Engl Metr ***
                                       in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -   # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -   # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -   # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2          ***
    # -   # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3          ***
    # -   # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -   # ***  RETS      SURS
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                    <--Area-->      <-Target->   MBLK    ***
<Name>   #                    <-factor->      <Name>   #   Tbl#    ***
Basin  1***
PERLND  10                         36.47      COPY   501     12
PERLND  10                         36.47      COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1


<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                        in  out                               ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                   ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50      ***
  <------><--------><--------><--------><--------><--------><-------->      ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                      ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
```

```
WDM       1 EVAP     ENGL    0.76            PERLND   1 999 EXTNL  PETINP
WDM       1 EVAP     ENGL    0.76            IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01         END    2011 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                               ***
WDM        26   volumes infil.12.052a.wdm
MESSU      25   Mitvolumes infil.12.052a.MES
           27   Mitvolumes infil.12.052a.L61
           28   Mitvolumes infil.12.052a.L62
           30   POCvolumes infil.12.052a1.dat
END FILES

OPN SEQUENCE
    INGRP                INDELT 00:15
      PERLND      10
      PERLND      16
      IMPLND       1
      IMPLND      14
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Trapezoidal Pond  1         MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #          K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                           in  out           ***
   10      C, Forest, Flat          1    1    1    1   27    0
   16      C, Lawn, Flat            1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   10         0    0    1    0    0    0    0    0    0    0    0    0
   16         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY
```

```
  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -   # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   10         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   16         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -   # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   10         0    0    0    0    0    0    0    0    0    0    0
   16         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >       PWATER input info: Part 2          ***
    # -   # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   10              0       4.5      0.08       400      0.05       0.5     0.996
   16              0       4.5      0.03       400      0.05       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >       PWATER input info: Part 3          ***
    # -   # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   10              0         0         2         2         0         0         0
   16              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >      PWATER input info: Part 4                                  ***
    # -   #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   10             0.2       0.5      0.35         6       0.5       0.7
   16             0.1      0.25      0.25         6       0.5      0.25
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -   # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   10              0         0         0         0       2.5         1         0
   16              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -   #                    User  t-series Engl Metr ***
                                        in  out          ***
    1       ROADS/FLAT             1    1    1   27    0
   14       POND                   1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -   # ATMP SNOW IWAT  SLD  IWG IQAL    ***
    1         0    0    1    0    0    0
   14         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -   # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
   14         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
```

```
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -   # CSNO RTOP  VRS  VNN RTLI     ***
    1          0    0    0    0    0
   14          0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >       IWATER input info: Part 2          ***
    # -   # ***  LSUR      SLSUR      NSUR      RETSC
    1            400       0.01       0.1        0.1
   14            400       0.01       0.1        0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >       IWATER input info: Part 3          ***
    # -   # ***PETMAX    PETMIN
    1              0         0
   14              0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -   # ***  RETS      SURS
    1              0         0
   14              0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK    ***
<Name>   #                  <-factor->     <Name>   #   Tbl#    ***
Basin  1***
PERLND  10                       11.2      RCHRES   1     2
PERLND  10                       11.2      RCHRES   1     3
PERLND  16                       7.03      RCHRES   1     2
PERLND  16                       7.03      RCHRES   1     3
IMPLND   1                       2.07      RCHRES   1     5
IMPLND  14                       1.51      RCHRES   1     5
Basin  2***
PERLND  16                      10.26      RCHRES   1     2
PERLND  16                      10.26      RCHRES   1     3
IMPLND   1                        4.4      RCHRES   1     5

******Routing******
PERLND  10                       11.2      COPY     1    12
PERLND  16                       7.03      COPY     1    12
IMPLND   1                       2.07      COPY     1    15
IMPLND  14                       1.51      COPY     1    15
PERLND  10                       11.2      COPY     1    13
PERLND  16                       7.03      COPY     1    13
PERLND  16                      10.26      COPY     1    12
IMPLND   1                        4.4      COPY     1    15
PERLND  16                      10.26      COPY     1    13
RCHRES   1                          1      COPY   501    17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1


<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
```

```
    RCHRES        Name          Nexits   Unit Systems   Printer                  ***
    # -   #<-------------------><---> User T-series  Engl Metr LKFG              ***
                                            in  out                               ***
    1      Trapezoidal Pond-005     2     1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -   # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1          1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -   # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1          4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                          ***
    # -   #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
    1        0  1  0  0    4  5  0  0  0       0  0  0  0  0        2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -   #    FTABNO        LEN      DELTH      STCOR        KS       DB50        ***
  <------><--------><--------><--------><--------><--------><-------->             ***
    1              1       0.01        0.0        0.0       0.5        0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                             ***
    # -   # ***   VOL      Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft      for each possible exit        for each possible exit
  <------><-------->      <---><---><---><---><---> *** <---><---><---><---><--->
    1          0            4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE       1
   91    5
     Depth       Area     Volume   Outflow1   Outflow2  Velocity  Travel Time***
      (ft)     (acres)  (acre-ft)    (cfs)      (cfs)   (ft/sec)    (Minutes)***
  0.000000   0.749828   0.000000   0.000000   0.000000
  0.088889   0.761617   0.067175   0.000000   3.213323
  0.177778   0.773419   0.135399   0.000000   3.213323
  0.266667   0.785234   0.204673   0.000000   3.213323
  0.355556   0.797062   0.274997   0.000000   3.213323
  0.444444   0.808904   0.346373   0.000000   3.213323
  0.533333   0.820758   0.418803   0.000000   3.213323
  0.622222   0.832626   0.492286   0.000000   3.213323
  0.711111   0.844506   0.566825   0.000000   3.213323
  0.800000   0.856400   0.642421   0.000000   3.213323
  0.888889   0.868307   0.719075   0.000000   3.213323
  0.977778   0.880226   0.796787   0.000000   3.213323
  1.066667   0.892159   0.875560   0.000000   3.213323
  1.155556   0.904105   0.955394   0.000000   3.213323
  1.244444   0.916064   1.036291   0.000000   3.213323
  1.333333   0.928036   1.118250   0.000000   3.213323
  1.422222   0.940021   1.201275   0.000000   3.213323
  1.511111   0.952019   1.285366   0.000000   3.213323
  1.600000   0.964030   1.370524   0.000000   3.213323
  1.688889   0.976054   1.456750   0.000000   3.213323
  1.777778   0.988091   1.544045   0.000000   3.213323
  1.866667   1.000142   1.632411   0.000000   3.213323
```

1.955556	1.012205	1.721848	0.000000	3.213323
2.044444	1.024282	1.812359	0.000000	3.213323
2.133333	1.036371	1.903944	0.000000	3.213323
2.222222	1.048474	1.996603	0.000000	3.213323
2.311111	1.060589	2.090339	0.000000	3.213323
2.400000	1.072718	2.185153	0.000000	3.213323
2.488889	1.084860	2.281045	0.000000	3.213323
2.577778	1.097015	2.378018	0.000000	3.213323
2.666667	1.109182	2.476071	0.000000	3.213323
2.755556	1.121363	2.575206	0.000000	3.213323
2.844444	1.133557	2.675425	0.000000	3.213323
2.933333	1.145764	2.776728	0.000000	3.213323
3.022222	1.157984	2.879117	0.000000	3.213323
3.111111	1.170218	2.982593	0.000000	3.213323
3.200000	1.182464	3.087156	0.000000	3.213323
3.288889	1.194723	3.192809	0.000000	3.213323
3.377778	1.206995	3.299552	0.000000	3.213323
3.466667	1.219281	3.407387	0.000000	3.213323
3.555556	1.231579	3.516314	0.000000	3.213323
3.644444	1.243891	3.626335	0.000000	3.213323
3.733333	1.256215	3.737450	0.000000	3.213323
3.822222	1.268553	3.849662	0.000000	3.213323
3.911111	1.280904	3.962972	0.000000	3.213323
4.000000	1.293268	4.077379	0.000000	3.213323
4.088889	1.305644	4.192886	0.000000	3.213323
4.177778	1.318034	4.309494	0.000000	3.213323
4.266667	1.330437	4.427204	0.000000	3.213323
4.355556	1.342853	4.546017	0.000000	3.213323
4.444444	1.355282	4.665934	0.000000	3.213323
4.533333	1.367724	4.786957	0.000000	3.213323
4.622222	1.380180	4.909086	0.000000	3.213323
4.711111	1.392648	5.032323	0.000000	3.213323
4.800000	1.405129	5.156668	0.000000	3.213323
4.888889	1.417623	5.282124	0.000000	3.213323
4.977778	1.430131	5.408691	0.000000	3.213323
5.066667	1.442651	5.536370	0.000000	3.213323
5.155556	1.455185	5.665163	0.000000	3.213323
5.244444	1.467732	5.795070	0.000000	3.213323
5.333333	1.480291	5.926093	0.000000	3.213323
5.422222	1.492864	6.058234	0.000000	3.213323
5.511111	1.505450	6.191492	0.000000	3.213323
5.600000	1.518049	6.325870	0.000000	3.213323
5.688889	1.530660	6.461368	0.000000	3.213323
5.777778	1.543285	6.597988	0.000000	3.213323
5.866667	1.555923	6.735730	0.000000	3.213323
5.955556	1.568575	6.874597	0.000000	3.213323
6.044444	1.581239	7.014588	0.000000	3.213323
6.133333	1.593916	7.155706	0.000000	3.213323
6.222222	1.606606	7.297952	0.000000	3.213323
6.311111	1.619309	7.441326	0.000000	3.213323
6.400000	1.632026	7.585830	0.000000	3.213323
6.488889	1.644755	7.731464	0.000000	3.213323
6.577778	1.657498	7.878231	0.000000	3.213323
6.666667	1.670253	8.026131	0.000000	3.213323
6.755556	1.683022	8.175166	0.000000	3.213323
6.844444	1.695804	8.325336	0.000000	3.213323
6.933333	1.708598	8.476642	0.000000	3.213323
7.022222	1.721406	8.629087	0.064525	3.213323
7.111111	1.734227	8.782671	0.721407	3.213323
7.200000	1.747061	8.937395	1.742165	3.213323
7.288889	1.759908	9.093260	3.024410	3.213323
7.377778	1.772768	9.250268	4.522712	3.213323
7.466667	1.785641	9.408419	6.209470	3.213323
7.555556	1.798527	9.567716	8.065580	3.213323
7.644444	1.811426	9.728158	10.07680	3.213323
7.733333	1.824339	9.889748	12.23197	3.213323
7.822222	1.837264	10.05249	14.52206	3.213323
7.911111	1.850202	10.21637	16.93953	3.213323
8.000000	1.863154	10.38141	19.47800	3.213323

END FTABLE 1

```
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      1 1        1      WDM   1001 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      2 1        1      WDM   1002 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1003 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>    <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK         2
PERLND      PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK     2

  MASS-LINK         3
PERLND      PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK     3

  MASS-LINK         5
IMPLND      IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK     5

  MASS-LINK        12
PERLND      PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    12

  MASS-LINK        13
PERLND      PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    13

  MASS-LINK        15
IMPLND      IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    15

  MASS-LINK        17
RCHRES      OFLOW  OVOL    1                COPY           INPUT  MEAN
  END MASS-LINK    17


END MASS-LINK

END RUN
```

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WWHM2012

PROJECT REPORT

General Model Information

Project Name:	default
Site Name:	Tract B Pond
Site Address:	
City:	
Report Date:	8/13/2013
Gage:	Fairgrounds (Kaiser)
Data Start:	1955/10/01
Data End:	2011/09/30
Timestep:	15 Minute
Precip Scale:	1.00
Version:	2013/06/26

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data
Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Forest, Steep	15.7
Pervious Total	15.7
Impervious Land Use	Acres
Impervious Total	0
Basin Total	15.7

← PREDEVELOPED AREAS

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No
Pervious Land Use	Acres
C, Lawn, Flat	9.58
C, Pasture, Steep	1.66
Pervious Total	11.24
Impervious Land Use	Acres
ROADS FLAT	1.6
ROADS STEEP	1.6
POND	1.36
Impervious Total	4.56
Basin Total	15.8

Developed AREAS

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length:	158.11 ft.
Bottom Width:	158.11 ft.
Depth:	7 ft.
Volume at riser head:	4.3447 acre-ft.
Side slope 1:	3 To 1
Side slope 2:	3 To 1
Side slope 3:	3 To 1
Side slope 4:	3 To 1
Discharge Structure	
Riser Height:	6 ft.
Riser Diameter:	18 in.
Orifice 1 Diameter:	2.81 in. Elevation:0 ft.
Orifice 2 Diameter:	7.34 in. Elevation:4.002 ft.
Orifice 3 Diameter:	4.44 in. Elevation:4.5 ft.
Element Flows To:	
Outlet 1	Outlet 2

Design Pond Configuration

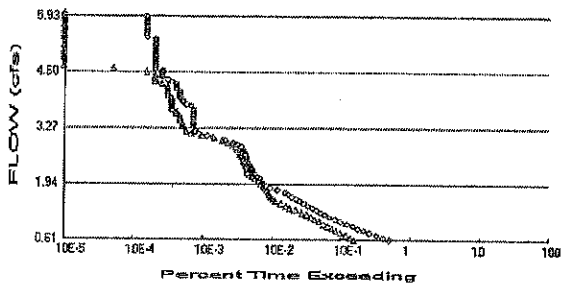
Pond Hydraulic Table

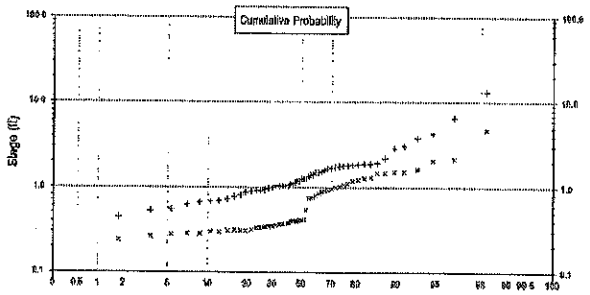
Stage(ft)	Area(ac)	Volume(ac-ft)	Discharge(cfs)	Infilt(cfs)
0.0000	0.573	0.000	0.000	0.000
0.0778	0.577	0.044	0.057	0.000
0.1556	0.580	0.089	0.081	0.000
0.2333	0.584	0.135	0.100	0.000
0.3111	0.587	0.180	0.115	0.000
0.3889	0.591	0.226	0.129	0.000
0.4667	0.594	0.272	0.141	0.000
0.5444	0.597	0.319	0.153	0.000
0.6222	0.601	0.365	0.163	0.000
0.7000	0.604	0.412	0.173	0.000
0.7778	0.608	0.459	0.182	0.000
0.8556	0.611	0.507	0.191	0.000
0.9333	0.615	0.554	0.200	0.000
1.0111	0.618	0.602	0.208	0.000
1.0889	0.622	0.651	0.216	0.000
1.1667	0.625	0.699	0.224	0.000
1.2444	0.629	0.748	0.231	0.000
1.3222	0.632	0.797	0.238	0.000
1.4000	0.636	0.846	0.245	0.000
1.4778	0.640	0.896	0.252	0.000
1.5556	0.643	0.946	0.258	0.000
1.6333	0.647	0.996	0.265	0.000
1.7111	0.650	1.047	0.271	0.000
1.7889	0.654	1.097	0.277	0.000
1.8667	0.658	1.148	0.283	0.000
1.9444	0.661	1.200	0.289	0.000
2.0222	0.665	1.251	0.294	0.000
2.1000	0.669	1.303	0.300	0.000
2.1778	0.672	1.355	0.306	0.000
2.2556	0.676	1.408	0.311	0.000
2.3333	0.680	1.461	0.316	0.000
2.4111	0.683	1.514	0.322	0.000
2.4889	0.687	1.567	0.327	0.000

2.5667	0.691	1.621	0.332	0.000
2.6444	0.694	1.675	0.337	0.000
2.7222	0.698	1.729	0.342	0.000
2.8000	0.702	1.783	0.347	0.000
2.8778	0.706	1.838	0.351	0.000
2.9556	0.709	1.893	0.356	0.000
3.0333	0.713	1.948	0.361	0.000
3.1111	0.717	2.004	0.365	0.000
3.1889	0.721	2.060	0.370	0.000
3.2667	0.725	2.116	0.374	0.000
3.3444	0.728	2.173	0.379	0.000
3.4222	0.732	2.230	0.383	0.000
3.5000	0.736	2.287	0.388	0.000
3.5778	0.740	2.344	0.392	0.000
3.6556	0.744	2.402	0.396	0.000
3.7333	0.748	2.460	0.400	0.000
3.8111	0.751	2.518	0.404	0.000
3.8889	0.755	2.577	0.409	0.000
3.9667	0.759	2.636	0.413	0.000
4.0444	0.763	2.695	0.708	0.000
4.1222	0.767	2.755	0.911	0.000
4.2000	0.771	2.814	1.054	0.000
4.2778	0.775	2.875	1.172	0.000
4.3556	0.779	2.935	1.274	0.000
4.4333	0.783	2.996	1.366	0.000
4.5111	0.787	3.057	1.504	0.000
4.5889	0.791	3.118	1.682	0.000
4.6667	0.795	3.180	1.813	0.000
4.7444	0.799	3.242	1.926	0.000
4.8222	0.803	3.304	2.030	0.000
4.9000	0.807	3.367	2.127	0.000
4.9778	0.811	3.430	2.218	0.000
5.0556	0.815	3.493	2.304	0.000
5.1333	0.819	3.557	2.386	0.000
5.2111	0.823	3.621	2.465	0.000
5.2889	0.827	3.685	2.542	0.000
5.3667	0.831	3.749	2.615	0.000
5.4444	0.835	3.814	2.686	0.000
5.5222	0.839	3.879	2.755	0.000
5.6000	0.843	3.945	2.822	0.000
5.6778	0.847	4.010	2.887	0.000
5.7556	0.852	4.077	2.951	0.000
5.8333	0.856	4.143	3.013	0.000
5.9111	0.860	4.210	3.074	0.000
5.9889	0.864	4.277	3.133	0.000
6.0667	0.868	4.344	3.443	0.000
6.1444	0.872	4.412	4.051	0.000
6.2222	0.876	4.480	4.835	0.000
6.3000	0.881	4.548	5.760	0.000
6.3778	0.885	4.617	6.806	0.000
6.4556	0.889	4.686	7.959	0.000
6.5333	0.893	4.755	9.209	0.000
6.6111	0.898	4.825	10.55	0.000
6.6889	0.902	4.895	11.97	0.000
6.7667	0.906	4.965	13.47	0.000
6.8444	0.910	5.036	15.05	0.000
6.9222	0.915	5.107	16.70	0.000
7.0000	0.919	5.178	18.42	0.000

7.0778	0.923	5.250	20.21	0.000

Analysis Results
POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 15.7
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 11.24
Total Impervious Area: 4.56

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	1.21191
5 year	2.166262
10 year	3.048917
25 year	4.523112
50 year	5.934516
100 year	7.663957

Predev Flows

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.565103
5 year	1.057945
10 year	1.509366
25 year	2.25251
50 year	2.952372
100 year	3.796506

Dev Flows

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	1.587	0.783
1957	2.903	0.762
1958	0.668	0.276
1959	1.073	0.399
1960	1.488	1.634
1961	0.985	0.400
1962	0.438	0.282
1963	3.803	1.007
1964	1.034	0.396
1965	1.260	0.353

1966	0.616	0.307
1967	1.245	0.382
1968	0.969	0.342
1969	0.551	0.308
1970	0.922	0.408
1971	1.404	0.903
1972	1.734	1.478
1973	1.036	1.185
1974	0.763	0.412
1975	0.888	0.309
1976	1.323	1.290
1977	1.038	0.235
1978	1.778	0.997
1979	1.040	0.318
1980	1.700	0.871
1981	1.805	0.753
1982	1.855	0.730
1983	1.894	0.396
1984	1.170	0.360
1985	0.523	0.306
1986	1.897	1.216
1987	1.502	1.506
1988	0.808	0.362
1989	0.904	0.296
1990	2.192	2.147
1991	4.336	4.700
1992	13.401	1.534
1993	1.519	0.368
1994	0.693	0.262
1995	1.246	1.083
1996	1.900	2.060
1997	6.649	0.836
1998	3.035	0.341
1999	1.127	1.311
2000	0.670	0.333
2001	0.256	0.214
2002	1.180	0.952
2003	0.907	0.293
2004	1.828	0.538
2005	0.723	0.280
2006	1.101	0.362
2007	0.876	1.096
2008	1.414	0.932
2009	1.797	1.488
2010	1.662	0.325
2011	1.026	0.407

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	13.4006	4.7002
2	6.6492	2.1473
3	4.3359	2.0602
4	3.8030	1.6341
5	3.0349	1.5335
6	2.9034	1.5059
7	2.1923	1.4877
8	1.8996	1.4782

9	1.8969	1.3113
10	1.8945	1.2904
11	1.8545	1.2156
12	1.8275	1.1854
13	1.8046	1.0960
14	1.7973	1.0830
15	1.7783	1.0068
16	1.7345	0.9966
17	1.7000	0.9520
18	1.6619	0.9323
19	1.5868	0.9026
20	1.5189	0.8707
21	1.5016	0.8363
22	1.4885	0.7829
23	1.4139	0.7618
24	1.4042	0.7533
25	1.3232	0.7303
26	1.2598	0.5377
27	1.2464	0.4119
28	1.2448	0.4083
29	1.1805	0.4072
30	1.1696	0.4000
31	1.1268	0.3988
32	1.1012	0.3963
33	1.0730	0.3955
34	1.0404	0.3822
35	1.0376	0.3682
36	1.0361	0.3623
37	1.0339	0.3618
38	1.0259	0.3604
39	0.9852	0.3526
40	0.9689	0.3416
41	0.9221	0.3410
42	0.9073	0.3330
43	0.9042	0.3250
44	0.8885	0.3176
45	0.8759	0.3094
46	0.8078	0.3085
47	0.7631	0.3070
48	0.7228	0.3060
49	0.6926	0.2957
50	0.6699	0.2933
51	0.6679	0.2825
52	0.6162	0.2805
53	0.5511	0.2761
54	0.5231	0.2617
55	0.4376	0.2350
56	0.2557	0.2139

Duration Flows
The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.6060	9576	2963	30	Pass
0.6598	7792	2621	33	Pass
0.7136	6321	2299	36	Pass
0.7674	5037	1909	37	Pass
0.8213	4127	1653	40	Pass
0.8751	3438	1417	41	Pass
0.9289	2863	1241	43	Pass
0.9827	2329	1086	46	Pass
1.0365	1903	951	49	Pass
1.0904	1591	808	50	Pass
1.1442	1333	716	53	Pass
1.1980	1130	618	54	Pass
1.2518	981	527	53	Pass
1.3057	853	423	49	Pass
1.3595	751	349	46	Pass
1.4133	644	307	47	Pass
1.4671	563	259	46	Pass
1.5210	489	217	44	Pass
1.5748	431	205	47	Pass
1.6286	380	190	50	Pass
1.6824	337	181	53	Pass
1.7363	302	172	56	Pass
1.7901	234	163	69	Pass
1.8439	183	153	83	Pass
1.8977	158	145	91	Pass
1.9516	144	135	93	Pass
2.0054	137	124	90	Pass
2.0592	128	108	84	Pass
2.1130	118	100	84	Pass
2.1668	108	90	83	Pass
2.2207	104	87	83	Pass
2.2745	102	85	83	Pass
2.3283	96	83	86	Pass
2.3821	93	80	86	Pass
2.4360	89	78	87	Pass
2.4898	86	75	87	Pass
2.5436	84	72	85	Pass
2.5974	83	70	84	Pass
2.6513	80	67	83	Pass
2.7051	78	64	82	Pass
2.7589	75	61	81	Pass
2.8127	70	59	84	Pass
2.8666	60	52	86	Pass
2.9204	52	44	84	Pass
2.9742	41	38	92	Pass
3.0280	27	28	103	Pass
3.0819	22	19	86	Pass
3.1357	17	13	76	Pass
3.1895	15	11	73	Pass
3.2433	15	11	73	Pass
3.2971	14	10	71	Pass
3.3510	14	10	71	Pass
3.4048	14	10	71	Pass

3.4586	14	9	64	Pass
3.5124	14	9	64	Pass
3.5663	14	9	64	Pass
3.6201	14	8	57	Pass
3.6739	14	8	57	Pass
3.7277	14	7	50	Pass
3.7816	13	7	53	Pass
3.8354	11	7	63	Pass
3.8892	10	7	70	Pass
3.9430	10	7	70	Pass
3.9969	9	7	77	Pass
4.0507	9	6	66	Pass
4.1045	9	6	66	Pass
4.1583	9	6	66	Pass
4.2122	8	6	75	Pass
4.2660	8	6	75	Pass
4.3198	8	5	62	Pass
4.3736	7	4	57	Pass
4.4274	6	4	66	Pass
4.4813	5	4	80	Pass
4.5351	5	4	80	Pass
4.5889	5	3	60	Pass
4.6427	5	3	60	Pass
4.6966	4	1	25	Pass
4.7504	4	0	0	Pass
4.8042	4	0	0	Pass
4.8580	4	0	0	Pass
4.9119	4	0	0	Pass
4.9657	4	0	0	Pass
5.0195	4	0	0	Pass
5.0733	4	0	0	Pass
5.1272	4	0	0	Pass
5.1810	4	0	0	Pass
5.2348	4	0	0	Pass
5.2886	4	0	0	Pass
5.3425	4	0	0	Pass
5.3963	4	0	0	Pass
5.4501	3	0	0	Pass
5.5039	3	0	0	Pass
5.5577	3	0	0	Pass
5.6116	3	0	0	Pass
5.6654	3	0	0	Pass
5.7192	3	0	0	Pass
5.7730	3	0	0	Pass
5.8269	3	0	0	Pass
5.8807	3	0	0	Pass
5.9345	3	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0.7406 acre-feet
On-line facility target flow:	0.3743 cfs.
Adjusted for 15 min:	0.3743 cfs.
Off-line facility target flow:	0.2426 cfs.
Adjusted for 15 min:	0.2426 cfs.

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

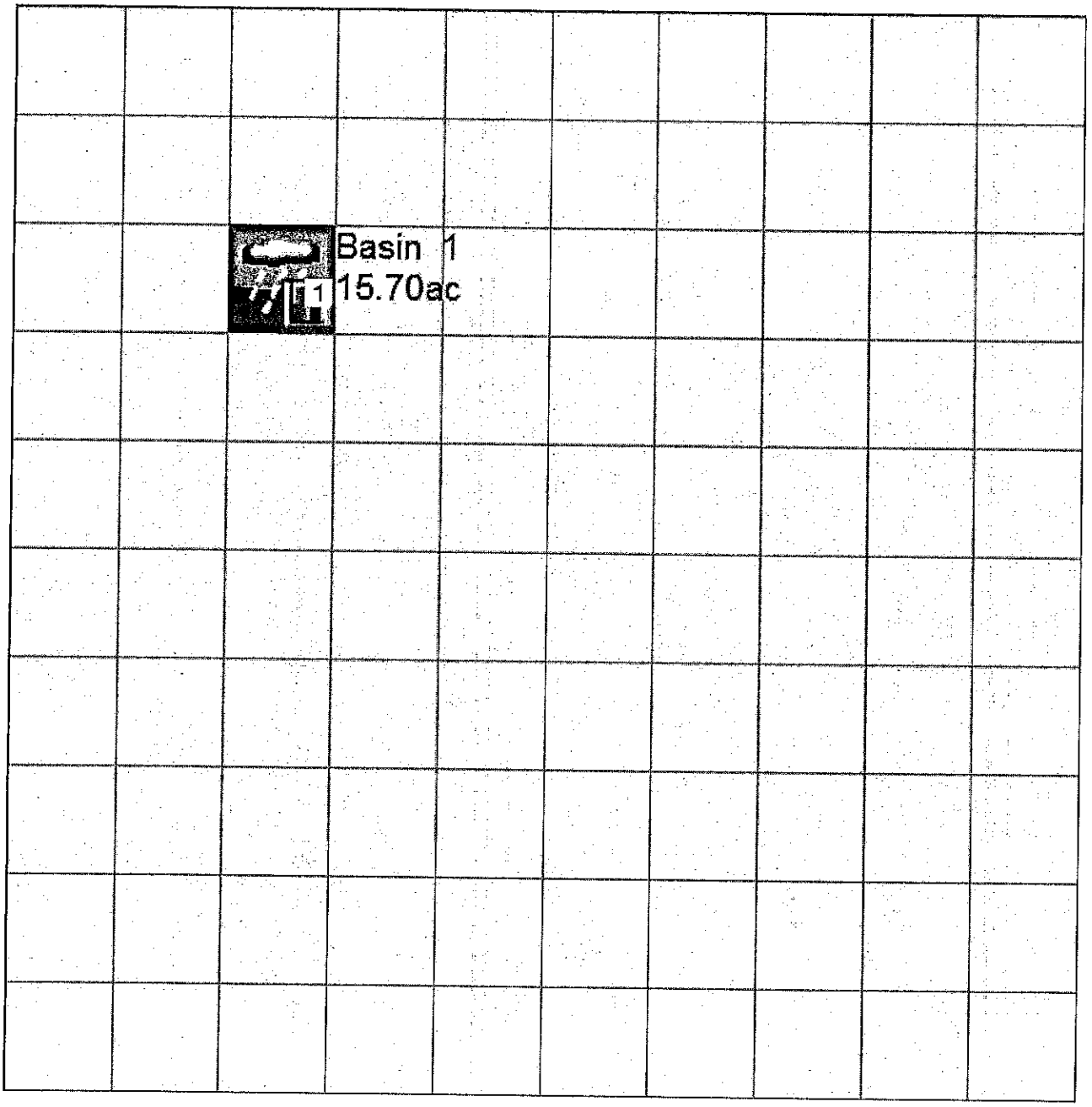
No PERLND changes have been made.

IMPLND Changes

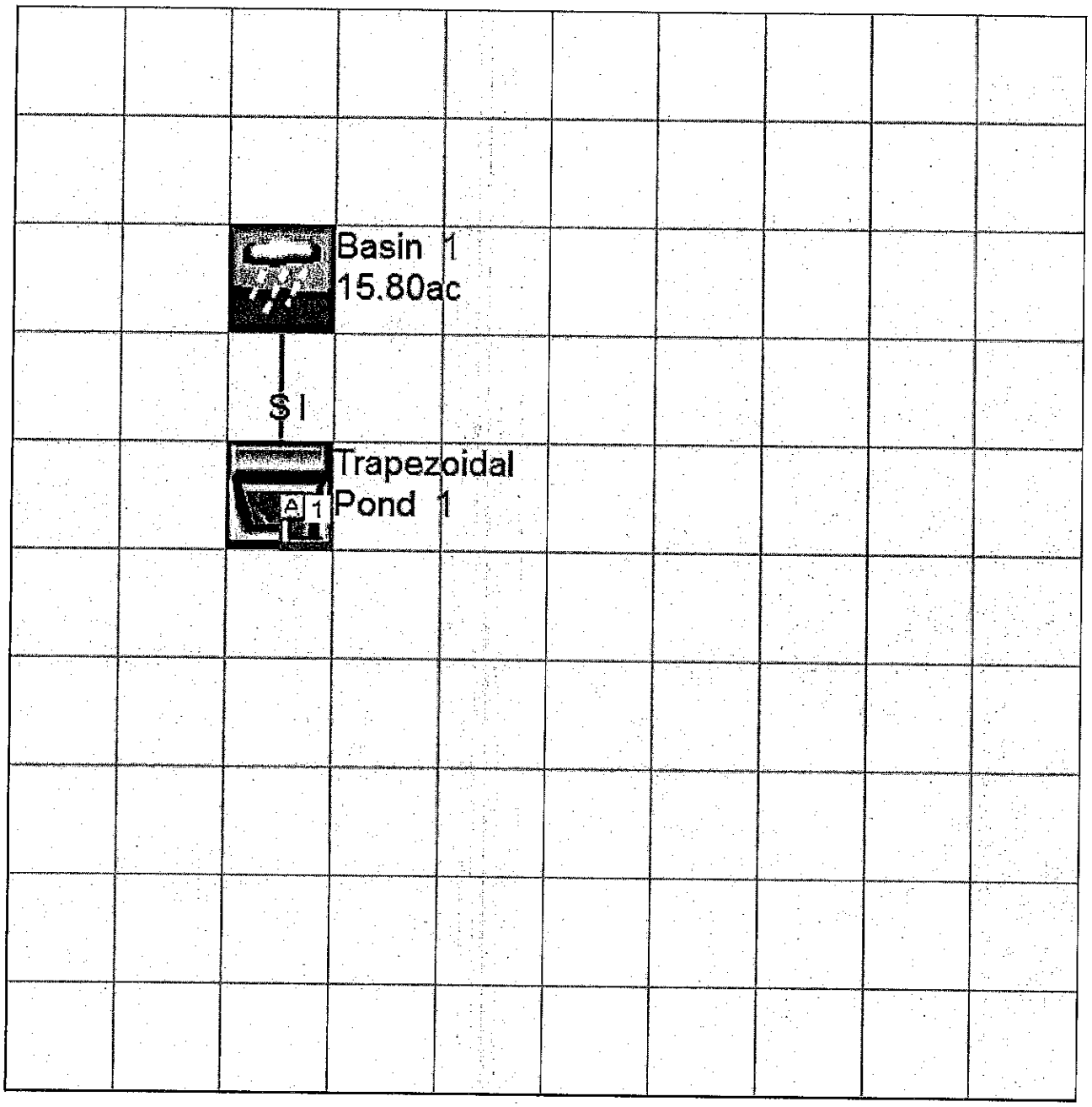
No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01         END    2011 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                               ***
WDM        26   default.wdm
MESSU      25   Predefault.MES
           27   Predefault.L61
           28   Predefault.L62
           30   POCdefault1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND      12
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
   # -   #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
   1        Basin  1                    MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -   #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #     # OPCD ***
  END OPCODE
  PARM
    #     #          K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -   #                          User  t-series Engl Metr ***
                                            in  out           ***
   12      C, Forest, Steep        1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -   # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   12         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -   # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   12         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -   # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   12          0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >       PWATER input info: Part 2          ***
    # -   # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   12               0       4.5      0.08       400      0.15       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >       PWATER input info: Part 3          ***
    # -   # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   12               0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >      PWATER input info: Part 4                                  ***
    # -   #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   12             0.2       0.3      0.35         6       0.3       0.7
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -   # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   12               0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -   #                     User  t-series Engl Metr ***
                                       in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -   # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -   # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -   # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2          ***
    # -   # ***  LSUR      SLSUR      NSUR     RETSC
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3          ***
    # -   # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -   # ***  RETS      SURS
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                    <--Area-->     <-Target->   MBLK    ***
<Name>   #                    <-factor->     <Name>   #   Tbl#    ***
Basin  1***
PERLND  12                          15.7     COPY   501     12
PERLND  12                          15.7     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1


<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<----------------------><---> User T-series  Engl Metr LKFG        ***
                                          in  out                             ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                   ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                      ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
```

```
WDM       1 EVAP     ENGL    0.76            PERLND   1 999 EXTNL  PETINP
WDM       1 EVAP     ENGL    0.76            IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>    #        <Name> # #<-factor->strg <Name>    #  <Name>    tem strg strg***
COPY    501 OUTPUT MEAN    1 1     48.4     WDM     501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>    <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        12
PERLND      PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    12

  MASS-LINK        13
PERLND      PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1955 10 01         END    2011 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                               ***
WDM        26   default.wdm
MESSU      25   Mitdefault.MES
           27   Mitdefault.L61
           28   Mitdefault.L62
           30   POCdefault1.dat
END FILES

OPN SEQUENCE
    INGRP                INDELT 00:15
      PERLND      16
      PERLND      15
      IMPLND       1
      IMPLND       3
      IMPLND      14
      RCHRES       1
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Trapezoidal Pond  1         MAX                   1   2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #          K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                           in  out            ***
   16      C, Lawn, Flat            1    1    1    1   27    0
   15      C, Pasture, Steep        1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
   16         0    0    1    0    0    0    0    0    0    0    0    0
   15         0    0    1    0    0    0    0    0    0    0    0    0
```

```
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -   # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
   16         0    0    4    0    0    0    0    0    0    0    0    0    1    9
   15         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -   # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
   16         0    0    0    0    0    0    0    0    0    0    0
   15         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2          ***
    # -   # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
   16              0       4.5      0.03       400      0.05       0.5     0.996
   15              0       4.5      0.06       400      0.15       0.5     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3          ***
    # -   # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
   16              0         0         2         2         0         0         0
   15              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                                  ***
    # -   #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
   16             0.1      0.25      0.25         6       0.5      0.25
   15            0.15      0.25       0.3         6       0.3       0.4
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
             ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -   # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
   16              0         0         0         0       2.5         1         0
   15              0         0         0         0       2.5         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -   #                     User  t-series Engl Metr ***
                                       in  out            ***
    1       ROADS/FLAT            1    1    1   27    0
    3       ROADS/STEEP           1    1    1   27    0
   14       POND                  1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -   # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    1         0    0    1    0    0    0
    3         0    0    1    0    0    0
   14         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -   # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    1         0    0    4    0    0    0    1    9
    3         0    0    4    0    0    0    1    9
```

```
  14          0     0     4     0     0     0     1     9
 END PRINT-INFO

 IWAT-PARM1
   <PLS >  IWATER variable monthly parameter value flags  ***
   # -   # CSNO RTOP  VRS  VNN RTLI      ***
   1          0    0    0    0    0
   3          0    0    0    0    0
  14          0    0    0    0    0
 END IWAT-PARM1

 IWAT-PARM2
   <PLS >       IWATER input info: Part 2          ***
   # -   # ***  LSUR      SLSUR      NSUR      RETSC
   1             400       0.01       0.1        0.1
   3             400        0.1       0.1       0.05
  14             400       0.01       0.1        0.1
 END IWAT-PARM2

 IWAT-PARM3
   <PLS >       IWATER input info: Part 3          ***
   # -   # ***PETMAX    PETMIN
   1              0         0
   3              0         0
  14              0         0
 END IWAT-PARM3

 IWAT-STATE1
   <PLS > *** Initial conditions at start of simulation
   # -   # ***  RETS      SURS
   1              0         0
   3              0         0
  14              0         0
 END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                    <--Area-->     <-Target->   MBLK    ***
<Name>   #                    <-factor->     <Name>   #   Tbl#    ***
Basin  1***
PERLND  16                          9.58     RCHRES   1      2
PERLND  16                          9.58     RCHRES   1      3
PERLND  15                          1.66     RCHRES   1      2
PERLND  15                          1.66     RCHRES   1      3
IMPLND   1                           1.6     RCHRES   1      5
IMPLND   3                           1.6     RCHRES   1      5
IMPLND  14                          1.36     RCHRES   1      5

******Routing******
PERLND  16                          9.58     COPY     1     12
PERLND  15                          1.66     COPY     1     12
IMPLND   1                           1.6     COPY     1     15
IMPLND   3                           1.6     COPY     1     15
IMPLND  14                          1.36     COPY     1     15
PERLND  16                          9.58     COPY     1     13
PERLND  15                          1.66     COPY     1     13
RCHRES   1                             1     COPY   501     16
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1


<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK
```

```
RCHRES
  GEN-INFO
    RCHRES        Name         Nexits   Unit Systems   Printer                  ***
    # -   #<------------------><---> User T-series  Engl Metr LKFG             ***
                                          in  out                               ***
    1     Trapezoidal Pond-005    1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -   # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ******************* PIVL  PYR
    # -   # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                        ***
    # -   #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
    1        0  1  0  0    4  0  0  0  0       0  0  0  0  0        2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -   #    FTABNO       LEN      DELTH      STCOR        KS       DB50       ***
  <------><--------><--------><--------><--------><--------><--------->          ***
    1              1      0.03        0.0        0.0       0.5        0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                           ***
    # -   # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><--------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1         0            4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   91    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)    (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.573893  0.000000  0.000000
  0.077778  0.577286  0.044768  0.057836
  0.155556  0.580688  0.089800  0.081793
  0.233333  0.584101  0.135098  0.100175
  0.311111  0.587524  0.180661  0.115672
  0.388889  0.590956  0.226491  0.129326
  0.466667  0.594399  0.272588  0.141669
  0.544444  0.597852  0.318953  0.153020
  0.622222  0.601315  0.365587  0.163585
  0.700000  0.604787  0.412491  0.173508
  0.777778  0.608270  0.459666  0.182894
  0.855556  0.611763  0.507112  0.191821
  0.933333  0.615265  0.554829  0.200350
  1.011111  0.618778  0.602820  0.208531
  1.088889  0.622301  0.651084  0.216403
  1.166667  0.625834  0.699623  0.223998
  1.244444  0.629376  0.748436  0.231345
  1.322222  0.632929  0.797526  0.238465
  1.400000  0.636492  0.846892  0.245378
```

1.477778	0.640064	0.896536	0.252102
1.555556	0.643647	0.946458	0.258651
1.633333	0.647240	0.996660	0.265039
1.711111	0.650843	1.047141	0.271276
1.788889	0.654455	1.097902	0.277372
1.866667	0.658078	1.148945	0.283338
1.944444	0.661711	1.200270	0.289181
2.022222	0.665353	1.251878	0.294908
2.100000	0.669006	1.303770	0.300525
2.177778	0.672669	1.355946	0.306040
2.255556	0.676341	1.408408	0.311457
2.333333	0.680024	1.461155	0.316782
2.411111	0.683717	1.514190	0.322018
2.488889	0.687420	1.567512	0.327171
2.566667	0.691132	1.621122	0.332243
2.644444	0.694855	1.675021	0.337240
2.722222	0.698588	1.729211	0.342163
2.800000	0.702330	1.783691	0.347017
2.877778	0.706083	1.838463	0.351804
2.955556	0.709846	1.893527	0.356526
3.033333	0.713618	1.948884	0.361187
3.111111	0.717401	2.004534	0.365788
3.188889	0.721194	2.060480	0.370332
3.266667	0.724996	2.116720	0.374821
3.344444	0.728809	2.173257	0.379257
3.422222	0.732632	2.230091	0.383642
3.500000	0.736464	2.287223	0.387977
3.577778	0.740307	2.344653	0.392264
3.655556	0.744160	2.402382	0.396505
3.733333	0.748023	2.460411	0.400701
3.811111	0.751895	2.518741	0.404853
3.888889	0.755778	2.577373	0.408963
3.966667	0.759671	2.636307	0.413033
4.044444	0.763573	2.695544	0.708578
4.122222	0.767486	2.755086	0.911672
4.200000	0.771409	2.814931	1.054635
4.277778	0.775341	2.875083	1.171996
4.355556	0.779284	2.935540	1.274163
4.433333	0.783237	2.996305	1.365957
4.511111	0.787199	3.057378	1.504662
4.588889	0.791172	3.118759	1.682612
4.666667	0.795155	3.180449	1.812964
4.744444	0.799147	3.242450	1.926923
4.822222	0.803150	3.304761	2.030799
4.900000	0.807163	3.367385	2.127396
4.977778	0.811185	3.430320	2.218310
5.055556	0.815218	3.493569	2.304581
5.133333	0.819261	3.557132	2.386939
5.211111	0.823313	3.621010	2.465929
5.288889	0.827376	3.685204	2.541969
5.366667	0.831448	3.749714	2.615396
5.444444	0.835531	3.814541	2.686480
5.522222	0.839624	3.879686	2.755449
5.600000	0.843726	3.945149	2.822491
5.677778	0.847839	4.010932	2.887770
5.755556	0.851962	4.077036	2.951426
5.833333	0.856094	4.143460	3.013579
5.911111	0.860237	4.210206	3.074337
5.988889	0.864390	4.277275	3.133794
6.066667	0.868552	4.344667	3.443494
6.144444	0.872725	4.412384	4.051099
6.222222	0.876908	4.480425	4.835490
6.300000	0.881100	4.548792	5.760584
6.377778	0.885303	4.617485	6.806246
6.455556	0.889516	4.686506	7.959125
6.533333	0.893738	4.755855	9.209520
6.611111	0.897971	4.825532	10.54997
6.688889	0.902213	4.895540	11.97451
6.766667	0.906466	4.965877	13.47823
6.844444	0.910729	5.036546	15.05698

```
  6.922222  0.915001  5.107546  16.70721
  7.000000  0.919284  5.178880  18.42583
  END FTABLE  1
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1              PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1              IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.76           PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.76           IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
RCHRES   1 HYDR   RO     1 1        1      WDM   1000 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1001 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>    <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>             <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK         2
PERLND      PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK     2

  MASS-LINK         3
PERLND      PWATER IFWO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK     3

  MASS-LINK         5
IMPLND      IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK     5

  MASS-LINK        12
PERLND      PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    12

  MASS-LINK        13
PERLND      PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    13

  MASS-LINK        15
IMPLND      IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK    15

  MASS-LINK        16
RCHRES      ROFLOW                          COPY           INPUT  MEAN
  END MASS-LINK    16


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

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SCOTT H. SPENCE

MITIGATED DETERMINATION OF NONSIGNIFICANCE
SEPA/Case Number: 12-239

Description of Proposal: Preliminary subdivision for 83 single-family lots, across three parcels totaling 42.6 acres. An 11.45 acre portion of the site is proposed to be set aside for future multifamily development. Approximately 17 acres is proposed to be set aside as open space (wetlands, buffers, tree tracts, landscaping, and active recreation).

Proponent: Taylor Development/Gateway 850, LLC

Location of Proposal: The site is unaddressed but is generally located at the northwest corner of the intersection of Britton Parkway NE and Gateway Boulevard. Assessor's parcel nos 11803340100, 11803430000 and 11810103000. The project is located in a portion of Section 3, Township 18N, Range 1W, W.M., Lacey, Thurston County, Washington.

Lead Agency: City of Lacey Community Development Department

Threshold Determination: As provided by RCW 43.21C.240 and WAC 197-11-158, the lead agency has determined that the requirements for environmental analysis, protection, and mitigation measures have been adequately addressed in the applicable development regulations and comprehensive plan adopted under Chapter 36.70A RCW and in other local, state, or federal laws or rules. Therefore, this proposal is not likely to have a significant adverse impact upon the environment, an Environmental Impact Statement is not required under RCW 43.21C.030(2)(C), and the City of Lacey will not require additional mitigation measures under SEPA. This decision was made after review of an Environmental Checklist and other information on file with the City. This information is available to the public upon request.

_X__ The comment period, pursuant to WAC 197-11-355, was combined with the Notice of Application comment period, using the Optional DNS Process. The comment period closed on May 10, 2013.

Environmental Conditions:

EXHIBIT
14

1. Prior to final subdivision approval, the developer shall enter into a voluntary mitigation agreement with North Thurston Public Schools. The voluntary mitigation agreement shall specify the proportionate school impact fee amount per residential lot, adjusted for inflation at the time of payment. The voluntary mitigation agreement shall also specify the payment method for specified school impact fee by either lump sum for all residential lots or by a lot by lot basis payable at the time of building permit issuance. The voluntary mitigation agreement shall be signed by the developer and North Thurston Public Schools and recorded with the Thurston County Auditor and a copy of which shall be submitted to the City of Lacey prior to final plat approval.

2. Traffic impact fees mitigating impacts to Thurston County roads in the amount totaling $113,500 shall be paid to the City of Lacey prior to building permit issuance for each building. The City of Lacey will then forward to Thurston County the collected impact fees.

Findings of Fact:

1. North Thurston Public Schools (NTPS) submitted comments dated September 12, 2012, identifying probable significant adverse impacts to the North Thurston Public School system. NTPS stated in their letter; "The proposed residential lots are planned to be served by Pleasant Glade Elementary School, Chinook Middle School, and North Thurston High School. The district's schools are anticipated to be over capacity at all levels as a result of the cumulative effect of previously approved development. We estimate the proposed housing units will generate approximately .76 FTE students per single family lot and .40 FTE per multi-family unit. The estimate is based on multipliers derived from U.S. Census data as presented in Demographic Multipliers for Common Configurations of Standard Housing Types for School Age Children from the U.S. Department of Commerce. The District does not own sufficient land for additional schools nor sufficient facilities for projected additional students..." Based on the review of the application materials and comments received from NTPS, it is determined that the identified probable significant adverse impacts to the North Thurston Public School system will be mitigated with the payment of school impact fees through a voluntary mitigation agreement between the developer and NTPS established prior to final subdivision approval.

2. Under LMC 14.24.160 "Substantive Authority," of the City of Lacey Environmental Policy, the City has adopted by reference the Capital Improvement Plan for North Thurston Public Schools and the means for mitigating impacts upon such a plan.

3. The Thurston County Roads and Transportation Services Department submitted comments dated May 13, 2013, identifying three County road projects that will be impacted by traffic generated by this proposal. There will be 41 p.m. peak hour trips that impact the 15th Avenue NE widening and pedestrian improvement project, with a

proportionate per trip cost of $2,000. Also, 42 p.m. peak hour trips will impact the Draham Street NE widening and pedestrian improvement project, with a proportionate per trip cost of $750. Based on the review of the application materials and comments received from Thurston County, it is determined that the identified probable significant adverse impact to the Thurston County road system will be mitigated with the payment of traffic impact fees to Thurston County prior to building permit issuance for each building.

4. Under LMC 14.24.160 "Substantive Authority," of the City of Lacey Environmental Policy, the City has adopted by reference the transportation plan for Thurston County and the means for mitigating impacts upon such plan.

5. No other probable significant adverse impacts were identified through the review of the environmental checklist and application materials that would not be addressed and/or governed by the provisions of the Lacey Municipal code.

Assigned Staff Person: Samra Seymour, AICP, Associate Planner

Responsible Official: Rick Walk, AICP, Director of Community Development

Address: 420 College Street SE, Lacey, WA 98503

Phone: (360) 491-5642 **Fax:** (360) 438-2669

Date: September 12, 2013 **Signature:** _____

Appeal Deadline: **5:00 p.m. on September 26, 2013**

NOTE: Pursuant to RCW 43.21.C.075 and Lacey City Code 14.24.170(A), a project denial based upon environmental information, and a conditioned or mitigated Determination of Nonsignificance (DNS) may be appealed by any agency or aggrieved person. Appeals are filed ether with the Community Development Department when there is also an underlying governmental action or with the City Council if there is no underlying governmental action. Appeals to the City Council must be filed within fourteen (14) days of the issuance of the written decision (refer to the Lacey City Code for time periods on appeals filed with the Community Development Department).

Cc Mike Laverty, North Thurston Public Schools
Kevin Hughes, Thurston County Public Works, Development Review
Jeff Pantier, Hatton Godat Pantier
Kevin O'Brien, Taylor Development
Department of Ecology
File 12-239

NOTICE OF APPLICATION WITH THE OPTIONAL DNS PROCESS

The City of Lacey Department of Community Development has received the following application for Preliminary Subdivision.

Date Application Received:	April 24, 2013
Project Name:	Gateway Residential Division 1
Project Description:	Preliminary subdivision for 83 single-family lots, across three parcels totaling 42.6 acres. An 11.45 acre portion of the site is proposed to be set aside for future multifamily development. Approximately 17 acres will be set aside as open space (wetlands, buffers, tree tracts, landscaping, and active recreation).
Project Location:	The site is unaddressed but is generally located at the northwest corner of the intersection of Britton Parkway NE and Gateway Boulevard. Assessor's parcel nos 11803340100, 11803430000 and 11810103000. The project is located in a portion of Section 3, Township 18N, Range 1W, W.M., Lacey, Thurston County, Washington.

The following studies and/or reports are required as a part of this application:

Tree report, wetland delineation, Mazama Pocket Gopher study, stormwater report

This Application will undergo the following approval process:

Environmental Review:	A review of the submitted Environmental Checklist and other supporting studies will be conducted.
Other Permits/Approvals Required:	Construction drawing approvals, grading and building permits, residential design review

At minimum, this project will be subject to the following regulations:

LMC Title 14 "Buildings and Construction", Title 15 "Land Division", Title 16 "Zoning", IBC/IFC, Development Guidelines and Public Works Standards

On April 26, 2013 this application was deemed complete pursuant to RCW 36.70B.070. This determination of completeness means that the application is sufficient for continued review. This determination <u>does not</u> preclude the City of Lacey or other reviewing agencies from

EXHIBIT 15

requesting additional information or studies either at the time of this notice or subsequently, if new information is required or if substantial changes in the proposal occur.

Pursuant to WAC 197-11-355, the City of Lacey is using the Optional DNS process. The Optional Process enables the comment periods for the environmental review and notice of application to be integrated. The City of Lacey expects to issue a Mitigated Determination of Nonsignificance for this project. This commenting period may be your only opportunity to comment on the environmental impacts of the proposal. Copies of the environmental checklist and supporting materials may be reviewed at Lacey City Hall.

Anyone may review any document submitted as part of this project application and may comment on this proposal. No action will be taken on this application for 14 days from the date of this notice or before **May 10, 2013**.

If you would like to make written comments, these may be directed to **Samra Seymour, AICP, Associate Planner** in the Department of Community Development at the address below. If a public hearing is required as part of the application review process, any member of the public may request to be notified, and may give written or oral comment on the proposal to the Hearings Examiner, and may request a copy of any decisions made on the project. A request for advance notification should be made to the Department of Community Development.

NOTE: Pursuant to RCW 43.21C.075 and Lacey City Code 14.24.170(A), a project denial based upon environmental information, and a conditioned or mitigated Determination of Nonsignificance (DNS) may be appealed by any agency or aggrieved person. Appeals are filed either with the Community Development Department when there is also an underlying governmental action or with the City Council if there is no underlying governmental action. Appeals to the City Council must be filed within ten (10) days of the issuance of the written decision (refer to the Lacey City Code for time periods on appeals filed with the Community Development Department).

Lacey Community Development Department
420 College St. SE
Lacey, WA 98503
(360) 491-5642

NOTICE OF APPLICATION

Notice is hereby given that the City of Lacey received a Preliminary Subdivision application on February 24, 2013, for the following proposal:

Application # 12-239: Taylor Development is proposing a preliminary subdivision application for 83 single-family lots, across three parcels totaling 42.6 acres. An 11.45 acre portion of the site is proposed to be set aside for future multifamily development. Approximately 17 acres will be set aside as open space (wetlands, buffers, tree tracts, landscaping, and active recreation). The site is unaddressed but is generally located at the northwest corner of the intersection of Britton Parkway NE and Gateway Boulevard. Assessor's parcel nos 11803340100, 11803430000 and 11810103000. The project is located in a portion of Section 3, Township 18N, Range 1W, W.M., Lacey, Thurston County, Washington.

On April 26, 2013, this application was deemed complete pursuant to RCW 36.70B.070. This determination of completeness means that the application is sufficient for continued review. Pursuant to WAC 197-11-355, the City of Lacey is using the Optional DNS process. The City of Lacey expects to issue a mitigated determination of nonsignificance (DNS) for this project. The complete application, notice of application, supporting documents and project information may be reviewed at the City of Lacey Community Development Department. Any one who wishes to make comment on this application may do so within 14 days from the date the application was deemed complete. If you would like to comment on this proposal please contact **Samra Seymour, Associate Planner**, of the City of Lacey Department of Community Development at the address or telephone number located below. Comments on this application shall be received by the city before **5:00 p.m., May 10, 2013**.

LACEY COMMUNITY DEVELOPMENT DEPARTMENT
420 College Street SE
Lacey, WA 98503
(360) 491-5642

Do not publish below this line

Please Publish: April 30, 2013

Send bill to City of Lacey, 420 College St. SE, Lacey, WA 98503.

EXHIBIT
16

Shaping our community together

CITY OF LACEY

TRANSMITTAL MEMORANDUM

Department of Community Development
420 College St. SE, Lacey, WA 98503
360-491-5642

Date: **April 26, 2013**

Project Name: **Gateway Residential Division 1**
H.T.E. Case Number: **12-239**
Parcel Number(s): **11803340100, 1180340000, 11810103000**

Please review the attached project information and notify **Samra Seymour, Associate Planner,** in our office in writing of any comments or recommendations by **May 10, 2013**. Your comments will become part of the record and utilized in the decision-making process. You may either mail your comments to the above-mentioned address or e-mail them to **sseymour@ci.lacey.wa.us**

TYPE OF APPLICATION:
Preliminary Subdivision

TO:

- ✓ Building Codes – Wade Rcvd 5/10.13
- ✓ Fire Codes – Terry Rcvd 4.30
- ✓ Development Review Division - Tom ✓
- ✓ Traffic Division - Martin ✓
- ✓ Surveying Division – Monty
- ✓ Finance Department ✓
- ✓ Addressing – Marci
- ✓ Parks Department - Lori Rcvd 5/3/13
- ✓ Police Department – Sean Bell
- ✓ Site Plan Review Committee
  - Rick, Scott
- ✓ City Arborist ✓
- ✓ City Engineer
- ✓ Water Resources Engineer ✓
- ✓ Health Department ✓
- ✓ Thurston County, adjacent jurisdiction
  - Planning
  - Public Works Development Review
  - Water Resources – Jim Bachmeier
- ✓ Puget Sound Energy - Amy
- ✓ Q West, Engineering Division
- ✓ Intercity Transit - Dennis
- ✓ Postmaster
- ✓ North Thurston Public Schools ✓ PSW
- ✓ Olympic Region Clean Air Agency
- ✓ WA State Dept. of Fish and Wildlife
  - Regional Biologist
  - Michelle Tirhi (pocket gophers)
- ✓ WA State Department of Ecology Rcvd 5/10
- ✓ US Army Corps of Engineers
- ✓ WA State Historic Preservation Office
- ✓ Nisqually Tribe
- ✓ Squaxin Island Tribe

EXHIBIT
17

If comments are not received by the date noted above, it will be construed that your agency/department does not have any comments or objections to the project as proposed.

SERVICE CENTER

NORTH THURSTON PUBLIC SCHOOLS

6620 Carpenter Road SE • Lacey, WA 98503
(360) 412-4521 • FAX (360) 412-4519

September 12, 2012

Samra Seymour
City of Lacey
420 College St SE
Lacey, WA 98503

RE: NORTH THURSTON PUBLIC SCHOOLS NO. 3
Comments Re. Project 12-239 Lacey Gateway Residential

Dear Ms. Seymour:

North Thurston Public Schools (NTPS) received the City of Lacey's (City's) request for review of the proposed Project 12-239, Lacey Gateway Residential development. NTPS has had the opportunity to review the application for the proposed development which the City forwarded along with the notice. In response to your consultation request, NTPS provides the following:

The proposed development will create additional residential units within North Thurston Public Schools boundaries. The proposed residential units are planned to be served by Pleasant Glade Elementary School, Chinook Middle School and North Thurston High School.

NTPS has determined that the proposed housing units will generate approximately .76 full-time equivalent (FTE) students per single family lot and .40 FTE per multi-family unit. This determination is based on multipliers derived from the attached Student Generation Factor worksheet for NTPS and U.S. Census data as presented in Demographic Multipliers for Common Configurations of Standard Housing Types for School Age Children from U.S. Department of Commerce.

As described in the district's Capital Facilities Plan (CFP), NTPS schools are over capacity. NTPS does not own sufficient land for additional schools nor sufficient facilities to house the projected additional students generated by the proposed development. Purchases of land with available water and sewer service, temporary classrooms and future facilities to house children are anticipated as a result of the increased enrollment projected from new residences such as this subdivision. In addition, sidewalks and bus facilities must be created to provide safe walking routes and transportation services for school children.

The cost of purchasing land and temporary classrooms and constructing new school facilities is estimated to be $3,728 per new single-family and $1,184 per new multi-family residential unit. This assessment of costs is based upon Appendix A of the CFP, Tables 18 and 19. The district adjusts this assessment annually to reflect the district's current costs. Due to the uncertainty of the number of multi-family versus single family units within the 800 units, the actual calculation of mitigation fee will determined at a later date. Such costs are subject to inflation.

BOARD OF DIRECTORS
MARCIA COPPIN • LAURIE DAVIES • CHUCK NAMIT • AARON OWADA • LEAH WELLS
EQUAL EDUCATIONAL OPPORTUNITIES EQUAL EMPLOYMENT OPPORTUNITIES
WWW.NTHURSTON.K12.WA.US

EXHIBIT
18

The State Environmental Policy Act requires proposed developments to mitigate probable significant adverse environmental impacts on the environment, which includes public schools. See WAC 197-11-444(2)(d)(iii). The addition of any new students to NTPS facilities as a result of the proposed development constitutes such an impact. Similarly, the State Subdivision Act, in RCW 58.17.110(2), requires that the permitting jurisdiction find that proposed plats adequately provide for schools and school grounds. The proposed development must provide mitigation to ensure that such facilities are available for the proposed new residents.

For these reasons, NTPS has determined that mitigation measures are needed to compensate for the impact of the increased student enrollment that this development will generate on its schools. NTPS requests that the developer and school district execute a voluntary mitigation agreement prior to final plat approval. That agreement should provide for dedication of land or payment of fees sufficient to mitigate the impacts identified herein. NTPS recommends that the City note such mitigation measures in the City's staff report for consideration of the proposed application, in its SEPA threshold determination, and on the face of the plat when recorded.

If the proponent of this proposed development provides NTPS with evidence that the assumptions of the CFP's Appendix A are not applicable to its proposed new units, NTPS may revise this assessment. NTPS may consider unusual circumstances of specific developments and may adjust the projected fee amount for specific developments if necessary. Should the developer provide NTPS with cause to revise its assessment, NTPS shall set forth its reasons for adjusting the fee in written findings submitted to the City by letter.

Finally, we would appreciate it if the City would promptly provide us notice of the date and time of any hearing on the proposal and a copy of any environmental determination made or other notice generated concerning this proposed project. These comments are provided based upon the information that has been made available to NTPS at this time. Please note that NTPS reserves its rights to provide further and additional comments on this application.

Thank you for the opportunity to respond concerning this proposed development. Please call me at (360) 412-4424 if you have any questions.

Sincerely,

Mike Laverty
Director of Construction & Design

cc: Raj Manhas, Superintendent, NTPS
John Bash, Chief Operations Officer, NTPS
Erich Weight, Director of Transportation, NTPS
Bruce Walton, Principal of Pleasant Glade Elementary

Shaping
our community
together

CITY OF LACEY

CITY OF LACEY
BUILDING DIVISION
PRESUBMISSION CONFERENCE NOTES

CASE NUMBER: 12-239 | APPLICANT: Gateway 850 LLC

RELATED CASES: None | PROJECT ADDRESS: Britton Prkwy NE

TYPE: Residential Dev. | MEETING DATE: 9/12/12

APPLICABLE STANDARDS AND COMMENTS:

1. The proposed development shall comply with all of the codes and ordinances adopted by the City of Lacey, including the 2009 International Building Code and the 2009 International Fire Code, including Appendix D (Sections D106 & D107). Please also know that as of 7/1/13, the 2012 International series of codes will take effect.

2. IBC Sec. 105.1 – A grading permit is required for the proposed project. Please refer to the City of Lacey Development Guidelines & Public Works Standards Section 3.085.

3. UPC Chapter 11 – Roof and foundation drains from each individual lot shall be tight-lined to a properly engineered retention facility designed to receive this discharge.

4. IFC Appendix D, Sec. 107.1 – Residential lots #1 through #39 shall be provided with approved automatic sprinkler systems due to the lack of a second approved fire apparatus access road.

5. Addresses for the proposed development shall be assigned by the City of Lacey. Your address contact is Marci Price (360)491-5642 if you have any questions.

The above noted items are only preliminary comments based on the information received. Please call me at (360)491-5642 if you have any questions regarding this matter.

EXHIBIT
19

Sincerely,

Wade R. Duffy
Building Official/Fire Marshal

P0020543.DOC

CITY OF LACEY

Shaping our community together

420 COLLEGE STREET SE
LACEY, WA 98503-1238

CITY COUNCIL

VIRGIL CLARKSON
Mayor

JASON HEARN
Deputy Mayor

JEFF GADMAN
LENNY GREENSTEIN
RON LAWSON
CYNTHIA PRATT
ANDY RYDER

CITY MANAGER
SCOTT H. SPENCE

Date: April 30, 2013

To: Samra Seymour, Associate Planner

Re: Transmittal Memorandum dated: April 26, 2013
Gateway Residential Division 1
Gateway Blvd and Britton Parkway

Project #12-239 Parcel #'s 118033 40100/118034 40000/118101 03000

Dear Ms. Seymour:

This letter confirms receipt of a transmittal memorandum, including site plans for the above referenced development project. When submitted to this office for review, site plans shall be reviewed in accordance International Fire Code (2009 Edition), as adopted by the City of Lacey. Approval of such plans shall be subject to the following conditions:

Timing of Installation:

1. Fire apparatus access roads shall be constructed and approved and fire hydrants shall be installed, tested and approved prior to building permit issuance. Fire access roads and fire hydrants shall be accessible and serviceable at all times during construction. Required fire hydrants shall be provided in accordance with the approved civil plans and shall be installed, tested and approved in accordance with City of Lacey Public Works Standards. IFC Sections 503.1 and 508.1

Fire Apparatus Access Roads:

2. Approved 20-foot wide all-weather surface fire apparatus access roads capable of handling the imposed loads of fire apparatus shall be provided to within 150-feet of all exterior portions of a building at ground level. The inside turning radius at corners along fire access roads shall be not less than 28-feet in width. Dead-end fire apparatus access roads shall be provided with approved means for the turning around of fire apparatus. Fire apparatus access roads shall be in accordance with the approved civil plans. IFC Section 503.1; LMC 14.07.015

3. Developments of one- and two-family dwellings where the number of dwelling units exceeds 30 shall be provided with separate and approved fire apparatus access roads in accordance with IFC Section D104.3.

   Note: The number of single/two-family dwellings indicated for "Tract G" is 38, which exceeds the maximum of 30 allowed from a single fire apparatus access. At least two separate and approved means of fire apparatus access shall be provided for said residential housing tract unless all buildings in this tract are provided with approved automatic fire sprinkler systems installed in accordance with NFPA 13D Standards (2007 Edition). IFC Section 903.3.1.3

EXHIBIT
20

4. Fire apparatus access roadways shall not exceed 10% grade. IFC Section D 103.2

Hydrant Requirements:

5. Fire hydrants shall be provided at all intersections and at 660-foot spacing along streets in single-family residential developments. A fire hydrant shall be not more than 300-feet from any residential building in this development. LMC 14.07.015

   Note: Fire hydrant locations were not specified in this transmittal. Civil plans showing fire hydrant locations shall be submitted for review and approval.

Hydrant Flow requirements:

6. The minimum fire flow required for single-family residential developments shall be not less than 750 gpm at 20 psi residual pressure from any single fire hydrant. The City of Lacey Water Systems Engineer shall perform a fire flow model to verify the required fire flow has been met based on the water system design. IFC Section B105.1; LMC 14.07.015

Building Address Numbers:

7. Approved address numbers are important for directing emergency response units to the proper location. Applicable building address numbers shall be provided at entrances to construction sites and shall be provided at conspicuous locations on the buildings prior to final occupancy approval. Said address numbers shall be placed facing the road from which the buildings are addressed. Address numbers shall be not less than 6-inches in height and shall contrast with their background. IFC Section 505.1

Street Signs:

8. If not existing, approved street name signs shall be provided at all intersections. Street signs shall be provided prior to issuance of building permits for any structure built on the street from which it addressed. IFC Section 505.2

If you have any questions regarding this review, please call me at (360) 456-7783.

TERRY M. DAVIS
Fire Code Specialist
City of Lacey

Samra Seymour

From: Chun Saul
Sent: Tuesday, April 30, 2013 1:39 PM
To: Samra Seymour
Subject: Gateway Residential Division 1, Case No. 12-239, Parcels: 11803340100, 11803430000, 11810103000

There are LID No. 19 assessment balance owing on the two of the three tax parcels. Here are total amount owing (payoff balance) for each of the parcels:

Parcel No. 11803340100: $70,553.24, Parcel No. 11803430000: $71,787.85, Parcel No. 11810103000: $0

The total payoff balance is $142,341.09.

The total assessments owing should be paid off in full prior to the final plat approval by the City Council or segregation approval must be approved prior to the final plat approval.
Please let me know if you need additional information.
Thank you.

Chun

From: Samra Seymour
Sent: Tuesday, April 30, 2013 9:44 AM
To: Chun Saul
Subject: RE: Gateway Residential Division 1

Hi Chun – Sorry about that. Thank you for letting me know. I copied the following parcel numbers right out of the assessor's data. I think the incorrect number should be the SECOND number listed: 11803340100, 11803430000, 11810103000

Please let me know if there is anything else.

Samra Seymour AICP | Associate Planner
City of Lacey
420 College St SE
Lacey, WA 98503

360.491.5642 department
360.413.3541 direct

From: Chun Saul
Sent: Monday, April 29, 2013 2:17 PM
To: Samra Seymour
Subject: Gateway Residential Division 1

Samra,
I received a Transmittal Memorandum you sent to me for information about LID assessments owing on the tax parcel numbers: 11803340100, 1180340000, and 11810103000.
The parcel number 1180340000 is missing a digit. Should this be 1103340000 instead? Please verify.
Thanks.

EXHIBIT
21

Chun K. Saul, CPA
Senior Accountant
City of Lacey Finance Department
Phone: 360-438-2668
Fax: 360-412-3181
Email: csaul@ci.lacey.wa.us
(Please note: This email may be considered a record subject to public review.)

PROJECT COMMENT AND RESPONSE FORM

TO: Samra Seymour

DATE: May 2, 2013

RECEIVED
MAY 03 2013
BY

CC:

FROM: Jill Glenn

PROJECT: Gateway Residential Div. 1 HTE: 12-239

SHEET # - PARA #	COMMENTS	RESPONSE
SEPA Checklist 12a	Cuvio Park is undeveloped and currently No recreational opportunities exist in the park.	

EXHIBIT 22

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

May 9, 2013

Samra Seymour, AICP, Associate Planner
City of Lacey
Community Development Department
PO Box 3400
Lacey, WA 98509-3400

Your address is in the **Deschutes** watershed

Dear Mr. Seymour:

Thank you for the opportunity to comment on the optional determination of nonsignificance/notice of application for the Gateway Residential Division 1 project located at northwest corner of the intersection of Britton Parkway Northeast and Gateway Boulevard as proposed by Kevin O'Brien, Gateway 850, LLC. The Department of Ecology (Ecology) reviewed the environmental checklist and has the following comment(s):

TOXICS CLEANUP: Elizabeth Weldin (360) 407-7094

This proposed project is located in an area that may have been contaminated with heavy metals due to the air emissions originating from the old Asarco Smelter in north Tacoma (visit Ecology's Tacoma Smelter Plume map search tool: https://fortress.wa.gov/ecy/smeltersearch/).

This property is adjacent to a known ASARCO smelter contaminated Property -- Lacey Gateway Parcel A (212 acres), FSID # 18563. In 2012, the Lacey Gateway Parcel A found duff and soil contaminated by the ASARCO smelter. The Property entered into the Voluntary Cleanup Program and developed a cleanup action plan. To search and access information concerning this property, visit Ecology's websites at: http://www.ecy.wa.gov/fs/ and https://fortress.wa.gov/ecy/gsp/SiteSearchPage.aspx. Too see the file on this property, please contact Central Files of the Southwest Regional Office of Ecology (SWRO) for review by appointment only. You can make an appointment by calling the SWRO resource contact at (360) 407-6365.

Soil and duff contamination from the former Asarco Smelter poses a risk to human health and the environment. Children are at especially high risk from direct exposure to contaminated soil and duff. Construction workers, landscapers, gardeners, and others who work in the soil and duff are also at risk.

Ecology recommends that the lead agency include the following as conditions of approval:

- Sample the soil and duff and analyze for arsenic and lead. The applicant shall contact Elizabeth Weldin with the SWRO, Toxics Cleanup Program at phone number given above or via email at ewel461@ecy.wa.gov for guidance about soil and duff sampling

EXHIBIT 23

within Tacoma Smelter Plume. The soil and duff sampling results shall be sent to the local land use permitting agency and Ecology for review.

- If lead or arsenic are found at concentrations above the Model Toxics Control Act (MTCA) cleanup levels (Chapter 173-340 WAC); the owners, potential buyers, construction workers, and others shall be notified of their occurrence. The applicant shall also contact the Environmental Report Tracking System Coordinator at the Ecology Southwest Regional Office at (360) 407-6300. The MTCA cleanup level for arsenic is 20 ppm and lead is 250 ppm.

- If lead, arsenic and/or other contaminants are found at concentrations above MTCA cleanup levels, the applicant shall:

  1) Enter into the Voluntary Cleanup Program with - Ecology prior to issuance of any site development permits for this proposal and/or the initiation of any grading, filling, or clearing activities. For more information on the Voluntary Cleanup Program, visit Ecology website at: http://www.ecy.wa.gov/programs/tcp/vcp/vcpmain.htm.

  2) Obtain an opinion letter from Ecology stating that the proposed soil and duff remediation will likely result in no further action under - MTCA prior to the issuance of any site development permit and/or the initiation of any grading, filling, or clearing activities. The issued site development permit plans shall be consistent with the plans reviewed and deemed consistent with MTCA by Ecology. The applicant shall provide to the local land use permitting agency the opinion letter from Ecology.

  3) Prior to finalizing site development permits, provide to the local land use permitting agency "No Further Action" determination from Ecology indicating that the remediation plans were successfully implemented under MTCA.

If Ecology determines this project should not be part of the Voluntary Cleanup Program, Ecology will contact the lead agency and discuss possible options.

- If soil and duff are found to be contaminated with arsenic, lead, or other contaminants, extra precautions shall be taken to avoid escaping dust, soil erosion, and water pollution during grading and site construction. Site design shall include protective measures to isolate or remove contaminated soil and duff from public spaces, yards, and children's play areas. Contaminated soil and duff generated during site construction shall be managed and disposed of in accordance with state and local regulations, including the Solid Waste Handling Standards regulation (Chapter 173-350 WAC). For information about soil and duff disposal contact the local health department in the jurisdiction where soil and duff will be placed.

The link below provides a fact sheet that explains more how the arsenic and lead clean-up levels were set and why Ecology sees that they are protective for human health: http://www.ecy.wa.gov/programs/tcp/sites_brochure/tacoma_smelter/2011/brochuresAndPubs.html - Click on "Level and Action Level FAQ."

For assistance and information about Tacoma Smelter Plume and soil and duff contamination, contact Elizabeth Weldin at the phone number given above or via email at ewel461@ecy.wa.gov.

SEPA REVIEWER: Sonia Mendoza
WATER QUALITY CONTACT: Deborah Cornett (360) 407-7269

Any discharge of sediment-laden runoff or other pollutants to waters of the state is in violation of Chapter 90.48 RCW, Water Pollution Control, and WAC 173-201A, Water Quality Standards for Surface Waters of the State of Washington, and is subject to enforcement action.

Erosion control measures must be in place prior to any clearing, grading, or construction. These control measures must be effective to prevent stormwater runoff from carrying soil and other pollutants into surface water or stormdrains that lead to waters of the state. Sand, silt, clay particles, and soil will damage aquatic habitat and are considered to be pollutants.

Proper disposal of construction debris must be on land in such a manner that debris cannot enter water of the state (e.g., wetlands and their buffers) and stormdrains draining to waters of the state or cause water quality degradation of state waters.

During construction, all releases of oils, hydraulic fluids, fuels, other petroleum products, paints, solvents, and other deleterious materials must be contained and removed in a manner that will prevent their discharge to waters and soils of the state. The cleanup of spills should take precedence over other work on the site.

Clearing limits and/or any easements or required buffers should be identified and marked in the field, prior to the start of any clearing, grading, or construction. Some suggested methods are staking and flagging or high visibility fencing.

A permanent vegetative cover should be established on denuded areas at final grade if they are not otherwise permanently stabilized.

Properties adjacent to the site of a land disturbance should be protected from sediment deposition through the use of buffers or other perimeter controls, such as filter fence or sediment basins.

All temporary erosion control systems should be designed to contain the runoff from the developed two year, 24-hour design storm without eroding.

Provision should be made to minimize the tracking of sediment by construction vehicles onto paved public roads. If sediment is deposited, it should be cleaned every day by shoveling or sweeping. Water cleaning should only be done after the area has been shoveled out or swept.

Wash water from paint and wall finishing equipment should be disposed of in a way which will not adversely impact waters of the state. Untreated disposal of this wastewater is a violation of State Water Quality laws and statutes and, as such, would be subject to enforcement action.

This project may require a construction stormwater permit (also known as National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for

Stormwater Discharges Associated with Construction). This permit is required for projects which meet both of the following conditions:

1. One or more acres of soil surface area will be disturbed by construction activities.
2. The site already has offsite discharge to waters of the state or stormdrains or will have offsite discharge during construction.

An application with instructions can be downloaded from Ecology's website at: http://www.ecy.wa.gov/programs/wq/stormwater/construction/ - Application. Construction site operators must apply for a permit at least 60 days prior to discharging stormwater.

Ecology's comments are based upon information provided by the lead agency. As such, they may not constitute an exhaustive list of the various authorizations that must be obtained or legal requirements that must be fulfilled in order to carry out the proposed action.

If you have any questions or would like to respond to these comments, please contact the appropriate reviewing staff listed above.

Department of Ecology
Southwest Regional Office

(SM:13-2069)

cc: Deborah Cornett, WQ
Josh Klimek, HQ/WQ
Elizabeth Weldin, TCP
Kevin O'Brien, Gateway 850, LLC (Applicant)

COUNTY COMMISSIONERS

Cathy Wolfe
District One

Sandra Romero
District Two

Karen Valenzuela
District Three

THURSTON COUNTY
WASHINGTON
SINCE 1852

PUBLIC WORKS
An Accredited Agency of the
American Public Works Association

Donavan Willcutt – Director

MEMORANDUM

TO: Samra Seymour, City of Lacey

FROM: Kevin Hughes, Thurston County Public Works

DATE: May 13, 2013

SUBJECT: **Gateway Residential Division 1**
City of Lacey Project #: 12-239
Thurston County Project #: 2013101618

REFERENCE: Preliminary Site Plan – Dated February 2013
Traffic Impact Analysis – Dated April 23, 2013

Upon review of the proposed project referenced above, Public Works has the following comments:

1. Based on an individualized examination of the proposal and associated Traffic Impact Analysis, it has been determined that there will be a significant impact that can be mitigated. The County has two projects that will be impacted. Attached is a copy of the Traffic Mitigation Estimate worksheet, outlining the affected CFP projects, with the associated impact trips, and mitigation. The total Thurston County mitigation is $113,500.

2. There appears to be temporary cul-de-sacs proposed for this development which will be located within Thurston County jurisdiction. Please include the following condition for preliminary approval:

    a. A Thurston County Construction Permit shall be applied for and received prior to any construction taking place within Thurston County jurisdiction (ie. temporary cul-de-sacs along the north property line).

If you have any questions or comments, please call me at (360) 867-2042.

cc: Project File

EXHIBIT
24

County Project Reviewer Kevin Hughes

Permit Type Residential
Permit No. 2013101618 / Lacey 12-239
Permit Name Gateway Residential Division 1

Ref. Traffic Analysis (Firm, Date) TENW - April 23, 2013
Project Description 86 res. units and 250 multi-family units
Number of New Trips 219 PM Peak Trips

County Road Project No.	Capital Facility Project Description	Project Cost in Thousands of Dollars	Constant Denominator	Per Trip Cost	New Trips	Mitigation
61335A	15th Ave (Olympia City Limits - Draham)	$8,000,000	4000	$2,000	41	$82,000
61335B	Draham St NE (15th- Carpenter)	$3,000,000	4000	$750	42	$31,500
Affected Jurisdicitions					THURSTON COUNTY SUBTOTAL	$113,500
					TOTAL	$113,500

NOTES:
1. This estimate was prepared with the best available information. The traffic mitigation estimate will be updated annually based on the most current Capital Facilities Plan (CFP).
2. All traffic mitigation unless otherwise noted are due prior to final plat approval, certificate of occupancy or final project acceptance.
3. Project Number: Accounting number for Capital Facility Project.
4. Trip "Hits": Project generated trips intersecting or passing through the project limits of a particular capital facilities project.
5. Project Cost: Please refer to the County Comprehensive Plan, Capital Facility Chapter for additional information.
6. Consistent Denominator: This number represents the capacity at or near Level of Service 'D' or 'C' in the urban and rural areas respectively under ideal conditions as described in the Highway Capacity Manual.
7. The Project cost for Yelm Highway Capacity Project (Henderson to Blvd) has be reduced by $1,052,000 to reflect the City of Olympia owned/maintained portion.

THURSTON COUNTY
WASHINGTON
SINCE 1852

RECEIVED
AUG 07 2013
BY_____

COUNTY COMMISSIONERS
Cathy Wolfe
District One
Sandra Romero
District Two
Karen Valenzuela
District Three

PUBLIC HEALTH AND
SOCIAL SERVICES DEPARTMENT

Don Sloma, MPH
Director
Diana T. Yu, MD, MSPH
Health Officer

August 2, 2013

Lacey Community Development Department
Attn: Samra Seymore, Associate Planner
420 College St. SE
Lacey, WA 98503

Subject: Gateway Residential Division 1; City of Lacey File 12-239;
Thurston County Project Reference Number 2013101546; Folder Sequence 13-104572 HI
Tax Parcels 11803340100/11803430000/11810103000

Dear Samra:

The above referenced application for site plan approval in the City of Lacey (preliminary plat subdivision) has been routed to this agency for review and comment. Environmental Health review of the project has been completed and the following is a report of our analysis & findings, requirements, and recommendation:

I. ANALYSIS & FINDINGS:

A. Project Description/Land Use: This project is for a proposed 83 lot subdivision on 42.6 acres across three parcels that will include 11.45 acres to be set aside for a future multifamily development and 17 acres to be set aside for open space. This project will be connected to City of Lacey public water and sanitary sewer utilities.

B. Lot Sizes: The average lot size is 4,863 sq. ft. with the smallest lot size being 3,300 sq. ft.

C. Natural Slope of the Land: Approximately 0 to 3%, 3-15% and 15-30%.

D. Soil Permeability, Type, and SCS Classifications: The soils on the three parcels are mapped by the Soil Conservation Service as Spanaway Gravelly Sandy Loam, Everett Very Gravelly Sandy Loam, Alderwood Gravelly Sandy Loam, Giles Silt Loam, Bellingham Silty Clay Loam and Indianola Loamy Sand. Since this subdivision will be served by City of Lacey sanitary sewer, there were **no** soil or on-site sewage system evaluations conducted by this office as part of this review

E. Existing and Proposed Water Supply: There are no existing water supplies on the property. This project will be connected to City of Lacey public water service.

EXHIBIT
25

F. Protection of Neighboring Water Supplies, Ground and Surface Water Resources: This project is not expected to result in any significant impacts to ground or surface waters in this area for the following reasons:

a. This project will be served by City of Lacey public water and sanitary sewer utilities. There will be no on-site sewage disposal and no new wells drilled on this property;

b. The property is located within the established well head protection area for a Group A public well. An Integrated Pest Management Plan (IPMP) has been prepared for this project to be used by future property owners and/or any homeowners association. This IPMP has been reviewed and approved for this proposal;

II. REQUIREMENTS FOR FINAL SUBDIVISION SUBMITTAL:

1. City of Lacey sanitary sewer must be extended to and through the project and written confirmation of final sewer extension approval from the City of Lacey must be provided to this office **prior to final plat approval.**

2. City of Lacey water service must be extended to and through this project and written confirmation of final water extension approval from the City of Lacey must be provided to this office **prior to final plat approval.**

3. An Integrated Pest Management Plan (IPMP) has been developed for the homeowners of this development and must be incorporated into the Declaration of Covenant, Conditions and Restrictions. In addition, the phone number listed in the IPMP to be distributed to future property owners for Thurston County Environmental Health must be changed to (360) 867-2664 as the current submittal lists an incorrect phone number.

III. RECOMMENDATION:

Subject to the requirements in SECTION II, REQUIREMENTS FOR FINAL SUBDIVISION SUBMITTAL above, this preliminary plat application is **recommended for approval** in accord with the requirements of the Thurston County Sanitary Code.

Sincerely,

Brad Sangston

Brad Sangston, R.S.
Environmental Health Specialist
Thurston County Environmental Health

C: Taylor Development/Gateway 850 LLC; 15 Lake Bellevue Drive #102, Bellevue, WA 98005
Hatton Godat Pantier; Attn: Jeff Pantier; 3910 Martin Way E., Ste. B., Olympia, WA 98506

Samra Seymour

From: Doug Christenson
Sent: Friday, September 06, 2013 10:00 AM
To: Samra Seymour
Subject: Gateway Residential Div. 1

Hi Samra,

Upon review of the resubmitted Preliminary Stormwater Site Plan by HGP, there are still a variety of concerns about this project and issues that have not been resolved. Several of my previous comments were not fully addressed and/or raised further questions. The comments below focus on the main stormwater concerns and issues.

1. The challenging nature of the site is acknowledged in the response letter from HGP dated August 13, but the general concept and layout haven't changed much. The plans show areas where finished grade is at or below the level of observed groundwater seepage, which indicates a high potential for problems with saturated ground, surface seepage, crawlspace flooding, etc. For example, Test Pit 12, located on proposed Lot 72, had groundwater seepage at approx. elevation 153 and till at 147, but proposed finished grade there is approx. elev. 143 with a regraded steep slope up to the east. The native soil is being completely removed from above the hardpan, while the seepage from the regraded slope will likely result in flow onto these lots and the street. Much of the site is known to have shallow groundwater and saturated soils, which must be accounted for in the site design.

2. The stormwater management concept is to collect, convey and concentrate all site runoff into two large ponds, which runs counter to our current manual's goals of keeping runoff dispersed, retained and infiltrated close to its source. While HGP says that areas suitable for infiltration have been utilized to their maximum capacity, there isn't much evidence to support this. Soils in the vicinity of Lots 1-58 appear potentially suitable for infiltration, but the only infiltration feature shown is the large pond along Britton parkway. The drainage report section addressing Core Requirement #5 (on page 8) doesn't say anything about roof downspout infiltration systems or bioretention, even though these methods are required to the maximum extent feasible to reduce the hydrologic disruption of site development, per the 2010 Stormwater Design Manual.

3. The western "Tract B" pond has several problems. It is a huge excavation that drops 48 ft. down from Lots 65-68, with a 2:1 slope. At the backs of Lots 66-67, the slope is shown as steeper than 1:1. The cut slope transects the till where Test Pit 13 had "heavy groundwater seepage" so this large slope would be subject to problems such as seepage, erosion, and unaccounted water flowing into the storm pond. For water quality treatment, both the drainage report and the comment response letter acknowledge the need for enhanced treatment for metals and phosphorus control, and there is mention of a constructed wetland – but there is no constructed wetlands on the plans, only a wetpond, which does not provide adequate water quality treatment for this situation. The detention pond lacks any sort of control structure and lacks an approvable discharge dispersal system. Also, as mentioned in previous comments, surface discharge of collected stormwater is not an approvable concept without first minimizing runoff, so there needs to be more effort at runoff reduction implemented upsystem within the project, such as by minimizing impervious surfaces.

4. The existing wetlands at the west end of the project site are likely to be hydrologically impacted by the project. A hydroperiod analysis must be performed, per Core Requirement #8, and must show that the wetland hydroperiod is not adversely affected.

5. The erosion and sediment control plan sheet needs to show BMPs to address all elements of the SWPPP. BMPs that are mentioned in the narrative shall be located on the plan. The erosion and sediment control plan must be completed and approved prior to any site-disturbing activity.

6. The response to previous comment about groundwater monitoring to be conducted across the site over at least one complete wet season indicated such monitoring has been included in the drainage report, but it is not listed in the table of contents and was not found. Data should continue to be collected over the coming wet season.

These are my main concerns at this point, and should not be considered as a complete set of review comments on the plans and report.

Thank you,

EXHIBIT
26

Doug

Doug Christenson
Stormwater Engineer
PW - Water Resources
ext. 2686
dchriste@ci.lacey.wa.us

CITY OF LACEY
Shaping our community together
420 COLLEGE STREET SE
LACEY, WA 98503-1238

CITY COUNCIL
VIRGIL CLARKSON
Mayor
JASON HEARN
Deputy Mayor
JEFF GADMAN
LENNY GREENSTEIN
RON LAWSON
CYNTHIA PRATT
ANDY RYDER

CITY MANAGER
SCOTT H. SPENCE

September 13, 2013

Jeff Schramm
TENW
816 – 6th Street South
Kirkland, WA 98033

SUBJECT: Lacey Gateway Residential Division 1Traffic Impact Analysis Approval, H.T.E. #12-239

I have reviewed the Traffic Impact Analysis (TIA) and have the several comments that will need to be addressed in the design of the project. The comments are as follows:

Site Plan

There is insufficient information to determine the functionality and volumes of the streets within the development. We are concerned about the future volumes from Division 2 impact to this phase of the development.

There are over 300 dwelling units in Division 1 that equates to 219 pm peak hour trips. A development of this size requires 2 full access points at opening to distribute the volumes for safety and emergency access.

The study addendum conflicts with the original study and identifies the new Major Collector -- Gateway Blvd Extension under varying levels of construction. The analysis identifies that the roadway is fully constructed to full standards without any reduction factors and this will be required. Also, the City built the original roundabout at Gateway Blvd and the geometrics shown does not correlate with the original design.

This requires that new east-west collector indentified as "Road B" be fully constructed at project opening. This Road B must be built to Major Collector Type II standards, unless an analysis is provided to determine that left turns are not warranted with all volumes proposed at full build.

The side streets indentified Road B must be Major Residential Streets.

The right angle knuckle style cul-de-sac must meet the minimum roadway radii as identified in the Public Works Standards.

EXHIBIT 27

According to the Thurston Regional Planning Council's 1999 Household Travel Survey, 5.6% of all trips are made by bicycling or walking. This project is expected to generate a similar number of pedestrians and cyclists. The Transportation Comprehensive Plan identifies the need for sidewalk, bike lanes and other facilities to accommodate multi-modal transportation. The multi-modal impacts from this project shall be mitigated by constructing the internal street network and frontage improvements according to Lacey's standards.

The Engineer shall develop a Traffic Calming Plan to be incorporated into the internal street network to control cut through traffic for all future phases, and reduce speed within the development. The Traffic Calming Plan shall be approved by the Public Works Department.

Traffic Mitigation

Traffic mitigation was calculated for 86 (Single-Family Detached Housing) and 250 (Residential Condominium/Townhouse) for the planned residential development.

A distribution, approved by the City of Lacey's Public Works Department was used in determining offsite traffic impacts and required mitigation. This distribution is based on the regional traffic model from Thurston Regional Planning Council. The trips generated from this project will have an adverse impact on the City of Lacey transportation network.

The project will pay traffic mitigation fees to the City of Lacey to mitigate offsite impacts. These fees are collected according to LMC 14.21 and results of the TIA. The mitigation collected will fund designated transportation improvement projects.

The mitigation fee will be determined at the date of payment for issuance of the building permit, unless otherwise noted. The fee shall be increased on July 1 and each year thereafter in an amount equal to the increase in the Engineering News Record Construction Cost Index. The estimate for the City of Lacey's traffic mitigation fees is attached.

Sincerely,

Patrick D. McGuin

Pat McGuin

cc Rick Walk, Community Development Director
Samra Seymour, Community Development
Scott Egger, Public Works
Tom Stiles, Development Review
File

Residential
Traffic Mitigation Fee Estimate

File/ Parcel Number: 08-118
Lacey Planning Project: 12-239
Lacey PW File #:
Project Description: Lacey Gateway Residential

ITE Land Use Code: 210

Land Use Name:
Trip Rate:
Per:

During:
New Units 336
Total Project Trips Generated: 217
Traffic Analysis Zone: 239
Total Trips in TAZ: 129

Updated:
Updated:
Updated:
Created: 9/6/2013 PDM

230	210
(Residential Condominium/ Townhouse)	(Single-Family Detached Housing)
0.52	1.01
Units)	Units)
Peak of Adj. Street, 1 hr. 4-	Peak of Adj. Street, 1 hr 4-6
250	86
130	87

Account Number	Project	2013/2014 Cost per Trip	TAZ Trips @ project	Distrib. Percent	Project Trips Generated	2013/2014 Traffic Mitigation	Cost per SF Unit	Cost per SF unit based on Cap	Cost per TH unit	Cost per TH unit based on Cap
102-0000-224.50-03	45th Avenue and College Street Improvements	$ 316.99	3	2.3%	5.0	$ 1,584.95	$ 18.43	$ 5.82	$ 6.34	$ 5.82
102-0000-224.50-08	45th Avenue and Ruddell Road Improvements	$ 116.86	2	1.6%	3.0	$ 350.58	$ 4.08	$ 1.29	$ 1.40	$ 1.29
102-0000-224.50-23	Sleater-Kinney at 14th Ave Improvements	$ 223.10	-	0.0%	-	$ -	$ -	$ -	$ -	$ -
102-0000-224.50-24	Ruddell Road at 22nd Avenue Improvements	$ 116.86	3	2.3%	5.0	$ 584.30	$ 6.79	$ 2.14	$ 2.34	$ 2.14
102-0000-224.50-25	College Street Extension NE	$ 841.36	16	12.4%	27.0	$ 22,716.72	$ 284.15	$ 83.37	$ 90.87	$ 83.37
102-0000-224.50-26	Mullen Road Extension	$ 1,717.78	4	3.1%	7.0	$ 12,024.46	$ 139.82	$ 44.13	$ 48.10	$ 44.13
102-0000-224.50-27	Yelm Highway Improvements College Street to Ruddell Road	$ 943.39	2	1.6%	3.0	$ 2,830.17	$ 32.91	$ 10.39	$ 11.32	$ 10.39
102-0000-224.50-28	Carpenter Road Capacity /Safety Improvements Pacific to Shady Lane	$ 981.59	3	2.3%	5.0	$ 4,907.95	$ 57.07	$ 18.01	$ 19.63	$ 18.01
102-0000-224.50-29	Mullen Road Capacity/Safety Improvements East of Ruddell	$ 1,472.39	-	0.0%	-	$ -	$ -	$ -	$ -	$ -
102-0000-224.50-31	Carpenter Road Widening / Pacific To Martin	$ 2,002.44	26	20.2%	44.0	$ 88,107.36	$ 1,024.50	$ 323.35	$ 352.43	$ 323.35
102-0000-224.50-32	Ruddell Road / 54th Avenue Improvements	$ 114.01	2	1.6%	3.0	$ 342.03	$ 3.98	$ 1.26	$ 1.37	$ 1.26
102-0000-224.50-33	Martin Way & I-5 Interchange Improvements	$ 981.59	12	9.3%	20.0	$ 19,631.80	$ 228.28	$ 72.05	$ 78.53	$ 72.05
102-0000-224.50-38	Carpenter Rd from Martin Way to Britton Parkway	$ 1,081.87	60	46.5%	101.0	$ 109,268.87	$ 1,270.57	$ 401.02	$ 437.08	$ 401.02
102-0000-224.50-39	Marvin Road-- Britton to Columbia Drive NE	$ 2,774.07	6	4.7%	10.0	$ 27,740.70	$ 322.57	$ 101.81	$ 110.96	$ 101.81
102-0000-224.50-40	Rainier Road from Yelm Hwy to City Limits (near Beckonridge)	$ 638.03	2	1.6%	3.0	$ 1,914.09	$ 22.26	$ 7.02	$ 7.66	$ 7.02
102-0000-224.50-41	Yelm Highway Improvements Ruddell Road to East City Limits	$ 1,104.29	1	0.8%	2.0	$ 2,208.58	$ 25.68	$ 8.11	$ 8.83	$ 8.11
102-0000-224.50-42	6th Avenue / Sleater Kinney Improvements	$ 1,110.21	1	0.8%	2.0	$ 2,220.42	$ 25.82	$ 8.15	$ 8.88	$ 8.15
102-0000-224.50-43	Golf Club Road Extension	$ 147.27	-	0.0%	-	$ -	$ -	$ -	$ -	$ -
102-0000-224.50-44	Martin Way / Hoh Street Intersection Improvements	$ 196.36	1	0.8%	2.0	$ 392.72	$ 4.57	$ 1.44	$ 1.57	$ 1.44
102-0000-224.50-45	Willamette Drive / 31st Ave Intersection Improvements	$ 245.45	4	3.1%	7.0	$ 1,718.15	$ 19.98	$ 6.31	$ 6.87	$ 6.31
102-0000-224.50-46	Hogum Bay Road Improvements	$ 3,962.95	2	1.6%	3.0	$ 11,888.85	$ 138.24	$ 43.63	$ 47.56	$ 43.63
102-0000-224.50-47	Carpenter Rd/Mullen Rd Intersection Improvements	$ 285.73	1	0.8%	2.0	$ 571.46	$ 6.84	$ 2.10	$ 2.29	$ 2.10
102-0000-224.50-48	Marvin Road Interchange Improvements Phase 2	$ 1,081.87	48	37.2%	81.0	$ 87,631.47	$ 1,018.97	$ 321.61	$ 350.53	$ 321.61
102-0000-224.50-49	College Street Reconstruction -- Lacey Blvd to 37th Ave	$ 1,081.87	4	3.1%	7.0	$ 7,573.09	$ 88.06	$ 27.79	$ 30.29	$ 27.79
102-0000-224.50-50	Marvin Road and Britton Parkway Intersection Improvements	$ 86.69	65	50.4%	109.0	$ 9,449.21	$ 109.87	$ 34.68	$ 37.80	$ 34.68
102-0000-224.50-51	31st Avenue Extension Hogum Bay to Marvin Road	$ 1,155.86	6	4.7%	10.0	$ 11,558.60	$ 134.40	$ 42.42	$ 46.23	$ 42.42
102-0000-224.50-52	Britton Parkway and Carpenter Road Intersection Improvements	$ 144.48	34	26.4%	57.0	$ 8,235.36	$ 95.76	$ 30.22	$ 32.94	$ 30.22
102-0000-224.50.56	Citywide ITS Signal Improvements	$ 105.00			267.0	$ 28,035.00	$ 325.99	$ 102.89	$ 112.14	$ 102.89
102-0000-224.50-55	Signal Retiming Fee:					$ -		$ -		$ -
	CITY OF LACEY PROPORTIONATE SHARE MITIGATION					$ 463,486.89	$ 5,389.38	$ 1,701.00	$ 1,853.95	$ 1,701.00
	THURSTON COUNTY PROPORTIONATE SHARE MITIGATION					$ 113,500.00		$ 337.80		$ 337.80
	TOTAL COMBINED MITIGATION							$ 2,038.80		$ 2,038.80
	RESIDENTIAL MAXIMUM CAP PER UNIT $ 1,701.00						USE RESIDENTIAL CAP	$ 146,286.00		$ 425,250.00

Note: This estimate is prepared with the best available information. The City reserves the right to update this estimate at any time.

CITY OF LACEY
DEVELOPMENT REVIEW
PUBLIC WORKS DIVISION
SITE PLAN REVIEW CONDITIONS

Shaping our community together

CITY OF LACEY

PW FILE #: 118-03-430000 **COMMENTS DATE:** 14 October, 2013
OWNER: Gateway 850 LLC **H.T.E. CASE NUMBER:** 12-239
APPLICANT: Taylor Development/Gateway 850, LLC
PROPOSED USE: High Density and Medium Density Residential Development (333 units)
PLANNER: Samra Seymour **NOTES BY:** Tom Stiles

Specific Water Improvements:

1. Adequately sized water mains shall be extended throughout the proposed site to provide domestic water service to each individual lot/unit, to provide irrigation water service, to meet fire flow and protection requirements, to assure water quality standards are met and as necessary to satisfy the City of Lacey's Water Comprehensive Plan requirements. An overall water plan and coordination with the City of Lacey as well as adjacent property owners will be required as there are a few different ways of satisfying these requirements. Pressure reducing valve stations as well as individual pressure reducing valves will mostly likely be required as the proposed site is bisected by two water pressure zones.

2. Please show all existing well locations (on or adjacent to the proposed site) on the site plan.

3. To irrigate planter strips, stormwater and open space areas, provisions for future reclaimed water shall be incorporated into the plat design. The irrigations system(s) shall be designed and constructed to reclaimed water standards. At this time, the system will be supplied with City of Lacey potable water; however, when reclaimed water is available the City will switch the system over to reclaimed water. Provisions to switch the systems will be incorporated into the design.

General Water Improvements:

4. For Irrigation lines located in the Right-of-Way, the following shall be stated on the irrigation plans and is a condition of approval: "The Home Owner's Associated will be responsible for maintaining and locating all irrigation lines located in the public Right-of-Way". (DG&PWS, Water, Irrigation 6.210)

5. Water system improvements shall meet the requirements of the City of Lacey, the Coordinated Water System Plan (CWSP), Department of Health (DOH), City of

EXHIBIT
28

Lacey Water System Plan, Department of Ecology, Thurston County Environmental Health and City of Lacey Fire Code Official's standards. Actual main size, loop closures, and possible off-site improvements including the number and location of fire hydrants, will depend on the fire flows required and available to the site. Water main shall also be looped as required by the City as needed for water quality purposes. (DG&PWS, Water 6.010)

6. Show all adjacent wells within 100-feet of the proposed plat with their protective radii (this will assure the proposed development will not impact any wells) (DG&PWS, Subdivisions and Short Plats, Chapter 2 – plat checklist).

7. To assure desired meters are available for your project, water meters 3-inches or larger must be ordered 10 weeks prior to being installed. Please make scheduling provisions to accommodate this lead time. (DG&PWS General Notes Water Main Installation)

8. Water mains shall be extended on North or East sides of roadways or drive aisles six feet off the centerline. (DG&PWS, Water 6.020)

9. Provide domestic water stubs to each lot/new building (if duplexes are utilized each side of the duplex must be metered), and appropriate connection fees must be paid. Irrigation meters with backflow prevention devices are needed for open space, landscaping, and stormwater facilities. (DG&PWS, Water 6.120 F)

10. To assure adequate water is present for your project. Modeling of the water system shall occur. Please contact Brandon McAllister (491-5600) to coordinate the fire flow modeling (typical cost for this service $500.00).

11. If utility extensions are needed for the proposed project for roads that were paved in the last five years and the roads must be "cut", a disruption fee will be charged in accordance with Lacey Municipal Code 12.16.055.

12. The builder/applicant is required to purchase a meters prior to the issuance of building permits. (DG&PWS Water 6.121)

Specific Sewer Improvements:

13. Adequately sanitary sewer mains shall be extended throughout the proposed site to provide sanitary sewer service to each individual lot/unit and as necessary to satisfy the city of Lacey's Sanitary Sewer Comprehensive Plan requirements.

14. As per the City of Lacey Comprehensive Sewer plan, only one lift station will be sited to serve the entire Gateway residential project with sewer. The station shall be located in a location agreeable to the City, it shall maximize the number of housing units either served entirely by gravity sewer or gravity sewer to the lift station. The use of grinder units shall be eliminated or minimized.

General Sewer Improvements:

15. Any existing on-site septic tanks and drainfields shall be removed per Department of Ecology and Thurston County Department of Health.

16. All existing and proposed structures shall be connected to sanitary sewer. (DG&PWS, Sewer 7A.010) Public mains with associated appurtenances shall be installed to serve the proposed plat with sewer.

17. Provide sewer stubs to each building connecting to the public main. Sewer main extensions shall be located 6-feet off the centerline of the street/drive area on the South or West side. (DG&PWS, Sewer 7A.010)

18. Sanitary sewer improvements associated with this project shall meet the requirements of the City of Lacey Comprehensive Sanitary Sewer Plan, Thurston County Health Department, Washington State Department of Health (DOH), the LOTT Clean Water Alliance and Department of Ecology. (DG&PWS, Sewer 7A.010 and Subdivisions and Short Plat 2-21)

Specific Stormwater Improvements:

See Doug Christenson for specific plat conditions.

General Stormwater Improvements:

19. Storm drainage improvements will be required in conjunction with the City of Lacey 2010 Stormwater Design Manual.

20. A final drainage report in accordance with the City of Lacey 2010 Stormwater Design Manual, shall be submitted to the City prior to Civil Plan approval. Within the report, include calculations with computer modeling showing proposed treatment and infiltration facilities have capacity for stormwater generated by this development. Also, include the modeling showing there are no downstream restrictions and the piping associated with the project is properly sized.

21. The following note shall be shown on the face of the plat, on the civil engineering drawings and is a condition for approval: "Roof drains shall have dry wells and be placed on individual lots. Dry wells shall be sized to accommodate storm runoff per the City of Lacey 2010 Stormwater Design Manual" If site conditions cannot support dry well systems, a note must be included on the face of the plat indicating that roof and foundation drains shall be tied into stormwater system. (DG&PWS, Storm Sewer 8.5.13)

22. A Stormwater Pollution Prevention Plan (SWPPP) shall be submitted to and approved by the City prior to beginning construction of the project. Each of the 12

required SWPPP elements as identified in Chapter 1 of the City of Lacey 2010 Stormwater Design Manual shall be addressed and included in the construction SWPPP. If site conditions render SWPPP elements unnecessary, exemptions for each element shall be clearly justified in the narrative of the SWPPP. The SWPPP shall be submitted to and approved by the City prior to Grading permit or Civil Plan Approval.

23. A Stormwater Facility Maintenance Plan per chapter 9 of the City of Lacey 2010 Stormwater Design Manual shall be submitted to and approved by the City of Lacey. The maintenance plan shall be included in the submitted drainage report as part of the stormwater site plan. The stormwater facilities maintenance plan shall contain five main sections:

- Section 1:Owner information
- Section 2: Description of the drainage system and facilities serving the site
- Section 3: Cost estimate for long-term facilities maintenance, repair & rehabilitation
- Section 4: Site and facility management
- Section 5: Stormwater facility maintenance guide

Also, the maintenance plan shall be prepared as a stand-alone document for the post-development facility owner(s). The maintenance plan shall be submitted to and approved by the City prior to Civil drawing approval.

24. Due to the nature of the soil that may be found on this site, construction times may be limited to the "dry" season and import material may be required for all utility trenching, as determined by the City of Lacey Director of Public Works prior to final approval of the civil engineering drawings.

25. A signed and sealed copy (by the applicant's engineer) of Appendix "4D" (Engineer's Construction Inspection Report Form) from the City of Lacey 2010 Stormwater Design Manual shall be submitted to and approved by the City prior to Final Public Works Approval. In order to submit Appendix 4D, the project engineer must perform infiltration tests and complete Appendix 4D forms from the City of Lacey 2010 Stormwater Design Manual. Appendix "4D" shall be submitted to and approved by the City prior to Final Public Works approval.

26. Treatment and infiltration/detention facilities shall be constructed for storm associated with the site, adjacent properties currently discharging to the site and half street storm water associated with roadways adjacent to the site.

<u>Specific Transportation Improvements:</u>

27. Per the Transportation Comprehensive Plan, multiple Major Collector Type II roadway (see Detail 4-3.1 dated 8/27/09 attached) corridor connections will need to

be accommodated throughout the proposed site. Coordination with the adjacent property owners and the City of Lacey will be required.

28. Due to the number of units associated with this project, two full access points will be required. Each connection point shall be constructed to Major Collector Type II roadway standards.

29. The "Gateway Boulevard" connection shall be constructed from curb to curb. On the west side of the roadway, full frontage improvements shall be installed to Major Collector Type II roadway standards.

30. The proposed east-west collector identified as Road "B" shall be fully constructed with the first phase of development. Road "B" shall be constructed to major Collector Type II standards.

31. Roadways connecting to Road "B" shall be constructed to Major Residential Roadway standards (see Detail 4-4.0 dated 8/27/09).

32. Outstanding frontage improvements along the property frontage of Britton Parkway (including the required stormwater treatment and infiltration facilities) shall be installed by the developer and approved by the City prior to final plat approval of this project. These improvements shall be installed to City of Lacey Boulevard standards (see Detail 4-2.1 dated 8/27/09).

33. The right angle knuckle style cul-de-sac shall meet minimum roadway radii requirements identified in the Development Guidelines and Public Works Standards manual.

34. The Transportation Comprehensive Plan identifies the need for sidewalks, bike lanes and other facilities to accommodate multi-modal transportation. The multi-modal impacts from this project shall be mitigated by construction the internal street network and frontage improvements according to Lacey's standards.

35. A traffic calming plan shall be incorporated into the internal street network to control cut through traffic for all future phases and reduce speed within the development. The traffic calming plan shall be approved by the Public Works Department.

General Transportation Improvements:

36. Existing curb ramps or other improvements that do not meet current Americans with Disability Act standards associated with the site shall be brought into conformance with the site development. (DG&PWS, 4C.030 7.)

37. Assure street lighting levels satisfy City of Lacey requirements for roadways and intersections. If they don't, additional street lighting shall be required for all streets associated with this project (Street lighting per City of Lacey spacing Standards). All

street light designs shall be prepared by an engineering firm capable of performing such work. (DG&PWS, Transportation, Illumination 4E.010)

38. As a condition of final Public Works Approval, electrical services associated with street lighting, pump stations, or other applications (for the Public benefit as agreed to by the City) shall be transferred into the City's name. In order to change service, the applicant/owner must provide a copy of a billing statement to the City. If service has not been established, the applicant/owner must provide the following information to the City to establish service: Project Name (final subdivision name), service meter's number, address of the service meter, owner's contact number and address, and the type of items are being energized by the service. All fees associated with the installation of the service shall be the responsibility of the developer. **Without the information outlined above or a copy of a previous billing statement, the service will remain in the applicant/owner's name and they will be responsible for payment of the bills until such time as the information is received by the City.**

39. Fiber optic conduit shall conform to the standards and requirements as set forth in Chapter 4 (Transportation) from the Development Guidelines & Public Works Standards (DG & PWS, Transportation 4E.035).

40. Access shall be provided to the property as determined and approved by the City. All access points shall meet minimum access spacing, minimum corner clearance, sight distance and minimum or maximum width requirements as outlined in the Development Guidelines & Public Works standards. (DG & PWS, Transportation 4B.025)

41. Traffic mitigation as determined by the Traffic Impact Analysis are required. Conditions of Lacey Municipal Code 14.21 shall be satisfied.

42. Minimum intersection curb radii and centerline radius requirements must be satisfied. Please label all radii on the final plat (DG&PWS 4B.020).

43. Proposed alleys shall be constructed to the Alley standard (DG&PWS, Transportation Standard Detail DNG No. 4-5.1). Alley improvements require a 20-foot easement. The minimum alley pavement width shall be 12-feet and the maximum alley pavement width shall be 16-feet.

44. Roadway sections (public or private) cannot be constructed in saturated ground areas. If separation from the water table cannot be obtained, the site must be filled to accommodate the roadways.

45. All public streets within the City and the City's UGA boundary will be planted with trees to create a distinct and pleasant character for those roadways. The street trees located in the Development Guidelines shall be required in or along the public Right-of-Way, including medians. Contact the City for specific street and accent trees in the core area. (DG&PWS, Transportation 4G.100)

46. The following is a condition for approval and shall be included on the face of the plat: "The City of Lacey has no responsibility to build, improve, maintain, or otherwise service the private roads and/or alleys within or providing access to the property described in this plat." (Lacey Municipal Code 15.32.190)

47. The structural design of the streets shall conform to City standards and requirements as set forth in the Development Guidelines & Public Works Standards. Structural sections shall be based on the actual Washington stabilometer R-value (as determined by a soils engineer licensed in the State of Washington) and may vary throughout the plat based on site specific factors such as differing soil types, wetlands, and high groundwater (DG&PWS, Transportation 4B.020 & 4B.160).

48. The following note is a condition for approval: "The Home Owner's Assocition shall be responsible for maintaining the private streets (along with associated parking areas) (DG&PWS, Transportation 4G.100D)

General Surveying Requirements:

49. Utility easements are required for all mains, water and sewer located on private property. Easements shall include fire hydrants, water meters, sewer improvements and future extensions of mains to adjacent properties. Easements and stub outs shall be provided to serve adjoining properties as determined by the City. Rather than being designated as water or sewer, all easements shall be identified as "utility" easements on the civil drawings and in the easement document. Specific requirements will be determined at the of plan review. All easements shall be prepared by a licensed land surveyor and submitted prior to release of approved civil drawings (DG&PWS Chapter 3.110).

50. The City of Lacey Coordinate System shall be Washington Coordinate System, NAD 83/91 south zone. Units are expressed in feet. Horizontal and vertical control information can be obtained from the Lacey Public Works Department. (DG&PWS 3.025)

51. Right-of-Way shall be dedicated for a subdivision, short subdivision, binding site plan, for a project that triggers Site Plan Review or for a conditional use permit. The requirement to dedicate Right-of-Way shall be determined by the City or Regional Transportation plans, by a Traffic Impact Analysis, or as determined by Public Works. Dedications shall be determined by a professional Land surveyor. Dedication shall be submitted and approved by the City prior to plan approval (DG&PWS, Transportation 4B.060).

Other Requirements:

52. All improvements shall satisfy City of Lacey Development Guideline Standards in place at the time of complete application is obtained (as determined by the City of Lacey Community Development Department). (LMC)

53. All Public Works improvements must be designed by an engineer licensed in the State of Washington and submitted to the City of Lacey Public Works Department for review and approval. The applicant is responsible for all connection fees at the time of any new connection. (DGPWS 3.040)

54. All structures associated with this site shall be connected to City of Lacey utilities (DG&PWS 6.010 and 7A.010).

55. Prior to civil drawing approval, two sets of mylar drawings along with digital a electronic file of the drawings in AutoCAD or other approved software format shall be submitted for all approved final plans. (DG&PWS Chapter 3.040,B)

56. Prior to final Public Works Construction approval, "as-built" mylar drawings along with the revised digital electronic diskette shall be submitted for all approved final plans. (DG&PWS Chapter 3.040, J)

57. A 20 percent maintenance bond or financial guarantee of the engineer's estimate or approved bid estimate is required for a period of 24 months upon construction completion and approval of Public Works improvements. The financial guarantee may be released after 18 months if all conditions of approval have been satisfied. The financial guarantee applies to sewer, stormwater, water, frontage, landscaping/irrigation, roadway and street lighting improvements (LMC 14.20.025).

58. Eight sets of civil drawings and three drainage reports shall be submitted directly to the City of Lacey Public Works Department. **Drawings submitted to other City departments will not satisfy this requirement.** (DG&PWS 3.040, B)

59. The property owner(s)/Home Owner's Association shall be responsible for maintaining the planter strip and street trees (weeding, irrigating, mowing, etc.) in a healthy and growing manner in perpetuity. If the planter strip and or trees are being maintained by another group or organization, then a maintenance agreement (or adequate documentation) that verifies the planter strip and/or trees are being (and will continue to be) maintained shall be submitted to the City for review (Development Guidelines & Public Works Standards, Transportation 4G.100D).

60. To protect the public interest on private property, utility mains located on private property shall be protected from damage. If on-site settling or other phenomenon occurs causing valve boxes, sewer manholes or other appurtenances to protrude

above the driving surfaces or ground elevations, the owner will be notified and the problem shall be fixed within 30 days of notification. If the problem is not fixed within the 30 day time period, the City will fix the problem and bill the property owner/Home Owner's Association. This language shall be included on the face of the plat or easement documents submitted to the City.

61. Prior to Final Public Works approval of the project, Bill of Sale documents for water and sewer improvements shall be submitted to and approved by the City.

End of Comments

NOTICE OF PUBLIC HEARING

Notice is hereby given that the City of Lacey Hearings Examiner will conduct a public hearing on October 30, 2013 at 10:00am, at Lacey City Hall, 420 College Street SE, in the Council Chambers, for consideration of the following item:

> Application # 12-239: Taylor Development is proposing a preliminary subdivision application for 83 single-family lots, across three parcels totaling 42.6 acres. An 11.45 acre portion of the site is proposed to be set aside for future multifamily development. Approximately 17 acres will be set aside as open space (wetlands, buffers, tree tracts, landscaping, and active recreation). The property is zoned High Density Residential. The site is unaddressed but is generally located at the northwest corner of the intersection of Britton Parkway NE and Gateway Boulevard. Assessor's parcel nos 11803340100, 11803430000 and 11810103000. The project is located in a portion of Section 3, Township 18N, Range 1W, W.M., Lacey, Thurston County, Washington.

The purpose of the public hearing is to give citizens an opportunity to testify to the Hearings Examiner regarding the above proposal. Any interested citizen may testify. Anyone who cannot attend the meeting may give testimony in a letter addressed to: Hearings Examiner, 420 College St. SE, Lacey, WA 98503. If your letter is received before the hearing, it will become part of the public record. Prior to the hearing, information regarding the proposal, including an environmental impact analysis, may be obtained from the Lacey Community Development Department at City Hall; or you may phone (360) 491-5642.

If you need special accommodations to participate in this meeting, please call us at (360) 491-5642 by 10:00 a.m. the day before the meeting.

LACEY COMMUNITY DEVELOPMENT DEPARTMENT
Samra Seymour, AICP, Associate Planner

Do not publish below this line

Please Publish: Sunday, October 20, 2013

Send bill to City of Lacey, 420 College St. SE, Lacey, WA 98503.

EXHIBIT
29

NOTICE OF PUBLIC HEARING

This is to notify you that the City of Lacey Hearings Examiner will conduct a public hearing on October 30, 2013 at 10:00am, at Lacey City Hall, 420 College Street SE, in the Council Chambers, for consideration of the following item(s):

> Application # 12-239: Taylor Development is proposing a preliminary subdivision application for 83 single-family lots, across three parcels totaling 42.6 acres. An 11.45 acre portion of the site is proposed to be set aside for future multifamily development. Approximately 17 acres will be set aside as open space (wetlands, buffers, tree tracts, landscaping, and active recreation). The property is zoned High Density Residential. The site is unaddressed but is generally located at the northwest corner of the intersection of Britton Parkway NE and Gateway Boulevard. Assessor's parcel nos 11803340100, 11803430000 and 11810103000. The project is located in a portion of Section 3, Township 18N, Range 1W, W.M., Lacey, Thurston County, Washington.

If you want to state your opinion of this project, please attend the public hearing. Be prepared to speak briefly to the Hearings Examiner. What you say will then become part of the public record. If you cannot come to the public hearing but wish to comment, please write a letter to: Hearings Examiner, 420 College St. SE, Lacey, WA 98503. Your letter will become part of the public record if we receive it **before the hearing.**

Information on this project, including a study of possible environmental impacts, is available at City Hall. Or, you may phone the Community Development Department at (360) 491-5642.

If you need special accommodations to participate in this meeting, please call us at (360) 491-5642 by 10:00 a.m. the business day before the hearing.

LACEY COMMUNITY DEVELOPMENT DEPARTMENT
Samra Seymour, AICP, Associate Planner
420 College St. SE
Lacey, WA 98503

DID YOUR NEIGHBORS RECEIVE THIS NOTICE?
PLEASE SHARE IT WITH THEM!

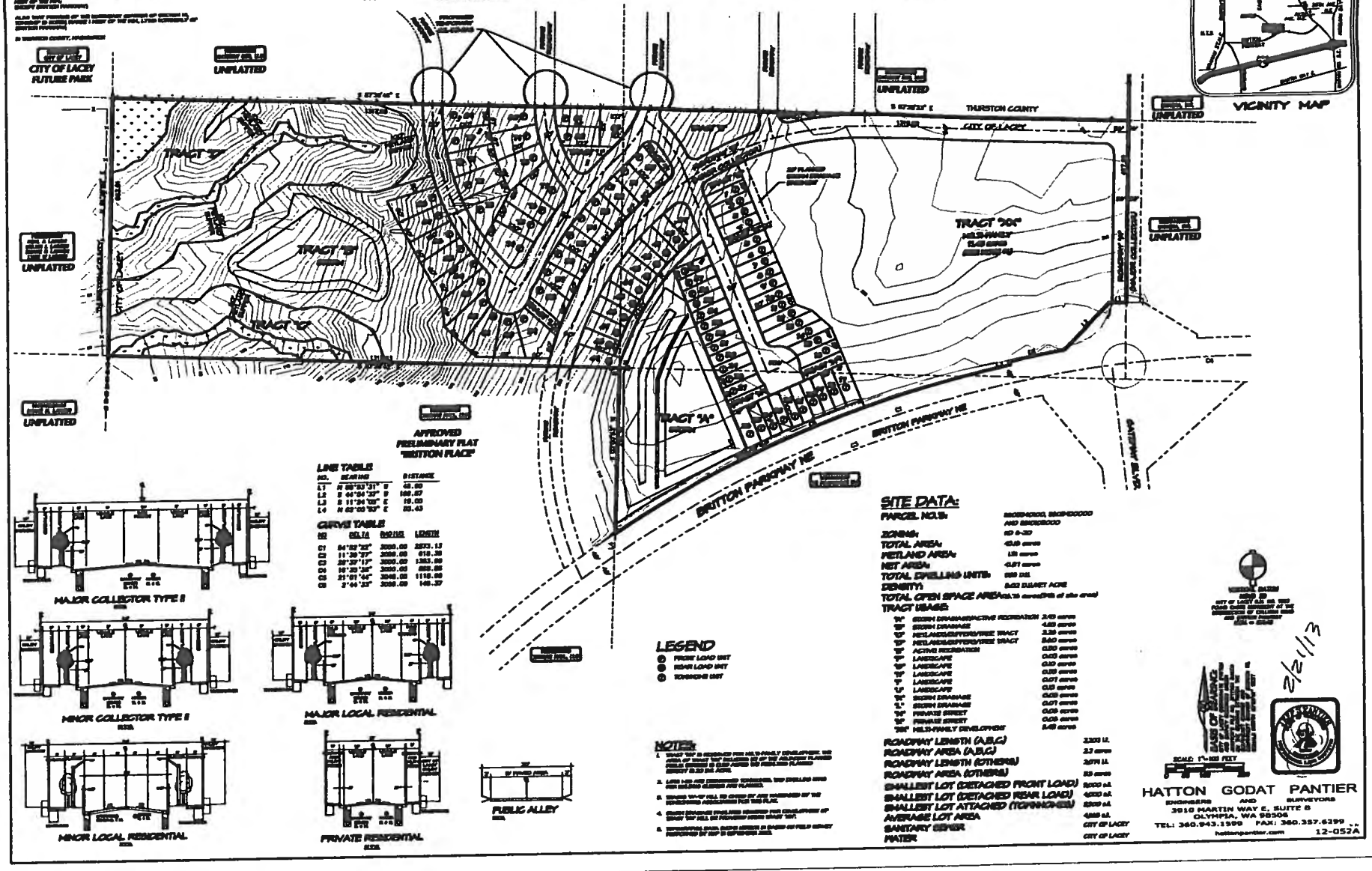
EXHIBIT
30

PRELIMINARY PLAT OF GATEWAY DIVISION 1

A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND OF THE SOUTHWEST OF THE SOUTH EAST QUARTER OF SECTION 9 AND
A PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 10, ALL IN TOWNSHIP 19 NORTH, RANGE 1 WEST, W.M.

LEGAL DESCRIPTION

[illegible]



LINE TABLE

NO.	BEARING	DISTANCE
L1	N 88°53'31" E	48.00
L2	S 44°54'33" E	169.67
L3	S 11°34'08" E	19.03
L4	N 62°55'53" E	85.43

CURVE TABLE

NO	DELTA	RADIUS	LENGTH
C1	94°53'22"	3000.00	2873.13
C2	11°39'37"	3000.00	610.38
C3	25°29'13"	3000.00	1323.00
C4	16°20'36"	3000.00	855.85
C5	21°01'44"	3000.00	1110.00
C6	2°44'33"	3000.00	143.37

CERTIFICATION OF PUBLIC NOTICE

I, Samra Seymour, for the City of Lacey hereby certify that public notice for the Project# 12-239: Gateway Residential Division 1 Preliminary Subdivision was given as follows:

APPLICATION

Notice of Application Published:	April 30, 2013
Notice of Application Posted:	April 26, 2013
Posting Locations:	west and east ends of subject properties along Britton Parkway
Environmental Determination Published:	September 15, 2013

HEARING

Notice of Public Hearing Published:	October 20, 2013
Notice of Public Hearing Posted:	October 19, 2013
Posting Locations:	west and east ends of subject properties along Britton Parkway
Notice of Public Hearing Mailed to Mailing List:	October 18, 2013

The above is an accurate accounting of the public notice provided for the project.

Samra Seymour

Samra Seymour

10·21·13

Date

STATE OF WASHINGTON)
) ss.
County of Thurston)

This is to certify that on 10 · 21, 2013 before the undersigned Notary Public, personally appeared Samra Seymour Planner for the City of Lacey.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year first above written.

Michele Capestany

Notary Public in and for the State of Washington, residing at: Olympia

My Commission Expires: 2·7·2016

MICHELE CAPESTANY
COMMISSION EXPIRES
NOTARY PUBLIC
2-7-2016
STATE OF WASHINGTON

EXHIBIT
31

Notary
Public
2-7-2014

Samra Seymour

From: Steve Hatton [SteveH@hattonpantier.com]
Sent: Tuesday, September 17, 2013 4:14 PM
To: Doug Christenson
Cc: Jeff Pantier; Tom Stiles; Samra Seymour
Subject: RE: Gateway Residential

Appreciate the feedback Doug. Thanks.

From: Doug Christenson [mailto:Dchriste@ci.lacey.wa.us]
Sent: Tuesday, September 17, 2013 3:31 PM
To: Steve Hatton
Cc: Jeff Pantier; Tom Stiles; Samra Seymour
Subject: RE: Gateway Residential

Steve,

Regarding the water quality treatment of stormwater prior to surface discharge in the west basin, my comment was referring to the Henderson Inlet Watershed TMDL. The largest tributary to Henderson Inlet is Woodland Creek, to which Eagle Creek is tributary. Eagle Creek, which is directly downslope from your project's proposed surface discharge of collected stormwater, is on the 303(d) list for failing to meet state water quality standards for several parameters, including Category 5 (impaired) for dissolved oxygen and Category 4A (polluted) for bacteria. Eagle Creek is one of the TMDL-named sites with the highest FC bacteria reduction needed to meet state standards, and Lacey's monitoring of Eagle Creek downstream from your site show that the state water quality standard for fecal coliform bacteria was exceeded in 2012.

Reducing discharges is essential to addressing the load reductions needed in Eagle Creek and downstream waters, which is part of the reason I commented that runoff from your project must first be minimized (i.e, retained and infiltrated upsystem within the plat) to the maximum extent feasible. Runoff volume reduction is the first step in reducing pollutant loads. Then, if surface discharge of stormwater is unavoidable, it must be treated for a high level of water quality improvement such that you don't cause further impairment of downstream waters – especially since the nearest creek is known to be impaired already. Surface discharge from a big deep impoundment, as proposed, does not achieve that goal – and in fact, some evidence suggests such a detention pond can cause a net increase in bacteria export (not to mention temperature increase, which is another parameter of concern). We don't have bacteria-specific BMPs, but some of the processes involved in enhanced treatment can help. For bacteria reduction, keeping all runoff on-site and using infiltration is preferred, but barring that we need to address it by providing a higher level of pollutant removal than would be achieved by basic treatment, i.e. the enhanced (metals control) treatment menu. Flow through the treatment system should be slow, shallow, and provide surfaces for sorption and filtration to facilitate bacteria reduction. For dissolved oxygen, phosphorus is a limiting factor, so we need to reduce phosphorus via BMPs in the phosphorus control menu. Note that phosphorus control applies to all 303(d)-listed surface waters within Lacey's jurisdiction, and to stormwater conveyed to those waters by surface flow. Thus, to try to achieve an adequate level of treatment prior to surface discharge from this project, addressing both enhanced (metals) treatment and phosphorus control is required. It will likely necessitate a combination of BMPs, or treatment train approach, to meet this discharge water quality goal.

The Henderson Inlet Watershed TMDL and the 2010 Stormwater Design Manual both provide justification for the higher treatment level being required for stormwater discharge from this project's western basin. The TMDL states that "improved management of stormwater discharges is the highest priority for reducing bacteria concentrations in the watershed," which indicates we need to use better methods than we have in the past. The 2010 Stormwater Design Manual (Chapter 1, CR #6) states that a TMDL may be used to develop runoff treatment requirements that are tailored to a specific basin. For the Gateway Residential project, runoff reduction and a high level of stormwater treatment are necessary to ensure downstream impairment is not worsened.

Regarding the hydroperiod analysis, I am not familiar with the use of WWHM2012 for wetland hydroperiod calculations, and Ecology's 2012 manual has not been adopted by Lacey. The applicable requirement is per CR #8 of the 2010 SDM,

EXHIBIT
32

which includes using a wetlands professional to evaluate the wetland impacts. Hydrologic modeling conducted as part of the wetland hydroperiod analysis could potentially use the new methodology as long as CR #8 requirements are met.

I hope this answers your questions and provides some clarity regarding the rationale for the water quality treatment requirements for this project.

Thanks,

Doug Christenson
Water Resources Engineer
City of Lacey - Public Works
360-438-2686
dchriste@ci.lacey.wa.us

From: Steve Hatton [mailto:SteveH@hattonpantier.com]
Sent: Monday, September 16, 2013 3:17 PM
To: Tom Stiles; Doug Christenson
Cc: Jeff Pantier
Subject: Gateway Residential

Hey guys, couple of quick follow up questions/comments as I prepare for a hearing.

1. Is the Woodland Creek Basin Plan the document Doug was referring to when commenting on TMDL restrictions for metals and phosphorus? Its referenced in his comment but on a second reading I'm not certain that is specifically what you were saying.

2. The new 2012 DOE Manual and WWHM2012 has a "built in" wetland hydroperiod protocol for demonstrating compliance with Min. Requirement #8. It's not a "hydroperiod study" per se but rather pre- and post-development modeling within WWHM that gets at the wetland maintenance issue. Would the 2012 DOE methodology be acceptable under the Lacey 2010 DM?

Appreciate your input guys. Productive exchange of thoughts today I think.

Steven D. Hatton
President
Hatton Godat Pantier, Inc.
3910 Martin Way E, Suite B
Olympia, WA 98506
Ofc (360)943-1599
Fax (360)357-6299
steveh@hattonpantier.com

www.hattonpantier.com

PRELIMINARY PLAT OF GATEWAY DIVISION 2

SITE DATA:

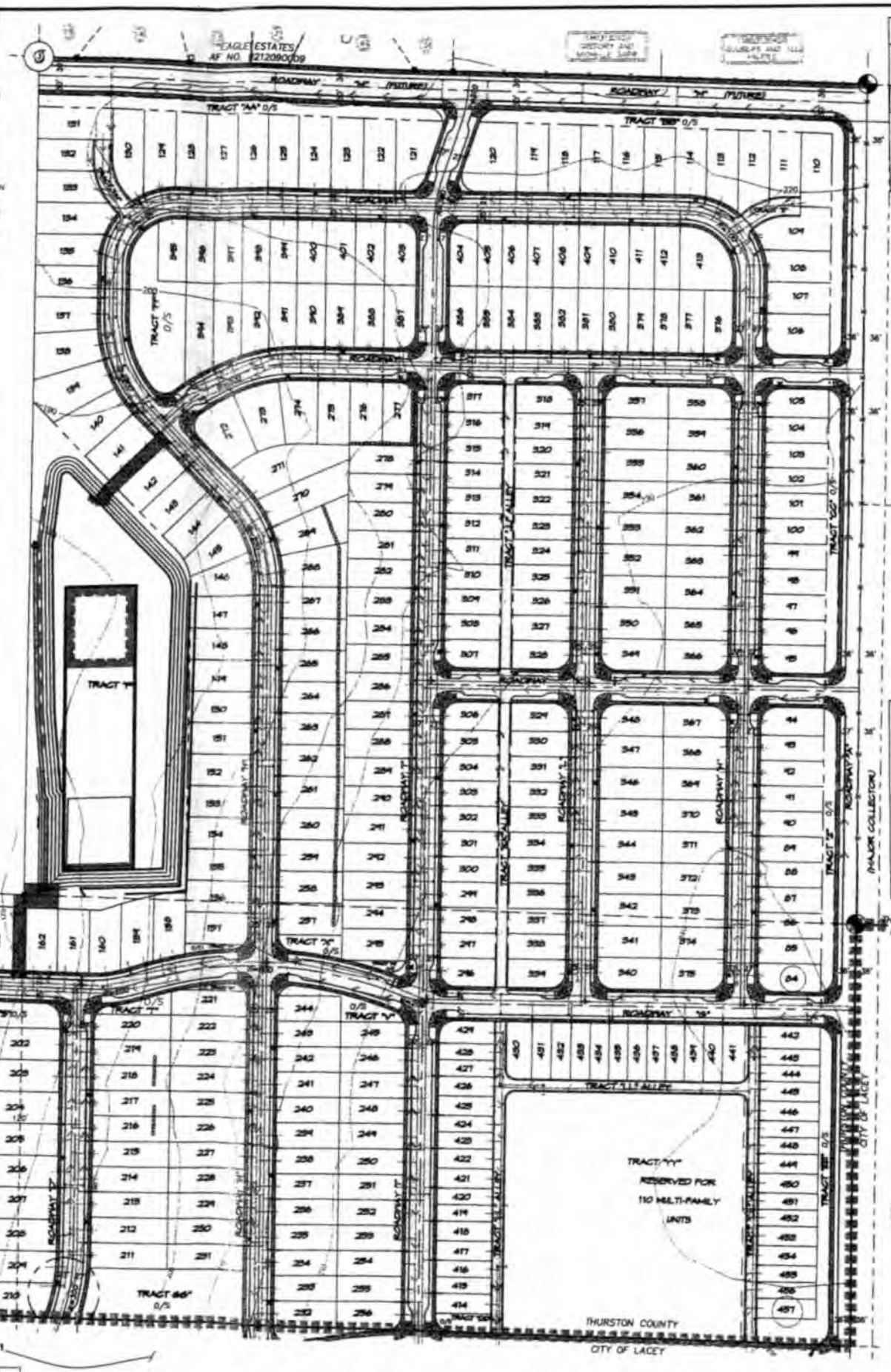
PARCEL NO.'S:	11803340060, 11803420000
ZONING:	MD 6-12 / HD 6-20
TOTAL AREA:	80.40 acres
WETLAND AREA:	3.20 acres
NET AREA:	77.20 acres
TOTAL DWELLING UNITS:	484 (INCLUDING TRACT "OO")
DENSITY:	6.27 D.U./NET ACRE
TOTAL OPEN SPACE AREA:	17.87 ACRES
ROADWAY LENGTH (ROADWAYS "A"-"M")	15,589 l.f.
ROADWAY AREA (ROADWAYS "A"-"M")	705,119 s.f.
ROADWAY LENGTH (PRIVATE ROADS AND ALLEYS)	2,477 l.f.
SMALLEST LOT (DETACHED FRONT LOAD)	4,000 s.f.
SMALLEST LOT (DETACHED REAR LOAD)	3,600 s.f.
SMALLEST LOT ATTACHED (TOWNHOMES)	2,340 s.f.
AVERAGE LOT AREA	3,563 s.f.
SANITARY SEWER	CITY OF LACEY
WATER	CITY OF LACEY

TRACT USAGE:

"O"	STORM DRAINAGE	3.80 acres
"P"	STORM DRAINAGE	4.54 acres
"Q"	WETLANDS/BUFFERS/TREE TRACT	6.71 acres
"R"	LANDSCAPE	0.16 acres
"S"	LANDSCAPE	0.18 acres
"T"	LANDSCAPE	0.06 acres
"U"	LANDSCAPE	0.02 acres
"V"	LANDSCAPE	0.09 acres
"W"	LANDSCAPE	0.02 acres
"X"	LANDSCAPE	0.06 acres
"Y"	LANDSCAPE	0.07 acres
"Z"	LANDSCAPE	0.20 acres
"AA"	LANDSCAPE	0.29 acres
"BB"	LANDSCAPE	0.42 acres
"CC"	LANDSCAPE	0.20 acres
"DD"	LANDSCAPE	0.06 acres
"EE"	LANDSCAPE	0.31 acres
"FF"	ACTIVE RECREATION	0.39 acres
"GG"	ACTIVE RECREATION	0.47 acres
	SUM OF OPEN SPACE	17.87 acres (22%)
"HH"	PRIVATE ROADWAY	0.08 acres
"II"	PRIVATE ROADWAY	0.06 acres
"JJ"	PRIVATE ALLEY	0.21 acres
"KK"	PRIVATE ALLEY	0.21 acres
"LL"	PRIVATE ALLEY	0.63 acres

LEGEND

- EX. POWER POLE
- EX. POWER VAULT
- EX. POWER TRANSFORMER
- EX. POWER PEDESTAL
- EX. PVC RISER
- EX. OVERHEAD POWER
- EX. UNDER GROUND POWER
- EX. TELEPHONE PEDESTAL
- EX. TELEPHONE MANHOLE
- EX. CABLE PEDESTAL
- EX. TELEPHONE LINE
- EX. GAS VALVE
- EX. GAS LINE
- EX. POWER JUNCTION BOX
- EX. CATCHBASIN TYPE 1
- EX. STORM MAIN LINE
- EX. CULVERT
- EX. SIGNS
- EX. FENCE
- EX. WATERMETER
- EX. HYDRANT
- EX. VALVE
- EX. BLOWOFF
- EX. WATER LINE
- EX. SEWER CLEANOUT
- EX. SEWER MANHOLE
- EX. SEWER LINE
- EX. CONCRETE
- EX. EDGE OF PAVEMENT
- EX. MAJOR CONTOUR
- EX. MINOR CONTOUR
- FINISH MAJOR CONTOUR
- FINISH MINOR CONTOUR
- NEW ROCK WALL
- NEW PEDESTRIAN STREET LIGHT
- NEW HIGH MAST W/ PED SCALE LIGHT
- NEW LIGHTING J BOX
- NEW TRANSFROMER & SERVICE DISCONNECT
- NEW WATERMETER
- NEW HYDRANT
- NEW VALVE
- NEW BLIND FLANGE
- NEW BLOCKING
- NEW WATERMAIN
- NEW CATCHBASIN TYPE 1
- NEW CATCHBASIN TYPE 2-48
- NEW STORM CATCHBASIN W/ SOLID LID
- NEW STORM MAIN LINE
- NEW LOT DRAINAGE LINE
- NEW SEWER CLEANOUT
- NEW SEWER MANHOLE
- NEW GRAVITY SEWER LINE
- NEW PIGG LAUNCH PORT
- NEW SEWER FORCEMAIN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AF NO. 4212090009
ROADWAY "A" (FUTURE)
ROADWAY "B" (FUTURE)
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TRACT "FFFF" O/S
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TRACT "VVVVVV" O/S
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TRACT "XXXXXX" O/S
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TRACT "ZZZZZZ" O/S
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TRACT "CCCCCCC" O/S
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GENERAL EROSION CONTROL NOTES:

1. A CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (CESCL) IS REQUIRED FOR ALL CONSTRUCTION PROJECTS. THE NAMED PERSON OR FIRM SHALL BE ON-SITE OR ON-CALL AT ALL TIMES. FOR THIS SITE, THE PERSON / FIRM IS TBD AND THEIR OFFICE TELEPHONE NUMBER IS TBD.
2. APPROVAL OF THIS EROSION / SEDIMENTATION CONTROL (ESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PIPES, RESTRICTORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.)
3. THE IMPLEMENTATION OF THESE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE APPLICATION CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION LANDSCAPING IS ESTABLISHED.
4. THE CLEARING LIMIT BOUNDARIES SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE APPLICANT/CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
5. THE ESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT ENTER THE DRAINAGE SYSTEM, ROADWAYS, OR VIOLATE APPLICABLE SURFACE WATER, GROUND WATER, OR DISCHARGE STANDARDS.
6. THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO ENSURE THAT SEDIMENT AND SEDIMENT-LADEN WATER DO NOT LEAVE THE SITE.
7. THE ESC FACILITIES ON ACTIVE SITES SHALL BE INSPECTED DAILY BY THE APPLICANT/CONTRACTOR--AND MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY--TO ENSURE THEIR CONTINUED FUNCTIONING.
8. THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED MONTHLY, OR WITHIN 48 HOURS FOLLOWING A MAJOR STORM EVEN, BY THE APPLICANT/CONTRACTOR--AND MAINTAINED, REPAIRED, OR AUGMENTED AS NECESSARY -TO ENSURE THEIR CONTINUED FUNCTIONING.
9. STORM INLETS OPERABLE DURING CONSTRUCTION SHALL BE PROTECTED SO THAT STORMWATER RUNOFF DOES NOT ENTER THE CONVEYANCE SYSTEM WITHOUT FIRST BEING FILTERED OR TREATED TO REMOVE SEDIMENT. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEARED PRIOR TO PROJECT COMPLETION AND ACCEPTANCE. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT-LADEN WATER OFFSITE WITHOUT TREATMENT.
10. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF THE CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.
11. ROADS SHALL BE CLEANED THOROUGHLY AS NEEDED TO PROTECT DOWNSTREAM WATER RESOURCES OR STORMWATER INFRASTRUCTURE. SEDIMENT SHALL BE REMOVED FROM ROADS BY SHOVELING OR PICKUP SWEEPING AND SHALL BE TRANSPORTED TO A CONTROLLED SEDIMENT DISPOSAL AREA.
12. FROM OCTOBER 15 THROUGH APRIL 1, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN 2 DAYS. FROM APRIL 2 TO OCTOBER 14, NO SOILS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN 7 DAYS. SOILS SHALL BE STABILIZED AT THE END OF THE SHIFT BEFORE A HOLIDAY OR WEEKEND IF NEEDED BASED ON THE WEATHER FORECAST. LINEAR CONSTRUCTION ACTIVITIES, SUCH AS RIGHT OF WAY AND EASEMENT CLEARING, ROADWAY DEVELOPMENT, PIPELINE, AND TRENCHING FOR UTILITIES, SHALL COMPLY WITH THESE REQUIREMENTS. THESE STABILIZATION REQUIREMENTS APPLY TO ALL SOILS ON SITE, WHEATHER AT FINAL GRADE OR NOT. THE LOCAL PERMITTING AUTHORITY MAY ADJUST THESE TIME LIMITS IF IT CAN BE SHOWN THAT A DEVELOPMENT SITE'S EROSION OR RUNOFF POTENTIAL JUSTIFIES A DIFFERENT STANDARD.
13. FROM OCTOBER 15 THROUGH APRIL 1, CLEARING, GRADING AND OTHER SOIL-DISTURBING ACTIVITIES SHALL ONLY BE PERMITTED IF SHOWN TO THE SATISFACTION OF THE LOCAL PERMITTING AUTHORITY THAT THE TRANSPORT OF SEDIMENT FROM THE CONSTRUCTION SITE TO RECEIVING WATER WILL BE PREVENTED.
14. SOIL STOCKPILES MUST BE STABILIZED AND PROTECTED WITH SEDIMENT-TRAPPING MEASURES.
15. ALL POLLUTANTS, INCLUDING WASTE MATERIALS AND DEMOLITION DEBRIS, THAT OCCUR ON SITE DURING CONSTRUCTION SHALL BE HANDLED AND DISPOSED OF IN A MANNER THAT DOES NOT CAUSE CONTAMINATION OF STORMWATER. WOODY DEBRIS MAY BE CHOPPED AND SPREAD ON SITE.
16. MAINTENANCE AND REPAIR OF HEAVY EQUIPMENT AND VEHICLES AND OTHER ACTIVITIES WHICH MAY RESULT IN DISCHARGE OF SPILLAGE OF POLLUTANTS TO THE GROUND OR INTO STORMWATER RUNOFF MUST BE CONDUCTED USING SPILL PREVENTION MEASURES, SUCH AS DRIP PANS. REPORT ALL SPILLS TO 911.
17. WATER FROM MOST DEWATERING OPERATION SHALL BE DISCHARGED INTO A SEDIMENT TRAP OR POND. CLEAN, NON-TURBID WATER MAY BE DISCHARGED TO STATED SURFACE WATERS, PROVIDED THE DISCHARGE DOES NOT CAUSE EROSION OR FLOODING. HIGHLY TURBID OR CONTAMINATED DEWATERING WATER FROM CONSTRUCTION EQUIPMENT OPERATION, CLAMSHELL DIGGING, CONCRETE TREMIE POUR, OR WORK INSIDE A COFFERDAM SHALL BE HANDLED SEPARATELY FROM STORMWATER AND PROPERLY DISPOSED.

CITY OF LACEY
VERTICAL DATUM
NGVD 29 BASED ON CITY OF LACEY BENCHMARK NUMBER 1083 FOUND CASED MONUMENT AT THE INTERSECTION OF CALLISON ROAD AND BRITTON PARKWAY ELEVATION = 216.42
MERIDIAN HORIZONTAL DATUM
CITY OF LACEY COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111152 BASED ON THE BEARING BETWEEN THE SOUTHEAST CORNER AND SOUTHWEST CORNER OF SECTION 10, EQUALS NORTH 87°35'41" WEST

100 50 0 100 200
SCALE: 1" = 100'

TOPOGRAPHIC NOTE:
THE EXISTING TOPOGRAPHIC DATA SHOWN ON THESE DRAWINGS HAS BEEN PREPARED, IN PART, BASED UPON INFORMATION FURNISHED BY OTHERS. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, HGP CANNOT ENSURE ITS ACCURACY AND THUS IS NOT RESPONSIBLE FOR THE ACCURACY OF THAT INFORMATION OR FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DRAWINGS AS A RESULT.

THIS DRAWING DOES NOT REPRESENT A RECORD DOCUMENT, UNLESS CERTIFIED BY HATTON GODAT PANTIER.

ANY ALTERATIONS TO THE DESIGN SHOWN HEREON MUST BE REVIEWED AND APPROVED BY HATTON GODAT PANTIER.

NOTE: THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS PRIOR TO CONSTRUCTION BY CALLING THE UNDERGROUND LOCATE LINE AT 1-800-424-5555 A MINIMUM OF 48 HOURS PRIOR TO ANY EXCAVATION.

DESIGNED BY: DS
DRAWN BY: MM
CHECKED BY: SDH
DATE: JUNE 2013
SCALE: H
V

11803340000, 11803420000

GATEWAY DIVISION 2
PRELIMINARY PLAT
PRELIMINARY EROSION CONTROL PLAN

REVISIONS: DATE:

HATTON GODAT PANTIER
ENGINEERS AND SURVEYORS
3910 MARTIN WAY E, SUITE B
OLYMPIA, WA 98506
TEL: 360.943.1599 FAX: 360.357.6299
hattonpantier.com

AGENCY NO.
SHEET: 2 OF 13
JOB: 12-052B

PRELIMINARY PLAT OF GATEWAY DIVISION 1

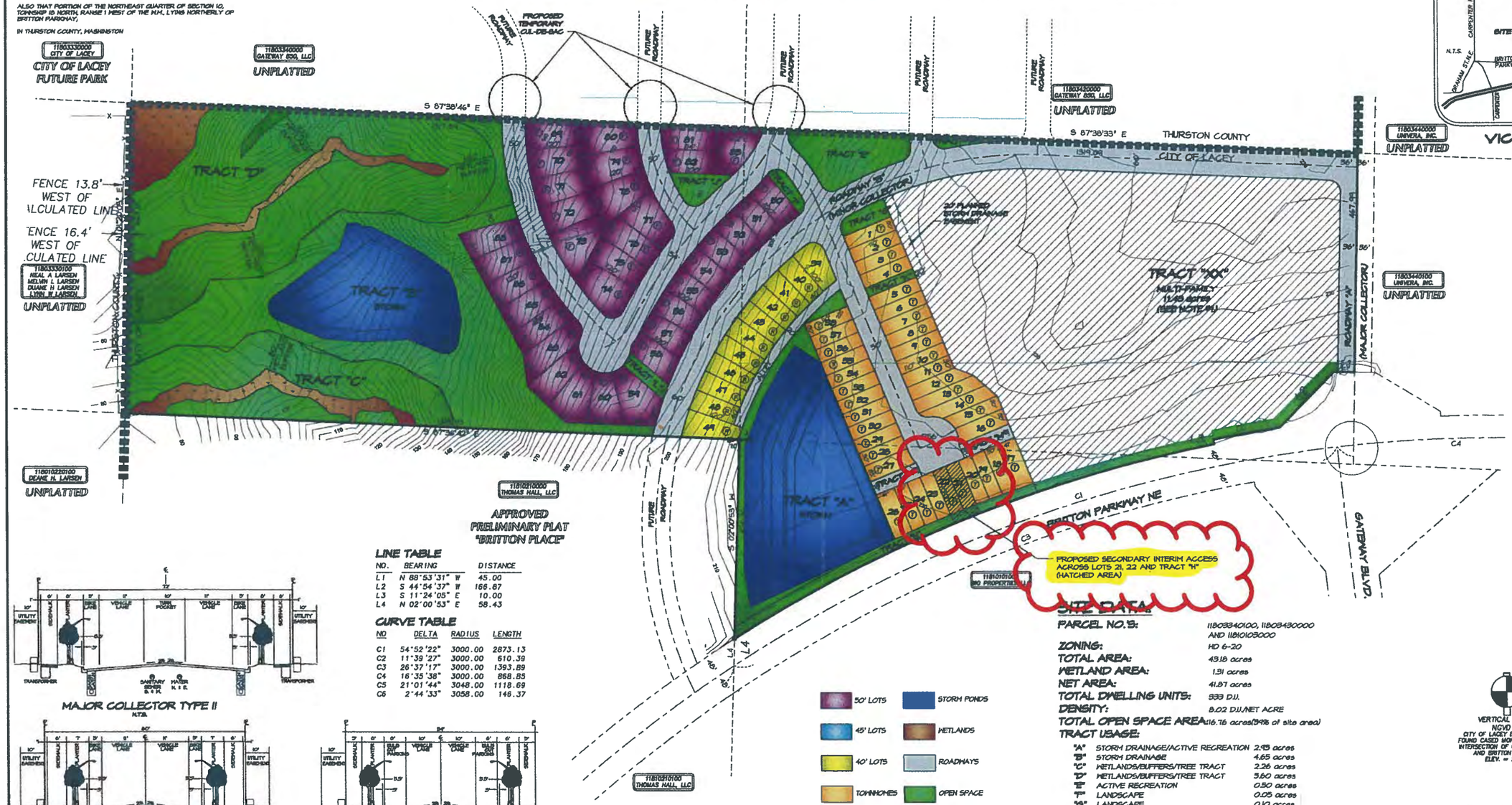
A PORTION OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND OF THE SOUTHWEST OF THE SOUTH EAST QUARTER OF SECTION 9 AND A PORTION OF THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 10, ALL IN TOWNSHIP 18 NORTH, RANGE 1 WEST, W.M.

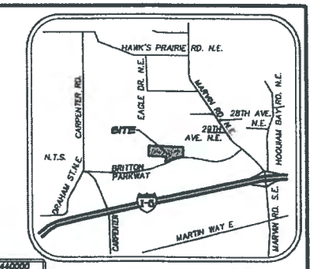
LEGAL DESCRIPTION

THE SOUTH HALF OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER AND THE SOUTH HALF OF THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 9, TOWNSHIP 18 NORTH, RANGE 1 WEST OF THE W.M.,
EXCEPT BRITTON PARKWAY;

ALSO THAT PORTION OF THE NORTHEAST QUARTER OF SECTION 10, TOWNSHIP 18 NORTH, RANGE 1 WEST OF THE W.M., LYING NORTHERLY OF BRITTON PARKWAY;

IN THURSTON COUNTY, WASHINGTON





VICINITY MAP

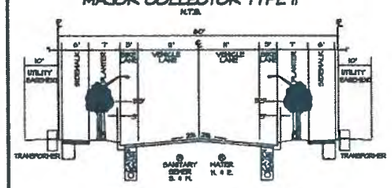
LINE TABLE

NO.	BEARING	DISTANCE
L1	N 88°53'31" W	45.00
L2	S 44°54'37" W	166.87
L3	S 11°24'05" E	10.00
L4	N 02°00'53" E	58.43

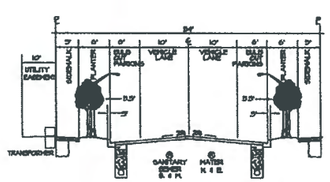
CURVE TABLE

NO	DELTA	RADIUS	LENGTH
C1	54°52'22"	3000.00	2873.13
C2	11°39'27"	3000.00	610.39
C3	26°37'17"	3000.00	1393.89
C4	16°35'38"	3000.00	868.85
C5	21°01'44"	3048.00	1118.69
C6	2°44'33"	3058.00	146.37

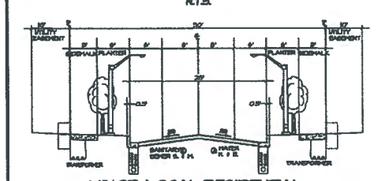
MAJOR COLLECTOR TYPE II
N.T.S.



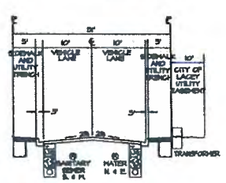
MINOR COLLECTOR TYPE II
N.T.S.



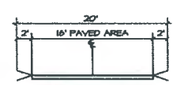
MAJOR LOCAL RESIDENTIAL
N.T.S.



MINOR LOCAL RESIDENTIAL
N.T.S.



PRIVATE RESIDENTIAL
N.T.S.



PUBLIC ALLEY
N.T.S.

LEGEND

- (F) FRONT LOAD UNIT
- (R) REAR LOAD UNIT
- (T) TOWNHOME UNIT

NOTES:

1. TRACT "XX" IS RESERVED FOR MULTI-FAMILY DEVELOPMENT. THE AREA OF TRACT "XX" INCLUDING 1/2 OF THE ADJACENT PLANNED PUBLIC STREETS IS 12.50 ACRES THE RESULTING PLANNED DENSITY IS 20 D.U. ACRE.
2. LOTS 1-38 ARE DESIGNATED TOWNHOMES. TWO DWELLING UNITS PER BUILDING CLUSTER ARE PLANNED.
3. TRACTS "A"-"H" WILL BE OWNED BY AND MAINTAINED BY THE HOMEOWNERS ASSOCIATION FOR THIS PLAT.
4. STORM DRAINAGE FACILITIES REQUIRED FOR DEVELOPMENT OF TRACT "XX" WILL BE PROVIDED WITHIN TRACT "XX".
5. TOPOGRAPHIC DATA SHOWN HEREON IS BASED ON FIELD SURVEY PERFORMED BY H&P IN SEPTEMBER 2012.

SITE DATA:

PARCEL NO.'S:	11803340100, 11803430000 AND 11810103000
ZONING:	HD 6-20
TOTAL AREA:	43.18 acres
WETLAND AREA:	1.31 acres
NET AREA:	41.87 acres
TOTAL DWELLING UNITS:	833 D.U.
DENSITY:	8.02 D.U./NET ACRE
TOTAL OPEN SPACE AREA:	16.76 acres(39% of site area)

TRACT USAGE:

"A"	STORM DRAINAGE/ACTIVE RECREATION	2.95 acres
"B"	STORM DRAINAGE	4.65 acres
"C"	WETLANDS/BUFFERS/TREE TRACT	2.26 acres
"D"	WETLANDS/BUFFERS/TREE TRACT	3.60 acres
"E"	ACTIVE RECREATION	0.50 acres
"F"	LANDSCAPE	0.05 acres
"G"	LANDSCAPE	0.10 acres
"H"	LANDSCAPE	0.33 acres
"I"	LANDSCAPE	0.07 acres
"J"	LANDSCAPE	0.13 acres
"K"	STORM DRAINAGE	0.05 acres
"L"	STORM DRAINAGE	0.07 acres
"M"	PRIVATE STREET	0.08 acres
"N"	PRIVATE STREET	0.08 acres
"XX"	MULTI-FAMILY DEVELOPMENT	11.43 acres

ROADWAY LENGTH (A,B,C)	2,202 l.f.
ROADWAY AREA (A,B,C)	2.2 acres
ROADWAY LENGTH (OTHERS)	2,079 l.f.
ROADWAY AREA (OTHERS)	9.5 acres
SMALLEST LOT (DETACHED FRONT LOAD)	5,000 s.f.
SMALLEST LOT (DETACHED REAR LOAD)	4,000 s.f.
SMALLEST LOT ATTACHED (TOWNHOMES)	3,300 s.f.
AVERAGE LOT AREA	4,863 s.f.
SANITARY SEWER	CITY OF LACEY
WATER	CITY OF LACEY

VERTICAL DATUM
NGVD 29
CITY OF LACEY B.M. NO. 1083
FOUND CASED MONUMENT AT THE INTERSECTION OF CALLISON ROAD AND BRITTON PARKWAY
ELEV. = 218.42

BASIS OF BEARING:
WASHINGTON STATE PLANE COORDINATE SYSTEM AND SURVEY RECORDED UNDER AUDITOR'S FILE NO. 3111157 BASED ON THE EAST LINE OF THE SOUTHEAST QUARTER AND SOUTHWEST QUARTER OF SECTION 10, EQUALS NORTH 0°24'41" WEST

SCALE: 1"=100 FEET
0 50 100 200

HATTON GODAT
ENGINEERS AND
3910 MARTIN WAY E, S
OLYMPIA, WA 985
TEL: 360.943.1599 FAX:
hattonpantier.co

10/24/13

EXHIBIT
34

Hall Equities Group™
Real Estate Investment · Development · Management

October 29, 2013 VIA E-MAIL

City of Lacey Hearings Examiner
420 College St. SE
Lacey, WA 98503

Re: **Taylor Development Application # 12-239**

Dear Hearings Examiner:

Hall Equities Group represents Thomas-Hall, LLC, owners of 29.74 acres of residential land along Britton Parkway known as Britton Place. The preliminary plat for the project was approved by the Lacey City Council on December 6th, 2007 as Britton Place – Preliminary Subdivision, Townhouse Development Permit, and Wetland Development Permit Case Number 06-23.

We are in receipt of the Notice of Public Hearing for Application # 12-239(Lacey Gateway Division 1) submitted by Taylor Development proposing a preliminary subdivision application for 83 single-family lots and a future multifamily development located on 42.6 acres located east and north of our Britton Place project.

In reviewing the proposed Application, we have identified an area of concern that we would like to bring to your attention. Specifically, the design for Lacey Gateway Division 1 includes a stormwater pond shown as Tract "A" on the plan. The pond is located directly east and north of approved residential lots on our Britton Place project. According to our engineering consultant Berger ABAM, the pond is significantly higher in grade than the proposed finish floor elevations of our approved lots.

Attached please find a letter from Berger ABAM. According to their analysis, our residential lots are located 30 feet lower in elevation than the bottom of the proposed pond and bio-swale. This significant differential in grade is likely to cause stormwater to seep into our residential lots with the potential of having the future roadway on our property acting as a "back stop" resulting in perpetually wet lots, damp crawlspaces and/or other potential foundation issues.

Our concern on this issue is not just limited to the likelihood of physical problems caused by the location of the storm pond. We are additionally concerned about the marketability of our project and the devaluation of the lots on our preliminary plat that are located directly below the storm pond with the only barrier being an earthen dam or built up dirt wall. Aside from the safety and maintenance concerns, the aesthetics of having a lot with a 30 foot manmade dirt wall out the back door will certainly cause concern to buyers. We believe that this is not proper or consistent land use planning and that further consideration should be given to how the Application interfaces with the Britton Place project.

EXHIBIT
35

BergerABAM

33301 Ninth Avenue South, Suite 300, Federal Way, Washington 98003-2600
206/431-2300 • 206/431-2250 Fax • www.abam.com

18 October 2013

Mr. Brandon Farrell
Hall Equities
1855 Olympic Blvd. Suite 300
Walnut Creek, CA 94596

RE: Review of grading of Gateway Division 1

Dear Brandon:

I was recently provided a copy of the Gateway Division 1 grading and drainage plans immediately adjacent to your Britton Place project in Lacey, WA. The plans were dated February 2013 and were produced by Hatton, Godat, Pantier. I have some concerns that I have outlined below.

The pond they are proposing next to Britton Parkway and adjacent to your project, identified as Tract "A" on their plan, is significantly higher in grade than the grades on your site. The pond elevation at the bottom of their pond and bio-swale is shown to be elevation 210, while the finished floor elevations of the future houses shown on your site plan will be in the neighborhood of 180 to match the future roadway. The slope between their pond and the future roadway will be fairly steep, which may cause stormwater to seep in the area of your future lots. If this happens, the future roadway will act as a "back stop" to the stormwater, thus creating wet lots, crawl-spaces, and yards.

This item needs to be resolved with the developer and engineer for the Gateway development. I would be happy to review any method they devise to ensure your lots in this area are feasible.

Please let me know if you have any questions regarding this matter. Thank you.

Sincerely,

Jeff McInnis, P.E.

JWM:keh

UNIQUE CONDITIONS:

Specific Transportation Improvements

17. Per the Transportation Comprehensive Plan~~, multiple Major Collector Type II roadway (see Detail 4-3.1 dated 8/27/09 attached) corridor connections will need to be accommodated throughout the proposed site. Coordination with the adjacent property owners and the City of Lacey will be required.~~ Gateway Boulevard and Road B shall both be classified as Major Collector Type II roadways.

18. ~~Due to the number of units associated with this project, two full access points will be required, as shown on the preliminary plat. Each connection point shall be constructed to Major Collector Type II roadway standards.~~ The proposed east-west roadway identified as Road "B" shall be constructed from Gateway Boulevard to its on-site terminus at the southwest property line, as shown on the preliminary plat map (exhibit 5).

19. Prior to ~~issuance of grading permits for Gateway Residential Division 2 or the 250 multi-family units associated with Division 1 the off-site portion of Road B, connecting to Britton Parkway~~ final plat shall be fully constructed. a forward full access

check the meaning recorded for Ted's language

20. ~~A temporary, emergency vehicle access, meeting IFC requirements for fire access (IFC Section 503) shall be installed connecting the roadway serving the townhouse lots (lots1-38) and Britton Parkway, as shown on exhibit 34. Bollards or other approved methods shall be used to ensure access by emergency vehicles only.~~

21. The "Gateway Boulevard" connection shall be constructed from curb to curb. On the west side of the roadway, full frontage improvements shall be installed to Major Collector Type II roadway standards.

22. ~~The proposed east-west collector identified as Road "B" shall be fully constructed with the first phase of development. Road "B" shall be constructed to Major Collector Type II standards, extending from Gateway Boulevard to Britton Parkway.~~

23. Roadways connecting to Road "B" shall be constructed to Major Residential Roadway standards (see Detail 4-4.0 dated 8/27/09).

24. Frontage improvements along the property frontage of Britton Parkway (including the required stormwater treatment and infiltration facilities) shall be installed by the developer and approved by the City prior to final plat approval of this project. These improvements shall be installed to City of Lacey Boulevard standards (see Detail 4-2.1 dated 8/27/09).

25. The right angle knuckle style cul-de-sac shall meet minimum roadway radii requirements identified in the Development Guidelines and Public Works Standards manual.

HATTON GODAT PANTIER

3910 Martin Way E, Suite B
Olympia, WA 98506
Phone 360.943.1599
Fax 360.357.6299
hattonpantier.com

MEMORANDUM

TO:	Kevin O'Brien	**DATE:**	October 30, 2013
BUSINESS/AGENCY:	Gateway 850, LLC	**# OF PAGES:**	1
FROM:	Steve Hatton, PE	**PROJECT:**	Gateway Residential
AGENCY #:	12-239	**HGP PROJECT #:**	12-052A

ACTION REQUESTED: ☒ No Action ☐ See Message ☐ Please Comment

MESSAGE:

I reviewed two letters provided to you yesterday by the City of Lacey. The first from Hall Equities and the second from Berger/ABAM both commenting on the location of the stormwater infiltration pond located near the common boundary between the Gateway and Britton Place (Hall Equities property) projects in Tract A. I have the following comments.

1. There is no "30 ft man-made dirt wall" proposed as stated in the Hall Equities letter. There may well be a small embankment along the property line due to changes in the elevation of the existing terrain. We're estimating about a 5 ft berm on the preliminary grading/drainage plans.

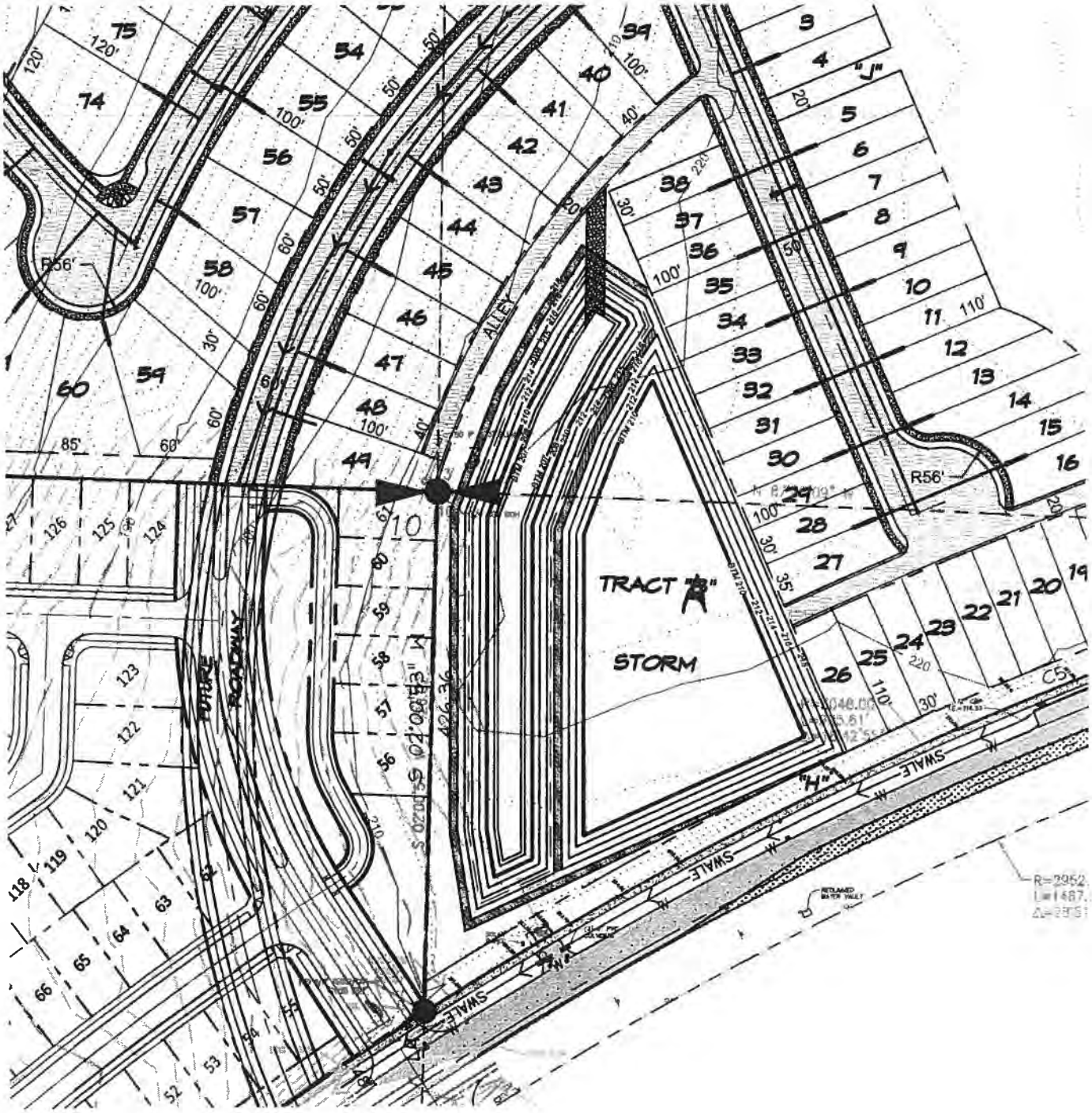
2. The pond bottom is at Elevation 210. The contour on the east line of Britton Place is also 210 and is ~150 feet west of the infiltration pond. Britton Place slopes down steeply to the west from its eastern/common property line with Gateway. This project nearly matches existing grade at the common boundary.

3. Berger/ABAM suggests that finish floor elevations will be 180 at the common property line which would suggest that they are proposing a 30 foot cut at the east property line. The Gateway project nearly matches existing grade at the common boundary. The proposed collector street through Britton Place leaves Britton Parkway at approximately elevation 210 and joins to Gateway property at approximately elevation 195.

4. I direct Berger/ABAM to the geotechnical report submitted with this application in addition to the preliminary grading plans. They will find in that report that no till layer exists in the pit near the infiltration pond within at least 14 feet of the surface. A test boring lower down the slope shows a slightly cemented layer at 5 ft of depth. Assuming there is a till layer beneath the pond that was not reached by the depth of the boring, that till would undoubtedly slope down with the surface contour and apparently transition from 14 ft to 5 ft deep.

5. If Britton Place overexcavates their development for reasons of their own they would have to be mindful of intercepting existing groundwater that is currently present along the till layer. The geotechnical investigations for Gateway revealed this interflow as well. Gateway's work will not materially affect the condition.

Based on the contours in the area, the geotechnical investigations performed for this project, and the location of the proposed infiltration pond in Tract A, I do not foresee any adverse impacts on adjacent properties.


TRACT "B"
STORM
FUTURE ROADWAY
ALLEY
SWALE
SWALE
SWALE
"J"
"H"
R56'
R56'
C5
R=2952.
L=1487.

LACEY CITY COUNCIL MEETING
November 21, 2013

SUBJECT: **Declaration of Need to Increase Ad Valorem Tax Levy by One Percent Resolution**

RECOMMENDATION: **Upon review and concurrence, adopt Declaration of Need resolution.**

STAFF CONTACT: Scott Spence, City Manager
Troy Woo, Finance Director

ORIGINATED BY: Troy Woo, Finance Department

ATTACHMENTS: 1. Resolution No. 1002

FISCAL NOTE: Projected 2014 General Levy Collections $5,533,994

PRIOR REVIEW: Finance and Economic Development Committee on October 28, 2013 and Revenue Hearing conducted on November 7, 2013

BACKGROUND:

Each year the taxing districts must certify their budgets and property tax levies by November 30 or the County Assessor will use the previous year's certified levy amounts.

A required step to establishing the property tax levy is the passage of a separate ordinance or resolution stating the property tax increases in dollar and percentage terms. RCW 84.55.120 states:

> No increase in property tax revenue, other than that resulting from the addition of new construction, increases in assessed value due to construction of electric generation wind turbine facilities classified as personal property, and improvements to property and any increase in the value of state-assessed property, may be authorized by a taxing district, other than the state, except by adoption of a separate ordinance or resolution, pursuant to

notice, specifically authorizing the increase in terms of both dollars and percentage. The ordinance or resolution may cover a period of up to two years, but the ordinance shall specifically state for each year the dollar increase and percentage change in the levy from the previous year.

The property tax is a significant source of revenue for the General Fund, so the full one percent increase is needed to address increasing expenditure needs. The 2014 Proposed Budget is balanced based on exercising the full 101 percent revenue limit increase in the amount of $53,700. Since the revenue limit on property tax growth was reduced from 6.0 to 1.0 percent annually from a proposed voter initiative and later reaffirmed by the State Legislature, property tax increases haven't kept pace with increases to the City's largest operating expenditures, salaries and benefits.

This proposed increase is in addition to adjustments resulting from the addition of new construction, increases to the state assessed property, and allowable adjustments for annexation and refunds. The following table includes each of the proposed adjustments to the property tax levy.

	Adjustment Amount	% Increase/ Decrease
2013 Property Tax Levy	$ 5,370,029	
2014 General Levy Increase	53,700	1.00%
2014 New Construction Levy	92,425	1.72%
2014 Annexation Levy	-	0.00%
2014 Net Refund Levy	17,840	0.33%
2014 General Property Tax Levy	$ 5,533,994	3.05%

This resolution should be adopted in advance of the ad valorem tax ordinance. It is requested that the City Council review and adopt the resolution declaring the need to increase property taxes.

ADVANTAGES:

1. The proposed property tax levels will help balance the proposed 2014 Budget, which preserves current service levels.

2. Exercising 101 percent revenue limit will help address the rising costs of the City's service delivery.

DISADVANTAGES:

1. This is a challenging economic time to increase property tax collections by the 1.0 percent revenue limit. However, this modest increase allows the City of Lacey to preserve its service levels.

RESOLUTION NO. 1002

CITY OF LACEY

A RESOLUTION OF THE CITY OF LACEY, WASHINGTON, DECLARING THE NEED TO INCREASE THE 2014 AD VALOREM TAX LEVY BY ONE PERCENT OVER THE TAX LEVY OF 2013.

WHEREAS, a public hearing was held before the City Council of the City of Lacey on November 7, 2013, for purposes of considering revenue sources to fund the City's 2014 Current Expense Budget which consists of expenditures to provide ongoing services exclusive of capital expenditures, utility and other enterprise funds and special assessment funds of the City, and

WHEREAS, information was provided at such hearing showing that due to a lack of revenues from sources other than the ad valorem property tax and the need for additional expenditures, there will be a need to increase the property tax by an amount equal to one percent in addition to revenue resulting from the addition of new construction and improvements to property, any increase in the value of state assessed property, and allowed adjustments for annexations and refunds,

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON, that there exists a need to increase the 2014 ad valorem tax levy by a percentage of 1.0% over the ad valorem tax levy for 2013, which increase will result in an increase in the regular property tax levy for 2014 of $53,700 more than the regular property tax levy for 2013 which increase shall be in addition to property tax revenue adjustments resulting from the addition of new construction and improvements to property, any increase in the value of state assessed property within the City and allowed adjustments for annexation and refunds.

PASSED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON, this 21st day of November, 2013.

CITY COUNCIL

_____
Mayor

Attest:

_____
City Clerk

Approved as to form:

_____
City Attorney

LACEY CITY COUNCIL MEETING
November 21, 2013

SUBJECT: **Ad Valorem Tax Ordinance**

RECOMMENDATION: **Upon review and concurrence, adopt the Ad Valorem Tax Ordinance.**

STAFF CONTACT: Scott Spence, City Manager
Troy Woo, Finance Director

ORIGINATED BY: Troy Woo, Finance Department

ATTACHMENTS: 1. Ordinance No. 1422

FISCAL NOTE: 2014 General Levy Collections $5,533,994
2014 Excess Bond Levy Collections (Fire Safety) $443,126
2014 Excess Bond Levy Collections (Parks) $695,200

PRIOR REVIEW: Finance and Economic Development Committee on October 28, 2013 and Revenue Hearing conducted on November 7, 2013

BACKGROUND:

Each year the taxing districts must certify their budgets and property tax levies by November 30 or the County Assessor will use the previous year's certified levy amounts.

There are a number of factors that will impact the City's property tax levy. The proposed 2014 levy will be increased by the refund levy, revenue limit, and new construction.

Refund Levy represents adjustments that were made to property assessments based on property owner assessment appeals, technical errors, or the granting of exemptions. The refunds were granted during the period of October 1, 2012, through September 30, 2013. The refunds did not change the legal property tax levy limit during that period, so the City is allowed by Revised Code of Washington (RCW) to recover the refunded tax dollars in the following year. The refunds totaled $17,840.

The property tax revenue limit for jurisdictions with populations greater than 10,000 is 101 percent or 100 percent plus inflation, whichever is less. Increases resulting from new construction and improvements to property, newly construction wind turbines, and state-assessed utility property are exempt from the revenue limit. The revenue limit is challenging for the City of Lacey because property tax is a significant source of revenue for the General Fund. 14.4 percent of all proposed 2014 General Fund budgeted revenues are from property taxes. It is typical for inflation to be in excess of one percent, so the 101 percent property tax limit does not keep pace with rising expenditures.

While the 101 percent revenue limit is challenging, the City of Lacey has been able to address growing service demands and inflationary growth to expenditures with strong property tax growth from new construction. The additions from new construction remain better than expected for 2014, but have dropped significantly compared to the previous five years. New construction valuing $70,161,929 will be added to next year's assessed value. This will result in property tax increases of $92,425.

The overall assessed value for Lacey is increasing $260,576,119. After removing the new construction additions, existing assessed valuation increased $190,414,190. Increasing valuations result in lower levy rates. Properties which experienced increases in assessed valuation at a similar rate as the overall Lacey valuation will not experience any changes to property tax collections despite the decrease to the levy rate. The following table illustrates the impact of a 10.0 percent increase to property assessments with the one-percent revenue limit in effect.

Tax District - City of Lacey	**Year 1**	**Year 2**	**Change**
Revenue Limit (1%)	$ 1,000,000	$ 1,010,000	1.0%
Total District Assessed Value	100,000,000	110,000,000	10.0%
Levy Rate per $1,000 Assessed Value	$ 10.00	$ 9.18	-8.2%

House in Lacey	**Year 1**	**Year 2**	**Change**
Assessed Value	$ 100,000	$ 110,000	10.0%
Taxes Due (Assessed Value x Levy Rate)	$ 1,000	$ 1,010	1.0%

The table illustrates that a house in Lacey that is appreciating in value at the same rate (10.0 percent) as the average appreciation rate for Lacey, and without considerations of statewide levies or other taxing districts, will have taxes due increased by one percent or the revenue limit.

The proposed ad valorem tax ordinance sets the 2014 general property tax at $5,533,994. This will result in an estimated levy rate of $1.2760 per $1,000 of assessed valuation. This is an increase of $163,966 or 3.1 percent compared to the 2013 general property tax collections. The adjustments to next year's levy include an $92,425 increase due to new construction, a $53,700 increase due exercising the 1.0 percent revenue limit adjustment, and a $17,840 increase from the 2013 refund levy.

The proposed ordinance also sets the voter-approved GO Bond redemption property tax levies. The total 2014 property tax levy collection for GO Bond redemption is $1,138,326. The total estimated GO Bond redemption levy rate is $0.2650 per $1,000 of assessed valuation. There are three outstanding voter approved GO Bonds. The outstanding GO Bonds and their portion of the property tax levies are listed below.

	Date Issued	Original Amount	Outstanding Balance	2014 Principal & Int.	Rate/ $1,000 AV
Fire Safety Refunded GO Bonds	December 1, 2010	$3,790,000	$ 3,430,000	443,126	0.10316
Parks Imp. GO Refunded Bonds 2012	July 1, 2003	4,025,000	3,810,000	317,800	0.07399
Parks Improvement GO Bonds 2006	December 1, 2006	4,985,000	4,025,000	377,400	0.08786
				$ 1,138,326	$0.26501

It is requested that the City Council review and adopt the ordinance setting the 2014 property tax levies.

ADVANTAGES:

1. The proposed property tax levels will help balance the proposed 2014 Budget, which preserves current service levels.

2. Exercising 101 percent revenue limit will help offset the rising costs of the City's service delivery.

DISADVANTAGES:

1. This is a challenging economic time to increase property tax collections by the 1.0 percent revenue limit. However, this modest increase allows the City of Lacey to preserve its service levels.

ORDINANCE NO. 1422

CITY OF LACEY

AN ORDINANCE OF THE CITY OF LACEY, WASHINGTON, FIXING THE AMOUNT OF THE ESTIMATED EXPENDITURES, LESS THE ESTIMATED REVENUES FROM SOURCES OTHER THAN AD VALOREM TAXATION, NEEDED FOR THE CURRENT EXPENSE BUDGET AND FOR THE PAYMENT OF PRINCIPAL AND INTEREST UPON THE GENERAL BONDED INDEBTEDNESS OF THE CITY OF LACEY FOR THE FISCAL YEAR 2014; LEVYING THE ANNUAL AD VALOREM TAXES OF THE CITY OF LACEY FOR THE FISCAL YEAR 2014 AND APPROPRIATING SAME TO CERTAIN FUNDS FOR CERTAIN PURPOSES AND ADOPTING A SUMMARY FOR PUBLICATION.

WHEREAS, a public hearing was held before the City Council of the City of Lacey on November 7, 2013, for purposes of considering revenue sources to fund the City's 2014 Current Expense Budget which consists of expenditures to provide on going services exclusive of capital expenditures, utility and other enterprise funds and special assessment funds of the City, and

WHEREAS, the assessed valuation of all taxable property within the City as determined by the Thurston County Assessor is $4,337,072,563 for the General Levy and $4,295,382,418 for general obligation levies, and

WHEREAS, the City Council, by passage of Resolution No. 1002 has declared a need to increase the 2014 property tax by one percent over the 2013 ad valorem property tax levy,

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON, as follows:

Section 1. The property tax levy, together with all adjustments thereto is shown below:

	Adjustment Amount	% Increase/ Decrease
2013 Property Tax Levy	$ 5,370,029	
2014 General Levy Increase	53,700	1.00%
2014 New Construction Levy	92,425	1.72%
2014 Annexation Levy	-	0.00%
2014 Net Refund Levy	17,840	0.33%
2014 General Property Tax Levy	$ 5,533,994	3.05%

Section 2. The amount of ad valorem tax levies of the City of Lacey for the fiscal year 2014 necessary for the payment of principal and interest of all general obligation bond issues, a total voted property tax of $1,138,326, on each dollar of assessed valuation for

such property, to wit:

	Total Assessed Valuation	$ Amount per $1,000 Assessed Value	$ Amount of Levy
2012 Refunded Parks Imp.	$4,295,382,418	$ 0.07399	$317,800
2006 Parks Improvement	4,295,382,418	0.08786	377,400
2010 Refunding (Fire Safety)	4,295,382,418	0.10316	443,126

Section 3. The taxes herein provided for are levied for the purpose of raising revenue sufficient to pay the principal and interest upon the general bonded indebtedness, if any, of the City of Lacey, for a portion of the General Fund, and for the operation of the different departments of the municipal government of the City of Lacey for the fiscal year beginning January 1, 2014, and ending December 31, 2014 (current expense budget); and are hereby levied upon all the real and personal property as shown by the assessment in the County of Thurston as finally fixed by the County and State Board of Equalization, and as extended upon the books of the County Assessor showing the property within said City subject to taxation for municipal purposes and upon the amount of real and personal property as certified by the County Assessor, all pursuant to and under and by virtue of the laws of the State of Washington.

Section 4. That the taxes collected from the levies hereby fixed and made are hereby appropriated and this appropriation, together with the estimated revenues from all sources other than ad valorem taxation shall, when the annual budget for the fiscal year 2014 is finalized and adopted by ordinance, constitute the appropriations of the City of Lacey for the fiscal year 2014.

Section 5. The Summary attached hereto is hereby approved for publication.

PASSED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON, this 21st day of November, 2013.

CITY COUNCIL

_____
Mayor

Attest:

_____
City Clerk

Approved as to form:

_____
City Attorney

Publish: November 25, 2013

SUMMARY FOR PUBLICATION

ORDINANCE NO. 1422

CITY OF LACEY

The City Council of the City of Lacey, Washington, passed on November 21, 2013, Ordinance No. 1422, entitled "AN ORDINANCE OF THE CITY OF LACEY, WASHINGTON, FIXING THE AMOUNT OF THE ESTIMATED EXPENDITURES, LESS THE ESTIMATED REVENUES FROM SOURCES OTHER THAN AD VALOREM TAXATION, NEEDED FOR THE CURRENT EXPENSE BUDGET AND FOR THE PAYMENT OF PRINCIPAL AND INTEREST UPON THE GENERAL BONDED INDEBTEDNESS OF THE CITY OF LACEY FOR THE FISCAL YEAR 2014; LEVYING THE ANNUAL AD VALOREM TAXES OF THE CITY OF LACEY FOR THE FISCAL YEAR 2014 AND APPROPRIATING SAME TO CERTAIN FUNDS FOR CERTAIN PURPOSES AND ADOPTING A SUMMARY FOR PUBLICATION."

The main points of the Ordinance are described as follows:

1. The Ordinance sets the 2014 general property tax levy to be in the sum of $5,533,994.00 and sets the amount of ad valorem tax levies for the payment of outstanding bonded indebtedness.

2. The Ordinance declares that the taxes levied, together with estimated revenues from all other sources other than ad valorem taxation shall constitute the appropriations of the City for the 2014 fiscal year budget.

3. The Ordinance approves this Summary for publication.

A copy of the full text of this Ordinance will be mailed without charge to any person requesting the same from the City of Lacey.

Published: November 25, 2013.

LACEY CITY COUNCIL MEETING
November 21, 2013

SUBJECT: **Storwmwater Rate Ordinance**

RECOMMENDATION: **Upon review and concurrence, adopt stormwater rate ordinance setting the 2014-2019 stormwater rates.**

STAFF CONTACT: Scott Spence, City Manager
Troy Woo, Finance Director

ORIGINATED BY: Troy Woo, Finance Department

ATTACHMENTS: 1. Ordinance No. 1423

FISCAL NOTE:

PRIOR REVIEW: Finance and Economic Development Committee on October 28, 2013 and Revenue Hearing conducted on November 7, 2013

BACKGROUND:

The City engaged the services of a consultant to perform the first ever comprehensive plan for the Stormwater utility. The financial chapter will recommend stormwater rates for the years 2014-2019. The draft financial chapter was presented to the Utilities Committee on June 7 and the Finance Committee on June 24. The final revisions to the financial chapter are being completed and staff presented the financial chapter to the public at an open house on October 22. The City Council discussed the proposed multi-year rate increases during the October 3 budget workshop. The City Council concurred to consider the acceptance of the rate recommendations as part of the 2014 Budget development.

The major components requiring the proposed stormwater rate increases include:

- 2014-2019 $6.1 million inflated capital improvement program
- A capital improvement plan that is limited to essential projects (other capital projects are deferred)

- Minimum operating reserve levels of 60 days of operating and maintenance expenses
- Growth escalator of 1.25 percent
- Industry standard capital reserves between 1.0 percent and 2.0 percent
- System reinvestment levels of 25 percent
- Acceptable debt issuance levels
- Do not exceed a debt to equity ratio of 50.0 percent

The stormwater financial chapter recommendation for 2014-19 rate increases has the following impact:

Rate Category	Percent of Impervious Surface	2014 Monthly Service Charge Per Gross Acre	2015 Monthly Service Charge Per Gross Acre	2016 Monthly Service Charge Per Gross Acre	2017 Monthly Service Charge Per Gross Acre	2018 Monthly Service Charge Per Gross Acre	2019 Monthly Service Charge Per Gross Acre
Single Family Residence	N/A	8.03	8.75	9.54	10.11	10.72	11.36
Duplex Family Residence	N/A	16.05	17.50	19.07	20.22	21.43	22.72
Very Light	0% to 10%	3.68	4.01	4.38	4.64	4.92	5.21
Moderate Light	>10% to 25%	13.32	14.51	15.82	16.77	17.78	18.84
Light	>25% to 40%	25.78	28.10	30.63	32.46	34.41	36.48
Moderate	>40% to 55%	39.29	42.83	46.69	49.49	52.46	55.60
Moderately Heavy	>55% to 70%	53.50	58.31	63.56	67.37	71.42	75.70
Heavy	>70% to 85%	69.01	75.22	81.99	86.91	92.13	97.66
Very Heavy	>85% to 100%	85.38	93.07	101.44	107.53	113.98	120.82

It is requested that the City Council review the proposed stormwater rate and adopt the proposed ordinance that will establish the 2014-2019 stormwater rates.

ADVANTAGES:

1. The proposed rate adjustment will address future capital needs and associated debt repayments.

2. Enables the Stormwater Fund to meet industry standards for cash reserve levels.

3. Despite the 2014 rate increase, Lacey's stormwater rates remain reasonable in comparison to neighboring jurisdictions.

DISADVANTAGES:

1. This is a challenging time to increase rates. However, compared to many other consumer products and services, a $0.67 per month increase is reasonable for this important community service.

ORDINANCE NO.

CITY OF LACEY

AN ORDINANCE RELATING TO STORMWATER SERVICE RATES, AMENDING SECTION 13.70.030 OF THE LACEY MUNICIPAL CODE AND APPROVING A SUMMARY FOR PUBLICATION.

WHEREAS, the City of Lacey is committed to comply with the Phase II Western Washington Municipal Stormwater Permit, which provides for the requirements necessary to preserve water quality and resources, and

WHEREAS, additional requirements and significant capital improvements to the City's stormwater system have greatly impacted the operating costs of such system, and

WHEREAS, it is necessary to increase the stormwater service rates in order to provide for the additional maintenance costs to meet system requirements and provide funding for scheduled capital improvements,

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON, as follows:

Section 1. Section 13.70.030 of the Lacey Municipal Code is hereby amended to read as follows:

13.70.030 Service charge rate.

Subject to the rate adjustments provided in LMC 13.70.035, the storm and surface water utility charges shall be levied upon the basis of a flat monthly rate for all developed single-family residential parcels and two-family residential parcels and a sliding rate for all other parcels. The sliding rate shall be determined by measuring the amount of impervious surface area on each parcel and dividing that figure by the total area of the parcel to determine the percent of impervious surface and therefore the rate category. The monthly charge shall be that amount resulting from multiplying the service charge for the rate category applicable to the parcel by the total area of the parcel. The rate categories, the parameters of impervious surface for said rate categories and the monthly service charge applicable to each category shall be as follows:

	~~Rate Category~~	~~Percent of Impervious Surface~~	~~Monthly Service Charge Per Gross Acre~~
~~1.~~	~~Single Family Residence~~	~~N/A~~	~~$7.36~~
~~2.~~	~~Duplex Family Residence~~	~~N/A~~	~~$14.73~~
~~3.~~	~~Very Light~~	~~0% to 10%~~	~~$3.38~~
~~4.~~	~~Moderate Light~~	~~>10% to 25%~~	~~$12.22~~
~~5.~~	~~Light~~	~~>25% to 40%~~	~~$23.65~~
~~6.~~	~~Moderate~~	~~>40% to 55%~~	~~$36.05~~
~~7.~~	~~Moderately Heavy~~	~~>55% to 70%~~	~~$49.08~~
~~8.~~	~~Heavy~~	~~>70% to 85%~~	~~$63.31~~
~~9.~~	~~Very Heavy~~	~~>85% to 100%~~	~~$78.33~~

	Rate Category	**Percent of Impervious Surface**	**2014 Monthly Service Charge Per Gross Acre**	**2015 Monthly Service Charge Per Gross Acre**	**2016 Monthly Service Charge Per Gross Acre**
1	Single Family Residence	N/A	8.03	8.75	9.54
2	Duplex Family Residence	N/A	16.05	17.50	19.07
3	Very Light	0% to 10%	3.68	4.01	4.38
4	Moderate Light	>10% to 25%	13.32	14.51	15.82
5	Light	>25% to 40%	25.78	28.10	30.63
6	Moderate	>40% to 55%	39.29	42.83	46.69
7	Moderately Heavy	>55% to 70%	53.50	58.31	63.56
8	Heavy	>70% to 85%	69.01	75.22	81.99
9	Very Heavy	>85% to 100%	85.38	93.07	101.44

	Rate Category	**Percent of Impervious Surface**	**2017 Monthly Service Charge Per Gross Acre**	**2018 Monthly Service Charge Per Gross Acre**	**2019 Monthly Service Charge Per Gross Acre**
1	Single Family Residence	N/A	10.11	10.72	11.36
2	Duplex Family Residence	N/A	20.22	21.43	22.72
3	Very Light	0% to 10%	4.64	4.92	5.21
4	Moderate Light	>10% to 25%	16.77	17.78	18.84
5	Light	>25% to 40%	32.46	34.41	36.48
6	Moderate	>40% to 55%	49.49	52.46	55.60
7	Moderately Heavy	>55% to 70%	67.37	71.42	75.70
8	Heavy	>70% to 85%	86.91	92.13	97.66
9	Very Heavy	>85% to 100%	107.53	113.98	120.82

The rates set forth above shall be effective for all stormwater utility billings rendered on or after January 1, ~~2013~~2014 through 2019. Thereafter, the 2019 rates shall remain in effect until further amended.

Section 2. This Ordinance shall be effective as of January 1, 2014.

Section 3. The Summary attached hereto is hereby approved for publication.

PASSED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON, at a regularly-called meeting thereof, held this _____day of November, 2013.

CITY COUNCIL

By:_____
Mayor

Approved as to form:

_____
City Attorney

Attest:

_____
City Clerk

SUMMARY FOR PUBLICATION

ORDINANCE NO. 1423

CITY OF LACEY

The City Council of the City of Lacey, Washington, passed on November 21, 2013, Ordinance No. 1423, entitled "AN ORDINANCE RELATING TO STORMWATER SERVICE RATES, AMENDING SECTION 13.70.030 OF THE LACEY MUNICIPAL CODE AND APPROVING A SUMMARY FOR PUBLICATION."

The main points of the Ordinance are described as follows:

1. The Ordinance, which takes effect on January 1, 2014, sets the stormwater service charge rates for the calendar years 2014-2019.

2. The Ordinance approves this Summary for Publication.

A copy of the full text of this Ordinance will be mailed without charge to any person requesting the same from the City of Lacey.

Published: November 25, 2013.

LACEY CITY COUNCIL MEETING
November 21, 2013

SUBJECT: **Sewer Rate Ordinance**

RECOMMENDATION: **Upon review and concurrence, adopt sewer rate ordinance setting the 2014 sewer rates.**

STAFF CONTACT: Scott Spence, City Manager
Troy Woo, Finance Director

ORIGINATED BY: Troy Woo, Finance Department

ATTACHMENTS: 1. Ordinance No. 1424

FISCAL NOTE:

PRIOR REVIEW: Finance and Economic Development Committee on October 28, 2013 and Revenue Hearing conducted on November 7, 2013

BACKGROUND:

The process to update the Sewer Comprehensive Plan is in progress. Staff has just completed the first review of the financial chapter and suggested changes. The consultant is incorporating staff comments and reviewing the draft capital improvement program. The first-draft comprehensive plan is not expected prior to the adoption of the 2014 Budget. When completed, the plan will include a program gap analysis, provide recommendations for improvements, develop the Capital Improvement Program (CIP), and perform a financial analysis. The financial analysis will examine the Sewer rates, rate structure, and funding strategy.

Upon completion of the draft Sewer Comprehensive Plan, it will be reviewed by the public, City staff, Planning Commission, and City Council. The plan assumptions and capital expenditures have been reduced to include only essential items, but further scrutiny is expected. Until that time, the expectation is that plan will include program increases and the Capital Improvement Program will be significant. The initial indications show a $23.9

million CIP. The proposed 2014 Budget includes sewer capital replacement projects totaling $7.2 million, which includes a $2.4 million utility local improvement district (ULID) project. The CIP has and will continue to be higher than recent past years.

Although the Sewer Comprehensive Plan will not be completed and ready for acceptance prior to the adoption of the 2014 Budget, it is recommended that the City consider a nominal sewer rate increase effective January 1, 2014. The consultant's early recommendations include a $0.82/month/equivalent residential unit (ERU) increase for 2014 and similar rate increases through the comprehensive plan time period. At this early stage, this assumes a $23.9 million CIP, an operating reserve of 60 days, and debt issuance of $6.4 million in 2016.

The proposed total 2014 sewer ERU charge including the LOTT Clean Water Alliance increase of $1.02/month/ERU is $52.31. The following table illustrates the impact of the proposed sewer rate increase:

	2011	**2012**	**2013**	**2014**
Lacey Sewer Charge	$ 15.75	$ 16.00	$ 16.48	$ 17.30
LOTT Charge	31.50	33.00	33.99	35.01
Total Monthly Charges	$ 47.25	$ 49.00	$ 50.47	$ 52.31

The Sewer Comprehensive Plan is expected to be completed by early 2014 and is expected to address the utility needs for the years 2014 through 2019.

The proposed ordinance will also include changes to the LOTT Alliance wastewater rate. The proposed language is similar to the action taken by the City Council on June 13, 2013 relating to the LOTT capacity development charges. The proposed ordinance includes a provision to indicate future LOTT wastewater service charge will be equal to an amount set by the LOTT Alliance Board of Directors. Historically, the City has adopted the LOTT wastewater service charge annual in conjunction with its service charge.

It is requested that the City Council review the proposed sewer rate and adopt the proposed ordinance that will establish the 2014 sewer rates.

ADVANTAGES:

1. The proposed rate adjustment will help address future capital needs.

2. Any rate increase imposed in 2014 will help lessen the expected future rate increase impacts.

3. Provides customers consistent and predictable rate increases.

DISADVANTAGES:

1. This is a challenging time to increase rates. However, compared to many other consumer products and services, a $0.82 per month increase is reasonable for this important community service.

ORDINANCE NO. 1424

CITY OF LACEY

AN ORDINANCE RELATING TO SEWER SERVICE CHARGES, AMENDING SECTION 13.16.060 OF THE LACEY MUNICIPAL CODE AND ADOPTING A SUMMARY FOR PUBLICATION.

WHEREAS, additional requirements and significant capital improvements to the City's sewer system have greatly impacted the operating costs of such system, and

WHEREAS, it is necessary to increase the sewer service rates in order to provide for the additional maintenance costs to meet system requirements and provide funding for scheduled capital improvements, and

WHEREAS, LOTT Wastewater Alliance provides wastewater treatment and management services for the City, and

WHEREAS, the LOTT Wastewater Alliance has authority to establish rates and set fees for the wastewater services that it provides, known as "wastewater service charges," and

WHEREAS, the LOTT wastewater service charges have historically been combined with and included in the City's sewer service rates, and

WHEREAS, the City Council is desirous of separating the wastewater service charges from the sewer service rates to lend clarity to the city's billing practices,

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON, as follows:

Section 1. Section 13.16.060 of the Lacey Municipal Code is hereby amended to read as follows:

13.16.060 Service charge – Designated.

A. The "basic sewer service charge" of Lacey shall be $~~50.47~~17.30 per month per equivalent residential unit for all utility billings rendered during the calendar year ~~2013~~2014 and thereafter until amended.

B. The "wastewater service charge" shall be an amount equal to that set by the LOTT Alliance Board of Directors pursuant to the LOTT Alliance Intergovernmental Agreement.

Section 2. The Summary attached hereto is hereby approved for publication.

PASSED BY THE CITY COUNCIL OF THE CITY OF LACEY, WASHINGTON, at a regularly-called meeting thereof, held this 21st day of November, 2013.

CITY COUNCIL

By:_____
Mayor

Approved as to form:

_____
City Attorney

Attest:

_____
City Clerk

SUMMARY FOR PUBLICATION

ORDINANCE NO. 1424

CITY OF LACEY

The City Council of the City of Lacey, Washington, passed on November 21, 2013, Ordinance No. 1424, entitled "AN ORDINANCE RELATING TO SEWER SERVICE CHARGES, AMENDING SECTION 13.16.060 OF THE LACEY MUNICIPAL CODE AND ADOPTING A SUMMARY FOR PUBLICATION."

The main points of the Ordinance are described as follows:

1. The Ordinance amends section 13.16.060 of the Lacey Municipal Code providing an increase for "basic sewer service charges" and providing that "wastewater service charges" shall be equal to the amount set by the LOTT Board of Directors.

2. The Ordinance approves this Summary for Publication.

A copy of the full text of this Ordinance will be mailed without charge to any person requesting the same from the City of Lacey.

Published: November 25, 2013.

FINANCE & ECONOMIC DEVELOPMENT COMMITTEE
OCTOBER 28, 2013
12:00 – 12:55 P.M.

COUNCIL PRESENT: Virgil Clarkson, Andy Ryder

COUNCIL ABSENT: Jason Hearn

STAFF PRESENT: Scott Spence, Troy Woo, Carol Litten, Scott Egger, Dave Schneider Lori Flemm

COUNCILMEMBER RYDER MOVED TO APPROVE THE AGENDA. MAYOR CLARKSON SECONDED. MOTION CARRIED.

BUDGET DISCUSSION

Troy Woo, Finance Director, reported that the following three changes will be presented to Council during the Budget Public Hearing on November 7, 2013.

1) The property tax levy amount may be increased by $17,840 due to the allowable refund levy.
2) The amount of $3.7 million budgeted for the creation of the Tanglewilde ULID may be reduced by $1.3 million due to a reduction in the scope of the project.
3) A balancing entry of $59,000 in the 2014 Budget should have been eliminated.

As a result, staff recommends reducing the use of the Pension Reserve Fund by $76,000 towards balancing the budget.

THE COMMITTEE AGREED TO SUPPORT STAFF RECOMMENDATIONS.

PROPERTY TAX AND UTILITY RATES

DECLARATION OF NEED RESOLUTION

Troy Woo, Finance Director, presented the Committee with a request to review and concur with a Declaration of Need to Increase Ad Valorem Tax Levy by One Percent Resolution.

Troy noted that a required step to establishing the property tax levy is the passage of a separate ordinance or resolution stating the property tax increases in dollar and percentage terms.

The property tax is a significant source of revenue for the General Fund, so the full one percent increase is needed to address increasing expenditure needs. The 2014 Proposed Budget is balanced based on exercising the full 101 percent revenue limit

increase in the amount of $53,700. Since the revenue limit on property tax growth was reduced from 6.0 to 1.0 percent annually, which is one of the General Fund's largest sources of revenue, property tax increases haven't kept pace with increases to the City's largest operating expenditures, salaries and benefits.

This proposed 2014 General Property Tax Levy increase of 3.05% is in addition to adjustments resulting from the addition of new construction, increases to the state assessed property, and allowable adjustments for annexation and refunds.

COMMITTEE MEMBERS AGREED TO RECOMMEND ADOPTION OF THE DECLARATION OF NEED TO INCREASE AD VALOREM TAX LEVY BY ONE PERCENT RESOLUTION TO FULL COUNCIL.

AD VALOREM TAX

Troy Woo, Finance Director, presented the Committee with a request to recommend adoption of the Ad Valorem Tax Ordinance to full Council. The proposed 2014 property levy will be increased by the refund levy, revenue limit, and new construction.

Refund Levy represents adjustments that were made to property assessments based on property owner assessment appeals, technical errors, or the granting of exemptions. The Thurston County Assessor's Office has not provided this year's refunds yet. The refund amount will be included in the staff recommendation when this issue goes before the full City Council.

The property tax revenue limit for jurisdictions with populations greater than 10,000 is 101 percent or 100 percent plus inflation, whichever is less. The revenue limit is challenging for the City of Lacey because property tax is a significant source of revenue for the General Fund. It is typical for inflation to be in excess of one percent, so the 101 percent property tax limit does not keep pace with rising expenditures.

The overall assessed value for Lacey is increasing $253,862,424. After removing the new construction additions, existing assessed valuation increased $183,646,145. Increasing valuations result in lower levy rates.

The proposed ad valorem tax ordinance sets the 2014 general property tax at $5,516,225. This will result in an estimated levy rate of $1.2738 per $1,000 of assessed valuation. This is an increase of $146,197 or 2.7 percent compared to the 2013 general property tax collections. The adjustments to next year's levy include an $92,497 increase due to new construction, a $53,700 increase due exercising the 1.0 percent revenue limit adjustment, and the 2013 refund levy when it is provided.

The proposed ordinance also sets the voter-approved General Obligation (GO) Bond redemption property tax levies. The total 2014 property tax levy collection for GO Bond redemption is $1,138,326. The total estimated GO Bond redemption levy rate is $0.2654 per $1,000 of assessed valuation. There are three outstanding voter approved GO Bonds.

The proposed property tax levels will help balance the proposed 2014 Budget, which preserves current service levels. Exercising 101 percent revenue limit will help offset the rising costs of the City's service delivery.

COMMITTEE MEMBERS AGREED TO RECOMMEND ADOPTION OF THE AD VALOREM TAX ORDINANCE TO FULL COUNCIL.

STORMWATER RATE ORDINANCE

Troy Woo, Finance Director, reported the 2014 Proposed Budget includes a 9.0% per year (2014-16) and 6.0% per year (2017-19) stormwater service rate increases effective with billings beginning January 1, 2014.

The City Council concurred to consider the acceptance of the stormwater rate recommendations as part of the 2014 Budget development.

The major components requiring the proposed stormwater rate increases include:

- 2014-2019 $6.1 million inflated capital improvement program
- A capital improvement plan that is limited to essential projects (other capital projects are deferred)
- Minimum operating reserve levels of 60 days of operating and maintenance expenses
- Growth escalator of 1.25 percent
- Industry standard capital reserves between 1.0 percent and 2.0 percent
- System reinvestment levels of 25 percent
- Acceptable debt issuance levels
- Do not exceed a debt to equity ratio of 50.0 percent

The proposed Stormwater rate schedule will be included as a topic during the November 7 public hearing on the City's 2014 Revenue Sources. City Council action will be requested at the November 21 City Council meeting.

SEWER RATE ORDINANCE

Troy Woo, Finance Director, reported the 2014 Proposed Budget includes a 5.0% sewer rate increase effective with billings after January 1, 2014.

The process to update the Sewer Comprehensive Plan is in progress. The first-draft comprehensive plan is not expected prior to the adoption of the 2014 Budget. When completed, the plan will include a program gap analysis, provide recommendations for improvements, develop the Capital Improvement Program (CIP), and perform a financial analysis. The financial analysis will examine the Sewer rates, rate structure, and funding strategy for the years 2014-2019.

The expectation is that Capital Improvement Program increases will be significant with initial indications showing a $23.9 million CIP. The proposed 2014 Budget includes sewer capital replacement projects totaling $7.2 million, which includes a $3.7 million utility local improvement district (ULID) project. The CIP has and will continue to be higher than recent past years.

Although the Sewer Comprehensive Plan will not be completed and ready for acceptance prior to the adoption of the 2014 Budget, it is recommended that the City consider a nominal sewer rate increase effective January 1, 2014. The consultant's early recommendations include 5.0 percent increases per year during the comprehensive plan time period (5 years). At this early stage, this assumes a $23.9 million CIP, an operating reserve of 60 days, and debt issuance of $6.4 million in 2016.

A 5.0 percent increase to the basic sewer service charge is equal to $0.82 per month per equivalent residential unit. The proposed total 2014 sewer equivalent residential unit charge including the LOTT Clean Water Alliance increase of 3.0 percent is $52.31.

The proposed ordinance will also include changes to the LOTT Alliance wastewater rate relating to the LOTT capacity development charges, and includes a provision to indicate future LOTT wastewater service charge will be equal to an amount set by the LOTT Alliance Board of Directors.

The proposed Sewer rate schedule will be included as a topic during the November 7 public hearing on the City's 2014 Revenue Sources. City Council action will be requested at the November 21 City Council meeting.

CREDIT CARD POLICY

Troy Woo, Finance Director, presented the Committee with a proposal to update the Credit Card Policy. While the current policy is adequate, credit card internal controls can be strengthened and it does not allow for City employees to take full advantage of the efficiencies of a credit card system. Adoption of an update policy is recommended.

The significant differences of the proposed policies are as follows:

- Credit cards may be issued to individual regular status employees rather than limiting the credit card distribution to two generic accounts subtitled "City Manager" and "Finance Director."
- The proposed policy enforces more restricted uses than the current policy. The following are key purchasing restrictions included in the proposed policy:
    - Cash advances
    - Personal use of any kind
    - Minor equipment over $500
    - Travel, lodging, or meals
    - Fuel

- The proposed policy includes a maximum transaction amount of $1,000 for cards assigned to individuals and monthly limits will be established by the City Manager.
- If for any reason a disallowable charge is not repaid by the cardholder, the city will retain a lien against and a right to withhold funds payable to the employee.

The proposed policy is modeled after policies used by other local governments. The policies and procedures used by other local governments have been reviewed by the Washington State Auditor's Office.

Staff recommended that the policy adoption by the full City Council be delayed until the City has more information on the specific credit card program it will utilize to ensure consistency.

COMMITTEE MEMBERS CONCURRED WITH STAFF RECOMMENDATIONS OF THE PROPOSED CREDIT CARD POLICY.

UTILITIES COMMITTEE
NOVEMBER 1, 2013
4:00 – 4:55 P.M.

COUNCIL PRESENT: Chair, Jeff Gadman, Lenny Greenstein, Andy Ryder

STAFF PRESENT: Scott Spence, Troy Woo, Peter Brooks, Doug Christenson, Dave Schneider, Carol Litten

COUNCILMEMBER RYDER MOVED TO APPROVE THE AGENDA. COUNCILMEMBER GREENSTEIN SECONDED. MOTION CARRIED.

STORMWATER COMPREHENSIVE PLAN UPDATE

Doug Christenson, Utilities Civil Engineer, provided an update of the Stormwater Comprehensive Plan, which was adopted by Council in July 2013 without a section related to the financial plan.

The Stormwater Comprehensive Plan (SCP) includes staffing recommendations for addressing compliance with the NPDES Phase II Municipal Stormwater Permit, and a Capital Improvement Program (CIP) of projects to address flooding and water quality issues. A financial plan for the SCP has now been developed. Financial analysis of the Stormwater Utility, including the recommended staffing levels and CIP project plan, indicates utility rates will need to be increased over the next six years.

Proposed rate increases are 9% each year in 2014, 2015 and 2016, then 6% each year in 2017, 2018 and 2019. The effect of a 9% rate increase for 2014 on a single-family residential (SFR) property yields a $0.67 increase, from $7.36 per month (2013 rate) to $8.03 per month (2014).

Under the Phase II permit, stormwater activities must increase in a variety of ways, including facility inspections, maintenance intervals, field screening for illicit discharges, and outreach activities. Three significant new requirements include: (1) revising all of the City's development-related codes, standards and regulations to implement and require Low Impact Development methods, (2) water quality efforts to comply with the Henderson Inlet Watershed TMDL, and (3) payments of $27,639 per year to support Ecology's new Regional Stormwater Monitoring Program. To ensure compliance with these new federal mandates, staffing levels will be increased over time.

Staff noted that in an analysis of stormwater rates in 30 western Washington Phase II cities, Lacey's current SFR rate was the lowest, lagging behind Tumwater, Olympia, and many other cities that are subject to the same Phase II permit. Even after six years of proposed rate increases, Lacey's 2019 SFR rate of $11.36 per month is less than the 2013 average for the 30 cities. Committee members recommended emphasizing rate increases in dollars and cents rather than using percentages.

Staff reported that public outreach regarding the proposed stormwater rate increases has included information posted on the City of Lacey website; direct notification to Lacey HOAs, Lacey Chamber of Commerce and Olympia Master Builders; a City of Lacey press release and

Twitter tweet on October 15; and an open house on stormwater rates at City Hall on October 22, 2013. It was noted that no members of the public were in attendance at the open house.
Scott Spence, City Manager, commented that the Capital Improvement Programs and Stormwater Comprehensive Plan are components that contribute to the budgeting process. The financial plan related to stormwater rate increases will be presented to Council by the end of the year for action.

COUNCILMEMBER GREENSTEIN MOVED TO ADJOURN THE MEETING. COUNCILMEMBER RYDER SECONDED. MOTION CARRIED.

LAND USE COMMITTEE
NOVEMBER 4, 2013
12:00 – 1:00 P.M.

COUNCIL PRESENT: Cynthia Pratt, Ron Lawson

COUNCIL EXCUSED: Andy Ryder

STAFF PRESENT: Scott Spence, Rick Walk, Dave Burns, Troy Woo, Ryan Andrews, Carol Litten

COUNCILMEMBER LAWSON MOVED TO APPROVE THE AGENDA. COUNCILMEMBER PRATT SECONDED. MOTION CARRIED.

2013 HOUSEKEEPING AMENDMENTS

Dave Burns, Principal Planner, presented the Committee with proposed 2013 Housekeeping Amendments.

Earlier this year, the Community Development Department identified a number of housekeeping amendments to clarify and refine existing text providing a code that will better implement planning objectives. These items were reviewed by the Planning Commission and a public hearing was held. No one objected to the amendments.

Amendments include:

- Clarification when an SPR approval expires. To make the time period for vesting more appropriate to the intent, staff recommends attaching the deadline to when the actual work begins.
- Date changes for template tables in the Land Division ordinance from 19XX to 20XX.
- Amending the 5 acre exemption for Land Divisions.
- Clarification of the orientation of Cottage Housing around open space, and allowing flexibility to work with viable projects for non-profits that don't meet certain code provisions, but do meet planning objectives identified in the Comprehensive Land Use Plan.
- Clarification of accessory structure height in residential zones to be taller than 16 feet if subjected to design review.
- Clarification of permitted urban agricultural use in multifamily context, subject to the apartment's management approving the use and taking responsibility for providing adequate space.

COMMITTEE MEMBERS CONCURRED WITH STAFF RECOMMENDATIONS.

MERIDIAN CAMPUS MASTER PLAN AMENDMENT

Ryan Andrews, Associate Planner, presented the Committee with a proposal to recommend to full Council the adoption of the Planning Commission recommendation on the Applicant-Initiated Master Plan Amendment to re-designate within the Meridian Campus Planned Community.

Several property owners in the Meridian Campus Planned Community represented by Puget Western Inc. have submitted a master plan amendment to re-designate various properties around the intersection of Willamette Drive NE and 31st Avenue NE.

The Meridian Campus Planned Community was approved by Thurston County in 1987 and later annexed into the City of Lacey in 1992. The City of Lacey adopted the Master Plan and the associated Final Supplemental Environmental Impact Statement, which set forth the design of the community including zoning, development standards, transportation corridors, and open spaces. Modifications to the Master Plan are reviewed by the Planning Commission and a public hearing is held.

The Planning Commission recommends approval of the request as follows:

a. Re-designation of the "A" lots along 31st Avenue north of Christa Heights from Business Park to Moderate Density Residential to include a 6.18-acre multi-family parcel for the easterly most "A" lot.
b. Re-designation of the parcel at the terminus of Commerce Place Drive NE from Business Park to Light Industrial.
c. Lots "B-2" and "B-3" from Business Park to Light Industrial.
d. Existing Business Park parcel west of the Campus Prairie subdivision along 31st Avenue NE from Business Park to Moderate Density Residential and elimination of the proposed multi-family site
e. Re-designation of the "church site" from Open Space Institutional to Low Density Residential 3-6.

Approval of the proposed amendment to the Meridian Campus Master Plan will increase the marketability of the parcels, be consistent with the applicable goals and policies of the Land Use Element of the Comprehensive Plan, encourage development in a location where infrastructure exists to support it, and will adequately address compatibility issues between land uses.

COMMITTEE MEMBERS CONCURRED WITH FORWARDING TO FULL COUNCIL THE PLANNING COMMISSION RECOMMENDATIONS TO RE-DESIGNATE PARCELS IN THE MERIDIAN PLANNED CAMPUS DEVELOPMENT.

MULTI-FAMILY TAX EXEMPTION

Rick Walk, Community Development Director, stated a focus of the City of Lacey over the last 20 years has been to promote multi-family residential development within the Woodland District. This focus was highlighted by the Downtown 2000 Plan by identifying the need for high density residential to locate within the district as one component to achieve a vibrant, prosperous mixed-use district. Since the adoption of the plan in 2000, one residential project, called 6th Avenue Place, was developed on 6th Avenue totaling 100 multi-family units.

One year ago, the City undertook a second planning effort focusing on the Woodland District. Called the Woodland District Strategic Plan, this effort was focused on identifying strategic steps the community could take to realize and build on the vision of the Downtown 2000 Plan. Even with the development of 6th Avenue Place, the strategic plan identified the need to promote additional housing within the District. The plan identified the district has capacity to support approximately 1,000 multi-family units over the next 20 years.

However, the market study associated with the strategic plan acknowledged that there would be a financial challenge to develop high density residential in the district to meet competitive market rates due to land and construction cost. The Strategic Plan identified 25 action items to facilitate re-investment to create a diverse and dense urban center, including the Multi-family Tax Exemption Program.

The Multi-family Tax Exemption Program is a program created by the State Legislature. The purpose is to encourage increased residential opportunities, including affordable housing, through new construction and rehabilitation of existing buildings located within the urban centers of cities planning under the GMA.

To begin the process, the City may adopt a Resolution of Intention to designate a residential target area generally described within the resolution. Once the residential target area is designated, the City must adopt and implement standards and guidelines to be utilized in considering applications and making the determinations to approval or deny applications for the tax exemption. As indicated by the Urban Corridor Task Force and the Woodland District Strategic Plan, the Woodland District meets the purpose of RCW 84.14.

The Multi-family Tax Exemption Program exempts the ad valorem tax specific to the value of new housing construction and the increased value of housing rehabilitation. The tax exemption would not apply to the ad valorem tax on land value or improvements not related to housing. The tax exemption would be for a period of eight years or twelve years if the developer commits to reserve 20% of the units for moderate to low income residents (80% of median family income adjusted for family size).

The multi-family tax exemption would also include all taxing districts such as the State of Washington, Thurston County, North Thurston Public Schools, and Lacey Fire District

#3, as part of the ad valorem exemption. Outreach to the taxing districts would need to be conducted to provide information on the tax exemption program, the vision of the Woodland District Strategic Plan, and the opportunity to spur economic development.

In essence, the program delays the collection of future revenues for a period of eight or twelve years. The benefit is the strong potential to spur additional redevelopment in the urban center increasing the tax revenues as a whole. Once the tax exemption expires then the residential projects would be taxed at market rate.

In summary, the Multi-Family Tax Exemption Program is an action item identified in the Woodland District Strategic Plan that, if implemented, would facilitate re-investment in the District meeting the community's vision.