CITY OF KIRKLAND
Planning and Community Development Department
123 Fifth Avenue, Kirkland, WA 98033 425.587.3225
www.ci.kirkland.wa.us

ADVISORY REPORT
FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

To: Kirkland Hearing Examiner

From: _____ Eric R. Shields, AICP, Planning Director, SEPA Responsible Official

_____ Susan Greene, Project Planner

Date: July 11th, 2008

Subject: APPEAL OF A STATE ENVIRONMENTAL PROTECTION ACT (SEPA) DETERMINATION; APPEAL FILE NO: APL08-00007; SEPA FILE NO. SEP07-00031

Hearing Date and Place: Tuesday, July 22nd, 2008 at 1p.m.
City Hall Council Chamber
123 Fifth Avenue, Kirkland

I. INTRODUCTION

A. Appellant: Mr. Arni Fredrickson residing at 11804 – 98th Ave NE, Apt. E Kirkland, WA 98034 (see Attachment 1).

B. Applicant: Juanita Partners LLC, PO Box 1797, Bellevue, WA 98009.

C. Action Being Appealed: Planning Director/SEPA Responsible Official decision to issue a mitigated determination of non-significance for a mixed use project called the Waterbrook. SEPA review was conducted in conjunction with a building permit submitted by the applicant- building permit no. BLD07-00996. The project being appealed under this SEPA determination is a mixed use project containing 84 condominium units and 11,894 square feet of office/retail space on the ground floor. There is also an underground parking structure (See Attachment 2 for the entire SEPA package with enclosures).

D. Request: The appellant is requesting that the Mitigated Determination of Non-significance (MDNS) reviewed under SEPA rules, and issued by the City of Kirkland on May 13th, 2008 be revoked and has made claim that there are significant adverse impacts on the quality of the environment caused by the Waterbrook project and that this requires an Environmental Impact Statement (EIS).

E. SEPA review requirements: State law specifies that environmental review under the State Environmental Policy Act (SEPA) is to focus only on potential significant impacts to the environment that cannot be adequately mitigated through development regulations and the Comprehensive Plan (See RCW 43.21C.240). The position of City staff is that any probable significant adverse environmental impacts for this project have been addressed through the Kirkland Zoning Code and Comprehensive Plan. One impact has been identified and has been addressed through a mitigation agreed upon by the applicant (see Attachment 2).

II. RULES FOR THE APPEAL. CRITERIA FOR APPEAL & DECISION

A. Rules: The Kirkland Municipal Code (KMC) section 24.02.105 sets forth the rules for SEPA appeals. In the event that a project permit does not include an open record public hearing, the SEPA appeal will be heard and decided upon by the hearing examiner using the provisions of subsection (g), (h) and (i) of 24.02.105, which include noticing, participation and staff report requirements.

B. Criteria for submission of an appeal: An appeal must be filed with the environmental coordinator within fourteen calendar days of the date the determination is issued by the responsible official. Additionally, the appeal must be in written form and must "contain a brief and concise statement of the matter being appealed, the specific components or aspects that are being appealed, the appellants basic rationale or contentions on appeal, and a statement demonstrating standing to appeal". The appeal may also contain whatever supplemental information the appellant wishes to include.

C. The decision on the appeal: The hearing body shall consider all information and material within the scope of the appeal submitted by persons entitled to participate in the appeal. The hearing body shall either:

1. Affirm the decision being appealed; or
2. Reverse the decision being appealed; or
3. Modify the decision being appealed.

III. HEARING SCOPE AND CONSIDERATIONS

A. KMC 24.02.105.i (1-4) additional appeal procedures:

1 The matters to be considered and decided upon in the appeal are limited to the matters raised in the notice of appeal.

2 The decision of the responsible official shall be accorded substantial weight.

3 All testimony will be taken under oath.

4 The decision of the hearing body hearing the appeal shall be the final decision on any appeal of a threshold determination including a mitigated determination of nonsignificance.

IV. BACKGROUND & SITE DESCRIPTION

A. Site Location: 11820 and 11810 98th Ave NE in Kirkland (see SEPA memo, enclosure 1).

B. Zoning and Land Use: The subject property consists of three parcels totaling 51,960 square feet. The site is zoned JBD 2, which allows commercial and residential development (see Attachment 3). The current use of the properties consists of a vacant restaurant, a tire store and an espresso stand.

C. Development Process: The proposed development of the subject property requires Design Review pursuant to the Kirkland Zoning Code Chapter 142 and also requires a building permit.

1. The project received Design Review approval on 4/9/07 from the Design Review Board (DRB); (see Attachment 4); File no. DRC07-00002. No appeals of the Design Review Board decision were filed.
2. The applicant submitted a building permit (BLD07-00996) and SEPA review materials on 10/02/07. The building permit plans are currently under review for compliance with the Kirkland Zoning Code and DRB decision. Initial review of the building permit has been completed by city staff at the time of the writing for this report and staff expects to be able to issue a building permit for this project.

3. SEPA review is required for building permits where more than 9 units will be built. The Waterbrook would have 84 units. Through SEPA review, a significant operational and safety concern was identified regarding the location of the existing crosswalk on 98th Ave near the subject property. The applicant has agreed to mitigate the safety concern and has agreed to move the crosswalk to a safer location. A mitigated determination of non-significance (MDNS) was issued on May 13th, 2008. These materials can be found in attachment 2

4. The appellant submitted an appeal to the SEPA determination on May 23rd, 2008 within the time limit for appeal, which ended on May 28th, 2008.

V. STAFF ANALYSIS OF ISSUES RAISED IN THE APPEAL:

A. The appeal letters raise several issues although they do not identify the specific SEPA components or aspects pertinent to this appeal. Rather, much of the appeal focuses on issues of code compliance and consistency with the Comprehensive Plan—issues that were already considered in the proceedings before the DRB. In addition, the appellant's primary concerns appear to be preservation of the view from his property and potential impacts on his driveway, neither of which are SEPA issues. However, staff has attempted to summarize and analyze the issues within the appeal letter below. The summarized issues for the appellant are numbered and underlined while the staff analysis is below each issue in italics.

1. Aesthetics: The appeal letter makes the claim that SEPA requirements have not been met based on question number 10 of the SEPA checklist list that is entitled "aesthetics" (see Attachment 2, SEPA enclosure 3). This question asks "what views in the immediate vicinity would be altered or obstructed". The appellant claims that the Waterbrook project does not meet the view corridor requirements of JBD-2 (Juanita Business District 2) because the view corridor provided does not provide a view corridor for the East Ridge neighbors as mentioned in the Kirkland Comprehensive Plan (see Attachment 5).

   Staff Response: It should be noted that the KZC regulates height at 26 feet above average building elevation and not through number of stories as is the case with the Comprehensive Plan language. The KZC for the JBD 2 zoning district allows a height increase of 13 feet above the height limit if a view corridor is maintained across 30% of the average parcel width for the portion of the building that is above 26 feet. KZC requires further that the view corridor will be located to provide the widest view corridor given development on adjacent properties to the north and south. The subject property is 211.12 feet wide and would require a 63.33 foot wide view corridor. The view corridor requirement was explored during the design review process and was found to meet the requirements as proposed. Please see Attachment 6 which shows the view corridor as 63.5 feet wide. The building permit and design review plans show that the view corridor requirement is met with a 63.5 foot wide view corridor.

   The Comprehensive Plan does have language that calls for preservation of views for the East Ridge a referenced in Attachment 5. However, the regulations within JBD 2 establish the requirements for height and view corridors and, as a result, the City cannot use the Comprehensive Plan as a basis for regulating specific developments. A map of the East Ridge properties from the Comprehensive Plan (see Attachment 7), shows that the East Ridge is a very large area and it is apparent that views could not be protected for each and every dwelling unit or property along this ridge absent the City regulating which specific property owners private views will be protected. The Zoning Code provides for the locations of JBD 2 view corridors based only on the width of the subject property and the development on properties located to the north and the south. The appellant's property is located to the east of the subject property. Finally, as mentioned previously, SEPA is not allowed to be used as a regulating tool per state law when development regulations already exist.

2. Public Notice was done improperly: The appellant contends that the notification for the design review process was inadequate and that a public notice sign was not placed on each parcel.

Staff Response: *This is not a SEPA issue. Public notice requirements were satisfied during the design review process using the noticing requirements in KZC 142.35.8.*

3. The architect for The Waterbrook mislead the City from the beginning.

   Staff Response: The SEPA checklist was submitted by the applicant with the building permit on 10/2/07. Staff has visited the site on repeated occasions and has conducted an independent review of the SEPA checklist. Additional traffic information was requested by the City's transportation engineer, Thang Nguyen, and it was submitted in December 2007. Revisions to the building permit were requested and submitted on 4/22/08 and SEPA was issued on May 13th, 2008 as a mitigated determination of non-significance. There is nothing in the SEPA checklist to indicate that the architect misled the City and nothing in the building permit plans to suggest that the architect misled the City.

4. The impacts including emergency access associated with the use of the access easement by the applicant's proposed building was not accurately considered.

   Staff response: A traffic report was required and was submitted by the applicant. This report was reviewed by Thang Nguyen, the City's transportation engineer. Mr. Nguyen identified a safety issue with the existing crosswalk across 98th from Juanita Village to the subject property. Through SEPA, the City required the applicant to move the crosswalk 50 feet to the north to eliminate the possible safety hazard for cars and pedestrians. The applicant has agreed to this mitigation. All other aspects of the traffic report were reviewed and approved by the City's transportation engineer.

   Rob Jammerman, Development Engineering Manager in the Public Works Department, met with Mr. Fredrickson to investigate Mr. Fredrickson's complaints about turn around area for delivery vehicles and garbage service. As a result, a new turn around area is being requested of the applicants, which would be installed within the fire access area. Additionally, a loading zone will be created along 98th Ave NE.

   Kirkland's Fire Department has approved the access for the newly proposed structure for compliance with adopted policies and has required an access area at the east end of the structure (see Attachment 6 plan view at the south east portion of the property adjoining the existing access easement).

VI. RECOMMENDATION

Staff recommends that the SEPA determination be affirmed and that the Mitigated Determination of Nonsignificance (MDNS) be upheld. Even if the appeal submitted by the appellant contained specific matters pertinent to SEPA, there would be no mitigation or remedy because by state law the City is not allowed to impose a SEPA requirement when there are city codes in place that guide the decision maker in approving or denying a proposal. RCW 43.21.C.240. Each issue within the appellant's arguments has a city code that governs that particular issue. The exception to this is the SEPA imposed requirement for moving the existing crosswalk and that issue has been adequately mitigated through the SEPA determination that was issued on May 13th, 2008.

VII. JUDICIAL REVIEW (KMC 24.02.110)

Judicial review of SEPA determinations are by RCW 43.21C.075 required to be heard only at the time of judicial review of the underlying action, i.e. approval or disproval of the proposal for which SEPA review was required. For rules on perfecting and timing of the SEPA determination and judicial appeal, see RCW 43.21C.075 and WAC 197-11-680(4). The notice required by WAC 197-11-680(5) shall be appended to the permit or notice of appeal at the time of final city action. (Ord 2830 Part 7, § 1 (part), 1984).

VIII. ATTACHMENTS

1. SEPA Appeal letters by Mr. Arni Fredrickson (2 letters)

2. SEPA issuance materials including the memo of explanation and enclosures 1-8

SEPA Enclosures include: 1. vicinity map; 2. site plan; 3. environmental checklist; 4. traffic report by the Transpo Group; 5. traffic impact analysis by Thang Nguyen; 6. a geotechnical evaluation; 7. a comment letter from Arni Fredrickson.

3. Juanita Business District 2 (JBD2) Use Zone Chart from Kirkland Zoning Code section 52.14.

4. DRB Approval Notice for the Waterbrook from file no DRC07-00002.

5. Comprehensive Plan page XV.1-22.

6. Plan view of the Waterbrook showing a 30% view corridor.

7. Comprehensive Plan page XV.1-20 showing the East Ridge area.

RECEIVED
MAY 23 2008
PLANNING DEPARTMENT
BY ____ PM

5/23/08

City of Kirkland
Planning and Community Development Department
123-5th Ave
Kirkland, WA 98033

Environmental Coordinator

RE: SEPA appeal

The height bonus was improperly "given" to the Waterbrook.

We own 11804-98th Ave NE, which is the property east of and adjacent to the Waterbrook's 11810 site and we are adjacent to and just south of the Waterbrook's 11820 site.

Their architect, Bill Walker, prepared the City of Kirkland's Environmental Checklist, which is intended to describe basic information about the Waterbrook proposal. The view comments are grossly understated or untrue. It is inconceivable that they were unaware that their design would completely block the view of our building. **It is only 28 feet away and the Waterbrook is taller (13 feet above the maximum height established for JBD-2) and perfectly positioned to block 95% of our Lake Washington view to the southwest.** Their checklist was completed as follows:

B.10 Aesthetics

a. What views in the immediate vicinity would be altered or obstructed?
Some views toward Lake Washington to the south
b. Proposed measures to reduce or control aesthetic impacts, if any:
Project is under the height limit established for this zone

"A view corridor is required and has been met with the design of the structure"

NO view corridor had been provided to mitigate this impact. The Waterbrook and the City of Kirkland have not complied with the JBD-2 zoning code or the Comprehensive plan. The Water brook is not **"under the height limit established for this zone"** as Mr. Walker claims in the Environmental Checklist. Our view, that would be completely blocked, is not even mentioned. The Architect **was aware** that their building would completely block our view at 1104-98th Ave NE and made it clear to me when we met on 3/6/08.

I asked the architect of the Waterbrook, Bill Walker, why they designed their building with no consideration for our Lake Washington view "corridor" this is what he had to say:

> **"We have no obligation (or incentive) to protect your view! Your view is not guaranteed! We don't have to change anything."**
>
> It was obvious from his comment that he did not care if their project destroyed both our view and feeling. It is 13 feet taller and only 28 feet directly in front of our building. He was confident that the City of Kirkland would support him.

It is apparent from his cool reaction to my concern that neither he or the City of Kirkland had considered the KZC or the Comprehensive plans stated goal of preserving the view of the "East Ridge" properties..

> The Comprehensive plan repeatedly states that one of its primary goals is to preserve the views of the "East Ridge" properties. The KZC requires a view corridor that meets the criteria stated in those documents in order to allow the KBD-2 height limit to be exceeded by 13 feet.

In order to allow the Waterbrook to exceed the maximum height limit allowed in the JBD-2 zone it must provide a view corridor that benefits the "East Ridge" neighbors. **A window well that is described by the developers as "view corridor" simply because it meets the 30% separation requirement is absurd. That feature benefits no one other than the Waterbrook developers. Even the future owners of Waterbrook units on their north and south property lines will eventually be harmed by this design. They have provided 63.3 feet of separation between their two buildings. They have provided only 28 feet of separation from ours at 11804. The property to the north could build within 5 feet and the property to the south could build within 31 feet. It is clear that they are designing a building to satisfy the 30% requirement, to gain the 13 foot bonus, at the expense of all logical design considerations. I can understand why the Waterbrook architects have done this but it is beyond my comprehension why the City of Kirkland and the DRB have accepted their design. These facts clearly show that the Waterbrook has given no consideration for ANY of its neighbors. They have not met the provisions of KZC or the Comprehensive plan.**

All of the "East Ridge" neighbors are at least 80 feet away from the Waterbrook with the exception of our property at 11804, which is only 28 feet away and directly behind the taller Waterbrook building. All of the "East Ridge" **properties "—sit on a ridge that overlooks the Juanita commercial core"** with the notable exception of our property at 11804.

The Conference Staff Advisory Report, above, incorrectly misleads the reader to believe that Waterbrook will not have any significant impact on our view. The Architect initially stated, both to me on 3/6/08 and initially on the initial Environmental Check List below that their building would have only a minimal impact on the view from our building at 11804.

Many Design Response Conference notifications were either returned as undeliverable or simply never received. Only one notice was posted on 11820 and none on11810. As a result of the City of Kirkland's failure to actually "contact" many of the "East Ridge" neighbors,

only one person attended the meeting and made a comment. Phyllis Bergsman, an owner of an Eastridge Condominium, complained of the vast scale of the Waterbrook. The Waterbrook from the northeast is an imposing structure. It is 45 feet tall at 98th Ave and maintains its, 13 feet above maximum, height for the entire depth of its site, 257 feet.

There is no comment in the staff comment section of the records regarding her concerns. There are only referenced to the massive scale of the two structures.

Both the DRB and the Staff recognized that the scale of the Waterbrook was a problem but only considered the view of the Waterbrook from 98th Ave. That view has nothing to do with a view corridor that would mitigate the effect of the Waterbrook on the "East Ridge" properties views. Our views are toward Lake Washington to the southwest. The 63.3 feet between the two Waterbrook buildings does nothing but provide separation between their two buildings at the expense of the view of their "East Ridge" neighbors and their future neighbors to the north and south. The neighbors to the north could build to within 5 feet of the Waterbrook's 257 foot long 45 foot high north wall.

The staff report of 3/19/08 only comments on the fact that by accepting the Waterbrook's self serving 63.3 foot interior separation it leaves only 5 feet on the north and the DRB did not even follow up on their concern. Every thing about the two building concept is self serving and is detrimental to both it's JBD-2 neighbor to the north and it's East Ridge neighbors to the east. Apparently neither the DRB or C of K staff considered these issues important enough to follow up on. **They decided that the identified problem of the excessive mass of the two buildings could be solved by adding some breaks in the exterior walls and making some color changes.**

It is apparent that neither the DRB, the C of K staff or the Waterbrook architects made any attempt to satisfy the requirements of the Comprehensive Plan or the JBD-2 height bonus criteria. They recognized, and called out, the damage that would be done to the JBD-2 property to the north but did nothing about it. **They never even acknowledged that the Waterbrook was unnecessarily blocking "East Ridge" properties views.**

The Waterbrook should not have been allowed to add the 13 feet to the height of their buildings. Their design not only does not meet the requirements of the code, in fact it is the worst possible design for every "East Ridge" neighbor. There is nothing more that they could do that would be more damaging to the views of the "East Ridge" properties. All but one are 80-120 feet away and look over the Waterbrook at the Seattle skyline, even after their lake view is blocked. It is absolutely devastating to 11804, our property, which is only 28 feet away and at the same level. We will not be able to see anything but the end of the Waterbrook's south building that looms over ours. It should not be allowed.

This oversight is a significant adverse impact on the quality of the environment."

SEPA Chapter 43.21C RCW states: "significant adverse impacts on the quality of the environment." Requires an environmental impact statement (EIS). The checklist below misrepresented the impact of their design on their "East Ridge" neighbors.

1. The Architect for the Waterbrook mislead the City of Kirkland from the beginning.
2. The City of Kirkland's Conference Staff Advisory Report of 3/1/07 is misleading.
3. Kirkland's own Comprehensive plan has been ignored.
4. The KZC JBD-2 view corridor requirements have not been met, because they have not provided a view corridor that allows the "East Ridge" neighbors.

City of Kirkland **Comprehensive Plan**
XV.1-15 to 27

Thirteen pages (13) have been ignored by the City of Kirkland and the Waterbrook. Virtually every page makes reference to preserving view corridors for the East Ridge. (the slope just east of the JBD-2 zone and 100th Ave NE) and specifically states that **the extra height --"could** (only) **be approved by the Design Review Board if views from East Ridge are preserved." The Waterbrook has done just the opposite.** They have not even considered our view.

Thank You

Arni & Elaine Fredrickson
11804-98th Ave NE Apt.E
Kirkland, WA 98034
206 999-2269

RECEIVED
CITY OF KIRKLAND MAY 23 2008
APPROVED FOR SUBMITTAL PM
PLANNING DEPARTMENT
BY
Type of Review
Initials / Date Exp F T Reg M/F
Building /
Planning /
Public works 5/28/08

5/23/08

City of Kirkland
Planning and Community Development Department
123-5th Ave
Kirkland, WA 98033

Environmental Coordinator

RE: Supplemental SEPA ~~Concurrency~~ appeal 5/28/08 4:49P

The effect of the use of our easement driveway on the pedestrian path that is shared with the vehicles, the elimination of our turn around and emergency exit and the impact of the additional burden of the JBD-2 use has not been accurately considered.

We own 11804-98th Ave NE, which is the property east of and adjacent to the Waterbrook's 11810 site and we are adjacent to and just south of the Waterbrook's 11820 site.

The traffic study has not mentioned or considered the effect on the function of our driveway. It has not considered the fact that we have the use of 11810 for a turn-around and as an emergency exit.

On 5/15/08 I met with Rob Jammerman, Susan Greene and Grace Stewart who is the Fire Marshal. I was there to raise these same questions. When I mentioned that it would be simple to add a few feet to the planned fire lane to create a turn around the Fire Marshal, Grace Stewart, was reluctant. She explained to me that the fire lane was never intended to be used by fire vehicles. It is curious that the Development Standards for Case No.:DRC7-00002, PCD File No.:DRC07-00002 states:

FIRE DEPARTMENT CONDITIONS

1-Access as proposed is acceptable. The fire access **ROAD** to the courtyard shall be capable of supporting **68,000 lbs.**

Rob Jammerman was more helpful and suggested that there may be enough room for a turn around could possibly be designated for public use, sharing it with the fire lane. He said that even 13 feet would be better than nothing and would probably work. He said that he would ask the developer if they had any objection to that use. His follow up letter indicated that it might get done. 13 feet with no radiuses perpendicular to a 20.92 ft. driveway that is shared with walkers might work for a small car but I have no idea how a tow truck, ambulance, garbage truck, delivery truck or fire truck of any size could use it, but it would be better than nothing. It would however diminish our use of **"our driveway".**

At the same meeting I expressed my concern for all the services that would have to briefly stop, in our driveway, to do their business. Rob assured me that the garbage truck could drive in during the night and then back out onto 98th to continue its rounds and that there were parking spots on 98th that the other services could use. I objected to the 98th parking spots because I know form experience that they are **always** full. It does not make sense to first block the driveway, at all at any time, for garbage service when they have enough room on their sites to easily add 10 or more feet to our easement. They control their own access and yet they want to compromise our driveway. The 10 feet that they should add to our easement would make room for a loading area, just east of their garage entrance, a third lane and a wider landscaped pedestrian walkway that the City of Kirkland has always wanted to formalize. There could be one going out to the left and one going out to the right and would be 31.92 feet wide and much harder to block especially with the loading zone that the extra space would make room for. They would also be contributing something to the easement to justify their 11820 site's use of **"our driveway".** Their use could be made legal if they did it right.

The two exit lanes would cut in half the wait time that the 128 future residents that will be using our driveway will have to endure. Then by adding only 7 feet of width to the fire lane they could create a 20 foot wide turn around with normal radiuses. I provided sketches of this plan to the City of Kirkland at our 5/15/08 meeting. Rob also told me in his follow up letter that they would designate a parking spot on 98th Ave. as a loading zone. He is trying to make the existing substandard (for the proposed level of use) easement work.

Before I contacted Susan Green the City had not considered the effect of the Waterbrook's added burden on the cross walk that was installed too close to our driveway and has been an ongoing problem for 15 residents and two small businesses. The City of Kirkland did not do an adequate study when they installed that cross walk. I called the City when it was planned to tell the City that it was to close to our driveway. It turns out that even the taper was backwards. It barely provides room for one car and it cannot always straighten out before turning. The second car ends up blocking traffic. The City of Kirkland ignored me then and only suggested moving it now because of my more recent complaint.

The reason for this appeal is that none of my concerns were raised by the Concurrency report except the pedestrian island, and that was the result of my comments. I know that these concerns are real because I have been associated with this driveway for 40 years and have been the owner of 11804 for 15 years and have lived there and now spend time there every week. I have experienced the problems that I have been trying to explain to you. Your studies may be excellent but they cannot take the place of experiencing the use of our driveway on a daily basis.

Arni Fredrickson Supplemental SEPA ~~Concurrency~~ appeal 5/23/08

The Concurrency Report does not mentioned or consider the effect on the function of our driveway as a pedestrian pathway, linking 100th and 98th Ave.

The Concurrency Report does not mentioned or consider the effect on the function of our driveway when our emergency exit and turn around have bee lost.
Than You

The Concurrency conclusions of your report are not accurate because they have ignored key elements that are unique to our driveway.

Thank you,

Arni & Elaine Fredrickson
11804-98th Ave NE Apt. E
Kirkland, WA 98034
206 999-2269

CITY OF KIRKLAND
Planning and Community Development Department
123 Fifth Avenue, Kirkland, WA 98033 425.587-3225
www.ci.kirkland.wa.us

CITY OF KIRKLAND
NOTICE OF SEPA DETERMINATION
NOTICE OF ROAD CONCURRENCY TEST NOTICE

The City of Kirkland has conducted an environmental review and road concurrency review of the following project:

Permit No.: SEP07-00031/BLD07-00996
Proponent: Juanita Partners LLC
Address or Location of proposal: 11810 and 11680 98th Avenue NE
Description of project: Build a new four story mixed use building with 84 residential units and 11,894 square feet of retail space.

Notice is hereby given that on May 13, 2008 the City of Kirkland issued a Mitigated Determination of Nonsignificance (MDNS) in accordance with the State Environmental Policy Act (SEPA) and Chapter 197-11 of the Washington Administrative Code.

The proposal has been changed to include the following measures summarized to mitigate impacts: In order to issue a DNS, the applicant shall:
Prior to issuance of a Certificate of Occupancy, the applicant shall submit revised plans that show the existing crosswalk will be moved 50 feet to the north and this work shall be done before the certificate of occupancy is issued. The relocated crosswalk shall match the design of the crosswalk that exists today.

SEPA Comments: Comments must be submitted by **5 PM** on May 28, 2008 to the City of Kirkland, Department of Planning and Community Development, 123 Fifth Avenue, Kirkland, WA 98033. Contact Susan Greene for further information at (425) 587-3252 .

Procedures to Appeal SEPA: You may contact Susan Greene at (425) 587-3252 to ask about the procedures for SEPA appeals:
1. A written appeal must be filed with the Environmental Coordinator by **5 PM** on May 28, 2008 at the above address.
2. The appeal must contain a brief and concise statement of the matter being appealed, the specific components or aspects that are being appealed, the appellant's basic rationale or contentions on appeal, and a statement demonstrating standing to appeal. The following have standing to appeal: a) the applicant; b) any agency with jurisdiction; c) any individual or other entity who is specifically and directly affected by the proposed action. The appeal may also contain whatever supplemental information the appellant wishes to include.
3. Pay the $195.00 fee to file an appeal.
This project requires a public hearing by the Hearing Examiner. Many issues are most appropriately considered during the hearing process rather than through the SEPA process. However some issues, such as traffic, are usually considered only through SEPA and may only be contested or appealed by filing an appeal of the DNS. **There may be no other opportunity to appeal these issues**. Call Susan Greene at (425) 587-3252 if you have questions about what issues are addressed in this DNS.

Notice is hereby given that the proposed project passed the road concurrency review and the City of Kirkland issued a road concurrency test notice in accordance with the Kirkland Municipal Code (KMC) Title 25.

Procedures to Appeal Road Concurrency:
1. Refer to KMC Chapter 25.23 for what decisions may not be appealed.
2. A written appeal must be filed with the Public Works Official, Thang Nguyen, by 5pm on May 28, 2008 at the above address.
3. A concurrency appeal will follow the same process as a SEPA appeal. See No. 2 and 3 above under SEPA appeals for procedures. A separate appeal fee of $195.00 is required.
There is no other opportunity to appeal road concurrency issues. Call Thang Nguyen at (425) 587-3869 if you have questions about what is addressed in concurrency review.

More information is available at www.kirklandpermits.net.

Publishing Date: May 24, 2008

CITY OF KIRKLAND
Planning and Community Development Department
123 Fifth Avenue, Kirkland, WA 98033 425.828.1257
www.ci.kirkland.wa.us

MEMORANDUM

To: Eric R. Shields, AICP, SEPA Responsible Official

From: Susan Greene, Planner

Date: May 13th, 2008

File: BLD07-00996; SEP07-00031

Subject: ENVIRONMENTAL DETERMINATION FOR THE WATERBROOK, A MIXED USE RETAIL/RESIDENTIAL DEVELOPMENT AT 11680 AND 11810 98TH AVE NE

Juanita Partners, LLC has proposed to replace a tire store, espresso stand and restaurant with a mixed use development containing bottom floor retail and office space with 3 stories of residential units above (see Enclosure 1). The proposed building would contain up to 11,894 square feet of retail and office space on the ground floor along 98th Ave NE and 3 floors of residential units above, containing 84 dwelling units. The proposal also involves underground structured parking facilities with 159 parking stalls. An entrance to the parking facility is proposed along an easement road along the south property line (see Enclosure 2). The applicant has been granted a parking modification based on a traffic study, which has been analyzed and approved by the City's Transportation Engineer (see Enclosure 5).

The site also has moderate landslide hazard areas as identified on the City's sensitive areas maps, which has been addressed in a Geotechnical Report submitted by Associated Earth Sciences (see Enclosure 7).

I have had an opportunity to visit the site and review the following documents:

- Enclosure 3: Environmental checklist.
- Enclosure 4: Traffic Analysis by Transpo Group Inc. dated September 7th, 2007 and an addendum dated December 27th.
- Enclosure 5: Traffic Impact Analysis Review memo from Thang Nguyen, City of Kirkland Transportation Engineer.
- Enclosure 6: Concurrency test notice from Thang Nguyen, City of Kirkland Transportation Engineer dated July 3, 2007.
- Enclosure 7: Geotechnical evaluation by Associated Earth Sciences, Inc., dated June 25th 2007
- Enclosure 8: Comment letter from Arni Fredrickson dated 4/11/08

The key environmental issues associated with this project are traffic and slope and soil impacts.

Traffic Impacts

The applicant's traffic analysis, which was prepared by the Transpo Group, and was reviewed by Thang Nguyen, Transportation Engineer for the City's Public Works Department. The Public Works Department concluded the following, which can be found in a memo from Thang Nguyen as Enclosure 5:

- The trip generation for the proposal results in approximately 968 daily net new trips per day: 61 PM peak hour net new trips and 57 AM peak trips daily.
- A gap analysis was done and conflicts were identified concerning the existing crosswalk. Due to these conflicts, Thang is recommending that the crosswalk be moved 50 feet to the north.
- The applicant has been granted a parking modification for the number of stalls based on analysis of other downtown developments within the City of Kirkland.
- Road impact fees shall be paid.

Slope and Soil Impacts

The eastern portion of the site contains a moderate landslide hazard potential as identified on City sensitive area maps. The edge of the northeastern portion of the site is a cut area with a steep slope that is approximately 11 feet high according the Geotechnical Engineer's report (see Enclosure 7). The southeastern portion of the site has a rockery approximately 7 feet tall. The Geotechnical Engineer has made recommendations in his report including (but not limited to) shoring for the underground structure and the presence of a geotechnical engineer on site. The report concludes that if the recommendations within the report are followed, the competency of the till soils and lack of adverse ground water seepage presents a low landslide hazard risk. The engineer also recommends that cuts greater than 5 feet at the toe of the slope be shored.

Public Comment

One comment letter was received by Arni Fredrickson on April 11, 2008 concerning the traffic impacts associated with he and his neighbor's access easement over a portion of the applicant's property and impacts to views of Lake Washington (see Enclosure 8). Mr. Fredrickson is concerned about emergency access when the Waterbrook project is built out and the legality of the north parcel within the subject property using the access easement. Additionally, his comments list the concern of the height of the building and the position of the view corridor that is provided with this project.

Staff response:

Access Easement

The access easement over the applicant's property used by Mr. Fredrickson and his neighbors is not an exclusive easement. Therefore, the applicant can also use the easement as well as grant the right to others to use it so long as Mr. Fredrickson and his neighbors can continue to use it too. In this case, the applicants have provided access to their site that meets the regulations of the City of Kirkland and their use will not prevent Mr. Fredrickson from using the easement as well. A fire access lane will also be provided on the subject property on the back half of the site behind the building. The access easement and the fire lane will not be allowed to be blocked in any way and the Kirkland Fire Department is requiring signage as part of the building permit that will say: "NO PARKING-FIRE

LANE" , which must be stenciled and painted on the curb as required and as indicated on the approved plans. Additionally the new building is required to have a sprinkler system.

View Corridor and Height
This project was previously reviewed per the Design Review Board and meets the applicable requirements within the Kirkland Zoning Code and Comprehensive Plan including the requirements for a view corridor and the height requirements. These elements of the submittal would not be reviewed and decided upon within the SEPA process and so are not addressed in this memo.

Conclusions

It will be necessary to further analyze certain aspects of the proposal to determine if the project complies with all the applicable City Codes and policies. That analysis is most appropriately addressed as part of the review of the building permit. In contrast, State law specifies that this environmental review under the State Environmental Policy Act (SEPA) is to focus only on potential significant impacts to the environment that could not be adequately mitigated through the Kirkland regulations and Comprehensive Plan.[1]

Based on my review of all available information and adopted policies of the City, I am recommending that the proposal be changed or clarified to include the following mitigating measures so that a Determination of Nonsignificance (DNS) can be issued:

Traffic Impacts

1. Prior to issuance of a Certificate of Occupancy, the applicant shall submit revised plans that show the existing crosswalk will be moved 50 feet to the north and this work shall be done before the certificate of occupancy is issued. The relocated crosswalk shall match the crosswalk that exists today.

This recommendation is based on adopted policies of the City as found in the City's Comprehensive Plan. Specifically the following elements of the Comprehensive Plan contain the following policies:

Transportation

Policy T-1.2: Mitigate adverse impacts of transportation systems and facilities on neighborhoods..

Policy T-2.1: Promote pedestrian and bicycle networks that safely access commercial areas, schools, transit routes, parks, and other destinations within Kirkland and connect to adjacent communities, regional destinations, and routes.

Policy 2.3 Increase the safety of the non-motorized transportation system by removing hazards and obstructions and through proper design, construction, and maintenance.

Policy 4.6 Ensure adequate access to commercial and industrial sites.

Policy T-4.8: Provide for local vehicular access to arterials, while minimizing conflicts with through traffic.
Policy T-5.4 Require new development to mitigate site-specific transportation impacts.

[1] ESHB 1724, adopted April 23, 1995

These policies directly support the above mentioned mitigating measures and require these measures in order to fully mitigate the impacts created by the proposal.

SEPA ENCLOSURES

1. Vicinity Map
2. Site Plan
3. Environmental Checklist
4. Traffic Analysis by The Transpo Group. dated September 2007 with an addendum dated December 27th.
5. Traffic Impact Analysis Review memo from Thang Nguyen, City of Kirkland Transportation Engineer
6. Concurrency test notice from Thang Nguyen, City of Kirkland Transportation Engineer dated July 3, 2007
7. Geotechnical evaluation by Associated Earth Sciences, Inc., dated June 25th 2007
8. Comment letter from Arni Fredrickson dated 4/11/08

_____

Review by Responsible Official:

_____ I concur _____ I do not concur

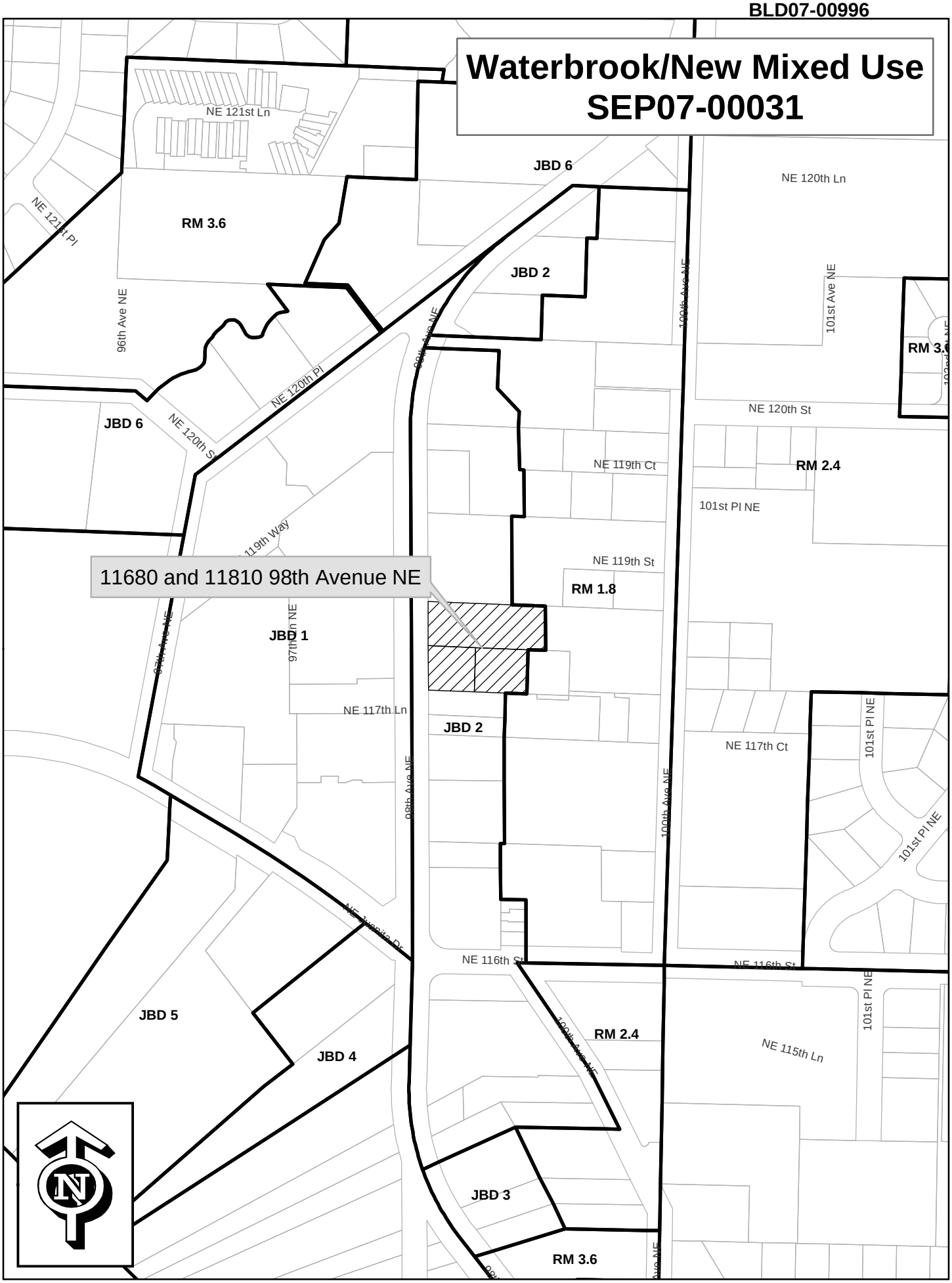
Comments:_____

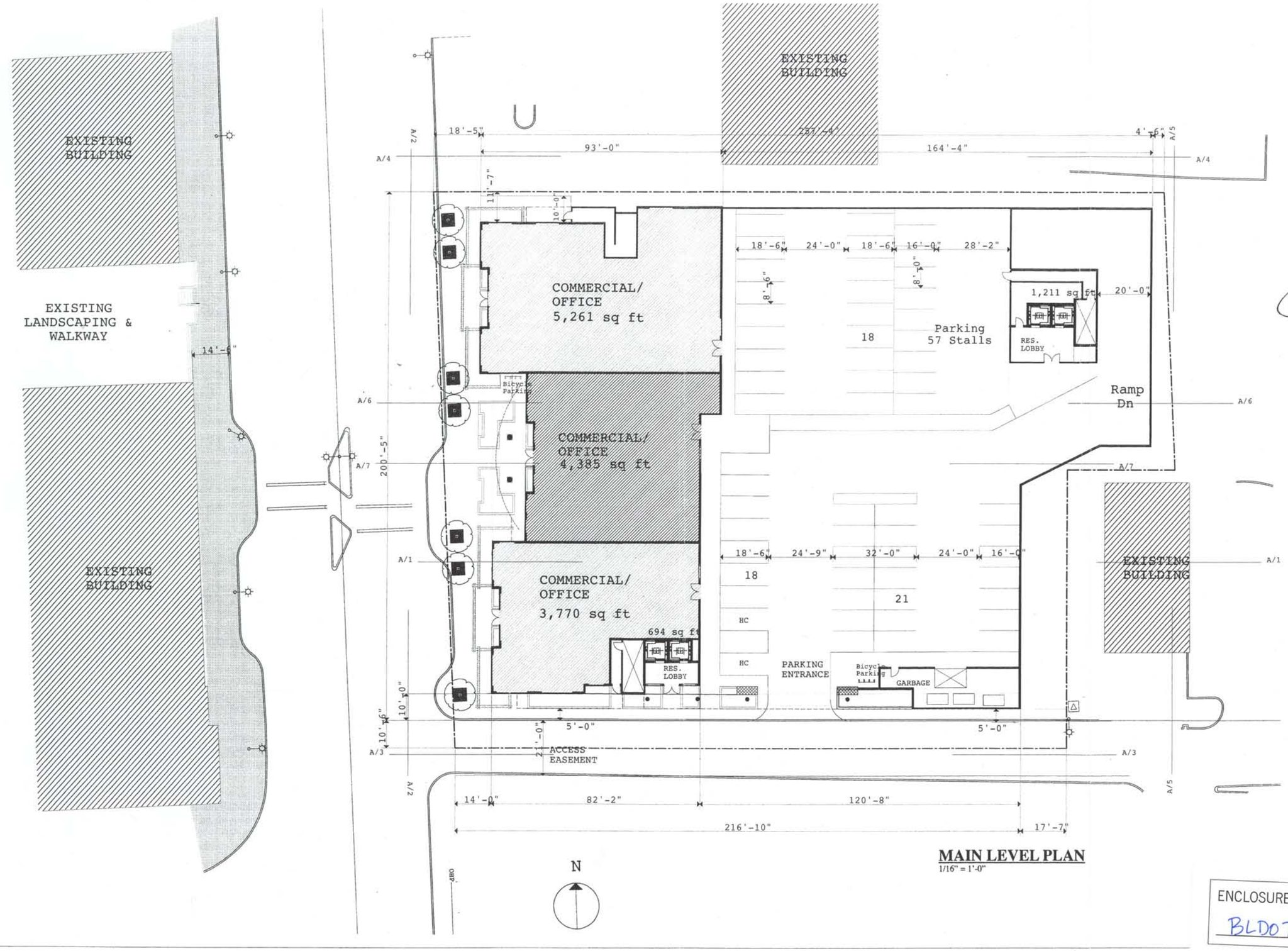
_____

_____

_____

Eric R. Shields, Planning Director Date


Waterbrook/New Mixed Use
SEP07-00031
11680 and 11810 98th Avenue NE
NE 121st Ln
NE 121st Pl
RM 3.6
JBD 6
JBD 2
NE 120th Ln
96th Ave NE
NE 120th Pl
NE 120th St
99th Ave NE
100th Ave NE
101st Ave NE
RM 3.6
JBD 6
NE 120th St
NE 119th Ct
RM 2.4
101st Pl NE
NE 119th Way
NE 119th St
RM 1.8
JBD 1
97th Ln NE
97th Ave NE
NE 117th Ln
JBD 2
NE 117th Ct
101st Pl NE
98th Ave NE
100th Ave NE
NE 116th St
NE 116th St
JBD 5
JBD 4
RM 2.4
NE 115th Ln
JBD 3
RM 3.6



MAIN LEVEL PLAN
1/16" = 1'-0"

w2architects
P.O. Box 1492
Edmonds, Wa. 98020
(425) 775-0665

REGISTERED ARCHITECT
2941
WILLIAM B. WALKER
STATE OF WASHINGTON

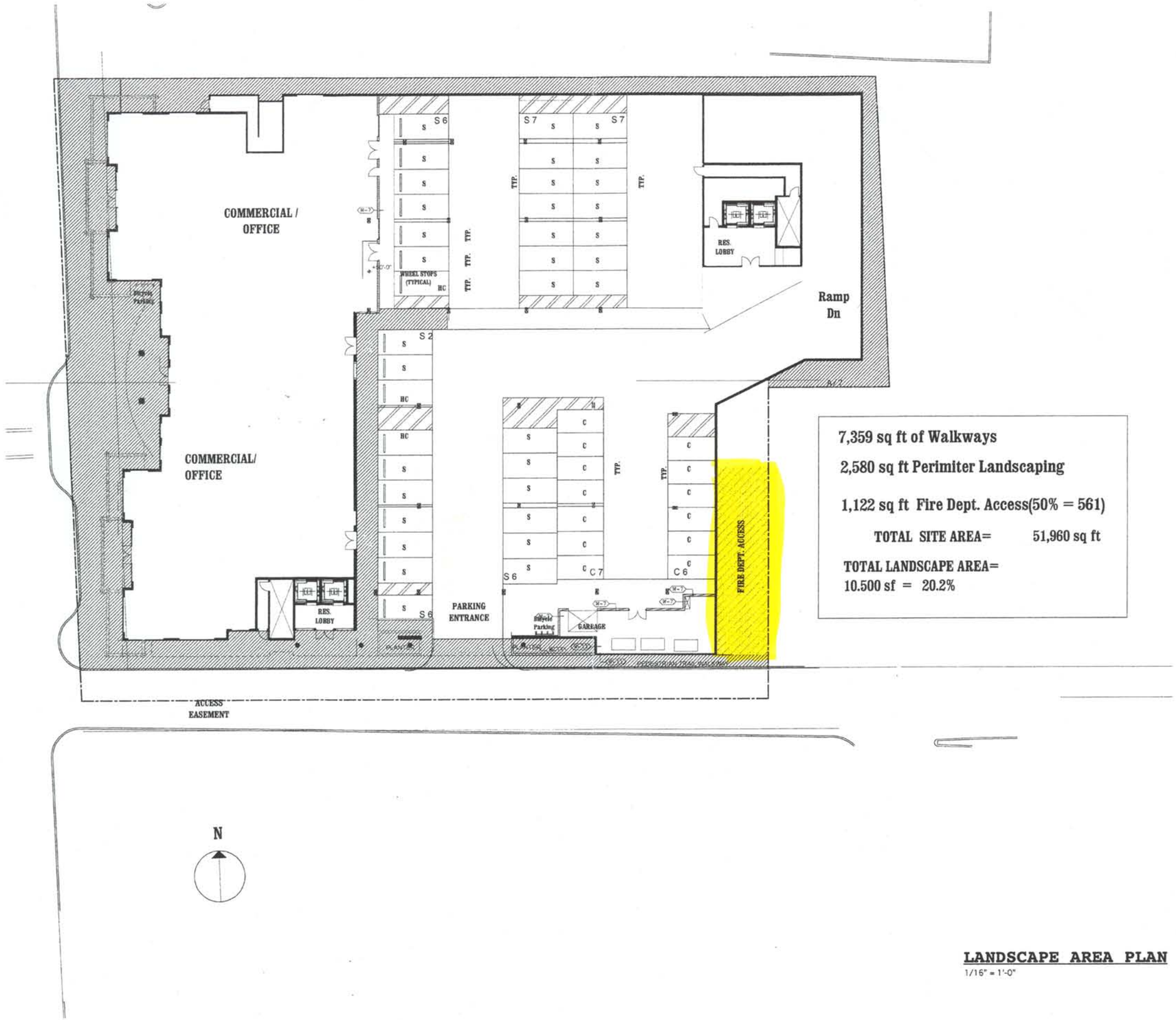
4-2-07

Design Review Set

THE WATERBROOK

Kirkland, Washington

ENCLOSURE 2 (2 pages)
BLD07-00996



7,359 sq ft of Walkways

2,580 sq ft Perimiter Landscaping

1,122 sq ft Fire Dept. Access(50% = 561)

TOTAL SITE AREA= 51,960 sq ft

TOTAL LANDSCAPE AREA=
10.500 sf = 20.2%

LANDSCAPE AREA PLAN
1/16" = 1'-0"

w2architects
PO Box 1462
Edmonds, WA 98020
(425) 765-0965

9-20-07

Waterbrook
Juanita Partners, LLC
Kirkland, , Washington

Landscape Area P.

A-05
Sheet No.
Print Date: 9/18/07

ENCLOSURE 3

ENCLOSURE 3 BLD07-00996 25

CITY OF KIRKLAND ENVIRONMENTAL CHECKLIST SEP06-00008

Purpose of Checklist:

The State Environmental Policy Act (SEPA), Chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant ad impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the City identify impacts your proposal, and to reduce or avoid impacts from the proposal, whenever possible

Instructions for Applicants:

This environmental checklist asks you to describe some basic information about your proposal. Answer the questions briefly with the most pr formation known, or give the best description you can.

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

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

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

Use of Checklist for Non-project Proposals:

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

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

A. BACKGROUND

1. Name of proposed project, if applicable: ***Waterbrook Mixed Use***

2. Name of applicant: ***Bill Walker***

3. Tax parcel number: ***3026059078 3026059148 3026059214***

4. Address and phone number of applicant and contact person: ***w2architects P.O. Box 1492 Edmonds, Wa. 98020 (425) 765-0665***

5. Date checklist prepared: ***8-28-07***

6. Agency requesting checklist: ***City of Kirkland, Washington***

7. Proposed timing or schedule (including phasing, if applicable): ***Const. Start 6-1-08***

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

   NO

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

   Soils Report and Level 1 Study

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

    None

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

    Building Permit from the City of Kirkland

12. Give brief, complete description of your proposal, including the proposed uses, the size and scope of the project and site including dimensions and use of all proposed improvements. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page.

    Demolition of the existing vacant restaurant at 11680 98th Ave. NE and the existing tire store at 11810 98th Ave. NE. Construction of a new 4 story Mixed Use building with underground parking containing 84 residential units and 12,644 SF of street front commercial space. The site is 51,960 SF. The building will house 63,787 SF of enclosed parking; 12,664 SF of commercial space and 82,851 SF of residential space, (84 units).

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

    The project will be constructed on 3 existing lots with two addresses, (11680 and 11810 98th Ave. NE. in the Juanita Business District across 98th to the east of the existing Juanita Village development.

ENCLOSURE 3

TO BE COMPLETED BY APPLICANT

EVALUATION FOR
AGENCY USE ONLY
REVIEWED BY: GMG

B. ENVIRONMENTAL ELEMENTS

1. EARTH

a. General description of the site (circle one): Flat, rolling, hilly, steep, slopes, mountainous, other
Flat with steep slopes on the eastern property edge.

b. What is the steepest slope on the site (approximate percent slope)?
60%

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.
Some fill, recessional outwash, logement till,(siltyto course sand)

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.
No

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.
Excavation and removal of approx. 22,000 cu.yds. Shoring around the entire site from 14 FT at the west side to 27 Ft at the east side

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.
No, Erosion will be controlled, (designed by the civil engineer)

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt, buildings)?
85%

80% maximum

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:
Erosion will be controlled, (designed by the civil engineer)

2. AIR

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

Some automobile emmissions

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.
No

c. Proposed measures to reduce or control emissions or other impacts to air, if any:
Mech. and natural ventilation of the enclosed parking areas

3. WATER

a. Surface

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.
Lake Washington about 1/2 mile to the south

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.
No

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.
None

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.
No

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.
No

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.
No

b. Ground

1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.
No

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

ENCLOSURE 3

served (if applicable), or the number of animals or humans the system(s) are expected to serve.
None

c. Water Runoff (including storm water):

1) Describe the source of runoff (include storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.
Storm water will be collected and discharged in the City System

2) Could waste materials enter ground or surface waters? If so, generally describe.
No

Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:
Designed Storm Water collection and discharge

4. PLANTS

a. Check or circle types of vegetation found on the site:

- [x] deciduous tree: alder, maple, aspen, other
- [x] evergreen tree: fir, cedar, pine, other
- [ ] shrubs
- [x] grass
- [ ] pasture
- [ ] crop or grain
- [ ] wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
- [ ] water plants: water lily, eelgrass, milfoil, other
- [x] other types of vegetation: Berry Bushes

b. What kind and amount of vegetation will be removed or altered?
Several trees, berry bushes and grasses along the east of the property

c. List threatened or endangered species known to be on or near the site.
None

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:
Landscaping will provided at the perimiter of the site and throughout the 2nd level courtyard

5. ANIMALS

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

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

b. List any threatened or endangered species known to be on or near the site.
None

c. Is the site part of a migration route? If so, explain.
No

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

6. ENERGY AND NATURAL RESOURCES

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

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.
No

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:
The design will comply with the Wash. State Energy Code

7. ENVIRONMENTAL HEALTH

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.
None

1) Describe special emergency services that might be required.
Fire, Police and Medical Aid

2) Proposed measures to reduce or control environmental health hazards, if any:
None

b. Noise

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

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

3) Proposed measures to reduce or control noise impacts, if any:
Control the hours of construction per City requirements

HVAC units must meet State standards

8. LAND AND SHORELINE USE

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

b. Has the site been used for agriculture? If so, describe.
No

c. Describe any structures on the site.
Two existing commercial buildings. A vacant restaurant, an occupied Tire Store and a Coffee Stand

d. Will any structures be demolished? If so, what?
Yes, All structures

e. What is the current zoning classification of the site?
Juanita Business District 2

f. If applicable, what is the current shoreline master program designation of the site?
N/A

g. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.
No

Moderate landslide hazard identified on City maps. Geotechnical report is provided

h. Approximately how many people would reside or work in the completed project.
120 People

i. Approximately how many people would the completed project displace?
None

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

None

k. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:
The design will comply with the present Kirkland Land Use Codes

9. HOUSING

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

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.
None

c. Proposed measures to reduce or control housing impacts, if any:
None

10. AESTHETICS

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?
The building will be 39FT tall, (from the average grade) The exterior will consist of brick, stucco and Hardie siding

b. What views in the immediate vicinity would be altered or obstructed?
Some views toward Lake Washington to the south

c. Proposed measures to reduce or control aesthetic impacts, if any:
Project is under the height limit established for this zone

a view corridor is required and has been met w/ the design of this structure

11. LIGHT AND GLARE

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?
Some light from the commercial uses in the evening

b. Could light or glare from the finished project be a safety hazard or interfere with views?
No

c. What existing off-site sources of light or glare may affect your proposal?
None

d. Proposed measures to reduce or control light and glare impacts, if any:
Provide exterior light fixtures that cast light downward and will not provide glare

12. RECREATION

a. What designated and informal recreational opportunities are in the immediate vicinity?
Juanita Beach Park at Lake Washington

b. Would the proposed project displace any existing recreational uses? If so, describe.
No

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:
None

13. HISTORICAL AND CULTURAL PRESERVATION

a. Are there any places or objects listed in, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.
No

b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.
None

c. Proposed measures to reduce or control impacts, if any:
None

14. TRANSPORTATION

a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on-site plans, if any.
98th Avenue NE

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

No, adjacent site to the north

c. How many parking spaces would the completed project have? How many would the project eliminate?
157 parking spaces Approx. 30 eliminated

159 spaces provided

d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).
No

New sidewalk required with street trees
New crosswalk 50 feet north of the existing is required.

e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.
No

f. How many vehicular trips per day would be generated by the completed project? If know, indicate when peak volumes would occur.
1,205 Total Trips per Day

P.M. peaks will generate approximately 71 net new trips daily

g. Proposed measures to reduce or control transportation impacts, if any:
We have filed and passed Concurency and provided Traffic Studies and will pay impact fees

Moving the crosswalk will improve safety for vehicles and pedestrians

15. PUBLIC SERVICES

a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.
Fire, Police Health Care, Transportation and Schools

b. Proposed measures to reduce or control direct impacts on public services, if any.
None

16. UTILITIES

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.
Electricity, (Puget Sound Energy) Natural Gas, (Wa. Nat. Gas) Water, (City of Kirkland) Sewer, (City of Kirkland) Garbage, (City of Kirkland)

C. SIGNATURE

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

Signature: _____

Date Submitted: 9/20/07

D. SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS

(Do not use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?
   None

   Proposed measures to avoid or reduce such increases are:
   None

2. How would the proposal be likely to affect plants, animals, fish, or marine life?
   No affect

   Proposed measures to protect or conserve plants, animals, fish, or marine life are:
   None

3. How would the proposal be likely to deplete energy or natural resources?
   Electricity and natural gas use

   Proposed measures to protect or conserve energy and natural resources are:
   Meet Washington State Energy Code Requirements

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?
No affect
Proposed measures to protect such resources or to avoid or reduce impacts are:
None

New residents would possibly use nearby parks.

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?
No affect

Proposed measures to avoid or reduce shoreline and land use impacts are:
None

6. How would the proposal be likely to increase demands on transportation or public services and utilities?
the addition of 12,644 SF of commercial space and 84 livung units will increase demands on transportation, services and utilities

Proposed measures to reduce or respond to such demand(s) are:
Meet requirements of the public agencies responsible

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.
None

Traffic Impact Analysis

WATERBROOK
KIRKLAND, WA

Prepared for:

W2 Architects

September 2007

Prepared by:
The Transpo Group, Inc.
11730 118th Avenue NE, Suite 600
Kirkland, WA 98034-7120
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Fax: 425.825.8434
www.thetranspogroup.com

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Introduction

This report summarizes the traffic impact study prepared for the proposed Waterbrook mixed-use development. The purpose of this analysis is to identify potential transportation-related impacts associated with the proposed development and to identify appropriate measures to mitigate identified project impacts, as necessary. The following analysis has been carried out in accordance with the State Environmental Policy Act (SEPA) and is consistent with the City of Kirkland Traffic Impact Analysis Guidelines.

Project Location and Description

Waterbrook is located at 11680 and 11810 98th Avenue N on the east side of 98th Avenue NE across from Juanita Village in Kirkland, Washington. The site is currently occupied by the vacant 2,880 square-foot Frosty's restaurant, a drive-through espresso stand, and the 3,200 square-foot Eastside Automotive and Tire store. The project vicinity is shown in Figure 1.

The site is classified as a JBD-2 land use zone which permits a mix of commercial and residential uses. The proposed project includes development of 84 condominium units, 9,080 square-feet of retail, and 2,814 square-feet of office. Access to the project site would be provided via an existing shared full access driveway on 98th Avenue NE. The shared access would accommodate the existing 15 multi-family residential units and the Comprehensive Medical Center located on the adjacent property south of the site as well as the proposed project. The project would provide a parking garage with 159 spaces. The project is anticipated to be completed by 2010. A preliminary site plan is provided as Figure 2.

Through the planning process, the Waterbrook project has evolved into the proposed uses presented above; however, at the time this analysis was initiated, the land use sizes were not finalized so the traffic impact analysis was based on a slightly more conservative development potential of the commercial uses. This included 9,031 square-feet of retail and 4,385 square-feet of medical/dental office. This mix of uses generates a higher level of traffic impacts than is actually being proposed, presenting a conservatively high estimate of potential impacts.

Transportation Analysis Scope and Approach

The transportation analysis scope and approach were identified through coordination with the City of Kirkland staff. In addition to the site access driveway, four intersections were identified for analysis in conjunction with the proposed project. The study intersections include those identified as significant based on the City's proportional share impact worksheets shown in Appendix A as well as closely spaced intersections impacting operations of adjacent significant intersections. The study intersections, listed below, represent locations within the project vicinity that would experience the greatest impact as a result of project traffic:

- NE 116th Street/98th Avenue NE

- NE 116th Street/120th Avenue NE
- NE 116th Street/Southbound (SB) I-405 On-ramp
- NE 116th Street/Northbound (NB) I-405 Off-ramp

The analysis was conducted for the PM peak hour which represents the one-hour of the day with highest combined background and project traffic volumes. The report first documents the existing study area characteristics, including the surrounding roadway network, traffic volumes, traffic safety, and non-motorized facilities. Future 2010 without-project (Baseline) conditions were analyzed to provide a basis for evaluating project impacts. Project-generated traffic was added to future baseline conditions to form the basis of the future with-project conditions. Finally, mitigation measures to offset potential project impacts were determined, as necessary.

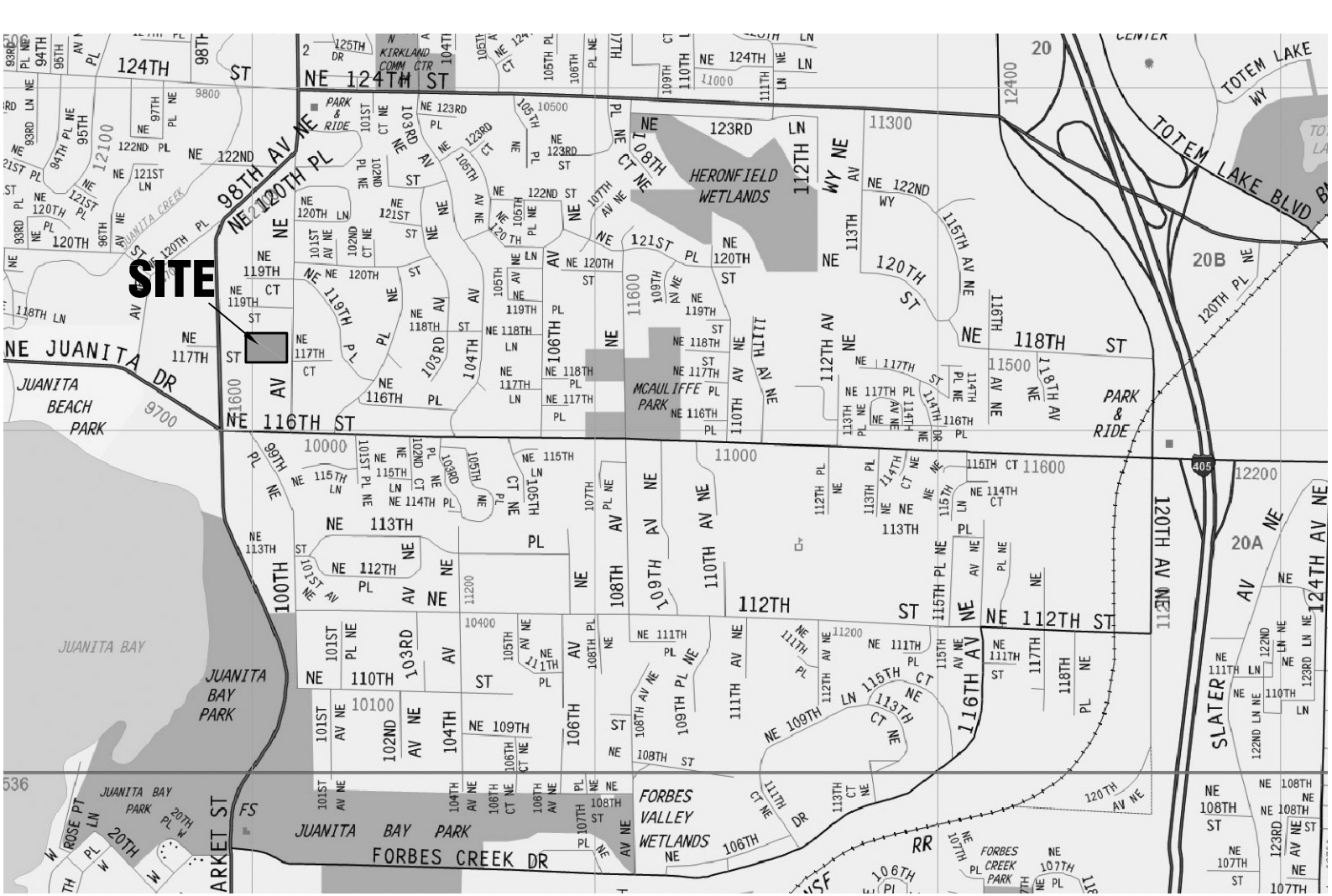

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Figure 1

Vicinity Map

Waterbrook

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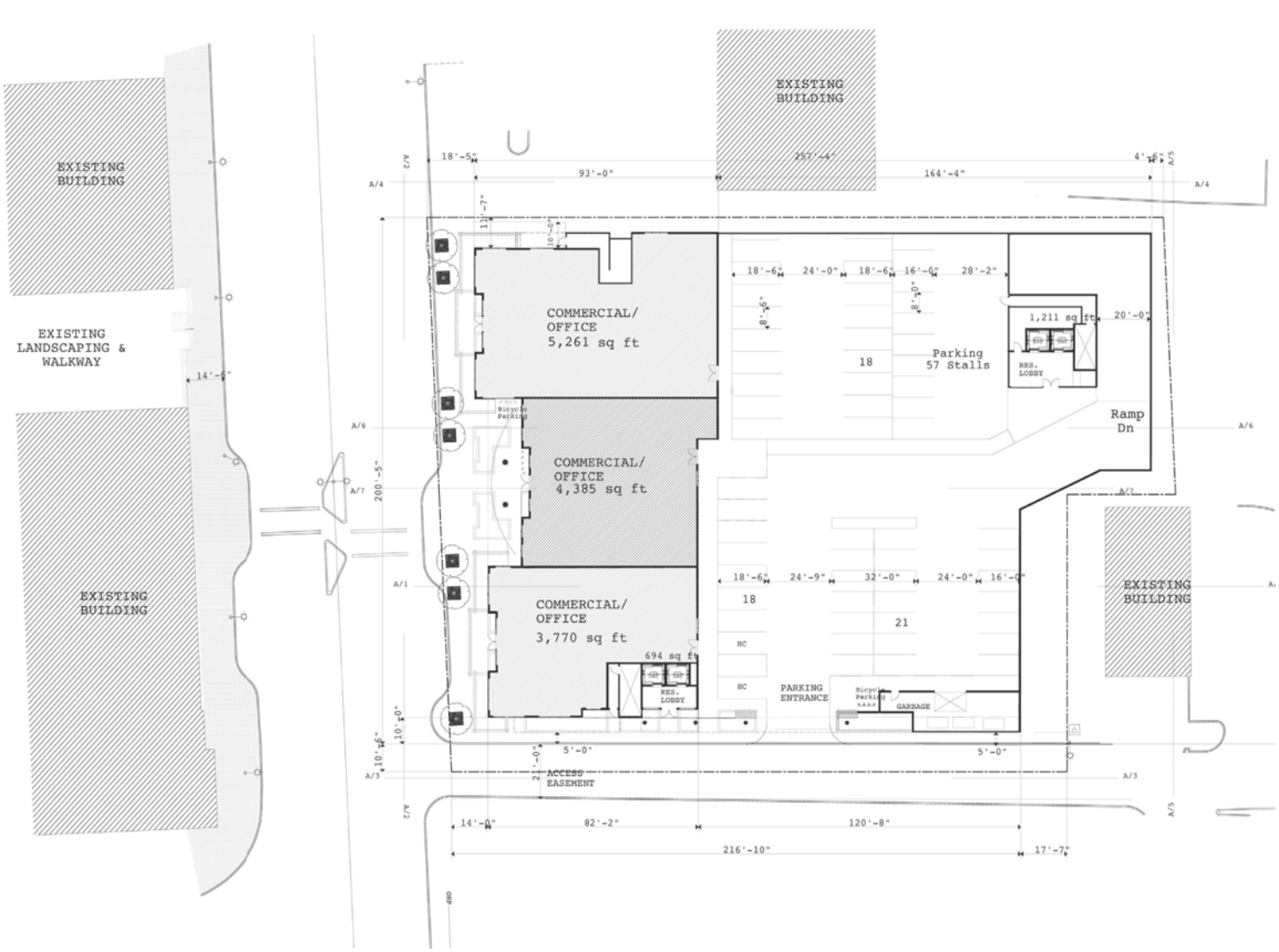

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Figure 2
Site Plan

Waterbrook

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Existing and Future Baseline Conditions

This section of the report documents the background conditions without the proposed project. It includes the existing 2007 conditions and forecast baseline (without-project) conditions for 2010, the year the proposed project is anticipated to be completed and occupied. The analysis of background conditions provides the basis by which the impacts of the proposed project are measured.

Existing Roadway Network

The primary roadways impacted by project-generated traffic are described below.

I-405 is classified by Washington State Department of Transportation (WSDOT) as an urban interstate. It primarily runs north-south from I-5 in Tukwila to I-5/SR-525 Alderwood. In the vicinity of the NE 116th Street interchange, I-405 has a posted speed limit of 60 miles per hour (mph) and provides three general purpose lanes per direction and one high occupancy vehicle (HOV) lane per direction.

98th Avenue NE is classified as a principle arterial by the City of Kirkland. It runs north-south from Juanita Bay Park at Forbes Creek Drive to NE 120th Place. Within the study area, it is a five-lane roadway with a sidewalk, curb and gutter on both sides. A bicycle lane is provided on the west side of 98th Avenue NE. In addition, portions of the roadway on the west side have on-street parking. The posted speed limit is 30 mph.

NE 116th Street is classified as a principal arterial by the City of Kirkland. It runs east-west from 98th Avenue NE to 124th Avenue NE. Within the study area, it is a three-lane roadway with a sidewalk, curb, gutter, and bicycle lane on both sides. The posted speed limit is 35 mph.

Traffic Volumes

Intersection turning movement counts were collected during a weekday PM peak hour in August 2007 for all four study intersections and the site access driveway. The count data is provided in Appendix B. The existing 2007 weekday PM peak hour volumes were rounded to the nearest five vehicles as weekday volumes fluctuate day-to-day. Existing traffic volumes are shown in Figure 3. Future 2010 with-project traffic volumes were provided by City of Kirkland Staff based on future traffic projections derived from the City's travel demand model. The City's travel demand model takes into consideration future growth within Kirkland as well as surrounding communities such as Redmond and Bellevue. It also anticipates completion of large developments such as the redevelopment of the Totem Lake Mall. Anticipated project traffic volumes were subtracted from the with-project volumes to determine future 2010 baseline traffic volumes. Figure 4 shows the 2010 baseline traffic volumes at the study intersections.

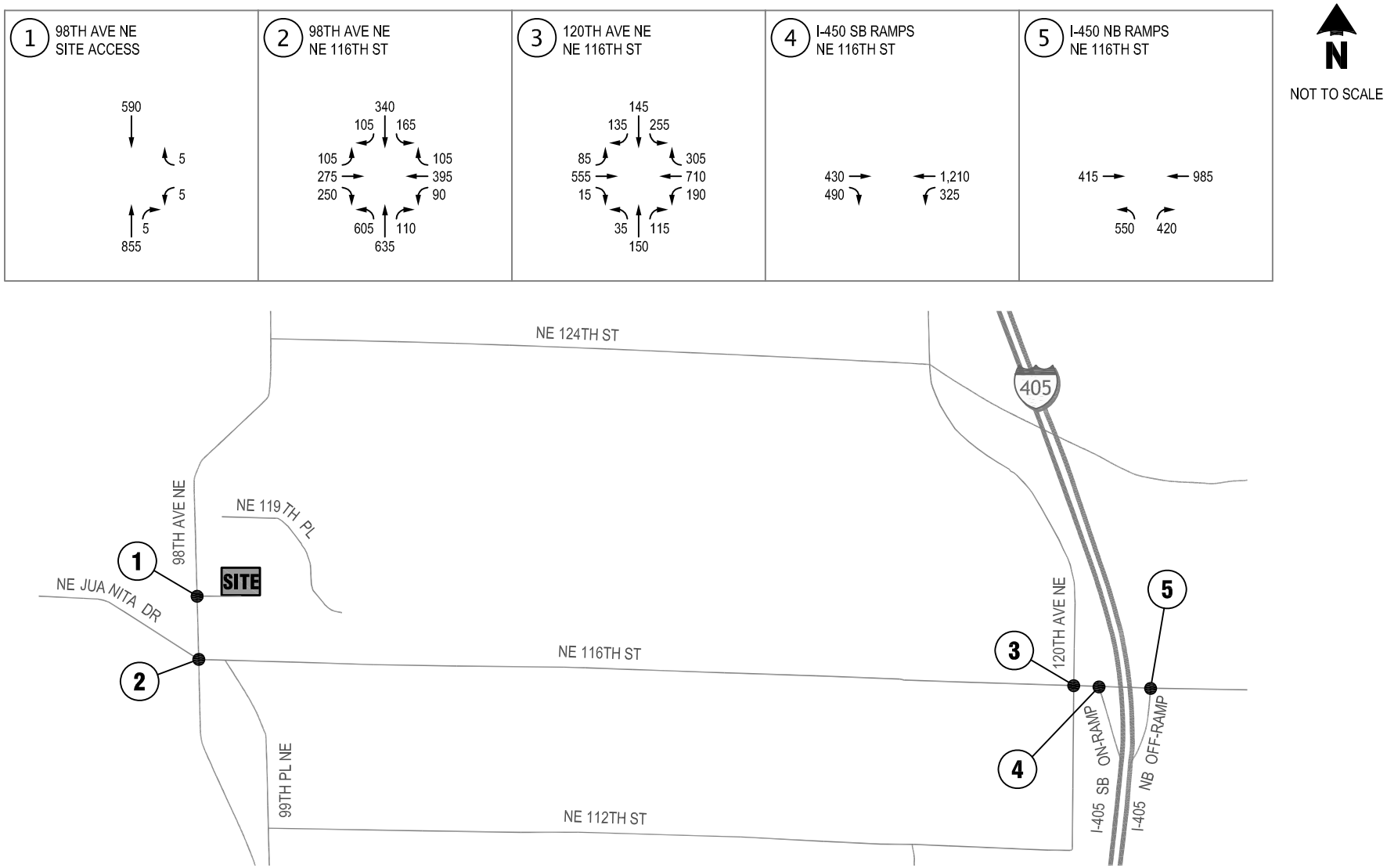

Figure 3
Existing Traffic Volumes

Waterbrook

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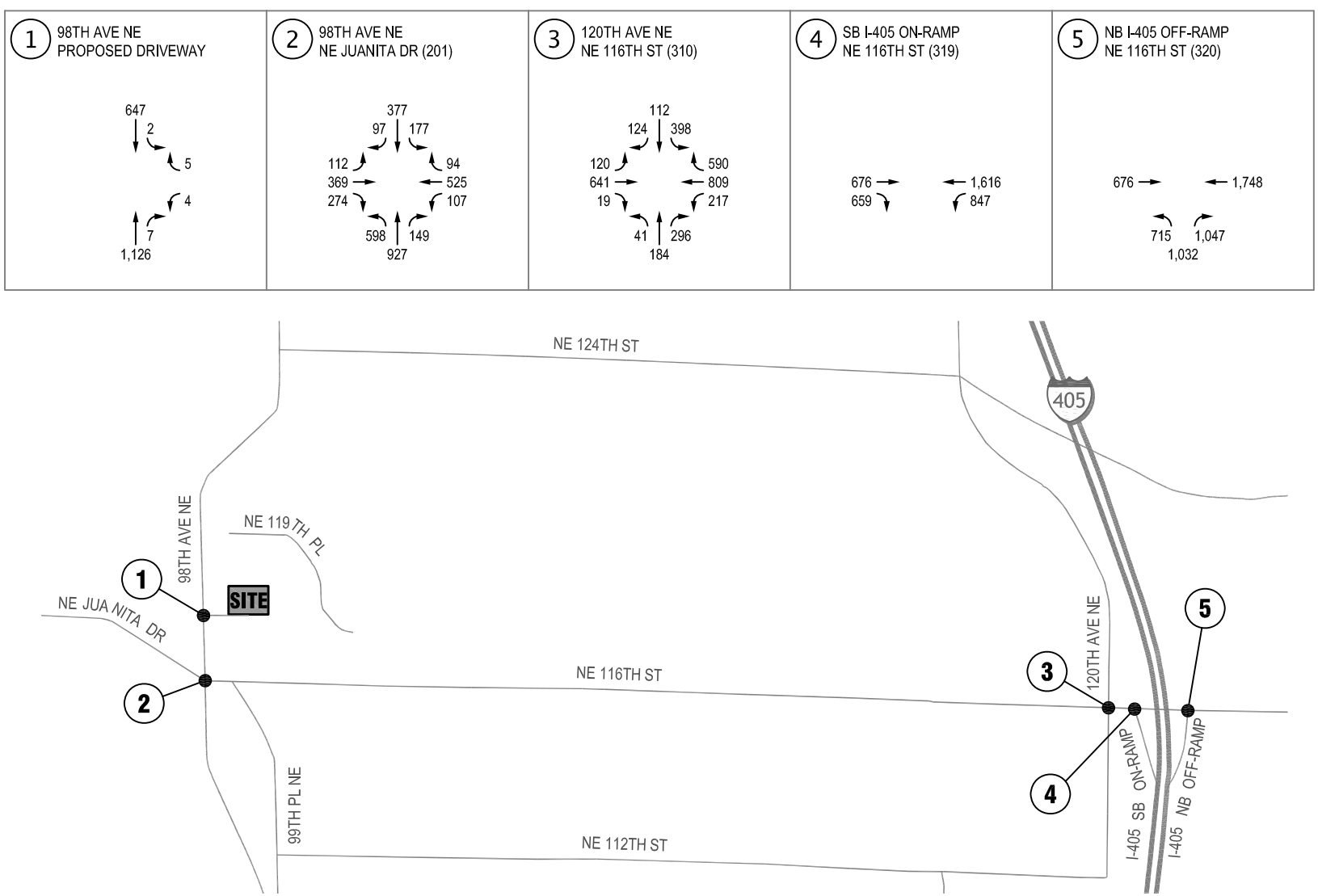

Figure 4

2010 Without-Project Traffic Volumes

Waterbrook

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Transportation Improvements

According to the City of Kirkland 2006-2011 Capital Improvement Program (CIP), an eastbound HOV lane will be constructed along NE 116th Street west of 120th Avenue NE approximately 1,500 feet. This lane will allow transit and HOV traffic access to the I-405 southbound on-ramp. The NE 116th Street/120th Avenue NE intersection traffic signals at this intersection will also be modified to allow designated traffic to bypass the single occupancy vehicle (SOV) queues. These improvements were not included in this analysis because they are not funded and are anticipated to be completed after the 2010 horizon year.

As part of the Kirkland Nickel Stage 1 and 2 projects, WSDOT would reconfigure the I-405 ramps at NE 116th Street as a single-point urban interchange (SPUI). It is anticipated that the reconfiguration of the interchange would not be completed until 2011; therefore, this was not included in the 2010 analysis.

Traffic Operations

This section summarizes traffic operations in the project vicinity under existing 2007 conditions and 2010 future baseline conditions. Traffic operations in the project vicinity are characterized through a level of service (LOS) analysis at the study area intersections. LOS is a widely applied analysis technique for measuring the quality of traffic flow through intersections and comparing the resulting traffic operations to adopted standards. Kirkland's adopted intersection LOS standard is LOS D or better. Based on the City's *Traffic Impact Analysis Guidelines* revised February 2004, the project would impact intersections operating at LOS E or F if it contributed to more than 15 percent of the total intersection traffic volume at an intersection operating at LOS E and more than 5 percent at an intersection operating at LOS F.

LOS values range from LOS A, which is indicative of free-flow conditions, to LOS F, which indicates extreme congestion and long delays. The LOS for each intersection was calculated using methodologies consistent with the *Highway Capacity Manual*, 2000. A more detailed description of the LOS criteria has been included in Appendix C. This methodology uses peak hour traffic volumes, intersection geometry, intersection control devices, and roadway characteristics as inputs to evaluate intersection operations. Table 1 shows the PM peak hour level of service results. Detailed LOS worksheets are included in Appendix D.

Table 1. Existing and Baseline PM Peak Hour LOS Summary

Intersection	2007 Existing LOS[1]	2007 Existing Delay[2]	2007 Existing V/C[3] or WM[4]	2010 Baseline LOS	2010 Baseline Delay	2010 Baseline V/C[3] or WM[4]
Signalized						
NE 116th St/98th Ave NE	D	47.2	0.79	D	50.4	0.91
NE 116th St/120th Ave NE	D	35.1	0.72	D	53.0	0.91
NE 116th St/NB I-405 Off-ramp	B	12.8	0.68	F	>80	1.13
Unsignalized						
NE 116th Street/SB I-405 On-ramp	B	10.7	WBL	F	>50	WBL

1. Level of service, based on 2000 Highway Capacity Manual methodology.
2. Average delay in seconds per vehicle.
3. Volume-to-capacity ratio reported for signalized intersections.
4. Worst movement reported for unsignalized intersections.

As shown in Table 1, all of the intersections operate within the City's LOS D standard under existing conditions. A comparison of 2004 (City of Kirkland's website) and 2007 traffic counts shows that traffic volumes decreased by 7 to 9 percent at the NE 116th Street/120th Avenue and NE 116th Street/I-405 SB On-Ramp intersections, respectively. Factors such as construction and seasonal variation (i.e., lower traffic volumes during the summer due to school vacation) may have an impact on the traffic volumes. Field observations indicate that traffic may be metered at these intersections because it takes more than one cycle for queues to dissipate. Therefore, existing intersection operations in the vicinity of the I-405 interchange may be worse than indicated by the LOS calculations.

Analysis of 2010 baseline conditions (i.e., without the project) shows that the NE 116th Avenue/I-405 interchange would operate at LOS F; all other intersections would operate at LOS D or better. As discussed previously, the NE 116th Street/I-405 interchange would be improved as part of WSDOT's Kirkland Nickel Stage 1 and 2 projects. Analysis of the NE 116th Street/I-405 interchange and NE 116th Street/120th Avenue NE intersection with WSDOT's improvements shows that these locations would operate at LOS D or better under 2010 conditions.

Traffic Safety

Collision history for the most recent three-year period (2004-2006) was provided by WSDOT. Collision analysis results can be found in Table 2. Typically, intersections experiencing an average rate of five or more collisions per year at an unsignalized intersection, and 10 collisions per year at signalized intersections or a rate of more than 1.0 accidents per million entering vehicles (MEV) are considered high accident locations (HAL). Table 2 summarizes the average number of accidents per year and the accident rate per MEV at the study intersections.

Table 2. Collision Analysis Summary

Intersection	Collision History 2004	2005	2006	Average per Year	Collisions per MEV[1]
NE 116th St/98th Ave NE	4	6	7	5.7	0.50
NE 116th St/120th Ave NE	11	6	13	10	1.04
NE 116th St/NB I-405 Off-ramp	10	10	14	11.3	1.34
NE 116th St/SB I-405 On-ramp	5	5	2	4	0.46

1. MEV = Million Entering Vehicles.

As shown in Table 2, the intersections at NE 116th Street/120th Avenue NE and NE 116th Street/NB I-405 off-ramp can be considered high accident locations. Both of these intersections experienced ten or more accidents per year from 2004 to 2006, with an average rate of greater than 1.0 collision per MEV. As previously mentioned, WSDOT has planned improvements at the NE 116th Street/120th Avenue NE intersection and NE 116th Avenue/I-405 interchange which are intended to improve intersection safety and operations at these locations.

Non-Motorized Facilities

Sidewalks are provided on both sides of NE 116th Street and 98th Avenue NE. In addition, the project intersections at NE 116th Street and 98th Avenue NE provide pedestrian crosswalks. A mid-block crosswalk with a center median refuge island connects the project site with the Juanita Village development across the street. Similar mid-block crossings are located on 98th Avenue NE, approximately 370 feet north of the proposed access driveway as well as along NE 116th Street between 101st Place NE and 102nd Pl NE, immediately east of 104th Ave NE, and immediately west of 110th Avenue NE.

Bicycle lanes are provided on both sides of NE 116th Street as well as on the west side of 98th Avenue NE opposite the project site.

Transit Service

Transit service in the area is provided by King County Metro Transit. The closest transit stop is on 98th Avenue NE approximately 200 feet north of the proposed site. This location is served by Metro Transit routes 234, 255, 260, 277, and 935. Table 3 provides a summary of the transit routes serving the project site.

Table 3. Transit Serving the Waterbrook Development

Route #	Route Description	Operation Days	Headways
234	Downtown Bellevue to Kenmore	Mon-Sat	30-60 min
255	Brickyard P&R to Kirkland to Downtown Seattle	Every Day	30-60 min
260	Finn Hill to Downtown Seattle	Mon-Fri, Peak only	30-60 min
277	Juanita to University District	Mon-Fri, Peak only	30-60 min
935	Totem Lake to Kenmore	Mon-Fri, Peak only	30-60 min

Source: King County Metro Transit (August 2007)

Project Impacts

This section of the report identifies the potential transportation-related impacts associated with the proposed development. In order to establish project impacts, the results of the with-project analysis are compared to the 2010 baseline conditions analysis.

Trip Generation

Daily and weekday peak hour trip generation for the proposed Waterbrook development was estimated based on the land use size and average trip rates from the Institute of Transportation Engineers' *Trip Generation,* 7th Edition for Condominium/Townhouse land use #230, Medical/Dental Office land use #720, and Specialty Retail land use #814.

The proposed development will replace existing uses; therefore, trip generation for the existing uses was estimated and subtracted from the proposed project traffic-generation to determine the net new project trips. Since the Frosty's restaurant was closed in March 2006 or more than one year ago, it was not considered in the trip generation credit. Traffic for the uses in operation was estimated based on the sizes and the average trip rates from ITE's *Trip Generation* for Tire Store land use #848 and coffee/espresso stand land use #935.

Table 4 summarizes the estimated trip generation for the proposed Waterbrook development.

Table 4. Estimated Weekday Project Trip Generation

Land Use	Size1	Daily	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Proposed Use								
Condominium/Townhouse #230	84 units	728	6	31	37	29	15	44
Medical/Dental Office #720	4.385 ksf	158	9	2	11	4	12	16
Retail #814	9.031 ksf	400	30	32	62	11	13	24
- less Pass-by Trips (34%)[2]		*-136*	*-10*	*-10*	*-20*	*-4*	*-4*	*-8*
Subtotal of Proposed Use		*1,150*	*35*	*55*	*90*	*40*	*36*	*76*
Existing Use								
Tire Store #848	3.200 ksf	80	6	3	9	6	7	13
Coffee/Espresso Stand #935[2]	1 Stand	1,400	130	130	260	30	30	60
- less Pass-by Trips (83%)[3]		*-1,162*	*-108*	*-108*	*-216*	*-25*	*-25*	*-50*
Subtotal of Existing Use		*318*	*28*	*25*	*53*	*11*	*12*	*23*
Net New Project Trips		***832***	***7***	***30***	***37***	***29***	***24***	***53***

1. Trip rates from ITE Trip Generation Handbook, 7th Edition.
2. Pass-by rates from ITE Trip Generation Handbook, 7th Edition.
3. Coffee/Espresso Stand is a Specialized Land Use of #935.

As shown in Table 4, the proposed Waterbrook development is expected to generate approximately 830 net new daily trips, with 37 trips occurring during the AM peak hour and 53 trips occurring during the PM peak hour.

As mentioned in the Project Location and Description section of this report, the land uses and sizes have changed slightly since initiating this analysis. The proposed project now has a slightly reduced overall commercial component and the Medical/Dental Office has changed to General Office. These changes would actually result in a lower total trip generation with approximately 710 daily trips and 42 PM peak hour trips. This is approximately 15 to 20 percent fewer trips. Since the changes reduce the trip generation, the analysis represents a conservatively high evaluation of traffic impacts.

Trip Distribution and Assignment

Traffic associated with the Waterbrook project was distributed to the surrounding roadway network based on the City's travel demand model and concurrency analysis. The traffic model distribution output is provided in Appendix E. Figure 5 summarizes the generalized distribution patterns. The anticipated net new PM peak hour trip generation for the development was then assigned to the study intersections based on these distribution patterns, and is illustrated in Figure 6. Project traffic assigned to the site access represents the total PM peak hour trip generation including pass-by; traffic from the existing residential and medical office use sharing the site access is included in the background traffic volumes.

Traffic Volumes

The City of Kirkland provided the 2010 with-project PM peak hour traffic volumes summarized in Figure 7. Table 5 provides a summary of project traffic at each study intersection, and the percent impact upon future traffic volumes.

Table 5. Traffic Volume Impact – PM Peak Hour

Study Intersection	2010 With-Project Volume	Project Traffic Only	Percent Impact
NE 116th St/98th Ave NE	3,841	34	0.9 %
NE 116th St/120th Ave NE	3,573	22	0.6 %
NE 116th St/SB I-405 On-ramp	3,820	22	0.6 %
NE 116th St/NB I-405 Off-ramp	5,234	16	0.3 %

As shown in Table 5, project-related traffic accounts for less than 1 percent of the total PM peak hour traffic volumes at the study intersections.

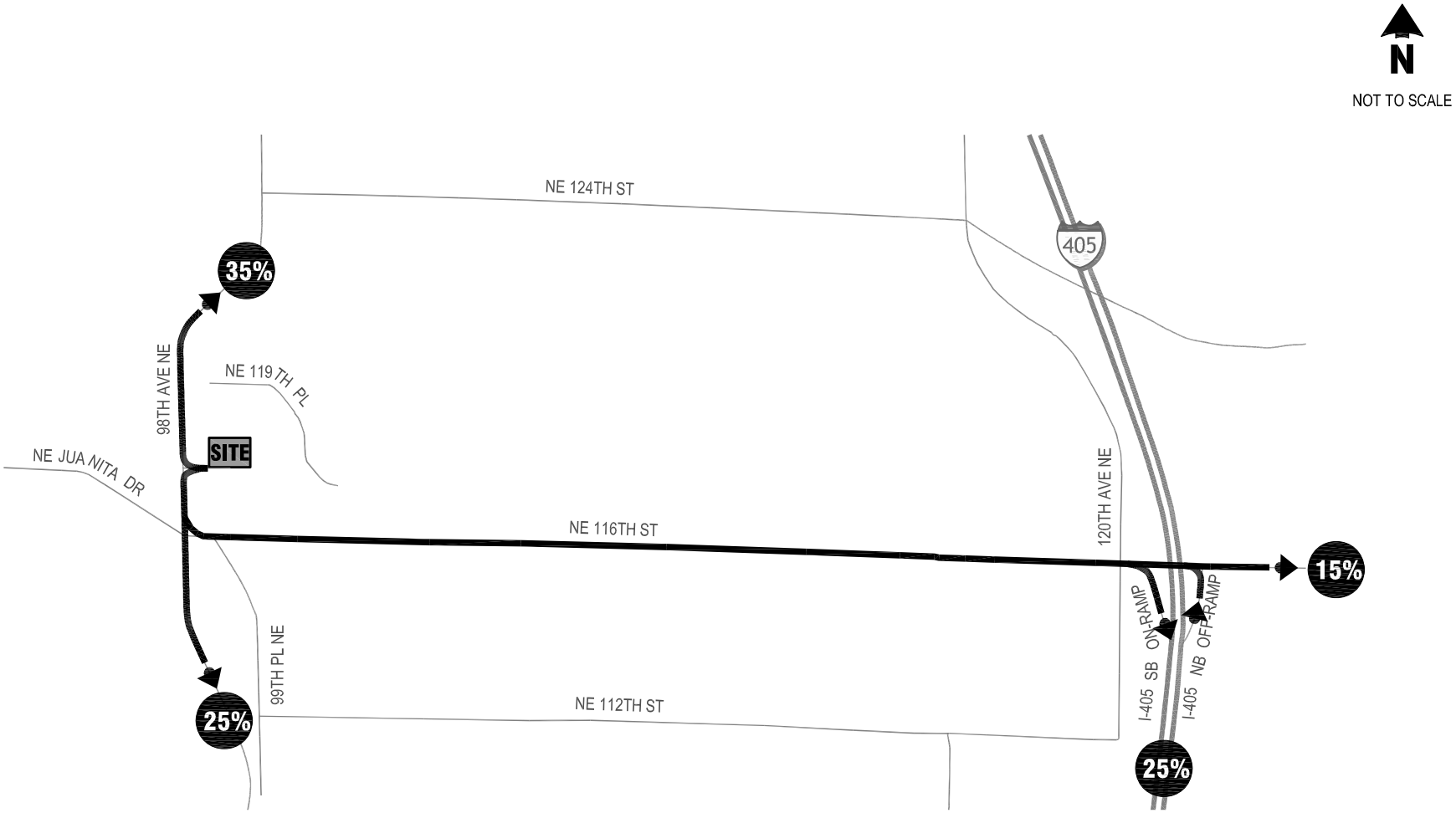

Figure 5
Project Trip Distribution

Waterbrook

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Figure 6
Project Trip Assignment

Waterbrook

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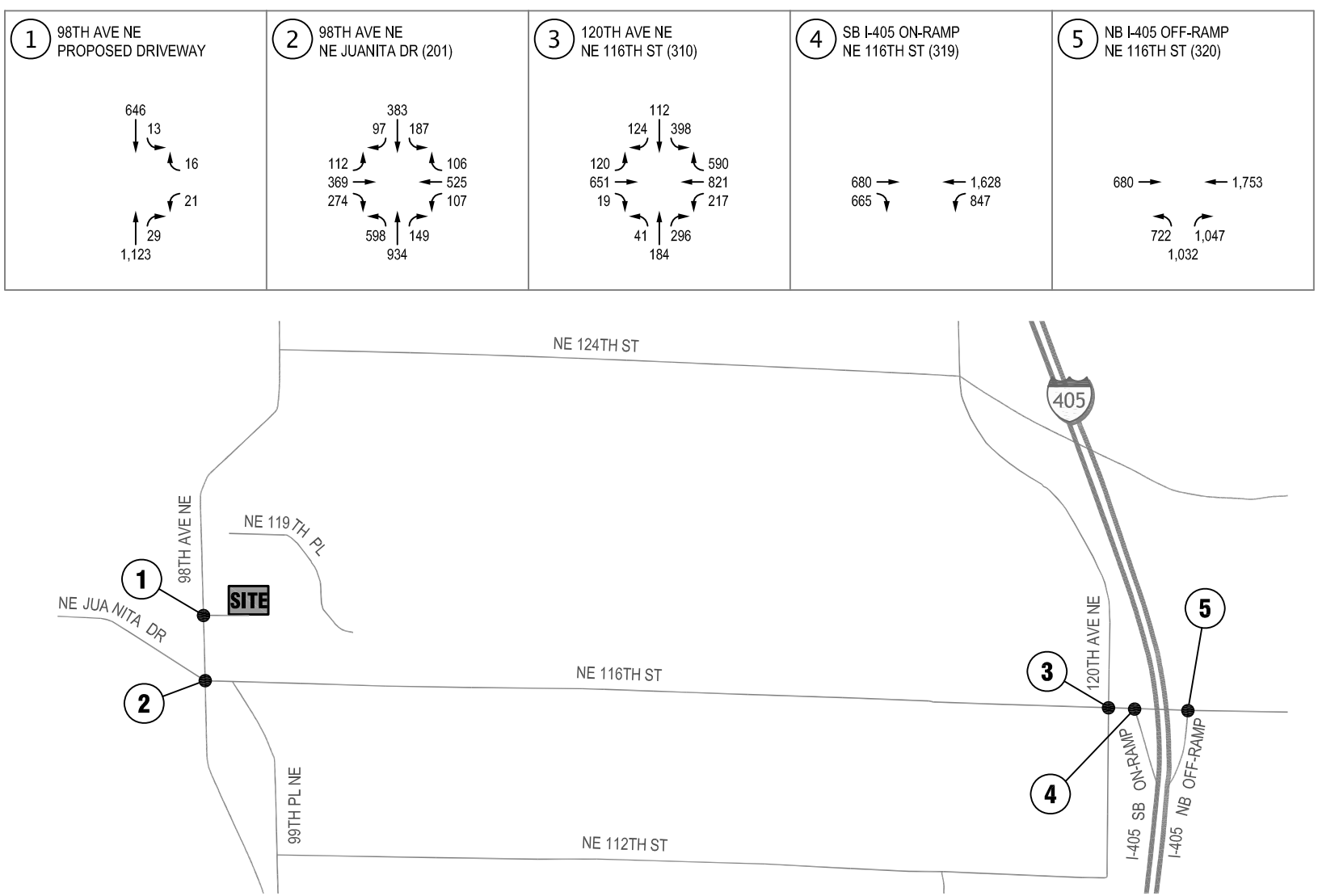

Figure 7

2010 With-Project PM Peak Hour Traffic Volumes

Waterbrook

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Traffic Operations

LOS analysis was conducted at the study intersections for 2010 PM peak hour with-project conditions. The results of the with-project analysis were compared to the results of the baseline analysis to identify the potential impacts of the proposed project. The results of the analysis are summarized in Table 6.

Table 6. 2010 Baseline & 2010 With-Project PM Peak Hour LOS Summary

	2010 Baseline			2010 With-Project		
Intersection	**LOS[1]**	**Delay[2]**	**V/C[3] or WM[4]**	**LOS**	**Delay**	**V/C[3] or WM[4]**
Signalized						
NE 116th St/98th Ave NE	D	50.4	0.91	D	50.8	0.92
NE 116th St/120th Ave NE	D	53.0	0.91	D	54.1	0.92
NE 116th St/NB I-405 Off-ramp	F	>80	1.13	F	>80	1.14
Unsignalized						
NE 116th Street/SB I-405 On-ramp	F	>50	WBL	F	>50	WBL

1. Level of service, based on 2000 Highway Capacity Manual methodology.
2. Average delay in seconds per vehicle.
3. Volume-to-capacity ratio reported for signalized intersections.
4. Worst movement reported for unsignalized intersections.

Table 6 shows that no change in LOS is expected to occur with the addition of project traffic; however, the NE 116th Street/I-405 interchange would operate at LOS F and would not meet the City's LOS D standard. As discussed previously, the City requires that project's mitigate their impact to intersection operating at LOS F when the project's proportionate share exceeds 5 percent at an intersection operating at LOS F. The project's proportionate share (shown in Table 5) is less than one percent at each of these intersections, which falls well below the City's 5 percent threshold; therefore, no project mitigation is required.

As discussed previously, the NE 116th Street/I-405 interchange would be improved as part of WSDOT's Kirkland Nickel Stage 1 and 2 projects. Analysis of the 116th Street/I-405 interchange and NE 116th Street/120th Avenue NE intersection with WSDOT's improvements shows that these locations would operate at LOS D or better under 2010 with-project conditions.

Transportation Concurrency

A transportation concurrency test was completed for this project by City of Kirkland staff on July 3, 2007. The proposed project passed the concurrency test based on the project having 84 condominium units, 4,385 square-feet of medical/dental office, and 9,031 square-feet of retail. Unless a development permit and certificate of concurrency or an extension is granted, this certificate of concurrency will expire in one year from the date of issuance. The concurrency test results are shown in Appendix F.

Site Access

The site access driveway would provide full access onto 98th Avenue NE for both the proposed project and the existing uses on the property south of the project site. This section discusses the proposed site access operations and its interaction with adjacent driveways and pedestrian connections.

Intersection Operations

In the future, the worst approach (i.e., westbound) would operate at LOS C with the project. This is within the City of Kirkland LOS standards. Table 7 shows the delay for each movement at the site access as well as the 95th percentile queue.

Table 7. Site Access Level of Service – PM Peak Hour

Movement	LOS[1]	Delay[2]	Storage[3]	95th Percentile Queue[1]
Westbound Left/Right-Turn	C	20.2	400-feet	13-feet
Northbound Through/Right-Turn	A	0.0	600-feet	0-feet
Southbound Left-Turn	B	12.0	60-feet	2-feet
Southbound Through	A	0.0	600-feet	0-feet

1. Level of Service and 95th percentile queue based on *2000 Highway Capacity Manual* methodology.
2. Average delay in seconds per vehicle.
3. Storage for northbound and southbound through measured to nearest major intersections.

As shown in the table, all of the movements would operate at LOS C or better. In addition, the 95th percentile queues would not exceed the storage.

Sight Distance

Sight distance was also evaluated at the project driveway. The City of Kirkland recommends an entering sight distance of 335-feet at driveways with a PM peak hour volume between 50 and 200 vehicles per hour with access to streets with an average daily traffic volume greater than 6,000 vehicles. The project site is located between two signalized intersections one is 600-feet to the south and the other is 860-feet to the north. Vehicles exiting both intersections are visible from the site access; therefore, sight distance requirements are exceeded in both the northbound and southbound directions.

Potential Vehicle and Pedestrian Conflicts

As shown in Figure 8, the site access is located approximately 60-feet north of the existing Juanita Village 98th Avenue NE access and approximately 60-feet south of an existing pedestrian crossing. This close spacing has a potential for vehicle and pedestrian conflicts.

The Juanita Village driveway located across 98th Avenue NE is offset to the south by approximately 60 feet. Each of these access driveways utilizes the two-way center left-turn lane for entering left-turns and as refuge for exiting left-turns. The entering left-turns would not pose a problem because they would not conflict with each other. The offset is not favorable for the exiting left-turns that desire to utilize the two-way center

left-turn lane as refuge. Vehicles exiting the Waterbrook and Juanita Village site access have the potential to conflict if exiting left-turn vehicles from both driveways desired to utilize the center lane as refuge at the same time. During the PM peak hour, the proposed project would have about 20 outbound left-turning vehicles and Juanita Village currently has about 50 outbound left-turning vehicles. If vehicles depart from the sites evenly throughout the PM peak hour, there would be about one vehicle every three minutes from Waterbrook and about one vehicle every minute from Juanita Village. In order for a conflict to occur, vehicles would need to be in the center lane within the same few seconds, which is not anticipated to be a frequent occurrence.

A mid-block crosswalk with center island landscaping is located north of the access driveway, limiting the southbound left-turn storage to approximately 60 feet. As shown in Table 7, the 95th percentile queue for the southbound left-turn movement is anticipated to be no more than one vehicle long and would be accommodated in the available 60-feet storage. Therefore, it is unlikely that the southbound left-turn queues would spill back into or cause any conflicts with the pedestrian crossing.

Parking

As discussed previously, the Waterbrook project has evolved during the planning process. The parking analysis was conducted for the currently proposed project which would include 84 condominium units, 9,080 square-feet of retail, and 2,814 square-feet of general office. The site plan includes a total of 159 on-site parking spaces with approximately 50 spaces provided for the retail, office, and residential visitor use and 109 spaces reserved for residential only. Table 8 summarizes the City's parking requirements for land use within zone JBD-2.

Table 8. Kirkland Parking Requirements

Land Use	Size	Required Parking Spaces[1]	Required Parking Supply
Condominiums	84 Units	1.7 spaces per unit + up to 0.5 for visitor	185 spaces[2]
Retail	9,080 sf	1 space per 300 sf	30 spaces
General Office	2,814 sf	1 space per 300 sf	9 spaces
Total			**224 spaces**

1. Based on City of Kirkland *Title 23 Zoning*.
2. Code calculation includes an additional 0.5 spaces per unit for visitors.

As shown in the table, the City's code requires the development to provide 224 spaces with 185 spaces for the condominium units. However, based on approval from the City of Kirkland, the project would be allowed to reduce the residential parking requirement. The proposed parking supply and justification for the parking code deviation is discussed below.

Parking Demand

The proposed development parking demand was calculated based on *ITE's Parking Generation* (3rd Edition) as well as site-specific studies conducted for similar

developments in downtown Kirkland. Parking demand is calculated for each individual use and does not account for shared parking. This parking strategy gives flexibility for new owners/developers, and also ensures sufficient parking during peak parking demand.

Condominium Parking Demand

ITE's residential condominium/townhouse (#230) average parking demand for suburban locations on weekdays is 1.46 vehicles per dwelling unit. ITE defines suburban locations as having "*limited transit service, surface parking, less-than-complete pedestrian networks, predominance of single-story buildings, sites with isolated land uses and larger groupings of homogeneous land uses*". Please note that the ITE regression equation is not appropriate for this project size because the data points within the range of this project size fall along the curve for average.

Site-specific studies were conducted as part of the *Parking Demand Analysis – Downtown Kirkland Condominiums*, October 28, 2005 and supplemental data was collected in April and July 2006. Note the supplemental data is consistent with the October 2005 data. The condominium average parking demand rate for the site-specific studies in downtown Kirkland was found to be 1.29 vehicles per dwelling unit, this includes both residential, visitor, and on-street parking demand.

The Juanita area is located outside of downtown Kirkland and does not include as urban of conditions as downtown but there is transit service (as discussed previously), a mix of uses, and pedestrian and bicycle networks that give this site more similar characteristics than an isolated suburban condominium development as studied in ITE. Therefore, this analysis assumes a parking demand for the condominiums of 1.38 vehicles per dwelling unit (i.e., the average of 1.46 vehicles per dwelling unit and 1.29 vehicles per dwelling unit). This average rate takes into account that the Waterbrook development's location and characteristics fall between those evaluated for the suburban conditions that the ITE rate is based on and those in downtown Kirkland. Table 9 summarizes the condominium parking demand.

Typically, the recommended parking supply or practical capacity is determined by applying a design safety factor to the parking demand. A safety factor is applied to the parking demand to allow for some reserved spaces to ensure vehicles circulating the parking area can find a space as well as accounts for peak surges and vehicles leaving parking spaces. However, condominium parking would be sold with the units and residents would have assigned spots. Each condominium unit would be assigned one space per bedroom, and the remaining parking would be extra spaces to sell with the unit or visitors. Based visitor parking demand rates provided in the Urban Land Institute (ULI) *Shared Parking* (2nd Editions), it is recommended that visitor parking make up about 8 percent of the condominium parking.

The 109 parking spaces on the lower level of the parking garage would be reserved for residential units (i.e., the lower level would be gated). The proposed project would have 96 bedrooms which would require 96 parking spaces; therefore, the lower level would have 13 additional spaces for residents wishing to purchase extra parking. Since there are

109 reserved parking spaces, the development would provide approximately 10 more spaces for residential visitor parking or a total of 119 parking spaces. Visitor parking would be provided on the same level as the commercial parking which would not be gated.

Retail and Office Parking

Retail parking demand is based on ITE's shopping center (#820) for non-December weekdays and office parking demand is based on ITE's office building (#701) for suburban locations. It should be noted that ITE does not have a parking demand rate for specialty retail which was assumed for the intersection analysis. The use of suburban locations presents conservative estimate of parking demand since Juanita does not meet ITE's definition of a suburban location. Table 9 summarizes Waterbrook parking demand for all proposed uses.

Table 9. Estimated Parking Demand

Land Use	Size	Parking Rate[1,2]	Parking Demand	Proposed Supply
Condominiums	84 units	1.38 vehicles per unit	116	119
Retail	9,080 sf	2.65 vehicles per 1,000 sf	24	30
General Office	2,814 sf	2.84 vehicles per 1,000 sf	8	10
Total			**148**	**159**

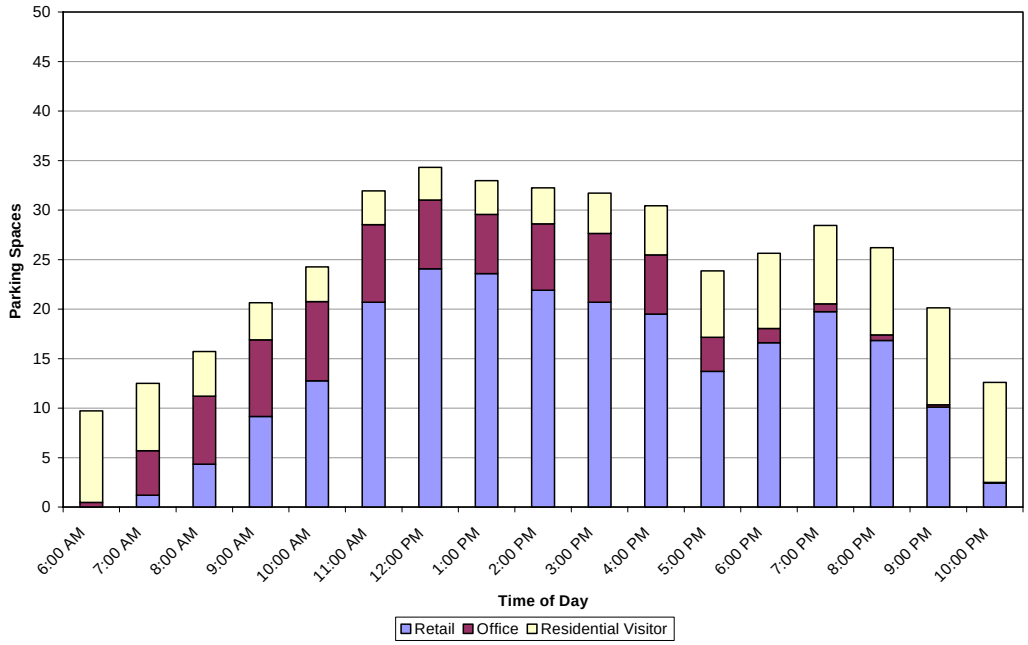
1. Condominium parking rate based on average parking demand developed from ITE's *Parking Generation* (3rd Edition) and *Parking Demand Analysis – Downtown Kirkland Condominiums*, October 28, 2005.
2. Retail (#820) and office (#701) average parking rate based on ITE's *Parking Generation* (3rd Edition).
3. Parking supply for condominiums assumes 109 reserved spaces and an additional 9 for visitors. Retail and office parking supply assumes provision of 10 percent more parking than the parking demand based on Robert A. Weant and Herbert S. Levinson's *Parking* reprinted 2003.

As shown in the table, the proposed parking supply for the retail and office uses would meet the City of Kirkland's code. In addition, the development would provide 119 residential parking spaces or about 1.42 spaces per unit. This rate is greater than the parking demand calculated by averaging ITE's rate and the downtown study rate, and it accounts for both reserved and visitor parking.

Potential Off-Peak Shared Parking

There are likely to be opportunities for the 50 parking spaces provided for the retail, office, and residential visitor use to be shared since these uses would peak at different times. Figure 8 shows ITE's hourly parking demand from 6:00 a.m. to 10:00 p.m. for each of the uses sharing the 50 parking spaces. ITE does not give hourly parking demand for condominiums so the hourly parking demand for rental townhouse (Land Use 224) was used.

Figure 8. Weekday Parking Demand Distribution



As shown in the figure above, the parking demand for all three uses peaks at noon with approximately 35 vehicles. In the early morning and late evening, the office parking demand is less than 5 vehicles and retail parking demand is less than 10 vehicles which would leave additional parking for residential visitors. The hourly parking demand for all three uses combined is less than the 50 parking spaces supplied and there are several hours throughout the day were spaces are available for additional residential visitors and sharing between uses, if necessary.

Summary and Mitigation

The following provides a brief summary of the anticipated traffic characteristics of the Waterbrook mixed-use development.

- Trip generation from the proposed development would result approximately 830 net new daily trips, with 37 trips occurring during the AM peak hour and 53 trips occurring during the PM peak hour.
- Study intersection LOS does not change with the addition of project traffic.
- The NE 116th Street/I-405 interchange would operate at LOS F under 2010 without and with-project conditions. The project impacts these intersections by less than one percent of the total traffic and no mitigation measures are warranted. Poor operations at the NE 116th Street/I-405 interchange is temporary, as WSDOT anticipates completion of improvements which would bring this interchange to acceptable operations (i.e., LOS D or better) by 2011.
- The proposed project will be paying the City's transportation impact fees as calculated below, which will contribute to funding City identified transportation improvements.
- The proposed site access operates at LOS C or better and all 95th percentile queues would be accommodated in the available storage.
- No conflicts are expected between pedestrians and vehicles making a southbound left-turn into the project driveway.
- There would be no conflicts between entering left-turn vehicles for the site access and the Juanita Village driveway. Vehicles exiting the Waterbrook and Juanita Village site access have the potential to conflict if exiting left-turn vehicles from both driveways desired to utilize the center lane as refuge at the same time; however, this not anticipated to be a frequent occurrence.
- The 159 parking spaces would adequately accommodate the peak demand.

Overall, the proposed Waterbrook development passed the City's concurrency test, and does not warrant off-site transportation improvements based on the City's methodology for identifying mitigation. The project is subject to transportation impact fees, in accordance with the Growth Management Act and per Title 27 Kirkland Municipal Code. The impact fee ordinance allows credit for existing land uses, which are reflected in the calculations in Table 10. The preliminary fee estimate for the proposed project is $149,700. No fee category is provided for the existing espresso stand, if credit is given the City would determine the appropriate fee. The transportation impact fees are provided as preliminary estimates and will be finalized by the City upon their review. No other mitigation is recommended or warranted.

Table 10. Preliminary Estimate of Road Impact Fees

Land Use	Size	Rate[1]	Fee
Proposed Uses			
Attached and Stacked Housing	84 Units	$2,012 per Unit	$169,000
Retail	9,080 sf	$4.02 per sf	$36,500
General Office	2,814 sf	$6.64 per sf	$18,700
Sub-total			*$224,200*
Existing Use Credit			
Tire Store	4 Service Bays	$4,379 per bay	$17,500
Restaurant	2,880 sf	$19.78 per sf	$57,000
Espresso Stand[2]	1 stand	TBD	TBD
Sub-total			*$74,500*
Total (not yet assuming credit for Espresso Stand)			**$149,700**

1. Based on Title 27 City of Kirkland Municipal Code.
2. No fee category provided in code and credit To Be Determined by City staff.

Appendix A: Intersection Proportional Share Impact

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	98th Ave NE	# of Lanes*=	2
Minor Street[1]	Juanita Dr	# of Lanes*=	1

DATE:

7/10/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	186.75	120	253	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	76.775	0	154	*Minor*

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
1	***1***	***1***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	1.87%
$P_2=V_2/(5{,}000 \times f_2)$ =	1.54%
$P_3=V_1/(15{,}000 \times f_3)$ =	1.25%
$P_4=V_2/(2{,}500 \times f_4)$ =	3.07%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	1.70%
$S_2=(P_3+P_4)/2$=	2.16%

Intersection Proportional Share = Maximum of S1 and S2 = 2.16%

Significant Intersection? **yes**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By:	Carole Turley
Company:	The Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	100th Ave NE	# of Lanes*=	2
Minor Street[1]	NE 124th St	# of Lanes*=	1

DATE:

7/16/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	107.9	149	66	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	17.53521	0	35	*Minor*

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
1	***1***	***1***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	1.08%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.35%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.72%
$P_4=V_2/(2{,}500 \times f_4)$ =	0.70%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.71%
$S_2=(P_3+P_4)/2$=	0.71%

Intersection Proportional Share = Maximum of S1 and S2 = 0.71%

Significant Intersection? **no**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Carole Turley
Company: The Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	100th Ave NE	# of Lanes*=	2
Minor Street[1]	NE 132nd St	# of Lanes*=	1

DATE:

7/16/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	58.1	62	54	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	0	0	0	*Minor*

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
1	***1***	***1***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	0.58%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.00%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.39%
$P_4=V_2/(2{,}500 \times f_4)$ =	0.00%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.29%
$S_2=(P_3+P_4)/2$=	0.19%

Intersection Proportional Share = Maximum of S1 and S2 = 0.29%

Significant Intersection? **no**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By:	Carole Turley
Company:	The Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	116th Way NE	# of Lanes*=	1
Minor Street[1]	NE 132nd St	# of Lanes*=	1

DATE:
7/16/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	0	0	0	***Major***
(Total of both approaches divided by two)	Minor Street Volume V_2 =	0	0	0	***Minor***

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	***1***	***0.833***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	0.00%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.00%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.00%
$P_4=V_2/(2{,}500 \times f_4)$ =	0.00%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.00%
$S_2=(P_3+P_4)/2$=	0.00%

Intersection Proportional Share = Maximum of S1 and S2 = 0.00%

Significant Intersection? **no**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Carole Turley
Company: The Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	Market St	# of Lanes*=	1
Minor Street[1]	Forbes Creek	# of Lanes*=	1

DATE:

7/16/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	91.3	108	75	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	0	0	0	*Minor*

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	***1***	***0.833***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	1.10%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.00%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.73%
$P_4=V_2/(2{,}500 \times f_4)$ =	0.00%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.55%
$S_2=(P_3+P_4)/2$=	0.37%

Intersection Proportional Share = Maximum of S1 and S2 = 0.55%

Significant Intersection? **no**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By:	Carole Turley
Company:	The Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	98th Avenue NE	# of Lanes*=	2
Minor Street[1]	NE 120th Pl	# of Lanes*=	1

DATE:

7/16/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	141.1	133	149	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	0	0	0	*Minor*

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
1	***1***	***1***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	1.41%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.00%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.94%
$P_4=V_2/(2{,}500 \times f_4)$ =	0.00%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.71%
$S_2=(P_3+P_4)/2$=	0.47%

Intersection Proportional Share = Maximum of S1 and S2 = 0.71%

Significant Intersection? **no**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By:	Carole Turley
Company:	The Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	Juanita Dr	# of Lanes*=	1
Minor Street[1]	93rd Ave NE	# of Lanes*=	1

DATE:

7/16/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	6.225	0	12	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	0	0	0	*Minor*

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	***1***	***0.833***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	0.07%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.00%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.05%
$P_4=V_2/(2{,}500 \times f_4)$ =	0.00%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.04%
$S_2=(P_3+P_4)/2$=	0.02%

Intersection Proportional Share = Maximum of S1 and S2 = 0.04%

Significant Intersection? **no**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By:	Carole Turley
Company:	The Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	Juanita Dr	# of Lanes*=	1
Minor Street[1]	97th Ave NE	# of Lanes*=	1

DATE:

7/16/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	6.225	0	12	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	0	0	0	*Minor*

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	***1***	***0.833***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	0.07%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.00%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.05%
$P_4=V_2/(2{,}500 \times f_4)$ =	0.00%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.04%
$S_2=(P_3+P_4)/2$=	0.02%

Intersection Proportional Share = Maximum of S1 and S2 = 0.04%

Significant Intersection? **no**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By:	Carole Turley
Company:	The Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	Market Street	# of Lanes*=	1
Minor Street[1]	7th Ave NE	# of Lanes*=	1

DATE:

7/16/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	91.3	108	75	***Major***
(Total of both approaches divided by two)	Minor Street Volume V_2 =	0	0	0	***Minor***

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	***1***	***0.833***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	1.10%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.00%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.73%
$P_4=V_2/(2{,}500 \times f_4)$ =	0.00%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.55%
$S_2=(P_3+P_4)/2$=	0.37%

Intersection Proportional Share = Maximum of S1 and S2 = 0.55%

Significant Intersection? **no**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By:	Carole Turley
Company:	The Transpo Group

209_Market_7th /Calculation sheet

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	NE 116th St	# of Lanes*=	1
Minor Street[1]	120th Ave NE	# of Lanes*=	1

DATE:

7/16/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	151.475	149	154	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	0	0	0	*Minor*

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	***1***	***0.833***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	1.82%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.00%
$P_3=V_1/(15{,}000 \times f_3)$ =	1.21%
$P_4=V_2/(2{,}500 \times f_4)$ =	0.00%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.91%
$S_2=(P_3+P_4)/2$=	0.61%

Intersection Proportional Share = Maximum of S1 and S2 = 0.91%

Significant Intersection? **no**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By:	Carole Turley
Company:	The Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	124th Ave NE	# of Lanes*=	1
Minor Street[1]	NE 116th St	# of Lanes*=	1

DATE:

7/16/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	26.975	54	0	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	31.125	50	12	*Minor*

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	***1***	***0.833***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	0.32%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.62%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.22%
$P_4=V_2/(2{,}500 \times f_4)$ =	1.25%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.47%
$S_2=(P_3+P_4)/2$=	0.73%

Intersection Proportional Share = Maximum of S1 and S2 = 0.73%

Significant Intersection? **no**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By:	Carole Turley
Company:	The Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	NE 124th St	# of Lanes*=	2
Minor Street[1]	116th Ave NE	# of Lanes*=	1

DATE:

7/16/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	35.275	37	33	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	6.225	0	12	*Minor*

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
1	***1***	***1***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	0.35%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.12%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.24%
$P_4=V_2/(2{,}500 \times f_4)$ =	0.25%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.24%
$S_2=(P_3+P_4)/2$=	0.24%

Intersection Proportional Share = Maximum of S1 and S2 = 0.24%

Significant Intersection? **no**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By:	Carole Turley
Company:	The Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	NE 124th St	# of Lanes*=	2
Minor Street[1]	113th Pl NE	# of Lanes*=	1

DATE:
7/16/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	64.325	62	66	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	0	0	0	*Minor*

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
1	***1***	***1***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	0.64%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.00%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.43%
$P_4=V_2/(2{,}500 \times f_4)$ =	0.00%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.32%
$S_2=(P_3+P_4)/2$=	0.21%

Intersection Proportional Share = Maximum of S1 and S2 = 0.32%

Significant Intersection? **no**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By:	Carole Turley
Company:	The Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	NE 124th St	# of Lanes*=	2
Minor Street[1]	I-405 SB off-ramp	# of Lanes*=	1

DATE:

7/16/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	29.05	25	33	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	0	0	0	*Minor*

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
1	***1***	***1***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	0.29%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.00%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.19%
$P_4=V_2/(2{,}500 \times f_4)$ =	0.00%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.15%
$S_2=(P_3+P_4)/2$=	0.10%

Intersection Proportional Share = Maximum of S1 and S2 = 0.15%

Significant Intersection? **no**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By:	Carole Turley
Company:	The Transpo Group

317_SBoff_124th /Calculation sheet

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	NE 124th St	# of Lanes*=	2
Minor Street[1]	I-405 NB off-ramp	# of Lanes*=	1

DATE:

7/16/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	29.05	25	33	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	0	0	0	*Minor*

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
1	***1***	***1***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	0.29%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.00%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.19%
$P_4=V_2/(2{,}500 \times f_4)$ =	0.00%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.15%
$S_2=(P_3+P_4)/2$=	0.10%

Intersection Proportional Share = Maximum of S1 and S2 = 0.15%

Significant Intersection? **no**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By:	Carole Turley
Company:	The Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	NE 116th St	# of Lanes*=	1
Minor Street[1]	I-405 SB Off-ramp	# of Lanes*=	1

DATE:

7/16/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	151.475	149	154	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	0	0	0	*Minor*

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	***1***	***0.833***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	1.82%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.00%
$P_3=V_1/(15{,}000 \times f_3)$ =	1.21%
$P_4=V_2/(2{,}500 \times f_4)$ =	0.00%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.91%
$S_2=(P_3+P_4)/2$=	0.61%

Intersection Proportional Share = Maximum of S1 and S2 = 0.91%

Significant Intersection? **no**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By:	Carole Turley
Company:	The Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	Waterbrook		
Major Street[1]	NE 116th St	# of Lanes*=	1
Minor Street[1]	I-405 NB Off-ramp	# of Lanes*=	1

DATE:

7/16/2007

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes**		
(Total of both approaches divided by two)	Major Street Volume V_1 =	58.1	50	66	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	43.575	87	0	*Minor*

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	***1***	***0.833***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	0.70%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.87%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.46%
$P_4=V_2/(2{,}500 \times f_4)$ =	1.74%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.78%
$S_2=(P_3+P_4)/2$=	1.10%

Intersection Proportional Share = Maximum of S1 and S2 = 1.10%

Significant Intersection? **yes**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By:	Carole Turley
Company:	The Transpo Group

Appendix B: Traffic Volume Counts

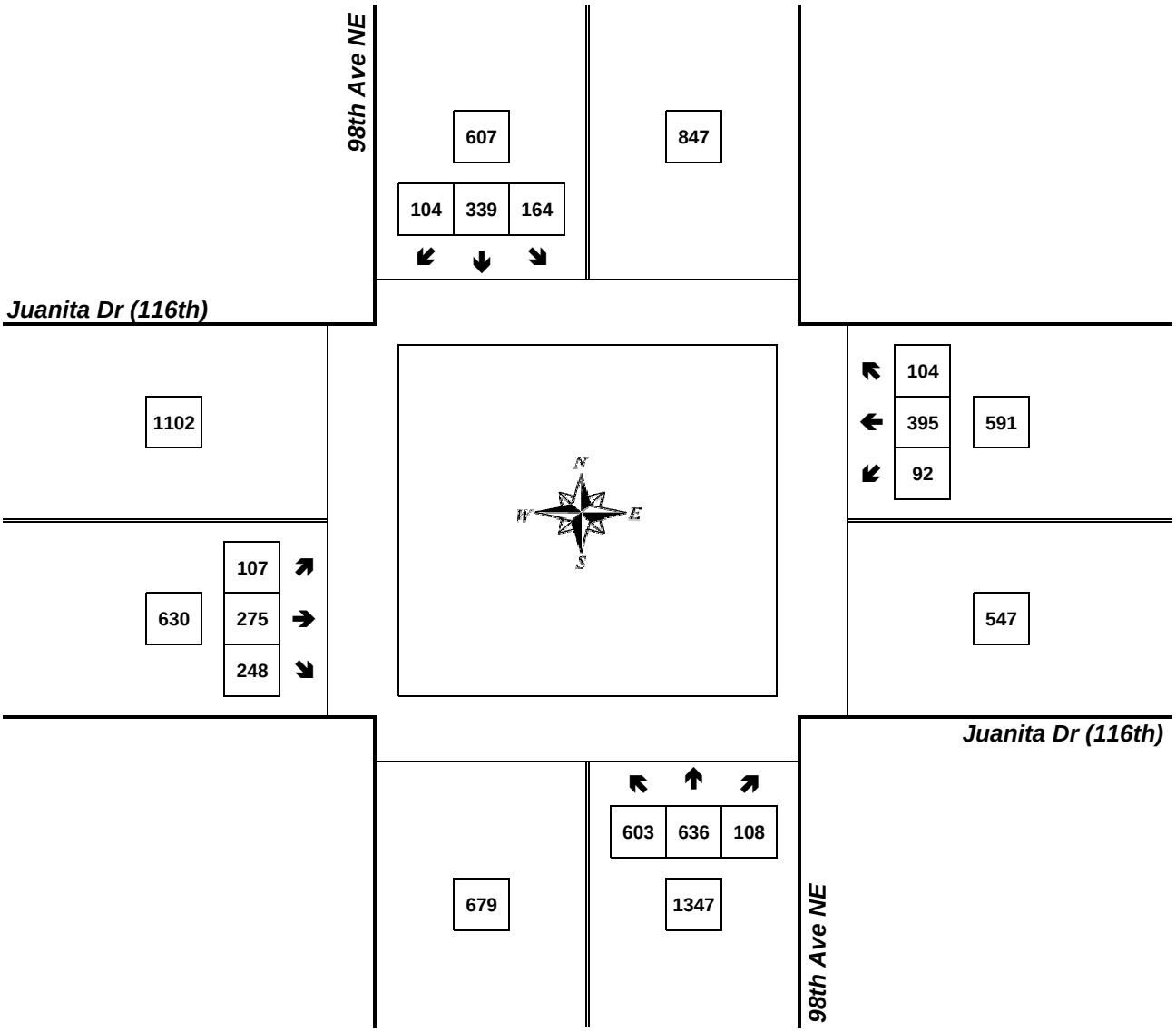
Peak Hour Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300

98th Ave NE & Juanita Dr (116th)

4:45 PM to 5:45 PM
Wednesday, August 01, 2007

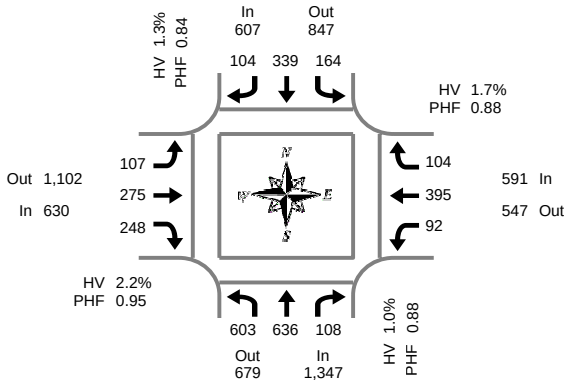


Approach	PHF	HV%	Volume
EB	0.95	2.2%	630
WB	0.88	1.7%	591
NB	0.88	1.0%	1,347
SB	0.84	1.3%	607
Intersection	0.97	1.4%	3,175

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

All Traffic Data Services Inc.
Mark Skaggs
(206) 251-0300



Peak Hour Summary
4:45 PM to 5:45 PM

98th Ave NE & Juanita Dr (116th)

Wednesday, August 01, 2007
4:00 PM to 6:00 PM

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 98th Ave NE				Southbound 98th Ave NE				Eastbound Juanita Dr (116th)				Westbound Juanita Dr (116th)				Interval Total
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV	
4:00 PM	115	138	22	2	40	76	16	2	24	76	54	6	21	92	34	2	708
4:15 PM	142	137	22	4	35	71	23	3	18	66	73	5	15	95	23	1	720
4:30 PM	156	157	16	6	31	79	27	4	19	74	58	4	17	117	21	4	772
4:45 PM	148	147	18	3	48	102	30	1	26	63	69	1	19	100	31	3	801
5:00 PM	153	151	26	4	44	69	32	2	33	75	58	6	20	92	20	2	773
5:15 PM	143	149	29	1	35	93	23	1	24	64	57	4	24	107	37	0	785
5:30 PM	159	189	35	6	37	75	19	4	24	73	64	3	29	96	16	5	816
5:45 PM	148	127	35	2	29	93	23	2	21	85	56	3	17	113	35	3	782
Total Survey	1,164	1,195	203	28	299	658	193	19	189	576	489	32	162	812	217	20	6,157

Peak Hour Summary
4:45 PM to 5:45 PM

By Approach	Northbound 98th Ave NE				Southbound 98th Ave NE				Eastbound Juanita Dr (116th)				Westbound Juanita Dr (116th)				Total
	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV	
Volume	1,347	679	2,026	14	607	847	1,454	8	630	1,102	1,732	14	591	547	1,138	10	3,175
%HV	1.0%				1.3%				2.2%				1.7%				1.4%
PHF	0.88				0.84				0.95				0.88				0.97

By Movement	Northbound 98th Ave NE				Southbound 98th Ave NE				Eastbound Juanita Dr (116th)				Westbound Juanita Dr (116th)				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	603	636	108	1,347	164	339	104	607	107	275	248	630	92	395	104	591	3,175
PHF	0.95	0.84	0.77	0.88	0.85	0.83	0.81	0.84	0.81	0.92	0.90	0.95	0.79	0.92	0.70	0.88	0.97

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 98th Ave NE				Southbound 98th Ave NE				Eastbound Juanita Dr (116th)				Westbound Juanita Dr (116th)				Interval Total
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV	
4:00 PM	561	579	78	15	154	328	96	10	87	279	254	16	72	404	109	10	3,001
4:15 PM	599	592	82	17	158	321	112	10	96	278	258	16	71	404	95	10	3,066
4:30 PM	600	604	89	14	158	343	112	8	102	276	242	15	80	416	109	9	3,131
4:45 PM	603	636	108	14	164	339	104	8	107	275	248	14	92	395	104	10	3,175
5:00 PM	603	616	125	13	145	330	97	9	102	297	235	16	90	408	108	10	3,156

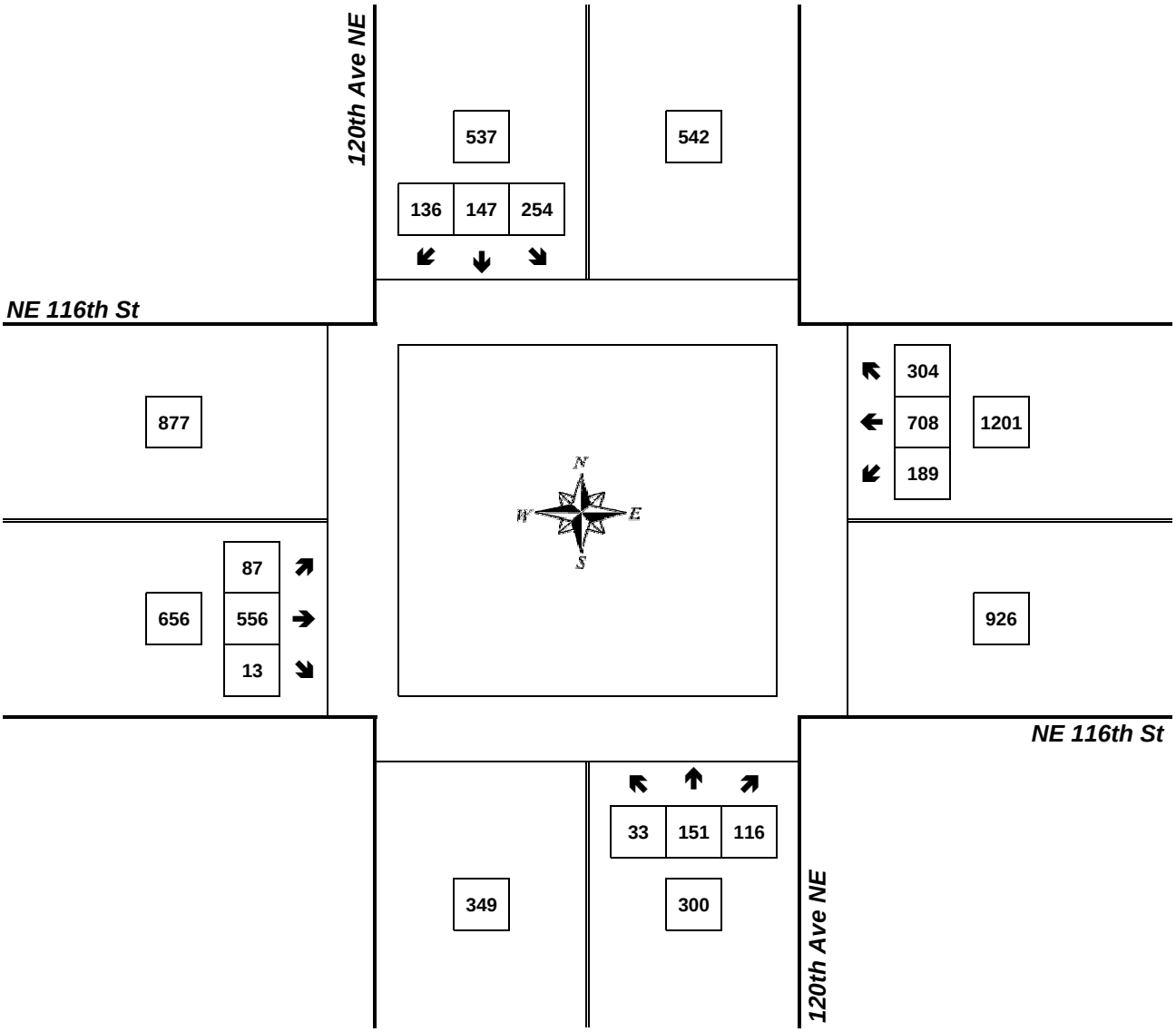
Peak Hour Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300

120th Ave NE & NE 116th St

4:15 PM to 5:15 PM
Wednesday, August 01, 2007

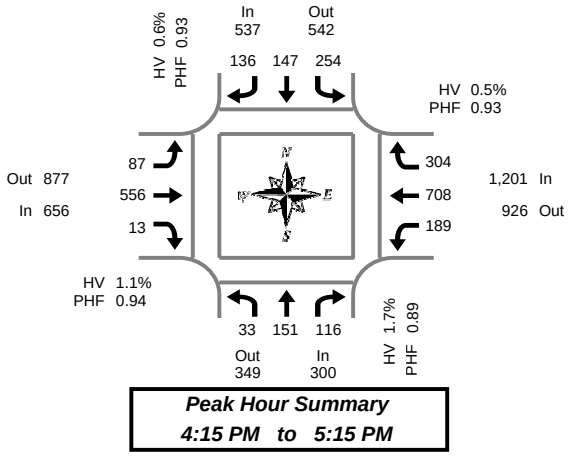


Approach	PHF	HV%	Volume
EB	0.94	1.1%	656
WB	0.93	0.5%	1,201
NB	0.89	1.7%	300
SB	0.93	0.6%	537
Intersection	0.98	0.8%	2,694

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

All Traffic Data Services Inc.
Mark Skaggs
(206) 251-0300



120th Ave NE & NE 116th St

Wednesday, August 01, 2007
4:00 PM to 6:00 PM

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 120th Ave NE				Southbound 120th Ave NE				Eastbound NE 116th St				Westbound NE 116th St				Interval Total
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV	
4:00 PM	4	16	17	0	63	39	25	0	16	131	6	2	41	151	77	3	586
4:15 PM	11	45	28	2	45	46	37	0	29	140	5	2	44	164	86	1	680
4:30 PM	7	34	26	1	60	34	34	2	22	144	1	0	38	202	82	2	684
4:45 PM	5	32	29	1	67	37	33	1	22	126	4	4	56	186	72	2	669
5:00 PM	10	40	33	1	82	30	32	0	14	146	3	1	51	156	64	1	661
5:15 PM	3	32	29	2	68	25	45	1	22	126	3	2	38	187	72	1	650
5:30 PM	7	35	21	1	72	36	32	2	26	124	4	1	46	198	69	4	670
5:45 PM	1	20	17	1	47	26	39	0	15	131	1	3	43	204	71	1	615
Total Survey	48	254	200	9	504	273	277	6	166	1,068	27	15	357	1,448	593	15	5,215

Peak Hour Summary
4:15 PM to 5:15 PM

By Approach	Northbound 120th Ave NE				Southbound 120th Ave NE				Eastbound NE 116th St				Westbound NE 116th St				Total
	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV	
Volume	300	349	649	5	537	542	1,079	3	656	877	1,533	7	1,201	926	2,127	6	2,694
%HV	1.7%				0.6%				1.1%				0.5%				0.8%
PHF	0.89				0.93				0.94				0.93				0.98

By Movement	Northbound 120th Ave NE				Southbound 120th Ave NE				Eastbound NE 116th St				Westbound NE 116th St				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	33	151	116	300	254	147	136	537	87	556	13	656	189	708	304	1,201	2,694
PHF	0.75	0.84	0.88	0.89	0.77	0.80	0.92	0.93	0.75	0.95	0.65	0.94	0.84	0.88	0.88	0.93	0.98

Rolling Hour Summary
4:00 PM to 6:00 PM

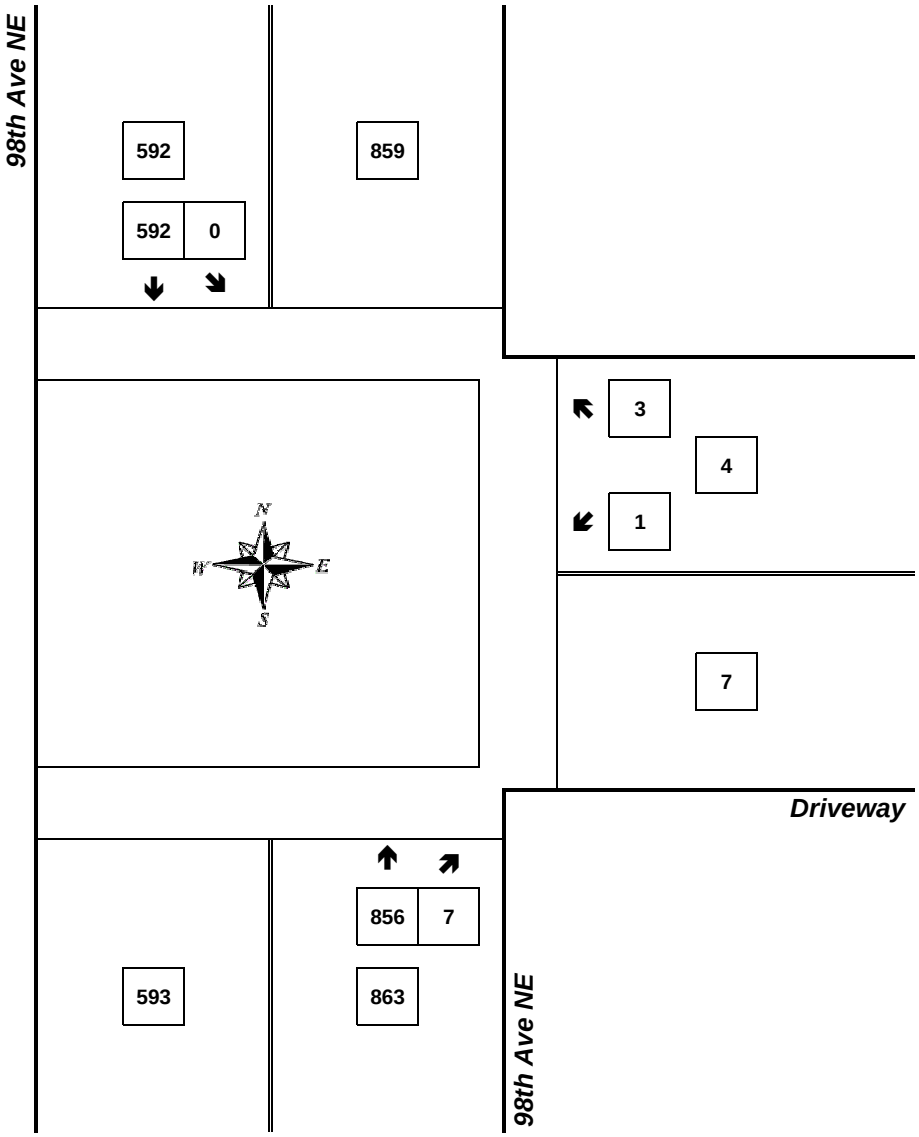
Interval Start Time	Northbound 120th Ave NE				Southbound 120th Ave NE				Eastbound NE 116th St				Westbound NE 116th St				Interval Total
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV	
4:00 PM	27	127	100	4	235	156	129	3	89	541	16	8	179	703	317	8	2,619
4:15 PM	33	151	116	5	254	147	136	3	87	556	13	7	189	708	304	6	2,694
4:30 PM	25	138	117	5	277	126	144	4	80	542	11	7	183	731	290	6	2,664
4:45 PM	25	139	112	5	289	128	142	4	84	522	14	8	191	727	277	8	2,650
5:00 PM	21	127	100	5	269	117	148	3	77	527	11	7	178	745	276	7	2,596

Peak Hour Summary

All Traffic Data Services Inc.
Mark Skaggs
(206) 251-0300

98th Ave NE & Driveway

4:30 PM to 5:30 PM
Tuesday, August 07, 2007

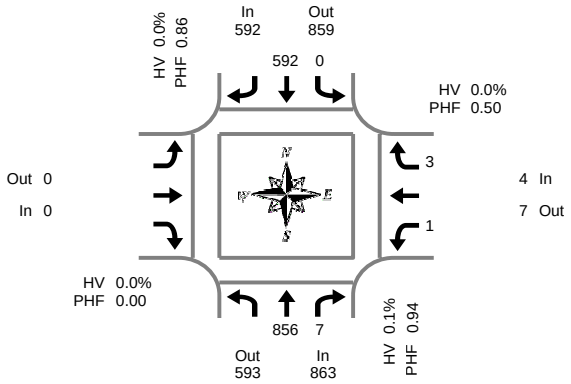


Approach	PHF	HV%	Volume
EB	0.00	0.0%	0
WB	0.50	0.0%	4
NB	0.94	0.1%	863
SB	0.86	0.0%	592
Intersection	0.90	0.1%	1,459

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

All Traffic Data Services Inc.
Mark Skaggs
(206) 251-0300



Peak Hour Summary
4:30 PM to 5:30 PM

98th Ave NE & Driveway

Tuesday, August 07, 2007
4:00 PM to 6:00 PM

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 98th Ave NE				Southbound 98th Ave NE				Eastbound Driveway				Westbound Driveway				Interval Total
		T	R	HV	L	T		HV					L		R	HV	
4:00 PM		202	0	1	0	121		1					2		1	0	326
4:15 PM		209	1	0	1	144		0					1		2	0	358
4:30 PM		229	0	1	0	173		0					0		2	0	404
4:45 PM		200	1	0	0	145		0					1		0	0	347
5:00 PM		217	5	0	0	125		0					0		0	0	347
5:15 PM		210	1	0	0	149		0					0		1	0	361
5:30 PM		189	1	0	0	184		0					1		1	0	376
5:45 PM		204	3	0	0	158		0					1		0	0	366
Total Survey		1,660	12	2	1	1,199		1					6		7	0	2,885

Peak Hour Summary
4:30 PM to 5:30 PM

By Approach	Northbound 98th Ave NE				Southbound 98th Ave NE				Eastbound Driveway				Westbound Driveway				Total
	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total		In	Out	Total	HV	
Volume	863	593	1,456	1	592	859	1,451	0	0	0	0		4	7	11	0	1,459
%HV	0.1%				0.0%				0.0%				0.0%				0.1%
PHF	0.94				0.86				0.00				0.50				0.90

By Movement	Northbound 98th Ave NE				Southbound 98th Ave NE				Eastbound Driveway				Westbound Driveway				Total
		T	R	Total	L	T		Total				Total	L		R	Total	
Volume		856	7	863	0	592		592				0	1		3	4	1,459
PHF		0.93	0.35	0.94	0.00	0.86		0.86				0.00	0.25		0.38	0.50	0.90

Rolling Hour Summary
4:00 PM to 6:00 PM

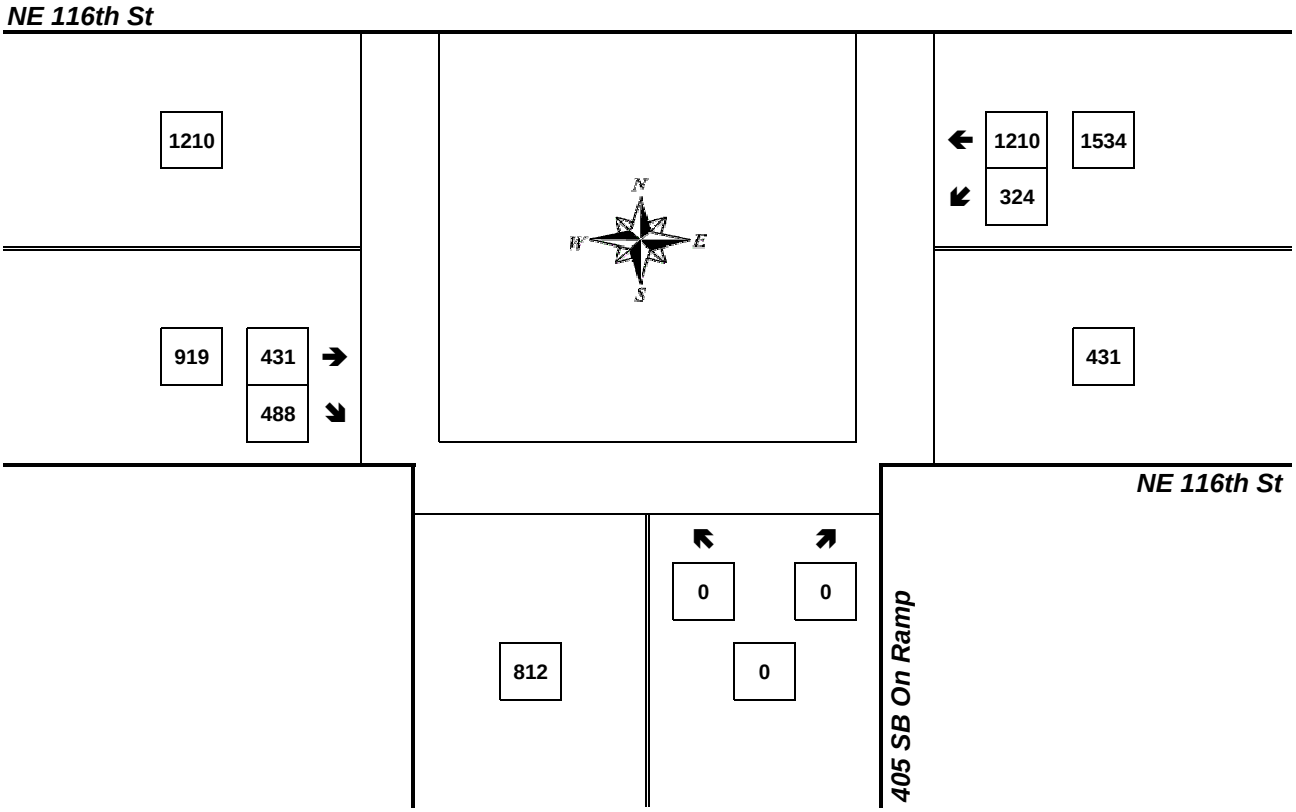
Interval Start Time	Northbound 98th Ave NE				Southbound 98th Ave NE				Eastbound Driveway				Westbound Driveway				Interval Total
		T	R	HV	L	T		HV					L		R	HV	
4:00 PM		840	2	2	1	583		1					4		5	0	1,435
4:15 PM		855	7	1	1	587		0					2		4	0	1,456
4:30 PM		856	7	1	0	592		0					1		3	0	1,459
4:45 PM		816	8	0	0	603		0					2		2	0	1,431
5:00 PM		820	10	0	0	616		0					2		2	0	1,450

Peak Hour Summary

Mark Skaggs
(206) 251-0300

405 SB On Ramp & NE 116th St

4:15 PM to 5:15 PM
Wednesday, August 01, 2007

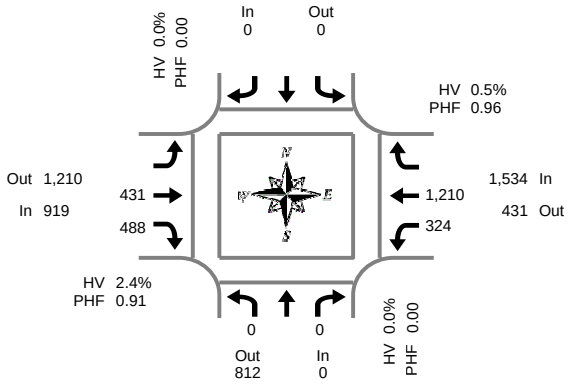


Approach	PHF	HV%	Volume
EB	0.91	2.4%	919
WB	0.96	0.5%	1,534
NB	0.00	0.0%	0
SB	0.00	0.0%	0
Intersection	0.97	1.2%	2,453

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

All Traffic Data Services Inc.
Mark Skaggs
(206) 251-0300



Peak Hour Summary
4:15 PM to 5:15 PM

405 SB On Ramp & NE 116th St

Wednesday, August 01, 2007
4:00 PM to 6:00 PM

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 405 SB On Ramp				Southbound 405 SB On Ramp				Eastbound NE 116th St				Westbound NE 116th St				Interval Total
	L		R	HV						T	R	HV	L	T		HV	
4:00 PM	0		0	0						106	123	8	86	263		5	578
4:15 PM	0		0	0						94	119	4	91	297		3	601
4:30 PM	0		0	0						103	126	7	77	323		2	629
4:45 PM	0		0	0						108	117	8	75	316		1	616
5:00 PM	0		0	0						126	126	3	81	274		2	607
5:15 PM	0		0	0						119	107	2	69	295		1	590
5:30 PM	0		0	0						102	112	4	67	312		5	593
5:45 PM	0		0	0						106	98	2	53	323		1	580
Total Survey	0		0	0						864	928	38	599	2,403		20	4,794

Peak Hour Summary
4:15 PM to 5:15 PM

By Approach	Northbound 405 SB On Ramp				Southbound 405 SB On Ramp				Eastbound NE 116th St				Westbound NE 116th St				Total
	In	Out	Total	HV	In	Out	Total		In	Out	Total	HV	In	Out	Total	HV	
Volume	0	812	812	0	0	0	0		919	1,210	2,129	22	1,534	431	1,965	8	2,453
%HV	0.0%				0.0%				2.4%				0.5%				1.2%
PHF	0.00				0.00				0.91				0.96				0.97

By Movement	Northbound 405 SB On Ramp				Southbound 405 SB On Ramp				Eastbound NE 116th St				Westbound NE 116th St				Total
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	0		0	0				0		431	488	919	324	1,210		1,534	2,453
PHF	0.00		0.00	0.00				0.00		0.86	0.97	0.91	0.89	0.94		0.96	0.97

Rolling Hour Summary
4:00 PM to 6:00 PM

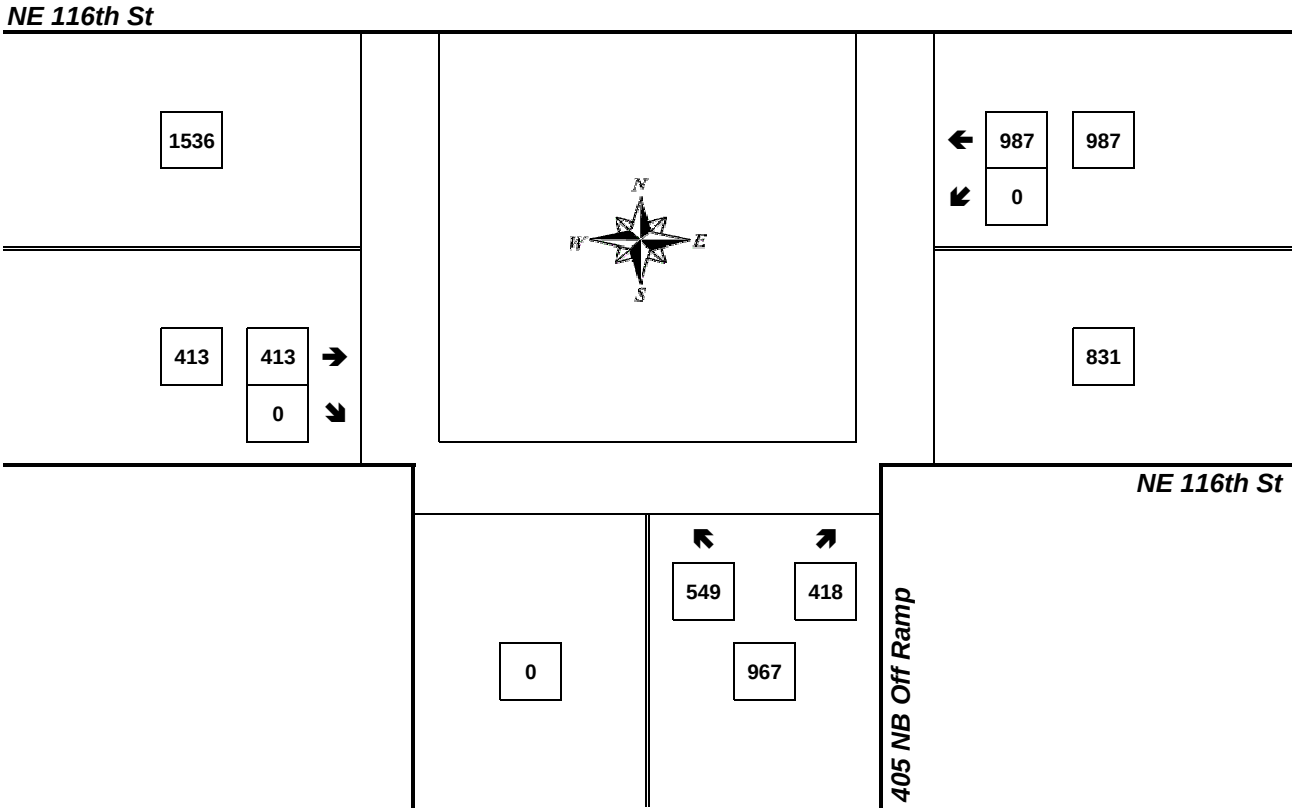
Interval Start Time	Northbound 405 SB On Ramp				Southbound 405 SB On Ramp				Eastbound NE 116th St				Westbound NE 116th St				Interval Total
	L		R	HV						T	R	HV	L	T		HV	
4:00 PM	0		0	0						411	485	27	329	1,199		11	2,424
4:15 PM	0		0	0						431	488	22	324	1,210		8	2,453
4:30 PM	0		0	0						456	476	20	302	1,208		6	2,442
4:45 PM	0		0	0						455	462	17	292	1,197		9	2,406
5:00 PM	0		0	0						453	443	11	270	1,204		9	2,370

Peak Hour Summary

All Traffic Data Services Inc.
Mark Skaggs
(206) 251-0300

405 NB Off Ramp & NE 116th St

4:00 PM to 5:00 PM
Wednesday, August 01, 2007

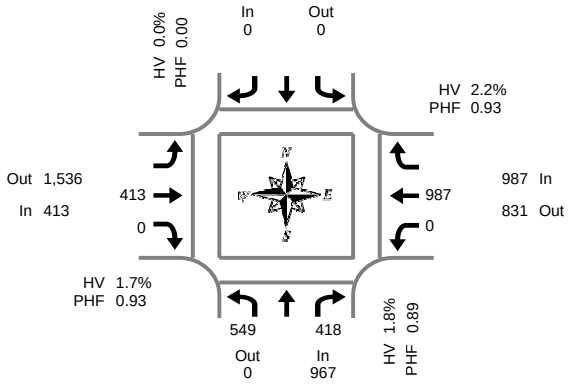


Approach	PHF	HV%	Volume
EB	0.93	1.7%	413
WB	0.93	2.2%	987
NB	0.89	1.8%	967
SB	0.00	0.0%	0
Intersection	0.95	1.9%	2,367

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary

All Traffic Data Services Inc.
Mark Skaggs
(206) 251-0300



Peak Hour Summary
4:00 PM to 5:00 PM

405 NB Off Ramp & NE 116th St

Wednesday, August 01, 2007
4:00 PM to 6:00 PM

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 405 NB Off Ramp				Southbound 405 NB Off Ramp				Eastbound NE 116th St				Westbound NE 116th St				Interval Total
	L		R	HV						T	R	HV	L	T		HV	
4:00 PM	136		108	7						98	0	1	0	221		6	563
4:15 PM	128		83	3						100	0	3	0	264		3	575
4:30 PM	151		120	4						104	0	2	0	251		6	626
4:45 PM	134		107	3						111	0	1	0	251		7	603
5:00 PM	123		91	5						122	0	2	0	225		7	561
5:15 PM	144		74	4						113	0	3	0	222		4	553
5:30 PM	132		69	7						104	0	6	0	236		4	541
5:45 PM	146		98	3						108	0	1	0	245		5	597
Total Survey	1,094		750	36						860	0	19	0	1,915		42	4,619

Peak Hour Summary
4:00 PM to 5:00 PM

By Approach	Northbound 405 NB Off Ramp				Southbound 405 NB Off Ramp				Eastbound NE 116th St				Westbound NE 116th St				Total
	In	Out	Total	HV	In	Out	Total		In	Out	Total	HV	In	Out	Total	HV	
Volume	967	0	967	17	0	0	0		413	1,536	1,949	7	987	831	1,818	22	2,367
%HV	1.8%				0.0%				1.7%				2.2%				1.9%
PHF	0.89				0.00				0.93				0.93				0.95

By Movement	Northbound 405 NB Off Ramp				Southbound 405 NB Off Ramp				Eastbound NE 116th St				Westbound NE 116th St				Total
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	549		418	967				0		413	0	413	0	987		987	2,367
PHF	0.91		0.87	0.89				0.00		0.93	0.00	0.93	0.00	0.93		0.93	0.95

Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 405 NB Off Ramp				Southbound 405 NB Off Ramp				Eastbound NE 116th St				Westbound NE 116th St				Interval Total
	L		R	HV						T	R	HV	L	T		HV	
4:00 PM	549		418	17						413	0	7	0	987		22	2,367
4:15 PM	536		401	15						437	0	8	0	991		23	2,365
4:30 PM	552		392	16						450	0	8	0	949		24	2,343
4:45 PM	533		341	19						450	0	12	0	934		22	2,258
5:00 PM	545		332	19						447	0	12	0	928		20	2,252

Appendix C: LOS Definitions

Highway Capacity Manual, 2000

Signalized intersection level of service (LOS) is defined in terms of the average total vehicle delay of all movements through an intersection. Vehicle delay is a method of quantifying several intangible factors, including driver discomfort, frustration, and lost travel time. Specifically, LOS criteria are stated in terms of average delay per vehicle during a specified time period (for example, the PM peak hour). Vehicle delay is a complex measure based on many variables, including signal phasing (i.e., progression of movements through the intersection), signal cycle length, and traffic volumes with respect to intersection capacity. Table 1 shows LOS criteria for signalized intersections, as described in the *Highway Capacity Manual* (Transportation Research Board, Special Report 209, 2000).

Table 1. Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (sec/veh)	General Description (Signalized Intersections)
A	≤10	Free Flow
B	>10 - 20	Stable Flow (slight delays)
C	>20 - 35	Stable flow (acceptable delays)
D	>35 - 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 - 80	Unstable flow (intolerable delay)
F	>80	Forced flow (jammed)

Unsignalized intersection LOS criteria can be further reduced into two intersection types: all-way stop-controlled and two-way stop-controlled. All-way, stop-controlled intersection LOS is expressed in terms of the average vehicle delay of all of the movements, much like that of a signalized intersection. Two-way, stop-controlled intersection LOS is defined in terms of the average vehicle delay of an individual movement(s). This is because the performance of a two-way, stop-controlled intersection is more closely reflected in terms of its individual movements, rather than its performance overall. For this reason, LOS for a two-way, stop-controlled intersection is defined in terms of its individual movements. With this in mind, total average vehicle delay (i.e., average delay of all movements) for a two-way, stop-controlled intersection should be viewed with discretion. Table 2 shows LOS criteria for unsignalized intersections (both all-way and two-way, stop-controlled).

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (sec/veh)
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	>50

Appendix D: LOS Worksheets

The Waterbrook
HCM Unsignalized Intersection Capacity Analysis

Existing
1: Site Access & 98th Ave NE

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	5	5	855	5	0	590
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	6	950	6	0	656
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	1					
Upstream signal (ft)			377			
pX, platoon unblocked	0.86	0.86			0.86	
vC, conflicting volume	1281	478			956	
vC1, stage 1 conf vol	953					
vC2, stage 2 conf vol	328					
vCu, unblocked vol	1160	222			780	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			100	
cM capacity (veh/h)	281	674			724	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	11	633	322	0	328	328
Volume Left	6	0	0	0	0	0
Volume Right	6	0	6	0	0	0
cSH	396	1700	1700	1700	1700	1700
Volume to Capacity	0.03	0.37	0.19	0.00	0.19	0.19
Queue Length 95th (ft)	2	0	0	0	0	0
Control Delay (s)	14.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	14.3	0.0		0.0		
Approach LOS	B					

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	33.8%	ICU Level of Service	A
Analysis Period (min)	15		

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The Waterbrook
HCM Signalized Intersection Capacity Analysis

Existing
2: NE 116th St & 98th Ave NE

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3428		1787	3495		1787	3448	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3428		1787	3495		1787	3448	
Volume (vph)	105	275	250	90	395	105	605	635	110	165	340	105
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	108	284	258	93	407	108	624	655	113	170	351	108
RTOR Reduction (vph)	0	0	74	0	21	0	0	12	0	0	25	0
Lane Group Flow (vph)	108	284	184	93	494	0	624	756	0	170	434	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		pm+ov	Prot			Prot			Prot		
Protected Phases	5	2	7	1	6		7	4		3	8	
Permitted Phases		2	2		6			4			8	
Actuated Green, G (s)	7.0	21.1	58.1	6.0	20.1		37.0	49.6		14.3	26.9	
Effective Green, g (s)	9.0	23.1	62.1	8.0	22.1		39.0	51.6		16.3	28.9	
Actuated g/C Ratio	0.08	0.20	0.54	0.07	0.19		0.34	0.45		0.14	0.25	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	139	374	855	123	659		606	1568		253	866	
v/s Ratio Prot	c0.06	c0.15	0.07	0.05	0.14		c0.35	0.22		c0.10	c0.13	
v/s Ratio Perm			0.04									
v/c Ratio	0.78	0.76	0.22	0.76	0.75		1.03	0.48		0.67	0.50	
Uniform Delay, d1	52.0	43.3	13.8	52.5	43.8		38.0	22.3		46.8	36.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	23.4	8.6	0.1	22.9	4.7		44.4	1.1		6.9	2.1	
Delay (s)	75.4	51.9	13.9	75.4	48.5		82.4	23.4		53.7	39.0	
Level of Service	E	D	B	E	D		F	C		D	D	
Approach Delay (s)		40.7			52.6			49.8			42.9	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	47.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

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8/20/2007

ENCLOSURE 4

The Waterbrook — Existing

HCM Signalized Intersection Capacity Analysis — 3: NE 116th St & 120th Ave NE

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1787	1874		1787	1881	1599	1770	1863	1583	1787	1745	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1787	1874		1787	1881	1599	1770	1863	1583	1787	1745	
Volume (vph)	85	555	15	190	710	305	35	150	115	255	145	135
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	87	566	15	194	724	311	36	153	117	260	148	138
RTOR Reduction (vph)	0	1	0	0	0	76	0	0	77	0	23	0
Lane Group Flow (vph)	87	580	0	194	724	235	36	153	40	260	263	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Turn Type	Prot			Prot		pt+ov	Prot		pt+ov	Prot		
Protected Phases	5	2		1	6	6 7	3	8	8 1	7	4	
Permitted Phases												
Actuated Green, G (s)	7.0	39.9		15.7	48.6	73.3	3.9	16.3	36.0	20.7	33.1	
Effective Green, g (s)	8.0	40.9		16.7	49.6	74.3	4.9	17.3	37.0	21.7	34.1	
Actuated g/C Ratio	0.07	0.38		0.15	0.46	0.68	0.05	0.16	0.34	0.20	0.31	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	132	706		275	859	1094	80	297	539	357	548	
v/s Ratio Prot	0.05	0.31		c0.11	c0.38	0.15	0.02	0.08	0.03	c0.15	c0.15	
v/s Ratio Perm												
v/c Ratio	0.66	0.82		0.71	0.84	0.21	0.45	0.52	0.07	0.73	0.48	
Uniform Delay, d1	49.0	30.6		43.6	26.1	6.4	50.5	41.8	24.2	40.7	30.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	11.3	7.7		8.0	7.6	0.1	4.0	1.5	0.1	7.2	0.7	
Delay (s)	60.3	38.2		51.6	33.6	6.4	54.5	43.3	24.3	47.9	30.8	
Level of Service	E	D		D	C	A	D	D	C	D	C	
Approach Delay (s)		41.1			29.6			37.4			38.9	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM Average Control Delay	35.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	108.6	Sum of lost time (s)	6.0
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

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The Waterbrook — Existing

HCM Unsignalized Intersection Capacity Analysis — 4: NE 116th St & I-405 SB On-Ramp

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	430	490	325	1210	0	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	443	505	335	1247	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	181			390		
pX, platoon unblocked			0.72		0.81	0.72
vC, conflicting volume			443		1990	696
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			223		1642	575
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			65		100	100
cM capacity (veh/h)			967		49	334

Direction, Lane #	EB 1	WB 1	WB 2	WB 3
Volume Total	948	335	624	624
Volume Left	0	335	0	0
Volume Right	505	0	0	0
cSH	1700	967	1700	1700
Volume to Capacity	0.56	0.35	0.37	0.37
Queue Length 95th (ft)	0	39	0	0
Control Delay (s)	0.0	10.7	0.0	0.0
Lane LOS		B		
Approach Delay (s)	0.0	2.3		
Approach LOS				

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		

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ENCLOSURE 4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			0.95	0.97	
Frt	1.00			1.00	0.94	
Flt Protected	1.00			1.00	0.97	
Satd. Flow (prot)	1863			3539	3286	
Flt Permitted	1.00			1.00	0.97	
Satd. Flow (perm)	1863			3539	3286	
Volume (vph)	415	0	0	985	550	420
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	437	0	0	1037	579	442
RTOR Reduction (vph)	0	0	0	0	106	0
Lane Group Flow (vph)	437	0	0	1037	915	0
Turn Type						
Protected Phases	2			6	4	
Permitted Phases						
Actuated Green, G (s)	21.4			21.4	19.9	
Effective Green, g (s)	21.4			21.4	19.9	
Actuated g/C Ratio	0.43			0.43	0.40	
Clearance Time (s)	4.0			4.0	4.0	
Vehicle Extension (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	809			1536	1326	
v/s Ratio Prot	0.23			c0.29	c0.28	
v/s Ratio Perm						
v/c Ratio	0.54			0.68	0.69	
Uniform Delay, d1	10.3			11.2	12.2	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	0.9			1.3	1.7	
Delay (s)	11.2			12.5	13.8	
Level of Service	B			B	B	
Approach Delay (s)	11.2			12.5	13.8	
Approach LOS	B			B	B	

Intersection Summary			
HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	49.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Waterbrook
HCM Unsignalized Intersection Capacity Analysis

Baseline
1: Site Access & 98th Ave NE

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	4	5	1096	7	2	642
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	4	6	1218	8	2	713
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	0					
Upstream signal (ft)			377			
pX, platoon unblocked	0.75	0.75			0.75	
vC, conflicting volume	1583	613			1226	
vC1, stage 1 conf vol	1222					
vC2, stage 2 conf vol	361					
vCu, unblocked vol	1441	140			962	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			100	
cM capacity (veh/h)	149	663			540	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	10	812	414	2	357	357
Volume Left	4	0	0	2	0	0
Volume Right	6	0	8	0	0	0
cSH	261	1700	1700	540	1700	1700
Volume to Capacity	0.04	0.48	0.24	0.00	0.21	0.21
Queue Length 95th (ft)	3	0	0	0	0	0
Control Delay (s)	19.3	0.0	0.0	11.7	0.0	0.0
Lane LOS	C			B		
Approach Delay (s)	19.3	0.0		0.0		
Approach LOS	C					

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		

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Waterbrook
HCM Signalized Intersection Capacity Analysis

Baseline
2: NE 116th St & 98th Ave NE

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3459		1787	3500		1787	3465	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3459		1787	3500		1787	3465	
Volume (vph)	112	369	274	107	525	94	598	927	149	177	377	97
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	115	380	282	110	541	97	616	956	154	182	389	100
RTOR Reduction (vph)	0	0	51	0	13	0	0	11	0	0	20	0
Lane Group Flow (vph)	115	380	231	110	625	0	616	1099	0	182	469	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		pm+ov	Prot			Prot			Prot		
Protected Phases	5	2	7	1	6		7	4		3	8	
Permitted Phases		2	2		6			4			8	
Actuated Green, G (s)	6.0	23.0	61.0	6.0	23.0		38.0	46.5		15.5	24.0	
Effective Green, g (s)	8.0	25.0	65.0	8.0	25.0		40.0	48.5		17.5	26.0	
Actuated g/C Ratio	0.07	0.22	0.57	0.07	0.22		0.35	0.42		0.15	0.23	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	123	405	895	123	752		622	1476		272	783	
v/s Ratio Prot	c0.06	c0.20	0.09	0.06	0.18		c0.34	c0.31		c0.10	0.14	
v/s Ratio Perm			0.06									
v/c Ratio	0.93	0.94	0.26	0.89	0.83		0.99	0.74		0.67	0.60	
Uniform Delay, d1	53.2	44.2	12.7	53.1	43.0		37.3	28.0		46.0	39.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	60.7	29.2	0.2	49.8	7.8		33.5	3.5		6.1	3.4	
Delay (s)	114.0	73.5	12.9	102.9	50.8		70.8	31.5		52.1	43.2	
Level of Service	F	E	B	F	D		E	C		D	D	
Approach Delay (s)		57.5			58.5			45.5			45.6	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM Average Control Delay	50.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

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ENCLOSURE 4

Waterbrook
HCM Signalized Intersection Capacity Analysis

Baseline
3: NE 116th St & 120th Ave NE

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1787	1873		1787	1881	1599	1770	1863	1583	1787	1732	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1787	1873		1787	1881	1599	1770	1863	1583	1787	1732	
Volume (vph)	120	641	19	217	809	590	41	184	296	398	112	124
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	122	654	19	221	826	602	42	188	302	406	114	127
RTOR Reduction (vph)	0	1	0	0	0	43	0	0	91	0	26	0
Lane Group Flow (vph)	122	672	0	221	826	559	42	188	211	406	215	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Turn Type	Prot			Prot		pt+ov	Prot		pt+ov	Prot		
Protected Phases	5	2		1	6	6 7	3	8	8 1	7	4	
Permitted Phases												
Actuated Green, G (s)	10.2	55.7		18.4	63.9	101.5	5.9	18.0	40.4	33.6	45.7	
Effective Green, g (s)	11.2	56.7		19.4	64.9	102.5	6.9	19.0	41.4	34.6	46.7	
Actuated g/C Ratio	0.08	0.40		0.14	0.46	0.72	0.05	0.13	0.29	0.24	0.33	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	141	749		245	862	1157	86	250	462	436	571	
v/s Ratio Prot	0.07	0.36		c0.12	c0.44	0.35	0.02	c0.10	0.13	c0.23	0.12	
v/s Ratio Perm												
v/c Ratio	0.87	0.90		0.90	0.96	0.48	0.49	0.75	0.46	0.93	0.38	
Uniform Delay, d1	64.5	39.8		60.2	37.1	8.3	65.7	59.1	41.0	52.4	36.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	38.8	13.5		32.6	20.9	0.3	4.3	12.0	0.7	26.7	0.4	
Delay (s)	103.3	53.2		92.9	58.0	8.7	70.0	71.1	41.7	79.0	36.8	
Level of Service	F	D		F	E	A	E	E	D	E	D	
Approach Delay (s)		60.9			44.6			54.3			63.3	
Approach LOS		E			D			D			E	

Intersection Summary			
HCM Average Control Delay	53.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	141.7	Sum of lost time (s)	9.0
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Waterbrook
HCM Unsignalized Intersection Capacity Analysis

Baseline
4: NE 116th St & I-405 SB On-Ramp

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	676	659	847	1616	0	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	697	679	873	1666	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	181			390		
pX, platoon unblocked			0.66		0.73	0.66
vC, conflicting volume			697		3616	1037
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			540		3286	1055
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			0		0	100
cM capacity (veh/h)			680		0	148

Direction, Lane #	EB 1	WB 1	WB 2	WB 3
Volume Total	1376	873	833	833
Volume Left	0	873	0	0
Volume Right	679	0	0	0
cSH	1700	680	1700	1700
Volume to Capacity	0.81	1.28	0.49	0.49
Queue Length 95th (ft)	0	846	0	0
Control Delay (s)	0.0	158.7	0.0	0.0
Lane LOS		F		
Approach Delay (s)	0.0	54.6		
Approach LOS				

Intersection Summary			
Average Delay	35.4		
Intersection Capacity Utilization	187.7%	ICU Level of Service	H
Analysis Period (min)	15		

ENCLOSURE 4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			0.95	0.97	
Frt	1.00			1.00	0.91	
Flt Protected	1.00			1.00	0.98	
Satd. Flow (prot)	1863			3539	3226	
Flt Permitted	1.00			1.00	0.98	
Satd. Flow (perm)	1863			3539	3226	
Volume (vph)	676	0	0	1748	715	1047
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	712	0	0	1840	753	1102
RTOR Reduction (vph)	0	0	0	0	76	0
Lane Group Flow (vph)	712	0	0	1840	1779	0
Turn Type						
Protected Phases	2			6	4	
Permitted Phases						
Actuated Green, G (s)	70.0			70.0	72.0	
Effective Green, g (s)	70.0			70.0	72.0	
Actuated g/C Ratio	0.47			0.47	0.48	
Clearance Time (s)	4.0			4.0	4.0	
Vehicle Extension (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	869			1652	1548	
v/s Ratio Prot	0.38			c0.52	c0.55	
v/s Ratio Perm						
v/c Ratio	0.82			1.11	1.30dr	
Uniform Delay, d1	34.5			40.0	39.0	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	6.4			60.3	75.2	
Delay (s)	40.9			100.3	114.2	
Level of Service	D			F	F	
Approach Delay (s)	40.9			100.3	114.2	
Approach LOS	D			F	F	

Intersection Summary			
HCM Average Control Delay	96.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	187.7%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Waterbrook
HCM Unsignalized Intersection Capacity Analysis

Future 2010-with Project
1: Site Access & 98th Ave NE

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	21	16	1093	29	13	641
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	23	18	1214	32	14	712
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	1					
Upstream signal (ft)			377			
pX, platoon unblocked	0.74	0.74			0.74	
vC, conflicting volume	1616	623			1247	
vC1, stage 1 conf vol	1231					
vC2, stage 2 conf vol	385					
vCu, unblocked vol	1482	144			984	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	88	97			97	
cM capacity (veh/h)	194	656			526	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	41	810	437	14	356	356
Volume Left	23	0	0	14	0	0
Volume Right	18	0	32	0	0	0
cSH	278	1700	1700	526	1700	1700
Volume to Capacity	0.15	0.48	0.26	0.03	0.21	0.21
Queue Length 95th (ft)	13	0	0	2	0	0
Control Delay (s)	20.2	0.0	0.0	12.0	0.0	0.0
Lane LOS	C			B		
Approach Delay (s)	20.2	0.0		0.2		
Approach LOS	C					

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	41.1%	ICU Level of Service	A
Analysis Period (min)	15		

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Waterbrook
HCM Signalized Intersection Capacity Analysis

Future 2010-with Project
2: NE 116th St & 98th Ave NE

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3450		1787	3500		1787	3466	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3450		1787	3500		1787	3466	
Volume (vph)	112	369	274	107	525	106	598	934	149	187	383	97
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	115	380	282	110	541	109	616	963	154	193	395	100
RTOR Reduction (vph)	0	0	50	0	15	0	0	11	0	0	19	0
Lane Group Flow (vph)	115	380	232	110	635	0	616	1106	0	193	476	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		pm+ov	Prot			Prot			Prot		
Protected Phases	5	2	7	1	6		7	4		3	8	
Permitted Phases		2	2		6			4			8	
Actuated Green, G (s)	6.0	23.0	61.0	6.0	23.0		38.0	46.1		15.9	24.0	
Effective Green, g (s)	8.0	25.0	65.0	8.0	25.0		40.0	48.1		17.9	26.0	
Actuated g/C Ratio	0.07	0.22	0.57	0.07	0.22		0.35	0.42		0.16	0.23	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	123	405	895	123	750		622	1464		278	784	
v/s Ratio Prot	c0.06	c0.20	0.09	0.06	0.18		c0.34	c0.32		c0.11	0.14	
v/s Ratio Perm			0.06									
v/c Ratio	0.93	0.94	0.26	0.89	0.85		0.99	0.76		0.69	0.61	
Uniform Delay, d1	53.2	44.2	12.7	53.1	43.2		37.3	28.4		46.0	39.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	60.7	29.2	0.2	49.8	8.8		33.5	3.7		7.3	3.5	
Delay (s)	114.0	73.5	12.9	102.9	51.9		70.8	32.1		53.3	43.4	
Level of Service	F	E	B	F	D		E	C		D	D	
Approach Delay (s)		57.5			59.3			45.9			46.2	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM Average Control Delay	50.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	85.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

M:\07\07171 Waterbrook\LOS\With Project.sy7
The Transpo Group

8/20/2007

ENCLOSURE 4

Waterbrook
HCM Signalized Intersection Capacity Analysis

Future 2010-with Project
3: NE 116th St & 120th Ave NE

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1787	1873		1787	1881	1599	1770	1863	1583	1787	1732	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1787	1873		1787	1881	1599	1770	1863	1583	1787	1732	
Volume (vph)	120	651	19	217	821	590	41	184	296	398	112	124
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	122	664	19	221	838	602	42	188	302	406	114	127
RTOR Reduction (vph)	0	1	0	0	0	42	0	0	89	0	26	0
Lane Group Flow (vph)	122	682	0	221	838	560	42	188	213	406	215	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Turn Type	Prot			Prot		pt+ov	Prot		pt+ov	Prot		
Protected Phases	5	2		1	6	6 7	3	8	8 1	7	4	
Permitted Phases												
Actuated Green, G (s)	10.1	56.5		18.4	64.8	102.6	6.0	18.1	40.5	33.8	45.9	
Effective Green, g (s)	11.1	57.5		19.4	65.8	103.6	7.0	19.1	41.5	34.8	46.9	
Actuated g/C Ratio	0.08	0.40		0.14	0.46	0.73	0.05	0.13	0.29	0.24	0.33	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	139	754		243	867	1160	87	249	460	435	569	
v/s Ratio Prot	0.07	0.36		c0.12	c0.45	0.35	0.02	c0.10	0.13	c0.23	0.12	
v/s Ratio Perm												
v/c Ratio	0.88	0.91		0.91	0.97	0.48	0.48	0.76	0.46	0.93	0.38	
Uniform Delay, d1	65.2	40.1		60.8	37.4	8.3	66.1	59.6	41.5	52.9	36.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	41.8	14.3		34.0	22.5	0.3	4.2	12.2	0.7	27.1	0.4	
Delay (s)	107.0	54.4		94.9	59.9	8.6	70.3	71.8	42.2	79.9	37.2	
Level of Service	F	D		F	E	A	E	E	D	E	D	
Approach Delay (s)		62.4			46.0			54.9			64.0	
Approach LOS		E			D			D			E	

Intersection Summary			
HCM Average Control Delay	54.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	142.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Waterbrook
HCM Unsignalized Intersection Capacity Analysis

Future 2010-with Project
4: NE 116th St & I-405 SB On-Ramp

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	680	665	847	1628	0	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	701	686	873	1678	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	181			390		
pX, platoon unblocked			0.65		0.73	0.65
vC, conflicting volume			701		3629	1044
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			542		3281	1067
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			0		0	100
cM capacity (veh/h)			672		0	144

Direction, Lane #	EB 1	WB 1	WB 2	WB 3
Volume Total	1387	873	839	839
Volume Left	0	873	0	0
Volume Right	686	0	0	0
cSH	1700	672	1700	1700
Volume to Capacity	0.82	1.30	0.49	0.49
Queue Length 95th (ft)	0	864	0	0
Control Delay (s)	0.0	165.0	0.0	0.0
Lane LOS		F		
Approach Delay (s)	0.0	56.5		
Approach LOS				

Intersection Summary			
Average Delay	36.6		
Intersection Capacity Utilization	188.6%	ICU Level of Service	H
Analysis Period (min)	15		

ENCLOSURE 4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			0.95	0.97	
Frt	1.00			1.00	0.91	
Flt Protected	1.00			1.00	0.98	
Satd. Flow (prot)	1863			3539	3227	
Flt Permitted	1.00			1.00	0.98	
Satd. Flow (perm)	1863			3539	3227	
Volume (vph)	680	0	0	1753	722	1047
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	716	0	0	1845	760	1102
RTOR Reduction (vph)	0	0	0	0	75	0
Lane Group Flow (vph)	716	0	0	1845	1787	0
Turn Type						
Protected Phases	2			6	4	
Permitted Phases						
Actuated Green, G (s)	70.0			70.0	72.0	
Effective Green, g (s)	70.0			70.0	72.0	
Actuated g/C Ratio	0.47			0.47	0.48	
Clearance Time (s)	4.0			4.0	4.0	
Vehicle Extension (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	869			1652	1549	
v/s Ratio Prot	0.38			c0.52	c0.55	
v/s Ratio Perm						
v/c Ratio	0.82			1.12	1.30dr	
Uniform Delay, d1	34.7			40.0	39.0	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	6.7			61.5	76.9	
Delay (s)	41.3			101.5	115.9	
Level of Service	D			F	F	
Approach Delay (s)	41.3			101.5	115.9	
Approach LOS	D			F	F	

Intersection Summary			
HCM Average Control Delay	97.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	188.6%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Appendix E: Traffic Model Distribution Output

1) Project ID:	**Waterbrook Mixed Use Development**	**4) Transportation Concurrency Status**	**6) Transportation Concurrency Certificate Date:**
2) Project Description:	Replace a tire a 3200sf tire strore, expresso stand and frosty reastaurant with 84 condos, 4385 medical office and 9031 shopping center use	PASS	
		5) Transportation Concurrency Test Date	**7) Certificate of Occupancy Date**
3) Build-out Year:	2010	3-Jul-07	

SUMMARY OF TRAFFIC IMPACTS

8) Daily Trips	1,205	**PM Peak Trips:**	71	**Impacted Subarea(s):**	Nw	**TAZ:**	284

Signalized Intersection PM Peak Traffic Impact

		Project PM Peak Turning Volumes															
		Eastbound			Westbound			Northbound			Southbound						
Code	Intersection	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	PM Peak Trips	Daily Trips	Sum of Critical Vol*	Vol. Capacity Ratio*
	Driveway/98th Ave NE				20		13			26	12			71			
														0			
201	98th Ave NE/Juanita Dr						14		11		12	7	1	45			
202	100th Ave NE/NE 124th St				6			1	6	5		6		24			
203	100th Ave NE/NE 132nd St								5			5		10			
204	116th Way NE/NE 132nd St													0			
205	Market St/Forbes Creek								10			6		16			
206	98th Ave NE/NE 120th Pl								12			12		24			
207	Juanita Drive/93rd Ave NE					1								1			
208	Juanita Dr/97th Ave NE					1								1			
209	Market St/7th Ave								10			6		16			
313	NE 124th St/113th Pl NE		5			6								11			
312	NE 124th St/116th Ave NE	1	2			3							1	7			
317	I-405/SB Off NE 124th St		2			3								5			
318	I-405/NB Off NE 124th St		2			3								5			
310	NE 116th St/120th Ave NE		12			14								26			
319	I-405/SB Off NE 116th St		4	8		14								26			
320	I-405/NB Off NE 116th St		4			6		8						18			
311	NE 116th ST/124th Ave NE		1	3		1		5						10			

Transportation Concurency Test

	LOS Standards		*LOS with Project Impacts*			
Subarea No	A= Max. Intersection LOS	B=Average 2010 V/C	a=No. exceeding 1.4	b=Average V/C	**a <= A?**	**b<= B?**
Southwest (1xx)	1.4	0.90	0	0.82	yes	yes
Northwest (2xx)	1.4	0.90	0	0.87	yes	yes
Northeast (3xx)	1.4	0.88	0	0.85	yes	yes
East(4xx)	1.4	1.05	0	0.99	yes	yes

TEST RESULTS

Result: **PASS**

* Based on Critical Movement, Planning Method TRC #212.
1. Number of intersection exceeding Average V/C LOS Standard (2022)
1. Sixth Year Target Average V/C ratio, see step 6, part 1 of the guidelines

ENCLOSURE 4

Appendix F: Concurrency Test

CITY OF KIRKLAND

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DEPARTMENT OF PUBLIC WORKS
MEMORANDUM

To: Stacy Clauson, Planner

From: Thang Nguyen, Transportation Engineer

Date: July 3, 2007

Subject: Waterbrook Traffic Concurrency Test Notice, DRC07-00002

This memo summarizes public works review of the traffic concurrency test result for the proposed redevelopment of a commercial site located at 11810 98th Avenue NE.

Project Description

The applicant proposes to replace a tire a 3200sf tire store, espresso stand and frosty restaurant with 84 condos, 4,385 square feet (sf) medical office and a 9,031 sf shopping center. It is estimated that the proposed project will generate 71 net new trips during the PM peak hour and 1,205 daily trips. It is anticipated that the project will be built and fully occupied by 2010.

The proposed project passed traffic concurrency. Attached is the result of the concurrency test. This memo will serve as the concurrency test notice for the proposed project. Per *Section 25.10.020 Procedures* of the KMC, this Concurrency Test Notice will expire in one year (July 3, 2008) unless a development permit and certificate of concurrency are issued or an extension is granted.

EXPIRATION

The concurrency test notice shall expire and a new concurrency test application is required unless:

1. A complete SEPA checklist, traffic impact analysis and all required documentation are submitted to the City within 90 calendar days of the concurrency test notice.

2. A Certificate of Concurrency is issued or an extension is requested and granted by the Public Works Department within one year of issuance of the concurrency test notice. (A Certificate of Concurrency is issued at the same time a development permit or building permit is issued if the applicant holds a valid concurrency test notice.)

3. A Certificate of Concurrency shall expire six years from the date of issuance of the concurrency test notice unless all building permits are issued for buildings approved under the concurrency test notice.

APPEALS

The concurrency test notice may be appealed by the public or agency with jurisdiction. The concurrency test notice is subject to an appeal until the SEPA review process is complete and the appeal deadline has passed. Concurrency appeals are heard before the Hearing Examiner along with any applicable SEPA appeal. For more information, refer to the Kirkland Municipal Code, Title 25. If you have any questions, please call me at x3869.

cc: Stefanie Fishman, The Transpo Group
Dan McKinney, The Transpo Group
Permit Plan, DRC07-00002

The Transpo Group

MEMORANDUM

Date:	September 7, 2007	**TG:**	07171.00
To:	Thang Nguyen, City of Kirkland		
From:	Stefanie Fishman, The Transpo Group		
cc:	Bill Walker, W2 Architects		
Subject:	Waterbrook – Proposed Parking Supply – REVISED		

This memorandum summarizes the parking demand and supply for the Waterbrook development located at 11810 and 11820 98th Avenue NE directly across from Juanita Village in the City of Kirkland. Justification is provided for allowing the residential code requirement to be reduced from 1.7 spaces per unit plus 0.5 spaces per unit for guest parking to 1.4 spaces per unit for the condominium portion of the development.

Kirkland Parking Requirements

The zoning for this site is JBD-2 which permits a mix of commercial and residential uses. The proposed project includes development of 84 condominium units (with 96 bedrooms), 9,080 square-feet of retail, and 2,814 square-feet of general office. Table 1 summarizes the City's parking requirements for land use within zone JBD-2. As shown in the table, the City's code requires the development to provide 224 spaces with 185 spaces for the condominium units.

Table 1. Kirkland Parking Requirements

Land Use	Size	Required Parking Spaces[1]	Required Parking Supply
Condominiums	84 Units	2.2 spaces per unit	185 spaces
Retail	9,080 sf	1 space per 300 sf	30 spaces
General Office	2,814 sf	1 space per 300 sf	9 spaces
Total			**224 spaces**

1. Based on City of Kirkland *Title 23 Zoning*.

Parking Demand

The proposed development parking demand was calculated based on *ITE's Parking Generation* (3rd Edition) as well as site-specific studies conducted for similar developments in downtown Kirkland. Parking demand is calculated for each individual use and doesn't account for shared parking. This parking strategy gives flexibility for new owners/developers, and also ensures sufficient parking during peak parking demand.

The Transpo Group Inc. 11730 118th Avenue N.E., Suite 600 Kirkland, WA 98034-7120 425.821.3665 Fax: 425.825.8434

Condominium Parking

ITE's residential condominium/townhouse (#230) average parking demand for suburban locations on weekdays is 1.46 vehicles per dwelling unit. ITE defines suburban locations as having "*limited transit service, surface parking, less-than-complete pedestrian networks, predominance of single-story buildings, sites with isolated land uses and larger groupings of homogeneous land uses"*. Please note that the ITE regression equation is not appropriate for this project size because the data points within the range of this project size fall along the curve for average.

Site-specific studies were conducted as part of the *Parking Demand Analysis – Downtown Kirkland Condominiums*, October 28, 2005 and supplemental data was collected in April and July 2006. Note the supplemental data is consistent with the October 2005 data. The condominium average parking demand rate for the site-specific studies in downtown Kirkland was found to be 1.29 vehicles per dwelling unit, this includes both residential, visitor, and on-street parking demand.

The Juanita area is located outside of downtown Kirkland and doesn't include as urban of conditions as downtown but there is transit service, a mix of uses, and pedestrian and bicycle networks that give this site more similar characteristics than an isolated suburban condominium development as studied in ITE. Please note transit service is provided by King County Metro Transit Routes 234, 255, 260, 277, and 935 with 30 to 60-minute headways. Route 234 operates Monday through Saturday and Route 255 operates both weekdays and weekends. The remaining routes operate on weekdays during the peak hours. The transit service in the area provides access to downtown Kirkland, Bellevue, Seattle, Totem Lake, Kenmore, and local park-and-rides. This transit service is more than the limited service included in ITE's definition of suburban locations.

Therefore, this analysis assumes a parking demand for the condominiums of 1.38 vehicles per dwelling unit. This average rate takes into account that the Waterbrook development's location and characteristics fall between those evaluated for the suburban conditions that the ITE rate is based on and those in downtown Kirkland. Table 2 summarizes the condominium parking demand.

Typically, the recommended parking supply or practical capacity is determined by applying a design safety factor to the parking demand. A safety factor of 10 percent is applied to the parking demand to allow for some reserved spaces to ensure vehicles circulating the parking area can find a space as well as accounts for peak surges and vehicles leaving parking spaces. However, condominium parking would be sold with the units and residents would have assigned spots. Each condominium unit would be assigned one space per bedroom, and the remaining parking would be extra spaces to sell with the unit or visitors. Based visitor parking demand rates provided in the Urban Land Institute (ULI) *Shared Parking* (2nd Editions), it is recommended that visitor parking make up about 10 percent of the condominium parking.

This study assumes that the 107 parking spaces on the lower level of the parking garage would be reserved for residential units (i.e., the lower level would be gated). The proposed project would have 96 bedrooms which would require 96 parking

spaces; therefore, the lower level would have 11 additional spaces for residents wishing to purchase extra parking. Since there are 107 reserved parking spaces, we recommend providing an additional 10 percent for visitor parking or a total of 118 parking spaces. Visitor parking would be provided on the same level as the commercial parking which would not be gated.

Retail and Office Parking

Retail parking demand is based on ITE's shopping center (#820) for non-December weekdays and office parking demand is based on ITE's office building (#701) for suburban locations. The use of suburban locations presents conservative estimate of parking demand since Juanita does not meet ITE's definition of a suburban location. Table 2 summarizes Waterbrook parking demand for all proposed uses.

As discussed previously, a safety factor of 10 percent was applied to the parking demand for the retail and medical/dental office uses. Ten percent is industry standard based on Robert A. Weant and Herbert S. Levinson, *Parking* (reprinted 2003).

Table 2. Estimated Parking Demand

Land Use	Size	Parking Rate[1,2]	Parking Demand	Recommended Supply[3]	Proposed Supply	Surplus /Deficiency
Condominiums	84 units	1.38 vehicles per unit	116	118	118	0
Retail	9,080 sf	2.65 vehicles per 1,000 sf	24	26	30	4
General Office	2,814 sf	2.84 vehicles per 1,000 sf	8	9	9	0
Total			**148**	**153**	**157**	**4**

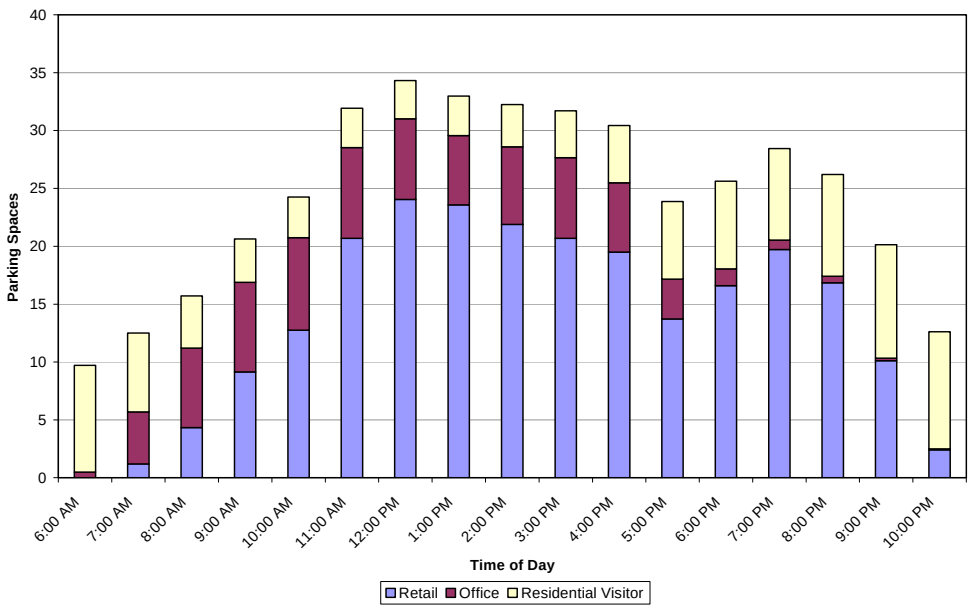
1. Condominium parking rate based on average parking demand developed from ITE's *Parking Generation* (3rd Edition) and *Parking Demand Analysis – Downtown Kirkland Condominiums*, October 28, 2005.
2. Retail (#820) and office (#701) average parking rate based on ITE's *Parking Generation* (3rd Edition).
3. Parking supply for condominiums assumes 107 reserved spaces and an additional 10 percent for visitors. Retail and office parking supply assumes provision of 10 percent more parking than the parking demand based on Robert A. Weant and Herbert S. Levinson's *Parking* reprinted 2003.

As shown in the table, the proposed parking supply would be about 4 spaces greater than the recommended supply and would meet the parking demand of the proposed uses. The development would provide 118 spaces or about 1.4 spaces per bedroom. This rate is consistent with the parking demand calculated by averaging ITE's rate and the downtown study rate, and it accounts for both reserved and visitor parking. It is expected that some residents and patrons to the development would use transit, walk, or bike since the site is in the vicinity of many neighborhoods and transit is accessible.

Potential Off-Peak Shared Parking

There are likely to be opportunities for the 50 parking spaces provided for the retail, office, and residential visitor use to be shared since these uses would peak at different times. Figure 1 shows ITE's hourly parking demand from 6:00 a.m. to 10:00 p.m. for each of the uses sharing the 50 parking spaces. ITE does not give hourly parking demand for condominiums so the hourly parking demand for rental townhouse (Land Use 224) was used.

Figure 1: Weekday Parking Demand Distribution



As shown in the figure above, the parking demand for all three uses peaks at noon with approximately 34 vehicles. In the early morning and late evening, the parking demand for the office use is less than 5 vehicles which would leave additional parking for residential visitors. In addition, retail parking demand is less than 10 vehicles in the early morning and late evening leaving additional parking for residential visitors. Therefore, the parking demand for all three uses combined is less than the available 50 parking spaces and there are several hours throughout the day were spaces are available for additional residential visitors, if needed.

Conclusion

The developer would provide 157 spaces which would provide sufficient parking to meet the expected parking demand of the development. In addition, there would be opportunities for the retail, office, and residential visitors to share parking. The parking impacts to the surrounding neighborhoods and businesses would be minimal since adequate parking is provided.

The Transpo Group

Draft MEMORANDUM

Date:	December 27, 2008	**TG:**	07171.00
To:	Thang Nguyen, City of Kirkland		
From:	Carole Turley and Stefanie Fishman, P.E., PTOE – The Transpo Group		
cc:	Bill Walker, W2 Architects		
Subject:	Draft Addendum to Waterbrook TIA		

The purpose of this memorandum is to address comments provided by the City of Kirkland in November 2007 on the *Waterbrook Traffic Impact Analysis (TIA)*, September 2007. These comments included:

1. **Trip Generation:** No pass-by reduction should be taken for the Specialty Retail. Restaurant with drive-thru should not be used for the coffee stand estimation. In addition, the coffee stand is closed during the PM peak hour.
2. **Site Driveway:** An AM peak hour analysis should be conducted for the driveway. A gap analysis should be conducted to determine if there are sufficient gaps to accommodate the development traffic entering and exiting the driveway, and the two-way left-turn (TWLT) lane can accommodate the traffic from the development and Juanita Village so that it does not block the through lanes. Determine if it is necessary to install things like c-curb to eliminate left-turns from the driveway.
3. **Other Comments:** What is the basis for the peak hour factors? Is Figure 8 included in the report? Does the parking at the existing Comprehensive Medical Center on the adjacent property obstruct sight distance at the proposed project driveway?

The remainder of this document provides additional information beyond what is provided in the Waterbrook TIA to address the comments above, and assist the City in the project approval process.

Summary of Findings

- Revisions to the trip generation would not change the findings of the traffic analysis provided in September 2007. All intersections are expected to operate at the same service levels.
- The AM peak hour driveway analysis shows that intersection operations at both the project and Juanita Village driveways are expected to be LOS B or better in the future (2010) both without and with project traffic.

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- There are sufficient gaps during the peak hours to accommodate inbound and outbound project and Juanita Village traffic. Conflicts between traffic from the two driveways are expected to be minimal; therefore, c-curb is not necessary at this time.

Trip Generation

Based on the City's comments the project trip generation was revised to eliminate pass-by trips from the Specialty Retail uses. Table 1 provides the revised project trip generation estimates based on the City's comments.

It should be noted that the standard ITE restaurant drive-thru was not used to estimate the coffee stand trip generation. There is specialized land use data provided under ITE land use 935 (i.e. Fast-Food Restaurant with Drive-Through Window and No Indoor Seating) for a coffee/espresso stand, which was used to estimate trip generation. In addition, at the time traffic counts were collected, the coffee stand was open until 6:00 p.m. (or during the PM peak hour)[1] and is included in the background traffic projections. Therefore, no revisions were made to the coffee stand trip generation provided in the September 2007 study.

In addition, the City also asked why site-specific trip generation was not used to estimate existing trip generation. There are multiple driveways to the existing property and not all driveways were captured in the traffic data collection. Since the traffic data does not capture the full trip generation of the existing site, ITE trip generation rates were used.

[1] Based on information provided by the coffee stand owner in November 2007 at the time of the traffic counts the stand was open until 6:00 p.m. The hours of operation have recently changed.

Table 1.Revised Estimated Weekday Project Trip Generation

Land Use	Size[1]	Daily	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Proposed Use								
Condominium/Townhouse #230	84 units	728	6	31	37	29	15	44
Medical/Dental Office #720	4.385 ksf	158	9	2	11	4	12	16
Retail #814	9.031 ksf	400	30	32	62	11	13	24
Subtotal of Proposed Use		*1,286*	*45*	*65*	*110*	*44*	*40*	*84*
Existing Use								
Tire Store #848	3.200 ksf	80	6	3	9	6	7	13
Coffee/Espresso Stand #935[2]	1 Stand	1,400	130	130	260	30	30	60
– less Pass-by Trips (83%)[3]		*-1,162*	*-108*	*-108*	*-216*	*-25*	*-25*	*-50*
Subtotal of Existing Use		*318*	*28*	*25*	*53*	*11*	*12*	*23*
Net New Project Trips		***968***	***17***	***40***	***57***	***33***	***28***	***61***

1. Trip rates from ITE Trip Generation Handbook, 7th Edition.
2. Pass-by rates from ITE Trip Generation Handbook, 7th Edition.
3. Coffee/Espresso Stand is a Specialized Land Use of #935.

As shown in Table 1, the proposed project would generate approximately 1,286 total daily trips with 110 trips occurring during the AM peak hour and 84 trips occurring during this PM peak hour. The project would generate approximately 968 net new daily trips with 57 occurring during the AM peak hour and 61 occurring during the PM peak hour. Compared to the trip generation provide in the September 2007 study, this is approximately 136 more daily trips, 20 more AM peak hour trips and 8 more PM peak hour trips.

The PM peak hour with-project intersection analysis was revised to determine if the revised trip generation would result in changes in service levels. Attachment 1 provides the revised level of service (LOS) analysis worksheets. As shown in the attachment, the service levels at each study intersection would remain the same as the previous analysis.

Site Driveway Analysis

The following provides an AM peak hour and gap analysis for the proposed project driveway.

AM Peak Hour Intersection Operations

Existing AM peak hour traffic counts were conducted on December 19, 2007 at the 98th Avenue NE intersections with the project and Juanita Village driveways. Future

(2010) AM peak hour forecasts were estimated based on the City of Kirkland's transportation model. For the PM peak-hour analysis, 2010 traffic volumes were provided by the City, and based on the City's model. To estimate 2010 AM peak hour traffic volumes, the growth rate between existing 2007 PM peak hour traffic counts and future 2010 PM peak hour forecasts was determined. This results in a growth rate of approximately 7 percent per year for the proposed driveway. This growth rate was applied to the existing 2007 AM peak hour traffic counts. Table 2 summarizes the existing and future without and with-project driveway operations.

Table 2. AM Peak Hour 98th Avenue NE Driveway Level of Service Summary

	2007 Existing			2010 Baseline			2010 With Project		
Location	LOS[1]	Delay[2]	WM[3]	LOS[1]	Delay[2]	WM[3]	LOS[1]	Delay[2]	WM[3]
Outbound									
Project Driveway	B	10.6	WB	B	11.2	WB	B	12.4	WB
Juanita Village Driveway	B	12.0	EB	B	13.4	EB	B	13.6	EB
Inbound									
Project Driveway	A	7.7	SBL	A	7.9	SBL	A	7.9	SBL
Juanita Village Driveway	A	9.5	NBL	B	10.4	NBL	B	10.5	NBL

1. Level of service, based on 2000 Highway Capacity Manual methodology.
2. Average delay in seconds per vehicle.
3. Worst movement reported for unsignalized intersections.

As shown in Table 2, all movements to and from the project and Juanita Village driveways currently operate at LOS B or better during the AM peak hour. In 2010, both without and with the project, these driveways would continue to operate at LOS B or better during the AM peak hour. Attachment 1 provides detailed LOS worksheets.

Gap Analysis

Data were collected on December 12 and 13, 2007 to determine the number of gaps along 98th Avenue NE that would be available for traffic entering and existing the project and Juanita Village driveways. The data is provided in Attachment 2. The analysis was based on a two-day average.

The necessary gap for passenger cars making left-turns into and out of the project and Juanita Village driveways was determined based on criteria found in the American Association of State Highway and Transportation Officials' (AASHTO) *A Policy on Geometric design of Highways and Streets*, 4th Edition (2001). The gap required for outbound left-turns (exiting) the driveways onto 98th Avenue NE is approximately 8.5 seconds. It should be noted that the gap time is based on a conservative assumption that drivers would not use the TWLT lane to exit the two driveways. The

gap for inbound left-turns (entering) the two driveways from 98th Avenue NE is approximately 6.0 seconds. Tables 3 and 4 summarize the gap analysis for the outbound and inbound left-turn movements.

Table 3. Outbound Left-turn Gap Analysis (Vehicles Exiting onto 98th Avenue NE)

	Vehicle Gaps > 8.5 seconds[1]	Project Outbound Left-turns	Juanita Village Outbound Left-turns	Total Left-Turns	Can the gaps serve the total left-turns?[2]
AM Peak Hour (~8:00 to 9:00 a.m.)	109	31	5	36	Yes
PM Peak Hour (~5:00 to 6:00 p.m.)	76	20	50	70	Yes

1. Based on AASHTO, vehicles would need an 8.5 second gap to make a left-turn from the driveways. The gap noted is for both directions (i.e., the section in front of the driveways is clear in both directions).
2. If the number of vehicle gaps greater than 8.5 seconds on 98th Avenue NE are greater than the total number of left-turns for both the project and Juanita Village then there are adequate gaps to serve both driveways traffic.

Table 3 shows there are sufficient gaps for both driveways during both the AM and PM peak hours. In addition, the AM peak hour gaps can serve total left-turns exiting both driveways without the need for using the TWLT lane. The PM peak hour gaps and the expected outbound left-turning vehicles are approximately the same; therefore, due to inefficient use of gaps (i.e., some gaps may be missed because vehicles arrive randomly) there may be some use of the TWLT lane. However, it should be noted that approximately 1/3 of the gaps during the PM peak hour are greater than 16 seconds and could accommodate more than one vehicle.

Based on the information provided, if the peak hour gaps greater than 8.5 seconds are spread evenly throughout the peak hour there would be a gap approximately every 30 seconds during the AM peak hour and approximately every 50 seconds during the PM peak hour. If outbound left-turn vehicles are spaced evenly throughout the hour, there would be a left-turning vehicle approximately every 1.5 minutes during the AM peak hour and approximately every 50 seconds during the PM peak hour. Since the arrival of left-turns is greater than or approximately the same as the occurrence of gaps, minimal queuing is expected at the driveways.

Conflicts between the left-turns would be minimized since there are adequate gaps to serve both directions and the use of the TWLT lane would not be necessary. Field observations show that the frequency of TWLT lane use by outbound vehicles from these driveways is minimal.

Table 4. Inbound Left-turn Gap Analysis (Vehicles Entering the Driveways)

	Vehicle Gaps >6.0 seconds NB[1]	Project Inbound Left-turns	Vehicle Gaps >6.0 seconds SB[1]	Juanita Village Inbound Left-turns
AM Peak Hour (~8:00 to 9:00 a.m.)	108	11	131	30
PM Peak Hour (~5:00 to 6:00 p.m.)	140	12	150	80

Notes: NB = northbound; SB = southbound

1. Based on AASHTO, vehicles would need a 6.0 second gap to enter the driveways from 98th Avenue NE.

Table 4 shows that AM and PM peak hour gaps to accommodate left-turn vehicles entering the driveways from 98th Avenue NE are much greater than the inbound left-turns for both driveways. Based on the information provided, if the peak hour gaps greater than 6.0 seconds are spread evenly throughout the peak hour there would be a gap approximately every 30 seconds during the AM peak hour (in both the northbound and southbound directions) and approximately every 25 seconds during the PM peak hour (in both the northbound and southbound directions). If inbound left-turn vehicles are spaced evenly throughout the hour, there would be a left-turning vehicle approximately every 5 minutes at the project driveway during both the AM and PM peak hours and at Juanita Village approximately every 2 minutes during the AM peak hour and approximately every 45 seconds during the PM peak hour. Since the arrival of inbound left-turns is greater than the occurrence of gaps, minimal queuing is expected within the TWLT lane.

Other Comments

Reponses to additional comments are as follows:

- The peak hour factor is based on existing traffic counts for all scenarios. The driveway peak hour factor during the PM peak hour was found to be 0.90 based on traffic counts.
- Figure 8 is provided on page 21 of the report.
- Based on field observations, vehicles parking at the Comprehensive Medical Center spaces located at the proposed project driveway would not obstruct sight distance. There is sufficient area in front of these spaces to accommodate vehicles and allow them to see on-coming traffic.

We trust this additional analysis will aid the City in the project approval process. Please feel free to contact us if you have additional questions or comments.

Attachment 1: LOS Worksheets

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	5	5	995	5	5	540
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	5	5	1036	5	5	562
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	1					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1331	521			1042	
vC1, stage 1 conf vol	1039					
vC2, stage 2 conf vol	292					
vCu, unblocked vol	1331	521			1042	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	99			99	
cM capacity (veh/h)	249	506			663	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	10	691	351	5	281	281
Volume Left	5	0	0	5	0	0
Volume Right	5	0	5	0	0	0
cSH	333	1700	1700	663	1700	1700
Volume to Capacity	0.03	0.41	0.21	0.01	0.17	0.17
Queue Length 95th (ft)	2	0	0	1	0	0
Control Delay (s)	16.1	0.0	0.0	10.5	0.0	0.0
Lane LOS	C			B		
Approach Delay (s)	16.1	0.0		0.1		
Approach LOS	C					

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	37.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	55	65	75	945	470	75
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	57	68	78	984	490	78
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	1					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1177	284	568			
vC1, stage 1 conf vol	529					
vC2, stage 2 conf vol	648					
vCu, unblocked vol	1177	284	568			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	81	91	92			
cM capacity (veh/h)	305	719	1001			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	125	78	492	492	326	241
Volume Left	57	78	0	0	0	0
Volume Right	68	0	0	0	0	78
cSH	443	1001	1700	1700	1700	1700
Volume to Capacity	0.28	0.08	0.29	0.29	0.19	0.14
Queue Length 95th (ft)	29	6	0	0	0	0
Control Delay (s)	16.3	8.9	0.0	0.0	0.0	0.0
Lane LOS	C	A				
Approach Delay (s)	16.3	0.7			0.0	
Approach LOS	C					

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

ENCLOSURE 4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	5	5	1245	5	5	675
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	5	5	1297	5	5	703
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	1					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1661	651			1302	
vC1, stage 1 conf vol	1299					
vC2, stage 2 conf vol	362					
vCu, unblocked vol	1661	651			1302	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	99			99	
cM capacity (veh/h)	181	416			528	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	10	865	438	5	352	352
Volume Left	5	0	0	5	0	0
Volume Right	5	0	5	0	0	0
cSH	252	1700	1700	528	1700	1700
Volume to Capacity	0.04	0.51	0.26	0.01	0.21	0.21
Queue Length 95th (ft)	3	0	0	1	0	0
Control Delay (s)	19.9	0.0	0.0	11.9	0.0	0.0
Lane LOS	C			B		
Approach Delay (s)	19.9	0.0		0.1		
Approach LOS	C					

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	70	80	95	1180	585	95
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	73	83	99	1229	609	99
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	1					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1471	354	708			
vC1, stage 1 conf vol	659					
vC2, stage 2 conf vol	812					
vCu, unblocked vol	1471	354	708			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	69	87	89			
cM capacity (veh/h)	234	648	886			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	156	99	615	615	406	302
Volume Left	73	99	0	0	0	0
Volume Right	83	0	0	0	0	99
cSH	355	886	1700	1700	1700	1700
Volume to Capacity	0.44	0.11	0.36	0.36	0.24	0.18
Queue Length 95th (ft)	54	9	0	0	0	0
Control Delay (s)	22.8	9.6	0.0	0.0	0.0	0.0
Lane LOS	C	A				
Approach Delay (s)	22.8	0.7			0.0	
Approach LOS	C					

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

ENCLOSURE 4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	31	19	1245	16	11	675
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	32	20	1297	17	11	703
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	1					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1680	657			1314	
vC1, stage 1 conf vol	1305					
vC2, stage 2 conf vol	374					
vCu, unblocked vol	1680	657			1314	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	82	95			98	
cM capacity (veh/h)	178	412			522	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	52	865	449	11	352	352
Volume Left	32	0	0	11	0	0
Volume Right	20	0	17	0	0	0
cSH	227	1700	1700	522	1700	1700
Volume to Capacity	0.23	0.51	0.26	0.02	0.21	0.21
Queue Length 95th (ft)	21	0	0	2	0	0
Control Delay (s)	25.5	0.0	0.0	12.0	0.0	0.0
Lane LOS	D			B		
Approach Delay (s)	25.5	0.0		0.2		
Approach LOS	D					

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	70	80	95	1191	613	95
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	73	83	99	1241	639	99
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	1					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1506	369	738			
vC1, stage 1 conf vol	688					
vC2, stage 2 conf vol	818					
vCu, unblocked vol	1506	369	738			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	68	87	89			
cM capacity (veh/h)	228	634	864			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	156	99	620	620	426	312
Volume Left	73	99	0	0	0	0
Volume Right	83	0	0	0	0	99
cSH	347	864	1700	1700	1700	1700
Volume to Capacity	0.45	0.11	0.36	0.36	0.25	0.18
Queue Length 95th (ft)	56	10	0	0	0	0
Control Delay (s)	23.6	9.7	0.0	0.0	0.0	0.0
Lane LOS	C	A				
Approach Delay (s)	23.6	0.7			0.0	
Approach LOS	C					

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		

Waterbrook
HCM Unsignalized Intersection Capacity Analysis

Future 2010-with Project
1: Site Access & 98th Ave NE

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Volume (veh/h)	20	13	1096	26	12	647
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	22	14	1218	29	13	719
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	1					
Upstream signal (ft)			377			
pX, platoon unblocked	0.74	0.74			0.74	
vC, conflicting volume	1618	623			1247	
vC1, stage 1 conf vol	1232					
vC2, stage 2 conf vol	386					
vCu, unblocked vol	1485	144			984	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	88	98			97	
cM capacity (veh/h)	193	656			526	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	37	812	435	13	359	359
Volume Left	22	0	0	13	0	0
Volume Right	14	0	29	0	0	0
cSH	267	1700	1700	526	1700	1700
Volume to Capacity	0.14	0.48	0.26	0.03	0.21	0.21
Queue Length 95th (ft)	12	0	0	2	0	0
Control Delay (s)	20.6	0.0	0.0	12.0	0.0	0.0
Lane LOS	C			B		
Approach Delay (s)	20.6	0.0		0.2		
Approach LOS	C					

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	41.1%	ICU Level of Service	A
Analysis Period (min)	15		

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The Transpo Group

12/17/2007

Waterbrook
HCM Signalized Intersection Capacity Analysis

Future 2010-with Project
2: NE 116th St & 98th Ave NE

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1583	1770	3450		1787	3500		1787	3466	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1583	1770	3450		1787	3500		1787	3466	
Volume (vph)	112	369	274	107	525	106	598	934	149	187	383	97
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	115	380	282	110	541	109	616	963	154	193	395	100
RTOR Reduction (vph)	0	0	50	0	15	0	0	11	0	0	19	0
Lane Group Flow (vph)	115	380	232	110	635	0	616	1106	0	193	476	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Turn Type	Prot		pm+ov	Prot			Prot			Prot		
Protected Phases	5	2	7	1	6		7	4		3	8	
Permitted Phases		2	2		6			4			8	
Actuated Green, G (s)	6.0	23.0	61.0	6.0	23.0		38.0	46.1		15.9	24.0	
Effective Green, g (s)	8.0	25.0	65.0	8.0	25.0		40.0	48.1		17.9	26.0	
Actuated g/C Ratio	0.07	0.22	0.57	0.07	0.22		0.35	0.42		0.16	0.23	
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	123	405	895	123	750		622	1464		278	784	
v/s Ratio Prot	c0.06	c0.20	0.09	0.06	0.18		c0.34	c0.32		c0.11	0.14	
v/s Ratio Perm			0.06									
v/c Ratio	0.93	0.94	0.26	0.89	0.85		0.99	0.76		0.69	0.61	
Uniform Delay, d1	53.2	44.2	12.7	53.1	43.2		37.3	28.4		46.0	39.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	60.7	29.2	0.2	49.8	8.8		33.5	3.7		7.3	3.5	
Delay (s)	114.0	73.5	12.9	102.9	51.9		70.8	32.1		53.3	43.4	
Level of Service	F	E	B	F	D		E	C		D	D	
Approach Delay (s)		57.5			59.3			45.9			46.2	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM Average Control Delay	50.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	85.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

M:\07\07171 Waterbrook\LOS\With Project - revised trip gen.sy7
The Transpo Group

12/17/2007

ENCLOSURE 4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1787	1873		1787	1881	1599	1770	1863	1583	1787	1732	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1787	1873		1787	1881	1599	1770	1863	1583	1787	1732	
Volume (vph)	120	651	19	217	821	590	41	184	296	398	112	124
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	122	664	19	221	838	602	42	188	302	406	114	127
RTOR Reduction (vph)	0	1	0	0	0	42	0	0	89	0	26	0
Lane Group Flow (vph)	122	682	0	221	838	560	42	188	213	406	215	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Turn Type	Prot			Prot		pt+ov	Prot		pt+ov	Prot		
Protected Phases	5	2		1	6	6 7	3	8	8 1	7	4	
Permitted Phases												
Actuated Green, G (s)	10.1	56.5		18.4	64.8	102.6	6.0	18.1	40.5	33.8	45.9	
Effective Green, g (s)	11.1	57.5		19.4	65.8	103.6	7.0	19.1	41.5	34.8	46.9	
Actuated g/C Ratio	0.08	0.40		0.14	0.46	0.73	0.05	0.13	0.29	0.24	0.33	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	139	754		243	867	1160	87	249	460	435	569	
v/s Ratio Prot	0.07	0.36		c0.12	c0.45	0.35	0.02	c0.10	0.13	c0.23	0.12	
v/s Ratio Perm												
v/c Ratio	0.88	0.91		0.91	0.97	0.48	0.48	0.76	0.46	0.93	0.38	
Uniform Delay, d1	65.2	40.1		60.8	37.4	8.3	66.1	59.6	41.5	52.9	36.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	41.8	14.3		34.0	22.5	0.3	4.2	12.2	0.7	27.1	0.4	
Delay (s)	107.0	54.4		94.9	59.9	8.6	70.3	71.8	42.2	79.9	37.2	
Level of Service	F	D		F	E	A	E	E	D	E	D	
Approach Delay (s)		62.4			46.0			54.9			64.0	
Approach LOS		E			D			D			E	

Intersection Summary			
HCM Average Control Delay	54.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	142.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	680	665	847	1628	0	0
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	701	686	873	1678	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	181			390		
pX, platoon unblocked			0.65		0.73	0.65
vC, conflicting volume			701		3629	1044
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			542		3281	1067
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			0		0	100
cM capacity (veh/h)			672		0	144

Direction, Lane #	EB 1	WB 1	WB 2	WB 3
Volume Total	1387	873	839	839
Volume Left	0	873	0	0
Volume Right	686	0	0	0
cSH	1700	672	1700	1700
Volume to Capacity	0.82	1.30	0.49	0.49
Queue Length 95th (ft)	0	864	0	0
Control Delay (s)	0.0	165.0	0.0	0.0
Lane LOS		F		
Approach Delay (s)	0.0	56.5		
Approach LOS				

Intersection Summary			
Average Delay	36.6		
Intersection Capacity Utilization	188.6%	ICU Level of Service	H
Analysis Period (min)	15		

ENCLOSURE 4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	
Lane Util. Factor	1.00			0.95	0.97	
Frt	1.00			1.00	0.91	
Flt Protected	1.00			1.00	0.98	
Satd. Flow (prot)	1863			3539	3227	
Flt Permitted	1.00			1.00	0.98	
Satd. Flow (perm)	1863			3539	3227	
Volume (vph)	680	0	0	1753	722	1047
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	716	0	0	1845	760	1102
RTOR Reduction (vph)	0	0	0	0	75	0
Lane Group Flow (vph)	716	0	0	1845	1787	0
Turn Type						
Protected Phases	2			6	4	
Permitted Phases						
Actuated Green, G (s)	70.0			70.0	72.0	
Effective Green, g (s)	70.0			70.0	72.0	
Actuated g/C Ratio	0.47			0.47	0.48	
Clearance Time (s)	4.0			4.0	4.0	
Vehicle Extension (s)	4.0			4.0	4.0	
Lane Grp Cap (vph)	869			1652	1549	
v/s Ratio Prot	0.38			c0.52	c0.55	
v/s Ratio Perm						
v/c Ratio	0.82			1.12	1.30dr	
Uniform Delay, d1	34.7			40.0	39.0	
Progression Factor	1.00			1.00	1.00	
Incremental Delay, d2	6.7			61.5	76.9	
Delay (s)	41.3			101.5	115.9	
Level of Service	D			F	F	
Approach Delay (s)	41.3			101.5	115.9	
Approach LOS	D			F	F	

Intersection Summary			
HCM Average Control Delay	97.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	188.6%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	50	75	80	1072	597	70
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	82	87	1165	649	76
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL					
Median storage veh)	1					
Upstream signal (ft)				316		
pX, platoon unblocked	0.74					
vC, conflicting volume	1443	362	725			
vC1, stage 1 conf vol	687					
vC2, stage 2 conf vol	757					
vCu, unblocked vol	1248	362	725			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	79	87	90			
cM capacity (veh/h)	263	634	874			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	136	87	583	583	433	292
Volume Left	54	87	0	0	0	0
Volume Right	82	0	0	0	0	76
cSH	406	874	1700	1700	1700	1700
Volume to Capacity	0.33	0.10	0.34	0.34	0.25	0.17
Queue Length 95th (ft)	36	8	0	0	0	0
Control Delay (s)	18.3	9.6	0.0	0.0	0.0	0.0
Lane LOS	C	A				
Approach Delay (s)	18.3	0.7			0.0	
Approach LOS	C					

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		

ENCLOSURE 4

Attachment 2: 98th Avenue NE Gap Data

All Traffic Data Services Inc.
2225 NE 27th St
Renton, WA 98056
Ph. 206-251-0300

Site Code: 01 GAP

98TH AVE NE NO NE 117TH LN

NB

Start	1	5	7	9	11	13	15	17	19	21	23	25	27	29
Time	4	6	8	10	12	14	16	18	20	22	24	26	28	999
12/12/07	50	1	3	6	4	2	6	3	3	1	6	3	6	41
01:00	27	1	2	1	1	1	2	2	0	1	1	1	2	30
02:00	7	1	0	1	1	0	0	0	0	0	0	1	0	19
03:00	6	0	0	0	0	0	0	0	0	0	0	1	1	13
04:00	3	0	0	0	0	0	0	0	0	0	0	0	0	8
05:00	1	0	0	0	0	0	1	0	0	0	0	0	0	9
06:00	8	1	0	0	1	0	1	0	0	1	0	0	0	17
07:00	22	4	2	4	3	2	1	3	3	4	1	1	3	42
08:00	91	16	13	6	8	8	6	1	1	5	4	9	5	44
09:00	154	20	17	20	17	7	6	9	7	6	6	4	4	39
10:00	184	25	21	12	16	6	12	10	10	5	6	5	7	36
11:00	186	29	18	15	14	10	10	7	7	15	4	5	4	37
12 PM	264	26	28	21	17	14	9	6	8	8	6	9	5	27
13:00	370	44	18	19	17	10	9	14	7	7	5	8	4	25
14:00	352	44	22	20	22	12	8	12	7	4	7	6	9	23
15:00	405	45	26	19	18	17	5	9	8	4	6	10	3	23
16:00	501	50	31	19	13	8	12	10	9	3	6	2	3	25
17:00	693	53	31	18	12	13	9	9	5	3	4	3	5	19
18:00	895	47	33	16	20	10	15	9	3	3	1	4	4	11
19:00	826	49	31	20	19	11	16	10	10	9	0	3	2	8
20:00	785	47	23	21	21	13	6	3	6	7	4	5	0	17
21:00	403	39	33	23	11	14	6	5	7	7	2	5	5	31
22:00	274	15	20	19	14	12	10	15	2	6	7	5	6	35
23:00	152	19	25	17	6	5	13	5	11	4	10	5	7	37
Total	6659	576	397	297	255	175	163	142	114	103	86	95	85	616

ENCLOSURE 4

All Traffic Data Services Inc.
2225 NE 27th St
Renton, WA 98056
Ph. 206-251-0300

Site Code: 01 GAP

98TH AVE NE NO NE 117TH LN

NB

Start Time	1 4	5 6	7 8	9 10	11 12	13 14	15 16	17 18	19 20	21 22	23 24	25 26	27 28	29 999
12/13/07	73	6	4	4	11	6	5	8	4	4	3	2	3	46
01:00	32	2	4	0	2	3	4	2	0	2	0	2	0	39
02:00	6	0	1	0	0	0	1	0	0	0	0	0	0	21
03:00	5	0	2	0	0	1	2	1	0	0	0	0	0	20
04:00	2	0	0	0	0	0	0	0	0	0	0	0	0	12
05:00	1	0	0	0	0	0	0	0	0	0	0	0	0	14
06:00	9	0	0	0	0	1	1	1	0	0	0	0	0	24
07:00	25	2	4	1	2	3	0	5	3	4	3	1	2	42
08:00	74	8	11	7	4	6	2	7	2	6	2	5	1	50
09:00	175	21	9	10	14	5	10	8	11	8	11	6	6	36
10:00	152	28	23	16	9	10	7	15	5	6	7	7	5	38
11:00	216	28	30	19	15	12	12	8	7	8	5	5	4	33
12 PM	280	36	20	18	13	16	8	6	7	2	9	6	7	32
13:00	345	29	20	14	21	14	17	8	9	6	6	8	1	25
14:00	419	50	21	17	21	6	12	14	9	7	5	8	5	19
15:00	459	46	27	19	15	15	11	3	7	7	7	4	4	22
16:00	500	54	37	17	18	12	8	13	9	2	4	3	4	19
17:00	683	55	30	24	20	13	14	9	6	7	5	3	3	10
18:00	903	45	32	23	15	9	11	7	6	7	5	1	3	8
19:00	841	46	23	15	18	15	6	5	2	4	2	4	3	16
20:00	649	43	30	21	12	15	8	8	5	4	2	7	6	18
21:00	351	37	29	23	16	19	9	12	10	11	2	4	7	20
22:00	266	31	17	15	11	12	12	6	10	4	4	7	4	34
23:00	156	20	18	9	7	7	8	8	9	4	4	7	6	40
Total	6622	587	392	272	244	200	168	154	121	103	86	90	74	638
Grand Total	13281	1163	789	569	499	375	331	296	235	206	172	185	159	1254

All Traffic Data Services Inc.
2225 NE 27th St
Renton, WA 98056
Ph. 206-251-0300

Site Code: 01 GAP

98TH AVE NE NO NE 117TH LN

SB

Start	1	5	7	9	11	13	15	17	19	21	23	25	27	29
Time	4	6	8	10	12	14	16	18	20	22	24	26	28	999
12/12/07	28	1	3	3	0	2	4	1	1	2	2	5	4	46
01:00	7	0	1	1	0	2	0	2	0	2	2	0	0	28
02:00	8	0	0	0	0	1	0	0	0	0	0	1	0	22
03:00	7	0	0	1	0	1	0	0	0	1	0	0	0	16
04:00	6	0	1	0	0	1	0	0	0	0	0	0	0	10
05:00	5	0	0	0	0	1	0	0	0	0	0	1	0	15
06:00	23	3	2	0	2	0	1	0	2	2	1	2	2	35
07:00	119	14	9	17	4	8	3	5	4	6	2	8	4	44
08:00	690	32	24	29	13	8	3	7	7	6	7	5	3	22
09:00	669	32	19	15	9	10	7	10	4	13	8	4	8	19
10:00	610	44	22	14	12	11	7	13	7	8	7	4	6	18
11:00	412	31	14	19	17	8	11	13	9	7	6	10	6	22
12 PM	306	54	33	17	14	12	11	8	8	6	10	2	5	26
13:00	391	50	34	20	14	16	13	6	5	3	8	6	4	24
14:00	397	46	26	24	12	13	12	9	9	11	5	7	6	17
15:00	376	45	18	18	22	21	6	9	9	9	8	7	0	23
16:00	374	39	23	12	11	8	5	11	10	6	6	7	6	25
17:00	387	47	31	20	8	8	12	8	6	8	10	4	2	27
18:00	466	30	14	16	17	7	8	11	3	9	6	5	6	29
19:00	429	42	24	20	13	12	10	13	3	8	9	2	5	25
20:00	302	45	23	14	15	12	4	9	2	8	8	12	6	27
21:00	207	26	20	19	8	10	12	6	14	10	12	6	9	27
22:00	128	16	16	9	7	6	9	5	11	10	7	4	6	41
23:00	62	5	4	7	6	7	5	3	2	5	3	2	1	47
Total	6409	602	361	295	204	185	143	149	116	140	127	104	89	635

All Traffic Data Services Inc.
2225 NE 27th St
Renton, WA 98056
Ph. 206-251-0300

Site Code: 01 GAP

98TH AVE NE NO NE 117TH LN

SB

Start	1	5	7	9	11	13	15	17	19	21	23	25	27	29
Time	4	6	8	10	12	14	16	18	20	22	24	26	28	999
12/13/07	20	3	5	2	2	2	3	3	1	1	1	5	3	37
01:00	17	2	0	2	1	0	1	1	1	0	0	0	2	26
02:00	2	0	0	0	0	0	0	2	0	1	0	0	0	24
03:00	6	0	0	1	0	1	0	0	0	0	0	0	0	16
04:00	3	0	0	0	1	0	0	0	1	0	0	0	0	17
05:00	1	0	0	0	0	0	0	0	1	0	0	0	0	12
06:00	14	1	1	4	2	0	1	0	2	1	0	0	0	38
07:00	140	20	10	11	3	8	6	9	11	3	9	6	7	42
08:00	674	35	17	19	10	9	10	6	5	7	7	5	6	19
09:00	701	29	18	9	14	6	18	4	9	3	5	6	2	24
10:00	589	50	22	10	8	16	8	11	13	5	4	9	1	20
11:00	494	29	24	19	11	9	12	10	7	8	6	11	10	15
12 PM	365	43	26	32	20	14	13	6	8	6	5	8	2	21
13:00	383	56	29	18	15	9	6	11	10	10	4	6	3	25
14:00	345	53	27	16	11	13	11	7	12	11	7	7	7	20
15:00	339	43	26	16	11	14	11	8	9	9	7	4	3	28
16:00	377	44	23	14	19	12	12	15	7	11	6	7	6	18
17:00	405	42	23	25	20	8	10	7	11	9	7	4	3	23
18:00	426	33	19	14	9	14	10	13	15	5	6	6	3	22
19:00	406	42	24	17	8	15	10	6	9	9	9	9	5	22
20:00	300	42	26	12	17	9	10	7	14	9	10	6	4	23
21:00	189	29	31	18	8	10	13	8	6	3	7	3	7	35
22:00	157	23	21	9	8	21	7	7	6	6	7	4	2	39
23:00	54	10	13	7	12	10	8	8	4	5	7	6	5	42
Total	6407	629	385	275	210	200	180	149	162	122	114	112	81	608
Grand Total	12816	1231	746	570	414	385	323	298	278	262	241	216	170	1243

ENCLOSURE 4

All Traffic Data Services Inc.
2225 NE 27th St
Renton, WA 98056
Ph. 206-251-0300

Site Code: 01 GAP

98TH AVE NE NO NE 117TH LN

Combined

Start	1	5	7	9	11	13	15	17	19	21	23	25	27	29
Time	4	6	8	10	12	14	16	18	20	22	24	26	28	999
12/12/07	87	11	10	16	11	9	12	7	6	2	9	7	7	37
01:00	36	1	4	4	3	5	6	3	2	5	5	1	3	39
02:00	18	3	2	2	1	0	1	0	1	0	2	2	0	28
03:00	13	0	0	1	0	2	0	0	1	1	0	2	1	26
04:00	9	0	1	0	0	1	0	0	0	0	0	0	0	18
05:00	6	0	0	1	0	1	1	0	0	0	0	1	0	23
06:00	32	5	2	2	5	0	3	2	3	6	3	2	1	36
07:00	166	25	20	23	10	13	9	7	8	10	4	7	4	34
08:00	815	57	41	29	20	7	7	8	4	7	5	1	4	11
09:00	884	47	42	27	19	9	13	3	11	11	3	0	3	5
10:00	867	57	35	29	17	16	7	15	5	3	5	1	4	5
11:00	674	57	36	40	27	7	14	10	6	7	7	2	0	4
12 PM	663	72	58	37	24	15	7	8	3	5	2	0	1	8
13:00	837	79	42	35	21	15	9	4	7	5	2	3	0	2
14:00	814	76	34	32	30	13	13	4	7	6	4	0	2	0
15:00	866	80	41	27	27	20	9	6	5	1	5	2	1	0
16:00	938	75	46	24	21	11	7	10	4	2	2	2	1	4
17:00	1143	60	40	23	14	18	6	5	5	3	1	1	2	1
18:00	1337	58	30	24	22	7	5	7	4	2	1	0	1	1
19:00	1267	69	29	25	26	6	7	6	6	2	2	0	0	0
20:00	1133	74	39	20	21	14	8	6	3	4	0	0	0	3
21:00	686	73	43	43	22	15	15	6	11	2	3	3	2	1
22:00	449	45	41	27	29	24	14	12	1	11	7	5	2	9
23:00	252	33	39	25	21	16	19	9	11	4	5	2	4	25
Total	13992	1057	675	516	391	244	192	138	114	99	77	44	43	320

ENCLOSURE 4

All Traffic Data Services Inc.
2225 NE 27th St
Renton, WA 98056
Ph. 206-251-0300

Site Code: 01 GAP

98TH AVE NE NO NE 117TH LN

Combined

Start	1	5	7	9	11	13	15	17	19	21	23	25	27	29
Time	4	6	8	10	12	14	16	18	20	22	24	26	28	999
12/13/07	107	16	12	14	15	14	8	12	5	7	4	5	4	39
01:00	55	6	4	6	4	3	7	2	3	4	3	2	2	43
02:00	11	0	2	0	0	2	0	2	0	1	1	0	0	39
03:00	13	0	3	1	0	2	2	1	0	0	0	0	0	33
04:00	5	0	1	0	2	0	0	0	0	0	0	0	0	28
05:00	3	0	0	0	0	1	0	0	1	0	1	0	0	23
06:00	28	2	2	9	2	0	3	4	3	2	1	1	0	43
07:00	184	32	18	24	7	14	9	18	10	8	11	5	6	30
08:00	784	51	25	25	13	11	12	6	7	8	6	7	5	8
09:00	908	48	28	25	18	16	19	7	8	2	3	0	3	8
10:00	811	69	36	26	25	14	12	11	7	2	4	1	2	4
11:00	775	59	43	42	20	15	12	12	5	2	0	3	2	4
12 PM	707	84	46	33	21	18	9	4	5	4	5	0	3	5
13:00	802	69	44	27	26	16	20	7	7	0	1	2	0	3
14:00	849	83	40	34	20	14	5	11	4	3	3	0	0	3
15:00	868	84	49	24	23	15	9	6	2	2	3	3	1	4
16:00	940	86	46	24	17	14	3	6	3	3	3	2	2	4
17:00	1152	77	39	24	20	5	6	5	1	2	4	0	0	1
18:00	1328	48	35	16	16	10	9	4	6	2	1	1	0	2
19:00	1270	70	28	21	17	8	8	6	2	2	3	1	0	2
20:00	1014	76	43	27	17	13	4	4	8	3	2	2	0	2
21:00	634	62	45	34	24	15	16	9	6	4	4	2	5	3
22:00	489	62	46	18	24	21	15	10	5	4	6	4	3	11
23:00	252	37	34	27	21	19	12	6	12	7	8	9	9	15
Total	13989	1121	669	481	352	260	200	153	110	72	77	50	47	357
Grand Total	27981	2178	1344	997	743	504	392	291	224	171	154	94	90	677

ENCLOSURE 4