

# CITY OF BURIEN, WASHINGTON

## RESOLUTION NO. 360

---

### **A RESOLUTION OF THE CITY OF BURIEN, WASHINGTON, CONDITIONALLY APPROVING THE BOULEVARD PARK, LLC SUBDIVISION PRELIMINARY PLAT AND LANDSCAPE TRANSITION ZONE ADJUSTMENT AND ADOPTING THE HEARING EXAMINER'S FINDINGS OF FACT AND CONCLUSIONS IN SUPPORT OF SAID APPROVAL**

---

WHEREAS, the City of Burien Hearing Examiner conducted an open record public hearing on October 30, 2014 at which testimony from city staff, the applicant and public was heard regarding preliminary plat approval of the Boulevard Park, LLC Subdivision; and

WHEREAS, on November 12, 2014 the Hearing Examiner issued Findings and Conclusions and recommended the City Council grant the request for the preliminary plat and landscape transition zone adjustment with conditions; and

WHEREAS, the City Council finds the application is consistent with the criteria listed in BMC Section 19.65.075(7)(C).

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF BURIEN, WASHINGTON, DOES RESOLVE AS FOLLOWS:

Section 1. The City Council, having considered the Boulevard Park, LLC Subdivision preliminary plat application and the Hearing Examiner's recommendation, conditionally approves the Boulevard Park, LLC Subdivision preliminary plat and landscape transition zone adjustment and adopts the Hearing Examiner's findings and conclusions attached as Exhibit "A", as fully incorporated herein as if fully set forth.

PASSED BY THE CITY COUNCIL OF THE CITY OF BURIEN, WASHINGTON, WASHINGTON, AT A REGULAR MEETING THEREOF THIS 1<sup>ST</sup> DAY OF DECEMBER, 2014.

CITY OF BURIEN, WASHINGTON

/s/ Lucy Krakowiak, Mayor

ATTEST/AUTHENTICATED:

/s/ Monica Lusk, City Clerk

Approved as to form:

/s/ Chris Bacha, Kenyon Disend, PLLC  
Interim City Attorney

Filed with the City Clerk: December 1, 2014  
Passed by the City Council: December 1, 2014  
Resolution No.: 360

**BEFORE THE HEARING EXAMINER  
FOR THE CITY OF BURIEN**

In the Matter of the Application of	)	No. PLA 14-1052
	)	
Michael Bellan, on behalf of	)	
Boulevard Park, LLC	)	Boulevard Park Subdivision
	)	
	)	FINDINGS, CONCLUSIONS,
<u>For a Preliminary Plat</u>	)	AND RECOMMENDATION

**SUMMARY OF RECOMMENDATION**

The Hearing Examiner recommends that the request for a preliminary plat to subdivide 0.47 acres into six, single-family residential lots and for a landscape transition zone adjustment at 1832 South 116<sup>th</sup> Street be **GRANTED**, with conditions. Conditions are necessary to comply with the municipal code and to mitigate specific impacts of the proposal.

**SUMMARY OF RECORD**

Hearing:

The Hearing Examiner held an open record hearing on the request on October 30, 2014.

Testimony:

The following individuals testified under oath at the open record hearing:

Elizabeth Olmstead, City Planner  
Michael Bellan, Applicant Representative  
Ben Iddins, E.I.T, for Applicant  
Brent Winder

Exhibits:

1. Staff Report, dated October 16, 2013, with the following attachments:
  1. Vicinity Map, undated
  2. Residential Subdivision Development Regulations
  3. Preliminary Plat, dated October 10, 2014
  4. Tree Retention Plan, dated May 6, 2014
  5. Email from Jon Fincher to Elizabeth Olmstead, dated July 24, 2014
  6. Memorandum from Ramesh Davad to Elizabeth Olmstead, dated July 23, 2014
  7. Certificate of Water Availability, Water District # 20, dated March 26, 2014
  8. Certificate of Sewer Availability, Valley View Sewer District, dated October 3, 2014
  9. Certificate of Fire Hydrant Availability, King County Fire District #2, dated May 16, 2014, with Site Plan (Sheet C01), dated April 18, 2014
  10. Memorandum from Heungkook Lim to Liz Olmstead, dated August 5, 2014

*Findings, Conclusions, and Recommendation  
City of Burien Hearing Examiner  
Boulevard Park Preliminary Plat, No. PLA 14-1052*

11. Technical Information Report, Davido Consulting Group, Inc., dated May 13, 2014
12. Memorandum from Tim Gabelein, P.E., to City of Burien Public Works, dated June 25, 2014
13. Preliminary Subdivision Application, received May 21, 2014
14. City PowerPoint (5 slides)
15. Landscape Plan and Plant Schedule (Sheet LS1), dated October 28, 2014; Temporary Irrigation Plan and Planting Details (Sheet LS2), dated October 28, 2014

Based upon the testimony and documents submitted at the open record hearing, the Hearing Examiner enters the following findings, conclusions, and recommendation:

### FINDINGS

#### Application and Notice

1. Michael Bellan, on behalf of Boulevard Park, LLC (Applicant) requests a preliminary plat to subdivide 0.47 acres into six, single-family residential lots. The Applicant also requests a Type 1 landscape transition zone adjustment. The property is at 1832 South 116<sup>th</sup> Street.<sup>1</sup> *Exhibit 1, Staff Report, pages 1 and 14 to 15; Exhibit 1, Attachment 3; Exhibit 1, Attachment 13; Exhibit 1, Attachment 15.*
2. The City of Burien (City) determined the application was complete on June 18, 2014. The City mailed notice of the application to owners of property within 500 feet of the property on June 23, 2014, and posted notice on the site and published notice in the local newspaper of record on June 25, 2014. City Planner Elizabeth Olmstead testified that the City mailed notice of the open record hearing to owners of property within 500 feet of the property on October 10, 2014, and posted notice on the site and published notice in *The Seattle Times* on October 15, 2014. *Exhibit 1, Staff Report, pages 1 and 4; Testimony of Ms. Olmstead.*

#### State Environmental Policy Act

3. The City determined that the proposal is a subdivision for less than 21 dwelling units and is exempt from review under the State Environmental Policy Act (SEPA), Chapter 43.21C Revised Code of Washington (RCW), in accord with Burien Municipal Code (BMC) 14.10.040(1). *Exhibit 1, Staff Report, page 6.*

#### Comprehensive Plan and Zoning

4. The property is designated Moderate Density Multi-Family Neighborhood under the City Comprehensive Plan. The designation provides for primarily multi-family residential uses in neighborhoods suited for this type of development, where community improvements and facilities that are normally necessary for development can be

---

<sup>1</sup> The property is identified by Tax Assessor Parcel No.098500-01990. A legal description of the property is included with the Certificate of Sewer Availability. *Exhibit 1, Staff Report, page 1; Exhibit 1, Attachment 8.*

provided. Development within this designation includes existing neighborhoods platted at an average of 12 to 24 units per acre. The Moderate Density Multi-Family Neighborhood designation is implemented by the City's Multi-Family Residential (RM-18) zoning district. *City Comprehensive Plan, page 2-11, April 1, 2013. Exhibit 1, Staff Report, page 16.*

5. The property is in the City's Multi-Family Residential (RM-18) zoning district. The purpose of the Multi-Family Residential Zone is to establish areas in which a wide range of single-family and multi-family housing opportunities can be provided that are compatible with adjacent lower-density single-family housing and that protect environmentally sensitive areas. The intent is to provide a variety of stable and attractive, well-designed housing choices located near transit, employment, shopping, and recreational facilities, and that meet the needs of existing and future city residents. *BMC 19.15.010. Single-family residential development is allowed within the RM-18 zone. BMC 19.15.010.4. Exhibit 1, Staff Report, pages 6 and 8.*
6. Development on lots within the RM zone must provide a 10-foot minimum front setback and a 5-foot minimum interior setback. Buildings may be no more than 35 feet tall, and two off-street parking spaces must be provided for each dwelling unit. Lots may contain no more than 55 percent building coverage and 75 percent impervious surface coverage. Lots must be at least 2,400 square feet in size. Five of the proposed lots would be 2,470 square feet, and Lot 6 would be 2,924 square feet. *BMC 19.15.010.4. Exhibit 1, Staff Report, page 8; Exhibit 1, Attachment 3.*

#### Existing Site and Surrounding Property

7. The property contains a single-family residence, trees, and natural vegetation. The site slopes from south to north. Property to the north, east, and south is zoned RM-18 with single-family development. The Rainier Golf and Country Club is located to the west and is zoned Single-Family Residential (RS-7200). *Exhibit 1, Staff Report, pages 3 and 4; Exhibit 1, Attachment 1; Exhibit 1, Attachment 11.*

#### Proposed Plat

8. The Applicant would remove the existing residence and develop six lots with six single-family residences, single-car garages, 10-foot wide driveways, a five-foot wide internal sidewalk, and a joint-use Tract A for a 25-foot access road, utilities, and stormwater facilities. Internal lots would have a five-foot side yard setback, and Lot 6 would have a 10-foot side yard setback from South 116<sup>th</sup> Street. Building height, setback, impervious surface coverage, and building coverage would be reviewed as part of the building permit process. Ms. Olmstead testified that the proposed plat density would be 18 units per acre. *Exhibit 1, Staff Report, page 4; Exhibit 1, Attachment 9; Exhibit 1, Attachment 3; Exhibit 1, Attachment 11; Testimony of Ms. Olmstead.*

#### Access and Traffic Impacts

9. South 116<sup>th</sup> Street runs along the southern boundary of the site and then dead ends a short distance to the west. The property has no driveway because the current residence utilizes

street parking along South 116<sup>th</sup> Street. The Applicant would construct a paved access road off of South 116<sup>th</sup> Street to provide access to each lot (Tract A). The 2008 Burien Road Standards require full urban frontage improvements including curb, gutter, five-foot wide sidewalks, Americans with Disabilities Act (ADA) ramps and pavement widening, a storm drain system, and a full/half street overlay along the South 116<sup>th</sup> Street project frontage. The Applicant would pay a Transportation Impact Fee prior to the issuance of building permits as set forth in BMC 19.35.060, Table 19.35.060, and would submit a Traffic Impact Analysis prior to the issuance of construction permits. *Exhibit 1, Staff Report, pages 9, 10, and 14; Exhibit 1, Attachment 3; Exhibit 1, Attachment 6; Exhibit 1, Attachment 11.*

#### Landscaping and Recreation

10. There are two significant deciduous trees<sup>2</sup> on the property. Under City Landscape Category A, at least 30 percent of the significant trees on the property must be retained. *BMC 19.25.120.2*. When the required amount of significant trees cannot be retained, the number of significant trees removed must be replaced per *BMC 19.25.160*. The Applicant's Tree Retention Plan identifies one deciduous tree as exempt from replacement. The Applicant proposes to replace a 16-inch caliper deciduous tree with eight, three-inch caliper deciduous trees. *Exhibit 1, Staff Report, page 14; Exhibit 1, Attachment 4.*
11. The Rainier County Golf and Country Club storage area is on property to the west in a single-family residential (RS) zone. The municipal code requires a transition zone to create a buffer between a residential zone and a zone allowing a higher intensity, and between any RM and RS zones. A 20-foot wide (full screen) buffer with Type 1 landscaping is required. *BMC 19.17.015.3.A*. This buffer would encompass approximately 17 percent of the site. The Applicant has requested a Type 1 landscape transition zone adjustment to a 10-foot wide buffer due to the small size of the site for reasonably sized single-family residences. The Applicant proposes to increase the density and size of the plantings in the 10-foot buffer beyond the minimum requirements for a 20-foot buffer. City staff determined that the adjacent property is developed as a golf course and country club and does not require the same level of buffering to mitigate possible visual and noise impacts on surrounding properties. City staff determined that the proposed reduction would provide landscaping in greater density and size than required by the code, and existing fencing would provide visibility protection from the adjacent property. *Exhibit 1, Staff Report, pages 14 and 15; Exhibit 1, Attachment 12.*
12. On-site recreational space or payment of a fee in lieu of recreational space is required for residential developments. *BMC 19.17.013*. The Applicant would pay for 390 square feet of recreation space for each lot (five lots, with credit for the existing lot) prior to recording the final plat. *Exhibit 1, Staff Report, pages 13 and 14.*

---

<sup>2</sup> A significant tree is a healthy tree that has a minimum eight-inch diameter for evergreen trees, or 12 inches for deciduous trees, when each are measured four feet above grade. *BMC 19.10.493.*

### Stormwater

13. The Applicant would comply with the 2009 King County Surface Water Design Manual and the 2009 Stormwater Pollution Prevention Manual. Davido Consulting Group, Inc., prepared a Technical Information Report (Full Drainage Review) (TIR) for the Applicant dated May 13, 2014. The TIR identified 1,229 square feet of impervious area from the existing residence and 11,614 square feet of impervious surface after development. The entire site would be cleared, making full dispersion of roof runoff unfeasible without native vegetation. Soils beneath the site are not conducive to concentrated amounts of infiltration. The Applicant would construct a new porous asphalt access road and porous asphalt driveways for each new lot. Drainage for the developed site would include roof downspouts, footing drains, Type 1 and Type 2 catch basins, and an on-site detention/flow control facility. A 765 square foot, 6.955-foot deep detention facility would be constructed beneath the access road. Stormwater would be discharged via a proposed catchbasin to the City's stormwater system in the south side of South 116<sup>th</sup> Street, then to an unnamed stream approximately 1,150 feet downstream of the project site that eventually discharges into the Duwamish River. *Exhibit 1, Attachment 11; Exhibit 1, Attachment 13.*
14. The TIR also includes a Temporary Erosion and Sediment Control Plan (Sheet C02), dated May 8, 2014, and a GeoTech Consultants, Inc., Geotechnical Engineering Study (GES), dated February 13, 2014. The GES determined that the site soils are not susceptible to seismic liquefaction because of their dense nature and the absence of near-surface groundwater. The proposed structures could be supported on conventional continuous and spread footings on undisturbed, dense native soil, or on structural fill placed above the soil. The GES also includes recommendations about placement and compaction of structural fill beneath structures, foundation and retaining walls, slabs-on-grade, and excavations and slopes. *Exhibit 1, Attachment 11.*

### Utilities and Services

15. The proposed plat would obtain water service from King County Water District #20. Water District #20 issued a certificate of Water Availability, dated March 26, 2014, identifying a service connection to an eight-inch water main located 10 feet from the site, with a fire hydrant located approximately 110 feet from the site with a flow rate of 1,000 gallons per minute for two hours or more. The Valley View Sewer District would provide sewer service via an existing six-inch sewer line, zero feet from the site. Fire District #2 would provide fire protection for the area, and approved the proposed plat for water flow, hydrant spacing, and access, so long as NFPA 13D residential sprinkler systems are required in the new residences to mitigate access and hydrant distance. *Exhibit 1, Staff Report, pages 9, 11, and 12; Exhibit 1, Attachment 7; Exhibit 1, Attachment 8; Exhibit 1, Attachment 9.*
16. The Highline School District identified walking routes to school bus stops for elementary-, middle-, and high-school students. Elementary school students must walk east on South 116<sup>th</sup> Street along a graveled shoulder, then north on 20<sup>th</sup> Avenue South

along a paved area on the east side of 20<sup>th</sup> Avenue South to a bus stop at 11421 20<sup>th</sup> Avenue South. Middle- and high-school students would walk east on South 116<sup>th</sup> Street along a graveled shoulder, then south on a sidewalk on the west side of Des Moines Memorial Drive South, to a bus stop at 11621 Des Moines Memorial Drive South. Ms. Olmstead testified that the graveled shoulders are greater than four feet wide. *Exhibit 1, Staff Report, page 16; Testimony of Ms. Olmstead.*

#### Public Comment

17. The RainierHouse Homeowners Association Board commented on the application and raised concerns about traffic, parking, and construction. City staff responded that the Applicant would provide full frontage improvements on South 116<sup>th</sup> Street. The Applicant would address sight distance concerns at the northwest corner of 20<sup>th</sup> Avenue South and South 116<sup>th</sup> Street as part of a Traffic Impact Analysis prior to issuance of construction permits and would provide two parking spaces on-site per dwelling unit (one garage space, and one driveway space). Construction hours would be limited to 7:00 AM to 10:00 PM on weekdays and 9:00 AM to 10:00 PM on weekends and street access would be maintained. *Exhibit 1, Staff Report, pages 4 to 6, and 9; Exhibit 1, Attachment 5.*
18. Brent Winder testified that he is familiar with the Rainier Golf and Country Club. He testified there is heavy use of the Club's storage site to the west of the proposed plat that may create odor, noise, and dust, and he questioned whether it is appropriate to reduce the transition zone buffer from 20 feet to 10 feet. He expressed concerns about the existing house on the property, which has had no one living there for over 12 years, and requested rodent control prior to its demolition. He also requested that the access road be widened for parking to avoid overflow parking on South 116<sup>th</sup> Street and 20<sup>th</sup> Avenue South. Applicant Representative Michael Bellan testified that he agrees that a finding could be made concerning odor, noise, and dust from the adjacent Club's storage site. He testified that the access road would be 25 feet wide. Ben Iddins, an engineer-in-training, testified for the Applicant that although no parking on the access road would be allowed, frontage improvements along South 116<sup>th</sup> Street would provide additional improved parking. He also suggested that rat poison be placed in the existing residence for at least 30 days prior to demolition. He testified that the Applicant agrees with the proposed conditions. *Testimony of Mr. Winder; Testimony of Mr. Bellan; Testimony of Mr. Iddins.*

#### Staff Recommendation

19. City staff reviewed the proposed preliminary subdivision and recommended that, with seven conditions, the request should be approved. Ms. Olmstead testified that all the proposed conditions, except for Condition 7 regarding the Transition Buffer Reduction Request, are already required by the municipal code. *Exhibit 1, Staff Report, pages 2 to 3; Testimony of Ms. Olmstead.*

## CONCLUSIONS

### Jurisdiction

The Hearing Examiner has jurisdiction to receive and examine information on a preliminary plat application; conduct a public hearing on the application; prepare a record of the hearing; enter findings of fact and, based upon those facts, make a recommendation to the City Council. The recommendation may be to grant the application, grant the application with conditions, or deny the application. *BMC 2.15.070 (2) (a); BMC 2.15.080; BMC 17.55.040*. A recommendation to the City Council is a Type 3 review process. *BMC 19.65.075*.

The Applicant has also requested a landscape transition zone reduction. The Applicant may request and the Director may grant an adjustment to the standards in this section through a Type 1 review process. *BMC 19.17.015.4*. The municipal code provides that an application involving two or more decisions shall be processed collectively under the highest numbered procedure required for any of the requested applications. *BMC 19.1.015.4*. Thus, the requested reduction is also reviewed using the Type 3 process.

### Criteria for Review

#### Preliminary Plat

The Hearing Examiner's decision must be supported by the evidence presented and must be consistent with the objectives and goals of the comprehensive plan, zoning code, subdivision code, and other City codes and ordinances. *BMC 2.15.070(2); BMC 2.15.080; BMC 17.55.040(3)*.

The preliminary plat application review standards and criteria are found in Title 17 BMC and Chapter 58.17 RCW. Subdivisions must conform to Chapter 17.15 BMC and Chapter 17.20 BMC, including the following:

- a. Subdivision streets shall conform in effect to the master plan as adopted and/or to the general pattern of the highway system of the city of Burien. *BMC 17.15.030*.
- b. The proposed subdivision and its ultimate use shall be in the best interests of the public welfare and the neighborhood development of the area and the subdivider shall present evidence to this effort when requested by the city of Burien. *BMC 17.15.050*.
- c. The tract to be subdivided shall not be part of or encroach on an area or areas designated in the master plan for future public facilities. *BMC 17.15.060*.
- d. No plan for the replatting, subdivision or dedication of any area shall be approved by the city of Burien unless the streets shown therein are connected by a surfaced road or street (according to city specifications) to an existing dedicated highway of the city. *BMC 17.15.140*.

- e. Sidewalks or walkways shall be required for all existing and proposed streets including perimeter streets in business and residential subdivisions as specified in Chapter 17.20 BMC. *BMC 17.15.170.*
- f. No lot or portion of a lot in this plat shall be divided and sold or resold or ownership changed or transferred whereby the ownership of any portion of this plat shall be less than the area required for the use (zone) district in which located. *BMC 17.15.230.*
- g. All lots must be served by or provision made for an adequate public sewage disposal system. *BMC 17.15.280.*
- h. All lots must have an adequate water supply before the plat may be recorded. *BMC 17.15.290.*

Under Chapter 17.20 BMC, the minimum dimensions for lots must conform to the dimensions established in the zoning code and must not be less than the requirements for the use district in which located. *BMC 17.20.010.*

The criteria and standards in Title 17 BMC are essentially identical to those in Chapter 58.17 of the Revised Code of Washington (RCW). The application must meet the RCW criteria before a decision of approval may be made. *BMC 17.10.310.* RCW 58.17.110 requires that appropriate provisions must be made for the public health, safety and general welfare, for open spaces, drainage ways, streets or roads, alleys, other public ways, transit stops, potable water supplies, sanitary wastes, parks and recreation, playgrounds, schools and school grounds 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 must be served by the subdivision.

The criteria for review adopted by the Burien City Council implements 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 developments 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.*

#### *Transition Standards Adjustment*

A transition standards adjustment may be approved if it:

- A. Will not be detrimental to surrounding properties; and
- B. Will comply with the purpose and intent of this section (BMC 19.17.015.1); and
- C. Will provide equal or greater protection for the zone receiving transition than strict compliance with this section would provide.

*BMC 19.17.015.4.*

*Findings, Conclusions, and Recommendation  
City of Burien Hearing Examiner  
Boulevard Park Preliminary Plat, No. PLA 14-1052*

### Conclusions Based on Findings

1. **With conditions, the proposed development would be consistent with Title 17 BMC provisions and Chapter 58.17 RCW.** The City provided adequate notice and opportunity to comment on the proposed subdivision. The Applicant presented evidence that the proposed development would be in the best interests of the public welfare because the development would provide single-family residences compatible with surrounding single-family residential development and consistent with the Comprehensive Plan designation for the property. The access to the proposed subdivision would be on South 116<sup>th</sup> Street. Single-family residential development is an allowed use within the City's RM-18 zoning district, and lots would conform to the minimum lot size required within the RM-18 zone. Setbacks are required on subdivision lots under City code. Two significant trees would be removed and replaced with eight, three-inch caliper deciduous trees. Adequate sewer and water would be provided to the proposed subdivision. The proposed on-site detention vault within Tract A would provide adequate stormwater drainage of the proposed subdivision site and adequate water-quality treatment. The Applicant would pay a fee in lieu of providing on-site recreational space. The Applicant would submit a Traffic Impact Analysis prior to the issuance of construction permits. Students would have safe access to school by walking on graveled shoulders along South 116<sup>th</sup> Street and a paved area on the east side of 20<sup>th</sup> Avenue South to get to nearby school bus stops.

The City determined that the proposed plat was exempt from SEPA review. Conditions of approval are necessary to ensure that the proposed development complies with applicable ordinances, standards, and Fire Marshal requirements and to ensure that the Applicant submits detailed plans and updated Technical Information Report and Engineering Plans. Conditions of approval are also necessary to ensure that the Applicant installs all street, stormwater, and utility improvements; pays a fee in lieu of providing recreation spaces; records a Declaration of Covenant; pays a transportation impact fee; and receives a right-of-way use construction permit and a clearing and grading permit. *Findings 1 – 19.*

2. **The proposed transition zone buffer would meet the adjustment criteria of BMC 19.17.015.4.** The municipal code requires a finding that a reduction in transition zone “will provide equal or greater protection for the zone receiving transition than strict compliance with this section would provide.” Here, the golf course is in an RS zone and would be the zone receiving transition from the RM zone of the property. The reduction from a 20-foot to a 10-foot transition buffer would not be detrimental to the adjacent golf course and country club storage area. Although the storage area may generate noise, odors, and dust that could impact the residents of the proposed plat, there is no evidence that the proposed plat would be detrimental to the adjacent storage area. The purpose of the transition standards zone is to create a buffer between a residential zone and a zone that permits development of a higher intensity. Here, the golf course and country club storage area is in the RS zone, and the proposed plat is in the RM zone. A 10-foot transition buffer containing vegetation greater in density and size than required by the

municipal code, along with the existing fencing, would provide an adequate buffer for the property located to the west of the proposed plat such that there would be no detrimental impacts from development of the proposed plat. A storage area that generates noise, odors and dust may have a detrimental impact on the value of the property within the subdivision. The Applicant, however, has a self interest in eliminating the noise, odor and dust that may negatively impact sales of properties within the subdivision. There is a potential code enforcement action he may wish to pursue with the exiting neighboring property owners to mitigate those adverse impacts. *Findings 1, 5, 11, 19.*

### RECOMMENDATION

Based on the preceding Findings and Conclusions, the Hearing Examiner recommends that the City Council **GRANT** the request for a preliminary plat to subdivide 0.47 acres into six, single-family residential lots and for a landscape transition zone adjustment at 1832 South 116<sup>th</sup> Street, with the following conditions:<sup>3</sup>

1. This application is subject to the applicable requirements contained in the Burien Municipal Code (including but not limited to the Zoning Code, Building Code and Fire Code), the 2009 King County Surface Water Design Manual and the 2009 Stormwater Pollution Prevention Manual as adopted by the City of Burien and the 2008 Burien Road Standards. It is the responsibility of the Applicant to ensure compliance with the various provisions contained in these documents. Preliminary approval does not guarantee that the number of lots proposed can be accommodated on the subject parcel and meet all required development standards.
2. Prior to the issuance of development permits for any construction activities on-site the Applicant shall:
  - a. Submit detailed on-site street improvement plans for review and approval by the Development Review Engineer. The Plans shall be in accordance with the requirements of the 2008 Burien Road Standards and address the issues expressed in the Development Review Engineer's memorandum dated July 23, 2014 (See Exhibit 1, Attachment 6).
  - b. Submit for review and approval to the Surface Water Management Engineer an updated TIR and final engineered drawings for all required street improvements consistent with the Surface Water Management Engineer's comments dated August 5, 2014 (See Exhibit 1, Attachment 10).
  - c. Submit approved utility plans for the various underground utilities serving or proposed to serve the site.

---

<sup>3</sup> Conditions are necessary to mitigate specific impacts of proposed development and comply with municipal code. Conditions recommended by staff are modified to delete references to conclusions in the Staff Report so that compliance with the conditions can be determined without reference to the Staff Report

3. Prior to recording the final subdivision, the Applicant shall:
  - a. Make any changes as necessary to the size or configuration of lots to better address the required development standards.
  - b. Install all street, stormwater and utility improvements per the approved plans and provide appropriate performance and maintenance bonds to the Development Review Engineer.
  - c. Submit final as-built drawings on mylar and in electronic form.
  - d. Pay a fee in lieu of providing 390 square feet of recreation space on the property for each of the five additional lots created.
4. Prior to issuance of building permits for future development of single-family homes on each of the new lots, the Applicant shall:
  - a. Record a Declaration of Covenant, provided by the City of Burien, per page 1-46 of the King County Surface Water Design Manual.
  - b. Demonstrate conformance with all requirements of the Fire Marshal (See Exhibit 1, Attachment 9).
  - c. Pay a Transportation Impact Fee as set forth in Chapter 19.35 BMC.
5. Prior to beginning any work in the public right-of-way or on-site, the Applicant shall apply for and obtain a right-of-way use construction permit and a grading & clearing Permit.
6. The replacement trees as shown on the tree replacement plan shall be planted prior to Certificate of Occupancy.
7. Type 1 Landscaping per the Transition Buffer Reduction Request shall be planted prior to Certificate of Occupancy. The Applicant shall provide a landscape maintenance bond or other appropriate security for a period of two years from planting to ensure proper installation, establishment and maintenance.
8. The Applicant shall implement rodent control within the existing house for at least 30 days prior to demolition.

**RECOMMENDED** this 12<sup>th</sup> day of November 2014.



THEODORE PAUL HUNTER  
Hearing Examiner  
Sound Law Center



## CITY OF BURIEN, WASHINGTON

Department of Community Development  
400 SW 152<sup>nd</sup> St., Suite 300, Burien, Washington 98166  
Phone: (206) 241-4647 Fax: (206) 248-5539

---

### TYPE 3 LAND USE REVIEW STAFF RECOMMENDATION TO THE HEARING EXAMINER

DATE: October 8, 2014

FILE NO.: PLA 14-1052

APPLICANT: Michael Bellan, Boulevard Park, LLC

REQUEST: Subdivide one (1) existing residential lot into six (6) single-family residential lots in the RM-18 zone.

LOCATION: 1832 S 116<sup>th</sup> Street, Burien, WA

PARCEL: 098500-0190

APPLICATION SUBMITTED: May 21, 2014

APPLICATION COMPLETE: June 18, 2014

RECOMMENDATION: Approval with conditions

DECISION MAKER: City Council

HEARING EXAMINER DATE: October 30, 2014

PROJECT PLANNER: Liz Olmstead, Planner

#### I. INTRODUCTION

##### A. PROJECT SUMMARY

The applicant is proposing a 6-lot single-family residential subdivision on a 0.47 acre site (Attachment 1). The lots are proposed to gain access to South 116<sup>th</sup> Street from a joint-use access tract. Site work includes development of a joint-use tract for access, utilities, and stormwater facilities (Attachment 3).

## **B. RECOMMENDATION**

Based on the Findings of Fact and Conclusions (Section II) and Attachments to this report, it is recommended that the application be approved subject to the following conditions:

1. This application is subject to the applicable requirements contained in the Burien Municipal Code (including but not limited to the Zoning Code, Building Code and Fire Code), the 2009 King County Surface Water Design Manual and the 2009 Stormwater Pollution Prevention Manual as adopted by the City of Burien and the 2008 Burien Road Standards. It is the responsibility of the applicant to ensure compliance with the various provisions contained in these documents. Attachment 2, Residential Subdivision Development Regulations, is provided in this report to familiarize the applicant with some of the additional requirements that may apply to the project. This attachment does not include all of the additional requirements (see Conclusion II.E.1). Preliminary approval does not guarantee that the number of lots proposed can be accommodated on the subject parcel and meet all required development standards (see Conclusion II.E.2).
2. Prior to the issuance of development permits for any construction activities on-site the applicant shall:
  - a. Submit detailed on-site street improvement plans for review and approval by the Development Review Engineer. The Plans shall be in accordance with the requirements of the 2008 Burien Road Standards and address the issues expressed in the Development Review Engineer's memorandum dated July 23, 2014 (see Conclusion II.E.3).
  - b. Submit for review and approval to the Surface Water Management Engineer an updated TIR and final engineered drawings for all required street improvements consistent with the Surface Water Management Engineer's comments dated August 5, 2014 (see Conclusion II.E.5).
  - c. Submit approved utility plans for the various underground utilities serving or proposed to serve the site (see Conclusion II.E.4).
3. Prior to recording the final subdivision, the applicant shall:
  - a. Make any changes as necessary to the size or configuration of lots to better address the required development standards (see Conclusion II.E.2)
  - b. Install all street, stormwater and utility improvements per the approved plans and provide appropriate performance and maintenance bonds to the Development Review Engineer (see Conclusions II.E.3, 4 and 5)
  - c. Submit final as-built drawings on mylar and in electronic form (see Conclusion II.E.3)
  - d. Pay a fee-in-lieu of providing 390 square feet of recreation space on the property for each of the 5 additional lots created (see Conclusion II.E.6)

4. Prior to issuance of building permits for future development of single-family homes on each of the new lots, the applicant shall:
  - a. Record a Declaration of Covenant, provided by the City of Burien, per page 1-46 of the King County Surface Water Design Manual (see Conclusion II.E.5).
  - b. Demonstrate conformance with all requirements of the Fire Marshal (see Conclusion II.D.4).
  - c. Pay a Transportation Impact Fee as set forth in BMC 19.35 (see Conclusion II.E.8).
5. Prior to beginning any work in the public right-of-way or on-site, the applicant shall apply for and obtain a right-of-way use construction permit and a grading & clearing Permit (see Conclusion II.E.3 & II.E.5).
6. The replacement trees as shown on the tree replacement plan shall be planted prior to Certificate of Occupancy (see Conclusion II.E.7).
7. Type 1 Landscaping per the Transition Buffer Reduction Request shall be planted prior to Certificate of Occupancy. The applicant shall provide a landscape maintenance bond or other appropriate security for a period of two years from planting to ensure proper installation, establishment and maintenance (see Conclusion II.E.9).

## II. FINDINGS OF FACT AND CONCLUSIONS

### A. SITE DESCRIPTION

1. Facts:
  - a. Size: 20,577 square feet (0.47 acres)
  - b. Land Use: Existing Single-Family Residence
  - c. Terrain: The site is flat, containing less than one (1) foot of elevation change across the entire site.
  - d. Vegetation: The northern third of the site contains three (3) deciduous trees between 8" and 20" in caliper. The remainder of the site consists of areas of brush and grass. See Section II.E.7 for further analysis of trees located on site.

- e. Bulk Regulations: Future development of single detached dwelling units on the new lots in the RM-18 zone will be required to meet the following development standards:
    - Front Setback: 10 feet minimum
    - Interior Setback: 5 feet minimum
    - Building Coverage: 55% maximum
    - Impervious Surface Coverage: 75% Maximum
    - Height: 35' maximum
    - Minimum Parking Required: 2 off-street spaces per dwelling unit
  - f. Neighboring Development and Zoning: The subject site is bordered on the North, East, and South by single-family development and to the west by the Rainier Golf and Country Club. The properties to the north, east, and south are zoned RM-18 (Multi-family Residential), and the property to the West is zoned RS-7200 (Single-family Residential).
2. Conclusions: Size, land use, terrain, and vegetation are not constraining factors in the consideration of this application. Site specific requirements including, but not limited to, building height, setback, impervious surface coverage and building coverage will be reviewed when building permits are filed for each new lot. This application is consistent with neighboring development.

## **B. PUBLIC & AGENCY COMMENT**

### **1. Public Comments**

- a. Facts: Public notice of this application was posted on the site and published in the newspaper on June 25, 2014 and mailed to all property owners within 500 feet of the site on June 23, 2014. One public comment letter was received during the 30-day comment period, which ended on July 25, 2014. This comment letter has been addressed below.

#### **RainierHouse Condominiums Homeowners Association, (Attachment 5)**

The Homeowners Association Board for RainierHouse Condominiums raised the following concerns about traffic, parking and construction, and asked the following specific questions:

Traffic Concerns:

**Comment:** Six new homes means there will be additional traffic on the road, which will add to the wear and tear at the end of the road. Since 116<sup>th</sup> is a simple tar-and-chip road, is there a plan for additional maintenance or improvements on our small street?

**Response:** *As part of the plat development, full frontage improvements will be required along the project frontage on S 116<sup>th</sup> Street. Full frontage improvements consist of curb, gutter, five feet of sidewalk, ADA ramps, pavement widening, and a storm drain system. Any cuts on the road will have to be mitigated with either a full or half street overlay.*

**Comment:** The house on the corner of 116<sup>th</sup> and 20<sup>th</sup> has very high hedges which makes it difficult for traffic traveling south on 20<sup>th</sup> to turn onto 116<sup>th</sup> safely. With additional traffic on the west end of 116<sup>th</sup>, is there a plan to trim these hedges to increase visibility?

**Response:**

*Sight distance concerns due to the hedge at the northwest corner of 20<sup>th</sup> Ave S and S 116<sup>th</sup> St have been forward to the Public Works Department for investigation and possible action.*

**Comment:** What provisions are being made for parking? Our concern is that, if the new residents decide to park on 116<sup>th</sup>, they will be forced to either make a tight U-turn on the road, or use the driveways of other residents.

Again, if cars park on 116<sup>th</sup>, they will make foot traffic more difficult. Will sidewalks be added for safety for pedestrians?

*Response: Public parking is currently allowed on S 116<sup>th</sup> Street and will not be affected by the proposed development Per BMC 19.15.010.4, two (2) parking spaces are required to be provided on site per single detached dwelling unit. The applicant has proposed two parking spaces on-site per dwelling unit, one in a garage, and one in the driveway. Five foot wide sidewalks will be required along the project frontage for pedestrians.*

**Comment:** Will construction be time-limited? As a direct neighbor of the property, we are concerned about construction noise early in the morning as well as in the evening.

*Response: Yes, construction hours are limited to 7:00am to 10:00pm on weekdays and 9:00am to 10:00pm on the weekends (BMC 9.105.400.2.h).*

**Comment:** There are a number of families who live west of the planned construction site. As 116<sup>th</sup> is a dead end street, we want to make sure street access is unobstructed at all times.

*Response: The City of Burien works with contractors prior to and during construction to assure street access is maintained. Obstruction of the right-of-way is not allowed without a permit and the proper warning and safety devices. BMC 12.17.110 regulates the use of the right-of-way and states that any object or thing which shall occupy any right-of-way without a permit is declared a nuisance.*

**Comment:** The plan calls for subdividing the lot into six (6) smaller lots for single-family houses, but the site is zoned multi-family. How is that reconciled?

**Response:** *Per BMC 19.15.010, single detached dwelling units are an allowed use in all multi-family zones. All development regulations such as setbacks, building coverage, and impervious surface regulations apply to single-family residential construction on each lot.*

**Comment:** Will the homes be rentals or sold?

**Response:** *The developer has not indicated whether the homes will be rented or sold upon completion of the project.*

- b. Conclusions: The public comment requirement has been addressed for the proposal.

## 2. Agency Comments

- a. Facts: On February 11, 2013, notice of this application was distributed to Seattle City Light, Water District #20, King County Fire District # 2, Valley View Sewer District, and Burien Police Services. The water, sewer and fire districts have completed availability forms with comments and requirements (see Section II.E.4). No responses were received from Puget Sound Energy or Burien Police Services.
- b. Conclusions: The agency comment requirement has been addressed for the proposal.

## C. STATE ENVIRONMENTAL POLICY ACT (SEPA)

- 1. Facts: The City's adopted regulations related to the State Environmental Policy Act (SEPA), requires a SEPA Checklist and SEPA determination for all proposed subdivisions of more than twenty (20) dwelling units (BMC 14.10.040 (1)). Therefore, the proposed subdivision of six (6) residential lots is exempt from SEPA.
- 2. Conclusions: The proposed six (6) lot subdivision is exempt from SEPA requirements.

## D. APPROVAL CRITERIA

### 1. Subdivision Code Compliance

- a. Facts: The Burien Subdivision Code outlines various standards which are to be met when creating a subdivision. The purpose of the City of Burien's subdivision regulations is to:

- (1) Set forth the rules and regulations for the division of real property into subdivisions;
- (2) Provide for the proper location and width of streets, building lines; open spaces, safety and recreation facilities, utilities, and drainage;
- (3) Provide for the avoidance of congestion of population through requirements of minimum lot area and compatibility of design;
- (4) Require and fix the extent to which and the manner in which streets shall be graded and improved, and water, sewer, drainage, and other utility mains and piping or connections of other physical improvements shall be installed; and
- (5) Provide for and secure the actual construction of such physical improvements.

b. Conclusions: The application, as conditioned, meets the subdivision standards (see Section II.E).

## 2. Revised Code of Washington Section 58.17.110

a. Facts:

- (1) RCW 58.17.110, as amended, states that "A proposed subdivision shall not be approved unless the city... makes written findings that:
  - i) 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 school grounds 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
  - ii) The public use and interest will be served by the platting of such subdivision and dedication."
- (2) Pursuant to BMC 17.35.120.2 the preliminary plat decision shall be based on conformance to adopted city rules and regulations and RCW 58.17.110 states that prior to approval of the subdivision the city must find that the public use and interest must be served by the platting of such subdivision.

b. Conclusions: The proposal, as conditioned, complies with RCW 58.17.110. As conditioned, it will serve the public use and interest and is consistent with the public health, safety, and general welfare because it will contribute to the community's ability to provide additional single-family residential units and additional home ownership opportunities within the community. The property will develop in accordance with the Comprehensive Plan for this area (see Section II.F).

## E. DEVELOPMENT REGULATIONS

### 1. General Compliance

- a. Fact: This application is subject to the applicable requirements contained in the Burien Municipal Code (including but not limited to the Zoning Code, Building Code and Fire Code), the 2009 King County Surface Water Design Manual and the 2009 Stormwater Pollution Prevention Manual as adopted by the City of Burien, and the City of Burien 2008 adopted Road Design and Construction Standards.
- b. Conclusion: It is the responsibility of the applicant to ensure compliance with the various provisions contained in the Burien Municipal Code (including but not limited to the Zoning Code, Building Code and Fire Code), 2009 King County Surface Water Design Manual and the 2009 Stormwater Pollution Prevention Manual as adopted by the City of Burien, and the City of Burien 2008 adopted Road Design and Construction Standards. Attachment 2, Residential Subdivision Development Requirements, is provided to familiarize the applicant with some of the additional requirements that may apply to the project. This attachment does not include all of the additional requirements.

### 2. Lot Size and Layout

- a. Facts: The site is zoned RM-18 Multi-Family Residential. The minimum lot area per each single-family dwelling unit for this zone is 2,400 square feet. Proposed lot sizes and overall lot average are as follows:

Lot No.	Square Feet
1	2,470
2	2,470
3	2,470
4	2,470
5	2,470
6	2,924

Lot sizes for the proposed development will require attention to ensure sufficient space is provided for construction of dwellings based on the development standards.

- b. Conclusion: The proposed preliminary plat satisfies the minimum lot area requirements for the RM-18 zone as outlined in BMC 19.15.010.4. The applicant may want to modify the size or number of lots prior to submittal of the final plat in order to better address the required development standards.

### 3. Street Improvements & Access

- a. Facts: City of Burien Municipal Code section 17.35.120 requires that access and street improvements comply with the 2008 Burien Road Standards. The City of Burien Development Review Engineer reviewed the proposed development for compliance with the 2008 Burien Road Standards and provided comments in a memorandum dated July 23, 2014 (Attachment 6) including, but not limited to, the following:
- (1) The applicant shall submit approved utility plans for the various underground utilities serving or proposed to serve the site.
  - (2) Full urban frontage improvements shall consist of curb, gutter, five feet of sidewalk, ADA ramps and pavement widening, storm drain system and full/half street overlay will be required along the project frontage along S 116<sup>th</sup> St in accordance with the 2008 Burien Road Standards.
  - (3) A Traffic Impact Analysis (King County format) will be required prior to issuance of construction permits and shall address such issues as stopping and entering sight distances, traffic volumes, channelization, operations, driveway location, classification of the existing street, curb radius, on and off-street parking, vehicle turning movements, pedestrian facilities on and off-site, in accordance with AASHTO and the 2008 Burien Road Standards. A Traffic Impact Analysis (project impacts including traffic volume, operation impacts, trip generation, distribution and assignment) impacts checklist may be obtained from the Public Works Department to assist in preparing the traffic analysis.
  - (4) The City of Burien recommends that the application should provide on-site mailbox services.
  - (5) 3.01 Driveways: The City of Burien uses the 2008 BRS for driveway design. The proposed access driveway shall be specified in the BRS with a 25 foot minimum width and 35 foot maximum width in accordance with BRS figures 3.5 to 3.8.
  - (6) A full width overlay of the existing pavement is required for all street widening projects including pave shoulder (BRS 4.03(1)) along the project frontage on South 116<sup>th</sup> Street. The limits of the overlay will be based on the conditions of the existing pavement at the time of construction as determined by the Right-of-Way Inspector.
  - (7) All required utilities, drainage, and street improvement plans shall be designed by a Washington State Licensed Engineer in accordance with the City of Burien standards, 2008 BRS and 2008 KCSWDM.
  - (8) All utilities serving the property shall be place underground unless exempt per BMC § 12.40. All new electrical, phone, water, sewer, and cable

services to the site must be underground. Construction of these facilities must be inspected and approved by the City of Burien Public Works Inspector.

- (9) The applicant shall coordinate with the various underground utilities serving or proposed to serve the site. Prior to issuance of a clear and grade permit, the applicant shall submit approved utility plans for the various underground utilities serving or proposed to serve the site.
- (10) A right-of-way use permit will be required for any construction or utility work within the street right-of-way (ref. BMC § 12.17 and 12.18).
- (11) Restoration, performance, and maintenance security bonds, in forms acceptable to the City must be posted for required site and right-of-way improvements (ref. BMC § 17.35.130(1)(e), and per Section 1.2.7 KCSWDM, KCC Title 9, KCC).
- (12) As-Built drawings shall be prepared by a professional surveyor in accordance with the City of Burien Checklist or 2008 BRS and 2009 KCSWDM.
- (13) Final Corrected Plans/As-Built Drawings: Final corrected plans for archiving shall be original documents on mylar and produced in a manner that ensures durability, resistance to damage from use or exposure to water or light, and allows for the detection of any alteration. The plans shall be of suitable quality for producing legible prints through reductions, scanning, microfilming, or other standard copying procedures. Electronic copies of the final corrected plans shall be submitted in PDF and Auto CADD format. As-built drawings shall be signed and stamped by the responsible professional engineer and surveyor prior to submittal to the Review Agency.

**General requirements/comments for future construction permit submittals**

- (1) Provide on the cover sheet the names and phone numbers of the water, sewer, gas, phone, and electric utility contacts.
- (2) Provide/update Construction Sequence per 2009 KCSWDM and show the City of Burien name and Burien Road Standards instead of King County and King County Road.
- (3) Provide General notes per 2009 KCSWDM and show the City of Burien name and Burien Road Standards instead of King County and King County Road Standards.
- (4) Show full/half street overlay along project frontage on South 116<sup>th</sup> Street per BRS or provide note “per BRS section 4.03, a 2 inch half or full width

overlay shall be required. All appropriate repairs to the existing sub-grade, base material, surfacing and pre-level may be required prior to placing the overlay. The overlay may be waived only upon written request and after an evaluation of pavement condition and/or channelization requirements have been completed and approved by Right of Way Inspector”.

- (5) Provide standard cross section for proposed frontage improvements along S 116<sup>th</sup> St per 2008 Burien Road Standards, fig # 3.1.
  - (6) Provide T.E.S.C notes and drawings as per KCSWDM.
  - (7) The asphalt tapers on South 116<sup>th</sup> Street at east and west end of frontage improvements do not to meet the typical taper length, per AASHTO of  $WS^2/60$ , where W is the horizontal offset of the new curb and existing edge of pavement, and S is the posted speed limit or 85<sup>th</sup> percentile speed, whichever is greater.
  - (8) Provide standard driveway detail per 2008 Burien Road Standards.
- b. Conclusions: With the following conditions the proposal complies with the requirements for street improvements and access:
- (1) Prior to issuance of development permits for any construction activities on-site, the applicant shall submit for review and approval to the Development Review Engineer final engineered drawings for all required street improvements consistent with the Development Review Engineer’s comments dated July 23, 2014.
  - (2) A right-of-way use permit will be required for any construction or utility work within the street right-of-way (ref. BMC § 12.17 and 12.18).
  - (3) The applicant shall submit final as-built drawings on mylar and in electronic form.

#### 4. Utilities

a. Facts:

- (1) The site is located within Water District #20. Water District #20 approved the development for public water service based on the findings that water service is provided by connection to an existing 8-inch water main located approximately 10 feet from the site and the nearest fire hydrant is located approximately 110 feet from the site with a flow rate of 1,000 gallons or more for a duration of 2 hours or more (Attachment 7).

- (2) The site is located within Valley View Sewer District. Sewer service will be provided by side sewer connection to an existing 6" size sewer, zero feet from the site. Sewer service is subject to a district connection charge due prior to connection. An additional sewer stub may be necessary and the existing stub may need to be rehabbed (Attachment 8).
  - (3) Fire District #2 provides fire protection to the area. The Fire Marshal approved the development for water flow, hydrant spacing and access with the following conditions: 1) NFPA 13D residential sprinkler systems are required in new homes on all six lots to mitigate access and hydrant distance (Attachment 9).
- b. Conclusion: Prior to recording the Final Subdivision, water and sewer service shall be provided to each lot, or a bond submitted, consistent with the requirements of the serving utility and the Subdivision Code. The applicant shall show any utility easements or reference documents pertaining to sewer and water utility easements, which are necessary to provide service to the lots. Prior to issuance of development permits for any lots, the applicant shall demonstrate conformance with all requirements of the Fire Marshal.

## 5. Surface Water Management

- a. Facts: BMC 13.10.020 adopts the 2009 King County Surface Water Design Manual (KCSWDM) and the 2009 Stormwater Pollution Prevention Manual (SPPM) as the City's drainage control regulations. The applicant submitted a Technical Information Report (TIR) prepared by DCG, Inc, dated May 13, 2014 (see Attachment 11) and a Preliminary Site Plan, Erosion Control, Grading, and Drainage Plan prepared by DCG, Inc, dated May 6, 2014. The City of Burien Public Works Department reviewed the proposed development and provided comments in an August 5, 2014 memorandum regarding required surface water management improvements (Attachment 10). The Surface Water Management Engineer has identified the following conditions:
- (1) In general, the proposed storm drain detention facilities appear reasonable. Refinement of the final design of water quality and flow control facilities will be required prior to issuance of development permits for any construction activities on-site.
  - (2) Engineering plans and calculations must be prepared and stamped by a Washington State licensed civil engineer.
  - (3) Prior to issuance of development permits for any construction activities on-site, the submitted Downstream Analysis and Engineering plans shall be updated to reflect final design and calculation and shall include all the requirements in the KCSWDM.

- (4) For any development permits in the future, a TIR must be updated to include all of the requirements in the KCSWDM as below:
    - (i) All eight (8) core requirements in Section 1.2 in the KCSWDM
    - (ii) All five (5) special requirements in Section 1.3 in the KCSWDM
  - (5) The location, condition, and size of existing drainage systems and drainage easements, if any, shall be verified. The existing drainage systems in the proposed excavation area shall be removed, relocated, or appropriately treated.
  - (6) In computing runoff from the site, the assumed impervious surface coverage shall not be less than 4,000 square feet per lot in urban residential development, or the maximum impervious surface coverage permitted by city code (BMC 19.15.010), whichever is less.
  - (7) At least three (3) ESC inspections are required (i.e. prior to clearing and construction, during construction, and upon completion of construction).
  - (8) The facilities shall be owned and maintained by a Homeowner's Association. All privately maintained facilities must be maintained as specified in the site/lots declaration of covenant and grant of easement per Section 5.2.1 of the KCSWDM.
  - (9) A Declaration of Covenant must be recorded prior to engineering plan approval per page 1-46 of the KCSWDM. The form and instructions for the covenant will be provided during the building permit process.
- c. Conclusions: With the following conditions the proposal complies with the requirements for surface water management:
- (1) Prior to issuance of development permits for any construction activities on-site, the applicant shall:
    - a. Submit for review and approval to the Surface Water Management Engineer a TIR and final engineered drawings for all required stormwater improvements consistent with the Surface Water Management Engineer's comments dated August 5, 2014.
    - b. Record a Declaration of Covenant per page 1-46 of the KCSWDM.

## 6. Fee-In-Lieu of Recreation Space

- a. Facts: The Burien Zoning Code requires residential developments to provide on-site recreational areas or pay a fee-in-lieu of actual recreational space when the space is not provided (BMC 19.17.013). Since no on-site recreation space meeting the Code requirements has been provided, a fee-in-lieu of recreation space will be required. The applicant shall pay for 390 square feet of recreation

space for each additional lot being created. For the proposed subdivision, 5 additional lots are being created (credit is received for the one lot currently located on site). This fee shall be based on the assessed value per square foot of the land at the time of recording.

- b. Conclusions: To comply with the requirements of BMC 19.17.013, the Applicant shall pay a fee in lieu of providing 390 square feet of recreation space on the property for each of the 5 additional lots created. The fee shall be paid prior to recording the final plat.

## 7. Tree Retention and Protection

- a. Facts: Single Detached Dwelling Units in the RM-18 zone are required to comply with Landscape Category A (BMC 19.15.010.4). Landscape Category A requires 30% of the significant trees located on site to be retained (BMC 19.25.120.2). A significant tree is defined as a healthy tree, which when measured four feet above grade, has a minimum diameter of 8 inches for evergreen trees or 12 inches for deciduous trees (BMC 19.10.493). When the required amount of significant trees cannot be retained, the required number of significant trees that are removed shall be replaced per BMC 19.25.160.

The submitted tree retention plan (Attachment 4) shows that there are two (2) significant trees located on-site, both of which will be removed. In order to comply with BMC 19.25.160, the applicant has proposed to replace a 16” deciduous tree with eight (8) 3” caliper deciduous trees.

- b. Conclusions: The significant tree retention plan meets the City’s significant tree retention requirements. The replacement trees as shown on the tree replacement plan shall be planted prior to Certificate of Occupancy (attachment 4).

## 8. Transportation Impact Fee

- a. Facts: Any person who receives a building permit or any other construction permit for any development activity or who undertakes any development activity within the City’s corporate limits for which a building permit or other construction permit is not required, shall pay a transportation impact fees as set forth in Table 19.35-2 at the time of issuance of the permit (BMC 19.35.060).
- b. Conclusions: Prior to issuance of building permits for future development on each of the new lots, the applicant shall pay a Transportation Impact Fee as set forth in Table 19.35-2.

## 9. Transition Standards

1. Facts: The Applicant has requested an adjustment to the 20 ft. wide Type I landscape (full screen) transition zone requirement. The purpose of a transition zone is to create a buffer between a residential zone and a zone that permits

higher intensity, and between and RM and RS zone. Because the property to the west is in an RS zone, a transition buffer is required between the two properties. As shown in Attachment 12, the proposal is to reduce the 20 foot wide buffer with Type 1 landscaping to a 10 feet wide buffer with Type 1 landscaping. Burien Municipal Code Section 19.17.015 sets forth the decision criteria for an adjustment to the Transition Standards through a Type 1 decision. The Director may only approve the application if all of the following criteria are met:

- a. Will not be detrimental to surrounding properties; and

City Analysis: The proposed reduction of the required buffer will occur along the western property line adjacent to the Rainier Golf and Country Club storage area. While the adjacent land-use to the west of the site is zoned for residential single-family uses, it is developed as a golf and country club. This type of land-use is different in character from a single-family home and does not require the same level of buffering to mitigate possible visual and noise impacts. Therefore, a reduced transition buffer will not be detrimental to the property to the west of the site.

- b. Will comply with the purpose and intent of this section (BMC 19.17.015.1).

City Analysis: The stated purpose of BMC 19.17.015.1 is to create a buffer between a residential zone and a zone that permits development of a higher intensity. The proposed development will result in an improvement to the subject parcel by providing a 10 ft. wide Type I (full screen) landscape buffer along the western property line consisting of evergreen and coniferous trees, shrubs and groundcover. Given these proposed improvements, the single-family homes will provide adequate landscaping to provide a buffer between the site and the golf and country club to the west. Approval of the proposed development will comply with the purpose and intent of the Transition Zone buffer section of the BMC.

- c. Will provide equal or greater protection for the zone receiving transition than strict compliance with this section would provide.

City Analysis: The proposed landscaping will provide equal or greater protection for the property located to the west of the site by planting new vegetation greater in density and size than required by the code. Along with vegetation, existing fencing will provide visibility protection from the neighboring property as well.

2. Conclusions: The proposal is consistent with the approval criteria of BMC 19.17.015. Type 1 Landscaping per the Transition Buffer Reduction Request shall be planted prior to Certificate of Occupancy and landscaping maintenance bond or other appropriate security shall be required for a period of two years after planting to ensure proper installation, establishment and maintenance.

## 10. School Walkway Conditions

1. Facts: According to the Highline School District bus schedule information, the following indicates the school bus stop and walkway conditions to schools serving the site:
  - a. Elementary School: The nearest bus stop is located at 11421 20<sup>th</sup> Ave South, northwest of the subject site. To reach the bus stop, a person would walk east on South 116<sup>th</sup> Street along a graveled shoulder, then north on 20<sup>th</sup> Avenue South along a paved area on the east side of 20<sup>th</sup> Avenue South.
  - b. Middle School and High School: The nearest bus stop is located at 11621 Des Moines Memorial Drive South. To reach the bus stop, a person would walk east on South 116<sup>th</sup> Street along a graveled shoulder, then south on Des Moines Memorial Drive South on a sidewalk on the west side of Des Moines Memorial Drive South.
2. Conclusions: Students attending schools in the surrounding area are provided transportation via a school bus. The proposal is consistent with the standards set forth in BMC 17 and RCW 58.17.

## F. COMPREHENSIVE PLAN

1. Facts: The subject property is designated Moderate Density Multi-Family Neighborhood. Burien Comprehensive Plan Policy RE 1.8 indicates that the Moderate Density Multi-Family Neighborhood designation should provide primarily multi-family residential uses in neighborhoods suitable for this type of development, where community improvements and facilities that are normally necessary for development can be provided. Development within this designation includes existing neighborhoods that have been platted at an average of 12 to 24 units per acre.
2. Conclusions: The proposed subdivision is consistent with the Moderate Density Multi-Family Neighborhood land use designation. As conditioned, the proposal complies with the Comprehensive Plan.

## III. APPEALS AND JUDICIAL REVIEW

State law allows the city's final decision to be appealed by a party of record with standing by filing a land use petition in King County superior court. Such petition must be filed within 21 days after issuance of the decision, as provided in RCW 36.70C.

## IV. LAPSE OF APPROVAL

Under BMC 17.40.140(3)(a), subdivision preliminary approvals shall be valid for seven (7) years. If any condition is not satisfied and the final plat is not recorded within the 7-year period the preliminary subdivision approval shall be null and void. If all conditions have been

satisfied and all required documents have been submitted within the 7-year period, the city may grant a single extension of up to 90 days to obtain additional information or for the processing and recording of final plat documents. Applicants will have a maximum of 30 days to comply with requests for additional information made within the extension period.

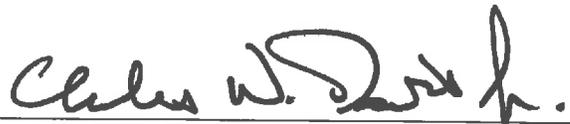
## V. ATTACHMENTS

1. Vicinity Map
2. Residential Subdivision Development Regulations
3. Preliminary Plat
4. Tree Retention Plan
5. Comment Letter, Jon Fincher for Rainer House Condominiums, received July 24, 2014
6. Public Works Recommended Conditions of Land Use Approval, dated July 23, 2014, Ramesh Davad, Development Review Engineer
7. Certificate of Water Availability, Water District # 20, March 26, 2014
8. Certificate of Sewer Availability, Valley View Sewer District, March 24, 2014
9. Certificate of Fire Hydrant Availability, King County Fire District #2, dated May 16, 2014
10. Public Works Stormwater Conditions of Land Use Approval, dated August 5, 2014, Heungkook Lim, Surface Water Management Engineer.
11. Technical Information Report, Davido Consulting Group, Inc., May 13, 2014
12. Transition Zone Buffer Reduction Request, Davido Consulting Group, Inc., June 25, 2014

## VI. PARTIES OF RECORD

Name	Address
Michael Bellan Boulevard Park, LLC	5319 1 <sup>st</sup> Ave S Seattle, WA 98108
Jon Fincher RainierHouse Condominiums	jfincher42@hotmail.com

Dated this 8th day of October, 2014



Charles W. "Chip" Davis, AICP  
Community Development Director



File: PLA 14-1052

Boulevard Park Subdivision

VicinityMap





**RESIDENTIAL SUBDIVISION DEVELOPMENT REGULATIONS**  
For Subdivisions and Consequent Building Permits

In addition to the standards addressed in the staff report, the City of Burien and other agencies will review the Final Plat and the Building Permits to ensure compliance with all applicable city, county, and state codes and policies. At a minimum, the following sections of the Burien Municipal Code (BMC), King County Code (KCC), and state laws will be analyzed during those reviews.

**BMC 13.10 Surface Water Management**

**BMC 12.05 Road Design and Construction Standards**

**BMC 12.40.070 Undergrounding of Utilities**

This section applies to new construction on an undeveloped site, to any substantial improvement on a developed site and any new or altered service. All utility lines on a site must be undergrounded. All existing overhead utility lines in the right of way adjacent to the site must be undergrounded unless the Public Works Director determines that this is infeasible. The Public Works Director may require the applicant to submit a statement from all utility companies with existing overhead lines indicating if undergrounding in the right-of-way is feasible. If the Public Works Director determines that undergrounding in the right of way is not feasible, the property owner must sign a concomitant agreement for future undergrounding.

**BMC Title 17 Subdivision Code**

**17.15.280 Sewage disposal.**

**Prior to recording the final plat**, either the approved public sewage system shall be installed to serve each lot, or a bond or similar security shall be deposited with the city of Burien and may be assigned to a purveyor to assure the construction of such facilities within two years of the date of plat recording.

**17.15.290 Water supply.**

**Prior to recording the final plat**, the approved public water system shall be installed to serve each lot unless a bond or similar security has been deposited with the city of Burien in a form and amount, and with conditions satisfactory to the city of Burien to provide for the construction of required water facilities in Group A systems as defined by board of health regulations, within two years of the date of plat recording.

**17.25.010 Site Improvements.**

**Prior to approval of the final plat**, all streets shall be improved in full compliance with and pursuant to a construction permit issued by the city of Burien. In lieu of the full compliance herewith, the plator may deposit a performance bond with the city in an amount equal to the cost as a guarantee that the plator will, within one year from the date of acceptance of the plat, fully comply with all the requirements set forth to the satisfaction of the development engineer.

17.40.040.3 Qualifications governing preliminary plat approval.

Prior to approval of the final plat, engineering details of the proposed streets, storm drainage, sanitary sewer and water systems and other proposed public facilities shall be approved by the city engineer and the King County department of public health.

17.45.030 Monuments.

All monuments shall be set after the grading of the streets. In case the plat is approved before the grading is complete, the grading shall be done and the monuments shall be set before the release of the road guarantee bond.

17.55.070 Performance Bond.

A performance bond or other satisfactory security shall be submitted to secure the successful operation of improvements for a period of 12 months in an amount and form satisfactory to the city. Such bond or security shall cover workmanship and materials, damage from reasonable expected usage and damage due to construction activities.

**BMC Title 19 Zoning Code**

19.10.265 Structure height.

Structure height is the vertical distance measured from average natural grade to the highest point of the structure. Natural grade is the topography of the lot immediately prior to any site preparation or grading, including excavation or filling. Prior to issuance of any development permits for the site, the city must have on file a topographic survey showing natural grade of the site prior to any development activity.

19.20.100.10 Parking for single detached dwelling units.

All vehicle parking and storage must be in a garage, carport or on an approved impervious surface. Any impervious surface used for vehicle parking or storage must have direct and unobstructed driveway access. Parking spaces shall be adequately sized and located to accommodate a standard-sized vehicle without the vehicle extending into the public right-of-way or vehicular access easement or tract.

19.35 Transportation Impact Fees.

19.35.060 Imposition of transportation impact fees.

Any person who receives a building permit or other construction permit for any development activity or who undertakes any development activity within the city's corporate limits for which a building permit, or other construction permit if a building permit is not required, shall pay the transportation impact fees as set forth in this chapter to the city. The impact fees shall be paid at the time of issuance of the permit.

19.17.013 Residential Recreation Space.

19.17.013 Fee in lieu of on-site recreation space.

In lieu of providing 390 square feet of on-site recreation space for each new lot created, the applicant shall pay a fee in lieu.

19.17.240 Sight Distance Requirements.

A sight distance triangle area shall contain no fence, berm, vegetation, on-site vehicle parking area, signs or other physical obstruction between 42 inches and eight feet above the existing street grade. The sight distance triangle at a site access point (driveway) is determined by measuring 15 feet along the street line and 15 feet along the edges of the driveway starting at the point of intersection. The third side of each triangle shall be a line connecting the endpoints of the first two sides of each triangle.

19.17.290 (1) Fences.

Fences exceeding a height of six feet shall comply with the applicable street and interior setbacks of the zone in which the property is located.

19.25.120 Significant trees - Retention required.

*Significant trees* shall be retained as follows:

Landscape Category A: Thirty percent (30%) of the *significant trees* located on the *site*, excluding *critical areas* or their *buffers*.

19.25.150 Significant trees - Protection.

To provide the best protection for *significant trees*:

1. No clearing shall be allowed on a *site* until approval of tree retention and landscape plans;
2. An area of prohibited disturbance, generally corresponding to the drip line of the *significant tree* shall be protected during construction with a temporary five-foot-high chain link or plastic net *fence*. The fencing shall be installed prior to issuance of development permits for the *site*;
3. No *impervious surfaces*, fill, excavation, or storage of construction materials shall be permitted within the area defined by such *fencing*;
4. A rock well shall be constructed if the grade level around the tree is to be raised by more than one foot. The inside diameter of the well shall be equal to the diameter of the drip line of the tree;
5. The grade level shall not be lowered within the larger of the two areas defined as follows:
  - A. The drip line of the tree(s); or
  - B. An area around the tree equal to one foot diameter for each inch of tree trunk diameter measured four feet above the ground; and
6. Alternative protection methods may be used if determined by the *Director* to provide equal or greater tree protection. [Ord. 293 § 1, 2000]

19.70.050 Surface Water Management.

All new development shall be served by an adequate surface water management system approved by the department as being consistent with the design, operating and procedural requirements of the 2009 Surface Water Design Manual and KCC Title 9.

19.70.100 Adequate Vehicular access.

All new development shall be served by adequate vehicular access meeting the standards of this section.

19.70.110 Adequate Fire Protection.

All new development shall be served by adequate fire protection. The water supply system must provide at least minimum fire flow and the road system must provide life safety/rescue access. Other fire protection requirements for buildings must be met as required by the fire code and IBC, and building and construction standards.



**SUBDIVISION**  
NO. PLA 14-1092  
CITY OF BURIEN, WASHINGTON



RECORDING NO.

VOL./PAGE

PORTION OF  
NE 1/4 of NW 1/4, S. 09 T.23 N., R. 04.E.

**RECORDER'S CERTIFICATE**  
filed for record this day of 20 at  
in book of at page at the request of  
Jonathan M. Becker

Mgr. Supt. of Records

**TAX PARCEL NUMBER:**  
0985000190

**ZONING:**  
RM-1B

**AREA:**  
TOTAL SITE AREA IS 29,572 SQUARE FEET OR 0.47 ACRES.

**METHOD OF SURVEY:**  
INSTRUMENTATION FOR THIS SURVEY WAS A TRIMBLE ELECTRONIC DISTANCE MEASURING UNIT. PROCEDURES USED IN THIS SURVEY WERE DIRECT AND REVERSE ANGLES, NO CORRECTION NECESSARY. MEETS STATE STANDARDS SET BY WAC 332-130-000.

**UNDERGROUND UTILITIES:**  
BURIED UTILITIES SHOWN BASED ON RECORDS FURNISHED BY OTHERS AND VERIFIED WHERE POSSIBLE IN THE FIELD. GEODIMENSIONS ASSUMES NO LIABILITY FOR THE ACCURACY OF THOSE RECORDS OR ACCEPT RESPONSIBILITY FOR UNDERGROUND LINES WHICH ARE NOT MADE PUBLIC RECORD. FOR THE FINAL LOCATION OF EXISTING UTILITIES IN AREAS CRITICAL TO DESIGN CONTACT THE UTILITY OWNER/AGENCY, AS ALWAYS, CALL 1-800-424-5555 BEFORE CONSTRUCTION.

**VERTICAL DATUM:**  
NAVD 86 PER GPS

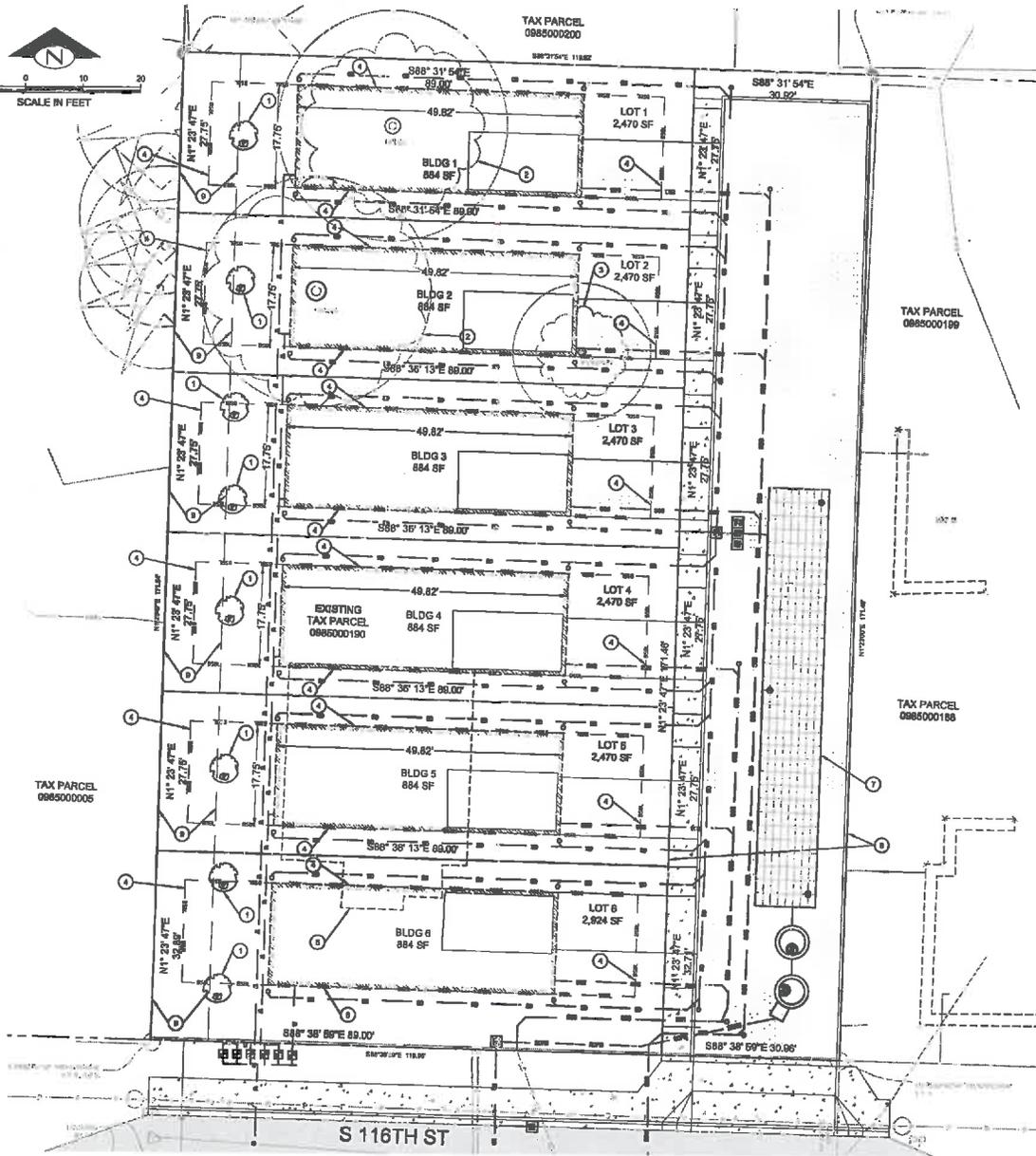
**BASIS OF BEARINGS:**  
PER RECORD OF SURVEY, BOOK 233, PG. 048, THE NORTH LINE OF THE NW QUARTER OF SECTION 6, T23N, R4E, BEARS N86°00'32"W.

**LEGAL DESCRIPTION:**  
LOT 13 AND THE WESTERLY 20.87 FEET OF LOT 12, BLOCK 2, BOULEVARD PARK ADDITION, ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 22 OF PLATS, PAGE 64, IN KING COUNTY, WASHINGTON;  
EXCEPT THE NORTH 80 FEET THEREOF.

**TITLE REPORT REFERENCE:**  
THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A TITLE REPORT.

EDWIN J. GREEN JR., PLS#15025

DATE



**PROJECT NOTES:**

ZONE: RM-1B (RESIDENTIAL MULTI-FAMILY)  
TOTAL AREA: 20,577 SF  
MINIMUM REQUIRED AREA FOR EACH LOT: 2,400 SF  
IMPERVIOUS SURFACE COVERAGE ALLOWED: 75%  
BUILDING COVERAGE ALLOWED: 56%

**KEY NOTES:**

KEY	NOTE
1	3" CALIPER (OR GREATER) REPLACEMENT TREE TO BE PLANTED
2	SIGNIFICANT TREE TO BE REMOVED
3	NON-SIGNIFICANT TREE TO BE REMOVED
4	5' BSDL
5	EX HOUSE TO BE REMOVED
6	10' BSDL
7	PROPOSED DETENTION SYSTEM FOR LOTS 1-6
8	TRACT A (6,304 SF)
9	10' WIDE TYPE 1 (FULL SCREEN) LANDSCAPING

**TREE RETENTION TABLE**

TREE DESCRIPTION:	QTY:
SIGNIFICANT TREES ON PROJECT SITE	2
SIGNIFICANT TREES TO BE REMOVED	2
SIGNIFICANT TREES TO BE RETAINED	0
TREES EXEMPT FROM REPLACEMENT	(1) 20" MAPLE
TREES REQUIRING REPLACEMENT	(1) 18" DECIDUOUS
PROPOSED REPLACEMENT TREES	(8) 3" CALIPER

**TREE RETENTION NOTES:**

- PER BMC 19.25.160, THE REQUIRED NUMBER OF SIGNIFICANT TREES THAT ARE REMOVED SHALL BE REPLACED WITH:
  - A. NEW TREES MEASURING 3" CALIPER OR MORE, AT A REPLACEMENT RATE OF ONE AND ONE-HALF (1.5) INCHES DIAMETER FOR EVERY ONE INCH DIAMETER OF THE REMOVED SIGNIFICANT TREE; OR
  - B. NEW TREES MEASURING LESS THAN 3" CALIPER AT A REPLACEMENT RATE OF TWO INCHES DIAMETER FOR EVERY ONE INCH DIAMETER OF THE REMOVED SIGNIFICANT TREE.
- PER BMC 19.25.120, A MINIMUM OF 30% OF THE SIGNIFICANT TREES LOCATED ON THE SITE MUST BE RETAINED.
- PER THE SMC, SIGNIFICANT TREES INCLUDE AN EXISTING HEALTHY TREE WHICH, WHEN MEASURED 4' ABOVE GRADE, HAS A MINIMUM DIAMETER OF 8" FOR EVERGREEN TREES OR 12" FOR DECIDUOUS TREES.

**LEGEND:**

- CONC PAVEMENT
- ASPH PAVEMENT
- POROUS ASPHALT
- ASPHALT OVERLAY

BASE MAP TOPOGRAPHY PROVIDED BY OTHERS. DCG CAN NOT BE HELD LIABLE FOR ACCURACY. CONTRACTOR SHALL FIELD VERIFY GRADES, UTILITIES, AND ALL OTHER EXISTING FEATURES AND CONDITIONS. IF CONDITIONS ARE NOT AS SHOWN AND/OR PLANS CANNOT BE CONSTRUCTED AS SHOWN, CONTACT DCG PRIOR TO CONSTRUCTION.

**CALL 2 DAYS BEFORE YOU DIG**  
1-800-424-5555  
(UNDERGROUND UTILITY LOCATIONS ARE APPROX.)

REVISION

DATE

BY

LEAD AP

DAVID CONSULTING GROUP, INC.  
Civil • Structural • Land Use

3100 Broadway, Suite 600  
Seattle, WA 98102  
Phone: 206.461.1100  
Fax: 206.461.1101  
www.dcginc.com

BOULEVARD PARK LLC  
5319 FIRST AVE S  
SEATTLE, WASHINGTON 98108

PROJECT:  
S 116TH ST SUBDIVISION  
S 116TH ST SEATTLE, WA 98108  
PROPOSED SUBDIVISION MAP

PROJ. MANAGER: JD

DESIGNED BY: TGM

DRAWN BY: DLE

CHECKED BY: JS

SCALE: 1" = 10'

DATE: 10/10/2014

REVISION

NO. DATE

1 10/10/2014

2 10/10/2014

3 10/10/2014

4 10/10/2014

5 10/10/2014

6 10/10/2014

7 10/10/2014

8 10/10/2014

9 10/10/2014

10 10/10/2014

11 10/10/2014

12 10/10/2014

13 10/10/2014

14 10/10/2014

15 10/10/2014

16 10/10/2014

17 10/10/2014

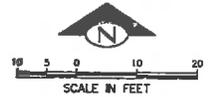
18 10/10/2014

19 10/10/2014

20 10/10/2014

ATTACHMENT 3





**KEY NOTES:**

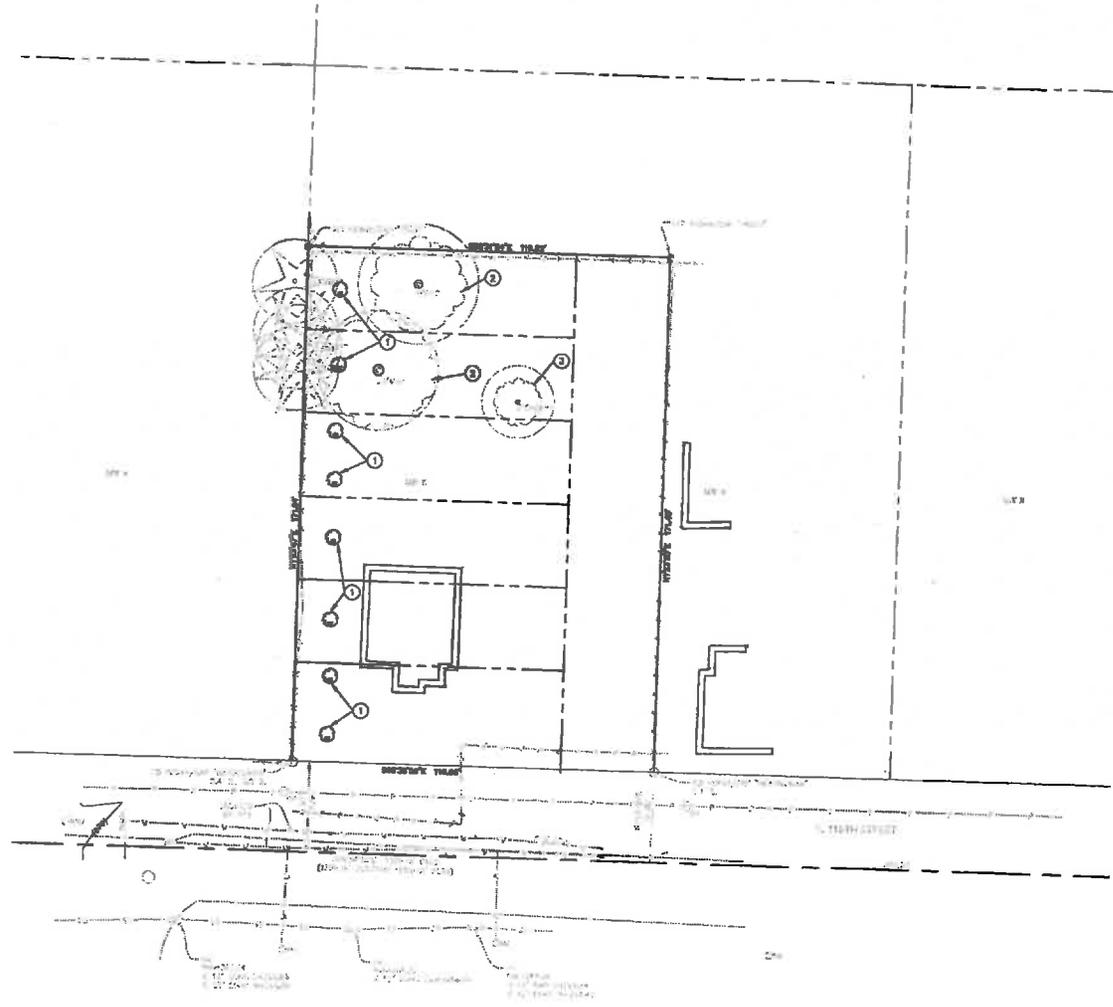
KEY	NOTE
①	3" CALIPER (OR GREATER) REPLACEMENT TREE TO BE PLANTED
②	SIGNIFICANT TREE TO BE REMOVED
③	NON-SIGNIFICANT TREE TO BE REMOVED

**TREE RETENTION TABLE**

TREE DESCRIPTION:	QTY:
SIGNIFICANT TREES ON PROJECT SITE	2
SIGNIFICANT TREES TO BE REMOVED	2
SIGNIFICANT TREES TO BE RETAINED	0
TREES EXEMPT FROM REPLACEMENT	(1) 20" MAPLE
TREES REQUIRING REPLACEMENT	(1) 16" DECIDUOUS
PROPOSED REPLACEMENT TREES	(8) 3" CALIPER

**TREE RETENTION NOTES:**

- FOR SMC 18.25.160, THE REQUIRED NUMBER OF SIGNIFICANT TREES THAT ARE REMOVED SHALL BE REPLACED WITH:
  - NEW TREES MEASURING 3" CALIPER OR MORE, AT A REPLACEMENT RATE OF ONE AND ONE-HALF (1.5) INCHES DIAMETER FOR EVERY ONE INCH DIAMETER OF THE REMOVED SIGNIFICANT TREE.
  - OR
  - NEW TREES MEASURING LESS THAN 3" CALIPER AT A REPLACEMENT RATE OF TWO INCHES DIAMETER FOR EVERY ONE INCH DIAMETER OF THE REMOVED SIGNIFICANT TREE.
- FOR SMC 18.25.150, A MINIMUM OF 30% OF THE SIGNIFICANT TREES LOCATED ON THE SITE MUST BE RETAINED.
- FOR THE SMC, SIGNIFICANT TREES INCLUDE AN EXISTING HEALTHY TREE WHICH, WHEN MEASURED 4" ABOVE GRADE, HAS A MINIMUM DIAMETER OF 8" FOR EVERGREEN TREES OR 12" FOR DECIDUOUS TREES.



SMC MAP TOPOGRAPHY PROVIDED BY OTHERS. DCG CANNOT BE HELD LIABLE FOR ACCURACY. CONTRACTOR SHALL FIELD VERIFY GRADES, UTILITIES, AND ALL OTHER EXISTING FEATURES AND CONDITIONS. IF CONDITIONS ARE NOT AS SHOWN AND/OR PLANS CANNOT BE CONSTRUCTED AS SHOWN, CONTACT DCG PRIOR TO CONSTRUCTION.

**CALL 2 DAYS BEFORE YOU DIG**  
 1-800-424-5555  
(UNDERGROUND UTILITY LOCATIONS ARE APPROX.)

NO.	DATE	BY	REVISION

LEED AP

DAVIDO CONSULTING GROUP, INC.  
 Civil • Structural • Land Use

3715 NE UNIVERSITY STREET  
 SUITE 1000  
 SEASIDE, WA 98148  
 PH: 206.323.4157  
 FAX: 206.323.4158  
 WWW.DCGROUP.COM

PROJ. MGR: [ ]  
 DESIGNED BY: [ ]  
 DRAWN BY: [ ]  
 CHECKED BY: [ ]  
 SCALE: [ ]  
 DATE: 05/09/2014  
 SHEET NO. 11  
 SHEET TOTAL 11

PROJECT: BOULEVARD PARK LLC  
 5519 FIRST AVE S  
 SEATTLE, WASHINGTON 98108  
 S 116TH ST SUBDIVISION  
 S 116TH ST SEATTLE, WA 98108  
 TREE RETENTION PLAN

SHEET NUMBER  
**C03**



## Elizabeth Olmstead

---

**From:** Jon Fincher [jfincher42@hotmail.com]  
**Sent:** Thursday, July 24, 2014 7:15 PM  
**To:** Elizabeth Olmstead  
**Cc:** RainierHouse; Long Ng; Mary Riem  
**Subject:** Comments re: File PLA 14-1052, Improvements to 1832 S. 116th St.

To: Elizabeth Olmstead  
Department of Community Development  
City of Burien

RE: File PLA 14-1052, improvements to 1832 S. 116<sup>th</sup> St, Burien, WA.

Ms. Olmstead:

We represent the residents of the RainierHouse Condominium, 1819 S. 116<sup>th</sup> St, Burien, WA. This email captures questions, concerns, and comments from the 24 families who live at RainierHouse about the project referenced above.

### TRAFFIC CONCERNS

- Six new homes means there will be additional traffic on the road, which will add to the wear and tear at this end of the road. Since 116th is a simple tar-and-chip road, is there a plan for additional maintenance or improvements on our small street?
- The house on the corner of 116th and 20th has very high hedges which makes it difficult for traffic traveling south on 20th to turn onto 116<sup>th</sup> safely. With additional traffic on the west end of 116th, is there a plan to trim these hedges to increase visibility?
- What provisions are being made for parking? Our concern is that, if the new residents decide to park on 116<sup>th</sup>, they will be forced to either make a tight U-turn on the road, or use the driveways of other residents.
- Again, if cars park on 116<sup>th</sup>, there will make foot traffic more difficult. Will sidewalks be added for safety for pedestrians?

### CONSTRUCTION CONCERNS

- Will construction be time-limited? As a direct neighbor of the property, we are concerned about construction noise early in the morning as well as in the evening.
- There are a number of families who live west of the planned construction site. As 116<sup>th</sup> is a dead end street, we want to make sure street access is unobstructed at all times.

### OTHER CONCERNS

- The plan calls for subdividing the lot into six (6) smaller lots for single family houses, but the site is zoned multi-family. How is that reconciled?
- Will these be rentals or sold?

Thank you for the opportunity to weigh in on this.

Sincerely,  
RainierHouse Homeowners Association Board  
Russ Stuber, President  
Mary Riem, Vice President

Jon Fincher, Treasurer  
Long Ng, Secretary

-----

Sent from Windows Mail

# MEMORANDUM

**Date:** July 23, 2014  
**To:** Elizabeth Olmstead, Project Planner  
**From:** Ramesh Davad, Development Review Engineer  
**Re:** PROJECT REVIEW FOR FILE # PLA 14-1052 (Boulevard Park LLC)  
Public Works and Community Development review

---

I have completed a review of the above mentioned preliminary project. This included review of the following documents:

- Preliminary Site/Drainage Plan by Davido Consulting Group, Inc., dated 05/06/14

Based upon our review, we have the following findings and conclusions:

It is noted that we did not review construction plans for water, sanitary sewer, or utilities (gas, phone, power, cable), which are reviewed and permitted by local purveyors.

Based on our review of the above documents, we wish to offer the following comments  
**General**

1. The applicant shall submit approved utility plans for the various underground utilities serving or proposed to serve the site.
2. The applicant shall obtain a Right-of-Way use permit from City of Burien regarding drainage connection and any work with the right-of-way.

## **Recommended PW conditions of approval**

1. Full urban frontage improvements shall consist of curb, gutter, five feet sidewalk, ADA ramps and pavement widening, storm drain system and full/half overlay will be required along the project frontage on South 116<sup>th</sup> Street in accordance with 2008 Burien Road Standards.
2. Traffic Impact Analysis (King County format) will be required for the project and shall address such issues as stopping and entering sight distances, traffic volumes, Channelization, operations, driveway location, and classification of existing street, curb radius, on and off street parking, vehicle turning movements, pedestrian facilities on and off site, in accordance with AASHTO, and 2008 Burien Road Standards. A Traffic Impact Analysis (project impacts including traffic volume, operation impacts, trip generation, distribution and

assignment) impacts checklist is attached to assist you in preparing the traffic analysis.

3. The City of Burien recommends that applicant should provide on-site mail box services.
4. 3.01 Driveways, the City of Burien uses the 2008 BRS for driveway design. The proposed access driveway shall be as specified in the BRS with 25 foot minimum width and 35 foot maximum width in accordance with BRS figures 3.5 to 3.8.
5. A full width overlay of the existing pavement is required for all street widening projects including paved shoulder (BRS 4.03.(1)) along project frontage on South 116<sup>th</sup> Street. The limits of the overlay will be based on the conditions of the existing pavement at the time of construction as determined by Right-of-Way inspector.
6. All required utilities, drainage and street improvement plans shall be designed by a Washington State Licensed Engineer in accordance with City of Burien standards, 2008 BRS and 2009 KCSWDM.
7. All utilities serving the property shall be placed underground unless exempt per BMC § 12.40. All new electrical, phone, water, sewer and cable services to the site must be underground. Construction of these facilities must be inspected and approved by the City of Burien Public Works Inspector.
8. The applicant shall coordinate with various underground utilities serving or proposed to serve the site. Prior to issue clear & grade permit, the applicant shall submit approved utility plans for the various underground utilities serving or proposed to serve the site.
9. A Right of Way Use Permit will be required for any construction or utility work within the street right of way or proposed ROW street (ref. BMC § 12.17 and 12.18).
10. Restoration, performance, and maintenance security bonds, in forms acceptable to the City, must be posted for required site and right of way improvements. (ref. BMC § 17.35.130(1)(e), and per Section 1.2.7 KCSWDM, KCC Title 9, KCC.
11. As-Built drawings shall be prepared by professional surveyor in accordance with City of Burien checklist or 2008 BRS and 2009 KCSWDM.
12. Final Corrected Plans/As-Built Drawings: Final corrected plans for archiving shall be original documents on mylar and are produced in a manner that ensures durability, resistance to damage from use or exposure to water or light and allows for the detection of any alternation. The plans shall be of suitable quality

for producing legible prints through reductions, scanning, microfilming or other standard copying procedure. Electronic copies of the final corrected plans shall be submitted in PDF and Auto CADD format. As-built drawings shall be signed and stamped by the responsible professional engineer and surveyor prior to submittal to the Review Agency.

**General requirements/comments for future construction permit submittals**

1. Provide the following on the cover sheet with names and phone number of water, sewer, gas, phone, and electric utility contacts.
2. Provide/update Construction Sequence per 2009 KCSWDM and show the City of Burien name and Burien Road Standards instead of King County and King County Road.
3. Provide General notes per 2009 KCSWDM and show the City of Burien name and Burien Road Standards instead of King County and King County Road Standards.
4. Show full/half street overlay along project frontage on South 116<sup>th</sup> Street per BRS or provide note "per BRS section 4.03, a 2 inch half or full width overlay shall be required. All appropriate repairs to the existing sub-grade, base material, surfacing and pre-level may be required prior to placing the overlay, The overlay may be waived only upon written request and after an evaluation of pavement condition and/or channelization requirements has been completed and approved by Right of Way Inspector".
5. Provide standard cross section for proposed frontage improvements along S 116<sup>th</sup> St per 2008 Burien Road Standards, fig # 3.1.
6. Provide T.E.S.C notes and drawings as per KCSWDM
7. The asphalt tapers on South 116<sup>th</sup> Street at east and west end of frontage improvements do not to meet the typical taper length, per AASHTO of  $WS^2/60$ , where W is the horizontal offset of the new curb and existing edge of pavement, and S is the posted speed limit or 85<sup>th</sup> percentile speed, whichever is greater.
8. Provide standard driveway detail per 2008 Burien Road Standards.







**CERTIFICATE OF SEWER AVAILABILITY / NON AVAILABILITY**

Residential: \$ 50.00

Commercial: \$ 100.00

Certificate of Sewer Availability OR  Certificate of Sewer Non-Availability

**Part A: ( To Be Completed By Applicant )**

Purpose of Certificate:

- Building Permit  Preliminary Plat or PUD  
 Short Division  Rezone  Other

Proposed Use:

- Residential Single Family  Commercial  Residential Multi-Family  Other

Applicant's Name

Phone Number

Property Address

Tax Lot Number

Legal Description (Attach Map and legal Description If Necessary);

**Part B: ( To be Completed by Sewer Agency )**

1.  a. A Sewer Service will be provided by side sewer connection only to an existing  size sewer  feet from the site and the sewer system has the capacity to serve the proposed use.  
 OR  b. Sewer service will require an improvement to the sewer system of:  
 (1)  feet of sewer trunk or lateral to reach the site; and/or  
 (2) The construction of a collection system on the site and/or  
 (3) Other (describe)

2. Must be completed if 1. b above is checked  
 a. The sewer system improvement is in conformance with a County-approved sewer comprehensive plan,  
 OR  b. The sewer system improvement will require a sewer comprehensive amendment.

3.  a. The proposed project is within the corporate limits of the District, or has been granted Boundary Review Board approval for extension of service outside the District.  
 OR  a. Annexation or BRB approval will be necessary to provide service.

4. Service is subject to the following;  
 a. District Connection Charges due prior to connection: Permit \$   
 GFC: \$  SFC: \$  Unit: \$  Total \$   
 (Subject to Change on January 1st)

Either a King County/METRO Capacity Charge, SWSSD or Midway Sewer District Connection Charge may be due upon connection to sewers.

b. Easements:  Required  May be Required

c. Other

I hereby certify that the above sewer agency information is true. This certification shall be valid for one year from the date of signature.

By

Title

Date

**ATTACHMENT TO  
VALLEY VIEW SEWER DISTRICT  
CERTIFICATE OF SEWER AVAILABILITY/NON-AVAILABILITY**

The following terms and conditions apply to the attached Valley View Sewer District ("District") Certificate of Sewer Availability/Non Availability ("Certificate")

1. This certificate is valid only for the real property referenced herein ("Property") which is in the District's service area, for the sole purpose of submission to the King County Department of Development and Environmental Services, King County Department of Public Health, City of Seattle, City of Tukwila, City of Burien and/or City of SeaTac. This certificate is between the District and the applicant only and no third person or party shall have any rights hereunder whether by agency, third-party beneficiary principles or otherwise.
2. This Certificate creates no contractual relationship between the District and the applicant and its successors and assigns and does not constitute and may not be relied upon as the District's guarantee that sewer service will be available at the time the applicant may apply to the District for such service.
3. As of the date of the District's signature on this Certificate, the District represents that sewer service is available to the Property through sewer systems that exist or that may be extended by the applicant. The District makes no other representations, express or implied, including without limitation that the applicant will be able to obtain the necessary permits, approvals and authorizations from King County, City of Seattle, City of Tukwila, City of Burien, City of Seatac or any other governmental agency before the applicant can utilize the sewer service which is the subject of this Certificate.
4. If the District or the applicant must extend the District's sewer system to provide sewer service to the Property, the District or applicant may be required to obtain from the appropriate governmental agency the necessary permits, approvals and authorizations. In addition, the governmental agency may establish requirements that must be satisfied as a condition of granting any such permits, approvals or authorizations, which may make impractical or impossible the provision of sewer services to the Property.
5. Application for and possible provision of sewer service to the Property shall be subject to and conditioned upon availability of sewer service to the Property at the time of such application, and compliance with federal, state, local and District laws, ordinances, policies, and/or regulations in effect at the time of such application.

*I acknowledge that I have received the Certificate of Sewer Availability/Non -Availability and this attachment, and fully understand the terms and conditions herein.*

Applicant's signature



Date

3/24/14

Reserve Form

Printing Charge

**General Facility Charge and System Facility Charge to increase in 2015**

After 17 years with no change in either the General Facility Charge (GFC) or the System Facility Charge (SFC) Valley View will be increasing both the GFC and SFC in 2015. The GFC which has been set at \$850.00 since 1997 will go up to \$1427.00. The SFC which has been set at \$1900.00 since 1997 will go up to \$4,000. This is intended to give you advance notice of this planned increase in connection charges. Please take this information into consideration when budgeting for future projects which will require connection to sewers.

**FIRE HYDRANT AVAILABILITY**

City of Burien

KCFD #2  
MAY 15 2014

This form must be completed and signed by the Fire Marshal. The form must be returned to the City of Burien Department of Community Development prior to issuance of a building permit or plat approval. The following must accompany this form to King County Fire District #2:

- Certificate of WATER AVAILABILITY completed by Water District
- A plot plan showing lot dimensions, building dimensions, placement of existing structures and streets *Plan Must be Drawn to Scale.*
- For projects involving Construction Review, a complete set of building plans are required.

PLAN REVIEW #: \_\_\_\_\_

BLDG. PERMIT #: \_\_\_\_\_

APPLICATION DATE: \_\_\_/\_\_\_/\_\_\_

DATE RECEIVED FD: \_\_\_/\_\_\_/\_\_\_

Submit application to: **King County Fire District #2**  
15100 8th Ave SW  
Burien, WA 98166-2244  
206 242-2040 / Fax: 206 433-6042

**Complete The Following For Proper Routing and Determinations:**

Property Address: 1832 S 116th St  
Burien WA

Please Check One:

Legal Description: Boulevard Park Add wao. 87ft  
of lot 12 & all of lot 13 less north 60' of

Water Dist Serving Property

- Water Dist. #20
- Water Dist. #49
- Water Dist. #125
- Highline Water Dist.
- City of Seattle

Contact Person: Michael Bellan Phone: 206 329 3121

Approximate Total Square Footage of Bldg.: 6 UNITS AT 1500 sq ft  
(Total of all floors, add attached garage for residential occupancies)

Specific Bldg. Use: RESIDENTIAL SINGLE

Please Check One:

Bldg. Occupancy Classification: SINGLE FAMILY

- New Construction
- Addition or Alteration
- Short Subdivision
- PUD

Type of Bldg. Construction: WOOD FRAME

*If you have trouble determining these items, ask for assistance.*

**FIRE DEPARTMENT USE ONLY**

DATE 5/16/14

**WATER FLOW**

Gallons Per Minute Required: 1000

Gallons Per Minute Available 1000

Approved

Not Approved

Approved w/conditions

**HYDRANT SPACING**

Distance to Nearest Hydrant: 300± - 420± ft.

Approved

Not Approved

Approved w/conditions

*\*350 feet maximum Travel Distance for Residential uses, 150 feet maximum travel distance for Commercial uses.*

**FIRE DEPARTMENT ACCESS**

Approved

Not Approved

Approved w/conditions

**RECEIVED**

*\*\*Fire Department Access and Turn Around Required if Over 150 Feet From the Main Roadway. MAY 21 2014*  
*(See Fire Department for details)*

Fire Department Comments/Conditions:

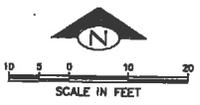
NFPA 13D RESIDENTIAL SPRINKLER SYSTEMS ARE REQUIRED IN NEW HOMES ON ALL SIX LOTS TO MITIGATE ACCESS & HYDRANT DISTANCE.  
SEE C.O.P SITE PLAN.

**CITY OF BURIEN**

APPROVED BY: [Signature]  
King County Fire District #2 Fire Marshal/Plans Examiner

NOT APPROVED BY: \_\_\_\_\_  
King County Fire District #2 Fire Marshal/Plans Examiner

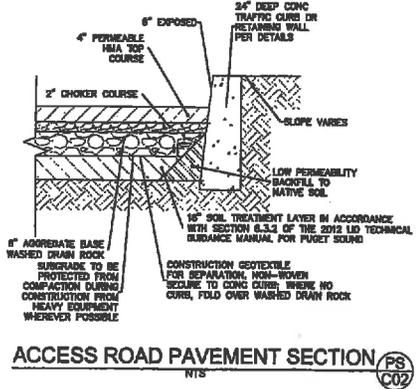
PLA 14-1052



KEY NOTES:		
KEY	NOTE	DETAIL/SHEET
1	20' WIDE ACCESS ROAD	PS/C02
2	80' WIDE TYPE 1 (FULL SCREEN) LANDSCAPING	-
3	SINGLE-CAR GARAGE	-
4	10' SIDE DRIVEWAY	-
5	6" CONC SIDEWALK PER 2008 BURDEN ROAD STANDARDS FIG 3.1	-
6	SEE SHEET C02 FOR FRONTAGE IMPROVEMENTS	-
7	6" VERTICAL CONC CURB PER 2008 BURDEN ROAD STANDARDS FIG 3.2. CURBS SHALL BE PAINTED YELLOW ON THE TOP SIDE DESIGNATING THE ACCESS ROAD AS A FIRE LANE. NO PARKING - FIRE LANE LETTERING SHALL BE PAINTED ON PAVEMENT ADJACENT TO PAINTED CURBS W/ MIN 18" IN HEIGHT BLACK LETTERING W/ MIN 3" BRUSH STROKES. LETTERING SHALL BE YELLOW AND SPACED AT 50' OR PORTION THEREOF INTERVALS.	-
8	31' DRIVEWAY AND UTILITY TRACT	-
9	LOT 1: 2,468 SF	-
10	LOT 2: 2,468 SF	-
11	LOT 3: 2,468 SF	-
12	LOT 4: 2,468 SF	-
13	LOT 5: 2,468 SF	-
14	LOT 6: 2,920 SF	-
15	10' WIDE RESIDENTIAL DRIVEWAY APPROACH PER 2008 BURDEN ROAD STANDARDS FIG 3.4	-

MARKED FIRE LANE w/ ROUND GOOD MAINTENANCE PROVISIONS IN COVENANTS

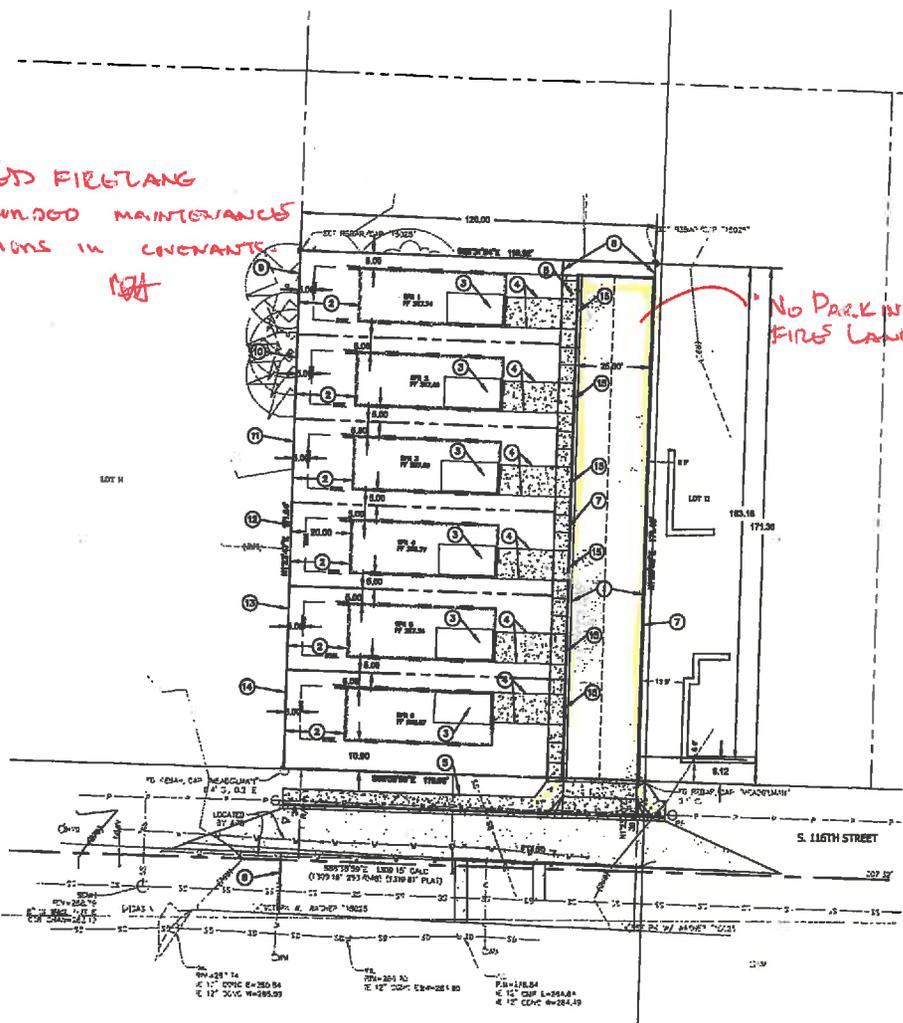
NO PARKING FIRE LANE



**PROJECT NOTES:**  
 ZONE: RM-18 (RESIDENTIAL MULTI-FAMILY)  
 TOTAL AREA: 20,577 SF  
 MINIMUM REQUIRED AREA FOR EACH LOT: 2,400 SF  
 IMPERVIOUS SURFACE COVERAGE ALLOWED: 75%  
 BUILDING COVERAGE ALLOWED: 55%

**LEGEND:**

	CONC PAVEMENT
	ASPH PAVEMENT
	POROUS ASPHALT
	ASPHALT OVERLAY



RECEIVED  
 MAY 8 2014  
 CITY OF BURien

DAVID CONSULTING GROUP, INC.  
 CIVIL - Structural - Land Use

MICHAEL BELLAN  
 5318 FIRST AVE S  
 SEATTLE, WASHINGTON 98108  
 S 116TH ST SUBDIVISION  
 S 116TH ST SEATTLE, WA 98168  
 SITE PLAN

PROJ. MANAGER: JB  
 DESIGNED BY: JB  
 DRAWN BY: JB  
 CHECKED BY: JB  
 SCALE: AS SHOWN  
 DATE: 04/18/2014  
 SHEET: A OF 1  
 SHEET NUMBER: C01

C:\P\BELLAN\PROJECTS\116TH ST SUBDIVISION\116TH ST SUBDIVISION\04182014\116TH ST SUBDIVISION - ORIGINAL SHEET 2008.ASI (6.00 X 11.00 INCHES)  
 C:\P\BELLAN\PROJECTS\116TH ST SUBDIVISION\116TH ST SUBDIVISION\04182014\116TH ST SUBDIVISION - ORIGINAL SHEET 2008.ASI (6.00 X 11.00 INCHES)  
 C:\P\BELLAN\PROJECTS\116TH ST SUBDIVISION\116TH ST SUBDIVISION\04182014\116TH ST SUBDIVISION - ORIGINAL SHEET 2008.ASI (6.00 X 11.00 INCHES)

## MEMORANDUM

Date: August 5, 2014  
To: Liz Olmstead, Planner  
From: Heungkook Lim, Surface Water Management Engineer  
Re: PROJECT REVIEW FOR FILE # PLA 12-2131 (Boulevard Park LLC Subdivision)  
Public Works Stormwater Conditions of Land Use Approval

---

I have completed a drainage review of the above mentioned project. This review is mainly for the proposed land use application but also contains drainage requirements for the future building permit application. Further drainage requirements and review will be provided during the building permit process. I reviewed following documents;

- Technical Information Report, prepared by DCG Inc., dated May 13, 2014.
- Preliminary Site Plan, Erosion Control, Grading, Drainage Plan., prepared by DCG Inc., dated May 6, 2014.

Below are Public Works Stormwater conditions.

1. Storm water facilities and the drainage site plan for the project shall be in accordance with the 2009 King County Surface Water Design Manual (KCSWDM), the 2009 the Stormwater Pollution Prevention Manual (SPPM) as adopted by the City of Burien (ref. BMC § 13.10.020), and the Burien Municipal Code (BMC), Chapter 13.10.
2. In general, the proposed storm drain detention facilities appear reasonable, refinement of the final design of water quality and flow control facilities will be required prior to issuance of development permits for any construction activities on-site.
3. Engineering plans and calculations must be prepared and stamped by a Washington State licensed civil engineer.
4. Engineering plans include a "technical information report (TIR)," "site improvement plans," and a "construction stormwater pollution prevention plan (CSWPPP)," which includes an "erosion and sediment control (ESC) plan" and a "stormwater pollution prevention and spill (SWPPS) plan."
5. Prior to issuance of development permits for any construction activities on-site, the submitted Downstream Analysis and Engineering plans shall be updated to reflect final design and calculation and to include all the requirements in the KCSWDM.
6. For any development permits in the future, TIR must be prepared to include all the requirements in the KCSWDM as below.
  - i. All eight core requirements in Section 1.2 in the KCSWDM
  - ii. All five special requirements in Section 1.3 in the KCSWDM
7. The location, condition, and size of existing drainage systems and drainage easements, if any shall be verified. The existing drainage systems on the proposed excavation area shall be removed, relocated, or appropriately treated.

8. In computing runoff from the site, the assumed impervious coverage shall not be less than 4,000 square feet per lot in urban residential development, or the maximum impervious coverage permitted by city code (BMC 19.15.005), whichever is less.
9. At least three ESC inspections are required i.e., prior to clearing and construction, during construction, upon completion of construction.
10. The facilities shall be owned and maintained by a Home Owner's Association. All privately maintained facilities must be maintained as specified in the site/lot's declaration of covenant and grant of easement per Section 5.2.1. of the KCSWDM.
11. A Declaration of Covenant must be recorded prior to engineering plan approval per page 1-46 of the KCSWDM. The form and the instruction of the covenant will be provided during building permit process.

Heungkook (HK) Lim  
Public Works Surface Water Management Engineer  
Email: heungkookl@burienwa.gov  
Telephone #: 206-248-5516

**TECHNICAL INFORMATION REPORT**  
**(FULL DRAINAGE REVIEW)**

**S 116<sup>th</sup> St Subdivision**  
**1832 S 116<sup>th</sup> St, Burien, WA 98168**  
**Parcel #: 098500-0190**  
**Project Number: TBD**

PLA 14-1052 / 3 OF 3

*May 13, 2014*

**Owner:**  
**Boulevard Park LLC**  
**Attn: Michael Bellan**  
**5319 1<sup>st</sup> Ave S**  
**Seattle, WA 98108**  
**Phone: 206.329.3121**

*For Submittal to*  
*City of Burien*



**RECEIVED**  
**MAY 21 2014**  
**CITY OF BURIEN**

**DAVIDO CONSULTING GROUP, INC.**  
**CIVIL • STRUCTURAL • LAND USE**

15029 Bothell Way NE, Ste 600  
Lake Forest Park, WA 98155  
Phone: 206.523.0024  
Fax: 206.523.1012

PO Box 1132  
Freeland, WA 98249  
Phone: 360.331.4131  
Fax: 360.331.7394

**CERTIFICATE OF ENGINEER**

The technical material and data contained within this report has been prepared by or under the direction of the following registered professional engineer(s), licensed in accordance with the laws of the State of Washington to practice in the State of Washington.



**QUICK REFERENCE PROJECT INFORMATION**

**General Project Information**

<b>Project Description</b>	Subdivision of the existing lot into six individual lots and the construction of six new single-family residences.
<b>Parcel #</b>	0985000190
<b>Site Address</b>	1832 S 116 <sup>th</sup> St, Burien, WA 98168
<b>Parcel Size</b>	20,577 SF (0.47 Acres)
<b>Owner/Developer</b>	Boulevard Park LLC Attn: Michael Bellan 5319 1 <sup>st</sup> Ave S Seattle, WA 98108 206.329.3121
<b>Consulting Engineer</b>	Tim Gabelein, P.E. Davido Consulting Group, Inc. 15029 Bothell Way NE, Ste. 600 Lake Forest Park, WA 98155 Phone: (206) 523-0024

**Drainage**

<b>Site Characteristics</b>	Small Site (<22,000 SF) - Residential	
<b>Drainage Reqmt's</b>	Full Drainage Review Requirements Per 2009 King County Surface Water Design Manual (KCSWDM). <ul style="list-style-type: none"> <li>• Flow Control Level 2 (&gt;2,000 SF impervious surface)</li> <li>• Basic Water Quality (&gt;5,000 SF of PGIS)</li> </ul>	
<b>Tributary Drainage Area &amp; Land Cover Summary (Includes frontage improvements)</b>	<i>Predeveloped Conditions:</i> Impervious Surface = 1,229 SF Pervious Surface = 19,348 SF Total = 20,577 SF	<i>Redeveloped Conditions:</i> Total Impervious = 11,614 SF PGIS = 5,625 SF Pervious Surface = 8,963 SF Total = 20,577 SF
<b>Soils</b>	Dense to very dense mixture of sand, silt and gravel (Glacial Till). See Section 1.7 for additional soils information.	
<b>Proposed Drainage System</b>	R-Tank detention system w/ multi-orifice flow restrictor tee and flow control best management practices (FCBMPs).	
<b>Flow Control BMPs</b>	Porous asphalt.	
<b>ESC Measures</b>	Stabilized construction entrances, straw wattles, silt fencing, sand bags to divert flows, and inlet protection at catch basins.	

TABLE OF CONTENTS

1.	Project Overview .....	1-7
1.1	General Description of Proposal.....	1-8
1.2	Pre-Developed Site Conditions.....	1-8
1.3	Developed Site Conditions .....	1-8
1.4	Site Area and Size of Improvements .....	1-8
1.5	Disposition of Stormwater before Project.....	1-9
1.6	Disposition of Stormwater after Project .....	1-9
1.7	Soils.....	1-9
2.	Conditions and Requirements Summary .....	2-11
2.1	Core Requirement #1: Discharge at the Natural Location.....	2-11
2.2	Core Requirement #2: Offsite Analysis.....	2-12
2.3	Core Requirement #3: Flow Control.....	2-12
2.4	Core Requirement #4: Conveyance System .....	2-13
2.5	Core Requirement #5: Erosion and Sediment Control .....	2-13
2.6	Core Requirement #6: Maintenance and Operations .....	2-13
2.7	Core Requirement #7: Financial Guarantees and Liability.....	2-13
2.8	Core Requirement #8: Water Quality .....	2-13
2.9	Special Requirement #1: Other Adopted Area-Specific Requirements.....	2-14
2.10	Special Requirement #2: Floodplain/Floodway Delineation.....	2-14
2.11	Special Requirement #3: Flood Protection Facilities .....	2-14
2.12	Special Requirement #4: Source Control.....	2-14
2.13	Special Requirement #5: Oil Control.....	2-14
3.	Offsite Analysis .....	3-14
3.1	Upstream Analysis.....	3-15
3.2	Downstream Analysis .....	3-15
3.2.1	Task 1: Study Area Definition and Maps .....	3-15
3.2.2	Task 2: Resource Review.....	3-15
3.2.3	Task 3: Field Inspect the Study Area.....	3-16
3.2.4	Task 4: Describe the Drainage System .....	3-16
3.2.5	Task 5: Mitigation of Existing or Potential Problems .....	3-16
4.	Flow Control and Water Quality Facility Analysis and Design .....	4-16
4.1	Existing Site Hydrology.....	4-16
4.2	Developed Site Hydrology.....	4-17
4.3	Performance Standards .....	4-17
4.4	Flow Control System .....	4-19
4.5	Water Quality Facility Design .....	4-21
5.	Conveyance System Analysis and Design .....	5-21
5.1	Existing Conveyance .....	5-22
5.2	Proposed Conveyance Description .....	5-22
6.	Special Reports and Studies.....	6-22
7.	Other Permits .....	7-22
8.	CSWPPP Analysis and Design .....	8-22
8.1	ESC Plan Analysis and Design.....	8-22
8.2	Stormwater Pollution Prevention and Spill Plan Design .....	8-25

---

9.	Bond Quantities, Facility Summaries, and Declaration of Covenants/agreements .....	1
9.1	Bond Quantities .....	1
9.2	Facility Summaries .....	1
9.3	Declaration of Covenants/Agreements .....	1
10.	Operations and Maintenance Manual .....	1

**APPENDICES**

APPENDIX A Figure 1 - Technical Information Report (TIR) Worksheet  
APPENDIX B Geotechnical Report  
APPENDIX C Site Improvement Plans  
APPENDIX D Temporary Erosion and Sediment Control Plan  
APPENDIX E Operation and Maintenance  
APPENDIX F Offsite Analysis  
APPENDIX G Bond Quantity Worksheet  
APPENDIX H Stormwater Facility Summary Sheet  
APPENDIX I KCRTS Modeling Results  
APPENDIX J Conveyance Calculations  
APPENDIX K R-Tank Information  
APPENDIX L KC Drainage Complaint  
APPENDIX M Email Correspondence

**LIST OF TABLES**

TABLE 1 Site Area and Size of Improvements ..... 1-8  
TABLE 2 Detention System Design Summary ..... 4-20  
TABLE 3 KCRTS Land Use Areas..... 4-20  
TABLE 4 KCRTS Predeveloped and Mitigated Flow Duration Comparison ..... 4-21  
TABLE 5 Proposed ESC Measures and Construction Sequencing..... 8-24

**LIST OF FIGURES**

FIGURE 1 TIR Worksheet.....APPENDIX A  
FIGURE 2 Site Location..... 1-7  
FIGURE 3 Developed Site Drainage Basin Map..... 1-10  
FIGURE 4 Regional Topography (from KC iMAP) ..... 1-11  
FIGURE 5 KCSWDM Figure 5.2.1.A Flow Chart for Determining Individual Lot BMP Requirements ..... 4-18



KCSWDM Section 1.1.2.3 and include compliance with all eight core requirements listed in Section 1.2 and all five special requirements listed in Section 1.3. The engineering plans and calculations submitted to demonstrate compliance with the above requirements are included in this report. The final report and supporting information will be stamped by a civil engineer licensed in the State of Washington.

### 1.1 General Description of Proposal

The project involves the demolition of an existing single-family residence, subdivision of the lot into six individual lots and the construction of 6 new single-family residences (each approximately 885 SF footprint). A new porous asphalt access road will provide access to each new lot from S 116<sup>th</sup> Street. Frontage improvements which include new curb and gutter, 5-foot concrete sidewalk, full-width overlay and minor street widening of S 116<sup>th</sup> Street will be included as a part of this project.

### 1.2 Pre-Developed Site Conditions

The existing site is accessed via S 116<sup>th</sup> Street. There is no existing driveway to the site as street parking along S 116<sup>th</sup> Street is utilized. The existing site conditions include a 1,229 SF single-family residence, trees and natural vegetation. TABLE 1 summarizes the existing site land cover. The site slopes generally from south to north.

### 1.3 Developed Site Conditions

The existing single-family residence will be demolished. The developed site conditions, shown in the project plans submitted under separate cover, include 6 new single-family residences and a paved access road providing access to all 6 lots. Porous asphalt will be utilized for the access road that serves the 6 proposed lots. Porous asphalt will be utilized for the driveways serving each individual lot. Drainage for the developed site will include roof downspouts, footing drains, porous asphalt, Type 1 and Type 2 catch basins, and an on-site detention/flow control facility.

### 1.4 Site Area and Size of Improvements

The pre-developed and developed site area and size of improvements are shown in FIGURE 3 and APPENDIX C and summarized in TABLE 1.

**TABLE 1 Site Area and Size of Improvements**

	Project Site Areas			
	Existing		Developed	
	SF	Acres	SF	Acres
<b>Impervious Areas:</b>				
Buildings	1,229	0.03	5,308	0.12
Driveways (porous asphalt)		0.00	1,140	0.03
Access Road (porous asphalt)			4,154	0.10
Concrete Sidewalk		0.00	1,012	0.02
<b>Total Impervious Surface:</b>	1,229	0.03	11,614	0.27
<b>Total New Impervious Surface:</b>		0.00	11,614	0.27

<b>Total Pollution Generating Impervious Surface:</b>		0.00	5,294	0.12
<b>Total New Pollution Generating Impervious Surface:</b>		0.00	5,294	0.12
<b>Pervious Areas:</b>				
Lawn	19,348	0.44	8,963	0.21
<b>Total Pervious Surface</b>	19,348	0.44	8,963	0.21
<b>Total</b>	20,577	0.47	20,577	0.47

The areas in TABLE 1 were determined by area measurements in AutoCAD from a topographic survey performed on February 20, 2014. As shown by TABLE 1, the developed project site impervious surfaces total 11,614 SF. There is 5,625 SF of pollution generating impervious surface comprised of the new porous asphalt access road and the porous asphalt driveways to each new lot. These areas represent the site coverage in the basin that will be mitigated by the porous asphalt and the proposed detention facility.

### 1.5 Disposition of Stormwater before Project

There are no known existing drainage facilities on the site. It is likely that runoff from the existing house is dispersed over the natural vegetation on the site.

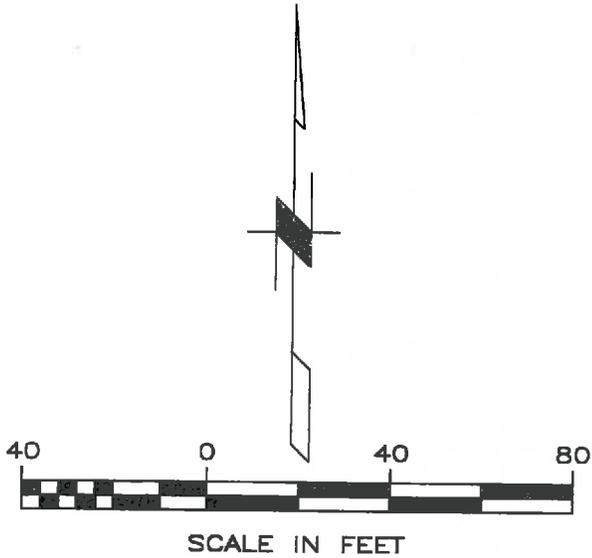
### 1.6 Disposition of Stormwater after Project

As shown in the site improvement plans in APPENDIX C, the proposed stormwater improvements include rooftop collection system with downspouts that are routed to an onsite detention facility. The outlet pipe from the detention facility will connect to a Type 2 manhole with a flow restrictor tee. Stormwater will then be pumped up to a proposed catch basin near the south property line before gravity flowing to the City's storm system in the south half of S 116<sup>th</sup> Street. The proposed driveway will be made of porous asphalt with a 6-inch rock layer underneath for stormwater storage. Any overflow from the porous asphalt will be captured in a catch basin onsite and routed to the detention facility. Runoff from the proposed porous asphalt driveways will be captured in a Type 1 catch basin and routed to the detention system as well. The developed site stormwater conditions will mimic the predeveloped conditions as much as possible as runoff will either be infiltrated onsite or enter the city's system in S 116<sup>th</sup> Street.

### 1.7 Soils

A geotechnical engineering study was completed by Geotech Consultants, Inc. and is summarized in a report dated February 13, 2014; a copy of the report is attached in APPENDIX B. The report includes investigation and recommendations for a stormwater infiltration system. The native soil underlying the site is glacial till and consists of a dense to very dense mixture of sand, silt and gravel. Per the geotechnical report, the site soils are not suitable for infiltration of concentrated amounts of stormwater. However, the geotechnical report states that "a shallowly installed pervious pavement system will function adequately on the eastern side of the site as long as the base of the drainage course is not excavated to near the contact with the till soils that were encountered at approximately 2.5 feet below existing grade on the eastern side of the site."

**FIGURE 3    Developed Site Drainage Basin Map**  
**(insert AutoCAD drawing Figure 3)**



## AREA CALCS:

### PROJECT SITE:

#### IMPERVIOUS AREAS:

BUILDINGS:	5,308 SF	0.12 AC
CONCRETE SIDEWALK:	1,012 SF	0.02 AC
PERMEABLE PAVEMENT:	5,294 SF	0.12 AC

TOTAL SITE IMP: 11,614 SF 0.27 AC

#### PERVIOUS AREA:

LANDSCAPING/GRASS: 8,963 SF 0.21 AC

TOTAL SITE PERV: 8,963 SF 0.21 AC

TOTAL SITE: 20,577 SF 0.47 AC

### LEGEND:



HATCH DENOTES PERVIOUS SURFACES



HATCH DENOTES IMPERVIOUS SURFACES DRAINING TO PROPOSED DETENTION SYSTEM



HATCH DENOTES PERMEABLE PAVEMENT SURFACES

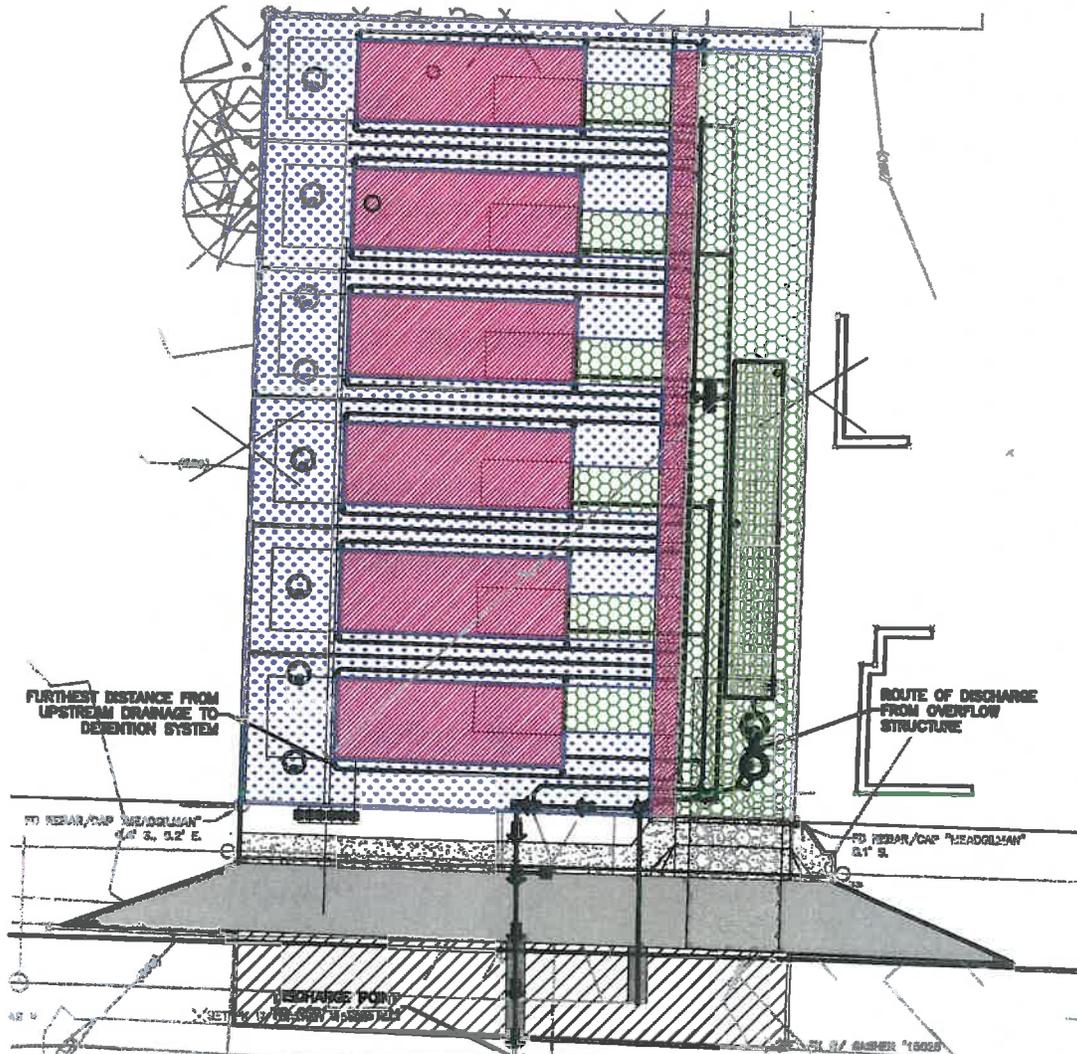


FIGURE 3: DEVELOPED SITE DRAINAGE BASIN MAP



The proposed drainage system will emulate the natural pre-developed conditions of the site as much as possible and the runoff routing to the existing drainage system will maintain the natural drainage course from the site.

## **2.2 Core Requirement #2: Offsite Analysis**

All proposed projects must submit an offsite analysis report that assesses potential offsite drainage and water quality impacts associated with the development of the project site and proposed appropriate mitigation of those impacts.

A Level 1 downstream analysis was conducted and is provided in Section 3. Included in the Level 1 downstream analysis is a qualitative survey of the downstream drainage system, which is the first step in identifying flooding or erosion problems. The downstream analysis followed the existing downstream conveyance system for approximately one-quarter mile downstream. The Level 1 analysis is composed of the following completed tasks:

- Task 1: Define and map the study area
- Task 2: Review all available information on the study area
- Task 3: Field Inspect the study area
- Task 4: Describe the drainage system, and its existing and predicted drainage and water quality problems.

See Section 3 and APPENDIX F for a complete summary of the offsite analysis.

## **2.3 Core Requirement #3: Flow Control**

All proposed projects must provide onsite flow control facilities or flow control BMPs or both to mitigate the impacts of storm and surface water runoff generated by new impervious surface, new pervious surface, and replaced impervious surface targeted for flow mitigation.

The project is adding in excess of 2,000 square feet of new plus replaced impervious surface and is therefore required to provide flow control. Furthermore, Section 13.10.140 of the City of Burien Municipal Code states “The city applies the Level two flow control standard as the default within the entire city.” Therefore, the project is required to provide Level 2 flow control to all new and replaced impervious surfaces.

Runoff from the developed site will be captured and conveyed to an onsite detention facility with multi-orifice flow restrictor tee which has been sized to match developed discharge durations to predeveloped durations for the range of predeveloped discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow. Also, the developed peak discharge rates will match the predeveloped peak discharge rates for the 2- and 10-year return periods (See Section 4). The site will discharge stormwater to an existing Type 1 catch basin in S 116<sup>th</sup> Street. Predeveloped conditions were modeled as forested.

Since the project is on a site that is less than 22,000 square feet it is subject to Small Lot BMP Requirements stipulated in Section 5.2.1.1 of The Manual. Furthermore, since the project is between 11,000 and 22,000 square feet it is required to provide FCBMPs to an impervious surface area equal to at least 20% of the site. This project proposed to use porous asphalt (BMP

C.2.6) for the proposed access road and individual driveways, which account for more than 20% of the site area.

#### **2.4 Core Requirement #4: Conveyance System**

The proposed onsite conveyance system consists of roof downspouts and tightlines, footing drains, and 4" to 36" inch storm drain pipe. All new conveyance elements have been sized in accordance with Section 1.2.4.1 of The Manual to convey the 25-year peak flow and as much of the 100-year flow necessary to not create or aggravate a severe flooding problem or severe erosion problem (see Section 5).

#### **2.5 Core Requirement #5: Erosion and Sediment Control**

Erosion and sediment control (ESC) measures have been proposed in accordance with Section 1.2.5 of the KCSWDM to prevent the transport of sediment from the site to adjacent properties, downstream drainage facilities and water resources during construction. Temporary measures include a stabilized construction entrance, perimeter protection around the low points of the site, and inlet protection on all existing and proposed catch basins and area drains that may be impacted during construction. All disturbed areas that will not be covered with impervious surface will be reseeded to reduce the potential for erosion (see APPENDIX D and Section 8). All streets that will remain open will be swept on a daily basis.

#### **2.6 Core Requirement #6: Maintenance and Operations**

Maintenance and operation of the drainage facilities for this project will be the responsibility of the owner(s), as the proposed drainage facilities are considered privately maintained systems. The proposed drainage facilities will follow the maintenance and operations guidelines as stipulated in Appendix A of the KCSWDM. A copy of the pertinent guidelines is provided as APPENDIX E of this report. See Section 10 for additional information on maintenance and operation of the proposed drainage facilities.

#### **2.7 Core Requirement #7: Financial Guarantees and Liability**

The owner(s) of this project will be responsible for maintaining the onsite drainage system. The Drainage Facilities and Site Stabilization Financial Guarantee will apply to this project and the contractor will provide a bond for construction completion and stabilization. Since the drainage facilities will not be maintained or operated by the City of Burien, a Drainage Defect and Maintenance Financial Guarantee is not required.

#### **2.8 Core Requirement #8: Water Quality**

The project is required to provide basic water quality since it is creating more than 5,000 SF of PGIS. Proposed PGIS consists of a porous asphalt access road and six porous asphalt driveways (one for each proposed lot). Basic water quality will be provided by an 18-inch imported engineered soils layer beneath the porous pavement in accordance with the Water Quality Treatment Section on Page 174 of the 2012 LID Technical Guidance Manual for Puget Sound. Soil characteristics of the engineered soils layer will include a cation exchange capacity of greater than or equal to 5 milliequivalents per 100 grams dry soil, minimum organic matter content of 0.5% and a maximum infiltration rate of 12 inches per hour.

## 2.9 Special Requirement #1: Other Adopted Area-Specific Requirements

In addition to the requirements of the KCSWDM, this project shall comply with the drainage requirements of other adopted area-specific plans. These area-specific plans include:

- Critical Drainage Areas (CDAs) – There are no known CDAs on or around the project site.
- Master Drainage Plans (MDPs) – A MDP is not required for this project since the project does not qualify for Large Project Drainage Review based on the criteria listed in Section 1.1.2.4 of the KCSWDM.
- Basin plans (BPs) – The project lies within the Duwamish River Drainage Basin and must comply with applicable basin plans.
- Salmon Conservation Plans (SCPs) – The project must comply with the Final WRIA 8 Chinook Salmon Conservation Plan.
- Stormwater Compliance Plans (SWCPs) – Specific SWCPs do not apply to this project.
- Lake Management Plans (LMPs) – No LMPs apply to this project since there are no lakes on or adjacent to the project site.
- Flood Hazard Reduction Plan Updates (FHRPs) – No flood hazard plans have been proposed on or adjacent to the project site.
- Shared Facility Drainage Plans (SFDPs) – SFDP's do not apply to this project as no shared drainage facilities are proposed.

Where conflicts may occur between the area-specific plans and the KCSWDM, the area-specific plans shall have precedence.

## 2.10 Special Requirement #2: Floodplain/Floodway Delineation

N/A. This requirement does not apply since the project does not contain and is not adjacent to a flood hazard area. Therefore, the project is exempt from Special Requirement #2.

## 2.11 Special Requirement #3: Flood Protection Facilities

N/A. There are no existing flood protection facilities, such as levees or revetments, on or adjacent to the project site and the proposed project will not be constructing a new one. Therefore, the project is exempt from Special Requirement #3.

## 2.12 Special Requirement #4: Source Control

The project is exempt from Special Requirement #4 because the site does not contain any industrial or commercial uses or materials that require source control.

## 2.13 Special Requirement #5: Oil Control

The project is exempt from Special Requirement #5 because it does not trigger oil control requirements.

## 3. OFFSITE ANALYSIS

An offsite analysis was performed in accordance with Section 1.2.2 of the KCSWDM to assess potential offsite drainage and water quality impacts associated with the redevelopment of the project site.

The proposed onsite drainage system will utilize flow control BMPs for an impervious surface equal to approximately 26% of the total site area. The project proposes to use Porous asphalt (BMP C.2.6) for the access road and individual driveways to each lot. Runoff from additional impervious surfaces, as well as overflow from the porous asphalt, will be routed to an onsite detention facility with a multi-orifice flow restrictor tee prior to discharging to the City's storm system in S 116<sup>th</sup> Street.

### **3.1 Upstream Analysis**

The upstream drainage system consists of seven Type 1 catch basins and 12 to 30 inch CMP and concrete culverts. Runoff from the proposed project will not create any backwater effects that will impact the upstream drainage system.

### **3.2 Downstream Analysis**

A Level 1 downstream analysis was performed in accordance with the KCSWDM. The analysis was a qualitative survey of the downstream drainage system to 1 mile downstream. A description of the four required tasks of a Level 1 downstream analysis as stipulated in Section 1.2.2.1 of the KCSWDM are described in the following sections.

#### **3.2.1 Task 1: Study Area Definition and Maps**

The project site is shown in APPENDIX C. The downstream drainage system flows easterly from the point of connection along the south side of S 116<sup>th</sup> Street via a series of Type 1 and Type 2 catch basins (8 catch basins total) and 12-36 inch CMP, concrete, and HDPE pipe. The last catch basin in the downstream drainage system is a Type 2 catch basin located in the SW corner of the intersection of S 116<sup>th</sup> Street and Military Road S. The drainage system flows NE from the final catch basin and discharges to an unnamed stream approximately 1,150 feet downstream of the project site. The stream flows northeasterly for approximately 2,000 feet until it eventually discharges to the Duwamish River. Pictures of the downstream drainage system can be seen in APPENDIX F.

#### **3.2.2 Task 2: Resource Review**

A review of all attainable information on the upstream and downstream drainage system was conducted to identify existing and potential problems within the study area. The King County iMap website was utilized to review critical areas onsite and to identify any drainage complaints nearby. The project site is located in an area that is considered to be susceptible to groundwater contamination. Furthermore, multiple drainage complaints have been reported on properties nearby the project site and along the downstream drainage path. However, the current site conditions do not provide any form of flow control. The proposed project will reduce the amount of stormwater generated onsite through the use of FCBMPs and reduce the rate at which stormwater discharges from the site compared to existing conditions by providing Level 2 flow control. Furthermore, runoff from proposed pollution generating impervious surfaces will be treated prior to infiltrating. Therefore, the proposed project will help alleviate any downstream flooding problems that may exist.

In addition, the following resources were reviewed:

- 2006 King County Flood Hazard Management Plan

- 2013 King County Flood Hazard Management Plan Update and Progress Report
- Final WRIA 8 Chinook Salmon Conservation Plan

The resources listed above did not describe any problems or issues directly affecting the study area.

### **3.2.3 Task 3: Field Inspect the Study Area**

The project site and existing offsite drainage system was inspected on April 11, 2014 from the discharge point from the site to the City's storm system in S 116<sup>th</sup> Street to the outfall to the unnamed stream approximately 1,150 feet downstream. See APPENDIX F for photos and descriptions of the downstream drainage system taken during the field inspection.

### **3.2.4 Task 4: Describe the Drainage System**

A detailed description of the existing downstream drainage system is attached in APPENDIX F. In general, the downstream drainage system consists of Type 1 and Type 2 catch basins and 12 to 36 inch storm drain flowing easterly in S 116<sup>th</sup> Street until it discharges to an unnamed stream approximately 1,150 feet downstream. Storm pipe material consists of CMP, concrete and HDPE. No problems were identified with the downstream drainage system during the inspection. All drainage features appeared to be in working condition and do not need to be repaired or replaced. However, the exact outfall location could not be identified during the downstream analysis because there was no access from S 116<sup>th</sup> Street down to the stream level. DCG recommends that the location and condition of the existing outfall be inspected by the contractor prior to construction of the onsite storm system.

### **3.2.5 Task 5: Mitigation of Existing or Potential Problems**

As stated in Section 3.2.2, multiple drainage complaints surrounding the site and along the downstream flowpath have been reported. The drainage complaints are mostly categorized as Development/Construction (DCA) and Remeasure (REM). However, a WQ – Dumping (WQD) complaint was recorded near the location of the outfall. A copy of the complaint has been reviewed and is attached in APPENDIX L. The proposed project conditions are anticipated to treat runoff from PGIS onsite and reduce the rate at which stormwater enters the downstream drainage system compared to existing conditions. The proposed project conditions will not aggravate any past drainage problems and will help prevent future downstream drainage problems from occurring.

## **4. FLOW CONTROL AND WATER QUALITY FACILITY ANALYSIS AND DESIGN**

The following sections summarize the stormwater flow control and water quality facility analysis and design.

### **4.1 Existing Site Hydrology**

The existing conditions of the project site are explained in Section 1.5. The existing site runoff either infiltrates, sheet flows to the City's storm system in S 116<sup>th</sup> Street, or disperses via sheet flow into onsite vegetation.

#### **4.2 Developed Site Hydrology**

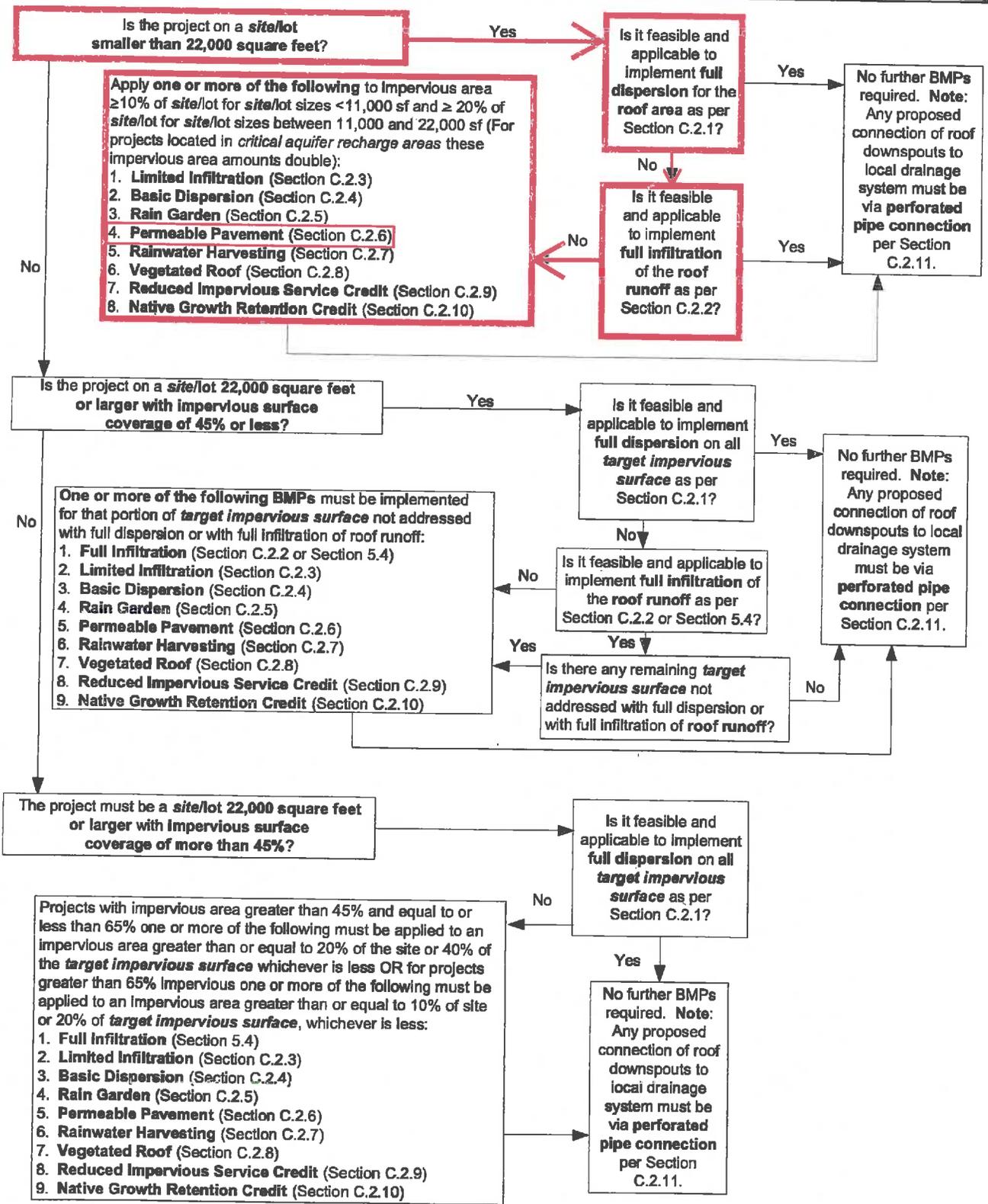
The developed project site is shown in the project plans in APPENDIX C. Proposed FCBMPs consist entirely of porous asphalt (BMP C.2.6). Runoff from all impervious surfaces that are not mitigated by porous asphalt, as well as overflow from the porous asphalt, will be routed to a detention facility with multi-orifice flow restrictor tee prior to discharging to the City's storm system in S 116<sup>th</sup> Street.

#### **4.3 Performance Standards**

The performance standards and project requirements are provided in section 2 of this report. The project will add more than 2,000 SF of impervious surface and is therefore required to provide flow control. Furthermore, Section 13.10.140 of the City of Burien Municipal Code states "The city applies the Level two flow control standard as the default within the entire city." Therefore, the project is required to provide Level 2 flow control to all new and replaced impervious surfaces. In addition, the project is required to provide water quality in accordance with Core Requirement #8 since more than 5,000 SF of PGIS will be added. Since the project site is less than 22,000 SF it is subject to Small Lot BMP requirements stipulated in Section 5.2.1.1 of The Manual. See FIGURE 5 for the flow chart used to determine individual lot BMP requirements from the KCSWDM.

LID flow control best management practices (FCBMPs) are proposed. As stipulated in Section 5.2.1.1 of the KCSWDM, full dispersion of roof runoff must be implemented if feasible and applicable. Since the entire site will be cleared, full dispersion of roof runoff is not feasible as the required native vegetated flowpath cannot be provided. Since full dispersion of roof runoff is not feasible, full infiltration of roof runoff must be implemented if feasible and applicable. However, the soils beneath the site are not conducive to concentrated amounts of infiltration (see Section 1.7). Therefore, the project must apply BMPs to an impervious area equal to at least 20% of the site since the site is between 11,000 and 22,000 square feet.

**FIGURE 5.2.1.A FLOW CHART FOR DETERMINING INDIVIDUAL LOT BMP REQUIREMENTS**



#### 4.4 Flow Control System

The Small Lot BMP Requirement will be satisfied with the use of porous asphalt for the proposed access road and individual driveways to each lot. The project proposes to implement 5,295 square feet of porous asphalt, which equals approximately 26% of the total site.

An onsite detention facility with associated Type 2 manhole and flow restrictor tee will be used to satisfy flow control requirements. The detention facility will be a 765 square foot by 6.955 feet (6.455 feet of storage and 0.5 feet of freeboard) deep detention facility comprised of 1,240 (8 rows wide X 31 units long X 5 units long) R-Tank units. The facility will include an impermeable liner along the bottom and sides to prevent any water from infiltrating since the site does not allow for infiltration. The DCG design team met with the regional representative of ACF West, Inc., the company that supplies the R-Tank Stormwater Management Systems, who aided in the design of the proposed detention system. The liner to be used for the detention system, as recommended by the regional representative of ACF West, will be a 40 mil HDPE liner. A cushion layer will be placed underneath and on top of the liner to protect the liner from rocks or any other abutting objects that could potentially compromise the strength of the liner. The R-Tank detention system also supports HS-25 vehicle loading and has a geogrid layer above it to absorb and distribute vehicle loading. See APPENDIX K for additional information on R-Tank Stormwater Management Systems.

The detention facility was sized in KCRTS to match the developed discharge durations to the predeveloped (i.e. forested) discharge durations from 50 percent of the 2-year flow up to the full 50-year flow as closely as possible given the parameters stipulated in The Manual. The detention facility was also sized to match developed peak discharge rates to predeveloped peak discharge rates for the 2- and 10-year return periods. The detention facility was modeled as a vault and the required storage volume from the model is 4,876 cubic feet. A 5 unit high R-Tank stack is 6.95 feet tall and provides 21.41 cubic feet of storage (see APPENDIX K for R-Tank Specifications). However, the top 6-inches of each stack will be dedicated to freeboard. Therefore, the first 6.45 feet of each stack will be used for storage which results in 19.87 cubic feet of storage per 5 unit R-Tank stack ( $6.45 \text{ CF} / 6.95 \text{ CF} * 21.41 \text{ CF} = 19.87 \text{ CF}$ ). The proposed R-Tank facility will include 248 stacks which results in 4,928 cubic feet of storage. The orifice sizes and heights associated with the flow restrictor tee were modeled in KCRTS and ensure that the discharge from the site will satisfy Level 2 Stream Protection criteria as stipulated in KCSWDM. See TABLE 2 for a summary of the detention vault design.

**TABLE 2 Detention System Design Summary**

Parameter	Result
Facility Width	10.5 ft
Facility Height	6.955 ft
Facility Length	72.8 ft
Effective Storage Depth	6.455 ft
Bottom Orifice	0.330"
Top Orifice	0.780" @ 4.80' above bottom orifice

**TABLE 3 KCRTS Land Use Areas**

Land Use Type	Area (Acres)
<i>Predeveloped</i>	
Till Forest	0.47
<i>Developed</i>	
Till Grass	0.25
Impervious	0.22

The land use areas used to create the predeveloped and developed time series in KCRTS are shown in TABLE 3. The porous asphalt was modeled as 50 percent impervious and 50 percent grass in accordance with Table 5.2.2.A of The Manual. In addition, the porous asphalt above the detention facility was modeled as 25% grass and 75% impervious in accordance with an email correspondence with Heungkook Lim (see APPENDIX M). TABLE 4 compares the predeveloped flows to the discharge from the detention system. The KCRTS Computer Software Reference Manual lists four conditions that must be met in the Predeveloped and Mitigated Flow Duration Comparison Table (shown in TABLE 4) when sizing a Level 2 Stream Protection Facility. Those conditions are:

1. First cutoff must have a percent change (last column) equal to or less than 0.0.
2. The remaining cutoffs must have a value less than positive 10.0 percent.
3. At least one-half of the cutoffs must have a zero or negative percent change.
4. The maximum positive excursion must be less than positive 10.0%.

The first cutoff is -7.1% (shown in the far right column) thus satisfying condition number 1. The remaining cutoffs all have a value less than 10.0 percent (also shown in the far right column) thus satisfying condition number 2. Seven of the fourteen cutoffs have a zero or negative percent change (the first seven cutoffs in the far right column) thus satisfying condition number 3. Lastly, the maximum positive excursion is 9.0% (displayed directly below TABLE 4) thus satisfying condition number 4. Since all conditions are met, the facility has been sized for Level 2 Stream Protection in accordance with The Manual.

**TABLE 4 KCRTS Predeveloped and Mitigated Flow Duration Comparison**

Duration Comparison Analysis  
 Base File: predeveloped.tsf  
 New File: rdout.tsf  
 Cutoff Units: Discharge in CFS

Cutoff	-----Fraction of Time-----			-----Check of Tolerance-----			
	Base	New	%Change	Probability	Base	New	%Change
0.006	0.94E-02	0.44E-02	-53.3	0.94E-02	0.006	0.006	-7.1
0.008	0.64E-02	0.36E-02	-43.5	0.64E-02	0.008	0.006	-27.1
0.010	0.48E-02	0.33E-02	-31.0	0.48E-02	0.010	0.006	-40.0
0.012	0.36E-02	0.26E-02	-25.7	0.36E-02	0.012	0.009	-22.2
0.014	0.28E-02	0.23E-02	-20.2	0.28E-02	0.014	0.011	-17.3
0.015	0.22E-02	0.18E-02	-16.7	0.22E-02	0.015	0.014	-9.1
0.017	0.15E-02	0.14E-02	-9.6	0.15E-02	0.017	0.016	-4.5
0.019	0.98E-03	0.12E-02	25.0	0.98E-03	0.019	0.020	5.9
0.021	0.64E-03	0.88E-03	38.5	0.64E-03	0.021	0.022	5.6
0.023	0.33E-03	0.57E-03	75.0	0.33E-03	0.023	0.024	6.9
0.024	0.21E-03	0.31E-03	46.2	0.21E-03	0.024	0.026	7.3
0.026	0.16E-03	0.21E-03	30.0	0.16E-03	0.026	0.027	4.3
0.028	0.82E-04	0.11E-03	40.0	0.82E-04	0.028	0.028	0.1
0.030	0.16E-04	0.16E-04	0.0	0.16E-04	0.030	0.031	3.6

Maximum positive excursion = 0.002 cfs (9.0%)  
 occurring at 0.019 cfs on the Base Data:predeveloped.tsf  
 and at 0.021 cfs on the New Data:rdout.tsf

Maximum negative excursion = 0.004 cfs (-42.6%)  
 occurring at 0.011 cfs on the Base Data:predeveloped.tsf  
 and at 0.006 cfs on the New Data:rdout.tsf

**4.5 Water Quality Facility Design**

Basic water quality is required for this project since it is adding over 5,000 SF of pollution generating impervious surface. Proposed PGIS consists of a porous asphalt access road and six porous asphalt driveways (one for each proposed lot). In an email correspondence with Heungkook Lim, it was determined that the 2012 LID Technical Guidance for Puget Sound (2012 LID Manual) may be used in addition to The Manual for LID and water quality purposes (see APPENDIX M). Basic water quality will be provided by an 18-inch imported engineered soils layer beneath the porous asphalt designed in accordance with the Water Quality Treatment Section on Page 174 of the 2012 LID Manual. Soil characteristics of the engineered soils layer will include a cation exchange capacity of greater than or equal to 5 milliequivalents per 100 grams dry soil, minimum organic matter content of 0.5% and a maximum infiltration rate of 12 inches per hour.

**5. CONVEYANCE SYSTEM ANALYSIS AND DESIGN**

The existing and proposed conveyance systems are discussed in the following sections.

### **5.1 Existing Conveyance**

No existing conveyance features exist on the project site. See Section 3 for information on the existing upstream and downstream conveyance features.

### **5.2 Proposed Conveyance Description**

The proposed onsite conveyance system consists of four-inch downspouts and tightlines, footing drains, and 4-36" storm drain pipe that conveys stormwater to the proposed detention facility and routes the stormwater to the City's system in S 116<sup>th</sup> Street. A new curb-side Type 1 catch basin will be placed in the north side of S 116<sup>th</sup> and will capture runoff from the required frontage improvements. The proposed catch basin will be tightlined to the City's system in the south side of S 116<sup>th</sup> Street. All new conveyance elements have been sized in accordance with Section 1.2.4.1 of The Manual to convey, at a minimum, the 25-year peak flow and as much of the 100-year storm as to not create or aggravate a severe flooding problem or severe erosion problem. See APPENDIX J for conveyance calculations.

## **6. SPECIAL REPORTS AND STUDIES**

The following reports and studies have been conducted related to this project:

### **Geotechnical Report:**

A geotechnical engineering study was completed by Geotech Consultants, Inc. and is summarized in a report dated February 13, 2014; a copy of the report is attached in APPENDIX B.

## **7. OTHER PERMITS**

A Right-of-Way Permit will be required for the work in the public right-of-way.

## **8. CSWPPP ANALYSIS AND DESIGN**

This section summarizes the construction stormwater pollution prevention plan (CSWPPP) analysis and design. The two components of the CSWPPP are the erosion and sedimentation control (ESC) and the stormwater pollution prevention and spill (SWPPS) plans. The analysis and design of these plans are discussed in the following sections.

### **8.1 ESC Plan Analysis and Design**

The ESC design follows the guidelines provided in Appendix D of the KCSWDM and is intended to satisfy Core Requirements #5 Erosion and Sediment Control.

A stabilized construction entrance will be maintained throughout construction of the site improvements. Perimeter protection such as silt fencing, compost socks, or straw wattles will be placed around the perimeter of the site where construction stormwater may leave the site. Site surface drainage will be maintained to prevent ponding and inlet protection will be provided at all existing and proposed catch basins that may receive runoff during construction. S 116<sup>th</sup> Street will be swept daily or more often if necessary to remove tracked sediment from the site. All

disturbed areas that will not be paved, will be stabilized by planting and mulching immediately after construction. The proposed ESC measures and construction sequence are shown on the site improvement plans in APPENDIX C and summarized in TABLE 5.

**TABLE 5 Proposed ESC Measures and Construction Sequencing  
 (All ESC Measures Shall Comply with the KCSWDM Appendix D)**

	<b>ESC Measure</b>	<b>Comment</b>
1	Identify Project Limits	Mark by fencing or other means to contain the grubbing and grading activities.
2	Catch Basin Inlet Protection	Install catch basin inlet protection in any drainage structures that may collect any stormwater flowing from the construction site.
3	Phase Grubbing and Grading	Phase clearing so that only those areas that are actively being worked are uncovered. From October 1 through April 30, no soils shall remain exposed for more than 2 days. From May 1 through September 30, no soils shall remain exposed for more than 7 days.
4	Install Straw Wattles	Install straw wattles around disturbed areas where sediment could be transported off-site. Adjust straw wattles as required by site conditions and construction sequencing.
5	Sod/Seed Exposed Areas	Cleared areas will be sod/seeded as soon as possible after grading completed (few weeks).
6	Soil Removal	Remove excess soil from the site as soon as possible after backfilling.
7	Protect Adjacent Properties	Adjacent properties shall be protected from sediment deposition by appropriate use of vegetative buffer strips, sediment barriers or filters, dikes or mulching, or by a combination of these measures and other appropriate BMPs.
8	Street Cleaning	Provide for periodic street cleaning to remove any sediment that may have been tracked out. Sediment should be removed by shoveling or sweeping and carefully removed to a suitable disposal area where it will not be re-eroded.
9	Inspect ESC BMPs	Inspect all erosion and sediment control BMPs installed regularly, especially after any large storm. Maintenance, including removal and proper disposal of sediment should be done as necessary.

## 8.2 Stormwater Pollution Prevention and Spill Plan Design

The Stormwater Pollution Prevention and Spill Plan (SWPPS) plan is intended to prevent pollutants from coming into contact with stormwater runoff, surface waters, or groundwater, during construction. Vehicles, construction equipment, sediment from clearing and grading, materials, and chemical storage all have the potential to pollute stormwater during construction. The following BMPs are required during construction of all buildings or structures:

- Maintain good housekeeping. This includes designating vehicle, equipment, and chemical storage areas.
- Inspect vehicle, equipment, and petroleum product storage and dispensing areas regularly to detect any leaks or spills.
- Store and contain liquid materials in such a manner that if the tank leaks, the contents will not discharge into the storm drainage system, surface waters, or groundwater.
- Provide maintenance and cleaning of the storm drainage system regularly by removing sediment and debris.
- Do not dispose of any wash water to storm drain system. Wash water shall be disposed in the sanitary sewer.
- Filter all dewatering water before it is dumped into a catch basin or somewhere offsite.
- All spills will be cleaned up immediately and disposed correctly. Do not hose down spill areas to a storm drainage system.
- All toxic materials will be stored under cover when not in use or during a rain event.
- Use storm drain covers or other similarly effective runoff control measure to prevent sediment and other pollutants from entering catch basins.

All ESC and SWPP BMPs will be inspected routinely by the ESC supervisor. All ESC measures will be removed, the site stabilized, and the drainage system cleaned once construction is completed. Both the ESC and SWPP Plans serve as guides as the contractor is required to design a working ESC plan for the site.

## **9. BOND QUANTITIES, FACILITY SUMMARIES, AND DECLARATION OF COVENANTS/AGREEMENTS**

The bond quantities, facility summaries, and declaration of covenants/agreements are addressed in the following sections.

### **9.1 Bond Quantities**

The bond quantities for this project are calculated in King County's Bond Quantity Worksheet in APPENDIX G.

### **9.2 Facility Summaries**

The stormwater facilities are summarized in the Stormwater Facility Summary Sheet in APPENDIX H.

### **9.3 Declaration of Covenants/Agreements**

The King County Declaration of Covenant for privately Maintained Flow Control and WQ Facilities will be provided under separate cover later.

## **10. OPERATIONS AND MAINTENANCE MANUAL**

The detention facility shall be maintained in accordance with the ACF R-Tank Maintenance and Maintenance Port Kit brochures, which are attached in APPENDIX E. All additional stormwater facilities should be maintained in accordance with Appendix A of the KCSWDM, which is also attached in APPENDIX E.



**APPENDIX A    Figure 1 - Technical Information Report (TIR)  
Worksheet**



TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

**Part 1 PROJECT OWNER AND PROJECT ENGINEER**

Project Owner Boulevard Park LLC  
 Phone 206-260-1510  
 Address 5319 First Ave S  
Seattle, WA 98108

Project Engineer Tim Gabelein, P.E.  
 Company Davido Consulting Group, Inc.  
 Phone 206-523-0024

**Part 2 PROJECT LOCATION AND DESCRIPTION**

Project Name S 116th St Subdivision  
 DDES Permit # TBD  
 Location Township 23N  
 Range 4W  
 Section 9

Site Address 1832 S 116th St  
Seattle, WA 98168

**Part 3 TYPE OF PERMIT APPLICATION**

Landuse Services  
Subdivison / Short Subd. / UPD

Building Services  
 M/F / Commerical / SFR

Clearing and Grading

Right-of-Way Use

Other \_\_\_\_\_

**Part 4 OTHER REVIEWS AND PERMITS**

DFW HPA                       Shoreline Management

COE 404                         Structural Rockery/Vault/\_\_\_\_\_

DOE Dam Safety                 ESA Section 7

FEMA Floodplain

COE Wetlands

Other \_\_\_\_\_

Part 5 PLAN AND REPORT INFORMATION	
Technical Information Report	Site Improvement Plan (Engr. Plans)
Type of Drainage Review (circle one): <u>Full</u> / Targeted / Large Site	Type (circle one): <u>Full</u> / Modified / Small Site
Date (include revision dates): <u>5/13/2014</u>	Date (include revision dates): <u>5/13/2014</u>
Date of Final: _____	Date of Final: _____

**Part 6 ADJUSTMENT APPROVALS**

Type (circle one): Standard / Complex / Preapplication / Experimental / Blanket

Description: (include conditions in TIR Section 2)

\_\_\_\_\_

\_\_\_\_\_

Date of Approval: \_\_\_\_\_

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

**Part 7 MONITORING REQUIREMENTS**

Monitoring Required: Yes  No

Describe: \_\_\_\_\_

Start Date: \_\_\_\_\_

Completion Date: \_\_\_\_\_

**Part 8 SITE COMMUNITY AND DRAINAGE BASIN**

Community Plan: \_\_\_\_\_

Special District Overlays: \_\_\_\_\_

Drainage Basin: Duwamish River

Stormwater Requirements: Level 2 Flow Control

**Part 9 ONSITE AND ADJACENT SENSITIVE AREAS**

<input type="checkbox"/> River/Stream _____	<input type="checkbox"/> Steep Slope _____
<input type="checkbox"/> Lake _____	<input type="checkbox"/> Erosion Hazard _____
<input type="checkbox"/> Wetlands _____	<input type="checkbox"/> Landslide Hazard _____
<input type="checkbox"/> Closed Depression _____	<input type="checkbox"/> Coal Mine Hazard _____
<input type="checkbox"/> Floodplain _____	<input type="checkbox"/> Seismic Hazard _____
<input type="checkbox"/> Other _____	<input type="checkbox"/> Habitat Protection _____
	<input type="checkbox"/> _____

**Part 10 SOILS**

Soil Type <u>Glacial Till</u>	Slopes <u>2% Average</u>	Erosion Potential <u>See geotech report</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

High Groundwater Table (within 5 feet)       Sole Source Aquifer

Other \_\_\_\_\_       Seeps/Springs

Additional Sheets Attached

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 11 DRAINAGE DESIGN LIMITATIONS	
REFERENCE	LIMITATION / SITE CONSTRAINT
<input checked="" type="checkbox"/> Core 2 – Offsite Analysis	None
<input type="checkbox"/> Sensitive/Critical Areas	
<input type="checkbox"/> SEPA	
<input type="checkbox"/> Other	
<input type="checkbox"/>	
<input type="checkbox"/> Additional Sheets Attached	

Part 12 TIR SUMMARY SHEET (provide one TIR Summary Sheet per Threshold Discharge Area)	
<b>Threshold Discharge Area:</b> (name or description)	Project Site
<b>Core Requirements (all 8 apply)</b>	
Discharge at Natural Location	Number of Natural Discharge Locations:
Offsite Analysis	Level: 1 / 2 / 3 dated: 4/11/2014
Flow Control (incl. facility summary sheet)	Level: 1 / 2 / 3 or Exemption Number _____ Small Site BMPs
Conveyance System	Spill containment located at: NA
Erosion and Sediment Control	ESC Site Supervisor: TBD Contact Phone: After Hours Phone:
Maintenance and Operation	Responsibility: Private / Public If Private, Maintenance Log Required: Yes / No
Financial Guarantees and Liability	Provided: Yes / No
Water Quality (include facility summary sheet)	Type: Basic / Sens. Lake / Enhanced Basicm / Bog or Exemption No. _____ Landscape Management Plan: Yes / No
<b>Special Requirements (as applicable)</b>	
Area Specific Drainage Requirements	Type: CDA / SDO / MDP / BP / LMP / Shared Fac. None Name:
Floodplain/Floodway Delineation	Type: Major / Minor / Exemption / None 100-year Base Flood Elevation (or range): _____ Datum:
Flood Protection Facilities	Describe:
Source Control (comm./industrial landuse)	Describe landuse: Describe any structural controls:

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

<p><b>Oil Control</b></p>	<p>High-use Site: Yes / <b>No</b></p> <p>Treatment BMP: _____</p> <p>Maintenance Agreement: Yes / <b>No</b> with whom? _____</p>
<p><b>Other Drainage Structures</b></p> <p>Describe: _____</p>	

Part 13 EROSION AND SEDIMENT CONTROL REQUIREMENTS	
<p style="text-align: center;"><b>MINIMUM ESC REQUIREMENTS DURING CONSTRUCTION</b></p> <p><input checked="" type="checkbox"/> Clearing Limits</p> <p><input checked="" type="checkbox"/> Cover Measures</p> <p><input checked="" type="checkbox"/> Perimeter Protection</p> <p><input checked="" type="checkbox"/> Traffic Area Stabilization</p> <p><input checked="" type="checkbox"/> Sediment Retention</p> <p><input checked="" type="checkbox"/> Surface Water Collection</p> <p><input type="checkbox"/> Dewatering Control</p> <p><input checked="" type="checkbox"/> Dust Control</p> <p><input checked="" type="checkbox"/> Flow Control</p>	<p style="text-align: center;"><b>MINIMUM ESC REQUIREMENTS AFTER CONSTRUCTION</b></p> <p><input checked="" type="checkbox"/> Stabilize Exposed Surfaces</p> <p><input checked="" type="checkbox"/> Remove and Restore Temporary ESC Facilities</p> <p><input checked="" type="checkbox"/> Clean and Remove All Silt and Debris, Ensure Operation of Permanent Facilities</p> <p><input type="checkbox"/> Flag Limits of SAO and open space preservation areas</p> <p><input type="checkbox"/> Other _____</p>

Part 14 STORMWATER FACILITY DESCRIPTIONS (Note: Include Facility Summary and Sketch)			
Flow Control	Type/Description	Water Quality	Type/Description
<p><input checked="" type="checkbox"/> Detention</p> <p><input type="checkbox"/> Infiltration</p> <p><input type="checkbox"/> Regional Facility</p> <p><input type="checkbox"/> Shared Facility</p> <p><input checked="" type="checkbox"/> Flow Control BMPs</p> <p><input type="checkbox"/> Other</p>	<p><u>Lined detention facility with R-Tank units</u></p> <p>_____</p> <p><u>Permeable Pavement</u></p> <p>_____</p>	<p><input type="checkbox"/> Biofiltration</p> <p><input type="checkbox"/> Wetpool</p> <p><input type="checkbox"/> Media Filtration</p> <p><input type="checkbox"/> Oil Control</p> <p><input type="checkbox"/> Spill Control</p> <p><input type="checkbox"/> Flow Control BMPs</p> <p><input type="checkbox"/> Other</p>	<p>_____</p> <p>_____</p> <p><u>Engineered Soils Layer beneath permeable pavement</u></p> <p>_____</p> <p>_____</p> <p>_____</p>

TECHNICAL INFORMATION REPORT (TIR) WORKSHEET

Part 15 EASEMENTS/TRACTS	Part 16 STRUCTURAL ANALYSIS
<input type="checkbox"/> Drainage Easement <input type="checkbox"/> Covenant <input type="checkbox"/> Native Growth Protection Covenant <input type="checkbox"/> Tract <input type="checkbox"/> Other	<input type="checkbox"/> Cast in Place Vault <input type="checkbox"/> Retaining Wall <input type="checkbox"/> Rockery > 4' High <input type="checkbox"/> Structural on Steep Slope <input type="checkbox"/> Other

Part 17 SIGNATURE OF PROFESSIONAL ENGINEER
<p>I, or a civil engineer under my supervision, have visited the site. Actual site conditions as observed were incorporated into this worksheet and the attached Technical Information Report. To the best of my knowledge the information provided here is accurate.</p> <p style="text-align: center;">                  Digitally signed by Tim Gabelein                  Date: 2014.05.12 13:00:57 -07'00'  <hr/>                 Signed/Date             </p>



**APPENDIX B    Geotechnical Report**



February 13, 2014

JN 14023

Bellan Construction  
5319 1st Ave. South  
Seattle, WA 98108

Attention: Michael Bellan

Subject: **Geotechnical Engineering Study**  
Proposed Six Residences (subplat)  
1832 South 116th Street  
Burien, Washington

Dear Mr. Bellan-

via email

We are pleased to present this geotechnical engineering report for the proposed subplat at 1832 South 116<sup>th</sup> Street in Burien. . The scope of our services consisted of exploring site surface and subsurface conditions, and then developing this report to provide recommendations for general earthwork and design criteria for foundations, retaining walls, and infiltration considerations. This work was authorized by your acceptance of our proposal, P-8678, dated July 10, 2013.

We were provided with a proposed site plan prepared by Charles Anderson Architects (dated May 29, 2013). Based on these plans, we understand that the existing house on the site will be removed and replaced with six new, three-story houses. The houses will be constructed with finished floors very near the existing site grades and an access driveway will be constructed along the eastern portion of the property.

If the scope of the project changes from what we have described above, we should be provided with revised plans in order to determine if modifications to the recommendations and conclusions of this report are warranted.

### **SITE CONDITIONS**

#### ***SURFACE***

The Vicinity Map, Plate 1, illustrates the general location of the site in Burien. The rectangular shaped property is features approximately 120 feet of frontage along the northern side of South 116<sup>th</sup> Street and a property depth of approximately 172 feet. Neighboring properties to the north and east are rural residential, and a golf course abuts the site to the west. The subject site is currently developed with a small single family residence located near the center of the property. The area surrounding the house and garage is mostly level and covered with grass lawn, sparse trees and overgrown landscaping.

#### ***SUBSURFACE***

The subsurface conditions were explored by excavating six test pits at the approximate locations shown on the Site Exploration Plan, Plate 2. Our exploration program was based on the proposed construction, anticipated subsurface conditions and those encountered during exploration, and the scope of work outlined in our proposal.

The test pits were excavated on January 27, 2014 with a small mini-excavator. A geotechnical engineer from our staff observed the excavation process, logged the test pits, and obtained representative samples of the soil encountered. "Grab" samples of selected subsurface soil were collected from the backhoe bucket. The Test Pit Logs are attached to this report as Plates 3 and 4.

### **Soil Conditions**

The test pits conducted for this study generally encountered 1.5 to 2 feet of native, loose, weathered, very silty sand with gravel beneath the topsoil. Underlying the weathered soils, we observed dense to very dense, silty to very silty sand with gravel. The dense to very dense native silty sand with gravel encountered in our test pits is known locally as Glacial Till and is a very dense glacially consolidated mixture of sand, silt and gravel. In Test Pits 4, 5, and 6, we encountered 1.5 to 2 feet of loose silty sand fill overlying the native soil profile, and in Test Pit 5, there were soft, wet, peaty organics to approximately 5 feet below existing grade.

No obstructions were revealed by our explorations. However, debris, buried utilities, and old foundation and slab elements are commonly encountered on sites that have had previous development.

### **Groundwater Conditions**

Minor groundwater seepage was observed at approximately 5 feet in Test Pit 5. The test pits were left open for only a short time period. Therefore, the seepage levels on the logs represent the location of transient water seepage and may not indicate the static groundwater level. It should be noted that groundwater levels vary seasonally with rainfall and other factors. It is possible that groundwater could be found in more permeable soil layers and between the near-surface weathered soil and the underlying denser soil.

The stratification lines on the logs represent the approximate boundaries between soil types at the exploration locations. The actual transition between soil types may be gradual, and subsurface conditions can vary between exploration locations. The logs provide specific subsurface information only at the locations tested. The relative densities and moisture descriptions indicated on the test pit logs are interpretive descriptions based on the conditions observed during excavation.

The compaction of backfill was not in the scope of our services. Loose soil will therefore be found in the area of the test pits. If this presents a problem, the backfill will need to be removed and replaced with structural fill during construction.

## **CONCLUSIONS AND RECOMMENDATIONS**

### **GENERAL**

*THIS SECTION CONTAINS A SUMMARY OF OUR STUDY AND FINDINGS FOR THE PURPOSES OF A GENERAL OVERVIEW ONLY. MORE SPECIFIC RECOMMENDATIONS AND CONCLUSIONS ARE CONTAINED IN THE REMAINDER OF THIS REPORT. ANY PARTY RELYING ON THIS REPORT SHOULD READ THE ENTIRE DOCUMENT.*

The test pits conducted for this study encountered competent native soils beneath varying amounts of loose weathered soils and loose fill soil. The medium dense or denser native silty sand with gravel (glacial till) beneath the loose weathered soils and loose fill soil is capable of supporting the proposed new building on conventional foundations. Also, if groundwater seepage or rain is encountered during foundation excavation, bearing surfaces should be protected with a layer of crushed rock immediately following excavation.

The site soils consist of dense, glacial till that is impermeable and not suitable for infiltration of concentrated amounts of stormwater; therefore, it appears that detention or dispersal of the concentrated stormwater is the only practical means of dealing with the stormwater on the subject site. Furthermore, we anticipate that a shallowly installed pervious pavement system will function with adequately on the eastern side of the site as

long as the base of the drainage course is not excavated to near the contact with the till soils that were encountered at approximately 2.5 feet below existing grade on the eastern side of the site.

The erosion control measures needed during the site development will depend heavily on the weather conditions that are encountered. We anticipate that a silt fence will be needed around the downslope sides of any cleared areas. Rocked construction access roads should be extended into the site to reduce the amount of soil or mud carried off the property by trucks and equipment. Wherever possible, these roads should follow the alignment of planned pavements, and trucks should not be allowed to drive off of the rock-covered areas. Cut slopes and soil stockpiles should be covered with plastic during wet weather. Following rough grading, it may be necessary to mulch or hydroseed bare areas that will not be immediately covered with landscaping or an impervious surface.

The drainage and/or waterproofing recommendations presented in this report are intended only to prevent active seepage from flowing through concrete walls or slabs. Even in the absence of active seepage into and beneath structures, water vapor can migrate through walls, slabs, and floors from the surrounding soil, and can even be transmitted from slabs and foundation walls due to the concrete curing process. Water vapor also results from occupant uses, such as cooking and bathing. Excessive water vapor trapped within structures can result in a variety of undesirable conditions, including, but not limited to, moisture problems with flooring systems, excessively moist air within occupied areas, and the growth of molds, fungi, and other biological organisms that may be harmful to the health of the occupants. The designer or architect must consider the potential vapor sources and likely occupant uses, and provide sufficient ventilation, either passive or mechanical, to prevent a build up of excessive water vapor within the planned structure.

Geotech Consultants, Inc. should be allowed to review the final development plans to verify that the recommendations presented in this report are adequately addressed in the design. Such a plan review would be additional work beyond the current scope of work for this study, and it may include revisions to our recommendations to accommodate site, development, and geotechnical constraints that become more evident during the review process.

We recommend including this report, in its entirety, in the project contract documents. This report should also be provided to any future property owners so they will be aware of our findings and recommendations.

### **SEISMIC CONSIDERATIONS**

In accordance with the UBC, the site soil profile within 100 feet of the ground surface is best represented by Site Class Type D (Stiff Site Class). As noted in the USGS website, the mapped spectral acceleration value for a 0.2 second ( $S_s$ ) and 1.0 second period ( $S_1$ ) equals 1.51g and 0.52g, respectively.

The UBC states that a site-specific seismic study need not be performed provided that the peak ground acceleration be equal to  $S_{DS}/2.5$ , where  $S_{DS}$  is determined in ASCE 7. It is noted that  $S_{DS}$  is equal to  $2/3S_{MS}$ .  $S_{MS}$  equals  $F_a$  times  $S_s$ , where  $F_a$  is determined in Table 11.4-1. For our site,  $F_a = 1.0$ . Thus, the calculated peak ground acceleration that we utilized for the seismic-related parameters of this report equals 0.40g.

The site soils are not susceptible to seismic liquefaction because of their dense nature and the absence of near-surface groundwater. This statement regarding liquefaction includes the knowledge of the determined peak ground acceleration noted above.

### **CONVENTIONAL FOUNDATIONS**

The proposed structures can be supported on conventional continuous and spread footings bearing on undisturbed, dense native soil, or on structural fill placed above this soil. Depending on the final site grades, some overexcavation will likely be required below the structures to remove the loose fill and weathered soils, and in the southwestern portion of the site there will likely be some more substantial overexcavation to remove loose fill and organic soils (see Test Pit 5) and to expose competent native soil. These overexcavations can be restored to the proposed foundation and slab grades with compacted structural fill. See the section entitled

**General Earthwork and Structural Fill** for recommendations regarding the placement and compaction of structural fill beneath structures. Adequate compaction of structural fill should be verified with frequent density testing during fill placement. Prior to placing structural fill beneath foundations, the excavation should be observed by the geotechnical engineer to document that adequate bearing soils have been exposed. We recommend that continuous and individual spread footings have minimum widths of 12 and 16 inches, respectively. Exterior footings should also be bottomed at least 18 inches below the lowest adjacent finish ground surface for protection against frost and erosion. The local building codes should be reviewed to determine if different footing widths or embedment depths are required. Footing subgrades must be cleaned of loose or disturbed soil prior to pouring concrete. Depending upon site and equipment constraints, this may require removing the disturbed soil by hand.

An allowable bearing pressure of 3,000 pounds per square foot (psf) is appropriate for footings supported as described above. A one-third increase in this design bearing pressure may be used when considering short-term wind or seismic loads. For the above design criteria, it is anticipated that the total post-construction settlement of footings founded on competent native soil will be less than one-inch, with differential settlements on the order of one half-inch in a distance of 50 feet along a continuous footing with a uniform load.

Lateral loads due to wind or seismic forces may be resisted by friction between the foundation and the bearing soil, or by passive earth pressure acting on the vertical, embedded portions of the foundation. For the latter condition, the foundation must be either poured directly against relatively level, undisturbed soil or be surrounded by level, well-compacted fill. We recommend using the following ultimate values for the foundation's resistance to lateral loading:

PARAMETER	ULTIMATE VALUE
Coefficient of Friction	0.45
Passive Earth Pressure	350 pcf

Where: (i) pcf is pounds per cubic foot, and (ii) passive earth pressure is computed using the equivalent fluid density.

We recommend maintaining a safety factor of at least 1.5 for the foundation's resistance to lateral loading, when using the above ultimate values.

#### **FOUNDATION AND RETAINING WALLS**

Retaining walls backfilled on only one side should be designed to resist the lateral earth pressures imposed by the soil they retain. The following recommended parameters are for walls that restrain level backfill:

PARAMETER	VALUE
Active Earth Pressure *	35 pcf
Passive Earth Pressure	350 pcf
Coefficient of Friction	0.45
Soil Unit Weight	130 pcf

Where: (i) pcf is pounds per cubic foot, and (ii) active and passive earth pressures are computed using the equivalent fluid pressures.

\* For a restrained wall that cannot deflect at least 0.002 times its height, a uniform lateral pressure equal to 10 psf times the height of the wall should be added to the above active equivalent fluid pressure.

The design values given above do not include the effects of any hydrostatic pressures behind the walls and assume that no surcharges, such as those caused by slopes, vehicles, or adjacent foundations will be exerted on the walls. If these conditions exist, those pressures should be added to the above lateral soil pressures. Where sloping backfill is desired behind the walls, we will need to be given the wall dimensions and the slope of the backfill in order to provide the appropriate design earth pressures. The surcharge due to traffic loads behind a wall can typically be accounted for by adding a uniform pressure equal to 2 feet multiplied by the above active fluid density. Heavy construction equipment should not be operated behind retaining and foundation walls within a distance equal to the height of a wall, unless the walls are designed for the additional lateral pressures resulting from the equipment.

The values given above are to be used to design only permanent foundation and retaining walls that are to be backfilled, such as conventional walls constructed of reinforced concrete or masonry. It is not appropriate to use the above earth pressures and soil unit weight to back-calculate soil strength parameters for design of other types of retaining walls, such as soldier pile, reinforced earth, modular or soil nail walls. We can assist with design of these types of walls, if desired. The values for friction and passive resistance are ultimate values and do not include a safety factor. We recommend a safety factor of at least 1.5 for overturning and sliding, when using the above values to design the walls. Restrained wall soil parameters should be utilized for a distance of 1.5 times the wall height from corners or bends in the walls. This is intended to reduce the amount of cracking that can occur where a wall is restrained by a corner.

#### **Wall Pressures Due to Seismic Forces**

The surcharge wall loads that could be imposed by the design earthquake can be modeled by adding a uniform lateral pressure to the above-recommended active pressure. The recommended surcharge pressure is  $8H$  pounds per square foot (psf), where  $H$  is the design retention height of the wall. Using this increased pressure, the safety factor against sliding and overturning can be reduced to 1.2 for the seismic analysis.

#### **Retaining Wall Backfill and Waterproofing**

Backfill placed behind retaining or foundation walls should be coarse, free-draining structural fill containing no organics. This backfill should contain no more than 5 percent silt or clay particles and have no gravel greater than 4 inches in diameter. The percentage of particles passing the No. 4 sieve should be between 25 and 70 percent. A minimum 12-inch width of free-draining gravel and a drainage composite similar to Miradrain 6000 should be placed against the backfilled retaining walls. The drainage composites should be hydraulically connected to the foundation drain system. Free-draining backfill or gravel should be used for the entire width of the backfill where seepage is encountered. For increased protection, drainage composites should be placed along cut slope faces, and the walls should be backfilled entirely with free-draining soil.

The purpose of these backfill requirements is to ensure that the design criteria for a retaining wall are not exceeded because of a build-up of hydrostatic pressure behind the wall. Also, subsurface drainage systems are not intended to handle large volumes of water from surface runoff. The top 12 to 18 inches of the backfill should consist of a compacted, relatively impermeable soil or topsoil, or the surface should be paved. The ground surface must also slope away from backfilled walls to reduce the potential for surface water to percolate into the backfill. Water percolating through pervious surfaces (pavers, gravel, permeable pavement, etc.) must also be prevented from flowing toward walls or into the backfill zone. The compacted subgrade below pervious surfaces and any associated drainage layer should therefore be sloped away. Alternatively, a membrane and subsurface collection system could be provided below a pervious surface.

It is critical that the wall backfill be placed in lifts and be properly compacted, in order for the above-recommended design earth pressures to be appropriate. The wall design criteria assume that the backfill will be well-compacted in lifts no thicker than 12 inches. The compaction of backfill near the walls should be accomplished with hand-operated equipment to prevent the walls from being overloaded by the higher soil forces that occur during compaction. The section entitled **General**

**Earthwork and Structural Fill** contains additional recommendations regarding the placement and compaction of structural fill behind retaining and foundation walls.

The above recommendations are not intended to waterproof below-grade walls, or to prevent the formation of mold, mildew or fungi in interior spaces. Over time, the performance of subsurface drainage systems can degrade, subsurface groundwater flow patterns can change, and utilities can break or develop leaks. Therefore, waterproofing should be provided where future seepage through the walls is not acceptable. This typically includes limiting cold-joints and wall penetrations, and using bentonite panels or membranes on the outside of the walls. There are a variety of different waterproofing materials and systems, which should be installed by an experienced contractor familiar with the anticipated construction and subsurface conditions. Applying a thin coat of asphalt emulsion to the outside face of a wall is not considered waterproofing, and will only help to reduce moisture generated from water vapor or capillary action from seeping through the concrete. As with any project, adequate ventilation of basement and crawl space areas is important to prevent a build up of water vapor that is commonly transmitted through concrete walls from the surrounding soil, even when seepage is not present. This is appropriate even when waterproofing is applied to the outside of foundation and retaining walls. We recommend that you contact an experienced envelope consultant if detailed recommendations or specifications related to waterproofing design, or minimizing the potential for infestations of mold and mildew are desired.

#### **SLABS-ON-GRADE**

The building floors can be constructed as slabs-on-grade atop firm on-site soils, or on structural fill. The subgrade soil must be in a firm, non-yielding condition at the time of slab construction or underslab fill placement. Any soft areas encountered should be excavated and replaced with select, imported structural fill.

Even where the exposed soils appear dry, water vapor will tend to naturally migrate upward through the soil to the new constructed space above it. This can affect moisture-sensitive flooring, cause imperfections or damage to the slab, or simply allow excessive water vapor into the space above the slab. All interior slabs-on-grade should be underlain by a capillary break or drainage layer consisting of a minimum 4-inch thickness of gravel or crushed rock that has a fines content (percent passing the No. 200 sieve) of less than 3 percent and a sand content (percent passing the No. 4 sieve) of no more than 10 percent.

As noted by the American Concrete Institute (ACI) in the *Guides for Concrete Floor and Slab Structures*, proper moisture protection is desirable immediately below any on-grade slab that will be covered by tile, wood, carpet, impermeable floor coverings, or any moisture-sensitive equipment or products. ACI also notes that vapor *retarders*, such as 6-mil plastic sheeting, have been used in the past, but are now recommending a minimum 10-mil thickness. A vapor retarder is defined as a material with a permeance of less than 0.3 perms, as determined by ASTM E 96. It is possible that concrete admixtures may meet this specification, although the manufacturers of the admixtures should be consulted. Where vapor retarders are used under slabs, their edges should overlap by at least 6 inches and be sealed with adhesive tape. The sheeting should extend to the foundation walls for maximum vapor protection. If no potential for vapor passage through the slab is desired, a vapor *barrier* should be used. A vapor barrier, as defined by ACI, is a product with a water transmission rate of 0.01 perms when tested in accordance with ASTM E 96. Reinforced membranes having sealed overlaps can meet this requirement.

#### **EXCAVATIONS AND SLOPES**

Excavation slopes should not exceed the limits specified in local, state, and national government safety regulations. Temporary cuts to a depth of about 4 feet may be attempted vertically in unsaturated soil, if there are no indications of slope instability. However, vertical cuts should not be made near property boundaries, or existing utilities and structures. Based upon Washington Administrative Code (WAC) 296, Part N, the upper soil at the subject site would generally be classified as Type B; while the underlying dense to very dense glacial till would be classified as Type A. Therefore, temporary cut slopes greater than 4 feet in height should

not be excavated at an inclination steeper than 0.75:1 (Horizontal:Vertical) or 1:1 (H:V) for Type A or B, respectively, extending continuously between the top and the bottom of a cut.

The above-recommended temporary slope inclination is based on the conditions exposed in our explorations, and on what has been successful at other sites with similar soil conditions. It is possible that variations in soil and groundwater conditions will require modifications to the inclination at which temporary slopes can stand. Temporary cuts are those that will remain unsupported for a relatively short duration to allow for the construction of foundations, retaining walls, or utilities. Temporary cut slopes should be protected with plastic sheeting during wet weather. It is also important that surface water be directed away from temporary slope cuts. The cut slopes should also be backfilled or retained as soon as possible to reduce the potential for instability. Please note that sand or loose soil can cave suddenly and without warning. Excavation, foundation, and utility contractors should be made especially aware of this potential danger. These recommendations may need to be modified if the area near the potential cuts has been disturbed in the past by utility installation, or if settlement-sensitive utilities are located nearby.

All permanent cuts into native soil should be inclined no steeper than 2:1 (H:V). To reduce the potential for shallow sloughing, fill must be compacted to the face of these slopes. This can be accomplished by overbuilding the compacted fill and then trimming it back to its final inclination. Adequate compaction of the slope face is important for long-term stability and is necessary to prevent excessive settlement of patios, slabs, foundations, or other improvements that may be placed near the edge of the slope.

Water should not be allowed to flow uncontrolled over the top of any temporary or permanent slope. All permanently exposed slopes should be seeded with an appropriate species of vegetation to reduce erosion and improve the stability of the surficial layer of soil.

#### **DRAINAGE CONSIDERATIONS**

Foundation drains should be used where (1) crawl spaces or basements will be below a structure, (2) a slab is below the outside grade, or (3) the outside grade does not slope downward from a building. Drains should also be placed at the base of all earth-retaining walls. These drains should be surrounded by at least 6 inches of 1-inch-minus, washed rock and then wrapped in non-woven, geotextile filter fabric (Mirafi 140N, Supac 4NP, or similar material). At its highest point, a perforated pipe invert should be at least 6 inches below the bottom of a slab floor or the level of a crawl space, and it should be sloped for drainage. All roof and surface water drains must be kept separate from the foundation drain system. A typical drain detail is attached to this report as Plate 5. For the best long-term performance, perforated PVC pipe is recommended for all subsurface drains.

Drainage inside the building's footprint)) should also be provided where (1) a crawl space will slope or be lower than the surrounding ground surface, (2) an excavation encounters significant seepage, or (3) an excavation for a building will be close to the expected high groundwater elevations. We can provide recommendations for interior drains, should they become necessary, during excavation and foundation construction.

As a minimum, a vapor retarder, as defined in the **Slabs-On-Grade** section, should be provided in any crawl space area to limit the transmission of water vapor from the underlying soils. Also, an outlet drain is recommended for all crawl spaces to prevent a build up of any water that may bypass the footing drains.

Minor groundwater seepage was observed during our field work. If seepage is encountered in an excavation, it should be drained from the site by directing it through drainage ditches, perforated pipe, or French drains, or by pumping it from sumps interconnected by shallow connector trenches at the bottom of the excavation.

The excavation and site should be graded so that surface water is directed off the site and away from the tops of slopes. Water should not be allowed to stand in any area where foundations, slabs, or pavements are to be constructed. Final site grading in areas adjacent to buildings should slope away at least 2 percent, except where the area is paved. Surface drains should be provided where necessary to prevent ponding of water behind foundation or retaining walls.

### **GENERAL EARTHWORK AND STRUCTURAL FILL**

All building and pavement areas should be stripped of surface vegetation, topsoil, organic soil, and other deleterious material. It is important that existing foundations be removed before site development. The stripped or removed materials should not be mixed with any materials to be used as structural fill, but they could be used in non-structural areas, such as landscape beds.

Structural fill is defined as any fill, including utility backfill, placed under, or close to, a building, behind permanent retaining or foundation walls, or in other areas where the underlying soil needs to support loads. All structural fill should be placed in horizontal lifts with a moisture content at, or near, the optimum moisture content. The optimum moisture content is that moisture content that results in the greatest compacted dry density. The moisture content of fill is very important and must be closely controlled during the filling and compaction process.

The allowable thickness of the fill lift will depend on the material type selected, the compaction equipment used, and the number of passes made to compact the lift. The loose lift thickness should not exceed 12 inches. We recommend testing the fill as it is placed. If the fill is not sufficiently compacted, it can be recompacted before another lift is placed. This eliminates the need to remove the fill to achieve the required compaction. The following table presents recommended relative compactions for structural fill:

<b>LOCATION OF FILL PLACEMENT</b>	<b>MINIMUM RELATIVE COMPACTION</b>
Beneath footings, slabs or walkways	95%
Filled slopes and behind retaining walls	90%
Beneath pavements	95% for upper 12 inches of subgrade; 90% below that level

Where: Minimum Relative Compaction is the ratio, expressed in percentages, of the compacted dry density to the maximum dry density, as determined in accordance with ASTM Test Designation D 1557-91 (Modified Proctor).

Structural fill that will be placed in wet weather should consist of a coarse, granular soil with a silt or clay content of no more than 5 percent. The percentage of particles passing the No. 200 sieve should be measured from that portion of soil passing the three-quarter-inch sieve.

### **LIMITATIONS**

The conclusions and recommendations contained in this report are based on site conditions as they existed at the time of our exploration and assume that the soil and groundwater conditions encountered in the test borings are representative of subsurface conditions on the site. If the subsurface conditions encountered during construction are significantly different from those observed in our explorations, we should be advised at once so that we can review these conditions and reconsider our recommendations where necessary. Unanticipated conditions are commonly encountered on construction sites and cannot be fully anticipated by merely taking samples in test borings. Subsurface conditions can also vary between exploration locations. Such unexpected conditions frequently require making additional expenditures to attain a properly constructed

project. It is recommended that the owner consider providing a contingency fund to accommodate such potential extra costs and risks. This is a standard recommendation for all projects.

This report has been prepared for the exclusive use of Bellan Construction, and its representatives, for specific application to this project and site. Our recommendations and conclusions are based on observed site materials, and selective laboratory testing and engineering analyses. Our conclusions and recommendations are professional opinions derived in accordance with current standards of practice within the scope of our services and within budget and time constraints. No warranty is expressed or implied. The scope of our services does not include services related to construction safety precautions, and our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design. Our services also do not include assessing or minimizing the potential for biological hazards, such as mold, bacteria, mildew and fungi in either the existing or proposed site development.

### ADDITIONAL SERVICES

In addition to reviewing the final plans, Geotech Consultants, Inc. should be retained to provide geotechnical consultation, testing, and observation services during construction. This is to confirm that subsurface conditions are consistent with those indicated by our exploration, to evaluate whether earthwork and foundation construction activities comply with the general intent of the recommendations presented in this report, and to provide suggestions for design changes in the event subsurface conditions differ from those anticipated prior to the start of construction. However, our work would not include the supervision or direction of the actual work of the contractor and its employees or agents. Also, job and site safety, and dimensional measurements, will be the responsibility of the contractor.

During the construction phase, we will provide geotechnical observation and testing services when requested by you or your representatives. Please be aware that we can only document site work we actually observe. It is still the responsibility of your contractor or on-site construction team to verify that our recommendations are being followed, whether we are present at the site or not.

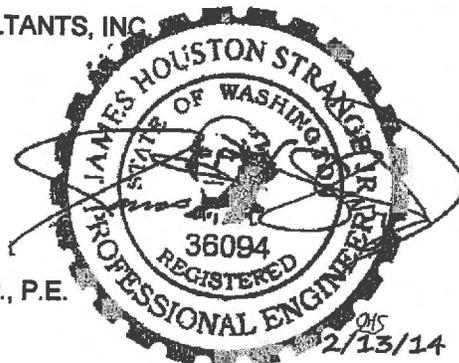
The following plates are attached to complete this report:

Plate 1	Vicinity Map
Plate 2	Site Exploration Plan
Plates 3 - 4	Test Pit Logs
Plate 5	Typical Footing Drain Detail

We appreciate the opportunity to be of service on this project. If you have any questions, or if we may be of further service, please do not hesitate to contact us.

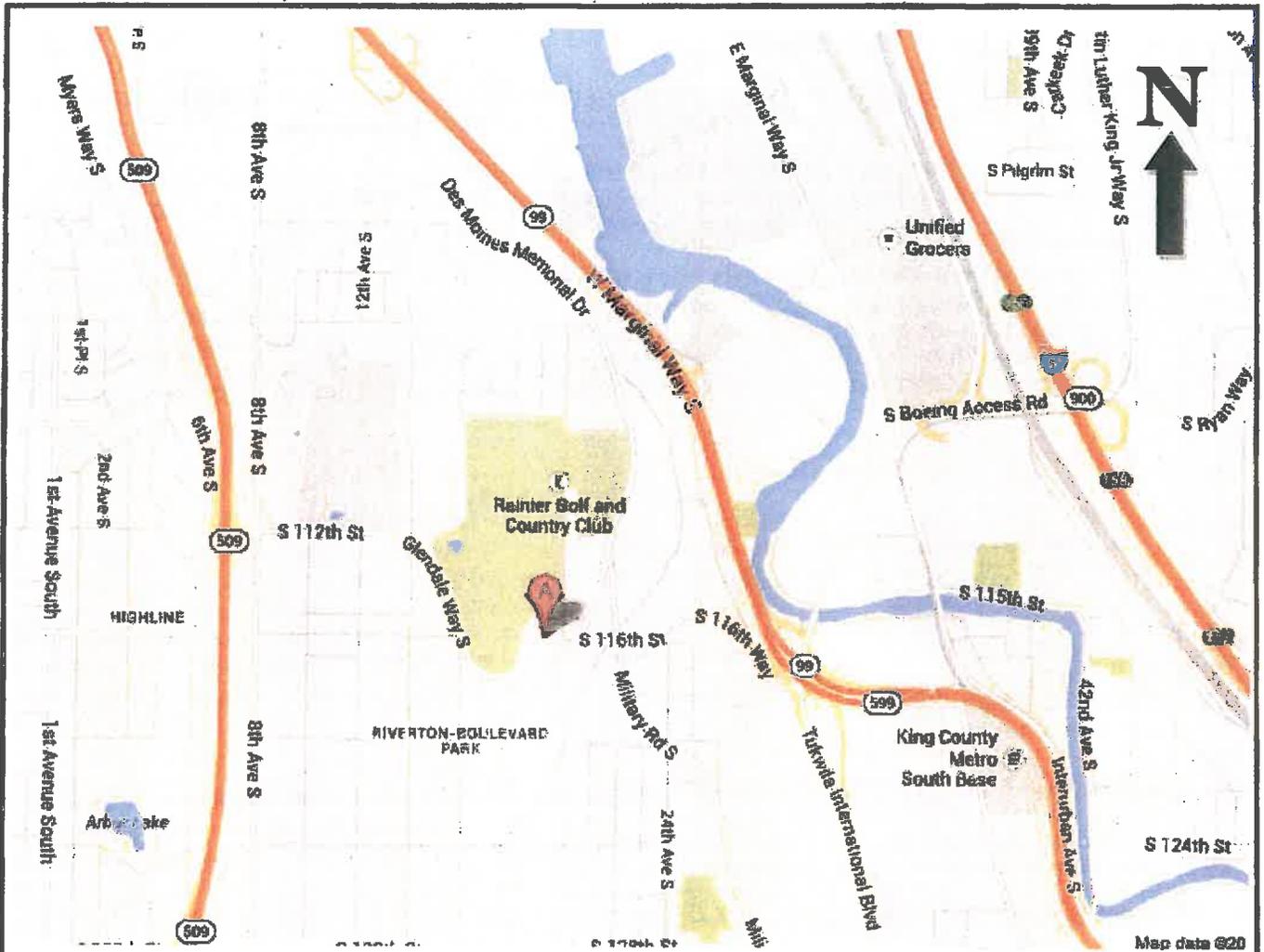
Respectfully submitted,

GEOTECH CONSULTANTS, INC.



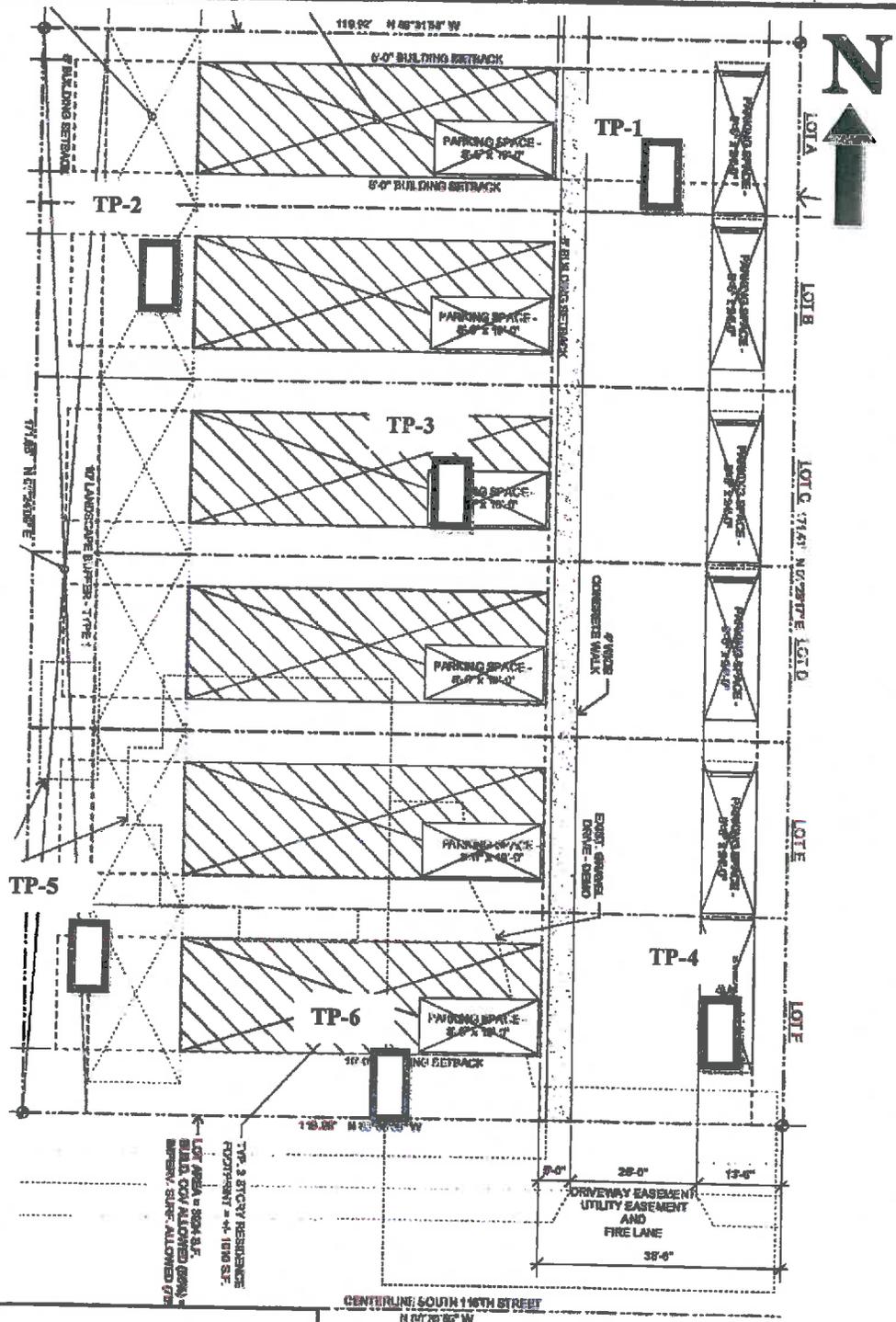
James H. Strange, Jr., P.E.  
Associate

JHS: jhs



**Vicinity Map**  
1832 South 116th Street  
Burien, Washington

<b>Job</b> 14023	<b>Date:</b> Feb. 2014	<b>Scale:</b> Not to Scale	<b>Plate:</b> 1
---------------------	---------------------------	-------------------------------	--------------------



**Legend**



- Approximate Test Pit Location



**GEOTECH  
CONSULTANTS, INC.**

**Site Exploration Plan**

1832 South 116th Street  
Burien, Washington

<b>Job</b> 14023	<b>Date:</b> Feb. 2014	<b>Scale:</b> Not to Scale	<b>Plate:</b> 2
---------------------	---------------------------	-------------------------------	--------------------

**TEST PIT (TP) 1**

Depth (feet)	Soil Description
0.0 – 1.0	Sod, over topsoil.
1.0 – 2.5	Red-brown with iron stains, very silty, SAND, fine-grained, very moist to wet, loose. [SM]
2.5 – 8.0	- becomes gray with iron stains, very rocky, dense (Glacial Till) [SM]

Test Pit was terminated at a depth of 8.0 feet on January 27, 2014.  
No groundwater seepage was observed in the pit.

**TEST PIT (TP) 2**

Depth (feet)	Soil Description
0.0 – 1.0	Sod, over topsoil.
1.0 – 3.0	Red-brown with iron stains, very silty, SAND, fine-grained, very moist to wet, loose. [SM]
3.0 – 7.0	- becomes gray with iron stains, very rocky, dense (Glacial Till) [SM]

Test Pit was terminated at a depth of 8.0 feet on January 27, 2014.  
No groundwater seepage was observed in the pit.

**TEST PIT (TP) 3**

Depth (feet)	Soil Description
0.0 – 1.0	Sod, over topsoil.
1.0 – 3.0	Red-brown with iron stains, very silty, SAND, fine-grained, very moist to wet, loose. [SM]
3.0 – 5.0	- becomes gray with iron stains, very rocky, dense (Glacial Till) [SM]

Test Pit was terminated at a depth of 5.0 feet on January 27, 2014.  
No groundwater seepage was observed in the pit.

**TEST PIT (TP) 4**

Depth (feet)	Soil Description
0.0 – 1.5	Sod, over silty sand with gravel, moist, loose to medium-dense. (Fill)
1.5 – 3.0	Red-brown with iron stains and occasional small boulders, very silty, SAND, fine-grained, very moist to wet, loose. [SM]
3.0 – 6.0	- becomes gray with iron stains, very rocky, dense (Glacial Till) [SM]

Test Pit was terminated at a depth of 6.0 feet on January 27, 2014.  
No groundwater seepage was observed in the pit.

Note - Letters in brackets [ ] denote USCS soil designation.

**Test Pit Logs**

1832 South 116th Street  
Burien, Washington

<b>Job</b> 14023	<b>Date:</b> Feb. 2014	<b>Scale:</b> Not to Scale	<b>Plate:</b> 3
---------------------	---------------------------	-------------------------------	--------------------

**TEST PIT (TP) 5**

Depth (feet)	Soil Description
0.0 – 1.5	Sod, over silty sand with gravel, moist, loose to medium-dense. (Fill)
1.5 – 5.0	Dark brown to black peaty organic topsoil
5.0 – 8.0	Brown with iron stains, very silty, SAND, fine-grained, very moist, medium-dense. [SM]

Test Pit was terminated at a depth of 6.0 feet on January 27, 2014.  
Groundwater seepage was observed at 5 feet in the pit

**TEST PIT (TP) 6**

Depth (feet)	Soil Description
0.0 – 2.0	Sod, over silty sand with gravel, moist, loose to medium-dense. (Fill)
2.0 – 3.0	Remnant topsoil
3.0 – 6.0	Red-brown with iron stains and occasional small boulders, very silty, SAND to Sandy SILT, fine-grained, very moist to wet, loose. [SM/ML] - becomes medium-dense at 4 feet
6.0 – 7.0	- becomes gray with iron stains, very rocky, dense (Glacial Till) [SM]

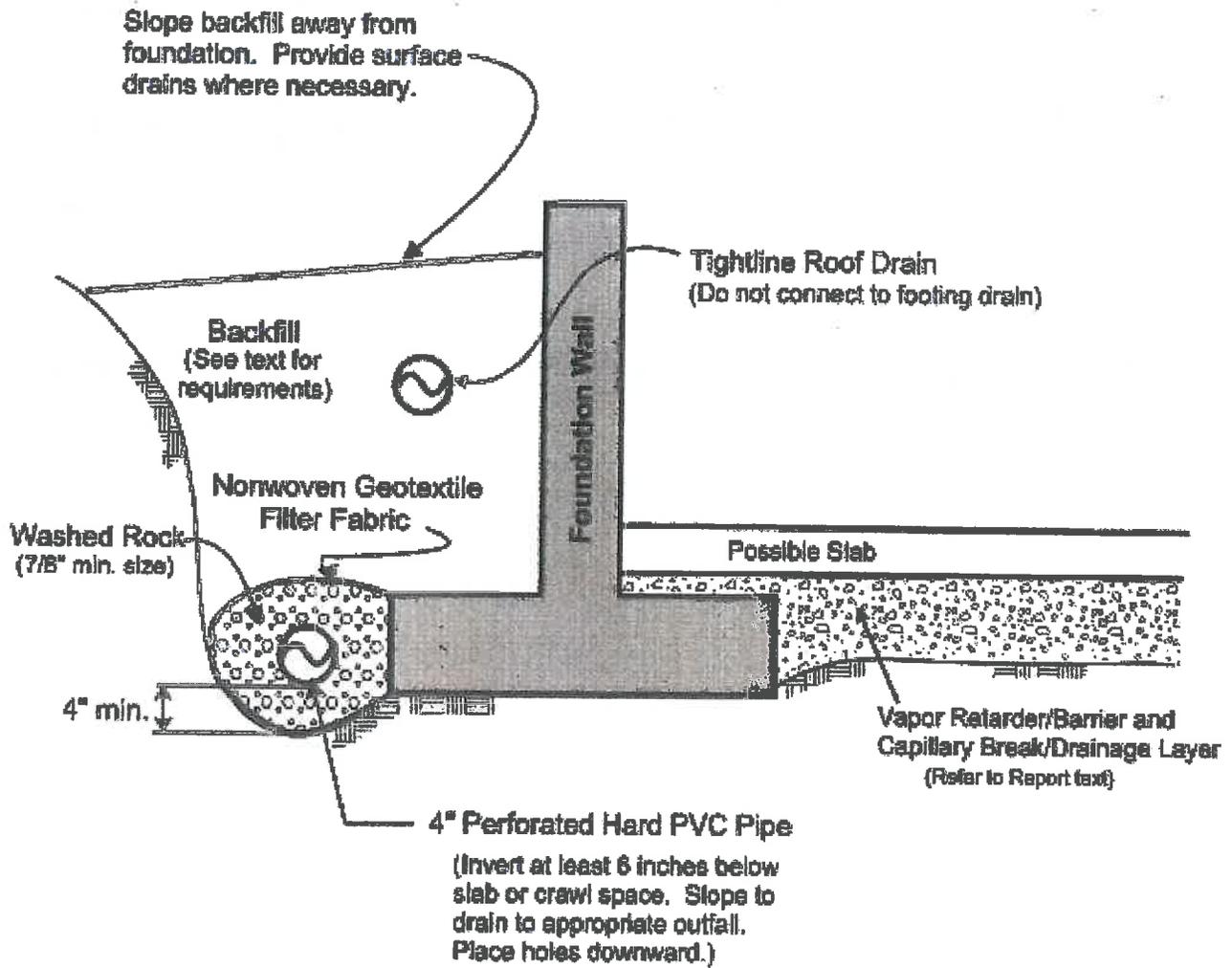
Test Pit was terminated at a depth of 7.0 feet on January 27, 2014.  
No groundwater seepage was observed in the pit

Note - Letters in brackets [ ] denote USCS soil designation.



**Test Pit Logs**  
1832 South 116th Street  
Burien, Washington

<b>Job</b> 14023	<b>Date:</b> Feb. 2014	<b>Scale:</b> Not to Scale	<b>Plate:</b> 4
---------------------	---------------------------	-------------------------------	--------------------



**NOTES:**

- (1) In crawl spaces, provide an outlet drain to prevent buildup of water that bypasses the perimeter footing drains.
- (2) Refer to report text for additional drainage, waterproofing, and slab considerations.



<b>Footing Drain Detail</b>			
1832 South 116th Street Burien, Washington			
<b>Job</b> 14023	<b>Date:</b> Feb. 2014	<b>Scale:</b> Not to Scale	<b>Plate:</b> 5

**APPENDIX C    Site Improvement Plans**



# S 116TH STREET SUBDIVISION

## SUBDIVISION IMPROVEMENTS PLANS

### 1832 S 116TH STREET BURIEN, WA MAY, 2014

#### GENERAL NOTES:

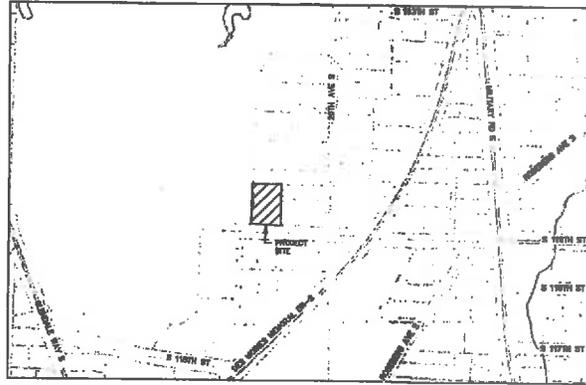
- (1) ALL DESIGN AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE KING COUNTY CODES (KCC), ROAD STANDARDS (KCRS), WASHINGTON STATE DOT (WSDOT) STANDARD SPECIFICATIONS AND THE CONDITIONS OF PRELIMINARY APPROVAL. IT SHALL BE THE SOLE RESPONSIBILITY OF THE APPLICANT AND THE PROFESSIONAL CIVIL ENGINEER TO CORRECT ANY ERROR, OMISSION, OR VARIATION FROM THE ABOVE REQUIREMENTS FOUND IN THESE PLANS. ALL CONSTRUCTION SHALL BE AT NO ADDITIONAL COST OR LIABILITY TO KING COUNTY.
- (2) THE DESIGN ELEMENTS WITHIN THESE PLANS HAVE BEEN REVIEWED ACCORDING TO THE KING COUNTY DEPARTMENT OF DEVELOPMENT AND ENVIRONMENTAL SERVICES (DOES) ENGINEERING REVIEW CHECKLIST. SOME ELEMENTS MAY HAVE BEEN OVERLOOKED OR MISSED BY THE DOES PLANE REVIEWER. ANY VARIANCE FROM ADOPTED STANDARDS IS NOT ALLOWED UNLESS SPECIFICALLY APPROVED BY KING COUNTY PRIOR TO CONSTRUCTION.
- (3) APPROVAL OF THIS ROAD, GRADING, PAVING AND DRAINAGE PLAN DOES NOT CONSTITUTE AN APPROVAL OF ANY OTHER CONSTRUCTION (E.G. DOMESTIC WATER CONVEYANCE, SEWER CONVEYANCE, GAS, ELECTRICAL, ETC.).
- (4) BEFORE ANY CONSTRUCTION OR DEVELOPMENT ACTIVITY, A PRECONSTRUCTION MEETING MUST BE HELD BETWEEN THE DOES LAND USE INSPECTION SECTION, THE APPLICANT, AND THE APPLICANT'S CONSTRUCTION REPRESENTATIVE.
- (5) A COPY OF THESE APPROVED PLANS MUST BE ON THE JOB SITE WHENEVER CONSTRUCTION IS IN PROGRESS.
- (6) GRADING ACTIVITIES (SITE ALTERATION) ARE LIMITED TO THE HOURS OF 7 A.M. TO 7 P.M. MONDAY THROUGH SATURDAY AND TO 8 A.M. TO 5 P.M. ON SUNDAY, UNLESS OTHERWISE APPROVED WITH A WRITTEN DECISION BY THE REVIEWING AGENCY.
- (7) IT SHALL BE THE APPLICANT/CONTRACTOR'S RESPONSIBILITY TO OBTAIN ALL CONSTRUCTION PERMITS NECESSARY BEFORE BEGINNING OFF-SITE WORK. PERMITS REQUIRE REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.
- (8) FRANCHISED UTILITIES OR OTHER INSTALLATIONS THAT ARE NOT SHOWN ON THESE APPROVED PLANS SHALL NOT BE CONSTRUCTED UNLESS AN APPROVED SET OF PLANS THAT MEET ALL REQUIREMENTS OF KING CHAPTER 8 ARE SUBMITTED TO THE DOES LAND USE INSPECTION SECTION THREE DAYS PRIOR TO CONSTRUCTION.
- (9) DATUM SHALL BE KING UNLESS OTHERWISE APPROVED BY DOES.
- (10) DEWATERING SYSTEM (UNDERDRAIN) CONSTRUCTION SHALL BE WITHIN A RIGHT-OF-WAY OR APPROPRIATE DRAINAGE EASEMENT, BUT NOT UNDERNEATH THE ROADWAY SECTION. ALL UNDERDRAIN SYSTEMS MUST BE CONSTRUCTED IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATIONS.
- (11) ALL UTILITY TRENCHES AND ROADWAY SUBGRADE SHALL BE BACKFILLED AND COMPACTED TO 95 PERCENT DENSITY, STANDARD PROCTOR.
- (12) OPEN CUTTING OF EXISTING ROADWAYS FOR NON-FRANCHISED UTILITY OR STORM WORK IS NOT ALLOWED UNLESS SPECIFICALLY APPROVED BY DOES AND NOTED ON THESE APPROVED PLANS. ANY OPEN CUT SHALL BE RESTORED IN ACCORDANCE WITH KCRS.
- (13) THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE SAFEGUARDS, SAFETY DEVICES, PROTECTIVE EQUIPMENT, FLAGGERS, AND ANY OTHER NEEDED ACTIONS TO PROTECT THE LIFE, HEALTH, AND SAFETY OF THE PUBLIC, AND TO PROTECT PROPERTY IN CONNECTION WITH THE PERFORMANCE OF WORK COVERED BY THE CONTRACTOR. ANY WORK WITHIN THE TRAVELLED RIGHT-OF-WAY THAT MAY INTERRUPT NORMAL TRAFFIC FLOW SHALL REQUIRE AT LEAST ONE FLAGGER FOR EACH LANE OF TRAFFIC APPROVED, MANUAL OR AUTOMATIC TRAFFIC CONTROL DEVICES (AUTOCDS) SHALL APPLY. WORK IN RIGHT-OF-WAY IS NOT AUTHORIZED UNTIL A TRAFFIC CONTROL PLAN IS APPROVED BY KING COUNTY.

#### PROJECT INFO:

**OWNER/APPLICANT:**  
MICHAEL BELLAN  
5219 FIRST AVE S  
SEATTLE, WA 98108

**CIVIL ENGINEER:**  
TIM GABELEN, P.E.  
DAVIDO CONSULTING GROUP, INC.  
18029 BOTHELL WAY NE, SUITE 800  
LAKE FOREST PARK, WA 98168  
PH: 206-828-0024  
FAX: 206-823-1012

**SURVEYOR:**  
GEODIMENSIONS, INC  
10001 MAIN STREET, SUITE 102  
BELLEVUE, WA 98004  
425-459-4488



VICINITY MAP

#### LEGAL DESCRIPTION:

LOT 18 AND THE WESTERLY 20.87 FEET OF LOT 12, BLOCK 2, BOULEVARD PARK ADDITION, ACCORDING TO THE PLAT THEREOF, RECORDED IN VOLUME 22 OF PLATS, PAGE 84, 1 KING COUNTY, WASHINGTON, EXCEPT THE NORTH 80 FEET THEREOF.

#### VERTICAL DATUM:

NAVD 88 PER GPS

#### BASIS OF BEARINGS:

PER RECORD OF SURVEY BOOK 253, PG. 048, THE NORTH LINE OF THE NW QUARTER OF SECTION 8, T29N, R4E, BEARS N88°00'32"W.

#### TITLE REPORT REFERENCE:

THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A TITLE REPORT.

#### SHEET INDEX

SHEET	SHEET TITLE
C00	COVER SHEET
C01	SITE PLAN
C02	EROSION CONTROL PLAN
C03	TREE RETENTION PLAN
C04	GRADING PLAN
C05	DRAINAGE PLAN
C06	UTILITY PLAN
C07	FRONTAGE IMPROVEMENT PLAN
C08	DETAILS
C09	DETAILS
C10	DETAILS
C11	DETAILS

#### ABBREVIATIONS:

- BOC = BACK OF CURB
- BOW = BACK OF SIDEWALK
- CB = CATCH BASIN
- CMF = CORRUGATED METAL PIPE
- EOP = EDGE OF PAVEMENT
- ESC = EROSION & SEDIMENTATION CONTROL
- FF = FILTER FENCE
- FGTODW = FINISH GRADE AT TOE OF WALL
- FGTDPW = FINISH GRADE AT TOP OF WALL
- FH = FIRE HYDRANT
- FM = SAN. SEWER FORCE MAIN
- SD = STORM DRAIN
- SDFM = STORM DRAIN FORCE MAIN
- SS = SANITARY SEWER
- SSCO = SANITARY SEWER CLEANOUT
- SSM = SANITARY SEWER MANHOLE
- SSS = SANITARY SIDE SEWER
- TOC = TOP OF CURB
- TOP = TOP OF PAVEMENT
- TP = TYPICAL
- W = WATER
- WM = WATER METER

**DAVIDO CONSULTING GROUP, INC.**  
Civil - Structural - Land Use

**AP**

LICENSED PROFESSIONAL CIVIL ENGINEER  
NO. 34567  
ISSUED 01/15/2011  
EXPIRES 12/31/2014  
WASHINGTON STATE

**SEAL**

THE KING COUNTY ENGINEER

FOR THE CITY OF BURIEN

APPROVED FOR CONSTRUCTION

BOULEVARD PARK LLC  
5319 FIRST AVE S  
SEATTLE, WASHINGTON 98108

S 116TH ST SUBDIVISION  
S 116TH ST SEATTLE, WA 98168

COVER SHEET

BASE MAPTOGRAPHY PROVIDED BY OTHERS. DCG CANNOT BE HELD LIABLE FOR ACCURACY. CONTRACTOR SHALL FIELD VERIFY GRADES, UTILITIES, AND ALL OTHER EXISTING FEATURES AND CONDITIONS. IF CONDITIONS ARE NOT AS SHOWN ANEOR PLANS CANNOT BE CONSTRUED AS SHOWN, CONTACT DCG PRIOR TO CONSTRUCTION.

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

UNDERGROUND UTILITY LOCATIONS ARE APPROX.

DATE PLOTTED: 5/15/2014 10:10 AM - SHEET 001 OF 001 - SHEET SIZE: 11X17 - PLOT SCALE: 1"=100'





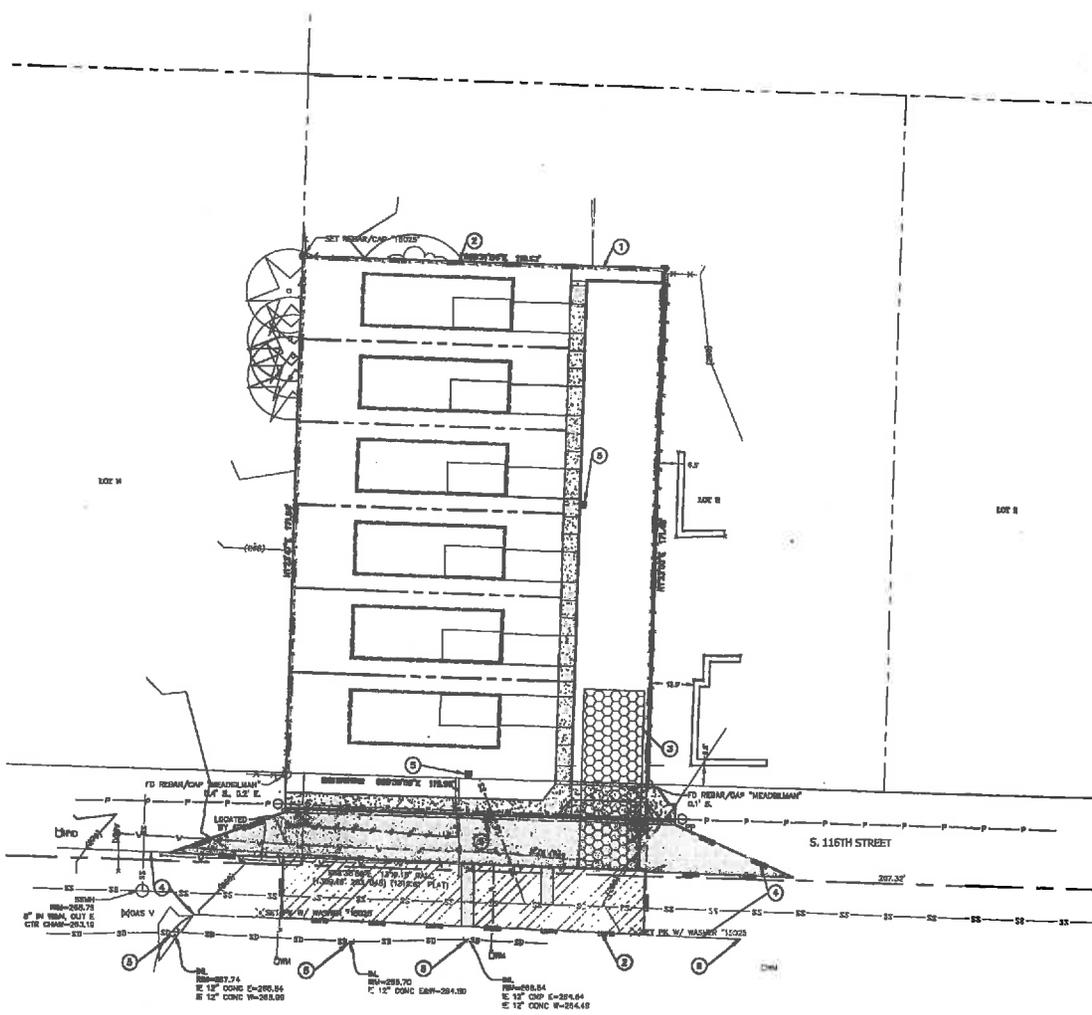
### EROSION AND SEDIMENT CONTROL RECOMMENDED CONSTRUCTION SEQUENCE:

- (1) PRE-CONSTRUCTION MEETING.
- (2) POST SIGN WITH NAME AND PHONE NUMBER OF ESO SUPERVISOR (MAY BE CONSOLIDATED WITH THE REQUIRED NOTICE OF CONSTRUCTION SIGN).
- (3) FLAG OR FENCE CLEARING LIMITS.
- (4) INSTALL CATCH BASIN PROTECTION IF REQUIRED.
- (5) GRADE AND INSTALL CONSTRUCTION ENTRANCES.
- (6) INSTALL PERIMETER PROTECTION (SILT FENCE, SILT/SHIELD BARRIER, ETC.).
- (7) CONSTRUCT SEDIMENT PONDS AND TRAPS.
- (8) GRADE AND STABILIZE CONSTRUCTION ROADS.
- (9) CONSTRUCT SURFACE WATER CONTROL (DISTRIBUTION DRES, PIPE SLOPE DRAIN, ETC.) SIMULTANEOUSLY WITH CLEARING AND GRADING FOR PROJECT DEVELOPMENT.
- (10) MAINTAIN EROSION CONTROL MEASURES IN ACCORDANCE WITH KING COUNTY STANDARDS AND MANUFACTURER'S RECOMMENDATIONS.
- (11) RELOCATE EROSION CONTROL MEASURES OR INSTALL NEW MEASURES SO THAT AS SITE CONDITIONS CHANGE THE EROSION AND SEDIMENT CONTROL MEASURES IN ACCORDANCE WITH THE KING COUNTY EROSION AND SEDIMENT CONTROL STANDARDS.
- (12) COVER ALL AREAS THAT WILL BE UNCOVERED FOR MORE THAN SEVEN DAYS DURING THE DRY SEASON OR TWO DAYS DURING THE WET SEASON WITH STRAW, WOOD PAPER MULCH, COMPOST, PLASTIC SHEETING OR EQUIVALENT.
- (13) STABILIZE ALL AREAS THAT REACH FINAL GRADE WITHIN SEVEN DAYS.
- (14) SEED OR SOO ANY AREAS TO REMAIN UNCOVERED FOR MORE THAN 30 DAYS.
- (15) UPON COMPLETION OF THE PROJECT, ALL DISTURBED AREAS MUST BE STABILIZED AND SIGNS REMOVED IF APPROPRIATE.

KEY NOTES:		
KEY	NOTE:	DETAIL/ SHEET
1	INSTALL APPROX 120 LF PERIMETER PROTECTION	D/CDB, K/C10
2	LIMITS OF DISTURBANCE	-
3	INSTALL TEMPORARY STABILIZED CONSTRUCTION ENTRANCE	J/C10
4	CONTRACTOR TO SWEEP STREET DAILY OR AT MORE FREQUENT INTERVALS AS NEEDED	-
5	INSTALL TEMPORARY STORM DRAIN INLET PROTECTION	E/CDB
6	INSTALL TEMPORARY STORM DRAIN INLET PROTECTION TO ALL STORM DRAIN INLETS 50' DOWNSTREAM OF SITE	E/CDB

### GENERAL NOTE:

\*INSTALL PERIMETER PROTECTION SUCH AS SILT FENCING, COMPOST BARRIERS, OR STRAW WATTLE IN ACCORDANCE WITH APPENDIX D OF THE 2009 KING COUNTY SURFACE WATER DESIGN MANUAL.



### EROSION AND SEDIMENTATION CONTROL NOTES

- (1) APPROVAL OF THIS EROSION AND SEDIMENTATION CONTROL (ESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PAVES, RESTRICT CURBS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.)
- (2) THE IMPLEMENTATION OF THESE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPDATES OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE APPLICANT/ENGINEER SUPERVISOR UNTIL ALL CONSTRUCTION IS APPROVED.
- (3) THE BOUNDARIES OF THE CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED BY THE BOUNDARIES OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES, SUCH AS CONSTRUCTED WHEEL WASH SYSTEMS OR WASH PADS, MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN AND TRUCKS OUT TO ROAD RIGHT OF WAY DOES NOT OCCUR FOR THE DURATION OF THE PROJECT.
- (4) THE ESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED PRIOR TO OR IN CONJUNCTION WITH ALL CLEARING AND GRADING SO AS TO ENSURE THAT THE TRANSPORT OF SEDIMENT TO SURFACE WATERS, DRAINAGE SYSTEMS, AND ADJACENT PROPERTIES IS MINIMIZED.
- (5) THE ESC FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND MODIFIED TO ACCOUNT FOR CHANGING SITE CONDITIONS (E.G. ADDITIONAL COVER MEASURES, ADDITIONAL BUMP PUMPS, RELOCATION OF DITCHES AND SILT FENCING, PERMEABLE PROTECTION ETC.).
- (6) THE ESC FACILITIES SHALL BE INSPECTED DAILY BY THE APPLICANT/ESO SUPERVISOR AND MAINTAINED TO ENSURE CONTINUED PROPER FUNCTIONING. WRITTEN RECORDS SHALL BE KEPT OF WEEKLY REVIEWS OF THE ESC FACILITIES.
- (7) ANY AREAS OF EXPOSED SOILS, INCLUDING ROADWAY EXPOSURES, THAT WILL NOT BE DISTURBED FOR TWO DAYS DURING THE WET SEASON OR SEVEN DAYS DURING THE DRY SEASON SHALL BE IMMEDIATELY STABILIZED WITH THE APPROVED ESC COVER METHODS (E.G., SEEDING, MULCHING, PLASTIC COVERING, ETC.).
- (8) ANY AREA REQUIRING ESC MEASURES, NOT REQUIRING IMMEDIATE ATTENTION, SHALL BE ADDRESSSED WITHIN SEVEN (7) DAYS.
- (9) THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN 24 HOURS FOLLOWING A STORM EVENT.
- (10) AT NO TIME SHALL MORE THAN ONE (1) FOOT OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A CATCH BASIN, ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO PAVING. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT/LASH WATER INTO THE DOWNSTREAM SYSTEM.
- (11) ANY PERMANENT RETENTION/DETENTION FACILITY USED AS A TEMPORARY SETTLING BASIN SHALL BE MODIFIED WITH THE NECESSARY EROSION CONTROL MEASURES AND SHALL PROVIDE ADEQUATE STORAGE CAPACITY. IF THE PERMANENT FACILITY IS TO FUNCTION ULTIMATELY AS AN INFILTRATION SYSTEM, THE TEMPORARY FACILITY MUST BE INSTALLED GRADED SO THAT THE BOTTOM AND SIDES ARE AT LEAST THREE FEET ABOVE THE FINAL GRADE OF THE PERMANENT FACILITY.
- (12) COVER MEASURES SHALL BE APPLIED IN CONFORMANCE WITH APPENDIX D OF THE SURFACE WATER DESIGN MANUAL.
- (13) PRIOR TO THE BEGINNING OF THE WET SEASON (OCT. 1), ALL DISTURBED AREAS SHALL BE REVIEWED TO IDENTIFY WHICH ONES CAN BE SEEDED IN PREPARATION FOR THE WINTER PERIOD. DISTURBED AREAS SHALL BE SEEDED WITHIN ONE WEEK OF THE BEGINNING OF THE WET SEASON. A SKETCH MAP OF THOSE AREAS TO BE SEEDED AND THOSE AREAS TO REMAIN UNCOVERED SHALL BE SUBMITTED TO THE CDBS INSPECTOR FOR REVIEW.

CDB FILE NUMBER: P:\PROJECTS\116TH ST SUBDIVISION\116TH ST SUBDIVISION.dwg  
 DATE: 05/06/2014 9:40 PM  
 USER: J. W. WALKER  
 TITLE: CIVIL ENGINEER  
 PROJECT: 116TH ST SUBDIVISION - EROSION CONTROL PLAN

REVISION	NO.	DATE	BY

LEED AP  
 David Consulting Group, Inc.  
 Civil - Structural - Land Use  
 2500 Broadway, Suite 1110  
 Seattle, WA 98108  
 Phone: 206.461.1110  
 Fax: 206.461.1119

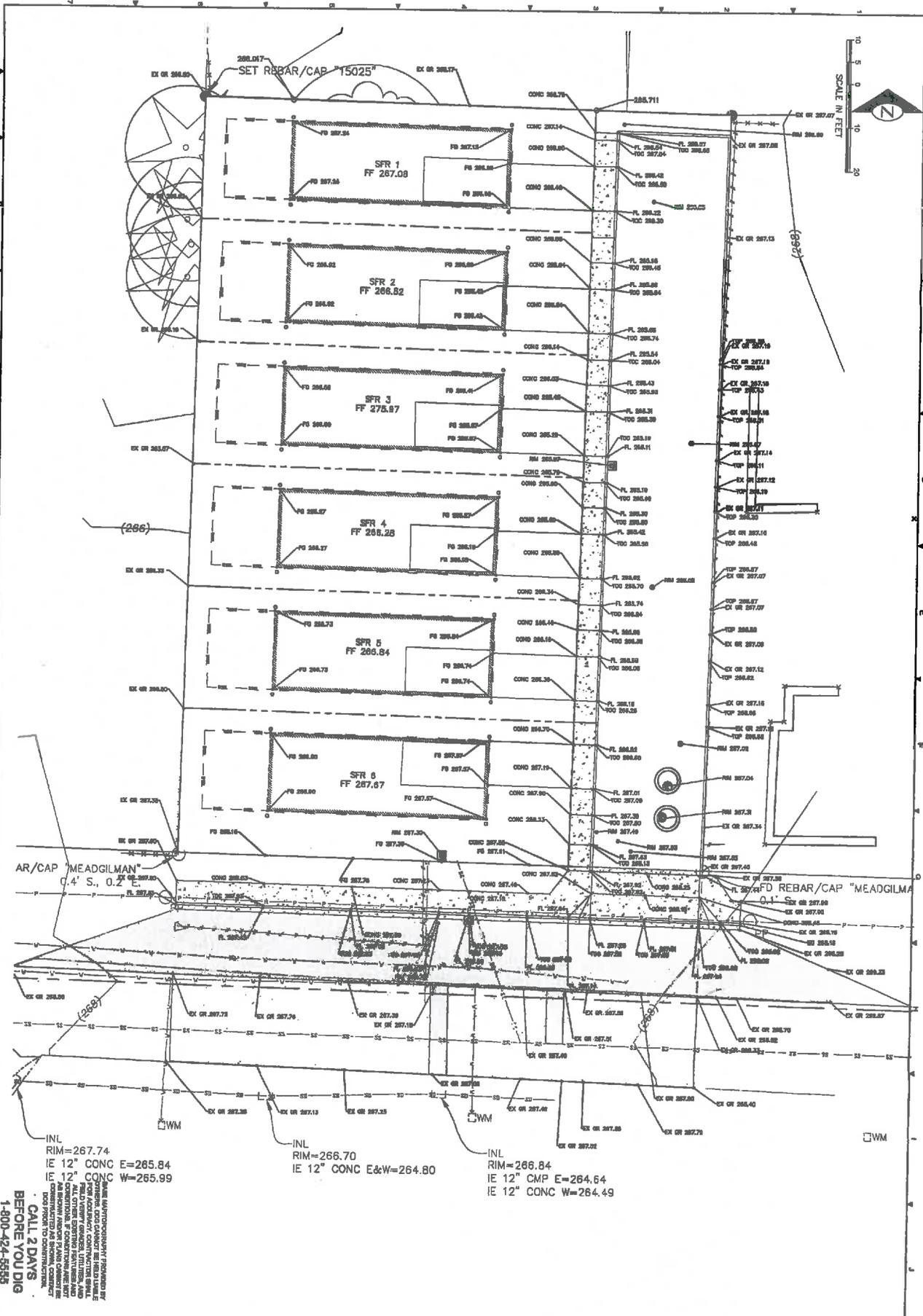
PROJECT MANAGER: JWB  
 DESIGNED BY: TMB  
 DRAWN BY: MMB  
 CHECKED BY: JWB  
 DATE: 05/06/2014  
 SHEET NUMBER: C02

BOULEVARD PARK LLC  
 5319 FIRST AVE S  
 SEATTLE, WASHINGTON 98108  
 S 116TH ST SUBDIVISION  
 S 116TH ST SEATTLE, WA 98108  
 EROSION CONTROL PLAN

BRASS MAPTOGRAPHY PROVIDED BY OTHERS. CDBS CANNOT BE HELD LIABLE FOR ACCURACY. CONTRACTOR SHALL FIELD VERIFY GRADES, UTILITIES, AND ALL OTHER EXISTING FEATURES AND CONDITIONS. IF CONDITIONS ARE NOT AS SHOWN REVISED PLANS CANNOT BE CONSTRUCTED AS SHOWN. CONTACT CDBS PRIOR TO CONSTRUCTION.  
**CALL 2 DAYS BEFORE YOU DIG**  
 1-800-424-5555

SURROUNDING UTILITY LOCATIONS ARE APPROX.





INL RIM=267.74  
 IE 12" CONC E=265.84  
 IF 12" CONC W=265.99

INL RIM=266.70  
 IE 12" CONC E&W=264.80

INL RIM=266.84  
 IE 12" CMP E=264.64  
 IE 12" CONC W=264.49

AMERICAN UTILITIES LOCATION (SEE ATTACHED)  
 1-800-424-5555  
 CALL 2 DAYS BEFORE YOU DIG

<p><b>C04</b></p>	<p>OWNER: <b>BOULEVARD PARK LLC</b>                  5319 FIRST AVE S                  SEATTLE, WASHINGTON 98108</p>	<p>PROJECT: <b>S 118TH ST SUBDIVISION</b>                  S 118TH ST SEATTLE, WA 98188  <b>GRADING PLAN</b></p>	<p>DATE: <b>6/12/2014</b></p>	<p>BY: <b>DAVIDO GROUP</b></p>	<p>REVISION:</p>
	<p>PROJECT: <b>DAVIDO CONSULTING GROUP, INC.</b>                  CM - Structural - Land Use</p>				

LEED AP  
 LEED ACCREDITED PROFESSIONAL'S SEAL RELATED TO ARCHITECTURE OR INTERIOR DESIGN IS VALID AND TRANSPARENT ONLY IF THE SEAL, GREEN BUILDING COUNCIL, IS APPLIED TO INDIVIDUALS HAVING LICENSE BY THE GREEN BUILDING COUNCIL OF AMERICA.





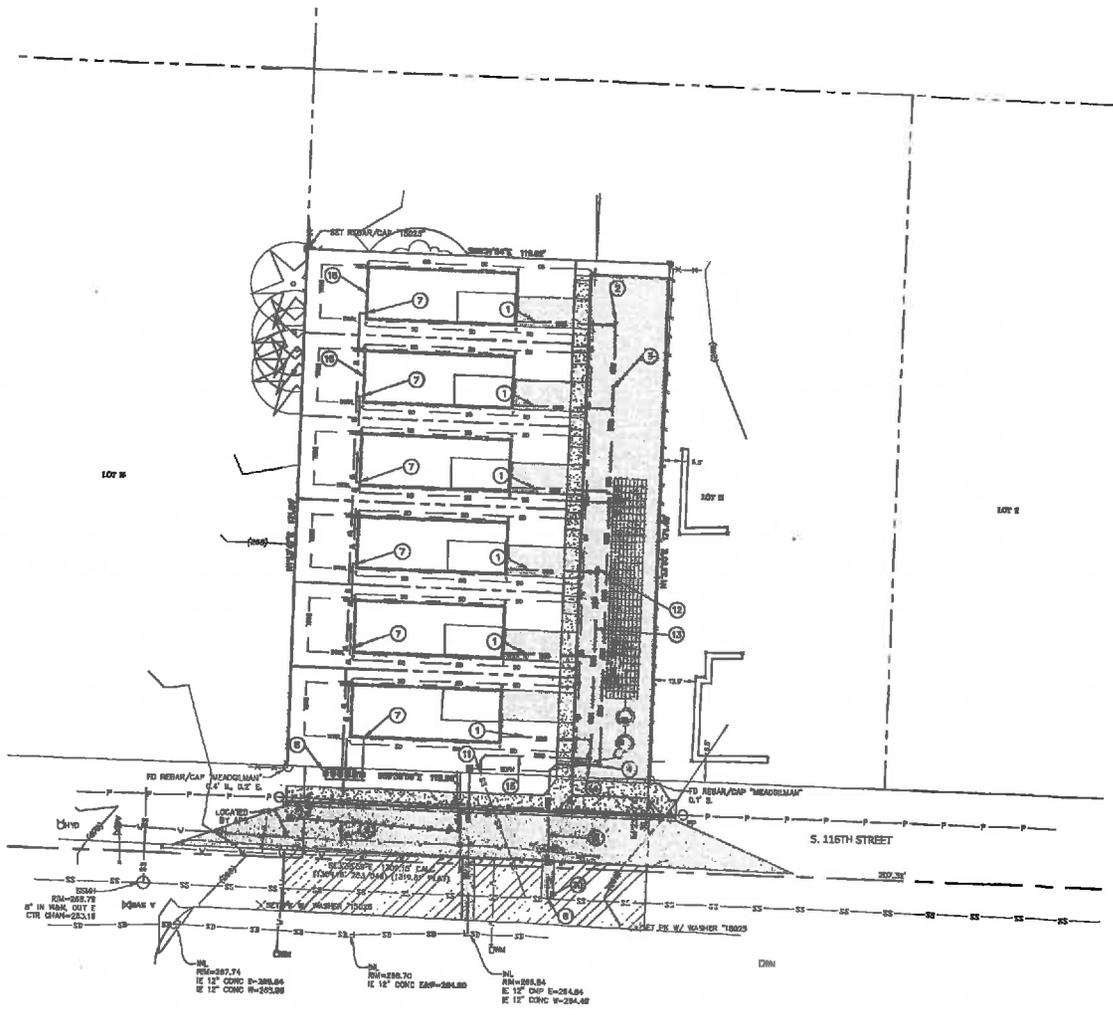
SCALE IN FEET  
0 10 20

### VALLEY VIEW SEWER DISTRICT NOTES:

- GENERAL REQUIREMENTS:**
- (1) SIDE SEWER PERMIT IS REQUIRED PRIOR TO WORK BEING STARTED.
  - (2) LEGAL DESCRIPTION OF LOT AND PLOT PLAN MUST BE PROVIDED.
  - (3) ALL WORK DONE IN THE PUBLIC RIGHT OF WAY MUST BE DONE BY A LICENSED CONTRACTOR.
  - (4) RECORDS OF PIPE MUST BE DONE BY HAND, NO BACKFILLING WILL BE DONE UNTIL INSPECTION IS COMPLETE AND APPROVED.
  - (5) BEDDING AND BAYAL BACKFILL MATERIAL MUST BE FREE FROM LARGE ROCKS.
- SIDE SEWER REQUIREMENTS:**
- 1- 4-INCH (MINIMUM SIZE) SEWER PIPE REQUIRED ON PROPERTY, 2% MINIMUM GRADE (1/4" FALL PER FOOT).
  - 2- JOINT SEWERS REQUIRE 6" PIPE FOR COMMON USE AND REQUIRE AN EASEMENT AGREEMENT. NO MORE THAN 4 SINGLE FAMILY RESIDENCES ARE ALLOWED TO CONNECT INTO ONE 8 INCH SEWER STUB.
  - 3- LISTING OF APPROVED PIPE:
    - PVC - TYPE SDR-35 ASTM-3034 (WITH STANDARD GASKET JOINTS)
    - ABS - TYPE DWV SCHEDULE 40 ASTM D 2688 (WITH SOLVENT WELD OR GELB JOINTS)
- NOTE: SOLVENT WELD JOINTS ARE ONLY PERMITTED IN CONJUNCTION WITH ABS TYPE PIPE NOT PVC.

#### KEY NOTES:

KEY	NOTE	DETAIL / SHEET
1	6" SSS @ 2.00% MIN SLOPE & 2.00' MIN COVER	--
2	6" SSSCO RM 295.95 6" IC 295.95	C/COR
3	147 LF 6" SSS @ 2.00%	--
4	6" SSSCO RM 297.05 6" IC 297.05	C/COR
5	80 LF 6" SSS @ 2.55%	--
6	CONTRACTOR TO VERIFY STORM SEWER DEPTH PRIOR TO CONSTRUCTION AND ADJUST CRATE SEWER AS NECESSARY 6" IC DQ 298.20	--
7	3/4" WATER SERVICE SIZE TO BE CONFIRMED ONCE FIXTURE COUNTS, SPRINKLER MAIN, AND MAIN PRESSURE IS DETERMINED	--
8	(8) NEW 3/4" WATER METERS	--
9	1-1/2" WATER SERVICE AND CONNECTION TO EX 6" MAIN	--
10	CONNECT TO EX 6" SEWER MAIN	--
11	CONNECT TO EX 6" SSS IC 295.30	--
12	6" SSSCO RM 295.80 6" IC 292.45	C/COR
13	62 LF 6" SSS @ 2.00%	--
14	6" SSSCO RM 297.35 6" IC 297.35	C/COR
15	41 LF 6" SSS @ 2.00%	--
16	WALK TO THE SPRINKLER (NFPA 13D RESIDENTIAL SPRINKLER, SPRINKLER DESIGN BY OTHERS)	--



DATE FILE NUMBER: 11/15/2014 10:00 AM BY: 10/15/2014 10:00 AM PROJECT NUMBER: 116TH ST SUBDIVISION SHEET 06 OF 10

DATE	BY	REVISION

**Davidson Consulting Group, Inc.**  
Civil - Structural - Land Use

116TH ST SUBDIVISION SHEET 06 OF 10  
PROJECT NUMBER: 116TH ST SUBDIVISION  
DATE: 11/15/2014 10:00 AM  
BY: 10/15/2014 10:00 AM



**BOULEVARD PARK LLC**  
5319 FIRST AVE S  
SEATTLE, WASHINGTON 98108

**S 116TH ST SUBDIVISION**  
S 116TH ST SEATTLE, WA 98108

UTILITY PLAN

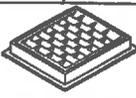
PROJ. MANAGER:	ED
DESIGNED BY:	YLB
DRAWN BY:	REH/MS
CHECKED BY:	ED
SCALE:	AS SHOWN
DATE:	06/06/2014
SHEET NUMBER:	06 OF 10

BASE MAP/TOPOGRAPHY PROVIDED BY OTHERS. DGC CANNOT BE HELD LIABLE FOR ACCURACY. CONTRACTOR SHALL FIELD VERIFY GRADES, UTILITIES, AND ALL OTHER EXISTING FEATURES AND CONDITIONS. IF CONDITIONS ARE NOT AS SHOWN AND/OR PLANS CANNOT BE CONSTRUCTED AS SHOWN, CONTACT DGC PRIOR TO CONSTRUCTION.

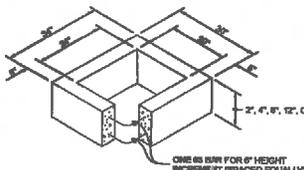
**CALL 2 DAYS BEFORE YOU DIG**  
1-800-424-5555  
(UNDERGROUND UTILITY LOCATIONS ARE APPROX.)

# C06

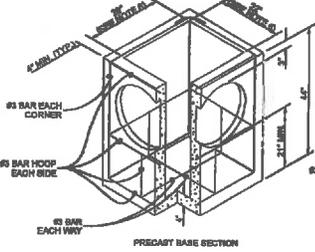




FRAME AND VINED GRATE



RECTANGULAR ADJUSTMENT SECTION

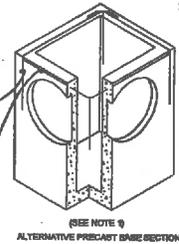


PRECAST BASE SECTION

PIPE ALLOWANCES	
PIPE MATERIAL	MINIMUM INCH DIAMETER
REINFORCED OR PRECAST CONCRETE	12"
ALL METAL PIPE	18"
CAST IRON (STD. SPEC. 4-18.13)	12"
BOILED WALL PVC (STD. SPEC. 4-08.12(1))	18"
PROFILE WALL PVC (STD. SPEC. 4-08.12(2))	18"

COMBUSTIBLE POLYETHYLENE STEEL REINFORCING PIPE

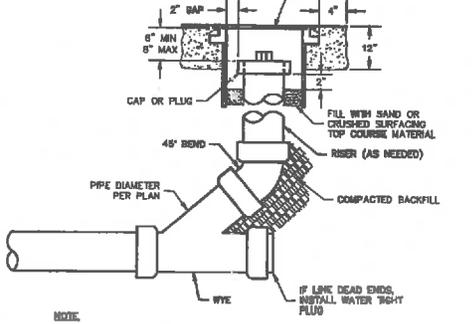
- NOTES**
- As acceptable alternatives to the information in the PRECAST BASE SECTION, steel (limited according to the Reinforcing Specifications) or wire mesh having a minimum area of 1.25 square inches per foot shall be used with the concrete and alternative wire ALTERNATIVE to the PRECAST BASE SECTION. Minimum shall be placed in the...
  - The maximum depth from the finished grade to the base of the precast base shall be 18" to 24"...
  - The frame and grate may be installed with the top down, or side up, and to the left or right with the top up...
  - The Precast Base Section may have a maximum slope, and the works may be placed at a site of 1:24 or steeper...
  - The opening shall be maximum at the top of the Precast Base Section...
  - All playing holes shall be grouted (filler) to back in accordance...
  - ...
  - ...



ALTERNATIVE PRECAST BASE SECTION

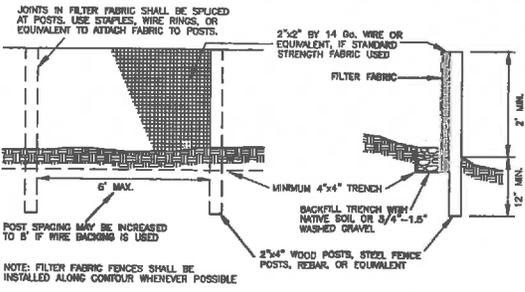
**CATCH BASIN TYPE 1 (A)**  
NTS C05

PLASTIC (LANDSCAPE AREAS) OR CAST IRON RING & COVER, OPENING DIAMETER 4" LARGER THAN NOMINAL PIPE SIZE, H-20 RATED IN PAVED AREAS.



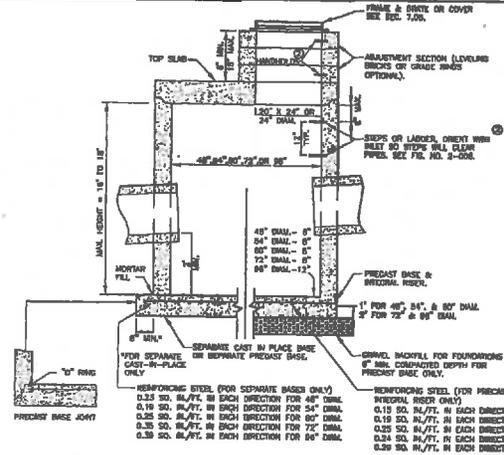
NOTE: CAST IRON COVER SHALL READ "SEWER", "STORM" OR "CO."

**CLEANOUT (C)**  
NTS C06, C06



NOTE: FILTER FABRIC FENCES SHALL BE INSTALLED ALONG CONTOUR WHENEVER POSSIBLE

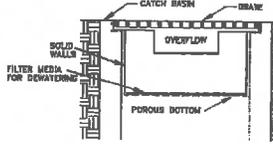
**SILT FENCE (D)**  
NTS C02



**NOTES**

- CATCH BASINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C909 (MINIMUM 1995) AND ASTM C909 UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE NOTES/APPROXIMATE SPECIFICATIONS.
- REINFORCED IN ADJUSTMENT SECTION SHALL HAVE 2" MIN. CLEARANCE. NO. 3-008 CATCH BASIN DETAILS. HORIZONTALS SHALL BE PLACED IN ALTERNATING ORANGE RINGS OR LAYERS WITH A MIN. OF ONE HORIZONTAL BETWEEN THE LAYER TOP AND TOP OF THE HORIZONTAL.
- ALL REINFORCED CAST-IN-PLACE CONCRETE SHALL BE CLASS 4000. ALL PRECAST CONCRETE SHALL BE CLASS 4000.
- PRECAST BASES SHALL BE FINISHED WITH CURBOUTS OR UNDESIGNED. UNDESIGNED SHALL HAVE WALL THICKNESS OF 2 IN. MIN. BRICKED INCHOUTS NEED NOT BE GRouted IF WALL IS LEFT EXPOSED. FINISH SHALL BE FINISHED ONLY IN FACTORY WORKSHOPS UNLESS OTHERWISE APPROVED BY THE CONTRACTOR.
- UNDESIGNED OR CURBOUT HOLE SIZE SHALL BE MIN. PIPE OUTER DIA. PLUS CATCH BASIN WALL THICKNESS. MIN. HOLE SIZE SHALL BE 24 IN. FOR 48 IN. C.I.P. OR 30 IN. FOR 60 IN. C.I.P., 48 IN. FOR 60 IN. C.I.P., 60 IN. FOR 72 IN. C.I.P., 64 IN. FOR 60 IN. C.I.P. UNDESIGNED HOLE SIZE SHALL BE 8 IN. FOR 48 IN. C.I.P. AND 10 IN. C.I.P. FOR 72 IN. AND 12 IN. C.I.P.
- CATCH BASIN FRAMES AND GRATES OR COVERS SHALL BE IN ACCORDANCE WITH SEC. 7.05 AND MEET THE STRUCTURAL REQUIREMENTS OF FEDERAL SPECIFICATION 88-2-8210. BRIDGE SURFACES SHALL BE FINISHED TO ASSURE NON-SKIDDING FIT WITH ANY COVER POSITION.
- ALL BASE REINFORCING STEEL SHALL HAVE A MIN. YIELD STRENGTH OF 60,000 PSI AND BE PLACED IN THE UPPER HALF OF THE BASE WITH 1 IN. MIN. CLEARANCE.
- MIN. 100# BENTONITE SHALL BE MAINTAINED, 1/2" LAYER FOR EACH FOOT.
- FOR DETAILS SHOWING LADDERS, STEPS, HORIZONTALS AND TOP SLABS. SEE FIG. 7-004.
- SEE THE NOTES/APPROXIMATE SPECIFICATIONS SEC. 7-003 FOR JOINT REQUIREMENTS.

**CATCH BASIN TYPE 2 (B)**  
NTS C05



**STORM DRAIN INLET PROTECTION (E)**  
NTS C02

BASE MAPTOGRAPHY PROVIDED BY OTHERS. DCS CANNOT BE HELD LIABLE FOR ACCURACY. CONTRACTOR SHALL FIELD VERIFY GRADES, UTILITIES, AND ALL OTHER EXISTING FEATURES AND CONDITIONS. IF CONDITIONS ARE NOT AS SHOWN AND/OR PLANS CANNOT BE CONSTRUCTED AS SHOWN, CONTACT DCS PRIOR TO CONSTRUCTION.

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

(UNDERGROUND UTILITY LOCATIONS ARE APPROX.)

DAVIDO CONSULTING GROUP, INC.  
Civil - Structural - Land Use

AP  
LEED  
GREEN BUILDING  
CERTIFICATION

BOULEVARD PARK LLC  
5319 FIRST AVE S  
SEATTLE, WASHINGTON 98108

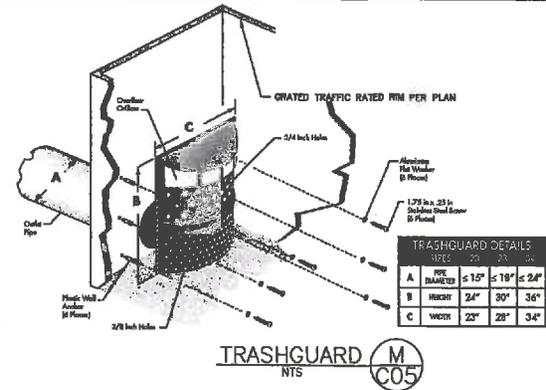
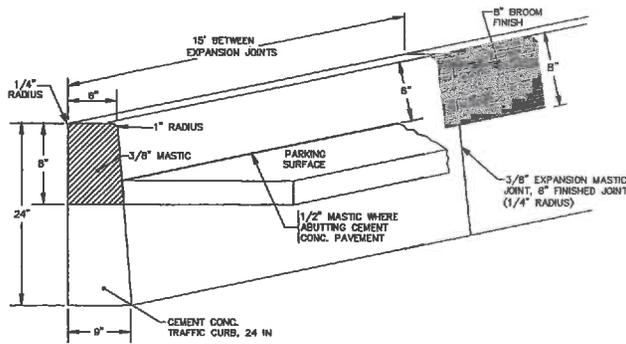
9 116TH ST SUBDIVISION  
9 116TH ST SEATTLE, WA 98168  
DETAILS

PROJECT: 06/09/2014  
DATE: 06/09/2014  
BY: [Signature]  
CHECKED BY: [Signature]  
DESIGNED BY: [Signature]  
DRAWN BY: [Signature]  
SCALE: [Signature]  
DATE: [Signature]  
REV: [Signature]  
BY: [Signature]  
DATE: [Signature]

SHEET NUMBER  
**C08**







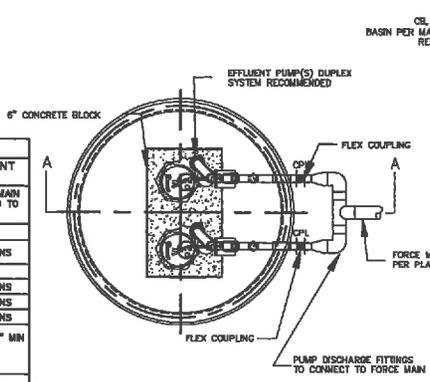
TRASHGUARD M C05

PUMP GENERAL NOTES

- IF A PUMP IS REQUIRED TO CONNECT THE SERVICE DRAIN FORCE LINE TO A SIDE SEWER OR PUBLIC MAIN, THE PERMITTEE SHALL ATTACH A COPY OF THE PUMP MANUFACTURER'S SPECIFICATIONS TO THE SIDE SEWER PERMIT FOR SERVICE DRAIN. THE PUMP SPECIFICATIONS SHALL INCLUDE GALLONS PER MINUTE (GPM) AND THE TOTAL SYSTEM HEAD (STATIC HEAD AND DYNAMIC HEAD).
- PUMPS SHALL BE STANDARD MANUFACTURE AND SHALL BE SPECIFICALLY DESIGNED FOR THE APPLICABLE USE (E.G., DRAINAGE DISCHARGES FOR A SPECIFIC PROJECT) USING THE PUMP MANUFACTURER'S RECOMMENDED OPERATING GUIDELINES. PUMP SIZING DATA AND/OR CALCULATIONS SHALL BE SUBMITTED TO THE CITY OF BURDEN DURING THE REVIEW PROCESS OF A ROUTED PLAN SET.
- NO MORE THAN ONE PROPERTY SHALL BE CONNECTED TO ANY PUMP SYSTEM, INCLUDING THE FORCE-LINE, UNLESS AUTHORIZED BY THE CITY OF BURDEN.
- AN ELECTRICAL PERMIT IS REQUIRED FOR AN ELECTRICAL HOOKUP OF A PUMP IF A NEW CIRCUIT IS REQUIRED FOR THE PUMP.
- A DUPLEX PUMP SYSTEM IS REQUIRED FOR NON-RESIDENTIAL STRUCTURES, SUCH AS FACTORIES, LARGE BUSINESS AND OFFICE STRUCTURES, RESTAURANTS, AND PROCESSING PLANTS. RESIDENTIAL STRUCTURES INCLUDING MULTI-UNIT RESIDENTIAL STRUCTURES, AND SMALL NON-RESIDENTIAL STRUCTURES, SUCH AS WAREHOUSES OR OFFICE STRUCTURES WITH LOW VOLUMES OF DRAINAGE DISCHARGES, MAY NOT REQUIRE THE INSTALLATION OF DUPLEX PUMPS.
- A DUPLEX PUMP SYSTEM IS REQUIRED FOR PROJECTS LOCATED WITHIN AN EDA WHEN THE PUMP SYSTEM IS LOCATED AT THE TOP OF A STEEP SLOPE. THE DUPLEX PUMP DESIGN SHALL USE A 20 YEAR STORM EVENT PROVIDED THERE IS A 100-YEAR DETENTION FACILITY INCORPORATED WITH THE DRAINAGE DESIGN.
- THE DISCHARGE PIPE (FORCE-LINE) SHALL HAVE A NON-CORROSIVE CHECK-VALVE, A QUICK-RELEASE-CONNECTOR/FITTING, AND A NON-CORROSIVE GATE-VALVE TO FACILITATE PUMP REMOVAL. THE PIPE SHALL BE PVC SCHEDULE 40 OR AS APPROVED BY THE SITE INSPECTOR.
- A FORCE-LINE PIPE MAY NOT CONNECT DIRECTLY TO A PUBLIC MAIN. PRIOR TO CONNECTING TO THE PUBLIC MAIN, THE FORCE-LINE SHALL DISCHARGE INTO A STANDARD, GRAVITY-FLOW SECTION OF SERVICE DRAIN PIPE THAT IS AT LEAST 10 FEET IN LENGTH (SEE DETAIL 11).
- FORCE-LINE SECTIONS OF PIPE ARE REQUIRED TO HAVE 90° ELBOWS FOR EACH OF THE FOLLOWING TWO CONDITIONS: 1) A MAXIMUM OF 100 FOOT INTERVALS AND 2) WHEREVER FITTING BENDS TOTAL 135°.
- IF THE FORCE-LINE PIPE NEEDS TO BE COVERED AND THE PUMP(S) ARE NOT AVAILABLE FOR TESTING, OR IF TESTING OF THE DISCHARGE PIPING IS IMPRACTICABLE, THEN THE OWNER WILL BE REQUIRED TO EXECUTE A HOLD HARMLESS AGREEMENT WITH KING COUNTY IF PRESURE TESTING OF THE DISCHARGE PIPING SYSTEM IS IMPRACTICABLE.
- IF A SEPARATE PUMP IS USED FOR THE STORMWATER SYSTEM ONLY, THE PUMP SHALL BE INSTALLED IN A CHAMBER THAT IS READILY SERVICEABLE. THE TANK SHALL BE MADE OF NON-POROUS, NON-CORROSIVE, STRUCTURALLY SOUND MATERIAL SUCH AS PLASTIC, FIBERGLASS, STAINLESS STEEL, OR CONCRETE.
- PUMP SYSTEMS SHALL BE DESIGNED AND INSTALLED TO PROVIDE EASY ACCESS FROM THE GROUND SURFACE TO ALL MECHANICAL AND ELECTRICAL DEVICES.
- THE FORCE MAIN PIPE LOCATED OUTSIDE THE BUILDING MUST WITHSTAND THE LINE PRESSURE BEFORE THE TESTING REQUIREMENTS.
- AN AUDIBLE ALARM SYSTEM IS RECOMMENDED FOR PUMP SYSTEMS.
- PUMPS LOCATED WITHIN A BUILDING ARE SUBJECT TO KING COUNTY PUBLIC HEALTH INSPECTION.

- NOTES:
- EXPANSION JOINT MATERIAL TO BE 3/8" THICK REMOLDED JOINT FILLER. FULL THICKNESS OF CONCRETE. EXPANSION JOINT SPACING TO BE 15' O.C. AND SHALL BE 5' FROM DRAINAGE OPENINGS
  - FORM AND SUBGRADE INSPECTION REQUIRED BEFORE POURING CONCRETE.
  - JOINTS SHALL BE TROWELED AND FINISHED FORMED, PERPENDICULAR TO STREET AND EXPOSED
  - CONCRETE SHALL BE CLASS 3000
  - BROOM FINISH TO BE PARALLEL TO STREET
  - USE ON STREET CLASSIFICATIONS WHERE BIKE LANE IS REQUIRED OR PLANNED.

CEMENT CONCRETE CURB L C01



DUPLEX PUMP STATION N C05

PUMP SPECIFICATIONS	
GENERAL DESCRIPTION	DUPLEX SUBMERSIBLE EFFLUENT PUMP
DESIGN FLOW & TDH	18 GPM @ 14 TDH (BASED ON FORCE MAIN DIAM. AND LENGTH PER PLAN DOUBLED TO ACCOUNT FOR MINOR LOSSES)
MINIMUM SOLIDS HANDLING	3/4"
PUMP EFFICIENCY	PER MANUFACTURER'S RECOMMENDATIONS
PUMP ELECTRICAL	SINGLE PHASE
PUMP CONTROLS	PER MANUFACTURER'S RECOMMENDATIONS
PUMP MOUNTING & DISCHARGE	PER MANUFACTURER'S RECOMMENDATIONS
DISCHARGE MANFOLD	PER MANUFACTURER'S RECOMMENDATIONS
FORCE MAIN & FITTINGS	2" (USED FOR TDH CALCS. CAN USE 2" MIN UP TO 4" MAX BUT REQUIRES RECALCULATION OF TDH)
CONTROL/FLOAT SPECIFICATIONS	PER MANUFACTURER'S RECOMMENDATIONS

- NOTES:
- THESE SPECIFICATIONS ARE SCHEMATIC IN NATURE AND SHALL BE CONFIRMED BY THE SUPPLIER AND CONTRACTOR.
  - PUMP FLOATS/CONTROLS AND DISCHARGE VALVES SHALL BE FIELD TESTED AND ADJUSTED TO ACHIEVE DESIGN FLOW AND OPTIMUM PUMP CYCLE TIMES PER MANUFACTURER'S RECOMMENDATIONS.
  - DUPLEX PUMP STATION RECOMMENDED.

CADD FILE NUMBER: P:\CADD\DESIGN\110181 ST SUBDIVISION\DWG\DWG\110181 SUBDIVISION.DWG  
 DATE: 5/17/2014 2:40 PM  
 SHEET SET: 2 (110181 SUBDIVISION - GENERAL SHEET SET) AND A (110181 X TLOD INDEX)  
 CADD FILE NUMBER: P:\CADD\DESIGN\110181 ST SUBDIVISION\DWG\DWG\110181 SUBDIVISION.DWG  
 DATE: 5/17/2014 2:40 PM  
 SHEET SET: 2 (110181 SUBDIVISION - GENERAL SHEET SET) AND A (110181 X TLOD INDEX)

REVISION

No.	DATE	BY

LEED AP

DAVIDCO CONSULTING GROUP, INC.  
 Civil - Structural - Land Use

110181 ST SUBDIVISION  
 5319 FIRST AVE S  
 SEATTLE, WASHINGTON 98108

PROJECT: 05082814

SHEET NUMBER

SCALE: 1/8" = 1'-0"

C11

BASE MAP TOPOGRAPHY PROVIDED BY OTHERS. DCA CANNOT BE HELD LIABLE FOR ACCURACY. CONTRACTOR SHALL FIELD VERIFY GRADES, UTILITIES, AND ALL OTHER EXISTING FEATURES AND CONDITIONS. IF CONDITIONS ARE NOT AS SHOWN AND/OR PLANS CANNOT BE CONSTRUCTED AS SHOWN, CONTACT DCA PRIOR TO CONSTRUCTION.

CALL 2 DAYS BEFORE YOU DIG  
 1-800-424-5555  
 (UNDERGROUND UTILITY LOCATOR ARE APPROX.)

**APPENDIX D    Temporary Erosion and Sediment Control Plan**





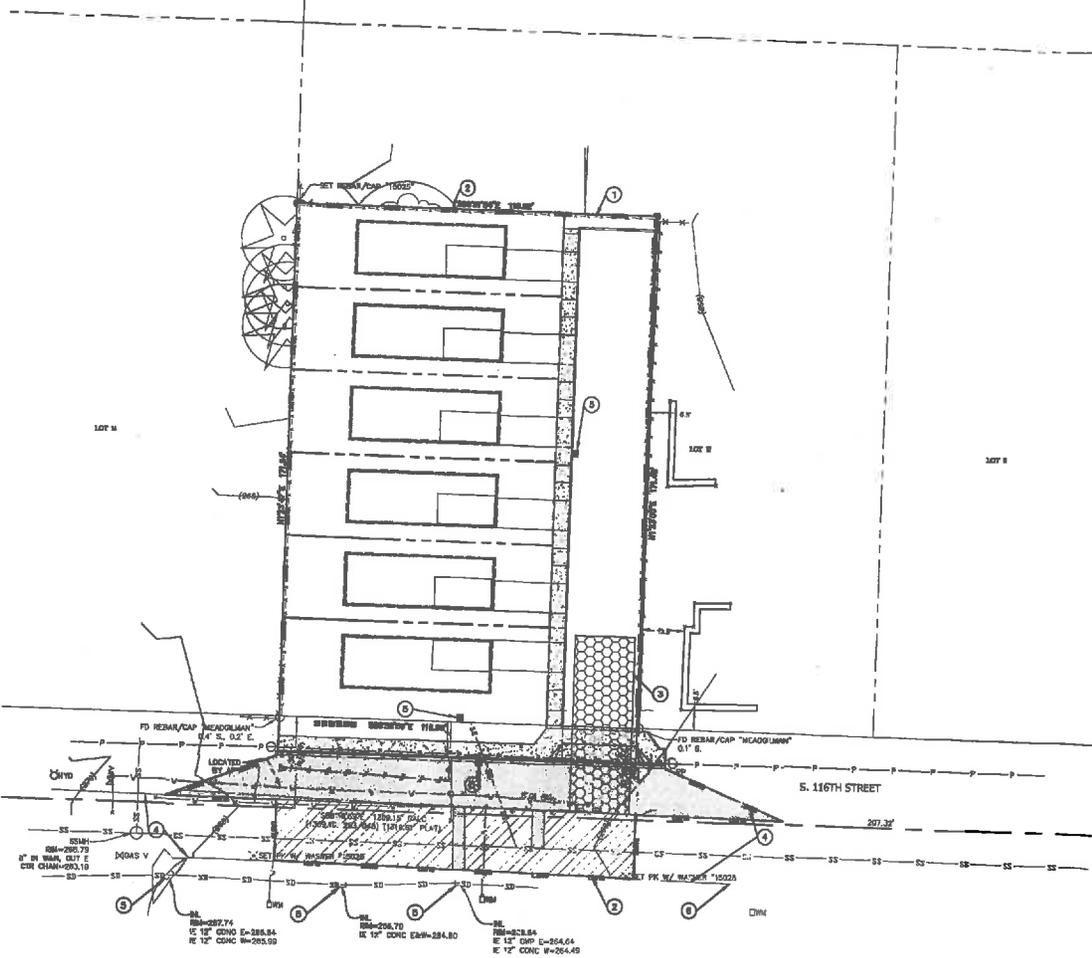
### EROSION AND SEDIMENT CONTROL RECOMMENDED CONSTRUCTION SEQUENCE:

- (1) PRE-CONSTRUCTION MEETING.
- (2) POST SIGN WITH NAME AND PHONE NUMBER OF ESC SUPERVISOR (MAY BE CONSOLIDATED WITH THE REQUIRED NOTICE OF CONSTRUCTION SIGN).
- (3) FLAG OR FENCE CLEARING LIMITS.
- (4) INSTALL CATCH BASIN PROTECTION IF REQUIRED.
- (5) GRADE AND INSTALL CONSTRUCTION ENTRANCES.
- (6) INSTALL PERIMETER PROTECTION (SILT FENCE, BRUSH BARRIER, ETC.).
- (7) CONSTRUCT SEDIMENT PONDS AND TRAPS.
- (8) GRADE AND STABILIZE CONSTRUCTION ROADS.
- (9) CONSTRUCT SURFACE WATER CONTROLS (INTERCEPTOR DIKES, PIPE SLOPE DRAINS, ETC.) SIMULTANEOUSLY WITH CLEARING AND GRADING FOR PROJECT DEVELOPMENT.
- (10) MAINTAIN EROSION CONTROL MEASURES IN ACCORDANCE WITH KING COUNTY STANDARDS AND MANUFACTURER'S RECOMMENDATIONS.
- (11) RELOCATE EROSION CONTROL MEASURES OR INSTALL NEW MEASURES SO THAT AS SITE CONDITIONS CHANGE THE EROSION AND SEDIMENT CONTROL IS ALWAYS IN ACCORDANCE WITH THE KING COUNTY EROSION AND SEDIMENT CONTROL STANDARDS.
- (12) COVER ALL AREAS THAT WILL BE UNWORKED FOR MORE THAN SEVEN DAYS DURING THE DRY SEASON OR TWO DAYS DURING THE WET SEASON WITH STRAW, WOOD FIBER MULCH, COMPOST, PLASTIC SHEETING OR EQUIVALENT.
- (13) STABILIZE ALL AREAS THAT REACH FINAL GRADE WITH SEVEN DAYS.
- (14) REED OR BOD ANY AREAS TO REMAIN UNWORKED FOR MORE THAN 30 DAYS.
- (15) UPON COMPLETION OF THE PROJECT, ALL DISTURBED AREAS MUST BE STABILIZED AND SIGNS REMOVED IF APPROPRIATE.

KEY NOTES:		
KEY	NOTE:	DETAIL SHEET
1	INSTALL APPROX 120 LF PERIMETER PROTECTION*	D/DOB, H/C10
2	LIMITS OF DISTURBANCE	-
3	INSTALL TEMPORARY STABILIZED CONSTRUCTION ENTRANCES	J/C10
4	CONTRACTOR TO SWEEP STREET DAILY OR AT MORE FREQUENT INTERVALS AS NEEDED	-
5	INSTALL TEMPORARY STORM DRAIN INLET PROTECTION	E/C08
6	INSTALL TEMPORARY STORM DRAIN INLET PROTECTION TO ALL STORM DRAIN INLETS 20' DOWNSTREAM OF SITE	E/C08

### GENERAL NOTE:

\*INSTALL PERIMETER PROTECTION SUCH AS SILT FENCING, COMPOST SOCKS, OR STRAW/BATTLES IN ACCORDANCE WITH APPENDIX D OF THE 2008 KING COUNTY SURFACE WATER DESIGN MANUAL.



### EROSION AND SEDIMENTATION CONTROL NOTES

- (1) APPROVAL OF THIS EROSION AND SEDIMENTATION CONTROL (ESC) PLAN DOES NOT CONSTITUTE AN APPROVAL OF PERMANENT ROAD OR DRAINAGE DESIGN (E.G. SIZE AND LOCATION OF ROADS, PIPES, RESTRICT ORS, CHANNELS, RETENTION FACILITIES, UTILITIES, ETC.).
- (2) THE IMPLEMENTATION OF THESE ESC PLANS AND THE CONSTRUCTION, MAINTENANCE, RE-ASSASSMENT, AND UPGRADING OF THESE ESC FACILITIES IS THE RESPONSIBILITY OF THE APPLICANT/ESC SUPERVISOR UNTIL ALL CONSTRUCTION IS APPROVED.
- (3) THE BOUNDARIES OF THE CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED BY THE APPLICANT/ESC SUPERVISOR.
- (4) STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES, SUCH AS CONSTRUCTED SWEEP WASH SYSTEMS OR WASH PADS, MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN AND TRAFFIC OUT TO ROAD RIGHT OF WAY DOES NOT OCCUR FOR THE DURATION OF THE PROJECT.
- (5) THE ESC FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED PRIOR TO OR IN CONJUNCTION WITH ALL CLEARING AND GRADING SO AS TO ENSURE THAT THE TRANSPORT OF SEDIMENT TO SURFACE WATERS, DRAINAGE SYSTEMS, AND ADJACENT PROPERTIES IS MINIMIZED.
- (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 SITE CONDITIONS AND MODIFIED TO ACCOUNT FOR CHANGING SITE CONDITIONS (E.G. ADDITIONAL COVER MEASURES, ADDITIONAL SUMP PUMPS, RELOCATION OF DITCHES AND SILT FENCES, PERIMETER PROTECTION ETC.).
- (7) THE ESC FACILITIES SHALL BE INSPECTED DAILY BY THE APPLICANT/ESC SUPERVISOR AND MAINTAINED TO ENSURE CONTINUED PROPER FUNCTIONING. WRITTEN RECORDS SHALL BE KEPT OF WEEKLY REVIEWS OF THE ESC FACILITIES.
- (8) ANY AREAS OF EXPOSED SOIL, INCLUDING ROADWAY EMBANKMENTS, THAT WILL NOT BE DISTURBED FOR TWO DAYS DURING THE WET SEASON OR SEVEN DAYS DURING THE DRY SEASON SHALL BE IMMEDIATELY STABILIZED WITH THE APPROVED ESC COVER METHODS (E.G. SEEDING, MULCHING, PLASTIC COVERING, ETC.).
- (9) ANY AREA REQUIRING ESC MEASURES, NOT REQUIRING IMMEDIATE ATTENTION, SHALL BE ADDRESSED WITHIN SEVEN (7) DAYS. THE ESC FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A MONTH OR WITHIN 24 HOURS FOLLOWING A STORM EVENT.
- (10) AT NO TIME SHALL MORE THAN ONE (1) FOOT OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A CATCH BASIN. ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO PAVING. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT-LOADED WATER INTO THE DOWNSPRAW SYSTEM.
- (11) ANY PERMANENT RETENTION/DETENTION FACILITY USED AS A TEMPORARY SETTLING BASIN SHALL BE MODIFIED WITH THE NECESSARY EROSION CONTROL MEASURES AND SHALL PROVIDE ADEQUATE STORAGE CAPACITY. IF THE PERMANENT FACILITY IS TO FUNCTION ULTIMATELY AS AN INFILTRATION SYSTEM, THE TEMPORARY FACILITY MUST BE ROUGH GRADED SO THAT THE BOTTOM AND SIDES ARE AT LEAST THREE FEET ABOVE THE FINAL GRADE OF THE PERMANENT FACILITY.
- (12) COVER MEASURES WILL BE APPLIED IN CONFORMANCE WITH APPENDIX D OF THE SURFACE WATER DESIGN MANUAL.
- (13) PRIOR TO THE BEGINNING OF THE WET SEASON (OCT. 1), ALL DISTURBED AREAS SHALL BE REVIEWED TO IDENTIFY "HOT SPOTS" AREAS SHALL BE SEEDED WITHIN ONE WEEK OF THE BEGINNING OF THE WET SEASON. A SWEEP MAP OF THOSE AREAS TO BE SEEDED AND THOSE AREAS TO REMAIN UNCOVERED SHALL BE SUBMITTED TO THE DCB INSPECTOR FOR REVIEW.

BASE PHOTOGRAPHY PROVIDED BY OTHERS. DCB CANNOT BE HELD LIABLE FOR ACCURACY. CONTRACTOR SHALL VERIFY GRADES, UTILITIES, AND ALL OTHER EXISTING FEATURES AND CONDITIONS. IF CONDITIONS ARE NOT AS SHOWN AND/OR PLANS CANNOT BE CONSTRUCTED AS SHOWN, CONTACT DCB PRIOR TO CONSTRUCTION.

**CALL 2 DAYS BEFORE YOU DIG**  
1-800-424-5555  
(UNDERGROUND UTILITY LOCATIONS ARE APPROX.)

NO.	DATE	BY	REVISION

David Consulting Group, Inc.  
 Civil - Structure - Land Use  
 2500 Westover Drive, Suite 111  
 Bellevue, WA 98005  
 206.775.1110

BOULEVARD PARK LLC  
 5319 FIRST AVE S  
 SEATTLE, WASHINGTON 98108  
 S 116TH ST SUBDIVISION  
 S 116TH ST SEATTLE, WA 98168  
 EROSION CONTROL PLAN

OWNER: BOULEVARD PARK LLC  
 PROJECT: S 116TH ST SUBDIVISION EROSION CONTROL PLAN  
 PROJ. MANAGER: ED  
 DESIGNED BY: TLM  
 DRAWN BY: RMB  
 CHECKED BY: TLM  
 SCALE: AS SHOWN  
 DATE: 05/08/2014 REV. SHEET: 14  
 SHEET NUMBER: C02

CAD FILE NUMBER: P:\CADD\116TH\116TH\_07\_08\EROSION\CONSTRUCTION\116TH\_EROSION\CONSTRUCTION.dwg DATE: 05/08/2014 2:40 PM - SHEET 14 OF 14  
 PLOT FILE NUMBER: P:\CADD\116TH\116TH\_07\_08\EROSION\CONSTRUCTION\116TH\_EROSION\CONSTRUCTION.dwg DATE: 05/08/2014 2:40 PM - SHEET 14 OF 14



**APPENDIX E    Operation and Maintenance**



## **S 116<sup>th</sup> Street Subdivision Operation and Maintenance Manual**

### **Person or Organization Responsible for Maintenance of the On-Site Storm System:**

Michael Bellan  
5319 1<sup>st</sup> Ave S  
Seattle, WA 98108

### **The Location Where the Operation and Maintenance Manual is to be Kept:**

1832 S 116<sup>th</sup> Street  
Burien, WA 98168

\*Note: The manual and maintenance activity log must be made available to the City of Burien for inspection purposes.

### **Description of On-Site Storm System**

Stormwater runoff from the proposed buildings will be captured in roof downspouts and routed to a Type 1 catch basin prior to entering an onsite detention facility. The detention facility will be connected to a Type 2 manhole and multi-orifice flow restrictor tee which will provide Level 2 flow control in accordance with The Manual. The detention facility will be comprised of 1,240 R-tank units (8 units wide, 31 units long and 5 units high) and will include an impermeable liner along the bottom and sides to prevent water from escaping the facility. Runoff will be routed from the detention facility to a pump station which will pump stormwater up to a Type 1 catch basin at the south property line before gravity flowing to an existing catch basin in the south side of S 116<sup>th</sup> Street.

The proposed access road and individual driveways will be porous asphalt and will satisfy the flow control best management practice (FCBMP) requirement stipulated by The Manual. Per the 2012 LID Technical Guidance Manual for Puget Sound, an 18-inch engineered soils layer beneath the permeable pavement with a cation exchange capacity of  $\geq 5$  milliequivalents/100 grams dry soil, minimum organic matter content of 0.5% and a maximum infiltration rate of 12 inches per hour will provide water quality for stormwater infiltrated through the porous asphalt. Overflow from the porous asphalt will be routed to the detention facility described above.

The onsite conveyance system will consist of 4" roof downspouts and tightlines and 6-36" PVC pipe. Conveyance pipes have been sized in accordance with Section 1.2.4.1 of the KCSWDM to handle the 25-year storm and as much of the 100-year storm as to not create or aggravate a severe flooding problem or severe erosion problem.

The catch basins, porous asphalt, engineered soils layer, and detention facility described above serve as source control of pollution on the project site. In order to control pollutants, proper maintenance and cleaning of debris, sediments, and oil from

stormwater collection and conveyance systems is required per the operation and maintenance recommendations found in the KCSWDM. See the attached sheets for operation and maintenance requirements pertaining to the project.

**Contact Information for Stormwater Facility Installers:**

**Contractor (Installer of On-Site Stormwater Facilities)**

Michael Bellan  
Bellan Construction Inc.  
5319 1<sup>st</sup> Ave S  
Seattle, WA 98108  
Phone – 206.329.9867  
[michael@bellan.com](mailto:michael@bellan.com)

**Civil Engineer (Designer of On-Site Stormwater Facilities)**

Erik Davido P.E., LEED A.P.  
Davido Consulting Group, Inc  
15029 Bothell Way NE  
Lake Forest Park, WA 98155  
Phone – 206.523.0024  
[erik@dcgengr.com](mailto:erik@dcgengr.com)

**Attachments**

- Operation and Maintenance Recommendations for Control Structure/Flow Restrictor from the 2009 KCSWDM
- Operation and Maintenance Recommendations for Catch Basins and Manholes from the 2009 KCSWDM
- Operation and Maintenance Recommendations for Conveyance Pipes and Ditches from the 2009 KCSWDM
- Operation and Maintenance Recommendations for Grounds (Landscaping) from the 2009 KCSWDM
- Operation and Maintenance Recommendations for Access Roads from the 2009 KCSWDM
- Operation and Maintenance Recommendations for Porous Pavement from the 2012 LID Technical Guidance Manual for Puget Sound
- ACF R-Tank Maintenance Brochure
- ACF Maintenance Port Kit Brochure

**NO. 4 – CONTROL STRUCTURE/FLOW RESTRICTOR**

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Structure	Trash and debris	Trash or debris of more than 1/2 cubic foot which is located immediately in front of the structure opening or is blocking capacity of the structure by more than 10%.	No Trash or debris blocking or potentially blocking entrance to structure.
		Trash or debris in the structure that exceeds 1/3 the depth from the bottom of basin to invert the lowest pipe into or out of the basin.	No trash or debris in the structure.
		Deposits of garbage exceeding 1 cubic foot in volume.	No condition present which would attract or support the breeding of insects or rodents.
	Sediment	Sediment exceeds 60% of the depth from the bottom of the structure to the invert of the lowest pipe into or out of the structure or the bottom of the FROP-T section or is within 6 inches of the invert of the lowest pipe into or out of the structure or the bottom of the FROP-T section.	Sump of structure contains no sediment.
	Damage to frame and/or top slab	Corner of frame extends more than 3/4 inch past curb face into the street (if applicable).	Frame is even with curb.
		Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch.	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab.	Frame is sitting flush on top slab.
	Cracks in walls or bottom	Cracks wider than 1/2 inch and longer than 3 feet, any evidence of soil particles entering structure through cracks, or maintenance person judges that structure is unsound.	Structure is sealed and structurally sound.
		Cracks wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering structure through cracks.	No cracks more than 1/4 inch wide at the joint of inlet/outlet pipe.
	Settlement/ misalignment	Structure has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Basin replaced or repaired to design standards.
	Damaged pipe joints	Cracks wider than 1/2-inch at the joint of the inlet/outlet pipes or any evidence of soil entering the structure at the joint of the inlet/outlet pipes.	No cracks more than 1/4-inch wide at the joint of inlet/outlet pipes.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Ladder rungs missing or unsafe	Ladder is unsafe due to missing rungs, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
FROP-T Section	Damage	T section is not securely attached to structure wall and outlet pipe structure should support at least 1,000 lbs of up or down pressure.	T section securely attached to wall and outlet pipe.
		Structure is not in upright position (allow up to 10% from plumb).	Structure in correct position.
		Connections to outlet pipe are not watertight or show signs of deteriorated grout.	Connections to outlet pipe are water tight; structure repaired or replaced and works as designed.
		Any holes—other than designed holes—in the structure.	Structure has no holes other than designed holes.
Cleanout Gate	Damaged or missing	Cleanout gate is missing.	Replace cleanout gate.

<b>NO. 4 – CONTROL STRUCTURE/FLOW RESTRICTOR</b>			
<b>Maintenance Component</b>	<b>Defect or Problem</b>	<b>Condition When Maintenance is Needed</b>	<b>Results Expected When Maintenance is Performed</b>
		Cleanout gate is not watertight.	Gate is watertight and works as designed.
		Gate cannot be moved up and down by one maintenance person.	Gate moves up and down easily and is watertight.
		Chain/rod leading to gate is missing or damaged.	Chain is in place and works as designed.
Orifice Plate	Damaged or missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
	Deformed or damaged lip	Lip of overflow pipe is bent or deformed.	Overflow pipe does not allow overflow at an elevation lower than design
Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20% or more of the pipe.	Inlet/outlet pipes clear of sediment.
	Trash and debris	Trash and debris accumulated in inlet/outlet pipes (includes floatables and non-floatables).	No trash or debris in pipes.
	Damaged	Cracks wider than 1/8-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than 1/8-inch wide at the joint of the inlet/outlet pipe.
Metal Grates (If Applicable)	Unsafe grate opening	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and debris	Trash and debris that is blocking more than 20% of grate surface.	Grate free of trash and debris. footnote to guidelines for disposal
	Damaged or missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.
Manhole Cover/Lid	Cover/lid not in place	Cover/lid is missing or only partially in place. <b>Any open structure requires urgent maintenance.</b>	Cover/lid protects opening to structure.
	Locking mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to Remove	One maintenance person cannot remove cover/lid after applying 80 lbs. of lift.	Cover/lid can be removed and reinstalled by one maintenance person.

**NO. 5 – CATCH BASINS AND MANHOLES**

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Structure	Sediment	Sediment exceeds 60% of the depth from the bottom of the catch basin to the invert of the lowest pipe into or out of the catch basin or is within 6 inches of the invert of the lowest pipe into or out of the catch basin.	Sump of catch basin contains no sediment.
	Trash and debris	Trash or debris of more than ½ cubic foot which is located immediately in front of the catch basin opening or is blocking capacity of the catch basin by more than 10%.	No Trash or debris blocking or potentially blocking entrance to catch basin.
		Trash or debris in the catch basin that exceeds 1/3 the depth from the bottom of basin to invert the lowest pipe into or out of the basin.	No trash or debris in the catch basin.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within catch basin.
		Deposits of garbage exceeding 1 cubic foot in volume.	No condition present which would attract or support the breeding of insects or rodents.
	Damage to frame and/or top slab	Corner of frame extends more than ¾ inch past curb face into the street (if applicable).	Frame is even with curb.
		Top slab has holes larger than 2 square inches or cracks wider than ¼ inch.	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than ¼ inch of the frame from the top slab.	Frame is sitting flush on top slab.
	Cracks in walls or bottom	Cracks wider than ½ inch and longer than 3 feet, any evidence of soil particles entering catch basin through cracks, or maintenance person judges that catch basin is unsound.	Catch basin is sealed and structurally sound.
		Cracks wider than ½ inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	No cracks more than 1/4 inch wide at the joint of inlet/outlet pipe.
	Settlement/ misalignment	Catch basin has settled more than 1 inch or has rotated more than 2 inches out of alignment.	Basin replaced or repaired to design standards.
	Damaged pipe joints	Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering the catch basin at the joint of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of inlet/outlet pipes.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Inlet/Outlet Pipe	Sediment accumulation	Sediment filling 20% or more of the pipe.
Trash and debris		Trash and debris accumulated in inlet/outlet pipes (includes floatables and non-floatables).	No trash or debris in pipes.
Damaged		Cracks wider than ½-inch at the joint of the inlet/outlet pipes or any evidence of soil entering at the joints of the inlet/outlet pipes.	No cracks more than ¼-inch wide at the joint of the inlet/outlet pipe.

<b>NO. 5 – CATCH BASINS AND MANHOLES</b>			
<b>Maintenance Component</b>	<b>Defect or Problem</b>	<b>Condition When Maintenance is Needed</b>	<b>Results Expected When Maintenance is Performed</b>
Metal Grates (Catch Basins)	Unsafe grate opening	Grate with opening wider than $7/8$ inch.	Grate opening meets design standards.
	Trash and debris	Trash and debris that is blocking more than 20% of grate surface.	Grate free of trash and debris. footnote to guidelines for disposal
	Damaged or missing	Grate missing or broken member(s) of the grate. <b>Any open structure requires urgent maintenance.</b>	Grate is in place and meets design standards.
Manhole Cover/Lid	Cover/lid not in place	Cover/lid is missing or only partially in place. <b>Any open structure requires urgent maintenance.</b>	Cover/lid protects opening to structure.
	Locking mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts cannot be seated. Self-locking cover/lid does not work.	Mechanism opens with proper tools.
	Cover/lid difficult to Remove	One maintenance person cannot remove cover/lid after applying 80 lbs. of lift.	Cover/lid can be removed and reinstalled by one maintenance person.

**NO. 6 – CONVEYANCE PIPES AND DITCHES**

Maintenance Component	Defect or Problem	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Pipes	Sediment & debris accumulation	Accumulated sediment or debris that exceeds 20% of the diameter of the pipe.	Water flows freely through pipes.
	Vegetation/roots	Vegetation/roots that reduce free movement of water through pipes.	Water flows freely through pipes.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Damage to protective coating or corrosion	Protective coating is damaged; rust or corrosion is weakening the structural integrity of any part of pipe.	Pipe repaired or replaced.
	Damaged	Any dent that decreases the cross section area of pipe by more than 20% or is determined to have weakened structural integrity of the pipe.	Pipe repaired or replaced.
Ditches	Trash and debris	Trash and debris exceeds 1 cubic foot per 1,000 square feet of ditch and slopes.	Trash and debris cleared from ditches.
	Sediment accumulation	Accumulated sediment that exceeds 20% of the design depth.	Ditch cleaned/flushed of all sediment and debris so that it matches design.
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to County personnel or the public.	Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where County personnel or the public might normally be.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Vegetation	Vegetation that reduces free movement of water through ditches.	Water flows freely through ditches.
	Erosion damage to slopes	Any erosion observed on a ditch slope.	Slopes are not eroding.
	Rock lining out of place or missing (if Applicable).	One layer or less of rock exists above native soil area 5 square feet or more, any exposed native soil.	Replace rocks to design standards.

<b>NO. 11 – GROUNDS (LANDSCAPING)</b>			
<b>Maintenance Component</b>	<b>Defect or Problem</b>	<b>Conditions When Maintenance is Needed</b>	<b>Results Expected When Maintenance is Performed</b>
Site	Trash or litter	Any trash and debris which exceed 1 cubic foot per 1,000 square feet (this is about equal to the amount of trash it would take to fill up one standard size office garbage can). In general, there should be no visual evidence of dumping.	Trash and debris cleared from site.
	Noxious weeds	Any noxious or nuisance vegetation which may constitute a hazard to County personnel or the public.	Noxious and nuisance vegetation removed according to applicable regulations. No danger of noxious vegetation where County personnel or the public might normally be.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Grass/groundcover	Grass or groundcover exceeds 18 inches in height.	Grass or groundcover mowed to a height no greater than 6 inches.
Trees and Shrubs	Hazard	Any tree or limb of a tree identified as having a potential to fall and cause property damage or threaten human life. <b>A hazard tree identified by a qualified arborist must be removed as soon as possible.</b>	No hazard trees in facility.
	Damaged	Limbs or parts of trees or shrubs that are split or broken which affect more than 25% of the total foliage of the tree or shrub.	Trees and shrubs with less than 5% of total foliage with split or broken limbs.
		Trees or shrubs that have been blown down or knocked over.	No blown down vegetation or knocked over vegetation. Trees or shrubs free of injury.
		Trees or shrubs which are not adequately supported or are leaning over, causing exposure of the roots.	Tree or shrub in place and adequately supported; dead or diseased trees removed.

**NO. 12 – ACCESS ROADS**

Maintenance Component	Defect or Problem	Condition When Maintenance is Needed	Results Expected When Maintenance is Performed
Site	Trash and debris	Trash and debris exceeds 1 cubic foot per 1,000 square feet (i.e., trash and debris would fill up one standard size garbage can).	Roadway drivable by maintenance vehicles.
		Debris which could damage vehicle tires or prohibit use of road.	Roadway drivable by maintenance vehicles.
	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Blocked roadway	Any obstruction which reduces clearance above road surface to less than 14 feet.	Roadway overhead clear to 14 feet high.
Any obstruction restricting the access to a 10- to 12 foot width for a distance of more than 12 feet or any point restricting access to less than a 10 foot width.		At least 12-foot of width on access road.	
Road Surface	Erosion, settlement, potholes, soft spots, ruts	Any surface defect which hinders or prevents maintenance access.	Road drivable by maintenance vehicles.
	Vegetation on road surface	Trees or other vegetation prevent access to facility by maintenance vehicles.	Maintenance vehicles can access facility.
Shoulders and Ditches	Erosion	Erosion within 1 foot of the roadway more than 8 inches wide and 6 inches deep.	Shoulder free of erosion and matching the surrounding road.
	Weeds and brush	Weeds and brush exceed 18 inches in height or hinder maintenance access.	Weeds and brush cut to 2 inches in height or cleared in such a way as to allow maintenance access.
Modular Grid Pavement	Contaminants and pollution	Any evidence of contaminants or pollution such as oil, gasoline, concrete slurries or paint.	Materials removed and disposed of according to applicable regulations. Source control BMPs implemented if appropriate. No contaminants present other than a surface oil film.
	Damaged or missing	Access surface compacted because of broken or missing modular block.	Access road surface restored so road infiltrates.

**Table IV. Porous Pavement Manual**

Level of Service	Service Level B (Good Effort)	Service Level C (Moderate Effort)	Service Level D (Low Effort)	Recommended Maintenance Activities
<b>Street</b>	Infiltration rate of 20 +in/hr	Infiltration rate of 10 in/hr	Infiltration rate of 3 in/hr	based on peak flows for 100yr design storm 3 in/hr and excess capacity for localized failure
<b>Sidewalk</b>	Infiltration rate of 20 +in/hr	Infiltration rate of 10 in/hr	Infiltration rate of 1 in/hr	
				Test infiltration rates per SPU Materials Lab procedure.
	Pressure wash @2500 psi bi-annually	Pressure wash @ 2500 psi annually	Pressure wash @ 2500 psi annually	
				Pressure wash pavement with an industrial machine

# Site Improvement Bond Quantity Worksheet

Web date: 11/28/2007

	Unit	Price	Unit	Existing Right-of-way		Future Public Road Improvements & Drainage Facilities		Private Improvements		Quant	Compls
				Quant	Price	Quant	Cost	Quant	Cost		
<b>PARKING LOT SURFACING</b>											
	<b>No.</b>										
2" AC, 2" top course rock & 4" borrow	PL - 1	\$ 15.84	SY								
2" AC, 1.5" top course & 2.5" base course	PL - 2	\$ 17.24	SY								
4" select borrow	PL - 3	\$ 4.55	SY								
1.5" top course rock & 2.5" base course	PL - 4	\$ 11.41	SY								
<b>WATER TREATMENT</b>											
(Such as detention/water quality vaults.)	<b>No.</b>										
R-Tank Units including Liner	WI - 1	\$ 5.00	CF					5321	26,605.00		
TrashGuard/Gratemaster	WI - 2	\$ 500.00	EA					3	1,500.00		
Stormwater Pump Station	WI - 3	\$ 4,000.00	EA					1	4,000.00		
Pervious HMA	WI - 4	\$ 117.00	TN					42	4,914.00		
Engineered Soil, 18"	WI - 5	\$ 50.00	CY					295	14,750.00		
Washed Drain Rock	WI - 6	\$ 19.00	TN					186	3,534.00		
Choker Course for Pervious HMA, 2"	WI - 7	\$ 30.00	TN					53	1,590.00		
Ductile Iron Pipe, CI 50, 12"	WI - 8	\$ 90.00	LF	55	4950						
Ductile Iron Pipe, CI 50, 8"	WI - 9	\$ 80.00	LF	5	400						
Cement Conc Curb, 24"	WI - 10	\$ 20.50	LF					359	7,359.50		

<b>SUBTOTAL</b>	5,350.00		84,252.50	
<b>SUBTOTAL (SUM ALL PAGES):</b>	23,130.49		89,964.95	
<b>30% CONTINGENCY &amp; MOBILIZATION:</b>	6,939.15		26,989.49	
<b>GRANDTOTAL:</b>	30,069.64		116,954.44	
<b>COLUMN:</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>

# Site Improvement Bond Quantity Worksheet

Web date: 11/28/2007

**Original bond computations prepared by:**

Name: Tim Gabelein, PE  
 PE Registration Number: 47652  
 Firm Name: Davido Consulting Group, Inc.  
 Address: 15029 Bothell Way NE Suite 600, Lake Forest Park, WA 98155

Date: 5/13/2014  
 Tel. #: 206-523-0024

Project No: \_\_\_\_\_

## ROAD IMPROVEMENTS & DRAINAGE FACILITIES FINANCIAL GUARANTEE REQUIREMENTS

	PERFORMANCE BOND* AMOUNT	BOND* AMOUNT REQUIRED AT RECORDING OR TEMPORARY OCCUPANCY ***	PUBLIC ROAD & DRAINAGE MAINTENANCE/DEFECT BOND*
Stabilization/Erosion Sediment Control (ESC)	(A) \$ <u>3,785.4</u>		
Existing Right-of-Way Improvements	(B) \$ <u>30,069.6</u>		
Future Public Road Improvements & Drainage Facilities	(C) \$ <u>-</u>		
Private Improvements	(D) \$ <u>116,954.4</u>		
Calculated Quantity Completed		(E) \$ <u>-</u>	
Total Right-of Way and/or Site Restoration Bond*/** (First \$7,500 of bond* shall be cash.)	(A+B) \$ <u>33,855.0</u>		
Performance Bond* Amount (A+B+C+D) = TOTAL	(T) \$ <u>150,809.4</u> Minimum bond* amount is \$1000.	T x 0.30 \$ <u>45,242.8</u> OR	
Reduced Performance Bond* Total ***		(T-E) \$ <u>150,809.4</u> Use larger of Tx30% or (T-E)	
Maintenance/Defect Bond* Total			(B+C) x 0.25 = \$ <u>7,517.4</u>

NAME OF PERSON PREPARING BOND\* REDUCTION: \_\_\_\_\_

Date: \_\_\_\_\_

\* NOTE: The word "bond" as used in this document means any financial guarantee acceptable to King County.

\*\* NOTE: KCC 27A authorizes right of way and site restoration bonds to be combined when both are required.

The restoration requirement shall include the total cost for all TESC as a minimum, not a maximum. In addition, corrective work, both on- and off-site needs to be included. Quantities shall reflect worse case scenarios not just minimum requirements. For example, if a salmonid stream may be damaged, some estimated costs for restoration needs to be reflected in this amount. The 30% contingency and mobilization costs are computed in this quantity.

\*\*\* NOTE: Per KCC 27A, total bond amounts remaining after reduction shall not be less than 30% of the original amount (T) or as revised by major design changes.

SURETY BOND RIDER NOTE: If a bond rider is used, minimum additional performance bond shall be \$ 116,954.4 (C+D)-E

REQUIRED BOND\* AMOUNTS ARE SUBJECT TO REVIEW AND MODIFICATION BY DDES

**APPENDIX H Stormwater Facility Summary Sheet**



**STORMWATER FACILITY SUMMARY SHEET** DDES Permit

Number TBD

(provide one Stormwater Facility Summary Sheet per *Natural Discharge Location*)

**Overview:**

Project Name

S 116th Street Subdivision

Date 5/13/2014

**Downstream Drainage Basins**

Major Basin Name Duwamish River

Immediate Basin Name \_\_\_\_\_

**Flow Control:**

Flow Control Facility Name/Number Detention Facility and Flow Restrictor Tee

Facility

Location 1832 S 116th St, Burien, WA

If none,

Flow control provided in regional/shared facility (give location) \_\_\_\_\_

No flow control required \_\_\_\_\_ Exemption number \_\_\_\_\_

**General Facility Information:**

Type/Number of detention facilities: Type/Number of infiltration facilities:

\_\_\_\_\_ ponds

\_\_\_\_\_ ponds

\_\_\_\_\_ vaults

\_\_\_\_\_ tanks

\_\_\_\_\_ tanks

\_\_\_\_\_ trenches

Lined facility with 1,240 R-Tank

units for stormwater storage

Control Structure Location

Southeast corner of subject property in access road

Type of Control Structure \_\_\_\_\_

2

Number of Orifices/Restrictions

Size of Orifice/Restriction:

No. 1 0.330"

No. 2 0.780"

No. 3 \_\_\_\_\_

No. 4 \_\_\_\_\_

Flow Control Performance Standard Level II Stream Protection

Live Storage Volume 4,928 cub. ft. Depth 6.955 feet Volume Factor of Safety \_\_\_\_\_

Number of Acres Served 0.47

Number of Lots 6 new lots

**Dam Safety Regulations (Washington State Department of Ecology)**

Reservoir Volume above natural grade \_\_\_\_\_

Depth of Reservoir above natural grade \_\_\_\_\_

**Facility Summary Sheet Sketch**

All detention, infiltration and water quality facilities must include a detailed sketch.  
(11"x17" reduced size plan sheets may be used)

See Appendix C for a detail of the proposed R-Tank detention facility.

**Water Quality:** 18-inches of imported soil beneath the permeable pavement with a cation exchange capacity of  $\geq 5$  milliequivalents/100 grams dry soil, minimum organic matter content of 0.5% & a maximum infiltration rate of 12 iph (per 2012 LID Technical Guidance Manual for Puget Sound).

**Type/Number of water quality facilities/BMPs:**

- |   |  |
|---|--|
| <input type="checkbox"/> biofiltration swale<br>(regular/wet/ or continuous inflow)<br>large) | <input type="checkbox"/> sand filter (basic or large)  |
| <input type="checkbox"/> combined detention/wetpond<br>large)                                 | <input type="checkbox"/> sand filter, linear (basic or |
| <input type="checkbox"/> (wetpond portion basic or large)                                     | <input type="checkbox"/> sand filter vault (basic or   |
| <input type="checkbox"/> combined detention/wetvault  | _____ sand bed depth _____ (inches)                    |
| <input type="checkbox"/> filter strip   | <input type="checkbox"/> stormwater wetland            |
| <input type="checkbox"/> flow dispersion  | <input type="checkbox"/> storm filter                  |
| <input type="checkbox"/> farm management plan   | <input type="checkbox"/> wetpond (basic or large)      |
| <input type="checkbox"/> landscape management plan  | <input type="checkbox"/> wetvault                      |
| <input type="checkbox"/> oil/water separator  | <input type="checkbox"/> Is facility Lined?            |
| above<br><br>(baffle or coalescing plate)<br>Liner? _____                                     | If so, what marker is used                             |

- catch basin inserts:  
Manufacturer \_\_\_\_\_
- pre-settling pond
- pre-settling structure:  
Manufacturer \_\_\_\_\_
- high flow bypass structure (e.g., flow-splitter catch basin)
- source controls

**Design Information**

- Water Quality design flow \_\_\_\_\_
- Water Quality treated volume (sandfilter) \_\_\_\_\_
- Water Quality storage volume (wetpool) \_\_\_\_\_

**Facility Summary Sheet Sketch**

All detention, infiltration and water quality facilities must include a detailed sketch.  
(11"x17" reduced size plan sheets may be used)

See Appendix C for a detail of the proposed engineered soils layer providing water quality treatment beneath the permeable pavement surfaces.

**APPENDIX I    KCRTS Modeling Results**



## KCRTS Detention Facility Modeling – Predeveloped Time Series

**Production of Runoff Time Series**

Project Location : Sea-Tac  
 Computing Series : Predeveloped.tsf  
 Regional Scale Factor : 1.00  
 Data Type : Reduced

Creating Hourly Time Series File  
 Loading Time Series File:C:\KNC\_SWDM\KNC\_DATA\STTF60R.rnf 8  
 Scaling Yr: 8

Till Forest 0.47 acres

Total Area : 0.47 acres  
 Peak Discharge: 0.038 CFS at 9:00 on Jan 9 in Year 8  
 Storing Time Series File:Predeveloped.tsf 8

---

Time Series Computed

---

KCRTS Command

---

Enter the Analysis TOOLS Module

---

Analysis Tools Command

---

Compute PEAKS and Flow Frequencies

---

Loading Stage/Discharge curve:predeveloped.tsf  
 Flow Frequency Analysis

---

Time Series File:predeveloped.tsf  
 Project Location:Sea-Tac  
 Frequencies & Peaks saved to File:Predeveloped.pks

KCRS Analysis Tools

Compute PEAKS and Flow Frequencies

---

Plot Flow FREQUENCIES

---

Compute Flow DURATION and Exceedence

---

Plot Probability EXCEEDENCE Curves

---

COMPARE Flow Durations

---

Extract a HYDROGRAPH

---

Plot a HydroGRAPH

---

Compute VOLUME Discharge

---

RETURN to Previous Menu

---

Compute a Flow Frequency Curve

Map Files - KCRS

Time Series File:predeveloped.tsf  
 Project Location:Sea-Tac

---Annual Peak Flow Rates---				---Flow Frequency Analysis---			
Flow Rate (CFS)	Rank	Time of Peak		Peaks (CFS)	Rank	Return Period	Prob
0.030	2	2/09/01 18:00		0.038	1	100.00	0.990
0.008	7	1/06/02 3:00		0.030	2	25.00	0.960
0.022	4	2/28/03 3:00		0.023	3	10.00	0.900
0.001	8	3/24/04 20:00		0.022	4	5.00	0.800
0.013	6	1/05/05 9:00		0.019	5	3.00	0.667
0.023	3	1/18/06 21:00		0.013	6	2.00	0.500
0.019	5	11/24/06 4:00		0.008	7	1.30	0.231
0.038	1	1/09/08 9:00		0.001	8	1.10	0.091
Computed Peaks				0.035		50.00	0.980

## KCRTS Detention Facility Modeling – Developed Time Series

**KCRTS**

Computing Series : Developed.tsf  
 Regional Scale Factor : 1.00  
 Data Type : Reduced  
 Creating Hourly Time Series File

    Loading Time Series File:C:\KRC\_SWDM\KRC\_DATA\STTG60R.rnf 8  
 Fill Grass           0.25 acres           Scaling Yr: 8  
 Loading Time Series File:C:\KRC\_SWDM\KRC\_DATA\STEI60R.rnf 8  
 Impervious           0.22 acres           Adding Yr: 8

    Total Area : 0.47 acres  
 Peak Discharge: 0.157 CFS at 6:00 on Jan 9 in Year 8  
 Storing Time Series File:Developed.tsf 8

---

Time Series Computed

---

KCRTS Command

Enter the Analysis TOOLS Module

---

Analysis Tools Command

Compute PEAKS and Flow Frequencies

Loading Stage/Discharge curve:developed.tsf

Flow Frequency Analysis

---

Time Series File:developed.tsf  
 Project Location:Sea-Tac  
 Frequencies & Peaks saved to File:Developed.pks

**KCRTS Analysis Tools**

Compute PEAKS and Flow Frequencies

---

Plot Flow FREQUENCIES

---

Compute Flow DURATION and Exceedence

---

Plot Probability EXCEEDENCE Curves

---

COMPARE Flow Durations

---

Extract a HYDROGRAPH

---

Plot a HydroGRAPH

---

Compute VOLUME Discharge

---

RETURN to Previous Menu

---

Compute a Flow Frequency Curve

Help / File - KRCRTS

Time Series File:developed.tsf  
 Project Location:Sea-Tac

Annual Peak Flow Rates				Flow Frequency Analysis			
Flow Rate (CFS)	Rank	Time of Peak		Peaks (CFS)	Rank	Return Period	Prob
0.076	5	2/09/01 2:00		0.157	1	100.00	0.990
0.058	8	1/05/02 16:00		0.092	2	25.00	0.960
0.092	2	2/27/03 7:00		0.086	3	10.00	0.900
0.060	7	8/26/04 2:00		0.080	4	5.00	0.800
0.073	6	10/28/04 16:00		0.076	5	3.00	0.667
0.080	4	1/18/06 16:00		0.073	6	2.00	0.500
0.086	3	10/26/06 0:00		0.060	7	1.30	0.231
0.157	1	1/09/08 6:00		0.058	8	1.10	0.091
Computed Peaks				0.135		50.00	0.980

## Retention/Detention Facility

Type of Facility: Detention Vault  
 Facility Length: 28.00 ft  
 Facility Width: 27.00 ft  
 Facility Area: 756. sq. ft  
 Effective Storage Depth: 6.45 ft  
 Stage 0 Elevation: 100.00 ft  
 Storage Volume: 4876. cu. ft  
 Riser Head: 6.45 ft  
 Riser Diameter: 18.00 inches  
 Number of orifices: 2

Orifice #	Height (ft)	Diameter (in)	Full Head Discharge (CFS)	Pipe Diameter (in)
1	0.00	0.33	0.008	
2	4.80	0.78	0.021	4.0

Top Notch Weir: None  
 Outflow Rating Curve: None

Stage (ft)	Elevation (ft)	Storage (cu. ft)	Discharge (ac-ft)	Discharge (cfs)	Percolation (cfs)
0.00	100.00	0.	0.000	0.000	0.00
0.01	100.01	8.	0.000	0.000	0.00
0.02	100.02	15.	0.000	0.000	0.00
0.03	100.03	23.	0.001	0.000	0.00
0.14	100.14	106.	0.002	0.001	0.00
0.25	100.25	189.	0.004	0.001	0.00
0.36	100.36	272.	0.006	0.002	0.00
0.46	100.46	348.	0.008	0.002	0.00
0.57	100.57	431.	0.010	0.002	0.00
0.68	100.68	514.	0.012	0.002	0.00
0.79	100.79	597.	0.014	0.003	0.00
0.90	100.90	680.	0.016	0.003	0.00
1.01	101.01	764.	0.018	0.003	0.00
1.12	101.12	847.	0.019	0.003	0.00
1.23	101.23	930.	0.021	0.003	0.00
1.34	101.34	1013.	0.023	0.003	0.00
1.45	101.45	1096.	0.025	0.004	0.00
1.56	101.56	1179.	0.027	0.004	0.00
1.67	101.67	1263.	0.029	0.004	0.00
1.78	101.78	1346.	0.031	0.004	0.00
1.89	101.89	1429.	0.033	0.004	0.00
2.00	102.00	1512.	0.035	0.004	0.00
2.10	102.10	1588.	0.036	0.004	0.00
2.21	102.21	1671.	0.038	0.004	0.00
2.32	102.32	1754.	0.040	0.005	0.00
2.43	102.43	1837.	0.042	0.005	0.00
2.54	102.54	1920.	0.044	0.005	0.00
2.65	102.65	2003.	0.046	0.005	0.00
2.76	102.76	2087.	0.048	0.005	0.00

2.87	102.87	2170.	0.050	0.005	0.00
2.98	102.98	2253.	0.052	0.005	0.00
3.09	103.09	2336.	0.054	0.005	0.00
3.20	103.20	2419.	0.056	0.005	0.00
3.31	103.31	2502.	0.057	0.005	0.00
3.42	103.42	2586.	0.059	0.005	0.00
3.53	103.53	2669.	0.061	0.006	0.00
3.64	103.64	2752.	0.063	0.006	0.00
3.74	103.74	2827.	0.065	0.006	0.00
3.85	103.85	2911.	0.067	0.006	0.00
3.96	103.96	2994.	0.069	0.006	0.00
4.07	104.07	3077.	0.071	0.006	0.00
4.18	104.18	3160.	0.073	0.006	0.00
4.29	104.29	3243.	0.074	0.006	0.00
4.40	104.40	3326.	0.076	0.006	0.00
4.51	104.51	3410.	0.078	0.006	0.00
4.62	104.62	3493.	0.080	0.006	0.00
4.73	104.73	3576.	0.082	0.006	0.00
4.80	104.80	3629.	0.083	0.006	0.00
4.81	104.81	3636.	0.083	0.007	0.00
4.82	104.82	3644.	0.084	0.008	0.00
4.83	104.83	3652.	0.084	0.008	0.00
4.84	104.84	3659.	0.084	0.010	0.00
4.85	104.85	3667.	0.084	0.010	0.00
4.86	104.86	3674.	0.084	0.011	0.00
4.87	104.87	3682.	0.085	0.011	0.00
4.98	104.98	3765.	0.086	0.014	0.00
5.09	105.09	3848.	0.088	0.016	0.00
5.20	105.20	3931.	0.090	0.017	0.00
5.31	105.31	4014.	0.092	0.019	0.00
5.42	105.42	4098.	0.094	0.020	0.00
5.53	105.53	4181.	0.096	0.021	0.00
5.64	105.64	4264.	0.098	0.022	0.00
5.75	105.75	4347.	0.100	0.023	0.00
5.86	105.86	4430.	0.102	0.024	0.00
5.97	105.97	4513.	0.104	0.025	0.00
6.08	106.08	4597.	0.106	0.026	0.00
6.18	106.18	4672.	0.107	0.027	0.00
6.29	106.29	4755.	0.109	0.028	0.00
6.40	106.40	4838.	0.111	0.028	0.00
6.45	106.45	4876.	0.112	0.029	0.00
6.55	106.55	4952.	0.114	0.491	0.00
6.65	106.65	5027.	0.115	1.340	0.00
6.75	106.75	5103.	0.117	2.430	0.00
6.85	106.85	5179.	0.119	3.730	0.00
6.95	106.95	5254.	0.121	5.200	0.00
7.05	107.05	5330.	0.122	6.620	0.00
7.15	107.15	5405.	0.124	7.150	0.00
7.25	107.25	5481.	0.126	7.640	0.00
7.35	107.35	5557.	0.128	8.110	0.00
7.45	107.45	5632.	0.129	8.540	0.00
7.55	107.55	5708.	0.131	8.960	0.00
7.65	107.65	5783.	0.133	9.360	0.00
7.75	107.75	5859.	0.135	9.740	0.00

7.85	107.85	5935.	0.136	10.110	0.00
7.95	107.95	6010.	0.138	10.460	0.00
8.05	108.05	6086.	0.140	10.800	0.00
8.15	108.15	6161.	0.141	11.130	0.00
8.25	108.25	6237.	0.143	11.460	0.00

Hyd	Inflow	Outflow		Peak		Storage	
		Target	Calc	Stage	Elev	(Cu-Ft)	(Ac-Ft)
1	0.16	*****	0.15	6.48	106.48	4896.	0.112
2	0.08	0.03	0.03	6.42	106.42	4851.	0.111
3	0.09	*****	0.02	5.91	105.91	4469.	0.103
4	0.08	*****	0.02	5.56	105.56	4200.	0.096
5	0.08	*****	0.01	4.86	104.86	3674.	0.084
6	0.05	*****	0.01	4.36	104.36	3299.	0.076
7	0.06	*****	0.01	3.80	103.80	2873.	0.066
8	0.06	*****	0.00	2.14	102.14	1620.	0.037

Duration Comparison Analysis  
 Base File: predeveloped.tsf  
 New File: rdout.tsf  
 Cutoff Units: Discharge in CFS

Cutoff	-----Fraction of Time-----			-----Check of Tolerance-----			
	Base	New	%Change	Probability	Base	New	%Change
0.006	0.94E-02	0.44E-02	-53.3	0.94E-02	0.006	0.006	-7.1
0.008	0.64E-02	0.36E-02	-43.5	0.64E-02	0.008	0.006	-27.1
0.010	0.48E-02	0.33E-02	-31.0	0.48E-02	0.010	0.006	-40.0
0.012	0.36E-02	0.26E-02	-25.7	0.36E-02	0.012	0.009	-22.2
0.014	0.28E-02	0.23E-02	-20.2	0.28E-02	0.014	0.011	-17.3
0.015	0.22E-02	0.18E-02	-16.7	0.22E-02	0.015	0.014	-9.1
0.017	0.15E-02	0.14E-02	-9.6	0.15E-02	0.017	0.016	-4.5
0.019	0.98E-03	0.12E-02	25.0	0.98E-03	0.019	0.020	5.9
0.021	0.64E-03	0.88E-03	38.5	0.64E-03	0.021	0.022	5.6
0.023	0.33E-03	0.57E-03	75.0	0.33E-03	0.023	0.024	6.9
0.024	0.21E-03	0.31E-03	46.2	0.21E-03	0.024	0.026	7.3
0.026	0.16E-03	0.21E-03	30.0	0.16E-03	0.026	0.027	4.3
0.028	0.82E-04	0.11E-03	40.0	0.82E-04	0.028	0.028	0.1
0.030	0.16E-04	0.16E-04	0.0	0.16E-04	0.030	0.031	3.6

Maximum positive excursion = 0.002 cfs ( 9.0%)  
 occurring at 0.019 cfs on the Base Data:predeveloped.tsf  
 and at 0.021 cfs on the New Data:rdout.tsf

Maximum negative excursion = 0.004 cfs (-42.6%)  
 occurring at 0.011 cfs on the Base Data:predeveloped.tsf  
 and at 0.006 cfs on the New Data:rdout.tsf

**APPENDIX J    Conveyance Calculations**



**RATIONAL METHOD**

**for Conveyance Facility Sizing**

(Based on 2009 King County Surface Water Design Manual Section 3.2.1)

**Project:** S 116th Subdivision  
**Description:** Rational method for conveyance pipe sizing

**Design Storm:** 100 yr

$Q = CIA$

Where: Q = peak flow (cfs) I = peak rainfall intensity (inches/hour)  
 C = estimated composite runoff coefficient A = drainage subbasin area (acres)

**Composite Runoff Coefficient**

$C_c = (C_1 \cdot A_1 + C_2 \cdot A_2 \dots) / A_t$

Where: C<sub>c</sub> = composite runoff coefficient A<sub>#</sub> = area of land cover (acres)  
 C<sub>#</sub> = runoff coefficient for Area # A<sub>t</sub> = total area (acres)

C #	Description	Area (sf)	Area (acres)	C	A*C
1	Onsite/New Impervious Surface	11,614	0.27	0.90	0.24
2	Onsite/New Pervious Surface		0.00	0.25	0.00
<b>Totals:</b>			<b>0.27</b>		<b>0.24</b>

**C<sub>c</sub> = 0.90 (total C<sub>#</sub>A<sub>#</sub>)/(total area)**

**Time of Concentration**

Seg. #	Description of Flow Path Segment	Length (ft)	kr	Upper Elev	Lower Elev	Slope (ft/ft)	Travel Time (minutes)
1	Paved Area (sheet flow) and shallow gutter flow	300	20	122	100	0.073	0.92
<b>Totals:</b>		<b>300</b>					<b>0.9</b>

**Unity Peak Intensity Factor**

$i_r = a r^b T_c^{c-b}$

where: T<sub>c</sub> = time of concentration (minutes)  
 ar and br = coefficients from Table 3.2.1.B

T<sub>c</sub> = 6.30 minutes (from table above or 6.3 minimum or 100 max)  
 ar = 2.61 (from Table 3.2.1.B)  
 br = 0.63 (from Table 3.2.1.B)  
**i<sub>r</sub> = 0.82**

**Peak Rainfall Intensity**

$i_r = P_r \cdot i_r$

where: I<sub>r</sub> = peak rainfall intensity (inches/hour)  
 P<sub>r</sub> = total 24-hour precipitation for design return period (inches/24 hours)  
 i<sub>r</sub> = unit peak rainfall intensity factor

P<sub>r</sub> = 4.2 precipitation (inches)  
 i<sub>r</sub> = 0.82 unit peak intensity factor (from above)  
**I<sub>r</sub> = 3.44 inches/hour**

**Peak Runoff Rate**

$Q = C \cdot I_r \cdot A$

C = 0.90 C<sub>c</sub> (unitless) from above  
 I<sub>r</sub> = 3.44 I<sub>r</sub> (inches/hour) from above  
 A = 0.27 total area (acres) from above

**Q = 0.825 cfs**

**Pipe Capacity Calculations (Manning's Equation)**

Full Flow (d/D = 0.90)

Description	ID (inches)	Area (sf)	Wetted Per. (ft)	Hyd. Radius (ft)	Manning's n	Slope (ft/ft)	Velocity (ft/s)	Pipe Capacity (cfs)	Req'd Flow (cfs)	
6" for entire site	6	0.1963495	1.570796327	0.125	0.011	0.02	4.79	0.940	0.825	Capacity OK



**APPENDIX K R-Tank Information**





# RTANK

Stormwater Management System





# R-TANK

## Stormwater Management System

R-Tank™ stormwater detention, infiltration, and recycling systems provide underground storage of stormwater. This system is an alternative to stormwater basins and a more efficient, space saving alternative to other underground systems. After a rain event fills the R-Tank, stormwater can flow into the drainage system, infiltrate into the ground, or be reused.

## Applications

R-Tank can be used for a variety of applications including:

- Stormwater Retention/Infiltration
- Stormwater Detention
- Stormwater Recycling/Harvesting
- Pond Retrofits
- Dry Wells
- Bioretention

R-Tank is a modular system and can be assembled to a variety of heights from 9 1/2" to just under 7'. This rigid system can be placed beneath a variety of surfaces including:

- Parking Lots
- Streets and Access Roads
- Driveways
- Landscaping
- Athletic Fields/Playgrounds
- Swales and Channels

### Benefits

- **High Capacity**
  - 95% void internal area
- **Modular Design Footprints**
  - Available in any shape to efficiently use space
  - Vary height from 9 inches to 7 feet
- **High Strength**
  - Easily supports traffic loading from parking lots and roads
  - Backfill with sand - no stone required
- **Increased Infiltration and Exfiltration**
  - Outer shell is 95% open
  - Increases groundwater recharge, reducing post-construction runoff
- **Easy to Transport**
  - Can be supplied unassembled for reduced delivery costs
- **Lightweight and Quick to Install**
  - Installed by hand - no cranes required
  - Reduces site access delays
- **Permanent and Maintainable Storage Volume**
  - All storage volume is isolated inside filter fabric envelope
  - No reliance upon non-sustainable, temporary, assumed void space in crushed gravel backfill
- **Recycled Content**
  - Manufactured with recycled polypropylene





# R-TANK

Stormwater Management System

## Why Do You **NEED** Modular Versatility?

### Vary the system shape to:

- Work around obstacles / utilities
- Fit the system to the constraints of your site
- Replace sloped pipes with a flat system

### Eliminate header manifolds to:

- Reduce Costs
- Break the system into pieces to manage runoff close to the source

### Add stone storage to:

- Take advantage of available space on site and reduce costs
- Cost effectively increase footprint size for faster infiltration

### Vary the elevation of the top of the system to:

- Maintain cover beneath changing grades
- Change cover depths for different surface usage

### Vary the elevation of the bottom of the system to:

- Avoid / jump underground utilities
- Create a WQV sump

### Create construction phase flexibility to:

- Allow simple footprint changes on the fly without impacting storage volume
- Easily modify the system depth
- Account for unmarked utilities
- Help reduce the cost of change orders

## LEED™ Points

*Using R-Tank in a project design can earn as many as 11 LEED credits for your project.*

### Sustainable Sites – 4 Credits

By temporarily storing large volumes of water in a small footprint, R-Tank allows you to maximize open space (credit 5.1) while minimizing the development footprint (credit 5.2). This will also reduce the total quantity of stormwater runoff (credit 6.1). Incorporating R-Tank as part of a bioretention system can help remove pollutants from runoff, as well (credit 6.2).

### Water Efficiency – 5 Credits

R-Tank can be wrapped with a liner, allowing rain water or gray water stored in the system to be reused to irrigate the landscaping (credits 1.1, 1.2 and 2), resulting in reduced demand on the building's potable water resources (credits 3.1 and 3.2).

### Materials and Resources – 2 Credits

R-Tanks are always made from 100% post-consumer recycled plastics (credits 4.1 and 4.2).



# R-Tank Specifications

Technical

Dimensions						
Module (Units)	Width (mm)	Width (Inches)	Length (mm)	Length (Inches)	Height (mm)	Height (Inches)
Mini	400	15.75	715	28.15	240	9.45
Single (1)	400	15.75	715	28.15	440	17.32
Single + Mini (1.5)	400	15.75	715	28.15	680	26.98
Double (2)	400	15.75	715	28.15	880	34.65
Double + Mini (2.5)	400	15.75	715	28.15	1080	42.52
Triple (3)	400	15.75	715	28.15	1280	50.39
Triple + Mini (3.5)	400	15.75	715	28.15	1500	59.06
Quad (4)	400	15.75	715	28.15	1700	66.93
Quad + Mini (4.5)	400	15.75	715	28.15	1920	75.59
Pent (5)	400	15.75	715	28.15	2120	83.46

Details						
Module (Units)	Tank Volume (cf)	Storage Volume (cf)	# of Large Plates	# of Small Plates	# of Mini SmtLg Plates	Weight (lbs)
Mini	2.42	2.30	2	0	4/2	10.19
Single (1)	4.44	4.22	4	4	0/0	15.73
Single + Mini (1.5)	6.67	6.33	5	4	4/2	23.61
Double (2)	8.69	8.25	7	8	0/0	29.15
Double + Mini (2.5)	10.91	10.36	8	8	4/2	37.02
Triple (3)	12.93	12.28	10	12	0/0	42.56
Triple + Mini (3.5)	15.15	14.39	11	12	4/2	50.43
Quad (4)	17.17	16.31	13	16	0/0	55.97
Quad + Mini (4.5)	19.39	18.42	14	16	4/2	63.85
Pent (5)	21.41	20.34	16	20	0/0	69.39

Specifications			
Item	Description	Value	Unit
Void Area	Area available for water storage vs. that made up of plastic	95	%
Surface Area Void	Open area where water may percolate into or out of the unit	95	%
Rib Thickness	Thickness of load-bearing members	0.18 (4.5)	Inches (mm)
Unit Weight	Weight of plastic per cubic foot of tank	3.24	lbs / cf
Service Temperature	Operating temperatures where unit can be expected to perform adequately	-14 to 167	Degrees Fahrenheit
Unconfined Crush Strength*	Using a 5" x 5" load plate placed centrally over the unit will determine the pressure at which the top plate will bend to the point of failure	32.48	psi
Unconfined Crush Strength*	Using a full-size load plate that completely covers the top of the unit determines the pressure required to crush the entire unit	30.0	psi
Recycled Content	Percentage of product made from Recycled Polypropylene	100.0	%
180 Day Creep Testing	Used to determine the long-term performance of the system		
	Load Applied	Initial & Sustained	11.16 psi
	Creep Sustained	After 180 Days	0.20 inches
	Creep Sustained	After 180 Days	1.13 %
	Projected Creep	40 Years	1.72 %

\*All crush tests performed on units with two internal plates.

Product Pictures						
Mini	Single	Double	Triple	Quad	Pent	Other
						Taller Modules May Be Available - Call for Details



Order Line 1-800-448-3636  
www.acfenvironmental.com

## R-Tank & HS-25 Loads

**T**he R-Tank system is capable of easily supporting AASHTO HS-25 loads with safety factors well above the AASHTO requirement. The system has been used in a variety of applications around the world with tremendous success. Read on and we'll explain how the R-Tank handles heavy loads, and why it will work under HS-25 loads for your project.

### Bearing Capacity

The R-Tank's ultimate design load comes from the results of a crush test performed on an unconfined unit. This type of test yields very conservative results. That's why you won't see similar test results for any of the competitive underground detention/retention systems: they won't hold up under a load without the confining pressure of the backfill. But the R-Tank is different. It's a structural unit that delivers a dependable design load in a testing scenario far worse than any acceptable field application. And this sturdy foundation is just the beginning.

### Typical Load Calculation

The AASHTO HS-25 Standard uses a 40,000 lbs axle as the design load. To conservatively model the R-Tank's performance under these types of traffic loads, several steps are taken and additional factors considered:

- The axle load is distributed to two sets of dual wheels, each 10" x 20" at 80 psi
- The tire contact area is transferred down through the cover layers at an a conservative 1:2 angle (33%) to determine the Area of Applied Load on the top of the R-Tank
- A dynamic factor is added to account for the movement of the load (1.2)
- Weight of cover material in a saturated condition is added (130 lbs/cf)

With these factors in place, the HS-25 load can be modeled and the resulting safety factor determined. The following chart shows how the R-Tank performs at various depths of cover. Note that different configurations are specified at different cover depths, and that the Safety Factor never drops below 2.0. In fact, it's often much higher.

While a Safety Factor exceeding 2.0 is already highly conservative, remember that we're comparing the applied load to the strength of the R-Tank as derived from testing in an unconfined condition! Further, all HS-25 installations require the use of a geogrid, which will make the design even more conservative.



*R-Tank has been chosen for tough applications.*



*Unconfined Compression Test*



2831 Cardwell Road  
Richmond, VA 23234

800-448-3636

[www.acfenvironmental.com](http://www.acfenvironmental.com)

# R-Tank & HS-25 Loads

## Third Party Verification

Modeling product performance using engineering equations to ensure a successful project is important. But what really matters is product performance in the field. That's why we've done real-world testing with third party agencies who have installed the R-Tanks and subjected them to brutal testing. One test involved installing a Standard R-Tank with 18" of sand cover (normally we would use the Heavy Duty at this cover depth), no geogrid, and a 31 ton dump truck. Even in these harsh conditions, the R-Tank has supported the loads, passing every field test that's been done.



## Real World Performance

Your project **REQUIRES** a proven system. With thousands of installations around the world, R-Tank has proven itself again and again as one of the strongest systems available for underground detention/retention. Specify R-Tank and you can be confident your system will support the traffic loads above. Call ACF today to discuss your project's requirements.



## HS-25 Loading

Item	Cover Depth (inches)										
	18	24	36	48	60	72	84	96	108	120	168
Axle Load (lbs)	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Tire Load (lbs)	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
Tire Contact Area (10' x 20' = 200 inch <sup>2</sup> )	200	200	200	200	200	200	200	200	200	200	200
Area of Applied Load at 33% Angle of Repose (inch <sup>2</sup> )	1,064	1,436	2,576	3,944	5,600	7,544	9,776	12,296	15,104	18,200	33,464
Unmodified Wheel Load Applied to R-Tank	18.80	13.37	7.76	5.07	3.57	2.65	2.05	1.63	1.32	1.10	0.60
Live Load Dynamic Safety Factor of 1.2	22.56	16.04	9.32	6.09	4.29	3.18	2.45	1.95	1.59	1.32	0.72
Cover Material Pressure at 130 lbs/cf (psi)	1.35	1.31	2.71	3.61	4.51	5.42	6.32	7.22	8.13	9.03	12.64
Total Load Applied to R-Tank (psi)	23.91	17.85	12.03	8.70	6.80	6.60	8.77	9.17	9.71	10.35	13.36
Ultimate Bearing Capacity of R-Tank Unit (psi)	50.00	40.00	30.00	30.00	30.00	30.00	40.00	40.00	40.00	50.00	50.00
Safety Factor	2.09	2.24	2.49	3.09	3.41	3.49	4.56	4.36	4.12	4.83	3.74

- Standard 4-Plate R-Tank
- Heavy-Duty 5-Plate R-Tank
- Super Duty 5-Plate Half R-Tank



2831 Cardwell Road  
Richmond, VA 23234

800-448-3636

[www.acfenvironmental.com](http://www.acfenvironmental.com)

# TrashGuard

Trash Free Stormwater Discharge

NEW  
from ACF!



## What is TrashGuard®?

TrashGuard® is a patented stormwater pretreatment device that captures debris, sediment and floatables. TrashGuard® is easy to install and maintain and costs a fraction of other pretreatment devices currently available. TrashGuard® has extensive testing and an available calculator to assist design professionals in selecting the correct screen size for their particular project.

## TrashGuard®

### Advantages

- Captures debris, sediments and floatables
- Simple retrofits to existing catch basins
- Installs without heavy equipment
- Adjusts to irregular catch basin bottoms and/or walls
- Eliminates eyesore stormwater trash at public parks, beaches, and waterways
- Sediment reduction protects fish, shell fish, aquatic life and human recreation



TrashGuard® is available in three guard screen sizes for in-place or newly formed catch-basins that utilize discharge pipes of 24 inches or less in diameter. Each screen can be adjusted at installation to accommodate low flow stormwater events of 10 cfs or more.

Call ACF Environmental or your local distributor for more information.

**ACF**  
ENVIRONMENTAL  
Customer Focused, Environmentally Committed  
800-448-3636  
[www.acfenvironmental.com](http://www.acfenvironmental.com)



# TrashGuard® Installation Instructions

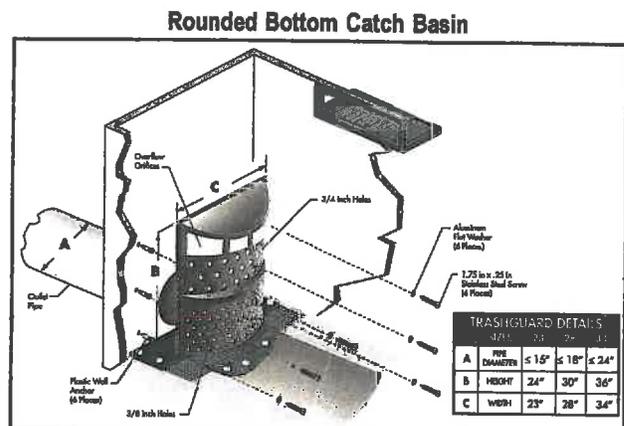
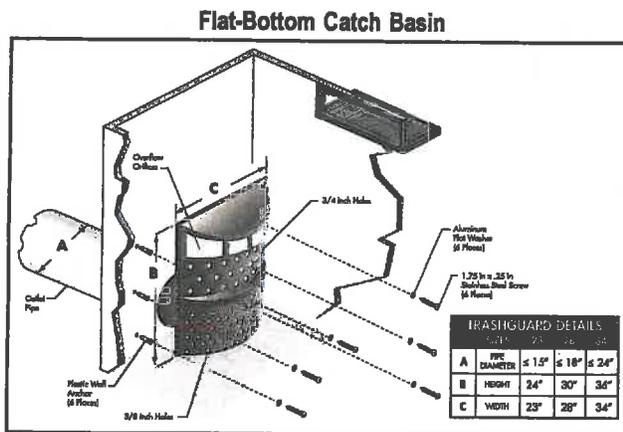
TrashGuard® can be installed in a variety of catch basin configurations (or field conditions). In general the TrashGuard® is mounted on the catch basin wall, centered over the outlet pipe.

Before installing TrashGuard® a hydraulic calculation should be performed to determine maximum flow rate based on depth of the catch basin and size of TrashGuard® used. This calculated model will determine maximum flow rate with no obstructions or varying amounts of trash build up, and determine drainage area required to support the calculated flow rate. Allowable trash build up and drainage area required for trash build up will determine maintenance frequency.

If catch basin conditions allow and increased flow rate and additional vertical capacity are desired, a model can be calculated to determine flow rate when extending TrashGuard® from one inch to seven inches from the catch basin wall. As above, this calculated model will determine maximum flow rate with no obstructions or varying amounts of trash build up. Contact TrashGuard® for assistance in determining flow rate and drainage areas under varying field conditions.

The following instructions are organized in sections described as follows:

- Section 1 - TrashGuard® installed on a flat perpendicular wall with a flat bottom
- Section 2 - Bottom Plate installed on an rounded bottom
- Section 3 - TrashGuard® installed on a flat perpendicular wall with an rounded bottom
- Section 4 - TrashGuard® installed on tiered brick wall escalating width from top to bottom with an rounded on flat bottom
- Section 5 - TrashGuard® installed on concaved wall reasonable flat top and bottom with an rounded or flat bottom.
- Section 6 - TrashGuard® installed extended from wall to increase flow capacity with an rounded or flat bottom.



Several other installation options are available.

**WARNING:** Improper installation of the TrashGuard® or failure to keep the area around the TrashGuard® free from sediment, debris and litter after installation may result in clogging of the stormwater drainage system and increase the risk of flooding during times of heavy rainfall. It is important to clear sediment, debris and litter from around the TrashGuard® at least four (4) times a year and more frequently in areas with large amounts of vegetation or litter. Please contact your local TrashGuard® distributor with any questions regarding the installation or regular maintenance requirements of the TrashGuard®.



2831 Cardwell Road  
 Richmond, Virginia 23234  
 (800) 448-3636 • FAX (804) 743-7779  
 www.acfenvironmental.com

## ACF Environmental

"Complete Source for Stormwater Solutions"

Distributed by:

# GRATEMASTER

Drop Inlet Filter



*Frame and filter prior to installation.*

## Gratemaster

The Gratemaster from ACF Environmental is the most cost-effective, easy to use stormwater filter on the market.

The Gratemaster frame adjusts in increments of 8" on each side making it the easiest unit on the market to install.

The large filter insert for Gratemaster is manufactured with high efficiency filter materials which capture sediment, trash, and debris. Gratemaster can be custom designed according to filtration requirements.

An optional XTEX Boom can be added to help remove hydro-carbons and other pollutants. Another great option is the Floc Boom that will enhance sediment removal with the 1106 Boom and heavy metals removal with the 1105 Boom. Built in overflows prevent ponding on the surface.

From construction phase through post construction, Gratemaster has your inlets protected.

## Gratemaster Advantages

- **Easy Installation**
  - remove grate
  - adjust Gratemaster to fit grate recess
  - replace grate
- **Designed for Post Construction use**

For more information about Permanent Inlet Protection, contact ACF Environmental.



# Gratemaster General Specification

## 1.0 Description

1.1 The purpose is to keep sediment, trash, and debris out of the stormwater system. Manufactured by:

*ACF Environmental, Inc.*

*2831 Cardwell Road*

*Richmond, Virginia 23234*

*Phone: 800-448-3636 • Fax: 804-743-7779*

*www.acfenvironmental.com*

## 2.0 Material:

### 2.1 Gratemaster

2.2 Gratemaster Filter Insert unit shall utilize monofilament fabric. with the following characteristics.

Property	Specification	Units	Test Results
Material	Polypropylene		
Weight	5.6 oz/sq yd		
Color	Black		
Grab Tensile Strength	390lbs (530N)	lbs.	255x275
Grab Elongation (Max %)	30%	%	20x15
Traezold Tear	120 lbs (250N) Min	lbs.	40x50
Puncture	140 lbs (250N) Min	lbs.	135
Mullen Burst	600 psi	P.S.I.	420
Coefficient of Permeability	0.04 in/sec		
Permittivity	0.53 Sec-1	sec <sup>-1</sup>	1.5
Water Flow Rate	152 gal/min/sq ft	gal/min/ft <sup>2</sup>	200
AOS	0.212mm	US Sieve	.40
UV Resistance Strength	90%		
Fabric Width	72"		

Results quoted above are the mean of multiple tests conducted at an independent testing facility.

## 3.0 Installation: 4 easy steps

3.1 Remove grate.

3.2 Adjust Gratemaster frame so outside edges extend to the outside edges of the grate recess which the grate rests on.

3.3 Insert Gratemaster filter bag and snap in place.

3.4 Replace Grate and your work is Complete!

## 4.0 Inspection/Maintenance:

4.1 Gratemaster should be inspected at least once every 3 months and after any major wet weather event.

4.2 Remove the grate, unsnap the Gratemaster filter bag, lift bag out of the frame with provided lift handles. Dispose contents of the bag and saturated booms in accordance with local waste disposal regulations.

4.3 Replace Gratemaster filter bag and reuse.

## INSTALLATION



Gratemaster frame and filter. Ready for installation.



Adjusting frame for inlet.



Frame installed on the grate recess.



Insert Gratemaster filter.



Snap Gratemaster filter onto frame.



Installed Gratemaster!



2831 Cardwell Road  
Richmond, Virginia 23234  
(800) 448-3636 • FAX (804) 743-7779  
www.acfenvironmental.com

**ACF Environmental**  
"Complete Source for Stormwater Solutions"

Distributed by:

**APPENDIX L    KC Drainage Complaint**





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

FILE NO.: 2008-0412  
 ADDRESS: #2246 So. 116<sup>th</sup> St.  
 NAME: Maureen Knight  
 PHONE: (206) 244-7826

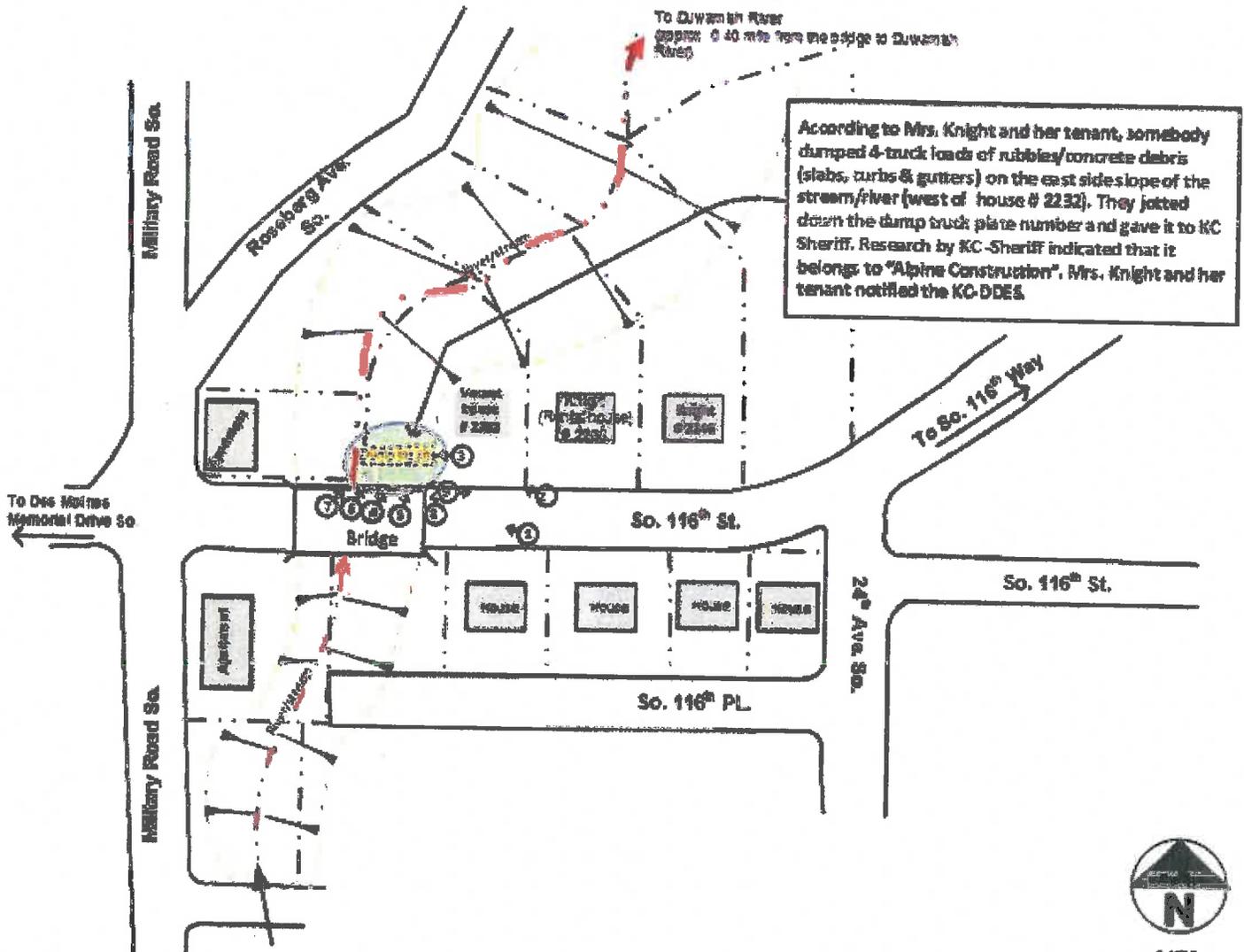
**DRAINAGE INVESTIGATION REPORT**  
 FIELD INVESTIGATION

DATE OF INVESTIGATION: 8/07/2008  
 INVESTIGATED BY: Virgil Pacampara

I went to the site on 8/07/2008 at 3:00 PM, and investigated a water quality complaint. I spoke with Mrs. Maureen Knight about her complaint. The complaint was about alleged dumping of 4-loads of rubbles (slabs, curbs & gutters) on the ravine/side slope of the river. According to her, the alleged dumping happened three times on 7/31/2008. She was notified by the mother of her tenants (who lives on her rental house) on the day of the alleged dumping. Mrs. Knight mentioned also that she has notified the KC-DDES Enforcement. I also spoke to the tenant of Mrs. Knight (who happened to be visiting her family). She witnessed the alleged dumping activities. She said that she spoke to the truck operator about the dumping of the rubbles near the stream/river. The alleged dump operator responded to her that 'somebody told him to dumped the concrete debris (rubbles) on the site. She said that the dump truck has no name, but she was able to jot down the plate number ("B42385D"). She reported the alleged dumping to KC-Sheriff and gave the plate number of the truck. She added that the researched by the KC-Sheriff on the plate number indicated that it belongs to "Alpine Construction".

It was sunny during the investigation. It appeared that the concrete debris (rubbles) were dumped west side of the house (# 2232) or on east side slope of the river/stream. The river/stream has no "fish bearing sign" along the bridge. The parcel search indicated that the former owner of the property (house # 2232) were **Mr. & Mrs Jose/Monica Flores of #3033 South 76<sup>th</sup> St. Tacoma WA**, and the **apparent new owner is West Coast Bank**. The concrete debris (rubbles) are consist of big chunks of slabs, curbs & gutters that may have come from a site development project. The concrete debris (rubbles) were approximately 4-loads of huge dump truck. The rubbles covered approximately 475 sq. ft of the side slope. Some of the concrete debris (rubbles) has accumulated near the river/stream. The side slope of the ravine/stream is steep and heavily vegetated. The vertical distance between top of the slope to the bottom is approx. 55'-65'. The water level on the river/stream is low. The stream/river is a tributary to **Duwamish River**, and the distance from the bridge to **Duwamish River is approximately 0.40 mile**.

Records of property (house # 2232) in KC-DDES (Code Enforcement) indicated that there was a General code enforcement on the property dated 8/04/2008 (Activity E08G0305). The code enforcement officer is Stephen Horswill.





**APPENDIX M    Email Correspondence**



Ben,

Per the BMC chapter 13 (see the BMC 13.10.130 and BMC 13.10.140), the city encourages using LIDs. Since King County Manual lacks some components of LID standard, you may use the 2012 LID Technical Guidance Manual for Puget Sound. You can find it at [http://www.psp.wa.gov/LID\\_manual.php](http://www.psp.wa.gov/LID_manual.php). If you see the page 174 of the water quality treatment section in the manual, you may find the options for the WQ. As you mentioned, you may use the methodology in the DOE manual to determine the WQ options too. However, in preparing TIR, you shall include all the supporting documentations and references.

Also, you shall address the vehicle loading depending on the type of permeable pavement (rigid concrete) or flexible (asphalt)). It looks like the fire department require H-25 vehicle loading.

And below is my response regarding your questions.

- 1) The project is proposing to place a detention facility beneath the permeable pavement access road. The site is about 20,000 SF and triggers Small Lot BMP Requirements. There is very minimal area onsite to implement flow control BMPs but the permeable pavement access road is large enough to provide a BMP to the required 20% of the site. There will be 2.25'-3' of cover between the top of the permeable pavement and the detention facility. Will the flow control BMP credit still be awarded for the permeable pavement that is directly above the detention facility? – *The percentage would be okay, but the permeable pavement is usually on top of native soil, the flow control credit above the detention system shall be reduced (e.g., 25% or so).*

Thanks.

HK

**From:** Ben Iddins [<mailto:ben@dcgengr.com>]  
**Sent:** Friday, April 11, 2014 9:34 AM  
**To:** Heungkook Lim  
**Cc:** Tim Gabelein  
**Subject:** RE: 1832 S 116th Street

HK,

I appreciate you looking into this. I have attached the geotechnical report for the project. While no infiltration tests were performed onsite there was 6 test pits that were dug which showed that the site is underlain by glacial till. Near the bottom of the 2<sup>nd</sup> page of the report it states the following:

“The site soils consist of dense, glacial till that is impermeable and not suitable for infiltration of concentrated amounts of stormwater; therefore, it appears that detention or dispersal of the concentrated stormwater is the only practical means of dealing with stormwater on the subject site. Furthermore we anticipate that a shallowly installed pervious pavement system will function adequately on the eastern side of the site as long as the base of the drainage course is not excavated to near the contact with the till soils that were encountered at approximately 2.5 feet below existing grade on the eastern side of the site.”

Individual lot BMPs were looked into but due to the infeasibility of infiltration and the lack of room to disperse or implement other BMPs it was determined that it wasn't the best route to go. FYI, the 20' of pervious area along the west side of the proposed houses is required to be full-screen (Type 1) landscaping which further limits the area onsite to implement BMPs.

Please let me know if you have any other questions.

Thanks,

Ben Iddins | EIT  
Davido Consulting Group, Inc.  
Lake Forest Park, WA 98155  
206.523.0024 ext. 115  
[ben@dcgengr.com](mailto:ben@dcgengr.com)

**From:** Heungkook Lim [<mailto:heungkookl@burienwa.gov>]  
**Sent:** Friday, April 11, 2014 9:03 AM  
**To:** Ben Iddins  
**Cc:** Tim Gabelein  
**Subject:** RE: 1832 S 116th Street

Hi Ben,

I will be looking into this and will be back to you early next week.  
Meanwhile, did you do any soil test (e.g., infiltration test) or review feasibility of individual lot BMPs? Thanks.

Heungkook Lim, P.E.

---

Surfacewater Management Engineer  
City of Burien, Public Works  
206-248-5516  
[www.burienwa.gov](http://www.burienwa.gov)

**From:** Ben Iddins [<mailto:ben@dcgengr.com>]  
**Sent:** Thursday, April 10, 2014 3:33 PM  
**To:** Heungkook Lim  
**Cc:** Tim Gabelein  
**Subject:** 1832 S 116th Street

Hi HK,

We are the civil engineers working on a 6-lot subdivision at 1832 S 116<sup>th</sup> Street in Burien. I have a few questions for you that I am hoping to get answered prior to finalizing our design.

- 2) The project triggers basic water quality requirements as it is adding about 5,600 SF of PGIS and is proposing a permeable pavement access road. The King County SWDM does not give clear guidance on how to provide treatment for stormwater mitigated by permeable pavement. On past projects that followed the DOE Stormwater Manual we have designed an engineered soils layer beneath the permeable pavement that provides treatment prior to infiltrating into the

native soils. Do we need to provide a similar design for this project? Overflow from the permeable pavement will be routed to a StormFilter catch basin prior to being routed to a detention facility. Are additional water quality measures required for the stormwater that will infiltrate through the permeable pavement or will treating just the overflow suffice?

- 3) The project is proposing to place a detention facility beneath the permeable pavement access road. The site is about 20,000 SF and triggers Small Lot BMP Requirements. There is very minimal area onsite to implement flow control BMPs but the permeable pavement access road is large enough to provide a BMP to the required 20% of the site. There will be 2.25'-3' of cover between the top of the permeable pavement and the detention facility. Will the flow control BMP credit still be awarded for the permeable pavement that is directly above the detention facility?

Attached is a preliminary site plan for reference. Please let me know if you have any questions.

Thanks,

Ben Iddins, EIT  
Davido Consulting Group, Inc.  
15029 Bothell Way NE Suite 600  
Lake Forest Park, WA 98155  
Phone: 206.523.0024 ext. 115  
Fax: 206.523.1012  
Cell: 425.232.5729  
[ben@dgcgengr.com](mailto:ben@dgcgengr.com)





**Davido Consulting Group**  
civil | structural | land use

## MEMORANDUM

**TO:** City of Burien Public Works  
**FROM:** Tim Gabelein, P.E.  
**DATE:** June 25, 2014  
**RE:** 1832 S 116<sup>th</sup> St Burien, WA  
Administrative Adjustment – Transition Zone Buffer Reduction

### TRANSITION ZONE BUFFER REDUCTION REQUEST:

The proposed project at 1832 S 116<sup>th</sup> Street in Burien, WA consists of a 6-lot subdivision with a new single-family residence on each new lot. The project site is zoned RM-18 and the property adjacent to the west is the Rainier Golf and Country Club which is zoned RS-7200. Since the project site is zoned multi-family and abuts a single-family zone, a 20-foot wide Type 1 (full-screen) landscape buffer consistent with BMC 19.25.050 is required along the property line that the two zones share (west property line of the project site).

As a part of the subdivision application process, we would like to request an administrative adjustment in accordance with BMC 19.17.015(4) to reduce of the buffer zone requirement along the west property line of the project site from 20 feet wide to 10 feet wide based on the following criteria:

- 1) The reduction of the buffer zone will not be detrimental to surrounding properties in any way. All parking will occur on the east half of the property, opposite of the Rainier Golf and Country Club and out of visual site.
- 2) The proposed 10-foot wide buffer zone will comply with the purpose and intent of BMC 19.17.015.1 as it will provide an equal or greater barrier between the proposed development and the Rainier Golf and Country Club. The upper half of the proposed single-family residences will be the only visible improvement above the buffer zone. Backdoors from the lowest levels of the homes will be located on the west side of the homes, but of sight given the 10' buffer zone of equal or greater protection.
- 3) The proposed 10-foot wide buffer zone will provide equal or greater protection for the zone receiving transition than the required 20-foot buffer zone as the density and size of plantings will exceed the minimum requirements of the 20-foot buffer zone thus maintaining a full-screening buffer zone.
- 4) Garbage and recycling containers will be located on the east side of the homes and out of sight of the adjacent site to the west.
- 5) The site is relatively small and a 20-foot wide buffer zone will encompass approximately 1/6 (17%) of the entire site. In order to fit reasonably sized single-family residences on the site that are not directly adjacent to the landscape buffer zone, a reduction in the buffer width is required. See the proposed Site Plan in Attachment A.

---

Mount Vernon Office  
2124 Riverside Drive, Suite 211  
Mount Vernon, WA 98273  
Tel 360.899.1110

Lake Forest Park Office  
15029 Bothell Way NE, Suite 600  
Lake Forest Park, WA 98155  
Tel 206.523.0024

Whidbey Island Office  
PO Box 1132  
Freeland, WA 98249  
Tel 360.331.4131

