

MEMORANDUM

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To: Mike Scarey, City of SeaTac Planning

From: Larry Toedtli
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Subject: SeaTac LRT Station Area Plans — Traffic Impact Assessment

The City of SeaTac is considering potential changes to its land use plans in the vicinity of the two Sound Transit Light Rail Transit (LRT) stations that will serve the City. The north station would be located in the southeast quadrant of the intersection of International Boulevard and S 154th Street. While this station is in the City of Tukwila, it also serves the City of SeaTac on the west side of International Boulevard. The second station will be located on the west side of International Boulevard at S 176th Street. A pedestrian bridge will connect the LRT station with developments on the east side of International Boulevard.

The City's planning effort is focused on identifying transit-oriented development in the vicinity of the two LRT stations. The City has evaluated a range of options and has developed a preferred plan for both station areas. Attachment 1 shows the vicinity of the planning areas and the approximate LRT stations. Attachments 2 and 3 show the S 154th Street Station Area and the SeaTac/Airport Station Area Districts.

This memorandum evaluates the potential level of traffic impacts that could occur with the redevelopment plan. It provides estimates of the PM peak hour trip generation, distributions, and traffic volume impacts that could result from the changes in land uses. Redevelopment of the two station areas will occur over many years. Therefore, a 2020 horizon year was used to assess the potential traffic impacts of the changes in land uses with the redevelopment of the station areas. The potential changes in traffic volumes due to the redevelopment around the stations are compared to 2020 baseline traffic forecasts. The 2020 baseline traffic forecasts were developed based on a travel forecasting model used to evaluate changes in land use and transportation system improvements for the area west of the S 154th Street Station Area.

The 2020 baseline forecasts assume completion of the extension of SR 509 to I-5 south of the airport. They also assume development of the Port of Seattle's "L-shaped" and "55-acre" properties north of the airport for air cargo type operations. The 2020 baseline model also assumes some changes to the local road network in the vicinity of the Port properties. These network changes include closing S 150th and S 152nd Streets east of 24th Avenue S and construction of a new north-south collector west of 24th Avenue S to provide for local circulation between S 154th and S 148th Streets west of the S 154th Street Station Area.

The next section of this memorandum summarizes key findings and conclusions of the analyses. The remaining sections provide an overview of the assumptions, methodologies, and results. This includes documenting the proposed changes in land uses, the potential increase in trip generation, and the resulting traffic volume impacts along area arterials and internal circulation streets. The traffic volume impacts use a 2020 forecast year, since the redevelopment of the station areas will likely take place over a 10 to 15 year period.

Findings and Conclusions

The following summarizes key findings and conclusions of the traffic impact assessment.

- Implementation of the station area plans will result in a mix of land uses that will help internalize traffic generation and promote use of other travel modes.
- A higher percentage of trips within the station areas would likely use transit, due to the proximity of the LRT line and the higher development densities, than under current land uses.
- The changes in land uses in the S 154th Street Station Area would result in an increase of up to 865 net new trips during the weekday PM peak hour compared to the existing development on those parcels. Approximately 60 percent of the increase in trips would be inbound, reflecting the higher proportion of residential development in this station area.
- Within the SeaTac/Airport Station Area, the changes in land uses would generate up to 1,265 net trips during the PM peak hour. The increase in PM peak hour traffic in this station area would be balanced between inbound and outbound traffic reflecting the broad mix of residential and commercial land uses.
- The mix of land uses will result in a fairly broad distribution of traffic to/from each of the station areas. The highest percentage of trips would be oriented to/from SR 518 via International Boulevard. A fairly high proportion of the station area traffic also would be directed to International Boulevard north of S 152nd Street or south of S 182nd Street.
- Lower levels of station area traffic would use local arterials and collectors to connect with adjacent residential areas or with the Southcenter area.
- The largest traffic volume impacts of both station areas will be on International Boulevard between S 154th Street and S 160th Street.
- The adjacent street system has capacity to accommodate the PM peak hour traffic increases; however, intersection operations and signal timing will need to be reviewed and adjusted as the development occurs over time.

- Planned improvements at the intersection of S 154th Street/International Boulevard should be reviewed and adjusted to reflect the changes in traffic volumes and travel patterns.
- A new signalized intersection is desirable at S 173rd Street/International Boulevard to provide for the primary access and circulation to the SeaTac/Airport Station Area.
- Turn lanes should be considered at access intersections along S 154th and S 152nd Streets serving the S 154th Street Station Area.
- Turn lanes should be considered at access intersections along S 170th and S 176th Streets adjacent to the SeaTac/Airport Station Area.
- A traffic signal may be warranted of the S 176th Street and 30th Avenue S intersection in the future. If and when a signal is warranted at this intersection, the signal should be interconnected with the existing signal at S 176th Street/International Boulevard to reduce the potential impacts of traffic queues between the intersections.
- An interconnected system of local streets, as generally identified in the station area plans, is needed to provide for property access and vehicular circulation to serve the higher intensity land uses. They will also provide circulation for pedestrians and could serve transit.
- Internal streets within the S 154th Street Station Area can be kept at two lanes. Additional turn lanes may be desirable at some locations depending on actual site plans and development levels.
- The internal street system serving the SeaTac/Airport Station Area north of S 176th Street should be 2/3 lanes with turn lanes at internal intersections and at major access points to garages or other parking. A boulevard design concept could be used with breaks provided for left-turn lanes.
- A fully connected system of pedestrian facilities should be provided in both station areas. The pedestrian system will provide connectivity between the mix of land uses and to transit.
- The pedestrian crossings at the intersection of S 154th Street and International Boulevard, and at S 152nd Street and International Boulevard, should be enhanced to accommodate increased connectivity to/from the LRT station.
- Pedestrian crossings should be designed and constructed to enhance pedestrian movement at the unsignalized intersections along S 176th and S 170th Streets.
- Pedestrian facilities should be upgraded along S 152nd, S 154th, S 170th, and S 176th Streets to improve connectivity to the adjacent residential neighborhoods.

- Bus transit service and facilities at the station areas should be reviewed as development occurs. Bus shelters should be considered at major stops to enhance ridership.
- The City should work with King County Metro to consider changes to bus routes serving the station areas to serve the higher density and mix of land uses.

Land Uses

The potential traffic impacts of the redevelopment are directly related to changes in the land uses in the two station areas. Attachment 4 summarizes the existing and proposed land uses for each station area. The existing and planned land use data were provided by Makers Architecture, lead consultant on the Station Area Planning project. The quantities shown in Attachment 4 only account for existing and planned land uses for properties that are expected to redevelop under the station area plan. They do not include properties that are not expected to redevelop under the plan. The land use analyses were done for smaller geographic districts within each station area (see Attachments 2 and 3). The assumptions for each of the districts were aggregated to illustrate the overall changes that could occur within each station area, as discussed below.

S 154th Street Station Area

Under the plan, the existing lower density residential areas in the S 154th Street Station Area would be able to redevelop at higher densities. This would result in an increase of nearly 1,400 residential units. Targeting higher density residential development in this station area would take advantage of the LRT line to increase transit use.

An additional 70,000 gross square feet (gsf) of retail uses also could be developed. These would be primarily oriented to serving the new residential units and the adjacent residential neighborhoods. An increase of approximately 45,000 gsf in office space also could occur. Much of this also could serve the surrounding area, such as realtors, insurance, or other services. The existing park-and-fly facility in the southwest part of the station area would be replaced with some of the new office uses.

SeaTac/Airport Station Area

The SeaTac/Airport Station Area is much bigger than the S 154th Street Station Area. Some of the existing major uses in the vicinity of the station are not expected to redevelop, as shown on Attachment 3. The SeaTac/Airport Station Area Plan includes a range and mix of land use types. Office space could increase by up to 100,000 gsf. This space would likely be targeted to companies that desire to be close to the airport. The office uses also could take advantage of access to/from downtown Seattle via Sound Transit's new LRT line.

An additional 870 hotel rooms also could result from the redevelopment. These would enable travelers to stay near the airport but have convenient access to downtown Seattle via the LRT line.

To add to the mix of land uses, nearly 700 residential units were estimated to be developed in the station area. Residents of the new units would have transit access to employment centers at or near the airport or along the LRT line, including downtown Seattle.

The plan estimates that an additional 150,000 gsf of retail, restaurant, and entertainment uses would be developed. These land uses would support the increased level of daytime and evening activities associated with the increased office, hotel, and residential development. These supporting land uses would help meet the service needs of the area, thereby reducing a portion of the off-site trips via automobile.

The SeaTac/Airport Station Area Plan would also include an increase in the number of park-and-fly spaces along International Boulevard. These would likely be integrated into parking structures as part of the mixed-use developments.

The City also envisions a public facility in the range of 25,000 gsf in this station area. A specific use is not defined, but the facility could be a library, visitor center, recreation center, or similar public facility.

Trip Generation

The number of additional weekday PM peak hour trips for each station area were determined based on the changes in the land use totals described above. Weekday PM peak hour trip generation for the redevelopment was estimated using rates from *Trip Generation*, Institute of Transportation Engineers (ITE), 7th Edition. The net change in trip generation was calculated by subtracting the trip generation associated with existing land uses from that of the forecast land uses.

Each station area consists of multiple land uses. Therefore, an analysis to define the internalization of trips was conducted. Internalized trips are those trips that result from a single vehicle visiting multiple uses within the same station area. These trips could be made by walking or bicycle mode. If a motorized vehicle were used for an internal trip, it would likely use the internal street system and would not impact the adjacent collector or arterial system. The analysis of internal trips was based on methodologies outlined in the *Trip Generation Handbook*, Institute of Transportation Engineers, 2nd Edition. No internal capture trips were assumed for the additional Park & Fly parking spaces or the 25,000 gsf public facility in the SeaTac/Airport Station Area.

In addition to internalized trips, pass-by trips for retail uses were also estimated. The redevelopment would attract some trips that would already be traveling on the adjacent roadway network, such as International Boulevard or S 154th Street, en route to another destination. These trips are defined as “pass-by” trips. The reduction for retail “pass-by” trips was based on methodologies documented in *Trip Generation*.

Multi-family dwelling units, as analyzed for the redevelopment, could consist of a mixture of condos and apartments. For purposes of these analyses, it was assumed that fifty percent of the new dwelling units would be condominiums and the remaining would be rental apartments. The trip generation rates from *Trip Generation* for each of these residential land uses were averaged to provide a trip generation rate used for all multi-family dwelling units in either station area.

Trip Generation does not provide any trip rate for the added Park & Fly parking spaces which are a portion of the SeaTac/Airport Station Area. Weekday PM peak hour traffic volumes at an existing Park & Fly site located within the Airport Station area were used to develop a trip generation rate for the Park & Fly lots used in this analysis.

Trip Generation does not have a land use category for a general public building or a visitor center. *Trip Generation* does include trip rate data for libraries, recreational community centers, and government office buildings. The average PM peak hour trip rate for the library land use is much higher than the trip rate for a recreational community center or a government office building. Therefore, the library land use was selected for estimating trip generation for the station area. This provides a likely conservative (high) estimate of potential traffic impacts of redevelopment of the station area.

The analysis of trip generation was conducted for each of the smaller districts within each station area. This approach was used since traffic would access and egress different parts of each station area using different roads. As noted above, the net change in trip generation for each subarea within the station areas was calculated by subtracting the trip generation for the existing land uses from the estimated future trip generation for each station area.

Adjustments were made to reflect possible shifts in travel mode, due to the proximity of the LRT stations. These estimates took into account general travel patterns and estimates of traffic shifts from the trip rates reported in *Trip Generation*.

The following summarizes the resulting net trip generation for each station area.

S 154th Street Station Area

Attachment 5 summarizes the estimated changes in weekday PM peak hour traffic that would result from the changes in land uses for the S 154th Street Station Area. Overall, weekday PM peak hour driveway trips within the station area would increase by approximately 1,050.

The increase of 1,050 trips during the PM peak hour would not all impact the adjacent arterials and collector system. After adjustments to account for trips that stay internal to the station area, retail pass-by trips, and shifts to transit due to the proximity to the LRT station, a net increase of approximately 865 PM peak hour trips would result. Approximately 60 percent of the net increase in trips would be inbound during the PM peak hour, reflecting the influence of the additional residential development.

SeaTac/Airport Station Area

The SeaTac/Airport Station Area has more potential redevelopment than the S 154th Street Station Area. This reflects the larger geographic area and the potential for taller buildings. As shown in Attachment 6, the redevelopment plan would result in just under 2,000 additional gross trips during the PM peak hour. However, the wide mix and compatibility of land uses, combined with adjustments for retail pass-by trips and increased transit use would reduce the net impact to 1,265 trips. The inbound and outbound trips are fairly evenly balanced, reflecting the mix of land uses between residential and commercial uses.

The additional 870 hotel rooms account for almost 30 percent of the net increase in traffic generated under the station area plan. The retail, restaurant, and entertainment land uses also account for just under 30 percent of the increase in traffic with the redevelopment plan. Combined, approximately 50 percent of these trips would be inbound and 50 percent would be outbound during the PM peak hour.

The addition of almost 700 multi-family residential units in the station area would result in just under 300 new PM peak hour trips added to the surrounding street system. This represents 22 percent of the net new trips. As shown on Attachment 6, two-thirds of the residential trips would be inbound to the station area.

The public agency building (assumed as a library), office, and park-and-fly land uses account for the remaining 20 percent of the increased traffic generation.

Trip Distribution and Assignment

The additional trips generated within each station area were distributed and assigned to the adjacent arterial and collector street system in order to estimate the volume impacts of the projects. The distribution and assignments were estimated for each district and for each type of land use. The distribution patterns were developed based on general travel patterns for residential and commercial uses estimated using a travel demand model prepared for prior recent studies prepared for the City of SeaTac and the Port of Seattle.

The additional trips were assigned to the street system based on the overall travel distribution patterns and likely access/egress routes. In addition, the internal trips were assigned to the station area roads, even though they may be made by non-motorized modes. This provides a conservative assessment for sizing the internal roadways.

S 154th Street Station Area

Attachment 7 shows the general distribution patterns of traffic growth associated with the S 154th Street Station Area. The distribution of retail trips is fairly even with higher percentages to/from the west and north. These travel patterns reflect the connection between residential areas to the north and west with the additional retail services provided in the station area plan. The remaining retail trips were distributed evenly to SR 518, International Boulevard south of SR 518, and the arterials/collectors east of

International Boulevard. Travel patterns for the office land uses would have a higher connection to SR 518, with slightly lower percentages to the west, south, and east on local arterials. This reflects the longer trip lengths associated with office uses compared to neighborhood retail centers.

The distribution of residential trips during the PM peak hour is based on locations of employment centers, as well as connections to nearby retail or services. Thirty percent of the residential traffic was distributed to/from SR 518. A slightly higher percentage (35%) was assigned to/from the north. Some of the trips to/from the north would connect to commercial uses along SR 99, while others would connect to the Duwamish or downtown Seattle employment centers. The remaining residential trips are fairly evenly distributed to the west, south, and east on the local arterial system.

Attachment 8 shows the resulting PM peak hour traffic assignments for the S 154th Street Station area for all of the land uses combined. As shown on Attachment 8, the largest project traffic volume impact of the S 154th Street Station Area project would be on SR 518 east of International Boulevard. This reflects the more regional trip characteristics of the residential uses that generate the highest volume of new trips. Increases in traffic on International Boulevard and Military Road north of the project station area would be in the range of 130 to 160 vehicles per hour (vph) (both directions). These include more regional trips connecting to employment areas via SR 99, as well as local area residents connecting to the increased commercial land uses within the station area. Impacts on International Boulevard south of SR 518 would be about 120 vph.

PM peak hour traffic volume impacts on S 154th Street would range from 80 vph east of International Boulevard to approximately 250 vph just west of International Boulevard. To the west of the station area, an increase of 110 vph is forecast on S 154th Street. The higher traffic volume on S 154th Street just west of International Boulevard reflects the layout of local streets for accessing the subarea. Similar levels of traffic would be seen on S 152nd Street between 32nd Avenue S and Military Road. Impacts on other east-west collectors or local streets outside of the study area would likely be in the range of 10 vph.

SeaTac/Airport Station Area

Attachment 9 shows the general traffic distribution for the new trips generated by the redevelopment in the SeaTac/Airport Station Area. The retail, restaurant, and entertainment land uses in the SeaTac/Airport Station Area would serve both local needs and the broader subregion of south King County including Burien, Des Moines, Riverton, and Tukwila. Therefore, these trips are relatively evenly distributed to the north, south, and east. A small percentage of these trips also would likely connect with the airport, west of the station area.

The additional office traffic was primarily distributed to the north and south along International Boulevard. These trips would generally be oriented to/from the regional freeway system or the residential areas of south King County. Some office trips would likely connect with the airport during the PM peak hour.

The additional hotel trips would be more regionally focused than the retail, restaurant, and entertainment uses. The hotels also would have significant connections with the airport, as shown on Attachment 9.

The additional park-and-fly spaces would have a significant portion of trips connecting to/from the airport, via shuttle circulators. The remaining trips would primarily be to/from regional access routes such as International Boulevard or the airport expressway connection to access SR 518.

Trips associated with the public agency facility (assumed as a library) would be fairly local to SeaTac and other nearby residential communities. This results in a relatively balanced distribution to/from the east, south, and north.

Many of the additional trips generated by the 700 multi-family residential units would be oriented to/from the regional highway system. These routes connect to employment centers and regional shopping at Southcenter. A portion of the residential trips during the PM peak hour would also connect to local jobs or activities.

The resulting PM peak hour trip assignment for the additional SeaTac/Airport Station Area traffic is shown on Attachment 10. The largest traffic impacts of the redevelopment would be found along International Boulevard. International Boulevard provides access/egress to the station area and provides the most direct connection to the regional highway system. North of S 170th Street, the redevelopment would add almost 500 trips during the PM peak hour. South of the airport access, the increase would be 320 vph. As shown on Attachment 10, the volumes at these locations are the same in the northbound and southbound directions. This reflects the balance in land uses and their resulting trip generation.

S 176th and S 170th Streets would connect the station area development to/from the east, including Southcenter and nearby residential areas. Higher levels of project traffic would use S 176th Street since it is central to the redevelopment and also connects most directly to the Southcenter area.

Transportation System Impact Analysis

Based on the increase in trip generation and traffic volumes, the relative impacts of the two station area projects in the area transportation system were evaluated. The increases in traffic volumes are first reviewed in terms of forecast 2020 PM peak hour traffic volumes on the adjacent arterial system. As needed, a planning-level assessment of possible roadway improvements to serve the new developments is identified. An assessment of traffic volumes on the internal circulation roads within each station area is also reviewed. The focus of this evaluation is to help in defining the appropriate number of lanes to serve the station area development and improvements at key access intersections.

Potential impacts and improvements for pedestrian and transit service are also presented. These focus on connectivity to the LRT stations and other transit, as well as internal connections between the mix of land uses.

Traffic Volumes

Since redevelopment of the station areas would occur over many years, a 2020 horizon year was selected for the evaluation of traffic volume impacts. Baseline 2020 PM peak hour traffic volumes were forecast using a travel demand model that was applied for the *North End Arterial Study*, Transsystems and The Transpo Group, March 2004. The *North End Arterial Study* was jointly sponsored by the City of SeaTac and the Port of Seattle to evaluate changes in land use and transportation system improvements for the area west of the S 154th Street Station Area. The extension of SR 509 to I-5 is assumed in the forecasts. The *North End Arterial Study* also assumes development of the Port of Seattle's "L-shaped" and "55-acre" parcels north of the airport for air cargo type operations. These properties are located west of the S 154th Street Station Area. Development of the "L-shaped" parcel would result in closure of S 152nd and S 150th Streets east of 24th Avenue S. A new north-south collector road would be constructed east of 24th Avenue S. The new collector would connect between S 154th and S 148th Streets to replace the local circulation that would be lost with the closure of S 152nd and S 150th Streets.

The 2020 PM peak hour forecasts from the *North End Arterial Study* model were used as the baseline to compare the relative impacts of the station area redevelopment. The PM peak hour traffic associated with each of the station areas were added to the 2020 baseline forecasts to estimate future volumes with the station area projects. Traffic associated with each station area was further assigned to the roadway system adjacent to the other station area. This provides a conservative (high) estimate of project traffic volume impacts since some of the new trips may connect between the station areas. For example, a resident in the S 154th Street Station Area may visit a new restaurant in the SeaTac/Airport Station Area.

Attachment 11 summarizes the traffic volume impacts of each station area and the resulting 2020 PM peak hour forecast. The results are presented by travel direction, since the overall roadway system needs are typically based on the peak travel direction during peak commuter travel periods. The percentage impacts of the traffic from each station area on these key arterials are also summarized.

S 154th Street Station Area

In the vicinity of the S 154th Street Station Area, the project impacts would be most pronounced on International Boulevard, S 154th Street, and S 152nd Street.

The forecast 2020 traffic volumes on International Boulevard north of SR 518 are within the general capacity of the five-lane arterial. The peak direction of travel along International Boulevard during the weekday PM peak hour is southbound. The S 154th Street Station Area traffic would represent approximately 7.5 to 8.5 percent of the 2020 forecast on International Boulevard in the vicinity of S 154th Street. In the northbound direction, the redevelopment traffic would be 5 to 6.5 percent of the 2020 traffic forecasts on this section of International Boulevard.

South of SR 518, the resulting 2020 forecasts on International Boulevard would increase by 280 vph in the southbound direction. The majority (240 vph) of this

increase is associated with the SeaTac/Airport Station Area redevelopment. Over 10 percent of the total southbound traffic at this location would be due to the redevelopment near the SeaTac/Airport LRT station. The resulting forecasts would still be within the capacity of the arterial with additional right- and/or left-turn lanes on International Boulevard.

The forecast 2020 traffic volumes on S 154th Street would be the highest approaching International Boulevard in the eastbound direction. The 940 vph indicates that the eastbound approach to International Boulevard will need to be modified to more efficiently process traffic. Improvements also may be needed to reduce the potential impacts of traffic queues on adjacent intersections. The City and Sound Transit have evaluated changes to the intersection channelization to address the traffic operations needs associated with increased development near the LRT station.

Forecast traffic volumes on S 154th west of 32nd Place S are within the capacity of a 2/3 lane arterial. Turn lanes at major access intersections (such as 32nd Place S) or a center/two-way left-turn lane would likely be needed.

The forecast volumes on S 152nd Street between 32nd Place S and International Boulevard are within the capacity of a two-lane arterial. Turn lanes would also be desirable at major access intersections. Traffic operations issues could develop between the closely-spaced intersections of Military Road and International Boulevard. The elimination of the south leg of the Military Road/S 152nd Street intersection would reduce some of the potential operations impacts. The operation and timing of the traffic signal at S 152nd Street/International Boulevard will need to be monitored and possibly adjusted to reduce the potential for traffic queues blocking the Military Road intersection. An additional eastbound lane may be needed on S 152nd Street between Military Road and International Boulevard to accommodate the closure of Military Road south of S 152nd Street.

The 2020 traffic forecasts on other sections of S 152nd Street do not indicate needs for capacity or operations improvements.

SeaTac/Airport Station Area

With the redevelopment of both station areas, peak hour traffic volumes on International Boulevard between S 188th Street and S 170th Street would be within the capacity of the existing arterial. In the peak southbound direction, traffic volumes would range from 2,000 to 2,400 vph. The southbound high-occupancy vehicle lane provides the additional capacity to help reduce traffic congestion and delays in the corridor. The SeaTac/Airport Station Area would represent 6 to 12 percent of the forecast southbound traffic along this section of International Boulevard. The S 154th Street Station Area redevelopment would account for approximately 1 to 2 percent of the forecast 2020 traffic volumes in the peak southbound direction. The project impacts in the northbound direction are relatively higher, since the 2020 baseline volumes are lower in the northbound direction.

The Station Area Plan identifies changes to the access intersections serving the area. This would include a new signal and turn lanes at S 173rd Street. This future signalized

intersection is located approximately midway between S 176th and S 170th Streets. Other access intersections along International Boulevard would be limited to right-in/right-out movements.

An operations analysis will need to be conducted to identify specific improvements or modifications at the other intersections along this section of International Boulevard.

The resulting traffic forecasts on S 170th Street east of International Boulevard are well within the capacity of the two-lane arterial. Turn lanes will likely be needed at the intersection of S 170th Street/31st Avenue S which will serve the north part of the redevelopment area. The SeaTac/Airport Station Area represents 14 to 15 percent of the PM peak hour traffic on S 170th Street just east of International Boulevard.

Forecast 2020 traffic volumes on S 176th Street, just east of International Boulevard would be accommodated by the 2/3 lane arterial. Turn lanes will be needed at the new 30th Avenue S access serving the areas to the north and the existing hotel to the south. Existing turn lanes at 32nd Avenue S would be adequate to serve the increased traffic. The SeaTac/Airport Station Area represents 15 to 20 percent of the 2020 forecast traffic on S 176th Street just east of International Boulevard.

Internal Roads and Station Area Access

The potential range of traffic volumes on the new or revised internal circulation roads for each station area was also estimated. These took into account the total trip generation within the station areas, not just the additional growth. Conceptual improvements at major access points also were reviewed.

S 154th Street Station Area

The key access/circulation roadway in this station area is 32nd Avenue S between S 154th and S 152nd Streets. A two-lane roadway would adequately provide access to and circulation within the subarea. Final roadway designs may need to consider additional turn lanes at S 154th and S 152nd Streets to reduce delays for traffic exiting the station area via 32nd Place S.

The proposed access at S 154th Street just west of International Boulevard shall be limited to right-in/right-out movements. The eastbound queues on S 154th Street approaching International Boulevard would block this access for left turns exiting the station area. Left turns from westbound S 154th Street into the station area may be allowed. If allowed, appropriate roadway signing and markings should be provided.

Left-turn pockets, or a center turn-lane, would likely be needed on S 154th Street at the access drives to the residential areas west of 32nd Place S. These would provide safe and more efficient operations to districts 4, 5, and 7 (see Attachment 2). Traffic volumes on S 152nd Street are not expected to require the addition of left-turn lanes at these residential access drives. However, widening S 152nd Street to provide the left-turn lanes could be considered if sight distance restrictions are identified.

SeaTac/Airport Station Area

As discussed above, a new signalized intersection at S 173rd Street/International Boulevard is included to provide access to this station area. As shown on Attachment 3, this access would connect to a new north-south corridor between S 170th and S 176th Streets. The new north-south corridor would be in the 30th/31st Avenue S alignment. These two internal streets, along with S 170th and S 176th Streets, would provide access and circulation for the north part (districts 1-8) of the station area.

The south part of the station area redevelopment (districts 9-11) would be primarily accessed via the existing signalized intersection at S 180th Street/International Boulevard. Additional right-in/right-out accesses also would serve this area via International Boulevard.

The estimated traffic volumes on the new S 173rd Street and 30th/31st Avenue S corridors would be accommodated by two-lane roadways. Additional turn lanes would be desired to serve major internal access drives or garages. To provide for these, a boulevard median could be considered, with turn lanes provided at major access points.

The westbound approach of S 173rd Street at International Boulevard should have separate left- and right-turn lanes. This would reduce the impacts to traffic flows along International Boulevard by reducing the amount of green signal time provided for the S 173rd Street approach.

The intersection of S 176th Street/30th Avenue S should have additional left-turn lanes on S 176th Street and for southbound traffic on 30th Avenue S to minimize traffic delays. The forecast volumes may warrant installation of a traffic signal in the future. If installed, the signal at 30th Avenue S/International Boulevard should be interconnected with the existing signal at S 176th Street/International Boulevard in order to reduce potential impacts of traffic queues blocking the adjacent intersection.

While not specifically needed for traffic operations, left-turn lanes also should be considered at the S 170th Street/31st Avenue S intersection. Providing turn lanes will help direct drivers to the station area and the internal circulation roadways.

Pedestrian Facilities

Both station area plans call for a fully connected system of sidewalks or other pedestrian connections. These include internal streets, pathways, and sidewalks along the adjacent arterials and collectors.

S 154th Street Station Area

One of the key pedestrian issues for this station area is the crossings of International Boulevard at both S 154th Street and S 152nd Street to connect to/from the LRT station. Pedestrian crossing signals are currently in place but signal timing parameters may need to be modified for the increased usage. Future modifications of the intersection should also incorporate improved crosswalks, signing, and markings.

Sidewalks also will be needed along S 154th and S 152nd Streets. These streets will connect residential areas in the west part of the station area with commercial uses near International Boulevard. In addition, a fully connected pedestrian system internal to the station area should be provided to enhance internal connections between the various subareas and land uses within the station area.

North-south pedestrian connections also should be provided throughout the station area.

SeaTac/Airport Station Area

Similar to the S 154th Street Station Area, a fully connected system of sidewalk and other pedestrian connections is a key element for the mixed-use station area plan. Sidewalks also need to be provided, or enhanced, along the arterials forming the periphery of the station area. These facilities will allow people to travel between land uses in a pleasant and safe environment. Some of the pedestrian connections could be through buildings to reduce exposure to inclement weather.

The pedestrian system connections should readily tie into the LRT station pedestrian bridge over International Boulevard at S 176th Street. This will enhance pedestrian access to the LRT, local bus service, and to/from the airport terminal.

Crosswalks, lighting, and other markings and signings should be implemented to enhance the visibility of pedestrians.

Special attention should be given to crosswalks along S 176th Street and S 170th Street at the 30th/31st Avenue S intersections. These unsignalized intersections will likely be major pedestrian crossings. Consideration of in-pavement flashing lights or other crossing treatments consistent with the *Manual on Uniform Traffic Control Devices* (MUTCD) should be considered at these and other locations.

Sidewalks also need to connect to the residential areas east of the station area. The commercial uses and transit access will attract pedestrians from the adjacent residential areas.

Transit

The land use plans for both station areas were developed to build on the proximity of the LRT stations. As discussed in the trip generation section, this proximity would help shift trips from automobile to transit modes. The traffic assessment only assumed that a limited shift of trips to LRT would occur in order to ensure that the potential traffic impacts were not understated.

The LRT line will have the capacity to accommodate the additional trips associated with redevelopment of both station areas.

In addition, the mix and density of land uses within the station areas will attract additional bus ridership. These will require convenient stops, good pedestrian connections, and other transit-supportive amenities.

S 154th Street Station Area

Primary transit service for this area will be the LRT and bus service along International Boulevard. Bus service could be reconfigured to better serve the higher-density residential areas in the west part of the station area. This could include stops along S 154th Street and connections with the LRT station to reduce the walking distance.

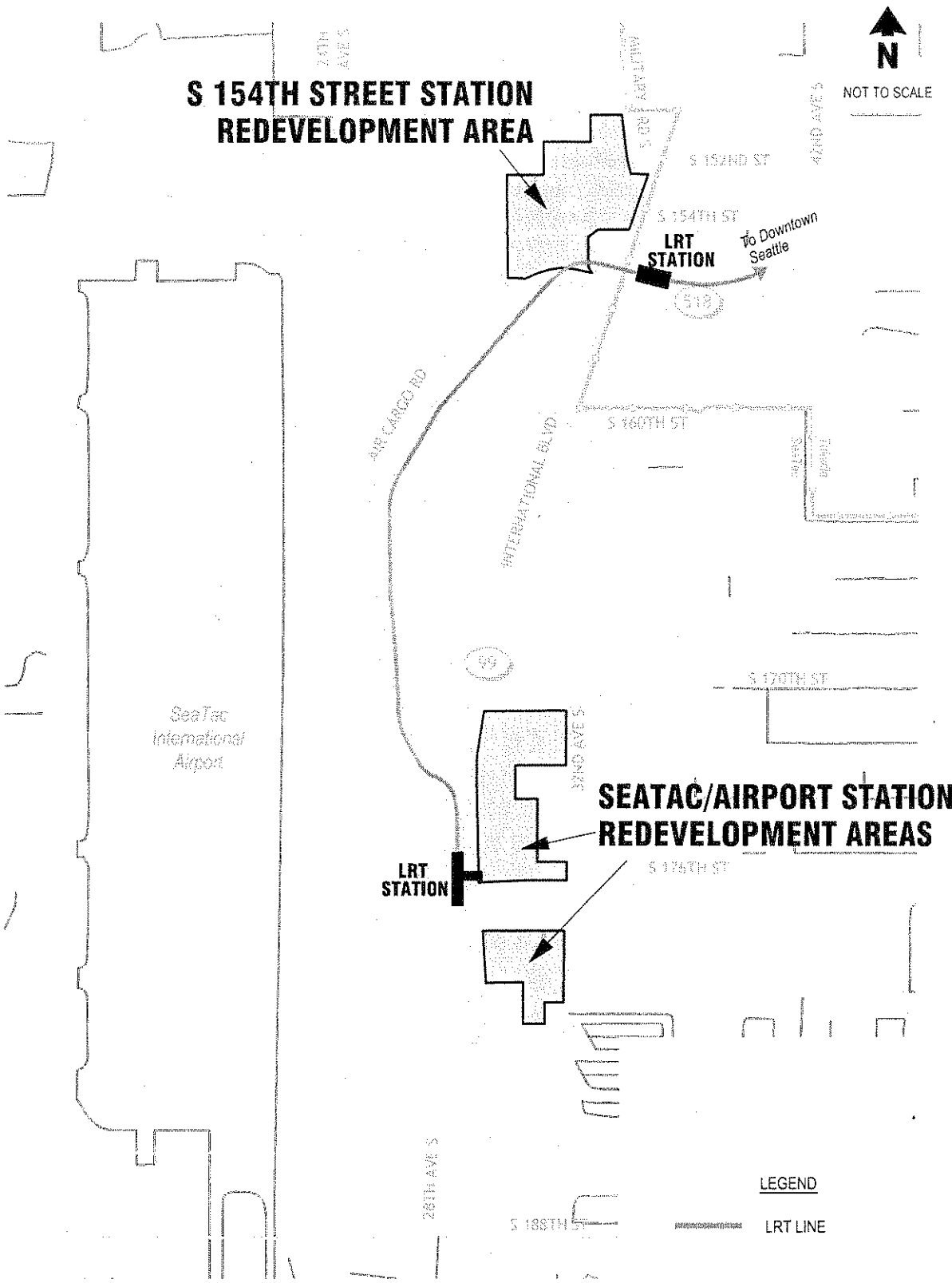
As noted above, a complete and fully connected pedestrian system will also enhance access to/from transit. Transit shelters and other amenities could be provided to support transit use.

SeaTac/Airport Station Area

International Boulevard is the primary transit corridor serving this area. It currently serves local and regional bus routes. The LRT station at S 176th Street will be the major focal point, including a kiss-and-ride drop-off/pick-up area.

Local or regional bus service could be rerouted to travel within the station area north of S 176th Street. Such a shift would provide shorter walking distance for many people. It also would provide a lower volume street for people waiting at a bus stop, compared to International Boulevard. The proposed signal at S 173rd Street would help reduce delays for buses entering and exiting International Boulevard.

Bus shelters and other amenities, combined with an integrated pedestrian system, will be important in serving this higher-density area.



Attachment 1

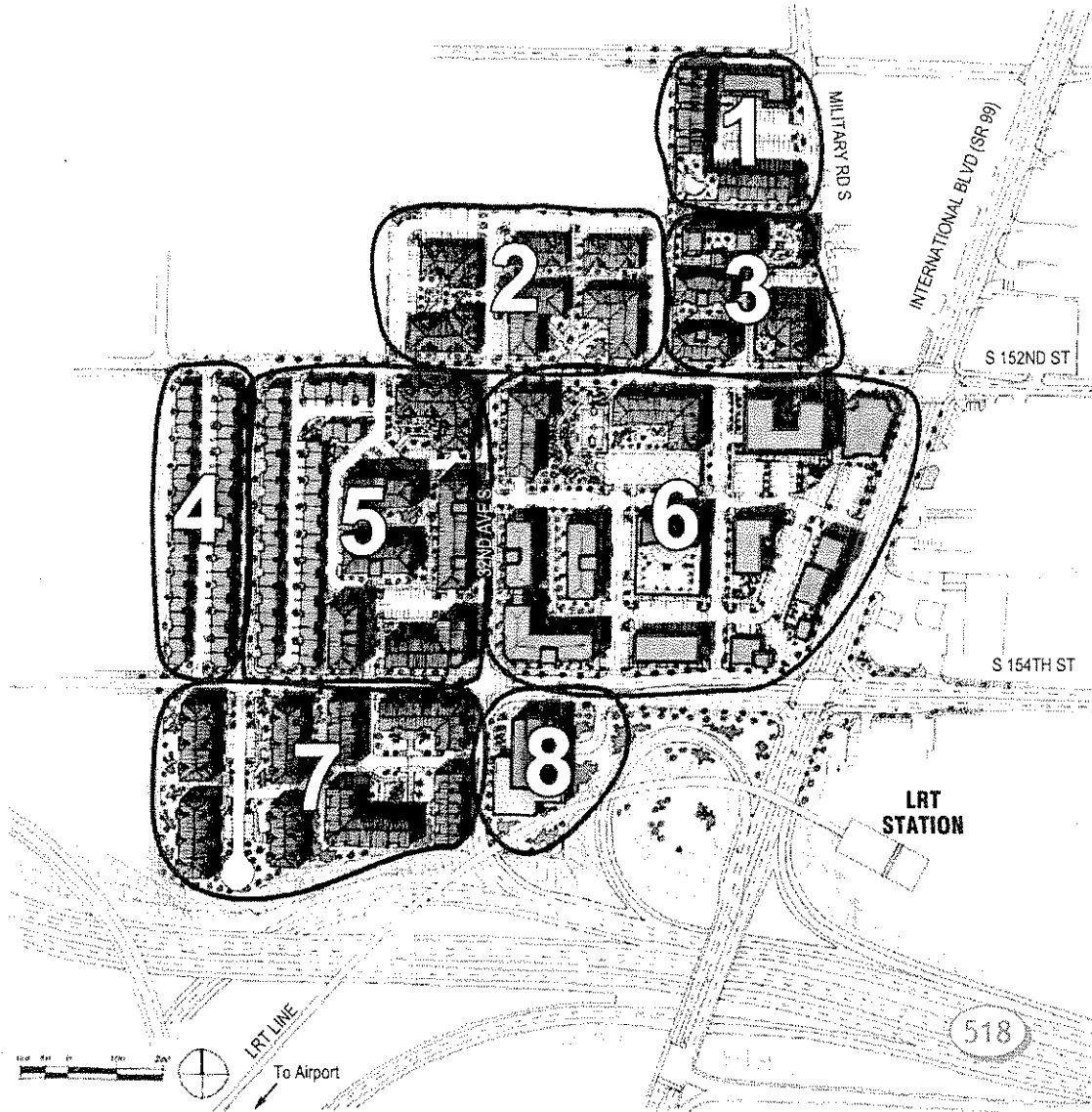
S 154th Street and SeaTac/Airport LRT Station Redevelopment Areas - Vicinity Map

SeaTac LRT Station Area Plan - Traffic Analyses





NOT TO SCALE



LEGEND



= DEVELOPMENT SUBAREA

Attachment 2

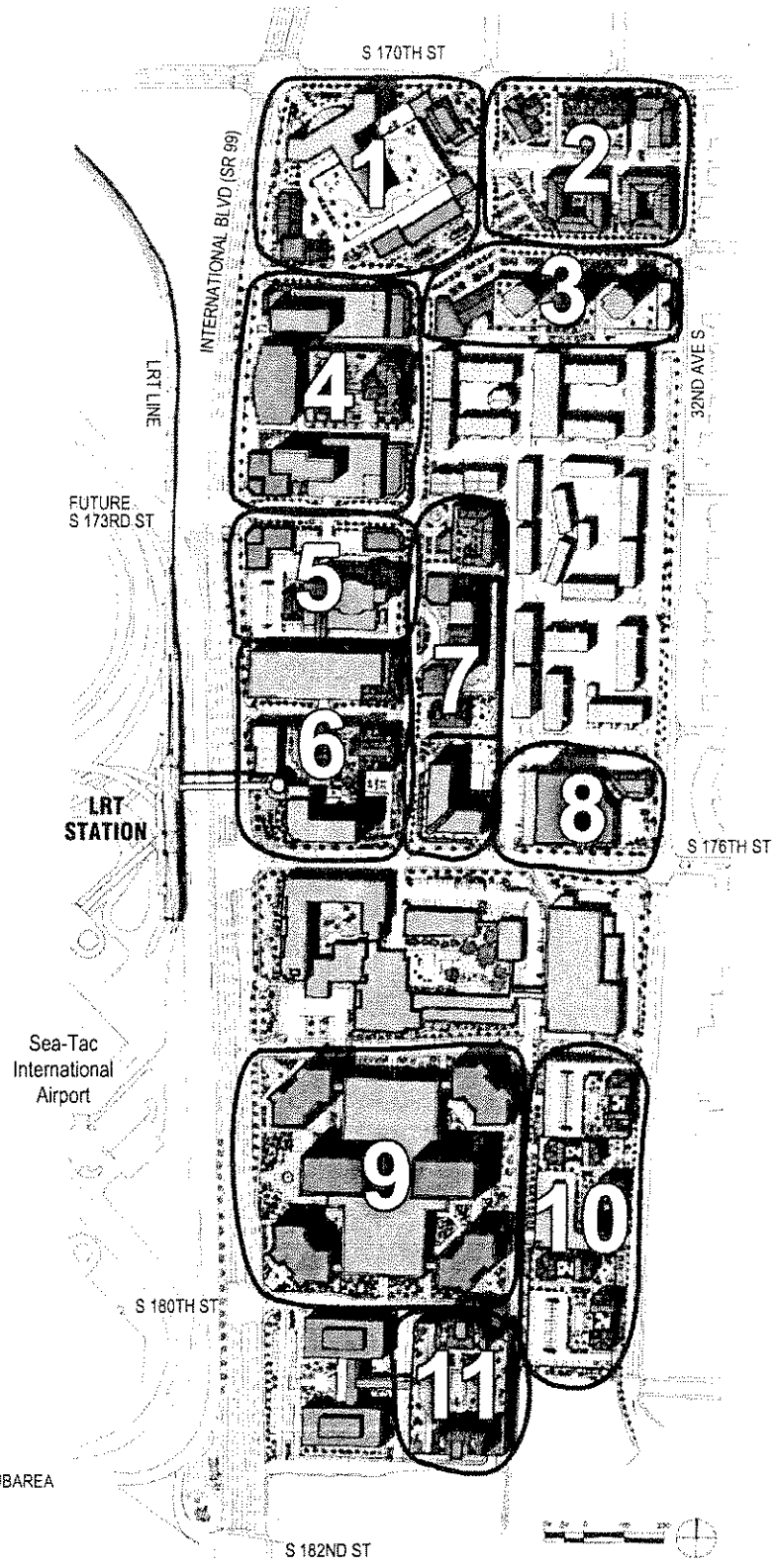
S 154th Street Station Area Redevelopment Districts

SeaTac LRT Station Area Plan - Traffic Analyses





NOT TO SCALE



LEGEND

= DEVELOPMENT SUBAREA

Attachment 3
 SeaTac/Airport Station Area Redevelopment Districts
 SeaTac LRT Station Area Plan - Traffic Analyses



Attachment 4

Existing and Proposed Land Uses

Land Use	Existing	Preferred Station Area Plan	Net Change
<u>S 154th Street Station Area</u>			
Non-Residential			
Retail (gross square feet)	92,900	162,700	+69,800
Office (gross square feet)	28,600	75,500	+46,900
Park-and-Fly (parking spaces)	180	0	-180
Residential			
Single-family (dwelling units)	55	0	-55
Multi-family (dwelling units) ¹	180	1,600	+1,420
<u>SeaTac/Airport Station Area</u>			
Non-Residential			
Retail/Restaurant/Entertainment (gross square feet)	9,000	158,200	+149,200
Hotel (rooms) ²	720	1,590	+870
Office (gross square feet)	689,000	785,500	+96,500
Public Agency Facility (gross square feet) ³	0	25,000	+25,000
Park-and-Fly (parking spaces)	2,960	3,440	+480
Residential			
Multi-family (dwelling units) ¹	0	690	+690

Note: values are rounded

1. Number of multi-family dwelling units is estimated based on gross square feet since trip generation for residential land uses are based on number of units.
2. Number of hotel rooms is estimated based on gross square feet since trip generation for hotel land uses are based on number of rooms.
3. Specific use of building is not defined. It could include a library, community center, visitor center, or other similar public use.

Attachment 5

154th Street Station Area Trip Generation Summary

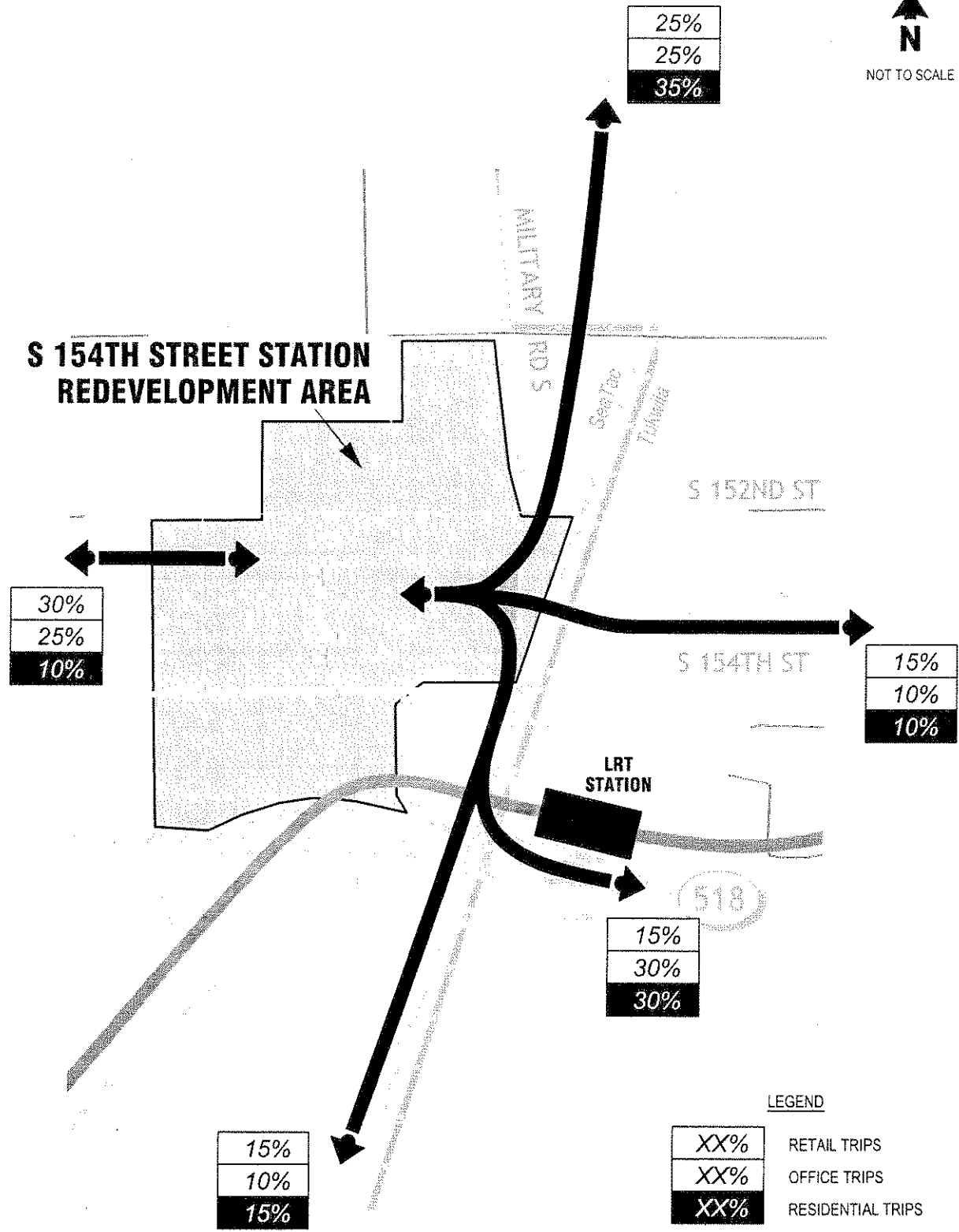
Land Use	Gross Trips	Internal Trips	Pass-by Trips	LRT Reduction	Net New Trips		
					Total	In	Out
<i>Existing</i>							
Shopping Center (LU #820) ¹	596	-75	-178	-	343	165	178
General Office (LU #710) ³	111	-14	-	-	97	16	81
Park & Fly ⁴	13	-	-	-	13	7	6
Single-family Residential (LU #210)	57	-23	-	-	34	21	13
Multi-family Residential ²	104	-42	-	-	62	40	22
Total	881	-154	-178	0	549	249	300
<i>Proposed</i>							
Shopping Center (LU #820)	863	-108	-256	-	499	240	259
General Office (LU #710)	163	-20	-	-4	139	24	115
Park & Fly	-	-	-	-	-	-	-
Single-family Residential (LU #210)	-	-	-	-	-	-	-
Multi-family Residential	911	-94	-	-41	776	504	272
Total	1,937	-222	-256	-45	1,414	768	646
<i>Net New Trips</i>							
Shopping Center (LU #820)	-	-	-	-	156	75	81
General Office (LU #710)	-	-	-	-	42	8	34
Park & Fly	-	-	-	-	-13	-7	-6
Single-family Residential (LU #210)	-	-	-	-	-34	-21	-13
Multi-family Residential	-	-	-	-	714	464	250
Total	1,056	-68	-78	-45	865	519	346

1. Trip generation for the retail land uses are Shopping Center category (LU #820) using the trip generation equation.
2. Multi-family residential trip rates are an average of the Apartment (LU #220) and Condo (LU #230) trip generation rates.
3. Trip generation for the General Office land use (LU #710) is estimated using the trip generation equation.
4. Trip generation for the Park & Fly land use is estimated using a trip generation rate of 0.07 trips per parking stall (55 percent inbound) developed from traffic counts at an existing Park & Fly lot within the Airport Station area. No internal capture trips are assumed.

Attachment 6

SeaTac/Airport Station Area Trip Generation Summary

Land Use	Gross Trips	Internal Trips	Pass-by Trips	LRT Reduction	Net New Trips		
					Total	In	Out
<i>Existing</i>							
Shopping Center (LU #820) ¹	127	-16	-38	-	73	35	38
Hotel (LU #310)	427	-18	-	-	409	217	192
General Office (LU #710) ³	850	-8	-	-	842	143	699
Park & Fly ⁴	207	-	-	-	207	114	93
Public Facility	-	-	-	-	-	-	-
Multi-family Residential ²	-	-	-	-	-	-	-
Total	1,611	-42	-38	-	1,531	509	1,022
<i>Proposed</i>							
Shopping Center (LU #820) ¹	847	-201	-220	-	426	204	222
Hotel (LU #310)	938	-100	-	-67	771	409	362
General Office (LU #710) ³	959	-36	-	-28	895	152	743
Park & Fly ⁴	241	-	-	-	241	133	108
Public Facility ⁵	177	-	-	-	177	85	92
Multi-family Residential ²	393	-95	-	-12	286	189	97
Total	3,555	-432	-220	-107	2,796	1,172	1,624
<i>Net New Trips</i>							
Shopping Center (LU #820)	-	-	-	-	353	169	184
Hotel (LU #310)	-	-	-	-	362	192	170
General Office (LU #710)	-	-	-	-	53	9	44
Park & Fly	-	-	-	-	34	19	15
Public Facility	-	-	-	-	177	85	92
Multi-family Residential	-	-	-	-	286	189	97
Total	1,944	-390	-182	-107	1,265	663	602
<ol style="list-style-type: none"> 1. Trip generation for retail, restaurant, and entertainment land uses are estimated based on the Shopping Center category (LU #820) using the trip generation equation. 2. Multi-family residential trip rates are an average of the Apartment (LU #220) and Condo (LU #230) trip generation rates. 3. Trip generation for the General Office land use (LU #710) is estimated using the trip generation equation. 4. Trip generation for the Park & Fly land use is estimated using a trip generation rate of 0.07 trips per parking stall (55 percent inbound) developed from traffic counts at an existing Park & Fly lot within the Airport Station area. No internal capture trips are assumed. 5. Specific use of the 25,000 gsf public facility is not defined at this time. For purposes of estimating trip generation, trip rates were based on a library land use (LU #590). The library land use category has higher PM peak hour trip rates than a recreational community center (LU #495) or a government office building (LU #730). 							



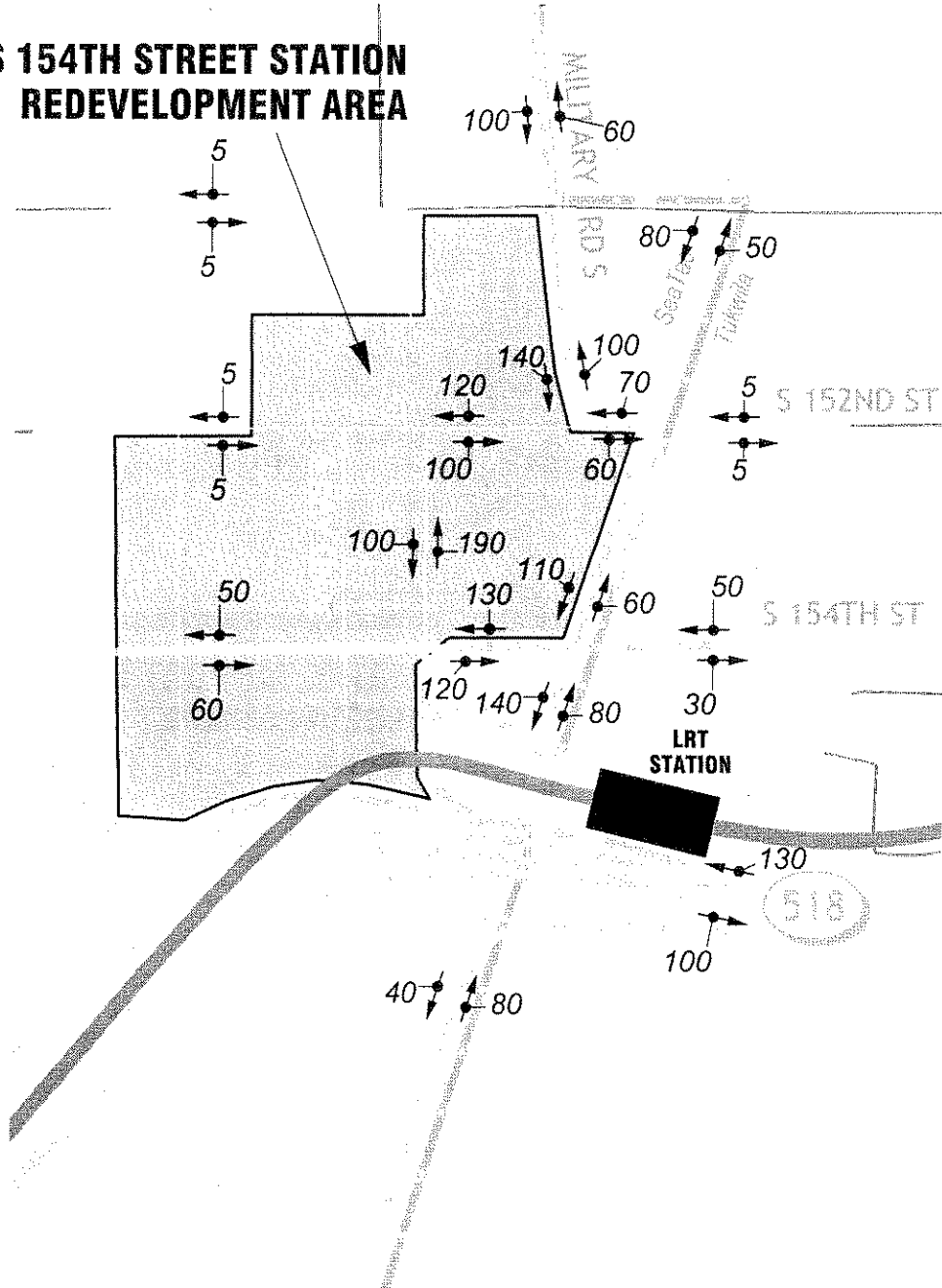
Attachment 7
S 154th Street LRT Station Area Trip Distribution
SeaTac LRT Station Area Plan - Traffic Analyses





NOT TO SCALE

S 154TH STREET STATION REDEVELOPMENT AREA

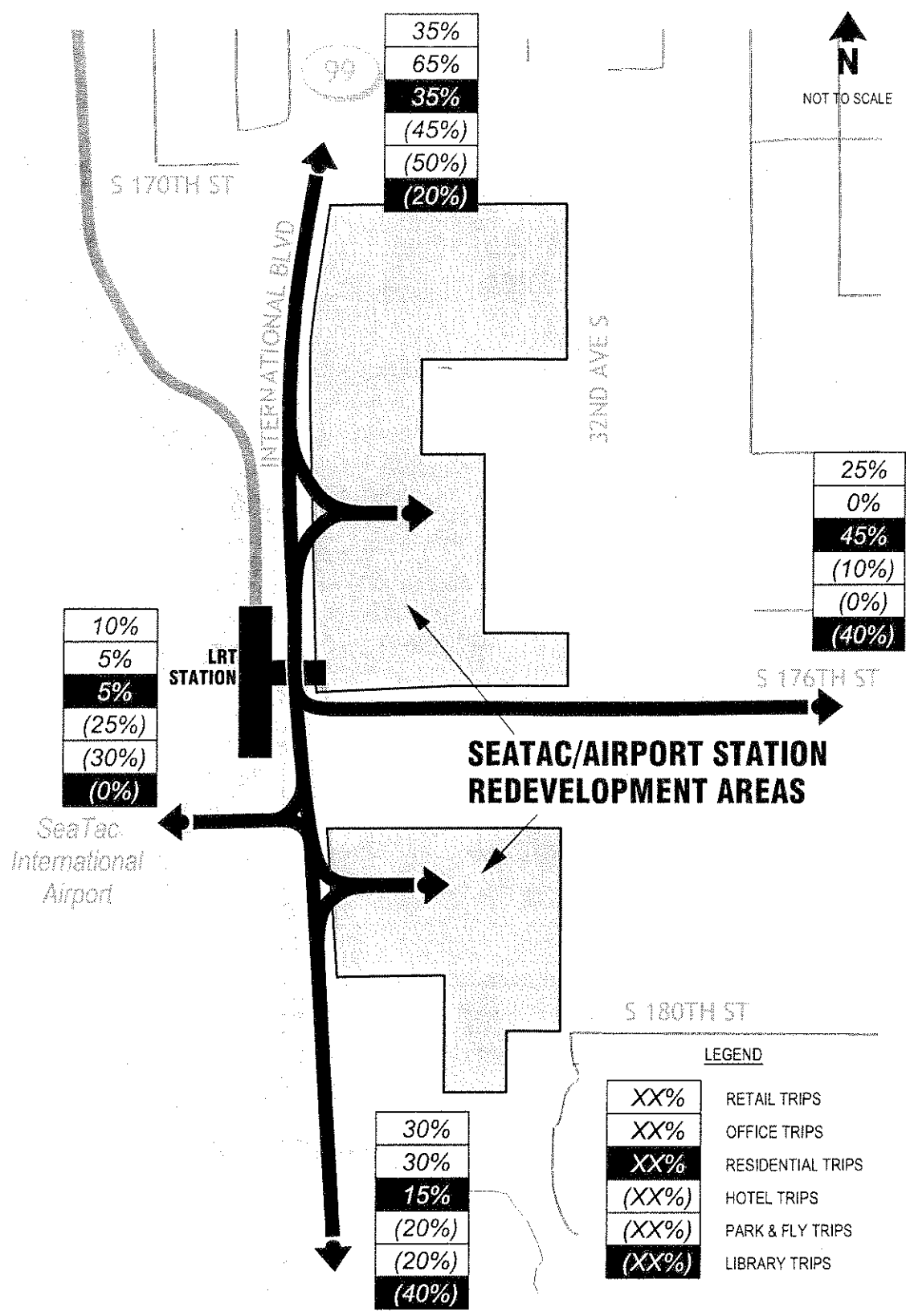


Attachment 8

S 154th Street LRT Station Area PM Peak Hour Traffic Volume Impacts

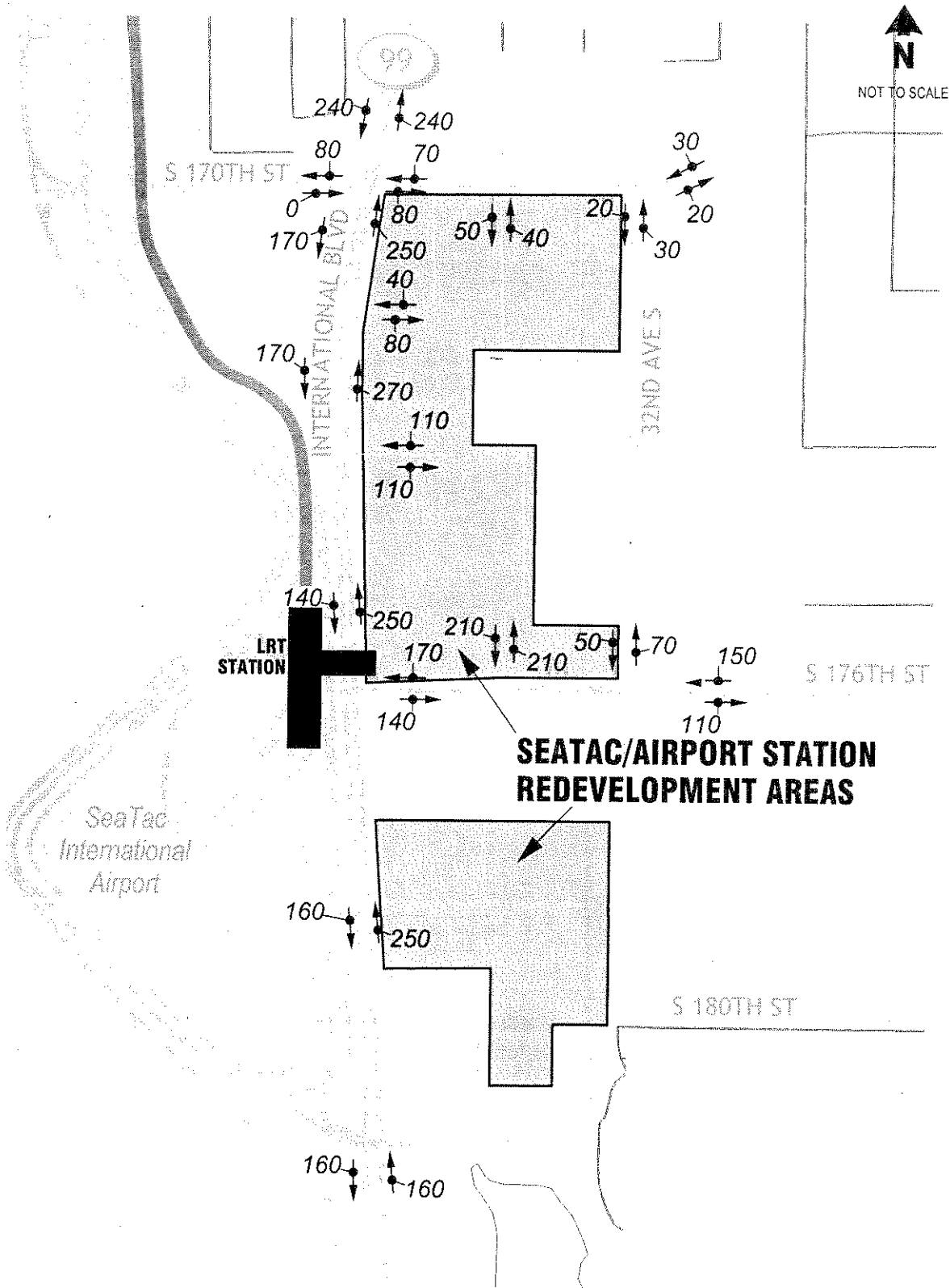
SeaTac LRT Station Area Plan - Traffic Analyses





Attachment 9
SeaTac/Airport LRT Station Area Trip Distribution
SeaTac LRT Station Area Plan - Traffic Analyses





Attachment 10

SeaTac/Airport LRT Station Area PM Peak Hour Project Traffic Volume Impacts

SeaTac LRT Station Area Plan - Traffic Analyses



Attachment 11

Station Area Project Traffic Volume Impact Summary — 2020 PM Peak Hour

Location	Station Area Volume				2020 Forecast Volume				Station Area Percentage of Forecast Traffic					
	S 154th Street		SeaTac/Airport		With Station Area		S 154th Street		SeaTac/Airport		S 154th Street		SeaTac/Airport	
	NB/EB ¹	SB/WB ²	NB/EB ¹	SB/WB ²	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB	NB/EB	SB/WB
S 154th Street Station Area														
International Blvd n/o S 154th St	60	110	70	70	1,200	1,480	5.0%	7.4%	5.8%	7.4%	5.8%	7.4%	4.7%	4.7%
International Blvd s/o S 154th St	80	140	110	70	1,210	1,720	6.6%	8.1%	9.1%	8.1%	9.1%	8.1%	4.1%	4.1%
International Blvd s/o SR 518	80	40	240	240	2,050	2,310	3.9%	1.7%	11.7%	1.7%	11.7%	10.4%	10.4%	10.4%
S 154th St e/o SR 518 WB on ramp	60	50	40	30	690	690	8.7%	7.2%	5.8%	7.2%	5.8%	7.2%	4.3%	4.3%
S 154th St w/o International Blvd	120	130	30	30	940	780	12.8%	16.7%	3.2%	16.7%	3.2%	16.7%	3.8%	3.8%
S 154th St e/o International Blvd	30	50	0	0	440	510	6.8%	9.8%	0.0%	9.8%	0.0%	9.8%	0.0%	0.0%
SeaTac/Airport Station Area														
International Blvd n/o S 170th St	80	40	240	240	1,880	2,060	4.3%	1.9%	12.8%	1.9%	12.8%	11.7%	11.7%	11.7%
International Blvd s/o S 170th St	80	40	250	170	2,180	2,410	3.7%	1.7%	11.5%	1.7%	11.5%	7.1%	7.1%	7.1%
International Blvd n/o S 173rd St	80	40	270	170	2,160	2,410	3.7%	1.7%	12.5%	1.7%	12.5%	7.1%	7.1%	7.1%
International Blvd n/o S 176th St	80	40	250	140	2,030	2,330	3.9%	1.7%	12.3%	1.7%	12.3%	6.0%	6.0%	6.0%
International Blvd n/o S 180th St	50	30	250	160	1,990	2,080	2.5%	1.4%	12.6%	1.4%	12.6%	7.7%	7.7%	7.7%
International Blvd s/o S 182nd St	50	30	160	160	1,940	2,210	2.6%	1.4%	8.2%	1.4%	8.2%	7.2%	7.2%	7.2%
S 170th St w/o International Blvd	0	0	0	80	990	830	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	9.6%	9.6%
S 170th St e/o International Blvd	0	0	80	70	590	460	0.0%	0.0%	13.5%	0.0%	13.5%	15.2%	15.2%	15.2%
S 176th St e/o International Blvd	10	30	140	170	1,040	880	1.0%	3.4%	13.5%	3.4%	13.5%	19.3%	19.3%	19.3%

1. Column includes traffic volumes in the northbound (NB) or eastbound (EB) direction depending on the street segment.
 2. Column includes traffic volumes in the southbound (SB) or westbound (WB) direction depending on the street segment.