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Community Development

Douglas Highway Corridor Traffic Study

Final Report

September 15, 1996

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Douglas Highway Corridor Traffic Study

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Final Report

DOUGLAS HIGHWAY CORRIDOR TRAFFIC STUDY

Submitted to
Community Development Department
City & Borough of Juneau
and
Alaska Department of Transportation & Public Facilities
Southeast Region

Submitted by
Parsons Brinckerhoff Quade & Douglas, Inc.

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PB
100 YEARS

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INTRODUCTION

PURPOSE OF THE STUDY

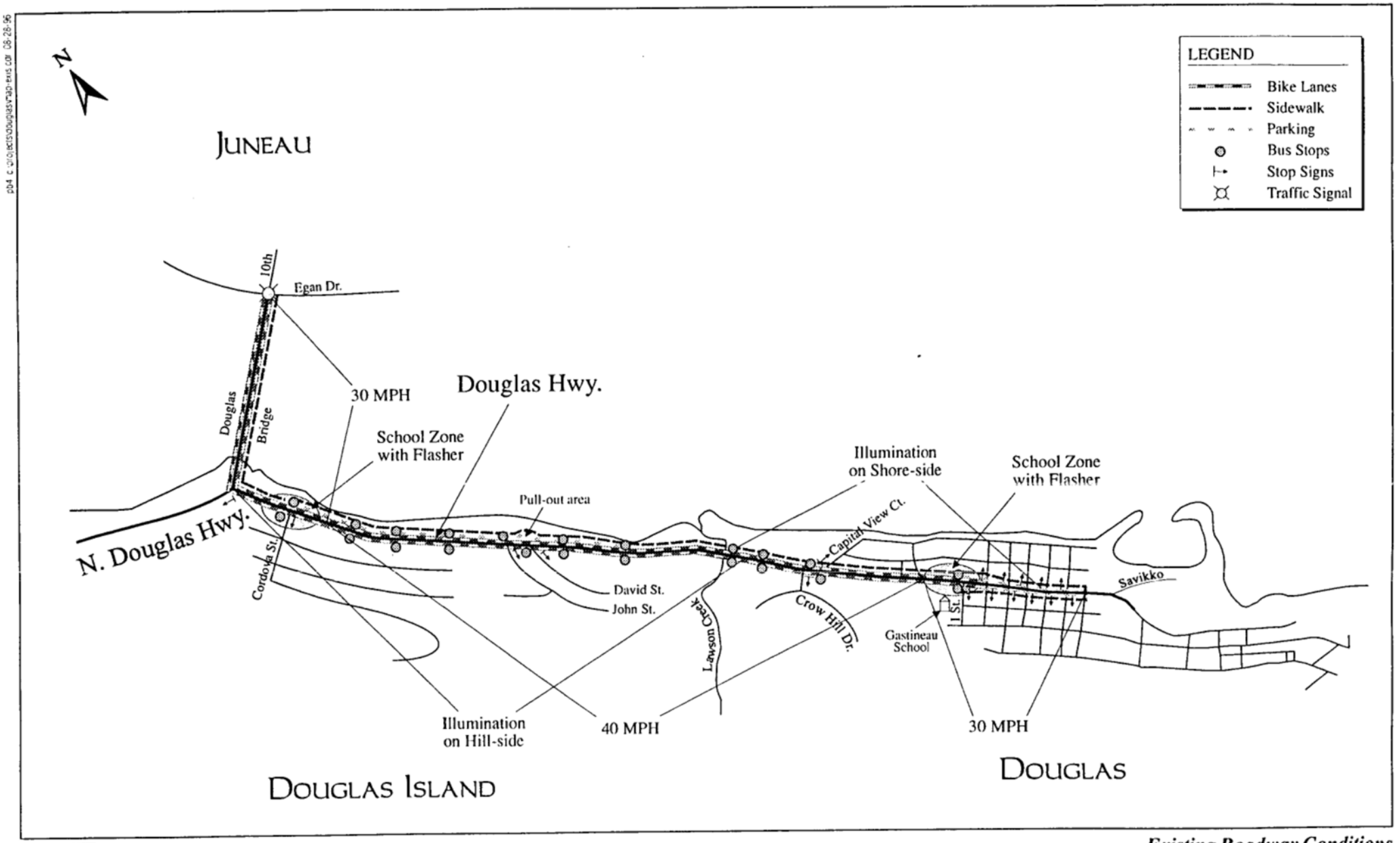
The Douglas Highway Corridor Traffic Study is an analysis of existing and future traffic needs along Douglas Highway on Douglas Island within the City and Borough of Juneau (CBJ). This study is funded by the Southeast Region of the Alaska Department of Transportation and Public Facilities (DOT&PF) through the City and Borough of Juneau (CBJ). The study is administered through the CBJ Community Development Department. The purpose of the study is to identify improvements for Douglas Highway to address the current and future needs for the corridor serving the growing communities of Douglas and West Juneau, and acknowledge the growth potential for areas served by the North Douglas Highway (West Douglas community). This study is an analysis of multiple transportation modes: vehicle, pedestrian, bicycle, as well as commercial traffic and public transit. The changing character of the land development along Douglas Highway indicates a changing set of transportation needs for the corridor.

STUDY AREA

Douglas Island lies roughly west of central Juneau and is connected to the mainland by the Juneau-Douglas Bridge over Gastineau Channel. Within the study area, Douglas Highway runs from Gastineau Elementary School in Douglas north to the Juneau-Douglas Bridge across the Gastineau Channel, a two-mile segment of two-lane roadway (Figure 1 shows the study area for this analysis). The focus of the study is Douglas Highway but includes analysis of side-street traffic operation and driveway operation along the highway. Douglas Highway is an element of the federal aid highway system and is owned, operated, and maintained by the Southeast Region of the DOT&PF. Access to the highway is permitted through joint review by both DOT&PF and CBJ, which has regulatory control over land use on Douglas Island.

STUDY PROCESS

The process for the traffic study is to: first, document the existing traffic conditions of Douglas Highway; second, develop traffic forecasts for the corridor for near-term, mid-range and long-range futures; third, evaluate the future baseline operation; fourth, identify and evaluate options for improving traffic operations; and fifth, make recommendations for the Douglas Highway Corridor and present them in a study report. The schedule for the Douglas Highway Corridor Traffic Study extends from May, 1996 through September, 1996. A project kickoff meeting was held May 15, 1996 in conjunction with the meeting of the Douglas Advisory Board to introduce the project to the public and to solicit public input on existing conditions, problem areas and concerns along the Douglas Highway corridor. The second public meeting was held June 26, 1996, again in conjunction with the meeting of the Douglas Advisory Board to review the existing and future transportation needs of the Douglas Highway Corridor. The presentation at the second public meeting was a summary of the first three steps in the study process. At the final public meeting for the project, on August 21, 1996, the range of possible treatments for Douglas Highway to address the transportation needs existing and expected in the future were presented and recommendations for the next steps to implement the transportation improvements were presented.



Existing Roadway Conditions

DOUGLAS HIGHWAY CORRIDOR TRAFFIC STUDY

FIGURE 1

EXISTING CONDITIONS

DATA COLLECTION

Field observations and traffic counts were made in May, 1996 at the start of the project, to document operations with limited tourist activities and to ensure school operations were reflected in traffic counts and observations. Daily traffic counts were provided by DOT&PF along with monthly and seasonal variation traffic factors for the Juneau area. Contacts with stakeholders who use the highway provided substantive additional input to the project data collection effort. These stakeholders included Capital Transit, CBJ Fire and Police Departments, public and private school transportation entities, and land/property owners. Additional information was available through the review of previous traffic studies of the area, such as the *West Juneau Traffic Impact Study* and the *Juneau, Alaska Douglas Highway Intersection with North Douglas Highway and Cordova Street: Traffic Study*. A bibliography of studies and references used for this study is presented in the Appendix.

GENERAL CHARACTER OF STUDY AREA

Douglas Highway runs along the southeastern shore of Douglas Island from Douglas to the Juneau-Douglas Bridge intersection and across the Gastineau Channel. The land use adjacent to the highway has gradually been changing from a rural character to an urban or suburban character, with increasing traffic on Douglas Highway, increasing side-street traffic and an increasing number of driveways per mile along the corridor. The increasing housing density is also increasing pedestrian and bicycle traffic. Douglas and West Juneau areas are attractive locations for housing. They are close to Juneau, within walking distance for many businesses and jobs Downtown. Douglas Highway serves a variety of transportation uses and needs, providing a commuter route by auto, bicycle, transit and foot; providing student walking, biking and busing routes to school; providing business and delivery routes for Douglas and nearby construction sites; and providing midday travel routes for a variety of purposes on and off the island. The area along Douglas Highway is in transition from existing single family land uses into mixed density housing and land use allowed by the CBJ Comprehensive Plan, which encourages increased housing density to provide for affordable housing within close proximity to Juneau.

ROADWAY CHARACTERISTICS

Douglas Highway is a two-lane roadway with enclosed drainage, varying in paved width from 40 to 42 feet. On-road bike lanes on both sides run from Juneau across the Juneau-Douglas Bridge into Douglas. The bike lanes terminate at Gastineau School (roadway characteristics for Douglas Highway are shown in Figure 1). Curb, gutter and sidewalk run along the shore-side of the roadway, and a paved shoulder edge along the uphill-side of the roadway. Parking is not allowed on the uphill-side of the roadway (by convention, this direction is southbound) until Gastineau School and then south into Douglas. Parking on the shore-side (or northbound direction), is allowed in Douglas up to Gastineau School, and parking is then prohibited to just beyond the Lawson Creek Bridge. Parking on the northbound side is thus allowed between David Street and Cordova Street and lies between the curb and the northbound bike lane. A five-foot sidewalk is continuous along the shore side of the roadway. Bike lanes range from 5-8 feet wide, narrowing to five feet in conjunction with parking. The width provided for parking is 8 feet. The driving lanes on Douglas Highway are 12 feet wide throughout the study area.

Roadway illumination exists along the project length and is provided on existing irregularly-space power poles. From south to north, the lighting is on the shore-side from the town of Douglas to the Lawson Creek Bridge. Here the lighting changes to the uphill-side of the highway. Luminaires appear to be mounted at approximately 25 feet high and lighting fixtures vary along the route.

The posted speed limit along Douglas Highway varies. Through Douglas, the speed limit is 30 miles per hour (MPH) to just north of Gastineau School, then 40 MPH from Gastineau School to just south of Cordova Street, changing back to 30 MPH from Cordova Street across the bridge to Egan Drive. Two school zones with 20 MPH speed limits (when flashing lights are operating) are located at the Gastineau School and in the vicinity of the Cordova Street intersection where there is a high volume school bus stop.

The topography of Douglas Island within the study area rises steeply uphill from Douglas Highway and drops away to the shore-side. Residences on the shore-side and uphill-side of the highway have limited room for driveways with a level landing at the highway, contributing to some of the traffic friction along the highway from adjacent development. The topography limits the number and location of side-streets serving the uphill-side and shore-side development areas. Few connections exist between side-streets, resulting in growing dead-end developments uphill of the highway. Key intersections along the Douglas Highway are: North Douglas Highway (at the Juneau-Douglas Bridge); Cordova Street; John Street; David Street; and Crow Hill Drive. John Street and David Street are located closely together (within 150 feet) almost operating as a single complex intersection with four legs. Both John Street and David Street intersect Douglas Highway at a non-right angle uphill from Douglas Highway.

TRANSIT SERVICE

Transit service to Douglas and West Juneau is provided by Capital Transit, a division of the Public Works Department of the CBJ. Service throughout the day is provided to both Juneau and the Mendenhall Valley on an hourly basis. Passengers may ride the Douglas route directly into Downtown, or transfer at the Federal Building to the Mendenhall Valley bus. This would be a timed transfer in which the buses arrive at the same time. An express bus serves Douglas on weekdays with one morning run and one evening run with service to the Federal Building, 15 minutes offset from the regular Douglas route service (7:30 AM for the morning run). The Mendenhall Valley bus operates during the same days and times as Douglas service, meeting every Douglas route bus and providing service from the Federal Building in Juneau to destinations north to Auke Bay. The Express route provides weekday service to 6:00 PM and runs on Egan Drive to the Airport commercial area and on to Auke Bay and the Auke Lake Campus of the University of Alaska Southeast.

Signed bus stops are present along Douglas Highway and buses currently stop in the bicycle lane. The Douglas route also serves Cedar Park development directly with a stop on Foster Avenue, uphill from Douglas Highway via Cordova Street. Since no curb space is reserved on Douglas Highway for the bus stops, parked vehicles occasionally block direct access to the bus stop for passengers, and buses stopped in the bicycle lane can block traffic and cause some delays during the peak periods.

PEDESTRIAN TRAVEL

Pedestrian travel along Douglas Highway primarily uses the shore-side sidewalk, which requires many pedestrians to cross Douglas Highway to reach the sidewalk. Marked crosswalks across Douglas Highway exist in Douglas, at Gastineau School, at Cordova Street and between Cordova Street and North Douglas Highway. There are several school bus stops along Douglas Highway where students cross at intersections without marked or signed crosswalks. The corridor is also used for pedestrian recreation, for walkers and joggers, as well as for commuting to work or school.

BICYCLE TRAVEL

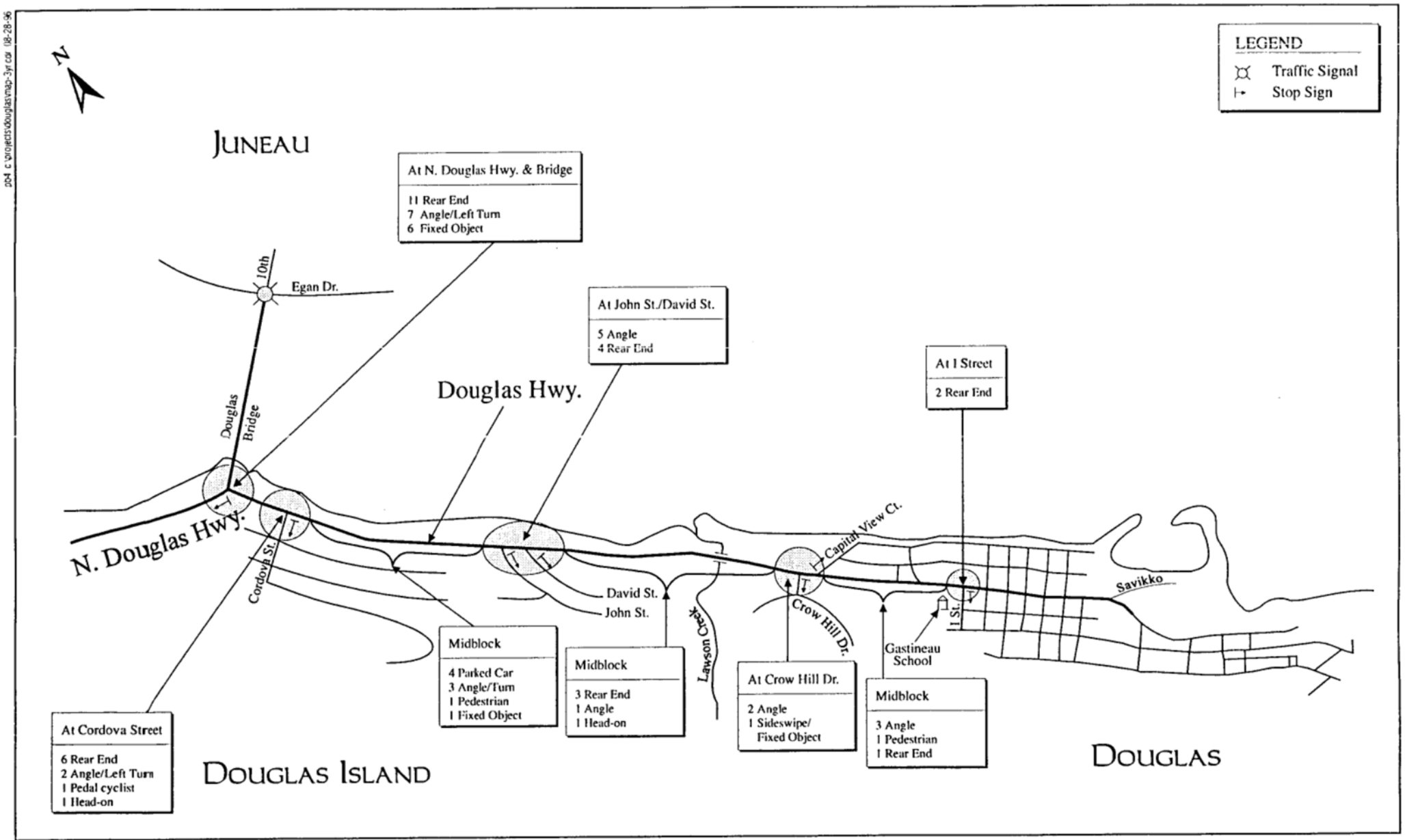
Bike lanes exist on both sides of Douglas Highway extending from Egan Drive on the mainland side of the Juneau-Douglas Bridge to Gastineau School in Douglas. Bicycle traffic observed includes commuters, students heading to the elementary school and multi-age recreational users. The southbound bike lane serves as an informal walkway when traffic may delay crossing to the sidewalk on the shore-side of the highway. At times, when vehicle traffic volumes are high, bicyclists ride contraflow in the bike lane waiting for an acceptable gap in the vehicular traffic stream, in order to cross and ride with vehicular traffic.

SAFETY / ACCIDENT HISTORY

Three full years of accident data were reviewed for this study, (1992-1994 plus nine months of 1995). A summary of accidents is presented by location in Figure 2 and in Table 1 with accident severity. Along the Douglas Highway corridor from the years 1992 through 1995, there were a total of 78 reported accidents. Most of the accidents occurred in the northern part of the corridor where North Douglas Highway and Douglas Highway meet. This could be explained by the higher volumes that are observed in that area.

Most of the accidents were either rear end or angle which are usually caused by vehicles slowing down or stopping to turn at intersections. These types of accidents indicate increasing difficulty turning from side-streets (angle/left turn with through traffic on Douglas Highway), and increasing delays due to left turning traffic into side-streets or driveways, which, in turn leads to increased potential for rear end accidents on the highway. In attempts to avoid the delays from left turning vehicles, vehicles in a queue behind the turning vehicle may show impatience and consider passing on the right. Several accidents in this period also involved parked cars and sideswipe or passing accidents, possibly reflecting increasing impatience with delays associated with left turning traffic at intersections or driveways. The sideswipe or passing accidents may also have occurred to avoid rear end accidents.

Thirty-five percent of those accidents resulted in injuries. It is interesting to note that there is not a higher percentage of accidents that result in injuries along the northern portion than the rest of the corridor. There does not seem to be one particular type of accident that results in the most injuries. Most of the accidents which resulted in injuries are evenly spread out among three types of accidents: Fixed object, Angle, and Rear end. In addition, two accidents with injuries were due to head on accidents and one involved a pedacycle.



PB 100 YEARS

3 -Year Accident Summary (1992-1994)

DOUGLAS HIGHWAY CORRIDOR TRAFFIC STUDY

FIGURE 2

Overall, increasing traffic on the two-lane highway with increasing turning movements to both side-streets and driveways contributes to increases in: 1) rear-end accidents, 2) left turn accidents, and 3) angle accidents. Accidents which occurred at intersections represent 72 percent of the total accidents along the corridor. This accident pattern along Douglas Highway indicates the changing character of the Douglas Highway from a rural arterial/highway with infrequent access to an urban arterial with more intersections and numerous driveways along the two-mile length. The increases in turning traffic onto and off of the highway increase the friction and delays for through traffic and increase the potential for conflict and accident.

Table 1
Summary of Traffic Accidents along Douglas Highway
(January 1993 through November 1995)

Location	Total # of Accidents	# of Accidents with Injuries	Total # of Injuries
N. Douglas Highway	4	3	4
Douglas Bridge	15	4	4
N. Douglas/Douglas Hwy. & Douglas Bridge	10	4	5
Cordova Street	11	4	10
Mid-block from Cordova to John Streets	10	5	6
David Street	9	1	2
Mid-block from David St. to Lawson Creek	4	2	6
Mid-block from Lawson Creek to Crow Hill Dr.	3	1	1
Crow Hill Drive	3	0	0
Mid-block from Crow Hill Drive to I Street	6	3	5
I Street	3	1	2

TRAFFIC VOLUMES AND OPERATION

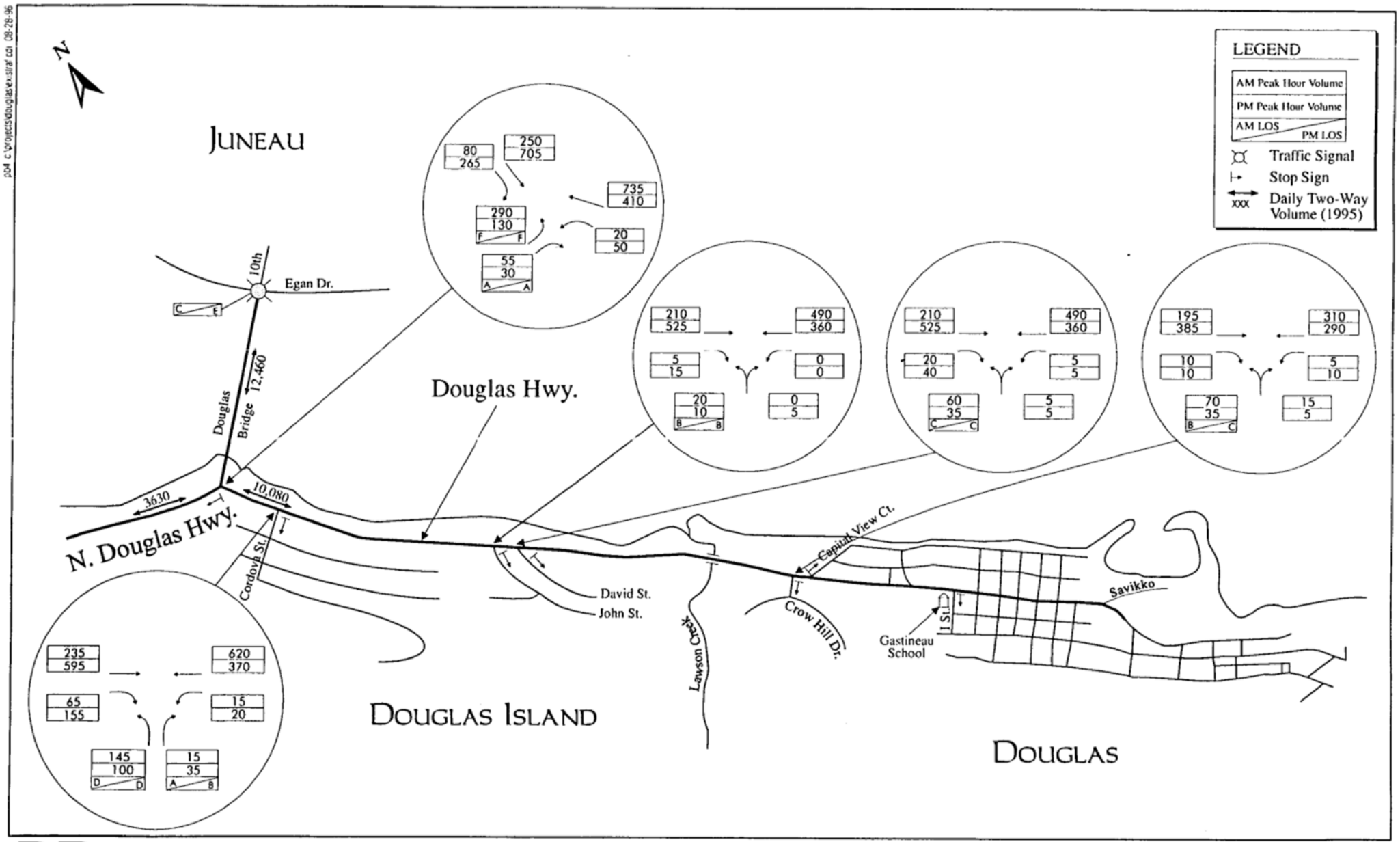
Traffic flow on Douglas Highway is not controlled from the signal at Egan Drive and 10th Street to the end of the highway in Douglas near Savikko Park. Side-street traffic is stop-controlled, with shared left, through and right turns from the side-street made from one lane at most locations. Two locations have separate left turn lanes: at the intersection with North Douglas Highway where left turning traffic is separated from right turning traffic from North Douglas Highway and at Cordova Street where adjacent left and right turn lanes approach the stop sign at Douglas Highway. Historical traffic growth on Douglas Highway has varied over the past ten years with fluctuations associated with the economy as well as the expansion of residential development on Douglas Island. Daily traffic on Douglas Highway

just south of the Juneau-Douglas Bridge has grown approximately 9 percent over the last eleven years (1985-1995, comparison with data in the *West Juneau Traffic Impact Report*, 1985), less than one percent per year. Daily traffic volumes on the Juneau-Douglas Bridge have experienced slower growth, at 0.6 percent per year, a 6 percent total growth for the 1985-1995 period.

Traffic volumes and intersection turning movements at the North Douglas Highway and at the Cordova Street intersections have changed little in the evening peak hour between 1985 and 1996, but the morning peak hour has experienced significant growth in through traffic on Douglas Highway, approximately 22 percent over the same time period. There have been some periods where daily traffic volumes have fluctuated, with a recent growth spurt on Cordova Street (1992 to 1994) balancing other areas along the Douglas Highway corridor which have seen a decrease in traffic. Current peak hour turning movement traffic volumes at key intersections along the highway are shown in Figure 3 along with daily two-way traffic volumes for the Juneau-Douglas Bridge, Douglas Highway and North Douglas Highway. Turning movement traffic counts at the key intersections on Douglas Highway were collected in May, 1996 during a reconstruction project for the Cedar Park housing development. Approximately one-third of the total project was occupied during the counting period, and the current traffic volumes presented in Figure 3 include estimated traffic at the Cordova Street intersection for the additional two-thirds of the Cedar Park development which will be reoccupied. This adjustment reflects the current traffic in the neighborhood served by Cordova Street.

During the morning peak hour, much of the commuting traffic is condensed within 20-30 minutes of high volume and long side-street delays. This condensed peak period or spike of travel demand during the peak hour is reflected in a relatively low peak hour factor (0.78) for the morning and evening peak: i.e., the travel demand is not uniform throughout the peak hour, and the evaluation of the peak hour intersection operation reflects the condensed peaking characteristics of the corridor and the neighborhoods on Douglas Island. The peak commuting traffic overlaps with the school bus operation at many shore-side bus stop locations along Douglas Highway. Capital Transit operation during the peak serves the commute toward Juneau also, with more pedestrians crossing to the shore-side bus stops for service into Juneau.

Intersection operation is evaluated for a peak period using the 1995 *Highway Capacity Manual* (*HCM*) method for signalized and unsignalized intersections. Level of service (LOS) is an evaluation of the amount of delay expected at the intersection for the stop-controlled traffic. LOS ratings range from LOS A to LOS F, where LOS A reflects little or no delays, and LOS F represents a breakdown condition of long delays, and high volumes of main street traffic, without adequate gaps for the side-street traffic demand at stop-controlled unsignalized intersections. Level of service evaluation for signalized intersections is comparable, with a LOS rating for the intersection as a whole, reflecting an average motorist delay ranging from very short or good operation (less than 5 seconds delay per vehicle, or LOS A) to long delays and poor operation (with delays averaging one minute or more per vehicle, at LOS F). A more detailed description of intersection levels of service is provided in the Appendix.



Existing Traffic Volumes
DOUGLAS HIGHWAY CORRIDOR TRAFFIC STUDY
FIGURE 3

The location of worst peak hour operation in the study area is at the North Douglas Highway intersection with Douglas Highway. Traffic during the 20-30 minute morning peak operates at LOS F and long delays for side-street traffic, and some congestion for through traffic on Douglas Highway. The short spacing between the intersections on Douglas Highway at North Douglas Highway and at Cordova Street results in a combined operation or interdependent operation for these two intersections. At times during the morning peak, northbound traffic slows through both intersections and the courtesy of motorists becomes the only way the side-street traffic can move toward Juneau. This courtesy merge can best be described as an operation where Douglas Highway motorists, by choice, allow side-street motorists to enter the queue of traffic on Douglas Highway. A combination of high volumes of traffic during this short peak, with school bus operation and public transit operation contribute to the slow moving traffic on Douglas Highway and the high delays for side-street traffic. Traffic volumes during the morning peak hour currently meet the *Manual on Uniform Traffic Control Devices* (*MUTCD*) peak hour warrant (#11) for traffic signal control. No other signal warrants are currently met at this intersection.

The intersection of 10th Street at Egan Drive, marking the eastern end of the Juneau-Douglas Bridge, is signalized with six-phase operation (where left turning traffic has protected movement). Douglas Island Traffic and 10th Street traffic have separate flows or split phasing (where left turning traffic and through traffic have concurrent right of way through the intersection). Current (1996) counts were not used for this analysis, due to spring and summer reconstruction at this intersection. Recent counts were adjusted with other intersection counts on Douglas Highway, to estimate current peak operation. Morning peak hour operation is good, at LOS C, with the highest traffic volumes coming from the Mendenhall Valley on Egan Drive. During the evening peak hour, this intersection operates at capacity, or LOS E, with average delays just below one minute per vehicle.

Side-street operation at the John/David Streets and Crow Hill Drive intersections is LOS C during the morning peak hour, with moderate delays (under a half-minute, on average) for side-street traffic. Through traffic on Douglas Highway near these intersections generally flows at the speed limit, with occasional and brief queues and delays from either school bus or public transit operation along the corridor.

The evening peak hour operation is generally the reverse of the morning peak hour, with similarly poor operation for side-street traffic at North Douglas Highway. However, left-turning traffic from the other side-streets is lower in the evening peak than the morning peak, reducing the overall delays at the stop-controlled intersections at Cordova Street, John and David Streets, and at Crow Hill Drive. For other intersections along Douglas Highway, the evening peak operation is good, since much of the higher volumes of turning traffic make right turns into hillside streets. However, left turning traffic into driveways along Douglas Highway experiences some delay and can cause delays to motorists behind, since there is only a single lane for each direction of traffic and no left turn refuge for turning vehicles, either at intersections or along areas with high numbers of driveways. The signal at 10th Street and Egan Drive operates at capacity, or LOS E, during the evening peak hour.

Off-peak operation (during the remaining hours of the day) at these four key intersection locations is very good with little to no delay for side-street traffic and speed limit operation along the highway. Off peak operation on Douglas Highway extends throughout almost 22 hours of the day.

Another factor affecting the overall operation of traffic on Douglas Highway (and throughout the area) is the influence of weather on visibility and traction for automobiles. Slick roadway surfaces can cause a loss of traction approaching Douglas Highway making it difficult to control the vehicle. Winter conditions require slower vehicle speeds, increased spacing between vehicles, and longer gaps in traffic for side-street access to the highway. The combination of these weather-related factors results in lower levels of operation along the highway during much of the winter. Nighttime and storm limited visibility can likewise contribute to the risks for pedestrians, bicyclists and motorists along the highway.

OTHER CONCERNS

A part of the data collection effort for this study included the solicitation of public input to the definition of the existing traffic issues and problems along the Douglas Highway corridor. A small sampling of the comments received at the initial public meeting (held on May 15, 1996) and through conversations with citizens and agency staff are summarized briefly here to complement the documentation of the traffic characteristics of the Douglas Highway corridor. All the comments solicited become part of the project documentation and are included in the Appendix for reference.

- There needs to be a sidewalk on the uphill side of the highway; at times it's too dangerous for students to cross over to the existing sidewalk.
- Backing from driveways into the highway causes problems along roadway.
- Speeding along Douglas Highway is an issue and enforcement is sporadic, and not enough.
- Snow removal piles snow in sidewalk and bike path, blocking sidewalk and bike path for travel.
- Street lighting is not adequate near Lawson Creek bridge, not enough light to see pedestrians when driving at night, especially when snowing or raining.
- There should be more level landings at intersections to reduce the risk of vehicles sliding into the highway from the side-streets.
- Desire to separate pedestrians and bicyclists from vehicular traffic, whether grade separated or with some distance.
- Bicyclists use sidewalk at times and across bridge, when and where bike lanes are not considered safe. Bike lanes on bridge have residual gravel and sand from winter operations, causing some problems.
- No break in guardrail at North Douglas intersection to provide a crossover for pedestrians or bicyclists to access the walkway across the Juneau-Douglas Bridge.

SUMMARY OF EXISTING CONDITIONS

The Douglas Highway corridor experiences good traffic operation throughout most of the day, with short delays for side-street traffic. However, during the morning peak, side-street delays at the North Douglas Highway intersection are high, with poor intersection operation (LOS F) for side-street traffic from

North Douglas Highway. Intersection operation at Cordova Street is closely tied to that for the North Douglas Highway intersection. During the morning peak, the side-street delays at Cordova Street are mitigated with the "courtesy merge" operation. At other intersections along Douglas Highway morning peak operation is acceptable (LOS C) with moderate delays for side-street traffic, primarily due to lower traffic volumes on Douglas Highway and lower side-street demand volumes. With the communities of Douglas and West Juneau located so close to downtown Juneau, there is an intense and short peak period of commuting traffic tied to an 8 AM starting time. This intense peak coincides with school bus operations transporting students both on and off of Douglas Island, and with the public transit operation serving the peak commute. The signalized intersection of 10th Street and Egan Drive operates at LOS C during the morning peak. It provides the sole external traffic control for traffic flow to or from Douglas Island and Douglas Highway.

Evening peak traffic along Douglas Highway is approximately the same as the morning peak operation, with the highest side-street delays occurring at the North Douglas Highway and Cordova Street intersections. The traffic signal at 10th Street and Egan Drive currently operates at LOS E (capacity) during the evening peak, effectively providing a metered flow of traffic to and from Douglas Island. Evening peak period traffic operation is affected with some delays due to left turning traffic to side-streets and driveways along the corridor.

Accident patterns reflect that the increasing traffic along Douglas Highway coupled with increasing development uphill and shore side contributes to greater traffic friction and larger left turn demands both on the highway and from the side-streets and driveways. Pedestrian safety is a concern with sidewalk on only one side. Crossing the highway is difficult during the peak periods when student and school schedules overlap with the highest commuting vehicle traffic volumes.

Traffic on Douglas Highway is a combination of travel modes, where the private automobile makes up the majority of the traffic, and pedestrian travel, bicycles, transit and school buses, taxis and commercial traffic round out the mode split. These modes both share and compete for the space and time along the roadway, sometimes resulting in conflicts or accidents. The changing character of Douglas Highway from a rural to (sub)urban arterial is expected to amplify these conflicts and competition for highway use.

FUTURE CONDITIONS

FORECASTING PROCESS AND ASSUMPTIONS

Vehicular traffic volume forecasts for Douglas Highway were developed for three horizons based on land use. The study team used a technique which combined field observations with a review of the adopted 1995 Comprehensive Plan for the CBJ, tempered by the longer range population forecasts for the CBJ. Expected population growth is assumed to be reflected in comparable growth of housing units, and a growth in housing translates directly into a growth of vehicular traffic. Comparable growth in non-motorized traffic is expected for the study area as well. A population forecast developed in 1993 by the McDowell Group indicates a range of growth in CBJ population from 1.8 percent per year to 2.3 percent per year through year 2015. This overall growth could occur in many ways, gradually or through several spurts of growth followed by gentle adjustments of lower growth in population. The three horizons developed for this study are: 1) a short- or near-term future—five years out, to year 2000; 2) a mid-range future—ten years out, to year 2005; and 3) a long-range future—twenty years into the future, to year 2015. An analysis of needs for the Douglas Highway Corridor as it relates to these three horizons can help identify the staging of transportation improvements in the corridor which will accommodate the growing demand for the Douglas Island residential communities, and provide for the continued livability of the area. Additionally, this view of the three horizons can aid in the budgeting for improvements needed to address both current needs and future needs.

Also included in the forecast is a view of the potential development of Goldbelt Corporation and CBJ land into a planned community in West Douglas. This is presented to give a range of possible traffic forecasts for North Douglas Highway. Traffic forecasts for North Douglas Highway are thus presented in two cases: 1) under the current Comprehensive Plan densities for North and West Douglas Island, and 2) with a development proposed jointly by the CBJ and the Goldbelt Corporation. These two cases are referred to, in this report, as horizon year without Goldbelt Development and with Goldbelt Development, respectively. Development scenarios for the North and West Douglas areas have a direct impact on traffic operations along Douglas Highway. The single current outlet for traffic from the North Douglas area is the North Douglas Highway and its stop-controlled access to the Juneau-Douglas Bridge and Douglas Highway.

The forecasts are based on existing traffic volumes, 1995 adjusted daily counts and current 1996 peak period counts. Assignment of traffic growth uses the existing traffic patterns along Douglas Highway, reflecting some traffic from each of the growth areas continuing to be directed to Douglas and some traffic growth on Douglas Highway south of the bridge continuing to be directed to North Douglas. Current permits and lots available for development were used to estimate the growth in housing units within the study area for each of the three horizons. Using data published by the Institute of Transportation Engineers in *Trip Generation* (Fifth Edition, 1995), the forecasted housing units (grouped into single family (SF) and multi-family (MF) units) were translated into daily vehicle trips and peak hour vehicle trips to be added to the existing traffic volumes, resulting in forecasts of vehicle traffic for years 2000, 2005, and 2015.

Table 2 is a list of expected amounts of housing development used to generate these forecasts. The forecasted housing growth (as presented in Table 2) could vary with changes in the Comprehensive Plan

in the future, and with changes in overall zoning on Douglas Island. The forecasts developed for this study represent a possible reasonable future growth on Douglas Island. The following sections describe the assumptions and background for each of the three horizons.

Table 2
Expected Housing Growth

Growth Area	Period				
	1996-2000	1996-2005		1996-2015	
		w/o Goldbelt	with Goldbelt	w/o Goldbelt	with Goldbelt
Douglas Highway					
Cordova Street					
Single Family Units	25	40	40	75	75
Multi-Family Units	0	0	0	0	0
John/David Streets					
Single Family Units	0	0	0	20	20
Multi-Family Units	45	90	90	90	90
Crow Hill Drive					
Single Family Units	0	20	20	40	40
Multi-Family Units	120	200	200	200	200
Douglas					
Multi-Family Units	0	40	40	40	40
Douglas Highway Total					
South of Juneau-Douglas Bridge					
Single Family Units	**25**	**60**	**60**	**135**	**135**
Multi-Family Units	**165**	**330**	**330**	**330**	**330**
North Douglas Highway					
Single Family Units	60	120	120	240	340
Multi-Family Units	10	10	310	10	460
Douglas Island Total					
Single Family Units	**85**	**180**	**180**	**375**	**475**
Multi-Family Units	**175**	**340**	**640**	**340**	**790**

Note: For lack of more refined information about the Goldbelt Corporation development in West Douglas, it was assumed that the traffic generated by the housing development would roughly accommodate the proposed limited commercial development for phases one and two of the development. This would be a balance of the housing traffic (reflecting that all trips would be oriented outside West Douglas), with the commercial traffic to support the West Douglas community, for the purpose of this analysis. A more refined analysis of traffic associated with the Goldbelt Corporation development of West Douglas is expected to accompany the development proposal in its review process.

NEAR-TERM FUTURE (5 YEAR FORECAST)

The near-term forecast is based mostly on current permits and a review of available and platted lots within the developed areas adjacent to Douglas Highway. Four general areas access Douglas Highway and are assumed to be the locations for future growth for the corridor. Locations where traffic from these development areas would flow into the Douglas Highway Corridor are: at Cordova Street, at John Street and David Street, and at Crow Hill Drive; and also to the north at North Douglas Highway. Uphill on Cordova Street there is an estimated supply of 75 platted single family (SF) lots of which 7 are currently permitted (sold lots) leaving 68 SF lots for development. The Comprehensive Plan for the area served by Cordova Street provides for single family density for new development. An estimated 18 homes or 25 percent of the available lots could be built out over the next five years, adding traffic from 25 single family homes to the current traffic on Cordova Street. It is assumed that the remaining lots would develop gradually over the twenty year horizon, with 25 percent of the lots built in each five year period.

Also served by Cordova Street is the Cedar Park housing development, which is currently being reconstructed, replacing the existing 50 apartments with 50 renovated and expanded apartments. The traffic associated with Cedar Park will remain the same.

John Street and David Street are two separate but closely spaced streets which serve the same general area of the hillside. Current development mix is attached housing and duplexes, multi-family housing. An estimated 45 duplexes (or other multi-family housing) could be developed in the same area during the first five year horizon on John and David Streets, combined.

Other development south of the bridge is assumed to be located uphill on Crow Hill Drive. Development south of Crow Hill Drive, in the town of Douglas, is assumed to be very slow and practically dormant over the first five-year period, reflecting that the town of Douglas is quite built-out and little is expected to be newly developed. Currently, 30 permits have been issued this year for multi-family housing (attached units or condos) and they are assumed to be located in the vicinity of Crow Hill Drive. An estimated additional 90 MF housing units could be built by year 2000 in this area, resulting in an estimated increase in traffic on Crow Hill Drive from 120 new MF housing units.

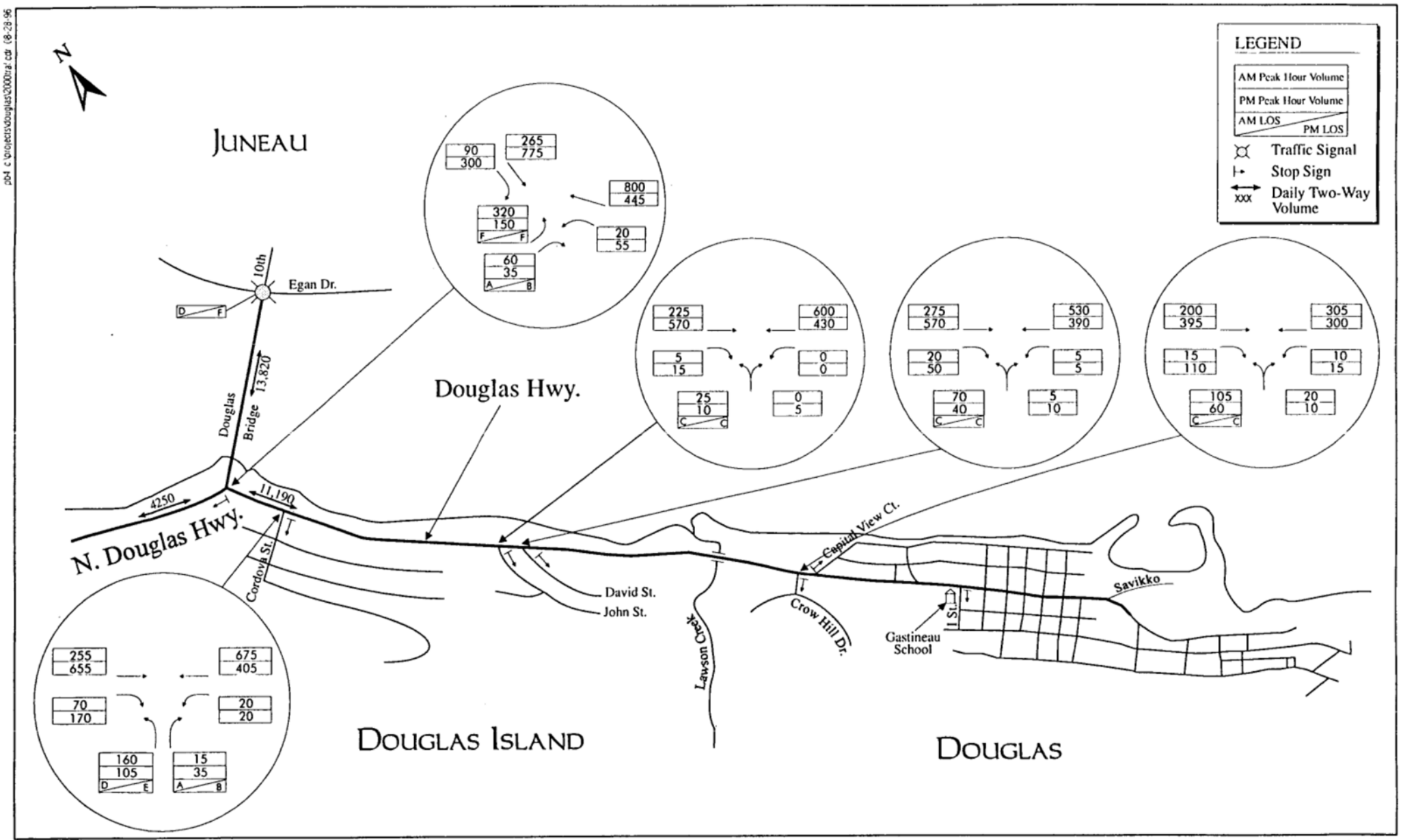
Current development permits in the North Douglas area include 18 single family houses, 6 duplexes and 15 single family mobile homes. An estimated additional 27 SF and 4 duplex units could be developed through year 2000 in the area served by the North Douglas Highway for a total five-year growth of 60 SF (single family houses and mobile homes) and 10 MF (duplex) housing units. The Comprehensive Plan indicates a development density of approximately one house per 36,000 square feet of land for the area north of the Juneau-Douglas Bridge. This reflects the limited public services for water, sewer, etc., available in the area. Other development along the North Douglas Highway would include a new CBJ harbor which is expected to be developed and operational within the five year horizon. Traffic associated with a new harbor has not been identified for this analysis, and would contribute to the existing peak period traffic and congestion at the intersection of North Douglas Highway at Douglas Highway.

The total estimated development expected to occur over the first five year horizon which will feed traffic onto the Douglas Highway Corridor is: 85 single family units (detached homes or mobile homes) and 175 multi-family units (duplexes, attached housing, or condominiums), for a total development of 260 new housing units by year 2000. The trip generation rates used to translate housing units to daily and peak hour traffic are for two categories: single family housing units (10 vehicle trips per day) and multi-family housing units (6 daily vehicle trips), (ITE *Trip Generation* Land Use Codes 210 and 221, respectively). Table 3 shows the traffic growth generated by this housing increase expected over this first five year horizon for each of the four growth areas feeding into the Douglas Highway corridor. The resulting five year traffic forecast for year 2000 is presented in Figure 4 for both daily traffic and peak period traffic volumes at the key intersections along the Douglas Highway Corridor. Year 2000 traffic operations during the peak periods are also presented in Figure 4. This figure shows expected unacceptable operation (LOS F) during the morning and evening peak hours for side-street traffic at stop signs at the North Douglas Highway intersection, and LOS E at the Cordova Street intersection. The intersections of John/David Street and Crow Hill Drive at Douglas Highway are expected to continue with acceptable operation (LOS C) during the peak periods, and better (LOS A or B) throughout the rest of the day in year 2000. It is expected that the traffic volumes at North Douglas Highway intersection will meet the *MUTCD* warrant values for signal installation before the year 2000.

Table 3
Five-Year Forecast of Traffic Growth

Growth Area	Add. Daily Vehicle Trips	Peak Hour Vehicle Trips		Current AADT	% increase in 5 Years
		AM	PM		
Douglas Highway South of Juneau-Douglas Bridge					
Cordova Street	250	20	25	2690	9.3%
John/David Streets*	270	20	25	760	17.8%
Crow Hill Drive	720	55	70	1250	57.6%
Douglas (south of Crow Hill Dr.)	0	0	0	5145	0.0%
North Douglas Highway	660	50	65	3635	18.2%

* David Street count only; John Street count not available. Percentage is half, assuming same AADT on John Street as on David Street.



Year 2000 Estimated Traffic Volumes

DOUGLAS HIGHWAY CORRIDOR TRAFFIC STUDY

FIGURE 4

MID-RANGE FUTURE (10 YEAR FORECAST)

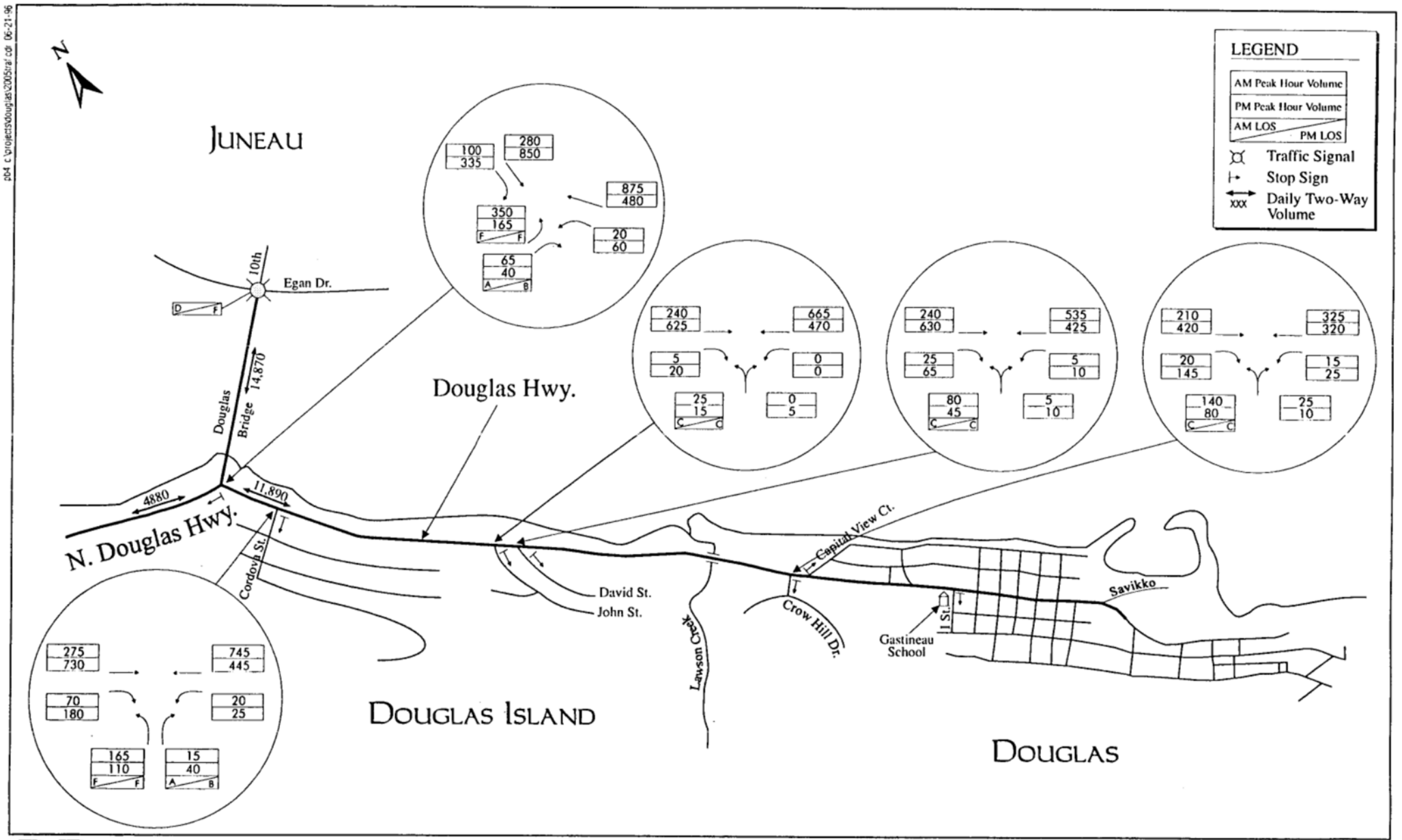
Current Comprehensive Plan

Similar to the 5-year horizon, the mid-range forecast was developed by estimating the ten-year development potential for each of the four growth areas feeding traffic into Douglas Highway and for Douglas. During the second five-year period, an estimated 25 percent of the buildable lots or 15 SF homes would be built off of Cordova Street, and an estimated additional 45 MF duplex/attached housing units would be built off of John/David Streets. Crow Hill Drive could accommodate an additional 80 housing units at multi-family density, and an estimated 20 SF homes would be built higher up the hillside. An estimated development of 40 multi-family housing units is forecast for Douglas, under mixed use zoning. The ten-year development on North Douglas Highway is estimated to be 120 SF homes, at approximately 12 homes per year, according to the Comprehensive Plan. The net ten-year (1996 to 2005) estimate of additional housing development which would contribute traffic to Douglas Highway would thus be 180 SF units and 340 MF units (as summarized for number of units in Table 2 and added traffic by growth area in Table 4, respectively). The resulting traffic forecast for year 2005 daily and peak hour periods is shown in Figure 5.

Table 4
Ten-Year Forecast of Traffic Growth

	without Goldbelt			with Goldbelt					
	Daily Vehicle	Peak Hour Vehicle Trips		Daily Vehicle	Peak Hour Vehicle Trips		Current	Increase without	Increase with
Growth Area	Trips	AM	PM	Trips	AM	PM	AADT	Goldbelt	Goldbelt
Douglas Highway South of Juneau-Douglas Bridge									
Cordova Street	400	30	40	400	30	40	2690	14.9%	14.9%
John/David Streets*	540	40	45	540	40	45	760	35.5%	35.5%
Crow Hill Drive	1400	110	135	1400	110	135	1250	112.0%	112.0%
Douglas	240	20	25	240	20	25	5145	4.7%	4.7%
North Douglas Highway	1260	95	125	3060	235	300	3635	34.7%	84.2%

* David Street count only; John Street count not available. Percentage is half, assuming same AADT on John Street as on David Street.



Year 2005 Estimated Traffic Volumes Without Goldbelt Development

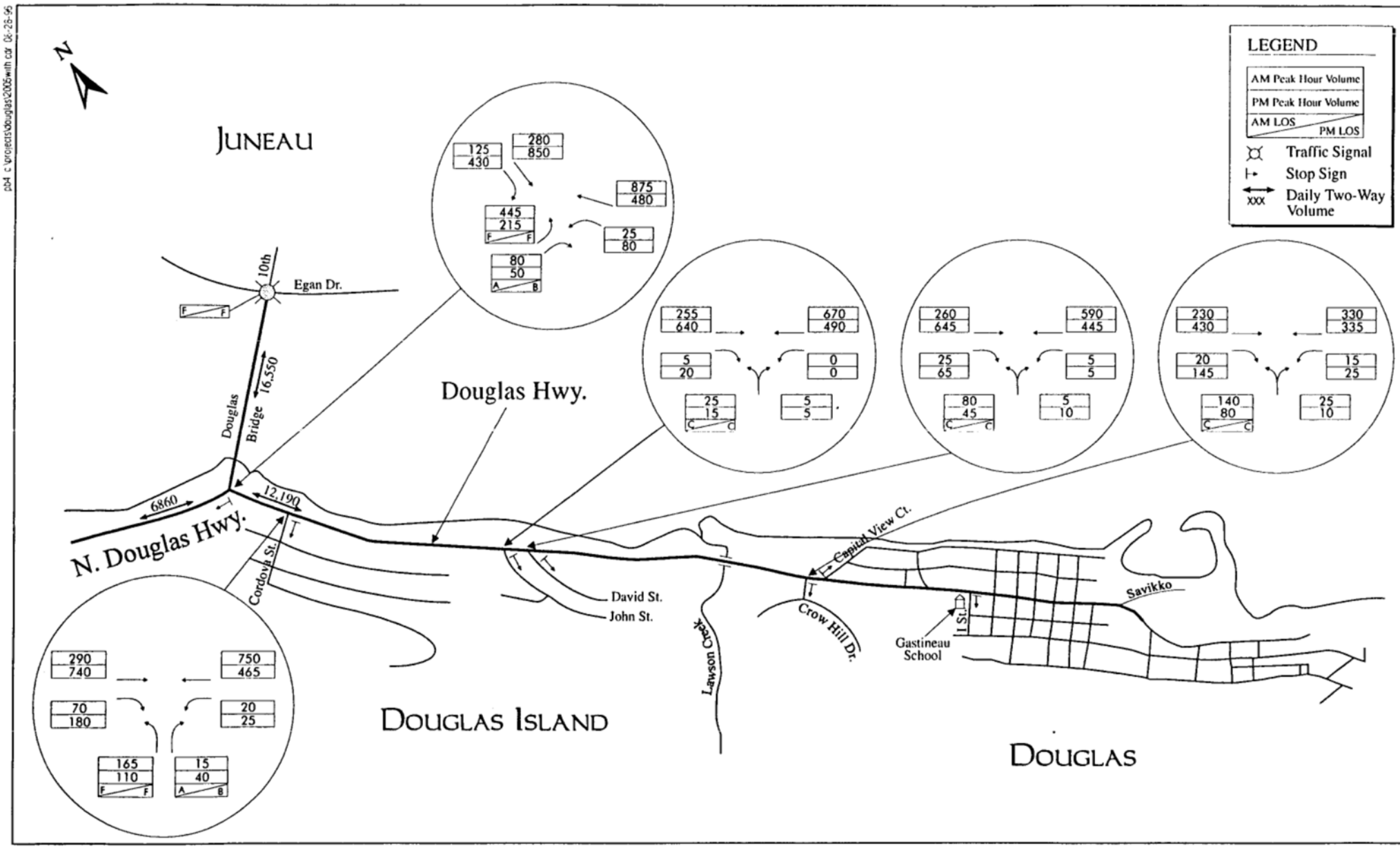
DOUGLAS HIGHWAY CORRIDOR TRAFFIC STUDY

FIGURE 5

With Goldbelt Development (Phase 1)

A second scenario for future development north of the bridge would include some of the proposed development by the Goldbelt Corporation and CBJ in West Douglas. Three phases have been identified for the approximately 4500 acres of development, and it is likely that Phase 1 could be developed by the end of ten years. Phase 1 would include the construction of 300 MF units of condominiums, an associated golf course, motel with conference facilities, and some limited supporting commercial development. For the purposes of this analysis, the housing development traffic has been estimated without any reduction in traffic which could occur due to the closer supporting commercial development, and no traffic was estimated for either the motel or commercial. This Goldbelt traffic estimate for housing growth was added to the mid-range forecast for other development along North Douglas Highway and Douglas Highway. Table 2 shows the ten-year housing unit forecast for Douglas Island with the Goldbelt Development, by traffic growth area, and Table 4 shows the associated traffic generated by this housing growth. The total year 2005 traffic forecast and intersection operation with the Goldbelt development is shown in Figure 6. As previously noted, it is expected that a new CBJ harbor would be developed along the North Douglas Highway. Traffic associated with a new harbor has not been included in this horizon year, however, the conclusions regarding future operation do not change.

Note: Intersection operation in year 2005 **with** Goldbelt is expected to be comparable to operation in year 2005 **without** Goldbelt at all four key intersections. The intersection of North Douglas Highway at Douglas Highway would continue to breakdown during the peak periods, with stop control, with increasing delays and potentially increasing accident risks. It is expected that the North Douglas Highway intersection volumes would warrant signalization or other control before year 2005, with or without Goldbelt Development in West Douglas.



Year 2005 Estimated Traffic Volumes With Goldbelt Development

DOUGLAS HIGHWAY CORRIDOR STUDY

FIGURE 6

LONG-RANGE FUTURE (20 YEAR FORECAST)

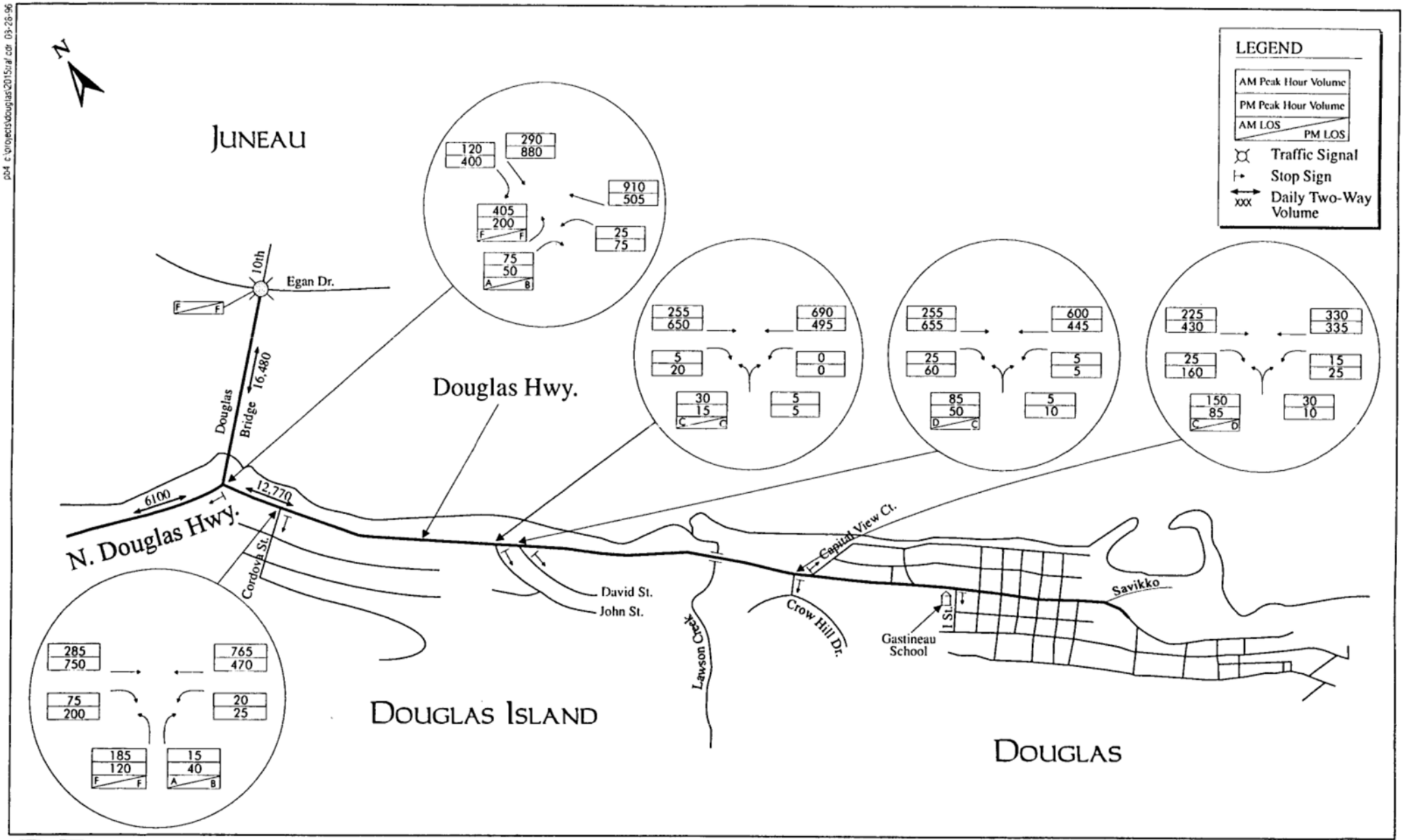
Current Comprehensive Plan

Development is expected to occur on a slower pace south of the Juneau-Douglas Bridge for the second ten year period, with an expected 135 SF units and 330 MF units built over the twenty year period between 1996 and 2015. North of the bridge, a continued rate of 12 SF homes built per year, or 120 SF overall in the second ten years is expected. Table 2 shows the expected twenty-year growth in housing units (375 SF and 340 MF, total) for the growth areas which feed traffic onto Douglas Highway, and Table 5 shows the additional daily and peak hour development traffic from the twenty-year growth. Traffic forecasts for year 2015 under the Comprehensive Plan are shown in Figure 7 for daily and peak periods, with expected peak hour operation at the four key intersections.

Table 5
Twenty-Year Forecast of Traffic Growth

Growth Area	without Goldbelt			with Goldbelt			Current AADT	Increase without Goldbelt	Increase with Goldbelt
	Daily Vehicle Trips	Peak Hour Vehicle Trips		Daily Vehicle Trips	Peak Hour Vehicle Trips				
		AM	PM		AM	PM			
Douglas Highway South of Juneau-Douglas Bridge									
Cordova Street	750	55	75	750	55	75	2690	27.9%	27.9%
John/David Streets*	740	55	70	740	55	70	760	48.7%	48.7%
Crow Hill Drive	1600	125	155	1600	125	155	1250	128.0%	128.0%
Douglas	240	20	25	240	20	25	5145	4.7%	4.7%
North Douglas Highway	2460	185	250	6160	470	610	3635	67.7%	169.5%

* David Street count only; John Street count not available. Percentage is half, assuming same AADT on John Street as on David Street.



Year 2015 Estimated Traffic Volumes Without Goldbelt Development

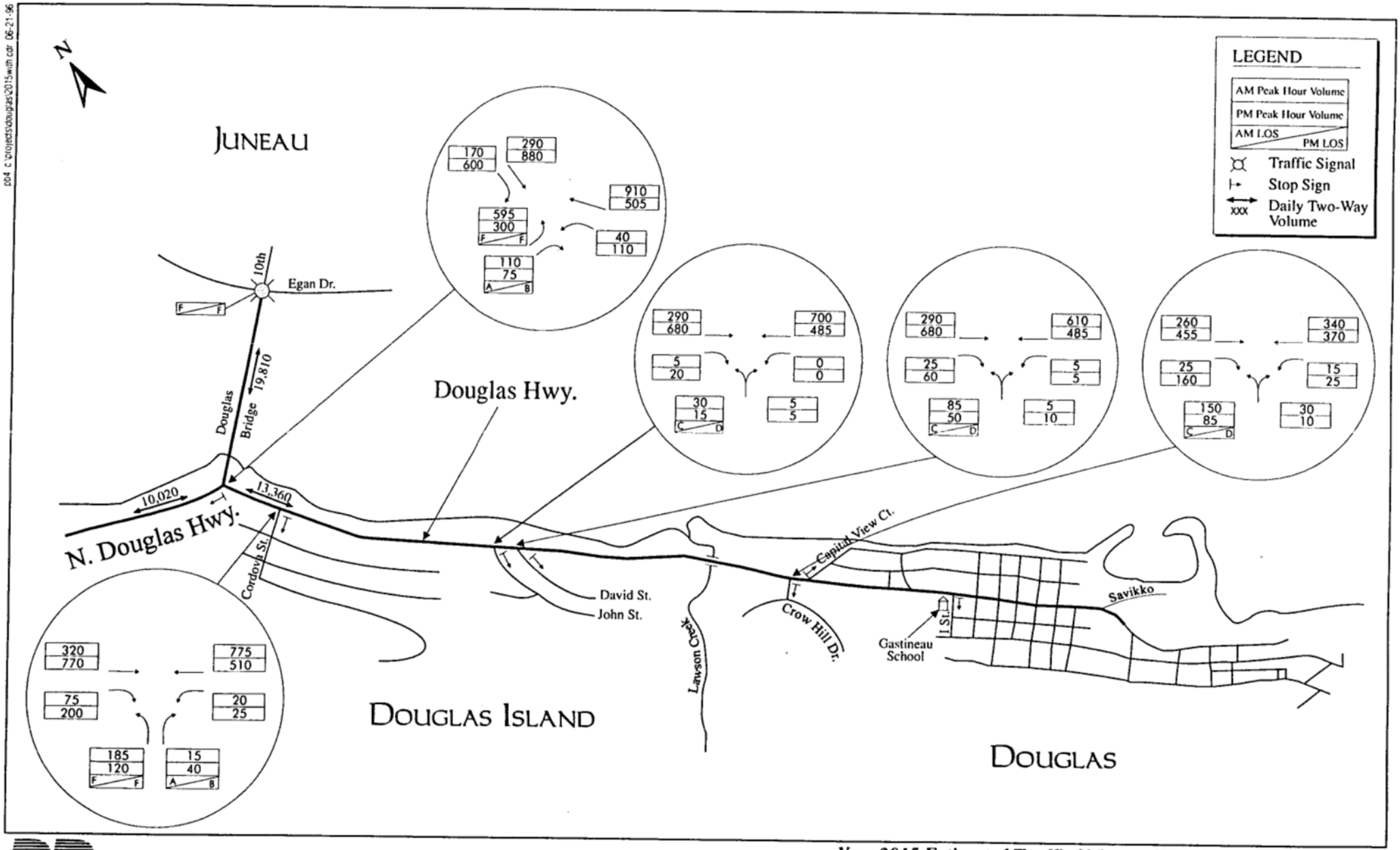
DOUGLAS HIGHWAY CORRIDOR TRAFFIC STUDY

FIGURE 7

With Goldbelt Development (Half of Phase 2)

Goldbelt Corporation development in West Douglas is expected to continue beyond year 2015 (which is the horizon year for this analysis). Phase 1 will be complete and an estimated half of Phase 2 developed by year 2015. The second phase of the planned community is expected to include 500 mixed-density housing units, an elementary school, marina, along with light industrial and commercial development. Half this phase of housing development would amount to 250 mixed-density housing units (assumed to be 100 SF and 150 MF for our forecasts) with marina and port development and some industrial land use. For the purpose of this analysis, traffic growth has been estimated for the housing growth, assuming all of the housing-related trips would be oriented outside of West Douglas. Table 2 is a summary of the forecasted twenty-year growth in housing for the four growth areas feeding Douglas Highway, including the expected Goldbelt growth in West Douglas, and resulting traffic growth for daily and peak hour periods shown in Table 5. Year 2015 traffic forecasts with Goldbelt Phase 1 and half of Phase 2 are shown in Figure 8 with intersection peak hour operation at the four key intersections along Douglas Highway. Note, again, that this forecast does not include any traffic associated with the expected CBJ harbor development along North Douglas Highway, which is expected to occur within the first five years of the twenty year period.

Note: The development of Goldbelt properties into the Phase 2 is expected to warrant an additional access route to North and West Douglas areas.



Year 2015 Estimated Traffic Volumes With Goldbelt Development

Douglas Highway Corridor Traffic Study

FIGURE 8

SUMMARY OF EXPECTED TRAFFIC AND FUTURE CORRIDOR OPERATION

Under the current CBJ Comprehensive Plan and the twenty year horizon for this study, housing growth on Douglas Island could range from approximately 700 housing units (both single family and multi-family dwellings), up to approximately 1250 housing units with progressive development of the Goldbelt Corporation property in West Douglas. The largest potential for growth lies north of the Juneau-Douglas Bridge, with access along the North Douglas Highway. With the Goldbelt Development (Phase 1 and a portion of Phase 2), traffic volumes on North Douglas Highway could approach 75 percent of the traffic on Douglas Highway south of the intersection with North Douglas Highway, and thus require reassessment of the traffic control at North Douglas Highway and Douglas Highway.

This amount of growth cannot be accommodated with the existing intersection configuration and traffic control at the intersection of Douglas and North Douglas Highway. The operation of intersections on both ends of the Juneau-Douglas Bridge is critical to accommodating the growth forecasted for Douglas Island and each intersection provides a sort of metering of traffic flow to and from the bridge. The signalized intersection of 10th Street at Egan Drive will continue to operate as a constraint, or meter, for traffic onto and off of Douglas Island, with peak period operation slipping to LOS F within the five-year horizon. The unsignalized intersection of North Douglas Highway at Douglas Highway likewise acts as a meter for traffic on North Douglas Highway, with increased risk for accidents as side-street delays increase with traffic volumes. Table 6 lists the estimated peak period intersection operation by forecast year for the key intersections along Douglas Highway. It shows continued failure at the North Douglas Highway intersection and the gradual and interconnected failure of operation at Cordova Street. These two key intersections are integral to the overall operation of traffic to and from Douglas Island. With housing growth increasing traffic volumes on Douglas Highway during the peak periods, the peak hour would have a more uniform travel demand throughout the hour than exists today. The 20-30 minute peak would spread to possibly a 45-60 minute peak, reflecting a higher peak hour factor. The analysis of future intersection operation is based on the use of an average peak hour factor (PHF) of 0.85, a gradual transition to more (sub)urban travel characteristics.

The daily traffic on Douglas Highway is expected to increase. The current 10,080 daily vehicle trips near Cordova Street could grow to an estimated 12,770 daily trips without Goldbelt Development and an estimated 13,360 with Goldbelt. Traffic growth is assigned to the roadway network based on the current split of traffic between Douglas Highway and North Douglas Highway, where there is some interaction of traffic between the two roadways. The two lane highway will have increasing delays due to turning traffic, autos backing from driveways, school and public transit bus operations, and overall side-street friction.

The increase in housing units in Douglas and West Juneau and the overall change in development character from rural to suburban, along Douglas Highway, would result in increased demand for non-motorized travel along Douglas Highway, amplifying the needs for a pathway or sidewalk on both sides of the highway, marked crosswalks and improved roadway illumination.

Table 6
Estimated Intersection Level of Service by Forecast Year

Intersecting Street	Year									
	2000		2005				2015			
			w/o Goldbelt		with Goldbelt		w/o Goldbelt		with Goldbelt	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
North Douglas Highway										
through traffic on Douglas Hwy	A	A	A	B	A	B	A	B	A	B
left turn from Douglas Hwy	F	F	F	F	F	F	F	F	F	F
right turn from Douglas Hwy	A	B	A	B	A	B	A	B	A	B
Cordova Street										
left traffic from Douglas Hwy	A	B	A	B	A	B	A	B	A	B
left turn from Cordova	E	E	F	F	F	F	F	F	F	F
right turn from Cordova	A	B	A	B	A	B	A	B	A	B
John/David Streets										
left traffic from Douglas Hwy	A	A	A	A	A	A	A	A	A	A
right/left turn from John/David	C	C	C	C	C	C	C	D	C	D
Crow Hill Drive										
left traffic from Douglas Hwy	A	A	A	A	A	A	A	A	A	A
right/left turn from Crow Hill Dr	C	C	C	C	C	C	C	D	C	D

Level of service is a qualitative measure describing operational conditions within a traffic stream; generally described in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. Tables 7 and 8 below summarize levels-of-service A through F for both signalized and unsignalized (stop-controlled) intersections.

Table 7
Level of Service Criteria for Signalized Intersections

Level of Service	Stopped Delay Per Vehicle (sec.)	Comments
A	<5.1	Very low delay
B	5.1 to 15.0	Some delays
C	15.1 to 25.0	Average delays
D	25.1 to 40.0	Longer delays
E	40.1 to 60.0	Limit of acceptable delay
F	> 60.0	Failure of Intersection

Table 8
Level of Service Criteria for Unsignalized Intersections

Reserve Capacity (PCPH)	Level of Service	Expected Delay to Minor Street Traffic
>399	A	Little or no delay
300 to 399	B	Short traffic delay
200-299	C	Average traffic delays
100-199	D	Long traffic delays
0-99	E	Very long traffic delays
*	F	*

* When demand exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvement to the intersection.

PCPH: Passenger cars per hour.

SUMMARY OF EXISTING AND FUTURE CORRIDOR NEEDS

Douglas Highway is expected to experience growth in housing over the next 20 years, with an associated growth in traffic volumes from the current 10,000 vehicles per day (vpd) up to and estimated 13,360 vpd in 2015 with the estimated Goldbelt development in West Douglas. Traffic on the Juneau-Douglas Bridge could grow from the existing 12,460 vpd up to 19,800 vpd with the Goldbelt development in West Douglas, with breakdown conditions at either end of the bridge. These estimated future traffic volumes are based on two conditions: an overall growth rate in housing of approximately 2 percent per year, and that conservative growth plus some development of the Goldbelt property in West Douglas (Phase One and part of Phase Two). As noted previously, these forecasts are based on assumed growth along Douglas Highway under the current Comprehensive Plan and for North Douglas Highway under both the current Comprehensive Plan and with an overlay of the Goldbelt development of West Douglas. Development under the Comprehensive Plan assumes little change from the existing patterns of residential development and land use on Douglas Island. These forecasts provide a range of possible future traffic volumes for the Douglas Highway corridor, within which the future traffic is likely to lie.

Existing and future corridor needs on Douglas Highway can be summarized into three categories: operation, safety and network needs. Existing operational problems such as backups and delays behind left-turning vehicles and left turn delays at side-streets can be addressed by adding roadway capacity, by separating movements or by streamlining flow through the corridor. Safety needs along Douglas Highway include the need for pedestrian access along and across the corridor and increased visibility for pedestrians, crossing or walking along the roadway. Safety needs for both motorized and non-motorized travel can be addressed through increased driver awareness, improved visibility, removal of, or reduction in levels of conflict and addressed minimally with increases in corridor throughput capacity.

Network connections between uphill neighborhoods could reduce the local traffic on Douglas Highway and provide and alternative school walk route, in lieu of busy Douglas Highway. These neighborhood connections, however would not provide much relief for peak period traffic delays at intersections along Douglas Highway. Property access is critical along the corridor where many residents have driveways onto the highway and increasing through traffic volume and speed contribute to delays in access to and from properties adjacent to the highway. An additional existing network need is to provide level intersection approaches to Douglas Highway and to realign the intersecting street to right angle. This can improve the visibility and operation at the side-street, thereby improving overall safety as well.

If we apply the urban standard for intersection operations (LOS D/E near capacity, as described in the TRB *Highway Capacity Manual*), the intersection of North Douglas Highway and Douglas Highway currently fails to meet this standard. The intersection of Cordova Street and Douglas Highway would fail to meet this standard by the year 2005 with or without development of Goldbelt land in West Douglas. Also failing is the intersection of 10th Street at Egan Drive during the evening peak prior to year 2000. Traffic throughput across the Juneau-Douglas Bridge is constrained by the operation of the intersection of 10th Street and Egan Drive. Capacity improvements to these three intersections and the roadway connection between Douglas Island and the mainland would be needed to support the forecasted level of

development on Douglas Island. Current morning peak hour traffic volumes at the North Douglas and Douglas Highway intersection meet the threshold values for signalization, using the peak hour signal warrant (Warrant #11) as outlined in the *MUTCD*.

Additional operational and safety needs currently involve student transportation, via school buses and private auto. The confluence of school-based traffic with the morning peak commuting traffic contributes to overall traffic delays along Douglas Highway. Student safety and safe school bus operation are critical to any possible change in student transport to and from the schools, both on Douglas Island and on the mainland.

Improvements to address operation, safety and network needs could take several forms; the next section of this report includes descriptions and an evaluation of the effectiveness of alternative transportation treatments to address the corridor needs.

TRAFFIC IMPROVEMENT TREATMENTS

DEVELOPMENT OF TREATMENTS

Transportation problems along Douglas Highway can be classified into three general areas of need: safety, operation, and network. Possible treatments to provide relief for these needs were identified, ranging from restriping to construction of new roadway segments. For ease of review and to group the treatments into generational stages of improvements, three categories of treatment will be used: 1) Transportation System Management (TSM); 2) Travel Demand Management (TDM); and 3) Capital Improvements, ranging from low to high cost. Treatment descriptions are outlined below, by category of improvement type and generational stage. Many identified treatments are compatible and their positive results could be complementary and additive, especially those included in the Transportation System Management (TSM) and Travel Demand Management (TDM) categories. Table 9 is a matrix listing the treatments by grouping along with location, general time frame for implementation and effectiveness, issues addressed by the treatment, rough category of estimated cost for the treatment, other possible impacts and additional comments relating to the treatments.

TRANSPORTATION SYSTEM MANAGEMENT (TSM) TREATMENTS

The TSM list of treatment options includes improvements which could maximize the use of the existing roadway facility, with little or no construction along the corridor, all within the existing public right of way. In other words, these treatments could help squeeze out the most effectiveness from the existing roadway facility and right of way. These improvements would be complementary or additive and could be implemented within a short time frame and within a limited budget. The array of TSM treatments is listed below, with a brief description of each treatment. Some of the TSM treatments and associated locations are shown in Figure 9.

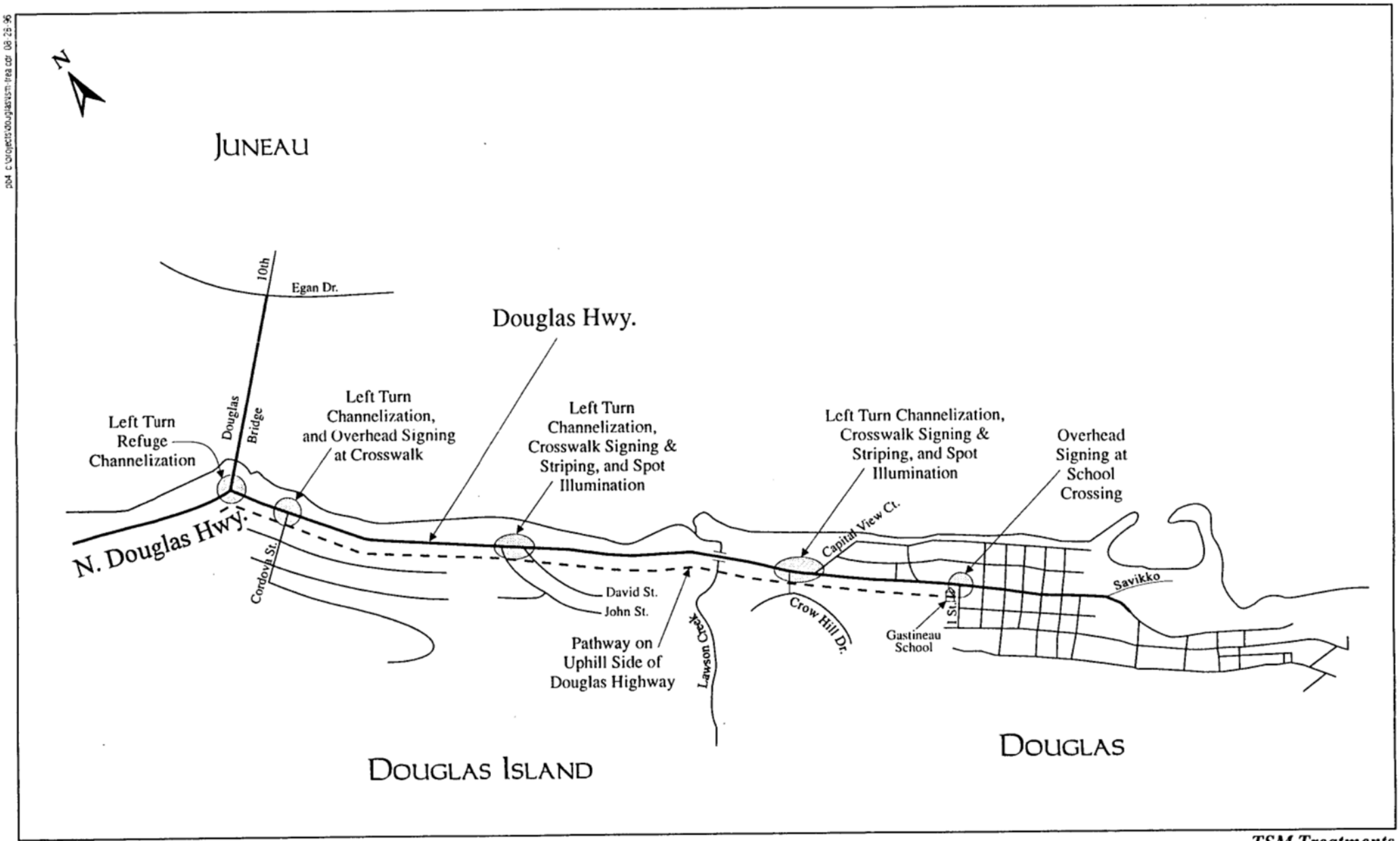
- Establish a consistent baseline speed limit through the corridor, to be more compatible with the evolution of Douglas Highway to an urban arterial roadway and to reflect some existing sight distance constraints for side-street traffic. The consistent speed limit could reflect an increasing number of direct access driveways and side-street intersections along Douglas Highway as well as the current levels of pedestrian and bicycle travel. As outlined in the *MUTCD*, six factors should be considered when selecting the appropriate speed limit for a roadway: 1) road surface characteristics, shoulder condition, grade, alignment and sight distance, 2) current operating speeds on the facility (85th percentile speed and pace), 3) roadside culture, development and friction, 4) safe speed for curves or hazardous locations, 5) parking practices and pedestrian activity, and 6) reported accident experience for a recent 12-month period, (reference: *MUTCD*, Section 2B-10).
- Establish crosswalks at key intersections (John/David Streets, Crow Hill Drive) with pavement markings, advanced warning signs, and warning signs at the crosswalks, plus augment existing illumination **at** the crosswalk for improved visibility of pedestrians. Provide overhead warning signs for crosswalks and school crossing locations to highlight the key crosswalks along Douglas Highway. Where possible, provide median refuge for pedestrians at crosswalks.

Table 9
Treatment Summary Matrix

List of Treatments	Locations	Implementation			Timeframe for Effectiveness		Issues Addressed By Treatment							Possible Other Impacts	Planning Level Cost	Additional Comments
		Immediate	Short Term	Long Range	Short Term	Long Range	Operation	Safety	Capacity	Access	Pedestrian	Bicycle	Travel Demand			
Transportation System Management																
Uniform Speed Limit	Corridor	X			X	X	X	X							Low	Follow MUTCD Section 2B-10
Trim Bushes for Visibility	Intersections	X			X		X	X							Low	
Crosswalks across Douglas Highway															Low	Install pavement markings, signs
Signing and Striping	key intersections	X			X			X		X	X				Low	
Overhead Signing	key crossings		X		X	X		X			X				Low	
Add Median Refuge			X		X	X		X			X			parking	Low	
Overhead Signing at School Crossings	Gastineau School and Cordova		X		X	X		X			X		X		Low	Provide addition emphasis for existing school
Street Lighting																
At Crosswalks	key crossings	X	X		X		X	X			X			light/glare	Low	Co-locate with crosswalks, spot additions
Continuous	corridor		X			X	X	X						light/glare	High	Replace existing with continuous lighting
Continuous, vintage fixtures	in Douglas or along corridor		X			X	X	X						light/glare	High	Consider vintage fixtures for community
Left Turn Channelization																
Pockets at Side Streets, temporary	Cordova, John/David & Crow Hill Dr.	X			X		X	X	X					parking	Low	Can restripe now in interim; Minor widening needed for permanent left turn channelization.
Pockets at Side Streets, permanent	Cordova, John/David & Crow Hill Dr.		X		X	X	X	X	X					R/W, parking	Low	
Soft Path Walkway or Sidewalk	Uphill side of Douglas Hwy	X	X		X	X		X		X	X				Low	Keep within right of way
Bus Stop Shelters	High Volume stops		X		X	X					X		X	parking	Low	Coord. with Transit Plan, work for curb space
Parking restrictions near side-streets	Douglas		X		X		X	X							Low	Improve visibility for side-street traffic
Travel Demand Management																
Increase Transit Service															Mod - High	Work with ex. timed transfer service
Frequency	Douglas route		X			X			X				X			
Routing	expand or extend service from Douglas		X		X	X				X			X			
Promote Ridesharing				X											Low	Coord. w/agencies, employers; establish CBJ ridesharing coordinator position
Provide ridematching	CBJ-wide		X			X							X			
Employer-based incentives	CBJ-wide		X			X							X			
Implement Parking Fees	Downtown Juneau, employee parking			X											Mod.	Implementing parking fees = monitoring, etc.
Disincentive for Driving Alone	CBJ-wide, employer-based		X			X							X			
Incentive for Carpooling or using transit	CBJ-wide, employer-based		X			X							X			
Encourage vanpooling, carpooling	CBJ-wide		X	X		X			X				X		Low	
Establish informal Park & Pool lots	corridor, CBJ-wide	X	X		X	X							X		Low	Coord with available parking areas, churches
Provide Guaranteed Ride Home	CBJ-wide, employer-based		X	X		X							X		Low	
Encourage Flextime, Staggered Hours	CBJ-wide, employer-based		X	X	X	X	X						X		Low	
Bike Racks on Buses and at Stops	Capital Transit, CBJ-wide	X	X		X	X						X	X		Low	Add to Transit Plan, coord. with employers
Work with School District to reduce impacts on peak hour traffic							X	X	X		X		X		Low	Coord with schools, start time, walk routes, etc.

Treatment Summary Matrix

List of Treatments	Locations	Implementation			Timeframe for Effectiveness		Issues Addressed By Treatment							Possible Other Impacts	Planning Level Cost	Additional Comments
		Immediate	Short Term	Long Range	Short Term	Long Range	Operation	Safety	Capacity	Access	Pedestrian	Bicycle	Travel Demand			
Capital Treatments																
Sidewalk	uphill side along corridor		X		X	X		X			X		X	R/W	Mod.	Consider alternate uphill transportation corridors for continuous pathway.
Signal																
at N Douglas Highway	N Douglas Hwy. intersection		X		X		X	X	X						Mod.	Fully actuated signal, improve approaches
at Cordova Street	Cordova St. intersection		X		X		X		X					R/W	Mod.	Fully actuated signal, may delay with improvements from N Douglas signal
Continuous Street Lighting			X	X	X	X		X			X	X		light, glare		
Standard fixtures	corridor														High	
Vintage/Decorative fixtures	corridor														High	
Neighborhood Connections			X		X	X	X			X			X	R/W, envir., social		
Nowell to Simpson/Peters Ln.	connect Cordova and John St. neighborhoods														High	
John Street to David Street	connect to share access and improvements														Mod	
Widen Douglas Highway to 3 lanes	N Douglas to Gastineau School		X			X			X	X				R/W, access, envir.		
with bike lanes				X		X									High	
with bike lanes and parking				X		X									Very High	
Reconfigure 10th @ Egan Dr.	east end of J-D Bridge			X		X	X		X					access, bikes, peds	High	Consider circulation/access to downtown
streamline traffic flow, fewer phases																
delete 10th approach, reroute traffic																
Bicycle and Ped Improvements on J-D Bridge						X		X			X	X	X			
Guardrail break/access at N Douglas Hwy.	N Douglas Hwy. intersection		X		X					X	X	X			Low	
Two-way path for bikes, combined w peds	on bridge, separated from auto traffic			X		X						X			Mod	
Upgrade N Douglas signal for double left turns				X		X	X		X						Mod	Coordinate w/10 & Egan & 3 lane operation on
coordinate with 10th/Egan revisions																
response to increased traffic from N Douglas																
Reconfigure Juneau-Douglas Bridge to three lanes, widen for bike/ped pathway				X		X	X		X					impacts on local acce	Very High	Evaluate three lane operation, to Island or from Island, enhance bike/ped facilities on bridge
Uphill Collector Roadway	parallel to Douglas Highway			X		X	X		X	X				R/W, environ., creek	High	Parallel collector roadway requires signal at N Douglas. Consider parallel road only if other improvements to Douglas Hwy. not effective.
Connect to N Douglas Highway, with signal at Douglas Hwy/N Douglas Hwy across Kowee Cr.			X		X											
Connect uphill from Cordova, John/David and Crow Hill neighborhoods				X		X										
Connect uphill in Douglas				X		X										
Limited Access Roadway system	Egan Dr. to N Douglas Hwy			X		X	X		X					R/W, environ., social	Very High	Need associated with large growth on Douglas Island. Must be consistent with vision for corridor and community.
Grade separated interchange at Egan Drive																Consider circulation/access of downtown
Grade separated interchange at Douglas Hwy																
Second Channel Crossing	Airport vicinity			X		X			X	X			X	R/W, environ., social	Very High	Current est. $18million.



TSM Treatments

DOUGLAS HIGHWAY CORRIDOR TRAFFIC STUDY

FIGURE 9

- Add street lighting (illumination) with focus on new crosswalks. This could initially be coordinated with the power company to add lighting on existing power poles. Later, the street lighting for the corridor could be redesigned and installed, with an emphasis on uniformity and adequate light levels (for the degree of pedestrian, bicycle and transit use within the right of way), and reflecting the neighborhood. Decorative fixtures could be used, with lower mounting heights and more diffused lighting, that would attain the required lighting levels both along the corridor and at the crossings.
- Restripe existing roadway to establish left-turn pockets at side-street intersections (especially at Cordova Street, John/David Streets and Crow Hill Drive) and provide left-turn refuge for turns from the side-street. Restriping to provide left turn pockets would maintain a minimum 4-foot bike lane, but would require the removal of some parking along the shore-side of the highway near the Cordova Street and John/David Streets intersections. Medians for pedestrian refuge could be incorporated with left turn channelization at intersections.
- Develop a continuous and desirably separated soft path walkway along the uphill side of the roadway, to allow school children to walk to school without the need to cross and re-cross Douglas Highway. This pathway should be outside the roadway and within the existing public right of way, to keep it a TSM treatment. Some easements may need to be negotiated for the pathway.
- Review locations of existing bus stops, with respect to ridership and spacing along the corridor. Relocate stops to be adjacent to existing and new crosswalks. Provide shelters at key bus stops which are highly used. Consider installation of shelters for students at school bus stop locations, with adequate sidewalk/storage area for waiting students out of the roadway. Wherever possible, provide dedicated curb space for bus stops, allowing buses to stop next to the curb, in lieu of stopping in the bike lane or in the travel lane.
- Restrict parking within 60-70 feet of the side-street and construct bulbs in the sidewalk (sidewalk extensions) at crossings to provide adequate visibility for side-street motorists at stop signs and to increase awareness of crosswalks. This would primarily apply on 3rd Street in Douglas, at lower operating speeds.
- Provide periodic maintenance at intersections to mow or trim shrubbery (keeping height below 3 feet above pavement) to restore available sight distance for side-street motorists at stop signs. Consider some changes to landscaping, to replace the high-maintenance grasses with hardy, natural, low-growing low-maintenance ground cover.

TRAVEL DEMAND MANAGEMENT (TDM) TREATMENTS

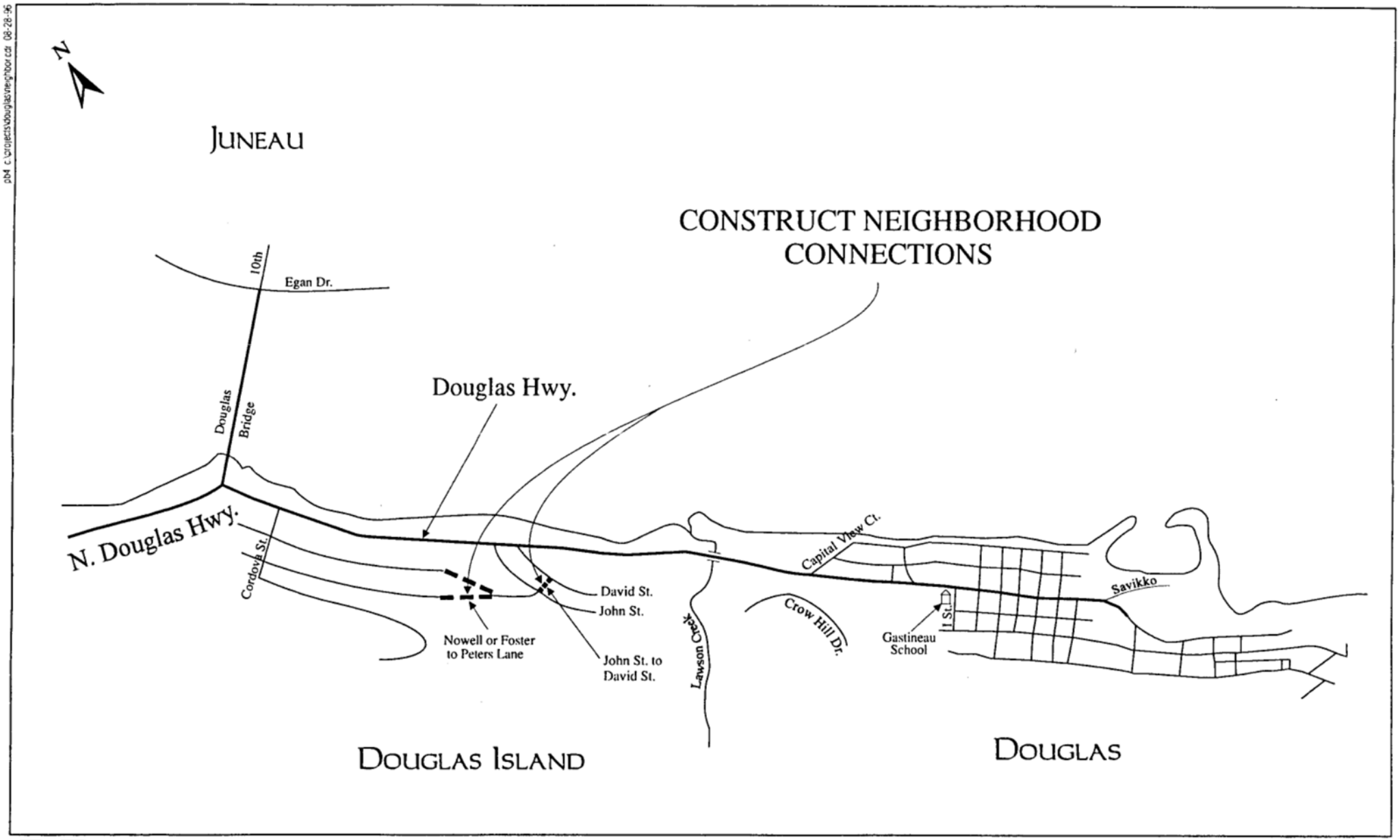
Travel Demand Management would include policies and actions to encourage the use of alternative modes of travel. This can be accomplished through ridesharing, flex-time, and other methods of decreasing the peak period traffic demand and overall use of motorized modes along the corridor, thereby extending the functional life of the roadway, as is. TDM options would be coordinated through the agencies, CBJ and DOT&PF, targeting employers as well as employees in Juneau, in addition to coordinating the use of the limited parking supply in Downtown Juneau. Primary employers in Juneau are the Federal, state and local governments. TDM measures could also be considered in coordinating student transportation to and from Douglas Island. Examples of TDM treatments include:

- Increase transit service, both in terms of frequency of runs on Douglas Highway and in terms of routing (destinations served). Current operations focus on a timed transfer system at a hub at the Federal Building in Juneau. Provide increased transit service during the peak periods, changing from hourly headways to at least half-hour headways for two to three additional runs for each peak.
- Promote ridesharing throughout the CBJ through public service announcements, provision of ridematching service and bulletin boards for ridematch. Employer-based incentives could be developed to encourage ridesharing.
- Implement parking fees for commuter parking in Downtown, recognizing the limited parking available and encouraging ridesharing/carpooling. Preferential parking (closest to the entrance, desirable locations) could be reserved for carpools or vanpools, without fee or with reduced parking fee. This would be coordinated by CBJ and employers, making the best use of the available and limited parking Downtown.
- Establish informal Park & Pool lots where commuters can meet to share the ride to work. These could be located at churches or other locations where normal parking demand would be compatible with commuting parking demand.
- Encourage vanpooling and carpooling, CBJ-wide.
- Provide a guaranteed ride home to commuters who do take the bus, end up working late or otherwise need to return home off-schedule. This can provide a backup of reliability for the transit or carpooling commuter, allowing more flexibility in getting to work.
- Encourage flex-time for employees, encouraged by the CBJ and provided by employers. This could allow the severe peak commuting demand on Douglas Highway to be spread more evenly throughout an hour or hour-and-half, reducing some of the long side-street delays along Douglas Highway, and allowing more flexibility in using transit in lieu of driving alone to work.
- Coordinate school bus routing and scheduling to reduce impacts on commuting peak traffic flows. This could involve relocating or consolidating school bus stop locations, considering stops uphill from Douglas Highway, where students could gather and be picked up or dropped off without stopping Douglas Highway traffic. This would require coordination of intersection improvements, crosswalks and other amenities to make this operation successful. Additional coordination could be successful with the PTA and the school district to encourage ridesharing for student trips and reduce the number of school-based trips during the morning peak period.

CAPITAL TREATMENTS

Treatments to consider for Douglas Highway, beyond maximizing the existing facility with TSM and TDM treatments, consist of capital construction projects. Capital treatments would provide significant improvements for operation, safety and access. These projects would be more complicated to implement, involving higher costs than the TSM and TDM types of improvements, and a broader group of stakeholders. The capital treatments are listed below in general transition from low cost to very high cost for both implementation and in terms of other impacts, such as environmental and social impacts.

- Construction of continuous sidewalk or pathway along the uphill side of Douglas Highway. This can reduce the number of pedestrians crossing the highway and provide a walking route to Gastineau School for students living on the uphill side of Douglas Highway. A continuous sidewalk or pathway along the uphill side of Douglas Highway can accommodate transit riders walking to and from the bus stops, without conflicts with vehicles or bicycles.
- Install traffic signal control at the North Douglas Highway intersection, providing level approaches and minor rechannelization for the signal. This intersection currently meets only the peak hour warrant for signalization, and traffic volumes are expected to fulfill more warrants within the next five years. Install a fully actuated traffic signal control system to be responsive to fluctuations in traffic volumes throughout the day along Douglas Highway and North Douglas Highway.
- Install traffic signal control at the Cordova Street intersection, when traffic volumes meet warrants for signalization. It is expected that traffic volumes would approach the vehicular traffic warrants and may be supplemented with the school crossing warrant (#4) and school bus operations at this intersection. Traffic operations currently are dependent upon operation at the North Douglas Highway intersection. With signalization of North Douglas Highway, operation at Cordova Street may improve.
- Design and construction of roadway illumination to serve not only driver needs but also the needs of pedestrians and bicyclists, providing a more uniform illumination consistent with the neighborhood character. This could be implemented using regular lighting fixtures, comparable with existing fixtures, or using decorative or vintage lighting fixtures, to accent the neighborhood character. Both can provide the needed uniformity of lighting along the roadway corridor.
- As much as possible, without construction on the bridge, provide for improved bicycles and pedestrian use across the bridge. This could include a combined bikeway/pathway or consist of reduced exposure of bicyclists across the bridge (exposure to both vehicles and visual exposure at the open railing along the north side of the bridge).
- Construction of left turn channelization at key intersections and at high volume driveways would be completed to DOT&PF standards. Left turn pockets and left turn refuge for side-street left turns would be provided at Cordova Street, John/David Streets and Crow Hill Drive, and at driveways where daily traffic exceeds 500 vehicles per day. The construction of left turn channelization with bike lanes would involve some widening. Should there be the need to also provide parking and/or bus stop areas outside of the traveled way, additional widening would be required.
- Construct a local street connection between John and David Streets to provide neighborhood connectivity. Another location for neighborhood connection is between Nowell and Peters Streets, which is currently accessible by foot traffic. These connections are shown in Figure 10 and can provide alternatives to using Douglas Highway for short trips or deliveries. School walk routes could be provided uphill from Douglas Highway, connecting the neighborhoods, in lieu of student travel along the highway.
- Construct intersection approach adjustments on side-street intersections at Douglas Highway, to make the intersections closer to right angle to the highway, and to provide level landing for side-street traffic at the intersection.



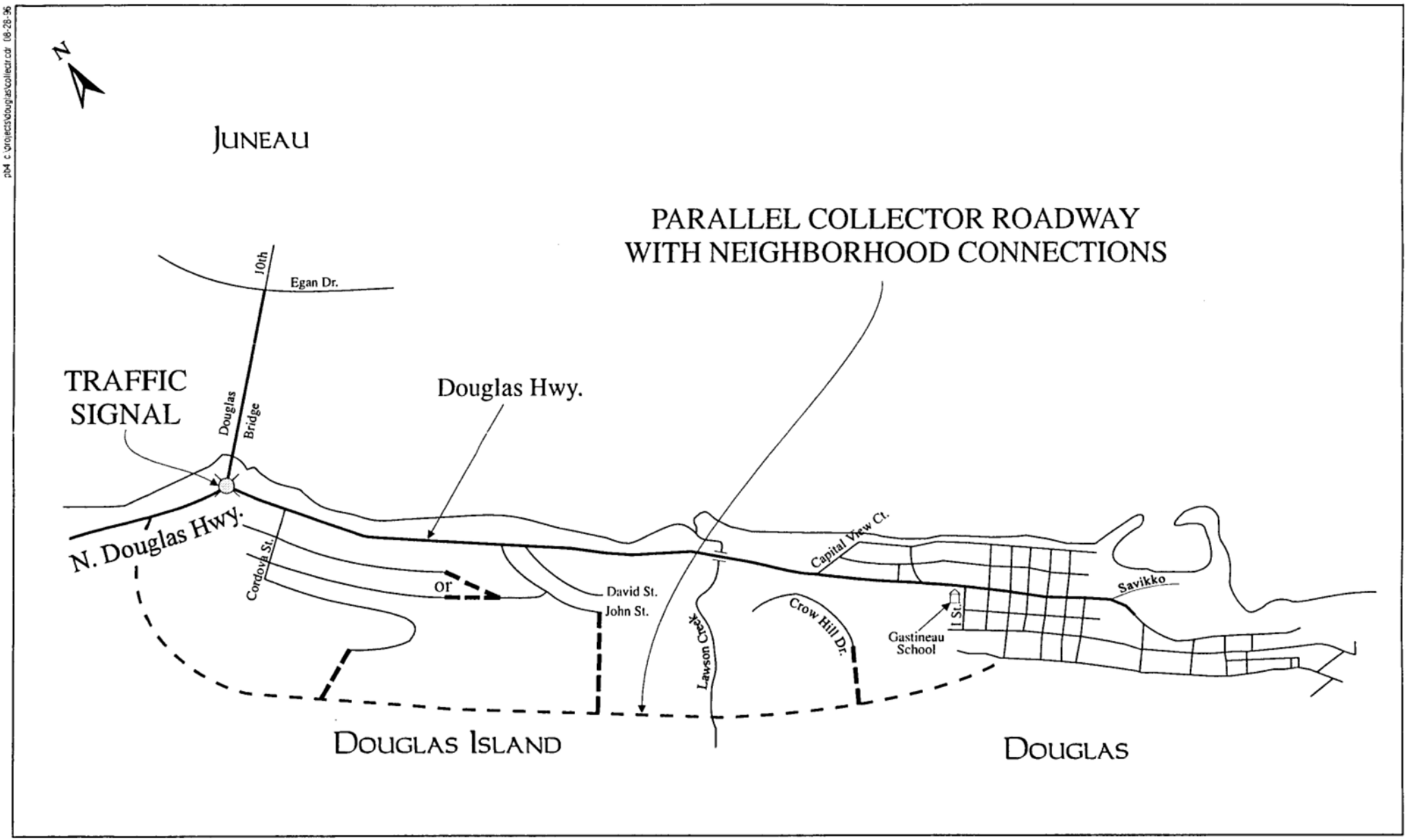
PB 100 YEARS

Neighborhood Connections

DOUGLAS HIGHWAY CORRIDOR TRAFFIC STUDY

FIGURE 10

- Construct a roadway connection between development above Cordova Street (associated with development of additional multi-family housing in West Juneau), to include a bridge across Kowee Creek, providing a connection from the Cordova Street neighborhood to North Douglas Highway. Note: this new roadway connection would require there be a signal at the intersection of North Douglas Highway and Douglas Highway. Figure 11 shows a conceptual layout for this collector roadway. This uphill connection could provide an alternate path for traffic from the Cordova Street neighborhood bound for North Douglas.
- Widen Douglas Highway to a three-lane roadway, with a continuous two-way left turn lane providing access to driveways and side-streets along the corridor (this could be done through restriping alone, given the existing roadway width, however, the bike lanes and parking would be removed). Include bike lanes and pathway/walkway on uphill side of Douglas Highway. If parking is required, additional widening would be required.
- Reconfigure the Juneau-Douglas Bridge to three lanes, with streamlined flow at both ends, 10th at Egan Drive and at the North Douglas Highway intersection. Depending upon which peak period is considered, the third lane operation could be either toward Douglas Island (PM peak flow) or toward Juneau (AM peak flow). Both intersection termini function as meters for traffic flow, and three lane operation may be moot without other changes on both Island side and mainland side of the bridge.
- Install bike racks on buses to promote multi-modal commuting and travel beyond the existing transit routing. Provide bike racks at bus stops and employer locations throughout the CBJ.
- Bicycle and pedestrian improvements on both sides of bridge (even without changing to 3 lane operation on bridge) or provision of a two-direction pathway for bikes and pedestrians on the bridge. Provide for a break in the guardrail for access to sidewalk at North Douglas Highway intersection.
- With increasing development and associated traffic, the signalized intersection of North Douglas Highway at Douglas Highway may need to be upgraded for double left turn lanes from North Douglas Highway and two-lane approach to the Juneau-Douglas Bridge.
- Reconfiguration of the 10th Street at Egan Drive signalized intersection to streamline traffic flow along Egan Drive and to/from Douglas Island. This could include a traffic revision rerouting 10th Street traffic to an alternate intersection, providing for only Egan Drive and Bridge traffic flows. This would involve reconfiguration of traffic circulation into the downtown employment area of Juneau and would affect a broader area than just this intersection. Note: the signal at 10th Street and Egan Drive, as currently configured, would be a constraint to development and traffic growth on Douglas Island before the bridge reconfiguration to three lanes would be needed.
- Convert the existing bridge and roadway/at-grade intersection network to a higher-design roadway network including limited access roadways, bridge and interchanges at both ends of Juneau-Douglas Bridge. The grade-separated interchanges would provide for smooth movement of traffic to and from the bridge with merged flows from the north and south legs of Douglas Highway and grade separated flow from the Juneau-Douglas bridge to Egan Drive northbound toward the Mendenhall Valley. This alternative would require reconfiguration of access to Egan Drive and traffic circulation within the downtown area of Juneau.



Collector Roadway Parallel to Douglas Highway

DOUGLAS HIGHWAY CORRIDOR TRAFFIC STUDY

FIGURE 11

- Construct an uphill collector roadway parallel to Douglas Highway, ultimately connecting Douglas with North Douglas Highway. This would be a collector roadway, with access limited to intersections (no direct driveway access, unless a collected driveway for many housing units). The first element would be a connection across Kowee Creek from North Douglas Highway to Pioneer or a higher roadway in the West Juneau neighborhood. The collector roadway could extend south, with other connections to the John and David Streets neighborhood, to the Crow Hill Drive neighborhood and south into Douglas, possibly aligning with 5th or 6th Street. The collector roadway would cross Kowee Creek and Lawson Creek. Signalization of the intersection of North Douglas Highway at Douglas Highway would be required with this alternative. The intersection of the collector roadway with North Douglas Highway would have left turn channelization on North Douglas Highway and be stop controlled for traffic from the new roadway.
- Construct a second channel crossing, with possible location near the airport, providing alternative routing and access to Douglas Island from the mainland. A second crossing could provide significant relief to the anticipated traffic load on the Juneau-Douglas Bridge, yet would provide little benefit to the current and anticipated traffic issues on Douglas Highway south of the bridge, since these issues predominantly derive from the existing development patterns and property access. A second crossing/connection to the mainland would most likely be associated with the level of development identified for West Douglas.

EVALUATION OF TREATMENTS

Each of the treatment options for the Douglas Highway Corridor is intended to address one or more of the needs of the corridor, (safety, operation or network), within the short- or long-term future. The collection of treatments for improving traffic conditions in the corridor are presented in a summary matrix to help guide the selection of roadway and neighborhood improvements for the Douglas Highway transportation corridor. For each treatment, the following items are noted: implementation time frame, time frame for effectiveness, issues addressed by the treatment, other possible impacts, planning level cost estimates for implementation, and any additional comments regarding coordination with other treatments or constraints. Descriptions of the treatments, above, present much of the evaluation of the effectiveness expected for the treatment. Many treatments are presented as possible options for implementation, and the selection of treatments for Douglas Highway would include public participation as part of the planning and implementation of the higher type improvements for Douglas Highway and the communities of West Juneau and Douglas.

The highest and earliest degree of effectiveness to be gained from the implementation of these treatments would come from low-cost treatments which address the current and near-term safety and operational needs of Douglas Highway. These treatments would consist of elements from the TSM and TDM lists, and could include: additional signing and striping for crosswalks, provision of left turn channelization on Douglas Highway, additional spot illumination at crosswalks and intersections, designation of a uniform speed limit for the corridor (with school zone speed reduction), development of a continuous pathway on the uphill side of the highway, increase of transit service on Douglas Highway, and implementation of many incentive programs to encourage ridesharing and transit usage. The TSM and TDM treatments

could help mitigate the existing traffic problems and needs along Douglas Highway and aid in accommodating the near-term growth expected for the area.

To achieve more significant increases in roadway capacity and vehicle throughput, thereby accommodating longer ranger growth on Douglas Island, capital projects would be required. These projects would entail not only a higher financial cost, but also potentially higher social or environmental costs than the TSM or TDM treatments.

CONCLUSIONS AND RECOMMENDATIONS FOR DOUGLAS HIGHWAY

It is important to address the current corridor travel needs, balancing the benefits of treatments with the possible costs, monetary and non-monetary of the implementation. Current and near-term needs (through year 2000) on Douglas Highway can, to a high degree, be addressed through the implementation of several of the Transportation System Management (TSM) and Travel Demand Management (TDM) treatments presented in this study. These treatments would address the immediate needs of the corridor including those related to pedestrian facilities crossing and parallel to Douglas Highway, vehicular turning movements and delays at intersections, and visibility along the corridor, as well as start to address the issues of travel demand in the CBJ and encouraging alternative modes of travel for the commute. To address the near-term needs, it is recommended that the CBJ and DOT&PF work together to make the most of the existing roadway facility, effectively squeezing the highest use and benefit from low cost treatments. All of these treatments would involve some degree of additional public participation, which has been started with this study. The following list of treatments is recommended for near-term implementation along Douglas Highway:

- Designate a consistent speed limit for the roadway, based on evaluation process outlined in the *MUTCD*, Section 2B-10. This speed limit would likely be 30 MPH throughout the corridor with 20 MPH speed zones associated with the Gastineau School and the school bus stop near Cordova Street.
- Mark and sign for crosswalks at key intersections (John/David Streets, Crow Hill Drive) and coordinate with bus stop locations.
- Consider installation of overhead signs at school crossings (at Cordova Street and at Gastineau School) to provide additional emphasis at the crossing.
- Restripe existing pavement for left turn channelization and left turn refuge on Douglas Highway, keeping 4-foot bike lanes, at Cordova Street, at John/David Streets, at Crow Hill Drive intersections.
- Where possible, in conjunction with left turn channelization, provide for median refuge for crosswalk.
- Provide left turn refuge (in existing raised island) for left turning traffic from North Douglas Highway onto Douglas Highway, to allow for a two-stage left turn from North Douglas Highway.
- Provide additional street lighting at crosswalks and intersections. Coordinate with power company for interim additional lighting (plan for continuous lighting along roadway).
- Develop pathway on uphill side of Douglas Highway, within existing right of way.
- Increase transit service on Douglas Highway, with a focus on peak period commuting service.
- Initiate programs to encourage transit use, encourage ridesharing, and other Transportation Demand Management measures such as flextime, guaranteed ride home, etc.
- Provide bike racks on buses and bike racks at bus stops and employment locations.

When fully warranted or justified with higher traffic volumes throughout more of the day, install an actuated traffic signal system at the intersection of North Douglas Highway and Douglas Highway. The signalization of this intersection, in conjunction with several of the TSM and TDM treatments, is expected to help the corridor accommodate the growth expected under the Comprehensive Plan beyond year 2000. Other important improvements to include in the near-term plans for Douglas Highway include the reconstruction of intersection approaches to Douglas Highway, to provide level approaches and improve visibility at the intersection. Connections between neighboring streets and neighborhoods would also complement the TSM and TDM improvements for the corridor. The implementation of these connections would affect more than just traffic operations, and should also include appropriate public involvement with the planning and design.

The intended use of the Treatment Summary Matrix (Table 9) is as a tool for stakeholders to consider treatment options, aware of both potential benefits and potential costs, and to assemble reasonable packages of treatments to implement for Douglas Highway as growth continues on Douglas Island.

Further improvements for Douglas Highway, to take the corridor into the next stage or level of development, should be preceded with the identification of a joint CBJ, DOT&PF and stakeholders' vision for the corridor. This would be a process through which to answer this question: What kind of roadway is desired/needed for West Juneau and Douglas communities? What elements are most important to the users? There needs to be further discussion fully involving all of the stakeholders: local government, state government, residents, schools, transit, business owners, and other users. With this community vision in hand, the selection of treatments to address the transportation needs of the Douglas Highway Corridor can become a plan for accommodating growth, maintaining the West Juneau and Douglas community character and keeping Douglas Highway a livable street serving all modes of travel.

APPENDICES

- **Appendix A: Public Meetings and Comments**
- **Appendix B: Bibliography**
- **Appendix C: Examples**
- **Appendix D: Glossary of Technical Terms**

APPENDIX A: PUBLIC MEETINGS AND COMMENTS

Grassroute&Associates

Douglas Highway Corridor
Traffic Study

Public Meeting #1
May 15, 1996

SIGN IN

Bob/SAAC	P.O. Box 210-223 9824	Douglas Advisory Board
Les Morse	1403 1st. Street, Douglas	Douglas Advisory Board
Bern Savikko	608 5th Street, Douglas	
Rick A Savikko	905 2nd Street, Douglas	
Budd Simpson	402 Alaska Belle Court, Douglas	Douglas Advisory Board
Cathy Connor	745 5th Street,Douglas	
Helen Laurent	811 5th Street, Douglas	Douglas Advisory Board
Wes Coyner	3111 Douglas Highway, Juneau	
Dolores Coyner	3111 Douglas Highway, Juneau	
Mike Barton	P.O. Box 70, Douglas	364-3153
Stella Fullam	P.O. Box 020351 Juneau	586-4720
Timothy J. Fullam		
Janet Teague	Box 240329, Douglas	364-3409
Bill Teague	Box 240329, Douglas	364-3409

Douglas Highway Corridor Traffic Study
May 15, 1996
Public Meeting #1 Sign-in
Page 2

Grassroute&Associates
Douglas Highway Corridor Traffic Study
1st meeting Sign-in sheet
Page 2

Natalie Alton	3181 Douglas Highway
Red P???	745 5th Street, Douglas
Margo Waring	1215 5th Street, Douglas
Vi Cope	2850 Douglas Highway, Douglas
Bill Leighty	227 Gastineau Avenue

Grassroute &Associates

MEETING #1
May 15, 1996

DOUGLAS HIGHWAY CORRIDOR TRAFFIC STUDY

Comments related to future vision of community:

- This is a global issue, as well as Juneau-wide issue, not just Douglas:

    a. most forecasts (Shell Oil, International, et al) show world production of conventional recoverable crude oil peaking approximately the year 2020.

    b. world population, and per capita petroleum consumption will increase, exacerbating competition for fossil fuels: supply, price problems for private vehicle transport.

    c. USA has an international treaty obligation (framework climate change convention, 1992) to reduce CO2 emissions to 1990 levels by year 2000.

    d. USA now imports 50% of its crude oil, will probably import 70% by year 2010.

- DOT looks at highways from a capacity stand only, not an esoteric view Is the highway a community road or a highway with moving vehicles the highest priority?

- increase study area to go further into Douglas town or identify it in final recommendations as a need or subsequent study into/through Douglas.

- has the development of 'Tonsgarrd' subdivision been discussed in the larger scheme of the Island.

Grassroute & Associates
meeting #1, May 15, 1996 NOTES
Douglas Highway Corridor Traffic Study

Comments related to transit/alternative movement of people:

- Do not invest anything to accommodate more private vehicle transport; invest in improved high-occupancy transit: frequent bus, street car/rail, etc.

- Douglas Highway is ideal corridor, because of topology, density, proximity of housing to highway, for shifting passengers from single occupancy vehicles, lov's to High Occupancy Vehicles.

- lax snow removal of pedestrian areas increases auto (SOV) traffic.

- sensitivity analysis should be conducted as regards the potential use of small or medium size vans/buses to move people during peak hours.

- better bus shelters would entice riders.

- Study should describe difference between capacity improvements vs. transit and pedestrian type improvements.

- Expand busing to include evening trips with better connections from the Valley/University to Douglas.

- AHFC- increased multi family development impacts the need for transit especially.

- ferry service from Island to Mainland.

Grassroute & Associates
meeting #1, May 15, 1996 NOTES
Douglas Highway Corridor Traffic Study

Comments related to employer incentives:

- Request State of Alaska, as employer, to stagger hours or flex-time, eg: begin at 7:45, 8:00, 8:15 shifts or waves.

- some adjustment of work hours would help.

- Governments/Employers don't provide company cars for use by bus/bicycle commuters.

- Parking in town is in short supply. This affects whether people will use flex time if they can't get a parking spot by coming in at a different time from others.

- adopt flexible work hours

Grassroute & Associates
meeting #1, May 15, 1996 NOTES
Douglas Highway Corridor Traffic Study

Comments that relate to design:

- Sidewalks are important on both sides of the highway. Most imperative is a sidewalk on the same side of Gastineau School to the bridge.

- Cross walks for pedestrians (bicyclists) are a must.

- Lighting quality is bad, especially from Lawson Creek into town.

- Multiple family housing driveways are being used as sledding opportunities. Kids end up running into road. Very dangerous.

- School on uphill side but sidewalk is on ocean side. Kids walk in bike lane on uphill side but that area is reduced in winter because of snow storage. **Sidewalksare neededon both sides of road.**

- cross walks needed, especially in downtown Douglas.

- elevate road bed periodically and have bicycle/pedestrian pathways that cross the highway underneath.

- bus traffic early a.m. (during peak travel periods) creates blockage.

- residents back-in to driveways for safer entrance onto highway.

- Acute angle at David Street on a right turn.

- lax snow removal of pedestrian areas increases auto (SOV) traffic.

- bike lanes are poorly designated on return over bridge and into Douglas.

- pedestrians get 'plowed' over by bicyclists using pedestrian path over bridge.

Grassroute & Associates
meeting #1, May 15, 1996 NOTES
Douglas Highway Corridor Traffic Study

Comments related to design, continued:

- Parking in town is in short supply. This affects whether people will use flex time if they can't get a parking spot by coming in at a different time from others.

- bench road should not be considered an alternative. INstead expand 6th street across Douglas.

- double deck bridge

- speed limit reduction at library: traffic calming.

- install stop/go lights at Cordova Street. These lights would tell drivers to move on to bridge, during peak periods, at intervals.

- Stop light at Cordova.

- peak in traffic after recreational activities at Savikko park but since this is usually not coincident with North Douglas traffic trying to leave or enter the island it flows smoothly.

- Valley commuters bog down mainland side of bridge.

Grassroute & Associates
meeting #1, May 15, 1996 NOTES
Douglas Highway Corridor Traffic Study

Comments related to zoning:

- Proliferation of housing

- Overlay zoning density on road map.

- has the development of 'Tonsgarrd' subdivision been discussed in the larger scheme of the Island.

- Coogan-Cedar Park

Grassroute & Associates
meeting #1, May 15, 1996 NOTES
Douglas Highway Corridor Traffic Study

Comments related to maintenance:

- School on uphill side but sidewalk is on ocean side. Kids walk in bike lane on uphill side but that **areais reducedin winter becauseof snow storage.**Sidewalks are needed on both sides of road.

- lax snow removal of pedestrian areas increases auto (SOV) traffic.

- Douglas Highway is a 'tier 2' road on state maintenance list. Discussion on turning maintenance over to CBJ would elevate its plowing???

- Review CBJ? policy of plowing snow into road beds.

Grassroute & Associates
meeting #1, May 15, 1996 NOTES
Douglas Highway Corridor Traffic Study

Comments related to policy:

- Do not invest anything to accommodate more private vehicle transport; invest in improved high-occupancy transit: frequent bus, street car/rail, etc.

- Request State of Alaska, as employer, to stagger hours or flex-time, eg: begin at 7:45, 8:00, 8:15 shifts or waves.

- Make Douglas Highway a Toll road.

- residents back-in to driveways for safer entrance onto highway.

- Energy Advisory Committee plan -12 Policies in CBJ Comprehensive Plan.

- Review CBJ? policy of plowing snow into road beds.

Grassroute & Associates
meeting #1, May 15, 1996 NOTES
Douglas Highway Corridor Traffic Study

Proposals and comments from Potentially Affected Interests in attendance. Transcribed from voiced or written comments. Grouped as obviously as possible. Some comments appear more than once because they pertain to more than one category.

- This is a global issue, as well as Juneau-wide issue, not just Douglas:

  a. most forecasts (Shell Oil, International, et al) show world production of conventional recoverable crude oil peaking approximately the year 2020.

  b. world population, and per capita petroleum consumption will increase, exacerbating competition for fossil fuels: supply, price problems for private vehicle transport.

  c. USA has an international treaty obligation (framework climate change convention, 1992) to reduce CO2 emissions to 1990 levels by year 2000.

  d. USA now imports 50% of its crude oil, will probably import 70% by year 2010.

- Do not invest <u>anything</u> to accommodate more private vehicle transport; invest in improved high-occupancy transit: frequent bus, street car/rail, etc.

- Request State of Alaska, as employer, to stagger hours or flex-time, eg: begin at 7:45, 8:00, 8:15 shifts or waves.

- Douglas Highway is ideal corridor, because of topology, density, proximity of housing to highway, for shifting passengers from single occupancy vehicles, lov's to High Occupancy Vehicles.

- Make Douglas Highway a Toll road.

Grassroute & Associates
meeting #1, May 15, 1996 NOTES
Douglas Highway Corridor Traffic Study

- Sidewalks are important on both sides of the highway. Most imperative is a sidewalk on the same side of Gastineau School to the bridge.

- Cross walks for pedestrians (bicyclists) are a must.

- Lighting quality is bad, especially from Lawson Creek into town.

- Multiple family housing driveways are being used as sledding opportunities. Kids end up running into road. Very dangerous.

- School on uphill side but sidewalk is on ocean side. Kids walk in bike lane on uphill side but that area is reduced in winter because of snow storage. Sidewalks are needed on both sides of road.

- Proliferation of housing

- cross walks needed, especially in downtown Douglas.

- elevate road bed periodically and have bicycle/pedestrian pathways that cross the highway underneath.

- peak in traffic after recreational activities at Savikko park but since this is usually not coincident with North Douglas traffic trying to leave or enter the island it flows smoothly.

- bus traffic early a.m. (during peak travel periods) creates blockage.

- some adjustment of work hours would help.

- Valley commuters bog down mainland side of bridge.

- residents back-in to driveways for safer entrance onto highway.

- Acute angle at David Street on a right turn.

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meeting #1, May 15, 1996 NOTES
Douglas Highway Corridor Traffic Study

- lax snow removal of pedestrian areas increases auto (SOV) traffic.

- sensitivity analysis should be conducted as regards the potential use of small or medium size vans/buses to move people during peak hours.

- better bus shelters would entice riders.

- bike lanes are poorly designated on return over bridge and into Douglas.

- pedestrians get 'plowed' over by bicyclists using pedestrian path over bridge.

- Energy Advisory Committee plan -12 Policies in CBJ Comprehensive Plan.

- Governments/Employers don't provide company cars for use by bus/bicycle commuters.

- DOT looks at highways from a capacity stand only, not an esoteric view

- Is the highway a community road or a highway with moving vehicles the highest priority?

- Study should describe difference between capacity improvements vs. transit and pedestrian type improvements.

- Parking in town is in short supply. This affects whether people will use flex time if they can't get a parking spot by coming in at a different time from others.

- Expand busing to include evening trips with better connections from the Valley/University to Douglas.

- Overlay zoning density on road map.

Grassroute & Associates
meeting #1, May 15, 1996 NOTES
Douglas Highway Corridor Traffic Study

- speed vehicles at John/David streets.??

- bench road should not be considered an alternative. INstead expand 6th street across Douglas.

- double deck bridge

- ferry service from Island to Mainland.

- has the development of 'Tonsgarrd' subdivision been discussed in the larger scheme of the Island.

- affect of development in Coogan-Cedar Park?

- AHFC- increased multi family development impacts the need for transit especially.

- Douglas Highway is a 'tier 2' road on state maintenance list. Discussion on turning maintenance over to CBJ would elevate its plowing???

- Review CBJ? policy of plowing snow into road beds.

- adopt flexible work hours

- speed limit reduction at library: traffic calming.

- increase study area to go further into Douglas town or identify it in final recommendations as a need or subsequent study into/through Douglas.

- install stop/go lights at Cordova Street. These lights would tell drivers to move on to bridge, during peak periods, at intervals.

- Stop light at Cordova.

Grassroute&Associates

Douglas Highway Corridor
Traffic Study

Public Meeting #2
June 26, 1996

SIGN-IN

Margie Germain-Antrim	3220 Douglas Highway	463-5303
Dick & Marie Kent	3270 Nowell Ave.	586-3695
Jim McGrole (?)	3260 Nowell Ave.	586-2493
Stella & Tim Fullam	3070 Douglas Highway	586-4720
Jane MacKinnon	2666 Douglas Highway	364-3415
Les Morse	1403 1st St., Douglas	(?)364-3775
Bill Dapcevich	3221 Nowell Ave.	586-6814
Wes & Dolores Coyner	3111 Douglas Highway	586-1931
Helen Laurent	811 5th St., Douglas	364-2435
Alfreda Dove (?)	Box 240636, Douglas	364-3485
Paul Fuhs	10652 Porter Lane, Jnu.	790-3030
Jonathon Sperber	1109 4th St., Douglas	364-2158
Vi Cope	2850 Douglas Highway	586-6840
Natalie Alton	3181 Douglas Highway	586-1408
Paul Hennon	1107 5th St., Douglas	364-3293
Rod Flynn	745 5th St., Douglas	364-3772

DOUGLAS HIGHWAY CORRIDOR TRAFFIC STUDY

PUBLIC COMMENTS 2ND MEETING-6/26/96
PARSONS BRINCKERHOFF/DOUGLAS ADVISORY BOARD

Proposals and comments from Potentially Affected Interests in attendance. Transcribed from voiced or written comments.

-Mass transit will extend the life of downtown parking

-maximize what we have especially transit with an accommodating schedule.

-too much traffic from cross streets.

-blocked sight lines from parked cars.

-in right of way that exists, combine areas set aside for bicycle/pedestrian accessibility into one multi-use trail.

-more CBJ land than Goldbelt land would be developed in West Douglas.

-Point Hilda is the most likely for port development

-a bench road that would come out at Six-mile North Douglas would cost approximately $13 million. It doesn't address the bottlenecking traffic at the intersection of 10th and Egan.

-If West Douglas is approved for development a new marina would develop.

-$18 million for a causeway to intersect North Douglas with Mapco/Fred Meyers.

-emphasize transit for the amount of money spent on bench road or causeway.

-funding sources for transit is different than for Capitol projects. Money to pay for drivers to move buses is difficult to get. Process for projects to get on needs list.

-bus schedule is out of sync with working public on a regular schedule. A person in Douglas can take the bus to work but can't get it home again at a reasonable time especially if you need to stay later at work on occasion.

-transit is an adventure. Cold hanging around bus shelters.

-transit schedule changes when Gastineau school lets out. This increases traffic earlier in the day/evening.

Commentsrelated to: future vision of community

-Mass transit will extend the life of downtown parking

-in right of way that exists, combine areas set aside for bicycle/pedestrian accessibility into one multi-use trail.

-more CBJ land than Goldbelt land would be developed in West Douglas.

-Point Hilda is the most likely for port development

-a bench road that would come out at Six-mile North Douglas would cost approximately $13 million. It wouldn't address the bottlenecking traffic at the intersection of 10th and Egan.

-If West Douglas is approved for development a new marina would develop.

-A cost of $18 million for a causeway to intersect North Douglas with Mapco/Fred Meyers.

Commentsrelated to: transit/alternativemovementof people and goods

-Mass transit will extend the life of downtown parking

-maximize what we have especially transit with an accommodating schedule.

-in right of way that exists, combine areas set aside for

-bus schedule is out of sync with working public on a regular schedule. A person in Douglas can take the bus to work but can't get it home again at a reasonable time especially if you need to stay later at work on occasion.

-transit is an adventure. Cold hanging around bus shelters.

-transit schedule changes when Gastineau school lets out. This increases traffic earlier in the day/evening.

Commentsrelated to: future vision of community

-Mass transit will extend the life of downtown parking

-in right of way that exists, combine areas set aside for bicycle/pedestrian accessibility into one multi-use trail.

-more CBJ land than Goldbelt land would be developed in West Douglas.

-Point Hilda is the most likely for port development

-a bench road that would come out at Six-mile North Douglas would cost approximately $13 million. It wouldn't address the bottlenecking traffic at the intersection of 10th and Egan.

-If West Douglas is approved for development a new marina would develop.

-A cost of $18 million for a causeway to intersect North Douglas with Mapco/Fred Meyers.

Commentsrelated to: transit/alternativemovementof people and goods

-Mass transit will extend the life of downtown parking

-maximize what we have especially transit with an accommodating schedule.

-in right of way that exists, combine areas set aside for

bicycle/pedestrian accessibility into one multi-use trail.

-emphasize transit for the amount of money spent on bench road or causeway.

-funding sources for transit is different than for Capitol projects. Money to pay for drivers to move buses is difficult to get. Process for projects to get on needs list.

-bus schedule is out of sync with working public on a regular schedule. A person in Douglas can take the bus to work but can't get it home again at a reasonable time especially if you need to stay later at work on occasion.

-transit is an adventure. Cold hanging around bus shelters.

-transit schedule changes when Gastineau school lets out. This increases traffic earlier in the day/evening.

Commentsrelated to: design

-too much traffic from cross streets.

-blocked sight lines from parked cars.

-in right of way that exists, combine areas set aside for bicycle/pedestrian accessibility into one multi-use trail.

-a bench road that would come out at Six-mile North Douglas would cost approximately $13 million. It wouldn't address the bottlenecking traffic at the intersection of 10th and Egan.

Commentsrelated to: policy

-emphasize transit for the amount of money spent on bench road or causeway.

-transit schedule changes when Gastineau school lets out. This increases traffic earlier in the day/evening.

Commentsrelated to: Maintenance

-in right of way that exists, combine areas set aside for bicycle/pedestrian accessibility into one multi-use trail.

Grassroute&Associates

Douglas Highway Corridor
Traffic Study

Public Meeting #3
August 21, 1996

SIGN IN

Dick Kent	3270 Nowell Avenue, W. Juneau	586-3695
Nina Brown	P.O. Box 020981, Douglas	586-1248
Margo Waring	1215 5th, Douglas	364-3155
Nancy Waterman	227 Gastineau Ave, Juneau, -802	586-3278
Cheryl Easterwood	CBJ	586-5230
Jeannie Johnson	1621 2nd Street, Douglas	364-3570
JSJohnson	P.O. Box 20469, Douglas	586-5624
Mark Regan	P.O. Box 240535?	364-2874
Judy Hall	1669 Harbor Way	463-3864
Bob Isaac	P.O. Box 240223, Douglas	364-2431
Gary Hogan	ADOT/PF	
Stella Fullam	Box 020351, Douglas	586-4720

DOUGLAS HIGHWAY CORRIDOR TRAFFIC STUDY

PUBLIC COMMENTS 3RD MEETING-8/21/96
PARSONS BRINCKERHOFF/DOUGLAS ADVISORY BOARD/CBJ

Proposals and comments from Potentially Affected Interests in attendance. Transcribed from voiced or written comments.

- On the recommendation for the 2nd Channel Crossing: change the wording from construct to 'provide'.

- the tide at the north end of Gastineau Channel is restrictive.

- Walking through Gastineau playground is difficult during the winter by children from Geneva Woods multi-family housing.

- If there is a lack of trails how about looking at connecting the parking lots.

- What can be done right now to correct the traffic? What does PB recommend?

- Left turn lane is a safety issue especially when school buses are trying to stop traffic so passengers can unload and cross street.

- The entrance to Breeze Inn needs attention.

- In regards to existing traffic conditions and the perception of a traffic problem: noticed how much less traffic there is in the summer because school traffic is not on the road. Some solutions during the winter school season could be: instead of parents having to transit kids that miss bus, have a smaller bus that shadows the regular buses to pick up kids; provide a continuous shuttle for pick up.

APPENDIX B: BIBLIOGRAPHY

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13. McDowell Group. *Juneau Trends/Economic Benchmark Report.* January 1994.

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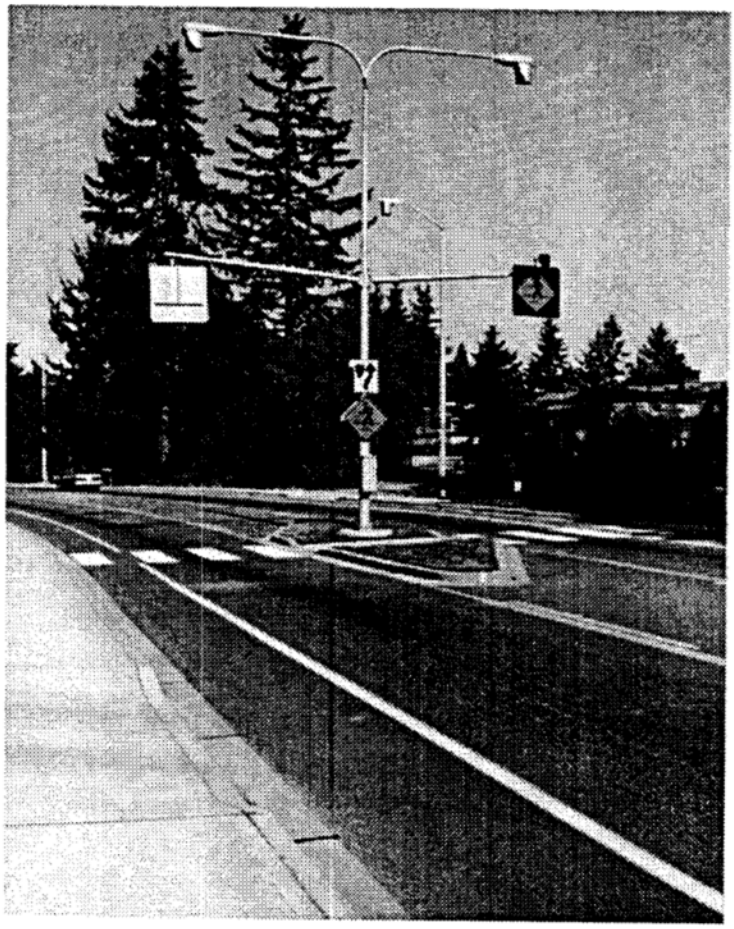
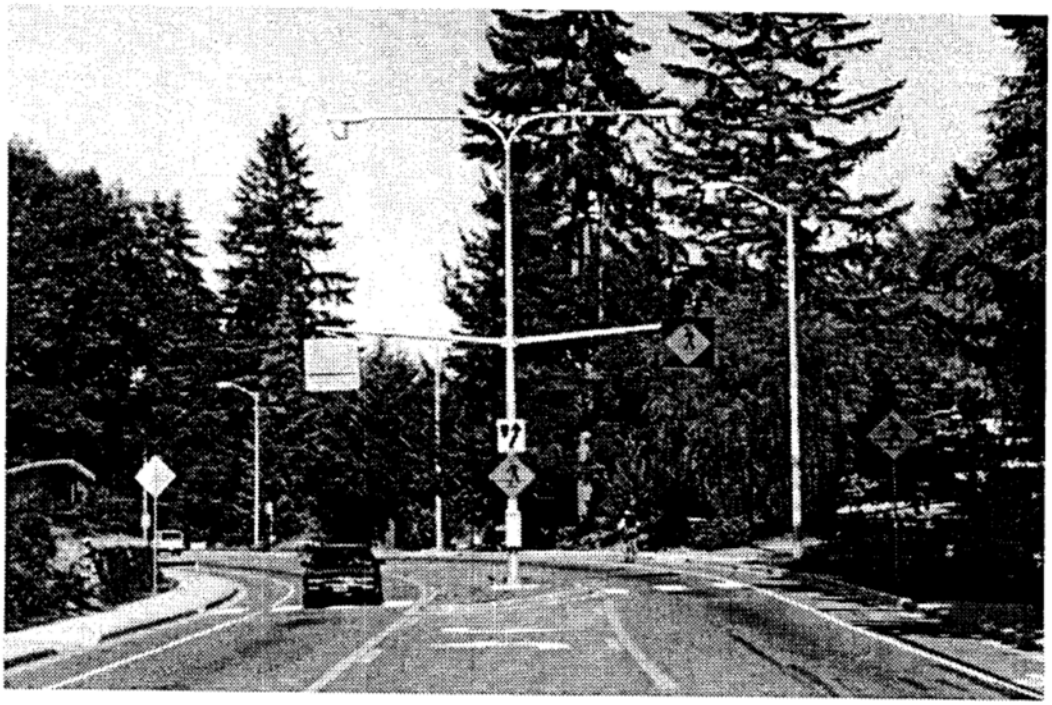
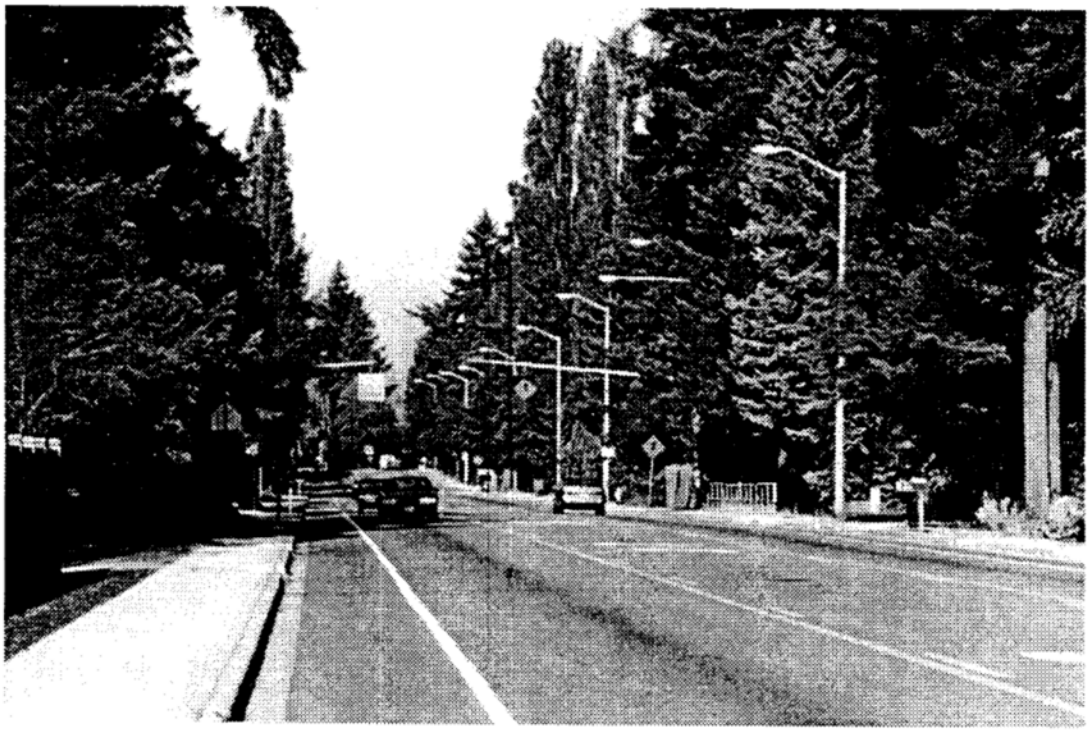
APPENDIX C: EXAMPLES

Examples





Examples



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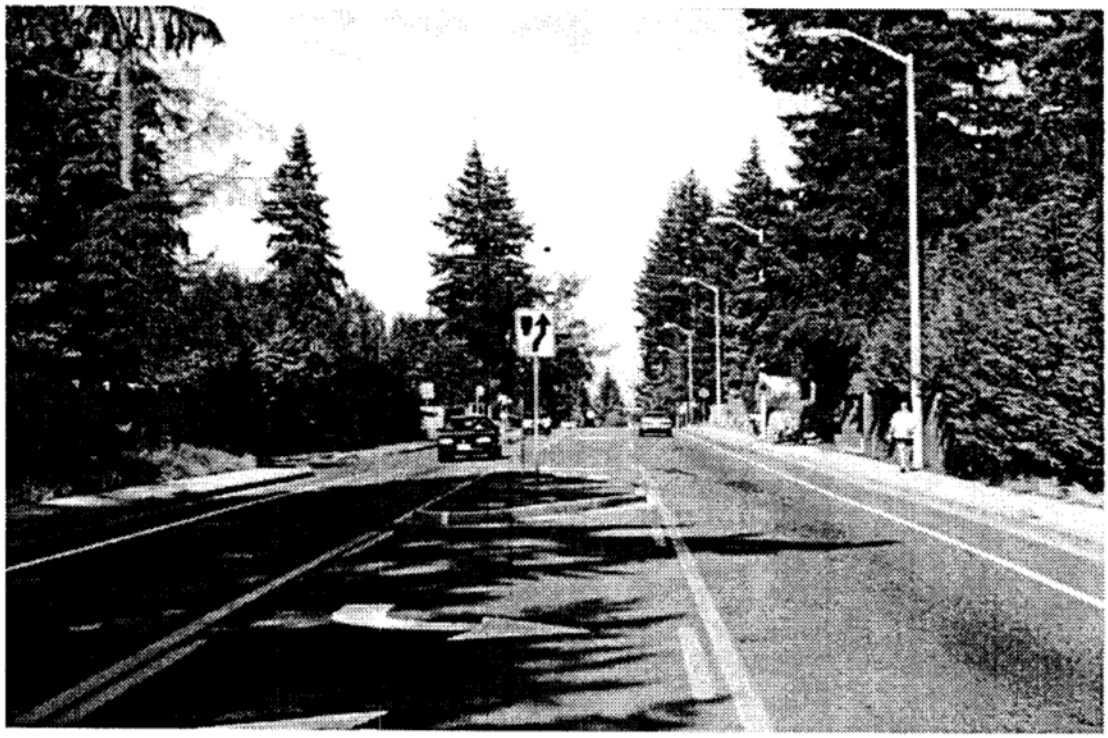
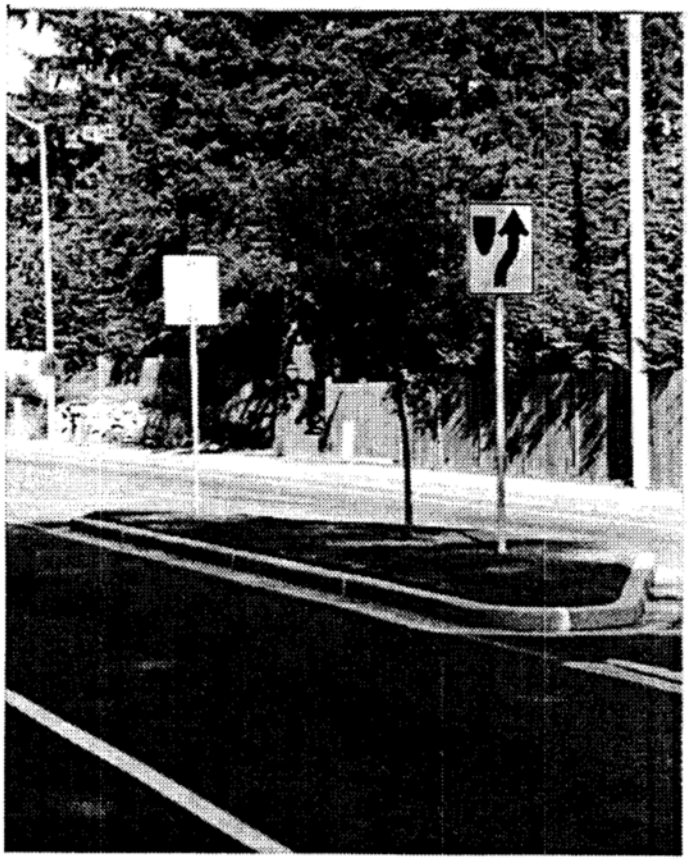
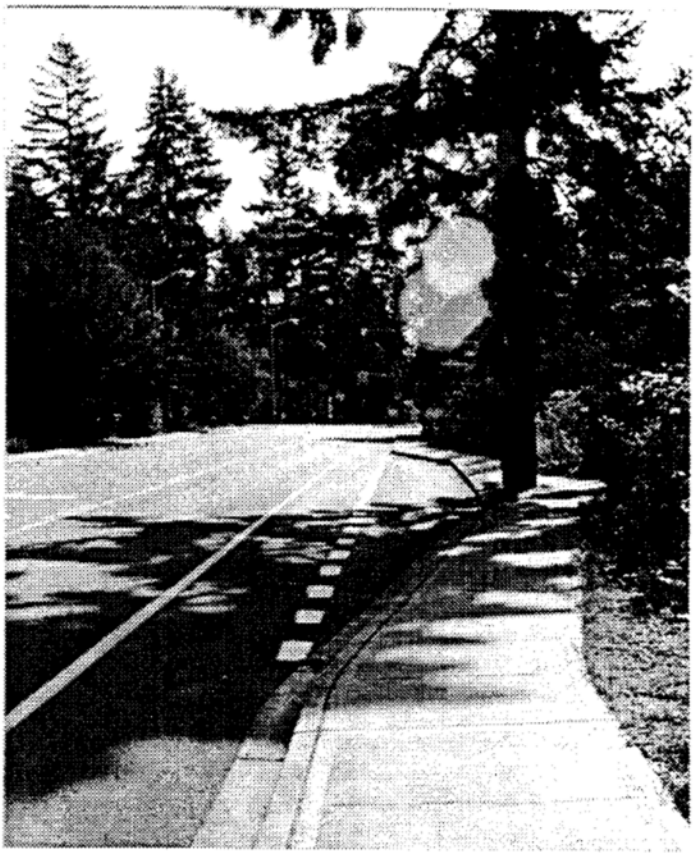
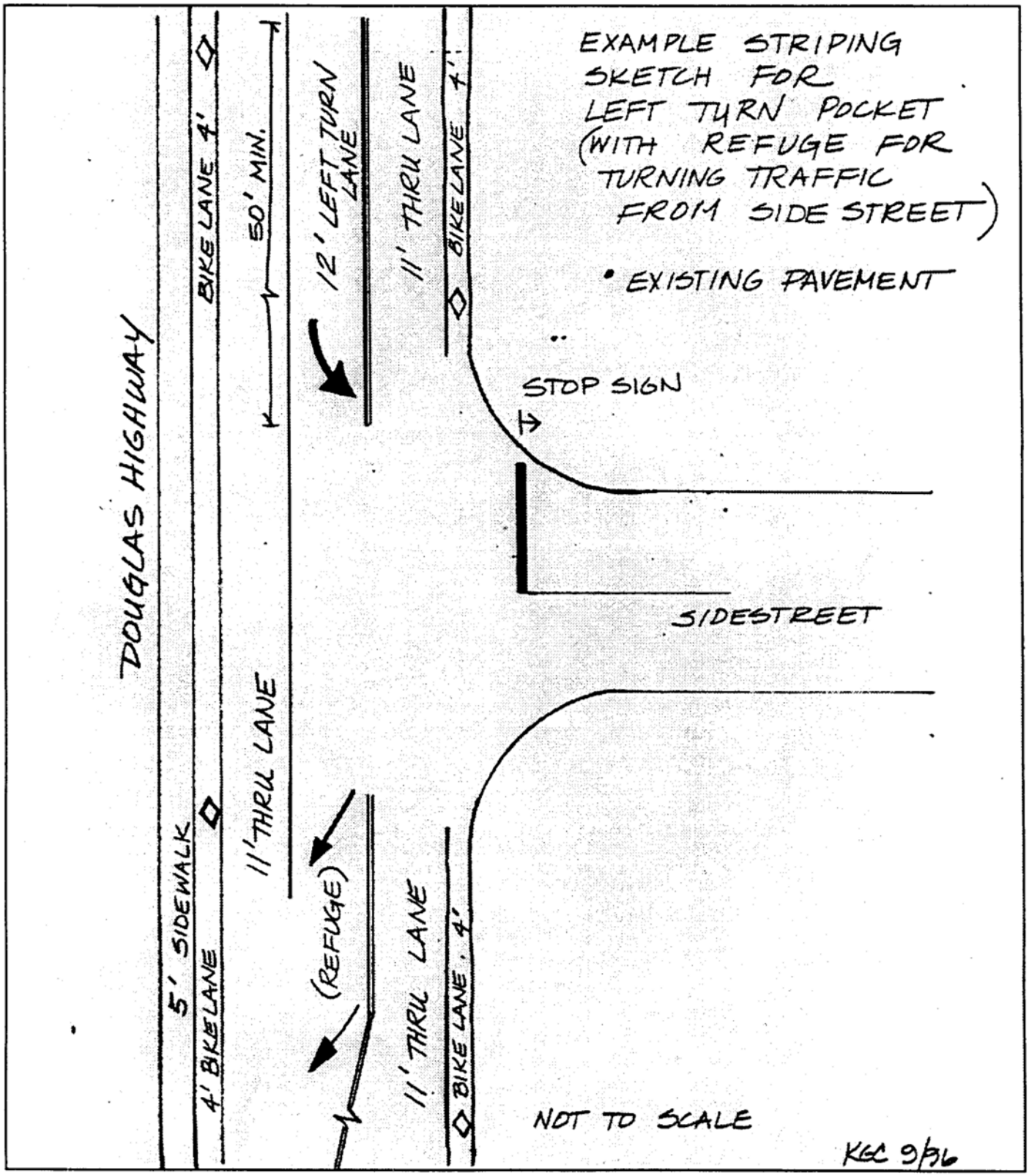






Examples


EXAMPLE STRIPING SKETCH FOR LEFT TURN POCKET (WITH REFUGE FOR TURNING TRAFFIC FROM SIDE STREET)
• EXISTING PAVEMENT
DOUGLAS HIGHWAY
5' SIDEWALK
4' BIKE LANE
BIKE LANE 4'
11' THRU LANE
50' MIN.
12' LEFT TURN LANE
11' THRU LANE
BIKE LANE 4'
(REFUGE)
11' THRU LANE
BIKE LANE 4'
STOP SIGN
SIDESTREET
NOT TO SCALE
KGC 9/96

APPENDIX D: GLOSSARY OF TECHNICAL TERMS

BENCH ROAD

A collector Arterial roadway that provides access only at side-streets. No access is allowed at driveways.

HCM

Highway Capacity Manual, a publication of the Transportation Research Board (Special Report 209), which outlines the accepted concepts of traffic flow and capacity of roadway systems.

LEVEL OF SERVICE

A qualitative measure describing operational conditions within a traffic stream; generally described in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

MUTCD

Manual on Uniform Traffic Control Devices, a publication of the Federal Highway Administration which presents the accepted standards for traffic signs, pavement markings, signals and other traffic control devices, guiding the installation and use of these devices.

PCPH

Passenger cars per hour.

SIGNAL PHASING

The sequence of right of way (or green time) given to different approaches at a signalized intersection. Two-phase operation of a signal is the simplest phasing where one roadway first has right of way (and both approaches have green indications) and then the other roadway has the right of way (green light) through the intersection. Full eight phase signal operation would exist at the intersection of two streets where all left turning movements have a separate right of way and all through/right movements have separate right of way. Other phasing scenarios are possible based on lane configuration at the roadway approach.

SIGNAL WARRANT

The installation of a traffic signal to control traffic at an intersection is based on many factors and warrants justifying the installation have been standardized and published in the MUTCD. Eleven warrants are currently identified to justify signal installation, reflecting traffic volumes or accident.

2WLTL

Two way left turn lane.

TRB

Transportation Research Board.