Tulalip Tribes Long Range Transportation Plan

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ACRONYMS

ADT	Average Daily Traffic
BIA	Bureau of Indian Affairs
CDP	Census Designated Place
CTR	Commute Trip Reduction
EDDS	Engineering Design and Development Standards
EIS	Environmental Impact Statement
GMA	Growth Management Act
GP	General Purpose
HCM	Highway Capacity Manual
HOV	High-Occupancy Vehicle
I-5	Interstate 5
LOS	Level of Service
LRTP	The Tulalip Tribes Long Range Transportation Plan
MTP	Metropolitan Transportation Plan
PSRC	Puget Sound Regional Council
RPEC	Regional Project Evaluation Committee
RTID	Regional Transportation Investment District
SAFETEA-LU	Safe, Affordable, Frequent, Efficient, Transportation Equity Act: a Legacy for Users
SEPA	State Environmental Protection Agency
SOV	Single-Occupant Vehicle
SPUI	Single-Point-Urban-Interchange
SR	State Route
STP	Surface Transportation Program
TAZ	Transportation Analysis Zone
TDM	Transportation Demand Management
TIA	Transportation Improvement Account
TIB	Transportation Improvement Board
TIP	Transportation Improvement Program
TPP	Transportation Partnership Program
TSM	Transportation Systems Management
UGA	Urban Growth Area
V/C	Volume to Capacity ratio
VPD	Vehicles Per Day
WSDOT	Washington State Department of Transportation

1. INTRODUCTION

1.1 PURPOSE OF THE TULALIP TRIBES LONG RANGE TRANSPORTATION PLAN

This Long Range Transportation Plan (LRTP) is an important piece of the overall comprehensive plan. The vision, goals, and policies contained in this document are a result of tribal member's comment and participation to ensure that Tulalip Tribes' transportation system responds to the needs of the community. (See Appendix A)

The Tulalip Tribes Long Range Transportation Plan was formed to support the land use element. The plan goes beyond a discussion of how efficiently automobiles can get from one place to another to a real examination of what Tulalip Tribes transportation needs are to ensure an overall healthy, vibrant community. The result is an extensive dialogue about modes of travel other than single-occupancy vehicles. The TSTP emphasizes the need to consider pedestrians and bicycles in transportation planning, the creation of walk able centers with appealing streetscapes, and setting standards on heavily used arterials to enable efficient automobile mobility while still protecting neighborhood character and safety. Level of service (LOS) standards is established to evaluate future development for consistency with the long-term vision for growth within the Tulalip Reservation.

The Tribes are exempt from numerous state and county mandates articulated in the Washington State Growth Management Act (GMA) and the County wide planning policies. However, this LRTP serves purposes similar to transportation plans and transportation elements prepared for other cities under GMA and serves as an integral part of the regional transportation fabric. The Tulalip Tribes is dedicated to working with Washington State and Snohomish County to ensure safe, reliable, and effective transportation within the Tulalip Reservation and its surrounding areas. Quality of life for the Tulalip Tribes and the surrounding region as well as reducing urban sprawl and other undesirable development patterns is dependant upon a well-developed LRTP.

1.2 TRIBAL HISTORY AND BACKGROUND

From time immemorial, Coast Salish tribes have inhabited what is now known as the Puget Sound region. When Captain George Vancouver sailed through this area in 1792 the Snohomish Tribe had a longhouse on Tulalip Bay and many more along what is now the Tulalip Indian Reservation. During the Treaty of Point Elliot, this area was reserved as the exclusive homeland for what would become the Tulalip Tribes for three reasons. First, there were sources of readily available drinking water provided by Tulalip Creek and Battle Creek. Second, the area was accessible to surrounding areas via the water by canoe. Finally, Tulalip Bay provided protection from the elements being a sheltered bay. Tribal ancestors knew that this area was vital to the survival and continuity of the Tribes for future generations and so selected it as a reserve.

The Tulalip Tribes have occupied the Puget Sound region, most recently known as the Salish Sea Eco Region, since time immemorial. As Coast Salish people, the Tulalip Tribes sustained a flourishing economy rooted in fish harvests, shellfish harvests, hunting, gathering, and trading of resources within the Salish Salish Sea Eco Region. Many cultural values exist within the Reservation Community including knowledge of medicinal plants, language, clothing, diet, shelter, traditional modes of transportation, spiritual beliefs, and burial practices.

The Tribe inherited the land, mountains, and waterways from our ancestors who have occupied the Salish Sea Eco Region for thousands of years. The Tulalip Tribes are the successors in interest to the signatories of the Point Elliot Treaty of 1855; which pre-dates Washington statehood. The Tulalip Tribes were organized under the Indian Reorganization Act of 1934, choosing the name of the prominent bay on the Reservation to describe the tribes and allied bands living on the Reservation: Tulalip Bay. The Tulalip Tribes ceded its interest in approximately 7.2 million acres to the United States and reserved approximately 22,500 acres, about 36 square miles, for the exclusive use of the Tribe's membership. Treaties between the U.S. and Indian tribes proliferated in the 19th Century, until ending by statute in 1871.

During the treaty era, the U.S. acquired vast sums of land, often in areas with burgeoning non-Indian settlements. The tribes and bands that now occupy the Tulalip Indian Reservation were promised goods and services in exchange for ceding tribal lands. Article III of The Treaty of Point Elliot, identifies the reservation that is now known as the Tulalip Indian Reservation as the site for an "industrial and agricultural" school that was to be operated for 20 years. The Reservation was established "with a view of ultimately drawing thereto and settling thereon all the Indians living west of the Cascade Mountains…"

Much of the original Reservation land base has gone out of Tribal ownership due to federal legislation dating back to the 1880's that divided Reservation lands among Tribal families and allowed the land to be sold out of Trust ownership status – land held "in trust" to Tulalip Tribal members by the U.S. government. Today, much of the land that went out of Tribal ownership has been reacquired with over 60% of the Reservation in Tribal ownership amongst Tribal members and the Tribal government

1.2.1 Government

The Tulalip Tribes operates under their constitution and bylaws that were adopted January 24th, 1936. The board of directors supervises tribal affairs. The active committees administer lands, leasing, loans, education, enrollment, water resources and roads, hunting and fishing and recreation.

During the late 1920's and early 1930's, the advent of the Indian Reorganization Act based constitution and by-laws resulted in an increase in community desire and the means to once again manage resources for the tribal peoples. The goals adopted by our first Board of Directors provided guidance for the last 60 years. During the last 30 years, Puget Sound Tribes have experienced a renewal assisted, in part, through federal court reaffirmation of their Native American rights and responsibilities in natural resource management and salmon harvesting (more commonly referred to as the Boldt Fishing Decision of 1974). The subsequent growth and diversification of tribal government to once again manage natural resources assisted in building the governmental and business infrastructure for business development.

While the Indian Gaming Regulatory Act of 1988 provided a further means for economic diversification and resultant benefits to the community, the Tulalip Tribes continue to reach and strategically plan for broad based governance, social and economic structure. This planning effort shows in the strategic placement and utilization of portions of the reservation, tribal homeland, into productive business land leases.

1.2.2 Land Use

The Tulalip Reservation is located at the mouth of the Snohomish River five miles north of the City of Everett and west of Marysville in Snohomish County, Washington. The Reservation lands are bound to the west and south by Puget Sound, to the east by Interstate 5 (I-5), and to the north by 140th Street NW (Fire Trail Road).

As the exclusive homeland for the Tulalip Tribes, the Tulalip Reservation consists of approximately 22,500 upland acres and Tribal tidelands. This represents a limited land base as the Reservation cannot grow beyond the exterior boundaries as they now exist. This is in stark contrast with cities in Washington state, required to plan under the Growth Management Act. These cities can expand Urban Growth Areas when there is not enough land available to accommodate forecast population and employment growth.

Being finite in geographic extent, the Reservation does not have the same opportunity to grow as do surrounding cities. For this reason, proactive planning for growth on the Reservation is a necessity. Accommodating more people and jobs within these approximately 22,500 acres, requires that the Reservation land base be used wisely as development pressures persist.

To anticipate what future land uses will be needed on the Reservation by 2030, employment and population forecasts were used. Also figured into the guidance for future land uses are existing locations of development, plans for housing, infrastructure improvements, and opportunities for development as well as cultural and environmental constraints that limit where development should occur. Considered together, all of these factors lead to the determination of what is the best pattern for preservation and development on the Reservation.

Future land uses are planned for the Reservation to provide orderly development and resource conservation. These land uses and their corresponding acreages are categorized as follows:

- **Low Density Residential Lands** – a supply of 4,835 acres are designated for low density residential use. The average expected residential density for this land use designation is one dwelling unit/acre. These are areas not intended to be served by water and sewer systems in the near future. The local roads will be constructed at rural road standards with a lower level of maintenance than more heavily used roadways. This land use designation covers approximately 21% of the Reservation.

- **Medium Density Residential Lands** – a supply of 3,765 acres are designated for medium density residential use. The average expected residential density for this land use designation is four dwelling units/acre. These areas are designated for high density development with community water and sewer services provided. This higher density housing will make the cost of provision of water, sewer, and roads more efficient. This land use designation covers approximately 17% of the Reservation.

- **High Density Residential Lands –** a supply of 203 acres are designated for high density residential use. All of this high density land is located within two areas in the southeastern corner of the Reservation. The average expected residential density for this land use designation is nine dwelling units/acre. This land use designation covers approximately 1% of the Reservation.

- **Mixed Residential/Commercial/Institutional Lands –** a supply of 1020 acres are designated for a mixture of high density residential, service-oriented commercial, and institutional uses. This mixture of uses may be supplemented by industrial use in QCV, though no residential uses should be present in close proximity to these industrial areas. This land use designation covers approximately 5% of the Reservation.

- **Agricultural Lands –** a supply of 1,248 acres of the Reservation are designated as Agricultural Lands in the only area where significant agricultural activity takes place. This land use designation covers approximately 6% of the Reservation.

- **Commercial Lands** – a supply of 1,248 acres are designated for commercial uses on the Reservation. These areas are intended for general office and retail commercial development. Much of this land has already been developed. This land use designation covers approximately 6% of the Reservation.

- **Heritage Lands –** a supply of 8,488 acres are designated Heritage Lands to protect and provide sacred, cultural, spiritual, and natural areas on the Reservation. These areas were identified by the Tribe's Natural Resources Department and the Cultural Resources Department as significant Tribal resources that are important to cultural preservation. This land use designation covers approximately 38% of the Reservation.

- **Institutional Lands –** a supply of 398 acres are designated for institutional uses on the Reservation. Land uses in this category include public administration, educational, health care, and other institutional uses. This land use designation covers approximately 2% of the Reservation.

- **Industrial Lands** – a supply of 250 acres are designated for industrial development. Land uses in this category include manufacturing, warehousing, light industrial, and retail storage. This land use designation represents approximately 1% of the Reservation.

- **Recreational Lands –** a supply of 1072 acres of land are designated for recreational use on the Reservation. These areas include the Port Susan Camping Club, whose lease is set to expire in 2052, and Battle Creek Golf Course. This land use designation covers approximately 5% of the Reservation.

To varying degrees, development will be restricted within all land use designation areas based on site-specific constraints. These constraints include – but are not limited to – the availability of water, access to the transportation system, steep slopes, unsuitable soils for development, and the presence of wetlands.

1.2.3 Population and Employment Data

Demographic data provided by the Tulalip Tribes Enrollment Department states that in the year 2000, 23% of the population on the Reservation was Tribal and 77% was non-Tribal. The Reservation experienced a 3% growth rate of Tribal members and non-Tribal members between 1990 and 2000.

Based on the 2006 Enrollment Statistics Report from the Tulalip Tribes Enrollment Department, Tribal member population is expected to increase by over 2000 people from 3,885 in October 2007 to approximately 5,900 by the year 2030. The off-Reservation Tribal member population constitutes approximately 38% of the population while on-Reservation Tribal members represent 62% of the Tribal

population. If current on-Reservation versus off-Reservation living status remains constant, we can expect that 3,658 Tribal members will live on-Reservation by 2030 with 2,242 living off-Reservation. Whether or not the Tribal member population increase occurs exactly as forecasted, the population is expected to increase, thus placing residential and commercial development pressure upon limited Reservation resources.

Table 1 shows population and employment figures for the base year of 2000 and forecasts employment growth by the Puget Sound Regional Council (PSRC) on the Tulalip Reservation to 2030. An analysis of the data shows that the total population figure is much higher than the total employment figure in each 10-year increment due to the exclusion of non-working age population, unemployment rate, and the effect of employment off-Reservation drawing Reservation residents to work outside of the Reservation's exterior boundaries.

The Puget Sound Regional Council does not base projections on Tribal or non-Tribal status, instead calculating for the population as a whole. For this reason, Tribal members are included within the total projections. The following is an explanation of each employment category:

- RETAIL – Retail Trade.
- FIRES – Finance, Insurance, Real Estate, and Services.
- MANU – Manufacturing.
- WTCU – Wholesale Trade, Transportation Services, Communication, and Utilities.
- GOV/ED – Government and Education.
- TOTEMP – Total Number of Jobs.

Table 1. Population and Employment Figures from 2000-2030

Year	TOTPOP	RETAIL	FIRES	MANU	WTCU
2000	9,247	369	1,661	140	92
2008*	10,149	1,190	1,952	153	131
2010	10,374	1,395	2,025	156	141
2020	12,290	1,644	2,676	211	276
2030	14,525	1,796	3,223	299	499

Source: Puget Sound Regional Council, 2008

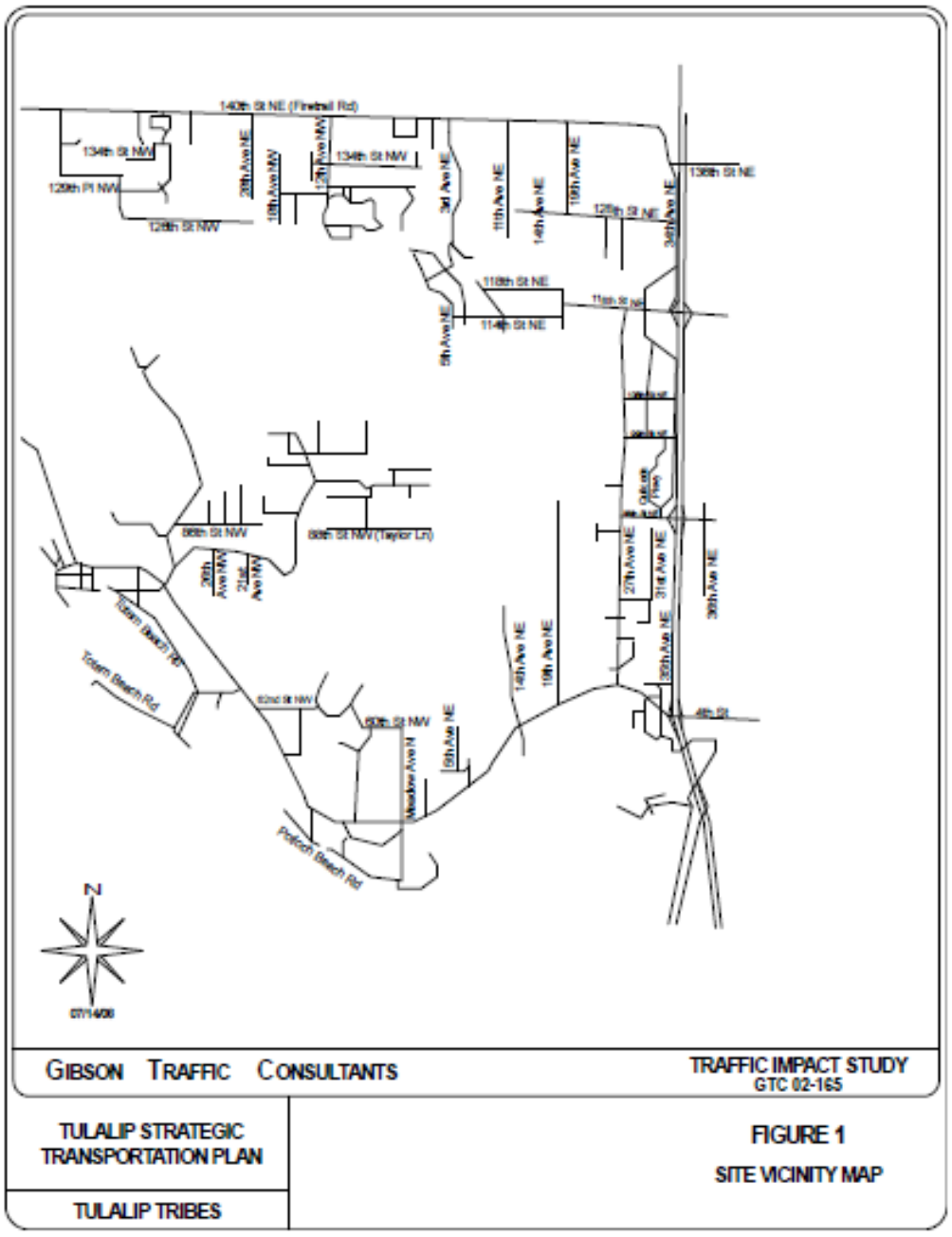
*2008 Projection by Tulalip Tribes Community Development Department. Differences between 2000 and 2010 projections by column were multiplied by .8 (8-years out of 10-years) and added to 2000 figures.

**Total employment numbers do not reflect most agricultural, resource, and construction jobs. The reason for this is that these jobs are highly mobile – are not confined to one geographic area. Examples of this are home remodeling businesses doing work at houses around the region, and fishermen based out of Seattle that actually work in Everett. While the jobs generate revenue that is brought into the area, the employment is not necessarily taking place in the area.

While the PSRC projections show the population of the Reservation steadily increasing in this 30-year timeframe (9,247 to 14,525), employment projections shows more than a doubling in growth (2,679 to 6,479).

Projections from 2008-2030 shows what is likely to happen in the Reservation employment base over the next 22-years. 2008-2030 total employment is expected to grow with 2,580 new jobs added to the Reservation economy in that timeframe.

Figure 1. Study Area



1.3 SCOPE AND CONTENT.

This LRTP contains the following:

(1) Outline of assumptions to be used in estimating travel and travel needs for comprehensive planning.

(2) Inventory of existing capital facilities and transportation services including:

  (a) Land: Streets, highways, pedestrians, and bicycles.

  (b) Public Transit: Routes and service, etc.

(3) Proposed LOS standards for arterial streets.

(4) Outline systems improvements to bring substandard facilities up to the desired LOS.

(5) Forecast traffic levels for the next ten years, based on the land use plans of the Tulalip Tribes and surrounding unincorporated and incorporated areas that are expected to affect local traffic demands.

  (a) Location and capacity improvement recommendations.

  (b) Recommendations for new facilities or routes.

(6) Analysis of funding capability and funding sources.

(7) Identification of additional transportation strategies and needs other than capacity improvements already identified in the TSTP.

1.4 GOALS, POLICIES, AND THE VISION FOR TULALIP TRIBES

This LRTP identifies the basic goals and objectives of the transportation system. The Tulalip Tribes have gone through an extensive visioning process and policy review in order to determine the most desirable direction and actions of this LRTP. The LRTP will provide a strategy that will implement the Tribal vision by:

(1) *Encouraging efficient multi-modal transportation systems based on local priorities and coordinated with the Tribal Reservation Comprehensive Land Use Plan - Draft, as well as state, local and federal plans.*

(2) S*trategically investing in transportation facilities to support the economic and community growth of the Tulalip Reservation.*

Supporting Policies:

- Connect residential areas with centers through expanded transit service.
- Promote moderate expansion of key roadways that support centers and access to jobs.
- Promotion of programs encouraging transit and ridesharing options, modifying travel behavior.
- Development of a regionally coordinated network of facilities for pedestrians and bicycles.
- Maintaining the existing transportation system in a safe state.

- Promotion of transportation projects that get the most efficiency out of existing roads.
- Promotion of programs that shift travel demand to less congested times or reduce demand.

(3) **The Tulalip Tribal Vision:** The Tulalip Tribes Reservation wide LRTP will:

- promote convenient, accessible, safe, and environmentally responsible transportation for residents, employers, employees, visitors, and commerce.
- support alternatives to the automobile, such as walking, bicycling, public transportation, carpooling, ferries, etc.
- be integrated, convenient, and reliable, and encourage connectivity and economic vitality.
- support vibrant and healthy neighborhoods.
- incorporate aesthetic landscape and design elements to enhance neighborhood character and encourage safe and convenient walking and cycling.

(4) **Tulalip Tribes' Transportation Goals:** the following goals support the vision of the Tulalip Tribes:

Multi Modal:

T1 Encourage development of an integrated multimodal transportation system that provides a variety of convenient transportation choices to improve the movement of people, goods, and freight.

T1a This step requires new development and redevelopment to incorporate transit, pedestrian, and non-motorized transportation measures during the development review process, including measures such as:

- Provide bus/transportation shelters, pullouts;
- Provide adequate sidewalks, pathways and crosswalks that allow for access by all persons;
- Minimize walking distance between buildings, streets, sidewalks, and transit stops;
- Preserve and extend the connectivity of the pedestrian, bicycle, and grid street system;
- Minimize neighborhood street widths to reduce speeds and crossing distances;
- Incorporate open space and green space in streetscapes.

T1b Work continues with Community Transit to coordinate transit schedules and further transportation conveniences.

Community Character:

T2 Develop transportation improvements that reflect Tulalip Tribes natural, historic, maritime, waterfront, and character, consistent with the short and long-term vision of the Tulalip Bay Vision Plan I and II, Comprehensive Land Use Plan, Zoning Ordinance and Design Build Guidelines.

T2a These guidelines reflect both the rural and urban nature of roadways within the Tulalip Reservation by encouraging where appropriate:

- Street trees and landscaping;
- Traffic calming strategies and devices;
- Street lighting;
- Accommodations for transit stops;
- Crosswalks and sidewalks.

Environment:

T3 Develop and maintain a transportation system that respects the natural environment including the quality of the Tulalip Reservation air, water and natural habitats. To accomplish this:

T3a Preserve and restore natural habitats and native vegetation.

T3b Minimize impacts of road construction on environmentally sensitive areas; minimize damaging storm water runoff and pollution from road use and maintenance.

T3c Implement programs that encourage the planting of low-maintenance, vegetated groundcover and trees along roadways.

T3d Wherever possible and economically feasible, create under-grounding of overhead utilities to reduce the need for removal and maintenance of roadside vegetation.

Neighborhoods:

T4 Protect residential neighborhoods from negative transportation impacts. To accomplish this:

T4a Minimize the impacts of traffic on residential neighborhoods through discouraging the regular use of local access streets by non-local traffic.

T4b Maintain connectivity of the transportation system.

T4c Reduce speed on neighborhood streets through the use of street design devices such as curb bulbs, "median obstacles," or other measures proven to be safe and effective at reducing travel speeds.

T4d Establish and maintain traffic control program for assessing and responding to residential neighborhood traffic control concerns. Establish standards for maximum desirable traffic volumes and percentage of non-local traffic. Establish a process for escalating control responses based on the severity of the disturbance to the neighborhood.

T4e Minimize neighborhood street widths and crossing distances.

Levels of Services/Operations:

T5 Improve mobility and connectivity through identification and implementation of improvements that maintain strategic development standards. Ongoing efforts continue to develop concurrency which will:

- Ensure that the Tribal policy for the provision for safe and adequate access and the allocation of responsibility for immediate or future road improvements necessitated by new development is fairly and consistently applied to all developments;
- Ensure that those transportation facilities necessary to support development shall be adequate to serve the development concurrent with the time the development is occupied.

Adoption of LOS standards:

- These standards will establish LOS criteria on an identified list of links and/or intersections within the Reservation.
- Through the creation of this system impacts are accessed on LOS to be established during the development permitting process.
- Adoption of this step will allow staff to enforce a concurrency system that does not issue development permits unless and/or until maintenance of adopted LOS standards on links or at intersections impacted by a development proposal is assured.

Safety:

T6 Ensure public safety through maintenance of infrastructure and incorporation of safety enhancements in transportation improvement projects. To accomplish this:

T6a Maximize functionality and safety of the local circulation system.

- Control the location and spacing of commercial driveways and the design of parking lots to avoid traffic and pedestrian accidents, confusing circulation patterns, and line-of-sight obstructions.
- Designate and clearly mark appropriate routes for through truck traffic, hazardous materials transport, and oversized traffic.
- Develop and utilize clear and uniform signage to guide traffic throughout the Reservation.
- Encourage bus pull out lanes.
- Establish a regular maintenance schedule for the existing transportation inventory.
- Enhance the reservations accident reporting and historical documentation.

Through Traffic/State Highways:

T7 Ensure state facility improvements meet the goals of the Tulalip Tribe transportation vision and Comprehensive Plan while minimizing the negative impacts on the local transportation system.

T7a Tulalip Tribes is an active participant in the cooperative regional transportation planning processes.

T7b All efforts are taken to expand opportunities for public involvement in the identification, design, and implementation of transportation related improvements within the Tulalip Reservation.

T7c Staff continues to work with Snohomish County, WSDOT, regional transportation agencies, and transportation providers to plan, fund, and implement joint transportation projects and programs.

T7d Executive members continue to meet, discuss and support improvements on State Highways to reduce congestion, and improve safety and access for through traffic, local traffic, and non-motorized and transit users.

Transit:

T8 Encourage the use of public transit and encourage transportation agencies to operate and maintain local and regional service and facilities that reduce the need for single-occupant vehicles and support the needs of transit-dependent users.

T11a Efforts continue to work with transportation providers to develop a public transportation system that allows for convenient and efficient travel between centers.

T11b Continue to work with Community Transit to designate appropriate park & ride facilities, as well as appropriate locations.

T11c Continue to work towards identification of possible corridors for development of future mass transit options such as light rail, monorail, and bus rapid transit and intermodal transportation.

T11d Continue to expand usage and infrastructure for mass transportation.

T11e Encourage and support the use of public transit by bicyclists and pedestrians to:

- Provide safe, attractive comfortable walkways and waiting facilities at public transit loading areas.
- Provide bicycle storage at transit facilities;
- Install bicycle racks on buses, and
- Develop and distribute information concerning local and regional non-motorized routes is a crucial element of this public outreach program.

Non-Motorized:

T9 Continue to provide a transportation system that effectively serves the needs of and encourages pedestrian, bicycle and other non-motorized travel. This work continues in the following arenas:

T9a Develop a non-motorized transportation plan which will:

- Maximize safety when identifying pedestrian and bike paths corridors.
- Establish uniform signage to designate bike paths.

T9b Ensure that designated centers are walkable, and encourage connectivity.

T9c Maintain existing and create new, engineered bike lanes.

T9d Adopt street standards, which require bike lanes on identified bike routes.

T9e Connect non-motorized routes with parks, recreation areas and open-commercial- and public spaces.

Economic:

T10 Incorporate the needs of business and commercial traffic flow through the development of transportation improvements that affect commercial and industrial centers. Work continues in the area of:

T10a Establish and identify a signage plan for truck and oversized load route.

T10b Apply appropriate street design standards for industrial and commercial districts, that allows for the easy movement of goods and services.

T10c Prioritize circulation system improvements needed to address safety, maintenance, congestion relief, multi-modal projects, transit, and growth.

T10d Continue to coordinate closely with policy makers to secure adequate funding sources for transportation improvements and services through a variety of mechanisms including traffic mitigation fees

(5) **Quil Ceda Village Goals and Policies**: The following goals and policies for Quil Ceda Village, the economic core on the tribal reservation, are summarized as follows:

Goals:

- Provide the community with economic growth – present and future;
- Enhance the sense of community, provide environmental quality;
- Provide long-term environmental protection and the restoration of resources for the use and enjoyment of future generations;
- Enhance the sense of tribal community; provide environmental quality, ecological functions and open space by creating incentives to developers who provide environmentally sensitive development projects.

(6) **Relationships to Existing Plans & Policies:** In addition to the vision statements and goals, The Tulalip Tribes as a whole have also reviewed the goals and policies of its existing plans, as well as the provisions of the following plans to ensure consistency:

1. The Tulalip Tribes Comprehensive Land Use Plan – Preliminary Draft – 2008
2. I-5 / 116th Street NE Access Point Decision Report, Parametrix, – 2005
3. County Transportation Element (Snohomish Co.) – 2007
4. Destination 2030:Metropolitan Transportation Plan (PSRC) – 2001
5. Highways of Statewide Significance – WSDOT - Update 2003
6. Quil Ceda Village Business Park Environmental Assessment – 2003
7. Quil Ceda Village Development Final Environmental Assessment Supplemental Environmental Documentation, HDR July 2002

8. Quil Ceda Visioning Charette 2002/2006
9. Snohomish County Non motorized Facilities Plan – Adopted: 2002
10. Transit First (Community Transit's Draft Six-Year Transit Development Plan) – 2003
11. Washington State Highway System Plan 2003-2022 WSDOT
12. Quil Ceda Village Road Design Standard
13. Tulalip Bay Vision Plan – 2005
14. Tulalip Bay Vision Plan II – 2008

2. EXISTING CONDITIONS AND DEFICIENCIES

This section of the TSTP describes the existing transportation system conditions in the study area. This includes a description of the roadway characteristics, functional classification, traffic volumes, LOS (Level of Service), accidents, transit service, and pedestrian and bicycle facilities.

2.1 ROADWAY CHARACTERISTICS AND FUNCTIONAL CLASSIFICATIONS

Table 5 lists the functional classification of the arterial roadway system serving the Tulalip Tribal Reservation. Identification of the roadway functions is the basis for planning roadway improvements and the appropriate standards (right-of-way width, roadway width, design speed) that would apply to each roadway facility. The following definitions serve as a general guide in determining street classifications:

- **Major Arterials –** Intercommunity roadways connecting primary community centers with major regional transportation facilities. Major arterials are generally intended to serve through traffic. It is desirable to limit direct access to abutting properties.
- **Minor Arterials –** Intracommunity roadways connecting community centers with major arterials. In general, minor arterials serve trips of moderate length. Access is partially controlled with infrequent access to abutting properties.
- **Collectors** – Streets connecting residential neighborhoods with smaller community centers and facilities as well as access to the minor and major arterial system. Property access is generally a higher priority for collector arterials; through-traffic movements are served as a lower priority.
- **Local Access Streets** – Area streets providing direct access to individual residential or commercial properties

The Tulalip Tribes Long Range Transportation Plan addresses primarily the arterial street system within the Tulalip Reservation since local access and collector streets typically do not have capacity deficiencies. However, collectors and local access streets are an integral part of the street network, and are important travel routes used by pedestrians and bicyclists. Creating safe travel routes for pedestrians and bicyclists are discussed in subsequent chapters.

The reservation has a fairly well developed circulation system with the county road system providing the major structure of the system. A network of roads and streets that have been privately developed and are open to public use further supplements this system. In addition, there are Bureau of Indian Affairs (BIA) roads and tribally owned roads that service the Reservation Community.

The road system on the Tulalip Reservation comprises over 128 miles of state, county, BIA, tribal, and other private roads, not all of which are paved. The maintenance/responsibility of these roads is divided such that 57 miles are maintained by Snohomish County, 26 miles by the Tulalip Tribes themselves with the remainder being private roads other than the BIA Public Road System which consists of one route (Route 52) totaling 0.7 miles of paved roadway. A physical inventory confirms that in general, roads, which serve developed areas, are paved in good condition. The majority of the arterial roads on the reservation are county roads and are in fair-to-good condition. Many of the shorter local roads need significant maintenance or reconstruction. Several roads are under threat to lose postal service if these roads are not improved.

Maintenance of BIA routes on the Tulalip Reservation is handled by sub-contracting through the Puget Sound Agency, headquartered in Portland, Oregon. Only the most critical maintenance problems have been addressed in past years because of severe funding limitations. This includes snow removal, which is often left to the county and then only done on major arterials and school bus routes.

Arterial Routes on the Tulalip Tribes Reservation

The Tulalip Reservation is bordered on the east side by I-5 and along its south and west side by the Marine Drive (minor arterial)/Port Susan with 140th Street (Firetrail road major arterial) completing a loop along the north side. Access to the area is predominantly provided either from I-5 via the Marine Drive (Major arterial), 88th Street NE (Major arterial) or 116th Street NE interchanges (Major arterial) or from the east (Marysville) across the above identified interchanges over crossings. Secondary access to the area is provided via the extension of Marine Drive to the North (Stanwood) and 136th Street over crossing that provide access to the east from 140th Street and to the northeast part of the reservation via the 136th Street NE connection to 34th Avenue NE that runs along the west side of I-5 north of the Quil Ceda Village Business Park.

Marine Drive is west of I-5 and goes 12.2 miles from the southern edge of the reservation following the west side all the way to the north side. It provides the primary access to I-5 for the residential portion of the Tulalip Tribes. The driving surface width is 50-30 feet as it varies from a 5-lane to 2-lane road with sidewalk or paved shoulder, respectively. The County is responsible for the maintenance of the road. The terrain is primarily flat with some rolling. There is a significant population of Tulalip Tribes tribal members that live in and around Marine View Drive and several of these tribal members own land in this area. This road also is used for recreational and employment purposes. The daily traffic on this road near its connection with I-5 is approximately 23,000 average daily trips (ADT). Along the 3-lane section west of 27th Avenue NE there are approximately 13,500 ADT and on the 2-lane section, the west section of Marine Drive, there is approximately 10,000 ADT or less.

Quil Ceda Way (also known as 88th Street NE) is an existing arterial located south of the Quil Ceda Village Business Park. 88th Street east of I-5 is a five-lane road with curb-gutter-sidewalk both sides and an ADT volume of approximately 24,000 vehicles per day (vpd). Between the northbound ramp and southbound ramp terminals, 88th Street is a 6-lane road with curb-gutter-sidewalks both sides and includes a 215-foot long bridge structure over I-5 with pedestrian walkway. There are two lanes in each direction and two westbound left-turn lanes on the overpass at the southbound ramp intersection. There are two eastbound through lanes, an eastbound left-turn lane and three westbound trough lanes on the overpass at the northbound ramp intersection. West of the southbound ramp terminal to 27th Avenue NE, 88th Street is a four/5-lane roadway with shoulders and open drainage ditches. The ADT on this section is approximately 24,600 vpd. 88th Street NE ends at 27th Avenue NE, beyond 27th Avenue NE is an access to an office building. Intersection traffic controls are: traffic signals at 36th Drive NE, Quil Ceda Boulevard, the I-5 northbound ramp terminals, and the I-5 southbound ramp terminals; and, stop sign control at the intersection with 27th Avenue NE (all way stop).

116th Street NE is the existing arterial along the northerly border of the Quil Ceda Village Business Park. 116th Street NE to the east of 36th Avenue NE is a two to five-lane road that is improved along the north side, but has paved shoulders and open drainage along the south side. There are approximately 18,650vpd on the east side of Interstate-5. 116th Street NE between 36th Drive NE and 34th Avenue NE crosses over I-5 and includes signalized intersections at the northbound and southbound ramp terminals; the ADT within this section is 17,500 vpd. The roadway section has three lanes with single eastbound and westbound left-turn lanes. There are dedicated left-turn lanes for the northbound and southbound on-ramps. The structure over I-5 is 275 feet long with a pedestrian walkway on the north side. Between 34th

Avenue NE and 27th Avenue NE, 116th Street is 4/5 lanes with wide shoulders; the ADT within this section ranges from 13,800 vpd west of 34th Avenue NE to 4,000 vpd east of 27th Avenue NE. West of 27th Avenue NE, the roadway has two traffic lanes without shoulders and an ADT of 1,900 vpd. Intersection traffic control consists of: traffic signals at Quil Ceda Boulevard, the I-5 northbound ramp terminal and I-5 southbound ramp terminals; and, stop sign control at the intersection with 34th Avenue NE (stop on 34th Avenue NE) 27th Avenue (all way stop). Spring of 2008 the Tribe, WSDOT, BIA and FHWA jointly funded the installation of a new 140 ft long – 18' diameter culvert under the 116th Street NE area. This work was necessary due to the fact that the 50 year old culvert now in year 33 was corroding and the new one will improve fish passage. The project also involved the widening between the I-5 southbound ramp terminals and Quil Ceda Boulevard to provide additional traffic benefits thus reducing congestion. An additional westbound lane west of the interchange was added to reduce delays at the interchange.

Table 2. Arterial Street Functional Classification & Maintenance Responsibility

Roadway	Section	Functional Classification & Maintenance Responsibility	
		Functional Class	Maintenance responsibility
Marine Drive NW /NE	4/5-lane urban east of 27th Ave NE, 3-lane urban 27th Ave to 7th Dr NW, 2-lane rural w/channelization @ major intersections west of 7th Drive NW	Arterial	County
140th Street NW /NE (Firetrail Road)	2-lane rural/long intersection spacing channelization @ major intersections	Arterial	County
88th Street NE (Quil Ceda Way)	4/5-lane with paved shoulders	Arterial	Tribes
34th Avenue NE	2-lane rural /long intersection spacing channelization @ major intersections	Arterial	County
27th Avenue NE	2-lane rural/long intersection spacing channelization @ major intersections	Arterial	County/Tribes
Quil Ceda Boulevard	5/3-lane with paved shoulders or sidewalk on one side	Arterial	Tribes
99th Street NE	4/5-lane with paved shoulders & sidewalk on one side	Collector	Tribes
Quil Ceda Parkway	3/4-lane with paved shoulders or sidewalk on one side	Collector	Tribes
105th Street NE	3/4-lane with paved shoulders or sidewalk on one side	Collector	Tribes
19th Avenue NE	2-lane rural minimum shoulders no channelization	Collector	County/Tribes
64th Street NW	2-lane with some pedestrian facilities no channelization	Collector	County
Meridian Av N	2-lane rural minimum shoulders no channelization	Collector	County
Water Works Road	2-lane rural minimum shoulders no channelization	Collector	County
Turk Road	2-lane rural minimum shoulders no channelization	Collector	County
Totem Beach Road	2-lane urban type road with sidewalks on one side	Collector	County
76th Pl NW	2-lane with some pedestrian facilities no channelization	Collector	BIA

Quil Ceda Boulevard is located 500 feet west of the I-5 southbound Ramp/88th Street NE intersection and east of the wetland and tributary to Quil Ceda Creek. It is constructed as a 5-lane roadway for the first 300 feet north of 88th Street NE, and then is a 4–lane roadway up to the end of the south retail center area and then as a 3-lane road (with center turn lane) up to 99th Street NE. It is a 5-lane section north of

99th Street NE up to 116th Street. Quil Ceda Boulevard continues north from 116th Street NE and intersects with 34th Avenue NE. Quil Ceda Boulevard has a 5-lane section north of 116th Street NE, but tapers to a 3-lane section and then to a 2-lane section at the intersection with 34th Avenue NE. The ADT on Quil Ceda Boulevard immediately north of 88th Street is 26,000 ADT and 8,900 ADT immediately south of 116th Street NE. The ADT north of 116th Street NE is 7,900 ADT.

140th Street (Firetrail Road) is an existing east west arterial along the northerly border of the Tulalip Tribes Reservation. It connects Marine Drive NW to the west with 34th Avenue NE and 136th Street NE to the east thus providing access south to the I-5/116th Street interchange for the Lakewood area and access to Marysville via the 136th Street NE over crossing. 140th Street NE is a two-lane road with some paved shoulders and open drainage. The ADT is 8,800 vpd near I-5 and 3,000 ADT near Marine Drive NW.

34th Avenue NE is an existing north south arterial along the eastern border of the northern part of the Tulalip Tribes Reservation. It connects 140th Street NE and the 136th Street NE over crossing in the north with the I-5/116th Street interchange and Quil Ceda Village Business Park road in the south. 34th Avenue NE is a two-lane road with some paved shoulders and open drainage. The intersection of 34th Avenue NE at 128th Street NE has recently been improved to include a northbound left-turn lane to mitigate an existing safety issue. A roundabout at the intersection of the Quil Ceda Boulevard extension and 34th Avenue NE has been constructed by Tulalip Tribes. The 1-lane roundabout has been constructed by Tulalip Tribes as part of the 116th Street NE interchange improvements. The ADT is 4,200 vpd south of the intersection with Quil Ceda Boulevard and approximately 12,000 ADT north of the roundabout.

27th Avenue NE (also known as Quil Ceda Avenue) borders the westerly side of Quil Ceda Village Business Park. It is a two-lane arterial with shoulders and open drainage constructed to current design standards. There is a center two-way-left-turn-lane at the intersection of 27th Avenue NE and 74th Street NE. The ADT is 7,300 vpd south of 88th Street and 5,300 south of 116th Street.

31st Avenue NE and 33rd Avenue NE are 2-lane roadways that provide north-south access to the commercial areas along Marine Drive in the vicinity of I-5. 33rd Avenue NE provides access to Marysville as an alternate to Marine Drive, but it does not have the capacity of Marine Drive. The intersection of 31st Avenue NE and 33rd Avenue NE are Marine Drive are both signalized. Both roadways are anticipated to carry 7,000 ADT or less.

105th Street NE, 99th Street NE, Herman Williams Road and Quil Ceda Parkway are internal collector arterial roads within the Quil Ceda Village Business Park. 105th Street NE and 99th Street NE are east/west roadways that are north and south of the Casino and Hotel. Quil Ceda Parkway runs parallel to Quil Ceda Boulevard and terminates at the Hotel. Herman Williams Road connects Quil Ceda Boulevard with 105th Street NE along the west side of the Seattle Premium Outlet stores. The roads have been constructed with curb & gutter and sidewalk/bike lanes. The roads currently provide access to the Seattle Premium Outlet stores, the Casino and the Hotel, but will also provide access for future development within the business park.

Meridian Avenue N, 76th Avenue NW, 64th Street NW, 19th Avenue, Turk Road, Water Works Road and Totem Beach Road are all 2 lane rural road with 18-20 feet of pavement with no pedestrian facilities. All existing traffic volumes are below 4,000 ADT.

I-5 Interchanges Providing Linkage to Tulalip Tribes Reservation

The I-5 interchange at **88th Street** is a standard diamond interchange. The northbound off-ramp has recently been widened by Tulalip Tribes to include a right-turn lane, a left-turn lane and a shared

left/through/right-turn lane at the ramp terminal. Also, an additional westbound through lane has been added to the structure by the Tulalip Tribes. The northbound on-ramp is a single lane ramp. The southbound off-ramp has been recently improved with the addition of a separate right-turn lane. The southbound on-ramp is a two-lane ramp at 88th Street so it can accept the two westbound-to-southbound left-turn lanes from 88th Street.

The I-5 interchange at **116th Street** is a standard diamond interchange. The northbound off-ramp widens to a single right-turn lane and a single left-turn lane at the ramp terminal. The southbound and northbound on-ramps are single lane ramps. The southbound off-ramp widens to a single right-turn lane and a single left-turn lane at the ramp terminal. This interchange is planned to be improved to a Single-Point Urban Interchange (SPUI) based on future volumes. This improvement is not currently scheduled for completion due to funding shortfalls.

The I-5 interchange at **Marine Drive** is a standard diamond interchange. The northbound off-ramp widens to a single right-turn lane, a shared through/right-turn lane and a single left-turn lane at the ramp terminal. The northbound on-ramp is a single lane ramp. The southbound off-ramp is a single-lane ramp that widens for separate left- and right-turn lanes. The southbound on-ramp is a two-lane ramp at 116th Street so it can accept the two westbound-to-southbound left-turn lanes from 4th Street NE (Marine Drive west of I-5).

2.2 TRAFFIC VOLUMES

Existing two-way daily traffic volumes are shown on Figure 2. These volumes are based on daily and PM peak-hour counts recorded between the years 2003 and 2008. Figure 3 show the PM peak hour traffic counts recorded between the years 2006 and 2008 by the Tulalip Tribes, the County, WSDOT and independent count firms. The average daily weekday traffic volumes shown in Figure 2 range from less than 1,000 vehicles per day on 19th Avenue to 26,000 on Quil Ceda Boulevard north of 88th Street NE. The PM peak hour volumes range from less than 200 peak hour directional trips on Waterworks Road to over 1,200 peak hour directional trips on 88th Street NE west of I-5.

Figure 2. Existing Traffic Volumes and Level of Service – Average Weekday

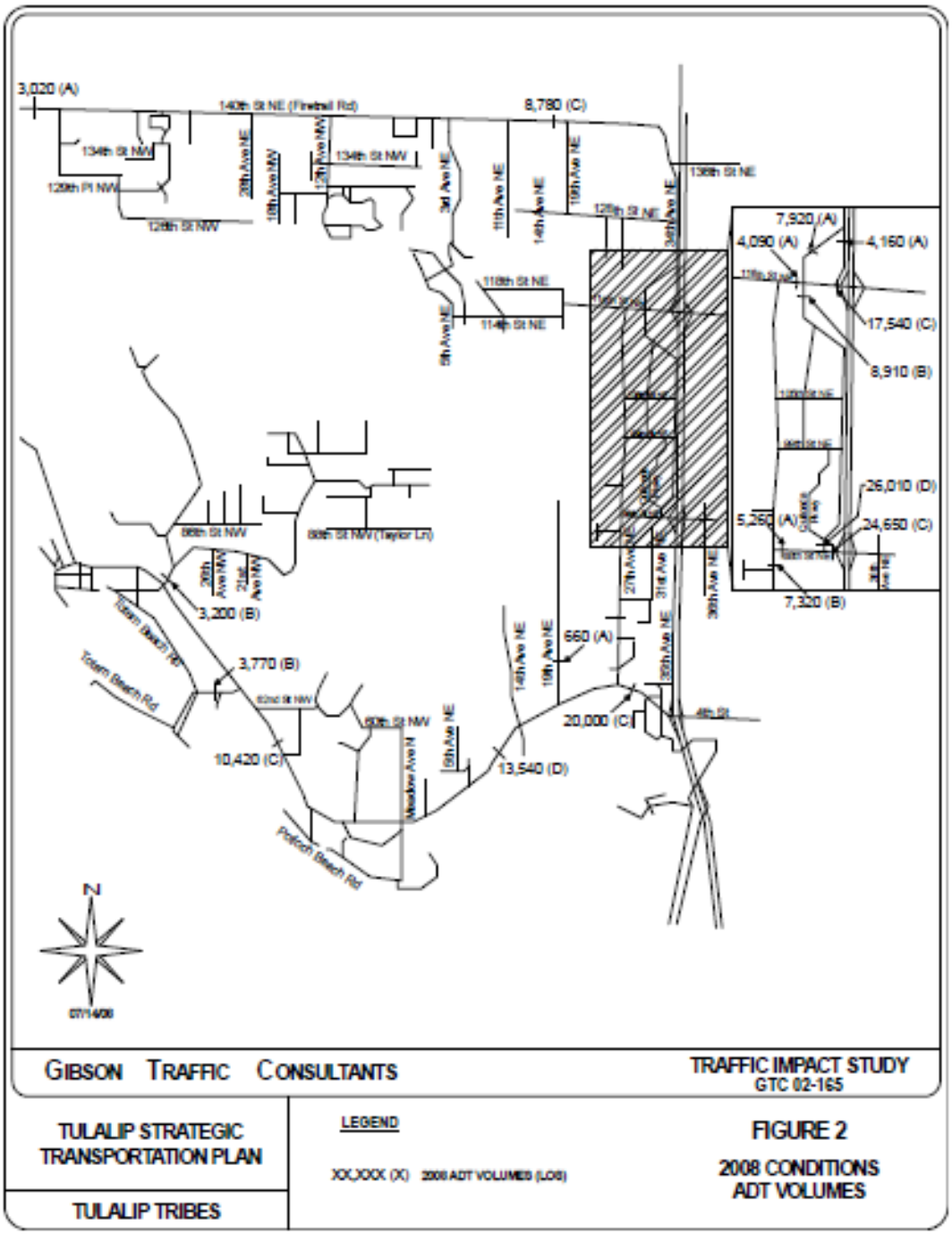
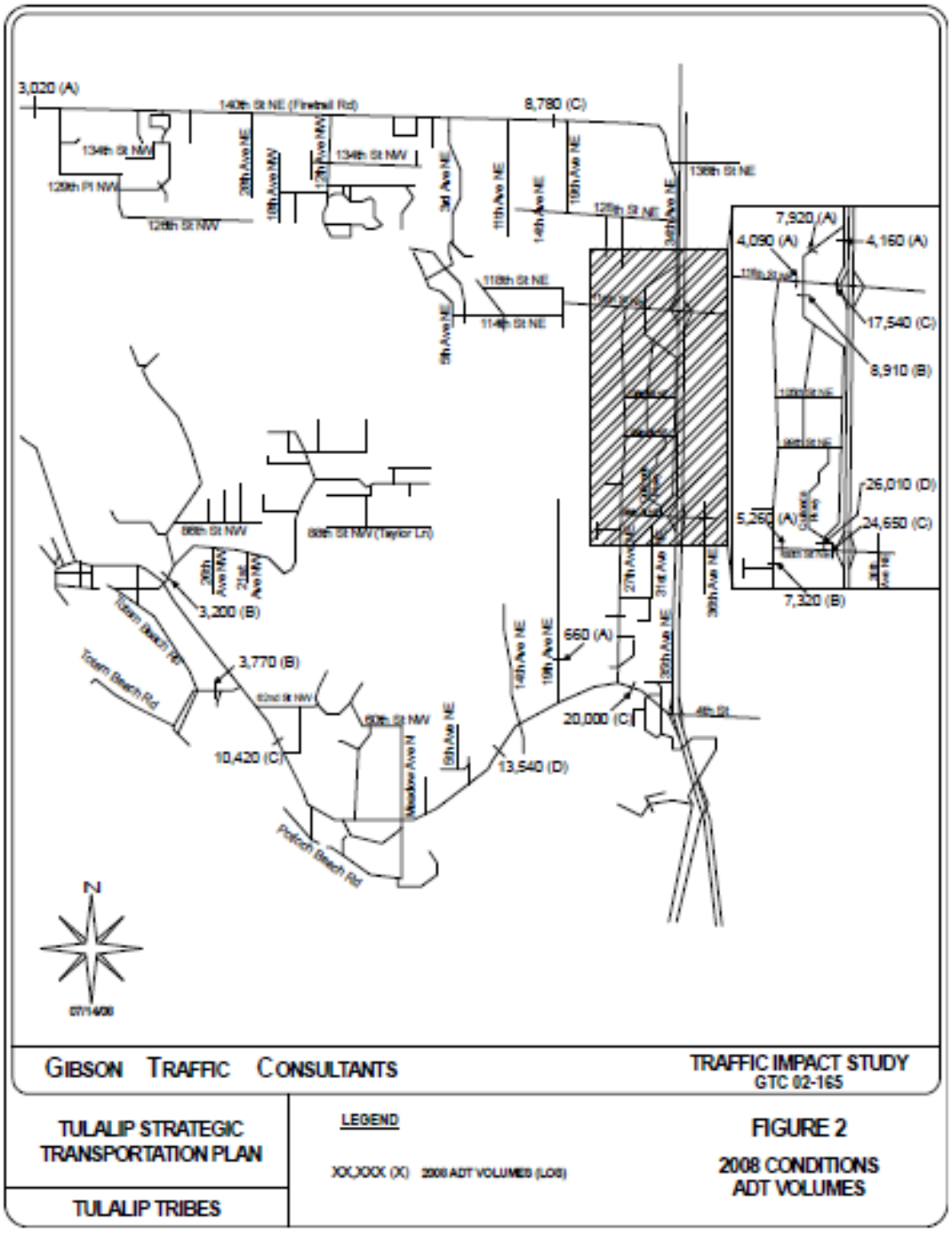


Figure 3. Existing PM Peak Hour Traffic Volumes and Level of Service



2.3 LEVEL OF SERVICE

The following section provides a summary of the roadway LOS standards and methodology used for the TSTP. The purpose of this information is to provide an overview of LOS and to identify its relationship to the transportation goals and policies of the Tribal Board of Directors.

(1) **Level of Service Definition:** LOS is an estimate of the quality and performance of transportation facility operations in a community. One commonly used method is the Transportation Research Board's *Highway Capacity Manual 2000* (HCM) LOS system. The degree of traffic congestion and delay is rated using the letter "A" for the least amount of congestion to the letter "F" for the highest amount of congestion. The following LOS categories provide general descriptions of the different levels of service defined in the HCM. The community decides what level of traffic congestion is tolerable (i.e., decides whether their standard is "D," "E," or some other level). The choice of a particular LOS threshold can vary by planning sub area, roadway classification, or specific corridor or street.

(2) **Level of Service Categories:**

- **LOS A**. A free-flow condition. Speeds are at or near the speed limit and little to no delay exists. Freedom to select desired speeds and to make turns and maneuver within the traffic stream is extremely high.
- **LOS B**. Zone of stable flow. Drivers still have reasonable freedom to select their speed. Only minor delays of 10 to 20 seconds per vehicle at signalized intersections are experienced.
- **LOS C**. Still in the zone of stable flow, but speeds and maneuverability are more closely controlled by the higher volumes. The selection of speed is not affected by the presence of others, and maneuvering within the traffic stream requires vigilance on the part of the driver. Longer delays of 20 to 35 seconds per vehicle are experienced at signalized intersections.
- **LOS D**. Approaches unstable flow. Speed and freedom to maneuver are somewhat restricted with average delays of 35 to 55 seconds per vehicle at signalized intersections. Small increases in traffic flow can cause operational difficulties at this level.
- **LOS E**. Represents operating conditions at or near the capacity of the roadway. Low speeds (approaching 50 percent of normal) and average intersection delays of 55 to 80 seconds per vehicle exist at signalized intersections. Freedom to maneuver within the traffic stream is extremely difficult. Any incident can be expected to produce a breakdown in traffic flow with extensive queuing.
- **LOS F**. Describes forced flow operation at very low speeds. Operations are characterized by stop-and-go traffic. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Long delays of over 80 seconds per vehicle occur at signalized intersections.

A more technical method has been developed in the Highway Capacity Manual (HCM) to measure LOS, involving the calculation of the volume to capacity ratio (V/C) of the roadway or intersection. Table 3 summarizes the V/C ranges for determining planning level mid-block LOS on urban and rural roadways.

Table 3. Level of Service Definitions for Urban and Rural Roadways

LOS		Volume/Capacity (V/C) Ratio
A	Less than or equal to	0.30
B	Less than or equal to	0.50
C	Less than or equal to	0.75
D	Less than or equal to	0.90
E	Less than or equal to	1.0
F	Greater than	1.0

Note: Based on 2000 Highway Capacity Manual.

More detailed methodologies to calculate LOS at specific locations such as Non-signalized or signalized intersections are also outlined in the HCM. LOS experienced at specific intersection locations may not necessarily be consistent with LOS along adjacent roadway links, since intersection LOS is dependent upon a variety of other factors, including intersection traffic control, signal timing/phasing, intersection geometrics, and cross-street traffic volumes.

(3) **Existing Link Level of Service:** Based on current traffic volumes, the volume to capacity ratio and LOS was calculated for mid-block arterial roadway sections throughout the Reservation. The results shown in Table 3 indicate that Marine Drive between 27th Avenue NE and 7th Drive NE and Quil Ceda Boulevard between 88th Street and Quil Ceda Parkway are already at LOS D. The link analysis indicated there are no links that exceed the proposed LOS thresholds at this time.

(4) **Existing Intersection Level of Service:** Based on current traffic volumes, the operational intersection LOS was calculated for the critical arterial/arterial signalized intersections within the reservation. Additionally, the critical minor approach LOS for non-signalized arterial intersections for critical locations was also analyzed. The results are shown in Table 4 and graphically in Figure 3. LOS D west of 7th Drive NW and LOS E east of 7th Drive NW were selected as the initial LOS criteria to identify system deficiencies. The intersection operational analysis indicated there are no intersections that exceed the LOS threshold.

Table 4. Existing Corridor Level of Service

Street	Section	Two-Way Average Daily Volume	Capacity	LOS
Marine Drive	7th Dr NW to 140th St NW	10,420	16,000	C
27th Avenue NE	Marine Dr NE to 88th St NE	7,320	16,000	B
34th Avenue NE	South of Quil Ceda Blvd	4,160	16,000	A
140th Street NW	34th Ave NE to 11th Ave NE	8,780	16,000	C
140th Street NW	11th Ave NE to Marine Dr	3,020	16,000	A
Marine Drive NE	27th Ave NE to 7th Dr NW	13,540	16,800	D
116th Street NE	Quil Ceda Blvd. to 27th Ave NE	4,090	16,800	A
88th Street NE	I-5 to Quil Ceda Blvd.	24,650	38,000	C
88th Street NE	Quil Ceda Blvd to 27th Ave NE	5,260	28,000	A
116th Street NE	I-5 to Quil Ceda Blvd	17,540	28,000	C
Marine Drive NE	I-5 to 27th Ave NE	20,000	28,000	C
Quil Ceda Blvd	88th St NE to Quil Ceda Parkway.	26,010	34,000	D
Water Works Road	Entire Length	3,200	8,000	B
19th Avenue NE	Marine Dr NE to 19th Ave NE (Rainwater Rd)	660	8,000	A
64th Street NW	Entire Length	3,770	8,000	B
Quil Ceda Blvd	South of 116th St NE	8,910	28,000	B
Quil Ceda Blvd	North of 116th St NE	7,920	28,000	A

Table 5. Existing Intersection Level of Service

Intersection		2008 Existing	
		LOS	Delay
1.	116th St NE @ 27th Ave NE	A	7.8 sec
2.	116th St NE @ Quil Ceda Blvd	B	18.5 sec
3.	116th St NE @ 34th Ave NE	B	11.6 sec
4.	116th St NE @ I-5 SB Ramps	B	15.3 sec
5.	116th St NE @ I-5 NB Ramps	C	32.6 sec
6.	88th St NE @ 27th Ave NE	B	12.1 sec
7.	88th St NE @ Quil Ceda Blvd	B	18.7 sec
8.	88th St NE @ I-5 SB Ramps	B	13.7 sec
9.	88th St NE @ I-5 NB Ramps	C	30.7 sec
10.	88th St NE @ 36th Dr NE	B	15.4 sec
11.	Marine Dr NW @ Water Works Rd	B	10.6 sec
12.	Marine Dr NW @ 64th St NW	C	18.5 sec
13.	Marine Dr NE @ 19th Ave NE	D	25.2 sec
14.	Marine Dr NE @ 27th Ave NE	B	14.2 sec
15.	Marine Dr NE @ 31st Ave NE	C	31.3 sec
16.	Marine Dr NE @ 33rd Ave NE	B	19.9 sec
17.	Marine Dr NE @ I-5 SB Ramps	C	24.1 sec
18.	Marine Dr NE @ I-5 NB Ramps	C	27.6 sec
19.	136th St NE @ 34th Ave NE	B	16.9 sec

2.4 ACCIDENT INFORMATION

Accident data is available at WSDOT intersections. The Tulalip Tribes Police keep their own accident records as does Snohomish County Sheriffs and WSDOT State Patrol. Due to separate accident history reporting techniques differences in history search results may occur. An example of this is along 27th Avenue NE. Accident records from a manual Tulalip Tribes record search shows 23 accidents, but Snohomish County records only show 6 accidents for the same period. The accident data from the Tulalip Tribes showed 18 accidents at the intersection of Marine Drive and 27th Avenue NE, while the Snohomish County data did not show any accidents at this intersection. It is difficult to determine accurate data based on county records alone and therefore which Tulalip Tribes intersections and roadways have high accident rates. Enhancements to the Tulalip Accident data base are being further developed.

The historic Tulalip accident data on 27th Avenue NE is included in this document, as an example of the difference a detailed accident data base can make. The data was collected for the period from the beginning of the year 2004 through March of 2007. The intersections were reviewed for the number of accidents.

The criteria used to determine if an intersection should be considered for further examination from a safety perspective were:

- Five or more average accidents per year for Non-signalized intersections

- Ten or more average accidents per year for signalized intersections.

This is similar to the criteria used by the City of Seattle to identify intersections that should be examined from a safety perspective. After many years of using these thresholds, the City of Seattle has found them to be a simple way of identifying possible safety issues and prioritizing intersection improvements. Table 6 identifies the intersections that exceed accident thresholds based on the average number of accident between the years 2004 through 2007. All intersections/locations with an annual average of 1 accident per year or more have been summarized.

As shown in Figure 4, the only intersections or segments to meet the high accident location threshold for additional analysis, when the Tulalip Tribes and Snohomish County data are combined, are the Marine Drive at 27th Avenue NE intersection and the section between 74th Street NE and 77th Street NE. The intersection of Marine Drive at 27th Avenue NE has an annual accident rate of 6 accidents per year. The section of 27th Avenue NE between 74th Street NE and 77th Street NE has an annual accident rate of 1 accident per year.

The intersection of 34th Avenue NE at 128th Street NE has recently been improved to mitigate an accident history that was included in the previous TSTP. The intersection now has additional channelization on 34th Avenue NE that should reduce the number and severity of accidents. However, it is not possible to determine if this improvement has reduced the number of accidents due to a lack of a comprehensive database.

The accident data from the 2003 TSTP is included in Table 6 since it is the most reliable data available due to the change in reporting criteria.

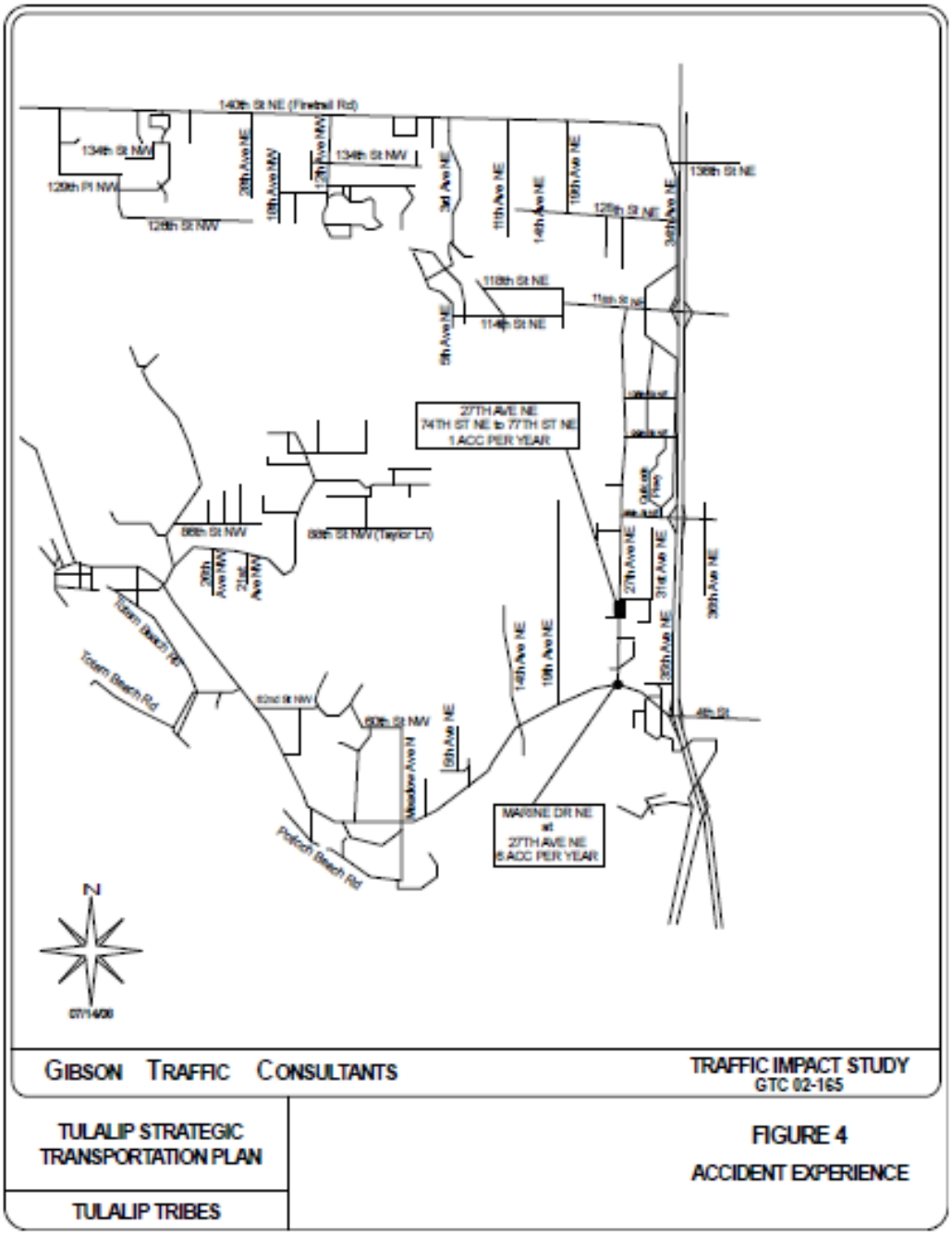
Table 6. Annual Accident Analysis

Major Road	Minor Rd	No. of Accidents	3-Year Avg.	Signalized	Above High Accident Threshold
116th Street NE	I-5 NB Ramps	5	1.67	Yes	No
	I-5 SB Ramps	8	2.67	Yes	No
	34th Ave NE	12	4.00	Yes	No
	Donna's Truck Stop	3	1.00	No	No
140th Street NW	39th Dr NW	4	1.33	No	No
140th Street NW (Continued)	16th Ave NW	4	1.33	No	No
	12th Ave NW	3	1.00	No	No
	2nd Ave NE	3	1.00	No	No
	23rd Ave NE	6	2.00	No	No
	26th Ave NE	3	1.00	No	No
	Stimson Rd	8	2.67	Yes	No
27th Avenue NE	116th Street NE	6	2.00	No	No
34th Avenue NE	128th St NE	15	5.00	No	Yes
	Marine Dr NE/SR-528	3	1.00	No	No
Marine Drive NE	I-5 NB Ramps	31	10.33	Yes	Yes
	I-5 SB Ramps	19	6.33	Yes	No

Table 9. Annual Accident Analysis (continued)

Major Road	Minor Rd	No. of Accidents	3-Year Avg.	Signalized	Above High Accident Threshold
	33rd Ave NE	13	4.33	Yes	No
	31st Ave NE	7	2.33	Yes	No
	27th Ave NE	8	2.67	Yes	No
	19th Ave NE	3	1.00	No	No
	14th Ave NE	3	1.00	No	No
	7th Ave NE	13	4.33	No	No
	2nd Ave NE	10	3.33	No	No
Marine Drive NW	7th Dr NW	5	1.67	No	No
	12th Ave NW	7	2.33	No	No
	62nd St NW	3	1.00	No	No
	64th St NW	3	1.00	No	No
	Water Works Rd	4	1.33	No	No
	Hermosa Bch Rd	5	1.67	No	No
	188th St NW	3	1.00	No	No
	Frank Waters Rd	3	1.00	No	No
	Happy Hollow Rd	3	1.00	No	No
88th Street NE	I-5 NB Ramps	20	7.00	Yes	No
	I-5 SB Ramps	11	4.00	Yes	No
	27th Ave NE	3	1.00	No	No
	Wal-Mart Various driveways/Parking Lot	15	5.00		
	Old Casino Various Driveways/Parking Lot	11	3.67		
	New Casino Various Driveways/Parking Lot	7	2.33		

Figure 4. Accident Experience



2.5 TRANSIT SERVICE

In 1997, The Tulalip reservation residents voted to become part of Community Transit's public benefit area with transit service beginning the following year. Community Transit operates bus routes 221 and 222 within the Tulalip Tribes Reservation. Route 221 originates near the Tulalip Casino, continues south to Quil Ceda Way, east across I-5 into Marysville and terminates in Lake Stevens. Route 222 originates near Silver Village in Tulalip Tribes Reservation and continues east on Marine Drive, north to the Tulalip Casino, and across I-5 into Marysville. The route terminates at State Avenue/Grove Street. Table 7 summarizes the service hours for Routes 221 and 222.

Table 7. Route 221 and 222 Hours of Service.

Day of Week	Direction	Hours of Service
Route 221		
Monday-Friday	Eastbound	6:30 a.m. – 9:40 p.m.
Monday-Friday	Westbound	5:50 a.m. – 7:50 p.m.
Saturday/Sunday	Eastbound	8:30 a.m. - 7:30 p.m.
Saturday/Sunday	Westbound	8:30 a.m. – 7:30 p.m.
Route 222		
Monday-Friday	Eastbound	6:30 a.m. - 11:15 p.m.
Monday-Friday	Westbound	5:40 a.m. - 10:30 p.m.
Saturday	Eastbound	7:10a.m. - 11:00 p.m.
Saturday	Westbound	6:20 a.m. - 10:10 p.m.
Sunday	Westbound	7:15 a.m. - 9:00 p.m.
Sunday	Eastbound	8:10 a.m. - 9:50 p.m.

Note: Hours of service are based on Community Transit's May, 2008 schedules.

From Route 221, there are transfer points in Marysville at 5th Street/State Avenue and near Frontier Village in Lake Stevens at 91st Street NE/Market Place. At 5th Street/State Avenue there are bus connections to routes 207, 222, 421 and 821. All of these routes provide north-south bus connections north to the City of Arlington and south to the City of Everett. From 91st Street NE/Market Place there is a transit connection to route 280 and route 425, which extends east to Everett Boeing Field and west to Granite Falls.

Within the Tulalip Reservation, Route 222 has a bus stop at Marine Drive/33rd Avenue, which is near the I-5/4th Street flyer stop. At the flyer stop, there are bus connections to bus Routes 201, 202, 207, 247, 421, 422 and 422 in the southbound direction, and Routes 247 and 422 in the northbound direction. These connections provide transit riders access to Marysville, Arlington, Everett and Downtown Seattle.

In Marysville, Route 222 has transfer point at the Grove Street/Alder Avenue bus stop. Route 222 also connects with route 221 at the Tulalip Casino in the Quil Ceda Village.

Due to a shortage of bus routes provided by Community Transit, The Tulalip Tribes are currently augmenting public bus transit service through the following methods:

- Casino/Bingo shuttles
- Healthcare transportation
- Senior busses
- Veteran vans and shuttles

The Tulalip Tribes is pursuing funding for future enhancement and expansion of this system.

2.6 PEDESTRIAN AND BICYCLE FACILITIES

On the Reservation, sidewalks currently exist on arterial streets within the Quil Ceda Village Business Park and on Marine Drive east of 7th Avenue NW and on sections of 64th Street NW. The other major streets on the reservation either have paved, gravel or dirt shoulders.

Pedestrian/bicycle facilities near the Quil Ceda Village Business Park were identified in the Quil Ceda Village Development Final Environmental Assessment Supplemental Environmental Documentation, prepared by HDR Engineering, Inc. (HDR) in July 2002. These include the following:

- Between the northbound ramp and southbound ramp terminals 88th Street N.E. has sidewalks on the north side of the street. There is also a 215-foot long bridge structure with a pedestrian walkway.
- A pedestrian walkway exists on the north side of the 116th Street/I-5 overpass.
- A ¾ of a mile paved and well-lit bicycle/pedestrian path is provided along the western perimeter of the Quil Ceda Village Business Park. This path extends north on Quil Ceda Parkway from 88th Street NE to 99th Place NE. The trail terminates at the 27th Avenue NE/99th Place NE intersection. There are shoulders on 27th Avenue NE near the Quil Ceda Village Business Park.

The Tulalip Tribes are also pursuing grant money to provide sidewalks along the east side of 27th Avenue, south of 88th Street and improve pedestrian facilities near the intersection of Marine Drive at Water

Works Road. These pedestrian facilities are necessary to provide safe walk routes for school children. Currently there are not separate pedestrian facilities in the vicinity of the school on the west side of 27th Avenue. The pedestrian facilities near the intersection of Marine Drive at Water Works Road are in a state of disrepair and are therefore no longer used, which results in school children crossing Marine Drive, rather than using the pedestrian facilities.

Expanding the Reservations non-motorized road network is consistent with the Tulalip Tribe's overall Transportation Goals to encourage an integrated multi-modal transportation system and to provide a transportation system that effectively encourages pedestrian, bicycle and other non-motorized travel. Both pedestrian and bicycle facilities have been and will continue to be an integral part of the transportation network, and the provision for these facilities should be incorporated in the transportation improvement program to encourage non-motorized trips.

The Tulalip Tribes is considering adopting Snohomish County's Bike plan; in addition, they have identified other facilities, such as 27th Avenue from Marine Drive to 116th Street, as a potential bicycle route. The non-motorized facilities within The Tulalip Tribes include sidewalks, pedestrian paths and bike lanes. The existing non-motorized facilities within The Tulalip Tribes are summarized in Appendix E.

2.7 ROADWAY MAINTENANCE

The Tulalip Tribes acknowledges the importance of regular maintenance of the public facilities. A generic outline of what maintenance is and when it should be conducted has been documented in Appendix D. The plan covers:

- Roadway Maintenance & Operations;
- Drainage Maintenance & Slope Repair;
- Roadside & Landscape Maintenance;
- Snow & Ice control;
- Traffic Services;
- Sanitary Sewer System;
- Water System.

The Tulalip Tribes, Quil Ceda Village, the Bureau of Indian Affairs, WSDOT/FHWA and Snohomish County currently have maintenance responsibilities throughout the Reservation. These entities are striving to develop a collaborative and consistent maintenance plan.

2.8 INDIAN RESERVATION ROADS

The Bureau of Indian Affairs (BIA) uses the inter tribal Indian Reservation Road (IRR) Inventory to determine funding for planning and construction of roads within the Tulalip Tribes. A list of the roads that are currently on the IRR or need to be added to the IRR are listed in Table 8.

Table 8. Tulalip Tribes IRR Roads

Roadway	Length	Route-Section #	Status	Ownership
64th St NW	1.0 Mile	0003-10	In-Process	County
Interstate-5	4.9 Miles	0005-810	Official	WSDOT
31st Ave NE	0.6 Miles	1010-810	In-Process	Tribes
76th Place NW	0.2 Miles 1.8 Miles	1110-810 1110-820	In-Process	BIA
88th Street NE (Quil Ceda Way)	0.8 Miles	1120-810	Official	Tribes
99th Street NE	0.4 Miles	1130-10	In-Process	Tribes
105th Street NE	0.4 Miles	1140-10	In-Process	Tribes
Quil Ceda Boulevard	0.7 Miles 1.2 Miles	1150-10 1150-20	Official	Tribes
Quil Ceda Parkway	0.4 Miles	1170-10	In-Process	Tribes
33rd Avenue NE	0.3 Miles	6002-810	Official	Tribes
27th Avenue NE	1.4 Miles	6015-810	Official	County/Tribes
Water Works Road	2.1 Miles 0.1 Miles	6075-810 6075-820	In-Process In-Process	County
Turk Drive		6076-10	In-Process	County
116th Street NE	1.6 Miles	6100-810	Official	Tribes
128th Street NE	1.6 Miles	6130-810	In-Process	County
34th Avenue NE	1.3 Miles	6133-810	Official	County
140th Street NW /NE (Firetrail Road)	0.9 Miles	6143-810	Official	County
140th Street NW /NE (Firetrail Road)	7.2 Miles	9630-810	Official	County
Marine Drive NW /NE	12.2 Miles	9682-810	Official	County
Totem Beach Road		0052	To be Updated	County
Mission Beach Road		6088	To be Updated	County
Meridian Avenue		6039	To be Updated	County
74th Street NE		6099	To be Updated	County
Herman Williams Senior Drive	0.4 Miles		To be Added	Tribes
Quil Ceda Boulevard Extension	0.6 Miles		To be Added	Tribes
93rd Street NE			In Planning	Tribes
East-West Roadway			In Planning	Tribes
19th Avenue NE			In Planning	County/Tribes

The routes, including official routes, on the IRR are intended to be updated annually to account for changes in daily trip volumes, surface wear and changes in other aspects of the roadway. In addition, routes may be updated for length and sectioning to better represent the roadway.

3. FUTURE CONDITIONS AND DEFICIENCIES

This section of the TSTP describes future conditions in the year 2018. The methodology used to estimate traffic volumes is described. Level of service standards and future transportation system deficiencies are also discussed in this section.

3.1 TRAVEL DEMAND FORECASTING FOR YEAR 2018

Regional travel demand and roadway network traffic volumes on the Tulalip Tribes Reservation are forecast for the year 2018. The volumes are a combination of information contained in the Tulalip Tribes Vision Plan II performed by Mithun with a growth rates and pipeline data from the Quil Ceda Village.

- Based on the Puget Sound Regional Council's data provided in the EMME-2 model completed for the 116th Street Access Point Decision Report a 1% percent annually compounded growth factor was applied to the existing traffic volumes.
- The projected traffic from the Quil Ceda Village is from a 740 room Hotel, 130,000 SF expansion of the Seattle Premium Outlet shopping area, 205,000 SF shopping area in the southern section and 300,300 SF shopping area in the northern section. The pipeline data was added to the existing growth factored volumes.
- Mithun's Tulalip Tribes Vision Plan II included development in the area around the bay. The development in this area consists of approximately 1,800 residential units, 50,000 square feet of commercial space, a 500 student school and a 100,000 square foot government office.

3.2 LEVEL OF SERVICE STANDARDS

Tribal staff continues to work on established LOS standards for arterial streets to measure the performance of the transportation system. This TSTP methodology used to calculate LOS is a two tier system involving links and intersections. The LOS standards for streets links is based on the daily link LOS volume to capacity ratio while intersection LOS is based on the PM peak hour operational calculations. This methodology is described in the existing conditions section of the plan.

Although there is no formal adopted policy, the Tulalip Tribes historically have required transportation improvements to be made before development occupancy and have historically followed Snohomish County's or WSDOT standards for the area, which is basically LOS C in the rural areas and LOS E in the Quil Ceda Village influence area or at State intersections. The States Growth Management Act (GMA) only requires that a transportation facility must be planned for improvement within six years to a level that does not exceed the standard. Tribal policy makers are still in the process of determining whether to bring the Tribes LOS policy in line with the States GMA concurrency 6-year timeframe; thus, if construction to improve the transportation facility is not planned for completion within the six-year timeframe the development will not be allowed to proceed.

In order to encourage growth in targeted areas of the Reservation, a LOS standard E is recommended along several arterial corridors and LOS exception for some others. The following preliminary LOS standards are recommended for the Reservation. Approval from the Tribal Council will be required in order for these standards to be put in effect:

- Maintain intersection LOS E along 27th Avenue NE and east of 27th Avenue NE
- Maintain intersection LOS D or better west of 27th Avenue NE

- Maintain link LOS E from 7th Drive NW east to I-5 with the exception of Quil Ceda Boulevard south of Quil Ceda Parkway and 88th Street NE between Quil Ceda Boulevard and I-5 that should maintain LOS E outside of the PM peak 2 hour period but is exempt for LOS standards for the 2 hour PM peak period.

3.3 FUTURE TRAFFIC VOLUMES AND LEVEL OF SERVICE

PM peak hour traffic volume forecasts were prepared for the year 2018 and assumed to be the same with or without the improvement identified in the analysis section, except for the East-West Roadway, which diverts trips from Marine Drive. These peak hour volumes were converted to daily volumes using a ratio of PM peak to daily of 1:12, which is consistent with the existing ratios across the Reservation. The estimated daily volumes were used to calculate V/C ratios and to determine the link LOS of arterial streets in the Reservation. The year 2018 traffic volume forecasts were also prepared assuming that future travel characteristics would continue to be the same as they are today. Note that there are potential changes that have not been taken into account, such as: increased transit use; spreading of the peak hour as a facility becomes increasingly congested; shift in travel patterns with new interchanges or arterial improvements in other jurisdictions; increased bicycle and pedestrian facility use; and, other transportation demand management strategies such as telecommuting. These non-traditional travel demand adjustments could reduce the total peak hour volumes by as much as 10 percent. The largest reductions could occur from increased transit use and peak hour spreading.

The LOS for 2018 with and without potential improvements is summarized in Table 9.

The following Capacity improvements are those assumed in the "With Improvements" Analysis:

- 116th Street NE @ I-5 Northbound and Southbound Ramps
  - Replacement of the existing 116th Street NE three-lane bridge over I-5 with a new single-point-urban-interchange (SPUI) with two east-west through lanes in each direction, two northbound to westbound left-turn lanes, two westbound to southbound left-turn lanes, two eastbound to northbound left-turn lanes and a single southbound to eastbound left-turn lane.
  - Widening and realigning of the 116th Street NE northbound I-5 on-ramp to meet current design guidelines for two-lane eastbound to northbound movement and provide a new right-turn pocket on 116th Street NE for a westbound to northbound movement.
  - Installing a new permanent traffic signal at the 116th Street SPUI.
- 88th Street NE @ 27th Avenue NE
  - Signalize or provide roundabout with appropriate channelization.
- Marine Drive @ Water Works Road

  Provide left-turn lanes on the north-south road.
- 88th Street @ I-5 Northbound Ramp
  - Providing a separate westbound right-turn lane.
- Additional East-West roadway
  - An east-west roadway parallel to Marine Drive is proposed between the area around the bay and 27th Avenue. The east-west roadway will either connect from Water Works Road to 88th Street at 27th Avenue or from Marine Drive at 64th Street to 27th Avenue at 74th Street. The east-west connection between Water Works Road and 88th Street will

change trips patterns at more intersections than the connection between 64th Street and 74th Street. The connection between Water Works Road and 88th Street has been included in the future analysis with improvements.

Table 9. Year 2018 Corridor Level of Service

		Existing (2008)		2018 No Improvements		2018 With Improvements[1]	
Street	**Section**	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**
Marine Drive NW	7th Ave NW to 140th St NW	10,420	C	28,550	F	22,780	F
27th Avenue NE	Marine Dr NE to 88th St NE	7,320	B	14,460	E	10,190	C
34th Avenue NE	South of Quil Ceda Blvd	4,160	A	5,860	B		
140th Street NW	34th Ave NE to 11th Ave NE	8,780	C	13,310	E		
140th Street NW	11th Ave NE to Marine Dr	3,020	A	4,580	A		
Marine Drive NE	27th Ave NE to 7th Dr NW	13,540	D	29,050	F	23,280	F
116th Street NE	Quil Ceda Blvd to 19th Ave NE	4,090	A	4,990	A		
88th Street NE	I-5 to Quil Ceda Blvd	24,650	C	45,350	F	46,850	F
88th Street NE	Quil Ceda Blvd to 27th Ave NE	5,260	A	8,820	B	10,320	B
116th Street NE	I-5 to Quil Ceda Blvd	17,540	C	26,690	E		
Marine Drive NE	I-5 to 27th Ave NE	20,000	C	32,440	F	31,760	F
Quil Ceda Blvd	88th St NE to Quil Ceda Parkway.	26,010	D	45,360	F		
Water Works Rd	Entire Length	3,200	B	6,310	D	12,080[2]	C
19th Avenue NE	Marine Dr NE to Rainwater Rd	660	A	1,640	A		
64th Street NW	Entire Length	3,770	B	4,490	C		
Quil Ceda Blvd	South of 116th St NE	8,910	B	20,800	C		
Quil Ceda Blvd	North of 116th St NE	7,920	A	9,940	B		

[1] Only links impacted by the improvements were evaluated for link LOS for the "With Improvement" scenario.
[2] The capacity increases on Water Works Road with the East-West Roadway.

Table 9 summarizes the LOS that is expected to result on the designated roadway segments. Figure 5 also show the daily volumes and LOS for the locations listed in Table 8. The roadway link analysis indicates that there are certain links that would experience LOS F conditions in the Tulalip tribes that presently do not have any identified capacity projects. The 88th Street NE segment between Quil Ceda Boulevard and I-5 as well as Quil Ceda Boulevard between 88th Street and Quil Ceda Parkway are both identified as potential LOS F links during the PM peak 2-hour period. However, these links are exempt from level of service threshold during the PM peak 2-hour period and the intersections along these links operate within acceptable ranges. Because the adjacent land is highly developed in these areas, and the roadways are already built to a high functioning design standard, the level of improvement that would be necessary to further improve conditions is not financially feasible at this time. The ultimate improvement for the 88th Street interchange is a SPUI, which is a costly improvement. The planned interchange improvement at 116th Street NE as well as the identified 27th Avenue NE widening between 88th Street NE and Marine Drive NE would provide alternative improved access to I-5 and Marysville. Therefore, the projected future volume on this link may be less than the unconstrained volumes presently identified. Based on these factors it is not recommended to provide any additional improvements on these links other than those already identified in the plan above.

There are sections of Marine Drive, primarily east of Water Works Road, that will also operate at LOS F, even with the East-West Roadway. The alignment and nature of the East-West Roadway is not currently

known. It is also not known if there will be additionally widening along Marine Drive or 27th Avenue, which would increase the capacity of the roadway. Due to both of these reasons, additional analysis of Marine Drive and the East-West Roadway will need to be performed to ensure both roadways operate at an acceptable level.

Table 10 summarizes the LOS that is expected from the operational intersection analysis. Figures 6 shows the forecasted 2018 turning movement volumes and the LOS for the locations listed in Table 9. With the identified improvements in this TSTP all the study intersections would operate at LOS E or better east of 7th Drive NW and LOS C or better west of 27th Avenue NE and thus meet the intersection LOS criteria identified in this LRTP's objective. The one exception is the intersection of Marine Drive at 19th Avenue NE. This intersection is anticipated to operate at LOS F with the additional traffic. This is primarily due to the fact that improvements for this intersection are not known and it is a stop-controlled intersection with 1-lane approaches. Further analysis of the Marine Drive and East-West Roadway alternatives will need to include the analysis of the 19th Avenue NE intersection. It is possible that additional capacity on Marine Drive or the construction of a signal, if warranted, would allow this intersection to operate acceptably.

Table 10. Year 2018 PM Peak Hour Intersection Level of Service

	Intersection	2008 Existing		2018 No Improvements		2018 With Improvements	
		LOS	Delay	LOS	Delay	LOS	Delay
1.	116th St NE @ 27th Ave NE	A	7.8 sec	A	8.7 sec		
2.	116th St NE @ Quil Ceda Blvd	B	18.5 sec	C	21.8 sec		
3.	116th St NE @ 34th Ave NE	B	11.6 sec	C	15.9 sec		
4.	116th St NE @ I-5 SB Ramps	B	15.3 sec	C	29.9 sec	C	28.9 sec
5.	116th St NE @ I-5 NB Ramps	C	32.6 sec	F	109.2 sec		
6.	88th St NE @ 27th Ave NE	B	12.1 sec	F	97.6 sec	B	14.6 sec
7.	88th St NE @ Quil Ceda Blvd	B	18.7 sec	B	18.5 sec	C	23.2 sec
8.	88th St NE @ I-5 SB Ramps	B	13.7 sec	B	17.8 sec	C	21.8 sec
9.	88th St NE @ I-5 NB Ramps	C	30.7 sec	F	97.4 sec	E	72.8 sec
10.	88th St NE @ 36th Drive NE	B	15.4 sec	B	18.9 sec	B	18.4 sec
11.	Marine Dr NE @ Water Works Rd	B	10.6 sec	F	211.5 sec	C	25.7 sec
12.	Marine Dr NE @ 64th St NW/Admin Access	C	18.5 sec	B	19.7 sec		
13.	Marine Dr NE @ 19th Ave NE	D	25.2 sec	F	--- sec	F	--- sec
14.	Marine Dr NE @ 27th Ave NE	B	14.2 sec	E	58.0 sec		
15.	Marine Dr NE @ 31st Ave NE	C	31.3 sec	C	28.0 sec		
16.	Marine Dr NE @ 33rd Ave NE	B	19.9 sec	C	33.4 sec		
17.	Marine Dr NE @ I-5 SB Ramps	C	24.1 sec	D	36.3 sec		
18.	Marine Dr NE @ I-5 NB Ramps	C	27.6 sec	E	72.3 sec		
19.	136th St NE @ 34th Ave NE	B	16.9 sec	B	19.7 sec		

Figure 5. 2013 Daily Volumes and Level of Service

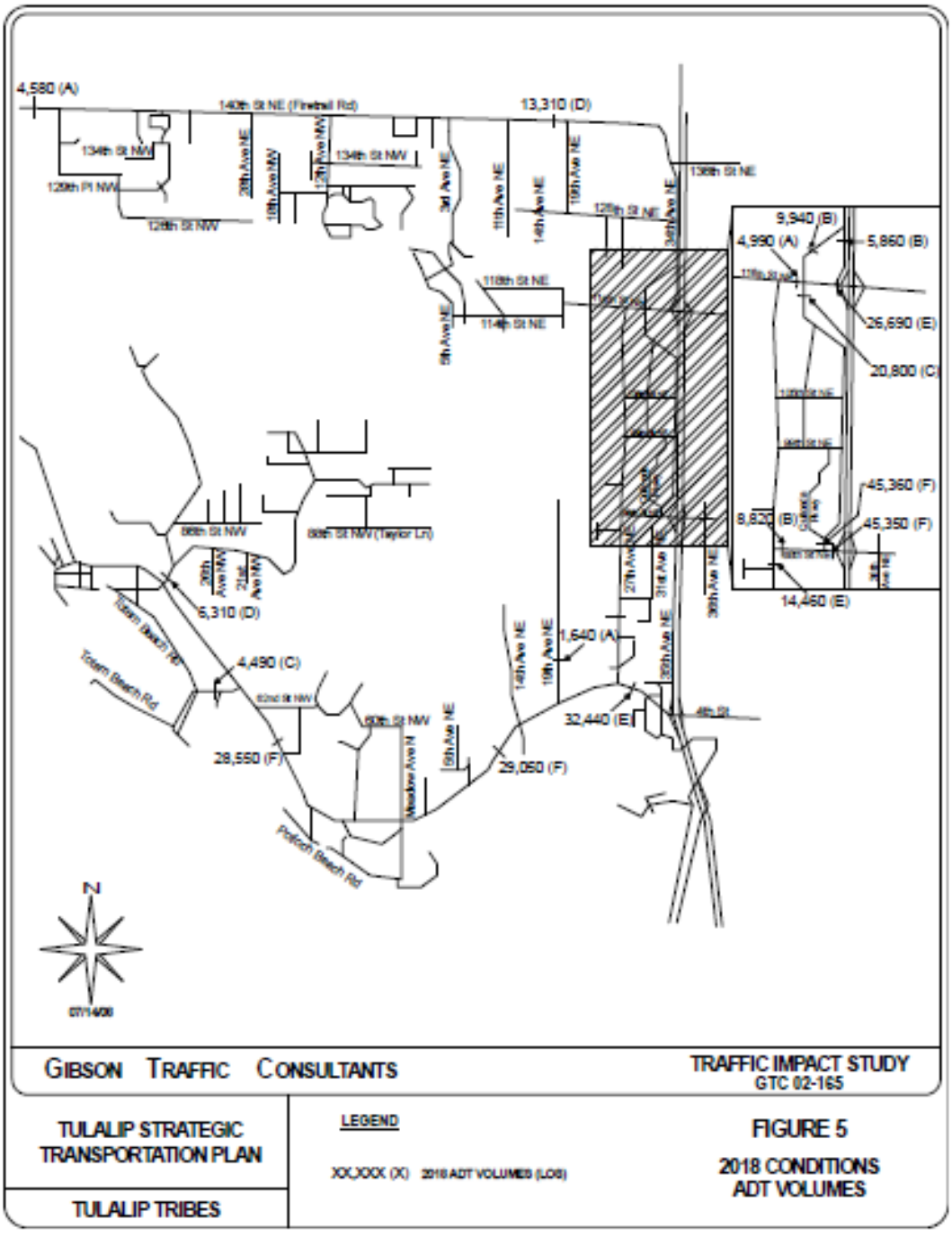
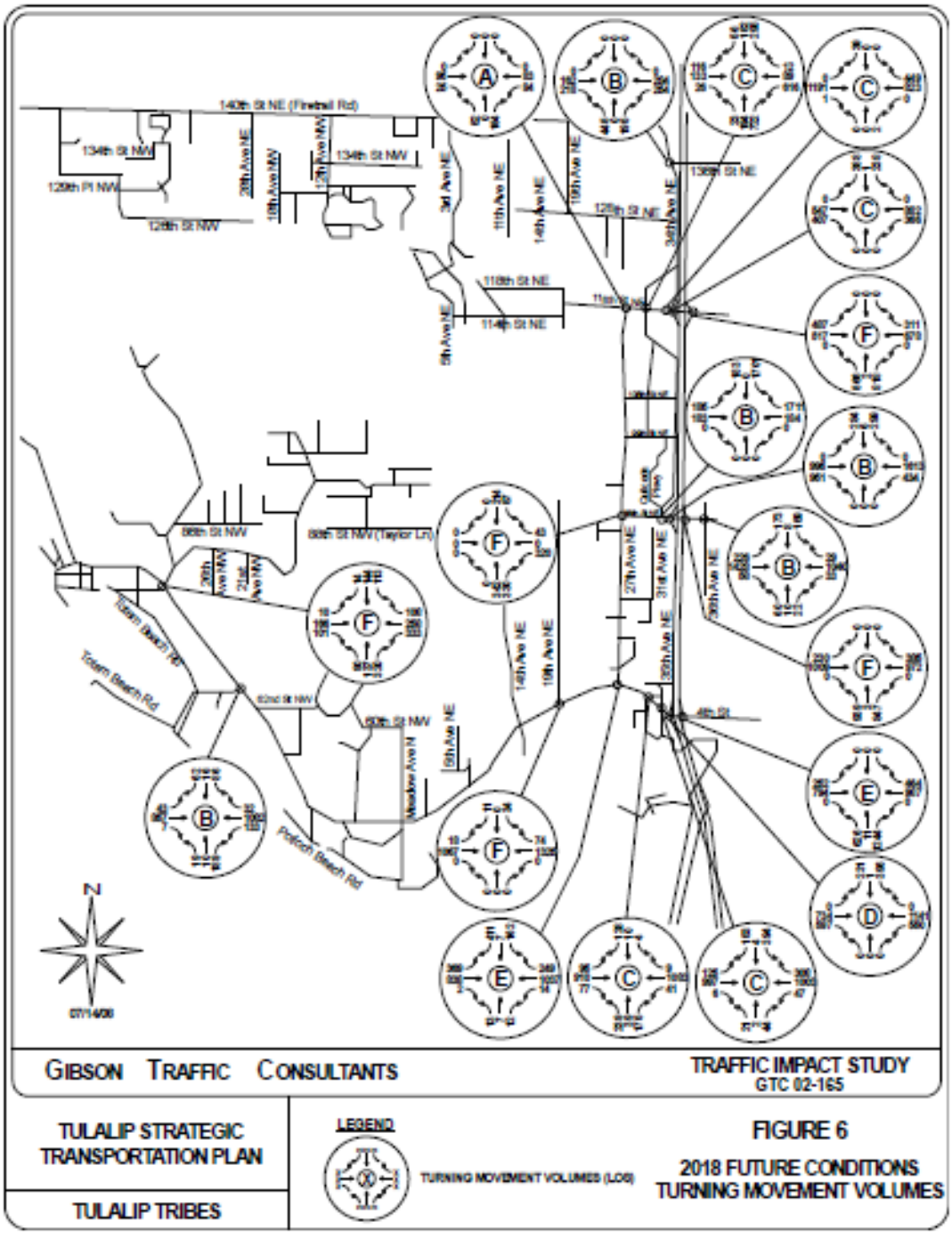


Figure 6. 2013 PM peak Hour Intersection Volumes and Level of Service



4. PROPOSED TRANSPORTATION IMPROVEMENTS AND COSTS

This section of the report describes the transportation facility improvements and costs needed to accommodate the future travel demand resulting from increased growth on the Tulalip Tribes Reservation. In addition to the roadway facility improvements, transit, pedestrian, bicycle, and transportation demand management strategies are also identified in this section of the plan.

4.1 ROADWAY IMPROVEMENTS

The following improvements are included in the "With Improvements" analysis:

- Installing a new permanent traffic signal at the 116th Street SPUI.
- 116th Street NE @ 27th Avenue NE - Signalize or provide roundabout with appropriate channelization.
- 88th Street NE @ 27th Avenue NE - Signalize or provide roundabout with appropriate channelization.
- Marine Drive @ Water Works Road – Provide left-turn lanes on the north-south roads.
- East-West Roadway parallel to Marine Drive that will connect Water Works Road to 88th Street of 64th Street NW to 74th Street NE.

In addition to the major corridor improvements discussed above, there are a number of other improvements that are recommended for improving traffic operations and safety.

4.2 TRANSIT SERVICE AND FACILITY IMPROVEMENTS

Community Transit is in the process of updating *Transit First*, their Six Year Transit Development Plan for the year 2008 to 2013. Staff, the Tribal Board of Directors and public for approval are currently reviewing the plan. The main goal of the *Transit First* is to find innovative ways to improve access and improve transit service efficiency and effectiveness with the limited tax revenue available. They have proposed to achieve this by:

- Working with partner transit agencies to find new, more stable sources of funding
- Minimizing fare increases without sacrificing service quality
- Expanding transit service at a rate of approximately one percent per year for the next 10 years in an effort to add an additional 30,000 annual hours of fixed route and Para transit service. In addition, there are goals to increase vanpool service by roughly 520,000 hours. To meet these goals, Community Transit will have to limit project expansion to those projects already underway, rather than make new facility improvements.
- Working with Sound Transit to identify opportunities to restructure Community Transit service.
- Improving bus stops with new or replacement shelters.
- Working with Puget Sound region to make electronic fare payment a reality.
- Implementing transit signal priority to improve the speed and reliability of service.

- Transit center in vicinity of 116th Street NE.

4.3 PEDESTRIAN AND BICYCLE IMPROVEMENTS

Expanding the Reservation's non motorized network is consistent with the Tribes overall transportation goal to encourage the development of an integrated multi-modal transportation system and to effectively encourage non-motorized travel. The provisions for the pedestrian, bicycle and other nonmotorized facilities should be incorporated in the transportation improvement program, as these facilities are becoming increasingly important to compliment other elements of the transportation system. For Tulalip Tribes, the trips that have the greatest potential for shifting to a non-motorized travel mode include trips to and from bus transit and short trips for shopping, errands, and other purposes. Improving safety for pedestrians and bicyclists is also critical to advance this form of transportation.

The first category of pedestrian and bicycle facilities that provide access to transit and shopping areas can improve the viability and increase the usage of both transit and non-motorized travel modes. The main transit transfer area is between the Marine Drive NE/33rd Avenue NE bus stop and the I-5/4th Street flyer stop. Presently, Tulalip Tribes has nonmotorized routes in the eastern portion of the reservation, beginning near the Quil Ceda Village Business Park and extending south to Marine Drive NE, and east to 7th Drive NW.

The goal of the second category of pedestrian and bicycle facilities would be to provide a safe, convenient and interconnected environment for bicycling and walking. Providing safe and convenient local facilities would offer opportunities for substituting bicycling and walking for short, intra-community vehicle trips. Facility improvements in this category would include safety improvements at crosswalks in central areas, access to and across major arterials, and removal of barriers to pedestrian and bicycle travel. Other improvements could include the provision of new sidewalks where they are currently nonexistent, too narrow, or deficient.

Projects and Improvements Planned for Non-Motorized Facilities

Snohomish County

Snohomish County has prepared a 2007 Transportation Needs Report that summarizes improvements identified by citizens and public officials. The report prioritizes these projects from high to low priority. There were three low priority projects identified in Tulalip Tribes, including:

- A walkway or paved shoulder at Marine Drive between Shoemaker Road and 140th Street NW.
- A bicycle lane on Marine Drive between 7th Drive NW and Shoemaker Road
- A paved shoulder on Marine Drive between Shoemaker Road and 140th Street NW
- A walkway along the west side of 27th Avenue NE in the vicinity of 74th Street NE

In addition, Snohomish County has proposed future bicycle improvements in the Transportation Element of their Comprehensive Plan. Identifying these projects occurred independently of the bicycle routes reported in the Transportation Needs Report. The following are the three routes identified in the Transportation Element:

- Marine Drive from I-5 to 140th Street NE (the portion of Marine Drive from 44th Avenue NW to I-5 is within their long-range phase between 2001-2012).
- 140th Street NW from Marine Drive to 16th Avenue NW
- 140th Street NE from 23rd Avenue NE to 34th Avenue NE

Construction of these bicycle routes is dependent on future road improvements listed in the Major Road Improvement – Concurrency Projects and Safety Projects in the Transportation Needs Report, since the

construction of bicycle lanes will occur concurrently with roadway improvements. It is the goal of policymakers to make roadway improvements ranked high priority in the Transportation Needs Report. The segment between 19th Avenue NW and 7th Drive NW is recently construction. The roadway segments on Marine Drive between 7th Drive NW and 64th Street NW and between 64th Street NW and 83rd Place NW, and on 140th Street NE between 23rd Avenue NW and 34th Avenue NE are ranked medium priority. Therefore, the construction of these projects is slated to occur beyond the 6-year horizon.

Tulalip Tribes

The primary focus of non-motorized facilities by the Tulalip Tribes has been with new development, which has primarily occurred in the Quil Ceda Village Business Park. The master plan for the business park/ Quil Ceda Village proposes new pedestrian and walkway improvements, including crosswalks, connections to the regional bicycle path/trail and a new pedestrian bridge. Table 11 summarizes the pedestrian facilities in the Quil Ceda Village Business Park.

Table 11. Pedestrian and Walkway Facilities within the Quil Ceda Village Development

Roadway	Section	Improvement
99th St NE	Quil Ceda /27th Ave NE	Add a crosswalk
104th St NE	Quil Ceda Blvd	Add a crosswalk
110th St NE	West Chelsea Rd	Add a crosswalk
Quil Ceda Blvd	West Chelsea Rd	Add a crosswalk
Quil Ceda Blvd	north of West Chelsea Rd	Add a crosswalk
Quil Ceda Blvd	south of I-5	Add a crosswalk
27th Ave NE/Quil Ceda	From Marine Drive to 88th Street NE.	Provide a bicycle/pedestrian path
Quil Ceda Blvd.	East of West Chelsea Rd to East of I-5 in Marysville	Provide a bicycle/pedestrian path that connects to the City of Marysville's 116th St NE road improvement project via the existing rail Bridge
I-5 Overpass	Quil Ceda Blvd	Construct a pedestrian bridge at the existing railroad bridge.

To complete the north-south non-motorized trail near the Quil Ceda Village Development, Tulalip Tribes has plans to extend the proposed/existing nonmotorized route south of the development. This new nonmotorized facility would extend west on 88th Street NE, from the Quil Ceda Parkway to 27th Avenue NE, and south on 27th Avenue NE from 88th Street NE to Marine Drive.

Tulalip Tribes has taken an "opportunistic" approach to enhance the bicycling and walking environment by considering non-motorized improvements as part of regular maintenance or capital improvement projects. Public awareness and education campaigns are planned to encourage pedestrians and bicyclists, and improve the awareness of safety issues and concerns.

Policy for Frontage Improvements for New Developments or Redevelopments

Staff is reviewing the pros and cons of a policy that would require frontage improvements for all new developments and redevelopments that occur in the Tulalip Tribes Reservation. This policy would create

more continuity between the existing non-motorized facility network and future developments and redevelopments.

The policy could be a simple as adopting Snohomish County's EDDS and identifying where the Tribes would want the urban or rural standards to apply. Improvements may include curb, gutter, sidewalk, storm drainage, street lighting, traffic signal equipment, utility installation or relocation, landscaping strip, trail, street trees and landscaping, irrigation, street widening, turn pockets, and channelization or other improvements deemed necessary. Additional improvements beyond the property frontage (i.e. ramps from the new sidewalk or walkway to the property frontage, ramps from the new sidewalk or walkway to the existing shoulder, and pavement and channelization tapering back to the existing pavement and channelization), as needed for safety and in accordance with accepted engineering practices.

4.4 TRANSPORTATION DEMAND MANAGEMENT STRATEGIES

All communities in the Puget Sound region, including the Tribal Reservation, have inadequate funds to continue to expand roadways for single-occupant vehicles. Since the region can no longer rely exclusively on "building our way out" of congestion problems, (TDM) Transportation Demand Management strategies have received increasing attention during the last 20 to 25 years. The goal of any TDM strategy is to reduce the amount of vehicle travel on roadways (and ferries). This can be accomplished by:

- Shifting single-occupant vehicle trips to carpools, transit, or non-motorized travel modes.
- Eliminating trips entirely—telecommuting and home shopping are common examples of trip elimination.
- Shortening trip lengths and "trip-chaining"—combining a series of multi-purpose trips into a longer chain of trips can improve efficiency and reduce vehicle miles traveled.

Most TDM programs need to be initiated at the state or regional level since most trips cross many jurisdictional boundaries. The Tulalip staff continues to research and initiate, with the support of policy makers, at the local level programs that can enhance and support these larger statewide and regional programs.

The full-range of TDM strategies that are being reviewed by the Tribes, for possible incorporation to its internal long range plans, have been grouped into four categories: employer-based strategies, land use strategies, telecommunications, and capital facilities that support TDM. Historically, TDM strategies have focused solely on the work trip; more recently, however, TDM has been broadened to cover all trip types since work trips account for only 20 to 30 percent of all trips made in the region. Specific TDM activities in each of the five categories are described in more detail below.

(1) **Employer-Based Strategies:** This is the category of TDM strategies that comes to mind most often because of the statewide Commute Trip Reduction (CTR) requirements that affect employers with more than 100 employees. Work trips are the only trip type affected by employer-based strategies and programs.

(2) **Land-Use Strategies:** Concentrating population and employment growth in centers, as well as providing a mix of land use types, can be an effective TDM strategy.

(3) **Telecommunications:** This category encompasses the broad range of telecommunications strategies that can reduce or eliminate certain types of trips. This goes beyond telecommuting which focuses solely on the work trip. While the trip reduction potential of these strategies are currently difficult to quantify, they're potential for reducing or eliminating certain trip types is nearly unlimited.

(4) **Capital Facilities that Support TDM:** Transportation facilities that support the other TDM strategies by providing alternative travel options are included in this category. These include transit, pedestrian, bicycle, and High Occupancy Vehicle (HOV) facilities. While these facilities are also identified in other sections of the TSTP, they are repeated in the TDM element because of their importance in helping to reduce overall travel demand within the tribal reservation community.

Even through it is recognized that much of the direct work on TDM strategies needs to occur at the state and regional level, the Tribal community continues to be involved in TDM activities by:

- Supporting statewide and regional TDM initiatives and programs.
- Implementing local public awareness and education program designed to promote the TDM strategies outlined above.
- Supporting and implementing capital facility improvements that support TDM such as transit, HOV, bicycle and pedestrian facility improvements.
- Cooperating with Community Transit on implementation of the State's CTR program.

4.5 TRANSPORTATION SYSTEM MANAGEMENT STRATEGIES

Transportation systems management or TSM refer to strategies that improve facility operations, traffic flow, or safety without adding lanes to increase capacity. TSM strategies are generally low-cost improvements since they do not involve major construction of new or expanded capital facilities. The following lists some of the more common TSM strategies that have been used by Tulalip Tribes as well as other jurisdictions in the Puget Sound region.

- **Access control** – Left turn restrictions or consolidating driveways to individual businesses can improve facility operations and safety by increasing roadway capacity and reducing the potential for vehicle conflicts. Closing or restricting access driveways improves through traffic movement; however, this strategy can be controversial due to potential side street traffic increases.
- **Traffic signal timing coordination** – Interconnecting a series of traffic signals can improve traffic flow progression through an arterial corridor. This strategy is particularly useful in areas with closely spaced signalized intersections such as freeway interchanges.

These and other TSM strategies will be evaluated as part of all planned transportation improvements in the Quil Ceda Village Business Park.

4.6 TRAFFIC CALMING

The purpose of traffic calming is to reduce the speed and volume of traffic to acceptable levels to support livability, safety, and community character within residential neighborhoods. By implementing various design features and strategies to meet these objectives, traffic calming measures can result in more pedestrian-friendly and desirable neighborhoods.

Traffic calming measures can be separated into two groups based on the intended impact. Speed control measures are primarily used to address speeding problems by changing vertical alignment, changing horizontal alignment, or narrowing the roadway. Volume control measures are primarily used to address cut-through traffic problems by blocking certain movements and diverting traffic to streets more appropriate for higher traffic volumes. Some of the more commonly used traffic calming measures used

throughout the region are listed in the following sections and could be considered by Tulalip for addressing speeding and cut-through traffic as appropriate.

Speed Control Measures

Vertical deflections, horizontal deflections, and roadway narrowing are measures used to reduce speed and enhance the street environment for non-motorists. The following are descriptions of typical examples of such measures:

Vertical Deflection Measures

- **Speed Humps** are rounded raised pavement devices placed across roadways to slow and/or discourage traffic.
- **Speed Tables** are flat-topped speed humps often constructed with a brick or other textured material to slow traffic.
- **Raised Crosswalks** are speed tables outfitted with crosswalk markings and signage to canalize pedestrian crossings, providing pedestrians with a level street crossing.
- **Raised Intersections** are flat raised areas covering an entire intersection, with ramps on all approaches and often with brick or other textured materials on the flat section.
- **Textured Pavements** include the use of stamped pavement or distinctive paving materials to create an uneven surface for vehicles to traverse. They may be used to emphasize either an entire intersection or a pedestrian crossing, and are sometimes used along entire street blocks.

Horizontal Deflection Measures

- **Traffic Circles** are raised islands, placed in intersections, around which traffic circulates.
- **Roundabouts** are similar to traffic circles but are used on higher volume streets to allocate right-of-way between competing movements.
- **Chicanes** are curb extensions that alternate from one side of the street to the other, forming S-shaped curves.
- **Realigned Intersections** are changes in alignments that convert T-intersections with straight approaches into curving roadways meeting at right angles.

Horizontal Narrowing Measures

- **Neck downs** are curb extensions at intersections that reduce the roadway width from curb to curb. They "pedestrianize" intersections by shortening crossing distances for pedestrians and drawing attention to pedestrians via raised peninsulas. They also tighten the curb radii at the corners, reducing the speeds of turning vehicles.
- **Center Island Narrowings** - A center island narrowing is a raised island located along the centerline of a street that narrow the travel lanes at that location. Center island narrowings are often landscaped to provide a visual amenity. Placed at the entrance to a neighborhood, and often combined with textured pavement, they are often called "gateway islands." Fitted with a gap to allow pedestrians to walks through at a crosswalk, they are often called "pedestrian refuges."
- **Chokers** are curb extensions at midblock locations that narrow a street by widening the sidewalk or planting strip. If marked as crosswalks, they can also improve pedestrian safety. Two-lane chokers leave the street cross section with two lanes that are narrower

than the normal cross section. One-lane chokers narrow the width to allow travel in only one direction at a time, operating similarly to one-lane bridges.

Other Speed Control Measures

- **Educating** residents on safe on-street vehicle travel.
- **Tribal Police** impose the local safe vehicle laws, including those for posted speeds and traffic signal/signs.
- **Speed Trailers/Reader Boards** placed so that vehicle travel speeds are displayed when vehicles approach the trailer/reader board. These devices can be moved from location to location or installed permanently at locations where travel speeds are a significant concern.

Volume Control Measures

Volume control measures are intended to reduce cut-through traffic by obstructing traffic movements in one or more directions. The following is a list of typical measures used for volume control:

- **Full Closures** are barriers placed across a street to completely close the street to through-traffic, usually leaving only sidewalks open.
- **Half Closures** are barriers that block travel in one direction for a short distance on otherwise two-way streets.
- **Diagonal Diverters** are barriers placed diagonally across an intersection, blocking through movements and creating two separate, L-shaped streets. Like half closures, diagonal diverters are often staggered to create circuitous routes through the neighborhood as a whole, discouraging non-local traffic while maintaining access for local residents.
- **Median Barriers** are islands located along the centerline of a street and continuing through an intersection so as to block through movement at a cross street.
- **Forced Turn Islands** are raised islands that block certain movements on approaches to an intersection.

4.7 FUTURE ROADWAY NEEDS

Table 12 summarizes the Tribal priority list of planning-level needs identified in the LRTP. More details and costs should be developed in the 6-year Transportation Improvement Plan (TIP).

Table 12. Priority List of Planning-level Improvement Needs

Project	Description
I-5/116th Street NE Interchange Reconstruction	Capacity, Reconstruct bridge deck and ramps to complete SPUI
I-5/88th Street NE Interchange Reconstruction	Capacity, Reconstruct the interchange
116th St NE and 27th Ave NE	Safety/Capacity, Signalize the intersection or install roundabout
88th St NE and 27th Ave NE	Safety/Capacity, Signalize the intersection or install roundabout
28th Avenue NW	Preservation, repave and stripe
27th Avenue – 88th St to 116th St	Capacity/Safety, Widen roadway to 3 or 5-lane section – ped/bike/transit improvements
27th Avenue - Marine Dr to 88th St	Capacity/Safety, Widen roadway to 3 or 5-lane section – ped/bike/transit improvements
Marine Drive and Waterworks Road	Safety/Capacity, East-west left-turn lanes on Waterworks Road
60th Place NE	Maintenance, Stripe 3/10th of a mile
20th Drive NE	Maintenance, Stripe 3/10th of a mile
19th Drive NE	Maintenance, Stripe 2/10th of a mile
Gays Drive	Maintenance, Stripe 2/10th of a mile
Ed Williams and Levy Lamont Road	Maintenance, Stripe 2/10th of a mile
Alphonsus Bob Loop Drive	Maintenance, Stripe 1/10th of a mile
65th Street NE	Maintenance, Stripe 1/10th of a mile
66th Place NE	Maintenance, Stripe 1/10th of a mile
66th Street NE	Maintenance, Stripe 1/10th of a mile
11th Avenue NE	Maintenance, Stripe 1/10th of a mile
Old Tulalip – east of 27th Ave NE	Preservation, Reconstruct roadway
29th Avenue NE	Preservation, Reconstruct roadway
67th Place NE	Maintenance, Stripe 1/10th of a mile
12th Avenue NW	Preservation, Pave and stripe 2/10th of a mile
Joseph Charles Place, Charles Jr Place and Jack George Drive	Maintenance, Stripe 6/10th of a mile
12th Avenue NW	Maintenance, Stripe 7/10th of a mile
60th Street NW	Maintenance, Gravel 1/10th of a mile
Turk Road Extension	Capacity, Improve/extend from Marine Dr to east-west roadway
72nd Street NE	Preservation, Grade and gravel 2/10th of a mile
Turk Drive and Waterworks Road	Capacity/safety, Improve Y-intersection
Quil Ceda Parkway and 99th Street NE	Capacity/safety, Intersection improvements
14th Avenue NE and 7th Avenue NE connectors	Capacity/Safety, Reconstruct and extend to new east-west roadway
19th Avenue NE	Capacity, Widen to 3-lane and extend to new east-west roadway
Quil Ceda Boulevard and 99th Street NE	Preservation/Safety/Capacity, Intersection improvements
Quil Ceda Boulevard	Preservation, pavement overlay

Project	Description
99th Street NE	Preservation, pavement overlay
105th Street NE Circulator Road	Circulation Improvement, Improvements between Herman Williams Sr. Dr. and Quil Ceda Boulevard
Marine Drive at 64th Street	Capacity/Safety, Signalization and construction of the east leg
John Sam Lake Roadway System	Preservation/safety
6th Avenue NW – Marine Dr to 60th St NW	Preservation/safety/capacity, Reconstruct lanes and shoulder widening
7th Avenue NE – Marine Dr to 54th St to 60th St	Preservation/safety/capacity, Reconstruct, extend lanes and shoulder widening
54th Street NE – 7th Ave to 6th/7th Ave NE	Preservation/safety/capacity, Reconstruct, extend lanes and shoulder widening
81st Street NE – East of 27th Ave NE	Preservation/safety/capacity, Reconstruct and improve roadway
Mission Height Road	Preservation/safety, Reconstruct roadway
Totem Beach Road	Preservation/safety, Reconstruct and improve roadway
Totem Beach Loop Road	Preservation/safety, Reconstruct and improve roadway
131st Street NW	Capacity/circulation, Extend roadway east of 1st Avenue for connectivity
125th Place NW	Capacity/circulation, Extend roadway east of 1st Avenue for connectivity
76th Place NW – 40th Ave NW to 44th Ave NW	Preservation, Reconstruct roadway
77th Place NW – 40th Ave NW to 44th Ave NW	Preservation, Reconstruct roadway
78th Place NW – 40th Ave NW to 44th Ave NW	Preservation, Reconstruct roadway
Illumination Enhancements	Safety, Provide roadway lighting at various locations, such at 27th Avenue between 88th St and 116th St

5. FINANCING AND IMPLEMENTATION PLAN

The Tulalip Tribes have set aside funds in 2004 to develop a financial element to be included as part of future updates to the TSTP. The financial plan will include a comparison of estimated transportation improvement costs against the potential revenue generated from existing and future sources. Future revenues will include development impact fees, revenues from state and federal fuel taxes, and grants from federal, state, or county agencies if applicable.

It is critical that whatever plan developed it must be sufficient to fund the improvements identified in the plan. If additional funding sources cannot be identified the LOS standard or land use assumptions contained in the plan should be adjusted to maintain a balance between costs and revenues.

5.1 POTENTIAL REVENUE

Potential funding sources in the federal and state categories include:

- **Surface Transportation Program (STP):** For local agencies, most of the potential for federal transportation funding is from the STP of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). For local agencies, STP funding is available in the following categories: regional competition, statewide competition, transportation enhancements and safety (hazard elimination and railroad grade crossings). SAFETEA-LU authorized the Federal surface transportation programs for highways, highway safety, and transit for the 5-year period 2005-2009.
- **Arterial Improvement Program:** These are statewide competitive grants allocated through the Transportation Improvement Board (TIB) for streets and arterials within urban areas. Funds are distributed regionally based on roadway miles, population, and needs.
- **Transportation Partnership Program (TPP):** The TPP is funded from the Transportation Improvement Account and is also administered through the TIB with minimum percentages to certain areas. Through its city selection process, the TIB requires multi-agency planning and coordination and public/private cooperation to further the goal of achieving a balanced transportation system in Washington State.

Other potential funding sources include:

- **Local Sales Tax**: Sales tax is currently collected on retail sales at the rate of 8.7 percent within the Tulalip Tribal Reservation and paid to the State of Washington. The state typically distributes these within its state general fund with a portion going to the city in which the taxes are being collected. The Municipality of Quil Ceda Village does not receive any of these funds.
- **Impact Fees**: These are fees paid by development to mitigate the impacts on the transportation system.
- **Real Estate Excise Tax**: This is a tax applied to the sale of real estate within the Reservation. The funds are required to be expended on capital improvements.
- **Loan Proceeds:** Policy makers may fund capitol improvement projects through the issuance of bonds of loan funds. These loans allow the cost of large projects to be spread over several years.

5.2 ADDITIONAL WORK TO BE ADDRESSED IN FUTURE TRANSPORTATION PLANNING

This chapter describes the additional non-capacity related work that future TSTP updates need to address.

Establish a Concurrency Policy

Staff/Consultants have been researching a Concurrency Management System policy procedure to determine whether adequate facilities are available to support new development and to implement transportation improvements concurrent with the development. In most jurisdictions, the adoption of concurrency policies allows for development to occur as long as there are financial strategies in place to meet the adopted LOS within 6 years of the proposed development. Additionally a concurrency policy allows a jurisdiction to exempt certain facilities from LOS standard if the facility is deemed to be at its ultimate capacity or financially unsupportable for improvement.

Identify facilities to be monitored or for Reduced LOS Standards

Several arterial links have been identified for potential capacity issues in 2018 even with the identified improvements. The following roadways show future daily volumes that exceed the LOS E threshold:

- Marine Drive west of 7th Avenue NW
- Marine Drive between 27th Avenue NE and 7th Avenue NW
- Marine Drive between I-5 and 27th Avenue NW

As already stated in the body of this report, additional improvements to alternative routes may reduce the actual future volumes on Marine Drive. Therefore careful monitoring of Marine Drive is underway rather than actual improvements at this time.

Additionally, the roadway links of 88th Street NE between Quil Ceda Boulevard and I-5 as well as Quil Ceda Boulevard from Quil Ceda Parkway to 88th Street NE demonstrates over capacity conditions in 2018, even though the adjacent intersection operational analysis indicates acceptable LOS E conditions. A future concurrency policy or tribal policy/resolution accepting LOS F on these specific links, as the subject roadway has been build to their ultimate configuration, would need to be passed. Road funds could be allocated to improving alternative routes to Quil Ceda Village such as 116th Street NE and 27th Avenue NE.

Manage Transportation Capacity

This step involves establishing a process to manage transportation capacity available to potential development, and monitor its consumption as new development is approved.

Monitor Level of Service

Periodic adjustments to LOS standards as part of the annual *Comprehensive Plan* amendment process will take place as well as analyzing external influences on the Concurrency Management System.

Establish Impact Fee System

Effective July 1, 1990, the 51st Legislature authorized cities to impose impact fees as a method of obtaining financing for projects to ensure that adequate facilities are available to serve new growth and development. Impact fees are intended to promote orderly growth and development by establishing standards by which

cities may require new growth and development to pay a proportionate share of the cost of new facilities. Impact fees are to provide a balance with other sources of public funds and not intended to be a sole source of project funding.

The Tribes presently utilizes Snohomish County's Unified Development Code 66B as a guideline to establish traffic impact fees. The present fee is $227 per new daily commercial trip generated or $264 per new residential daily trip generated by new development.

The transportation impact fee should be recalculated to more closely relate to the capacity needs of the Tulalip Reservation. During any update the following principles must be observed: Impact fees will be imposed on new development only for transportation system improvements that are directly related to the new development. Impact fees do not exceed an equitable share of the cost of system improvements that directly relate to the new development and they are used for system improvements that directly benefit new developments and mitigate their adverse traffic impacts.

Enhance Accident Data Base and the Reporting Procedure

Due to the combination of jurisdictions in this area (Tribe,WSDOT, County) there is no one single accident database or consistent reporting format. To clearly identify safety issues and accident patterns it is imperative that a consistent methodology for developing a reservation accident database is determined. The Tulalip Tribes Police Force is the primary agency responsible for the Reservation accident database.

Establish Consistent Development Standards That Support the Tribes Zoning and Transportation Goals

Staff/consultants have been looking at the identification of engineering and development standards in one document that promotes the goals identified in the TSTP and the tribes land use plan. The standards should be consistent for private and tribal developments. The standards should address urban and rural development standards as well as residential and commercial.

Enhance Road Maintenance Procedures

The July 2002 Tulalip Business Park Roadway Maintenance Plan & Schedule was extended to include all tribal roads. A funding mechanism for its implementation is a continuing resolution.

Collaborate with other Jurisdictions

The Tulalip Tribes should increase interjurisdictional collaboration to obtain funding and coordinate projects for regional priority.

6. REFERENCES

The Tulalip Tribes Comprehensive Land Use Plan – Preliminary Draft – 2008

I-5 / 116th Street NE Access Point Decision Report, Parametrix, – 2005.

County Transportation Element (Snohomish Co.) – 007

Destination 2030:Metropolitan Transportation Plan (PSRC) – 2001

Highways of Statewide Significance – WSDOT – Update 2003

Quil Ceda Village Business Park Environmental Assessment – 2003

Quil Ceda Village Development Final Environmental Assessment Supplemental Environmental Documentation, HDR July 2002.

Quil Ceda Visioning Charette 2002/2006

Snohomish County Non motorized Facilities Plan – Adopted: 2002

Transit First (Community Transit's Draft Six-Year Transit Development Plan) – 2003

Washington State Highway System Plan 2003-2022 WSDOT

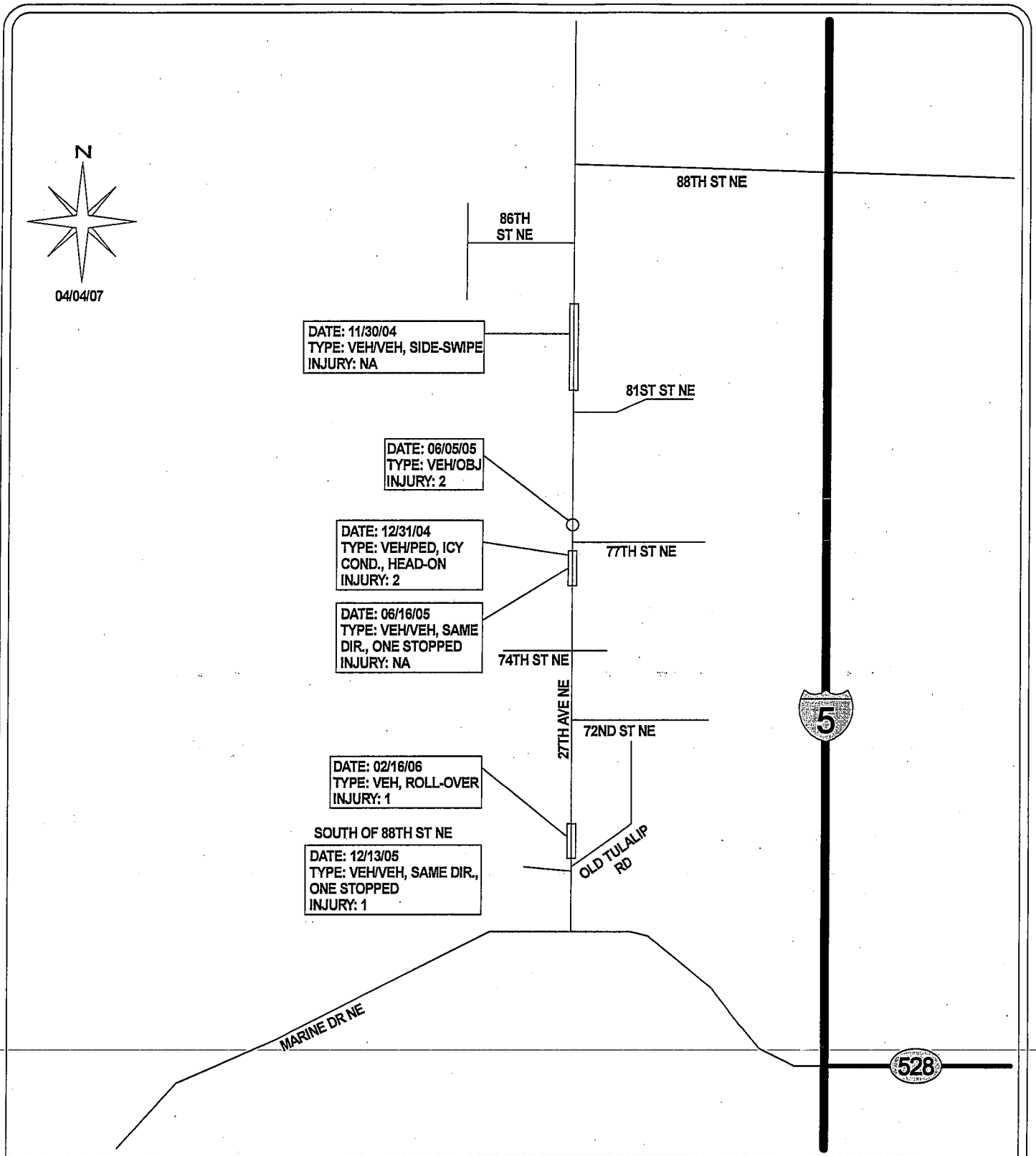
Quil Ceda Village Road Design Standard

Tulalip Bay Vision Plan I – 2005

Tulalip Bay Vision Plan II – 2008

APPENDIX A

Backup Accident Figures



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #04-136

27TH AVE NE
ACCIDENT ANALYSIS

TULALIP TRIBE

LEGEND

DATE: MM/DD/YY
TYPE:
INJURY: #/NA

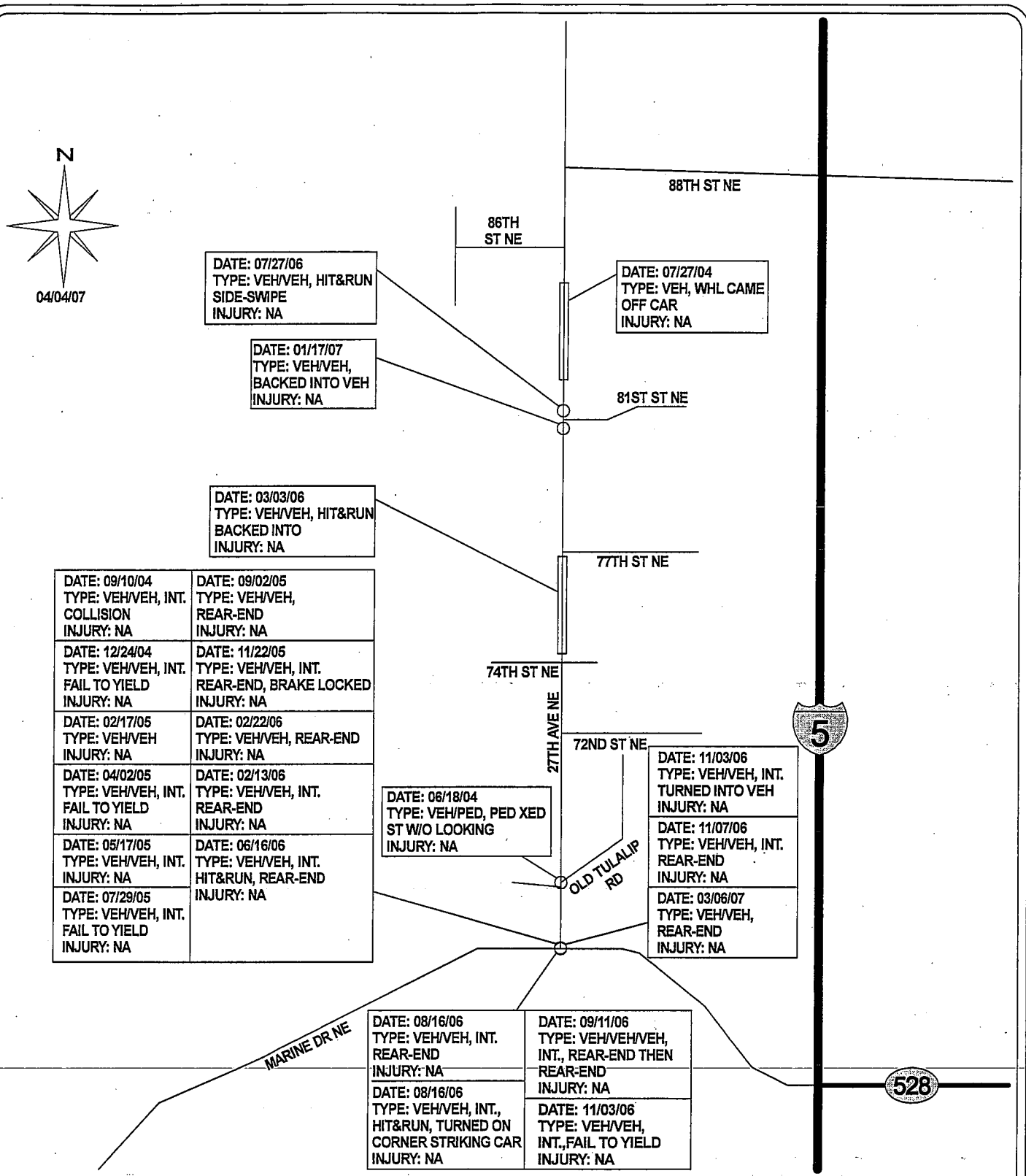
NA

ACCIDENT INFORMATION

NOT AVAILABLE AT THE MOMENT

FIGURE 2

COUNTY ACCIDENT DATA
MARINE DR NE TO 88TH ST NE
2004 TO MARCH 2007



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY
GTC #04-136

27TH AVE NE
ACCIDENT ANALYSIS

TULALIP TRIBE

LEGEND

DATE: MM/DD/YY
TYPE:
INJURY: #/NA

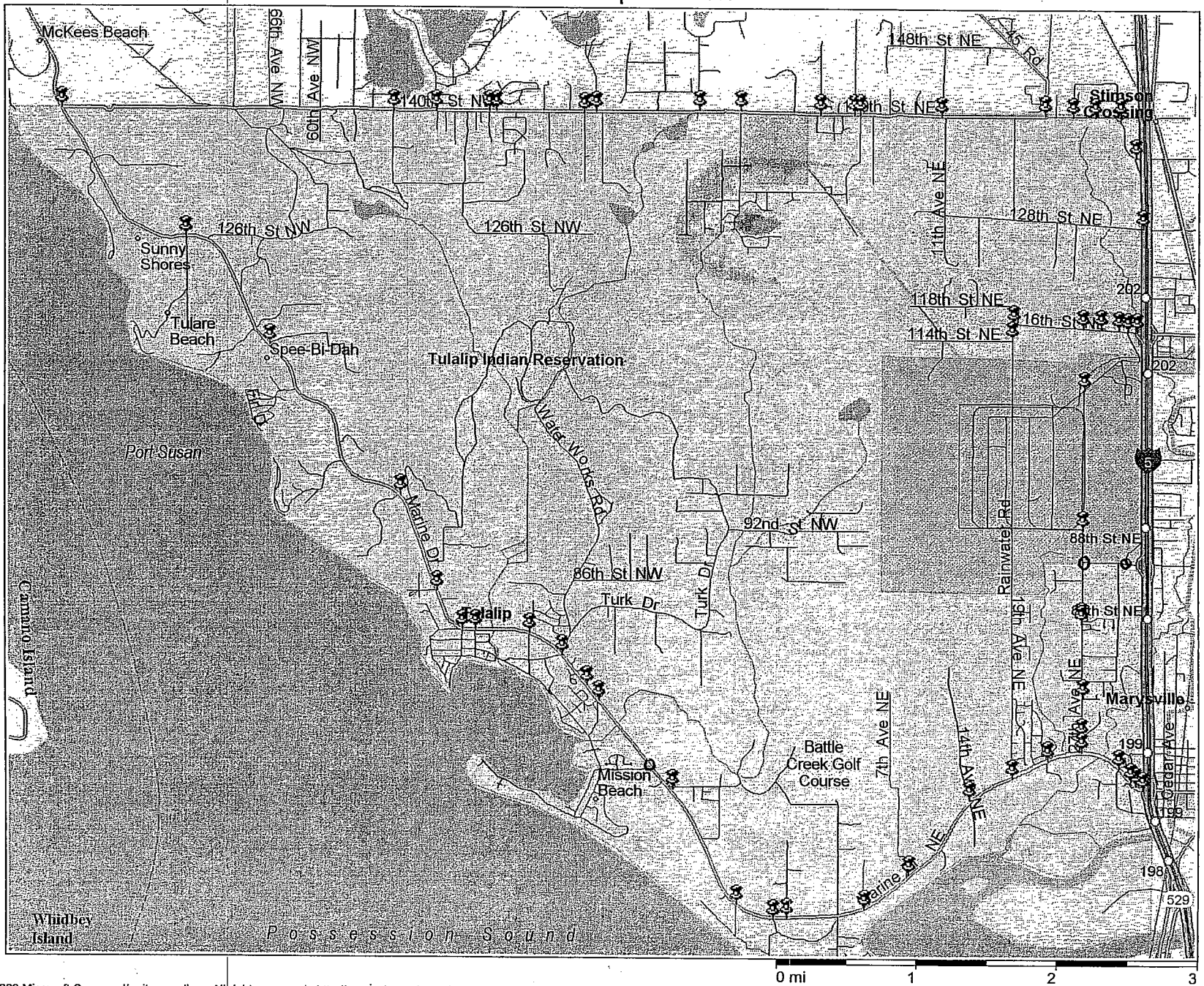
ACCIDENT INFORMATION

NA — NOT AVAILABLE AT THE MOMENT

FIGURE 1

TULALIP TRIBE POLICE
ACCIDENT DATA
MARINE DR NE TO 88TH ST NE
2004-MARCH 2007

Accident Map Balloon



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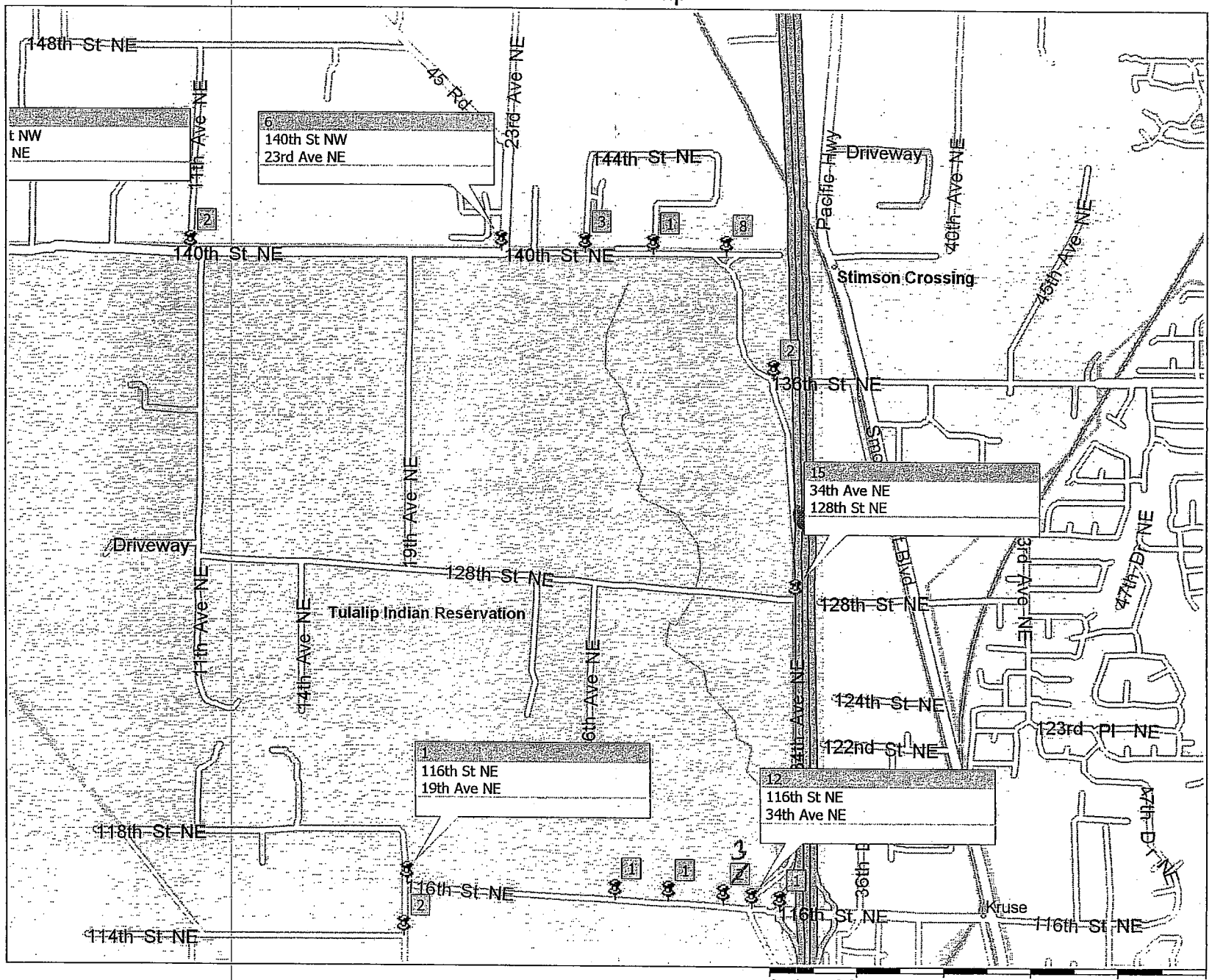
Accident Map



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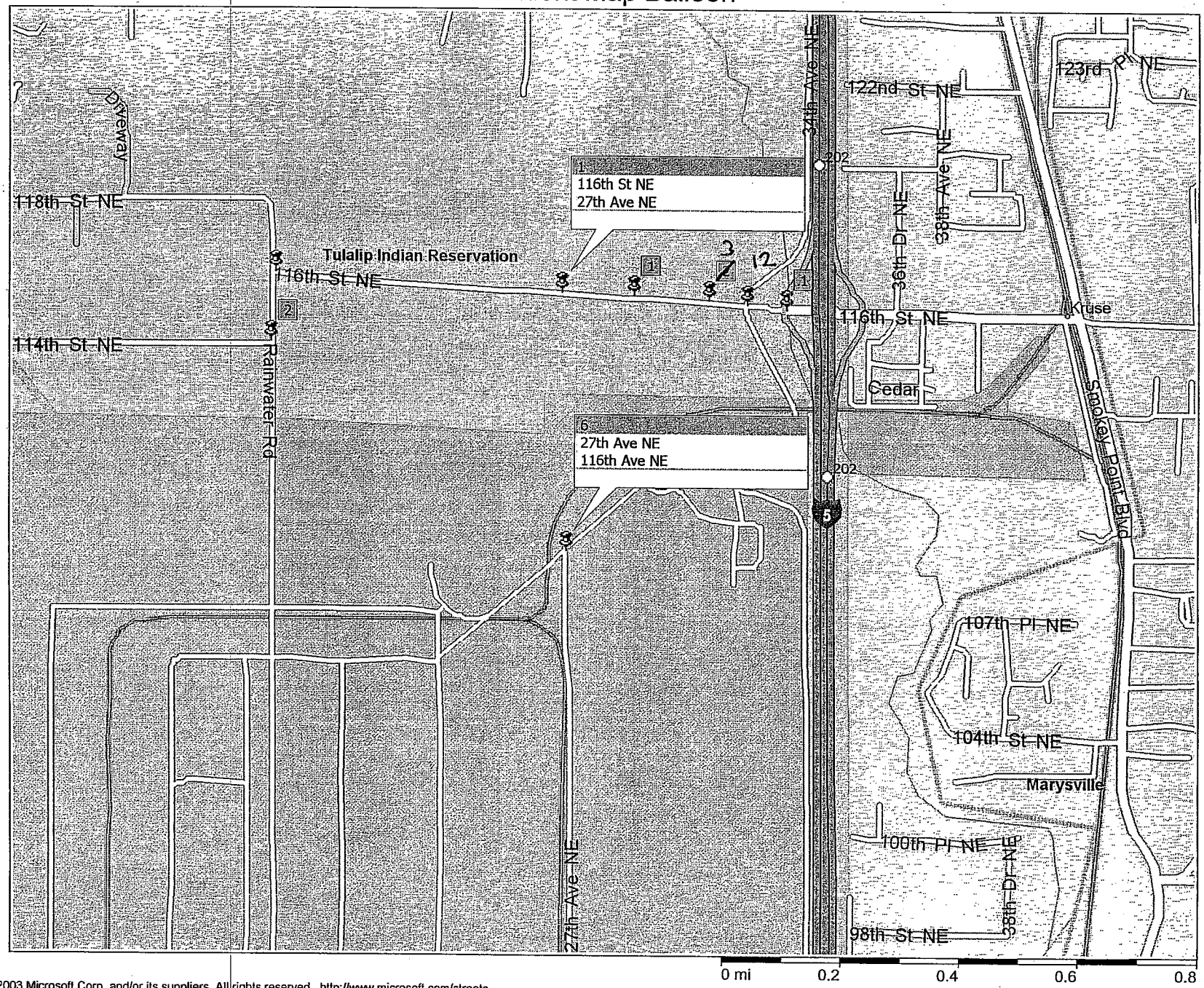

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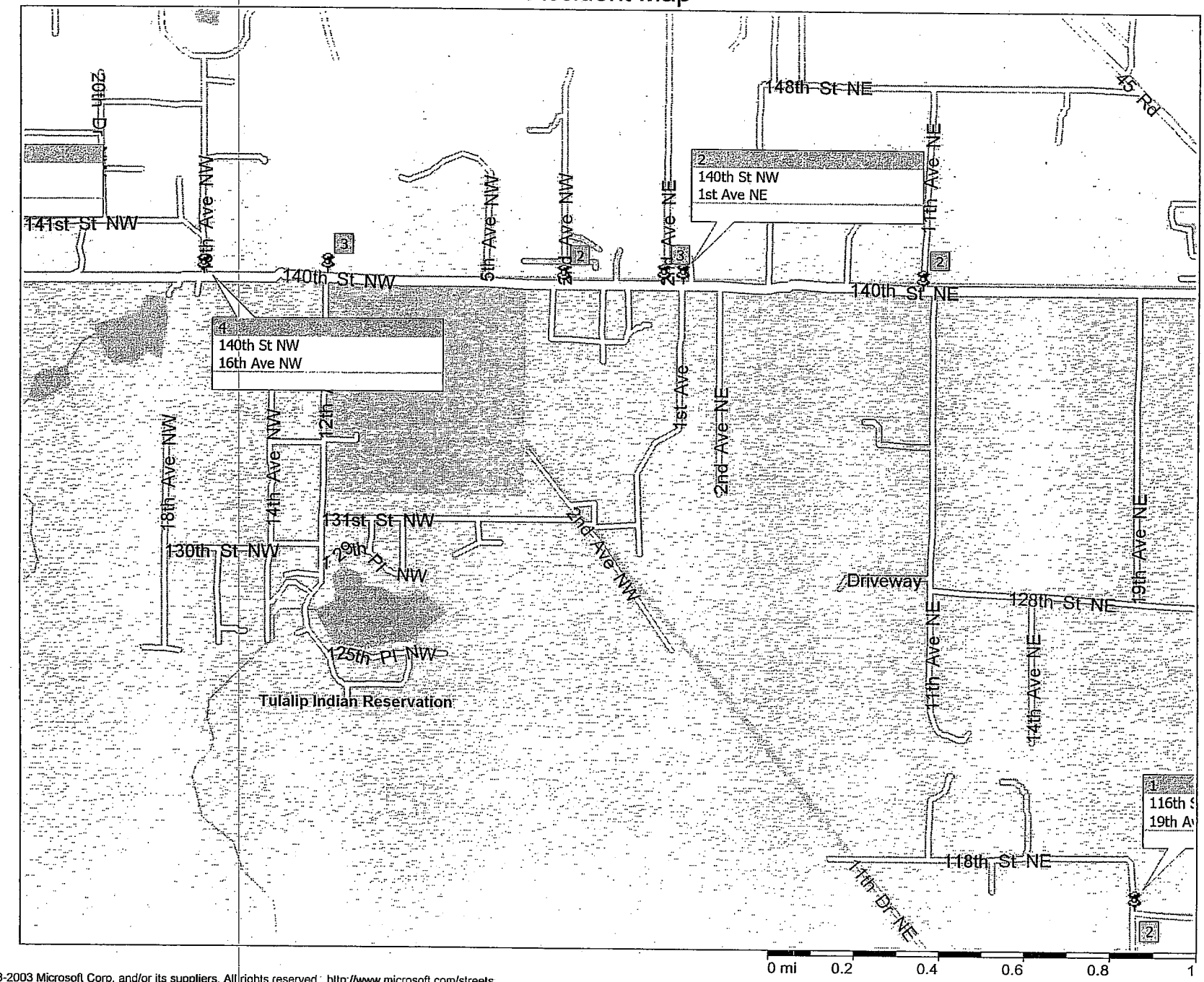

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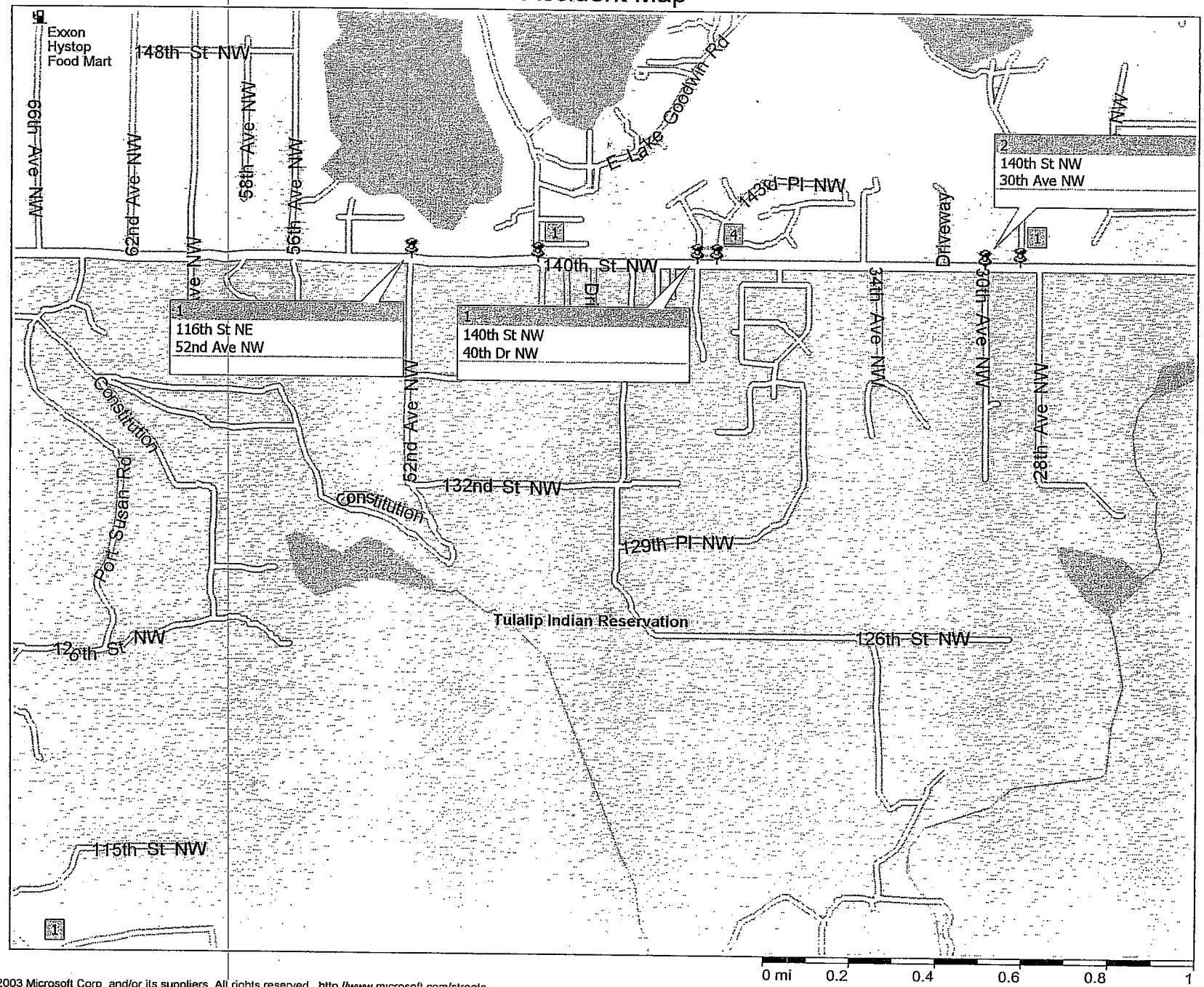

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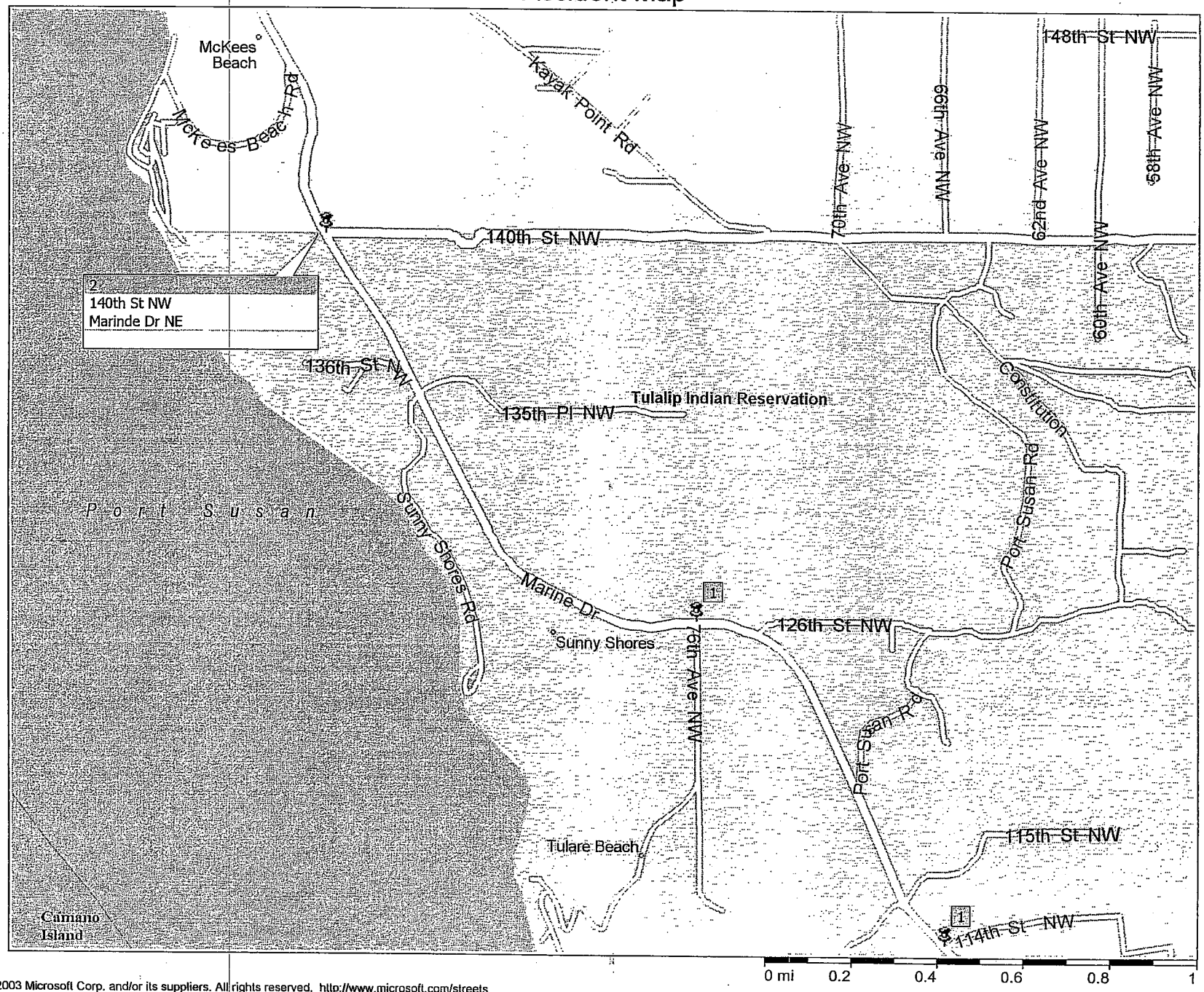

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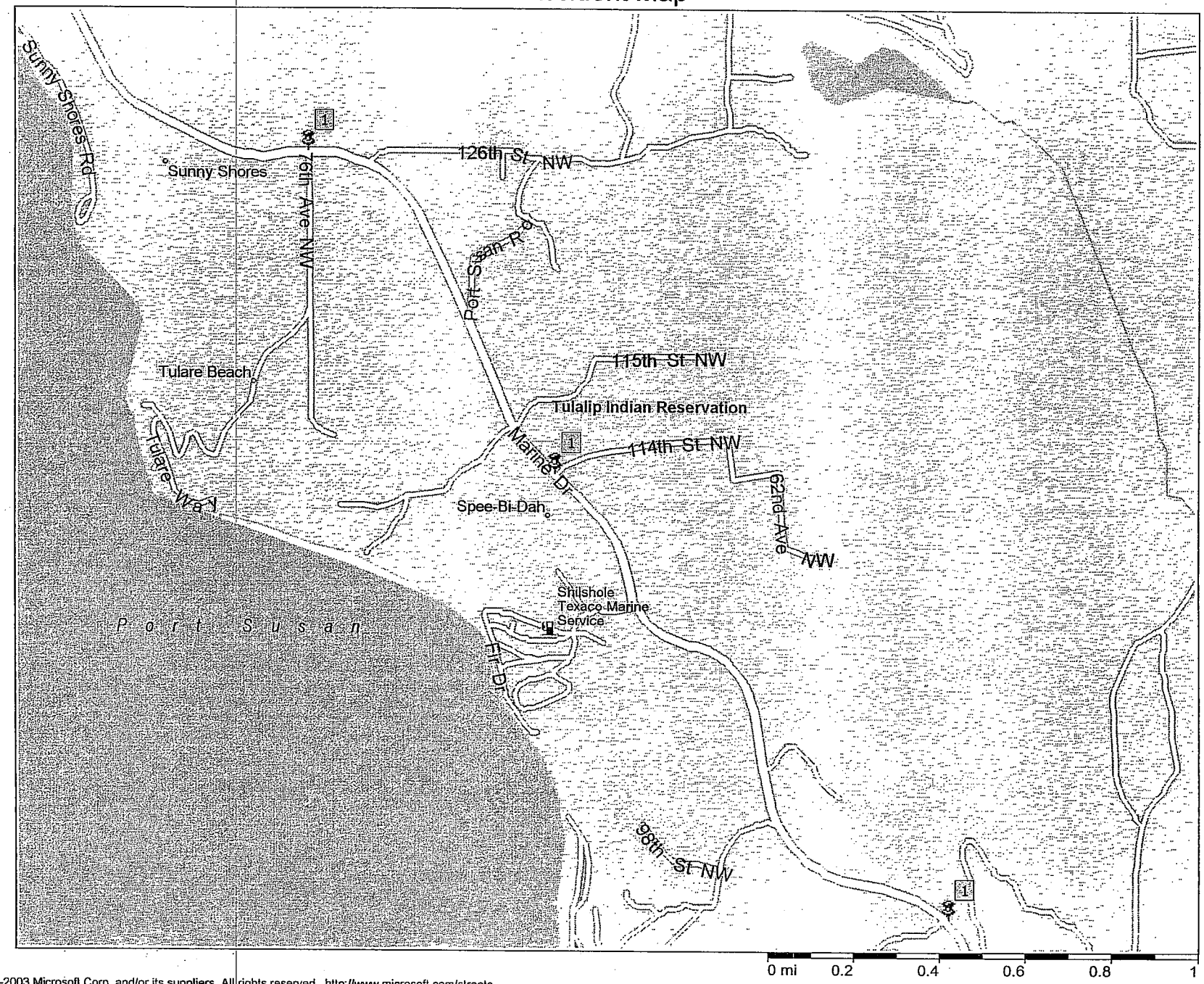

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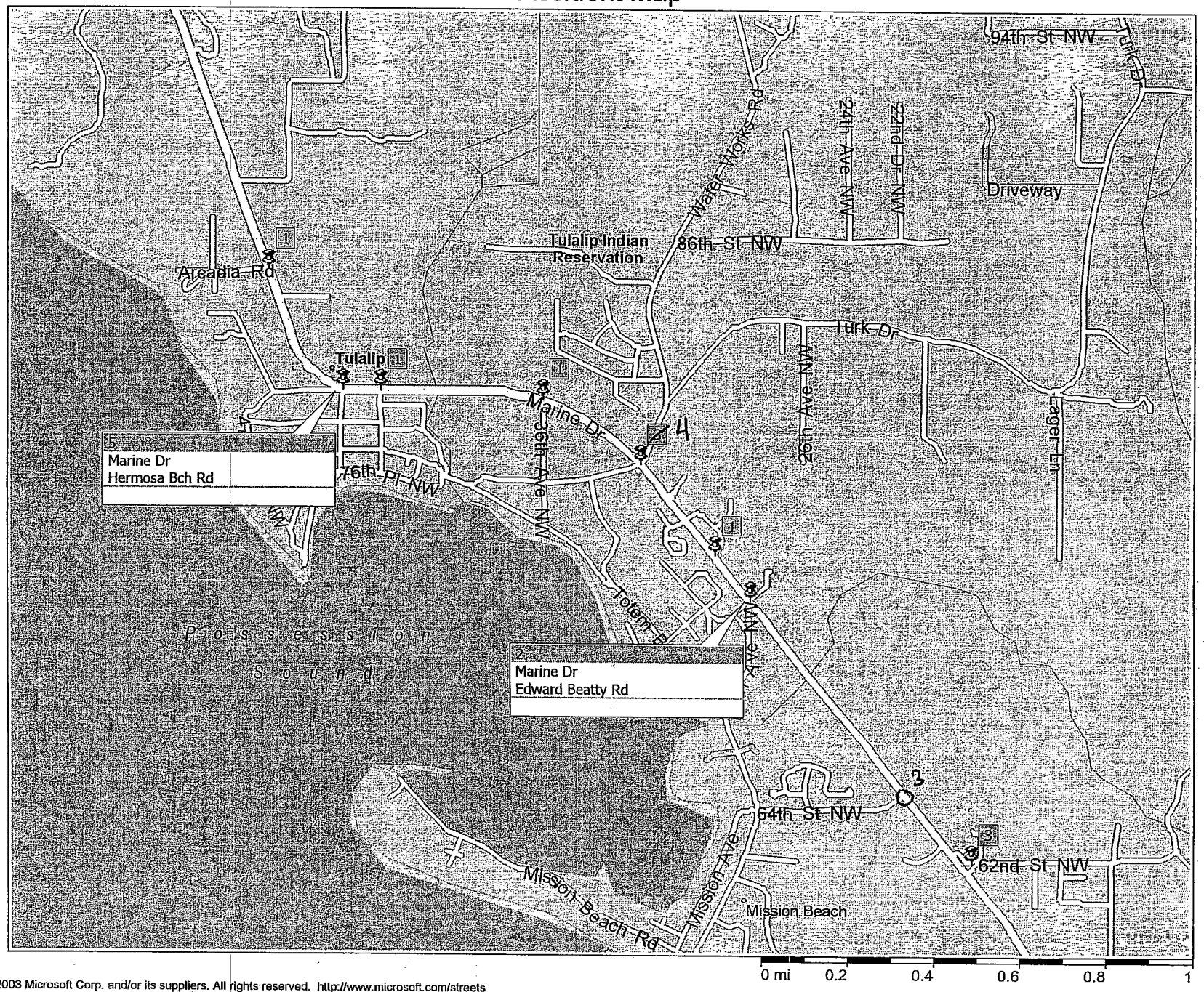

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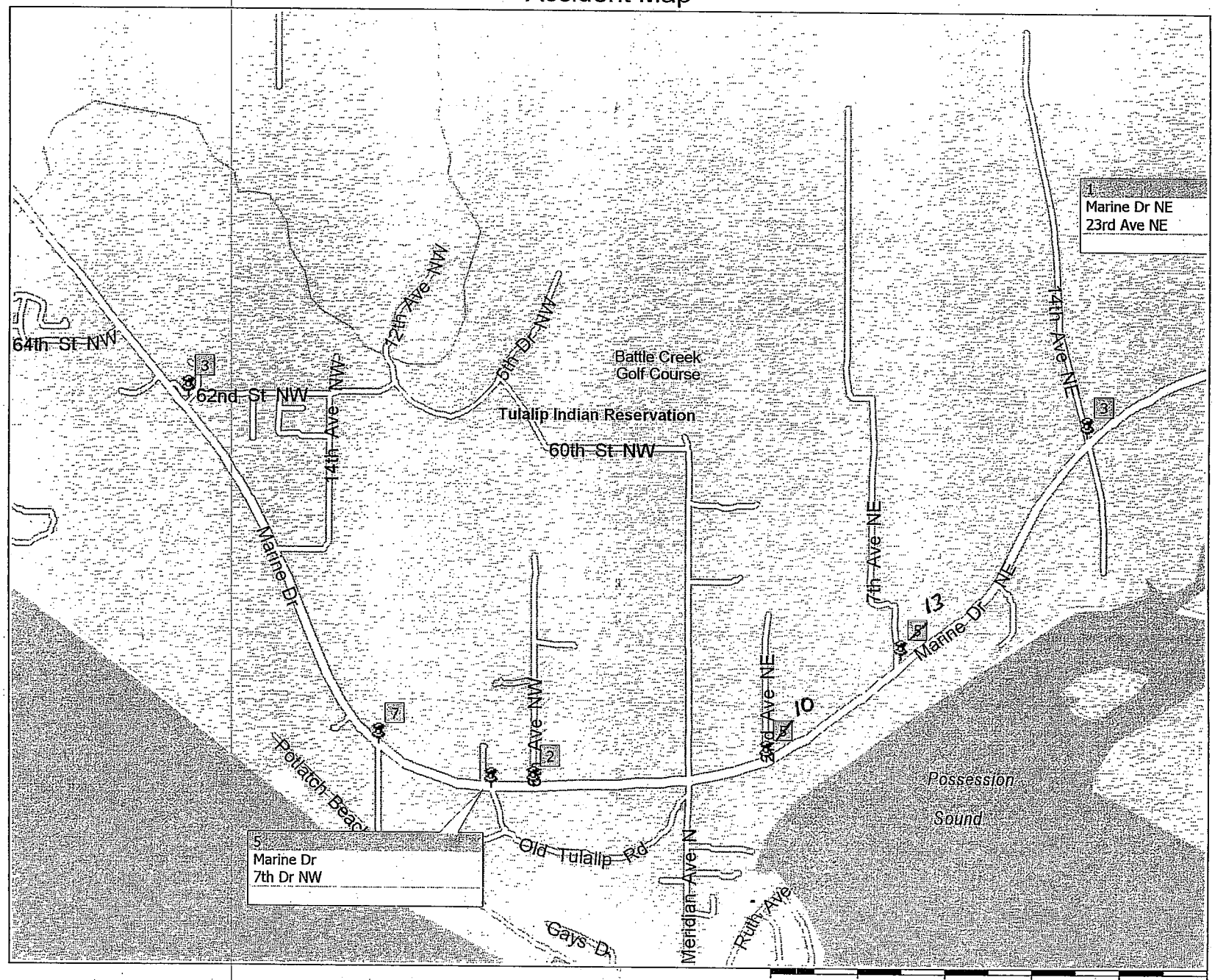

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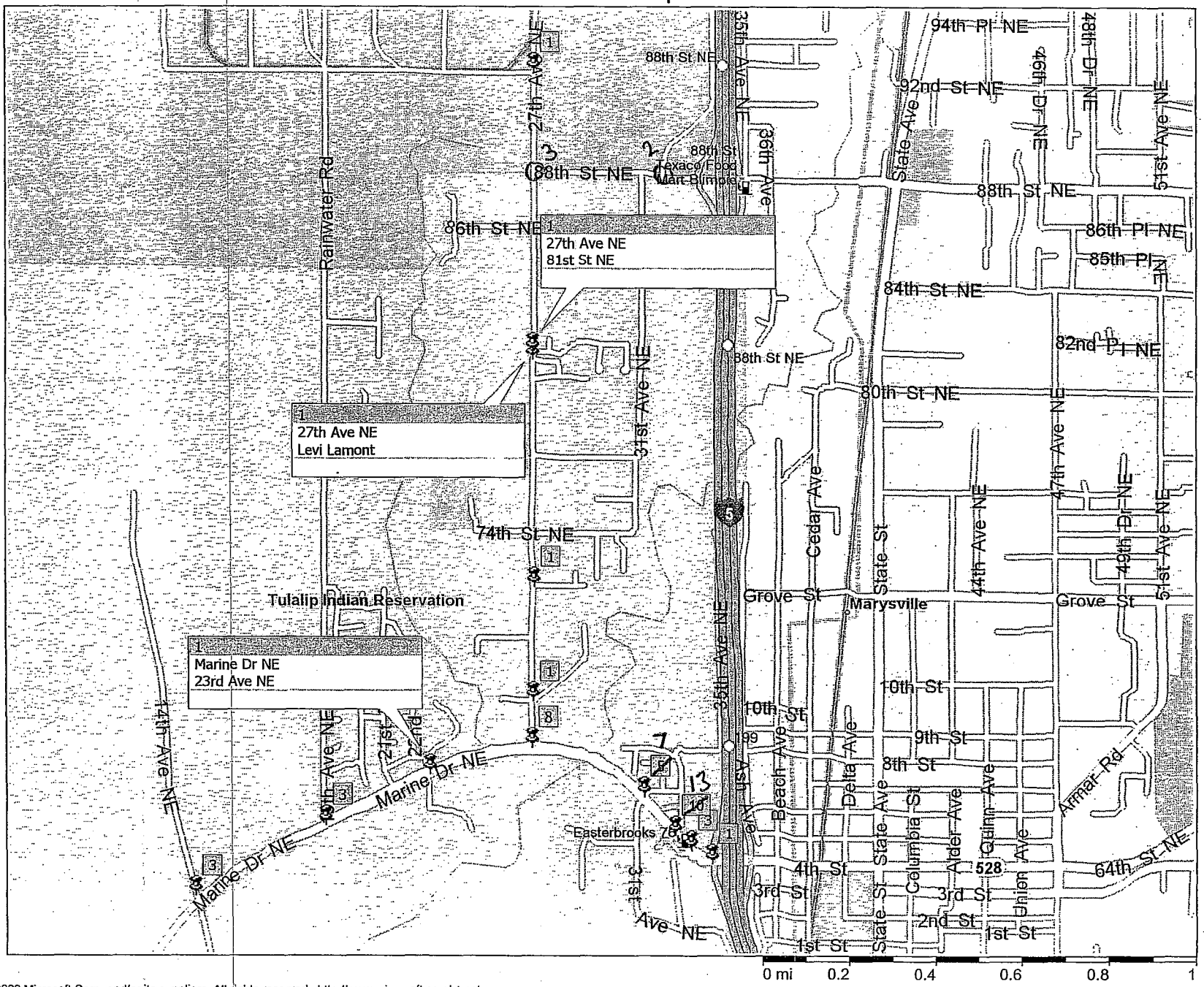

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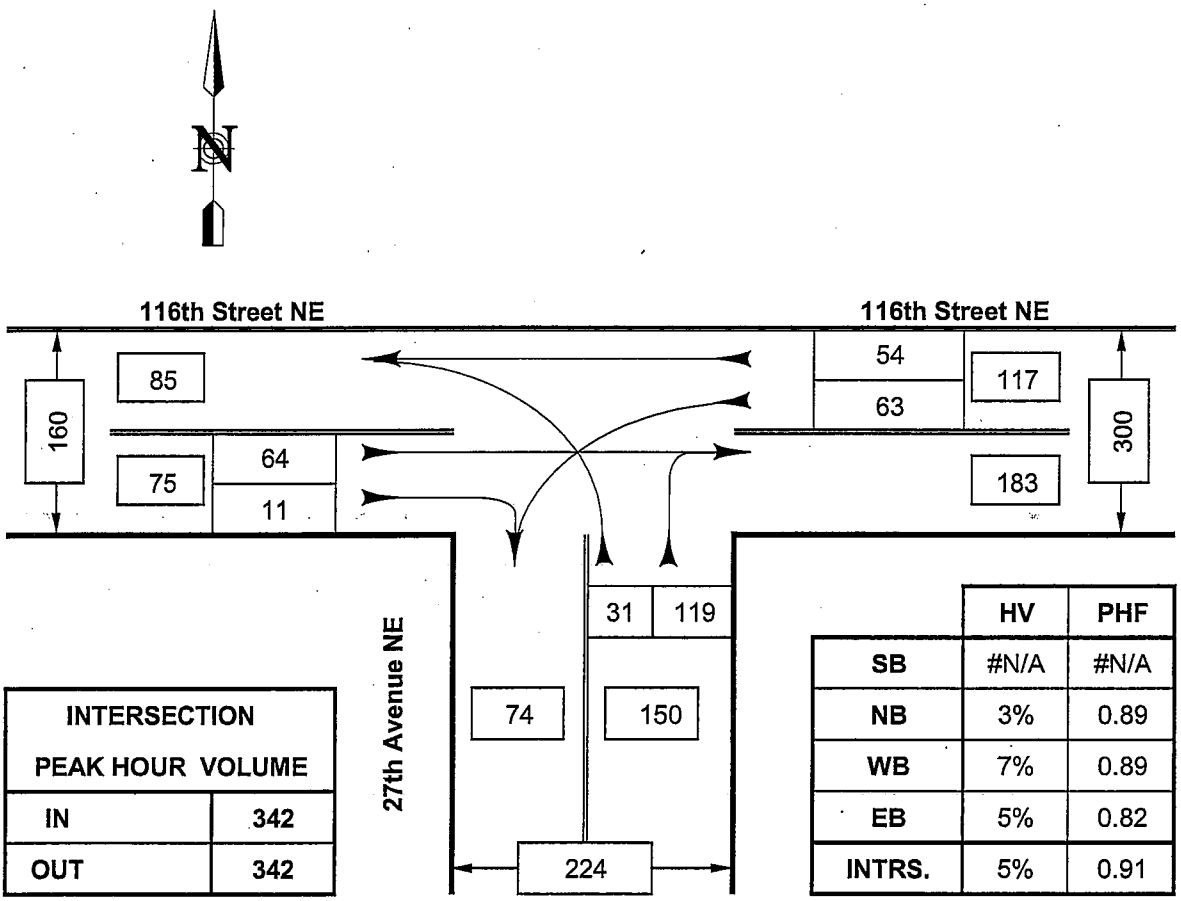
APPENDIX B

Turning Movement Counts

DTG TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

4:00 - 6:00 PM PEAK HOUR: 4:15 PM TO 5:15 PM



INTERSECTION PEAK HOUR VOLUME	
IN	342
OUT	342

	HV	PHF
SB	#N/A	#N/A
NB	3%	0.89
WB	7%	0.89
EB	5%	0.82
INTRS.	5%	0.91

HV = HEAVY VEHICLES

PHF = PEAK HOUR FACTOR

27th Avenue NE @ 116th Street NE

Tulalip, WA

COUNTED BY:	UG	DATE OF COUNT:	Thu. 8/3/06
REDUCED BY:	CN	TIME OF COUNT:	4:00 - 6:00 PM
DATE OF REDUCTION:	Mon. 8/7/06	WEATHER:	Sunny

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: 27th Avenue NE @ 116th Street NE
Tulalip, WA

DATE OF COUNT: Thu. 8/3/06
TIME OF COUNT: 4:00 - 6:00 PM

COUNTED BY: UG
WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON 0				FROM SOUTH ON 27th Avenue NE				FROM EAST ON 116th Street NE				FROM WEST ON 116th Street NE				INTERVAL TOTALS
	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	1	8	0	24	2	7	14	0	1	0	15	1	69
04:45 PM	0	0	0	0	1	9	0	28	3	20	13	0	2	0	16	4	90
05:00 PM	0	0	0	0	1	5	0	37	1	16	15	0	0	0	14	2	89
05:15 PM	0	0	0	0	2	9	0	30	2	20	12	0	1	0	19	4	94
05:30 PM	0	0	0	0	0	7	0	24	0	14	12	0	1	0	8	2	67
05:45 PM	0	0	0	0	0	7	0	16	2	19	13	0	2	0	17	4	76
06:00 PM	0	0	0	0	1	4	0	23	4	11	12	0	0	0	18	3	71
PEAK HOUR TOTALS	0	0	0	0	5	31	0	119	8	63	54	0	4	0	64	11	INTERSECTION
ALL MOVEMENTS	0				150				117				75				342
% HV	#N/A				3%				7%				5%				5%
PEAK HOUR FACTOR	#N/A				0.89				0.89				0.82				0.91

HV = Heavy Vehicles
PHF = Peak Hour Factor

4:00 - 6:00 PM PEAK HOUR: 4:15 PM TO 5:15 PM

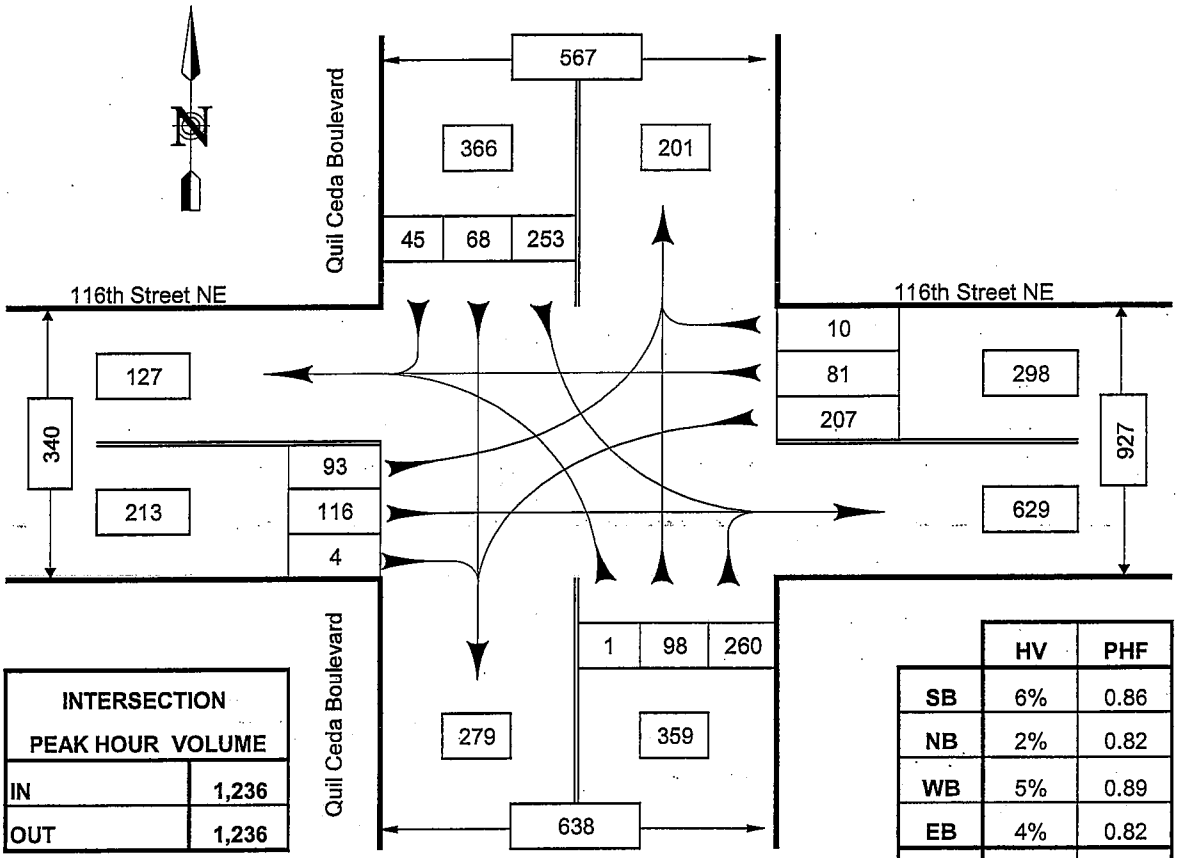
REDUCED BY: CN

DATE OF REDUCTION: 8/7/2006

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

4:00 - 6:00 PM PEAK HOUR: 4:15 PM TO 5:15 PM



INTERSECTION PEAK HOUR VOLUME	
IN	1,236
OUT	1,236

	HV	PHF
SB	6%	0.86
NB	2%	0.82
WB	5%	0.89
EB	4%	0.82
INTRS.	4%	0.96

HV = Heavy Vehicles
PHF = Peak Hour Factor

116th St NE @ Quil Ceda Blvd

Tulalip, WA

COUNTED BY: KH

REDUCED BY: CN

DATE: Thu. 5/31/07

DATE OF COUNT: Wed. 5/30/07

TIME OF COUNT: 4:00 - 6:00 PM

WEATHER: Sunny

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: 116th St NE @ Quil Ceda Blvd
Tulalip, WA

DATE OF COUNT: Wed. 5/30/07
TIME OF COUNT: 4:00 - 6:00 PM

COUNTED BY: KH
WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON Quil Ceda Boulevard				FROM SOUTH ON Quil Ceda Boulevard				FROM EAST ON 116th Street NE				FROM WEST ON 116th Street NE				INTERVAL TOTALS
	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	8	53	23	15	0	0	19	60	5	53	23	0	0	11	30	2	289
04:30 PM	8	74	17	15	2	0	32	57	5	61	16	0	1	12	27	2	313
04:45 PM	4	69	16	8	1	0	33	77	3	34	23	3	2	21	28	2	314
05:00 PM	1	41	17	10	2	0	14	73	3	49	24	4	1	31	25	0	288
05:15 PM	10	69	18	12	3	1	19	53	4	63	18	3	4	29	36	0	321
05:30 PM	5	61	33	23	2	0	18	53	1	48	16	5	0	20	31	1	309
05:45 PM	1	41	18	8	3	3	23	70	2	57	27	5	1	24	20	2	298
06:00 PM	2	57	23	11	3	0	12	55	6	49	29	7	0	21	27	1	292
PEAK HOUR TOTALS	23	253	68	45	8	1	98	260	15	207	81	10	8	93	116	4	INTERSECTION
ALL MOVEMENTS	366				359				298				213				1236
% HV	6%				2%				5%				4%				4%
PEAK HOUR FACTOR	0.86				0.82				0.89				0.82				0.96

HV = Heavy Vehicles
PHF = Peak Hour Factor

4:00 - 6:00 PM PEAK HOUR: 4:15 PM TO 5:15 PM

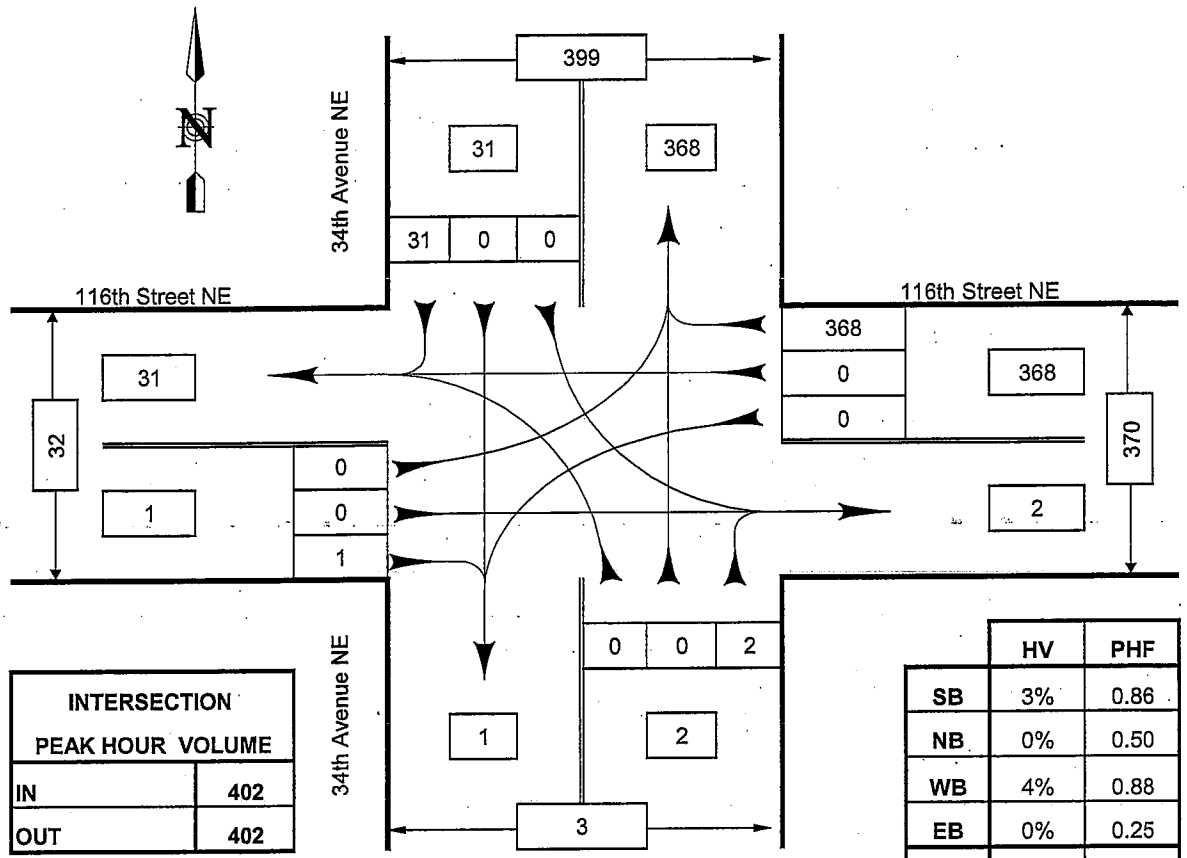
REDUCED BY: CN

DATE OF REDUCTION: 5/31/2007

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

4:00 - 6:00 PM PEAK HOUR: 5:00 PM TO 6:00 PM



INTERSECTION PEAK HOUR VOLUME	
IN	402
OUT	402

	HV	PHF
SB	3%	0.86
NB	0%	0.50
WB	4%	0.88
EB	0%	0.25
INTRS.	4%	0.88

HV = Heavy Vehicles
PHF = Peak Hour Factor

116th St NE @ 34th Avenue NE

Tulalip, WA

COUNTED BY: CN

REDUCED BY: CN

DATE: Thu. 5/31/07

DATE OF COUNT: Wed. 5/30/07

TIME OF COUNT: 4:00 - 6:00 PM

WEATHER: Sunny

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: 116th St NE @ 34th Avenue NE
Tulalip, WA

DATE OF COUNT: Wed. 5/30/07
TIME OF COUNT: 4:00 - 6:00 PM

COUNTED BY: CN
WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON 34th Avenue NE				FROM SOUTH ON 34th Avenue NE				FROM EAST ON 116th Street NE				FROM WEST ON 116th Street NE				INTERVAL TOTALS
	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	2	0	0	15	0	0	0	0	6	0	0	62	0	0	0	0	77
04:30 PM	1	0	0	9	0	0	0	1	4	0	0	86	0	0	0	0	96
04:45 PM	0	0	0	15	0	0	0	1	5	0	0	74	0	0	0	0	90
05:00 PM	0	0	0	6	0	0	0	2	5	0	0	84	0	0	0	0	92
05:15 PM	0	0	0	6	0	0	0	1	7	0	0	91	0	0	0	1	99
05:30 PM	0	0	0	7	0	0	0	1	3	0	0	97	0	0	0	0	105
05:45 PM	0	0	0	9	0	0	0	0	2	0	0	75	0	0	0	0	84
06:00 PM	1	0	0	9	0	0	0	0	3	0	0	105	0	0	0	0	114
PEAK HOUR TOTALS	1	0	0	31	0	0	0	2	15	0	0	368	0	0	0	1	INTERSECTION
ALL MOVEMENTS	31				2				368				1				402
% HV	3%				0%				4%				0%				4%
PEAK HOUR FACTOR	0.86				0.50				0.88				0.25				0.88

HV = Heavy Vehicles
PHF = Peak Hour Factor

4:00 - 6:00 PM PEAK HOUR: 5:00 PM TO 6:00 PM

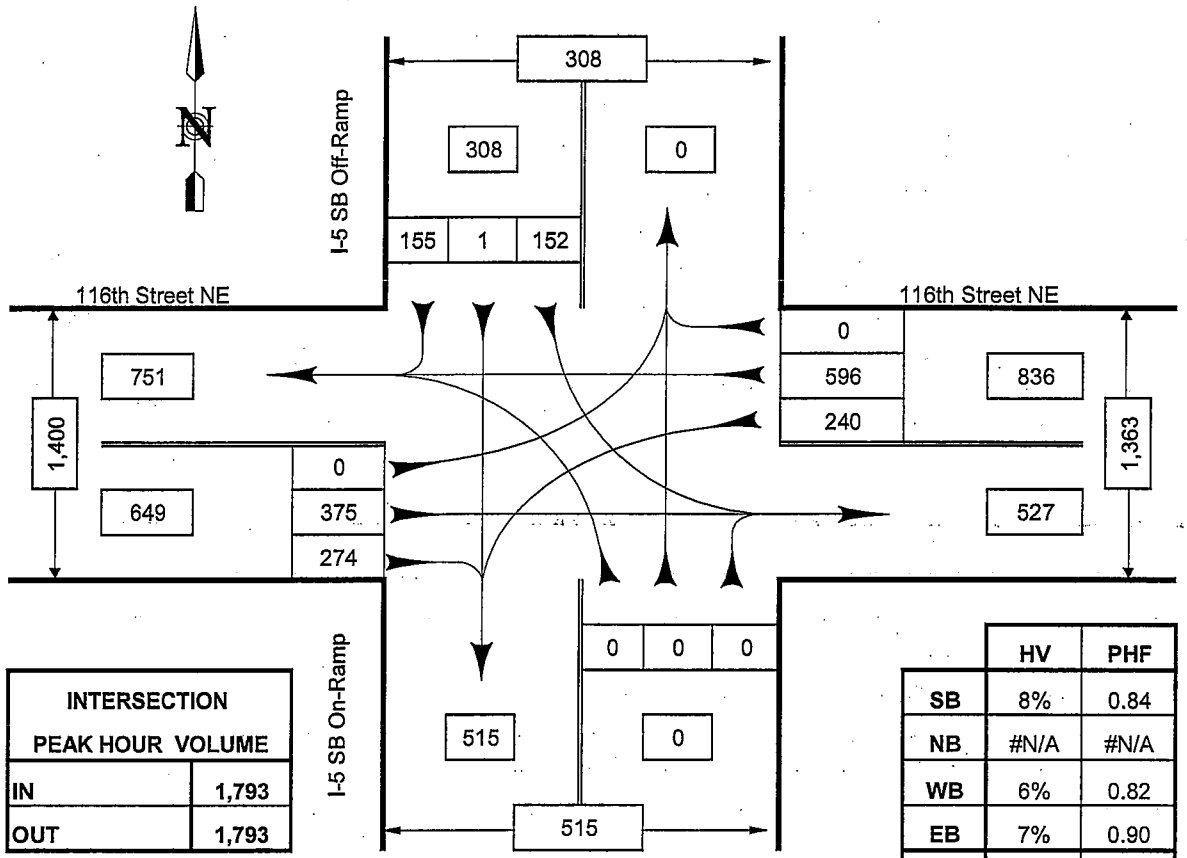
REDUCED BY: CN

DATE OF REDUCTION: 5/31/2007

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

4:00 - 6:00 PM PEAK HOUR: 5:00 PM TO 6:00 PM



INTERSECTION PEAK HOUR VOLUME	
IN	1,793
OUT	1,793

	HV	PHF
SB	8%	0.84
NB	#N/A	#N/A
WB	6%	0.82
EB	7%	0.90
INTRS.	7%	0.90

HV = Heavy Vehicles
PHF = Peak Hour Factor

116th St NE @ I-5 SB Ramps

Tulalip, WA

COUNTED BY: JH

REDUCED BY: CN

DATE: Thu. 5/31/07

DATE OF COUNT: Wed. 5/30/07

TIME OF COUNT: 4:00 - 6:00 PM

WEATHER: Sunny

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: 116th St NE @ I-5 SB Ramps
Tulalip, WA

DATE OF COUNT: Wed. 5/30/07
TIME OF COUNT: 4:00 - 6:00 PM

COUNTED BY: JH
WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON I-5 SB Off-Ramp				FROM SOUTH ON I-5 SB On-Ramp				FROM EAST ON 116th Street NE				FROM WEST ON 116th Street NE				INTERVAL TOTALS
	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	5	29	0	43	0	0	0	0	12	63	118	0	15	0	99	66	418
04:30 PM	6	28	0	38	0	0	0	0	8	58	133	0	16	0	89	76	422
04:45 PM	6	46	1	31	0	0	0	0	13	88	104	0	5	0	108	82	460
05:00 PM	3	40	1	45	0	0	0	0	10	61	120	0	2	0	96	55	418
05:15 PM	8	36	0	56	0	0	0	0	14	79	139	0	12	0	101	80	491
05:30 PM	6	35	0	30	0	0	0	0	9	55	119	0	8	0	97	67	403
05:45 PM	8	28	0	43	0	0	0	0	11	57	132	0	9	0	83	57	400
06:00 PM	4	53	1	26	0	0	0	0	15	49	206	0	14	0	94	70	499
PEAK HOUR TOTALS	26	152	1	155	0	0	0	0	49	240	596	0	43	0	375	274	INTERSECTION
ALL MOVEMENTS	308				0				836				649				1793
% HV	8%				#N/A				6%				7%				7%
PEAK HOUR FACTOR	0.84				#N/A				0.82				0.90				0.90

HV = Heavy Vehicles
PHF = Peak Hour Factor

4:00 - 6:00 PM PEAK HOUR: 5:00 PM TO 6:00 PM

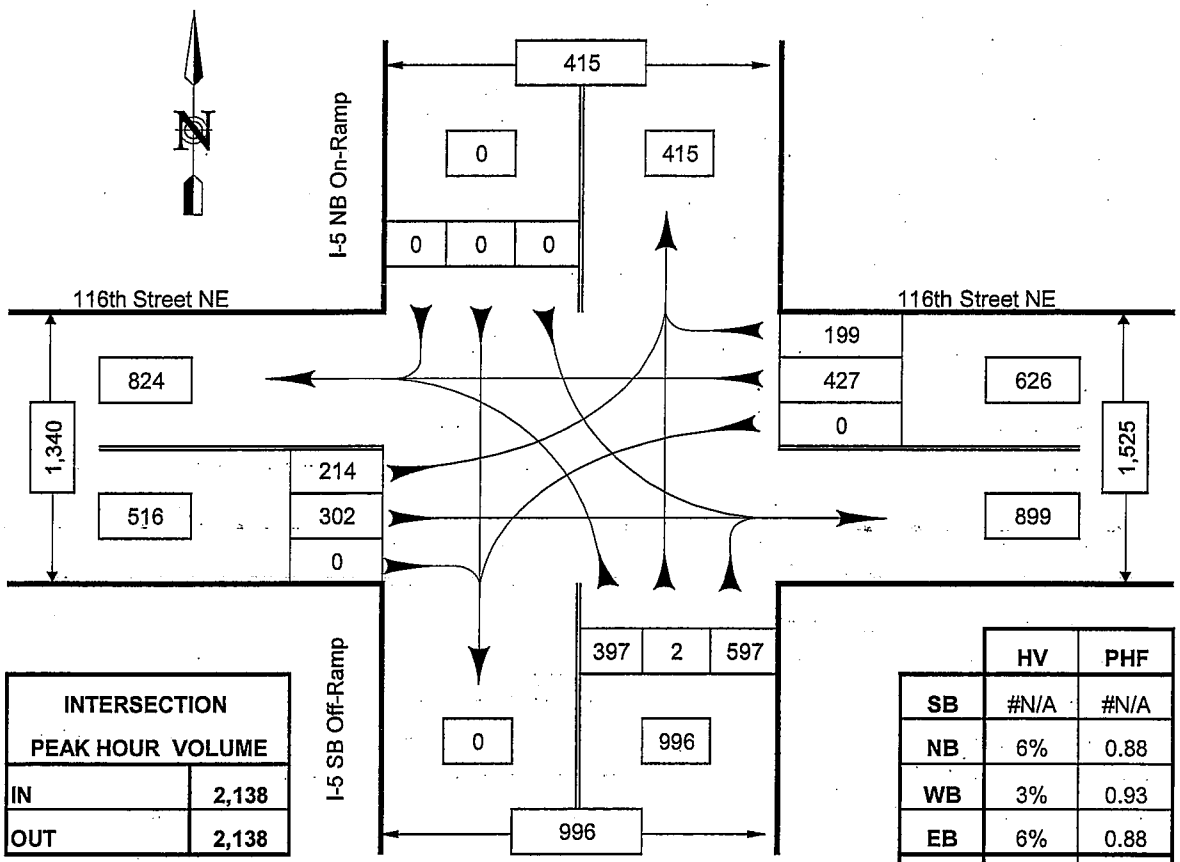
REDUCED BY: CN

DATE OF REDUCTION: 5/31/2007

DTG TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

4:00 - 6:00 PM PEAK HOUR: 5:00 PM TO 6:00 PM



INTERSECTION PEAK HOUR VOLUME	
IN	2,138
OUT	2,138

	HV	PHF
SB	#N/A	#N/A
NB	6%	0.88
WB	3%	0.93
EB	6%	0.88
INTRS.	5%	0.93

HV = Heavy Vehicles
PHF = Peak Hour Factor

116th St NE @ I-5 NB Ramps

Tulalip, WA

COUNTED BY: RH

REDUCED BY: CN

DATE: Fri. 6/1/07

DATE OF COUNT: Wed. 5/30/07

TIME OF COUNT: 4:00 - 6:00 PM

WEATHER: Sunny

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: 116th St NE @ I-5 NB Ramps
Tulalip, WA

DATE OF COUNT: Wed. 5/30/07
TIME OF COUNT: 4:00 - 6:00 PM

COUNTED BY: RH
WEATHER: Sunny

TIME INTERVAL ENDING	FROM NORTH ON I-5 NB On-Ramp				FROM SOUTH ON I-5 SB Off-Ramp				FROM EAST ON 116th Street NE				FROM WEST ON 116th Street NE				INTERVAL TOTALS
AT	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	18	97	1	147	6	0	109	54	14	55	55	0	518
04:30 PM	0	0	0	0	12	81	0	129	9	0	100	45	9	58	49	0	462
04:45 PM	0	0	0	0	12	88	1	109	9	0	138	50	1	58	79	0	523
05:00 PM	0	0	0	0	9	100	0	104	6	0	99	57	2	70	90	0	520
05:15 PM	0	0	0	0	18	103	1	118	4	0	120	47	8	63	66	0	518
05:30 PM	0	0	0	0	14	110	0	133	6	0	76	48	5	52	94	0	513
05:45 PM	0	0	0	0	11	84	1	163	4	0	118	51	7	48	66	0	531
06:00 PM	0	0	0	0	12	100	0	183	5	0	113	53	11	51	76	0	576
PEAK HOUR TOTALS	0	0	0	0	55	397	2	597	19	0	427	199	31	214	302	0	INTERSECTION
ALL MOVEMENTS	0				996				626				516				2138
% HV	#N/A				6%				3%				6%				5%
PEAK HOUR FACTOR	#N/A				0.88				0.93				0.88				0.93

HV = Heavy Vehicles
PHF = Peak Hour Factor

4:00 - 6:00 PM PEAK HOUR: 5:00 PM TO 6:00 PM

REDUCED BY: CN

DATE OF REDUCTION: 6/1/2007

DTG **TRAFFIC DATA GATHERING**

TURNING MOVEMENTS DIAGRAM

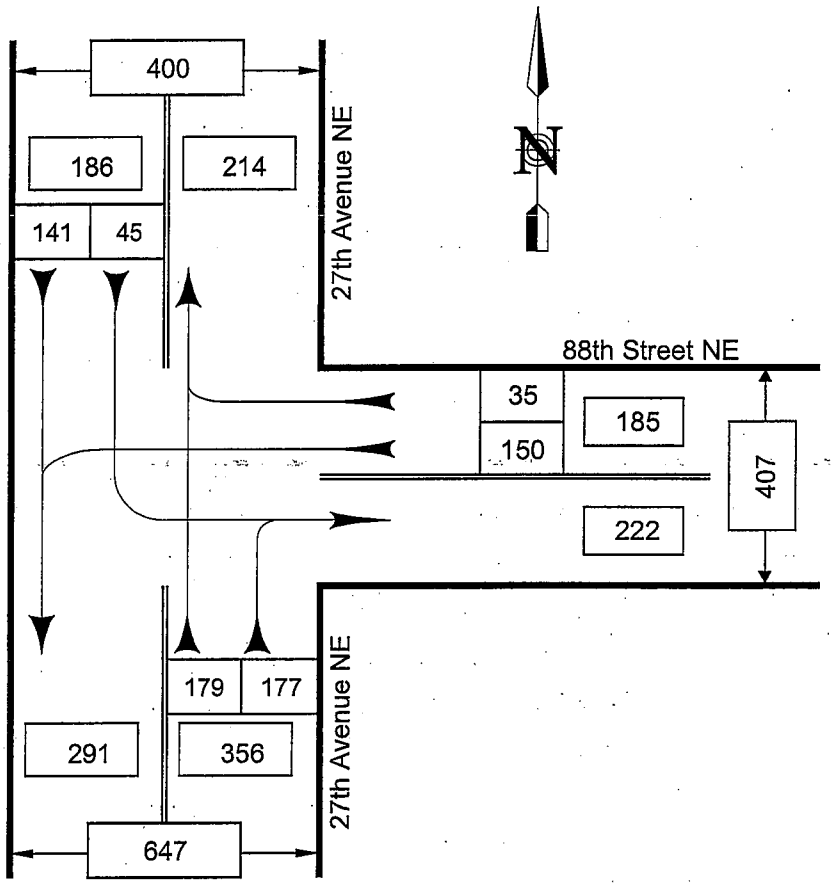
4:00 - 6:00 PM PEAK HOUR: **4:00 PM TO 5:00 PM**

	HV	PHF
SB	3%	0.89
NB	4%	0.89
WB	2%	0.84
EB	#N/A	#N/A
INTRS.	3%	0.92

HV = Heavy Vehicles

PHF = Peak Hour Factor

INTERSECTION PEAK HOUR VOLUME	
IN	727
OUT	727



27th Avenue NE @ 88th Street NE

Tulalip, WA

COUNTED BY:	BF	DATE OF COUNT:	Thu. 8/3/06
REDUCED BY:	CN	TIME OF COUNT:	4:00 - 6:00 PM
DATE OF REDUCTION:	Mon. 8/7/06	WEATHER:	Sunny

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: 27th Avenue NE @ 88th Street NE
Tulalip, WA

DATE OF COUNT: Thu. 8/3/06
TIME OF COUNT: 4:00 - 6:00 PM

COUNTED BY: BF
WEATHER: Sunny

TIME INTERVAL ENDING	FROM NORTH ON 27th Avenue NE				FROM SOUTH ON 27th Avenue NE				FROM EAST ON 88th Street NE				FROM WEST ON 0				INTERVAL TOTALS
AT	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	1	8	32	0	3	0	54	46	1	44	0	8	0	0	0	0	192
04:30 PM	1	9	39	0	1	0	37	38	0	30	0	5	0	0	0	0	158
04:45 PM	3	14	38	0	5	0	44	47	3	46	0	9	0	0	0	0	198
05:00 PM	1	14	32	0	5	0	44	46	0	30	0	13	0	0	0	0	179
05:15 PM	1	7	33	0	1	0	35	40	1	32	0	7	0	0	0	0	154
05:30 PM	0	10	23	0	1	0	39	32	0	32	0	8	0	0	0	0	144
05:45 PM	3	13	23	0	2	0	40	24	0	32	0	3	0	0	0	0	135
06:00 PM	0	9	18	0	1	0	35	28	0	33	0	7	0	0	0	0	130
PEAK HOUR TOTALS	6	45	141	0	14	0	179	177	4	150	0	35	0	0	0	0	INTERSECTION
ALL MOVEMENTS	186				356				185				0				727
% HV	3%				4%				2%				#N/A				3%
PEAK HOUR FACTOR	0.89				0.89				0.84				#N/A				0.92

HV = Heavy Vehicles
PHF = Peak Hour Factor

4:00 - 6:00 PM PEAK HOUR: 4:00 PM TO 5:00 PM

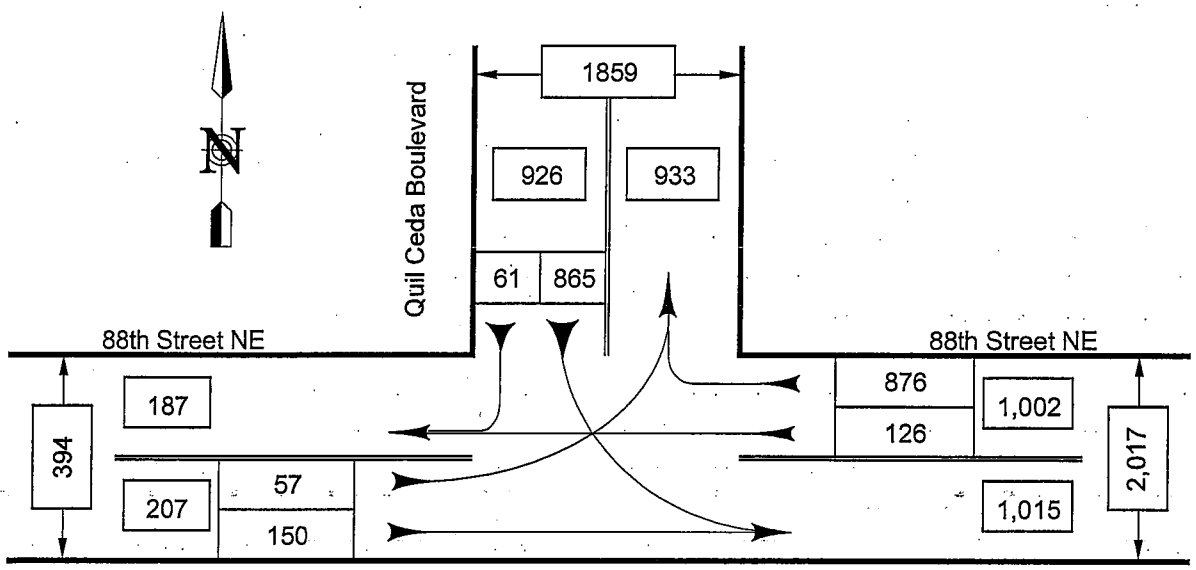
REDUCED BY: CN

DATE OF REDUCTION: 8/7/2006

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

3:00 - 6:00 PM PEAK HOUR: 4:45 PM TO 5:45 PM



INTERSECTION PEAK HOUR VOLUME	
IN	2,135
OUT	2,135

	HV	PHF
SB	0%	0.97
NB	#N/A	#N/A
WB	1%	0.91
EB	1%	0.75
INTRS.	1%	0.95

HV = Heavy Vehicles
PHF = Peak Hour Factor

Quil Ceda Boulevard @ 88th Street NE

Tulalip, WA

COUNTED BY:	LH	DATE OF COUNT:	Thu. 3/30/06
REDUCED BY:	CN	TIME OF COUNT:	3:00 - 6:00 PM
DATE OF REDUCTION:	Fri. 3/31/06	WEATHER:	Sunny

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Quil Ceda Boulevard @ 88th Street NE
Tulalip, WA

DATE OF COUNT: Thu. 3/30/06
TIME OF COUNT: 3:00 - 6:00 PM

COUNTED BY: LH
WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON Quil Ceda Boulevard				FROM SOUTH ON 0				FROM EAST ON 88th Street NE				FROM WEST ON 88th Street NE				INTERVAL TOTALS
	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	1	268	0	22	0	0	0	0	0	0	30	194	0	16	39	0	569
03:30 PM	0	225	0	18	0	0	0	0	0	0	25	211	0	8	30	0	517
03:45 PM	0	220	0	18	0	0	0	0	1	0	28	232	0	14	15	0	527
04:00 PM	1	219	0	12	0	0	0	0	1	0	24	201	0	17	31	0	504
04:15 PM	1	254	0	8	0	0	0	0	1	0	35	227	0	13	40	0	577
04:30 PM	0	183	0	18	0	0	0	0	2	0	29	181	0	16	33	0	460
04:45 PM	0	197	0	17	0	0	0	0	2	0	13	204	1	18	29	0	478
05:00 PM	0	213	0	15	0	0	0	0	2	0	26	214	0	18	51	0	537
05:15 PM	0	222	0	15	0	0	0	0	1	0	29	211	1	18	31	0	526
05:30 PM	2	221	0	17	0	0	0	0	3	0	33	242	1	8	38	0	559
05:45 PM	0	209	0	14	0	0	0	0	2	0	38	209	1	13	30	0	513
06:00 PM	0	203	0	8	0	0	0	0	3	0	26	202	0	16	54	0	509
PEAK HOUR TOTALS	2	865	0	61	0	0	0	0	8	0	126	876	3	57	150	0	INTERSECTION
ALL MOVEMENTS	926				0				1002				207				2135
% HV	0%				#N/A				1%				1%				1%
PEAK HOUR FACTOR	0.97				#N/A				0.91				0.75				0.95

HV = Heavy Vehicles
PHF = Peak Hour Factor

3:00 - 6:00 PM PEAK HOUR: 4:45 PM TO 5:45 PM

REDUCED BY: CN

DATE OF REDUCTION: 3/31/2006

WASHINGTON STATE DEPT OF TRANSPORTATION

Site Code : 00520003/11 — PAGE: 1
LOCATION : I-5 SB RAMPS — FILE: 20051PM
I/T : QUIL CEDR WY / 88TH ST NB
MILEPOST : 200.51 — Movements by: Primary — DATE: 3/14/06

Time Begin	From North RT	THRU	LT	From East RT	THRU	LT	From South RT	THRU	LT	From West RT	THRU	LT	Vehicle Total
3:00 PM	41	1	47	0	146	83	0	0	0	128	121	0	607
3:15	45	0	61	0	221	75	0	0	0	138	140	0	684
3:30	57	0	69	0	200	98	0	0	0	130	152	0	686
3:45	50	0	69	0	198	121	0	0	0	113	99	0	650
HR TOTAL	193	1	246	0	785	381	0	0	0	509	512	0	2627
4:00 PM	40	4	59	0	211	76	0	0	0	136	158	0	683
4:15	36	2	71	0	186	91	0	0	0	131	135	0	652
4:30	28	0	55	0	189	108	0	0	0	149	134	0	663
4:45	43	0	76	0	190	106	0	0	0	122	147	0	686
HR TOTAL	147	6	262	0	776	381	0	0	0	538	574	0	2684
5:00 PM	28	0	56	0	186	95	0	0	0	121	133	0	619
5:15	30	2	84	0	182	113	0	0	0	131	131	0	673
5:30	40	0	68	0	191	96	0	0	0	115	107	0	617
5:45	22	0	68	0	170	100	0	0	0	100	108	0	576
HR TOTAL	120	2	276	0	729	412	0	0	0	467	479	0	2485
DAY TOTAL	460	9	784	0	2290	1174	0	0	0	1514	1565	0	7796

PEAK PERIOD ANALYSIS FOR THE PERIOD: 3:00 PM - 6:00 PM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES Right	Thru	Left	Total	PERCENTS Right	Thru	Left
North	3:00 PM	0.92	193	1	246	440	44	0	56
East	3:15 PM	0.94	0	830	374	1204	0	69	31
South	3:15 PM	0.00	0	0	0	0	0	0	0
West	4:00 PM	0.95	538	574	0	1112	48	52	0
Entire Intersection									
North	3:15 PM	0.91	172	4	257	433	40	1	59
East		0.94	0	830	374	1204	0	69	31
South		0.00	0	0	0	0	0	0	0
West		0.91	517	549	0	1066	48	52	0

WASHINGTON STATE DEPT OF TRANSPORTATION

Site Code : 00532005S3 PAGE: 1

LOCATION : I-5 NB RAMPS FILE: 20050PM

SCT : S 88TH ST NB

MILEPOST : 200.50 Movements by: Primary DATE: 3/14/06

Time Begin	From North RT	From North THRU	From North LT	From East RT	From East THRU	From East LT	From South RT	From South THRU	From South LT	From West RT	From West THRU	From West LT	Vehicle Total
3:00 PM	0	0	0	59	147	0	148	2	109	0	144	33	633
3:15	0	0	0	61	166	0	133	0	116	0	167	39	682
3:30	0	0	0	67	175	0	182	0	107	0	152	32	715
3:45	0	0	0	69	157	0	144	0	143	0	135	35	683
HR TOTAL	0	0	0	247	645	0	607	2	475	0	598	139	2713
4:00 PM	0	0	0	69	167	0	158	0	108	0	158	30	690
4:15	0	0	0	71	159	0	183	0	110	0	159	41	723
4:30	0	0	0	73	157	0	153	1	104	0	147	33	708
4:45	0	0	0	69	129	0	185	0	123	0	171	34	711
HR TOTAL	0	0	0	282	652	0	679	1	445	0	635	138	2832
5:00 PM	0	0	0	96	168	0	180	1	108	0	156	26	735
5:15	0	0	0	84	151	0	210	1	115	0	168	28	757
5:30	0	0	0	69	170	0	178	0	98	0	138	20	673
5:45	0	0	0	85	141	0	145	0	93	0	113	23	580
HR TOTAL	0	0	0	314	630	0	713	2	414	0	575	97	2745
DAY TOTAL	0	0	0	843	1927	0	1999	5	1334	0	1808	374	8290

PEAK PERIOD ANALYSIS FOR THE PERIOD: 3:00 PM - 6:00 PM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES Right	Thru	Left	Total	PERCENTS Right	Thru	Left
North	12:00 AM	0.00	0	0	0	0	0	0	0
East	4:30 PM	0.90	322	645	0	967	33	67	0
South	4:45 PM	0.92	753	2	444	1199	63	0	37
West	4:00 PM	0.94	0	635	138	773	0	82	18

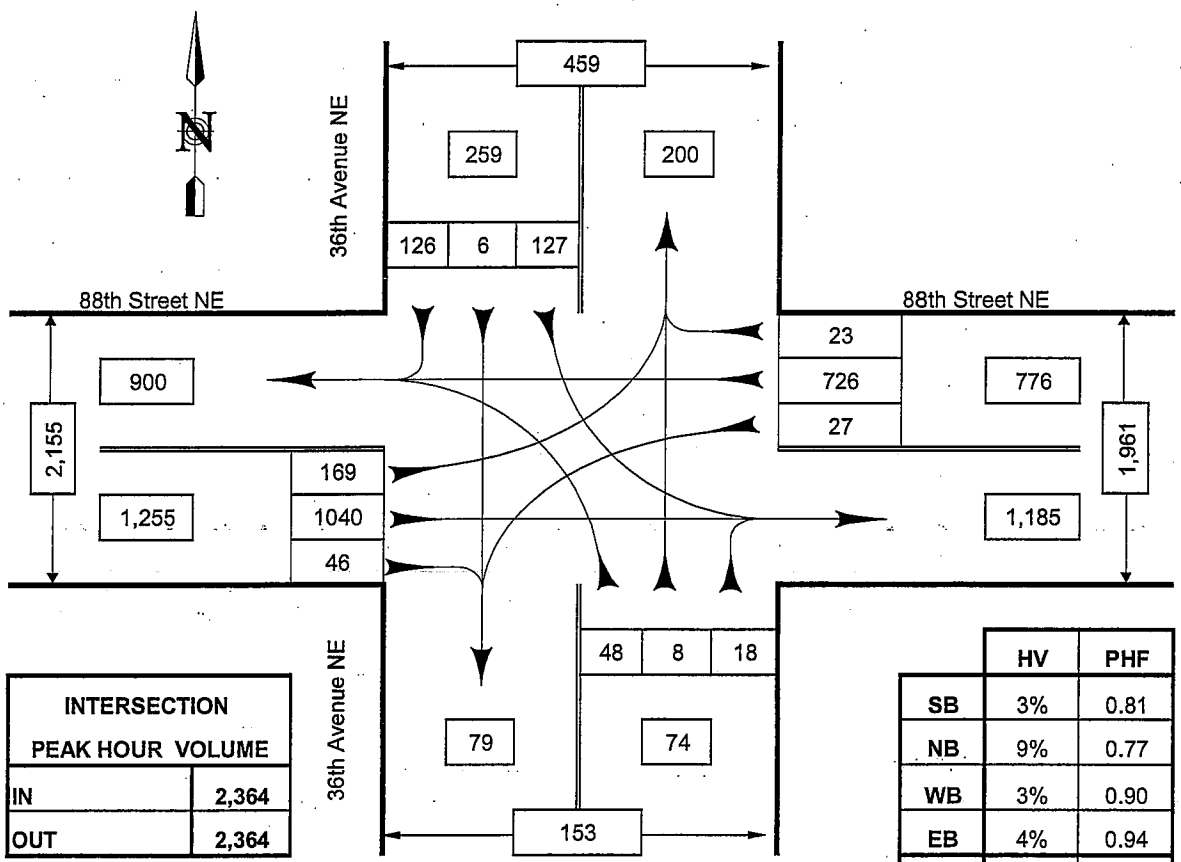
Entire Intersection

North	4:30 PM	0.00	0	0	0	0	0	0	0
East		0.90	322	645	0	967	33	67	0
South		0.91	728	3	450	1181	62	0	38
West		0.93	0	642	121	763	0	84	16

DTG TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

4:00 - 6:00 PM PEAK HOUR: 5:00 PM TO 6:00 PM



INTERSECTION PEAK HOUR VOLUME	
IN	2,364
OUT	2,364

	HV	PHF
SB	3%	0.81
NB	9%	0.77
WB	3%	0.90
EB	4%	0.94
INTRS.	4%	0.99

HV = Heavy Vehicles
PHF = Peak Hour Factor

36th Avenue NE @ 88th Street NE

Tulalip, WA

COUNTED BY: RH

REDUCED BY: CN

DATE: Mon. 8/7/06

DATE OF COUNT: Thu. 8/3/06

TIME OF COUNT: 4:00 - 6:00 PM

WEATHER: Sunny

TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: 36th Avenue NE @ 88th Street NE
Tulalip, WA

DATE OF COUNT: Thu. 8/3/06
TIME OF COUNT: 4:00 - 6:00 PM

COUNTED BY: RH
WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON 36th Avenue NE				FROM SOUTH ON 36th Avenue NE				FROM EAST ON 88th Street NE				FROM WEST ON 88th Street NE				INTERVAL TOTALS
	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	1	35	3	39	10	12	12	2	6	6	174	2	6	28	238	5	556
04:30 PM	0	24	0	16	0	8	0	1	6	15	195	3	5	32	246	12	552
04:45 PM	2	29	0	35	0	7	2	2	10	1	190	2	6	43	276	10	597
05:00 PM	0	28	0	36	1	3	1	6	9	8	175	3	9	39	246	12	557
05:15 PM	2	29	1	32	2	20	1	3	8	9	164	5	12	43	278	13	598
05:30 PM	3	25	2	36	2	8	1	2	6	16	196	3	8	42	250	10	591
05:45 PM	0	46	3	31	0	7	2	7	7	0	182	2	9	45	237	15	577
06:00 PM	2	27	0	27	3	13	4	6	6	2	184	13	17	39	275	8	598
PEAK HOUR TOTALS	7	127	6	126	7	48	8	18	27	27	726	23	46	169	1040	46	INTERSECTION
ALL MOVEMENTS	259				74				776				1255				2364
% HV	3%				9%				3%				4%				4%
PEAK HOUR FACTOR	0.81				0.77				0.90				0.94				0.99

HV = Heavy Vehicles
PHF = Peak Hour Factor

4:00 - 6:00 PM PEAK HOUR: 5:00 PM TO 6:00 PM

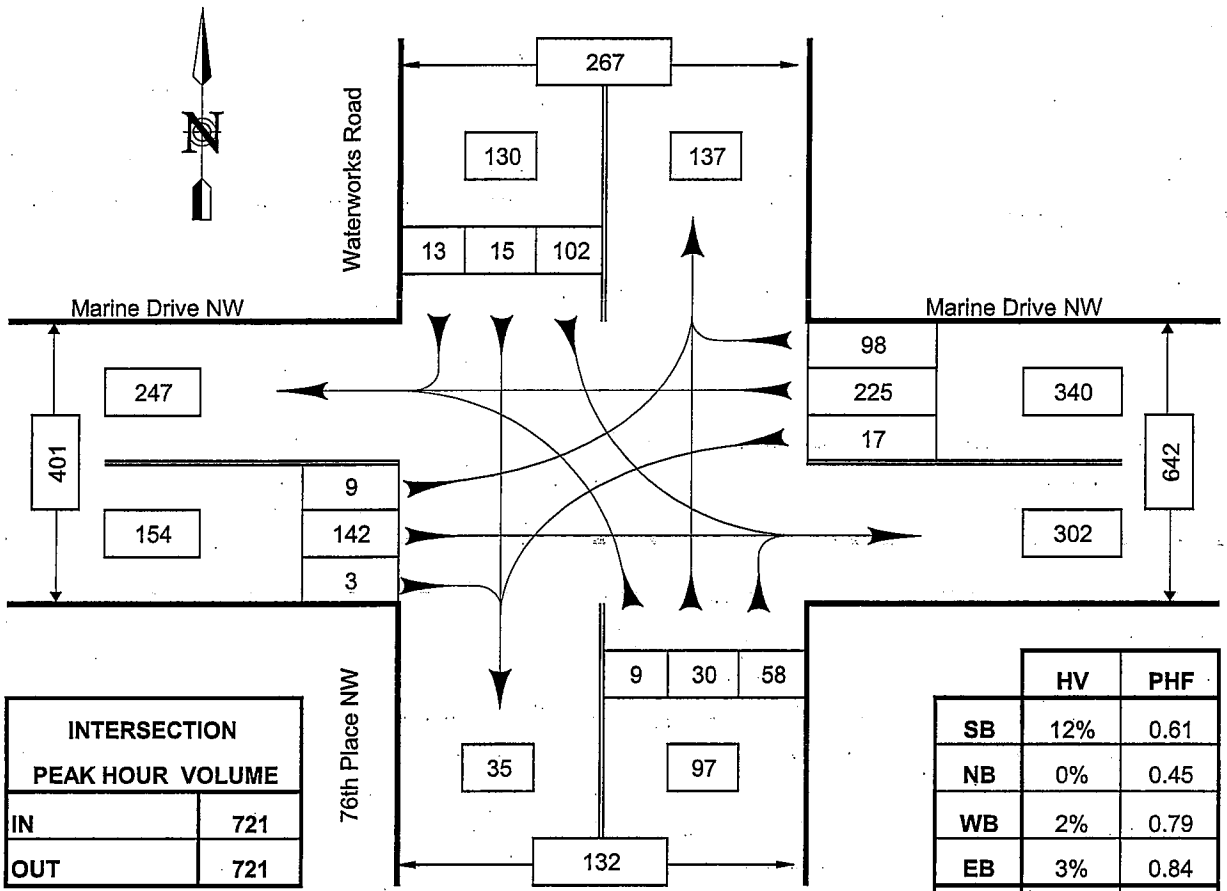
REDUCED BY: CN

DATE OF REDUCTION: 8/7/2006

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

4:00 - 6:00 PM PEAK HOUR: 4:30 PM TO 5:30 PM



INTERSECTION PEAK HOUR VOLUME	
IN	721
OUT	721

	HV	PHF
SB	12%	0.61
NB	0%	0.45
WB	2%	0.79
EB	3%	0.84
INTRS.	4%	0.81

HV = Heavy Vehicles
PHF = Peak Hour Factor

Marine Drive NW @ Waterworks Road

Tulalip, WA

COUNTED BY: CN

REDUCED BY: CN

DATE: Thu. 4/10/08

DATE OF COUNT: Thu. 4/10/08

TIME OF COUNT: 4:00 - 6:00 PM

WEATHER: Overcast

DTG TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Marine Drive NW @ Waterworks Road
Tulalip, WA

DATE OF COUNT: Thu. 4/10/08
TIME OF COUNT: 4:00 - 6:00 PM

COUNTED BY: CN
WEATHER: Overcast

TIME INTERVAL ENDING AT	FROM NORTH ON Waterworks Road				FROM SOUTH ON 76th Place NW				FROM EAST ON Marine Drive NW				FROM WEST ON Marine Drive NW				INTERVAL TOTALS
	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	1	22	8	8	0	0	8	14	2	4	37	22	1	2	33	0	158
04:30 PM	0	12	3	4	1	1	9	9	1	4	48	17	0	4	29	3	143
04:45 PM	13	40	8	5	0	5	20	29	3	2	45	31	1	5	33	0	223
05:00 PM	0	18	3	5	0	3	5	15	4	9	73	26	3	0	38	1	196
05:15 PM	1	22	3	0	0	1	0	12	0	1	57	20	0	2	29	0	147
05:30 PM	1	22	1	3	0	0	5	2	1	5	50	21	1	2	42	2	155
05:45 PM	1	16	2	2	1	0	5	1	1	2	48	21	0	5	17	2	121
06:00 PM	0	11	3	5	0	3	3	6	1	2	51	28	1	4	13	1	130
PEAK HOUR TOTALS	15	102	15	13	0	9	30	58	8	17	225	98	5	9	142	3	INTERSECTION
ALL MOVEMENTS	130				97				340				154				721
% HV	12%				0%				2%				3%				4%
PEAK HOUR FACTOR	0.61				0.45				0.79				0.84				0.81

HV = Heavy Vehicles
PHF = Peak Hour Factor

4:00 - 6:00 PM PEAK HOUR: 4:30 PM TO 5:30 PM

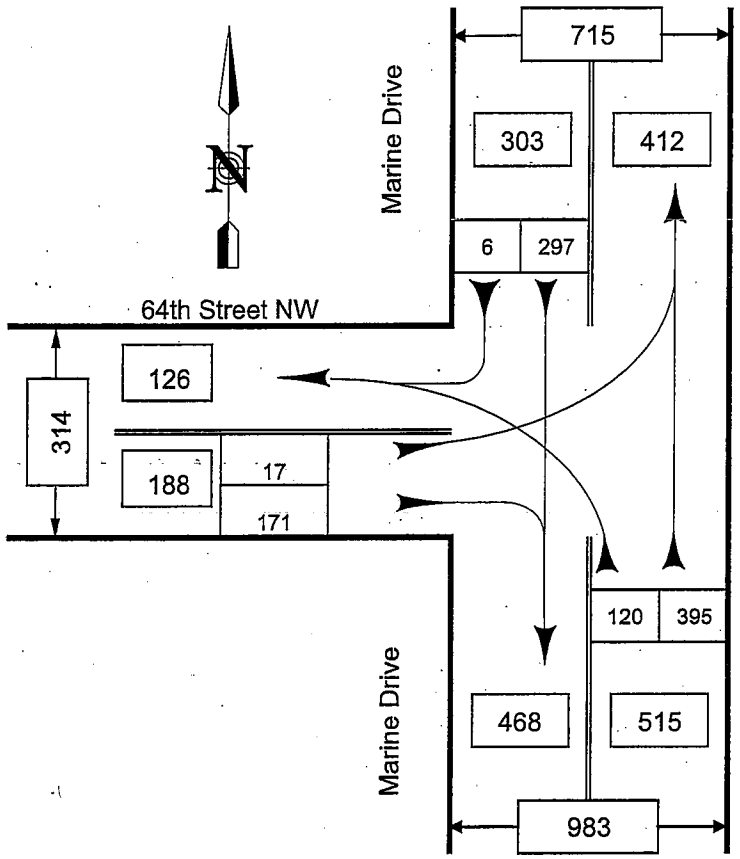
REDUCED BY: CN

DATE OF REDUCTION: 4/10/2008

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

4:00 - 6:00 PM PEAK HOUR: 4:15 PM TO 5:15 PM



	TRKS	PHF
SB	2%	0.63
NB	4%	0.89
WB	#N/A	#N/A
EB	2%	0.58
INTRS.	3%	0.77

HV = Heavy Vehicles

PHF = Peak Hour Factor

INTERSECTION PEAK HOUR VOLUME	
IN	1,006
OUT	1,006

Marine Drive @ 64th Street NW

Tulalip, WA

COUNTED BY: TV

REDUCED BY: CN

DATE OF REDUCTION: Thu. 5/29/08

DATE OF COUNT: Thu. 5/29/08

TIME OF COUNT: 4:00 - 6:00 PM

WEATHER: Sunny

DTG TRAFFIC DATA GATHERING

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Marine Drive @ 64th Street NW
Tulalip, WA

DATE OF COUNT: Thu. 5/29/08
TIME OF COUNT: 4:00 - 6:00 PM

COUNTED BY: TV
WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON Marine Drive				FROM SOUTH ON Marine Drive				FROM EAST ON				FROM WEST ON 64th Street NW				INTERVAL TOTALS
	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	6	0	58	6	7	23	89	0	0	0	0	0	2	3	0	20	199
04:30 PM	2	0	36	3	5	36	88	0	0	0	0	0	0	5	0	30	198
04:45 PM	2	0	121	0	3	28	97	0	0	0	0	0	0	5	0	76	327
05:00 PM	1	0	81	1	8	32	90	0	0	0	0	0	1	2	0	47	253
05:15 PM	2	0	59	2	3	24	120	0	0	0	0	0	2	5	0	18	228
05:30 PM	2	0	61	0	6	28	74	0	0	0	0	0	0	6	0	16	185
05:45 PM	1	0	55	3	5	32	84	0	0	0	0	0	0	1	0	15	190
06:00 PM	0	0	38	5	3	17	79	0	0	0	0	0	1	3	0	20	162
PEAK HOUR TOTALS	7	0	297	6	19	120	395	0	0	0	0	0	3	17	0	171	INTERSECTION
ALL MOVEMENTS	303				515				0				188				1006
% HV	2%				4%				#N/A				2%				3%
PEAK HOUR FACTOR	0.63				0.89				#N/A				0.58				0.77

HV = Heavy Vehicles
PHF = Peak Hour Factor

4:00 - 6:00 PM PEAK HOUR: 4:15 PM TO 5:15 PM

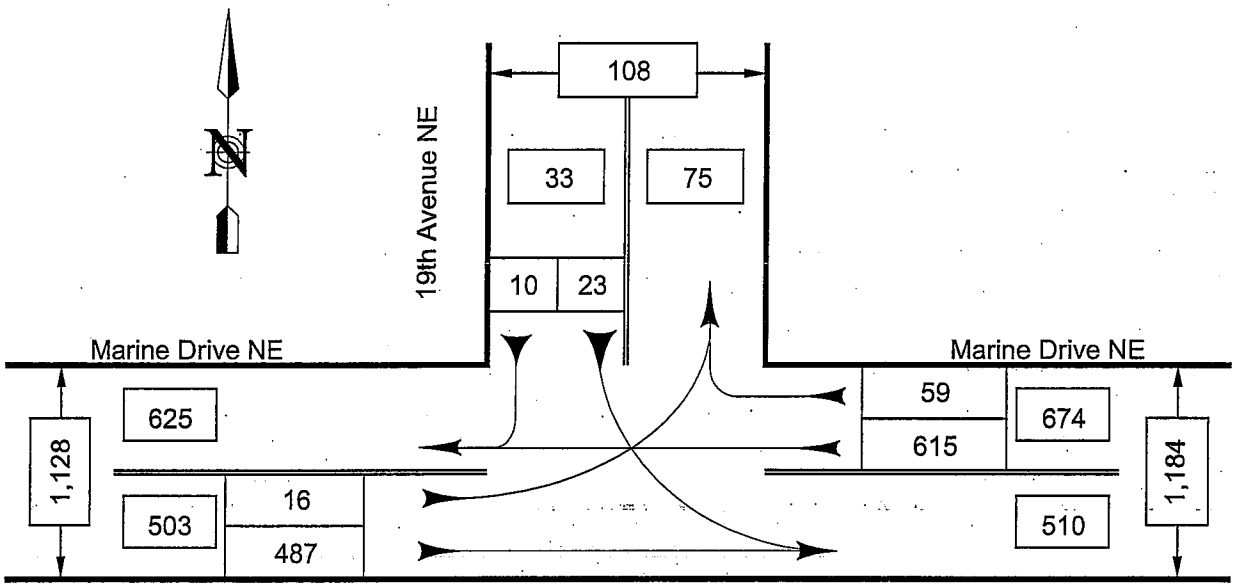
REDUCED BY: CN

DATE OF REDUCTION: 5/29/2008

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

4:00 - 6:00 PM PEAK HOUR: **4:30 PM** **TO** **5:30 PM**



INTERSECTION PEAK HOUR VOLUME	
IN	1,210
OUT	1,210

	HV	PHF
SB	3%	0.83
NB	#N/A	#N/A
WB	2%	0.92
EB	2%	0.90
INTRS.	2%	0.96

HV = Heavy Vehicles
PHF = Peak Hour Factor

Marine Drive NE @ 19th Avenue NE

Tulalip, WA

COUNTED BY:	JH	DATE OF COUNT:	Thu. 4/3/08
REDUCED BY:	CN	TIME OF COUNT:	4:00 - 6:00 PM
DATE OF REDUCTION:	Thu. 4/10/08	WEATHER:	Overcast

DTG *TRAFFIC DATA GATHERING*

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Marine Drive NE @ 19th Avenue NE
Tulalip, WA

DATE OF COUNT: Thu. 4/3/08
TIME OF COUNT: 4:00 - 6:00 PM

COUNTED BY: JH
WEATHER: Overcast

TIME INTERVAL ENDING AT	FROM NORTH ON 19th Avenue NE				FROM SOUTH ON				FROM EAST ON Marine Drive NE				FROM WEST ON Marine Drive NE				INTERVAL TOTALS
	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	1	2	0	2	0	0	0	0	5	0	140	13	5	3	110	0	270
04:30 PM	0	20	0	3	0	0	0	0	4	0	126	5	9	2	107	0	263
04:45 PM	0	5	0	1	0	0	0	0	5	0	159	13	4	6	132	0	316
05:00 PM	1	4	0	5	0	0	0	0	3	0	124	13	4	6	133	0	285
05:15 PM	0	8	0	2	0	0	0	0	3	0	167	15	1	1	104	0	297
05:30 PM	0	6	0	2	0	0	0	0	5	0	165	18	1	3	118	0	312
05:45 PM	1	6	0	1	0	0	0	0	6	0	170	14	4	6	96	0	293
06:00 PM	1	8	0	2	0	0	0	0	2	0	160	10	6	0	79	0	259
PEAK HOUR TOTALS	1	23	0	10	0	0	0	0	16	0	615	59	10	16	487	0	INTERSECTION
ALL MOVEMENTS	33				0				674				503				1210
% HV	3%				#N/A				2%				2%				2%
PEAK HOUR FACTOR	0.83				#N/A				0.92				0.90				0.96

HV = Heavy Vehicles
PHF = Peak Hour Factor

4:00 - 6:00 PM PEAK HOUR: 4:30 PM TO 5:30 PM

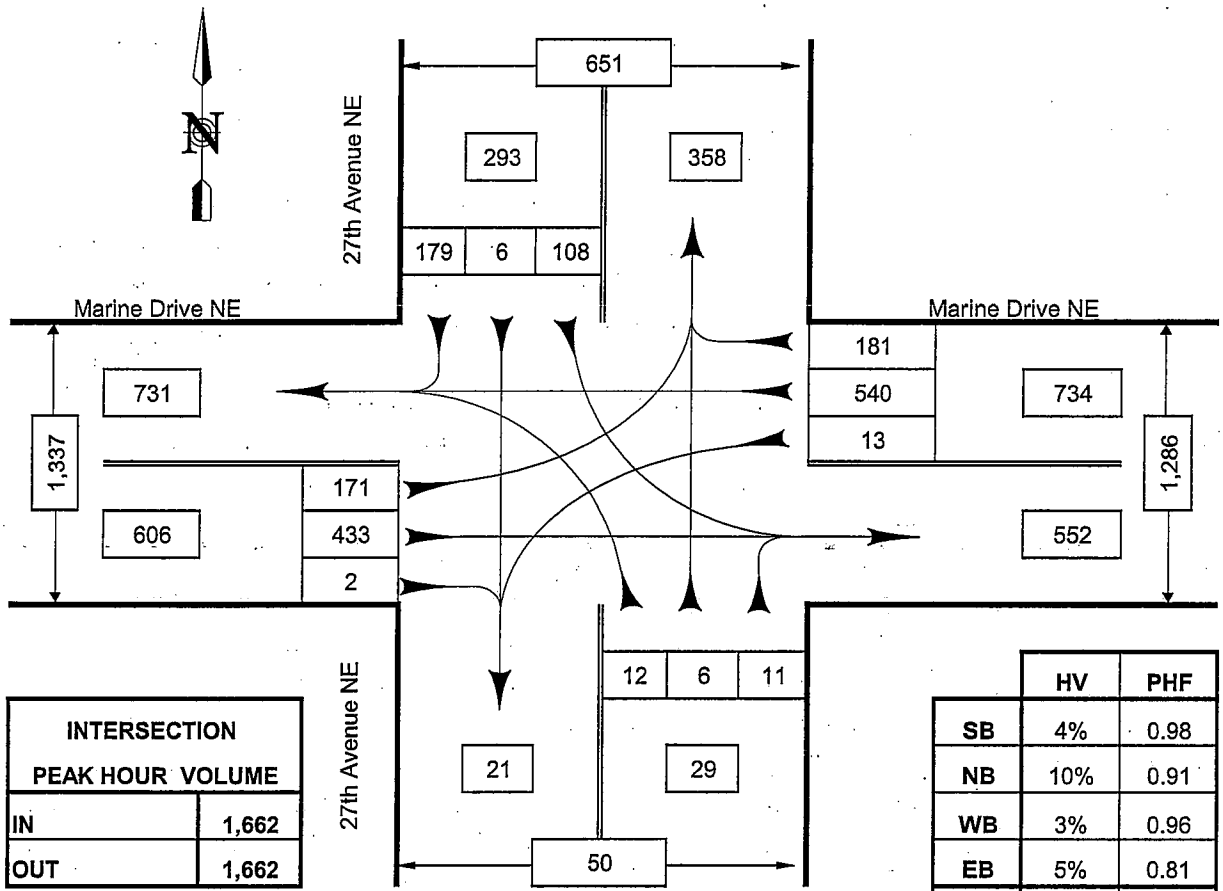
REDUCED BY: CN

DATE OF REDUCTION: 4/10/2008

TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

4:00 - 6:00 PM PEAK HOUR: 4:15 PM TO 5:15 PM



INTERSECTION PEAK HOUR VOLUME	
IN	1,662
OUT	1,662

	HV	PHF
SB	4%	0.98
NB	10%	0.91
WB	3%	0.96
EB	5%	0.81
INTRS.	4%	0.90

HV = Heavy Vehicles
PHF = Peak Hour Factor

Marine Drive NE @ 27th Avenue NE

Tulalip, WA

COUNTED BY: JH

REDUCED BY: CN

DATE: Thu. 4/10/08

DATE OF COUNT: Thu. 4/3/08

TIME OF COUNT: 4:00 - 6:00 PM

WEATHER: Overcast

DTG *TRAFFIC DATA GATHERING*

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Marine Drive NE @ 27th Avenue NE
Tulalip, WA

DATE OF COUNT: Thu. 4/3/08
TIME OF COUNT: 4:00 - 6:00 PM

COUNTED BY: JH
WEATHER: Overcast

TIME INTERVAL ENDING AT	FROM NORTH ON 27th Avenue NE				FROM SOUTH ON 27th Avenue NE				FROM EAST ON Marine Drive NE				FROM WEST ON Marine Drive NE				INTERVAL TOTALS
	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	2	23	2	45	1	1	1	5	10	3	118	40	2	33	87	0	358
04:30 PM	5	23	2	47	1	4	0	3	6	2	144	46	9	36	85	1	393
04:45 PM	2	35	1	39	0	3	2	2	3	5	131	38	11	31	84	0	371
05:00 PM	3	27	1	47	1	1	2	4	6	3	137	50	4	54	133	1	460
05:15 PM	2	23	2	46	1	4	2	2	10	3	128	47	4	50	131	0	438
05:30 PM	1	25	2	24	0	1	1	1	11	3	141	31	5	31	96	0	356
05:45 PM	2	20	0	42	0	3	0	1	6	2	130	41	3	32	73	0	344
06:00 PM	2	25	1	36	0	0	1	0	11	2	133	41	3	35	70	0	344
PEAK HOUR TOTALS	12	108	6	179	3	12	6	11	25	13	540	181	28	171	433	2	INTERSECTION
ALL MOVEMENTS	293				29				734				606				1662
% HV	4%				10%				3%				5%				4%
PEAK HOUR FACTOR	0.98				0.91				0.96				0.81				0.90

HV = Heavy Vehicles
PHF = Peak Hour Factor

4:00 - 6:00 PM PEAK HOUR: 4:15 PM TO 5:15 PM

REDUCED BY: CN

DATE OF REDUCTION: 4/10/2008

VEHICLE VOLUME SUMMARY

LOCATION MARINE DR NE @ 31 AVE NE

PEAK HOUR: 16:30

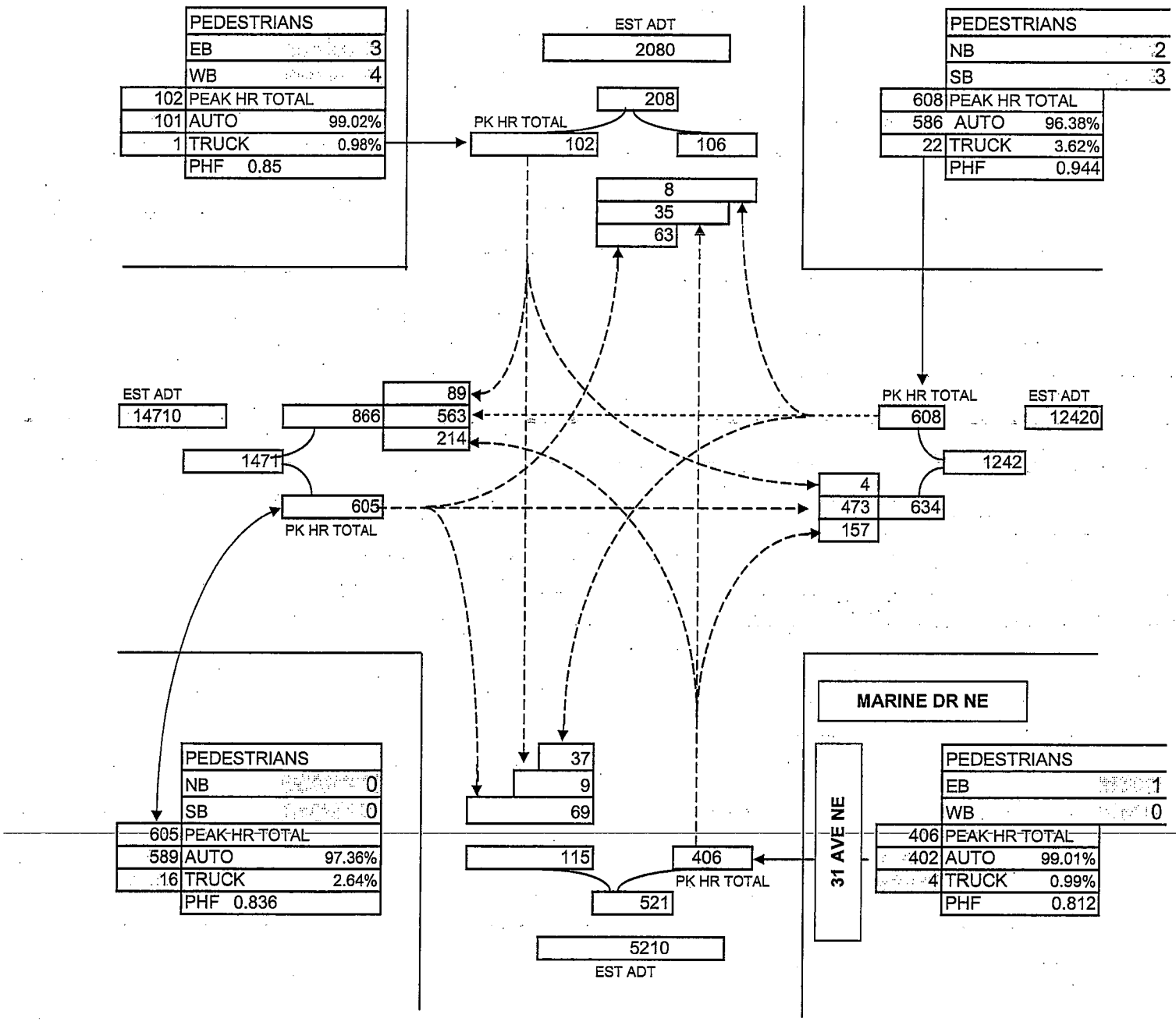
DATE 1/24/2007

PREPARED BY: BETH

WEATHER DRY

COUNTED BY: BB

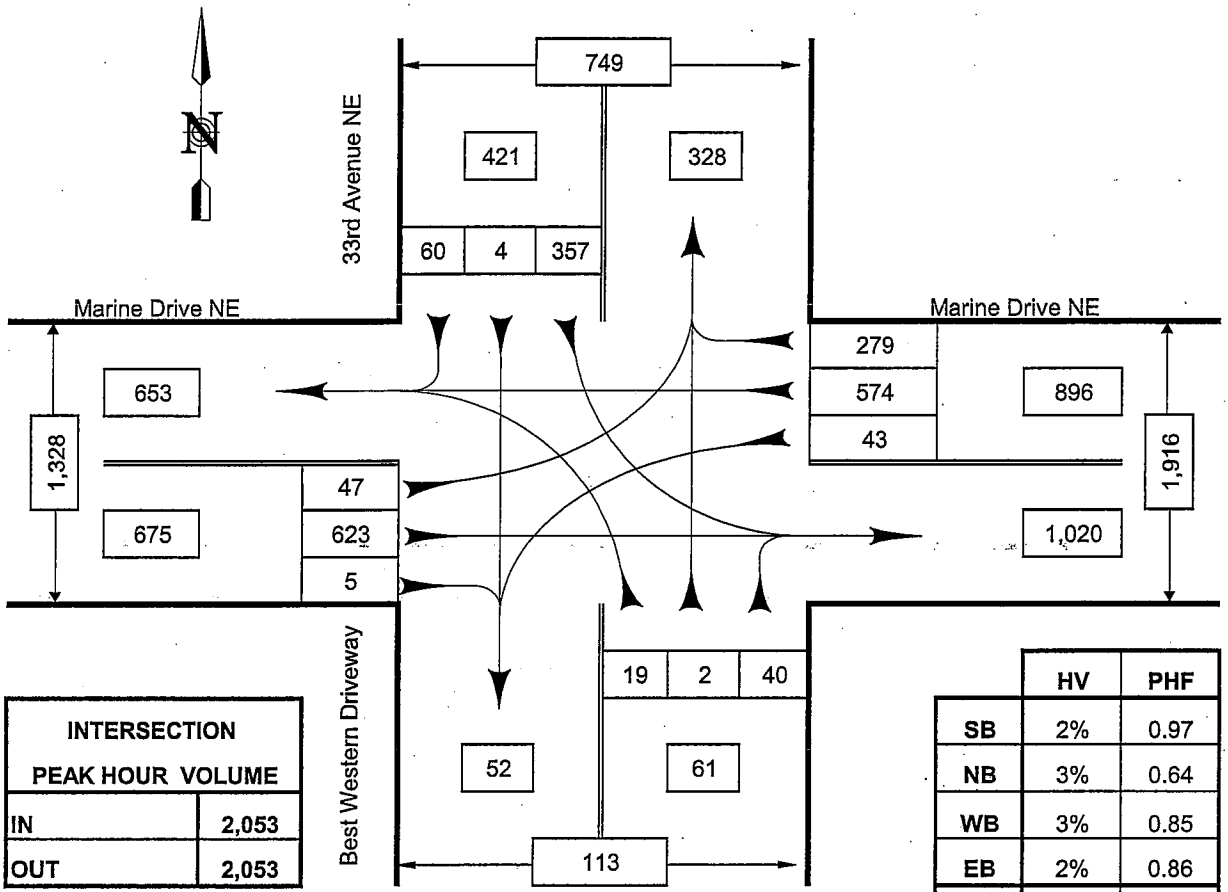
FILE NO. 012407Ap -ADT#372, KI#470



TRAFFIC DATA GATHERING

TURNING MOVEMENTS DIAGRAM

4:00 - 6:00 PM PEAK HOUR: 4:30 PM TO 5:30 PM



INTERSECTION PEAK HOUR VOLUME	
IN	2,053
OUT	2,053

	HV	PHF
SB	2%	0.97
NB	3%	0.64
WB	3%	0.85
EB	2%	0.86
INTRS.	3%	0.90

HV = Heavy Vehicles
PHF = Peak Hour Factor

Marine Drive NE @ 33rd Avenue NE

Tulalip, WA

COUNTED BY: JH

REDUCED BY: CN

DATE: Tue. 4/8/08

DATE OF COUNT: Tue. 4/8/08

TIME OF COUNT: 4:00 - 6:00 PM

WEATHER: Overcast

DTG *TRAFFIC DATA GATHERING*

INTERSECTION TURNING MOVEMENTS REDUCTION SHEET

LOCATION: Marine Drive NE @ 33rd Avenue NE
Tulalip, WA

DATE OF COUNT: Tue. 4/8/08
TIME OF COUNT: 4:00 - 6:00 PM

COUNTED BY: JH
WEATHER: Overcast

TIME INTERVAL ENDING AT	FROM NORTH ON 33rd Avenue NE				FROM SOUTH ON Best Western Driveway				FROM EAST ON Marine Drive NE				FROM WEST ON Marine Drive NE				INTERVAL TOTALS
	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	HV	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
04:15 PM	1	92	4	14	0	2	3	6	8	4	121	84	2	10	123	0	**463**
04:30 PM	1	116	1	14	2	5	1	11	10	8	128	73	8	8	118	4	**487**
04:45 PM	2	87	1	13	1	1	0	11	9	9	125	65	3	13	150	1	**476**
05:00 PM	3	90	2	17	0	5	1	9	4	12	150	62	4	11	185	0	**544**
05:15 PM	2	88	0	18	0	5	0	5	8	11	131	66	4	11	122	3	**460**
05:30 PM	3	92	1	12	1	8	1	15	8	11	168	86	5	12	166	1	**573**
05:45 PM	2	78	1	19	0	3	0	8	6	6	136	74	4	6	134	1	**466**
06:00 PM	3	116	1	12	0	4	1	10	9	10	120	87	4	3	117	1	**482**
PEAK HOUR TOTALS	10	357	4	60	2	19	2	40	29	43	574	279	16	47	623	5	INTERSECTION
ALL MOVEMENTS	421				61				896				675				2053
% HV	2%				3%				3%				2%				3%
PEAK HOUR FACTOR	0.97				0.64				0.85				0.86				0.90

HV = Heavy Vehicles
PHF = Peak Hour Factor

4:00 - 6:00 PM PEAK HOUR: 4:30 PM TO 5:30 PM

REDUCED BY: CN

DATE OF REDUCTION: 4/8/2008

WASHINGTON STATE DEPT OF TRANSPORTATION

Site Code : 05199133 PAGE: 1
LOCATION : I-5 SB RAMPS FILE: 19913PM1
JCT : SR 528
MILEPOST : 199.13 Movements by: Primary DATE: 2/27/07

Time	From North			From East			From South			From West			Vehicle
Begin	RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	RT	THRU	LT	Total
4:00 PM	33	0	62	0	167	123	0	0	0	91	123	0	599
4:15	26	0	81	0	147	127	0	0	0	75	85	0	541
4:30	34	0	82	0	163	116	0	0	0	91	137	0	623
4:45	42	0	88	0	175	128	0	0	0	96	146	0	675
HR TOTAL	135	0	313	0	652	494	0	0	0	353	491	0	2438
5:00 PM	29	0	86	0	195	127	0	0	0	103	146	0	686
5:15	48	0	87	0	173	110	0	0	0	103	97	0	618
5:30	26	1	94	0	208	128	0	0	0	82	146	0	685
5:45	42	1	62	0	191	142	0	0	0	71	111	0	620
HR TOTAL	145	2	329	0	767	507	0	0	0	359	500	0	2609
DAY TOTAL	280	2	642	0	1419	1001	0	0	0	712	991	0	5047

PEAK PERIOD ANALYSIS FOR THE PERIOD: 4:00 PM - 6:00 PM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES Right	Thru	Left	Total	PERCENTS Right	Thru	Left
North	4:45 PM	0.93	145	1	355	501	29	0	71
East	5:00 PM	0.95	0	767	507	1274	0	60	40
South	5:00 PM	0.00	0	0	0	0	0	0	0
West	4:30 PM	0.92	393	526	0	919	43	57	0
Entire Intersection									
North	4:45 PM	0.93	145	1	355	501	29	0	71
East		0.93	0	751	493	1244	0	60	40
South		0.00	0	0	0	0	0	0	0
West		0.92	384	535	0	919	42	58	0

WASHINGTON STATE DEPT OF TRANSPORTATION

Site Code : 05199123 — PAGE: 1
LOCATION : I-5 NB RAMPS — FILE: 19912PM
JCT : SR 528
MILEPOST : 199.12 — Movements by: Primary — DATE: 3/06/07

Time Begin	From North RT	From North THRU	From North LT	From East RT	From East THRU	From East LT	From South RT	From South THRU	From South LT	From West RT	From West THRU	From West LT	Vehicle Total
4:00 PM	0	0	0	100	216	0	203	2	79	0	134	40	774
4:15	0	0	0	87	184	0	290	5	99	0	163	31	859
4:30	0	0	0	100	213	0	283	1	93	0	136	62	888
4:45	0	0	0	121	186	0	249	2	86	0	178	38	860
HR TOTAL	0	0	0	408	799	0	1025	10	357	0	611	171	3381
5:00 PM	0	0	0	108	214	0	293	2	99	0	162	45	923
5:15	0	0	0	91	188	0	232	2	107	0	163	33	816
5:30	0	0	0	99	210	0	287	0	100	0	183	33	912
5:45	0	0	0	86	222	0	283	3	79	0	170	34	877
HR TOTAL	0	0	0	384	834	0	1095	7	385	0	678	145	3528
DAY TOTAL	0	0	0	792	1633	0	2120	17	742	0	1289	316	6909

PEAK PERIOD ANALYSIS FOR THE PERIOD: 4:00 PM - 6:00 PM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES Right	VOLUMES Thru	VOLUMES Left	VOLUMES Total	PERCENTS Right	PERCENTS Thru	PERCENTS Left
North	12:00 AM	0.00	0	0	0	0	0	0	0
East	4:30 PM	0.95	420	801	0	1221	34	66	0
South	4:15 PM	0.95	1115	10	377	1502	74	1	25
West	4:45 PM	0.97	0	686	149	835	0	82	18

Entire Intersection

North	4:15 PM	0.00	0	0	0	0	0	0	0
East		0.94	416	797	0	1213	34	66	0
South		0.95	1115	10	377	1502	74	1	25
West		0.94	0	639	176	815	0	78	22

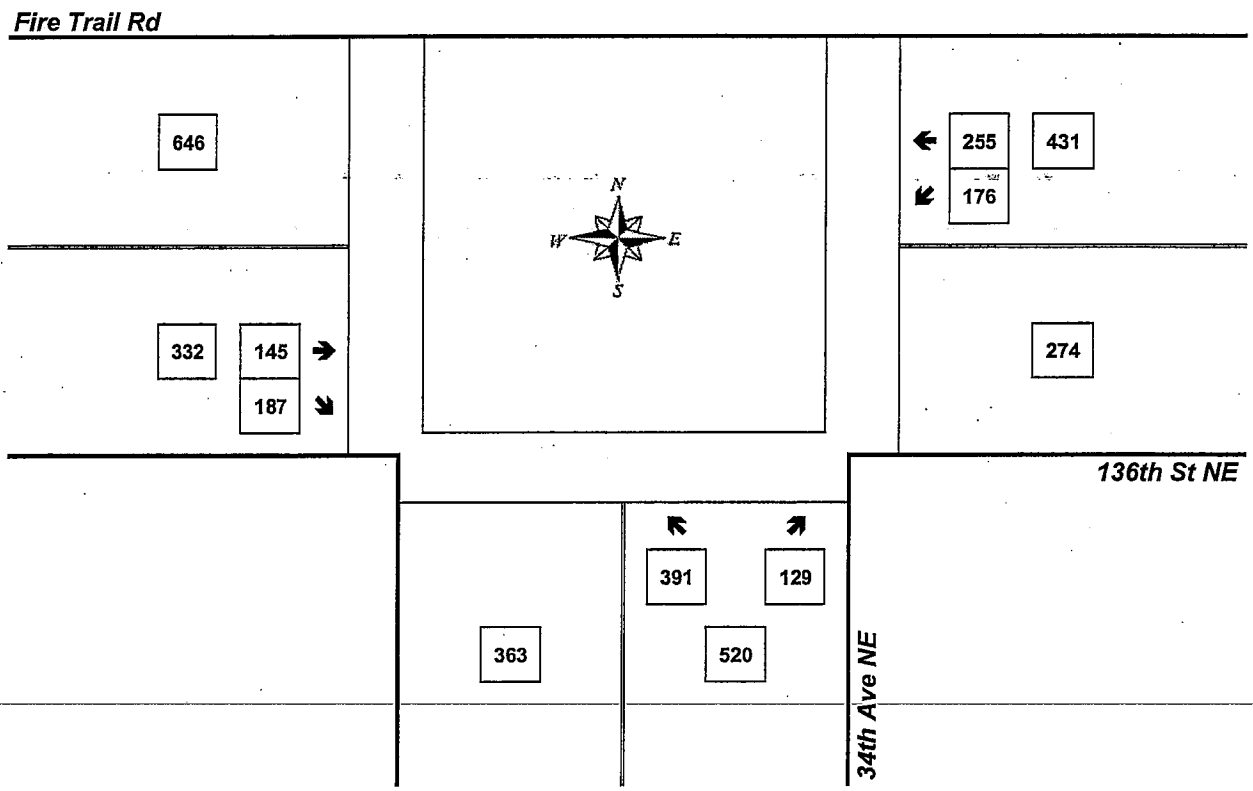
Peak Hour Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300

34th Ave NE & 136th St NE

5:00 PM to 6:00 PM
Tuesday, July 17, 2007

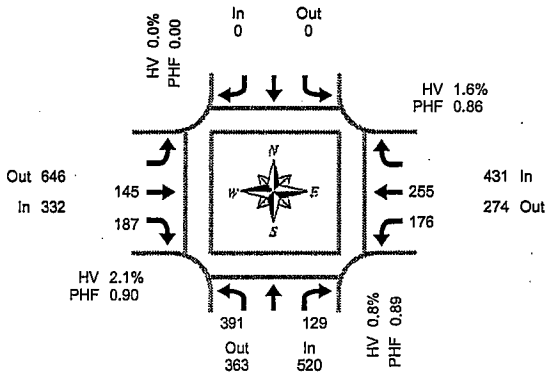


Approach	PHF	HV%	Volume
EB	0.90	2.1%	332
WB	0.86	1.6%	431
NB	0.89	0.8%	520
SB	0.00	0.0%	0
Intersection	0.92	1.4%	1,283

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

Total Vehicle Summary

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



34th Ave NE & 136th St NE

Tuesday, July 17, 2007
4:00 PM to 6:00 PM

Peak Hour Summary
5:00 PM to 6:00 PM

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

Interval Start Time	Northbound 34th Ave NE				Southbound 34th Ave NE				Eastbound Fire Trail Rd				Westbound 136th St NE				Interval Total
	L		R	HV					T	R	HV		L	T		HV	
4:00 PM	83		31	2					36	33	2		59	68		6	310
4:15 PM	107		31	2					43	32	4		43	51		1	307
4:30 PM	94		25	5					34	33	2		56	64		4	306
4:45 PM	101		36	1					36	30	1		46	52		2	301
5:00 PM	80		25	2					30	50	2		59	66		1	310
5:15 PM	101		31	0					36	47	2		28	51		2	294
5:30 PM	110		36	0					33	44	0		43	81		2	347
5:45 PM	100		37	2					46	46	3		46	57		2	332
Total Survey	776		252	14					294	315	16		380	490		20	2,507

Peak Hour Summary
5:00 PM to 6:00 PM

By Approach	Northbound 34th Ave NE				Southbound 34th Ave NE				Eastbound Fire Trail Rd				Westbound 136th St NE				Total
	In	Out	Total	HV	In	Out	Total		In	Out	Total	HV	In	Out	Total	HV	
Volume	520	363	883	4	0	0	0		332	646	978	7	431	274	705	7	1,283
%HV	0.8%				0.0%				2.1%				1.6%				1.4%
PHF	0.89				0.00				0.90				0.86				0.92

By Movement	Northbound 34th Ave NE				Southbound 34th Ave NE				Eastbound Fire Trail Rd				Westbound 136th St NE				Total
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	391		129	520				0		145	187	332	176	255		431	1,283
PHF	0.89		0.87	0.89				0.00		0.79	0.94	0.90	0.75	0.79		0.86	0.92

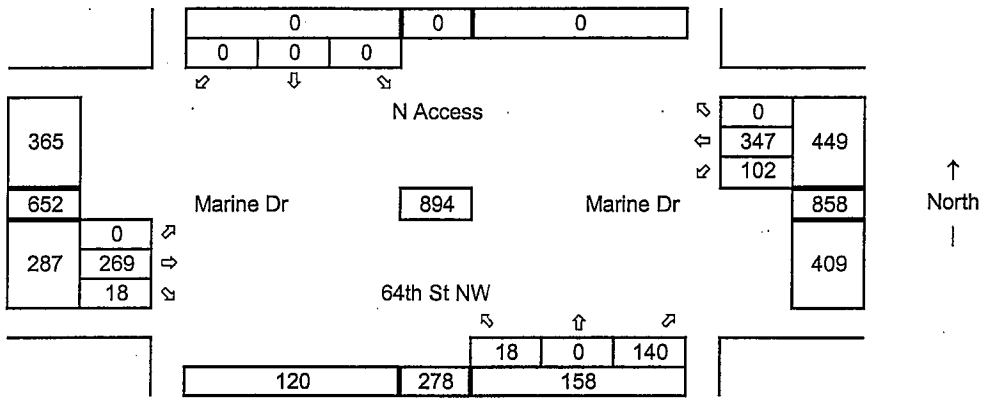
Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound 34th Ave NE				Southbound 34th Ave NE				Eastbound Fire Trail Rd				Westbound 136th St NE				Interval Total
	L		R	HV					T	R	HV		L	T		HV	
4:00 PM	385		123	10					149	128	9		204	235		13	1,224
4:15 PM	382		117	10					143	145	9		204	233		8	1,224
4:30 PM	376		117	8					136	160	7		189	233		9	1,211
4:45 PM	392		128	3					135	171	5		176	250		7	1,252
5:00 PM	391		129	4					145	187	7		176	255		7	1,283

Synchro ID: 3
Existing
Average Weekday
PM Peak Hour

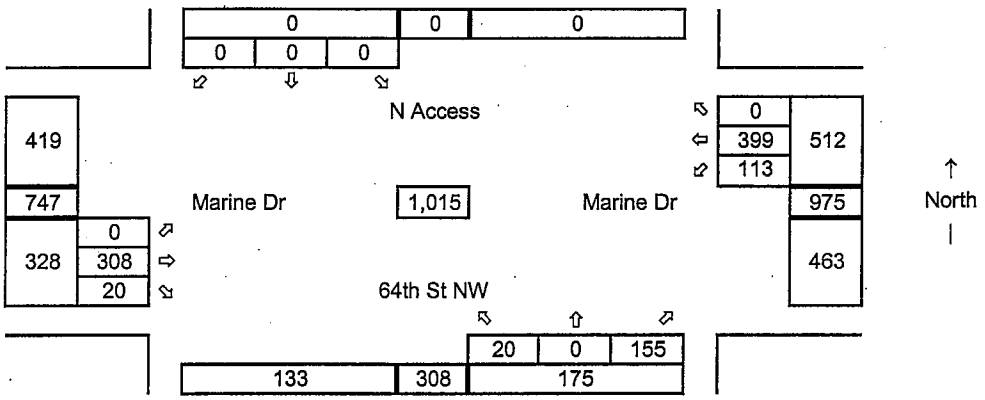
Year: **6/9/05**

Data Source: TDG

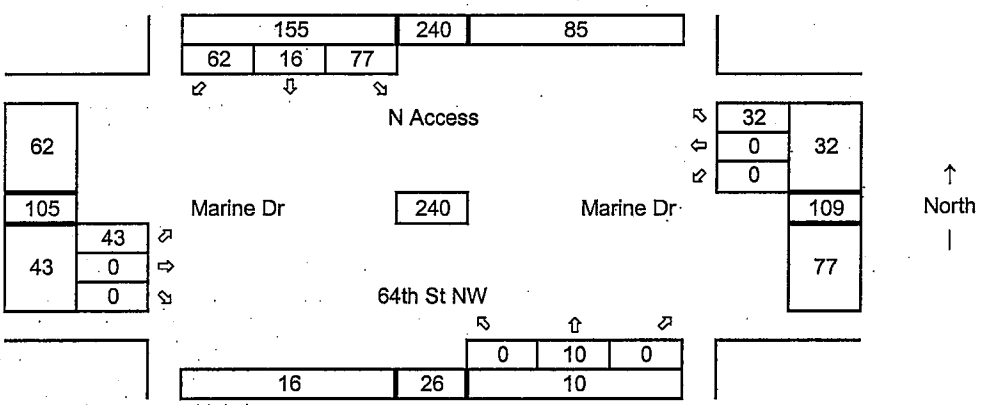


Future without Project
Average Weekday
PM Peak Hour

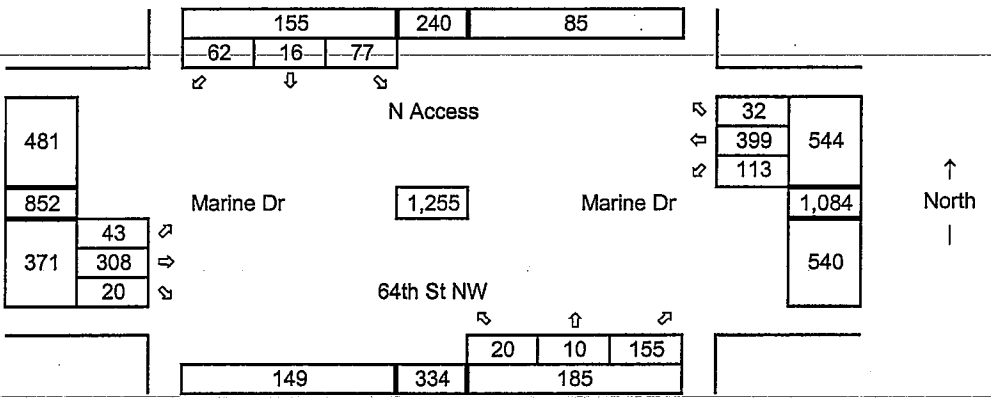
Year: 2010
Growth Rate = 2.0%
Years of Growth = 5
Total Growth = 1.1041



Total Project Trips
Average Weekday
PM Peak Hour



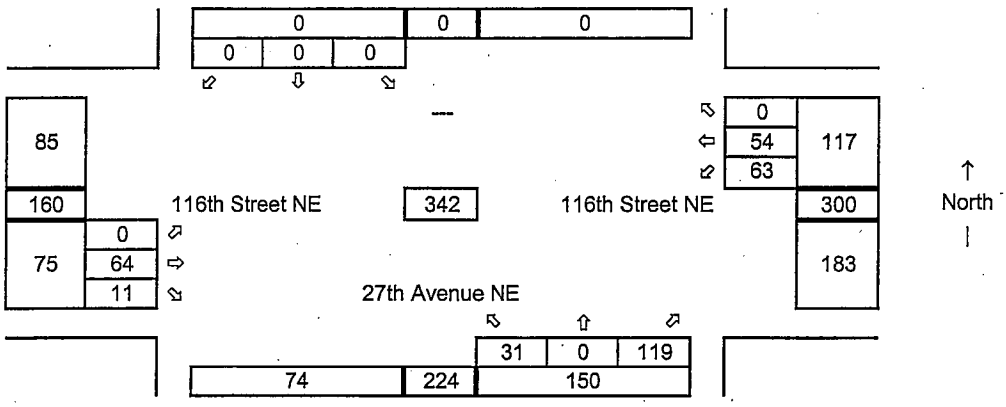
Future with Project
Average Weekday
PM Peak Hour



Synchro ID: 1
Existing
Average Weekday
PM Peak Hour

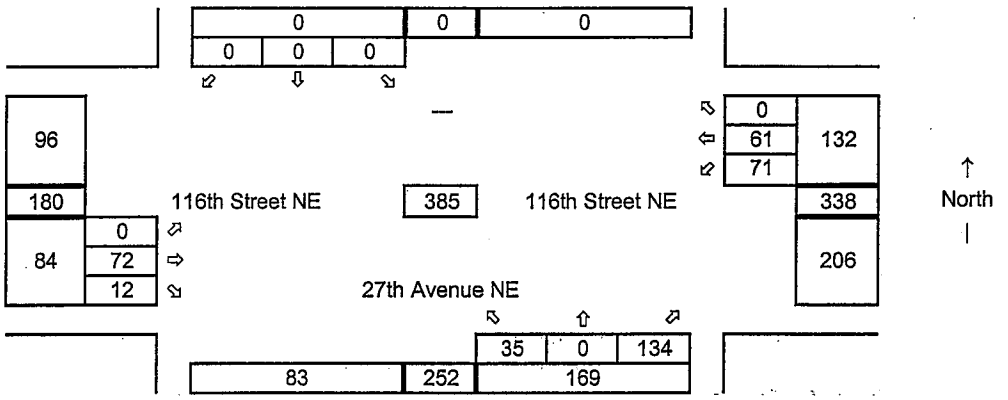
Date **8/3/2006**

Data Source: **TDG**

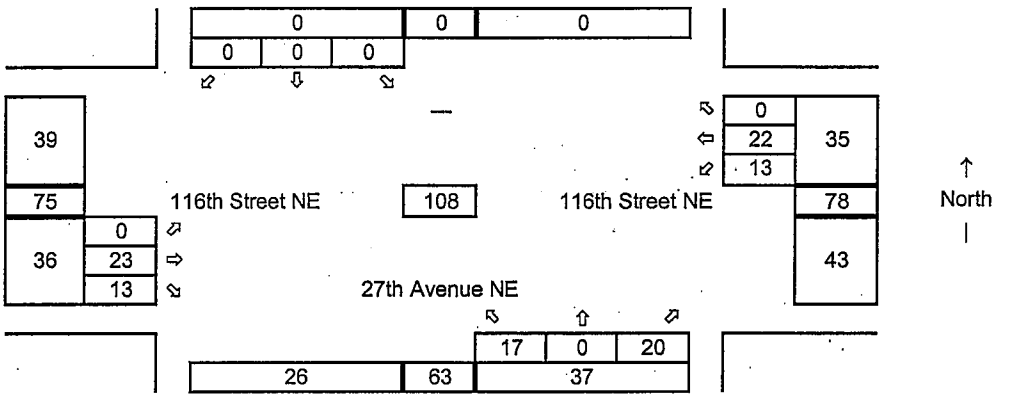


Growth-Factored Volumes
Average Weekday
PM Peak Hour

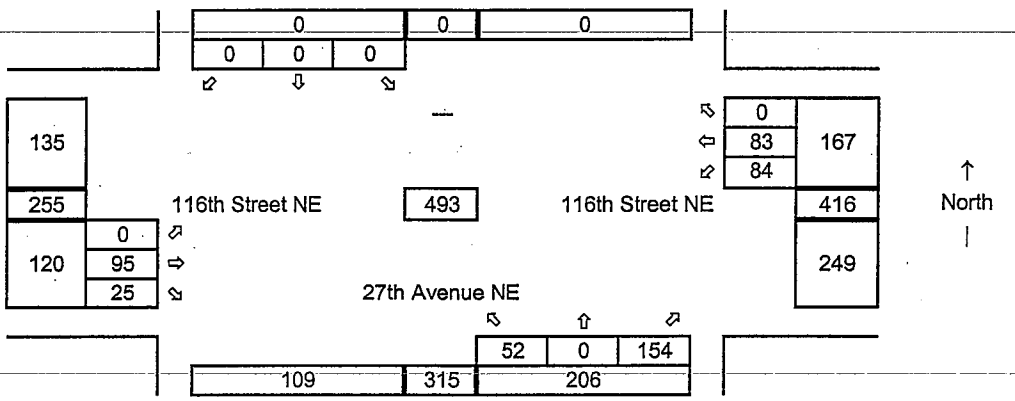
Year: 2018
Growth Rate = 1.0%
Years of Growth = 12
Total Growth = 1.1268



Pipeline Trips
Average Weekday
PM Peak Hour



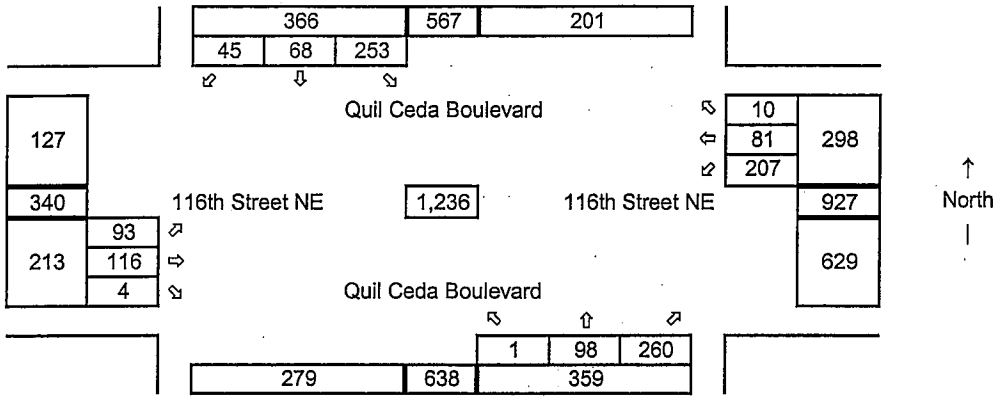
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 2
Existing
Average Weekday
PM Peak Hour

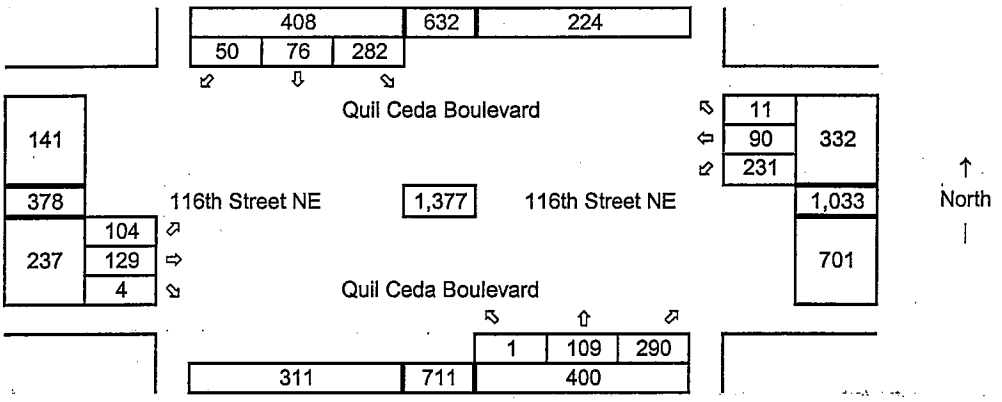
Date **5/30/2007**

Data Source: **TDG**

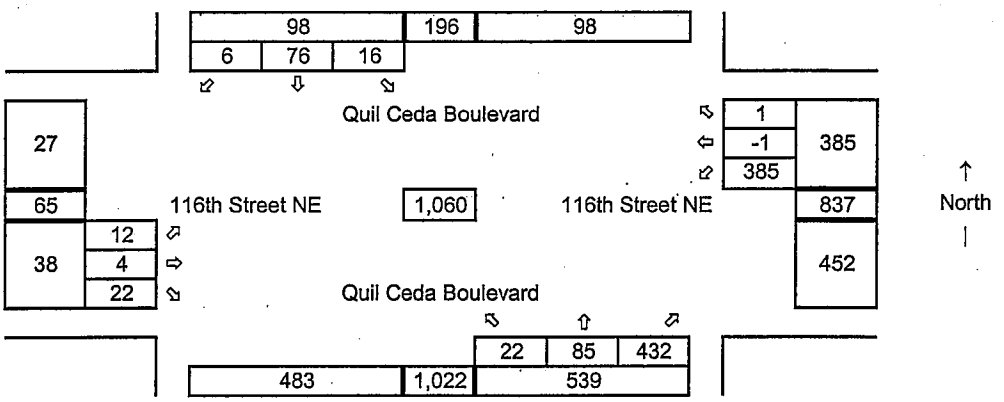


Growth-Factored Volumes
Average Weekday
PM Peak Hour

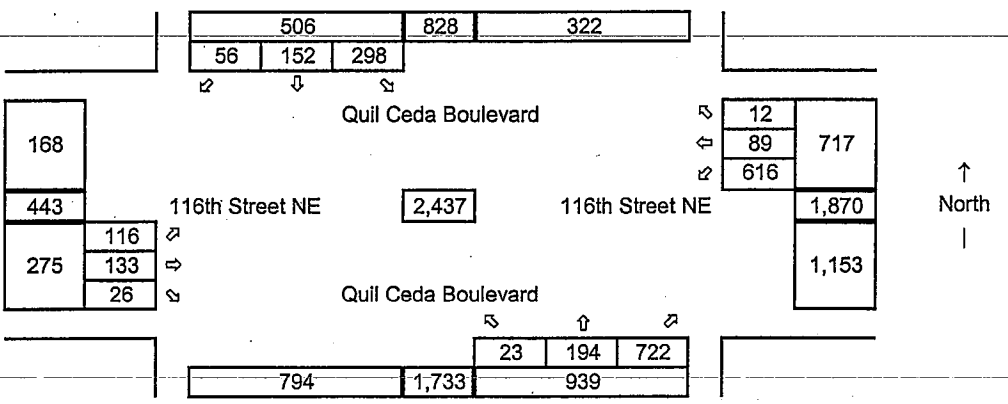
Year: 2018
Growth Rate = 1.0%
Years of Growth = 11
Total Growth = 1.1157



Pipeline Trips
Average Weekday
PM Peak Hour



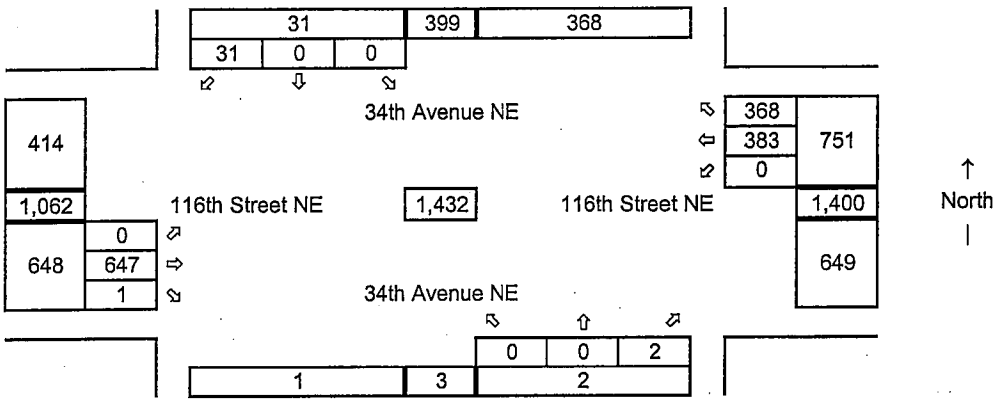
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 3
Existing
Average Weekday
PM Peak Hour

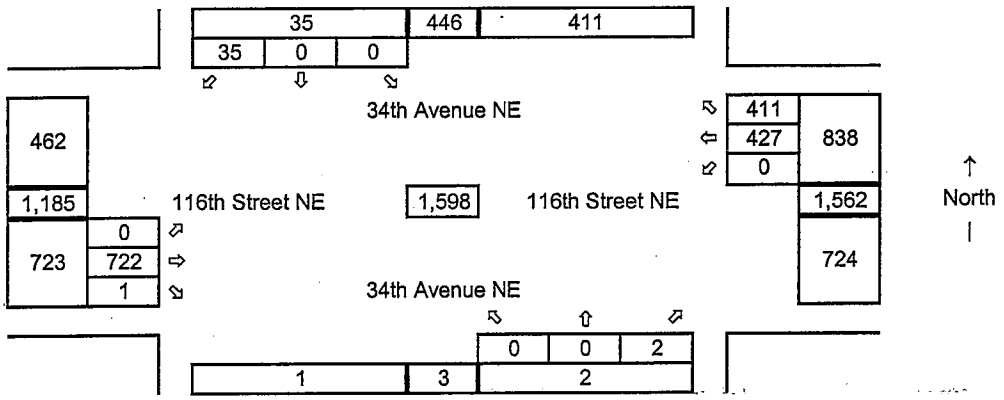
Date **5/30/2007**

Data Source: **TDG**

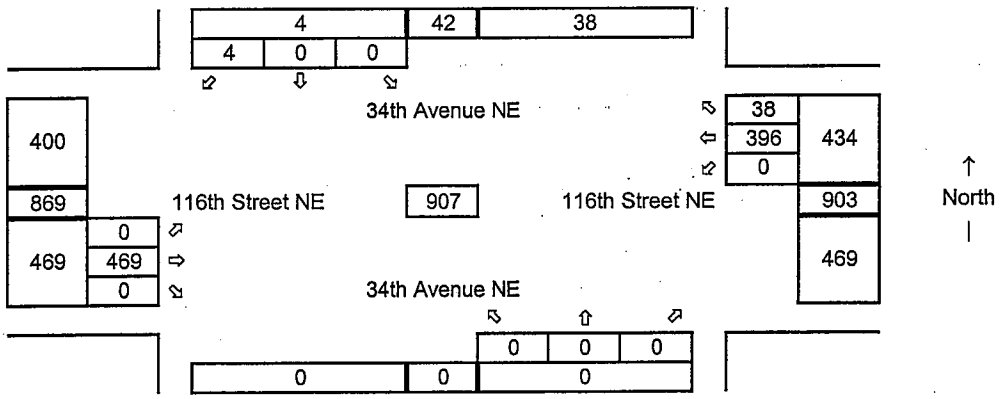


Growth-Factored Volumes
Average Weekday
PM Peak Hour

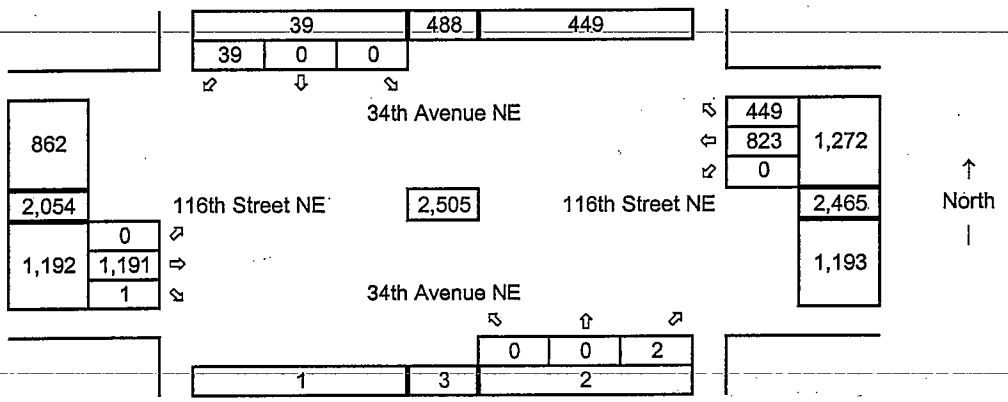
Year: 2018
Growth Rate = 1.0%
Years of Growth = 11
Total Growth = 1.1157



Pipeline Trips
Average Weekday
PM Peak Hour



Future Trips
Average Weekday
PM Peak Hour

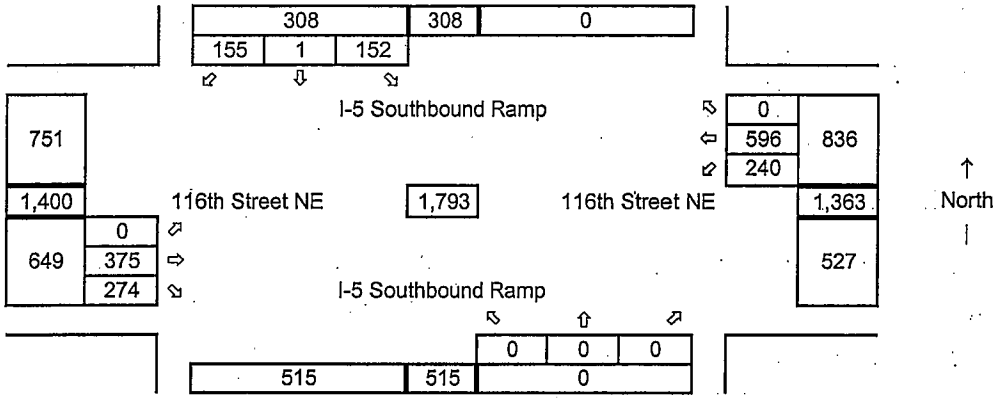


Synchro ID: 4

Existing
Average Weekday
PM Peak Hour

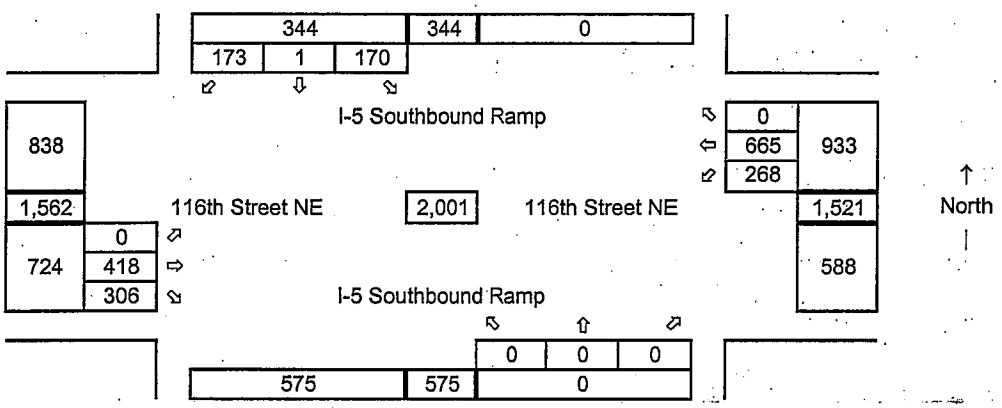
Date **5/30/2007**

Data Source: **TDG**

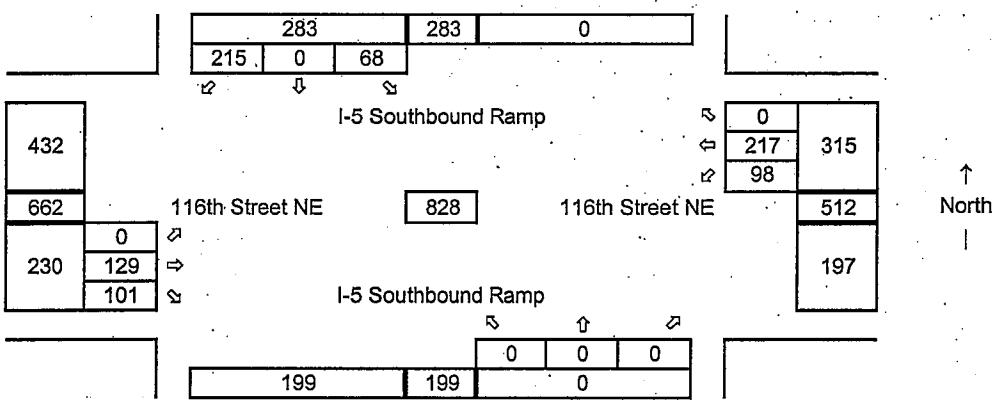


Growth-Factored Volumes
Average Weekday
PM Peak Hour

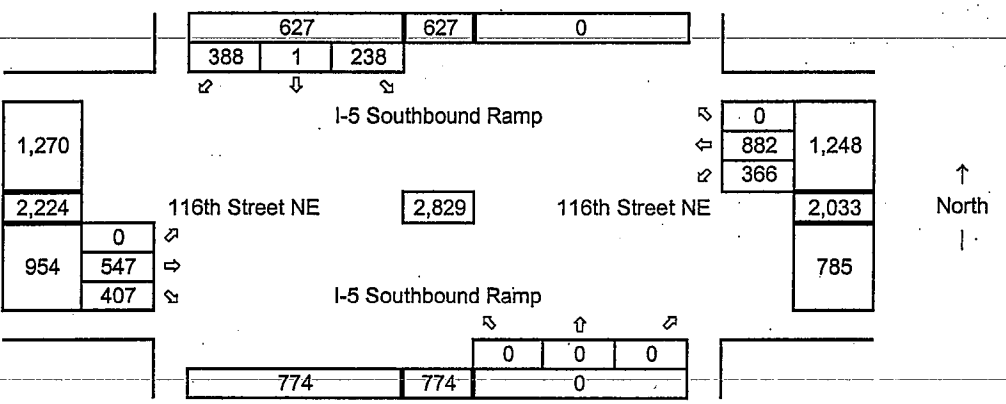
Year: 2018
Growth Rate = 1.0%
Years of Growth = 11
Total Growth = 1.1157



Pipeline Trips
Average Weekday
PM Peak Hour



Future Trips
Average Weekday
PM Peak Hour

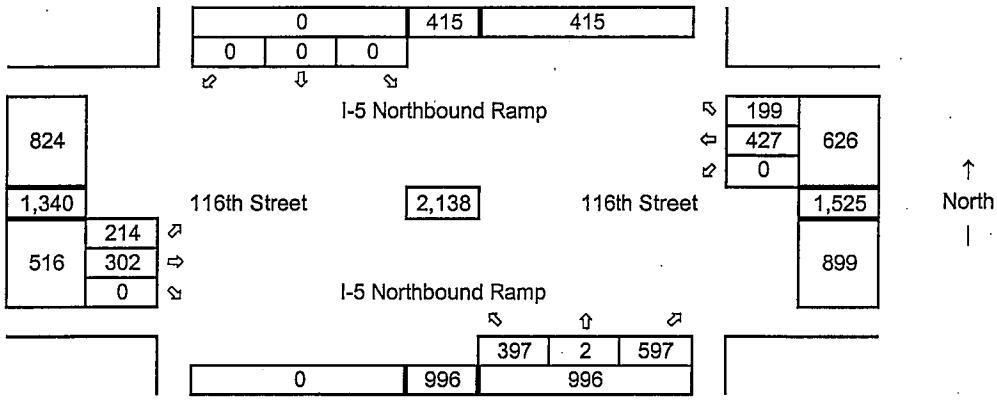


Synchro ID: 5

Existing
Average Weekday
PM Peak Hour

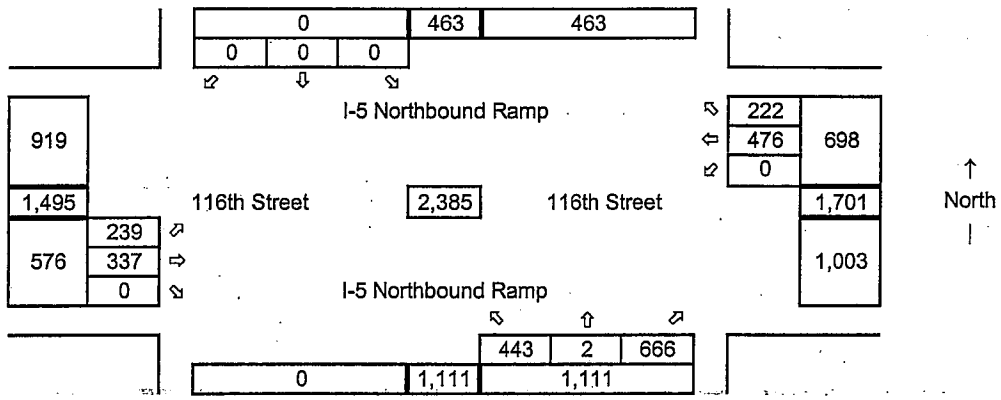
Date **5/30/2007**

Data Source: **TDG**

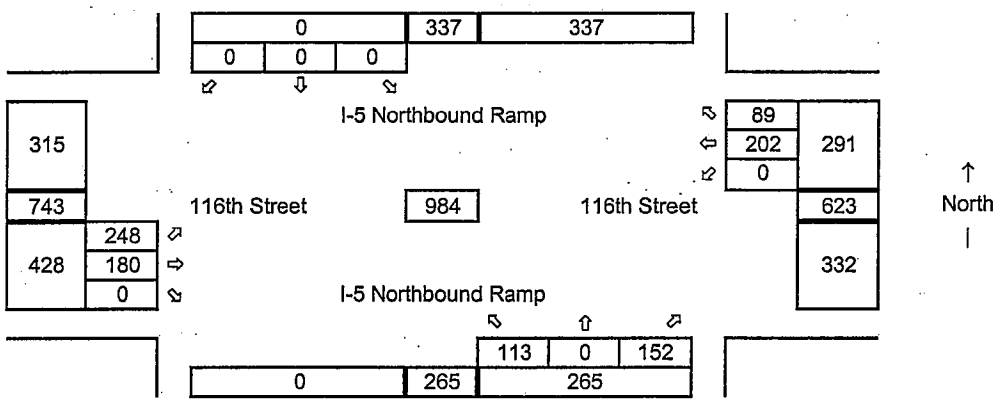


Growth-Factored Volumes
Average Weekday
PM Peak Hour

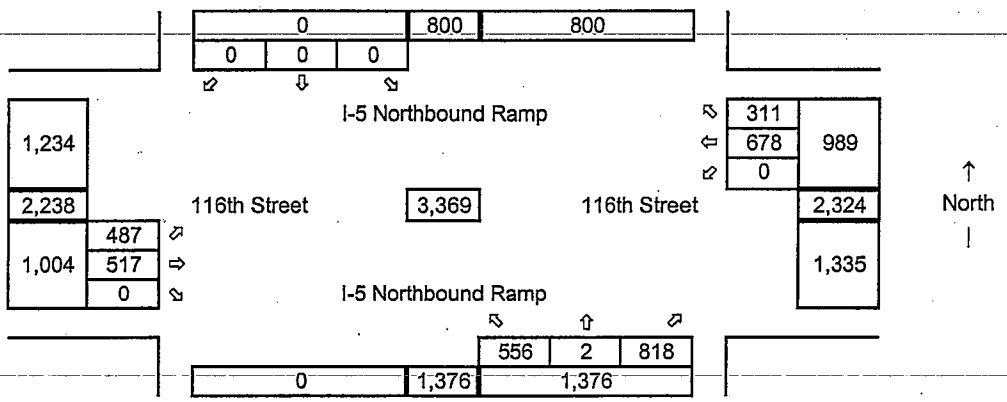
Year: 2018
Growth Rate = 1.0%
Years of Growth = 11
Total Growth = 1.1157



Pipeline Trips
Average Weekday
PM Peak Hour



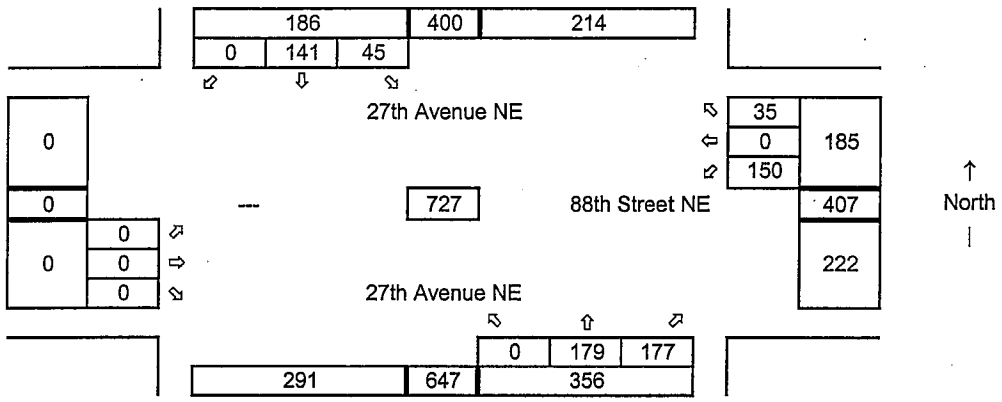
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 6
Existing
Average Weekday
PM Peak Hour

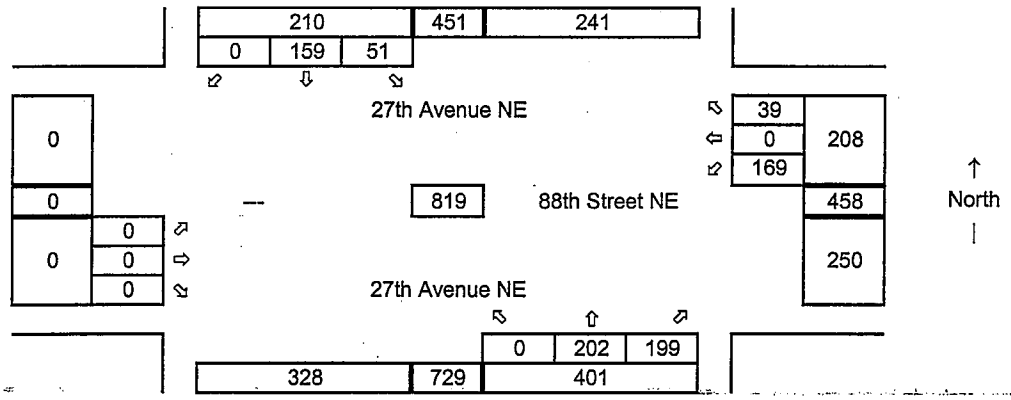
Date **8/3/2006**

Data Source: **TDG**

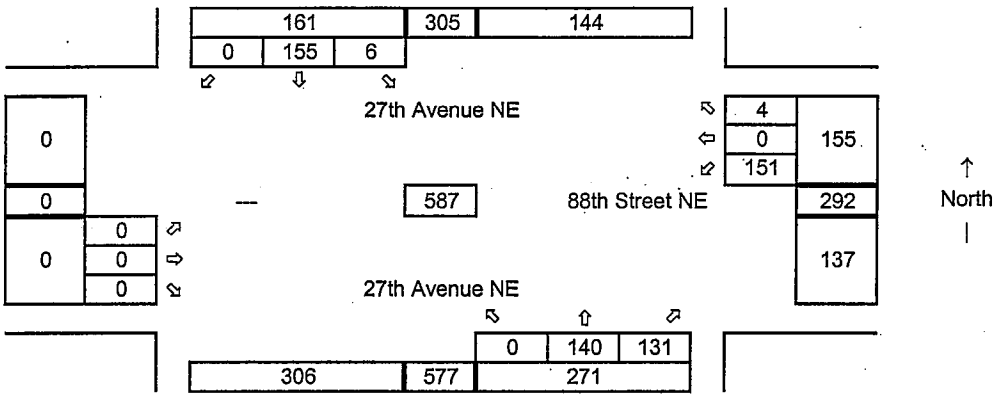


Growth-Factored Volumes
Average Weekday
PM Peak Hour

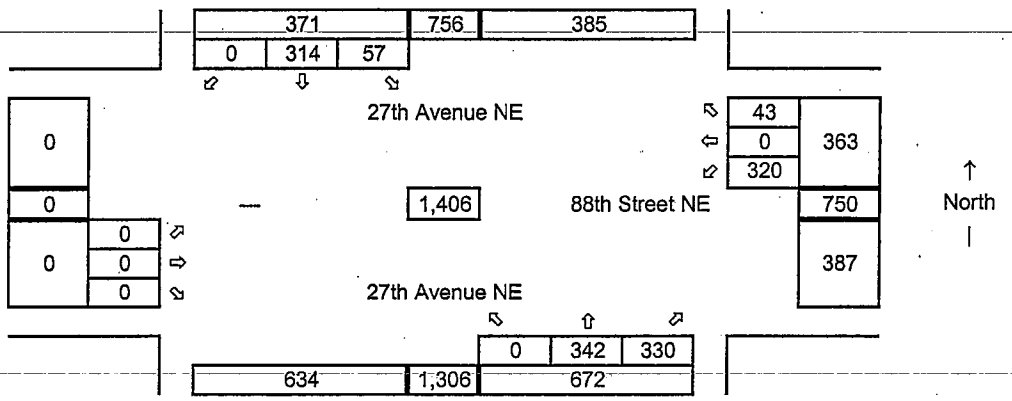
Year: 2018
Growth Rate = 1.0%
Years of Growth = 12
Total Growth = 1.1268



Pipeline Trips
Average Weekday
PM Peak Hour



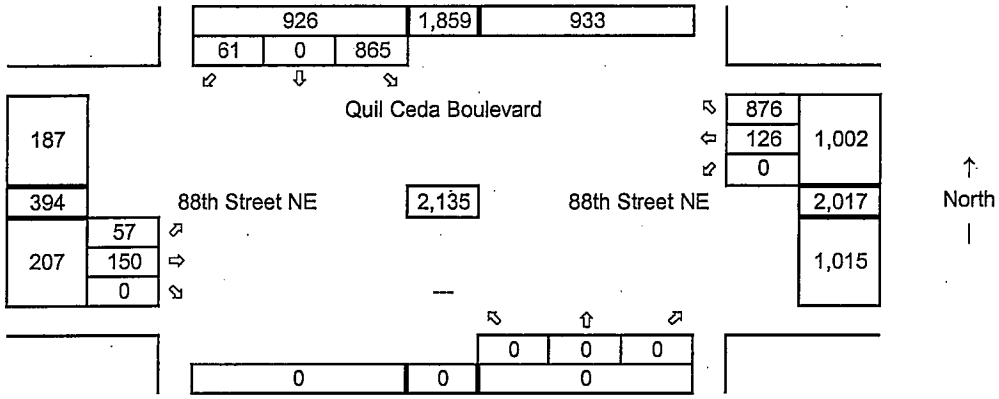
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 7
Existing
Average Weekday
PM Peak Hour

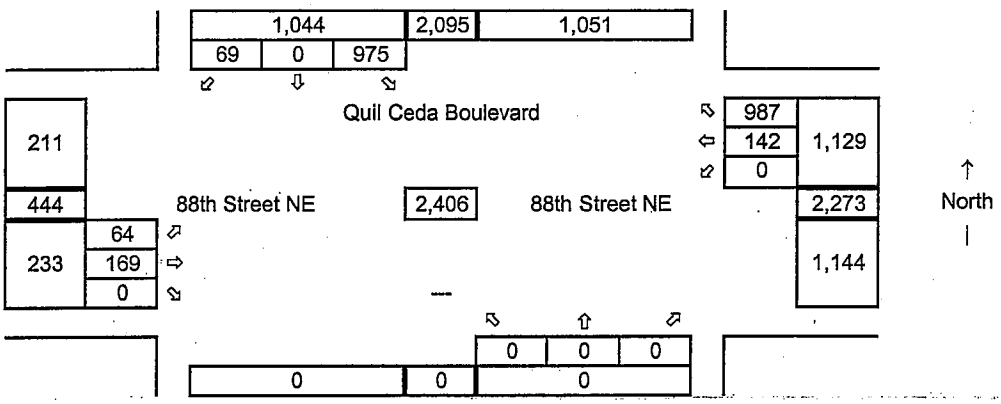
Date **3/30/2006**

Data Source: **TDG**

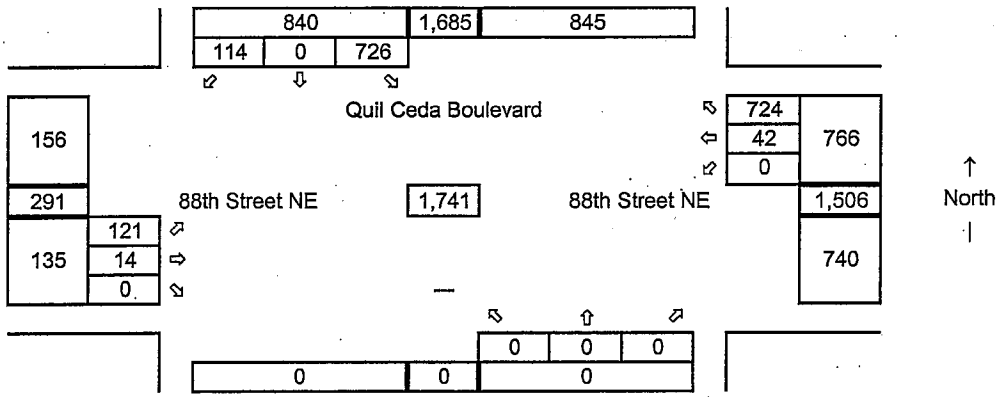


Growth-Factored Volumes
Average Weekday
PM Peak Hour

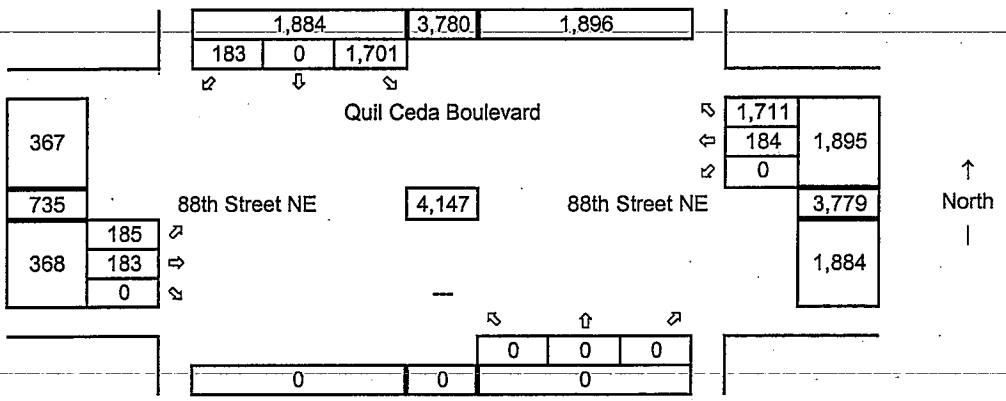
Year: 2018
Growth Rate = 1.0%
Years of Growth = 12
Total Growth = 1.1268



Pipeline Trips
Average Weekday
PM Peak Hour



Future Trips
Average Weekday
PM Peak Hour

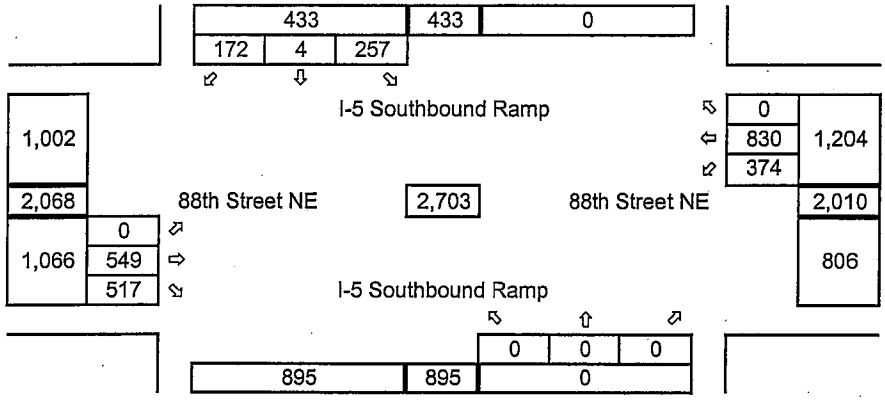


Synchro ID: 8

Existing
Average Weekday
PM Peak Hour

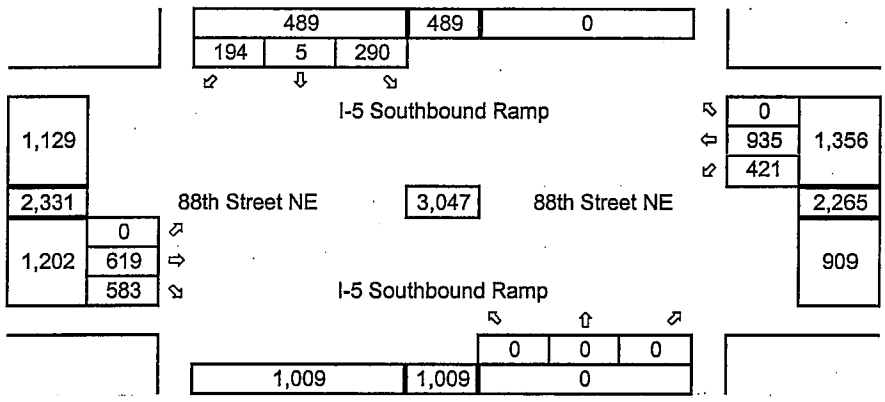
Date **3/14/2006**

Data Source: **WSDOT**

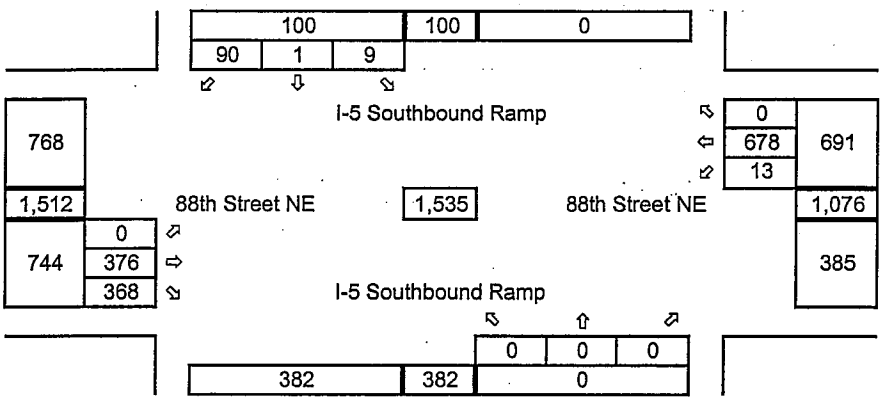


Growth-Factored Volumes
Average Weekday
PM Peak Hour

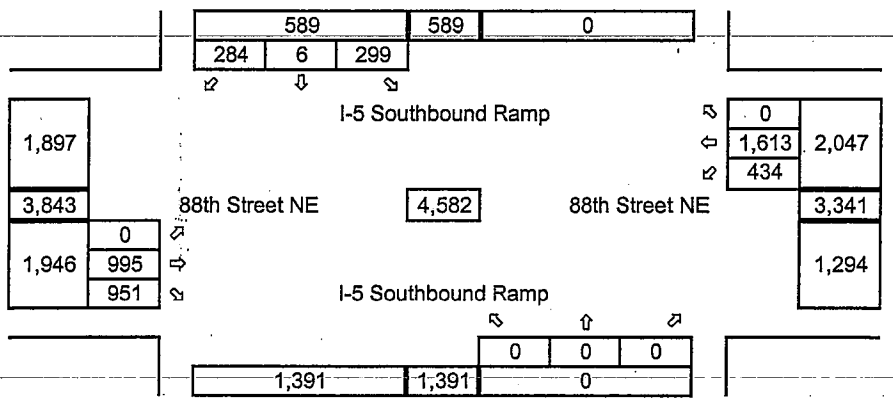
Year: 2018
Growth Rate = 1.0%
Years of Growth = 12
Total Growth = 1.1268



Pipeline Trips
Average Weekday
PM Peak Hour



Future Trips
Average Weekday
PM Peak Hour

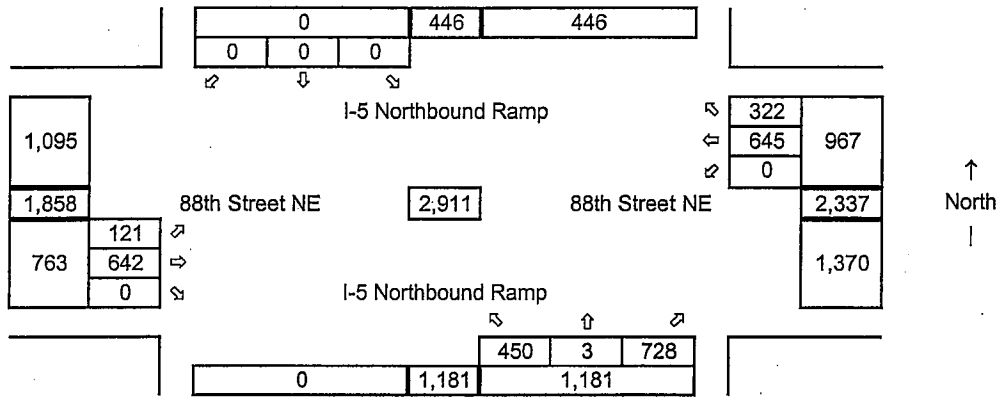


Synchro ID: 9

Existing
Average Weekday
PM Peak Hour

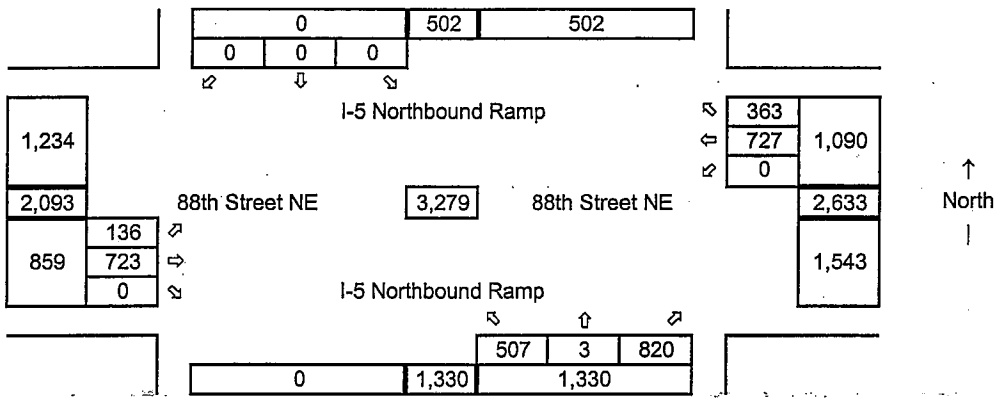
Date **3/14/2006**

Data Source: **WSDOT**

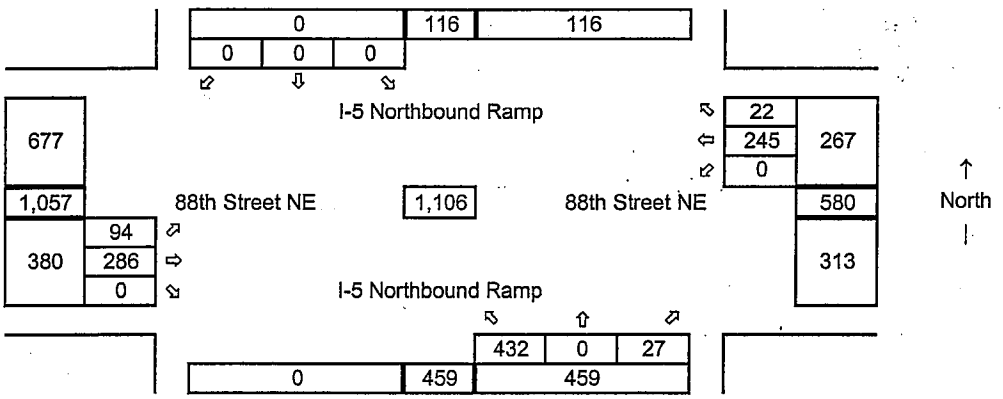


Growth-Factored Volumes
Average Weekday
PM Peak Hour

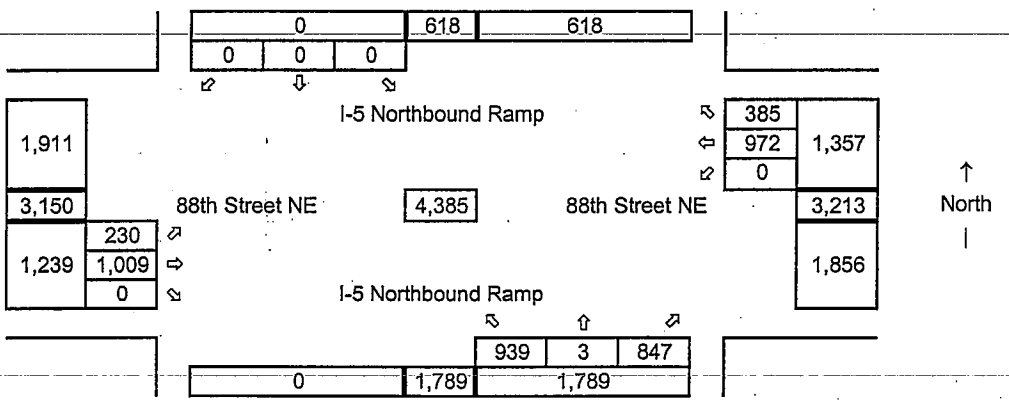
Year: 2018
Growth Rate = 1.0%
Years of Growth = 12
Total Growth = 1.1268



Pipeline Trips
Average Weekday
PM Peak Hour



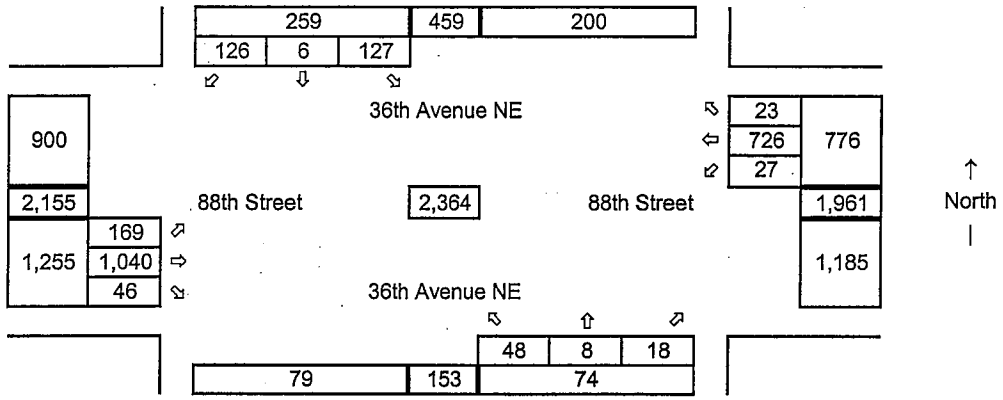
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 10
Existing
Average Weekday
PM Peak Hour

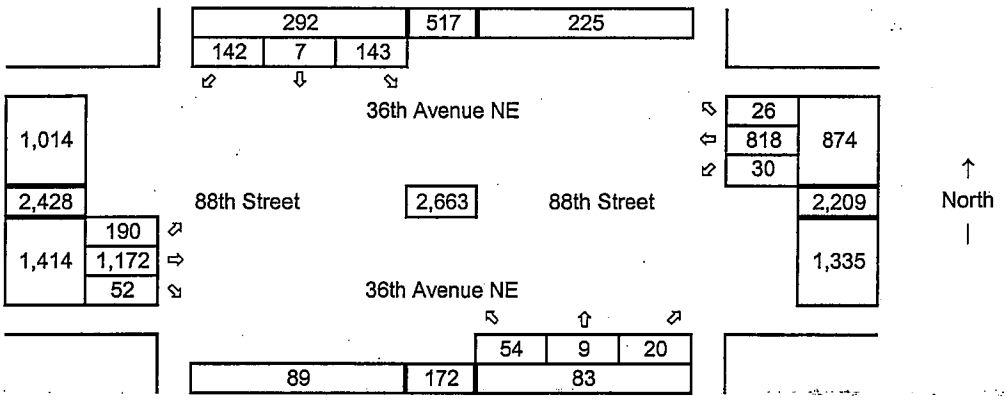
Date **8/3/2006**

Data Source: **TDG**

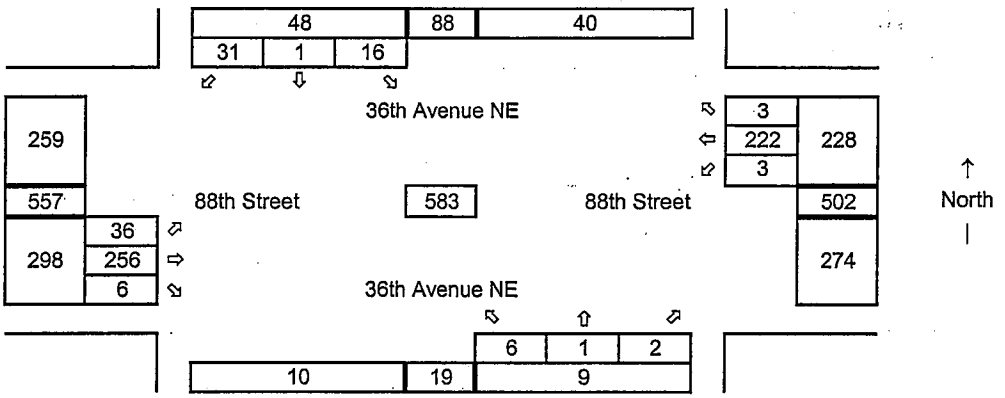


Growth-Factored Volumes
Average Weekday
PM Peak Hour

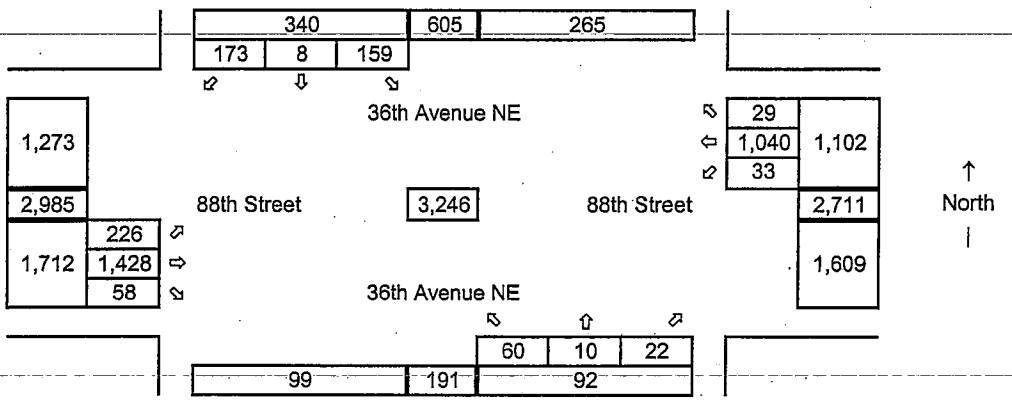
Year: 2018
Growth Rate = 1.0%
Years of Growth = 12
Total Growth = 1.1268



Pipeline Trips
Average Weekday
PM Peak Hour



Future Trips
Average Weekday
PM Peak Hour

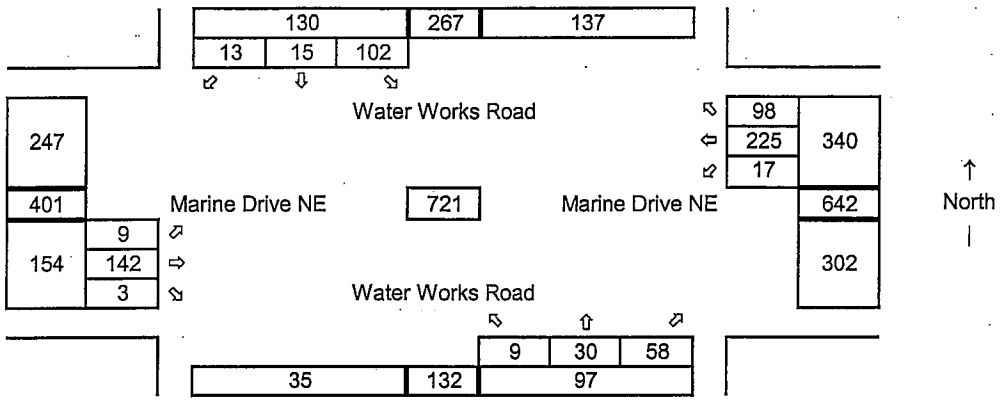


Synchro ID: 11

Existing
Average Weekday
PM Peak Hour

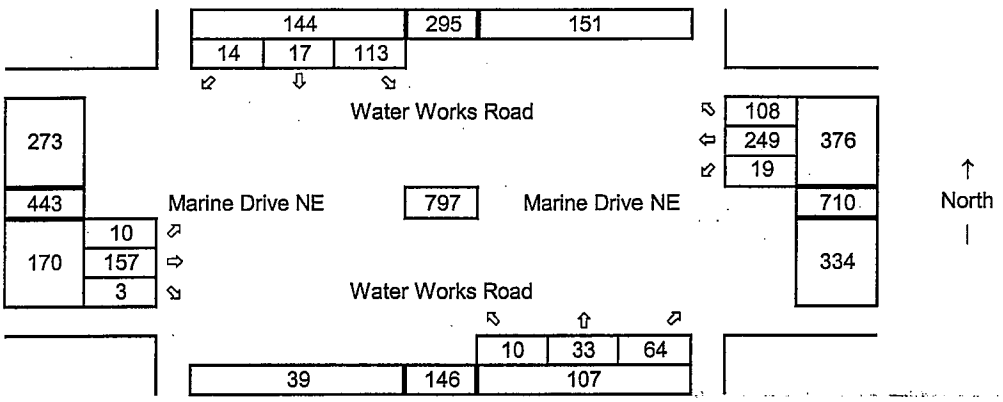
Date **4/10/2008**

Data Source: **TDG**

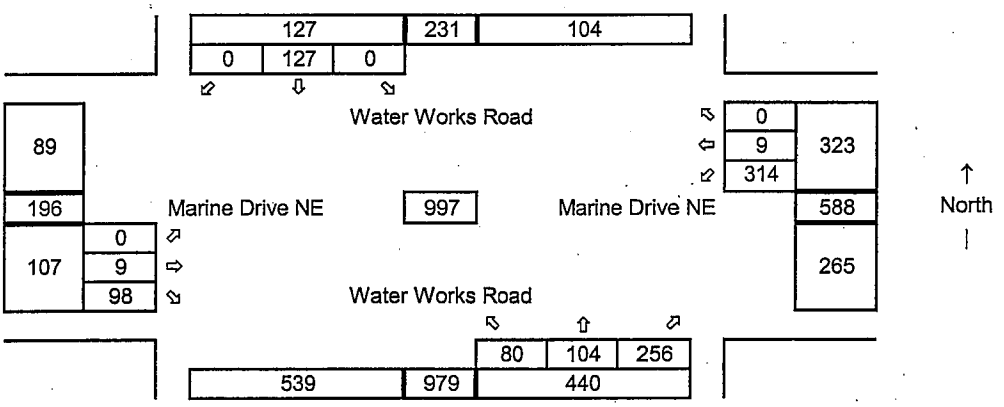


Growth-Factored Volumes
Average Weekday
PM Peak Hour

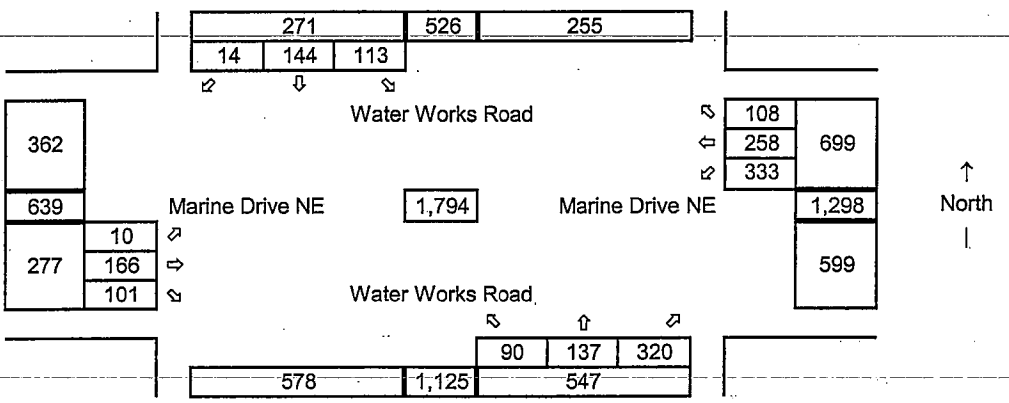
Year: 2018
Growth Rate = 1.0%
Years of Growth = 10
Total Growth = 1.1046



Pipeline Trips
Average Weekday
PM Peak Hour



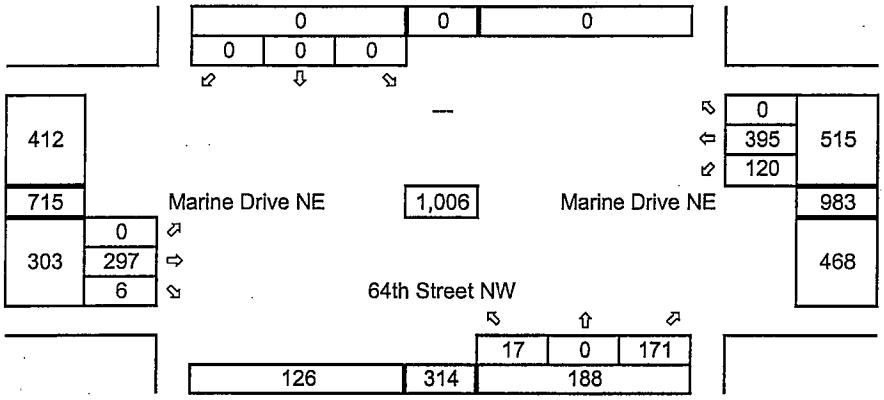
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 12
Existing
Average Weekday
PM Peak Hour

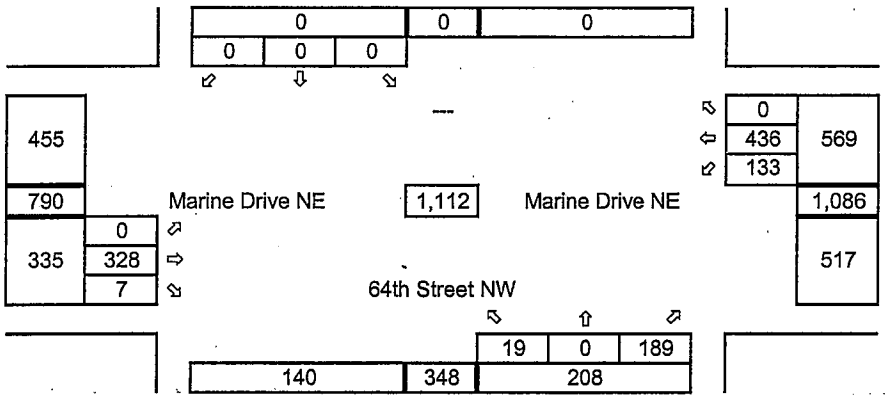
Date **5/29/2008**

Data Source: **TDG**

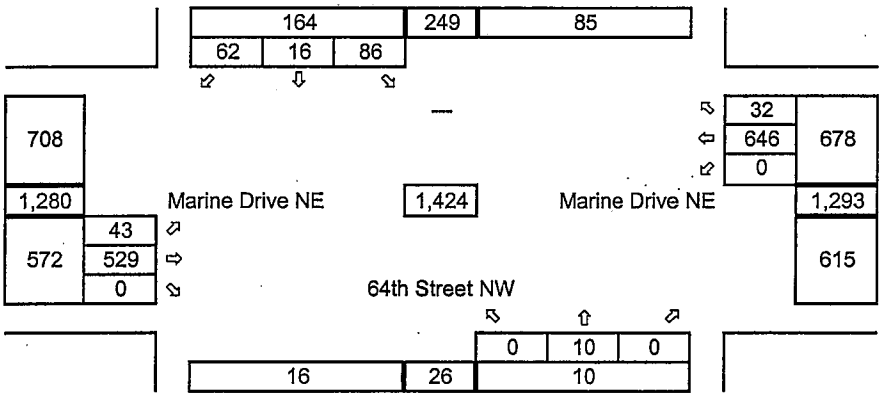


Growth-Factored Volumes
Average Weekday
PM Peak Hour

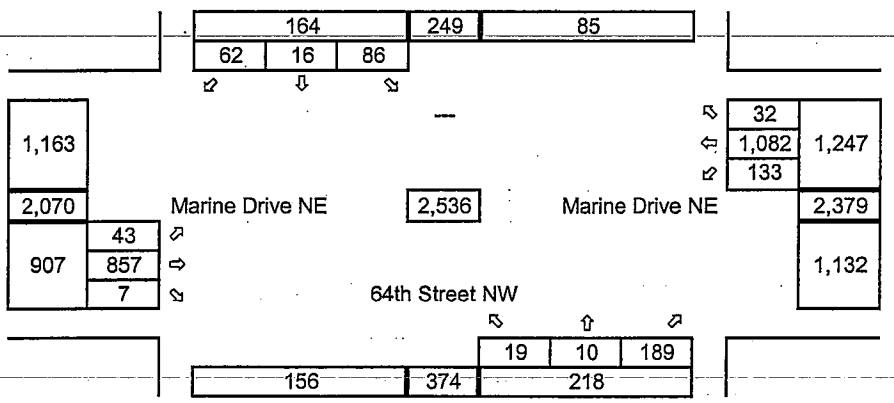
Year: 2018
Growth Rate = 1.0%
Years of Growth = 10
Total Growth = 1.1046



Pipeline Trips
Average Weekday
PM Peak Hour



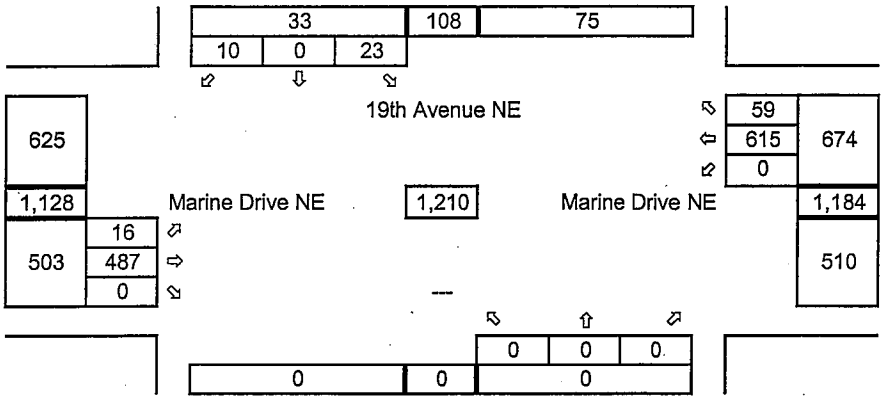
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 13
Existing
Average Weekday
PM Peak Hour

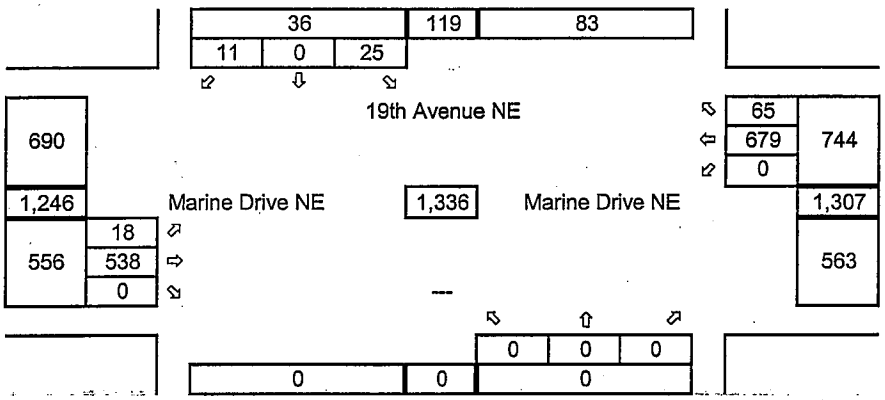
Date **4/3/2008**

Data Source: **TDG**

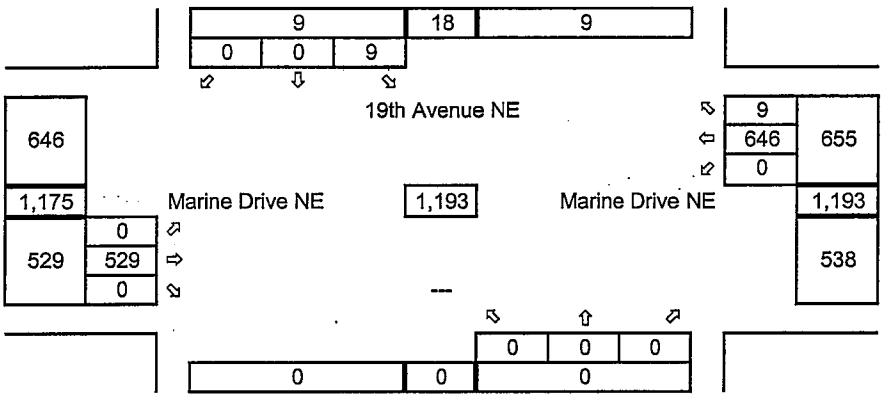


Growth-Factored Volumes
Average Weekday
PM Peak Hour

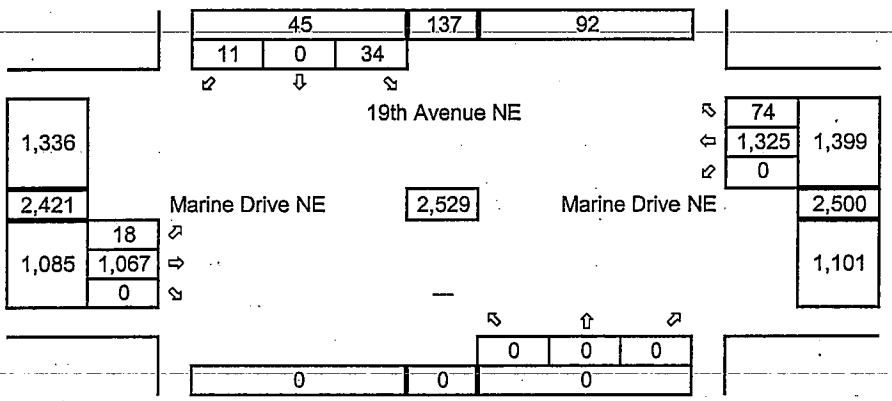
Year: 2018
Growth Rate = 1.0%
Years of Growth = 10
Total Growth = 1.1046



Pipeline Trips
Average Weekday
PM Peak Hour



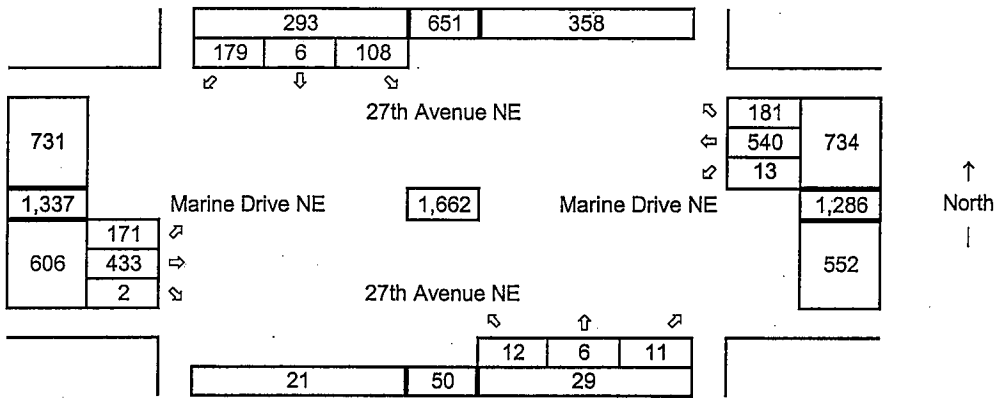
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 14
Existing
Average Weekday
PM Peak Hour

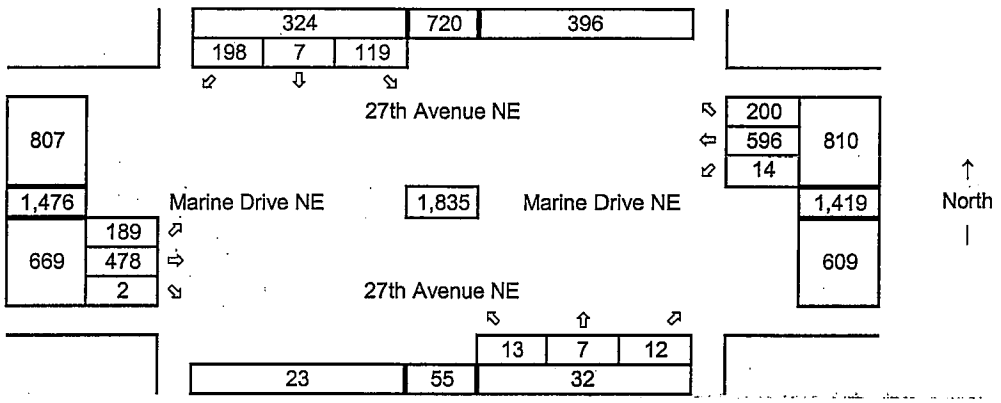
Date **4/3/2008**

Data Source: **TDG**

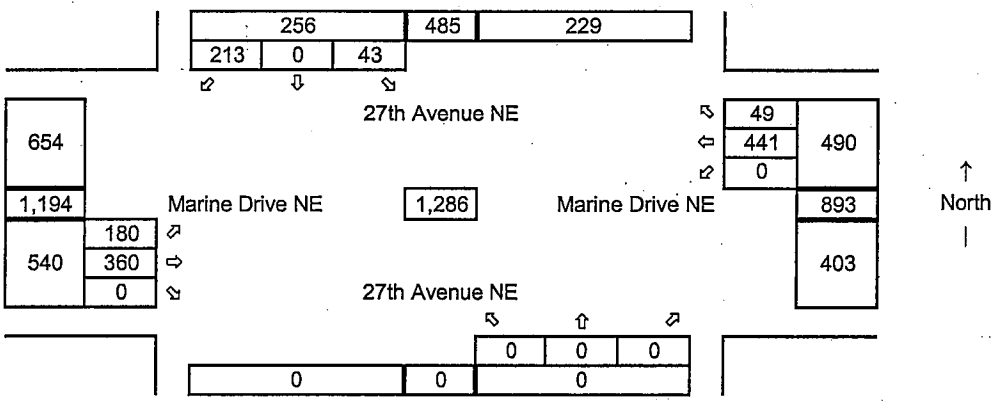


Growth-Factored Volumes
Average Weekday
PM Peak Hour

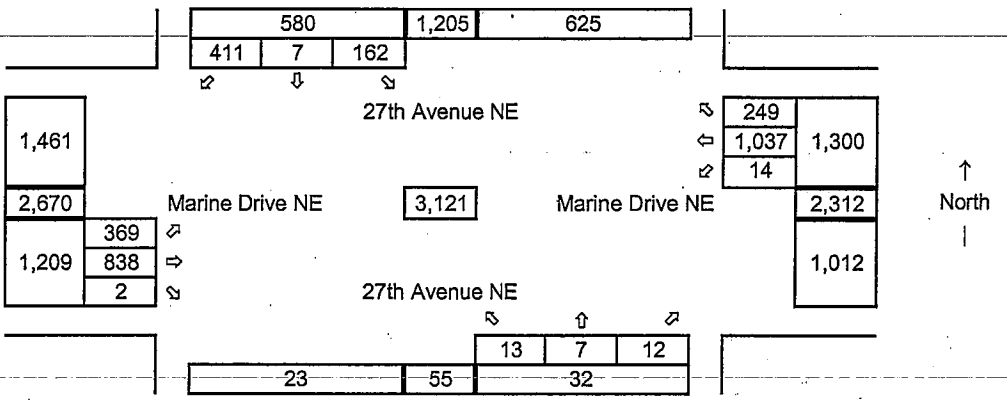
Year: 2018
Growth Rate = 1.0%
Years of Growth = 10
Total Growth = 1.1046



Pipeline Trips
Average Weekday
PM Peak Hour



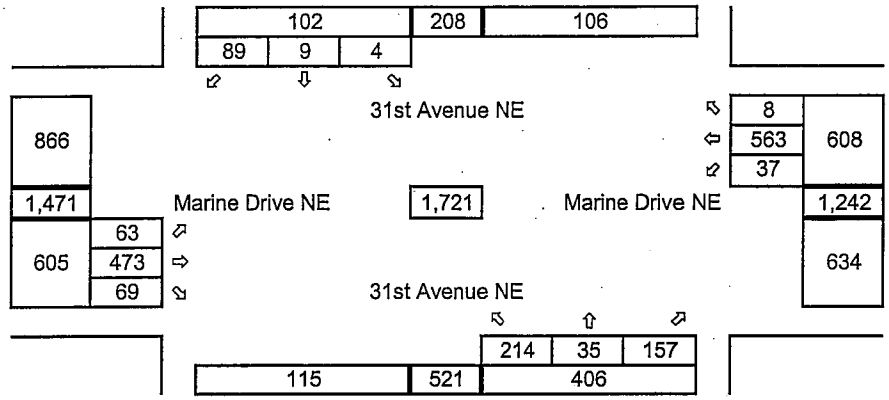
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 15
Existing
Average Weekday
PM Peak Hour

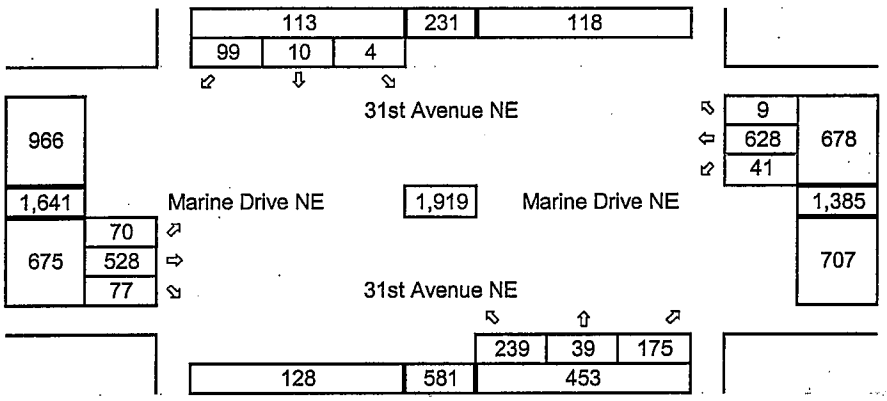
Date **1/24/2007**

Data Source: **Sno Co**

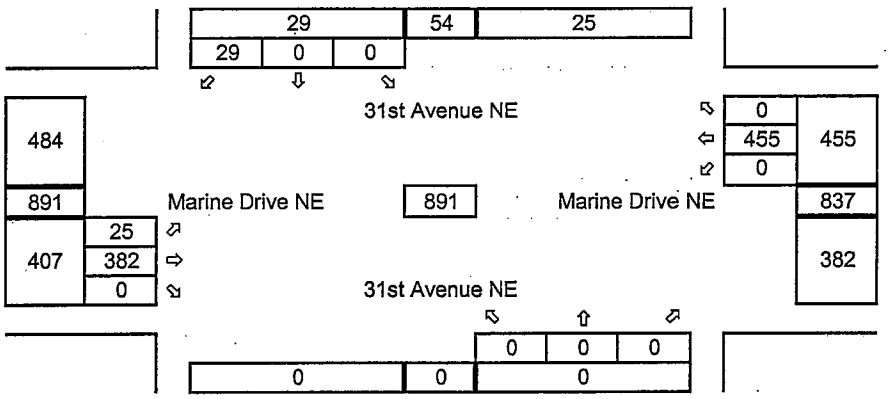


Growth-Factored Volumes
Average Weekday
PM Peak Hour

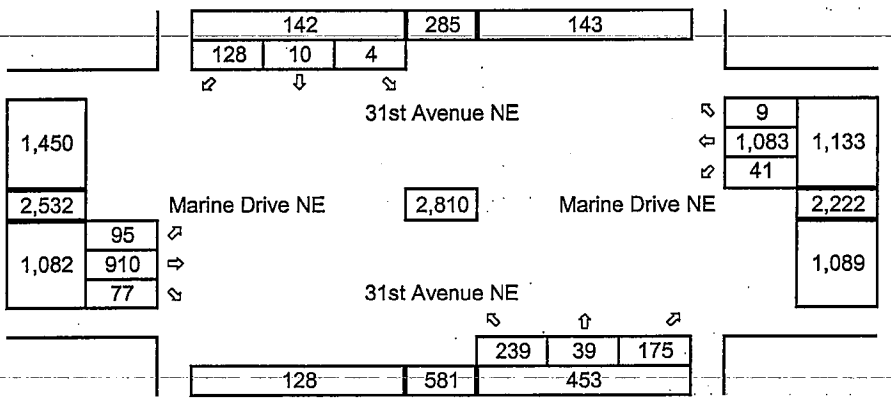
Year: 2018
Growth Rate = 1.0%
Years of Growth = 11
Total Growth = 1.1157



Pipeline Trips
Average Weekday
PM Peak Hour



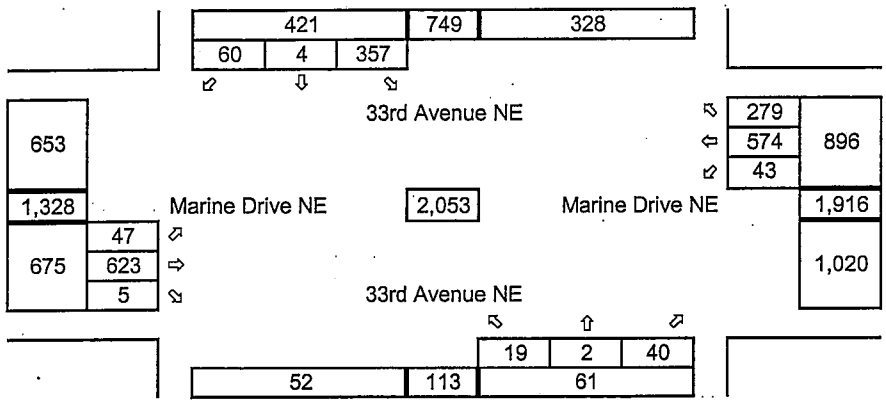
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 16
Existing
Average Weekday
PM Peak Hour

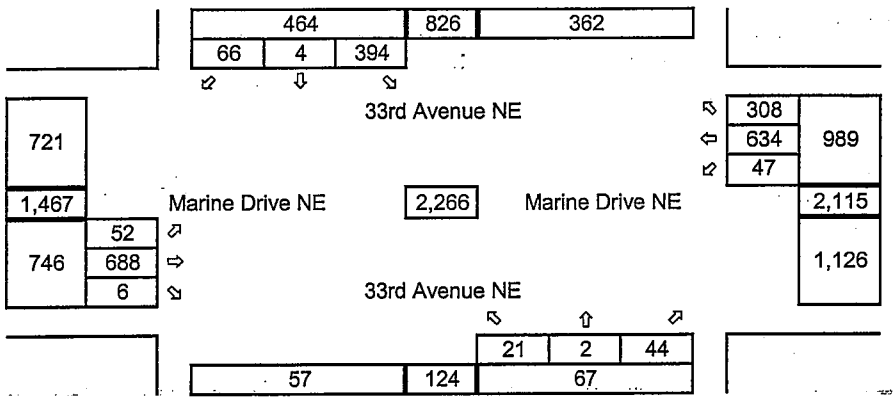
Date **4/8/2008**

Data Source: **TDG**

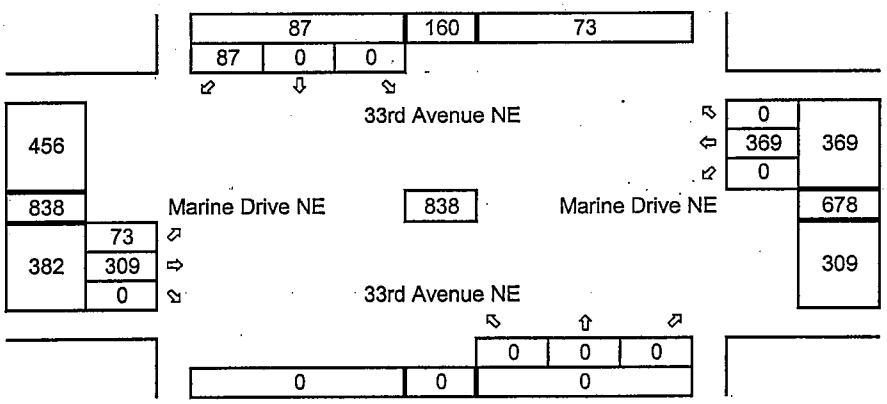


Growth-Factored Volumes
Average Weekday
PM Peak Hour

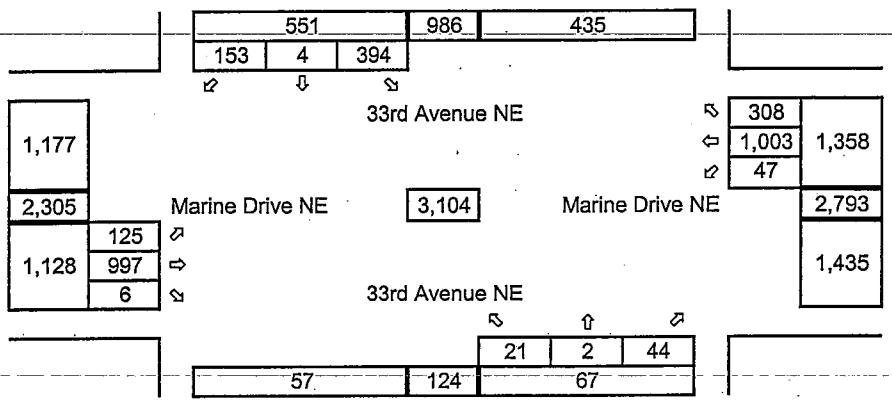
Year: 2018
Growth Rate = 1.0%
Years of Growth = 10
Total Growth = 1.1046



Pipeline Trips
Average Weekday
PM Peak Hour



Future Trips
Average Weekday
PM Peak Hour

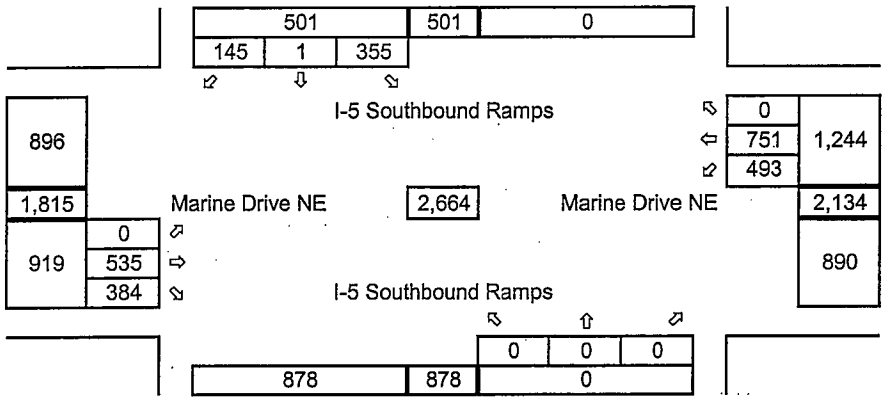


Synchro ID: 17

Existing
Average Weekday
PM Peak Hour

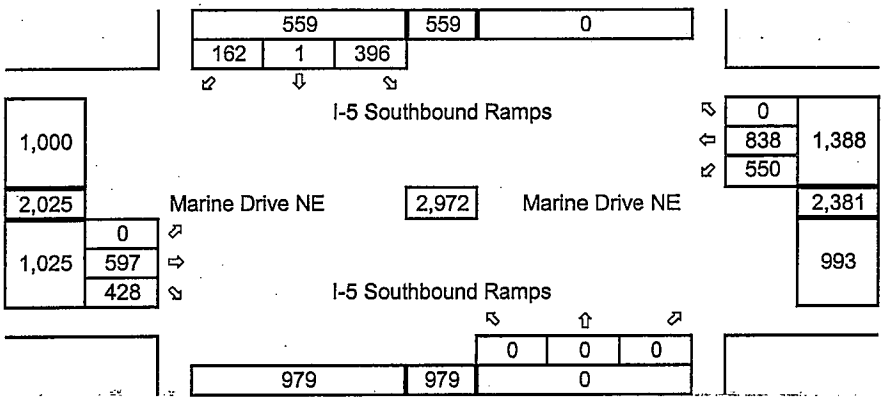
Date **2/27/2007**

Data Source: **WSDOT**

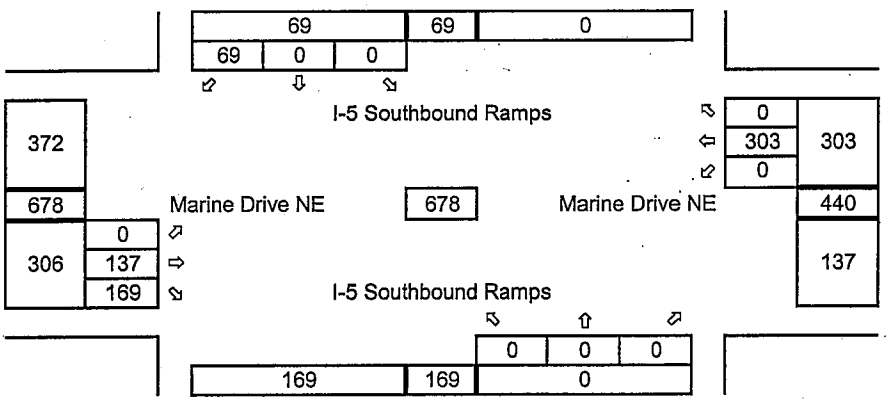


Growth-Factored Volumes
Average Weekday
PM Peak Hour

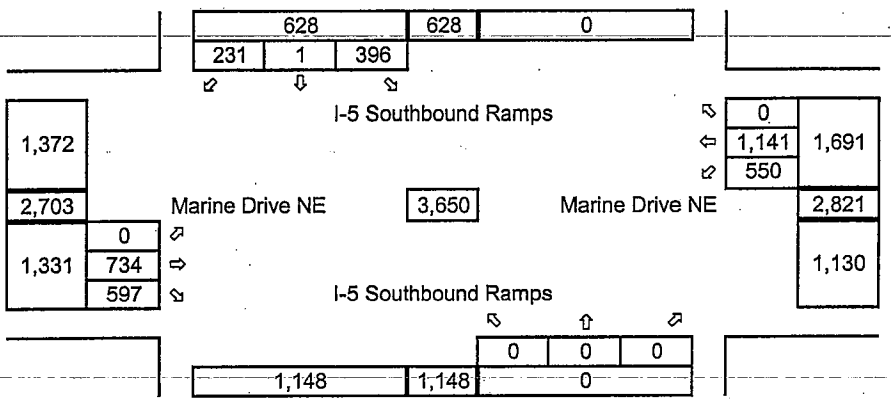
Year: 2018
Growth Rate = 1.0%
Years of Growth = 11
Total Growth = 1.1157



Pipeline Trips
Average Weekday
PM Peak Hour



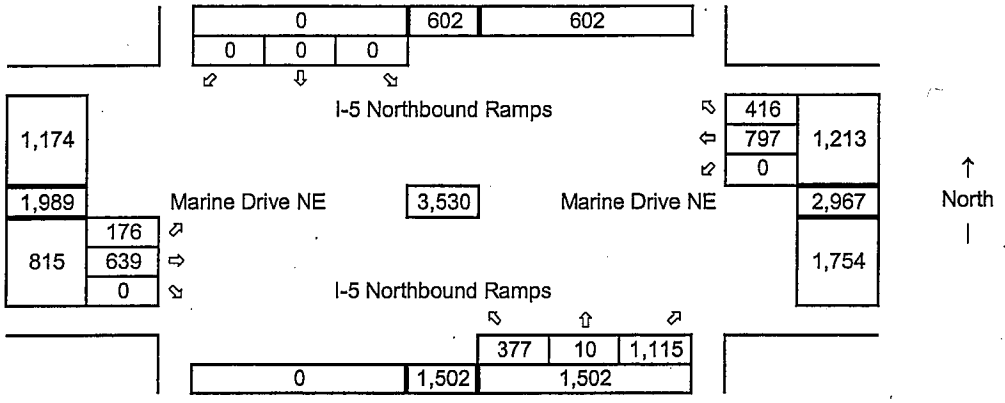
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 18
Existing
Average Weekday
PM Peak Hour

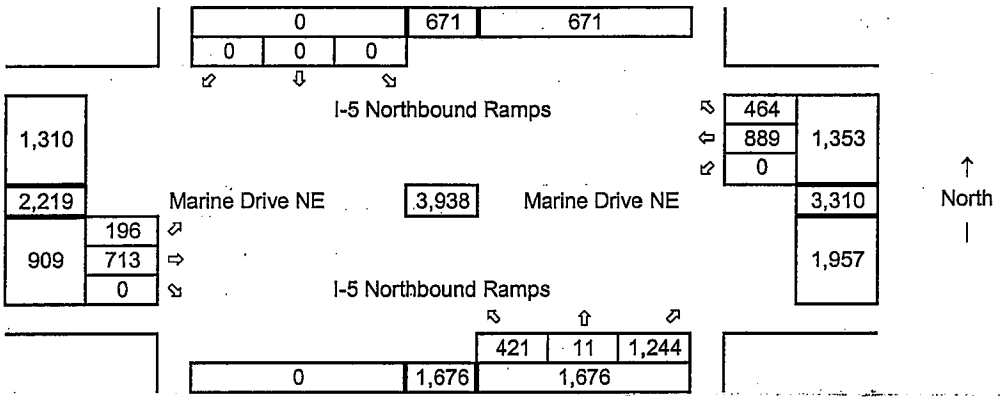
Date **3/6/2007**

Data Source: **WSDOT**

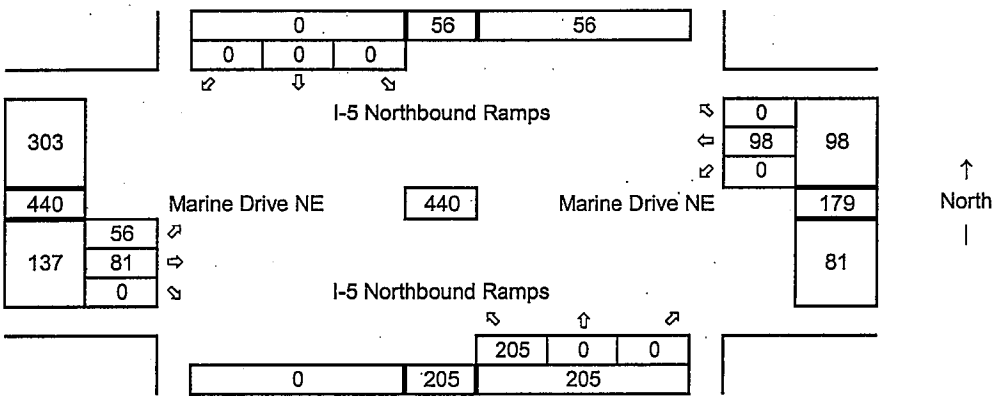


Growth-Factored Volumes
Average Weekday
PM Peak Hour

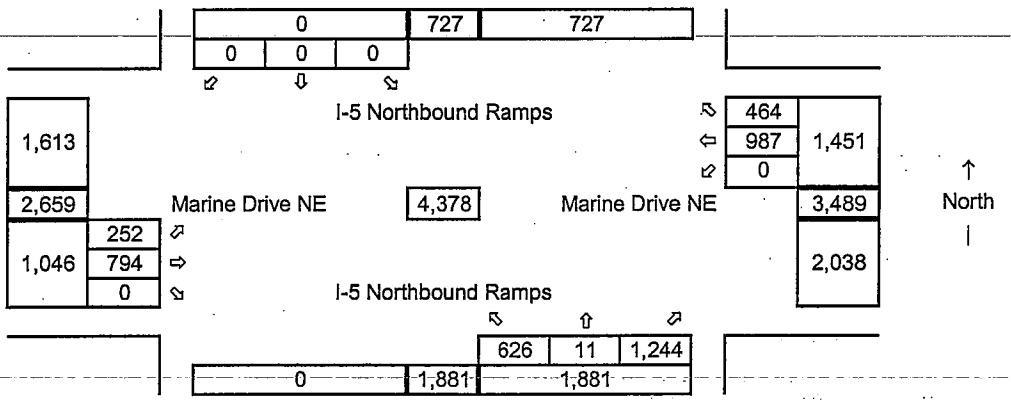
Year: 2018
Growth Rate = 1.0%
Years of Growth = 11
Total Growth = 1.1157



Pipeline Trips
Average Weekday
PM Peak Hour



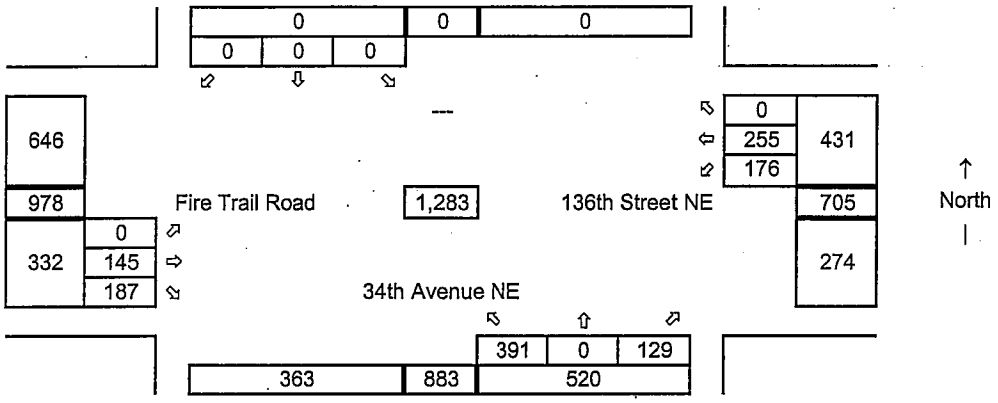
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 19
Existing
Average Weekday
PM Peak Hour

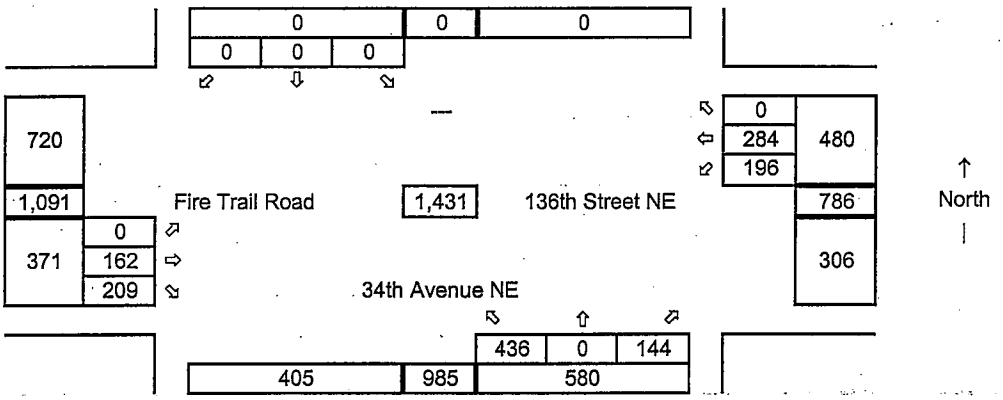
Date **7/17/2007**

Data Source: **ATD**

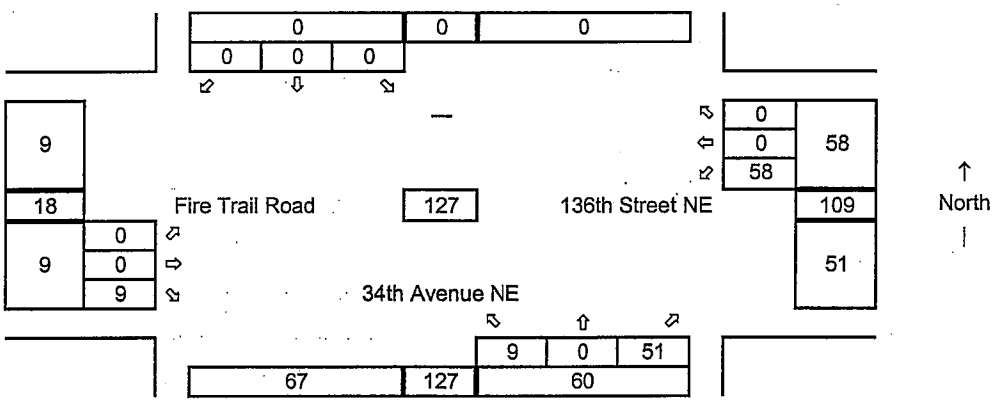


Growth-Factored Volumes
Average Weekday
PM Peak Hour

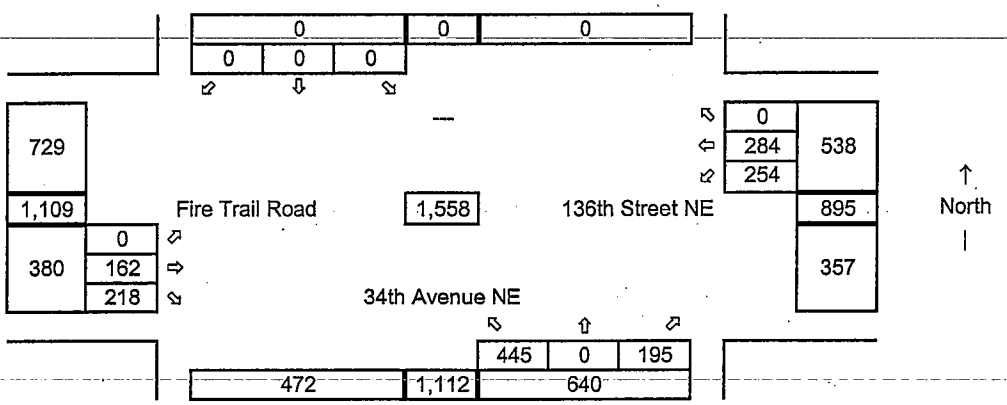
Year: 2018
Growth Rate = 1.0%
Years of Growth = 11
Total Growth = 1.1157



Pipeline Trips
Average Weekday
PM Peak Hour



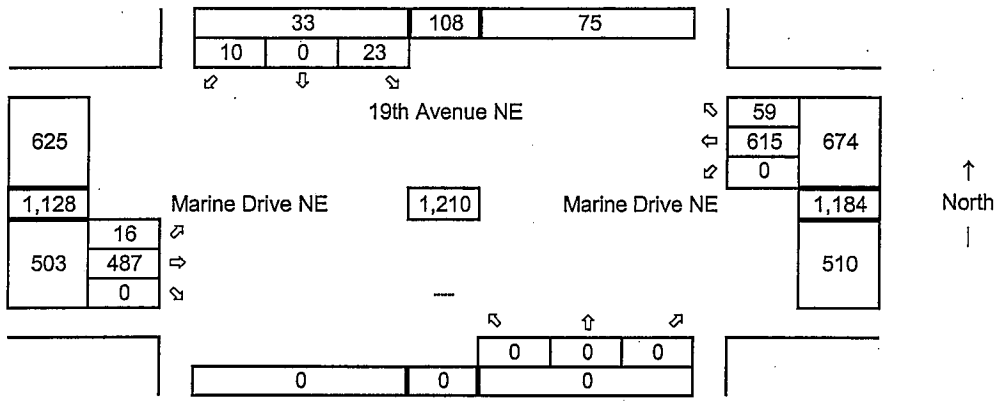
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 13
Existing
Average Weekday
PM Peak Hour

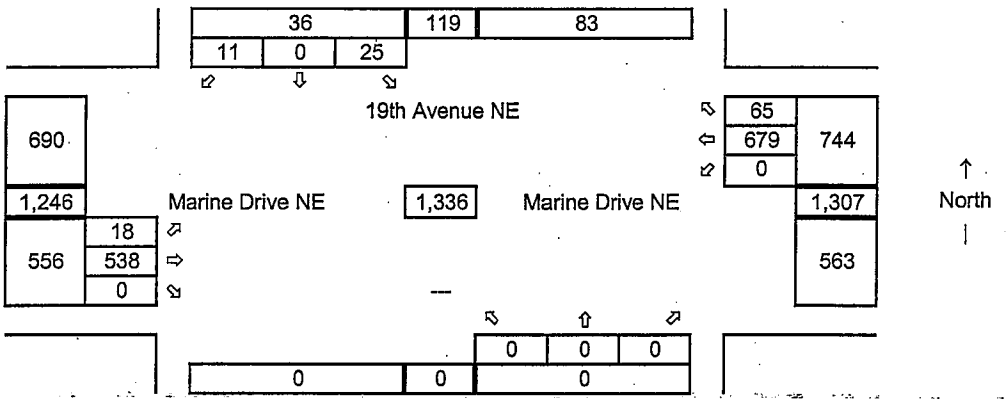
Date **4/3/2008**

Data Source: **TDG**

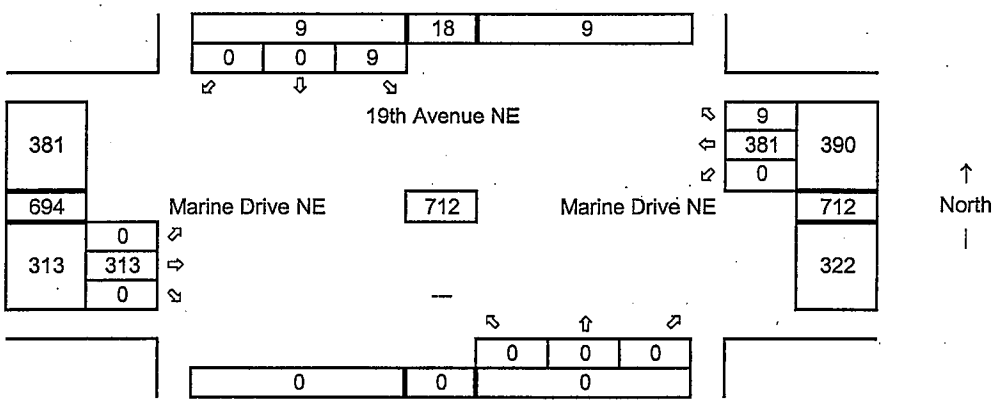


Growth-Factored Volumes
Average Weekday
PM Peak Hour

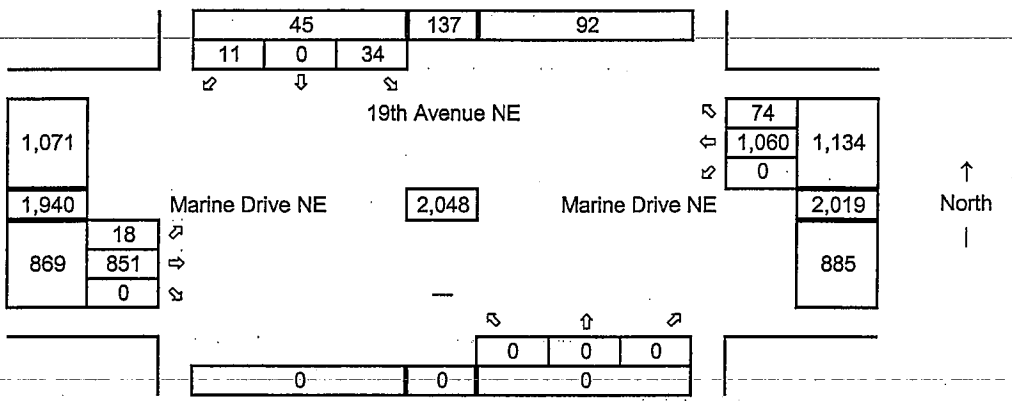
Year: 2018
Growth Rate = 1.0%
Years of Growth = 10
Total Growth = 1.1046



Pipeline Trips
Average Weekday
PM Peak Hour



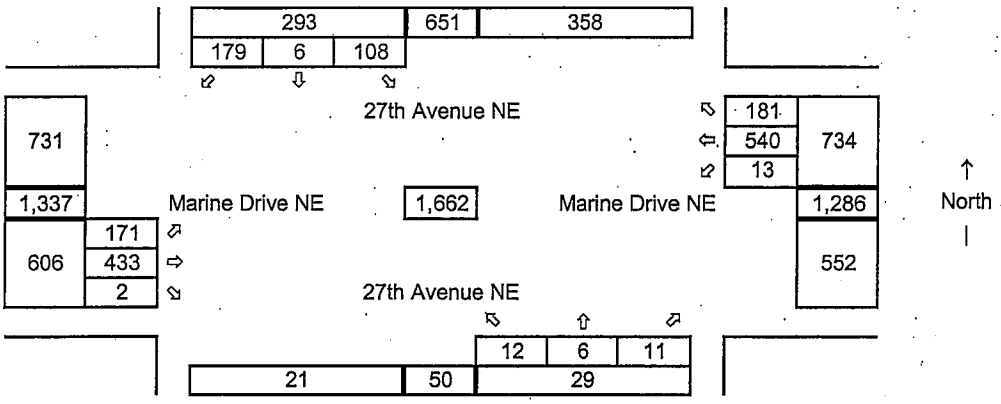
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 14
Existing
Average Weekday
PM Peak Hour

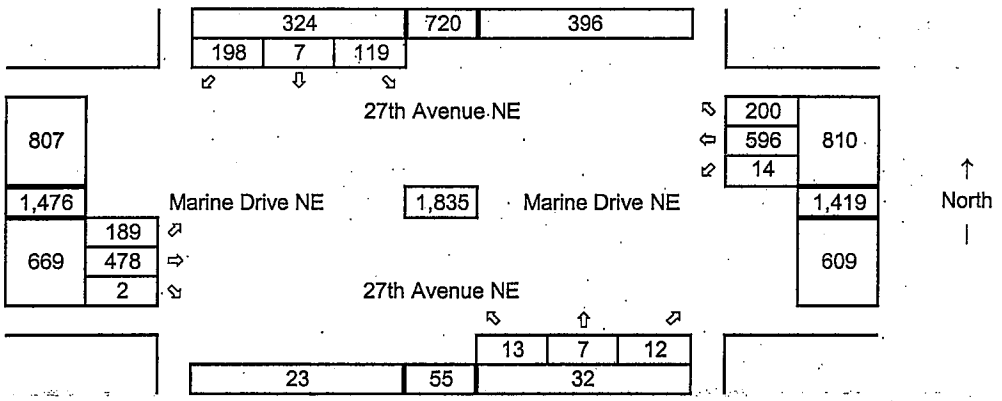
Date **4/3/2008**

Data Source: **TDG**

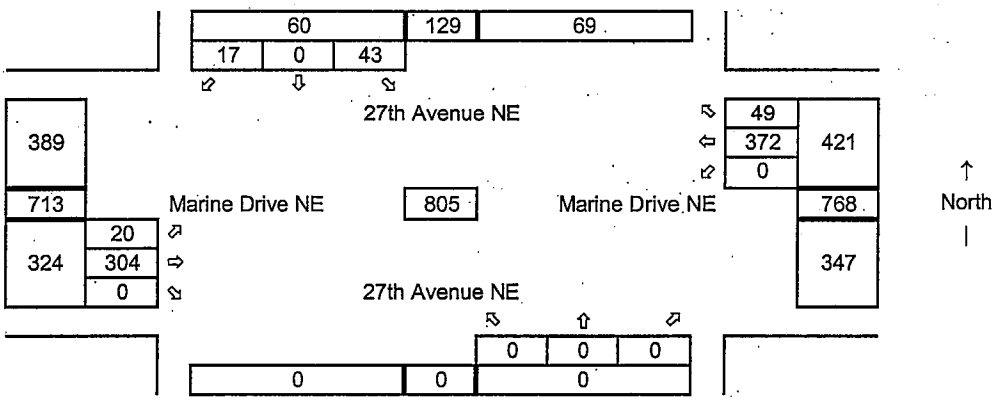


Growth-Factored Volumes
Average Weekday
PM Peak Hour

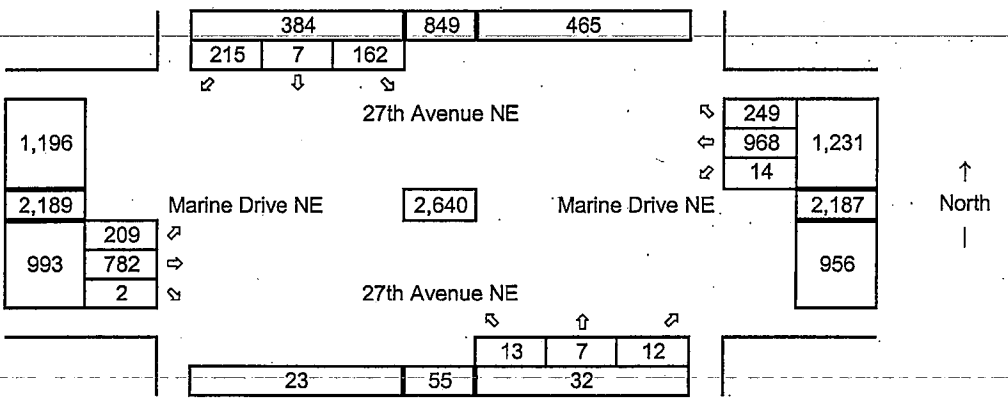
Year: 2018
Growth Rate = 1.0%
Years of Growth = 10
Total Growth = 1.1046



Pipeline Trips
Average Weekday
PM Peak Hour



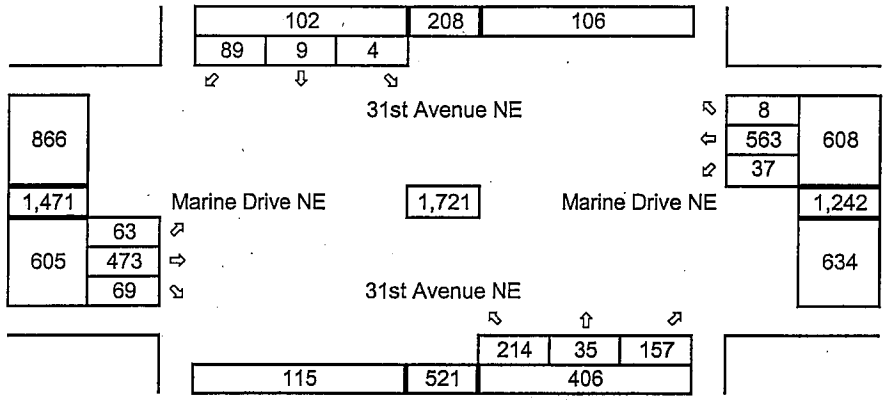
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 15
Existing
Average Weekday
PM Peak Hour

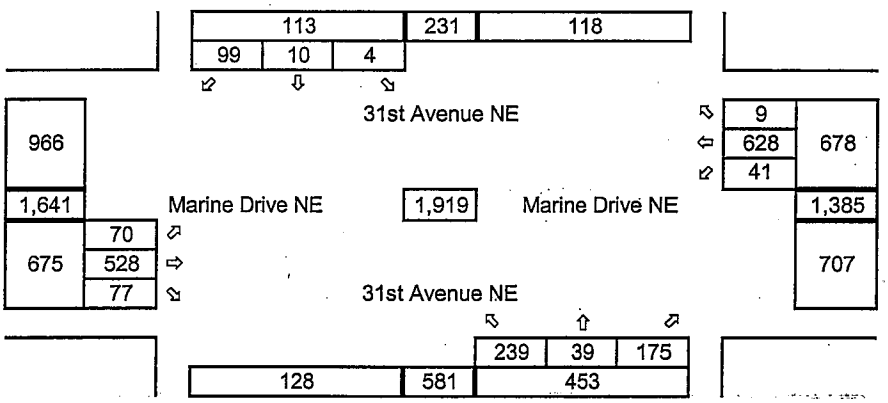
Date **1/24/2007**

Data Source: **Sno Co**

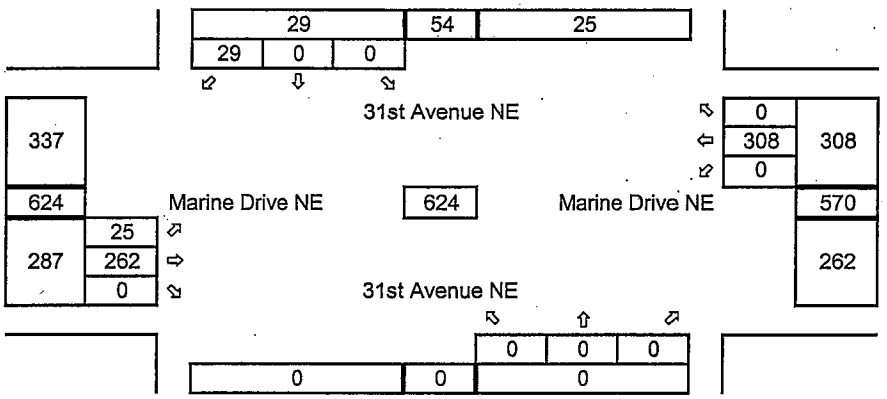


Growth-Factored Volumes
Average Weekday
PM Peak Hour

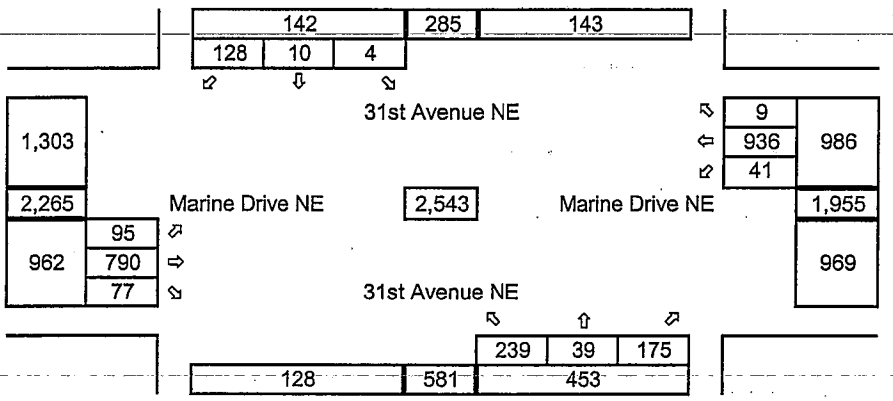
Year: 2018
Growth Rate = 1.0%
Years of Growth = 11
Total Growth = 1.1157



Pipeline Trips
Average Weekday
PM Peak Hour



Future Trips
Average Weekday
PM Peak Hour

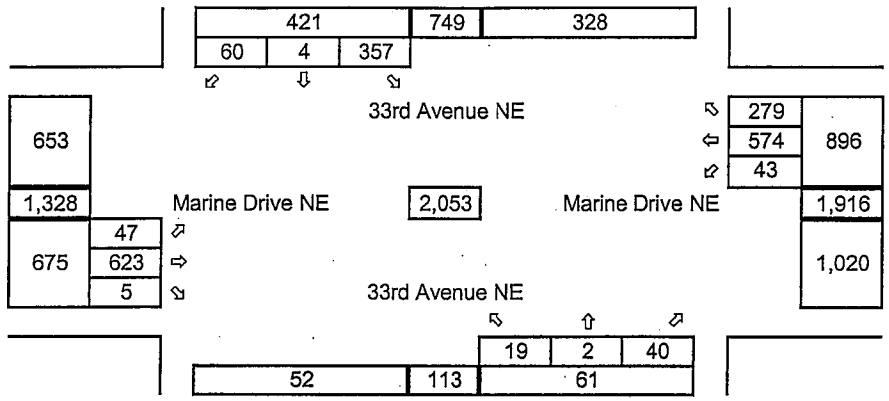


Synchro ID: 16

Existing
Average Weekday
PM Peak Hour

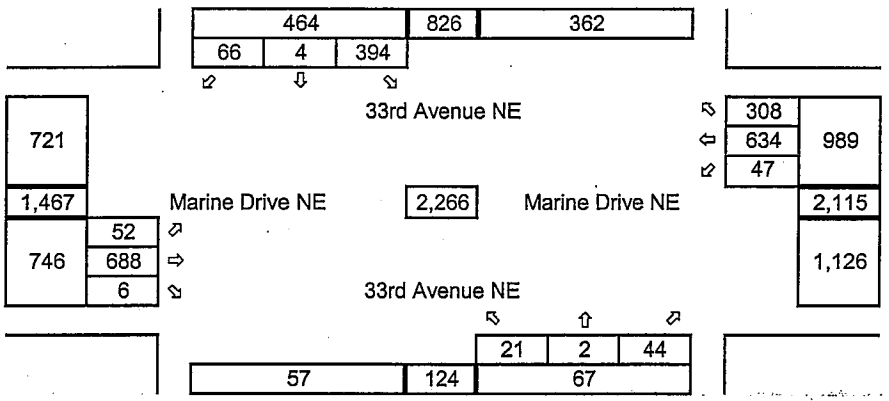
Date **4/8/2008**

Data Source: **TDG**

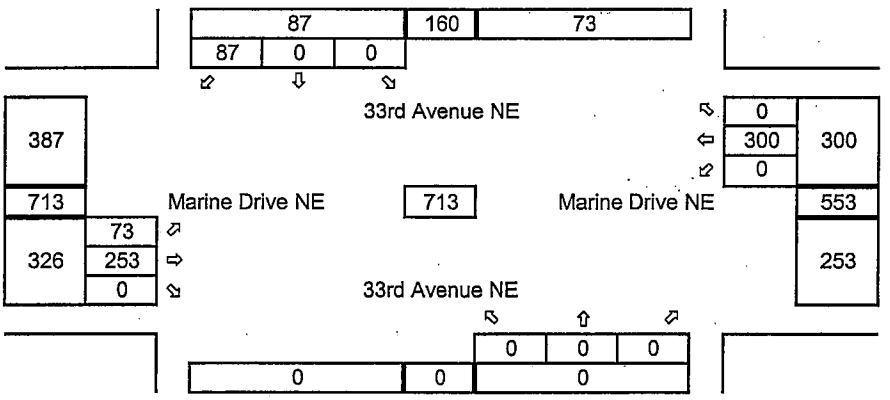


Growth-Factored Volumes
Average Weekday
PM Peak Hour

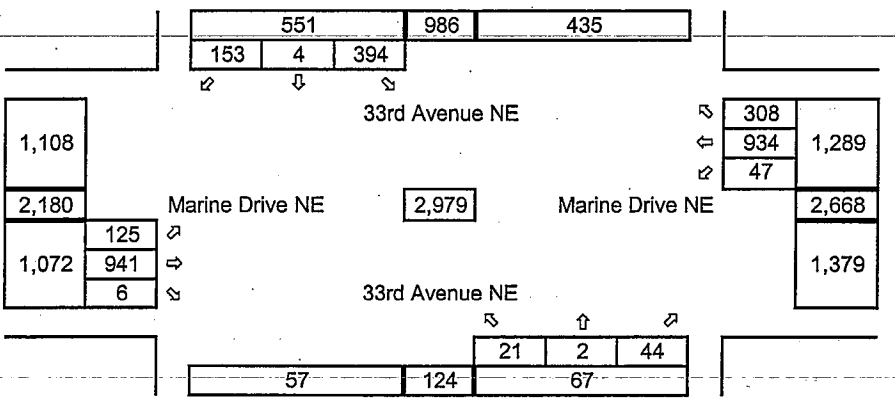
Year: 2018
Growth Rate = 1.0%
Years of Growth = 10
Total Growth = 1.1046



Pipeline Trips
Average Weekday
PM Peak Hour



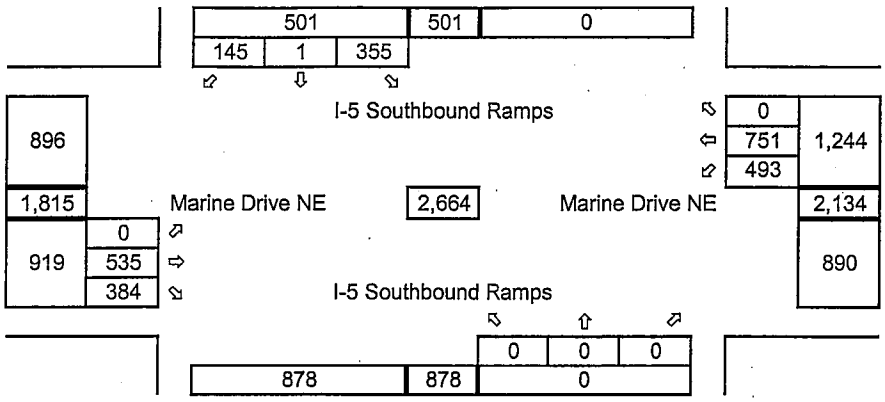
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 17
Existing
Average Weekday
PM Peak Hour

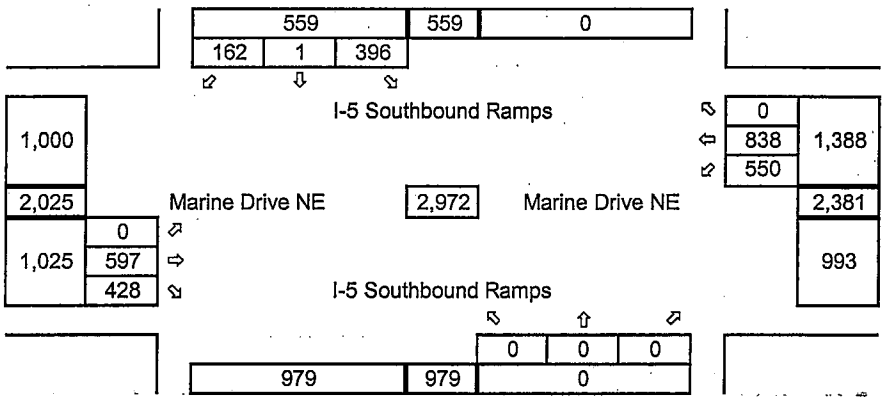
Date **2/27/2007**

Data Source: **WSDOT**

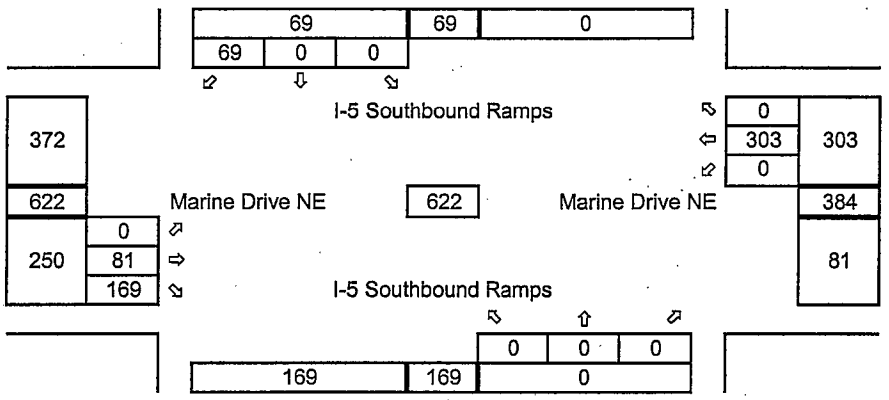


Growth-Factored Volumes
Average Weekday
PM Peak Hour

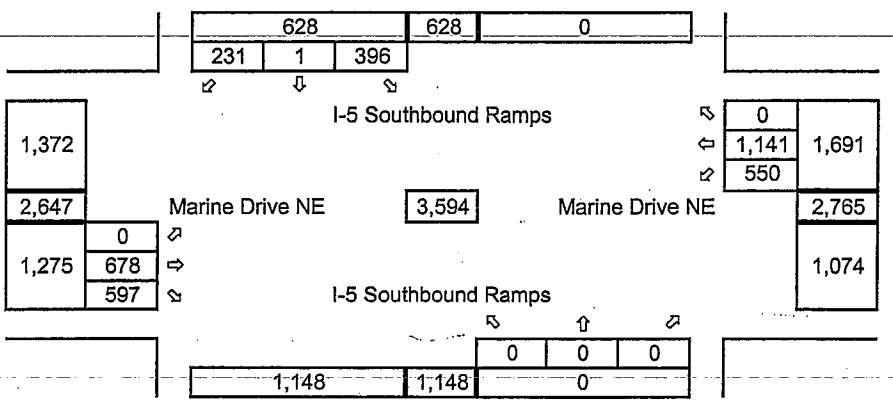
Year: 2018
Growth Rate = 1.0%
Years of Growth = 11
Total Growth = 1.1157



Pipeline Trips
Average Weekday
PM Peak Hour



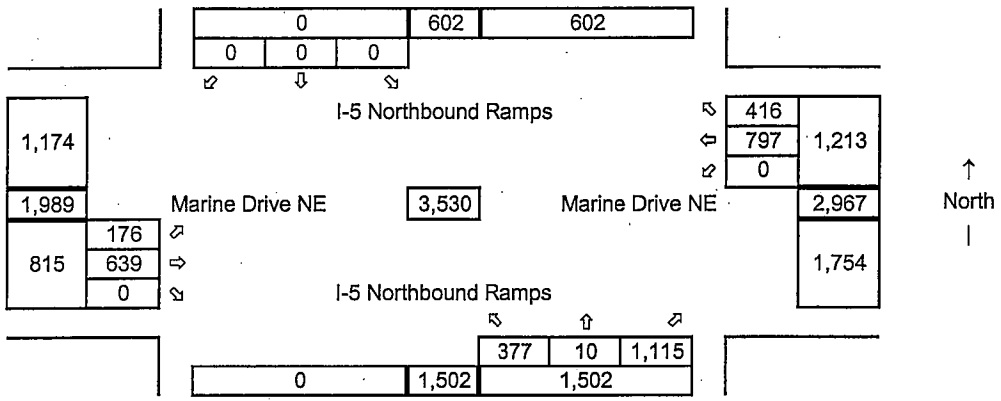
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 18
Existing
Average Weekday
PM Peak Hour

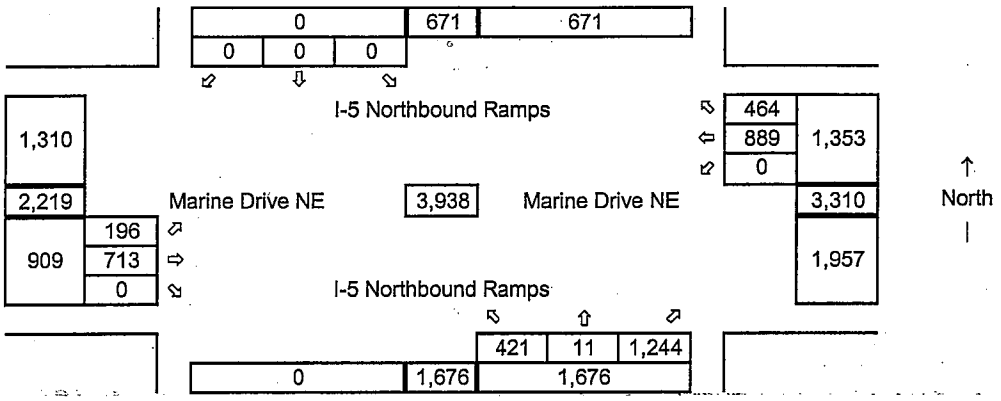
Date **3/6/2007**

Data Source: **WSDOT**

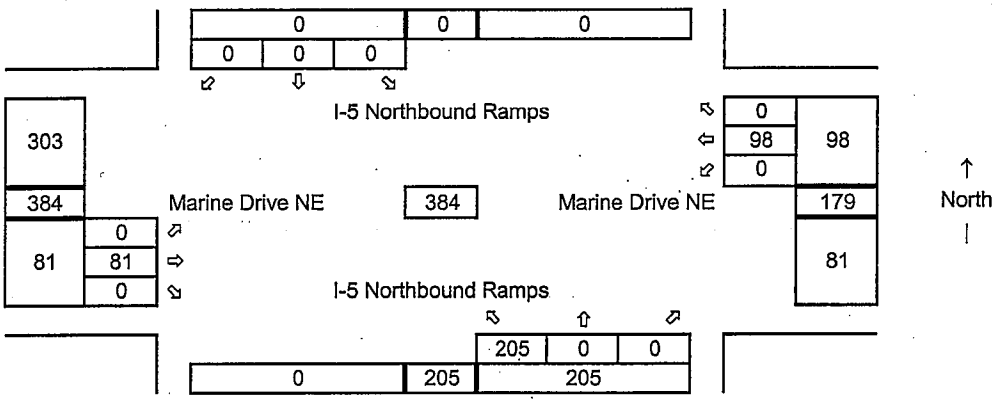


Growth-Factored Volumes
Average Weekday
PM Peak Hour

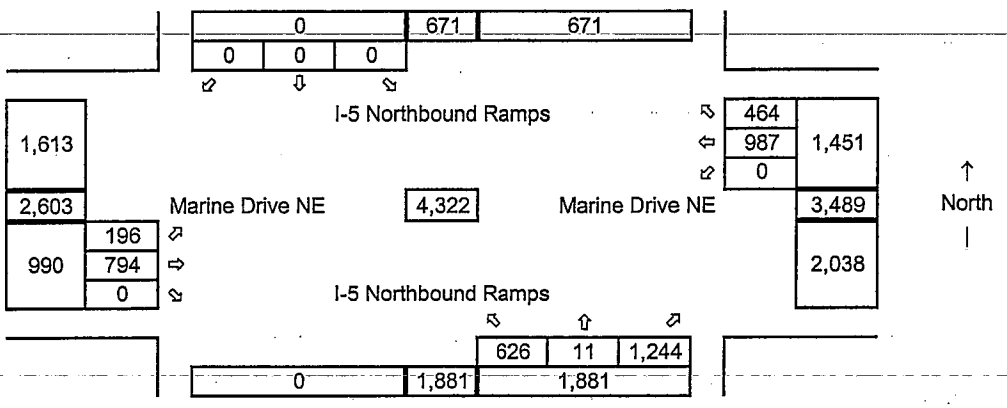
Year: 2018
Growth Rate = 1.0%
Years of Growth = 11
Total Growth = 1.1157



Pipeline Trips
Average Weekday
PM Peak Hour



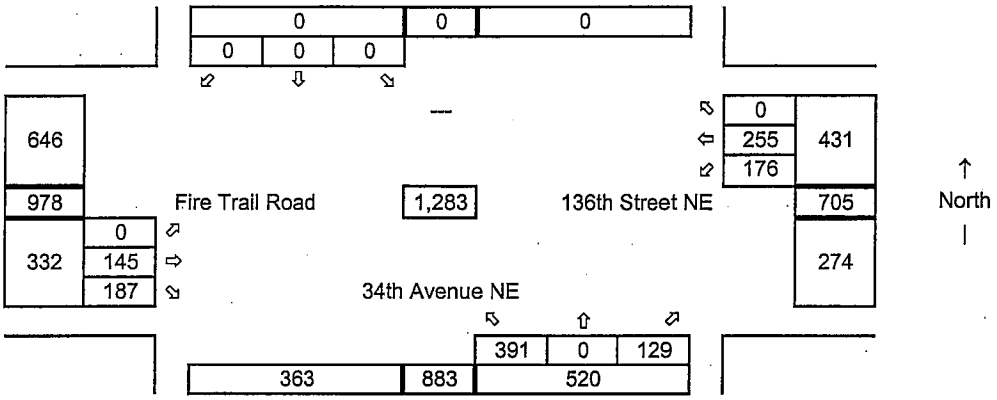
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 19
Existing
Average Weekday
PM Peak Hour

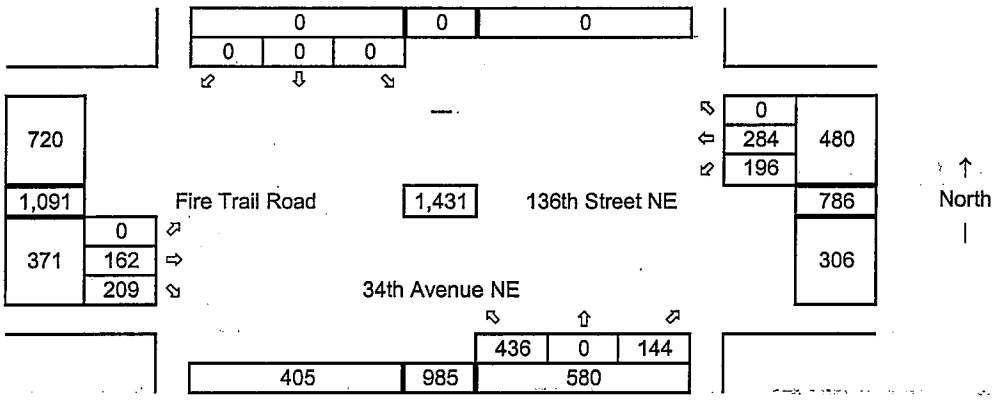
Date **7/17/2007**

Data Source: **ATD**

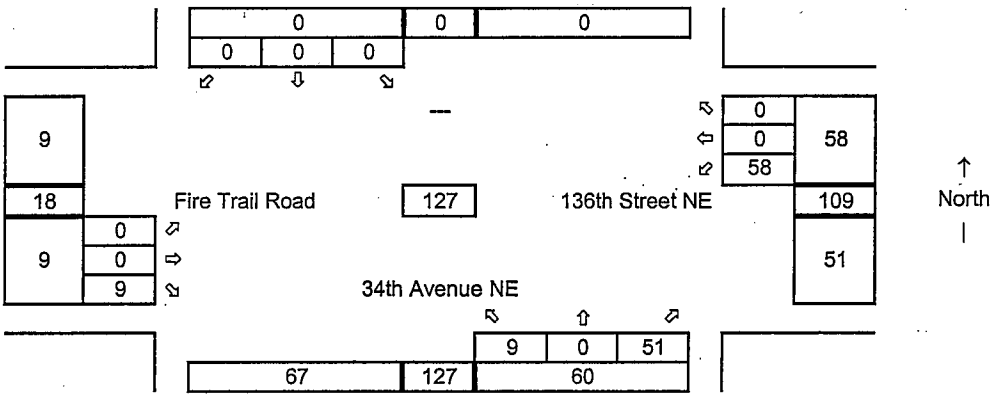


Growth-Factored Volumes
Average Weekday
PM Peak Hour

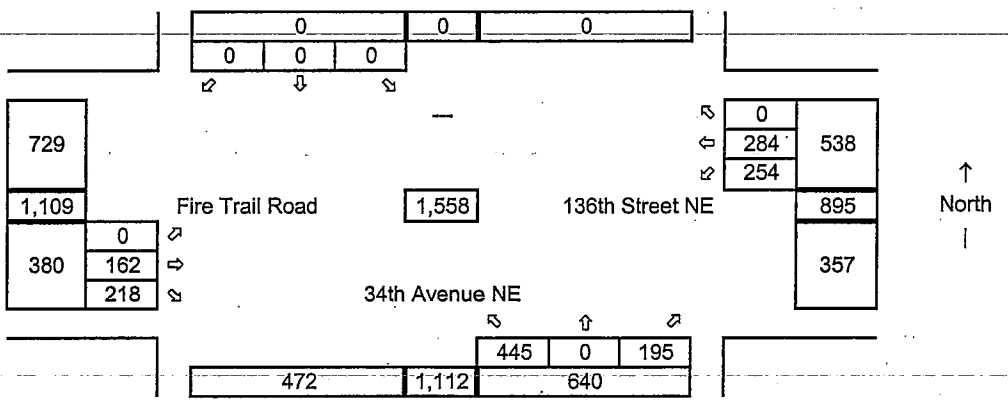
Year: 2018
Growth Rate = 1.0%
Years of Growth = 11
Total Growth = 1.1157



Pipeline Trips
Average Weekday
PM Peak Hour



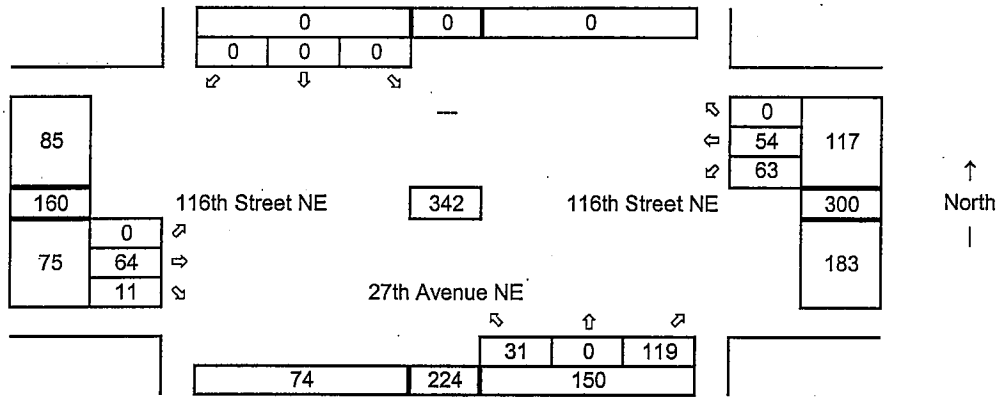
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 1
Existing
Average Weekday
PM Peak Hour

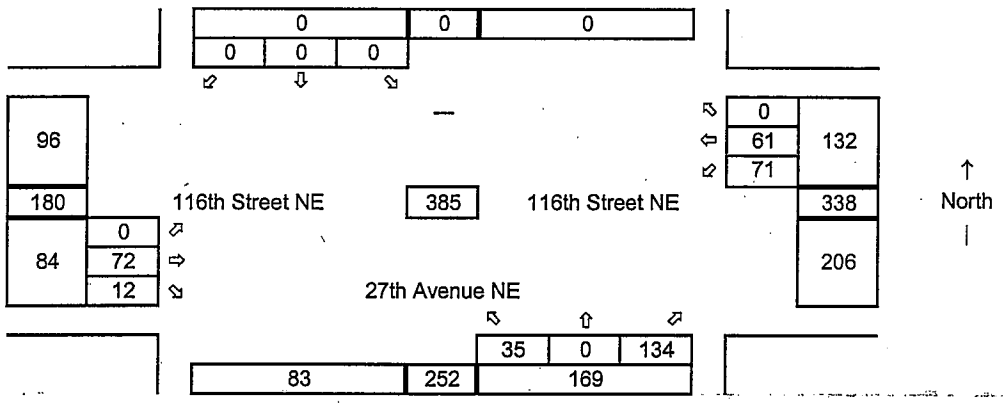
Date 8/3/2006

Data Source: **TDG**

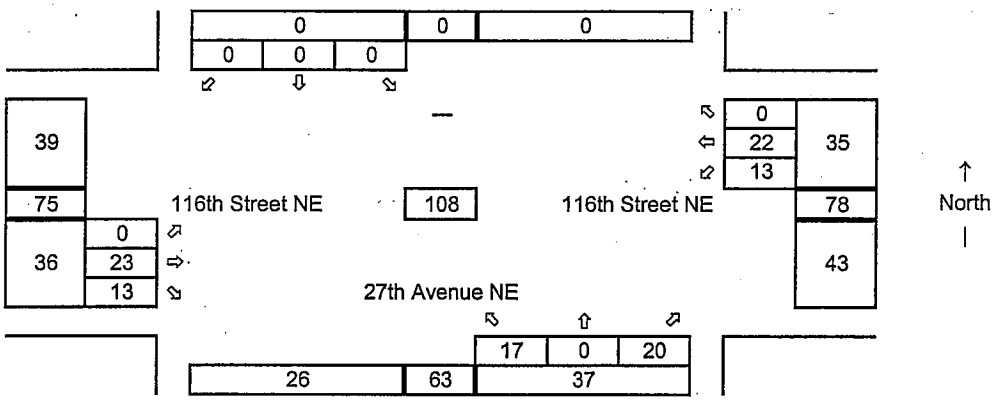


Growth-Factored Volumes
Average Weekday
PM Peak Hour

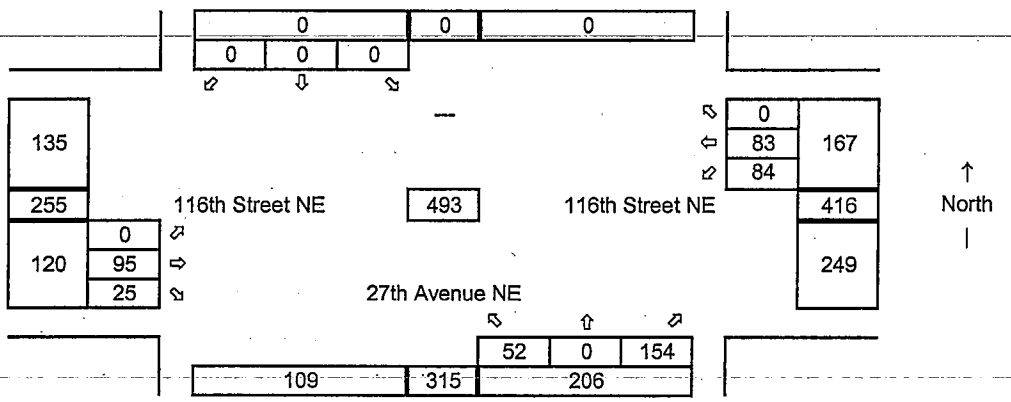
Year: 2018
Growth Rate = 1.0%
Years of Growth = 12
Total Growth = 1.1268



Pipeline Trips
Average Weekday
PM Peak Hour



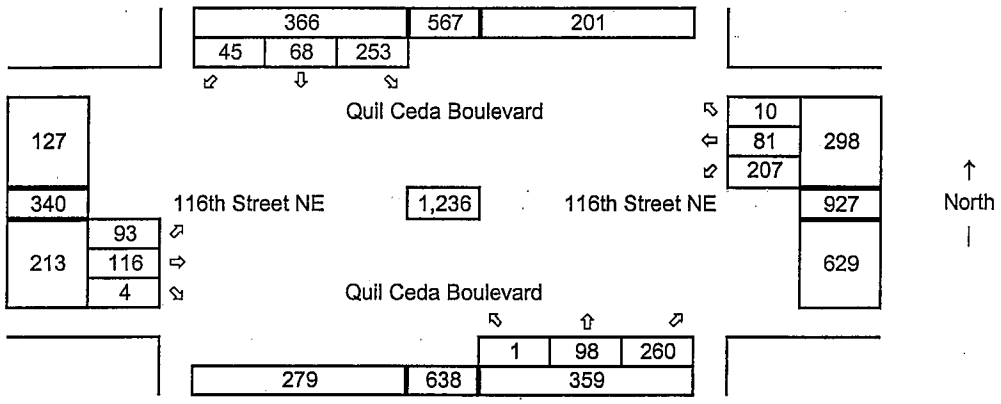
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 2
Existing
Average Weekday
PM Peak Hour

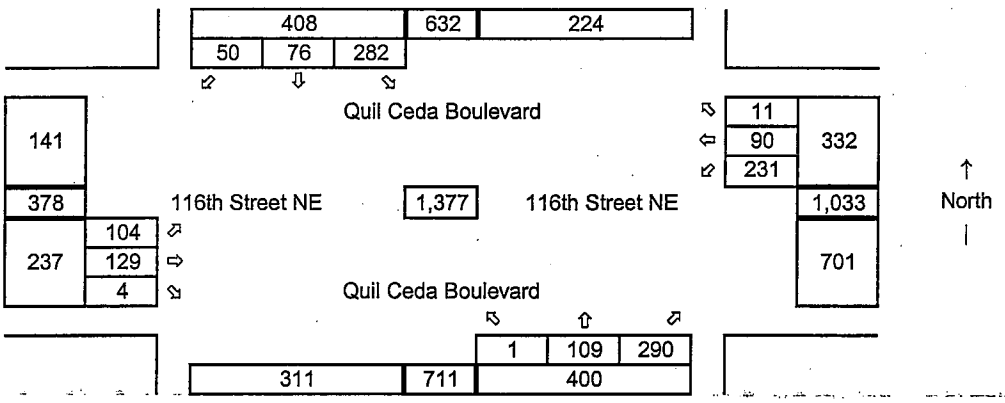
Date **5/30/2007**

Data Source: **TDG**

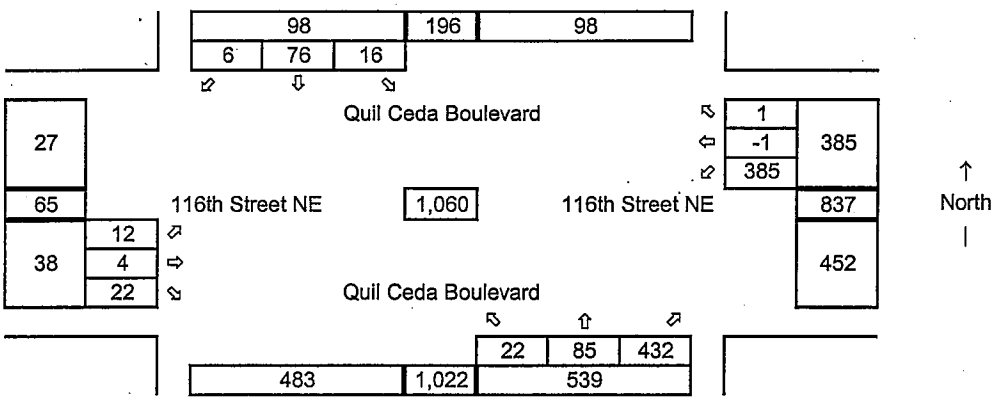


Growth-Factored Volumes
Average Weekday
PM Peak Hour

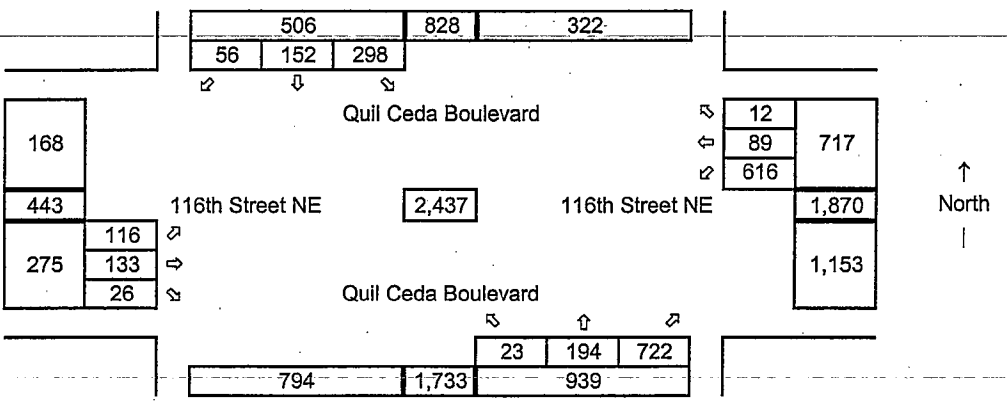
Year: 2018
Growth Rate = 1.0%
Years of Growth = 11
Total Growth = 1.1157



Pipeline Trips
Average Weekday
PM Peak Hour



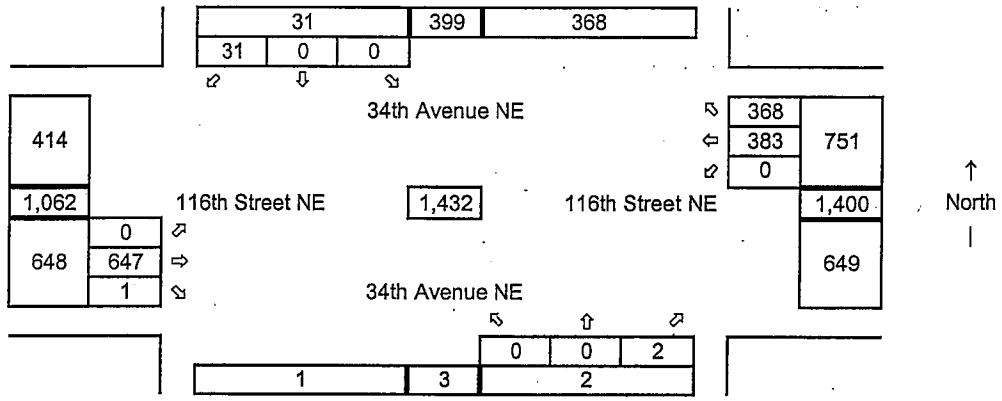
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 3
Existing
Average Weekday
PM Peak Hour

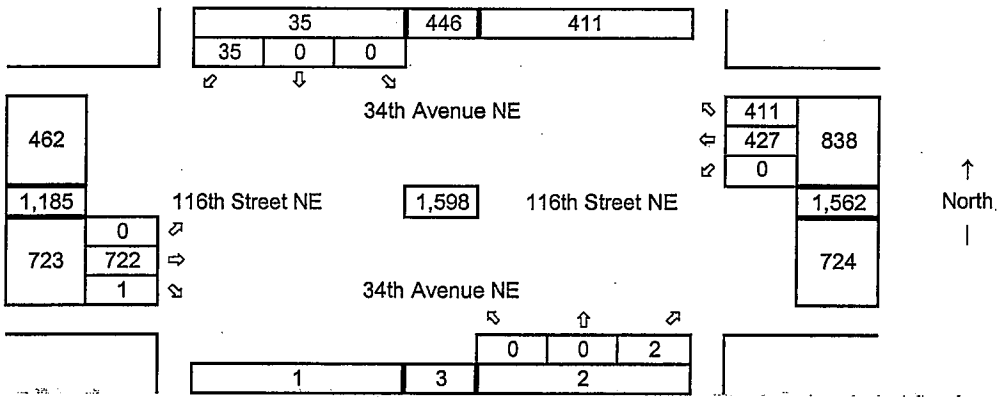
Date **5/30/2007**

Data Source: **TDG**

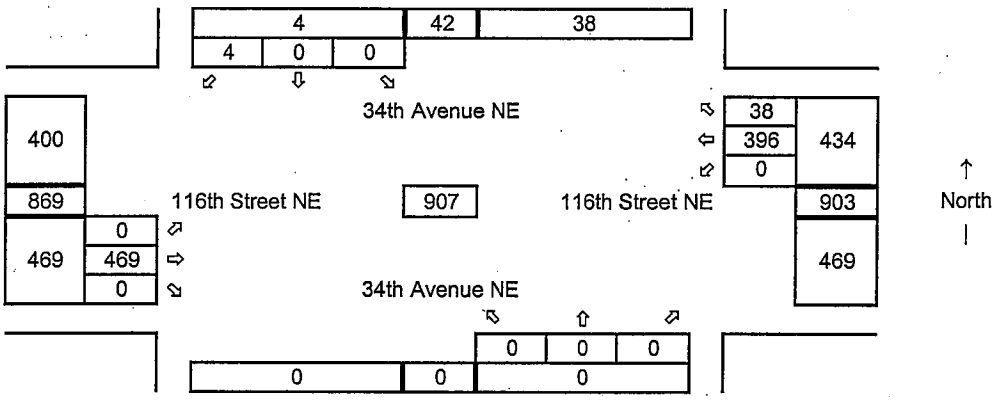


Growth-Factored Volumes
Average Weekday
PM Peak Hour

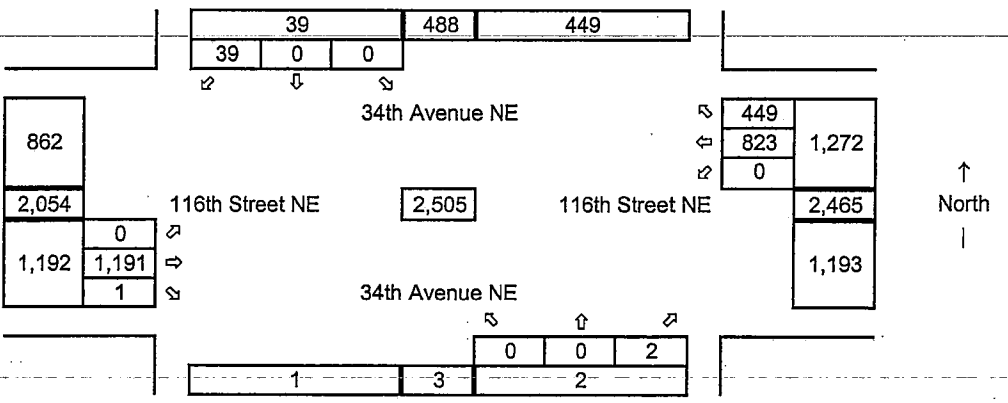
Year: 2018
Growth Rate = 1.0%
Years of Growth = 11
Total Growth = 1.1157



Pipeline Trips
Average Weekday
PM Peak Hour



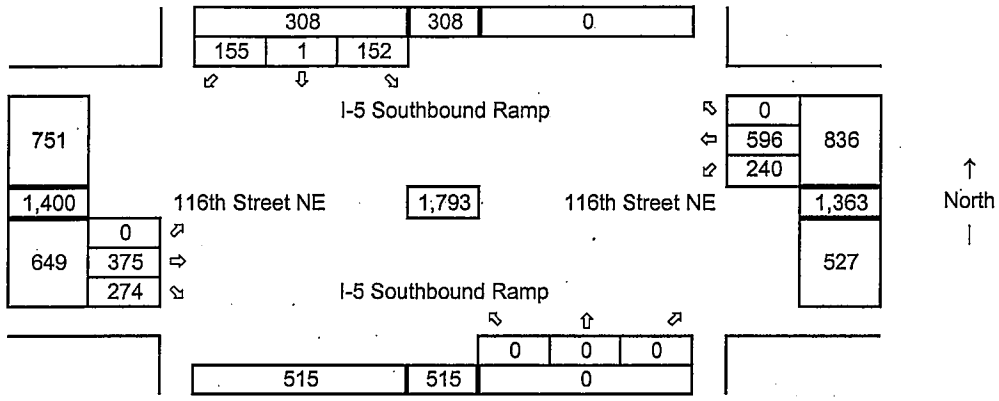
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 4
Existing
Average Weekday
PM Peak Hour

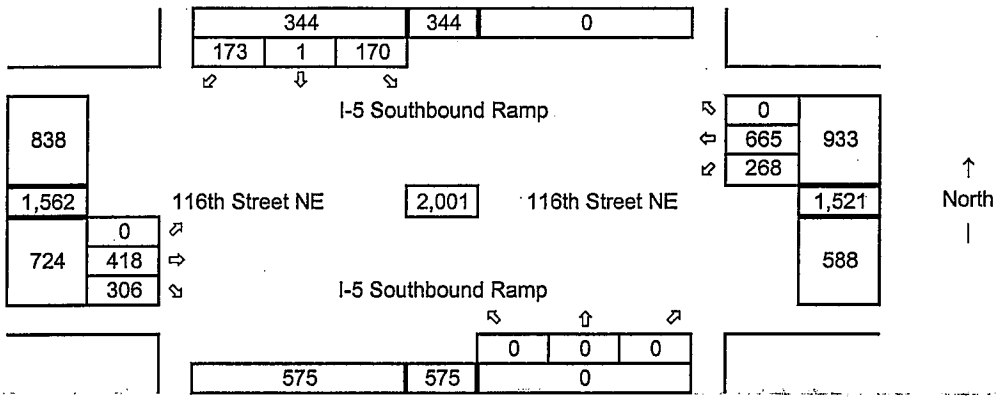
Date **5/30/2007**

Data Source: **TDG**

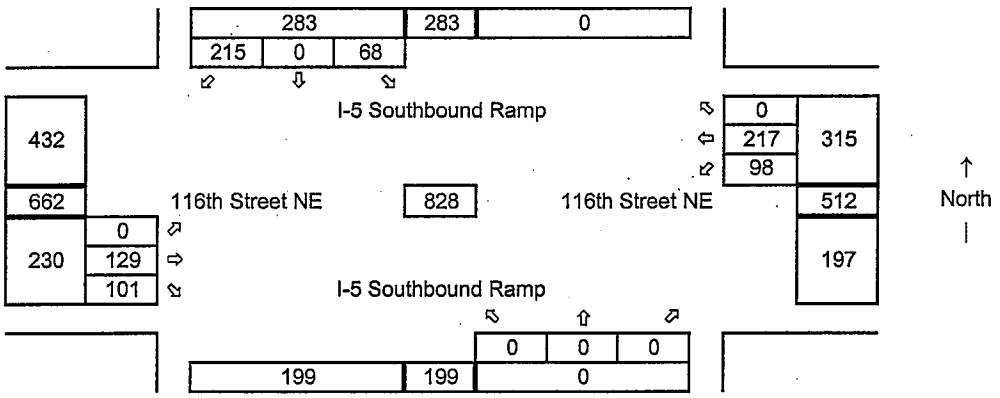


Growth-Factored Volumes
Average Weekday
PM Peak Hour

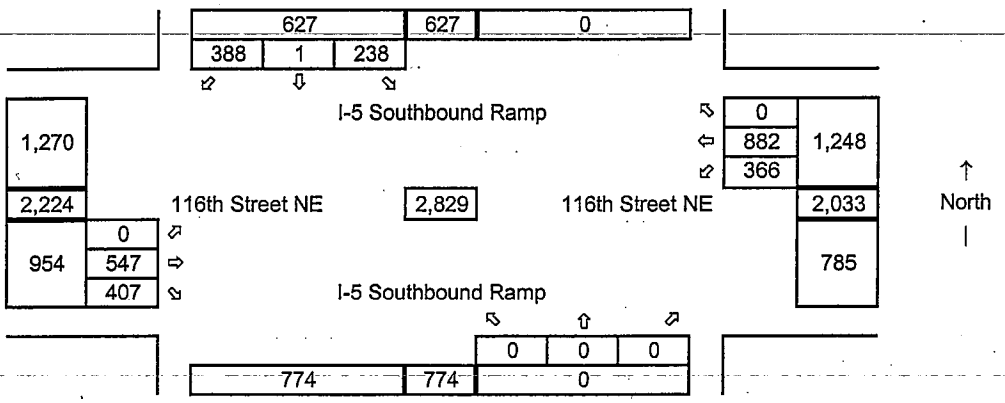
Year: 2018
Growth Rate = 1.0%
Years of Growth = 11
Total Growth = 1.1157



Pipeline Trips
Average Weekday
PM Peak Hour



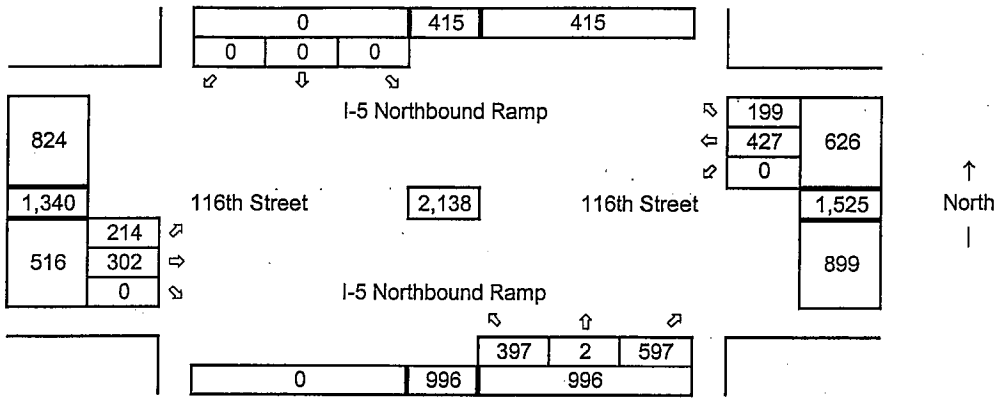
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 5
Existing
Average Weekday
PM Peak Hour

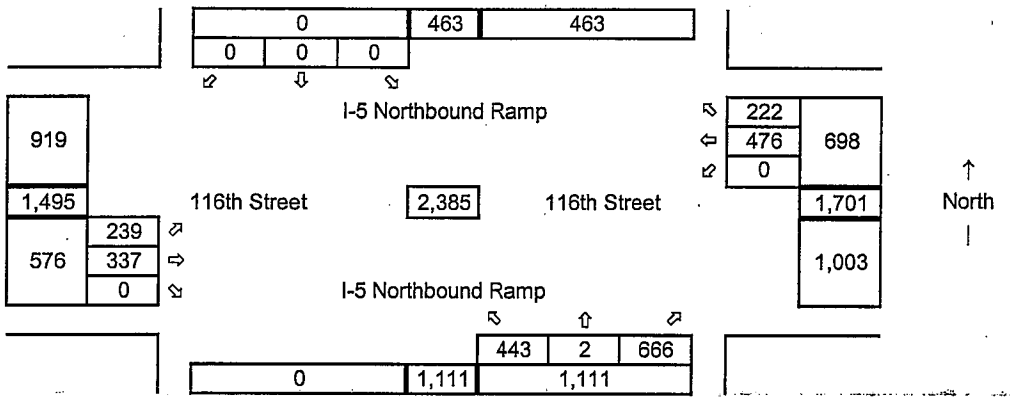
Date **5/30/2007**

Data Source: **TDG**

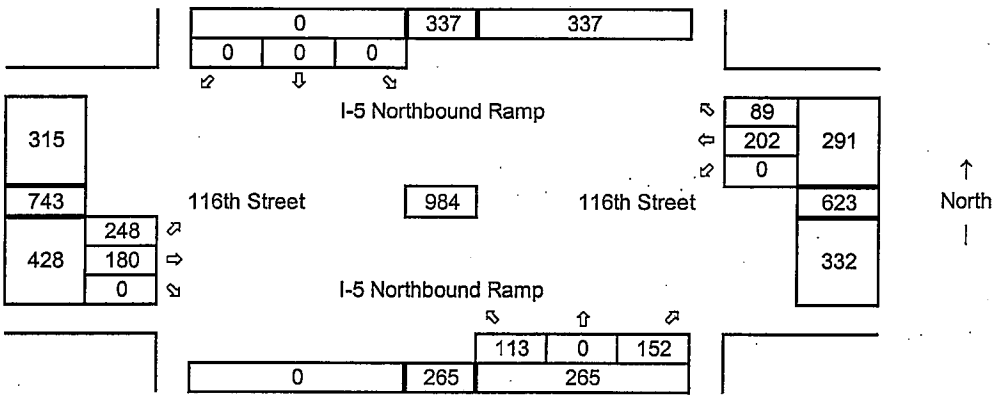


Growth-Factored Volumes
Average Weekday
PM Peak Hour

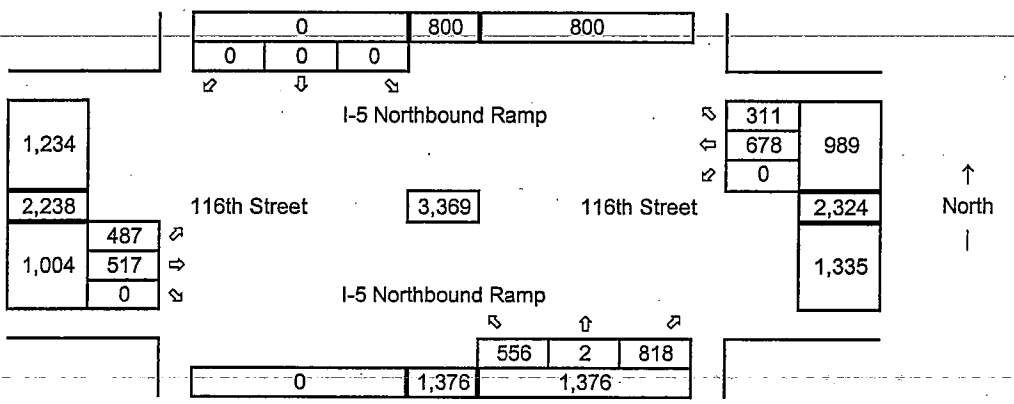
Year: 2018
Growth Rate = 1.0%
Years of Growth = 11
Total Growth = 1.1157



Pipeline Trips
Average Weekday
PM Peak Hour



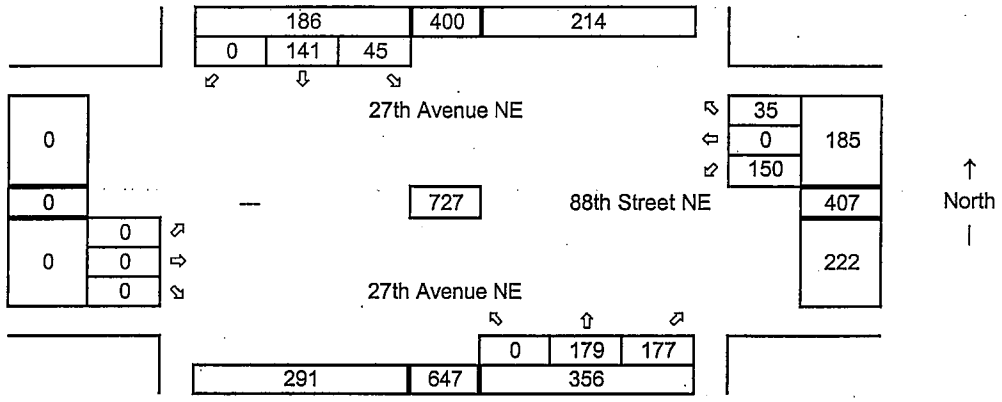
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 6
Existing
Average Weekday
PM Peak Hour

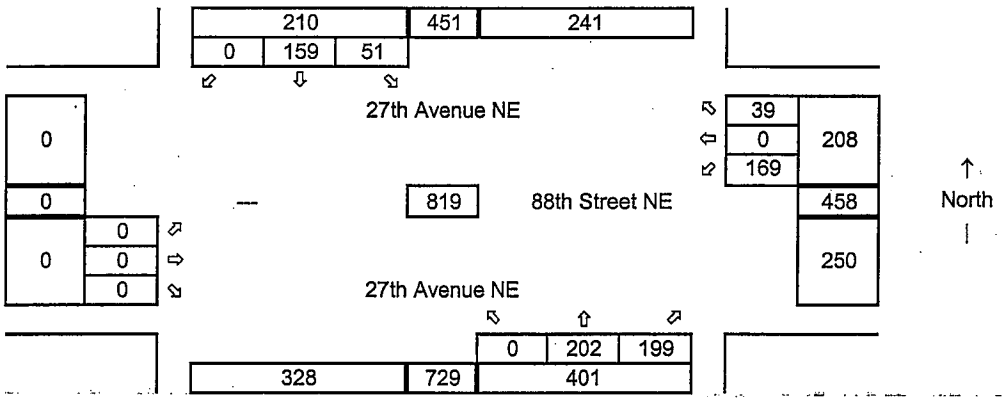
Date **8/3/2006**

Data Source: **TDG**

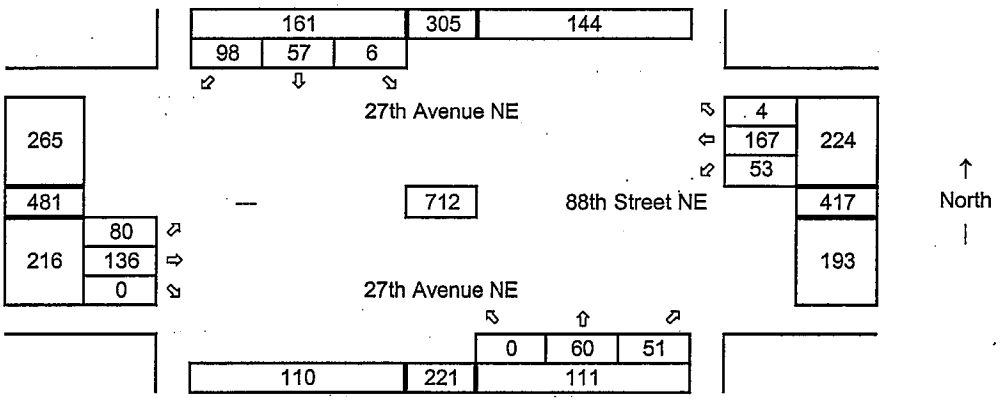


Growth-Factored Volumes
Average Weekday
PM Peak Hour

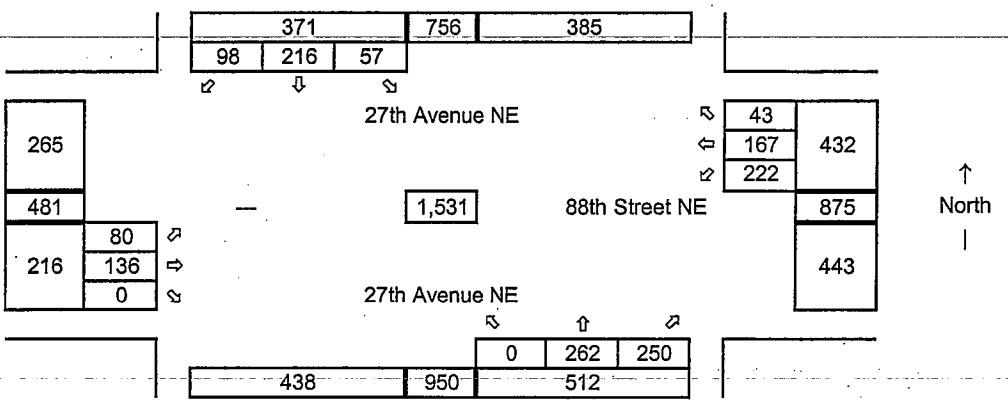
Year: 2018
Growth Rate = 1.0%
Years of Growth = 12
Total Growth = 1.1268



Pipeline Trips
Average Weekday
PM Peak Hour



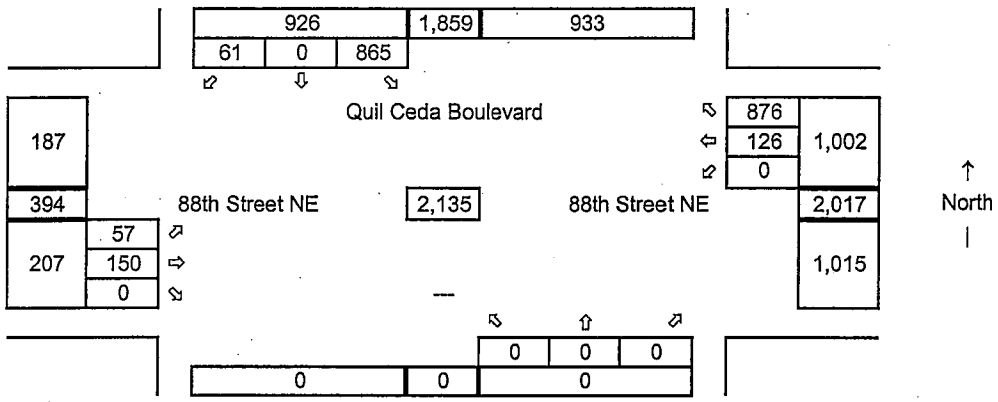
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 7
Existing
Average Weekday
PM Peak Hour

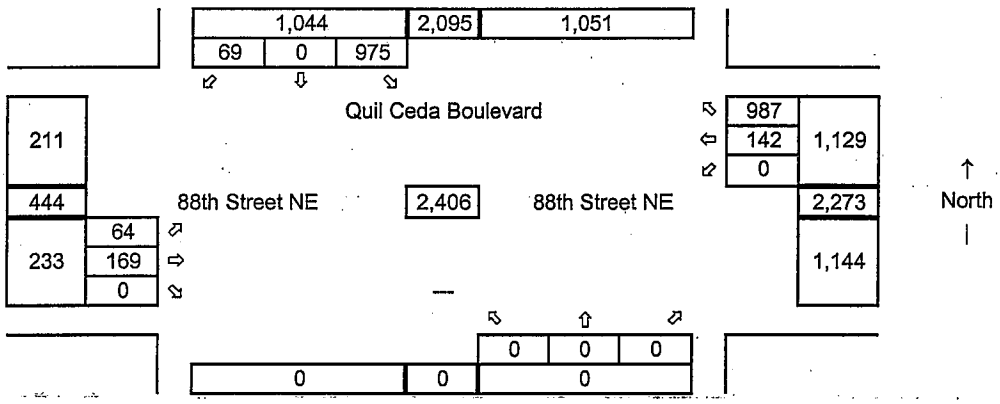
Date **3/30/2006**

Data Source: **TDG**

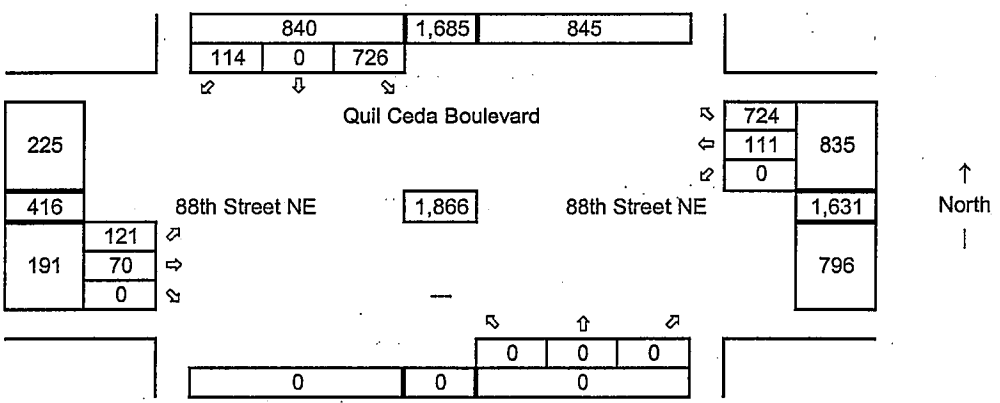


Growth-Factored Volumes
Average Weekday
PM Peak Hour

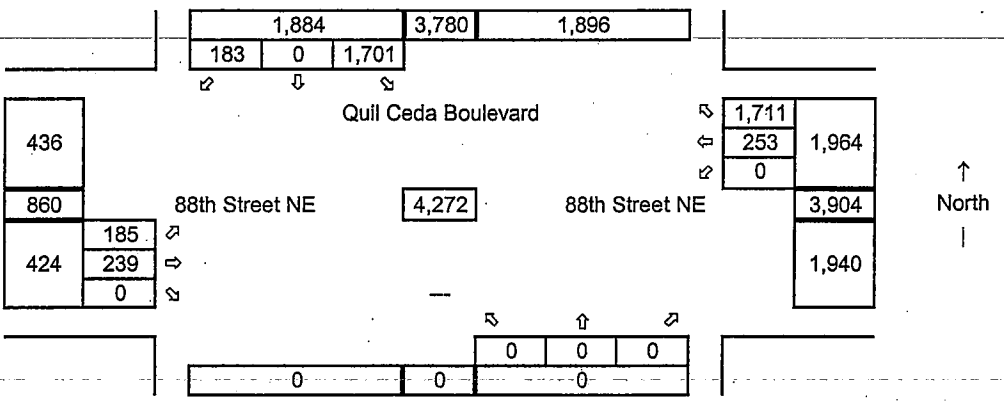
Year: 2018
Growth Rate = 1.0%
Years of Growth = 12
Total Growth = 1.1268



Pipeline Trips
Average Weekday
PM Peak Hour



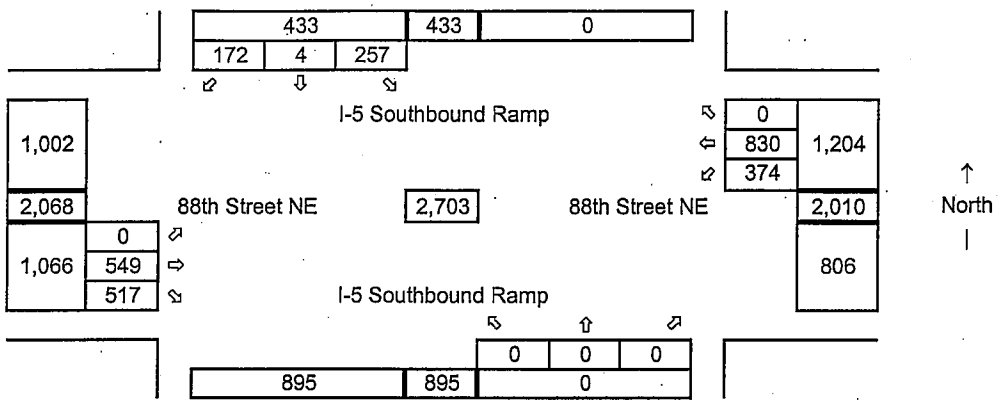
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 8
Existing
Average Weekday
PM Peak Hour

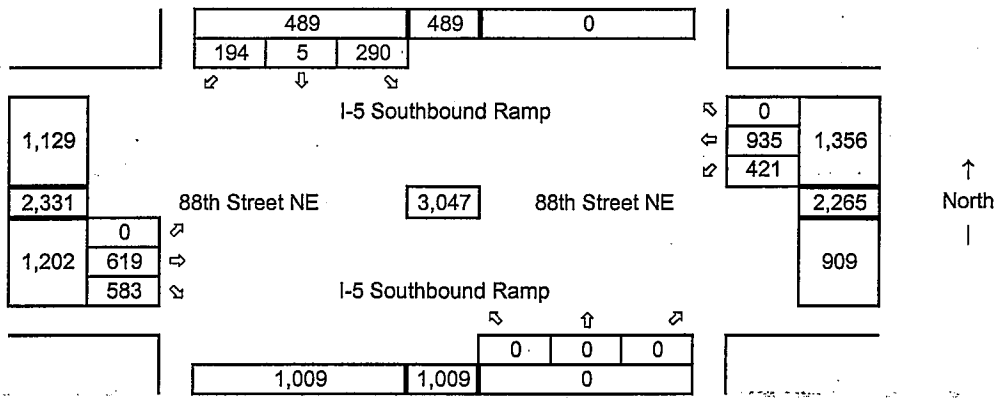
Date **3/14/2006**

Data Source: **WSDOT**

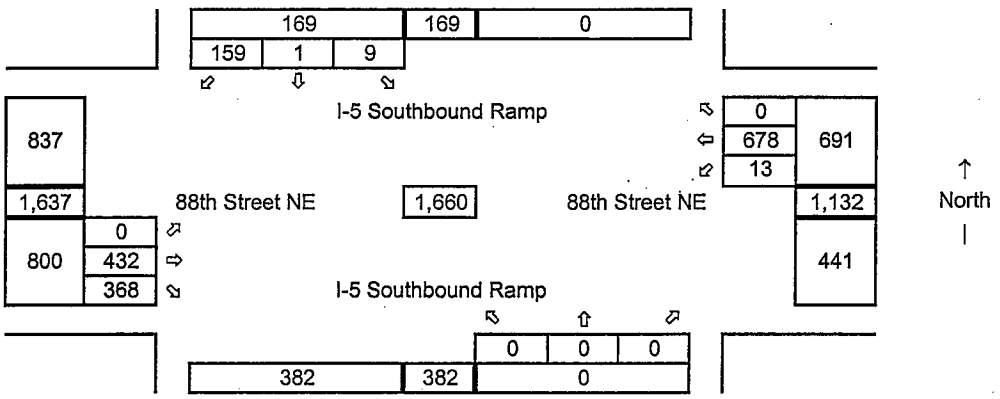


Growth-Factored Volumes
Average Weekday
PM Peak Hour

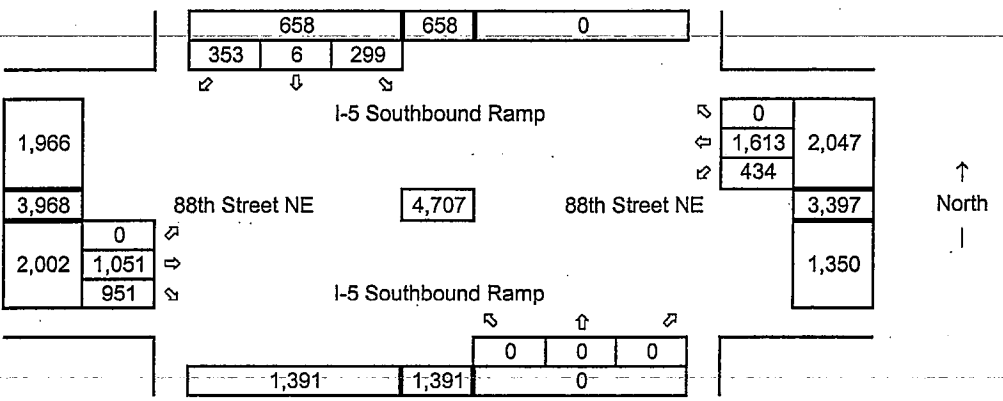
Year: 2018
Growth Rate = 1.0%
Years of Growth = 12
Total Growth = 1.1268



Pipeline Trips
Average Weekday
PM Peak Hour



Future Trips
Average Weekday
PM Peak Hour

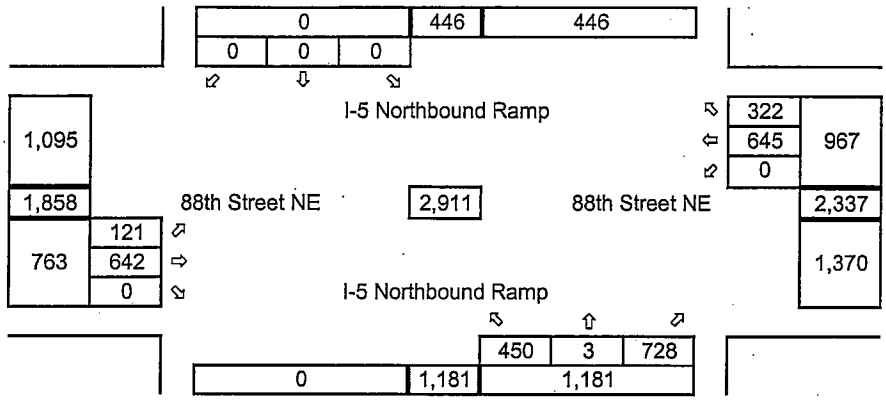


Synchro ID: 9

Existing
Average Weekday
PM Peak Hour

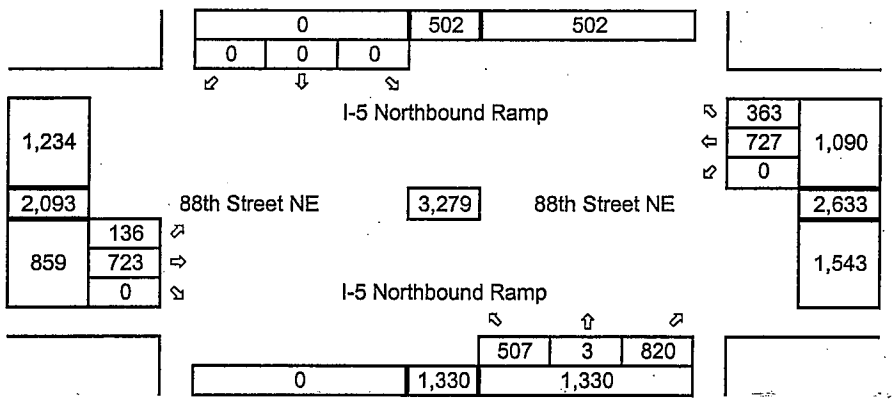
Date **3/14/2006**

Data Source: **WSDOT**

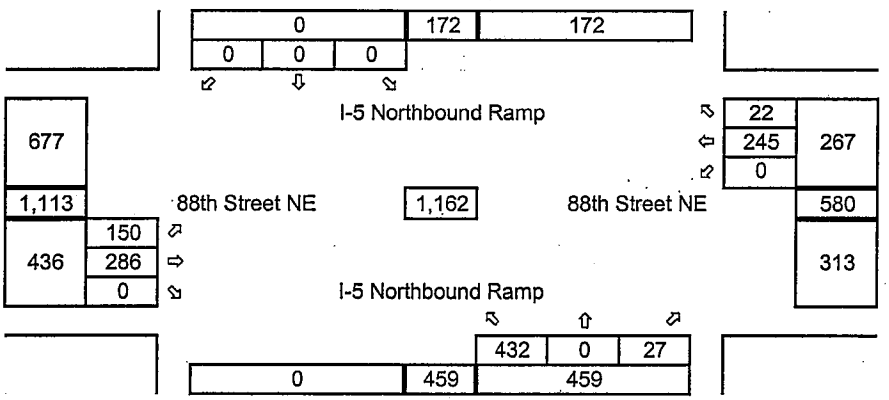


Growth-Factored Volumes
Average Weekday
PM Peak Hour

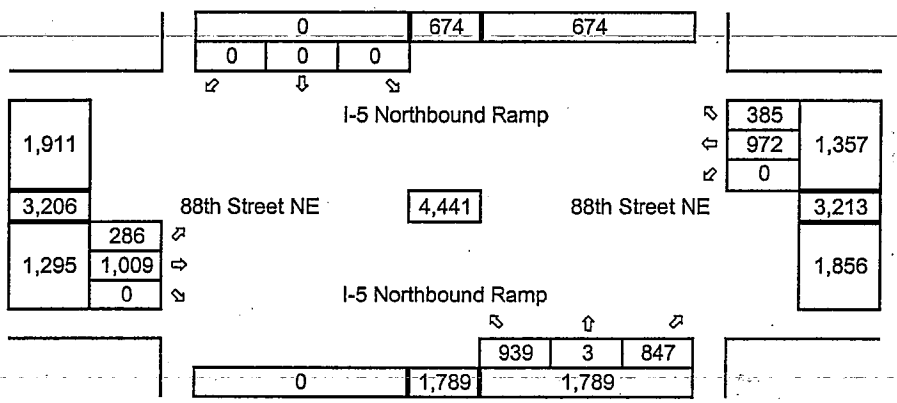
Year: 2018
Growth Rate = 1.0%
Years of Growth = 12
Total Growth = 1.1268



Pipeline Trips
Average Weekday
PM Peak Hour



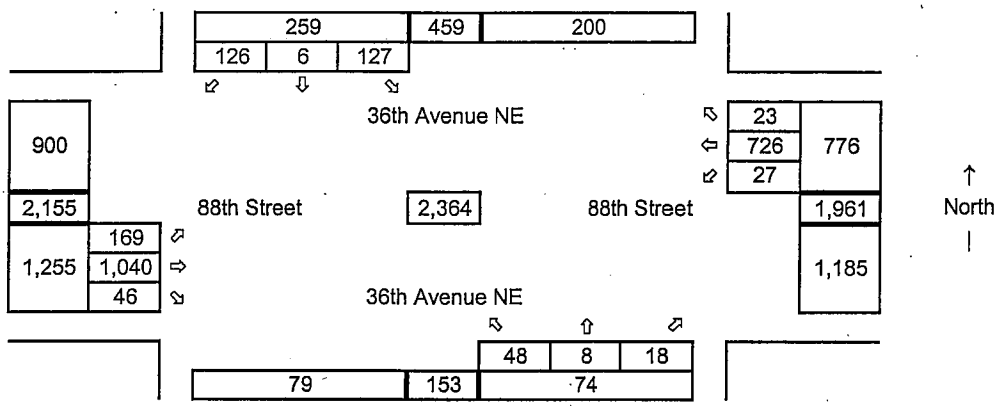
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 10
Existing
Average Weekday
PM Peak Hour

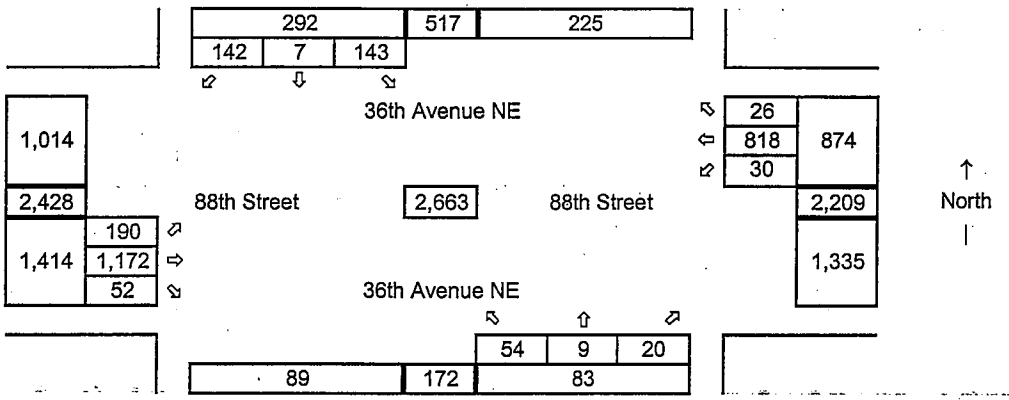
Date **8/3/2006**

Data Source: **TDG**

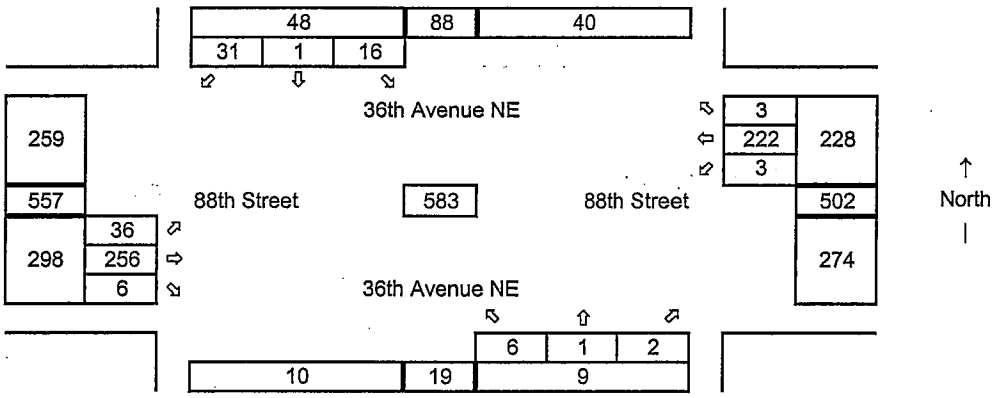


Growth-Factored Volumes
Average Weekday
PM Peak Hour

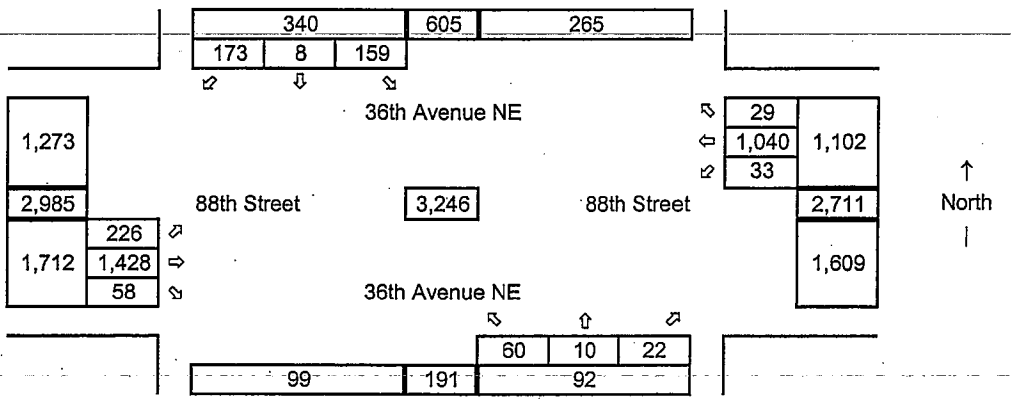
Year: 2018
Growth Rate = 1.0%
Years of Growth = 12
Total Growth = 1.1268



Pipeline Trips
Average Weekday
PM Peak Hour



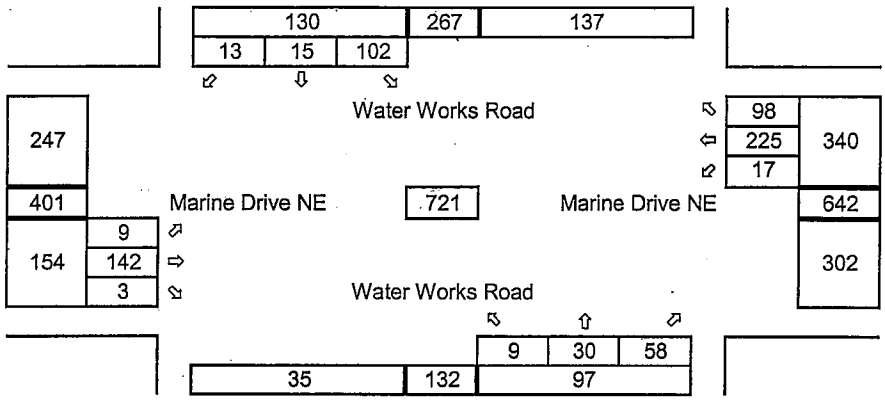
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 11
Existing
Average Weekday
PM Peak Hour

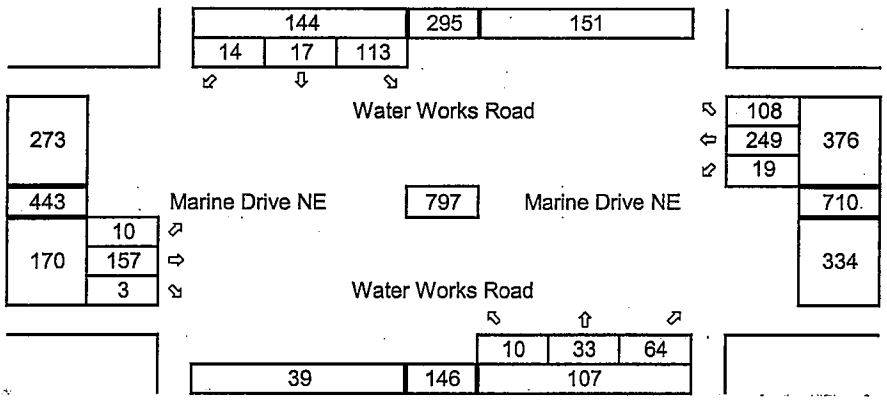
Date **4/10/2008**

Data Source: **TDG**

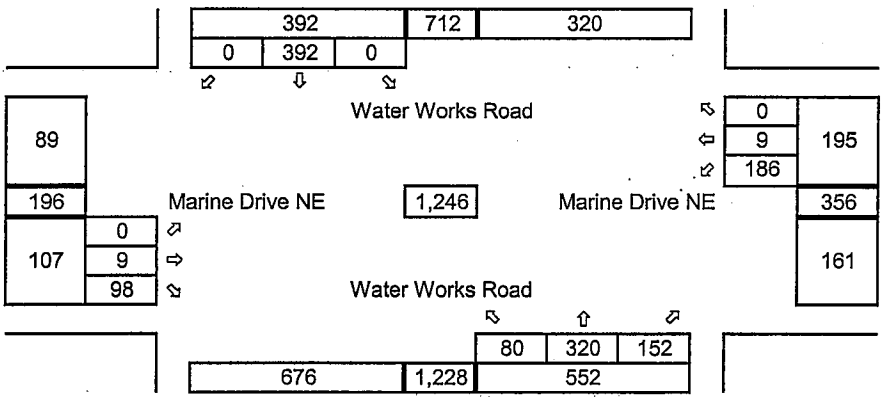


Growth-Factored Volumes
Average Weekday
PM Peak Hour

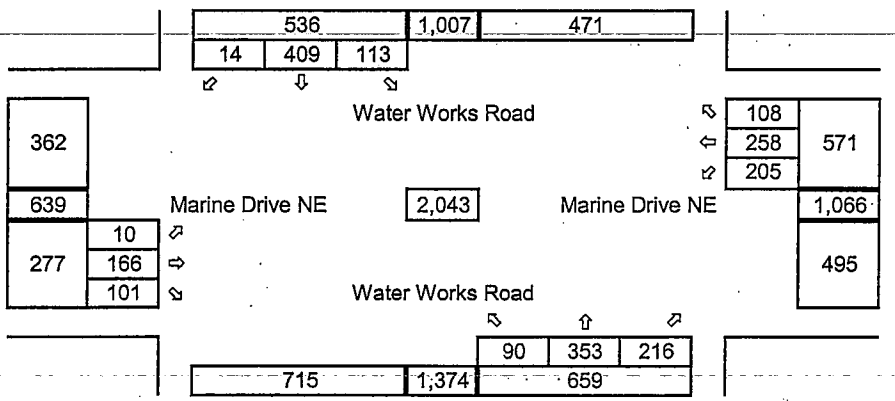
Year: 2018
Growth Rate = 1.0%
Years of Growth = 10
Total Growth = 1.1046



Pipeline Trips
Average Weekday
PM Peak Hour



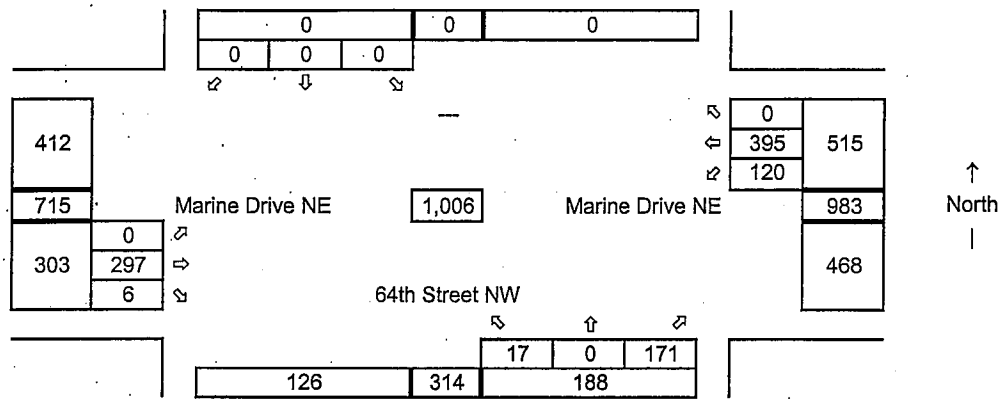
Future Trips
Average Weekday
PM Peak Hour



Synchro ID: 12
Existing
Average Weekday
PM Peak Hour

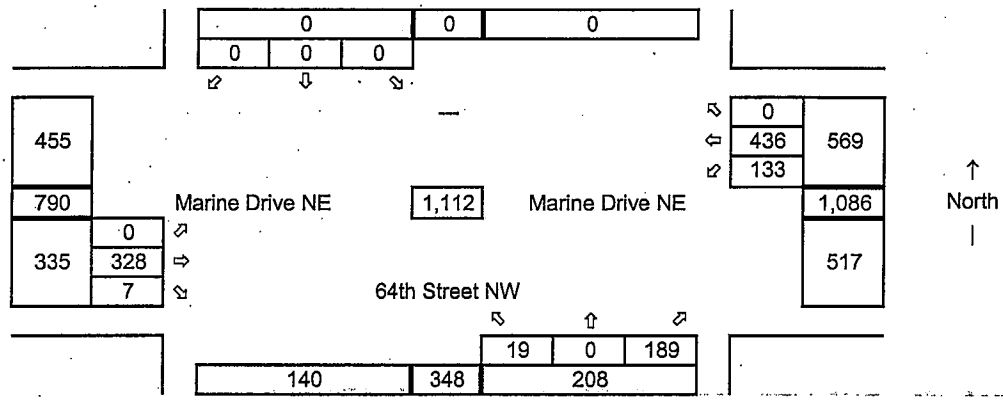
Date **5/29/2008**

Data Source: **TDG**

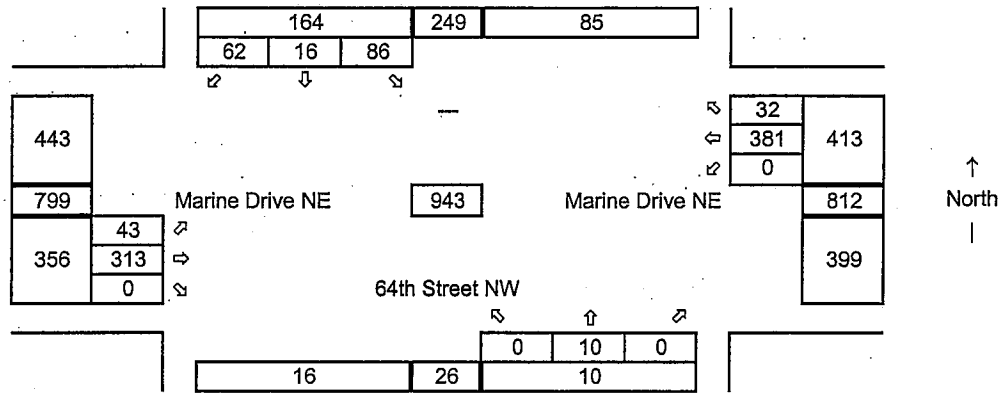


Growth-Factored Volumes
Average Weekday
PM Peak Hour

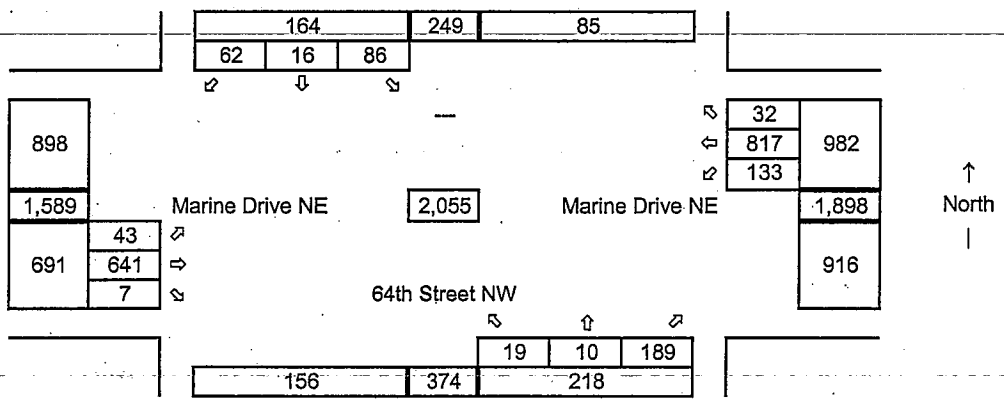
Year: 2018
Growth Rate = 1.0%
Years of Growth = 10
Total Growth = 1.1046



Pipeline Trips
Average Weekday
PM Peak Hour



Future Trips
Average Weekday
PM Peak Hour



APPENDIX C

Level of Service Analysis

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	64	11	63	54	31	119
Peak Hour Factor	0.82	0.82	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	78	13	71	61	35	134

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total (vph)	91	131	35	134
Volume Left (vph)	0	71	35	0
Volume Right (vph)	13	0	0	134
Hadj (s)	0.00	0.23	0.55	-0.65
Departure Headway (s)	4.4	4.6	5.6	4.4
Degree Utilization, x	0.11	0.17	0.05	0.16
Capacity (veh/h)	776	743	618	782
Control Delay (s)	8.0	8.6	7.7	7.0
Approach Delay (s)	8.0	8.6	7.2	
Approach LOS	A	A	A	

Intersection Summary			
Delay	7.8		
HCM Level of Service	A		
Intersection Capacity Utilization	23.0%	ICU Level of Service	A
Analysis Period (min)	15		

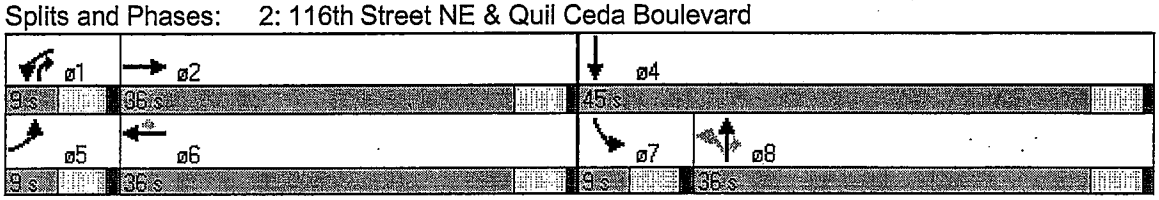
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	330		330	250		250	0		0
Storage Lanes	1		0	1		1	1		1	2		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt		0.995				0.850			0.850		0.940	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	3454	0	3335	1810	1538	1770	1863	2787	3303	1685	0
Flt Permitted	0.950			0.950			0.673			0.950		
Satd. Flow (perm)	1736	3454	0	3335	1810	1538	1254	1863	2787	3303	1685	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4				11			317		48	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		723			639			1729			295	
Travel Time (s)		16.4			14.5			39.3			6.7	
Volume (vph)	93	116	4	207	81	10	1	98	260	253	68	45
Peak Hour Factor	0.82	0.82	0.82	0.89	0.89	0.89	0.82	0.82	0.82	0.86	0.86	0.86
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	6%	6%	6%
Adj. Flow (vph)	113	141	5	233	91	11	1	120	317	294	79	52
Lane Group Flow (vph)	113	146	0	233	91	11	1	120	317	294	131	0
Turn Type	Prot			Prot		Perm	Perm		pm+ov	Prot		
Protected Phases	5	2		1	6			8	1	7	4	
Permitted Phases						6	8		8			
Detector Phases	5	2		1	6	6	8	8	1	7	4	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	9.0	36.0		9.0	36.0	36.0	36.0	36.0	9.0	9.0	36.0	
Total Split (s)	9.0	36.0	0.0	9.0	36.0	36.0	36.0	36.0	9.0	9.0	45.0	0.0
Total Split (%)	10.0%	40.0%	0.0%	10.0%	40.0%	40.0%	40.0%	40.0%	10.0%	10.0%	50.0%	0.0%
Maximum Green (s)	4.0	31.0		4.0	31.0	31.0	31.0	31.0	4.0	4.0	40.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lead	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	Min	Min	None	None	Min	
Walk Time (s)		7.0			7.0	7.0	7.0	7.0			7.0	
Flash Dont Walk (s)		24.0			24.0	24.0	24.0	24.0			24.0	
Pedestrian Calls (#/hr)		0			0	0	0	0			0	
Act Effct Green (s)	7.5	8.6		5.2	8.7	8.7	9.2	9.2	18.6	5.2	18.6	
Actuated g/C Ratio	0.18	0.20		0.12	0.19	0.19	0.22	0.22	0.44	0.12	0.44	
v/c Ratio	0.36	0.21		0.56	0.27	0.04	0.00	0.29	0.22	0.72	0.17	
Control Delay	26.3	15.7		27.3	18.2	9.3	14.0	17.1	1.9	34.4	6.5	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	26.3	15.7		27.3	18.2	9.3	14.0	17.1	1.9	34.4	6.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	B		C	B	A	B	B	A	C	A	
Approach Delay		20.3			24.2			6.1			25.8	
Approach LOS		C			C			A			C	
Queue Length 50th (ft)	27	15		29	19	0	0	25	0	37	12	
Queue Length 95th (ft)	#81	32		#75	51	9	3	56	13	#96	36	
Internal Link Dist (ft)		643			559			1649			215	
Turn Bay Length (ft)	250			330		330	250		250			
Base Capacity (vph)	311	1647		414	836	716	626	930	1412	409	1095	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.36	0.09		0.56	0.11	0.02	0.00	0.13	0.22	0.72	0.12	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 41.9
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 18.5 Intersection LOS: B
Intersection Capacity Utilization 33.1% ICU Level of Service A
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: 116th Street NE & Quil Ceda Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	647	1	0	383	368	0	0	2	0	0	31
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.50	0.50	0.50	0.86	0.86	0.86
Hourly flow rate (vph)	0	719	1	0	426	409	0	0	4	0	0	36
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)		970			288							
pX, platoon unblocked												
vC, conflicting volume	834			720			968	1554	360	993	1350	417
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	834			720			968	1554	360	993	1350	417
tC, single (s)	4.2			4.2			7.5	6.5	6.9	7.6	6.6	7.0
tC, 2 stage (s)												
tF (s)	2.3			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	100	100	94
cM capacity (veh/h)	763			851			198	114	642	197	148	582

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	479	241	284	551	4	36
Volume Left	0	0	0	0	0	0
Volume Right	0	1	0	409	4	36
cSH	1700	1700	1700	1700	642	582
Volume to Capacity	0.28	0.14	0.17	0.32	0.01	0.06
Queue Length 95th (ft)	0	0	0	0	0	5
Control Delay (s)	0.0	0.0	0.0	0.0	10.6	11.6
Lane LOS					B	B
Approach Delay (s)	0.0		0.0		10.6	11.6
Approach LOS					B	B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		

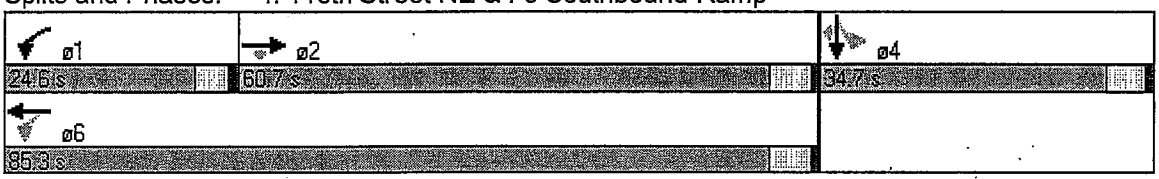
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	150		0	0		0	0		150
Storage Lanes	0		1	1		0	0		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950							0.953	
Satd. Flow (prot)	0	1776	1509	1703	1792	0	0	0	0	0	1677	1495
Flt Permitted				0.355							0.953	
Satd. Flow (perm)	0	1776	1509	636	1792	0	0	0	0	0	1677	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			304									185
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		288			768			1129			1244	
Travel Time (s)		6.5			17.5			25.7			28.3	
Volume (vph)	0	375	274	240	596	0	0	0	0	152	1	155
Peak Hour Factor	0.90	0.90	0.90	0.82	0.82	0.82	0.92	0.92	0.92	0.84	0.84	0.84
Heavy Vehicles (%)	7%	7%	7%	6%	6%	6%	2%	2%	2%	8%	8%	8%
Adj. Flow (vph)	0	417	304	293	727	0	0	0	0	181	1	185
Lane Group Flow (vph)	0	417	304	293	727	0	0	0	0	0	182	185
Turn Type			Perm	pm+pt						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases			2	6						4		4
Detector Phases		2	2	1	6					4	4	4
Minimum Initial (s)		7.0	7.0	3.0	7.0					5.0	5.0	5.0
Minimum Split (s)		21.3	21.3	8.0	26.3					31.0	31.0	31.0
Total Split (s)	0.0	60.7	60.7	24.6	85.3	0.0	0.0	0.0	0.0	34.7	34.7	34.7
Total Split (%)	0.0%	50.6%	50.6%	20.5%	71.1%	0.0%	0.0%	0.0%	0.0%	28.9%	28.9%	28.9%
Maximum Green (s)		55.4	55.4	20.0	80.0					29.7	29.7	29.7
Yellow Time (s)		4.3	4.3	3.6	4.3					4.0	4.0	4.0
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		4.0	4.0	2.5	4.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)					7.0					7.0	7.0	7.0
Flash Dont Walk (s)					14.0					19.0	19.0	19.0
Pedestrian Calls (#/hr)					0					0	0	0
Act Effct Green (s)		78.9	78.9	93.4	93.4						18.6	18.6
Actuated g/C Ratio		0.66	0.66	0.78	0.78						0.16	0.16
v/c Ratio		0.36	0.28	0.50	0.52						0.70	0.48
Control Delay		12.0	2.1	13.6	12.6						61.7	10.1
Queue Delay		0.0	0.0	0.0	0.6						0.0	0.0
Total Delay		12.0	2.1	13.6	13.2						61.7	10.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		B	A	B	B						E	B
Approach Delay		7.9			13.3						35.7	
Approach LOS		A			B						D	
Queue Length 50th (ft)		120	0	27	374						135	0
Queue Length 95th (ft)		271	42	84	366						185	48
Internal Link Dist (ft)		208			688			1049			1164	
Turn Bay Length (ft)				150								150
Base Capacity (vph)		1168	1096	678	1394						429	520
Starvation Cap Reductn		0	0	0	304						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.36	0.28	0.43	0.67						0.42	0.36

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 117 (98%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 15.3 Intersection LOS: B
Intersection Capacity Utilization 66.4% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 4: 116th Street NE & I-5 Southbound Ramp



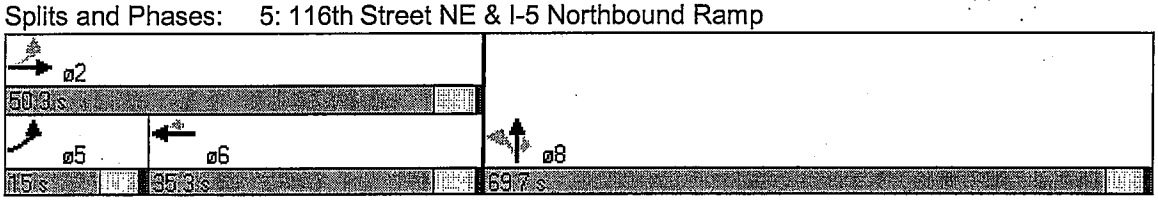
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		400	0		0
Storage Lanes	1		0	0		1	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1703	1792	0	0	1845	1568	0	1708	1524	0	0	0
Flt Permitted	0.113							0.953				
Satd. Flow (perm)	203	1792	0	0	1845	1568	0	1708	1524	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						208			345			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		768			286			1069			1275	
Travel Time (s)		17.5			6.5			24.3			29.0	
Volume (vph)	214	302	0	0	427	199	397	2	597	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.93	0.93	0.93	0.88	0.88	0.88	0.92	0.92	0.92
Heavy Vehicles (%)	6%	6%	6%	3%	3%	3%	6%	6%	6%	2%	2%	2%
Adj. Flow (vph)	243	343	0	0	459	214	451	2	678	0	0	0
Lane Group Flow (vph)	243	343	0	0	459	214	0	453	678	0	0	0
Turn Type	pm+pt					Perm	Perm		Perm			
Protected Phases	5	2			6			8				
Permitted Phases	2					6	8		8			
Detector Phases	5	2			6	6	8	8	8			
Minimum Initial (s)	3.0	5.0			5.0	5.0	5.0	5.0	5.0			
Minimum Split (s)	8.0	25.3			23.3	23.3	34.0	34.0	34.0			
Total Split (s)	15.0	50.3	0.0	0.0	35.3	35.3	69.7	69.7	69.7	0.0	0.0	0.0
Total Split (%)	12.5%	41.9%	0.0%	0.0%	29.4%	29.4%	58.1%	58.1%	58.1%	0.0%	0.0%	0.0%
Maximum Green (s)	10.0	45.0			30.0	30.0	64.7	64.7	64.7			
Yellow Time (s)	4.0	4.3			4.3	4.3	4.0	4.0	4.0			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.5			3.5	3.5	3.5	3.5	3.5			
Minimum Gap (s)	2.0	3.5			3.5	3.5	3.5	3.5	3.5			
Time Before Reduce (s)	10.0	10.0			10.0	10.0	10.0	10.0	10.0			
Time To Reduce (s)	10.0	10.0			10.0	10.0	10.0	10.0	10.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0			
Flash Dont Walk (s)		13.0			9.0	9.0	22.0	22.0	22.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	70.0	70.0			44.6	44.6		42.0	42.0			
Actuated g/C Ratio	0.58	0.58			0.37	0.37		0.35	0.35			
v/c Ratio	0.63	0.33			0.67	0.30		0.76	0.89			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	49.5	17.2			40.0	6.2		41.6	31.5			
Queue Delay	0.0	0.0			0.0	0.0		0.0	0.0			
Total Delay	49.5	17.2			40.0	6.2		41.6	31.5			
LOS	D	B			D	A		D	C			
Approach Delay		30.6			29.3			35.6				
Approach LOS		C			C			D				
Queue Length 50th (ft)	98	177			291	3		317	283			
Queue Length 95th (ft)	#285	232			#558	63		306	319			
Internal Link Dist (ft)		688			206			989			1195	
Turn Bay Length (ft)	150								400			
Base Capacity (vph)	385	1045			686	714		935	991			
Starvation Cap Reductn	0	0			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	0.63	0.33			0.67	0.30		0.48	0.68			

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 12 (10%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 32.6 Intersection LOS: C
Intersection Capacity Utilization 66.4% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: 116th Street NE & I-5 Northbound Ramp



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	10	10	150	10	35	10	179	177	45	141	10
Peak Hour Factor	0.92	0.92	0.92	0.84	0.84	0.84	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	11	11	11	179	12	42	11	201	199	51	158	11

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	33	179	54	411	220
Volume Left (vph)	11	179	0	11	51
Volume Right (vph)	11	0	42	199	11
Hadj (s)	-0.10	0.53	-0.51	-0.22	0.07
Departure Headway (s)	6.0	6.7	5.6	4.8	5.4
Degree Utilization, x	0.05	0.33	0.08	0.55	0.33
Capacity (veh/h)	508	500	588	710	632
Control Delay (s)	9.4	11.8	7.9	13.7	11.0
Approach Delay (s)	9.4	10.9		13.7	11.0
Approach LOS	A	B		B	B

Intersection Summary			
Delay	12.1		
HCM Level of Service	B		
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		

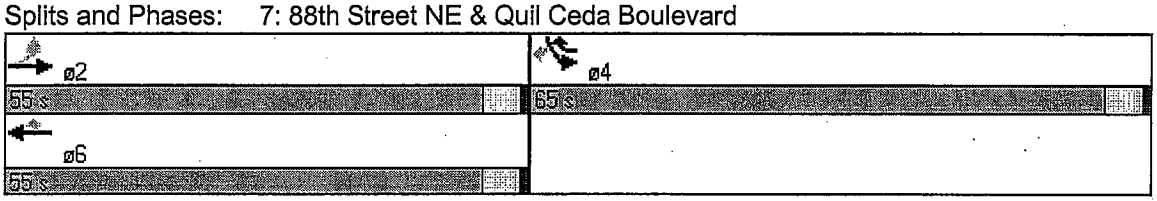
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	11	11
Storage Length (ft)	150			0	150	0
Storage Lanes	1			2	1	1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	0.88	0.97	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1728	1818	1818	2814	3385	1561
Flt Permitted	0.646				0.950	
Satd. Flow (perm)	1175	1818	1818	2814	3385	1561
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						63
Headway Factor	1.04	1.04	1.04	1.00	1.04	1.04
Link Speed (mph)		30	30		30	
Link Distance (ft)		1614	447		388	
Travel Time (s)		36.7	10.2		8.8	
Volume (vph)	57	150	126	876	865	61
Peak Hour Factor	0.75	0.75	0.91	0.91	0.97	0.97
Heavy Vehicles (%)	1%	1%	1%	1%	0%	0%
Adj. Flow (vph)	76	200	138	963	892	63
Lane Group Flow (vph)	76	200	138	963	892	63
Turn Type	Perm			pm+ov		Perm
Protected Phases		2	6	4	4	
Permitted Phases	2			6		4
Detector Phases	2	2	6	4	4	4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	21.0	37.0	21.0	21.0	21.0
Total Split (s)	55.0	55.0	55.0	65.0	65.0	65.0
Total Split (%)	45.8%	45.8%	45.8%	54.2%	54.2%	54.2%
Maximum Green (s)	50.0	50.0	50.0	60.0	60.0	60.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	4.0	4.0	4.0	3.5	3.5	3.5
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min
Walk Time (s)			7.0			
Flash Dont Walk (s)			25.0			
Pedestrian Calls (#/hr)			0			
Act Effct Green (s)	72.0	72.0	72.0	120.0	40.0	40.0
Actuated g/C Ratio	0.60	0.60	0.60	1.00	0.33	0.33
v/c Ratio	0.11	0.18	0.13	0.34	0.79	0.11
Control Delay	13.4	13.2	14.2	0.9	41.1	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Delay	13.4	13.2	14.2	0.9	41.1	5.5
LOS	B	B	B	A	D	A
Approach Delay		13.3	2.6		38.7	
Approach LOS		B	A		D	
Queue Length 50th (ft)	23	65	40	11	323	0
Queue Length 95th (ft)	50	110	84	13	324	26
Internal Link Dist (ft)		1534	367		308	
Turn Bay Length (ft)	150				150	
Base Capacity (vph)	705	1091	1091	2814	1721	824
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.18	0.13	0.34	0.52	0.08

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 22 (18%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 18.7 Intersection LOS: B
Intersection Capacity Utilization 44.6% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 7: 88th Street NE & Quil Ceda Boulevard



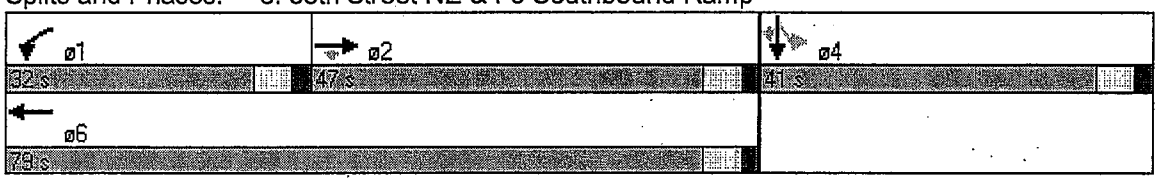
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		175	190		0	0		0	0		200
Storage Lanes	0		1	2		0	0		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	0.91	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979	0.850									0.850
Flt Protected				0.950							0.953	
Satd. Flow (prot)	0	3319	1441	3433	3539	0	0	0	0	0	1775	1583
Flt Permitted				0.950							0.953	
Satd. Flow (perm)	0	3319	1441	3433	3539	0	0	0	0	0	1775	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16	469									171
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		447			525			774			1117	
Travel Time (s)		10.2			11.9			17.6			25.4	
Volume (vph)	0	549	517	374	830	0	0	0	0	257	4	172
Peak Hour Factor	0.91	0.91	0.91	0.94	0.94	0.94	0.92	0.92	0.92	0.91	0.91	0.91
Adj. Flow (vph)	0	603	568	398	883	0	0	0	0	282	4	189
Lane Group Flow (vph)	0	702	469	398	883	0	0	0	0	0	286	189
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases			2							4		4
Detector Phases		2	2	1	6					4	4	4
Minimum Initial (s)		5.0	5.0	5.0	5.0					5.0	5.0	5.0
Minimum Split (s)		28.0	28.0	11.0	28.0					33.0	33.0	33.0
Total Split (s)	0.0	47.0	47.0	32.0	79.0	0.0	0.0	0.0	0.0	41.0	41.0	41.0
Total Split (%)	0.0%	39.2%	39.2%	26.7%	65.8%	0.0%	0.0%	0.0%	0.0%	34.2%	34.2%	34.2%
Maximum Green (s)		41.0	41.0	26.0	73.0					35.0	35.0	35.0
Yellow Time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
All-Red Time (s)		2.0	2.0	2.0	2.0					2.0	2.0	2.0
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		4.0	4.0	3.0	4.0					3.5	3.5	3.5
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		7.0	7.0		7.0					7.0	7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0					20.0	20.0	20.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		61.2	61.2	20.5	85.7						26.3	26.3
Actuated g/C Ratio		0.51	0.51	0.17	0.71						0.22	0.22
v/c Ratio		0.41	0.49	0.68	0.35						0.74	0.39
Control Delay		10.6	1.9	24.0	5.2						54.4	9.3
Queue Delay		0.1	0.2	0.0	0.2						0.0	0.0
Total Delay		10.7	2.1	24.0	5.4						54.4	9.3
LOS		B	A	C	A						D	A

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		7.3			11.2						36.4	
Approach LOS		A			B						D	
Queue Length 50th (ft)		65	0	107	92						209	11
Queue Length 95th (ft)		128	m9	m150	m147						279	66
Internal Link Dist (ft)		367			445			694			1037	
Turn Bay Length (ft)			175	190								200
Base Capacity (vph)		1700	965	801	2527						547	606
Starvation Cap Reductn		265	84	0	704						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.49	0.53	0.50	0.48						0.52	0.31

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 76 (63%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 13.7 Intersection LOS: B
Intersection Capacity Utilization 69.5% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: 88th Street NE & I-5 Southbound Ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	110		0	0		0	200		0	0		0
Storage Lanes	1		0	0		0	1		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt					0.950				0.850			
Flt Protected	0.950						0.950	0.953				
Satd. Flow (prot)	1770	3539	0	0	3362	0	1681	1686	1583	0	0	0
Flt Permitted	0.089						0.950	0.953				
Satd. Flow (perm)	166	3539	0	0	3362	0	1681	1686	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					78				134			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		525			364			821			1060	
Travel Time (s)		11.9			8.3			18.7			24.1	
Volume (vph)	121	642	0	0	645	322	450	3	728	0	0	0
Peak Hour Factor	0.93	0.93	0.93	0.90	0.90	0.90	0.91	0.91	0.91	0.92	0.92	0.92
Adj. Flow (vph)	130	690	0	0	717	358	495	3	800	0	0	0
Lane Group Flow (vph)	130	690	0	0	1075	0	248	250	800	0	0	0
Turn Type	pm+pt						Perm		Perm			
Protected Phases	5	2			6			8				
Permitted Phases	2						8		8			
Detector Phases	5	2			6		8	8	8			
Minimum Initial (s)	3.0	10.0			10.0		5.0	5.0	5.0			
Minimum Split (s)	8.0	25.0			23.0		34.0	34.0	34.0			
Total Split (s)	11.0	56.0	0.0	0.0	45.0	0.0	64.0	64.0	64.0	0.0	0.0	0.0
Total Split (%)	9.2%	46.7%	0.0%	0.0%	37.5%	0.0%	53.3%	53.3%	53.3%	0.0%	0.0%	0.0%
Maximum Green (s)	6.4	51.0			40.0		59.0	59.0	59.0			
Yellow Time (s)	3.6	4.0			4.0		4.0	4.0	4.0			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	2.5	4.0			4.0		3.5	3.5	3.5			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		7.0			7.0		7.0	7.0	7.0			
Flash Dont Walk (s)		13.0			9.0		22.0	22.0	22.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	54.2	54.2			43.1		57.8	57.8	57.8			
Actuated g/C Ratio	0.45	0.45			0.36		0.48	0.48	0.48			
v/c Ratio	0.76	0.43			0.86		0.31	0.31	0.96			
Control Delay	43.8	9.2			33.4		19.6	19.6	48.2			
Queue Delay	0.0	0.1			1.4		0.0	0.0	0.4			
Total Delay	43.8	9.2			34.8		19.6	19.6	48.5			
LOS	D	A			C		B	B	D			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		14.7			34.8			37.4				
Approach LOS		B			C			D				
Queue Length 50th (ft)	49	106			393		114	115	494			
Queue Length 95th (ft)	m#141	170			#515		174	175	#786			
Internal Link Dist (ft)		445			284			741			980	
Turn Bay Length (ft)	110						200					
Base Capacity (vph)	170	1598			1257		841	843	859			
Starvation Cap Reductn	0	0			67		0	0	0			
Spillback Cap Reductn	0	119			0		0	0	4			
Storage Cap Reductn	0	0			0		0	0	0			
Reduced v/c Ratio	0.76	0.47			0.90		0.29	0.30	0.94			

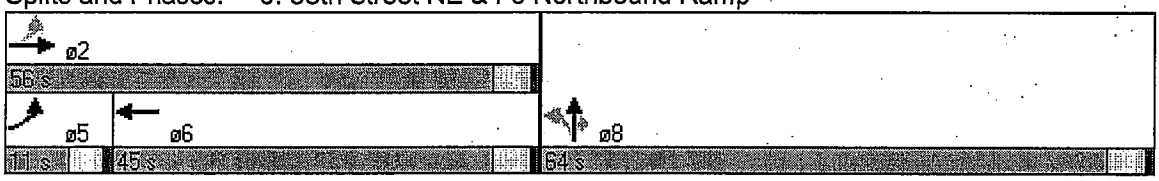
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green, Master Intersection
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 30.7 Intersection LOS: C
Intersection Capacity Utilization 69.5% ICU Level of Service C
Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: 88th Street NE & I-5 Northbound Ramp



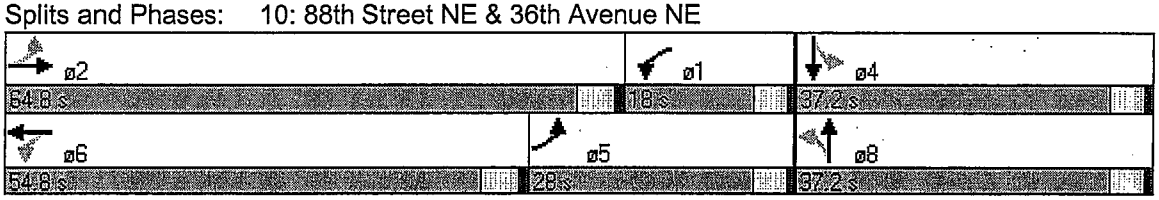
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	120		0	100		0	55		0	0		0
Storage Lanes	1		0	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.995			0.895			0.856	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	3450	0	1752	3487	0	1656	1560	0	1752	1579	0
Flt Permitted	0.225			0.119			0.562			0.736		
Satd. Flow (perm)	411	3450	0	220	3487	0	980	1560	0	1358	1579	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			3			23			156	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		364			1539			377			631	
Travel Time (s)		8.3			35.0			8.6			14.3	
Volume (vph)	169	1040	46	27	726	23	48	8	18	127	6	126
Peak Hour Factor	0.94	0.94	0.94	0.90	0.90	0.90	0.77	0.77	0.77	0.81	0.81	0.81
Heavy Vehicles (%)	4%	4%	4%	3%	3%	3%	9%	9%	9%	3%	3%	3%
Adj. Flow (vph)	180	1106	49	30	807	26	62	10	23	157	7	156
Lane Group Flow (vph)	180	1155	0	30	833	0	62	33	0	157	163	0
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phases	5	2		1	6		8	8		4	4	
Minimum Initial (s)	3.0	7.0		3.0	7.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	8.0	28.0		8.0	27.0		23.5	23.5		24.5	24.5	
Total Split (s)	28.0	64.8	0.0	18.0	54.8	0.0	37.2	37.2	0.0	37.2	37.2	0.0
Total Split (%)	23.3%	54.0%	0.0%	15.0%	45.7%	0.0%	31.0%	31.0%	0.0%	31.0%	31.0%	0.0%
Maximum Green (s)	23.5	59.8		13.5	49.8		32.7	32.7		32.7	32.7	
Yellow Time (s)	3.5	4.0		3.5	4.0		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lag	Lead		Lag	Lead							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.5		3.0	3.5		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	5.0		0.0	5.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	5.0		0.0	5.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max		Min	Min		Min	Min	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		16.0			15.0		12.0	12.0		13.0	13.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	93.2	87.0		83.2	77.0		18.8	18.8		18.8	18.8	
Actuated g/C Ratio	0.78	0.72		0.69	0.64		0.16	0.16		0.16	0.16	
v/c Ratio	0.40	0.46		0.13	0.37		0.40	0.12		0.74	0.43	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	11.6	9.6		7.2	12.2		51.5	20.8		67.3	10.8	
Queue Delay	0.0	0.3		0.0	0.1		0.0	0.0		0.0	0.0	
Total Delay	11.6	9.9		7.2	12.3		51.5	20.8		67.3	10.8	
LOS	B	A		A	B		D	C		E	B	
Approach Delay		10.1			12.1			40.8			38.5	
Approach LOS		B			B			D			D	
Queue Length 50th (ft)	31	185		4	162		44	7		118	5	
Queue Length 95th (ft)	m52	m381		15	245		69	26		159	44	
Internal Link Dist (ft)		284			1459			297			551	
Turn Bay Length (ft)	120			100			55					
Base Capacity (vph)	624	2501		345	2237		271	448		376	550	
Starvation Cap Reductn	0	666		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	376		0	0		0	16	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.29	0.63		0.09	0.45		0.23	0.07		0.42	0.31	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 6 (5%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 15.4 Intersection LOS: B
Intersection Capacity Utilization 59.2% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: 88th Street NE & 36th Avenue NE



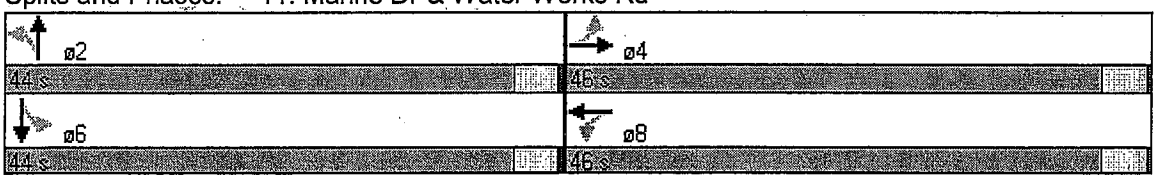
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997			0.961			0.919			0.989	
Flt Protected		0.997			0.997			0.995			0.967	
Satd. Flow (prot)	0	1834	0	0	1785	0	0	1737	0	0	1622	0
Flt Permitted		0.974			0.983			0.965			0.675	
Satd. Flow (perm)	0	1791	0	0	1760	0	0	1685	0	0	1132	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2			31			109			7	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		682			1534			635			515	
Travel Time (s)		13.3			29.9			14.4			11.7	
Volume (vph)	9	142	3	17	225	98	9	30	58	102	15	13
Peak Hour Factor	0.84	0.84	0.84	0.79	0.79	0.79	0.45	0.45	0.45	0.61	0.25	0.61
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	0%	0%	0%	12%	12%	12%
Adj. Flow (vph)	11	169	4	22	285	124	20	67	129	167	60	21
Lane Group Flow (vph)	0	184	0	0	431	0	0	216	0	0	248	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phases	4	4		8	8		2	2		6	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	46.0	46.0	0.0	46.0	46.0	0.0	44.0	44.0	0.0	44.0	44.0	0.0
Total Split (%)	51.1%	51.1%	0.0%	51.1%	51.1%	0.0%	48.9%	48.9%	0.0%	48.9%	48.9%	0.0%
Maximum Green (s)	42.0	42.0		42.0	42.0		40.0	40.0		40.0	40.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		14.9			14.9			15.2			15.2	
Actuated g/C Ratio		0.40			0.40			0.41			0.41	
v/c Ratio		0.25			0.59			0.28			0.52	
Control Delay		8.8			12.1			5.7			13.8	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		8.8			12.1			5.7			13.8	
LOS		A			B			A			B	
Approach Delay		8.8			12.1			5.7			13.8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		A			B			A			B	
Queue Length 50th (ft)		18			46			11			28	
Queue Length 95th (ft)		66			137			15			22	
Internal Link Dist (ft)		602			1454			555			435	
Turn Bay Length (ft)												
Base Capacity (vph)		1206			1194			1156			754	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.15			0.36			0.19			0.33	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 36.8
Natural Cycle: 40
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.59
Intersection Signal Delay: 10.6 Intersection LOS: B
Intersection Capacity Utilization 43.8% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 11: Marine Dr & Water Works Rd



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	297	6	120	395	17	171
Peak Hour Factor	0.58	0.58	0.89	0.89	0.63	0.63
Hourly flow rate (vph)	512	10	135	444	27	271
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	1108					
pX, platoon unblocked						
vC, conflicting volume			522		1231	517
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			522		1231	517
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			87		84	51
cM capacity (veh/h)			1034		170	558

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	522	135	444	27	271
Volume Left	0	135	0	27	0
Volume Right	10	0	0	0	271
cSH	1700	1034	1700	170	558
Volume to Capacity	0.31	0.13	0.26	0.16	0.49
Queue Length 95th (ft)	0	11	0	14	66
Control Delay (s)	0.0	9.0	0.0	30.1	17.4
Lane LOS		A		D	C
Approach Delay (s)	0.0	2.1		18.5	
Approach LOS				C	

Intersection Summary			
Average Delay	4.8		
Intersection Capacity Utilization	36.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	16	487	615	59	23	10
Peak Hour Factor	0.90	0.90	0.92	0.92	0.83	0.83
Hourly flow rate (vph)	18	541	668	64	28	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	733				1277	701
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	733				1277	701
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				85	97
cM capacity (veh/h)	872				179	437

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	18	541	733	40
Volume Left	18	0	0	28
Volume Right	0	0	64	12
cSH	872	1700	1700	218
Volume to Capacity	0.02	0.32	0.43	0.18
Queue Length 95th (ft)	2	0	0	16
Control Delay (s)	9.2	0.0	0.0	25.2
Lane LOS	A			D
Approach Delay (s)	0.3		0.0	25.2
Approach LOS				D

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		

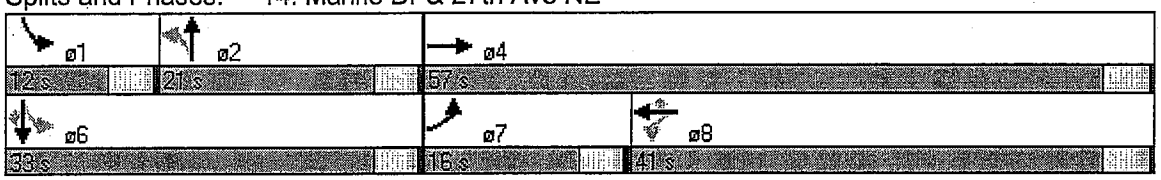
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	105		0	40		0	0		0	0		100
Storage Lanes	1		0	1		1	0		0	0		1
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	50
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999				0.850		0.949				0.850
Flt Protected	0.950			0.950				0.980			0.955	
Satd. Flow (prot)	1719	3435	0	1752	1845	1568	0	1606	0	0	1745	1553
Flt Permitted	0.950			0.452				0.899			0.804	
Satd. Flow (perm)	1719	3435	0	834	1845	1568	0	1474	0	0	1469	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				189		12				183
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		493			923			334			2420	
Travel Time (s)		9.6			18.0			6.5			47.1	
Volume (vph)	171	433	2	13	540	181	12	6	11	108	6	179
Peak Hour Factor	0.81	0.81	0.81	0.96	0.96	0.96	0.91	0.91	0.91	0.98	0.98	0.98
Heavy Vehicles (%)	5%	5%	5%	3%	3%	3%	10%	10%	10%	4%	4%	4%
Adj. Flow (vph)	211	535	2	14	562	189	13	7	12	110	6	183
Lane Group Flow (vph)	211	537	0	14	562	189	0	32	0	0	116	183
Turn Type	Prot			Perm		Perm	Perm			pm+pt		Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases				8		8	2			6		6
Detector Phases	7	4		8	8	8	2	2		1	6	6
Minimum Initial (s)	8.0	8.0		8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0
Minimum Split (s)	12.0	20.0		20.0	20.0	20.0	20.0	20.0		12.0	20.0	20.0
Total Split (s)	16.0	57.0	0.0	41.0	41.0	41.0	21.0	21.0	0.0	12.0	33.0	33.0
Total Split (%)	17.8%	63.3%	0.0%	45.6%	45.6%	45.6%	23.3%	23.3%	0.0%	13.3%	36.7%	36.7%
Maximum Green (s)	12.0	53.0		37.0	37.0	37.0	17.0	17.0		8.0	29.0	29.0
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Min	Min		None	Min	Min
Act Effct Green (s)	12.3	38.8		23.3	23.3	23.3		11.8			11.8	11.8
Actuated g/C Ratio	0.22	0.68		0.41	0.41	0.41		0.21			0.21	0.21
v/c Ratio	0.57	0.23		0.04	0.74	0.25		0.10			0.38	0.39
Control Delay	31.6	3.7		10.4	20.9	2.9		17.8			26.9	7.3
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	31.6	3.7		10.4	20.9	2.9		17.8			26.9	7.3
LOS	C	A		B	C	A		B			C	A
Approach Delay		11.5			16.3			17.8			14.9	
Approach LOS		B			B			B			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	62	24		3	150	0		6			35	0
Queue Length 95th (ft)	#161	49		12	287	30		29			93	48
Internal Link Dist (ft)		413			843			254			2340	
Turn Bay Length (ft)	105			40								100
Base Capacity (vph)	403	2589		450	995	932		441			599	741
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	0.52	0.21		0.03	0.56	0.20		0.07			0.19	0.25

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 56.9
Natural Cycle: 75
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 14.2 Intersection LOS: B
Intersection Capacity Utilization 60.5% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Marine Dr & 27th Ave NE



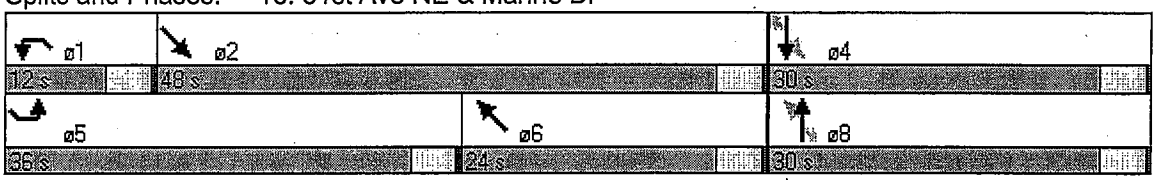
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	0		100	100		0	100		0
Storage Lanes	0		1	0		1	1		0	1		0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50	50	50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.981			0.998	
Flt Protected		0.959			0.985		0.950			0.950		
Satd. Flow (prot)	0	1804	1599	0	1853	1599	1752	3438	0	1736	3464	0
Flt Permitted		0.745			0.924		0.950			0.950		
Satd. Flow (perm)	0	1401	1599	0	1738	1599	1752	3438	0	1736	3464	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			181			105		26			2	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		404			531			552			630	
Travel Time (s)		9.2			12.1			10.8			12.3	
Volume (vph)	214	35	157	4	9	89	63	473	69	37	563	8
Peak Hour Factor	0.81	0.81	0.81	0.85	0.85	0.85	0.84	0.84	0.84	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	3%	3%	3%	4%	4%	4%
Adj. Flow (vph)	264	43	194	5	11	105	75	563	82	39	599	9
Lane Group Flow (vph)	0	307	194	0	16	105	75	645	0	39	608	0
Turn Type	Perm		Perm	Perm		Perm	Prot			Prot		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4		4						
Detector Phases	8	8	8	4	4	4	5	2		1	6	
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0		8.0	8.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	12.0	20.0		12.0	20.0	
Total Split (s)	30.0	30.0	30.0	30.0	30.0	30.0	36.0	48.0	0.0	12.0	24.0	0.0
Total Split (%)	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	40.0%	53.3%	0.0%	13.3%	26.7%	0.0%
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0	26.0	32.0	44.0		8.0	20.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)		51.3	51.3		51.3	51.3	10.3	25.5		9.0	21.8	
Actuated g/C Ratio		0.57	0.57		0.57	0.57	0.11	0.28		0.10	0.24	
v/c Ratio		0.38	0.20		0.02	0.11	0.37	0.65		0.22	0.72	
Control Delay		15.0	3.2		12.1	3.2	41.9	30.0		42.2	53.3	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		15.0	3.2		12.1	3.2	41.9	30.0		42.2	53.3	
LOS		B	A		B	A	D	C		D	D	
Approach Delay		10.4			4.4			31.2			52.6	
Approach LOS		B			A			C			D	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Length 50th (ft)		95	3		4	0	40	169		23	182	
Queue Length 95th (ft)		167	30		15	24	75	181		m43	216	
Internal Link Dist (ft)		324			451			472			550	
Turn Bay Length (ft)			100			100	100			100		
Base Capacity (vph)		798	989		990	956	642	1732		174	895	
Starvation Cap Reductn		0	0		0	0	0	0		0	0	
Spillback Cap Reductn		0	0		0	0	0	0		0	0	
Storage Cap Reductn		0	0		0	0	0	0		0	0	
Reduced v/c Ratio		0.38	0.20		0.02	0.11	0.12	0.37		0.22	0.68	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 59 (66%), Referenced to phase 4:SBTL and 8:NBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.72
Intersection Signal Delay: 31.3 Intersection LOS: C
Intersection Capacity Utilization 52.8% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: 31st Ave NE & Marine Dr



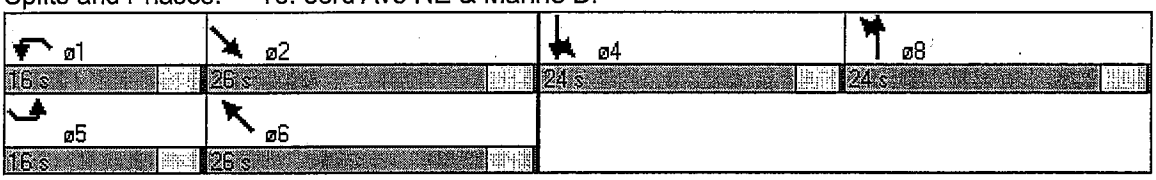
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.856			0.956			0.999			0.951	
Flt Protected	0.950			0.950	0.967		0.950			0.950		
Satd. Flow (prot)	1770	1595	0	1665	1620	0	1752	3501	0	1770	3366	0
Flt Permitted	0.950			0.950	0.967		0.950			0.950		
Satd. Flow (perm)	1770	1595	0	1665	1620	0	1752	3501	0	1770	3366	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		47			22			1			88	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		704			705			630			517	
Travel Time (s)		16.0			16.0			12.3			10.1	
Volume (vph)	19	2	40	357	4	60	47	623	5	43	574	279
Peak Hour Factor	0.86	0.86	0.86	0.85	0.85	0.85	0.64	0.64	0.64	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	3%	3%	3%	2%	2%	2%
Adj. Flow (vph)	22	2	47	420	5	71	73	973	8	44	592	288
Lane Group Flow (vph)	22	49	0	255	241	0	73	981	0	44	880	0
Turn Type	Split			Split			Prot			Prot		
Protected Phases	8	8		4	4		5	2		1	6	
Permitted Phases												
Detector Phases	8	8		4	4		5	2		1	6	
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		12.0	20.0		12.0	20.0	
Total Split (s)	24.0	24.0	0.0	24.0	24.0	0.0	16.0	26.0	0.0	16.0	26.0	0.0
Total Split (%)	26.7%	26.7%	0.0%	26.7%	26.7%	0.0%	17.8%	28.9%	0.0%	17.8%	28.9%	0.0%
Maximum Green (s)	20.0	20.0		20.0	20.0		12.0	22.0		12.0	22.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min		Min	Min		None	C-Max		None	C-Max	
Act Effct Green (s)	9.1	9.1		18.2	18.2		10.6	46.0		9.5	42.4	
Actuated g/C Ratio	0.10	0.10		0.20	0.20		0.12	0.51		0.11	0.47	
v/c Ratio	0.12	0.24		0.76	0.70		0.35	0.55		0.24	0.54	
Control Delay	38.5	15.4		48.2	41.0		56.6	10.2		41.8	12.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	38.5	15.4		48.2	41.0		56.6	10.2		41.8	12.3	
LOS	D	B		D	D		E	B		D	B	
Approach Delay		22.6			44.7			13.4			13.7	
Approach LOS		C			D			B			B	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Length 50th (ft)	12	1		142	120		43	87		19	195	
Queue Length 95th (ft)	33	31		210	186		61	84		m35	292	
Internal Link Dist (ft)		624			625			550			437	
Turn Bay Length (ft)	100			100			100			100		
Base Capacity (vph)	413	408		389	395		255	1790		256	1633	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.05	0.12		0.66	0.61		0.29	0.55		0.17	0.54	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 36 (40%), Referenced to phase 2:SET and 6:NWT, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 19.9 Intersection LOS: B
Intersection Capacity Utilization 60.0% ICU Level of Service B
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 16: 33rd Ave NE & Marine Dr



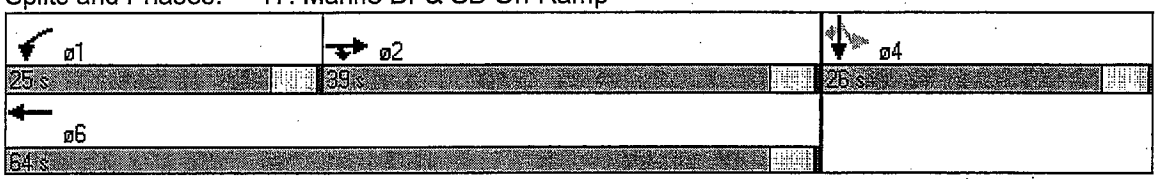
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱	↰↰	↑						↰↑	↱
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	0		1
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950							0.952	
Satd. Flow (prot)	0	1863	1583	3433	1863	0	0	0	0	0	1773	1583
Flt Permitted				0.950							0.952	
Satd. Flow (perm)	0	1863	1583	3433	1863	0	0	0	0	0	1773	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			417									156
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		189			521			740			805	
Travel Time (s)		3.7			10.1			16.8			18.3	
Volume (vph)	0	535	384	493	751	0	0	0	0	355	1	145
Peak Hour Factor	0.92	0.92	0.92	0.93	0.93	0.93	0.90	0.90	0.90	0.93	0.93	0.93
Adj. Flow (vph)	0	582	417	530	808	0	0	0	0	382	1	156
Lane Group Flow (vph)	0	582	417	530	808	0	0	0	0	0	383	156
Turn Type			Prot	Prot						Perm		Perm
Protected Phases		2	2	1	6						4	
Permitted Phases										4		4
Detector Phases		2	2	1	6					4	4	4
Minimum Initial (s)		8.0	8.0	8.0	8.0					8.0	8.0	8.0
Minimum Split (s)		20.0	20.0	12.0	20.0					20.0	20.0	20.0
Total Split (s)	0.0	39.0	39.0	25.0	64.0	0.0	0.0	0.0	0.0	26.0	26.0	26.0
Total Split (%)	0.0%	43.3%	43.3%	27.8%	71.1%	0.0%	0.0%	0.0%	0.0%	28.9%	28.9%	28.9%
Maximum Green (s)		35.0	35.0	21.0	60.0					22.0	22.0	22.0
Yellow Time (s)		3.5	3.5	3.5	3.5					3.5	3.5	3.5
All-Red Time (s)		0.5	0.5	0.5	0.5					0.5	0.5	0.5
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Act Effct Green (s)		39.4	39.4	19.5	61.9						22.1	22.1
Actuated g/C Ratio		0.44	0.44	0.22	0.69						0.25	0.25
v/c Ratio		0.71	0.45	0.71	0.63						0.88	0.31
Control Delay		29.1	8.7	31.4	10.7						55.2	6.4
Queue Delay		0.0	0.0	0.0	1.5						0.0	0.0
Total Delay		29.1	8.7	31.4	12.2						55.2	6.4
LOS		C	A	C	B						E	A
Approach Delay		20.6			19.8						41.1	
Approach LOS		C			B						D	
Queue Length 50th (ft)		226	25	143	309						207	0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)		#374	m129	m155	m386						#360	46
Internal Link Dist (ft)		109			441			660			725	
Turn Bay Length (ft)				200								
Base Capacity (vph)		816	928	839	1281						453	521
Starvation Cap Reductn		0	0	0	278						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.71	0.45	0.63	0.81						0.85	0.30

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 10 (11%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 24.1 Intersection LOS: C
Intersection Capacity Utilization 86.3% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 17: Marine Dr & SB On-Ramp



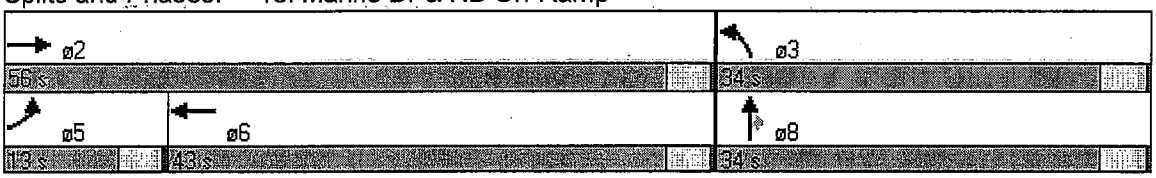
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt					0.949			0.853	0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	1863	0	0	3359	0	1770	1509	1504	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1770	1863	0	0	3359	0	1770	1509	1504	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					135			242	242			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		521			1634			669			777	
Travel Time (s)		10.1			31.8			15.2			17.7	
Volume (vph)	176	639	0	0	797	416	377	10	1115	0	0	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.95	0.95	0.95	0.90	0.90	0.90
Adj. Flow (vph)	187	680	0	0	848	443	397	11	1174	0	0	0
Lane Group Flow (vph)	187	680	0	0	1291	0	397	598	587	0	0	0
Turn Type	Prot						Prot		Perm			
Protected Phases	5	2			6		3	8				
Permitted Phases									8			
Detector Phases	5	2			6		3	8	8			
Minimum Initial (s)	8.0	8.0			8.0		8.0	8.0	8.0			
Minimum Split (s)	12.0	20.0			20.0		12.0	20.0	20.0			
Total Split (s)	13.0	56.0	0.0	0.0	43.0	0.0	34.0	34.0	34.0	0.0	0.0	0.0
Total Split (%)	14.4%	62.2%	0.0%	0.0%	47.8%	0.0%	37.8%	37.8%	37.8%	0.0%	0.0%	0.0%
Maximum Green (s)	9.0	52.0			39.0		30.0	30.0	30.0			
Yellow Time (s)	3.5	3.5			3.5		3.5	3.5	3.5			
All-Red Time (s)	0.5	0.5			0.5		0.5	0.5	0.5			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	None			None		C-Max	C-Max	C-Max			
Act Effct Green (s)	10.0	50.3			37.3		33.7	33.7	33.7			
Actuated g/C Ratio	0.11	0.56			0.41		0.37	0.37	0.37			
v/c Ratio	0.95	0.65			0.88		0.60	0.84	0.82			
Control Delay	81.6	7.9			29.2		28.3	28.0	26.9			
Queue Delay	0.0	1.2			0.0		0.4	0.0	0.0			
Total Delay	81.6	9.1			29.2		28.7	28.0	26.9			
LOS	F	A			C		C	C	C			
Approach Delay		24.7			29.2			27.8				
Approach LOS		C			C			C				
Queue Length 50th (ft)	114	161			297		188	210	202			
Queue Length 95th (ft)	m#169	m207			391		289	#436	#422			
Internal Link Dist (ft)		441			1554			589			697	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)												
Base Capacity (vph)	197	1097			1568		663	716	715			
Starvation Cap Reductn	0	210			0		0	0	0			
Spillback Cap Reductn	0	0			3		49	0	0			
Storage Cap Reductn	0	0			0		0	0	0			
Reduced v/c Ratio	0.95	0.77			0.82		0.65	0.84	0.82			

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 3:NBL and 8:NBT, Start of Green, Master Intersection
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 27.6 Intersection LOS: C
Intersection Capacity Utilization 86.3% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 18: Marine Dr & NB On-Ramp



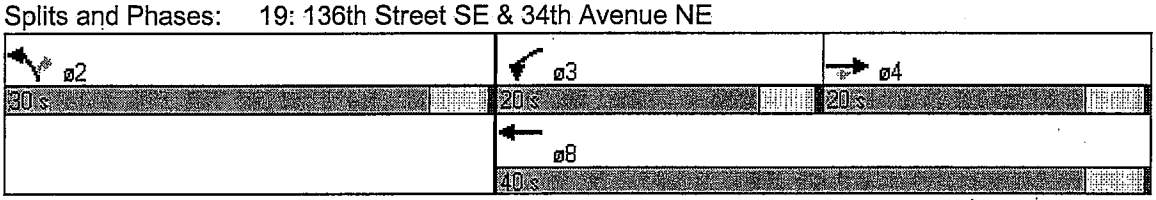
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		50	75		0	0
Storage Lanes		1	1		1	1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1863	1583	1770	1863	1787	1599
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1863	1583	1770	1863	1787	1599
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		208				145
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	716			1644	665	
Travel Time (s)	16.3			37.4	15.1	
Volume (vph)	145	187	176	255	391	129
Peak Hour Factor	0.90	0.90	0.86	0.86	0.89	0.89
Heavy Vehicles (%)	2%	2%	2%	2%	1%	1%
Adj. Flow (vph)	161	208	205	297	439	145
Lane Group Flow (vph)	161	208	205	297	439	145
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Detector Phases	4	4	3	8	2	2
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	40.0	30.0	30.0
Total Split (%)	28.6%	28.6%	28.6%	57.1%	42.9%	42.9%
Maximum Green (s)	16.0	16.0	16.0	36.0	26.0	26.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	Max	Max
Walk Time (s)	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	10.8	10.8	11.5	23.6	27.4	27.4
Actuated g/C Ratio	0.18	0.18	0.19	0.40	0.46	0.46
v/c Ratio	0.47	0.45	0.61	0.40	0.53	0.18
Control Delay	28.0	7.5	31.4	13.0	17.4	3.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.0	7.5	31.4	13.0	17.4	3.7

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
LOS	C	A	C	B	B	A
Approach Delay	16.5			20.5	14.0	
Approach LOS	B			C	B	
Queue Length 50th (ft)	54	0	68	69	116	0
Queue Length 95th (ft)	110	48	131	109	245	31
Internal Link Dist (ft)	636			1564	585	
Turn Bay Length (ft)		50	75			
Base Capacity (vph)	469	554	433	951	827	817
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.38	0.47	0.31	0.53	0.18

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 59.2
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.61
Intersection Signal Delay: 16.9 Intersection LOS: B
Intersection Capacity Utilization 49.0% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 19: 136th Street SE & 34th Avenue NE



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	95	25	84	83	52	154
Peak Hour Factor	0.82	0.82	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	116	30	94	93	58	173

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total (vph)	146	188	58	173
Volume Left (vph)	0	94	58	0
Volume Right (vph)	30	0	0	173
Hadj (s)	-0.04	0.22	0.55	-0.65
Departure Headway (s)	4.7	4.9	5.9	4.7
Degree Utilization, x	0.19	0.25	0.10	0.22
Capacity (veh/h)	725	703	583	728
Control Delay (s)	8.8	9.5	8.3	7.8
Approach Delay (s)	8.8	9.5	7.9	
Approach LOS	A	A	A	

Intersection Summary			
Delay	8.7		
HCM Level of Service	A		
Intersection Capacity Utilization	25.7%	ICU Level of Service	A
Analysis Period (min)	15		

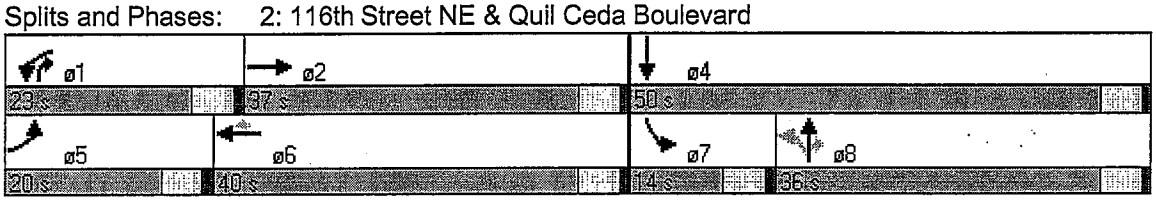
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	330		330	250		250	0		0
Storage Lanes	1		0	1		1	1		1	2		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	0.97	1.00	1.00	1.00	1.00	0.88	0.97	1.00	1.00
Frt		0.975				0.850			0.850		0.960	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	3384	0	3335	1810	1538	1770	1863	2787	3303	1721	0
Flt Permitted	0.950			0.950			0.608			0.950		
Satd. Flow (perm)	1736	3384	0	3335	1810	1538	1133	1863	2787	3303	1721	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21				13			752		21	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		723			639			1729			295	
Travel Time (s)		16.4			14.5			39.3			6.7	
Volume (vph)	116	133	26	616	89	12	23	194	722	298	152	56
Peak Hour Factor	0.82	0.82	0.82	0.89	0.89	0.89	0.82	0.82	0.82	0.86	0.86	0.86
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	6%	6%	6%
Adj. Flow (vph)	141	162	32	692	100	13	28	237	880	347	177	65
Lane Group Flow (vph)	141	194	0	692	100	13	28	237	880	347	242	0
Turn Type	Prot			Prot		Perm	Perm		pm+ov	Prot		
Protected Phases	5	2		1	6			8	1	7	4	
Permitted Phases						6	8		8			
Detector Phases	5	2		1	6	6	8	8	1	7	4	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	9.0	36.0		9.0	36.0	36.0	36.0	36.0	9.0	9.0	36.0	
Total Split (s)	20.0	37.0	0.0	23.0	40.0	40.0	36.0	36.0	23.0	14.0	50.0	0.0
Total Split (%)	18.2%	33.6%	0.0%	20.9%	36.4%	36.4%	32.7%	32.7%	20.9%	12.7%	45.5%	0.0%
Maximum Green (s)	15.0	32.0		18.0	35.0	35.0	31.0	31.0	18.0	9.0	45.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lead	Lead		
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None	None	Min	Min	None	None	Min	
Walk Time (s)		7.0			7.0	7.0	7.0	7.0			7.0	
Flash Dont Walk (s)		24.0			24.0	24.0	24.0	24.0			24.0	
Pedestrian Calls (#/hr)		0			0	0	0	0			0	
Act Effct Green (s)	11.7	9.9		19.2	20.0	20.0	14.9	14.9	38.1	10.1	29.0	
Actuated g/C Ratio	0.16	0.14		0.27	0.28	0.28	0.21	0.21	0.54	0.14	0.41	
v/c Ratio	0.50	0.39		0.76	0.19	0.03	0.12	0.60	0.47	0.73	0.33	
Control Delay	33.9	27.5		31.7	25.2	13.3	23.4	31.7	2.4	41.1	14.3	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	33.9	27.5		31.7	25.2	13.3	23.4	31.7	2.4	41.1	14.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C		C	C	B	C	C	A	D	B	
Approach Delay		30.2			30.6			9.0			30.1	
Approach LOS		C			C			A			C	
Queue Length 50th (ft)	56	35		140	35	0	10	92	13	74	61	
Queue Length 95th (ft)	103	63		#259	84	14	27	147	30	#145	111	
Internal Link Dist (ft)		643			559			1649			215	
Turn Bay Length (ft)	250			330		330	250		250			
Base Capacity (vph)	363	1214		910	765	658	417	686	1857	475	920	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.39	0.16		0.76	0.13	0.02	0.07	0.35	0.47	0.73	0.26	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 70.2
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 21.8 Intersection LOS: C
Intersection Capacity Utilization 54.1% ICU Level of Service A
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: 116th Street NE & Quil Ceda Boulevard



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↱			↑↑↱				↱			↱
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	1191	1	0	823	449	0	0	2	0	0	39
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.50	0.50	0.50	0.86	0.86	0.86
Hourly flow rate (vph)	0	1323	1	0	914	499	0	0	4	0	0	45
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)		970			288							
pX, platoon unblocked												
vC, conflicting volume	1413			1324			1826	2737	662	1830	2488	707
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1413			1324			1826	2737	662	1830	2488	707
tC, single (s)	4.2			4.2			7.5	6.5	6.9	7.6	6.6	7.0
tC, 2 stage (s)												
tF (s)	2.3			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	100	100	88
cM capacity (veh/h)	454			497			43	21	409	47	28	376

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	882	442	610	804	4	45
Volume Left	0	0	0	0	0	0
Volume Right	0	1	0	499	4	45
cSH	1700	1700	1700	1700	409	376
Volume to Capacity	0.52	0.26	0.36	0.47	0.01	0.12
Queue Length 95th (ft)	0	0	0	0	1	10
Control Delay (s)	0.0	0.0	0.0	0.0	13.9	15.9
Lane LOS					B	C
Approach Delay (s)	0.0		0.0		13.9	15.9
Approach LOS					B	C

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	47.1%	ICU Level of Service	A
Analysis Period (min)	15		

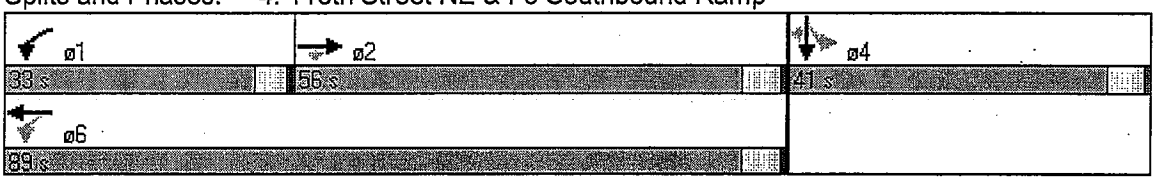
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	150		0	0		0	0		150
Storage Lanes	0		1	1		0	0		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950							0.953	
Satd. Flow (prot)	0	1776	1509	1703	1792	0	0	0	0	0	1677	1495
Flt Permitted				0.126							0.953	
Satd. Flow (perm)	0	1776	1509	226	1792	0	0	0	0	0	1677	1495
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			377									124
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		288			768			1129			1244	
Travel Time (s)		6.5			17.5			25.7			28.3	
Volume (vph)	0	547	407	366	882	0	0	0	0	238	1	388
Peak Hour Factor	0.90	0.90	0.90	0.82	0.82	0.82	0.92	0.92	0.92	0.84	0.84	0.84
Heavy Vehicles (%)	7%	7%	7%	6%	6%	6%	2%	2%	2%	8%	8%	8%
Adj. Flow (vph)	0	608	452	446	1076	0	0	0	0	283	1	462
Lane Group Flow (vph)	0	608	452	446	1076	0	0	0	0	0	284	462
Turn Type			Perm	pm+pt						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases			2	6						4		4
Detector Phases		2	2	1	6					4	4	4
Minimum Initial (s)		7.0	7.0	3.0	7.0					5.0	5.0	5.0
Minimum Split (s)		21.3	21.3	8.0	26.3					31.0	31.0	31.0
Total Split (s)	0.0	56.0	56.0	33.0	89.0	0.0	0.0	0.0	0.0	41.0	41.0	41.0
Total Split (%)	0.0%	43.1%	43.1%	25.4%	68.5%	0.0%	0.0%	0.0%	0.0%	31.5%	31.5%	31.5%
Maximum Green (s)		50.7	50.7	28.4	83.7					36.0	36.0	36.0
Yellow Time (s)		4.3	4.3	3.6	4.3					4.0	4.0	4.0
All-Red Time (s)		1.0	1.0	1.0	1.0					1.0	1.0	1.0
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		4.0	4.0	2.5	4.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)					7.0					7.0	7.0	7.0
Flash Dont Walk (s)					14.0					19.0	19.0	19.0
Pedestrian Calls (#/hr)					0					0	0	0
Act Effct Green (s)		57.1	57.1	87.2	87.2						34.8	34.8
Actuated g/C Ratio		0.44	0.44	0.67	0.67						0.27	0.27
v/c Ratio		0.78	0.52	1.00	0.90						0.63	0.94
Control Delay		41.3	7.5	40.4	8.3						48.6	62.1
Queue Delay		0.0	0.0	0.0	1.4						0.0	0.0
Total Delay		41.3	7.5	40.4	9.7						48.6	62.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A	D	A						D	E
Approach Delay		26.9			18.7						57.0	
Approach LOS		C			B						E	
Queue Length 50th (ft)		463	40	120	147						207	288
Queue Length 95th (ft)		#672	132	m71	m118						278	#423
Internal Link Dist (ft)		208			688			1049			1164	
Turn Bay Length (ft)				150								150
Base Capacity (vph)		780	874	481	1202						477	514
Starvation Cap Reductn		0	0	0	39						0	0
Spillback Cap Reductn		0	0	0	0						0	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.78	0.52	0.93	0.93						0.60	0.90

Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 61 (47%), Referenced to phase 2:EBT and 6:WBTL, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 29.9 Intersection LOS: C
Intersection Capacity Utilization 103.6% ICU Level of Service G
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: 116th Street NE & I-5 Southbound Ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		0	0		400	0		0
Storage Lanes	1		0	0		1	0		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950							0.953				
Satd. Flow (prot)	1703	1792	0	0	1845	1568	0	1708	1524	0	0	0
Flt Permitted	0.085							0.953				
Satd. Flow (perm)	152	1792	0	0	1845	1568	0	1708	1524	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						209			280			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		768			286			1069			1275	
Travel Time (s)		17.5			6.5			24.3			29.0	
Volume (vph)	487	517	0	0	678	311	556	2	818	0	0	0
Peak Hour Factor	0.88	0.88	0.88	0.93	0.93	0.93	0.88	0.88	0.88	0.92	0.92	0.92
Heavy Vehicles (%)	6%	6%	6%	3%	3%	3%	6%	6%	6%	2%	2%	2%
Adj. Flow (vph)	553	588	0	0	729	334	632	2	930	0	0	0
Lane Group Flow (vph)	553	588	0	0	729	334	0	634	930	0	0	0
Turn Type	pm+pt					Perm	Perm		Perm			
Protected Phases	5	2			6			8				
Permitted Phases	2					6	8		8			
Detector Phases	5	2			6	6	8	8	8			
Minimum Initial (s)	3.0	5.0			5.0	5.0	5.0	5.0	5.0			
Minimum Split (s)	8.0	25.3			23.3	23.3	34.0	34.0	34.0			
Total Split (s)	30.0	77.0	0.0	0.0	47.0	47.0	53.0	53.0	53.0	0.0	0.0	0.0
Total Split (%)	23.1%	59.2%	0.0%	0.0%	36.2%	36.2%	40.8%	40.8%	40.8%	0.0%	0.0%	0.0%
Maximum Green (s)	25.0	71.7			41.7	41.7	48.0	48.0	48.0			
Yellow Time (s)	4.0	4.3			4.3	4.3	4.0	4.0	4.0			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.5			3.5	3.5	3.5	3.5	3.5			
Minimum Gap (s)	2.0	3.5			3.5	3.5	3.5	3.5	3.5			
Time Before Reduce (s)	10.0	10.0			10.0	10.0	10.0	10.0	10.0			
Time To Reduce (s)	10.0	10.0			10.0	10.0	10.0	10.0	10.0			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0			
Flash Dont Walk (s)		13.0			9.0	9.0	22.0	22.0	22.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	73.0	73.0			43.0	43.0		49.0	49.0			
Actuated g/C Ratio	0.56	0.56			0.33	0.33		0.38	0.38			
v/c Ratio	1.40	0.58			1.20	0.51		0.98	1.24			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	209.8	9.1			141.8	15.4		72.3	145.8			
Queue Delay	0.0	0.2			0.0	0.0		0.0	0.0			
Total Delay	209.8	9.2			141.8	15.4		72.3	145.8			
LOS	F	A			F	B		E	F			
Approach Delay		106.4			102.1			116.0				
Approach LOS		F			F			F				
Queue Length 50th (ft)	~374	138			~742	78		525	~820			
Queue Length 95th (ft)	#329	125			#984	171		#750	#1035			
Internal Link Dist (ft)		688			206			989			1195	
Turn Bay Length (ft)	150								400			
Base Capacity (vph)	396	1006			610	659		644	749			
Starvation Cap Reductn	0	62			0	0		0	0			
Spillback Cap Reductn	0	0			0	0		0	0			
Storage Cap Reductn	0	0			0	0		0	0			
Reduced v/c Ratio	1.40	0.62			1.20	0.51		0.98	1.24			

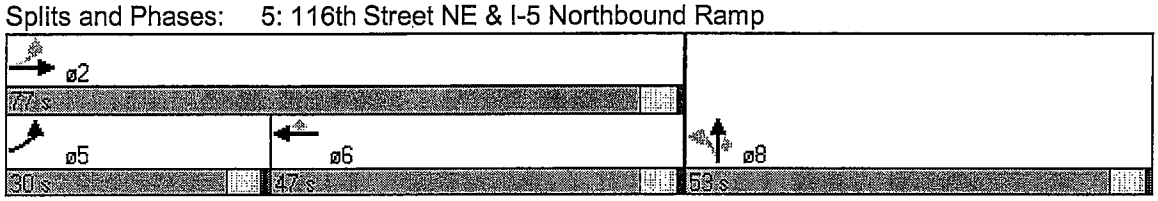
Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 130
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.40
Intersection Signal Delay: 109.2 Intersection LOS: F
Intersection Capacity Utilization 103.6% ICU Level of Service G
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 5: 116th Street NE & I-5 Northbound Ramp



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	0	0	0	320	0	43	0	342	330	57	314	0
Peak Hour Factor	0.92	0.92	0.92	0.84	0.84	0.84	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	0	0	381	0	51	0	384	371	64	353	0

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	0	381	51	755	417
Volume Left (vph)	0	381	0	0	64
Volume Right (vph)	0	0	51	371	0
Hadj (s)	0.00	0.53	-0.67	-0.23	0.08
Departure Headway (s)	8.7	7.9	6.7	6.2	6.7
Degree Utilization, x	0.00	0.83	0.09	1.31	0.78
Capacity (veh/h)	382	451	530	587	526
Control Delay (s)	11.7	37.8	9.1	171.5	29.3
Approach Delay (s)	0.0	34.4		171.5	29.3
Approach LOS	A	D		F	D

Intersection Summary			
Delay	97.6		
HCM Level of Service	F		
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		

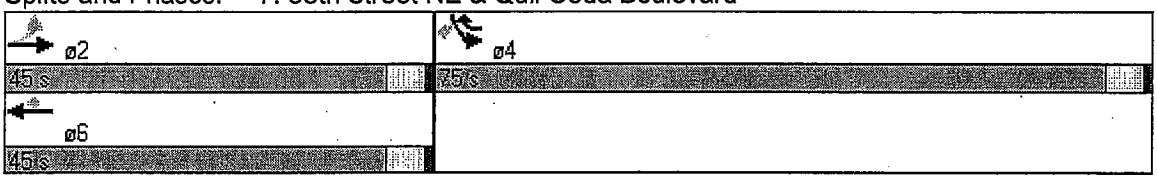
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	11	11
Storage Length (ft)	150			0	150	0
Storage Lanes	1			2	1	1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	0.88	0.97	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1728	1818	1818	2814	3385	1561
Flt Permitted	0.539				0.950	
Satd. Flow (perm)	980	1818	1818	2814	3385	1561
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						169
Headway Factor	1.04	1.04	1.04	1.00	1.04	1.04
Link Speed (mph)		30	30		30	
Link Distance (ft)		1614	447		388	
Travel Time (s)		36.7	10.2		8.8	
Volume (vph)	185	183	184	1711	1701	183
Peak Hour Factor	0.75	0.75	0.91	0.91	0.97	0.97
Heavy Vehicles (%)	1%	1%	1%	1%	0%	0%
Adj. Flow (vph)	247	244	202	1880	1754	189
Lane Group Flow (vph)	247	244	202	1880	1754	189
Turn Type	Perm			pm+ov		Perm
Protected Phases		2	6	4	4	
Permitted Phases	2			6		4
Detector Phases	2	2	6	4	4	4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	21.0	37.0	21.0	21.0	21.0
Total Split (s)	45.0	45.0	45.0	75.0	75.0	75.0
Total Split (%)	37.5%	37.5%	37.5%	62.5%	62.5%	62.5%
Maximum Green (s)	40.0	40.0	40.0	70.0	70.0	70.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	4.0	4.0	4.0	3.5	3.5	3.5
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min
Walk Time (s)			7.0			
Flash Dont Walk (s)			25.0			
Pedestrian Calls (#/hr)			0			
Act Effct Green (s)	41.0	41.0	41.0	120.0	71.0	71.0
Actuated g/C Ratio	0.34	0.34	0.34	1.00	0.59	0.59
v/c Ratio	0.74	0.39	0.33	0.67	0.88	0.19
Control Delay	49.7	32.4	42.3	2.4	27.1	2.7
Queue Delay	0.0	0.0	0.0	0.0	1.3	0.0

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Delay	49.7	32.4	42.3	2.4	28.4	2.7
LOS	D	C	D	A	C	A
Approach Delay		41.1	6.3		25.9	
Approach LOS		D	A		C	
Queue Length 50th (ft)	168	143	144	36	560	6
Queue Length 95th (ft)	211	174	m207	0	681	36
Internal Link Dist (ft)		1534	367		308	
Turn Bay Length (ft)	150				150	
Base Capacity (vph)	335	621	621	2814	2003	993
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	103	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.39	0.33	0.67	0.92	0.19

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 119 (99%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 18.5 Intersection LOS: B
Intersection Capacity Utilization 78.5% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: 88th Street NE & Quil Ceda Boulevard



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		175	190		0	0		0	0		200
Storage Lanes	0		1	2		0	0		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	0.91	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.975	0.850									0.850
Flt Protected				0.950							0.953	
Satd. Flow (prot)	0	3305	1441	3433	3539	0	0	0	0	0	1775	1583
Flt Permitted				0.950							0.953	
Satd. Flow (perm)	0	3305	1441	3433	3539	0	0	0	0	0	1775	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26	651									37
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		447			525			774			1117	
Travel Time (s)		10.2			11.9			17.6			25.4	
Volume (vph)	0	995	951	434	1613	0	0	0	0	299	6	284
Peak Hour Factor	0.91	0.91	0.91	0.94	0.94	0.94	0.92	0.92	0.92	0.91	0.91	0.91
Adj. Flow (vph)	0	1093	1045	462	1716	0	0	0	0	329	7	312
Lane Group Flow (vph)	0	1315	823	462	1716	0	0	0	0	0	336	312
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases			2							4		4
Detector Phases		2	2	1	6					4	4	4
Minimum Initial (s)		5.0	5.0	5.0	5.0					5.0	5.0	5.0
Minimum Split (s)		28.0	28.0	11.0	28.0					33.0	33.0	33.0
Total Split (s)	0.0	62.0	62.0	24.0	86.0	0.0	0.0	0.0	0.0	34.0	34.0	34.0
Total Split (%)	0.0%	51.7%	51.7%	20.0%	71.7%	0.0%	0.0%	0.0%	0.0%	28.3%	28.3%	28.3%
Maximum Green (s)		56.0	56.0	18.0	80.0					28.0	28.0	28.0
Yellow Time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
All-Red Time (s)		2.0	2.0	2.0	2.0					2.0	2.0	2.0
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		4.0	4.0	3.0	4.0					3.5	3.5	3.5
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		7.0	7.0		7.0					7.0	7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0					20.0	20.0	20.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		60.3	60.3	20.0	84.3						27.7	27.7
Actuated g/C Ratio		0.50	0.50	0.17	0.70						0.23	0.23
v/c Ratio		0.79	0.79	0.81	0.69						0.82	0.79
Control Delay		16.8	5.2	25.3	4.5						60.2	53.0
Queue Delay		3.2	1.0	0.0	0.1						2.2	0.0
Total Delay		20.0	6.2	25.3	4.6						62.4	53.0
LOS		B	A	C	A						E	D

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		14.7			9.0						57.9	
Approach LOS		B			A						E	
Queue Length 50th (ft)		251	5	122	185						242	198
Queue Length 95th (ft)		420	m73	m90	m175						#361	#307
Internal Link Dist (ft)		367			445			694			1037	
Turn Bay Length (ft)			175	190								200
Base Capacity (vph)		1673	1048	585	2485						444	424
Starvation Cap Reductn		256	73	0	125						0	0
Spillback Cap Reductn		0	0	0	16						37	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.93	0.84	0.79	0.73						0.83	0.74

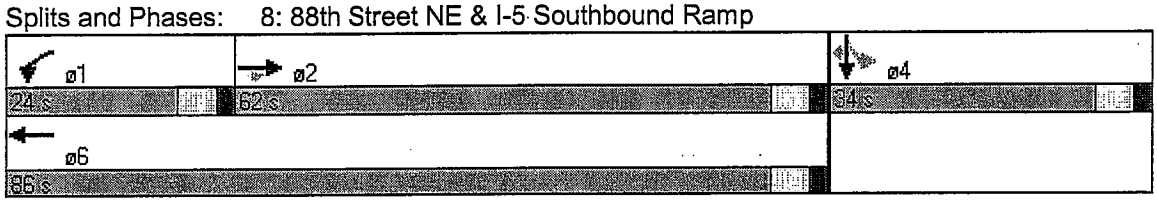
Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 54 (45%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 17.8 Intersection LOS: B
Intersection Capacity Utilization 142.0% ICU Level of Service H
Analysis Period (min) 15

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: 88th Street NE & I-5 Southbound Ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	110		0	0		0	200		0	0		0
Storage Lanes	1		0	0		0	1		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Frt					0.957				0.850			
Flt Protected	0.950						0.950	0.953				
Satd. Flow (prot)	1770	3539	0	0	3387	0	1681	1686	1583	0	0	0
Flt Permitted	0.085						0.950	0.953				
Satd. Flow (perm)	158	3539	0	0	3387	0	1681	1686	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					55				48			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		525			364			821			1060	
Travel Time (s)		11.9			8.3			18.7			24.1	
Volume (vph)	230	1009	0	0	972	385	939	3	847	0	0	0
Peak Hour Factor	0.93	0.93	0.93	0.90	0.90	0.90	0.91	0.91	0.91	0.92	0.92	0.92
Adj. Flow (vph)	247	1085	0	0	1080	428	1032	3	931	0	0	0
Lane Group Flow (vph)	247	1085	0	0	1508	0	516	519	931	0	0	0
Turn Type	pm+pt						Perm		Perm			
Protected Phases	5	2			6			8				
Permitted Phases	2						8		8			
Detector Phases	5	2			6		8	8	8			
Minimum Initial (s)	3.0	10.0			10.0		5.0	5.0	5.0			
Minimum Split (s)	8.0	25.0			23.0		34.0	34.0	34.0			
Total Split (s)	13.0	60.0	0.0	0.0	47.0	0.0	60.0	60.0	60.0	0.0	0.0	0.0
Total Split (%)	10.8%	50.0%	0.0%	0.0%	39.2%	0.0%	50.0%	50.0%	50.0%	0.0%	0.0%	0.0%
Maximum Green (s)	8.4	55.0			42.0		55.0	55.0	55.0			
Yellow Time (s)	3.6	4.0			4.0		4.0	4.0	4.0			
All-Red Time (s)	1.0	1.0			1.0		1.0	1.0	1.0			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?	Yes				Yes							
Vehicle Extension (s)	2.5	4.0			4.0		3.5	3.5	3.5			
Recall Mode	None	C-Max			C-Max		Min	Min	Min			
Walk Time (s)		7.0			7.0		7.0	7.0	7.0			
Flash Dont Walk (s)		13.0			9.0		22.0	22.0	22.0			
Pedestrian Calls (#/hr)		0			0		0	0	0			
Act Effct Green (s)	56.0	56.0			43.0		56.0	56.0	56.0			
Actuated g/C Ratio	0.47	0.47			0.36		0.47	0.47	0.47			
v/c Ratio	1.27	0.66			1.21		0.66	0.66	1.22			
Control Delay	171.0	23.1			127.8		29.6	29.7	139.1			
Queue Delay	0.0	2.4			0.0		0.0	0.0	48.5			
Total Delay	171.0	25.6			127.8		29.6	29.7	187.7			
LOS	F	C			F		C	C	F			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		52.5			127.8			104.5				
Approach LOS		D			F			F				
Queue Length 50th (ft)	~185	340			~738		315	317	~868			
Queue Length 95th (ft)	m#287	418			#854		448	451	#1120			
Internal Link Dist (ft)		445			284			741			980	
Turn Bay Length (ft)	110						200					
Base Capacity (vph)	195	1652			1249		784	787	764			
Starvation Cap Reductn	0	419			0		0	0	0			
Spillback Cap Reductn	0	7			0		0	0	63			
Storage Cap Reductn	0	0			0		0	0	0			
Reduced v/c Ratio	1.27	0.88			1.21		0.66	0.66	1.33			

Intersection Summary

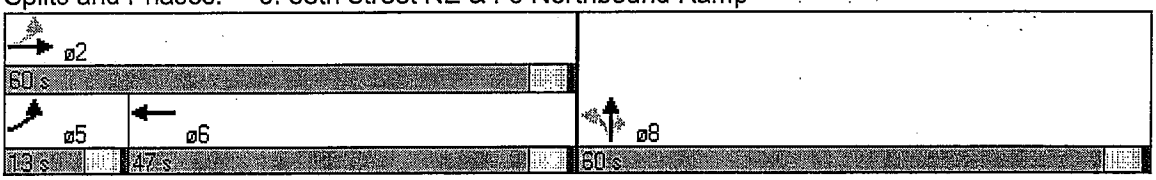
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green, Master Intersection
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.27
Intersection Signal Delay: 97.4 Intersection LOS: F
Intersection Capacity Utilization 142.0% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: 88th Street NE & I-5 Northbound Ramp



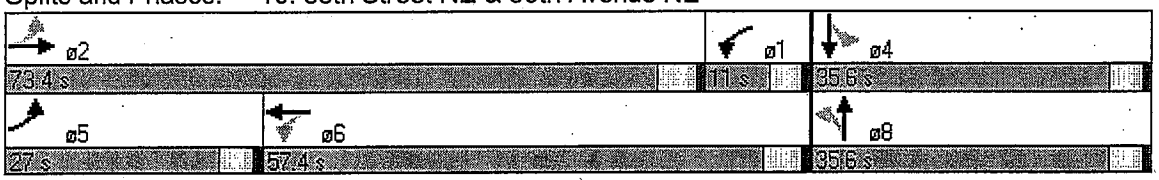
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	120		0	100		0	55		0	0		0
Storage Lanes	1		0	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.996			0.896			0.857	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	3450	0	1752	3491	0	1656	1562	0	1752	1581	0
Flt Permitted	0.086			0.117			0.451			0.730		
Satd. Flow (perm)	157	3450	0	216	3491	0	786	1562	0	1347	1581	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			3			29			214	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		364			1539			377			631	
Travel Time (s)		8.3			35.0			8.6			14.3	
Volume (vph)	226	1428	58	33	1040	29	60	10	22	159	8	173
Peak Hour Factor	0.94	0.94	0.94	0.90	0.90	0.90	0.77	0.77	0.77	0.81	0.81	0.81
Heavy Vehicles (%)	4%	4%	4%	3%	3%	3%	9%	9%	9%	3%	3%	3%
Adj. Flow (vph)	240	1519	62	37	1156	32	78	13	29	196	10	214
Lane Group Flow (vph)	240	1581	0	37	1188	0	78	42	0	196	224	0
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phases	5	2		1	6		8	8		4	4	
Minimum Initial (s)	3.0	7.0		3.0	7.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	8.0	28.0		8.0	27.0		23.5	23.5		24.5	24.5	
Total Split (s)	27.0	73.4	0.0	11.0	57.4	0.0	35.6	35.6	0.0	35.6	35.6	0.0
Total Split (%)	22.5%	61.2%	0.0%	9.2%	47.8%	0.0%	29.7%	29.7%	0.0%	29.7%	29.7%	0.0%
Maximum Green (s)	22.5	68.4		6.5	52.4		31.1	31.1		31.1	31.1	
Yellow Time (s)	3.5	4.0		3.5	4.0		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.5		3.0	3.5		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	5.0		0.0	5.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	5.0		0.0	5.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max		Min	Min		Min	Min	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		16.0			15.0		12.0	12.0		13.0	13.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	82.9	82.9		69.9	69.9		22.5	22.5		22.5	22.5	
Actuated g/C Ratio	0.69	0.69		0.58	0.58		0.19	0.19		0.19	0.19	
v/c Ratio	0.77	0.66		0.18	0.58		0.53	0.13		0.77	0.48	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	36.0	8.2		22.7	19.7		55.3	18.2		65.6	9.2	
Queue Delay	0.1	0.6		0.0	0.6		0.7	0.0		0.0	0.4	
Total Delay	36.1	8.8		22.7	20.3		56.0	18.2		65.6	9.7	
LOS	D	A		C	C		E	B		E	A	
Approach Delay		12.4			20.4			42.8			35.8	
Approach LOS		B			C			D			D	
Queue Length 50th (ft)	111	231		12	292		55	8		146	6	
Queue Length 95th (ft)	m155	m315		37	486		83	28		185	46	
Internal Link Dist (ft)		284			1459			297			551	
Turn Bay Length (ft)	120			100			55					
Base Capacity (vph)	411	2384		216	2035		207	433		355	574	
Starvation Cap Reductn	4	391		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	452		28	0		0	101	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.59	0.79		0.17	0.75		0.44	0.10		0.55	0.47	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 18.9 Intersection LOS: B
Intersection Capacity Utilization 73.3% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: 88th Street NE & 36th Avenue NE



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.951			0.979			0.921			0.996	
Flt Protected		0.998			0.977			0.992			0.988	
Satd. Flow (prot)	0	1751	0	0	1782	0	0	1736	0	0	1669	0
Flt Permitted		0.971			0.606			0.722			0.518	
Satd. Flow (perm)	0	1703	0	0	1105	0	0	1263	0	0	875	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		41			13			110			2	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		682			1108			635			515	
Travel Time (s)		13.3			21.6			14.4			11.7	
Volume (vph)	10	166	101	333	258	108	90	137	320	113	144	14
Peak Hour Factor	0.84	0.84	0.84	0.79	0.79	0.79	0.45	0.45	0.45	0.61	0.25	0.61
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	0%	0%	0%	12%	12%	12%
Adj. Flow (vph)	12	198	120	422	327	137	200	304	711	185	576	23
Lane Group Flow (vph)	0	330	0	0	886	0	0	1215	0	0	784	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phases	4	4		8	8		2	2		6	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	43.0	43.0	0.0	43.0	43.0	0.0	47.0	47.0	0.0	47.0	47.0	0.0
Total Split (%)	47.8%	47.8%	0.0%	47.8%	47.8%	0.0%	52.2%	52.2%	0.0%	52.2%	52.2%	0.0%
Maximum Green (s)	39.0	39.0		39.0	39.0		43.0	43.0		43.0	43.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)		40.0			40.0			44.0			44.0	
Actuated g/C Ratio		0.44			0.44			0.49			0.49	
v/c Ratio		0.42			1.78			1.80			1.83	
Control Delay		16.8			381.1			387.9			403.1	
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		16.8			381.1			387.9			403.1	
LOS		B			F			F			F	
Approach Delay		16.8			381.1			387.9			403.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			F			F			F	
Queue Length 50th (ft)		108			~767			~1029			~690	
Queue Length 95th (ft)		160			#839			#412			107	
Internal Link Dist (ft)		602			1028			555			435	
Turn Bay Length (ft)												
Base Capacity (vph)		780			498			674			429	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.42			1.78			1.80			1.83	

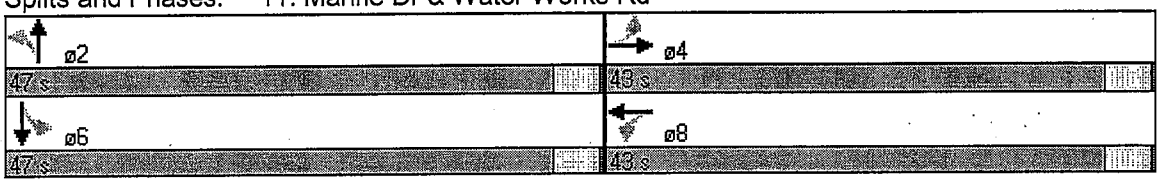
Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 40
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.83
Intersection Signal Delay: 351.6 Intersection LOS: F
Intersection Capacity Utilization 97.8% ICU Level of Service F
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Marine Dr & Water Works Rd



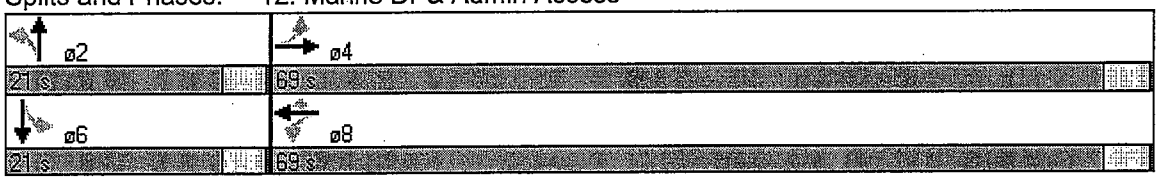
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999				0.850		0.858			0.880	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1861	0	1770	1863	1583	1770	1598	0	1770	1639	0
Flt Permitted	0.086			0.204			0.702			0.405		
Satd. Flow (perm)	160	1861	0	380	1863	1583	1308	1598	0	754	1639	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		1				35		201			67	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		1108			426			576			381	
Travel Time (s)		21.6			8.3			13.1			8.7	
Volume (vph)	43	857	7	133	1082	32	19	10	189	86	16	62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	932	8	145	1176	35	21	11	205	93	17	67
Lane Group Flow (vph)	47	940	0	145	1176	35	21	216	0	93	84	0
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Detector Phases	4	4		8	8	8	2	2		6	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0	20.0	20.0	20.0		20.0	20.0	
Total Split (s)	69.0	69.0	0.0	69.0	69.0	69.0	21.0	21.0	0.0	21.0	21.0	0.0
Total Split (%)	76.7%	76.7%	0.0%	76.7%	76.7%	76.7%	23.3%	23.3%	0.0%	23.3%	23.3%	0.0%
Maximum Green (s)	65.0	65.0		65.0	65.0	65.0	17.0	17.0		17.0	17.0	
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5	0.5	0.5	0.5		0.5	0.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None	None	Max	Max		Max	Max	
Walk Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0	11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0	0	0	0		0	0	
Act Effct Green (s)	52.8	52.8		52.8	52.8	52.8	17.6	17.6		17.6	17.6	
Actuated g/C Ratio	0.67	0.67		0.67	0.67	0.67	0.22	0.22		0.22	0.22	
v/c Ratio	0.44	0.75		0.57	0.94	0.03	0.07	0.42		0.55	0.20	
Control Delay	19.7	12.5		16.3	26.4	1.3	30.4	9.0		47.4	12.8	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay	19.7	12.5		16.3	26.4	1.3	30.4	9.0		47.4	12.8	
LOS	B	B		B	C	A	C	A		D	B	
Approach Delay		12.8			24.7			10.9			31.0	
Approach LOS		B			C			B			C	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	9	251		31	422	0	9	7		47	8	
Queue Length 95th (ft)	41	383		89	#845	7	30	67		#123	46	
Internal Link Dist (ft)		1028			346			496			301	
Turn Bay Length (ft)												
Base Capacity (vph)	116	1344		274	1346	1153	292	513		168	419	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.41	0.70		0.53	0.87	0.03	0.07	0.42		0.55	0.20	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 78.7
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.94
Intersection Signal Delay: 19.7 Intersection LOS: B
Intersection Capacity Utilization 90.6% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 12: Marine Dr & Admin Access



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	18	1067	1325	74	34	11
Peak Hour Factor	0.90	0.90	0.92	0.92	0.83	0.83
Hourly flow rate (vph)	20	1186	1440	80	41	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		897				
pX, platoon unblocked					0.56	
vC, conflicting volume	1521				2706	1480
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1521				4067	1480
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	95				0	91
cM capacity (veh/h)	439				2	153

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	20	1186	1521	54
Volume Left	20	0	0	41
Volume Right	0	0	80	13
cSH	439	1700	1700	2
Volume to Capacity	0.05	0.70	0.89	26.70
Queue Length 95th (ft)	4	0	0	Err
Control Delay (s)	13.6	0.0	0.0	Err
Lane LOS	B			F
Approach Delay (s)	0.2		0.0	9999.0
Approach LOS				F

Intersection Summary			
Average Delay	195.1		
Intersection Capacity Utilization	84.2%	ICU Level of Service	E
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	105		0	40		0	0		0	0		100
Storage Lanes	1		0	1		1	0		0	0		1
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50		50	50	50	50	50		50	50	50
Trailing Detector (ft)	0	0		0	0	0	0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850		0.950				0.850
Flt Protected	0.950			0.950				0.980			0.954	
Satd. Flow (prot)	1719	3438	0	1752	1845	1568	0	1608	0	0	1743	1553
Flt Permitted	0.950			0.276				0.865			0.660	
Satd. Flow (perm)	1719	3438	0	509	1845	1568	0	1419	0	0	1206	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						125		13				365
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		493			923			334			2420	
Travel Time (s)		9.6			18.0			6.5			47.1	
Volume (vph)	369	838	2	14	1037	249	13	7	12	162	7	411
Peak Hour Factor	0.81	0.81	0.81	0.96	0.96	0.96	0.91	0.91	0.91	0.98	0.98	0.98
Heavy Vehicles (%)	5%	5%	5%	3%	3%	3%	10%	10%	10%	4%	4%	4%
Adj. Flow (vph)	456	1035	2	15	1080	259	14	8	13	165	7	419
Lane Group Flow (vph)	456	1037	0	15	1080	259	0	35	0	0	172	419
Turn Type	Prot			Perm		Perm	Perm			pm+pt		Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases				8		8	2			6		6
Detector Phases	7	4		8	8	8	2	2		1	6	6
Minimum Initial (s)	8.0	8.0		8.0	8.0	8.0	8.0	8.0		8.0	8.0	8.0
Minimum Split (s)	12.0	20.0		20.0	20.0	20.0	20.0	20.0		12.0	20.0	20.0
Total Split (s)	40.0	117.0	0.0	77.0	77.0	77.0	21.0	21.0	0.0	12.0	33.0	33.0
Total Split (%)	26.7%	78.0%	0.0%	51.3%	51.3%	51.3%	14.0%	14.0%	0.0%	8.0%	22.0%	22.0%
Maximum Green (s)	36.0	113.0		73.0	73.0	73.0	17.0	17.0		8.0	29.0	29.0
Yellow Time (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5		0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Min	Min		None	Min	Min
Act Effct Green (s)	37.0	114.1		74.1	74.1	74.1		24.9			24.9	24.9
Actuated g/C Ratio	0.26	0.79		0.51	0.51	0.51		0.17			0.17	0.17
v/c Ratio	1.04	0.38		0.06	1.15	0.30		0.14			0.83	0.74
Control Delay	105.1	5.6		20.4	111.8	11.7		36.2			88.7	17.3
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0			0.0	0.0
Total Delay	105.1	5.6		20.4	111.8	11.7		36.2			88.7	17.3
LOS	F	A		C	F	B		D			F	B
Approach Delay		36.0			91.7			36.2			38.1	
Approach LOS		D			F			D			D	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	~476	146		7	~1223	68		18			159	44
Queue Length 95th (ft)	#602	166		22	#1533	134		51			#262	170
Internal Link Dist (ft)		413			843			254			2340	
Turn Bay Length (ft)	105			40								100
Base Capacity (vph)	439	2706		260	943	862		258			241	603
Starvation Cap Reductn	0	0		0	0	0		0			0	0
Spillback Cap Reductn	0	0		0	0	0		0			0	0
Storage Cap Reductn	0	0		0	0	0		0			0	0
Reduced v/c Ratio	1.04	0.38		0.06	1.15	0.30		0.14			0.71	0.69

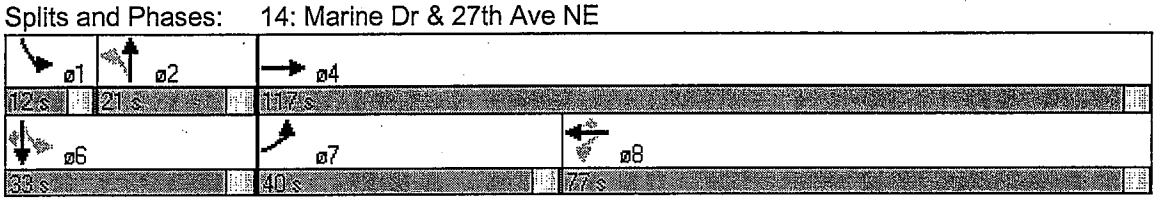
Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 145
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.15
Intersection Signal Delay: 58.0 Intersection LOS: E
Intersection Capacity Utilization 101.0% ICU Level of Service G
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: Marine Dr & 27th Ave NE



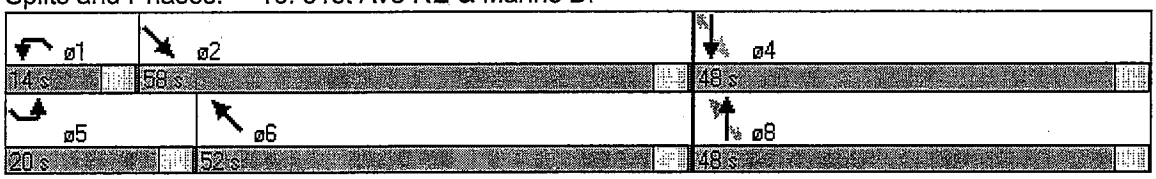
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	0		100	100		0	100		0
Storage Lanes	0		1	0		1	1		0	1		0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50	50	50	50	50	50	50		50	50	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt			0.850			0.850		0.988			0.999	
Flt Protected		0.959			0.986		0.950			0.950		
Satd. Flow (prot)	0	1804	1599	0	1855	1599	1752	3463	0	1736	3468	0
Flt Permitted		0.744			0.928		0.950			0.950		
Satd. Flow (perm)	0	1400	1599	0	1746	1599	1752	3463	0	1736	3468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			151			151		10			1	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		404			531			552			630	
Travel Time (s)		9.2			12.1			10.8			12.3	
Volume (vph)	239	39	175	4	10	128	95	910	77	41	1083	9
Peak Hour Factor	0.81	0.81	0.81	0.85	0.85	0.85	0.84	0.84	0.84	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	3%	3%	3%	4%	4%	4%
Adj. Flow (vph)	295	48	216	5	12	151	113	1083	92	44	1152	10
Lane Group Flow (vph)	0	343	216	0	17	151	113	1175	0	44	1162	0
Turn Type	Perm		Perm	Perm		Perm	Prot			Prot		
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8		8	4		4						
Detector Phases	8	8	8	4	4	4	5	2		1	6	
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0		8.0	8.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	12.0	20.0		12.0	20.0	
Total Split (s)	48.0	48.0	48.0	48.0	48.0	48.0	20.0	58.0	0.0	14.0	52.0	0.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	16.7%	48.3%	0.0%	11.7%	43.3%	0.0%
Maximum Green (s)	44.0	44.0	44.0	44.0	44.0	44.0	16.0	54.0		10.0	48.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	C-Max	C-Max	None	None		None	None	
Act Effct Green (s)		48.4	48.4		48.4	48.4	13.5	55.2		9.9	49.1	
Actuated g/C Ratio		0.40	0.40		0.40	0.40	0.11	0.46		0.08	0.41	
v/c Ratio		0.61	0.29		0.02	0.21	0.57	0.74		0.31	0.82	
Control Delay		35.4	9.6		23.9	4.6	61.5	29.6		61.5	25.6	
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.2		0.0	0.3	
Total Delay		35.4	9.6		23.9	4.6	61.5	29.8		61.5	25.9	
LOS		D	A		C	A	E	C		E	C	
Approach Delay		25.4			6.5			32.6			27.2	
Approach LOS		C			A			C			C	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Length 50th (ft)		218	33		8	0	84	370		36	169	
Queue Length 95th (ft)		281	69		23	36	132	416		m41	m229	
Internal Link Dist (ft)		324			451			472			550	
Turn Bay Length (ft)			100			100	100			100		
Base Capacity (vph)		564	735		704	735	248	1614		159	1471	
Starvation Cap Reductn		0	0		0	0	0	0		0	44	
Spillback Cap Reductn		0	2		0	0	0	61		0	0	
Storage Cap Reductn		0	0		0	0	0	0		0	0	
Reduced v/c Ratio		0.61	0.29		0.02	0.21	0.46	0.76		0.28	0.81	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 4 (3%), Referenced to phase 4:SBTL and 8:NBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.82
Intersection Signal Delay: 28.0 Intersection LOS: C
Intersection Capacity Utilization 68.8% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 15: 31st Ave NE & Marine Dr



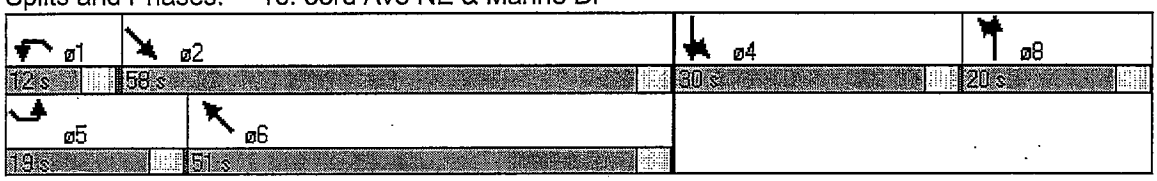
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	100		0	100		0	100		0
Storage Lanes	1		0	1		0	1		0	1		0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.95	1.00	0.95	0.95
Frt		0.856			0.917			0.999			0.965	
Flt Protected	0.950			0.950	0.979		0.950			0.950		
Satd. Flow (prot)	1770	1595	0	1665	1573	0	1752	3501	0	1770	3415	0
Flt Permitted	0.950			0.950	0.979		0.950			0.950		
Satd. Flow (perm)	1770	1595	0	1665	1573	0	1752	3501	0	1770	3415	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		51			48			1			40	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			35			35	
Link Distance (ft)		704			705			630			517	
Travel Time (s)		16.0			16.0			12.3			10.1	
Volume (vph)	21	2	44	394	4	153	125	997	6	47	1003	308
Peak Hour Factor	0.86	0.86	0.86	0.85	0.85	0.85	0.64	0.64	0.64	0.97	0.97	0.97
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	3%	3%	3%	2%	2%	2%
Adj. Flow (vph)	24	2	51	464	5	180	195	1558	9	48	1034	318
Lane Group Flow (vph)	24	53	0	325	324	0	195	1567	0	48	1352	0
Turn Type	Split			Split			Prot			Prot		
Protected Phases	8	8		4	4		5	2		1	6	
Permitted Phases												
Detector Phases	8	8		4	4		5	2		1	6	
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0		8.0	8.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		12.0	20.0		12.0	20.0	
Total Split (s)	20.0	20.0	0.0	30.0	30.0	0.0	19.0	58.0	0.0	12.0	51.0	0.0
Total Split (%)	16.7%	16.7%	0.0%	25.0%	25.0%	0.0%	15.8%	48.3%	0.0%	10.0%	42.5%	0.0%
Maximum Green (s)	16.0	16.0		26.0	26.0		15.0	54.0		8.0	47.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min		Min	Min		None	C-Max		None	C-Max	
Act Effct Green (s)	9.3	9.3		26.0	26.0		20.1	64.7		10.4	52.6	
Actuated g/C Ratio	0.08	0.08		0.22	0.22		0.17	0.54		0.09	0.44	
v/c Ratio	0.18	0.31		0.90	0.86		0.67	0.83		0.31	0.89	
Control Delay	54.8	20.0		73.9	60.1		73.6	16.2		64.7	30.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.2		0.0	0.0	
Total Delay	54.8	20.0		73.9	60.1		73.6	16.4		64.7	30.3	
LOS	D	B		E	E		E	B		E	C	
Approach Delay		30.8			67.0			22.8			31.4	
Approach LOS		C			E			C			C	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Length 50th (ft)	18	2		256	218		156	202		39	463	
Queue Length 95th (ft)	43	38		#384	#336		163	172		m46	m#620	
Internal Link Dist (ft)		624			625			550			437	
Turn Bay Length (ft)	100			100			100			100		
Base Capacity (vph)	251	270		375	391		298	1889		153	1520	
Starvation Cap Reductn	0	0		0	0		0	22		0	0	
Spillback Cap Reductn	0	0		0	0		0	43		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.10	0.20		0.87	0.83		0.65	0.85		0.31	0.89	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 74 (62%), Referenced to phase 2:SET and 6:NWT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.90
Intersection Signal Delay: 33.4 Intersection LOS: C
Intersection Capacity Utilization 76.8% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 16: 33rd Ave NE & Marine Dr



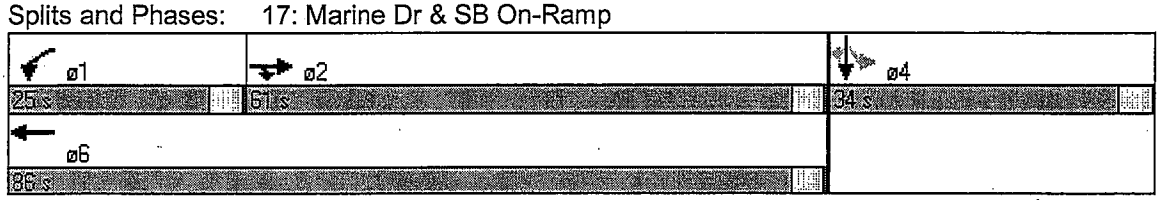
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	200		0	0		0	0		0
Storage Lanes	0		1	2		0	0		0	0		1
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850									0.850
Flt Protected				0.950							0.952	
Satd. Flow (prot)	0	1863	1583	3433	1863	0	0	0	0	0	1773	1583
Flt Permitted				0.950							0.952	
Satd. Flow (perm)	0	1863	1583	3433	1863	0	0	0	0	0	1773	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			519									104
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		189			521			740			805	
Travel Time (s)		3.7			10.1			16.8			18.3	
Volume (vph)	0	734	597	550	1141	0	0	0	0	396	1	231
Peak Hour Factor	0.92	0.92	0.92	0.93	0.93	0.93	0.90	0.90	0.90	0.93	0.93	0.93
Adj. Flow (vph)	0	798	649	591	1227	0	0	0	0	426	1	248
Lane Group Flow (vph)	0	798	649	591	1227	0	0	0	0	0	427	248
Turn Type			Prot	Prot						Perm		Perm
Protected Phases		2	2	1	6						4	
Permitted Phases										4		4
Detector Phases		2	2	1	6					4	4	4
Minimum Initial (s)		8.0	8.0	8.0	8.0					8.0	8.0	8.0
Minimum Split (s)		20.0	20.0	12.0	20.0					20.0	20.0	20.0
Total Split (s)	0.0	61.0	61.0	25.0	86.0	0.0	0.0	0.0	0.0	34.0	34.0	34.0
Total Split (%)	0.0%	50.8%	50.8%	20.8%	71.7%	0.0%	0.0%	0.0%	0.0%	28.3%	28.3%	28.3%
Maximum Green (s)		57.0	57.0	21.0	82.0					30.0	30.0	30.0
Yellow Time (s)		3.5	3.5	3.5	3.5					3.5	3.5	3.5
All-Red Time (s)		0.5	0.5	0.5	0.5					0.5	0.5	0.5
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Act Effct Green (s)		58.3	58.3	22.3	83.5						30.5	30.5
Actuated g/C Ratio		0.49	0.49	0.19	0.70						0.25	0.25
v/c Ratio		0.88	0.63	0.93	0.95						0.95	0.52
Control Delay		26.3	3.8	59.9	18.5						75.7	25.9
Queue Delay		2.1	0.4	0.0	14.7						6.1	0.0
Total Delay		28.4	4.1	59.9	33.2						81.8	25.9
LOS		C	A	E	C						F	C
Approach Delay		17.5			41.9						61.3	
Approach LOS		B			D						E	
Queue Length 50th (ft)		342	31	252	421						324	93

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 95th (ft)		m#769	m77	m245	m406						#521	177
Internal Link Dist (ft)		109			441			660			725	
Turn Bay Length (ft)				200								
Base Capacity (vph)		904	1035	637	1297						458	486
Starvation Cap Reductn		39	94	0	98						0	0
Spillback Cap Reductn		1	0	0	0						19	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.92	0.69	0.93	1.02						0.97	0.51

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 69 (58%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 36.3 Intersection LOS: D
Intersection Capacity Utilization 150.6% ICU Level of Service H
Analysis Period (min) 15
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 17: Marine Dr & SB On-Ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50			50		50	50	50			
Trailing Detector (ft)	0	0			0		0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt					0.952			0.853	0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	1770	1863	0	0	3369	0	1770	1509	1504	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	1770	1863	0	0	3369	0	1770	1509	1504	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)					80			163	163			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		521			1634			669			777	
Travel Time (s)		10.1			31.8			15.2			17.7	
Volume (vph)	252	794	0	0	987	464	626	11	1244	0	0	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.95	0.95	0.95	0.90	0.90	0.90
Adj. Flow (vph)	268	845	0	0	1050	494	659	12	1309	0	0	0
Lane Group Flow (vph)	268	845	0	0	1544	0	659	666	655	0	0	0
Turn Type	Prot						Prot		Perm			
Protected Phases	5	2			6		3	8				
Permitted Phases									8			
Detector Phases	5	2			6		3	8	8			
Minimum Initial (s)	8.0	8.0			8.0		8.0	8.0	8.0			
Minimum Split (s)	12.0	20.0			20.0		12.0	20.0	20.0			
Total Split (s)	20.0	73.0	0.0	0.0	53.0	0.0	47.0	47.0	47.0	0.0	0.0	0.0
Total Split (%)	16.7%	60.8%	0.0%	0.0%	44.2%	0.0%	39.2%	39.2%	39.2%	0.0%	0.0%	0.0%
Maximum Green (s)	16.0	69.0			49.0		43.0	43.0	43.0			
Yellow Time (s)	3.5	3.5			3.5		3.5	3.5	3.5			
All-Red Time (s)	0.5	0.5			0.5		0.5	0.5	0.5			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0	3.0			
Recall Mode	None	None			None		C-Max	C-Max	C-Max			
Act Effct Green (s)	17.0	70.0			50.0		44.0	44.0	44.0			
Actuated g/C Ratio	0.14	0.58			0.42		0.37	0.37	0.37			
v/c Ratio	1.07	0.78			1.06		1.02	1.01	1.00			
Control Delay	105.8	22.6			75.7		77.4	67.8	64.4			
Queue Delay	0.0	4.9			2.4		37.8	0.0	0.0			
Total Delay	105.8	27.4			78.1		115.2	67.8	64.4			
LOS	F	C			E		F	E	E			
Approach Delay		46.3			78.1			82.4				
Approach LOS		D			E			F				
Queue Length 50th (ft)	~237	367			~675		~523	~463	~434			
Queue Length 95th (ft)	m#284	m447			#816		#768	#729	#710			
Internal Link Dist (ft)		441			1554			589			697	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)												
Base Capacity (vph)	251	1087			1450		649	657	655			
Starvation Cap Reductn	0	179			0		0	0	0			
Spillback Cap Reductn	0	0			8		60	0	0			
Storage Cap Reductn	0	0			0		0	0	0			
Reduced v/c Ratio	1.07	0.93			1.07		1.12	1.01	1.00			

Intersection Summary

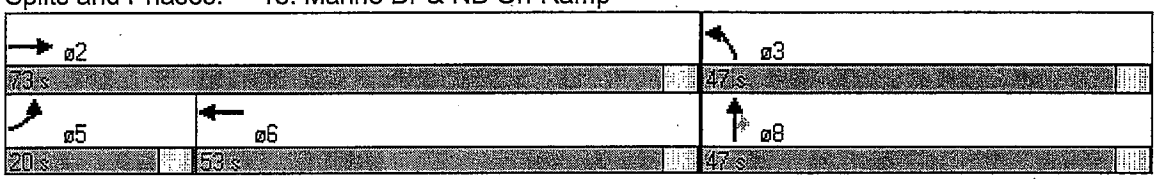
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 3:NBL and 8:NBT, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 72.3 Intersection LOS: E
Intersection Capacity Utilization 150.6% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 18: Marine Dr & NB On-Ramp



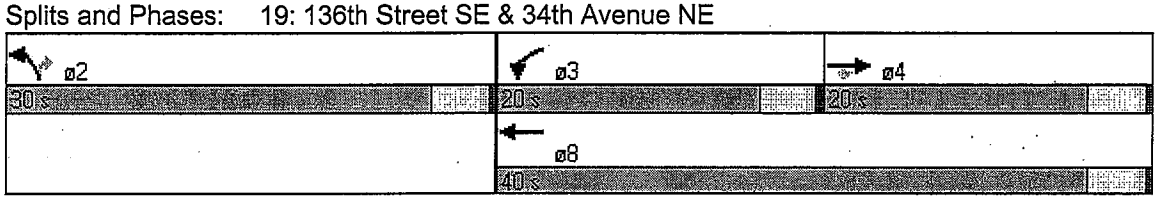
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		50	75		0	0
Storage Lanes		1	1		1	1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1863	1583	1770	1863	1787	1599
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1863	1583	1770	1863	1787	1599
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		242				219
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	30			30	30	
Link Distance (ft)	716			1644	665	
Travel Time (s)	16.3			37.4	15.1	
Volume (vph)	162	218	254	284	445	195
Peak Hour Factor	0.90	0.90	0.86	0.86	0.89	0.89
Heavy Vehicles (%)	2%	2%	2%	2%	1%	1%
Adj. Flow (vph)	180	242	295	330	500	219
Lane Group Flow (vph)	180	242	295	330	500	219
Turn Type		Perm	Prot			Perm
Protected Phases	4		3	8	2	
Permitted Phases		4				2
Detector Phases	4	4	3	8	2	2
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	8.0	20.0	20.0	20.0
Total Split (s)	20.0	20.0	20.0	40.0	30.0	30.0
Total Split (%)	28.6%	28.6%	28.6%	57.1%	42.9%	42.9%
Maximum Green (s)	16.0	16.0	16.0	36.0	26.0	26.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	Max	Max
Walk Time (s)	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	11.2	11.2	14.0	29.2	26.2	26.2
Actuated g/C Ratio	0.18	0.18	0.22	0.46	0.41	0.41
v/c Ratio	0.55	0.51	0.76	0.39	0.68	0.28
Control Delay	30.9	7.8	38.0	12.4	22.8	3.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.9	7.8	38.0	12.4	22.8	3.5

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
LOS	C	A	D	B	C	A
Approach Delay	17.6			24.5	16.9	
Approach LOS	B			C	B	
Queue Length 50th (ft)	66	0	107	78	162	0
Queue Length 95th (ft)	121	52	#207	122	#302	38
Internal Link Dist (ft)	636			1564	585	
Turn Bay Length (ft)		50	75			
Base Capacity (vph)	439	558	434	958	738	789
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.43	0.68	0.34	0.68	0.28

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 63.5
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.76
Intersection Signal Delay: 19.7 Intersection LOS: B
Intersection Capacity Utilization 57.3% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 19: 136th Street SE & 34th Avenue NE



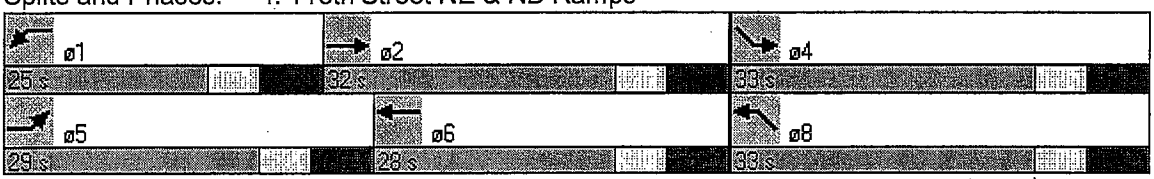
Lane Group	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15		15		15	15
Lane Util. Factor	*0.90	0.95	*0.90	0.95	1.00	*0.90
Frt						
Flt Protected	0.950		0.950		0.950	0.950
Satd. Flow (prot)	3154	3505	3185	3539	1703	3094
Flt Permitted	0.950		0.950		0.950	0.950
Satd. Flow (perm)	3154	3505	3185	3539	1703	3094
Right Turn on Red						
Satd. Flow (RTOR)						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35		35		
Link Distance (ft)		175		175		
Travel Time (s)		3.4		3.4		
Volume (vph)	487	279	366	326	238	566
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	3%	3%	2%	2%	6%	5%
Adj. Flow (vph)	502	288	377	336	245	584
Lane Group Flow (vph)	502	288	377	336	245	584
Turn Type	custom		Prot		custom	custom
Protected Phases	5	2	1	6	4	8
Permitted Phases	5				4	8
Detector Phases	5	2	1	6	4	8
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	13.0	25.0	13.0	25.0	13.0	25.0
Total Split (s)	29.0	32.0	25.0	28.0	33.0	33.0
Total Split (%)	32.2%	35.6%	27.8%	31.1%	36.7%	36.7%
Maximum Green (s)	20.0	23.0	16.0	19.0	24.0	24.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lag	Lead	Lag		
Lead-Lag Optimize?	Yes	Yes	Yes	Yes		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	None	C-Max	None	None
Walk Time (s)		5.0		5.0		5.0
Flash Dont Walk (s)		11.0		11.0		11.0
Pedestrian Calls (#/hr)		0		0		0
Act Effct Green (s)	24.0	33.5	20.6	30.1	26.9	26.9
Actuated g/C Ratio	0.27	0.37	0.23	0.33	0.30	0.30
v/c Ratio	0.60	0.22	0.52	0.28	0.48	0.63
Control Delay	31.8	21.1	32.9	24.3	28.7	30.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.8	21.1	32.9	24.3	28.7	30.3
LOS	C	C	C	C	C	C
Approach Delay		27.9		28.8		

Lane Group	EBL	EBT	WBL	WBT	SEL	NWL
Approach LOS		C		C		
Queue Length 50th (ft)	135	60	102	75	113	157
Queue Length 95th (ft)	187	95	148	117	175	207
Internal Link Dist (ft)		95		95		
Turn Bay Length (ft)						
Base Capacity (vph)	911	1305	779	1183	568	1031
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.22	0.48	0.28	0.43	0.57

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green, Master Intersection
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 28.9 Intersection LOS: C
Intersection Capacity Utilization 49.1% ICU Level of Service A
Analysis Period (min) 15
* User Entered Value

Splits and Phases: 4: 116th Street NE & NB Ramps



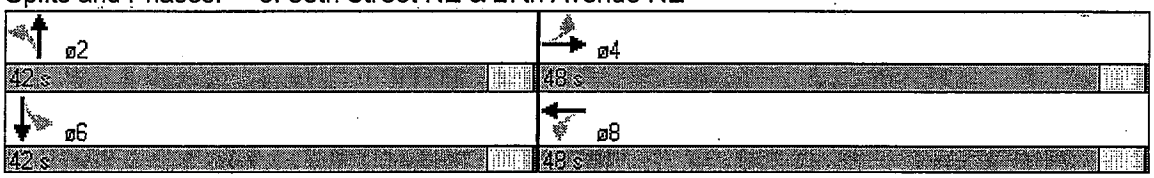
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.969			0.927			0.953	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1844	0	1770	1805	0	1736	1694	0	1752	1758	0
Flt Permitted	0.557			0.649			0.424			0.207		
Satd. Flow (perm)	1038	1844	0	1209	1805	0	775	1694	0	382	1758	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			20			66			31	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		379			1614			632			3449	
Travel Time (s)		8.6			36.7			14.4			78.4	
Volume (vph)	80	136	10	222	167	43	10	262	250	57	216	98
Peak Hour Factor	0.92	0.92	0.92	0.84	0.84	0.84	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	4%	4%	4%	3%	3%	3%
Adj. Flow (vph)	87	148	11	264	199	51	11	294	281	64	243	110
Lane Group Flow (vph)	87	159	0	264	250	0	11	575	0	64	353	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phases	4	4		8	8		2	2		6	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	48.0	48.0	0.0	48.0	48.0	0.0	42.0	42.0	0.0	42.0	42.0	0.0
Total Split (%)	53.3%	53.3%	0.0%	53.3%	53.3%	0.0%	46.7%	46.7%	0.0%	46.7%	46.7%	0.0%
Maximum Green (s)	44.0	44.0		44.0	44.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	15.4	15.4		15.4	15.4		22.0	22.0		22.0	22.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.47	0.47		0.47	0.47	
v/c Ratio	0.25	0.26		0.66	0.41		0.03	0.69		0.35	0.42	
Control Delay	14.4	12.7		22.4	13.5		9.0	14.6		16.6	10.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.4	12.7		22.4	13.5		9.0	14.6		16.6	10.2	
LOS	B	B		C	B		A	B		B	B	
Approach Delay		13.3			18.1			14.5			11.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		B			B			B			B	
Queue Length 50th (ft)	12	22		44	34		1	77		8	42	
Queue Length 95th (ft)	58	86		151	117		11	279		49	150	
Internal Link Dist (ft)		299			1534			552			3369	
Turn Bay Length (ft)												
Base Capacity (vph)	624	1111		727	1093		482	1078		237	1104	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.14	0.14		0.36	0.23		0.02	0.53		0.27	0.32	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 46.4
Natural Cycle: 45
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 14.6 Intersection LOS: B
Intersection Capacity Utilization 65.8% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 6: 88th Street NE & 27th Avenue NE



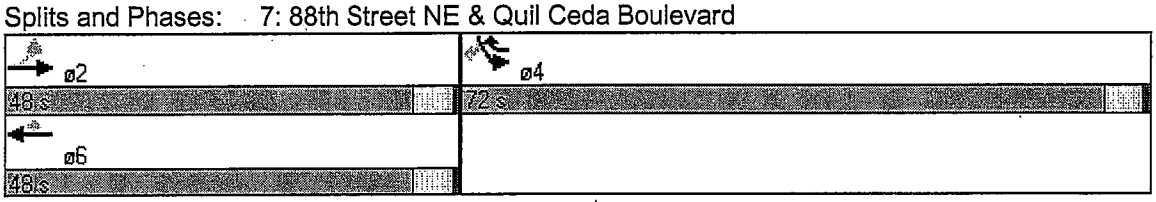
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	11	12	11	11
Storage Length (ft)	150			0	150	0
Storage Lanes	1			2	1	1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	0.88	0.97	1.00
Frt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1728	1818	1818	2814	3385	1561
Flt Permitted	0.457				0.950	
Satd. Flow (perm)	831	1818	1818	2814	3385	1561
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)						159
Headway Factor	1.04	1.04	1.04	1.00	1.04	1.04
Link Speed (mph)		30	30		30	
Link Distance (ft)		1614	447		388	
Travel Time (s)		36.7	10.2		8.8	
Volume (vph)	185	239	253	1711	1701	183
Peak Hour Factor	0.75	0.75	0.91	0.91	0.97	0.97
Heavy Vehicles (%)	1%	1%	1%	1%	0%	0%
Adj. Flow (vph)	247	319	278	1880	1754	189
Lane Group Flow (vph)	247	319	278	1880	1754	189
Turn Type	Perm			pm+ov		Perm
Protected Phases		2	6	4	4	
Permitted Phases	2			6		4
Detector Phases	2	2	6	4	4	4
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	21.0	21.0	37.0	21.0	21.0	21.0
Total Split (s)	48.0	48.0	48.0	72.0	72.0	72.0
Total Split (%)	40.0%	40.0%	40.0%	60.0%	60.0%	60.0%
Maximum Green (s)	43.0	43.0	43.0	67.0	67.0	67.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	4.0	4.0	4.0	3.5	3.5	3.5
Recall Mode	C-Max	C-Max	C-Max	Min	Min	Min
Walk Time (s)			7.0			
Flash Dont Walk (s)			25.0			
Pedestrian Calls (#/hr)			0			
Act Effct Green (s)	44.0	44.0	44.0	120.0	68.0	68.0
Actuated g/C Ratio	0.37	0.37	0.37	1.00	0.57	0.57
v/c Ratio	0.81	0.48	0.42	0.67	0.91	0.20
Control Delay	56.2	32.2	40.8	1.9	32.3	3.4
Queue Delay	0.0	0.0	1.4	0.0	6.6	0.0

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Delay	56.2	32.2	42.2	1.9	38.8	3.4
LOS	E	C	D	A	D	A
Approach Delay		42.7	7.1		35.4	
Approach LOS		D	A		D	
Queue Length 50th (ft)	171	188	192	21	600	10
Queue Length 95th (ft)	219	218	m266	0	729	43
Internal Link Dist (ft)		1534	367		308	
Turn Bay Length (ft)	150				150	
Base Capacity (vph)	305	667	667	2814	1918	953
Starvation Cap Reductn	0	0	222	0	0	0
Spillback Cap Reductn	0	0	0	0	144	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.81	0.48	0.62	0.67	0.99	0.20

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 113 (94%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 23.2 Intersection LOS: C
Intersection Capacity Utilization 82.1% ICU Level of Service E
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: 88th Street NE & Quil Ceda Boulevard



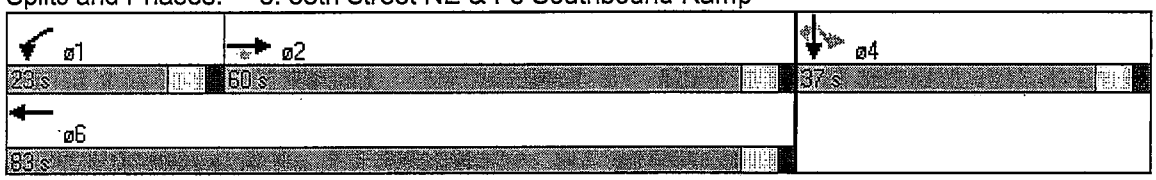
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		175	190		0	0		0	0		200
Storage Lanes	0		1	2		0	0		0	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50	50	50	50					50	50	50
Trailing Detector (ft)		0	0	0	0					0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.91	0.91	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980	0.850									0.850
Flt Protected				0.950							0.953	
Satd. Flow (prot)	0	3322	1441	3433	3539	0	0	0	0	0	1775	1583
Flt Permitted				0.950							0.953	
Satd. Flow (perm)	0	3322	1441	3433	3539	0	0	0	0	0	1775	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		18	690									32
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		447			525			774			1117	
Travel Time (s)		10.2			11.9			17.6			25.4	
Volume (vph)	0	1051	951	434	1613	0	0	0	0	299	6	353
Peak Hour Factor	0.91	0.91	0.91	0.94	0.94	0.94	0.92	0.92	0.92	0.91	0.91	0.91
Adj. Flow (vph)	0	1155	1045	462	1716	0	0	0	0	329	7	388
Lane Group Flow (vph)	0	1331	869	462	1716	0	0	0	0	0	336	388
Turn Type			Perm	Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases			2							4		4
Detector Phases		2	2	1	6					4	4	4
Minimum Initial (s)		5.0	5.0	5.0	5.0					5.0	5.0	5.0
Minimum Split (s)		28.0	28.0	11.0	28.0					33.0	33.0	33.0
Total Split (s)	0.0	60.0	60.0	23.0	83.0	0.0	0.0	0.0	0.0	37.0	37.0	37.0
Total Split (%)	0.0%	50.0%	50.0%	19.2%	69.2%	0.0%	0.0%	0.0%	0.0%	30.8%	30.8%	30.8%
Maximum Green (s)		54.0	54.0	17.0	77.0					31.0	31.0	31.0
Yellow Time (s)		4.0	4.0	4.0	4.0					4.0	4.0	4.0
All-Red Time (s)		2.0	2.0	2.0	2.0					2.0	2.0	2.0
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		4.0	4.0	3.0	4.0					3.5	3.5	3.5
Recall Mode		C-Max	C-Max	None	C-Max					Min	Min	Min
Walk Time (s)		7.0	7.0		7.0					7.0	7.0	7.0
Flash Dont Walk (s)		15.0	15.0		15.0					20.0	20.0	20.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		57.5	57.5	19.2	80.7						31.3	31.3
Actuated g/C Ratio		0.48	0.48	0.16	0.67						0.26	0.26
v/c Ratio		0.83	0.83	0.84	0.72						0.72	0.89
Control Delay		19.9	6.9	28.9	6.2						50.1	61.7
Queue Delay		9.0	1.0	0.0	0.2						1.6	0.0
Total Delay		29.0	7.8	28.9	6.4						51.6	61.7
LOS		C	A	C	A						D	E

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		20.6			11.2						57.0	
Approach LOS		C			B						E	
Queue Length 50th (ft)		285	6	112	256						233	264
Queue Length 95th (ft)		m447	m67	m140	226						340	#433
Internal Link Dist (ft)		367			445			694			1037	
Turn Bay Length (ft)			175	190								200
Base Capacity (vph)		1601	1049	549	2379						488	459
Starvation Cap Reductn		252	49	0	125						0	0
Spillback Cap Reductn		0	0	0	11						51	0
Storage Cap Reductn		0	0	0	0						0	0
Reduced v/c Ratio		0.99	0.87	0.84	0.76						0.77	0.85

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 51 (43%), Referenced to phase 2:EBT and 6:WBT, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 21.8 Intersection LOS: C
Intersection Capacity Utilization 133.9% ICU Level of Service H
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: 88th Street NE & I-5 Southbound Ramp



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	110		0	0		0	200		0	0		0
Storage Lanes	1		0	0		1	1		1	0		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50			50	50	50	50	50			
Trailing Detector (ft)	0	0			0	0	0	0	0			
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950	0.953				
Satd. Flow (prot)	1770	3539	0	0	3539	1583	1681	1686	1583	0	0	0
Flt Permitted	0.087						0.950	0.953				
Satd. Flow (perm)	162	3539	0	0	3539	1583	1681	1686	1583	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						383			51			
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		525			364			821			1060	
Travel Time (s)		11.9			8.3			18.7			24.1	
Volume (vph)	286	1009	0	0	972	385	939	3	847	0	0	0
Peak Hour Factor	0.93	0.93	0.93	0.90	0.90	0.90	0.91	0.91	0.91	0.92	0.92	0.92
Adj. Flow (vph)	308	1085	0	0	1080	428	1032	3	931	0	0	0
Lane Group Flow (vph)	308	1085	0	0	1080	428	516	519	931	0	0	0
Turn Type	pm+pt					Perm	Perm		Perm			
Protected Phases	5	2			6			8				
Permitted Phases	2					6	8		8			
Detector Phases	5	2			6	6	8	8	8			
Minimum Initial (s)	3.0	10.0			10.0	10.0	5.0	5.0	5.0			
Minimum Split (s)	8.0	25.0			23.0	23.0	34.0	34.0	34.0			
Total Split (s)	15.0	61.0	0.0	0.0	46.0	46.0	59.0	59.0	59.0	0.0	0.0	0.0
Total Split (%)	12.5%	50.8%	0.0%	0.0%	38.3%	38.3%	49.2%	49.2%	49.2%	0.0%	0.0%	0.0%
Maximum Green (s)	10.4	56.0			41.0	41.0	54.0	54.0	54.0			
Yellow Time (s)	3.6	4.0			4.0	4.0	4.0	4.0	4.0			
All-Red Time (s)	1.0	1.0			1.0	1.0	1.0	1.0	1.0			
Lead/Lag	Lead				Lag	Lag						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	2.5	4.0			4.0	4.0	3.5	3.5	3.5			
Recall Mode	None	C-Max			C-Max	C-Max	Min	Min	Min			
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0			
Flash Dont Walk (s)		13.0			9.0	9.0	22.0	22.0	22.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	57.0	57.0			42.0	42.0	55.0	55.0	55.0			
Actuated g/C Ratio	0.48	0.48			0.35	0.35	0.46	0.46	0.46			
v/c Ratio	1.38	0.65			0.87	0.53	0.67	0.67	1.24			
Control Delay	211.4	24.3			35.3	5.2	30.7	30.8	146.8			
Queue Delay	0.0	2.5			10.5	0.8	0.0	0.0	42.4			
Total Delay	211.4	26.8			45.8	6.0	30.7	30.8	189.2			
LOS	F	C			D	A	C	C	F			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach Delay		67.6			34.5			105.8				
Approach LOS		E			C			F				
Queue Length 50th (ft)	~260	368			414	30	321	324	~876			
Queue Length 95th (ft)	m#352	443			362	58	455	458	#1128			
Internal Link Dist (ft)		445			284			741			980	
Turn Bay Length (ft)	110						200					
Base Capacity (vph)	224	1681			1239	803	770	773	753			
Starvation Cap Reductn	0	450			151	147	0	0	0			
Spillback Cap Reductn	0	0			0	0	0	0	54			
Storage Cap Reductn	0	0			0	0	0	0	0			
Reduced v/c Ratio	1.38	0.88			0.99	0.65	0.67	0.67	1.33			

Intersection Summary

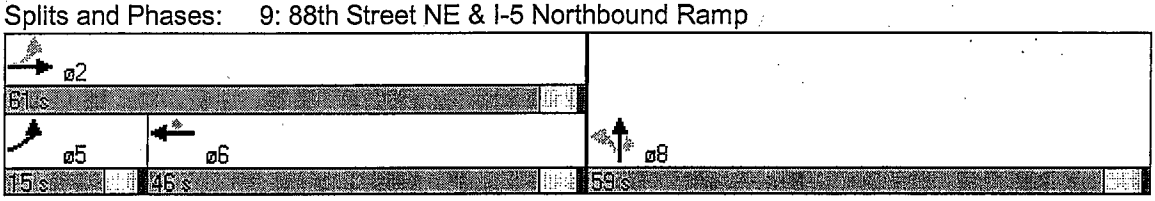
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBT, Start of Green, Master Intersection
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.38
Intersection Signal Delay: 72.8 Intersection LOS: E
Intersection Capacity Utilization 133.9% ICU Level of Service H
Analysis Period (min) 15

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 9: 88th Street NE & I-5 Northbound Ramp



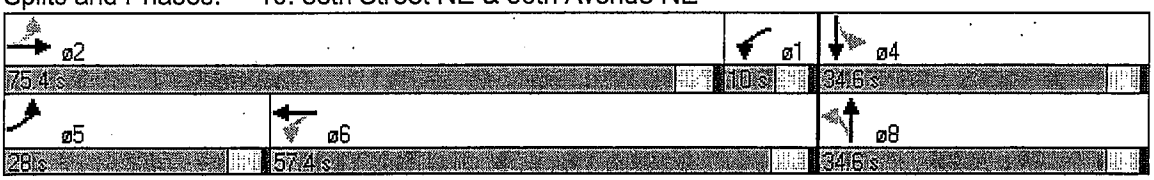
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	120		0	100		0	55		0	0		0
Storage Lanes	1		0	1		0	1		0	1		0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.996			0.896			0.857	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1736	3450	0	1752	3491	0	1656	1562	0	1752	1581	0
Flt Permitted	0.084			0.127			0.443			0.730		
Satd. Flow (perm)	153	3450	0	234	3491	0	772	1562	0	1347	1581	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		6			3			29			214	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		364			1539			377			631	
Travel Time (s)		8.3			35.0			8.6			14.3	
Volume (vph)	226	1428	58	33	1040	29	60	10	22	159	8	173
Peak Hour Factor	0.94	0.94	0.94	0.90	0.90	0.90	0.77	0.77	0.77	0.81	0.81	0.81
Heavy Vehicles (%)	4%	4%	4%	3%	3%	3%	9%	9%	9%	3%	3%	3%
Adj. Flow (vph)	240	1519	62	37	1156	32	78	13	29	196	10	214
Lane Group Flow (vph)	240	1581	0	37	1188	0	78	42	0	196	224	0
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phases	5	2		1	6		8	8		4	4	
Minimum Initial (s)	3.0	7.0		3.0	7.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	8.0	28.0		8.0	27.0		23.5	23.5		24.5	24.5	
Total Split (s)	28.0	75.4	0.0	10.0	57.4	0.0	34.6	34.6	0.0	34.6	34.6	0.0
Total Split (%)	23.3%	62.8%	0.0%	8.3%	47.8%	0.0%	28.8%	28.8%	0.0%	28.8%	28.8%	0.0%
Maximum Green (s)	23.5	70.4		5.5	52.4		30.1	30.1		30.1	30.1	
Yellow Time (s)	3.5	4.0		3.5	4.0		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lead/Lag	Lead	Lead		Lag	Lag							
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.5		3.0	3.5		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	5.0		0.0	5.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	5.0		0.0	5.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max		Min	Min		Min	Min	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		16.0			15.0		12.0	12.0		13.0	13.0	
Pedestrian Calls (#/hr)		0			0		0	0		0	0	
Act Effct Green (s)	83.6	83.6		69.8	69.8		22.4	22.4		22.4	22.4	
Actuated g/C Ratio	0.70	0.70		0.58	0.58		0.19	0.19		0.19	0.19	
v/c Ratio	0.76	0.66		0.17	0.58		0.54	0.13		0.78	0.48	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	36.1	7.4		22.0	19.7		56.6	18.5		66.4	9.4	
Queue Delay	0.1	0.6		0.0	0.2		0.0	0.0		0.0	0.0	
Total Delay	36.2	7.9		22.0	20.0		56.6	18.5		66.4	9.4	
LOS	D	A		C	B		E	B		E	A	
Approach Delay		11.6			20.0			43.2			36.0	
Approach LOS		B			C			D			D	
Queue Length 50th (ft)	112	226		12	292		55	8		146	6	
Queue Length 95th (ft)	m153	m293		37	486		84	29		188	47	
Internal Link Dist (ft)		284			1459			297			551	
Turn Bay Length (ft)	120			100			55					
Base Capacity (vph)	423	2405		212	2033		197	420		343	563	
Starvation Cap Reductn	8	398		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	264		0	0		0	16	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.58	0.79		0.17	0.67		0.40	0.10		0.57	0.41	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 118 (98%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 18.4 Intersection LOS: B
Intersection Capacity Utilization 73.3% ICU Level of Service D
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 10: 88th Street NE & 36th Avenue NE



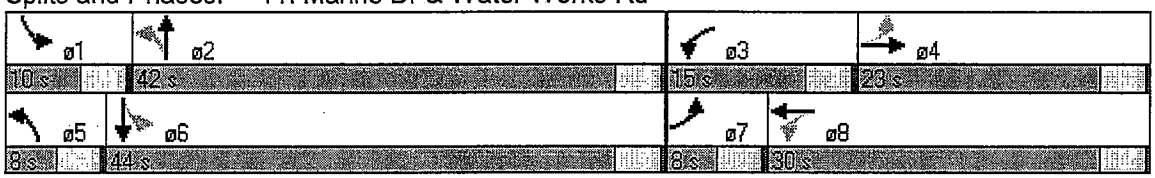
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	
Trailing Detector (ft)	0	0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.943			0.956			0.943			0.995	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1752	1740	0	1770	1781	0	1805	1792	0	1612	1688	0
Flt Permitted	0.321			0.242			0.347			0.160		
Satd. Flow (perm)	592	1740	0	451	1781	0	659	1792	0	271	1688	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		31			24			43			2	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		682			1108			635			515	
Travel Time (s)		13.3			21.6			14.4			11.7	
Volume (vph)	10	166	101	205	258	108	90	353	216	113	409	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	0%	0%	0%	12%	12%	12%
Adj. Flow (vph)	11	180	110	223	280	117	98	384	235	123	445	15
Lane Group Flow (vph)	11	290	0	223	397	0	98	619	0	123	460	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Detector Phases	7	4		3	8		5	2		1	6	
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	8.0	20.0		8.0	20.0		8.0	20.0		8.0	20.0	
Total Split (s)	8.0	23.0	0.0	15.0	30.0	0.0	8.0	42.0	0.0	10.0	44.0	0.0
Total Split (%)	8.9%	25.6%	0.0%	16.7%	33.3%	0.0%	8.9%	46.7%	0.0%	11.1%	48.9%	0.0%
Maximum Green (s)	4.0	19.0		11.0	26.0		4.0	38.0		6.0	40.0	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	Min		None	Min	
Walk Time (s)		5.0			5.0			5.0			5.0	
Flash Dont Walk (s)		11.0			11.0			11.0			11.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	20.2	17.3		26.8	26.2		32.0	29.3		34.8	30.7	
Actuated g/C Ratio	0.26	0.24		0.36	0.37		0.44	0.41		0.47	0.43	
v/c Ratio	0.05	0.65		0.61	0.59		0.26	0.81		0.45	0.63	
Control Delay	19.3	34.6		25.7	24.5		11.8	29.2		15.6	22.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.3	34.6		25.7	24.5		11.8	29.2		15.6	22.1	
LOS	B	C		C	C		B	C		B	C	
Approach Delay		34.0			24.9			26.8			20.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Approach LOS		C			C			C			C	
Queue Length 50th (ft)	3	127		79	147		25	267		32	184	
Queue Length 95th (ft)	14	#234		143	295		49	415		60	288	
Internal Link Dist (ft)		602			1028			555			435	
Turn Bay Length (ft)												
Base Capacity (vph)	242	544		404	771		380	921		275	882	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.05	0.53		0.55	0.51		0.26	0.67		0.45	0.52	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 71.5
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 25.7 Intersection LOS: C
Intersection Capacity Utilization 77.6% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 11: Marine Dr & Water Works Rd



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	18	851	1060	74	34	11
Peak Hour Factor	0.90	0.90	0.92	0.92	0.83	0.83
Hourly flow rate (vph)	20	946	1152	80	41	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)		897				
pX, platoon unblocked					0.72	
vC, conflicting volume	1233				2178	1192
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1233				2646	1192
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	96				0	94
cM capacity (veh/h)	565				18	227

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	20	946	1233	54
Volume Left	20	0	0	41
Volume Right	0	0	80	13
cSH	565	1700	1700	23
Volume to Capacity	0.04	0.56	0.73	2.40
Queue Length 95th (ft)	3	0	0	172
Control Delay (s)	11.6	0.0	0.0	999.4
Lane LOS	B			F
Approach Delay (s)	0.2		0.0	999.4
Approach LOS				F

Intersection Summary			
Average Delay	24.2		
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		

APPENDIX D

Tulalip Business Park Roadway Maintenance Plan & Schedule Community

DATE 7/10/02
RUHL-PARR & ASSOCIATES, P.S.
ARCHITECTS BELLEVUE, WA
JOB NO. 01-410

DRAFT

Tulalip Business Park

Tulalip Tribes Property
Tulalip, Washington
(Snohomish County)
Roadway Maintenance Plan & Schedule

Revised July 2, 2002
January 4, 2002

Owner:

Tulalip Tribes
6700 Totem Beach Road
Marysville, WA 98271
(360) 653-4585

Prepared By:

Bob Jewell, P.E.
Mike Neer, P.E.

Pacific Land Design

Planning, Engineering, & Development Services

606 Columbia Street NW, Suite 106, Olympia, Washington 98501-1093
(360) 786-9500 FAX: (360) 786-5267 E-Mail: pacland@pacland.com

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T30N. R.5E. SEC.17 W.M.

27TH AVE ST

QUIL CEDA WAY

QUIL CEDA PKWY

99TH ST NE

105TH ST NE

QUIL CEDA BLVD

ALL REQUIRED MAINTENANCE SHALL BE PERFORMED IN ACCORDANCE WITH THE ATTACHED ROADWAY MAINTENANCE PLAN AND SCHEDULE FOR THE TULALIP BUSINESS PARK.

SEE SHEET M-1.1 FOR CONTINUATION

GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

NO.	DATE	BY	REVISION DESCRIPTION

DESIGNED BY: MSN	ISSUE DATE: 7/1/02
DRAWN BY: JRM	ISSUE
CHECKED BY: REJ	PROJECT NO. 2001084.032

Pacific Land Design
Planning, Engineering, & Development Services
9709 3rd AVE NE, SUITE 203
Seattle, WA 98115-2027
(206) 522-9510 FAX: (206) 522-8344

THE TULALIP TRIBES

QUIL CEDA PARK

MARYSVILLE, WASHINGTON

MASTER ROADWAY MAINTENANCE PLAN

M-1.0

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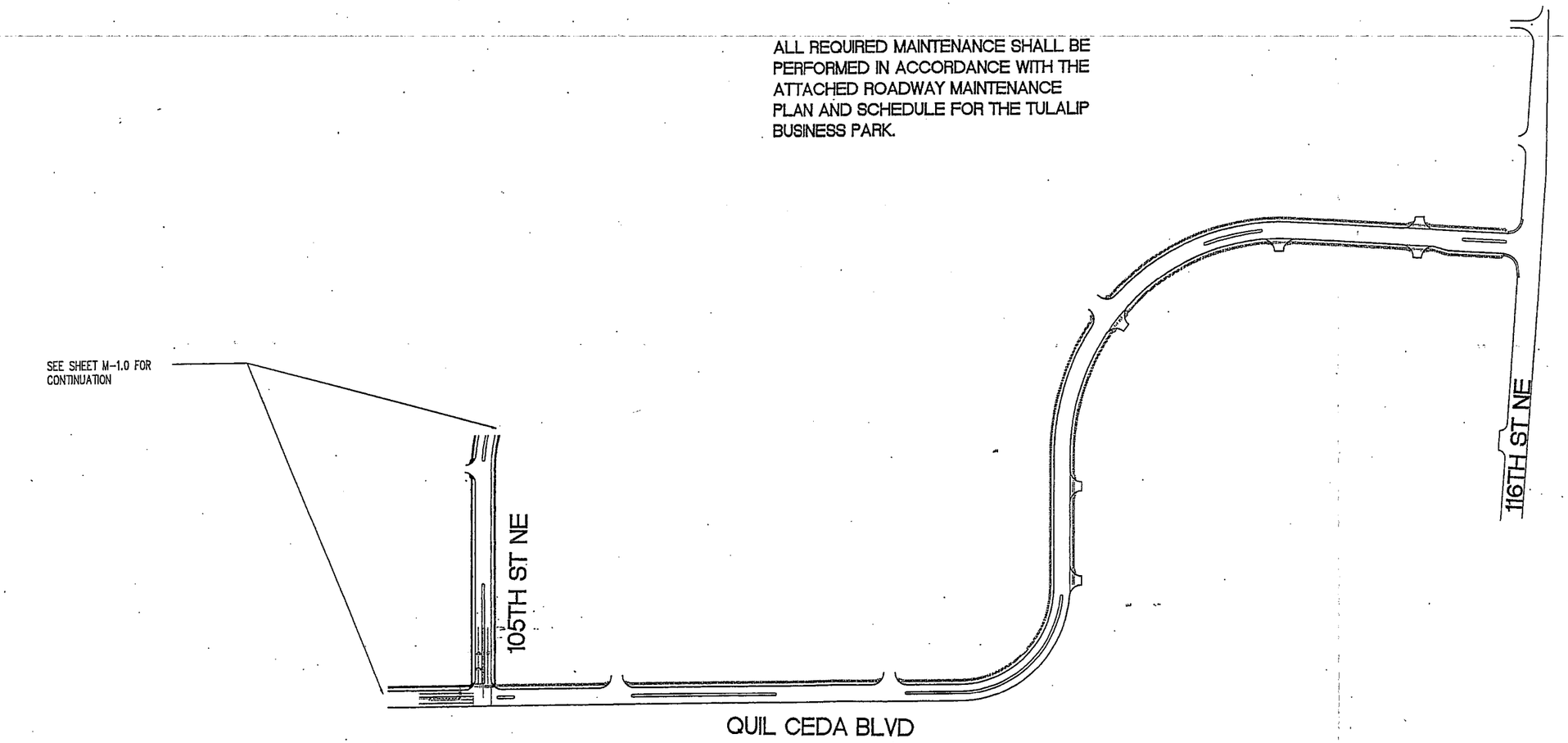
T30N. R.5E. SEC.17 W.M.

ALL REQUIRED MAINTENANCE SHALL BE PERFORMED IN ACCORDANCE WITH THE ATTACHED ROADWAY MAINTENANCE PLAN AND SCHEDULE FOR THE TULALIP BUSINESS PARK.



GRAPHIC SCALE

(IN FEET)
As Shown

NO.	DATE	BY	REVISION DESCRIPTION

DESIGNED BY: MSH	ISSUE DATE: 7/1/02
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M-1.1

P:\PROJECTS\WASHINGTON\TULALIP\dgn\1CEDA\1DRAWINGS\M-1.DWG

Roadway Maint. Plan and Sched. Checklist

ROADWAY MAINTENANCE PLAN AND SCHEDULE CHECKLIST
TULALIP BUSINESS PARK

The following are the standards for the maintenance of the roadway network for the Tulalip Business Park. Additional maintenance may be required at the discretion of the Tribe. In cases where lack of maintenance or improper operation of facilities causes or contributes to a problem, immediate action shall be taken to correct the problem.

Frequency	Feature	√	Problem	Conditions To Check For	Recommended Maintenance
M	Catch Basins		Trash or debris in or on catch basin	Trash or debris in front of the catch basin opening is blocking capacity by more than 10%.	Remove trash or debris immediately located in front of catch basin opening or on grate opening.
M	Catch Basins		Cover not in place	Cover is missing or only partially in place.	Place cover per design standards
M	Catch Basins		Trash or debris in catch basin	Trash or debris in any inlet or pipe blocking more than 1/3 of its height.	Remove trash or debris from inlet and outlet pipes.
M	Catch Basins		Locking Mechanism not working	Mechanism cannot be opened by one maintenance person with proper tools.	Mechanism opens with proper tools.
A	Catch Basins		Sediment in catch basin	Sediment or debris (in the basin) that exceeds 1/3 the depth from the bottom of basin to invert of the lowest pipe into or out of the basin.	Remove sediment or debris in the catch basin. Catch basin is dug out and clean.
A	Catch Basins		Structural Damage to frame, Basin top, walls or bottom	Maintenance person judges that structure is unsound	Basin replaced or repaired to design standards
A	Pipes		Sediment & Debris	Accumulated sediment that exceeds 20% of the diameter of the pipe.	Pipe cleaned of all sediment and debris
A	Pipes		Vegetation	Vegetation that reduces free movement of water through pipes.	All vegetation removed so water flows freely through pipes.
A	Pipes		Damaged (rusted, bent or crushed)	Rust is causing more than 50% deterioration of any part of pipe or dent that reduces cross-sectional area by more than 20%.	Pipe repaired or replaced
M	Open Ditches/Swales		Trash or Debris	Dumping of yard wastes such as grass clippings and branches into basin. Unsightly accumulation of non-degradable materials such as glass, plastic, metal, foam, and coated paper.	Remove trash and debris and dispose as prescribed by the County.
SA	Open Ditches/Swales		Sediment Buildup	Accumulated sediment that exceeds 20% of the design depth.	Ditch cleaned of all sediment and debris so that it matches design.
A	Open Ditches/Swales		Vegetation	Vegetation (e.g., weedy shrubs or saplings) that reduces free movements of water through ditches.	Remove weedy shrubs, noxious weeds and saplings such that water flows freely through ditches. Grassy vegetation should be left alone.
M	Trash Racks		Trash and Debris	Trash or Debris is plugging more than 20% of the openings in the barrier.	Barrier is cleared to design flow capacity
A	Trash Racks		Damaged or Missing Bars	Bars are bent out of shape more than 3 inches or missing	Bars are in place with no bends more than ¾ inch.
A	Rip Rap		Erosion	Soil erosion in or adjacent to the rock pad	Rip Rap replaced to design standards

If you are unsure whether a problem exists, please contact a Professional Engineer.

All maintenance is to be recorded and kept in a log.

The information above is based on the August 2000 Draft of the DOE Storm Water Management Manual for Western Washington, Volume V, Pierce County Storm Water Management Manual, & the Washington State Department of Transportation Maintenance Manual

Key:
A = Annually (March or April, preferred)
SM = Twice per Month
SA = Semi-Annually
M = Every Month
Q = Quarterly – Every 3 months
S = After major storms (use 1-inch in 24 hours as a guideline)

ROADWAY MAINTENANCE PLAN AND SCHEDULE CHECKLIST
TULALIP BUSINESS PARK
(Continued)

Frequency	Feature	√	Problem	Conditions To Check For	Recommended Maintenance
As Needed	Biofiltration Swale		Vegetation	When grass becomes excessively tall	Grass should be mowed to a height of 2 to 4 inches. Remove grass clippings
M	Biofiltration Swale		Inlet/Outlet area clogged	Inlet/Outlet areas are clogged with sediment and/or debris	Remove material so there is no clogging or blockage in the inlet and outlet area
M	Biofiltration Swale		Trash and Debris Accumulation	Trash or Debris accumulated in the bio-swale.	Remove Trash and debris from bio-swale
A	Biofiltration Swale		Poor Vegetation Coverage	When grass is sparse or bare or eroded patches occur in more than 10% of the swale bottom	Determine why grass growth is poor and correct that condition. Re-plant with plugs of grass from the upper slope: plant in the swale bottom at 8-inch intervals or re-seed into loosened fertile soil
A	Biofiltration Swale		Sediment Accumulated	Sediment depth exceeds 2 inches on grass	Remove sediment deposits on grass treatment area of the bio-swale. When finished, swale should be level from side to side and drain freely toward outlet
Per Appendix A	Oil/Water Separator		Perform Maintenance on all coalescing plate oil/water separators per Section 5.3 of the Facet International Operations & Maintenance Manual included in Appendix A		
A	Oil/Water Separator		Damaged Pipes	Inlet or outlet piping damaged or broken and in need of repair.	Pipe repaired or replaced.
A, S*	Infiltration Facility		Clogged perforated pipes or infiltration medium	Water levels in observation wells drain slowly (in excess of 24hours after rain stops)	Contact a Professional Engineer to evaluate the situation and provide further instructions
SM	Roadway Area		Sediment, trash or debris accumulation	Sediment, trash or debris is accumulated in parking area	Sweep roadway areas per Supplemental Section 1A4 attached
M	Landscaping		Weeds (nonpoisonous)	Weeds growing in more than 20% of the landscaped area (trees and shrubs only).	Remove weeds such that they are present in less than 5% of the landscaped area.
M	Landscaping		Insect hazard	Any presence of poison ivy or other poisonous vegetation or insect nests.	Remove poisonous vegetation or insect nests
M	Landscaping		Trash or litter	Trash or litter is present in landscaped areas	Remove trash or litter from landscaped areas
M	Landscaping		Erosion of Ground Surface	Noticeable rills are seen in landscaped areas	Eroded areas are filled contoured, and seeded (as applicable).
M	Landscaping		Damage Trees	Trees or shrubs that have been blown down or knocked over	Replant tree, inspecting for injury to stem or roots. Replace if severely damaged.
A	Landscaping		Damaged Trees	Limbs or parts of trees or shrubs that are split or broken which affect more than 25% of the total foliage of the tree or shrub.	Trim trees/shrubs to restore shape. Replace trees/shrubs with severe damage.
A	Landscaping		Damage Trees	Trees or shrubs which are not adequately supported or are leaning over, causing exposure of the roots.	Place stakes and rubber-coated ties around young trees/shrubs for support.
A	Landscaping		Bark Mulch	Inadequate bark mulch coverage.	Apply one inch layer of bark mulch in all planting beds in spring of each year

*For the first year after installation, inspect the infiltration facility after every large storm event and at least monthly from October 1st to March 31st and quarterly from April 1st to September 30th. Inspect the infiltration facility after every large storm and at least annually after the first year.

If you are unsure whether a problem exists, please contact a Professional Engineer.

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ROADWAY MAINTENANCE PLAN AND SCHEDULE CHECKLIST
TULALIP BUSINESS PARK
(Continued)

Frequency	Feature	√	Problem	Conditions To Check For	Recommended Maintenance
A	Irrigation		Winterize System	Potential Freeze Damage	Apply "forced air" via compressor to "blow-out" water prior to October 31 of each year
SM	Irrigation		Coverage	Inadequate coverage	Clean and adjust heads twice per month to maintain proper coverage
A	Irrigation		General Maintenance	Dirt and gravel buildup in pipeline	Remove last head from each system and flush pipelines of grit and gravel
SM	Illumination		Lamp is burnt out	Lamp is burnt out	Contact Puget Sound Energy to have the light bulb replaced
A	Illumination		Lamp is dim	Dirt buildup on glass	Contact Puget Sound Energy to have the glass cover on lamp cleaned
A	Traffic Signal		General Maintenance	Contact WSDOT Maintenance Department at (425) 339-1780	Contact WSDOT Maintenance Department at (425) 339-1780
A	Traffic Signal/Illumination Service Cabinet		General Maintenance	Contact WSDOT Maintenance Department at (425) 339-1780	Contact WSDOT Maintenance Department at (425) 339-1780
A	Signage		Dirt buildup	Perform recommended maintenance	Clean all roadway signs annually
A	Signage		Dents and Fading	Dents or fading	Replace damaged sign as needed and at least once every 5 years
A	Sidewalks		Raised Panels	Panel is raised in excess of ½ inch at joint	Remove and replace sidewalk section per original design requirements
A	Sidewalk, Curb & Gutter		General Damage	Inspect all sidewalk, curb & gutter annually	Replace/repair as necessary
5A	Thermoplastic Pavement Markings		General Maintenance	Perform recommended maintenance	Replace all thermoplastic pavement markings every 5 years
A	Painted Pavement Markings		General Maintenance	Perform recommended maintenance	Repaint all painted pavement markings annually
SM	Roadway		Pot holes, Alligator cracking, and rutting	Pot holes, Alligator cracking, and rutting	Patch and repair pavement per Supplemental Section 1A1 attached. Repair potholes immediately.
A	Roadway		Cracking	Inspect for cracks greater than one quarter inch in width	Seal cracks per Supplemental Section 1A2 attached.
5A	Sewer		Pipe Cleaning	Reduced Capacity	Clean pipes as required to remove debris and every 5 years at a minimum.
5A	Sewer		TV Inspection	Sag's in pipes, cracks, debris build-up, and roots	Repair and clean pipes as needed
2A	Sewer		Root Control	Roots in pipes	Repair and Clean pipes as needed
As Needed	Sewer		General Manhole and Pipe Deterioration	General Manhole and Pipe Deterioration	Repair and replace pipes and manholes as needed.
SA	Sewer		Lift Station	Debris build-up in wet well	Clean wet well every 6 months
A	Sewer		List Station	General Appearance	Paint Lift Station Exterior annually
See Recommended Maintenance	Sewer		Lift Station Pumps and Motors	General Maintenance	Inspect every time lift station is accessed and replace and repair as needed.

If you are unsure whether a problem exists, please contact a Professional Engineer.

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ROADWAY MAINTENANCE PLAN AND SCHEDULE CHECKLIST
TULALIP BUSINESS PARK
(Continued)

Frequency	Feature	√	Problem	Conditions To Check For	Recommended Maintenance
See Recommended Maintenance	Sewer		Lift Station Generators	Check oil, water, battery and fuel	Maintain as needed every time lift station is accessed. Operate at least 1 time per week.
See condition to check for	Sewer		Lift Station Electrical Panel	Visually inspect electrical components every time lift station is accessed.	Repair as needed by qualified electrician. Tighten electrical components annually.
3A	Water		Water Valves	General Maintenance	Inspect and Exercise valves every 3 years (min)
2A	Water		Fire Hydrant	General Maintenance	Exercise every two years at a minimum in coordination with the Fire Department. Repair Hydrants as needed.
See Recommended Maintenance	Water		Water Meters	General Maintenance	Maintain and repair as needed. Replace every 10 to 15 years.
5A	Water		Water Main	Reduced Capacity	Flush watermains in accordance with the jurisdiction having authority and every 5 years (min.)
1A	Water		Cross Connection Control	General Maintenance	Check all Cross Connection Control Devices annually to verify back water is not contaminating system.

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SM = Twice per Month
SA = Semi-Annually
'X'A = Every 'X' years
M = Every Month
Q = Quarterly – Every 3 months
S = After major storms (use 1-inch)

Glossary of Acronyms

GLOSSARY OF ACRONYMS

AAH	Adopt-A-Highway
AASHTO	American Association of State Highway Transportation Officials
AHB	Area Habitat Biologist
ATMS	Automated Training Management System
BMP	Best Management Practices
BPJ	Best Professional Judgment
CFR	Code of Federal Register
CMZ	Channel Migration Zones
Corps	Army Corps of Engineers
DNR	Washington State Department of Natural Resources
EAO	Environmental Affairs Office
Ecology	Washington State Department of Ecology
ERS	Environmental Reporting System
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FTE	Full Time Equivalent
GHPA	General Hydraulic Project Approval
HPA	Hydraulic Project Approval
HRM	Highway Runoff Manual
IPM	Integrated Pest Management
ISPG	Integrated Streambank Protection Guidelines
IVM	Integrated Vegetation Management

JARPA	Joint Aquatic Resource Permit Application
MAP	Maintenance Accountability Process
MOU	Memorandum of Understanding
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
OHWL	Ordinary High Water Level
PBA	Programmatic Biological Assessment
RCW	Revised Code of Washington
SC&DI Systems	Surveillance Control & Driver Information Systems
TEF	Transportation Equipment Fund
TRAINS	Transportation Allocation Information System
USEPA	U. S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WAC	Washington Administrative Code
WDFW	Washington State Department of Fish and Wildlife
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation

DEFINITION OF TERMS

Bankfull width: is synonymous with floodplain and means that flat landscape feature immediately adjacent to most stream and river channels that begins at the edge of the bankfull channel and receives overbank flow during most years (Dune and Leopold 1977).

Best Management Practice (BMP): physical, structural, and/or managerial practices that, when used singly or in combination, reduce water quality and aquatic habitat impacts of maintenance activities.

Channel: a channel is different from a ditch in that a channel is a feature that collects drainage water, can be parallel or perpendicular to the highway facility, and may or may not be a natural stream.

Channel Migration Zone (CMZ): is synonymous with 100-year floodplain and means the lateral extent of likely movement along a stream reach with evidence of active stream channel movement over the past 100 years.

Critical Areas: Include the following areas and ecosystesm: (a) Wetlands; (b) areas with a critical recharging effect on aquifers used for potable water; (c) fish and wildlife habitat conservation areas; (d) frequently flooded areas; and (e) geologically hazardous areas.

Ditch: a drainage feature that is a man-made conveyance system that collects, conveys, channels, holds, inhibits or diverts the movement of stormwater or ground water from the Tulalip Tribe facility and adjacent properties. It is not a channelized stream, or fish bearing stream.

Emergency: an emergency is a situation involving an act of God, disasters, casualties, national defense or security measures, etc., and includes response activities that must be taken to prevent the imminent loss of human life or property.

Emergency/Disaster Maintenance: activities required to alleviate an emergency condition. Work activities are the same or similar to routine maintenance activities except that they are greater in magnitude and scope depending upon the nature and intensity of the emergency. This work is not budgeted and/or scheduled and creates an immediate threat to life, the public, property, or environmental degradation. This includes work accomplished on a damaged roadway facility/element that has substantially retained the intended functionality of it original design. It does not include construction of new roadway elements. **Examples include:** Establishment of detours and temporary minor structures; Emergency traffic control; Any work needed to protect and maintain the area affected by the emergency.

Forbs: A general name for any herbaceous plant, other than grass, which is found in grasslands or woodlands.

Riparian area: means the 300-foot (91.4 meter) slope distance from either side of the Channel Migration Zone (CMZ), or bankfull width, whichever is greatest.

Routine Maintenance: budgeted work, performed routinely on a scheduled basis. It is intended to maintain the roadway facility/element so that it substantially retains its original intended use and function. **Examples include:** Sweeping and debris removal; Cleaning ditches, culverts, and catch basins; Correcting moderate slides and slope failures; Vegetation management and litter pickup; Routine bridge maintenance; Pavement patching, crack sealing, and routine surface treatment; Bridge maintenance such as debris removal, scour; Restoration/replacement of traffic control devices; Maintaining access control; Drainage restoration; Placing riprap; Snow and ice control; Traffic control.

Thalweg: The line extending down a channel that follows the lowest elevation of the bed.

Tulalip Tribe Maintenance Personnel: Member of Tulalip Tribe roadway maintenance department and/or appointed representative.

Tulalip Tribe Maintenance Supervisor: Individual designated by the Tribe, or appointed representative, as supervisor of maintenance operations.

Tulalip Tribe Maintenance Yard: Locations designated by the Tribe as acceptable.

Unscheduled Maintenance: unanticipated activities that occur due to unusual weather condition, vandalism, accident, etc. Work activities are conducted similar to routine maintenance activities except that work is unanticipated and poses an imminent danger to the existing structures or traveling public. It only retains the existing functionality of its original design. It does not include construction of new roadway elements. **Examples include:** Streambank protection; Bridge maintenance such as debris removal, scour (approaches, abutments & piers); Repair slides and slope failures; Repair of culverts.

Maint. And
Operations

Group 1 – Roadway Maintenance & Operations

1A1 - Pavement Patching & Repair

Activities required to fix pavement deficiencies such as pot holes, alligator cracking, and rutting in order to extend the life of the pavement. Work may include digging out old broken pavement, any unstable base material, and placing and compacting new, free draining base material and asphalt mix with mechanized equipment or hand tools depending on the size of the patch. For large areas of deficient pavement, an asphalt distributor spraying hot liquid asphalt or emulsified asphalt on the distressed pavement area, and covering it with crushed rock and rolling the rock to compact and seat the stones together, or an overlay patch with hot-mix asphalt may be used. Crews doing this work may vary from 2 to more than 10 people, depending on the size of the repair and amount of equipment needed to accomplish the work.

Timing: Most pavement patching and repair occurs from May through October. However potholes are repaired on an as needed basis throughout the year. Work may occur any day of the week or time of day (daylight or night).

Equipment: may include dump trucks, front end loader, motor grader, paving machine, steel roller, rubber tire roller, chip spreader, oil tank trailer and or an oil distributor.

Avoidance and Minimization

- For asphalt repair, diesel will only be used (typically as a releasing or cleaning agent) in applications where it can be captured/contained so as not to enter the roadside environment.
- Cleaning of asphalt truck tack nozzles will be performed at Tulalip Tribe maintenance yards or upland sites with adequate capture and disposal facilities for diesel asphalt wastes. Diesel will be used to clean the asphalt tack nozzles.
- Adequate spill control supplies (diapers, kitty litter, shovels, etc.) will be kept available. Types and amounts of spill control supplies kept available will be commensurate with the type and scope of activity being conducted. Tulalip Tribe maintenance personnel will be trained to correctly utilize spill control materials.
- Excess material such as gravels, sand, asphalt, etc. will be disposed at sites where subject materials are controlled in a manner that prevents them from adversely affecting sensitive habitat of protected species. Removed material may be temporarily stored in stable locations where the material will not be allowed to enter wetlands or waterways.
- Materials will be used for their originally intended purpose and therefore, will not become a waste product.

Best Management Practices

- BMPs will be used on all activities within 300-feet of surface water or potential riparian habitat to ensure that no foreign material, such as pavement slurry from

asphalt or concrete grindings is sidecast, and to control and prevent sediments from entering water or wetlands.

- Tulalip Tribe maintenance personnel will protect inlets and catchments from foreign material such as fresh concrete, oil, asphalt, fuel, etc. during inclement weather including but not limited to: block feature outlet and/or block downgrade end of pipe.
- Tulalip Tribe maintenance supervisor will determine if weather conditions are appropriate to perform surface work (i.e. heavy rainfall) that could result in adverse impacts to water quality or aquatic habitat.
- Carry spill kit in vehicle.
- Materials such as water asphalt grinds and concrete grinds shall be prevented from entering waters or wetlands if they are discharged off the developed portion of roadways.
- Concrete truck chute cleanout areas shall be provided with containment so that wet concrete or washings do not enter waters or wetlands.
- Erosion and sediment control devices such as check dams, silt fences, and other acceptable techniques, will be used so that sediment or other materials do not enter waters or wetlands.
- All fueling and maintenance of equipment will occur at locations greater than 300 feet from the nearest wetland, ditches, flowing or standing water.

1A2 - Crack Sealing

These are activities required to repair cracks in asphalt and concrete pavement in order to extend the life of the pavement. Random cracking will appear in pavements due to natural aging and traffic action. Cracks over 1/4 inch wide should be filled to prevent water from entering into and weakening the underlying subgrade. Crack sealing is accomplished by pouring hot liquid asphalt in the cracks. Crack sealing is a temperature and dry weather sensitive activity. Crews doing this work may vary from 2 or more people, depending on the amount of cracking and amount of equipment needed to accomplish the work.

Timing: Year round depending on temperature and dry weather. Work may occur any time of day or night depending on the project location.

Equipment: may include dump trucks, compressor, and asphalt kettle.

Avoidance and Minimization

- For asphalt repair, diesel will only be used (typically as a releasing or cleaning agent) in applications where it can be captured/contained so as not to enter the roadside environment.

- Cleaning of asphalt truck tack nozzles will be performed at Tulalip Tribe maintenance yards or upland sites with adequate capture and disposal facilities for diesel asphalt wastes. Diesel will be used to clean the asphalt tack nozzles.

- Adequate spill control supplies (diapers, kitty litter, shovels, etc.) will be kept available. Types and amounts of spill control supplies kept available will be commensurate with the type and scope of activity being conducted. Tulalip Tribe maintenance personnel will be trained to correctly utilize spill control materials.

- Excess material such as gravel, sand, asphalt, etc. will be disposed at sites where subject materials are controlled in a manner that prevents them from adversely affecting sensitive habitat of protected species. Removed material may be temporarily stored in stable locations where the material will not be allowed to enter wetlands or waterways.

- Materials will be used for their originally intended purpose and therefore, will not become a waste product.

Best Management Practices

- BMPs will be used on all activities within 300-feet of surface water or potential riparian habitat to ensure that no foreign material, such as asphalt, enters drainage systems that discharge into surface waters or wetlands.

- Tulalip Tribe will protect inlets and catchments from foreign material such as fresh concrete, oil, asphalt, fuel, etc. during inclement weather including but not limited to; block feature outlet and/or block downgrade end of pipe.

- Tulalip Tribe maintenance supervisor will determine if weather conditions are appropriate (i.e. heavy rainfall) that could result in adverse impacts to water quality or aquatic habitat.

- Carry spill kit in vehicle.

- All fueling and maintenance of equipment will occur at locations greater than 300 feet from the nearest wetland, ditches, flowing or standing water.

1A3 - Shoulder Maintenance

These are activities required to repair deficiencies in the paved shoulder or gravel area adjacent to the edge of the pavement. Includes all activities listed above for pavement patching and crack sealing, but also includes grading the gravel to repair erosion or where a drop-off has developed because of vehicles driving off the pavement edge. Grading activities will involve some level vegetation alteration such as low-growing grasses and forbs. Crews doing this work may vary from 1 to 4 people, depending on the size of the repair and amount of equipment needed to accomplish the work.

Timing: Year round depending on weather. Grading will occur during drier times of the year. Work may occur at any time of day or night, any day of the week.

Equipment: may include a motor grader for the grading work and a sweeper for clean up, or all the equipment listed for pavement patching and crack sealing.

Avoidance and Minimization

- For asphalt repair, diesel will only be used (typically as a releasing or cleaning agent) in applications where it can be captured/contained so as not to enter the roadside environment.

- Cleaning of asphalt truck tack nozzles will be performed at Tulalip Tribe maintenance yards or upland sites with adequate capture and disposal facilities for diesel asphalt wastes. Diesel will be used to clean the asphalt tack nozzles.

- Adequate spill control supplies (diapers, kitty litter, shovels, etc.) will be kept available. Types and amounts of spill control supplies kept available will be commensurate with the type and scope of activity being conducted. Tulalip Tribe maintenance personnel will be trained to correctly utilize spill control materials.

- Materials will be used for their originally intended purpose, and therefore, will not become a waste product.

- Tulalip Tribe Maintenance will incorporate road shoulder grading activities into local Integrated Vegetation Management (IVM) plans to consider and minimize impacts of this activity on riparian vegetation communities.

Best Management Practices

- BMPs will be used on all activities within 300-feet of surface water or potential riparian habitat to ensure that no foreign material such as pavement slurry from asphalt or concrete grinding equipment is not sidecast, and to control and prevent sediments from entering drainage systems that discharge into surface waters.

- Tulalip Tribe maintenance personnel will protect inlets and catchments from foreign material such as fresh concrete, oil, asphalt, fuel, etc. during inclement weather including but not limited to; block feature outlet and/or block downgrade end of pipe.

- Tulalip Tribe maintenance supervisor will determine if weather conditions are appropriate (i.e. heavy rainfall) that could result in adverse impacts to water quality or aquatic habitat.

- Carry spill kit in vehicle.

- Materials such as water asphalt grinds and concrete grinds shall be prevented from entering waters or wetlands if they are discharged off the developed portion of the roadway.

- Concrete truck chute cleanout areas shall be provided with containment so that wet concrete or washings do not enter waters or wetlands.

- Erosion and sediment control devices such as check dams, silt fences, and other acceptable techniques, will be used so that sediment or other materials do not enter waters or wetlands.

- Grading will be conducted in a manner which avoids disturbance to vegetation beyond widths needed for safety purposes.

- All fueling and maintenance of equipment will occur at locations greater than 300 feet from the nearest wetland, ditches, flowing or standing water.

1A4 - Sweeping & Cleaning

Includes sweeping of paved shoulders and paved islands either by hand or with a self propelled mechanical sweeper (both pick-up and non pick-up sweepers are used). Snow and ice control cleanup activities are addressed in Group 5, Snow and Ice Control Operations, pages 31-32.

Schedule for road sweeping is dependent on budget, equipment availability and percent of debris deposition on shoulder area. Road shoulders are routinely checked for accumulation of sediments and debris.

The work may include removing built-up sand, sweeping debris off the roadway and shoulder, picking up all debris, hauling it to a nearby waste disposal site and washing the pavement with a street flusher. A street flusher is a 1,500 to 2,000 gallon tanker truck that has three spray nozzles located either on the front or back and side of the truck. The water spray is used on the roadway to remove debris and sediment to shoulder. It is then picked-up by a vactor sweeper for disposal. Crews doing this work may vary from 1 to 6 people, depending on the amount of traffic control needed.

Timing: Year round depending on weather and equipment availability. Work may occur at any time of the day or night, seven days a week.

Equipment: may include dump trucks, sweeper and street flusher.

Best Management Practices

- BMPs will be used on all activities within 300-feet of surface water or potential riparian habitat to ensure that foreign material does not enter drainage systems that discharge into surface waters or wetlands.
- Water will be used as needed during sweeping to reduce dust.
- Sweeping materials will be recycled where appropriate.
- Work will be coordinated to follow sweeping/flushing with bridge drainage cleaning.
- All sweepings that have a potential to drain to waters or wetlands should be removed.
- Where appropriate and practical, place sediment barriers at identified locations along stream routes or direct drainage routes, to route sweeping material away from water course.
- All fueling and maintenance of equipment will occur at locations greater than 300 feet from the nearest wetland, ditches, flowing or standing water.

1A5 - Miscellaneous Roadway Maintenance

Includes grading and repairing gravel roads, and repairing broken curbs. Grading activities involving gravel roads will involve some level vegetation alteration such as low-growing shrubs, groundcovers or grasses and forbs. Crews doing this work may vary from 1 to 4 people, depending on the size of the repair and amount of equipment needed to accomplish the work.

Timing: Year round depending on equipment availability, and weather. Grading will occur during drier times of the year. Work may occur any time of day or night during any day of the week.

Equipment: may include a motor grader, roller, dump trucks, plus buffer trucks for traffic control.

Avoidance and Minimization

- For asphalt repair, diesel will only be used (typically as a releasing or cleaning agent) in applications where it can be captured/contained so as not to enter the roadside environment.
- Cleaning of asphalt truck tack nozzles will be performed at Tulalip Tribe maintenance yards or upland sites with adequate capture and disposal facilities for diesel asphalt wastes. Diesel will be used to clean the asphalt tack nozzles.
- Adequate spill control supplies (diapers, kitty litter, shovels, etc.) will be kept available. Types and amounts of spill control supplies kept available will be commensurate with the type and scope of activity being conducted. Tulalip Tribe maintenance personnel will be trained to correctly utilize spill control materials.
- Excess material such as gravel, sand, asphalt, etc. will be disposed at sites where subject materials are controlled in a manner that prevents them from adversely affecting sensitive habitat of protected species. Removed material may be temporarily stored in stable locations where the material will not be allowed to enter wetlands or waterways.
- Materials will be used for their originally intended purpose and therefore, will not become a waste product.
- Tulalip Tribe Maintenance will incorporate road shoulder grading activities into local Integrated Vegetation Management (IVM) plans to consider and minimize impacts of this activity on riparian vegetation communities.

Best Management Practices

- BMPs will be used on all activities within 300-feet of surface water or potential riparian habitat to ensure that no foreign material such as pavement slurry from asphalt or concrete grinding equipment is sidecast, and to control and prevent sediments from entering drainage systems that discharge into surface waters or wetlands.
- Tulalip Tribe maintenance personnel will protect inlets and catchments from foreign material such as fresh concrete, oil, asphalt, fuel, etc. during inclement weather

including but not limited to; block feature outlet and/or block downgrade end of pipe.

- Tulalip Tribe maintenance supervisor will determine if weather conditions are appropriate(i.e. heavy rainfall), that could result in adverse impacts to water quality or aquatic habitat.
- Carry spill kit in vehicle.
- Materials such as water asphalt grinds and concrete grinds shall be prevented from entering waters or wetlands if they are discharged off the developed portion of the roadway.
- Concrete truck chute cleanout areas shall be provided with containment so that wet concrete or washings do not enter waters or wetlands.
- Erosion and sediment control devices such as check dams, silt fences, and other acceptable techniques, will be used so that sediment or other materials do not enter waters or wetlands.
- Grading will be conducted in a manner which minimizes disturbance to vegetation beyond widths needed for safety purposes.
- All fueling and maintenance of equipment will occur at locations greater than 300 feet from the nearest wetland, ditches, flowing or standing water.

2-Drainage
Maint. and Slope
Repair

Group 2 - Drainage Maintenance & Slope Repair

Group 2, Drainage Maintenance & Slope Repair is divided into 5 program elements. These activities involve clearing ditches, channels, culverts and catch basins, correcting moderate slides and slope failures. Each program element description includes timing, equipment, locations and BMPs.

Water, either liquid or frozen, is the greatest natural destructive element that affects roadways. To control water within the existing right of way, or on Tulalip Tribe properties, a drainage system of all types, gutters, drains, culverts, storm sewers, and other miscellaneous drainage structures is provided as part of the roadway facility. The system is designed and constructed to collect and remove water from the roadway right of way or on Tulalip Tribe properties and it must be properly maintained to permit the maximum use of the roadway, to prevent damage to the roadway structure, and to protect the abutting property from damage.

2A1- Maintain Ditches

Ditches are a feature, typically parallel to the road, that carries surplus surface water or ground water from the Tulalip Tribe facility and adjacent properties. They are not a channelized stream, or fish bearing stream. Channel impacts will be addressed in the channel maintenance section of this document.

Ditches are maintained and preserved to the line, grade, depth and cross section to which they were originally designed and constructed. Includes all work necessary to remove soil and rock that have built up over time to restore the original hydraulic capacity of ditches. Work may include appropriate erosion control BMPs (e.g., seeding, mats, riprap), where there is the potential for continued erosion. Reshaping ditches which are designed to enhance motorist safety and improve water quality (e.g., by regrading the drainage ditch with gentler slopes, which can reduce erosion, increase growth of vegetation, increase uptake of nutrients and other substances by vegetation, etc.) will be considered. Material that is removed from the ditch must be hauled to a suitable disposal site. Crews doing this work may vary from 1 to more than 7 people depending on the size of the repair and amount of equipment needed to accomplish the work.

Timing: Year round depending on weather. Generally will occur during drier times of the year when stormwater flows are low. Work may occur at any time of day or night, any day of the week.

Equipment: may include dump trucks, front end loader, motor grader, belt loader, excavator, or backhoe.

Best Management Practices

- Appropriate BMPs will be used on all activities within 300-feet of surface water or potential riparian habitat. These practices must ensure that no foreign material such as side cast soils or oil and grease enter waters or wetlands.

- Open ditches are routinely checked for accumulation of sediment and other pollutants (e.g., organic debris, oil and grease). If there is any standing water on shoulder or if deposits fill >50 % of the capacity of the basin, as measured by depth of accumulation, they require cleaning.

- Plan and schedule activities in dry conditions, except in emergency situations.

- Where ditch maintenance is required within sensitive area boundaries, desirable vegetation will be retained on the inside shoulder slope to the greatest extent possible.

- Leave vegetative buffer outside of work zone to provide bio-filtration and shading on back slope of ditch.

- Leave vegetative buffer of grasses and small forbs between the shoulder and ditch if the area is wide enough.

- Leave vegetated sections in ditchline, where sediment buildup does not impede flow or infiltration. Leaving vegetation in the last 50 feet of a ditch produces less sediments and other pollutants in runoff than complete ditching.

- Remove slides from ditches and roadway.

- If cleaning is required they are maintained to the line and grade and depth and cross section to which they were constructed. Ditches may be reshaped to produce shallower side slopes, to enhance motorist safety and improve water quality by trapping sediments and increasing vegetation.

- Erosion and sediment control devices such as check dams, silt fences, and other acceptable techniques, will be used so that sediment or other materials do not enter waters or wetlands.

- When surface water is flowing, a flow bypass system such as flow bypass (pump and pipe), diversion berm, diversion channel, pump to gutter or temporary channel, and other acceptable techniques, will be used so that sediment or other materials do not enter waters or wetlands.

- Hydroseed or replant disturbed areas.
    * All exposed and erosive soils will be stabilized by application of effective erosion control BMP's, which protect the soil from the erosive forces of rain impact and flowing water.
    * Vegetation can be effectively restored after ditching by seeding, covering with straw, and holding the straw in place with stapled jute mat.
    * April 1 to May 15 and August 15 to October 1. Seeding, fertilizing, and mulching will be accomplished during the spring and fall period listed above.

- Excavated materials will be disposed upland and not in any waters or wetland.

- Excavated materials will be recycled when suitable.

- All fueling and maintenance of equipment will occur at locations greater than 300 feet from the nearest wetland, ditches, flowing or standing water.

- Carry spill kit in vehicle.

2A2- Channel Maintenance

A Channel is different from a ditch in that a channel is a feature that collects drainage water, can be parallel or perpendicular to the roadway facility, and may or may not be a natural stream.

This action includes the same tasks performed on ditches and/or stormwater facilities within Tulalip Tribe right of way includes cleaning, reshaping/regrading, erosion control/slope stabilization, vegetation management, removing debris, trash, yard waste, sediment and repairing channels. Maintenance of ditches and/or stormwater features, which are channels, is performed when sediment, debris, or vegetation impedes flows or storage of water and sediments to a point where safety or structural integrity is jeopardized. Features which are not properly functioning, can cause:

- Hazardous driving conditions, particularly during cold weather.
- Roadway washouts during storm events.
- Flooding of adjacent property.
- Saturation of the road sub-base.
- Large quantities of sediment transport.

Material that is removed from the channel must be hauled to a suitable disposal site. Crews doing this work may vary from 1 to more than 7 people depending on the size of the repair and amount of equipment needed to accomplish the work. Channel maintenance may require permits.

Timing: Year round depending on weather. Generally will occur during drier times of the year when stormwater flows are low. Work may occur at any time of day or night, any day of the week.

Equipment: may include dump trucks, front end loader, motor grader, belt loader, excavator, or backhoe.

Best Management Practices

- Appropriate BMPs will be used on all activities within 300-feet of surface water or potential riparian habitat. These practices must ensure that no foreign material such as side cast soils or oil and grease enter waters or wetlands.
- Open channels are routinely checked for accumulation of sediment and other pollutants (e.g., organic debris, oil and grease). If there is any standing water on shoulder or if deposits fill >50 % of the capacity of the basin, as measured by depth of accumulation, they require cleaning.
- Plan and schedule activities in dry conditions, except in emergency situations.
- Leave vegetative buffer outside of work zone to provide bio-filtration and shading on back slope of channel.

- Leave vegetative buffer of grasses and small forbs between the shoulder and channel if the area is wide enough.
- Leave vegetated sections in channel, where sediment buildup does not impede flow or infiltration.
- Remove slides from channels and roadway.
- If cleaning is required they are maintained to the line, grade, depth and cross section to which they were constructed.
- All permit conditions will be followed.
- If fish are present, in emergency and non-emergency situations, contact the Tulalip Tribes Natural Resources Department for proper procedures.
- Erosion and sediment control devices such as check dams, silt fences, and other acceptable techniques, will be used so that sediment or other materials do not enter waters or wetlands.
- When surface water is flowing, a flow bypass system such as flow bypass (pump and pipe), diversion berm, diversion channel, pump to gutter or temporary channel, and other acceptable techniques, will be used so that sediment or other materials do not enter waters or wetlands.
- Hydroseed or replant disturbed areas.
    * All exposed and erosive soils will be stabilized by application of effective erosion control BMP's, which protect the soil from the erosive forces of rain impact and flowing water.
    * Vegetation can be effectively restored after ditching by seeding, covering with straw, and holding the straw in place with stapled jute mat.
    * April 1 to May 15 and August 15 to October 1. Seeding, fertilizing, and mulching will be accomplished during the spring and fall period listed above.
- Excavated materials will be disposed upland and not in any waters or wetland.
- Excavated materials will be recycled when suitable.
- All fueling and maintenance of equipment will occur at locations greater than 300 feet from the nearest wetland, ditches, flowing or standing water.
- Carry spill kit in vehicle.

2A3 - Maintain Culverts

Includes all work necessary to keep cross culverts free of debris and siltation. Also includes removing debris build-up, a beaver dam, or brush at culvert ends to insure they are free of obstructions. Crews doing this work may vary from 2 to 4 people depending on the size of the obstruction.

All culverts are to be inspected at least twice a year and kept clean and in good operating condition. In some areas, frequent inspections, particularly after heavy storms or periods of high runoff, are necessary to enable maintenance personnel to take corrective measures if damages have occurred. During storms and flood, critical areas are patrolled and the culvert inlets kept clear. Priority will be given to those culverts located in perennial or salmonid-bearing streams, and culverts near streams in areas of high sediments load, such as those near construction activities.

Culverts with 25 percent or more constriction should be cleaned to restore the culvert's original capacity. However, maintenance personnel should be aware that all culverts in fish-bearing waters must be maintained to provide adequate fish passage, regardless of the percent obstruction. Cleaning when they are less than 25 percent constricted may be necessary.

Timing: Year round depending on weather.

Equipment: may include a culvert rodder, dump truck, backhoe, double drum dragline and hand tools.

Best Management Practices

- Appropriate BMPs will be used on all activities within 300-feet of surface water or potential riparian habitat. These practices must ensure that no foreign material such as side cast soils or oil and grease enter waters or wetlands.
- Erosion and sediment control devices such as check dams, silt fences, and other acceptable techniques, will be used so that sediment or other materials do not enter waters or wetlands.
- Material removed will be disposed upland and not in any waters or wetlands unless the authority having jurisdiction allows usage as habitat enhancement.
- Carry spill kit in vehicle.
- All fueling and maintenance of equipment will occur at locations greater than 300 feet from the nearest wetland, ditches, flowing or standing water.

2A4 - Maintain Catch Basins & Inlets

Includes all work necessary to restore flow and storage capacity of inlets, catch basins, manholes and connecting pipes. Work includes taking off the lid and removing built-up debris and silt. Crews doing this work may vary from 2 to 4 people depending on the amount of traffic control required.

Inlets, catch basins, and manholes are periodically inspected and cleaned out on an as needed basis using a vacuum truck or manual cleaning methods. At a minimum, all catch basins are pumped annually. In addition, inspections are made during storms to ensure that the inlet grates are not becoming clogged with water-born debris. Emphasis is on cleaning catch basins in urban traffic areas after the first storm at the beginning of autumn with a rainfall volume greater than 1 inch. This practice removes much of the pollutant load deposited during the dry months.

Timing: Year round depending on weather. Generally will occur during drier times of the year when stormwater flows are low. Work may occur at any time of day or night, any day of the week.

Equipment: may include a vacuum truck, culvert rodder, water tank truck, dump truck, truck-mounted attenuator, and hand tools.

Best Management Practices

- BMPs will be used on all activities within 300-feet of surface water or potential riparian habitat to ensure that no foreign material such as trash, organic debris, dead animals, oil and grease, and to control and prevent sediment from entering waters or wetlands.

- Catch basins are routinely checked for accumulation of sediment and other pollutants (e.g., organic debris, oil and grease). At a minimum, all catch basins are pumped annually. In addition, inspections are made during storms to ensure that the inlet grates are not becoming clogged with water-born debris. If there is standing water on shoulder or if deposits fill 35-50% of the capacity of the basin, as measured by depth of accumulation, they require cleaning.

- Solids are stored on Tulalip Tribe properties and placed on an impermeable surface where they are characterized for appropriate disposal options.

- Solids will be recycled when suitable.

- Decant water will be disposed to municipal decant stations and/or sanitary sewers where authority having jurisdiction has given approval to use.

- Carry spill kit in vehicle.

- All fueling and maintenance of equipment will occur at locations greater than 300 feet from the nearest wetland, ditches, flowing or standing water.

2A5 - Maintain Detention/Retention Basins

Detention/retention basins are maintained and preserved to the line, grade, depth and cross section to which they were originally designed and constructed. Includes all work necessary to remove soil and silt build-up in retention and detention basins. Work may include appropriate erosion control BMPs (e.g., seeding, mats, riprap), where there is the potential for continued erosion. Material that is removed from these basins must be hauled to a suitable disposal site. Crews doing this work may vary from 4 to more than 7 people, depending on the size of the repair and amount of equipment needed to accomplish the work. Accumulated settled materials must be removed on a schedule based on experience at each site.

Timing: Year round depending on weather. Generally will occur during drier times of the year when stormwater flows are low. Work may occur at any time of day or night, any day of the week.

Equipment: may include dump trucks, front end loader, excavator, or backhoe.

Avoidance and Minimization

- Erosion and Sediment Control BMPs will be utilized.
- Adequate spill control supplies (diapers, kitty litter, shovels, etc.) will be kept available. Types and amounts of spill control supplies kept available will be commensurate with the type and scope of activity being conducted. Tulalip Tribe maintenance personnel will be trained to correctly utilize spill control materials.
- Pond drawdown shall occur slowly and shall not result in erosion of banks, increase in ambient stream temperatures, or introduction of sediment to receiving waters.
- Develop a method of bypassing the flow coming into the pond past the work area. Sand bags and a tightline or pumps will allow the work to occur in the dry.
- Have a contingency plan for disposing of or handling excess turbid water. Evaluate access to sanitary sewer. If sewers are available, permission for discharge should be sought for contingency disposal. Pretreatment may be necessary. Tanker trucks can be used to take water to a location where disposal to land is more feasible. It may be feasible to use water for dust control.
- Have a sediment dewatering plan that assures that liquid will not be discharged to the roadway or off site. Side dump trailers are leak proof. Sawdust or other bulking agents may be used to facilitate handling.

Best Management Practices

- Appropriate BMPs will be used on all activities within 300-feet of surface water or potential riparian habitat. These practices must ensure that no foreign material such as side cast soils or oil and grease enter waters or wetlands.
- Tulalip Tribe maintenance supervisor will determine if weather conditions are appropriate (i.e. threatening rain), that could result in adverse impacts to water quality or aquatic habitat.
- If fish are present, in emergency and non-emergency situations, contact the Tulalip Tribes Natural Resources Department for proper procedures.
- Minimize time that the system will be out of service.
- Return pond to design function slowly to minimize impact to water quality.
- Only remove vegetation that is in the way of work. If trees are not interfering with access, leave trees alone.
- After completing work, reseed bare areas created by equipment.
- Prevent tracking out of soils onto public roads.

- Erosion and sediment control devices such as check dams, silt fences, and other acceptable techniques, will be used so that sediment or other materials do not enter waters or wetlands.

- All fueling and maintenance of equipment will occur at locations greater than 300 feet from the nearest wetland, ditches, flowing or standing water.

- Carry spill kit in vehicle.

- At the first sign of any equipment leaks or spills within the riparian area, Tulalip Tribe maintenance personnel shall immediately cease all work activities, contain the spill, and shall contact appropriate authority, to report the incident. Work shall not resume until further approval is given by the authority having jurisdiction.

2A6 - Slope Repair

Includes all work necessary to repair slope damage from slides, drifting sand or erosion. Work also includes repairing damage to riprap, cribbing, bulkheads, and dikes. For slide repair, the rock, mud, or dirt that that has slid into the ditch or on the roadway must be removed and the ditch returned to its original shape. Erosion repair will involve replacing the eroded material with rock, gravel or other material to stabilize the slope and restore it to its original shape. This may include re-vegetation of the slope as well as integration of bio-engineering concepts. It may also require removing the eroded material if it has caused damage to adjoining land. The crew size will vary greatly depending on the size of the slide or damage that has occurred and the amount of equipment needed to do the work.

Slope repair also includes bank stabilization activities which involves repairing and stabilizing eroding banks on section of rivers, streams and lakes directly adjacent to existing highways. The occurrence of these events is often precipitated by weather, flooding or naturally occurring changes in the river or stream morphology. High water flows during floods or spring run-off in a system can cause erosion of the bank to the point that part or all of the adjoining highway is removed. Immediate repairs normally involve reconstruction of the highway. Long term repairs involve redirection of the system's thalweg away from the road. This involves the placement of rip rap, barbs, or large woody debris, singly or in combinations, in the waterway.

Timing: Year round depending on weather.

Equipment: may include dump trucks, front end loader, excavator, or backhoe.

Avoidance and Minimization

- Tulalip Tribe maintenance personnel will dispose removed material above the bank line or at other appropriate disposal locations. Removed materials will not be placed in waterways or wetlands. In some instances, materials such as large, woody debris or large boulders may be replaced below the bank line as a habitat enhancement. This is done in coordination with the authority having jurisdiction.

- Adequate spill control supplies (diapers, kitty litter, shovel, etc.) will be kept available. Types and amounts of spill control supplies kept available will be

commensurate with the type and scope of activity being conducted. Tulalip Tribe maintenance personnel will be trained to correctly utilize spill control materials.

Best Management Practices:

- Appropriate BMPs will be used on all activities within 300-feet of surface water or potential riparian habitat. These practices must ensure that no foreign material such as side cast soils or oil and grease enter waters or wetlands.

- Carry spill kit in vehicle.

- Erosion and sediment control devices such as check dams, silt fences, and other acceptable techniques, will be used so that sediment or other material do not enter waters or wetlands.

- Excavated materials will be disposed upland, with protective measures to control, contain and prevent their entry into any waters or wetlands.

- Excavated materials will be recycled when suitable.

- All exposed soils will be revegetated after completion of the maintenance activity. All disturbed riparian vegetation will be replanted. When necessary, replacement of riparian trees with riparian shrubs that meet the highways safety requirements will be allowed. Riparian vegetation will be replanted with species native to the geographic region.

- All fueling and maintenance of equipment will occur at locations greater than 300 feet from the nearest wetland, ditches, flowing or standing water.

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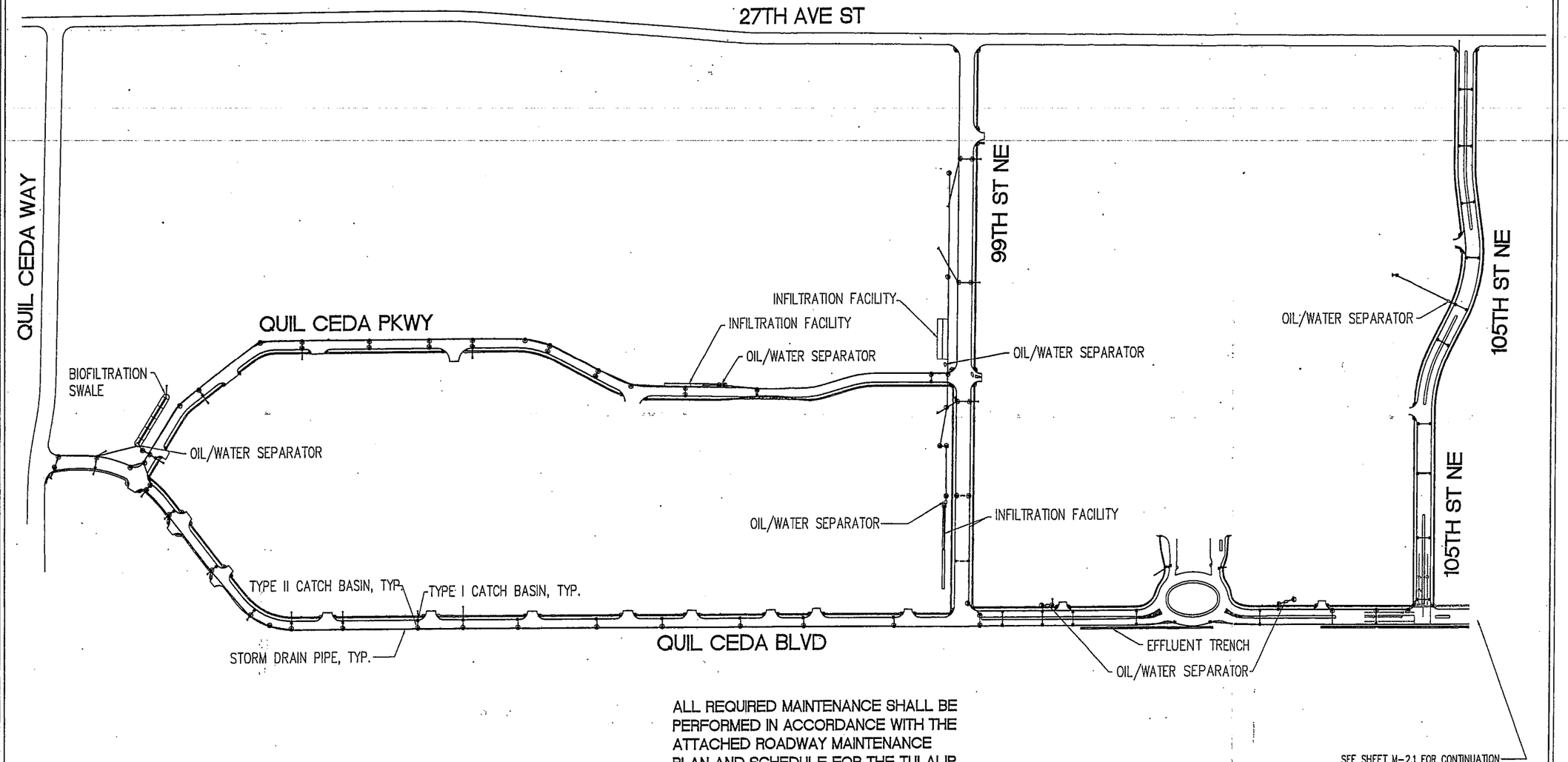

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GRAPHIC SCALE

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THE TULALIP TRIBES

QUIL CEDA PARK

MARYSVILLE, WASHINGTON

MASTER ROADWAY MAINTENANCE PLAN STORM DRAINAGE

M-2.0

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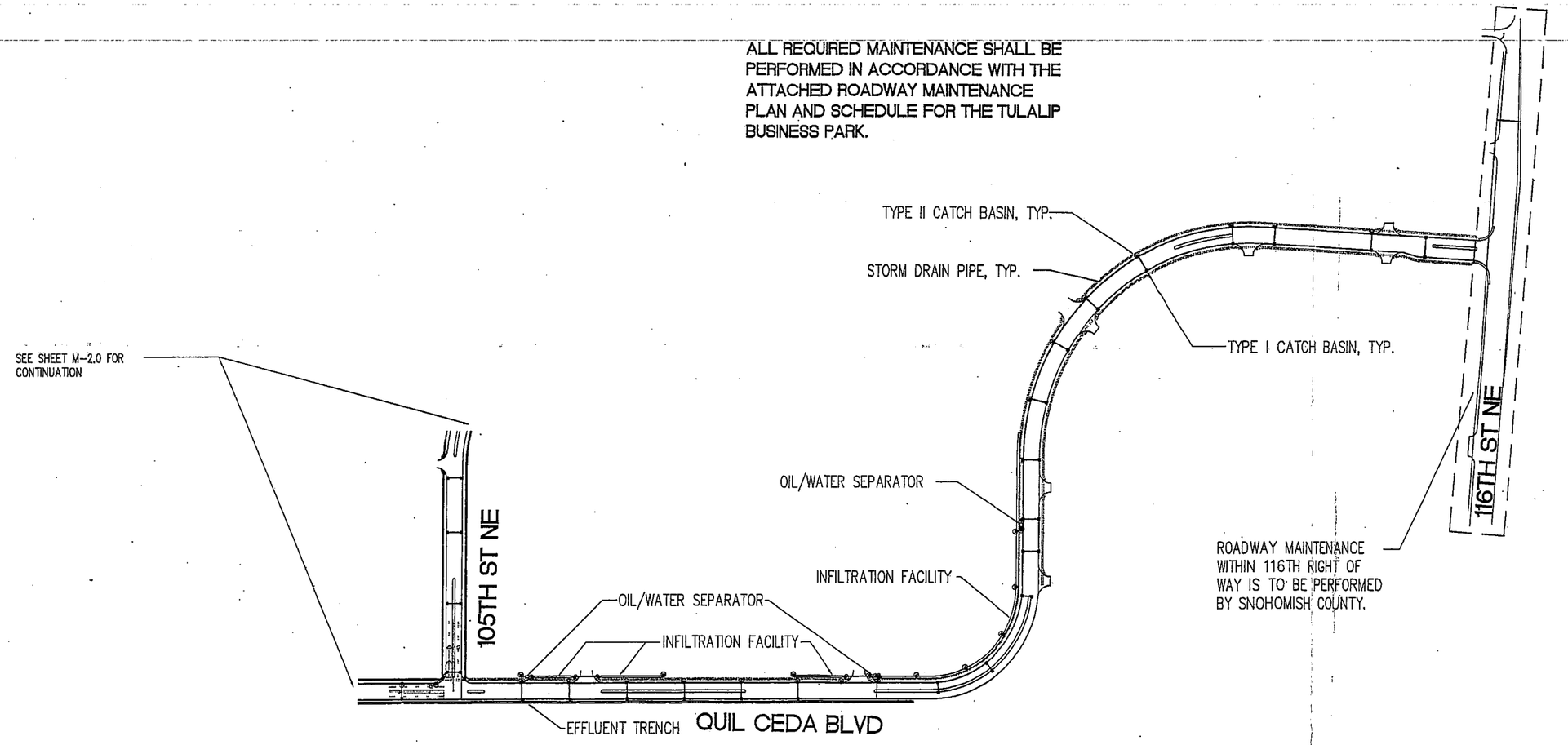

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QUIL CEDA PARK
MARYSVILLE, WASHINGTON

MASTER ROADWAY MAINTENANCE PLAN STORM DRAINAGE

M-2.1

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Group 3- Roadside & Landscape Maintenance

Roadsides are defined as the areas between the outside edges of the shoulders and the right of way boundaries. This applies to all lands managed by Tulalip Tribe and may extend to elements outside the right of way boundaries. This includes unpaved median strips and auxiliary facilities such as rest areas, roadside parks, viewpoints, heritage markers, pedestrian and bicycle facilities, wetlands and their associated buffer areas, stormwater treatment facilities, park and ride lots. Roadsides are primarily developed with native vegetation patterns and/or erosion control grasses. Formally designed ornamental landscapes are planted only in highly urbanized areas or in partnerships with local communities.

Roadsides are to be maintained to fulfill the functional needs of the roadway with safety as the top priority. The functional objectives of roadside maintenance include four categories: operational, environmental, visual and auxiliary. All roadside maintenance activities are intended to help achieve these functional objectives.

Tulalip Tribe's primary goal in management of roadside vegetation is to establish sustainable plant communities that fulfill the functional needs of the roadway system and require the least possible care and maintenance.

Roadside maintenance includes management of vegetation and features that are a part of the total transportation facility. Some areas are intended for active use by the traveling public while others are intended to integrate the transportation facility into the environment through which it passes. In areas with limited wildlife habitat, portions of the roadside can be managed to support wildlife in a manner that will not conflict with the safe use of the roadway.

3A1 - Litter Pickup

Includes all work necessary to remove litter, filled litter bags, debris, and dead animal carcasses from the shoulder and roadside, and haul it to an appropriate disposal site.

Timing: Litter pick up occurs year round.

Equipment: Dump trucks, pickup trucks with tilt bed trailers, and garbage compacting trucks may be used for bag pick up and disposal.

Best Management Practices

- All litter debris larger than fist size will be collected and disposed prior to mowing operations to prevent shredding and dispersion by mowers.
- All fueling and maintenance of equipment will occur at locations greater than 300 feet from the nearest wetland, ditches, flowing or standing water.

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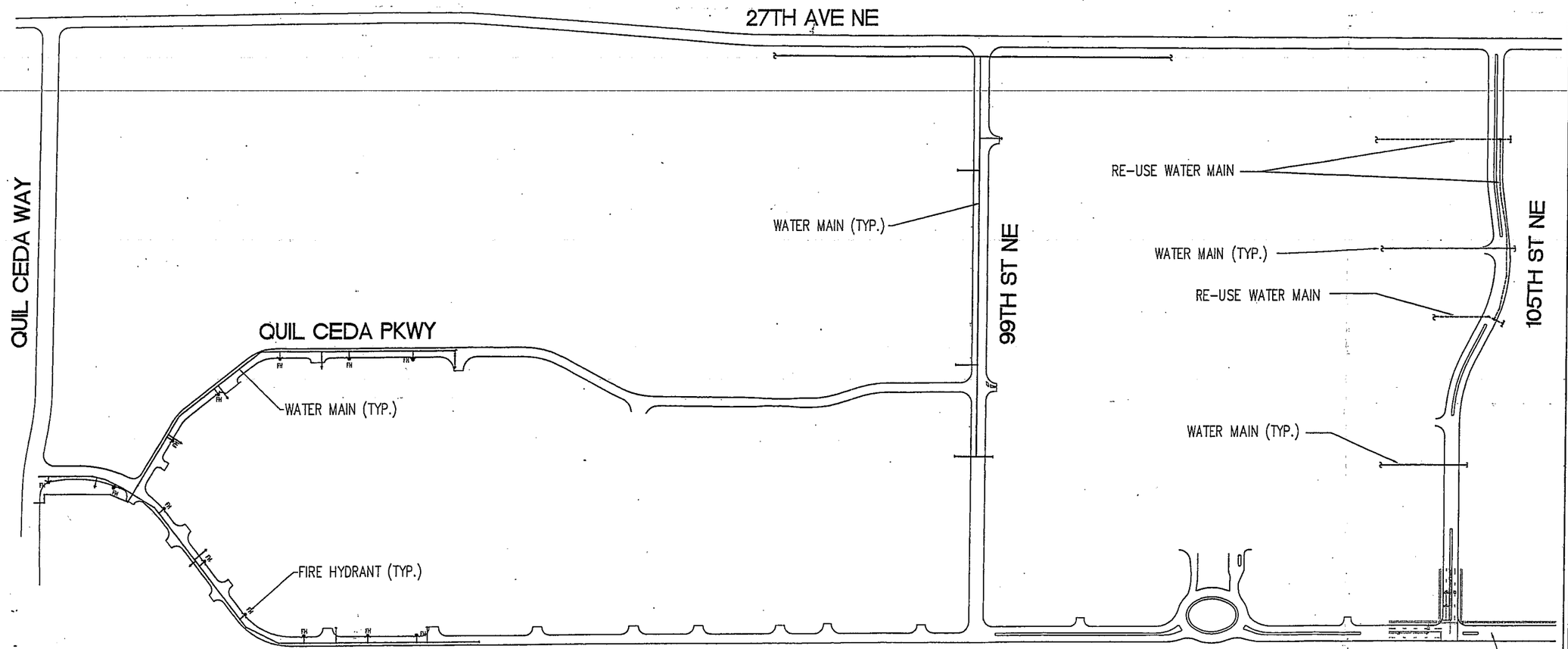

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THE TULALIP TRIBES

QUIL CEDA PARK

MARYSVILLE, WASHINGTON

MASTER ROADWAY MAINTENANCE PLAN WATER SYSTEM

M-4.0

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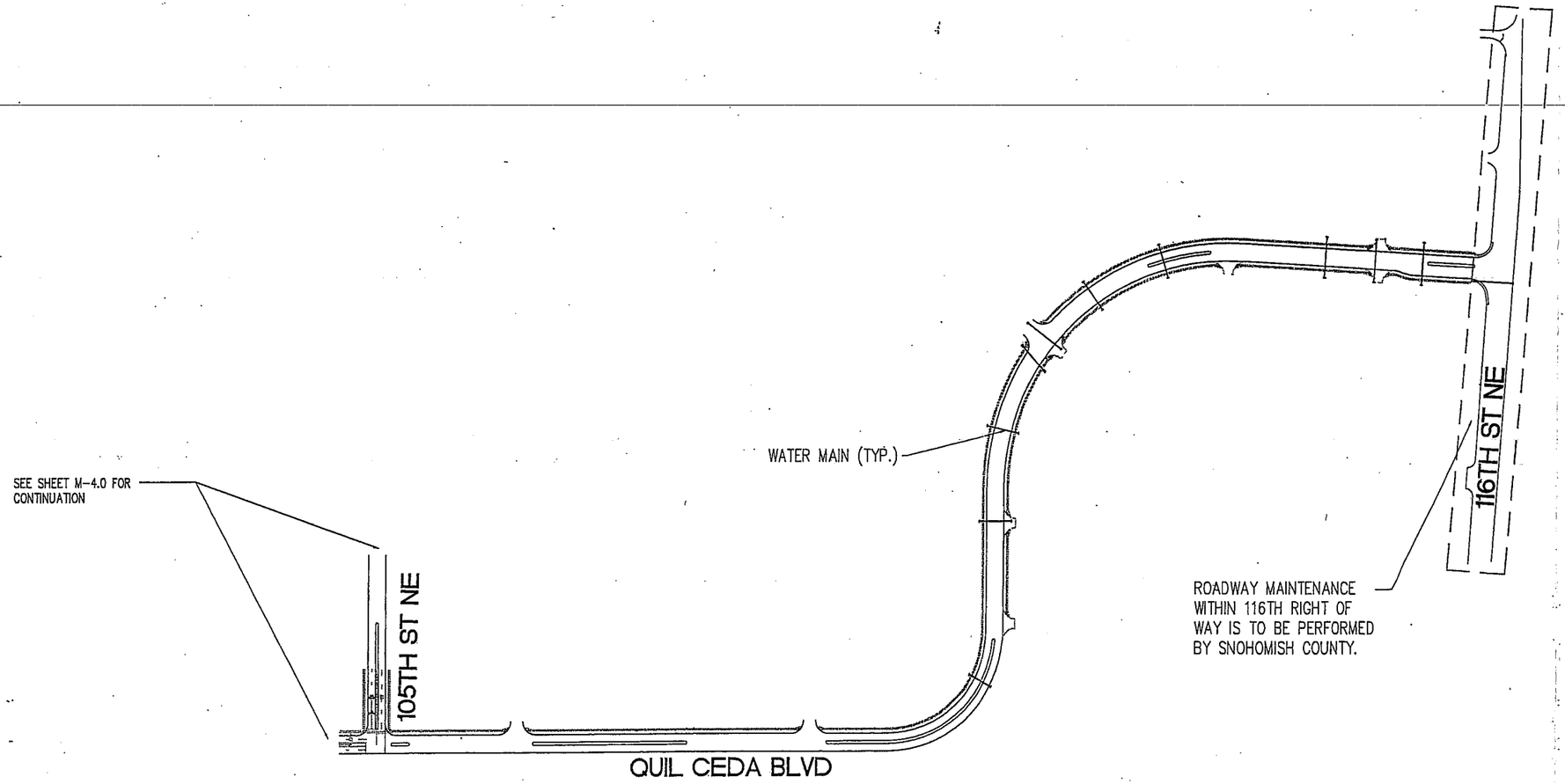

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MASTER ROADWAY MAINTENANCE PLAN WATER SYSTEM

M-4.1

The level of service required for operations and maintenance management must at a minimum address the demands of meeting all state and federal drinking water regulations this in turn requires adequate staffing levels and training opportunities on an ongoing basis. To insure the highest level of confidence that crisis situations within the system are avoided, preventative maintenance measures need to be incorporated into both short and long term work programs. Certified personnel are required for positions that are in direct charge of public water system or major segments of the system that are responsible for monitoring or improving water quality.

7A1 – Emergency Response Plan

The Washington Department of Health (DOH) suggests the inclusion of an Emergency Response Plan (ERP) in the operations program. The purpose of an ERP is to guide personnel through potential system malfunctions, natural disasters and other events that might alter routing system operation. Proper staffing, training, and communication, as well as suitable inventory of maintenance and repair parts are also basic to the ERP.

7A1.1 – General Field Response

The initial reaction by Tribe personnel to an emergency should be to take prompt action to remove any immediate threat to public health or safety. The water system supervisor or their designee, should be contacted, and crew dispatched to assess the damage and determine the materials and resources necessary for correction. It is essential that the tribes repair supplies inventory status report and list of material supply is kept up to date and readily accessible to avoid unnecessary delay in restoration of service. Throughout the emergency, radio contact should be maintained between work crews, the water system supervisor, and other key participants to enhance coordination of the corrective effort.

7A1.1.1 – Emergency Response Procedures

A series of potential natural disasters and other emergency conditions, which may impact the tribes' water system, are presented here in. Actions to be taken in the event of each emergency are discussed below.

Earthquake

Description – A major earthquake, with a magnitude of 5.0 or greater on the Richter Scale and an intensity of 9 or greater on the Modified Mercalli Scale, could disrupt the source, transmission, pumping, storage, distribution, and telemetry components of the water system. In addition power failures and interruption to conventional communication systems may occur.

Response – Tribal personnel should anticipate critical water use needs for fire fighting or medical facilities resulting from an earthquake. Since they are hidden from view and at least as susceptible to ground movement as above ground structures, pipeline, wells, and other buried facilities require closer attention in the event of an earthquake. The system should be checked thoroughly for unexplained drop in line pressure and reduction in flow rate, pump failure, leakage or other signs of damage.

Power Failure

Description – Short and long term interruptions in power supply can occur a variety of reason and may or may not be associated with other emergencies which would effect the water system. Facilities most effected by this type of emergency included source and booster pumping, telemetry equipment, and communication systems.

Response – The water system within the Business Park should not be adversely impacted by power failure since there are no booster pumps present.

Water Transmission Line Failure

Description – Rupture or leakage in the transmission lines could be a result of earthquake, pressure surge, vandalism, bomb blast, construction, soils scour, corrosion, or material failure. A major break could result in an interruption to a major source of supply for the Business Park and present a flood and erosion threat to nearby area.

Response – Such an even requires prompt action by Tribe personnel to isolate the damaged section and minimize the impact to the rest of the system. The size and nature of the rupture must be evaluated promptly to ensure that adequate repair materials, excavation equipment, dewatering facilities, and trained personnel are deployed immediately. A field response should also address the need to reroute traffic and warn business possible effected by the break.

7A2 – Routine and Preventative Maintenance

Good preventative maintenance is both cost effective and a deterrent to emergency conditions. The following is a schedule of maintenance activities the help provide an efficient and reliable system operation, extend the life of the equipment, and provide an early warning of mechanical breakdown.

The Tribe is to follow a schedule of monitoring and maintaining the facilities throughout the distribution system.

The following activities should be preformed by qualified personnel:

- Water Quality Sampling– Scheduling, sampling, collection, testing, reporting of results, maintenance of database and interpretation of findings for required and any additional biological and chemical water quality sampling program is to be accomplished. All water quality monitoring and testing shall be done in coordination with the City of Marysville Water Department and in accordance with Washington Department of Health.
- Cross Connection Control – Annual inspection of existing cross connection control equipment, inspection of new construction, testing of facilities, repair of failed equipment is to be accomplished. All cross connection control inspections shall be done in coordination with the City of Marysville Water Department.

- Flushing of Watermains – Periodic flushing of watermains to remove residue, improve capacity, and restrict bacterial growth potential, should be accomplished once every five years or as required per the Jurisdiction having authority.
- Maintenance of Meters – Maintain and repair (as required) all meters within the system. Service meters should be monitored and tested on a regular basis, and replaced as needed every 10 to 15 years.
- System Operation – Perform the necessary activities to operate the system such as dealing with minor emergencies, fixing leaks, replacement of small lines, etc.
- Exercise System Valves – Periodic locating, exercising, and maintaining of system valves should be accomplished once every three years at a minimum.
- Hydrant Maintenance and Repair – Repair hydrants found by fire department to be in need of work. Fire Hydrant should be maintained at least once every two years.
- Monitor the amount of water used versus the amount of water produced to determine the amount of water lost due to leaks and/or illegal watermain taps. Typically 3% to 5% is an acceptable loss due to watermain leaks.

T30N. R.5E. SEC.17 W.M.

27TH AVE NE

QUIL CEDA WAY

99TH ST NE

105TH ST NE

QUIL CEDA PKWY

SANITARY SEWER MANHOLE (TYP.)

SANITARY SEWER GRAVITY MAIN

SANITARY SEWER GRAVITY MAIN

SANITARY SEWER PUMP STATION

SANITARY SEWER FORCE MAIN

SANITARY SEWER PUMP STATION

QUIL CEDA BLVD

SEE SHEET M-3.1
FOR CONTINUATION

GRAPHIC SCALE

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THE TULALIP TRIBES

QUIL CEDA PARK

MARYSVILLE, WASHINGTON

MASTER ROADWAY MAINTENANCE PLAN
SANITARY SEWER SYSTEM

M-3.0

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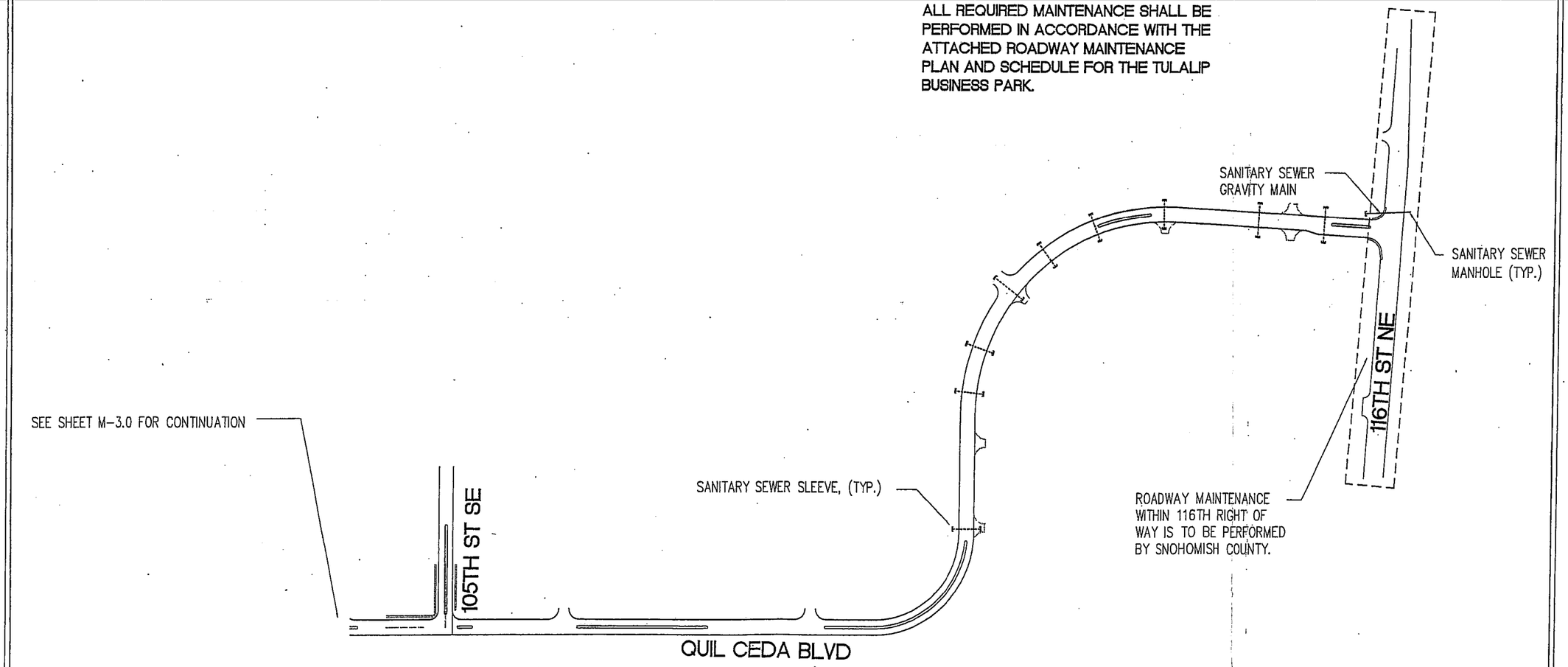

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MASTER ROADWAY MAINTENANCE PLAN SANITARY SEWER SYSTEM

M-3.1

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Area 4-5 Landscape and Irrigation Plans to be inserted upon receipt from the landscape architect.

4A1 - Snow & Ice Control

During winter months from November through March, the primary focus of roadway maintenance is to keep the roadway operational by the removal of snow and ice, and routine patrolling of the roadway for early detection of icing, and other winter hazards. Due to the intensity of some storms, snow and ice can build-up on the roadway surfaces, traction sand is applied to provide a safer driving condition. In some critical locations (traffic/safety-critical) "anti-icing" chemicals may be applied to prevent icing before it occurs. Between snow storms crews, in some areas, may sweep up accumulated sand, to reduce dust and minimize resulting air quality impacts and reduce the sediment contribution to adjacent water bodies. Roadways are prioritized for snow and ice control based primarily on traffic volumes and functional class. Interstate and principal arterial highways with the highest average daily traffic within a given maintenance area, will normally receive the first attention. Since winter storms may occur at any time, during any day, staffing schedules are adjusted to provide a broader coverage and offer better response to storm events. Crew sizes will vary depending on the number of lane miles they are responsible for.

Timing: Much of this effort is expended during the period from November 1 to early March, although isolated storms occur from late October through the middle of April. Exact timing for control of snow and ice varies year to year and throughout the winter season depending on the weather patterns.

Equipment: Typical equipment may include dump trucks with a sander and a plow, motor grader, deicer tanker/truck, pickup truck, front end loader, snow blower, pickup and side cast sweepers, vactor, and loader.

Avoidance and Minimization

- Tulalip Tribe maintenance personnel plans and prioritizes winter maintenance activities to identify traffic/safety critical areas, levels of service for roads, and methods for maintaining levels of service during winter weather. Environmental considerations include damage to roadside vegetation from excessive and improper anti icing chemical use, deposition of traction sand on roadside aquatic environments, and the contribution of abrasives to non-attainment thresholds for air quality standards. Locations of sensitive riparian areas nearby roads will be coordinated with these plans and priorities to guide environmental protection practices while conducting winter maintenance activities.

- Tulalip Tribe maintenance personnel trained in winter maintenance practices, apply sand and anti-icing chemicals to attain and maintain reasonably safe driving conditions. Applications which would have a negative impact to water quality and which do not promote safe driving conditions will be avoided.

- Sand and anti-icing chemicals used by Tulalip Tribe will be free of excessive levels of contaminants (i.e. heavy metals) known to cause water quality problems.

- Liquid deicers stored at facilities will be secured by secondary containment where the possibility of accidental releases into surface or ground waters exist.

Best Management Practices:

- Whenever possible avoid casting snow and/or sand into waterway.
- If a culvert or catch basin could drain with a sediment impact to waterways, sediment control measures will be implemented whenever possible to prevent excess sand run off into waterway.
- Sand will be recovered from bridges and the roadway shoulder when weather and road conditions allow. Cleanup should also include removal of sand from under the guardrail.
- Pending results of ongoing research, the use of liquid deicers will be preferred over the use of sand.
- Where possible, place barriers to route water runoff, which could cause erosion and sediment impact, away from water courses. This will also help in the recovery of sand.
- Reduce plow speed to minimize the casting of snow and sand into a watercourse.
- Mobile pickup sweeper will be used to recover sand. Avoid sidecasting materials.
- Identify and mark Sensitive Areas.
- All fueling and maintenance of equipment will occur at locations greater than 300 feet from the nearest wetland, ditches, flowing or standing water.

Group 5 - Traffic Services

Traffic services are those functions necessary for the safe and efficient movement of traffic. They include maintaining roadway signs, delineators, pavement markings, traffic islands, curbs, impact attenuates, barriers, guardrail, traffic signals, and highway illumination. Each serves a definite function in the control and guidance of traffic. For the purposes of this document only those elements that have the potential to impact fish will be discussed.

5A1 - Pavement Striping Maintenance

All roadways have lines that delineate the travel lane for motorists. On multi-lane and two lane roadways this normally consists of a continuous edge stripe closest to the outside shoulder on each side, and a dashed centerline down the middle, to separate the roadway from oncoming traffic. The combination of traffic, sand, dirt & debris can wear these stripes away over time and they must routinely be replaced. The stripes may last anywhere from a month during the winter season to more than one calendar year depending the combination of these factors. Most stripes are painted on the roadway, but there are some thermoplastic and methyl methacrylate materials that can also be used for this purpose. Pavement striping normally requires a crew of six people.

Timing: Most pavement striping occurs during May through the early part of October. However, painting must be completed in dry weather. Work may occur any day of the week generally during the daylight hours.

Equipment: may include a paint truck, flat bed truck, van, and 2 or more trucks with a mounted attenuator.

Avoidance and Minimization

- Water-borne striping paint will be used in place of solvent based paint to minimize potential adverse impacts to the environment.
- Paint totes will be stored in a manner that will minimize impacts to surface or groundwater should an accidental spill occur.
- Spill prevention/control training and spill control supplies will be provided to striping crews.
- Paint equipment cleaning will be conducted so paint residues will not enter surface or groundwater. Paint equipment is predominantly cleaned in wash bays whose drains are connected to sanitary sewers. On occasion when cleaning needs to take place where wash bays are not available, paint residues are captured in containers to avoid any runoff into nearby aquatic habitat areas.
- Materials will be used for their originally intended purpose and, therefore, will not become a waste product.

Best Management Practices

- BMPs will be used on all activities within 300-feet of surface water or potential riparian habitat to ensure no foreign material, such as paint and run off from freshly applied paint from entering waters or wetlands.
- Carry spill kit in vehicle.
- Tulalip Tribe will protect inlets and catchments from foreign material such as accidental spills of petrochemicals, paint, and run off from freshly applied paint if inclement weather unexpectedly occurs.
- Tulalip Tribe maintenance supervisor will determine if weather conditions are appropriate to perform surface work (i.e. heavy rainfall) that could result in adverse impacts to water quality or aquatic habitat.
- All fueling and maintenance of equipment will occur at locations greater than 300 feet from the nearest wetland, ditches, flowing or standing water.

5A2 - Guardrail Maintenance

Guardrail is placed at the edge of the pavement to prevent vehicles from striking hazardous obstacles, on coming traffic, or going down steep slopes. The purpose of the guardrail is to redirect errant vehicles and keep them on the road. Guardrail that is damaged must be repaired in order for it to maintain its functionality. Guardrail repair or replacement normally requires a crew of 3 to 10 people.

Timing: Guardrail is repaired on an as needed basis throughout the year. Work may occur any day of the week or time of the day (daylight or night).

Equipment: flat bed truck, backhoe, post hole digger, and a dump truck. A buffer truck may be necessary for traffic control safety.

Avoidance and Minimization

- In situations where guardrail repair presents a potential sedimentation threat to nearby aquatic habitat, erosion control measures will be utilized to eliminate or minimize the threat.
- Adequate spill control supplies (diapers, Kitty litter, shovels, etc.) will be kept available. Types and amounts of spill control supplies kept available will be commensurate with the type and scope of activity being conducted. Tulalip Tribe maintenance personnel will be trained to correctly utilize spill control materials.

Best Management Practices

- BMPs will be used on all activities within 300-feet of surface water or potential riparian habitat to ensure that no foreign material such as accidental spills of petrochemicals, and to control and prevent sediments from entering drainage systems that discharge into waters or wetlands.

- Carry spill kit in vehicle.

- Erosion and sediment control devices such as check dams, silt fences, and other acceptable techniques, will be used so that sediment or other materials do not enter waters or wetlands.

- All fueling and maintenance of equipment will occur at locations greater than 300 feet from the nearest wetland, ditches, flowing or standing water.

6A1 – Evaluation Criteria for Analysis of the Existing Sanitary Sewer System

The following section analyzes the integrity and function of the existing system. A description of the evaluation criteria will first be presented followed by the application of these criteria to each sanitary sewer system component.

6A1.1 – Pipeline Integrity

Pipeline integrity is the evaluation of pipe's physical characteristics, including strength and alignment. The following characteristics are used to evaluate pipe integrity.

6A1.1.1 – Structural Integrity

Structural characteristics define pipe strength. The pipe must be strong enough to support itself as well as withstand the surrounding soil pressure and loading applied at the ground surface. Factors that reduce the pipe's structural integrity include cracks, breaks, and pitting. Cracks and breaks can result from excessive loading on the pipe, loss of pipe support, or tree toots breaking through the pipe walls. Pitting is the result of hydrogen sulfide, an acidic gas byproduct of wastewater that corrodes the pipe material and reduces its strength.

Pipe age is also a factor in evaluating structural integrity since a pipe's strength weakens over time. Standard engineering practice designates the design life of sanitary sewer pipe to be approximately fifty years. Many factors affect design life, including exposure to hydrogen sulfide and commercial chemical waste, installation procedures, and application of excessive loads. Different pipe materials offer a variety of design lives based on the materials' durability and chemical resistance. Research did not reveal specific industry standards on the design lives for sanitary sewer pipe material due to the variable conditions that the sanitary sewers are exposed to that effect its integrity.

Visual observations of a pipe through television inspections are used to determine a pipe's structural condition. Inspection will reveal highly deteriorated pipes, severe cracks, holes and poorly sealed connections. These signs of pipe degeneration can eventually lead to the collapse of sanitary sewer pipes and the obstruction of wastewater flows. Decreased structural integrity can also affect the ground surface above the pipe. Cracks and breaks, as well as offset and separated sanitary sewer connections, allow groundwater and surrounding soil to enter the pipe and can lead to the undermining and settlement (sink holes) at the ground surface.

Holes in the pipe generally start as longitudinal cracks. Radial cracks, which travel around the pipe diameter, do not lead as readily to failure breaks. Although both types of cracks can allow infiltration of groundwater into the system, longitudinal cracks have a greater impact on the structural strength of a pipe.

6A1.1.2 – Pipe Alignment

The horizontal and vertical alignment of a sanitary sewer pipe can affect its ability to maintain flows. A sag in a sanitary sewer pipe may create restrictions that reduce the pipe's flow capacity. Misalignments are often seen in the form of offset joints, observed during television inspections. In addition, vertical alignment can be evaluated with a device known as a "belly" meter. The belly meter is attached to the video camera and measures the horizontal sag in a pipe. Current standard practice mandates that the sag in a newly constructed sanitary sewer pipe be no greater than one inch at any point in the line.

6A1.2 – Inflow and Infiltration (I&I)

Inflow consists of stormwater that is piped directly into the sanitary sewer from sources such as catch basins and roof drains. Infiltration is a result of groundwater entering the sanitary sewer system through pipe and manhole leaks. Inflow and infiltration (I&I) can significantly reduce the available capacity of the sanitary sewer system. In addition, I&I can be a symptom of structural defects within the sanitary sewer system. Therefore, it is an important indicator to use in the evaluation of an existing sanitary sewer system.

Evidence of I&I can be found through visual observations, flow monitoring, and smoke testing. Television inspections indicate stormwater connections, from catch basins or roof drains, as well as infiltration of groundwater through joints and cracks. Flow monitoring consists of comparing flow data collected during dry and wet seasons. A well-sealed system should have little difference between the dry and wet weather flows. During smoke testing, smoke is blown into the sanitary sewer pipes and passes through cracks and joints into the ground. Eventually the smoke reveals pipe defects as it rises through lawns into the air. The smoke also exposes roof drain and storm system connections, which are typically not allowed because they discharge rain runoff directly into sanitary sewer system.

6A1.3 - Capacity

Capacity is the measure of a collection system's ability to provide service. The flows contributed to the sanitary sewer system depend on the number of users, types of land use, and amount of inflow and infiltration entering the system. The capacity of each system component is determined by its physical characteristics. Gravity pipe capacity is characterized by the pipe size, interior pipe texture, and slope of the line. The key capacity characteristics for lift stations are the pump size, wet well volume, and size and length of the force main. Visible consequences of inadequate capacity include surface overflows and structure flooding. Pump run time records from lift stations and sanitary sewer pipe flow measurements also aid in the identification of capacity deficiencies within the system.

The maximum pipe capacity defines the sanitary sewer system's ability to convey wastewater flows. Maximum capacity is the volume of sanitary sewer flow that reaches 70 percent of full pipe depth during average dry weather conditions. Defining dry weather capacity as less than full pipe flow is necessary to provide adequate volume within the sanitary sewer system during the wet season, when flows will be higher due to I&I. Under wet weather conditions, maximum capacity of the sanitary sewer is

reached if the manageable surcharge of wastewater above the piping is two feet during a ten-year peak-hour storm.

6A1.4 – Operating Condition

Operating condition is the criterion used to measure a component's ability to serve its intended function. Lift stations, generators, pipes, and other elements of the system can be evaluated based on the efficiency of their operation. Efficiency is the comparison of useful output generated by a component to the total input necessary to make it function. Therefore, an efficient system component operates as designed with minimal input of energy or operation and maintenance. Mechanical and electrical equipment wear out over time and eventually require overhauls to recover at least portions of their efficiency. Also, as pipe condition deteriorates over time, the pipes become less able to convey the flows they were originally designed for. This deterioration may be due to the general wear of the interior pipe surface, the accumulation of grease along the pipe wall, and other factors. This reduction in capacity is a sign of decreased system efficiency.

With technological advances, system components have become more efficient and reliable. As the industry moves toward new technologies and older equipment is no longer manufactured, replacement parts become difficult to obtain. The maintenance of older components becomes difficult and, as a result, system reliability decreases. An inefficient or older system can lead to capacity problems. For example, a decrease in the efficiency of a lift station pump may reduce its ability to convey wastewater flows, resulting in wastewater overflows or backups.

Lift stations are evaluated by their ability to transport wastewater within their design parameters. General engineering practice dictates that each pump in a duplex lift station should operate no more than six times per hour with a five-minute interval between starts. In addition, the total operation time for all the pumps in a lift station should not exceed eighteen hours per day.

Many factors can cause sanitary sewer lift stations to exceed these operating parameters:

- Excessive Inflow and Infiltration.
- Erroneous pump activation settings.
- Inefficient pumps.

6A1.5 – Risk Assessment

A risk assessment evaluates the liabilities assumed by the Tulalip Tribe to sustain existing system conditions versus those associated with replacement or rehabilitation. Several issues are reviewed as part of assessing the risk of a sanitary sewer system component.

6A1.5.1 – Public Impact

Failure of the sanitary sewer system can have a substantial impact on the public. A complete liability analysis includes consideration for the effects of an existing sanitary sewer system failure on the customers. Attention should be focused to areas that will have the greatest impact on the largest number of people. For example, a main truck collector serving hundreds of users has a wider ranging impact compared to a minor collector serving ten users.

6A1.5.2 – Financial Impact

Consideration is given to the cost of maintaining the existing sanitary sewer system versus the cost of rehabilitation and replacement. Some of the financial impacts associated with the existing sanitary sewer system include:

- Operation and maintenance costs,
- Damage claims filed by property owners.

These impacts are weighted against upgrade costs to minimize the effect on rate payer while maximizing the efficiency of the sanitary sewer system.

6A1.6 – Existing System Capacity Analysis: Computer Model

Capacity is the measure of a collection system's ability to provide service. Sanitary sewer capacity analysis involves the estimation of generated flows. The results are compared to existing pipe and lift station physical characteristics to evaluate capacity. Capacity analysis is the principal tool used to identify extensions to unsewered portions of the service area. In addition, capacity data serves an important role in planning system infrastructure upgrades. Population, land use, and inflow and infiltration (I&I) are major components in calculating sanitary sewer volumes.

Computing wastewater flows can be accomplished manually or with the aid of a computer software program. Both methods require extensive time researching system infrastructure records, service area topography, existing and proposed land use, and current and future population information.

Manual calculation of wastewater flows for a small basin of approximately 25 acres can take as much as 50 hours for a single planning alternative. By contrast, these calculations performed for the same area with the aid of a computer software program can be completed in approximately 16 hours. Alternatives can be evaluated relatively quickly and efficiently, with the computer reducing the calculation time significantly. The standa4d practice is to use computer simulation models to conduct capacity analysis.

6A1.7 – Future Sanitary Sewer System Analysis

The second planning function of the computer model is the prediction of future flows. A review of the flows projected through existing infrastructure will reveal capacity needs throughout the sanitary sewer system. In addition, extensions are identified and sized based on model population growth projections. Growth horizons, future capacity needs. And the criteria for selecting future sanitary sewer system extensions are examined to analyze the Tulalip Tribes future needs.

6A2 - Sanitary Sewer System Management

Evaluation of the sanitary sewer system condition by the system management process is necessary for continued operations. Effective system management maintains the level of service by allocating resources to operate, maintain, and rehabilitate the sanitary sewer system. There are three methods of system management:

- Reactive – system deficiencies are corrected when there is a failure.
- Directive – resources are directed to correct deficiencies based on limited analysis.
- Proactive – true system condition id determined and resources are directed based on known priorities.

The following chapter presents a description of the current sanitary sewer system management, broken down into its three components:

- Operation and maintenance (O&M).
- System evaluation.
- Data Management.

This chapter also discusses and recommends an implementation strategy for proactive system management.

6A2.1 – Gravity Sanitary Sewer System

The gravity sanitary sewer system O&M program includes the following major activities to ensure efficient and unobstructed sanitary sewer flows. Neglecting these maintenance functions can lead to wastewater overflows.

6A2.1.1 – Pipe Cleaning

Pipe cleaning is the primary component of gravity sanitary sewer system maintenance. Pipe cleaning prevents surcharging and overflows by removing flow restrictions such as sludge, grease, roots, and soil. Grease build up is typically found downstream of restaurants, while soil and roots normally enter pipes through cracks, holes, and separated joints. The presence of soil and roots indicates a need for additional investigation of the pipe to evaluate its structural integrity.

The maintenance goal is to clean all of sewer pipe in the Tulalip Tribe's sanitary sewer system every five years. Pipes are cleaned when they are plugged, a partial backup is observed, a television inspection is to follow, or as part of routine maintenance. Pipes with known grease or root problems require more frequent cleaning.

Currently, routine pipe cleaning is directed to areas that have gone the longest without having been cleaned or televised. Other jurisdictions have implemented pipe cleaning programs that include a means to determine effective routing pipe cleaning frequencies. A case study, Optimizing line Cleaning Frequencies and Strategies, by William C. Carter, P.E., done in Johnson County, Kansas, describes a process to prioritize cleaning efforts. In this case study, pipe cleaning frequencies were determined based on the debris accumulation found in the pipe. Pipes with little to no debris were put on a five-year cleaning schedule. A pipe found with a major debris accumulation was place on a six-month cleaning frequency. If after six months it was found that the debris build up in the pipe did not warrant a six-month cleaning frequency, the schedule frequency was increased to one year. Other factors that could determine pipe cleaning frequency are pipe

material, age, slope, and size. For example, plastic (PVC) pipes under optimum flow conditions are less susceptible to debris build up than low flowing concrete pipes and can, therefore, be maintained less frequently.

6A2.1.2 – Television Inspection

Televising gravity sanitary sewer pipes is the only practical method to determine an in-place pipe's physical condition. The sanitary sewer system is televised to:

- Verify proper construction of newly constructed pipes.
- Evaluate the condition of existing pipes.
- Locate service connections.
- Locate improper storm connections.

The pipe should be clean before televising to allow an unobstructed path for the camera and to allow the operator to see the pipe surface. The camera operator evaluates pipe condition, including structural integrity, horizontal and vertical alignment, inflow and infiltration, and root intrusion. This information can be used to evaluate the need for pipe rehabilitation and replacement.

The maintenance goal it to televise all of the gravity pipe in the Tulalip Tribe's system every five years. Unplanned television inspections, which account for approximately 50 percent of all television inspections, reduce the ability of O&M personnel to meet their five-year frequency goal. Unplanned television inspection occurs when there is a:

- Request to locate a service connection.
- Sanitary sewer backup.
- Newly constructed pipe is to be inspected.
- Request to evaluate pipe for rehabilitation in association with a street overlay or other Public Works Project.

6A2.1.3 – Root Control

Regular root control is important in maintaining sanitary sewer pipe flow and structural integrity. Tree roots enter pipes, obstruct flow, and increase crack size if allowed to grow. O&M personnel control roots by two methods: foam the line with a herbicide to kill the tree roots, or cut the roots with a saw attachment on the cleaning hose. Root control occurs every one to two years at known problem locations, or upon finding a new root problem during routine television inspection.

6A2.1.4 – Pipe Rehabilitation and Replacement

Pipes deteriorate with age and use to a condition that may require rehabilitation or replacement. Deterioration rates are variable and are dependent on factors such as pipe material and exposure to hydrogen sulfide or other chemical waste. Left unrepaired, structural deterioration can cause plugging of pipe and can eventually lead to collapse.

There is no regularly planned pipe rehabilitation or replacement program for the Tulalip Tribe. Short runs of pipe are typically rehabilitated or replaced on an as needed basis by the O&M personnel.

6A2.1.5 – Manhole Rehabilitation and Replacement

Because of weakening grout (in brick manholes) and exposure to hydrogen sulfide, manholes can eventually deteriorate to a condition requiring rehabilitation or replacement. Deteriorate manholes can be a significant source of inflow and infiltration (I&I) and can eventually collapse, obstructing pipe flow and/or creating a public safety hazard.

Rehabilitation is done by lining or sealing the inside surface of the manhole. If a manhole is too deteriorated for lining or sealing, it is replace. Manholes are inspected during routine cleaning and televising operations and are rehabilitated and replace only as needed.

6A2.1.6 – Summary of Operations and Maintenance Activities

Information in Table 6.1 was obtained from the City of Olympia's O&M Division's work order database and the manual scheduling records. The table shows maintenance personnel activities by percentage of time spent per task. According to manual scheduling records, for all gravity sanitary sewer system activities combined, approximately 50 percent of their labor time is spent performing unplanned maintenance. Unplanned maintenance also includes responding to televising requests to locate service connections and inspect newly constructed sanitary sewer lines. To reiterate, all pipe and manhole rehabilitation activities are unplanned.

Table 6.1

Operations and Maintenance Division Activities for Gravity Sewer System

O&M Tasks	Time Allocation	Planned Time	Unplanned Time
Pipe Cleaning	33%	50%	50%
Television Inspection	32%	50%	50%
Root Removal	16%	70%	30%
Pipe Rehabilitation	7%	0	100%
Manhole Rehabilitation	1%	0	100%
Other Maintenance	11%	50%	50%

6A2.2 – Sanitary Sewer Lift Stations

The lift station operation and maintenance program minimizes lift station failures, providing for efficient and consistent conveyance of wastewater through the sanitary sewer systems' force mains. Failure of any of the critical components may lead to wastewater overflows.

6A2.2.1 – Station Checks

Telemetry systems should remotely monitor the lift station operation and notify the appropriate personnel if there is any system malfunction. Regularly planned on-site station checks are to occur every two weeks, to verify proper lift station equipment operation, such as pumps, meters, alarms, controls, and the general condition of the station. Unplanned station checks are initiated by alarms. A telemetry failure initiates a daily station check until the telemetry is sending acceptable messages.

6A2.2.2 – Cleaning and Painting

Good housekeeping of a lift station is important to ensure efficient operations. A clean lift station allows for easy problem identification and maintains a sanitary work environment. Wet well cleaning prevents debris from damaging pumps and prevents grease from adversely affecting liquid level sensing equipment.

Regularly planned wet well cleaning occurs every six months. Wet wells need more frequent cleaning if there are known debris accumulation problems, such as lift stations in high grease areas. Painting of the sanitary sewer lift stations occurs as needed, which is typically every two years.

6A2.2.3 – Pump and Motor Maintenance

Pumps and motors are inspected and operated during each station check. Since all lift stations have redundant pumping systems (at least two pumps per lift station) and variable operating parameters, predicting failure of pumps and motors is difficult. Therefore, pumps and motors are only maintained or rehabilitated upon failure. Since the pumps and motors are in the same casing, both get replace and rehabilitated when either fail.

6A2.2.4 – Generator Inspection and Maintenance

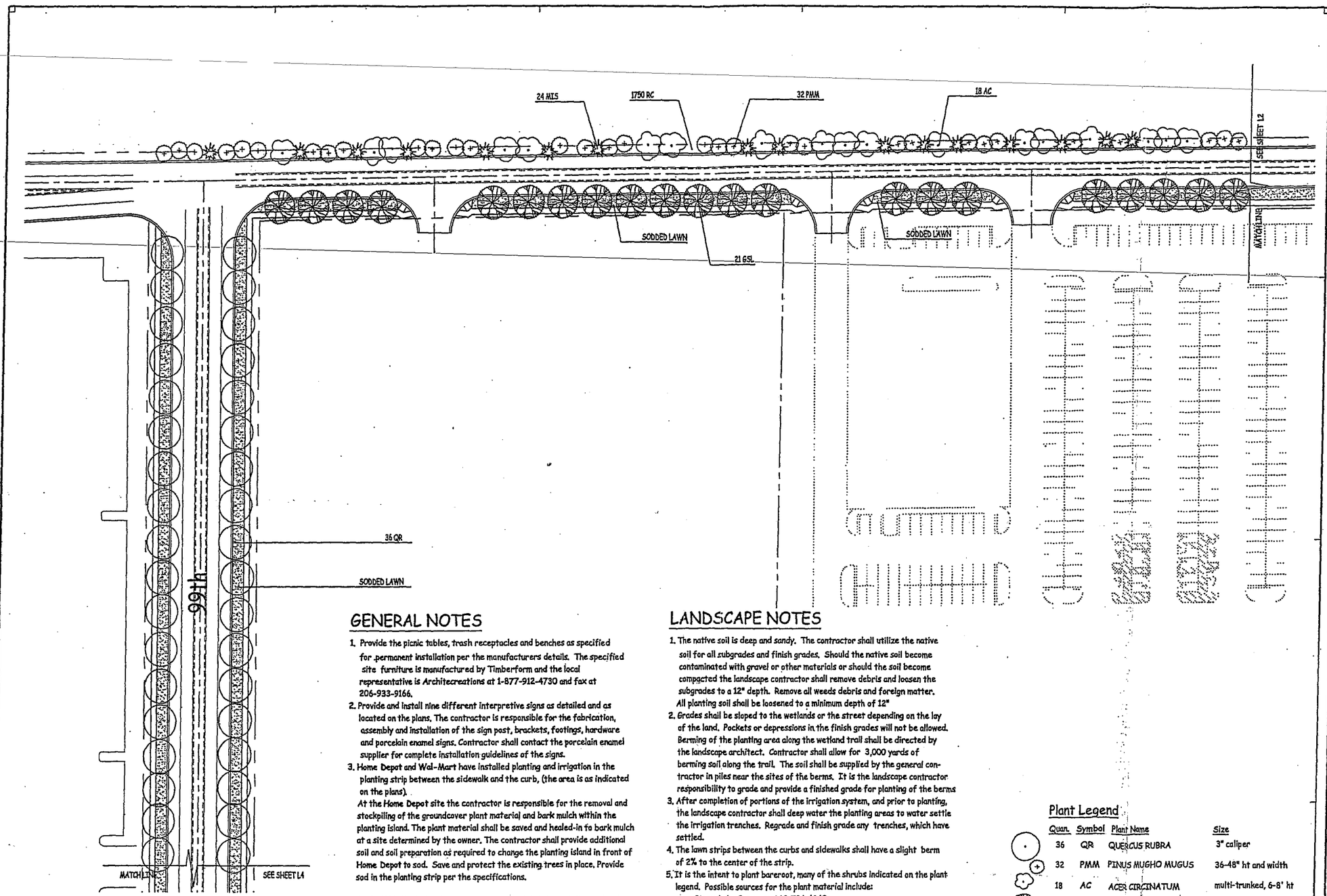
Typically, lift stations have on-site generators and are regularly inspected and maintained to ensure their proper function during a power outage. Portable generators are use to operated the lift stations that do not have on-site generators. During every station check, each generator's oil, water, battery, and fuel are checked and filled, if required. The on-site generators are remotely operated each week.

6A2.2.5 – Control System Inspection and Maintenance

The control system consists of all components that automate the operation of lift station. These include compressors, relays, programmable logic chips, floats, and motors starters. During every station check, pump station operators observe the control system to ensure it is functioning, replacing individual components upon failure.

6A2.2.6 – Electrical Inspection and Maintenance

A pump station operator visually inspects the electrical components of all the lift station systems during each station check. Electrical connections are tightened annually and current tests are performed when there is a problem, such as breakers tripping.



GENERAL NOTES

1. Provide the picnic tables, trash receptacles and benches as specified for permanent installation per the manufacturers details. The specified site furniture is manufactured by Timberform and the local representative is Architecreations at 1-877-912-4730 and fax at 206-933-9166.
2. Provide and install nine different interpretive signs as detailed and as located on the plans. The contractor is responsible for the fabrication, assembly and installation of the sign post, brackets, footings, hardware and porcelain enamel signs. Contractor shall contact the porcelain enamel supplier for complete installation guidelines of the signs.
3. Home Depot and Wal-Mart have installed planting and irrigation in the planting strip between the sidewalk and the curb, (the area is as indicated on the plans).
   At the Home Depot site the contractor is responsible for the removal and stockpiling of the groundcover plant material and bark mulch within the planting island. The plant material shall be saved and healed-in to bark mulch at a site determined by the owner. The contractor shall provide additional soil and soil preparation as required to change the planting island in front of Home Depot to sod. Save and protect the existing trees in place. Provide sod in the planting strip per the specifications.

   At the Wal-Mart site the contractor shall maintain the existing sod and provide the new trees as shown on the plan.
   The contractor shall also cap the existing supply irrigation lines (2 supply lines from 2 sites) from the Wal-Mart and Home Depot sites to the planting islands and reconnect four existing irrigation zones within the planting strip to the new Tulalip Village irrigation system. Provide all piping, new valves and wiring per the specifications. Connect wiring to the Tulalip Village control system. Provide a complete and operational system.

LANDSCAPE NOTES

1. The native soil is deep and *sandy*. The contractor shall utilize the native soil for all subgrades and finish grades. Should the native soil become contaminated with gravel or other materials or should the soil become compacted the landscape contractor shall remove debris and loosen the subgrades to a 12" depth. Remove all weeds debris and foreign matter. All planting soil shall be loosened to a minimum depth of 12"
2. Grades shall be sloped to the wetlands or the street depending on the lay of the land. Pockets or depressions in the finish grades will not be allowed. Berming of the planting area along the wetland trail shall be directed by the landscape architect. Contractor shall allow for 3,000 yards of berming soil along the trail. The soil shall be supplied by the general contractor in piles near the sites of the berms. It is the landscape contractor responsibility to grade and provide a finished grade for planting of the berms
3. After completion of portions of the irrigation system, and prior to planting, the landscape contractor shall deep water the planting areas to water settle the irrigation trenches. Regrade and finish grade any trenches, which have settled.
4. The lawn strips between the curbs and sidewalks shall have a slight berm of 2% to the center of the strip.
5. It is the intent to plant bareroot, many of the shrubs indicated on the plant legend. Possible sources for the plant material include:
   Storm Lake Growers: 360-794-4842
   Fourth Corner Nursery: 360-734-0079
   Wabash Farms: 360-825-7051
6. The street trees are shown at 30' on center. The layout of the trees shall be equally spaced between the intersecting roads or driveways with a minimum clearance of 15' from the driveways. The Landscape Contractor shall stake the location of the trees for approval by the landscape architect prior to planting. When the street trees are the same on both sides of the street, then the trees shall align across the road from each other.
7. Wetland trail shall be staked in the field by the landscape architect. The landscape contractor shall stake the tree locations and paint on the ground the edges of the shrub and groundcover beds. Each type of shrub or groundcover shall be indicated with a different color of paint.

Plant Legend

Quan.	Symbol	Plant Name	Size
36	QR	QUERCUS RUBRA	3" caliper
32	PMM	PINUS MUGHO MUGUS	36-48" ht and width
18	AC	ACER CIRCINATUM	multi-trunked, 6-8' ht
21	GSL	GLEDITSIA SKYLINE	3-4" caliper
1750	RC	RUBUS CALYCINOIDES	4" pot
24	MISC	MISCANTHUS SINENSIS	1 gallon can
		SODDED LAWN	Contractor to estimate quantities needed

1 L1 PARTIAL SITE PLAN
1"=40'-0"

NORTH

QUEEN'S LANDA PARK

TULALIP, WASHINGTON

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KEN LARGE
WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

REV	DATE	DESCRIPTION
2	09/21/01	GENERAL REVISIONS
1	11/06/00	BID SET
PROJECT MANAGER		JAR
ARCHITECT/ ENGINEER		JAR
DRAWN BY		ST DATE 11/02/00
CHECKED BY		KL DATE

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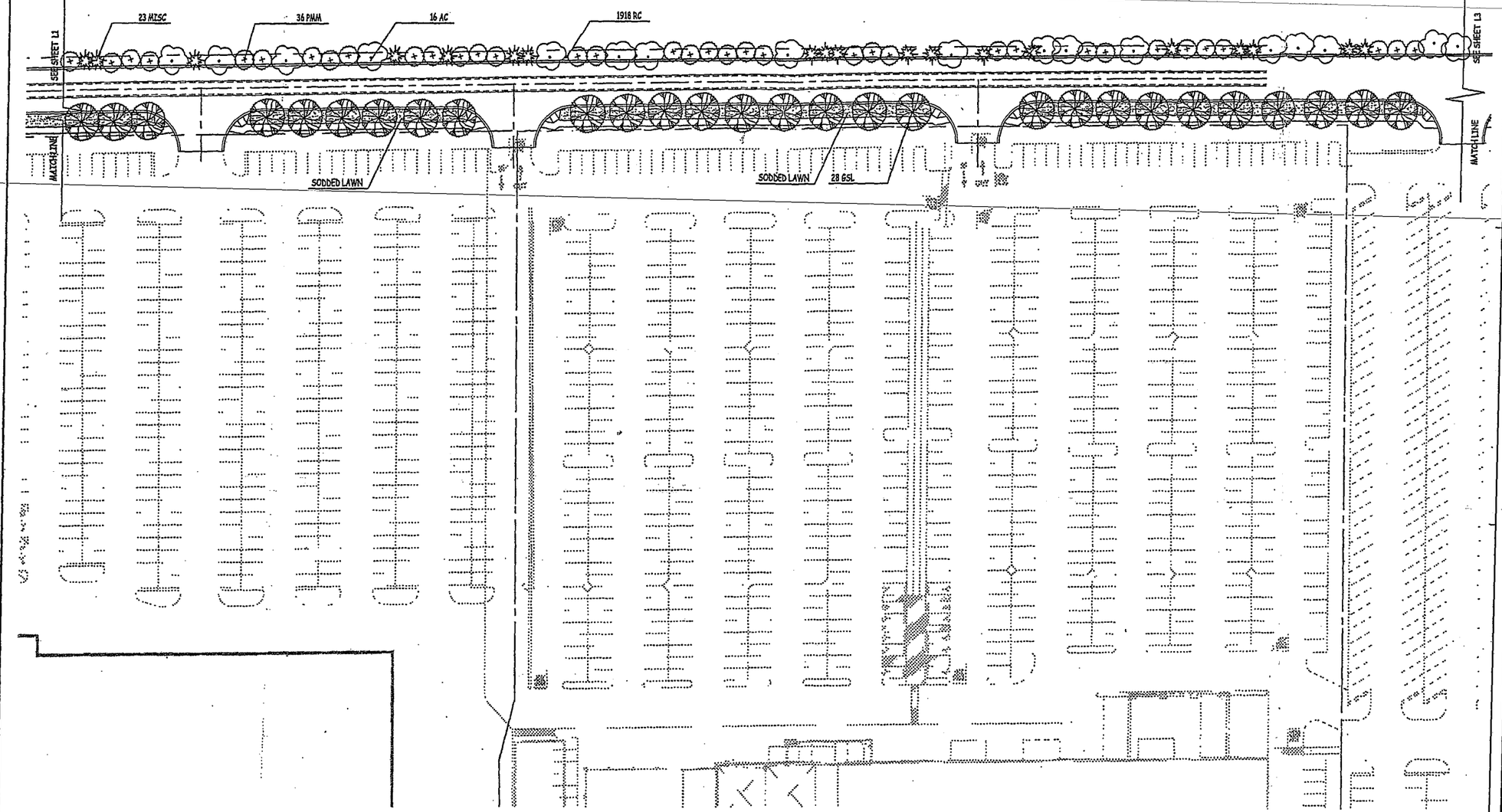
DRAWING TITLE
PARTIAL SITE PLAN
PLANTING PLAN

DRAWING NO
L1

JOB NUMBER
00-404

PRINT DATE



Plant Legend

Quan.	Symbol	Plant Name	Size
23	MISC	MISCANTHUS SINENSIS	1 gallon can
36	PMM	PINUS MUGHO MUGUS	36-48" ht and width
16	AC	ACER CIRCINATUM	multi-trunked, 6-8' ht
28	GSL	GLEDITSIA SKYLINE	3-4" caliper
1918	RC	RUBUS CALYCINOIDES	4" pot
		SODDED LAWN	Contractor to estimate quantities needed

1/L2 PARTIAL SITE PLAN
1"=40'-0"

NORTH

QUIL CEDA PARK

TULALIP, WASHINGTON

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STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

REV	DATE	DESCRIPTION
1	09/21/01	GENERAL REVISIONS
0	11/06/00	BID SET

PROJECT MANAGER	JAR	
ARCHITECT/ ENGINEER	JAR	
DRAWN BY	ST	DATE 11/01/00
CHECKED BY	KL	DATE

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DRAWING TITLE
PARTIAL SITE PLAN
PLANTING PLAN

DRAWING NO
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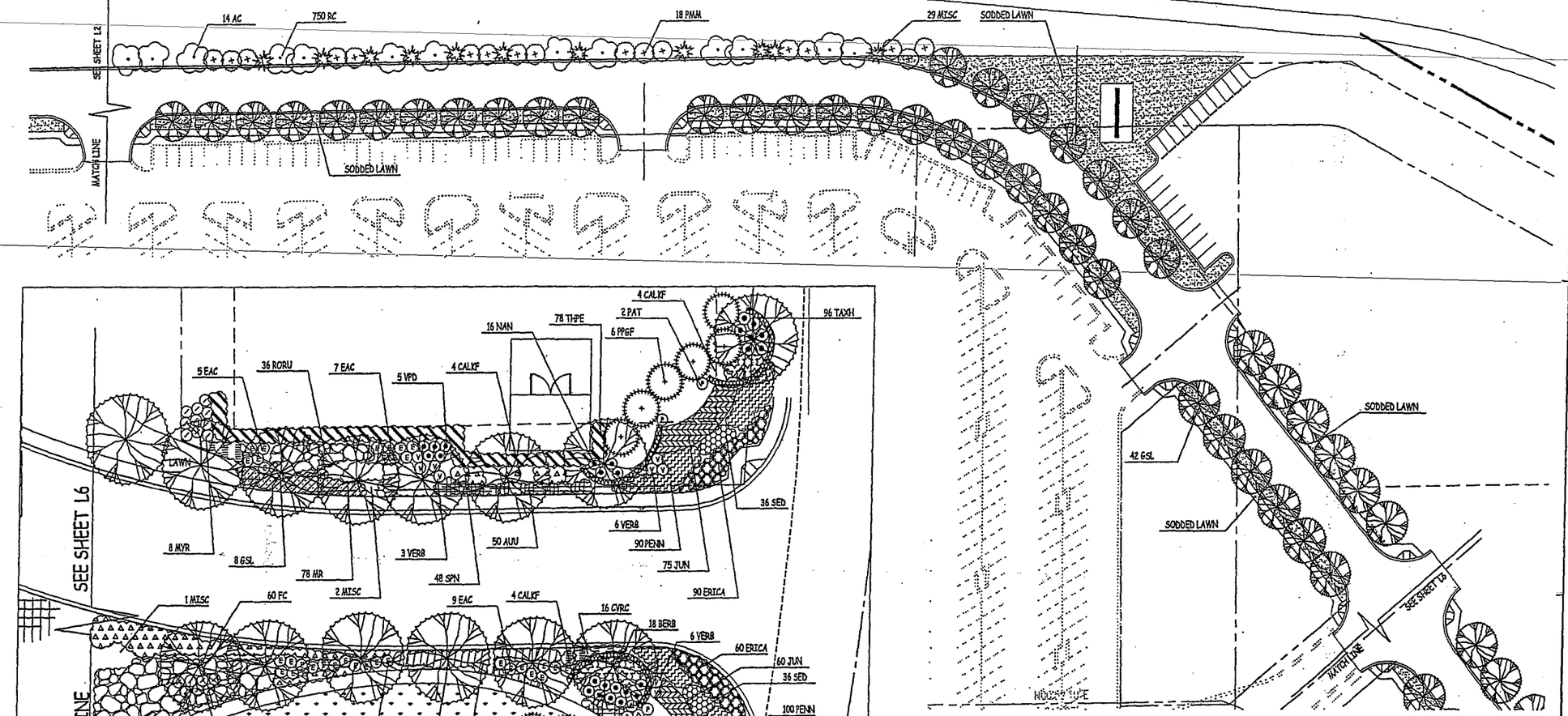

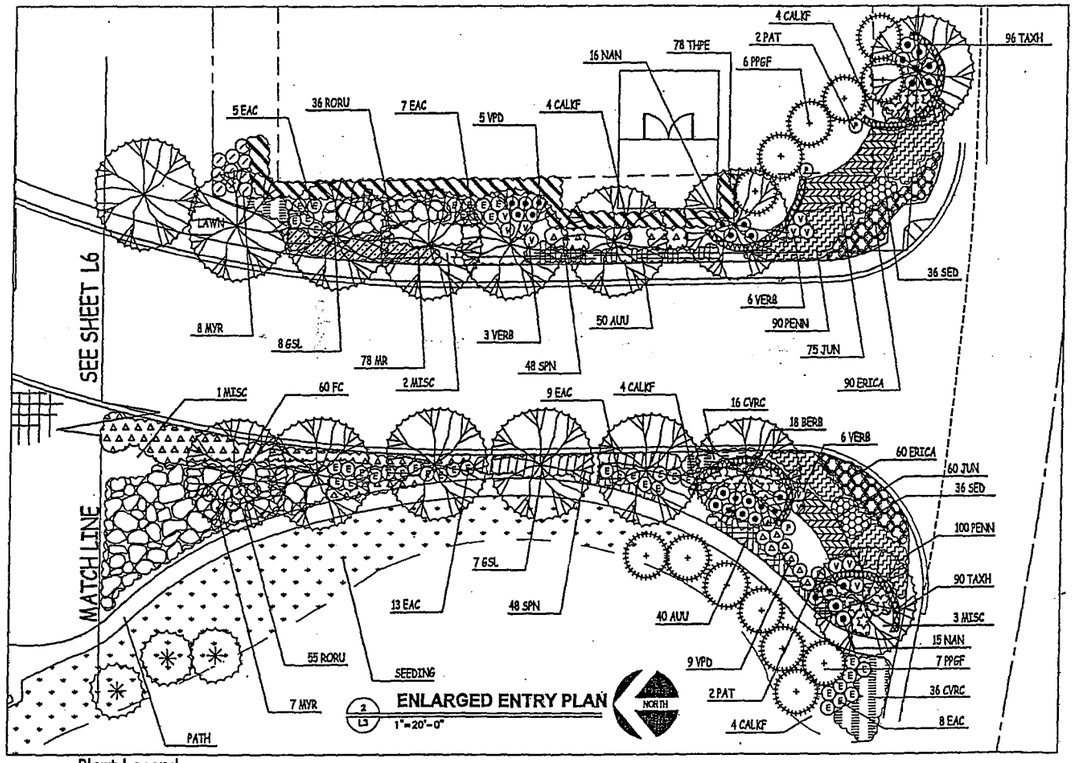

2 L3 ENLARGED ENTRY PLAN
1"=20'-0"

NORTH

Plant Legend

Quan.	Symbol	Plant Name	Size
15	GSL	GLEDITSIA T. SKYLINE	3.5-4" CALIPER
6	MIS	MISCANTHUS SINENSIS	1 GALLON
90	AUU	ARCTOSTAPHYLOS UVA URSI	1 GALLON, 2' TRI. SP.
15	VB	VERBENA BONARIENSIS	1 GALLON
10	CRO	CROCOSMIA LUCIFER	1 GALLON
91	RORU	ROSA RUGOSA	2-3' bare root if winter, 2gal off
96	SPN	SALIX PURPUREA NANA	2-3' bare root if winter, 2gal off
60	FC	FRAGRARIA CHILOENSIS	4" POT, 2' TRI SP
15	MYR	MYRICA CALIFORNICA	5 GAL, 24-30" HT MIN
41	EAC	EUONYMUS ALATA COMPACTA	18-24" HT AND WIDTH
74	MR	MAHONIA REPANS	1 GALLON
70	CVRC	CALLUNA V. RON CHAPMAN	1 GALLON, 2' TRI SP
12	CALKF	CALAMAGROSTIS KARL F.	1 GALLON
15	NAN	NANDINA DOMESTICA	5 GALLON
14	VPD	VIBURNUM P. PINK DAWN	5 GALLON
78	THPE	THUJA PYRAMIDALIS EMERALD	6-7' B/B
13	PPGF	PICEA PUNGENS GLAUCA FASTIG.	10-12' B/B, FULL TO GROUND
4	PAT	PARTHENOCISSUS TRICUSPIDATA	1 GALLON
186	TAXH	TAXUS HICKSII	24-30" X 12"WIDTH, B/B
135	JUN	JUNIPERUS BAR HARBOR	1 GALLON, 2' TRI SP
190	PENN	PENNISETUM ALOPICULOIDES	1 GALLON, 2' TRI SP
28	BERB	BERBERIS TH. ATROPURPUREA	5 GALLON
150	ERICA	ERICA D. KRAMMERS RED	1 GALLON, 2' TRI SP
72	SED	SEDUM BRILLIANT	1 GALLON, 2' TRI SP

Plant Legend

Quan.	Symbol	Plant Name	Size
29	MISC	MISCANTHUS SINENSIS	1 gallon can
18	PMM	PINUS MUGHO MUGUS	36-48" ht and width
14	AC	ACER CIRCINATUM	multi-trunked, 6-8' ht
42	GSL	GLEDITSIA SKYLINE	3-4" caliper
750	RC	RUBUS CALYCINOIDES	4" pot
		SODDED LAWN	Contractor to estimate quantities needed
		SEEDED LAWN	Contractor to estimate quantities needed

1 L3 PARTIAL SITE PLAN
1"=40'-0"

NORTH

QUEGEDA PARK

TULALIP, WASHINGTON

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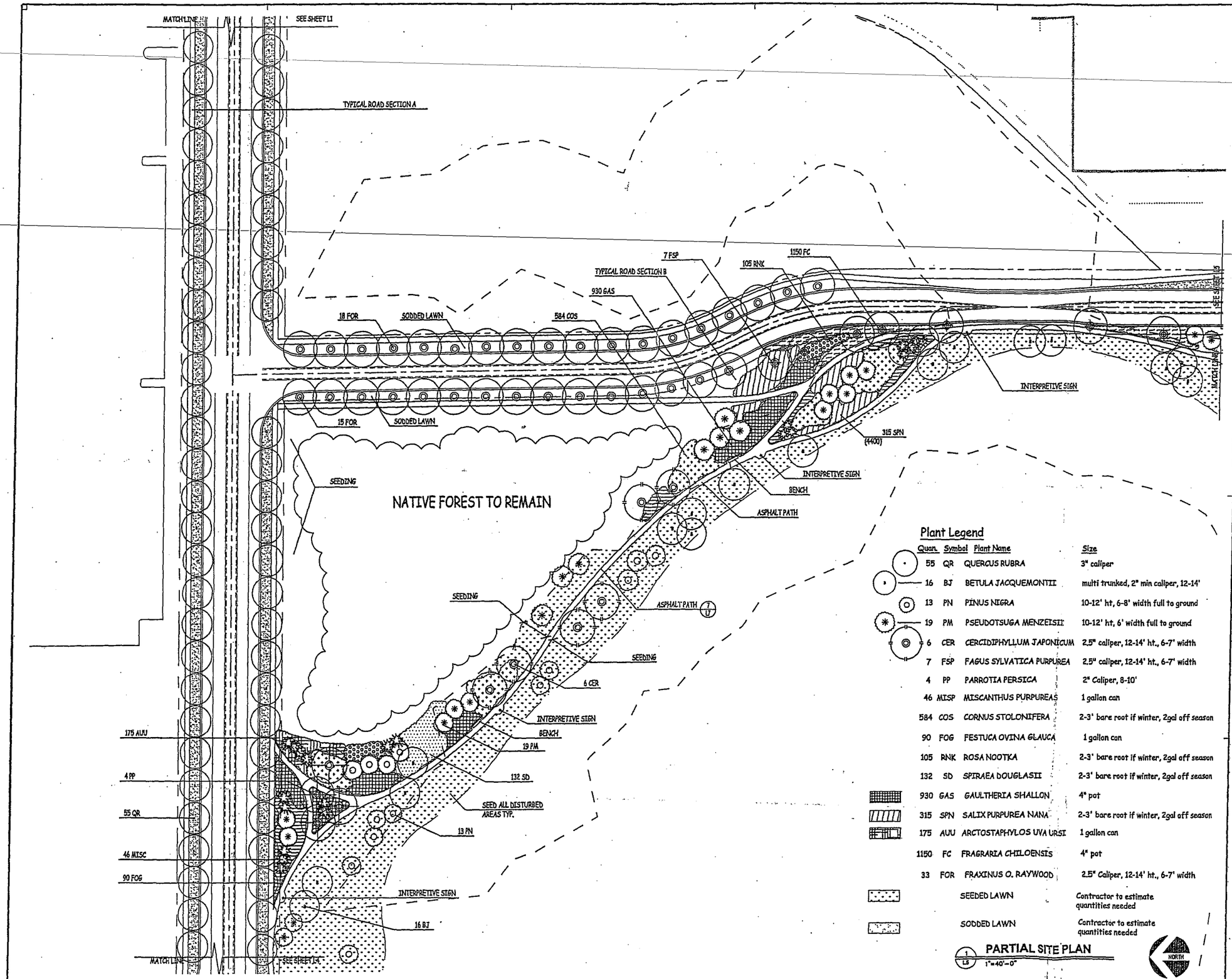

Plant Legend

Quan.	Symbol	Plant Name	Size
55	QR	QUERCUS RUBRA	3" caliper
16	BJ	BETULA JACQUEMONTII	multi trunked, 2" min caliper, 12-14'
13	PN	PINUS NIGRA	10-12' ht, 6-8' width full to ground
19	PM	PSEUDOTSUGA MENZEISII	10-12' ht, 6' width full to ground
6	CER	CERCIDIPHYLLUM JAPONICUM	2.5" caliper, 12-14' ht., 6-7' width
7	FSP	FAGUS SYLVATICA PURPUREA	2.5" caliper, 12-14' ht., 6-7' width
4	PP	PARROTIA PERSICA	2" Caliper, 8-10'
46	MISP	MISCANTHUS PURPUREAS	1 gallon can
584	COS	CORNUS STOLONIFERA	2-3' bare root if winter, 2gal off season
90	FOG	FESTUCA OVINA GLAUCA	1 gallon can
105	RNK	ROSA NOOTKA	2-3' bare root if winter, 2gal off season
132	SD	SPIRAEA DOUGLASII	2-3' bare root if winter, 2gal off season
930	GAS	GAULTHERIA SHALLON	4" pot
315	SPN	SALIX PURPUREA NANA	2-3' bare root if winter, 2gal off season
175	AUU	ARCTOSTAPHYLOS UVA URSI	1 gallon can
1150	FC	FRAGRARIA CHILOENSIS	4" pot
33	FOR	FRAXINUS O. RAYWOOD	2.5" Caliper, 12-14' ht., 6-7' width
		SEEDED LAWN	Contractor to estimate quantities needed
		SODDED LAWN	Contractor to estimate quantities needed

1/L5 PARTIAL SITE PLAN
1"=40'-0"

NORTH

QUIL CEDA PARK

TULALIP, WASHINGTON

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STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT

REV	DATE	DESCRIPTION
	09/21/01	GENERAL REVISIONS
	11/06/00	BID SET
PROJECT MANAGER		JAR
ARCHITECT/ ENGINEER		JAR
DRAWN BY		ST
CHECKED BY		KL
		DATE 11/02/00

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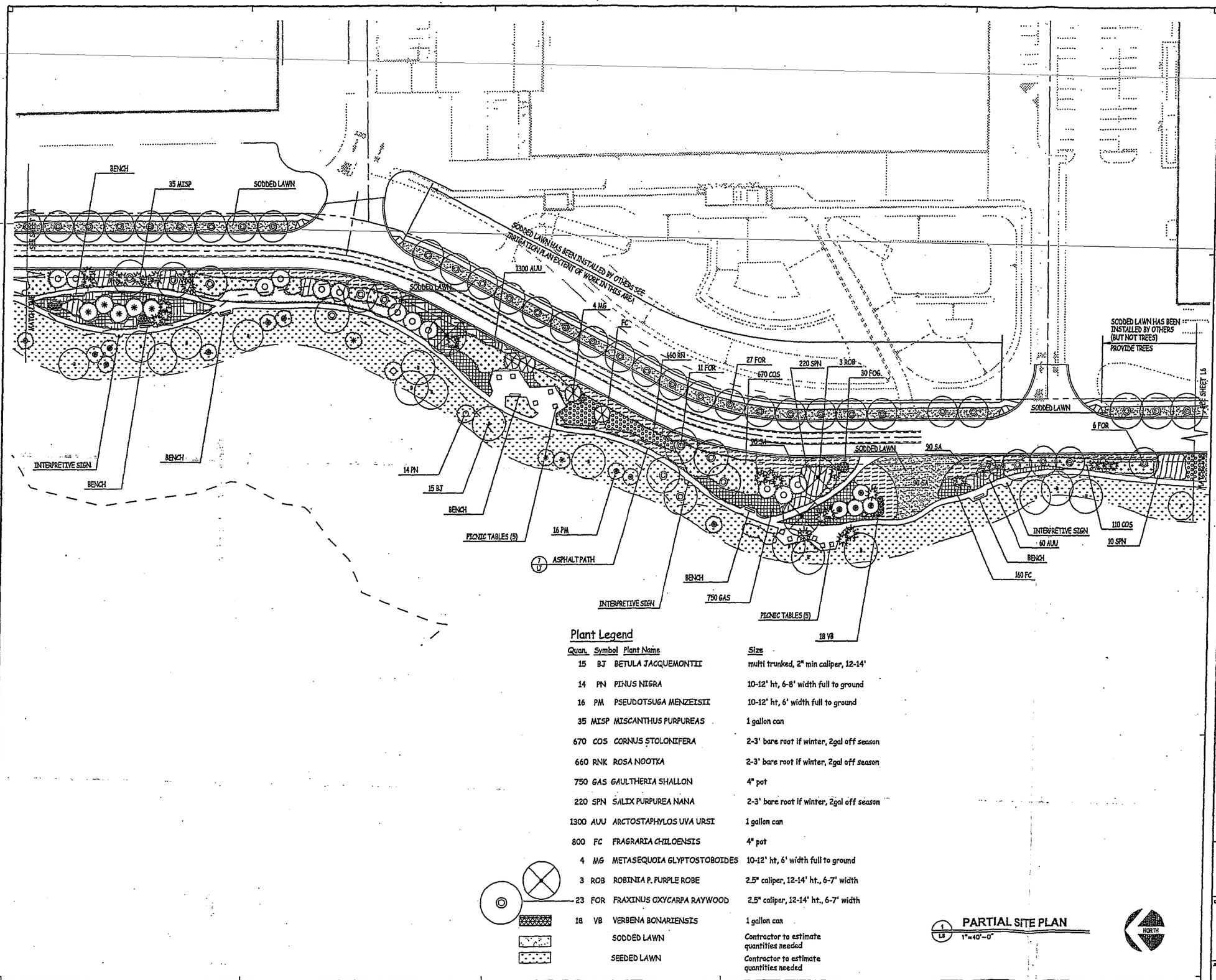
DRAWING TITLE
PARTIAL SITE PLAN
PLANTING PLAN

DRAWING NO
L4

JOB NUMBER
00-404

PRINT DATE



Plant Legend

Quan.	Symbol	Plant Name	Size
15	BJ	BETULA JACQUEMONTII	multi trunked, 2" min caliper, 12-14'
14	PN	PINUS NIGRA	10-12' ht, 6-8' width full to ground
16	PM	PSEUDOTSUGA MENZEISII	10-12' ht, 6' width full to ground
35	MISP	MISCANTHUS PURPUREAS	1 gallon can
670	COS	CORNUS STOLONIFERA	2-3' bare root if winter, 2gal off season
660	RNK	ROSA NOOTKA	2-3' bare root if winter, 2gal off season
750	GAS	GAULTHERIA SHALLON	4" pot
220	SPN	SALIX PURPUREA NANA	2-3' bare root if winter, 2gal off season
1300	AUU	ARCTOSTAPHYLOS UVA URSI	1 gallon can
800	FC	FRAGRARIA CHILOENSIS	4" pot
4	MG	METASEQUOIA GLYPTOSTOBOIDES	10-12' ht, 6' width full to ground
3	ROB	ROBINIA P. PURPLE ROBE	2.5" caliper, 12-14' ht., 6-7' width
23	FOR	FRAXINUS OXYCARPA RAYWOOD	2.5" caliper, 12-14' ht., 6-7' width
18	VB	VERBENA BONARIENSIS	1 gallon can
		SODDED LAWN	Contractor to estimate quantities needed
		SEEDED LAWN	Contractor to estimate quantities needed

1/L5 PARTIAL SITE PLAN
1"=40'-0"

NORTH

QUEDA PARK

TULALIP, WASHINGTON

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STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT

REV	DATE	DESCRIPTION
	09/21/01	GENERAL REVISIONS
	11/06/00	BID SET

PROJECT MANAGER	JAR	
ARCHITECT/ ENGINEER	JAR	
DRAWN BY	ST	DATE 10/30/00
CHECKED BY	KL	DATE

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DRAWING TITLE: PARTIAL SITE PLAN

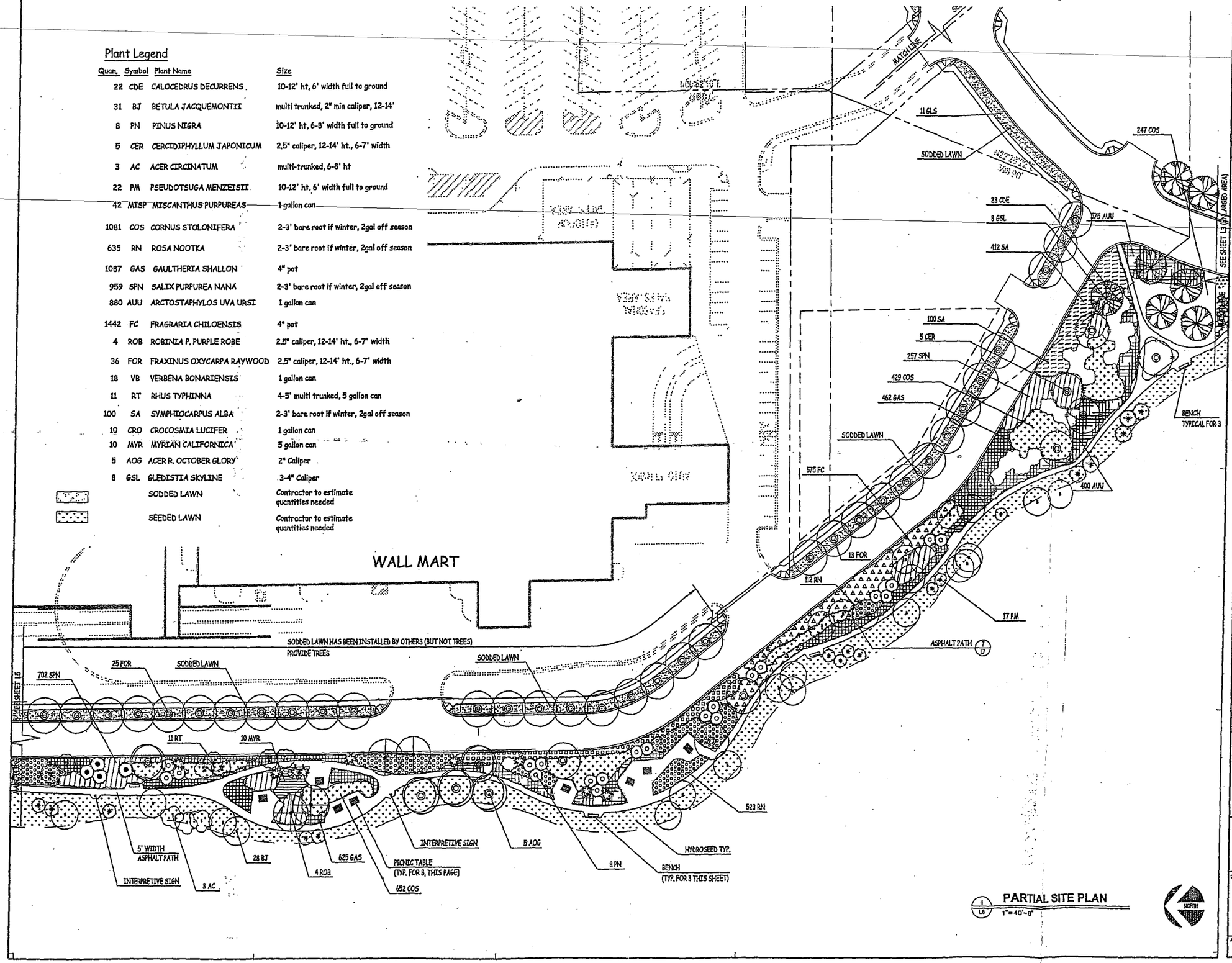
DRAWING NO: L5

JOB NUMBER: 00-404

PRINT DATE:

Plant Legend

Quan.	Symbol	Plant Name	Size
22	CDE	CALOCEDRUS DECURRENS	10-12' ht, 6' width full to ground
31	BJ	BETULA JACQUEMONTII	multi trunked, 2" min caliper, 12-14'
8	PN	PINUS NIGRA	10-12' ht, 6-8' width full to ground
5	CER	CERCIDIPHYLLUM JAPONICUM	2.5" caliper, 12-14' ht., 6-7' width
3	AC	ACER CIRCINATUM	multi-trunked, 6-8' ht
22	PM	PSEUDOTSUGA MENZEISII	10-12' ht, 6' width full to ground
42	MISP	MISCANTHUS PURPUREAS	1 gallon can
1081	COS	CORNUS STOLONIFERA	2-3' bare root if winter, 2gal off season
635	RN	ROSA NOOTKA	2-3' bare root if winter, 2gal off season
1087	GAS	GAULTHERIA SHALLON	4" pot
959	SPN	SALIX PURPUREA NANA	2-3' bare root if winter, 2gal off season
880	AUU	ARCTOSTAPHYLOS UVA URSI	1 gallon can
1442	FC	FRAGRARIA CHILOENSIS	4" pot
4	ROB	ROBINIA P. PURPLE ROBE	2.5" caliper, 12-14' ht., 6-7' width
36	FOR	FRAXINUS OXYCARPA RAYWOOD	2.5" caliper, 12-14' ht., 6-7' width
18	VB	VERBENA BONARIENSIS	1 gallon can
11	RT	RHUS TYPHINNA	4-5' multi trunked, 5 gallon can
100	SA	SYMPHIOCARPUS ALBA	2-3' bare root if winter, 2gal off season
10	CRO	CROCOSMIA LUCIFER	1 gallon can
10	MYR	MYRIAN CALIFORNICA	5 gallon can
5	AOG	ACER R. OCTOBER GLORY	2" Caliper
8	GSL	GLEDISTIA SKYLINE	3-4" Caliper
		SODDED LAWN	Contractor to estimate quantities needed
		SEEDED LAWN	Contractor to estimate quantities needed



QUIL CEDA PARK

TULALIP, WASHINGTON

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KEN LARGE
STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

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△	09/21/01	GENERAL REVISIONS
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ARCHITECT/ ENGINEER		JAR
DRAWN BY		ST — DATE 11/01/00
CHECKED BY		KL — DATE

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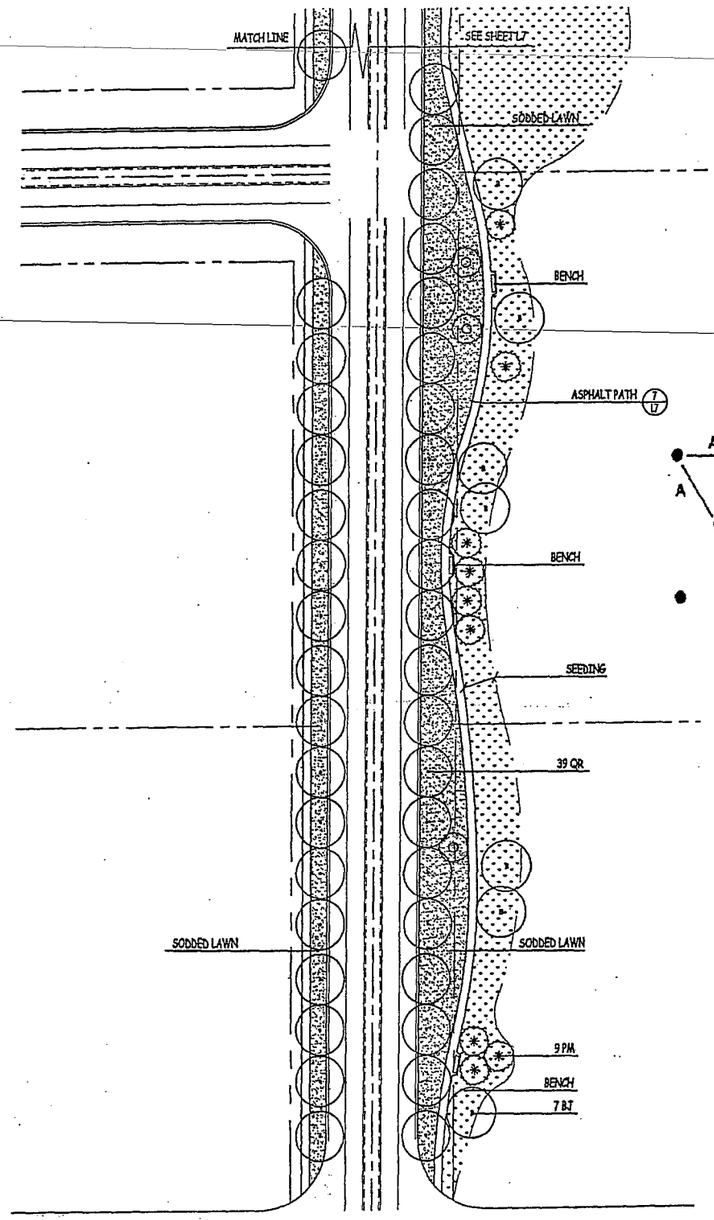
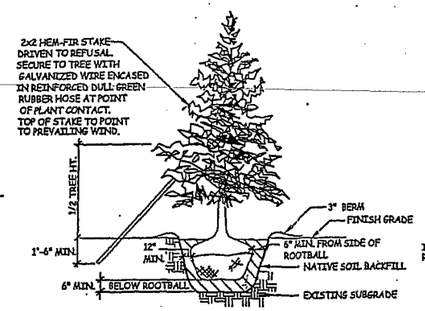
DRAWING TITLE: PARTIAL SITE PLAN
PLANTING PLAN

DRAWING NO: L6

JOB NUMBER: 00-404

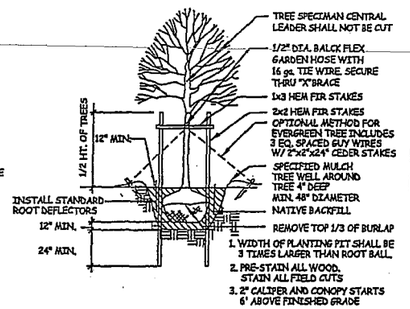
PRINT DATE:





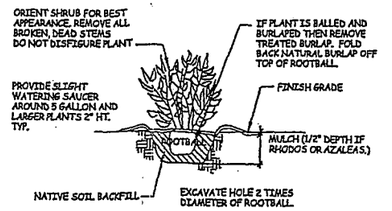
TYP. CONIFEROUS TREE PLANTING

2 / L7 N.T.S.



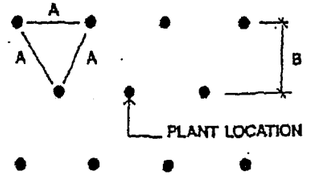
TYP. DECIDUOUS TREE PLANTING

3 / L7 N.T.S.



TYP. SHRIB PLANTING

4 / L7 N.T.S.



PLANT SPACING CHART

For use when plants are spaced equidistant from each other, as in all massed shrub/groundcover plantings.

PLANT SPACING CHART

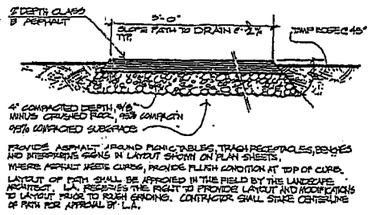
5 / L7 N.T.S.

SPACING "A"	SPACING "B"	# OF PLANTS/SF
6" O.C.	5.20"	4.60
8" O.C.	6.83"	2.60
10" O.C.	8.66"	1.66
12" O.C.	10.40"	1.15
15" O.C.	13.00"	.736
18" O.C.	15.60"	.512
24" O.C.	20.80"	.290
30" O.C.	26.00"	.185
36" O.C.	30.00"	.116

See Groundcover plant key for maximum triangular spacing "A". This chart is to be used to determine number of groundcover plants required in a given area.

GROUNDCOVER SPACING CHART

6 / L7 N.T.S.

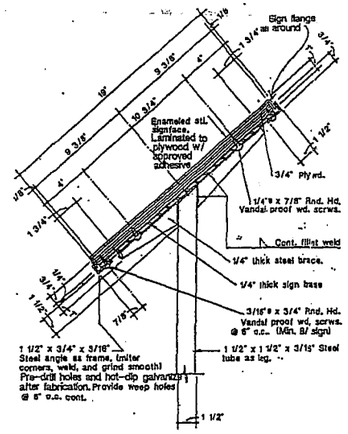


PROVIDE ASPHALT GROUND FIGHTER BUG TRACK PROOF SEAL, BOLTS AND INTERFERING SIGNS IN LAYOUT SHOWN ON PLAN SHEETS. WHERE ASPHALT MEETS CURBS, PROVIDE FLUSH CONDITION AT TOP OF CURB.

LAYOUT OF PATH SHALL BE APPROVED IN THE FIELD BY THE LANDSCAPE ARCHITECT. L.A. RESERVES THE RIGHT TO PROVIDE LAYOUT AND ROUGH STAKES TO LAYOUT PRIOR TO ROUGH GRADING. CONTRACTOR SHALL STAKE CENTERLINE OF PATH FOR APPROVAL BY L.A.

ASPHALT PATH

7 / L7 N.T.S.



NOTE: Field drill plate w/ holes to match frame.

INTERPRETIVE SIGN DETAIL

8 / L7 N.T.S.

SIGN POST FOOTING/MOUNTING

9 / L7 N.T.S.

DETAIL

10 / L7 N.T.S.

Plant Legend

Quan.	Symbol	Plant Name	Size
39	QR	QUERCUS RUBRA	3" caliper
		SODDED LAWN	Contractor to estimate quantities needed
		SEEDED LAWN	Contractor to estimate quantities needed
7	BJ	BETULA JACQUEMONTII	multi trunked, 2" min caliper, 12-14'
3	PN	PINUS NIGRA	10-12' ht, 6-8' width full to ground
9	PM	PSEUDOTSUGA MENZEISII	10-12' ht, 6' width full to ground

PARTIAL SITE PLAN

1 / L7 1"=40'-0"

NORTH

QUEEDA PARK

TULALIP, WASHINGTON

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STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT

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PROJECT MANAGER	JAR	
ARCHITECT/ ENGINEER	JAR	
DRAWN BY	ST	DATE 11/01/00
CHECKED BY	KL	DATE

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DRAWING TITLE: PARTIAL SITE PLAN / PLANTING PLAN

DRAWING NO: L7

JOB NUMBER: 00-404

PRINT DATE:

DWG. # : 1012.01a DATE : 10-06-00 1012A 1.mcb
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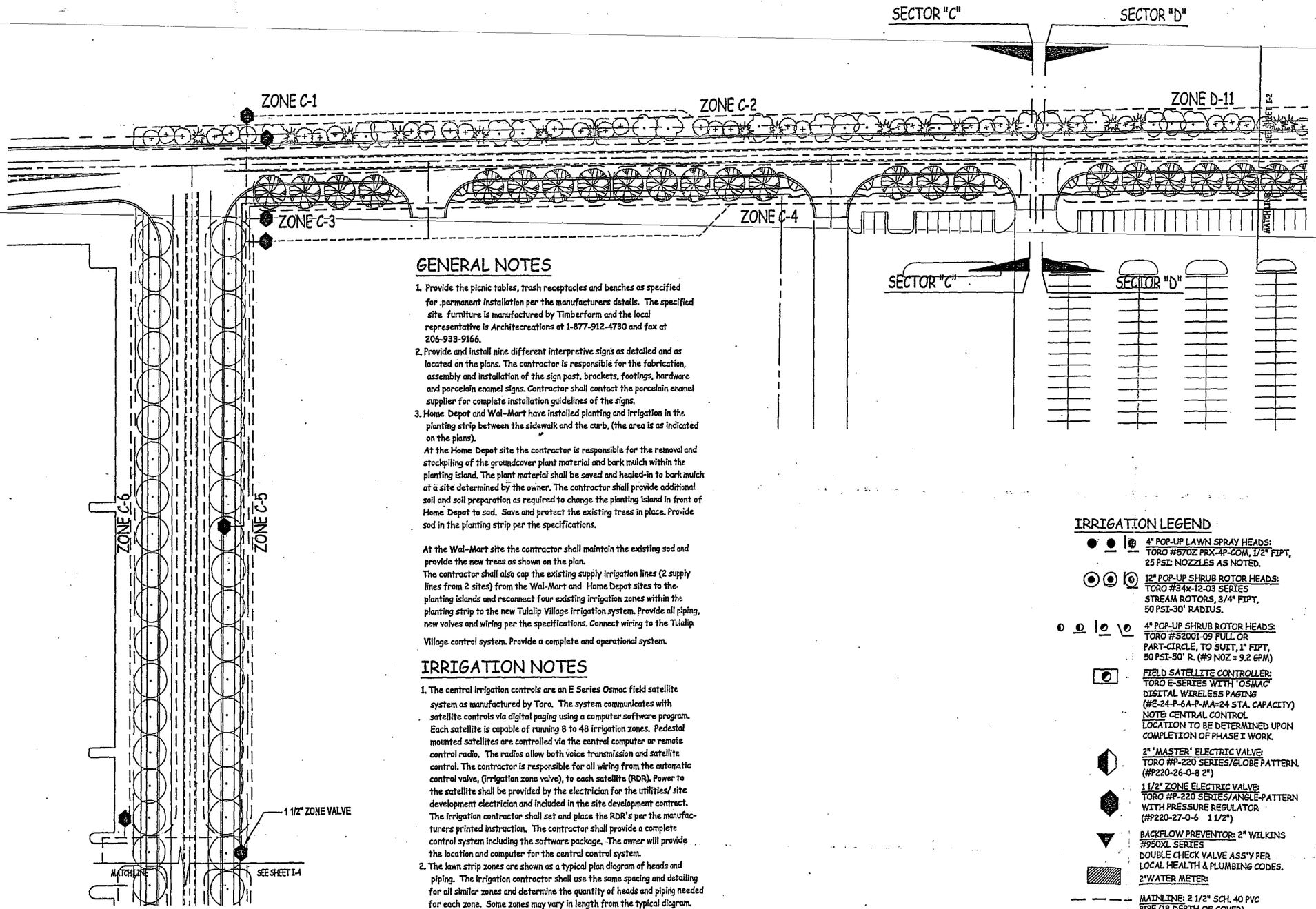

GENERAL NOTES

1. Provide the picnic tables, trash receptacles and benches as specified for ,permanent installation per the manufacturers details. The specifiecd site furniture is manufactured by Timberform and the local representative is Architecreations at 1-877-912-4730 and fax at 206-933-9166.
2. Provide and install nine different interpretive signs as detailed and as located on the plans. The contractor is responsible for the fabrication, assembly and installation of the sign post, brackets, footings, hardware and porcelain enamel signs. Contractor shall contact the porcelain enamel supplier for complete installation guidelines of the signs.
3. Home Depot and Wal-Mart have installed planting and irrigation in the planting strip between the sidewalk and the curb, (the area is as indicated on the plans).

At the Home Depot site the contractor is responsible for the removal and stockpiling of the groundcover plant material and bark mulch within the planting island. The plant material shall be saved and healed-in to bark mulch at a site determined by the owner. The contractor shall provide additional soil and soil preparation as required to change the planting island in front of Home Depot to sod. Save and protect the existing trees in place. Provide sod in the planting strip per the specifications.

At the Wal-Mart site the contractor shall maintain the existing sod and provide the new trees as shown on the plan.
The contractor shall also cap the existing supply irrigation lines (2 supply lines from 2 sites) from the Wal-Mart and Home Depot sites to the planting islands and reconnect four existing irrigation zones within the planting strip to the new Tulalip Village irrigation system. Provide all piping, new valves and wiring per the specifications. Connect wiring to the Tulalip Village control system. Provide a complete and operational system.

IRRIGATION NOTES

1. The central irrigation controls are an E Series Osmac field satellite system as manufactured by Toro. The system communicates with satellite controls via digital paging using a computer software program. Each satellite is capable of running 8 to 48 irrigation zones. Pedestal mounted satellites are controlled via the central computer or remote control radio. The radios allow both voice transmission and satellite control. The contractor is responsible for all wiring from the automatic control valve, (irrigation zone valve), to each satellite (RDR). Power to the satellite shall be provided by the electrician for the utilities/ site development electrician and included in the site development contract. The irrigation contractor shall set and place the RDR's per the manufacturers printed instruction. The contractor shall provide a complete control system including the software package. The owner will provide the location and computer for the central control system.
2. The lawn strip zones are shown as a typical plan diagram of heads and piping. The irrigation contractor shall use the same spacing and detailing for all similar zones and determine the quantity of heads and piping needed for each zone. Some zones may vary in length from the typical diagram. It is the irrigation contractor responsibility to adjust the quantities of materials to the actual site conditions. The remote control valves are shown on the overall plan with the mainline piping. Each remote control zone is shown as a different area on the plan.
3. The irrigation contractor shall verify that sleeves are installed It is the contractors responsibility to be on site during the road construction to ensure that irrigation sleeves are installed properly and in quantities needed. The irrigation contractor shall immediately notify the general contractor and the landscape architect of any problems, additions required or discrepancies.

IRRIGATION LEGEND

- 4" POP-UP LAWN SPRAY HEADS: TORO #570Z PRX-4P-COM, 1/2" FIPT, 25 PSI; NOZZLES AS NOTED.
- 12" POP-UP SHRUB ROTOR HEADS: TORO #34x-12-03 SERIES STREAM ROTORS, 3/4" FIPT, 50 PSI-30' RADIUS.
- 4" POP-UP SHRUB ROTOR HEADS: TORO #52001-09 FULL OR PART-CIRCLE, TO SUIT, 1" FIPT, 50 PSI-50' R. (#9 NOZ = 9.2 GPM)
- FIELD SATELLITE CONTROLLER: TORO E-SERIES WITH 'OSMAC' DIGITAL WIRELESS PAGING (#E-24-P-6A-P-MA=24 STA. CAPACITY) NOTE: CENTRAL CONTROL LOCATION TO BE DETERMINED UPON COMPLETION OF PHASE I WORK.
- 2" 'MASTER' ELECTRIC VALVE: TORO #P-220 SERIES/GLOBE PATTERN. (#P220-26-0-8 2")
- 1 1/2" ZONE ELECTRIC VALVE: TORO #P-220 SERIES/ANGLE-PATTERN WITH PRESSURE REGULATOR (#P220-27-0-6 1 1/2")
- BACKFLOW PREVENTOR: 2" WILKINS #950XL SERIES DOUBLE CHECK VALVE ASS'Y PER LOCAL HEALTH & PLUMBING CODES.
- 2"WATER METER:
- MAINLINE: 2 1/2" SCH. 40 PVC PIPE (18 DEPTH OF COVER)
- LATERAL: CL 200 PVC PIPE, SIZE AS NOTED. (12" COVER)
- SLEEVE UNDER PAVEMENT

1 I-1 PARTIAL SITE PLAN
1" = 40'-0"

NORTH

QUIL CEDA PARK

TULALIP, WASHINGTON

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STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT

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PROJECT MANAGER		JAR
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CHECKED BY		KL
	DATE	11/02/00
	DATE	

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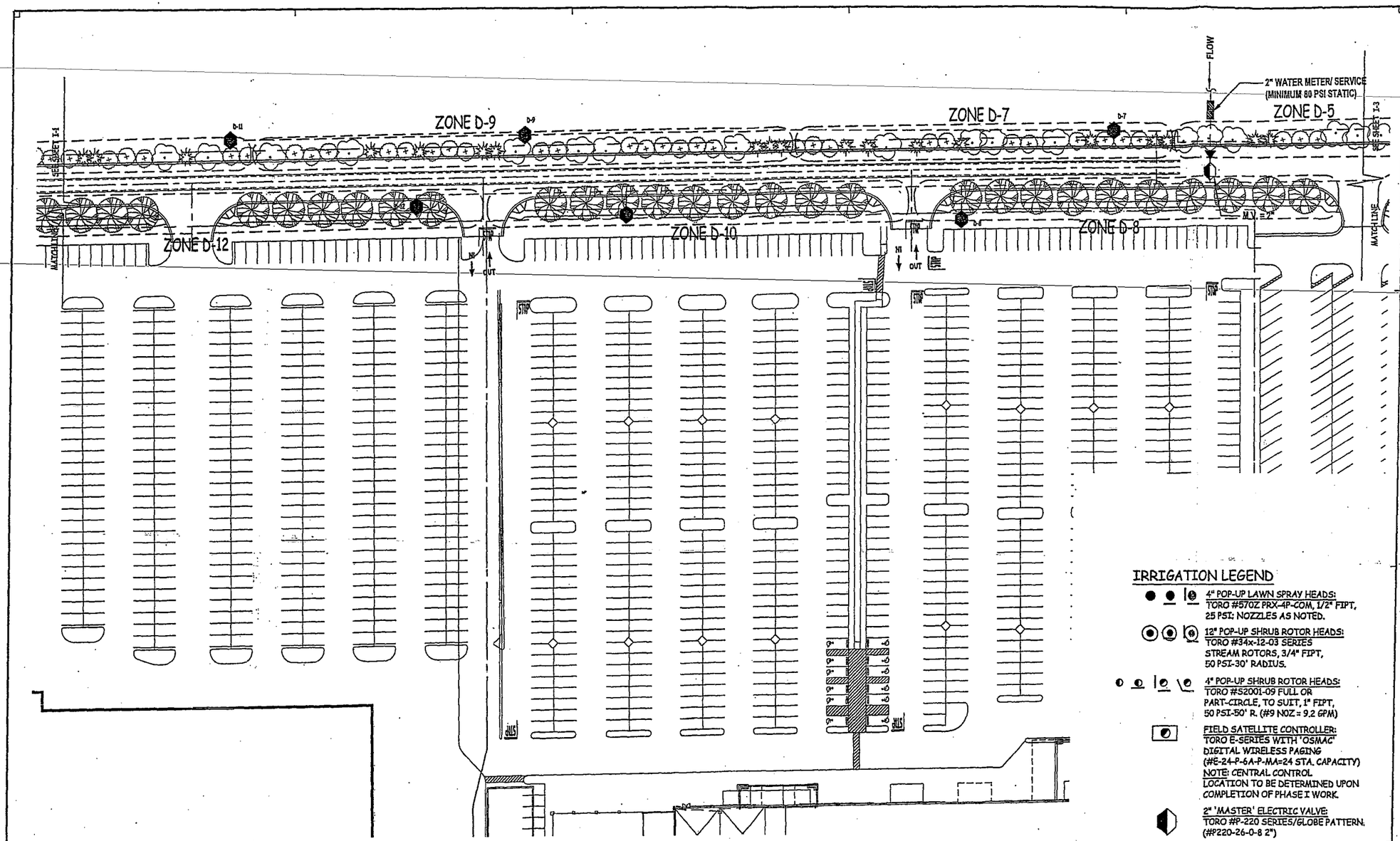
DRAWING TITLE: PARTIAL SITE PLAN / IRRIGATION PLAN

DRAWING NO: I-1

JOB NUMBER: 00-404

PRINT DATE:



IRRIGATION LEGEND

- 4" POP-UP LAWN SPRAY HEADS: TORO #570Z PRX-4P-COM, 1/2" FIPT, 25 PSI: NOZZLES AS NOTED.
- 12" POP-UP SHRUB ROTOR HEADS: TORO #34x-12-03 SERIES STREAM ROTORS, 3/4" FIPT, 50 PSI-30' RADIUS.
- 4" POP-UP SHRUB ROTOR HEADS: TORO #S2001-09 FULL OR PART-CIRCLE, TO SUIT, 1" FIPT, 50 PSI-50' R. (#9 NOZ = 9.2 GPM)
- FIELD SATELLITE CONTROLLER: TORO E-SERIES WITH 'OSMAC' DIGITAL WIRELESS PAGING (#E-24-P-6A-P-MA=24 STA. CAPACITY) NOTE: CENTRAL CONTROL LOCATION TO BE DETERMINED UPON COMPLETION OF PHASE I WORK.
- 2" 'MASTER' ELECTRIC VALVE: TORO #P-220 SERIES/GLOBE PATTERN. (#P220-26-0-8 2")
- 1 1/2" ZONE ELECTRIC VALVE: - TORO #P-220 SERIES/ANGLE-PATTERN WITH PRESSURE REGULATOR (#P220-27-0-6 1 1/2")
- BACKFLOW PREVENTOR: 2" WILKINS #950XL SERIES DOUBLE CHECK VALVE ASS'Y PER LOCAL HEALTH & PLUMBING CODES.
- 2"WATER METER:
- MAINLINE: 2 1/2" SCH. 40 PVC PIPE (18 DEPTH OF COVER)
- LATERAL: CL 200 PVC PIPE, SIZE AS NOTED. (12" COVER)
- SLEEVE UNDER PAVEMENT

1 / 1-2 PARTIAL SITE PLAN
1" = 10'-0"

NORTH

QUEST PARK

TULALIP, WASHINGTON

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ARCHITECT/ ENGINEER	JAR	
DRAWN BY	ST	DATE 11/02/00
CHECKED BY	KL	DATE

Ruhl-Parr & Associates, P.S.
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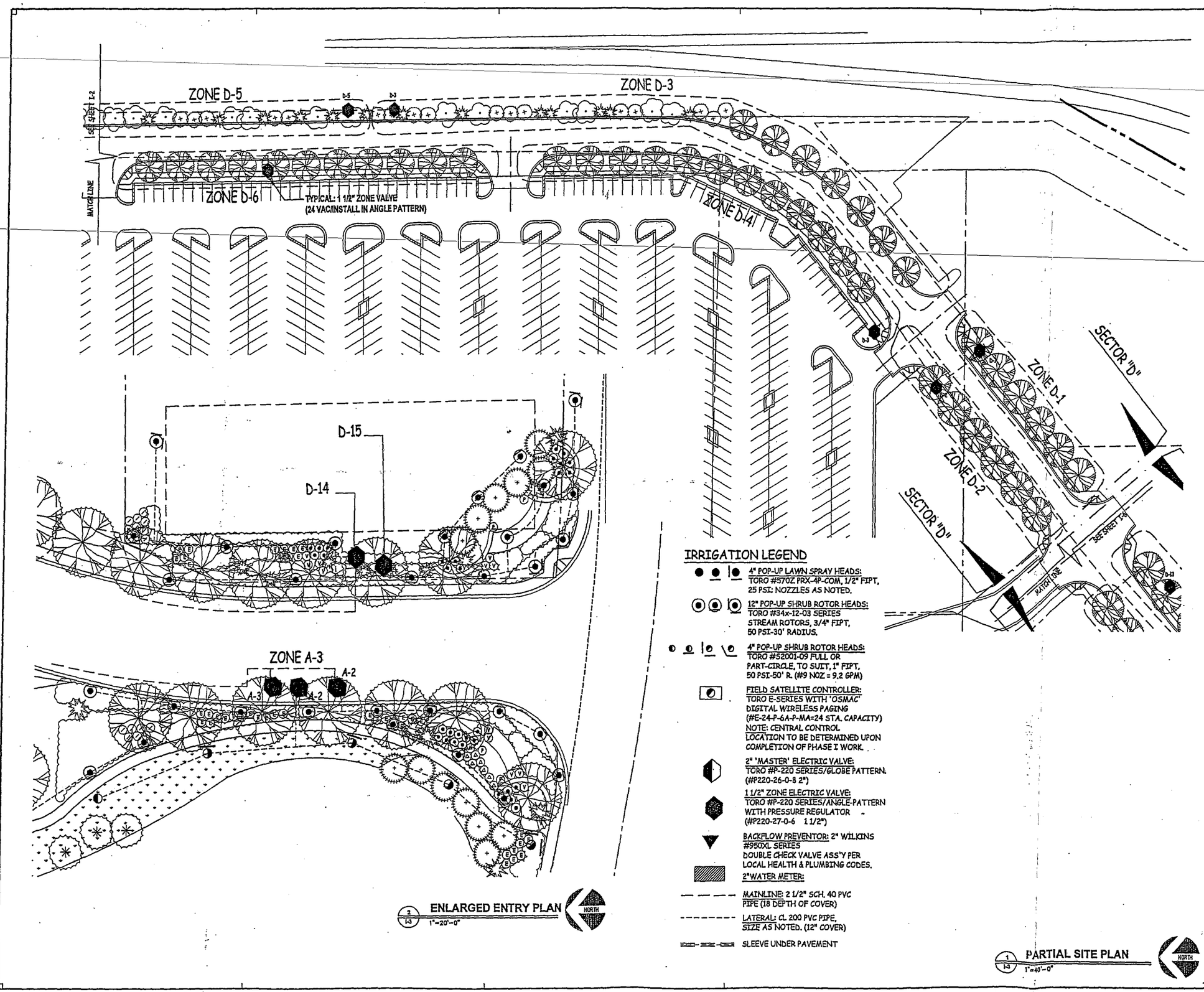
Bellevue, WA 98005-1368 (425) 644-6000

DRAWING TITLE	DRAWING NO
PARTIAL SITE PLAN IRRIGATION PLAN	L-2
JOB NUMBER 00-404	PRINT DATE



IRRIGATION LEGEND

- 4" POP-UP LAWN SPRAY HEADS: TORO #570Z PRX-4P-COM, 1/2" FIPT, 25 PSI: NOZZLES AS NOTED.
- 12" POP-UP SHRUB ROTOR HEADS: TORO #34x-12-03 SERIES STREAM ROTORS, 3/4" FIPT, 50 PSI-30' RADIUS.
- 4" POP-UP SHRUB ROTOR HEADS: TORO #52001-09 FULL OR PART-CIRCLE, TO SUIT, 1" FIPT, 50 PSI-50' R. (#9 NOZ = 9.2 GPM)
- FIELD SATELLITE CONTROLLER: TORO E-SERIES WITH 'OSMAC' DIGITAL WIRELESS PAGING (#E-24-P-6A-P-MA=24 STA. CAPACITY) NOTE: CENTRAL CONTROL LOCATION TO BE DETERMINED UPON COMPLETION OF PHASE I WORK.
- 2" 'MASTER' ELECTRIC VALVE: TORO #P-220 SERIES/GLOBE PATTERN. (#P220-26-0-8 2")
- 1 1/2" ZONE ELECTRIC VALVE: TORO #P-220 SERIES/ANGLE-PATTERN WITH PRESSURE REGULATOR (#P220-27-0-6 1 1/2")
- BACKFLOW PREVENTOR: 2" WILKINS #950XL SERIES DOUBLE CHECK VALVE ASS'Y PER LOCAL HEALTH & PLUMBING CODES.
- 2"WATER METER:
- MAINLINE: 2 1/2" SCH. 40 PVC PIPE (18 DEPTH OF COVER)
- LATERAL: CL 200 PVC PIPE, SIZE AS NOTED. (12" COVER)
- SLEEVE UNDER PAVEMENT

QUILCEDA PARK

TULALIP, WASHINGTON

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STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

REV	DATE	DESCRIPTION
PROJECT MANAGER		JAR
ARCHITECT/ ENGINEER		JAR
DRAWN BY		ST
CHECKED BY		KL

DATE 11/02/00

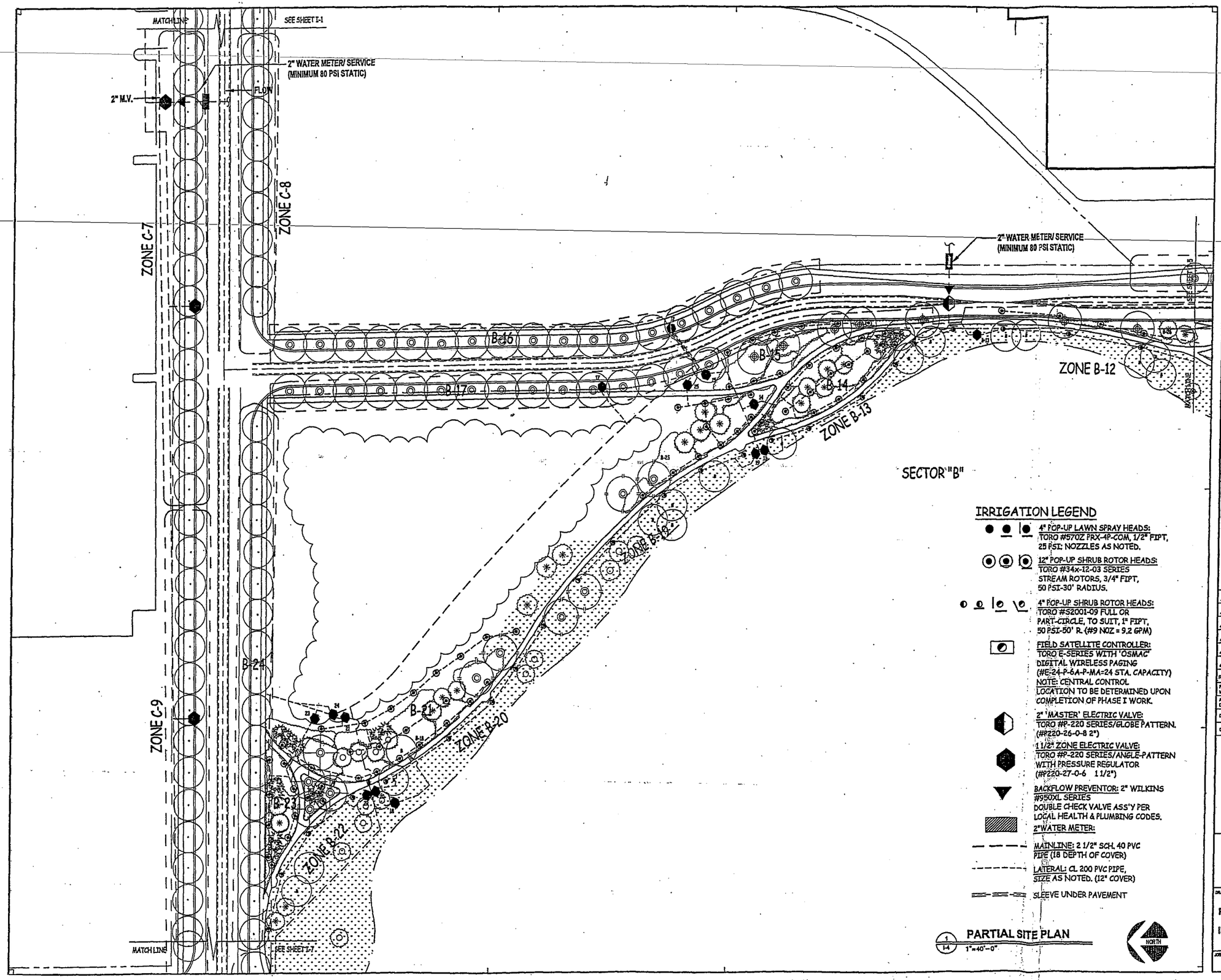
Ruhl-Parr & Associates, P.S.
Architects Planners
A Professional Service Corporation
3625 132nd Ave. S.E., Suite 100
Bellevue, WA 98006-1368 (425) 644-4000

DRAWING TITLE
PARTIAL SITE PLAN
IRRIGATION PLAN

DRAWING NO
I-3

JOB NUMBER
00-404

PRINT DATE



IRRIGATION LEGEND

- 4" POP-UP LAWN SPRAY HEADS: TORO #570Z PRX-4P-COM, 1/2" FIPT, 25 PSI: NOZZLES AS NOTED.
- 12" POP-UP SHRUB ROTOR HEADS: TORO #34x-12-03 SERIES STREAM ROTORS, 3/4" FIPT, 50 PSI-30' RADIUS.
- 4" POP-UP SHRUB ROTOR HEADS: TORO #S2001-09 FULL OR PART-CIRCLE, TO SUIT, 1" FIPT, 50 PSI-50' R. (#9 NOZ = 9.2 GPM)
- FIELD SATELLITE CONTROLLER: TORO E-SERIES WITH 'OSMAC' DIGITAL WIRELESS PAGING (#E-24-P-6A-P-MA=24 STA. CAPACITY) NOTE: CENTRAL CONTROL LOCATION TO BE DETERMINED UPON COMPLETION OF PHASE I WORK.
- 2" 'MASTER' ELECTRIC VALVE: TORO #P-220 SERIES/GLOBE PATTERN. (#P220-26-0-8 2")
- 1 1/2" ZONE ELECTRIC VALVE: TORO #P-220 SERIES/ANGLE-PATTERN WITH PRESSURE REGULATOR (#P220-27-0-6 1 1/2")
- BACKFLOW PREVENTOR: 2" WILKINS #950XL SERIES DOUBLE CHECK VALVE ASS'Y PER LOCAL HEALTH & PLUMBING CODES.
- 2"WATER METER:
- MAINLINE: 2 1/2" SCH. 40 PVC PIPE (18 DEPTH OF COVER)
- LATERAL: CL 200 PVC PIPE, SIZE AS NOTED. (12" COVER)
- SLEEVE UNDER PAVEMENT

1 / I-4 PARTIAL SITE PLAN
1"=40'-0"

NORTH

QUILCEDA PARK

TULALIP, WASHINGTON

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STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

REV	DATE	DESCRIPTION

PROJECT MANAGER	JAR	
ARCHITECT/ ENGINEER	JAR	
DRAWN BY	ST	DATE 11/02/00
CHECKED BY	KL	DATE

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Architects Planners
A Professional Service Corporation
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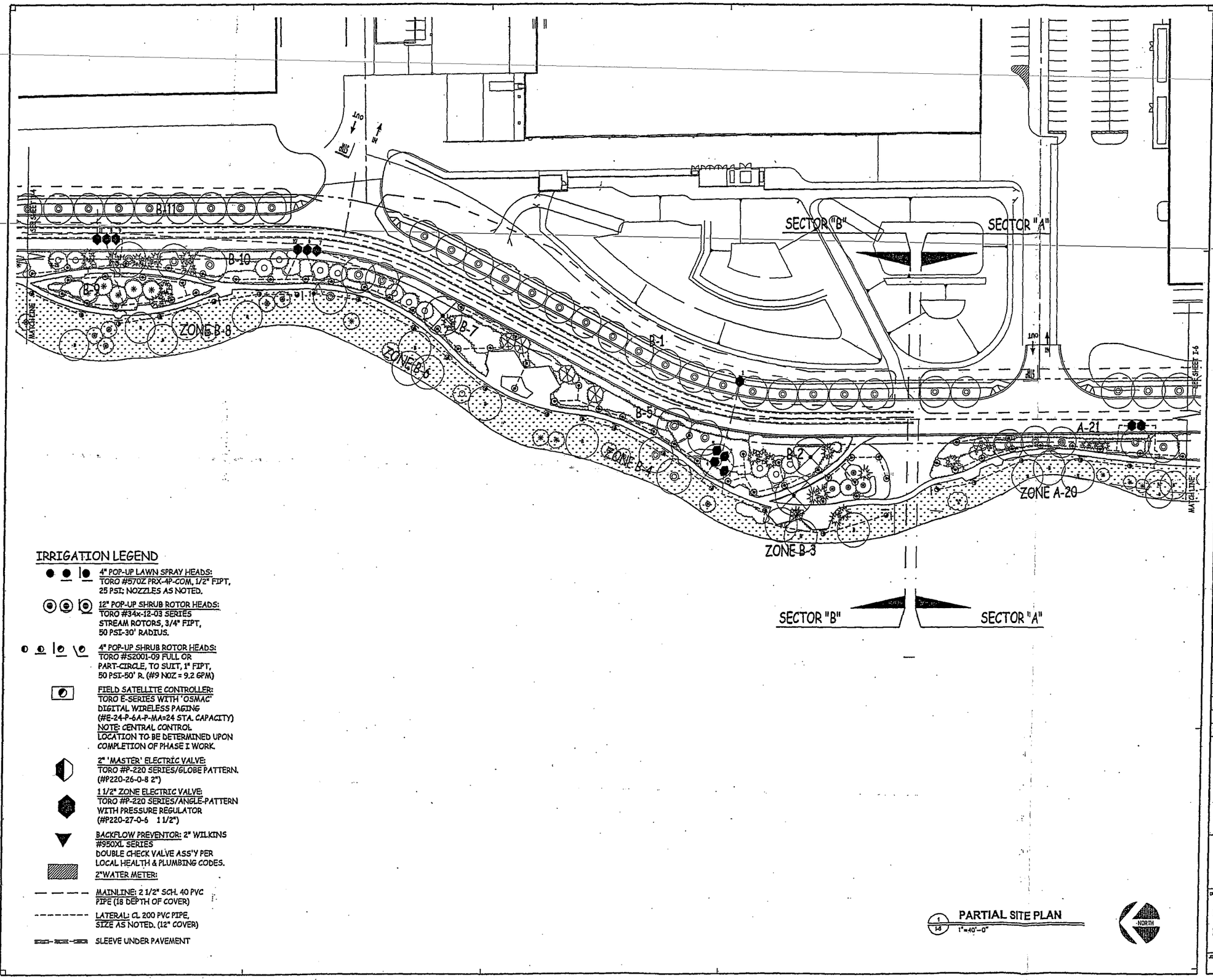
Bellevue, WA 98006-1388 (425) 644-4000

DRAWING TITLE	DRAWING NO
PARTIAL SITE PLAN IRRIGATION PLAN	I-4
JOB NUMBER 00-404	PRINT DATE



IRRIGATION LEGEND

- 4" POP-UP LAWN SPRAY HEADS: TORO #570Z PRX-4P-COM, 1/2" FIPT, 25 PSI: NOZZLES AS NOTED.
- 12" POP-UP SHRUB ROTOR HEADS: TORO #34x-12-03 SERIES STREAM ROTORS, 3/4" FIPT, 50 PSI-30' RADIUS.
- 4" POP-UP SHRUB ROTOR HEADS: TORO #S2001-09 FULL OR PART-CIRCLE, TO SUIT, 1" FIPT, 50 PSI-50' R. (#9 NOZ = 9.2 GPM)
- FIELD SATELLITE CONTROLLER: TORO E-SERIES WITH 'OSMAC' DIGITAL WIRELESS PAGING (#E-24-P-6A-P-MA=24 STA. CAPACITY) NOTE: CENTRAL CONTROL LOCATION TO BE DETERMINED UPON COMPLETION OF PHASE I WORK.
- 2" 'MASTER' ELECTRIC VALVE: TORO #P-220 SERIES/GLOBE PATTERN. (#P220-26-0-8 2")
- 1 1/2" ZONE ELECTRIC VALVE: TORO #P-220 SERIES/ANGLE-PATTERN WITH PRESSURE REGULATOR (#P220-27-0-6 1 1/2")
- BACKFLOW PREVENTOR: 2" WILKINS #950XL SERIES DOUBLE CHECK VALVE ASS'Y PER LOCAL HEALTH & PLUMBING CODES.
- 2"WATER METER:
- MAINLINE: 2 1/2" SCH. 40 PVC PIPE (18 DEPTH OF COVER)
- LATERAL: CL 200 PVC PIPE, SIZE AS NOTED. (12" COVER)
- SLEEVE UNDER PAVEMENT

1 I-5 PARTIAL SITE PLAN
1"=40'-0"

NORTH

QUIL CEDA PARK

TULALIP, WASHINGTON

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STATE OF WASHINGTON
REGISTERED
LANDSCAPE ARCHITECT

REV	DATE	DESCRIPTION

PROJECT MANAGER	JAR		
ARCHITECT/ ENGINEER	JAR		
DRAWN BY	ST	DATE	11/02/00
CHECKED BY	KL	DATE	

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Bellevue, WA 98006-1388 (425) 644-4000

DRAWING TITLE	DRAWING NO
PARTIAL SITE PLAN IRRIGATION PLAN	I-5
JOB NUMBER: 00-404	PRINT DATE

IRRIGATION LEGEND

- 4" POP-UP LAWN SPRAY HEADS: TORO #570Z PRX-4P-COM, 1/2" FIPT, 25 PSI; NOZZLES AS NOTED.
- 12" POP-UP SHRUB ROTOR HEADS: TORO #34x-12-03 SERIES STREAM ROTORS, 3/4" FIPT, 50 PSI-30' RADIUS.
- 4" POP-UP SHRUB ROTOR HEADS: TORO #52001-09 FULL OR PART-CIRCLE, TO SUIT, 1" FIPT, 50 PSI-50' R. (#9 NOZ = 9.2 GPM)
- FIELD SATELLITE CONTROLLER: TORO E-SERIES WITH 'OSMAC' DIGITAL WIRELESS PAGING (#E-24-P-6A-P-MA=24 STA. CAPACITY) NOTE: CENTRAL CONTROL LOCATION TO BE DETERMINED UPON COMPLETION OF PHASE I WORK.
- 2" 'MASTER' ELECTRIC VALVE: TORO #P-220 SERIES/GLOBE PATTERN. (#P220-26-0-8 2")
- 1 1/2" ZONE ELECTRIC VALVE: TORO #P-220 SERIES/ANGLE-PATTERN WITH PRESSURE REGULATOR (#P220-27-0-6 1 1/2")
- BACKFLOW PREVENTOR: 2" WILKINS #950XL SERIES DOUBLE CHECK VALVE ASS'Y PER LOCAL HEALTH & PLUMBING CODES.
- 2"WATER METER:
- MAINLINE: 2 1/2" SCH. 40 PVC PIPE (18 DEPTH OF COVER)
- LATERAL: CL 200 PVC PIPE, SIZE AS NOTED. (12" COVER)
- SLEEVE UNDER PAVEMENT

OUTDOOR SALES AREA
SEASONAL SALES AREA
AUTO SERVICE
2" WATER METER/ SERVICE (MINIMUM 80 PSI STATIC)
SECTOR "A"
SECTOR "B"
SEE SHEET L-3
MATCHLINE
ZONE D-13
ZONE A-1
ZONE A-2
ZONE A-3
ZONE A-4
ZONE A-5
ZONE A-6
ZONE A-7
ZONE A-8
ZONE A-9
ZONE A-10
ZONE A-11
ZONE A-12
ZONE A-13
ZONE A-14
ZONE A-15
ZONE A-16
ZONE A-17
ZONE A-18
ZONE A-19
SEE SHEET L-5
MATCHLINE

1 PARTIAL SITE PLAN
1"=40'-0"

NORTH

QUETEDA PARK

TULALIP, WASHINGTON

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STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT

REV	DATE	DESCRIPTION
PROJECT MANAGER		JAR
ARCHITECT/ ENGINEER		JAR
DRAWN BY		ST
CHECKED BY		KL
	DATE	11/02/00

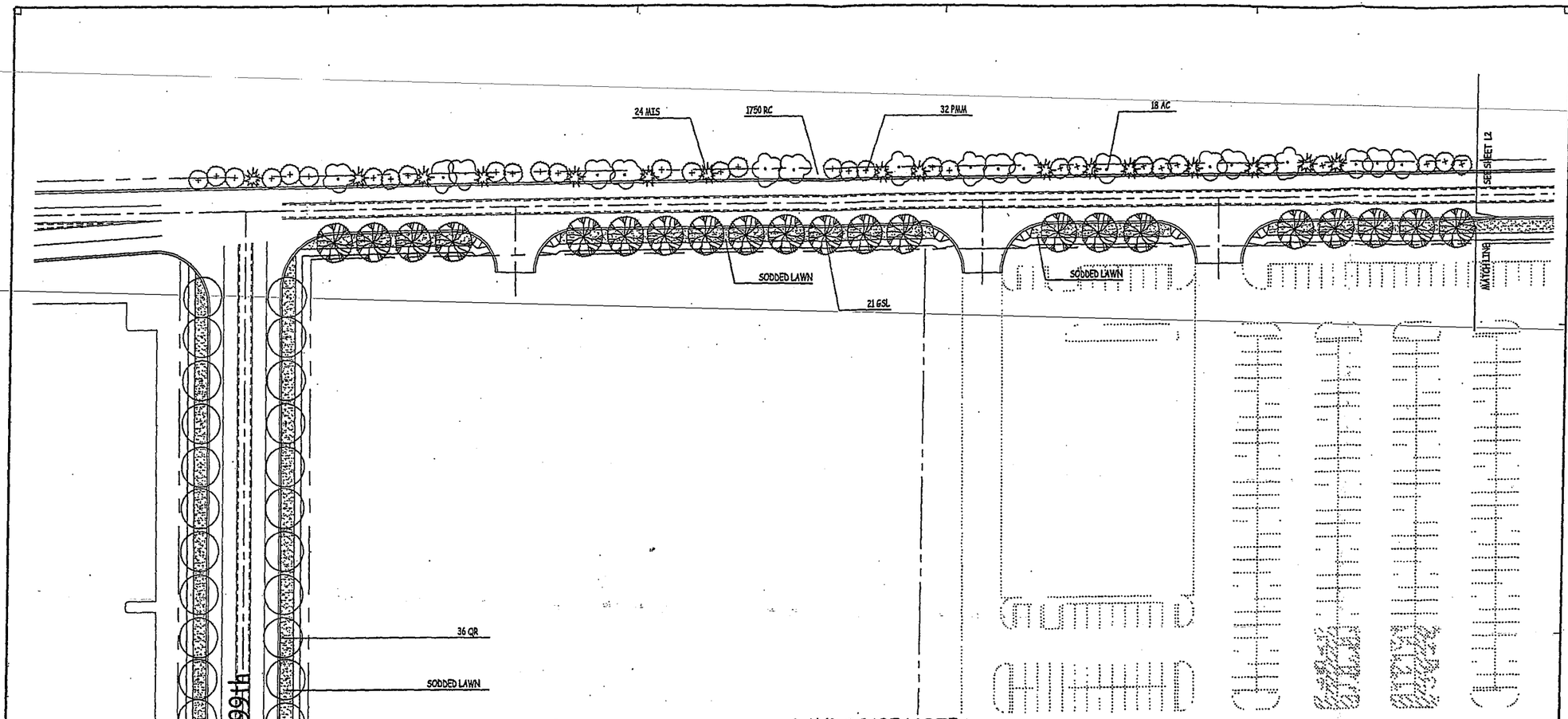
Ruhl-Parr & Associates, P.S.
Architects Planners
A Professional Service Corporation
3625 132nd Ave. S.E., Suite 103
Bellevue, WA 98006-1368 (425) 644-4000

DRAWING TITLE
PARTIAL SITE PLAN
IRRIGATION PLAN

DRAWING NO
L-6

JOB NUMBER
00-404

PRINT DATE



GENERAL NOTES

1. Provide the picnic tables, trash receptacles and benches as specified for permanent installation per the manufacturers details. The specified site furniture is manufactured by Timberform and the local representative is Architecreations at 1-877-912-4730 and fax at 206-933-9166.
2. Provide and install nine different interpretive signs as detailed and as located on the plans. The contractor is responsible for the fabrication, assembly and installation of the sign post, brackets, footings, hardware and porcelain enamel signs. Contractor shall contact the porcelain enamel supplier for complete installation guidelines of the signs.
3. Home Depot and Wal-Mart have installed planting and irrigation in the planting strip between the sidewalk and the curb, (the area is as indicated on the plans).
   At the Home Depot site the contractor is responsible for the removal and stockpiling of the groundcover plant material and bark mulch within the planting island. The plant material shall be saved and healed-in to bark mulch at a site determined by the owner. The contractor shall provide additional soil and soil preparation as required to change the planting island in front of Home Depot to sod. Save and protect the existing trees in place. Provide sod in the planting strip per the specifications.

   At the Wal-Mart site the contractor shall maintain the existing sod and provide the new trees as shown on the plan.
   The contractor shall also cap the existing supply irrigation lines (2 supply lines from 2 sites) from the Wal-Mart and Home Depot sites to the planting islands and reconnect four existing irrigation zones within the planting strip to the new Tulalip Village irrigation system. Provide all piping, new valves and wiring per the specifications. Connect wiring to the Tulalip Village control system. Provide a complete and operational system.

LANDSCAPE NOTES

1. The native soil is deep and sandy. The contractor shall utilize the native soil for all subgrades and finish grades. Should the native soil become contaminated with gravel or other materials or should the soil become compacted the landscape contractor shall remove debris and loosen the subgrades to a 12" depth. Remove all weeds debris and foreign matter. All planting soil shall be loosened to a minimum depth of 12"
2. Grades shall be sloped to the wetlands or the street depending on the lay of the land. Pockets or depressions in the finish grades will not be allowed. Berming of the planting area along the wetland trail shall be directed by the landscape architect. Contractor shall allow for 3,000 yards of berming soil along the trail. The soil shall be supplied by the general contractor in piles near the sites of the berms. It is the landscape contractor responsibility to grade and provide a finished grade for planting of the berms
3. After completion of portions of the irrigation system, and prior to planting, the landscape contractor shall deep water the planting areas to water settle the irrigation trenches. Regrade and finish grade any trenches, which have settled.
4. The lawn strips between the curbs and sidewalks shall have a slight berm of 2% to the center of the strip.
5. It is the intent to plant bareroot, many of the shrubs indicated on the plant legend. Possible sources for the plant material include:
   Storm Lake Growers: 360-794-4842
   Fourth Corner Nursery: 360-734-0079
   Wabash Farms: 360-825-7051
6. The street trees are shown at 30' on center. The layout of the trees shall be equally spaced between the intersecting roads or driveways with a minimum clearance of 15' from the driveways. The Landscape Contractor shall stake the location of the trees for approval by the landscape architect prior to planting. When the street trees are the same on both sides of the street, then the trees shall align across the road from each other.
7. Wetland trail shall be staked in the field by the landscape architect. The landscape contractor shall stake the tree locations and paint on the ground the edges of the shrub and groundcover beds. Each type of shrub or groundcover shall be indicated with a different color of paint.

Plant Legend

Quan.	Symbol	Plant Name	Size
36	QR	QUERCUS RUBRA	3" caliper
32	PMM	PINUS MUGHO MUGUS	36-48" ht and width
18	AC	ACER CIRCINATUM	multi-trunked, 6-8' ht
21	GSL	GLEDITSIA SKYLINE	3-4" caliper
1750	RC	RUBUS CALYCINOIDES	4" pot
24	MISC	MISCANTHUS SINENSIS	1 gallon can
		SODDED LAWN	Contractor to estimate quantities needed

1 L1 PARTIAL SITE PLAN
1"=40'-0"

NORTH

QUIL CEDA PARK

TULALIP, WASHINGTON

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STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT

REV	DATE	DESCRIPTION
3	09/21/01	GENERAL REVISIONS
2	11/06/00	BID SET
PROJECT MANAGER		JAR
ARCHITECT/ ENGINEER		JAR
DRAWN BY		ST DATE 11/02/00
CHECKED BY		KL DATE

KEN LARGE
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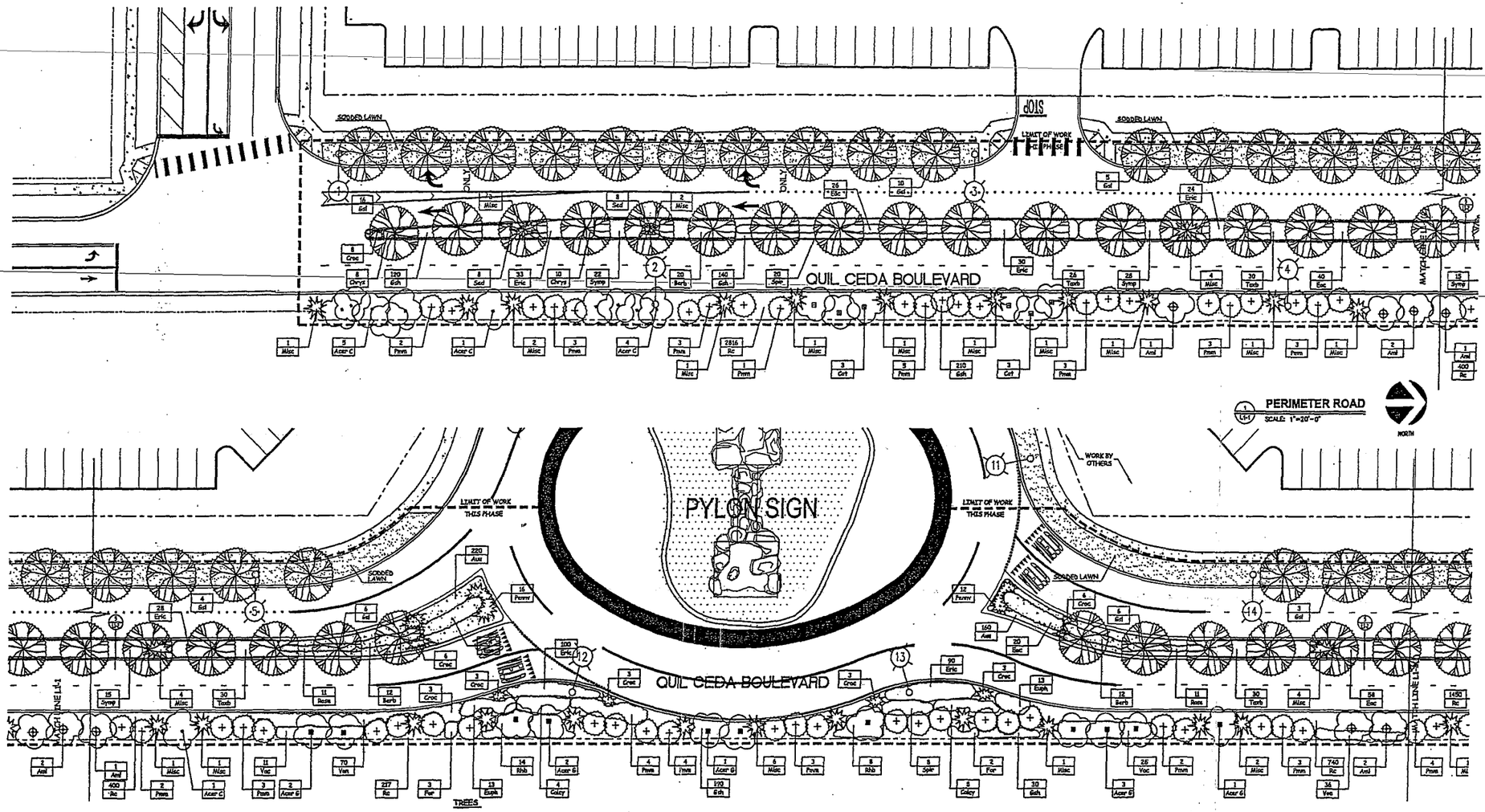
Bellevue, WA 98006-1308 (425) 644-4000

DRAWING TITLE
PARTIAL SITE PLAN
PLANTING PLAN

DRAWING NO. L1

JOB NUMBER 00-404

PRINT DATE



PERIMETER ROAD
SCALE: 1"=20'-0"

NORTH

TREES

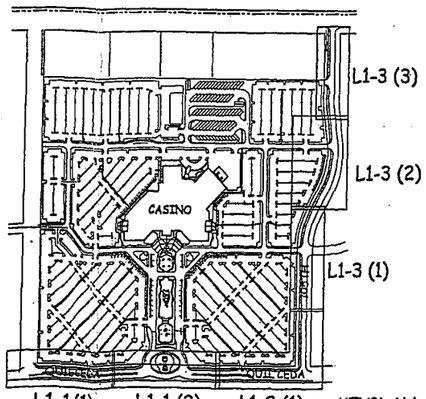
SYMBOL	DESCRIPTION	SIZE
Acerc	Acer circinatum Vine Maple	8-10' multi-trunked
Acerg	Acer ginnala Hedge Maple	8-10', 3" cal., multi-trunked
Aml	Amelanchier alnifolia Serviceberry	6-8' multi-trunked
Gsi	Gleditsia triacanthos Skyline Locust	3 1/2" caliper, 14' ht, 8'spread, branching to begin at 6'-6"
Picb	Picea p. Bacheri Bacheri Spruce	10-12' B/B
Qr	Quercus robur Columnar English Oak	3-1/2" cal. 12', branching to Begin at 6'-6"
Vibd	Vibd Viburnum plicatum Pink Dawn Pink Dawn Viburnum multi-trunked	6-8'ht.,4' width

SHRUBS AND GROUNDCOVERS

SYMBOL	DESCRIPTION	SIZE
Abe	Abelia grandiflora Dwarf Purple Abelia	5 gallon can
AUU	Arctostaphylos uva ursi Kinnikinick	1 gallon can
Berbrg	Berberis th. Rosey Glow Rosey Glow Barberry	5 gallon can
Caly	Callicarpa bodinieri Profusion Beautyberry	5 gallon can
Chrys	Chrysanthemum Superbum Superbum Daisy	1 gallon can
Cot	Cotinus coggyria Purple Palace Smoke bush	5 gallon can
CROC	Crocosmia lucifer Montbretia	1 gallon can
EAC	Euonymus alata Compacta Burning bush	5 gallon 2-3'ht, 2' sprd,full
ERIC	Erica carnea Springwood Pink Winter Heath	1 gallon can
EUPH	Euphorbia amygdaloides Wood Spurge	1 gallon can
For	Forsythia lynnwood Forsythia	5 gallon can
Gsh	Gaultheria shallon Salal	1 gallon can
ICC	Ilex crenata Green Island Japanese Holly b/b	10-12"ht,8-10" wth.
MISC	Miscanthus sinensis Morning Light Eulalia grass	1 gallon can
MAH	Mahonia repans Creeping Mahonia	1 gallon can
PENNV	Pennisetum villosum Fountain Grass	1 gallon can
Pmn	Pinus muga pumila Swiss Mountain Pine	36-42" ht., 36" width
RhB	Rhododendrons selected from the following varieties: Ramapo, Baden Baden, Elizabeth, Cilpinense, Dora Amateis, Bow Bells,Blue Diamond	21-24" ht.and width, b/b
ROSE	Rosa centifolia Muscosa	12" peat pot
Rc	Rosa Musk Rose	4" pots
Sed	Rubus calycinoides Emerald Carpet Bramble	1 gallon can
Spir	Sedum Brilliant Sedum	1 gallon can
Symp	Spiraea b. Anthony Waterer Spiraea	5 gallon can
Taxb	Symphiocarpus albus Snowberry	5 gallon can
Vac	Taxus baccata rependans Creeping Yew	5 gallon can
VERB	Vaccinium ovatum Evergreen Huckleberry	5 gallon can
Van	Verbena bonariensis Verbena	1 gallon can
	Viburnum opulas nana Highbush Cranberry	1 gallon can

Sodded Lawn Premium quality

Indicates limit of work



PERIMETER ROADS AREA II PHASE III

TULALIP, WASHINGTON

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT

REV	DATE	DESCRIPTION
PROJECT MANAGER		
MONTEZ/ OWNER		
DRAWN BY	KL/SkyTech	DATE 12/20/01
CHECKED BY		DATE

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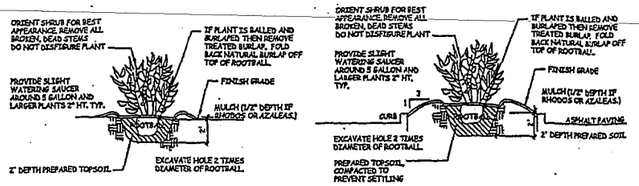
(425) 643-1415 Fax

DRAWING TITLE: LANDSCAPE PLAN CASINO PERIMETER

DRAWING NO: L1-1

JOB NUMBER

PRINT DATE



2 L1-2 TYPICAL SHRUB PLANTING NTS

3 L1-2 PLANTING ISLAND SHRUB NTS

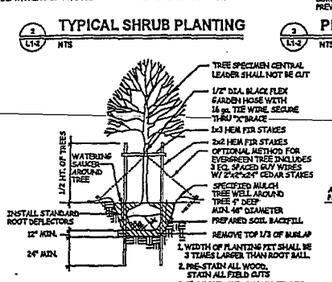
SPACING "A"	SPACING "B"	# OF PLANTS/SF
6" o.c.	5.20"	4.00
8" o.c.	6.93"	2.40
10" o.c.	8.66"	1.64
12" o.c.	10.40"	1.15
15" o.c.	13.00"	.738
18" o.c.	15.60"	.512
24" o.c.	20.80"	.290
30" o.c.	26.00"	.186
36" o.c.	30.00"	.128

SEE GROUNDCOVER PLANT KEY FOR MAXIMUM TRIANGULAR SPACING "A". THIS CHART IS TO BE USED TO DETERMINE NUMBER OF GROUNDCOVER PLANTS REQUIRED IN A GIVEN AREA.

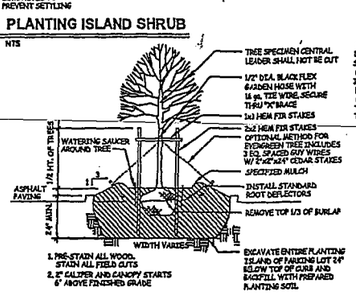
PLANT SPACING CHART

FOR USE WHEN PLANTS ARE SPACED EQUIDISTANT FROM EACH OTHER, AS IN ALL MASSED SHRUB/GROUNDCOVER PLANTINGS WHEN AREAS ARE SHOWN AS A PLANTING MASS THE CONTRACTOR SHALL SPACE THE SPECIFIED QUANTITY OF PLANTS EQUALLY OVER THE AREA SHOWN

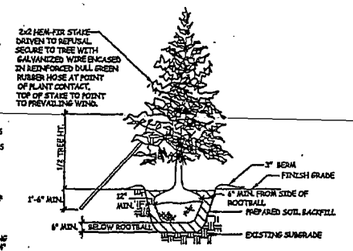
1 L1-2 PLANT SPACING CHART NTS



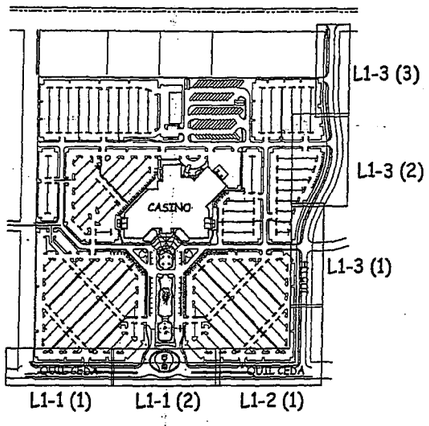
4 L1-2 TYPICAL DECIDUOUS TREE PLANTING NTS



5 L1-2 PLANTING ISLAND DECIDUOUS TREE NTS



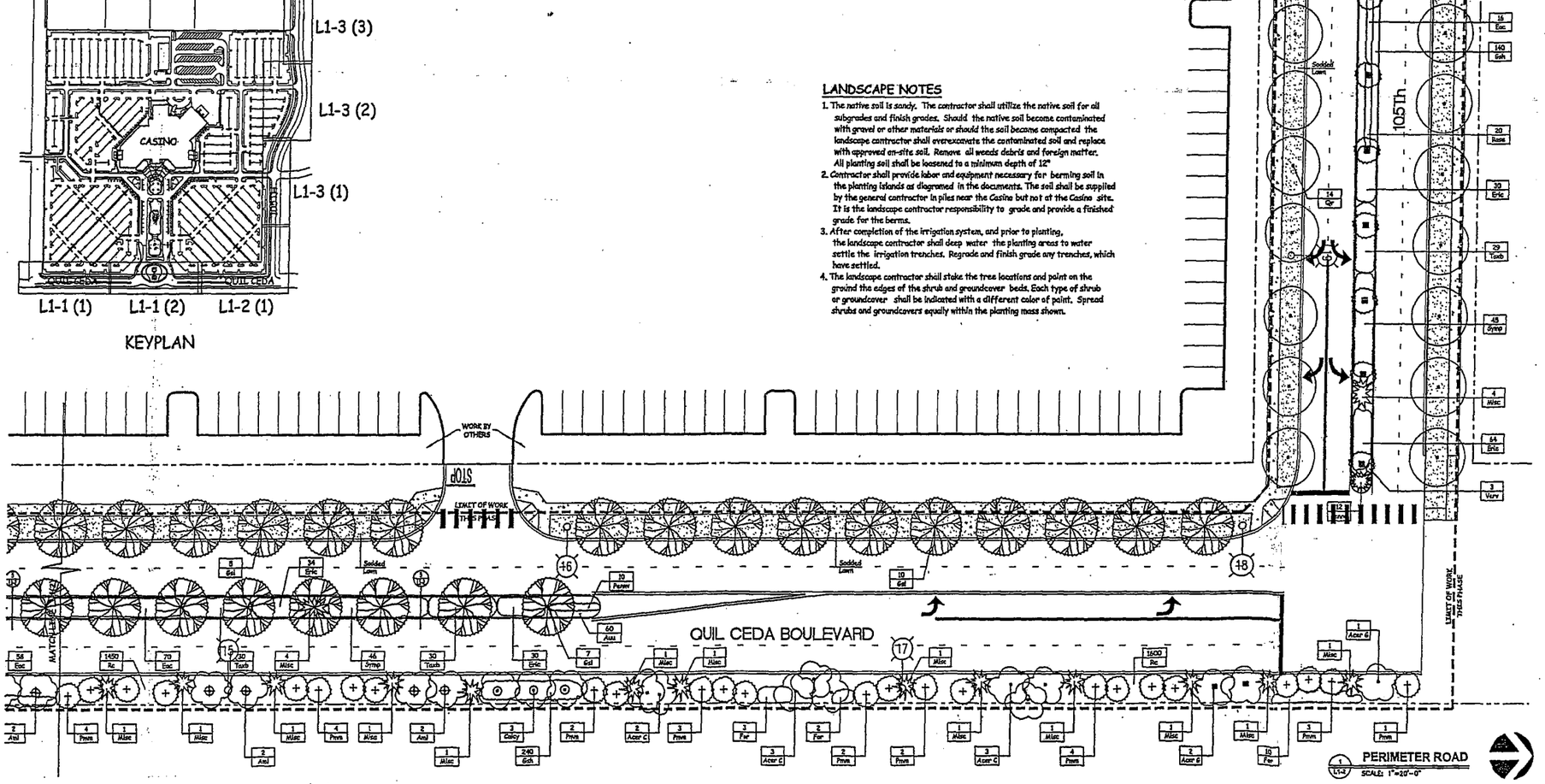
6 L1-2 TYPICAL CONIFEROUS TREE PLANTING NTS



KEYPLAN

LANDSCAPE NOTES

1. The native soil is sandy. The contractor shall utilize the native soil for all subgrades and finish grades. Should the native soil become contaminated with gravel or other materials or should the soil become compacted the landscape contractor shall overexcavate the contaminated soil and replace with approved on-site soil. Remove all weeds debris and foreign matter. All planting soil shall be loosened to a minimum depth of 12"
2. Contractor shall provide labor and equipment necessary for berming soil in the planting islands as diagramed in the documents. The soil shall be supplied by the general contractor in piles near the Casino but not at the Casino site. It is the landscape contractor responsibility to grade and provide a finished grade for the berms.
3. After completion of the irrigation system, and prior to planting, the landscape contractor shall deep water the planting areas to water settle the irrigation trenches. Regrade and finish grade any trenches, which have settled.
4. The landscape contractor shall stake the tree locations and point on the ground the edges of the shrub and groundcover beds. Each type of shrub or groundcover shall be indicated with a different color of paint. Spread shrubs and groundcovers equally within the planting mass shown.



PERIMETER ROADS AREA II PHASE III

TULALIP, WASHINGTON

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT

REV	DATE	DESCRIPTION
PROJECT MANAGER		
ARCHITECT/ ENGINEER		
DRAWN BY	KL/SkyTech	DATE 12/20/01
CHECKED BY		DATE

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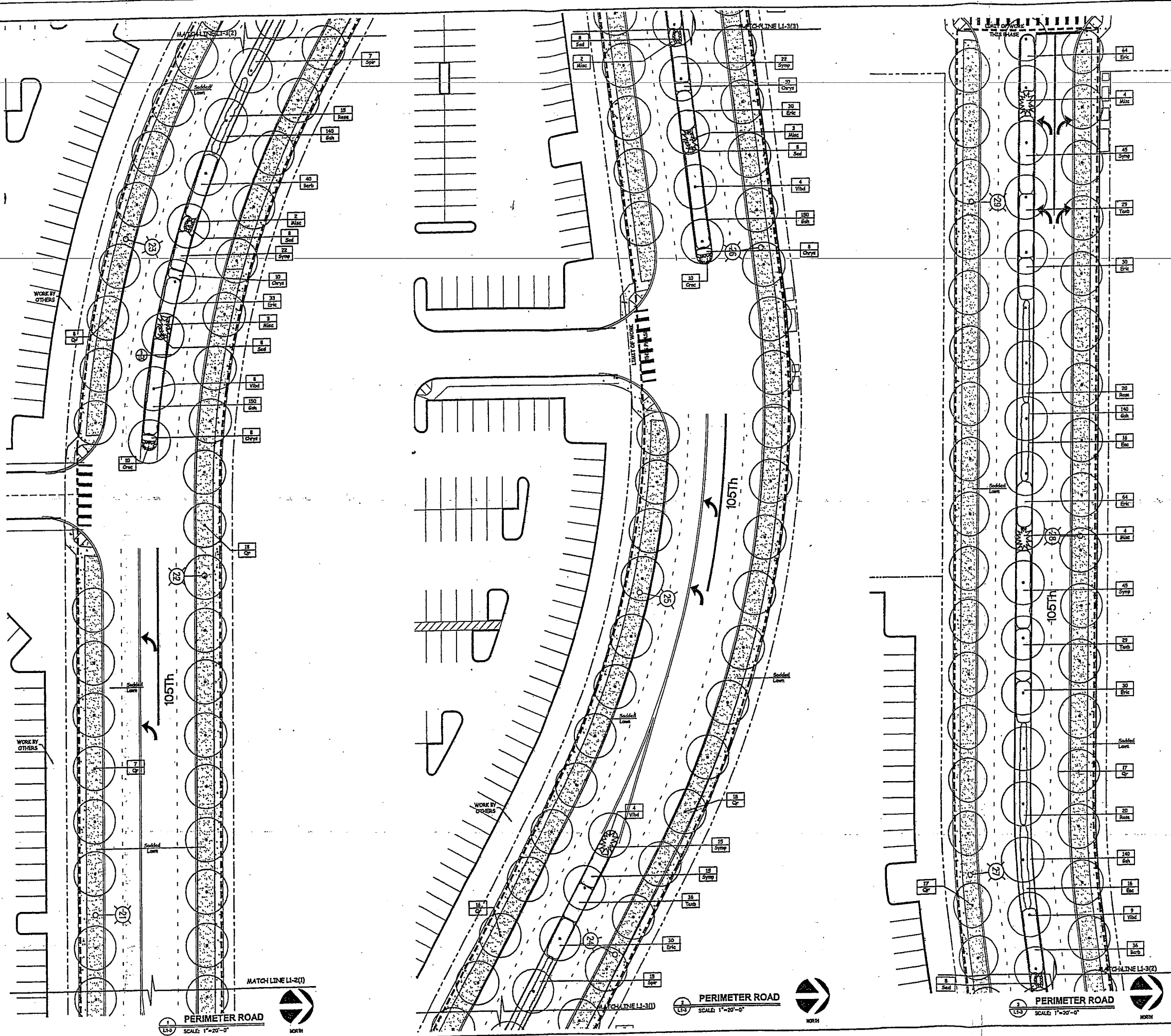
Bellevue, WA 98005 [425] 644-4020
[425] 643-4115 Fax

DRAWING TITLE: LANDSCAPE PLAN CASINO PERIMETER

DRAWING NO: L1-2

JOB NUMBER

PRINT DATE



PERIMETER ROADS AREA II PHASE III

TULALIP, WASHINGTON

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT

REV	DATE	DESCRIPTION
PROJECT MANAGER		
ARCHITECT/ ENGINEER		
DRAWN BY	KL/SkyTech	DATE 12/20/01
CHECKED BY		DATE

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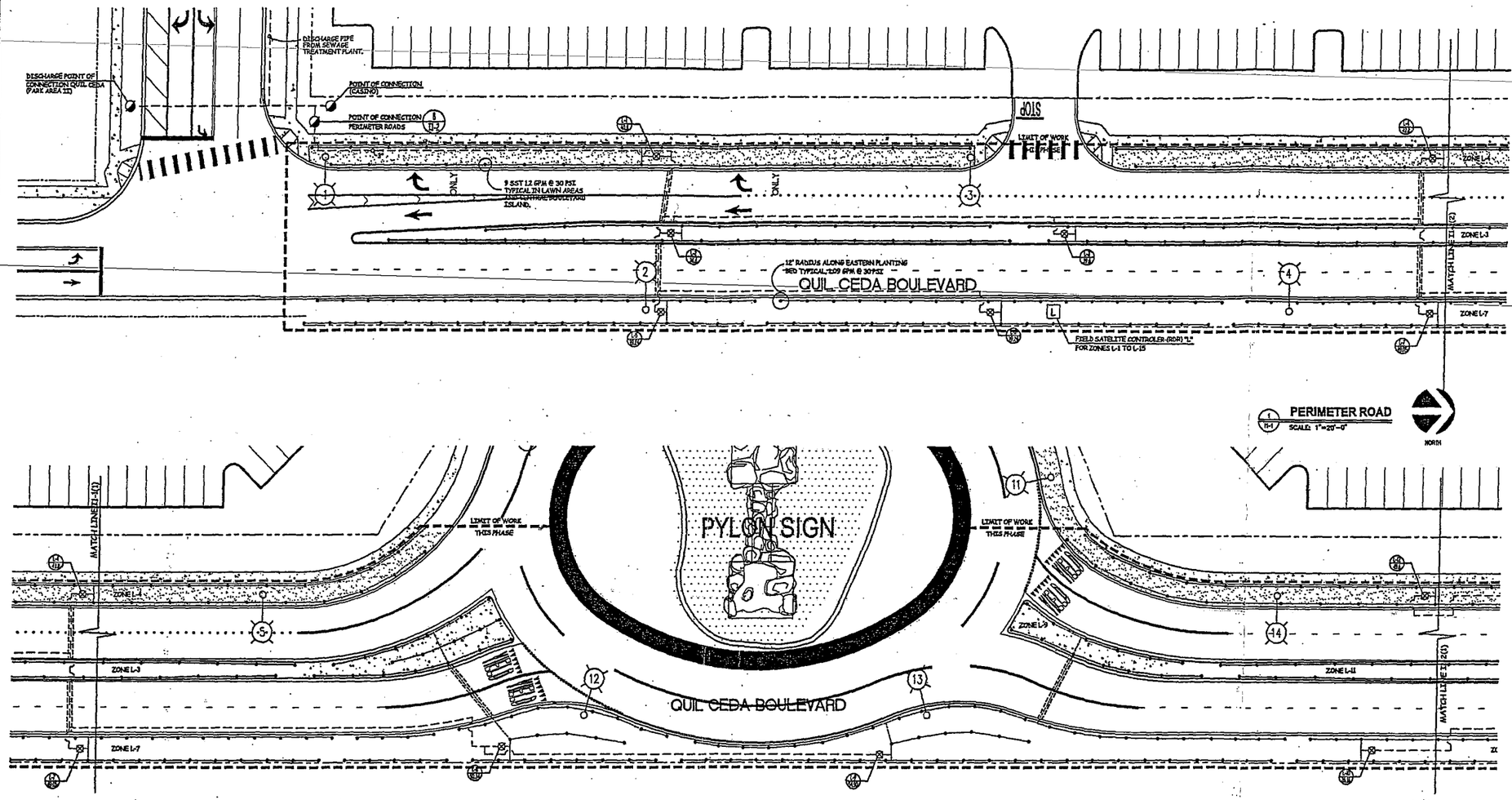
Buhl-Parr & Associates, P.S.
Architects Planners
A Professional Service Corporation

DRAWING TITLE: LANDSCAPE PLAN
CASINO PERIMETER

DRAWING NO: L1-3

JOB NUMBER

PRINT DATE

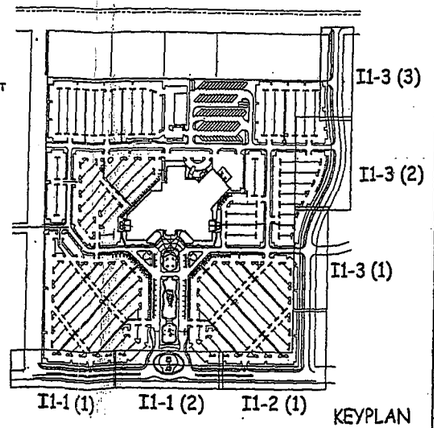


LEGEND

- LATERAL PIPE class 200 pvc pipe size per chart on sheet I1-2, 12" cover, purple color
- SLEEVE
- MAINLINE 3" sch 40 pvc, purple color 18" cover
- ISOLATION GATE VALVES: 3" 150 psi WOG Brass Gate Valve, FIPT X FIPT, with handwheel & rising stem.
- REMOTE CONTROL VALVE: 2" TORO #P-220-27-08 Series fitted with #EZR-100 (5-100 psi) Pressure Regulating Module. Contractor shall field install effluent solenoid assembly, #RW 60 Kit
- 1" QUICK COUPLING VALVE: (For Air Blow Out) Rain Bird 474 04: Install in 12" Standard Valve Box, with effluent (lavender) locking cover. 1" FIPT
- TORO 570Z PRX-4P or 6P-COM-E Series with molded lavendor colored plastic cover for permanent identification. 1/2" FIPT (Lawn areas 4" pop-up, 6" pop-up in shrub beds). Nozzels spacing
- FIELD SATELLITE CONTROLLER 'L' & 'M': Toro E-Series, pedestal mount with Osmoc digital wireless paging (#E-16-P-6A-P-MA=16 station capacity)

IRRIGATION NOTES:

1. The central irrigation controls are an E Series Osmoc field satellite system as manufactured by Toro. The system communicates with satellite controls via digital paging using a computer software program. Each satellite is capable of running 16 to 56 irrigation zones. Pedestal mounted satellites are controlled via the central computer or remote control radio. The radios allow both voice transmission and satellite control. The contractor is responsible for all wiring from the automatic control valve, (irrigation zone valve), to each satellite (RDR). (L&M). Power to the satellite shall be provided by the electrician for the utilities/ site development electrician and included in the site development contract. The irrigation contractor shall set and place the RDR's per the manufacturers printed instruction. The contractor shall provide a complete control system. which is linked to the existing controller.The software package, control antenna and computer are currently at another portion of the Tulalip Village. It is the contractors responsibility to make a complete operating system including all wiring and system de-bugging.
2. The Tulalip Tribe will use a hybrid source water supply system. The irrigation will be supplied by both domestic and discharge water from the sewage treatment plant. The valves & heads and valve boxes shall be supplied with effluent water marker, typical.
3. The nozzle arc and pattern are not typically shown, however the quantity of heads can be determined by using the typical details. The nozzle and pattern can be determined by scaling the plan, in most cases the heads are typically of 8, 10, 12, 9 SST and 15 foot radius patterns.
4. The irrigation contractor shall verify that sleeves are installed in the locations shown on the plans. It is the contractor responsibility to be on site during the construction to ensure that irrigation sleeves are installed properly. The irrigation contractor shall immediately notify the general contractor and the landscape architect of any problems, additions required or discrepancies.
5. Depth of Cover - Mainlines = 18" (purple color) Laterals = 12" (purple color)
6. Control Wiring (Satellite to Valves): #14-IUF Direct-Burial solid copper.
7. Mainline is diagrammatic location. Place mainline against edge of pavement (sidewalk) to avoid conflict w/ tree root balls, typ.
8. All valve boxes shall be supplied with lavender lids, typical.



PERIMETER ROADS AREA II PHASE III

TULALIP, WASHINGTON

STATE OF WASHINGTON REGISTERED LANDSCAPE ARCHITECT

NO	DATE	DESCRIPTION
PROJECT MANAGER		
ARCHITECT/ OWNER'S		
DRAWN BY	KL/SkyTech	DATE 12/20/01
CHECKED BY		DATE

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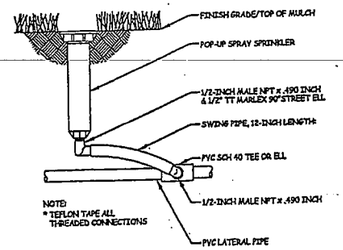
DRAWING TITLE: IRRIGATION PLAN CASINO PERIMETER

DRAWING NO: I1-1

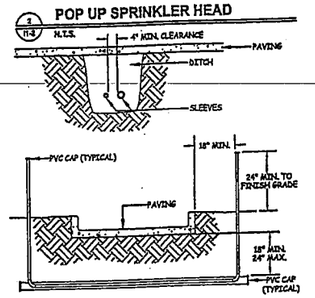
JOB NUMBER

PRINT DATE



2 H-8 N.T.S.

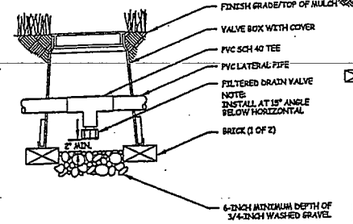
POP UP SPRINKLER HEAD



NOTES:
1. ALL PVC IRRIGATION SLEEVES TO BE TYPE 3034 SEWER PIPE.
2. ALL JOINTS TO BE SOLVENT WELDED AND WATERTIGHT.
3. WHERE THERE IS MORE THAN ONE SLEEVE, EXTEND THE SMALLER SLEEVE TO 24-INCHES MINIMUM ABOVE FINISH GRADE.
4. MECHANICALLY TAMP TO 95% PROCTOR.

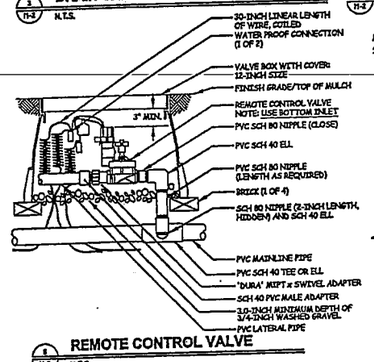
8 H-8 N.T.S.

SLEEVE UNDER PAVEMENT



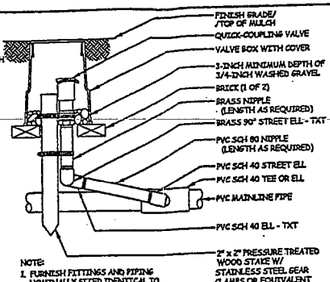
3 H-8 N.T.S.

DRAIN VALVE



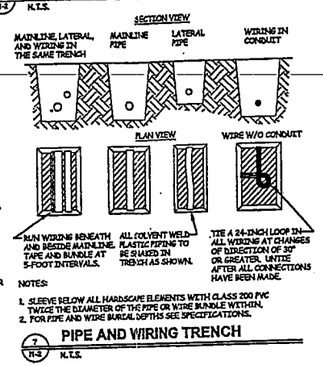
9 H-8 N.T.S.

REMOTE CONTROL VALVE



4 H-8 N.T.S.

QUICK COUPLER



NOTES:
1. SLEEVE BELOW ALL HARDSCAPE ELEMENTS WITH CLASS 200 PVC TWICE THE DIAMETER OF THE PIPE OR WIRE BUNDLE WITHIN.
2. FOR PIPE AND WIRE BURIAL DEPTHS SEE SPECIFICATIONS.

7 H-8 N.T.S.

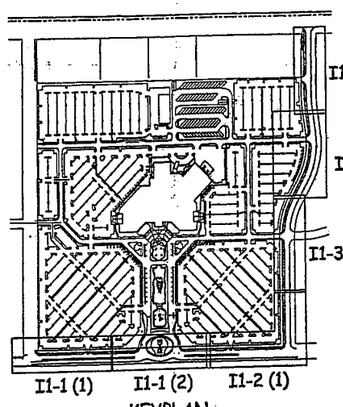
PIPE AND WIRING TRENCH

IRRIGATION FLOW CHART

THE FOLLOWING CHART IS TO BE USED BY THE CONTRACTOR FOR SIZING LATERAL PIPE. WHEN USING THIS CHART DO NOT EXCEED A VELOCITY OF 5 FEET PER SECOND. THIS CHART REPRESENTS THE FRICTION LOSS PER 100 FEET OF PIPE. THE CONTRACTOR SHALL CALCULATE GALLONAGE USING THE HEADS SHOWN ON THE PLAN.

FLOW (GPM)	VELOCITY FPS	FRICTION LOSS	VELOCITY FPS	FRICTION LOSS	VELOCITY FPS	FRICTION LOSS	VELOCITY FPS	FRICTION LOSS	VELOCITY FPS	FRICTION LOSS
1	0.47	0.06	0.26	0.02	0.18	0.01	0.11	0.00		
2	0.94	0.22	0.57	0.07	0.36	0.02	0.23	0.01	0.17	0.00
3	1.42	0.46	0.84	0.14	0.54	0.04	0.34	0.02	0.25	0.01
4	1.89	0.79	1.15	0.24	0.72	0.06	0.46	0.03	0.34	0.01
5	2.36	1.20	1.44	0.36	0.90	0.12	0.68	0.04	0.42	0.02
6	2.83	1.68	1.73	0.51	1.08	0.15	0.69	0.05	0.51	0.03
7	3.30	2.23	2.02	0.67	1.26	0.20	0.80	0.06	0.59	0.04
8	3.77	2.85	2.30	0.86	1.44	0.26	1.03	0.07	0.67	0.05
9	4.25	3.55	2.59	1.07	1.62	0.34	1.24	0.09	0.76	0.06
10	4.72	4.31	2.88	1.30	1.80	0.40	1.37	0.22	0.84	0.07
			3.17	1.54	1.98	0.50	1.51	0.24	0.93	0.09
			3.46	1.83	2.17	0.59	1.65	0.30	1.04	0.10
			4.04	2.43	2.53	0.78	1.92	0.40	1.23	0.14
			4.61	3.11	2.89	1.00	2.20	0.51	1.41	0.17
					3.25	1.24	2.48	0.64	1.59	0.22
					3.61	1.51	2.75	0.74	1.76	0.26
					3.97	1.83	3.03	0.83	1.94	0.32
					4.34	2.12	3.30	1.09	2.13	0.37
					4.70	2.46	3.58	1.27	2.33	0.43
							3.86	1.46	2.47	0.49
							4.13	1.66	2.65	0.56
							4.85	2.20	3.08	0.75
									3.53	0.96
									3.97	1.19
									4.41	1.44
									4.85	1.72

SIZE	3/4"	1"	1-1/4"	1-1/2"	2"
OD	1.050	1.315	1.660	1.900	2.375
ID	.930	1.189	1.502	1.720	2.149



KEYPLAN

8 H-8 DIAGRAMATIC

POINT OF CONNECTION

POINT OF CONNECTION NOTES

1. Four separate point of connection details shall be provided. Two for domestic (potable), and two for discharge (treated sewage) water. The domestic supply is cast iron pipe. The discharge supply is schedule 40 pvc (purple) pipe. Supply feed for both connections is equal to or greater than 8" diameter.

2. The domestic water meter shall be provided by others. The discharge water meter and purple piping from the discharge pipe source shall be provided by the contractor for this project.

3. Domestic and discharge sources shall not be "on" at the same time. The 3" x 12" nipple with unions shall be removed prior to switching to the alternative source.

4. Below grade portions of piping from the water meter to the last (downstream) isolation valve in the diagram shall be schedule 80 pvc, purple color.

1 H-8 SCALE: 1"=20'-0"

PERIMETER ROAD

NORTH

PERIMETER ROADS AREA II PHASE III

TULALIP, WASHINGTON

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ARCHITECT/ ENGINEER		
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DRAWING TITLE
IRRIGATION PLAN
CASINO PERIMETER

DRAWING NO. 11-2

JOB NUMBER

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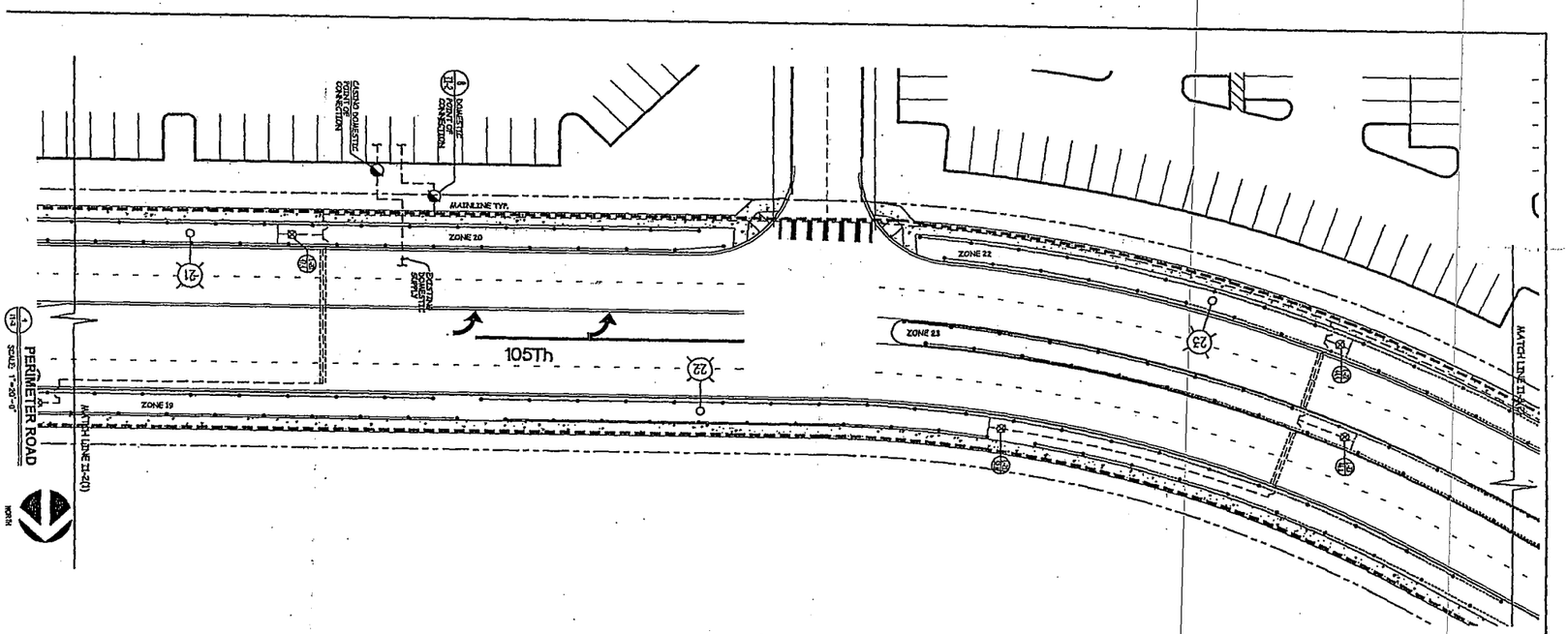

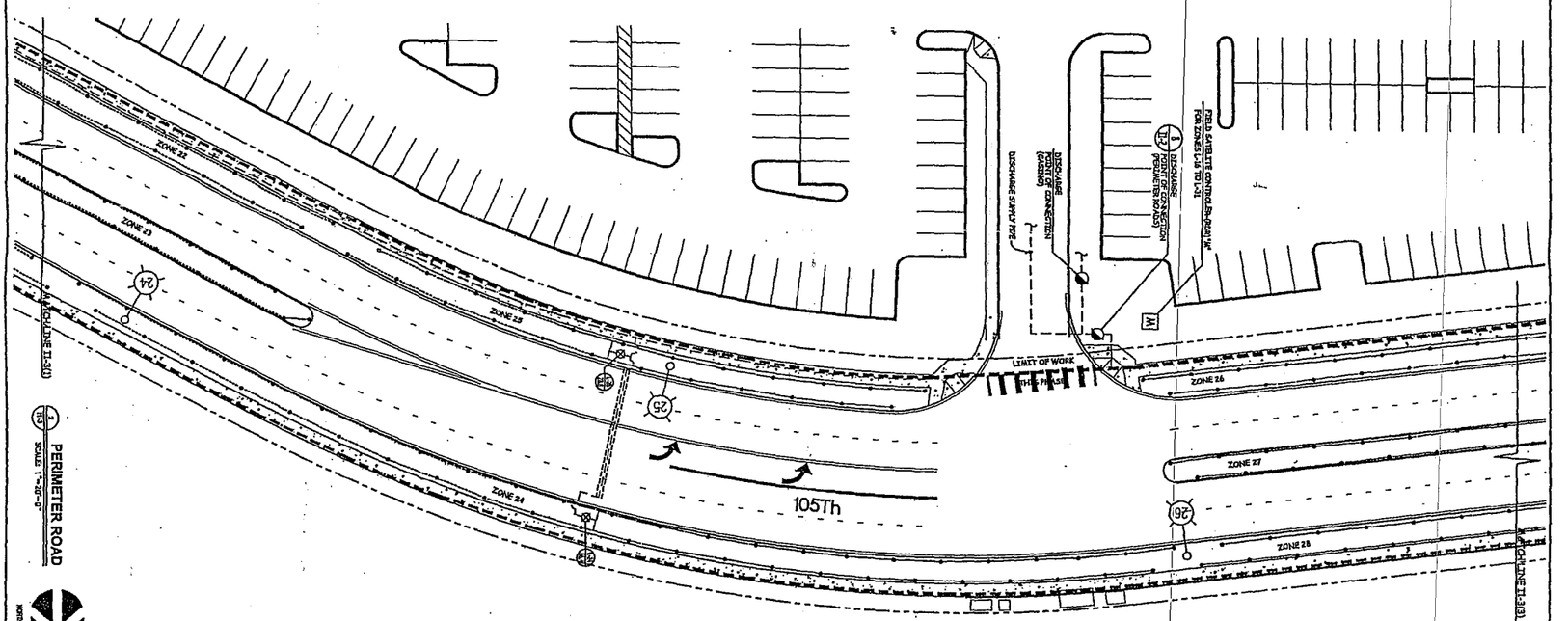

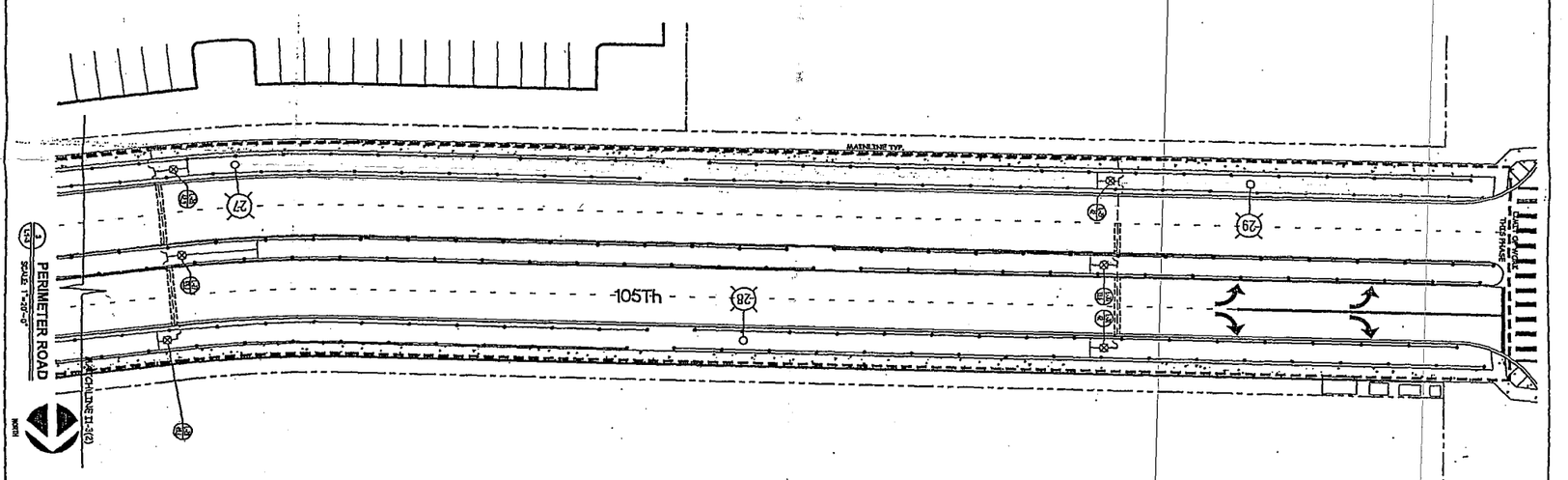

IRRIGATION PLAN
CASINO PERIMETER

11-3

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STATE OF WASHINGTON
REGISTERED LANDSCAPE ARCHITECT

PERIMETER ROADS AREA II PHASE III

TULALIP, WASHINGTON

Appendix A

APPENDIX A

Oil/Water Separator Operations and Maintenance Manual

Facet International
a CLARCOR company

Operations & Maintenance Manual for Concrete Vault Type Oil/Water Separator using Facet International Coalescing Plate Packs

Table of Contents

(Low to Moderate Solids Content Design)

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	Figure 1 / Cross Section	
	Figure 2 / MPak® Coalescing Plate Assembly	
3	Safety	
4	System Installation	
5	System Operation	
6	Troubleshooting	
7	Replacement Parts Information	

1.0 INTRODUCTION

The Facet International, Inc. MPak® vault system (See Figure 1) is an enhanced gravity separation system for the removal of oil and solids from wastewater. Oil droplets, being lighter (lower specific gravity) than water, tend to rise and separate from the wastewater. In a similar manner, the higher specific gravity (heavier) solids particles fall to the bottom of the separator. The Facet International MPak system enhances this separation by the use of special patented coalescing plates (U.S. Patent No. 4,897,206) to remove droplets much more efficiently than simple gravity separators.

The separator contains an inlet separation section set off from the rest of the separator by an inlet weir, a plate section, and an outlet section set off by an outlet weir.

The coalescing plates are made of calcium carbonate-filled polypropylene, stacked and bound together with sturdy rods and supports into modular plate packs known as MPaks. MPaks are available in either 1/4" or 1/2" nominal plate spacing. Spacing to be utilized will be based on the conditions and separation efficiency required.

The oil/water mixture flows into the separator and enters the coalescing plates. As the oil/water mixture passes horizontally through the plates, the oil droplets rise to meet the bottom of the next plate above them, where they are collected. From this point the oil droplets merge to form larger droplets that will rise through the holes located in the peaks. The oil droplets will continue to rise to the top of the separator to form an oil layer, which can then be removed periodically from the top of the separator by means of a vacuum truck or portable skimming device. Frequency of oil removal from the separator that is required will depend on the amount of oil entering the unit. An estimate of the quantity of oil to be captured by the separator may be found in the separator quotation. Actual oil removed depends on the amount of oil entering the separator. Optional equipment could include standpipe type skimmers that would remove the oil from the separator to an (optional) oil holding tank.

Most of the solids drop into the bottom of the inlet collection area. Some additional solids enter the plate packs and are separated there. Solid particles that are captured by the plate packs fall to the bottom of the plate area through the solids removal holes in the "valleys" of the plates. Space has been provided under the plates for these solids. The MPaks are designed to be cleaned in place with an optional cleaning wand (See section 5.3 Maintenance).

5SYSTEM DESCRIPTION AND REQUIREMENTS

Note: The following description of a separator is a general one and some systems may vary due to differing requirements.

2.1 Inlet Section In the inlet section of the separator, gross amounts of oil including all large drops will rise to the surface by gravity. Large solid particles will fall to the bottom and remain there until removed by vacuum truck or other means. The inlet section is separated from the plate section by the inlet weir. Please see Figure 1 for a cutaway of the separator showing this weir.

5.3MPak (Coalescing Plate Pack) Section

The MPak area of the separator will contain one to three rows of plate packs. The number and size of plate packs are determined by the process design conditions. These coalescing plate

packs will be either 1/4" or 1/2" nominal plate spacing. A typical detail of the installation of packs is shown as Figure 2.

Oil droplets not large enough to separate in the inlet chamber enter the plate packs and are captured on the underside of the plates. The oil droplets then merge to form larger droplets and run upward along the sloped bottom of the plates to the holes located in the peaks. The oil exits the holes at the peaks and rises vertically to the surface. The processed water flows out of the coalescing plate region under the oil dam into the outlet section.

2.3 Outlet Section

The outlet section is equipped with a weir arrangement that causes the water to flow under the first weir (oil dam) and over the second weir. This effectively traps any separated oil in the first two sections of the separator.
Water flows out of the area beyond the second weir and exits the separator.

2.4 Skimmers (optional)

The optional oil skimmers allow the oil to flow out of the separator to a holding tank. A skimmer should be located at each end of the separator. The skimmers are vertically adjustable to allow for variations in oil level that occur due to variations in the inlet oil level concentration as well as variations in water flow.

The skimmers are adjustable up or down by turning the locknuts on the supporting bracket. When adjusting the skimmers, first rotate the upper part of the skimmer (expansion joint) to loosen it before making vertical adjustments with the locknuts. The inner tube moves inside the outer pipe to get the necessary adjustments. The oil flows over the top of the skimmer and down into the connecting pipe to the oil holding tank (if provided). The skimmer should be adjusted so that the top of the skimmer is less than 3/8 inch above the waste water level with very little oil accumulated and with a normal flow rate. Access to the skimmer adjustment is through the access cover.

If floating or other type skimmers are provided, refer to manufacturer's instructions on installation/adjustment of these devices.

3.0 SAFETY

a) Normal fire prevention measures should be enforced around oil.

b) Care should be taken in keeping the area clean as oil/water mixtures can be dangerous, toxic, or hazardous.

5 SYSTEM INSTALLATION

Flow into the separator should be controlled at the recommended flow rate for the particular application. The maximum allowable flow rate may be found on the computer sizing provided with the quotation. The vault must be vented to the atmosphere through the top covers. The flow through the separator is normally gravity flow.
If a pump is used for the inlet oil/water mixture, it is recommended that a positive displacement pump or an air diaphragm pump be used. This will minimize the emulsification so the performance of the separator will not be adversely affected. Use of centrifugal pumps,

globe valves or other high shear devices can cause unduly small droplet sizes and reduce performance.

Excessive pressure drop in the inlet piping must be avoided, as this will cause emulsification of the oil, which will adversely affect the separator performance.
The separator vault should be level to within 1/16 inch per foot and adequately strong to support the weight of the separator full of water. In areas where the water table fluctuates, care should be taken to ensure that the vault will not be damaged if it is empty when the water table rises.

It is recommended that the water effluent pipe (in addition to the inlet pipe) be gravity flow. The outlet pipe must be arranged so as to be free flowing. If the outlet pipe is too small or has a high-pressure drop, water will "back up" into the separator, causing problems. External piping should be supported separately, not supported from the separator.
To install the separator, follow these steps:

1) Connect the oil/water inlet piping to separator inlet connection (Figure 1). It is recommended that a full port ball valve of the same size as the inlet piping be installed in the influent line to control the flow. The inlet valve (if provided) should be located at least ten pipe diameters upstream of the separator. **NOTE:** Excessive throttling causes turbulence and emulsification. Emulsification may adversely affect separator performance.

2) Connect the water outlet piping to the water outlet connection (Figure 1). No valving is necessary as the weir will control the height of the oil/water mixture in the separator.

5.0 SYSTEM OPERATION

5.1 Initial Start-Up The following procedure shall be followed after the installation of the Separator or after the Separator has been drained or pumped out and is ready to be restarted. This procedure assumes that the separator is delivered with plates installed. If plates are to be field installed, follow the procedure provided in the Maintenance section below.

1) Ensure there are no obstructions in the oil outlet or water outlet pipe.

2) Remove cover (or open access hatches).

3) Fill tank with clean water to avoid contaminating the Separator outlet area with oil.

4) Open the (user supplied) inlet valve to allow the oil/water mixture into the tank. Adjust for the desired flow rate as shown on the nameplate or on the proposal if no nameplate is attached. Calculations which include flow rate have been provided with the proposal.

5) Check to see if there is an oil build-up on the surface.

6) With flow at the required flow and some (at least 1/8") oil accumulation, set the oil skimmer to 3/8 inch above the water level.

7) Check for leaks of water into the oil.

8) Determine if effluent meets requirements after 15 minutes of run-time. (optional)

9) Replace cover (or close hatches) after oil begins to flow out of the skimmer pipe (if provided).

5.3 Normal Operation

Do not exceed the recommended flow rate, which has been previously determined. The unit can operate at any flow less than what is recommended.

The flow of skimmed oil out of the skimmer pipe, once a sufficient quantity of oil has accumulated in the Separator, varies with the concentration of oil entering the system. Only oil should be removed since the oil outlet skimmer is set above the water level. Oil is lighter than water so the oil will rise higher than the water level and be skimmed off if the skimmer is adjusted properly.

NOTE: An oil layer will always remain on the surface when the skimmer is adjusted properly. If skimmers are not provided, it is necessary to remove oil with a vacuum truck or portable skimmer. Frequency of oil removal will be a function of oil concentration in the inlet. IT IS THE RESPONSIBILITY OF THE OWNER TO REMOVE OIL PROMPTLY TO ENSURE ONLY OIL GETS OUT OF THE SEPARATOR AND NOT INTO THE OUTLET LINE. If the oil is not removed regularly, it may accumulate in enough volume to displace most of the water in the separator and eventually begin going under the oil dam.

The frequency of solids removal is dependent on the solids concentration in the influent and can best be determined during operations.

5.3 Maintenance

1) After the initial month of operation, the vault should be cleaned out as follows:

   a) Remove cover (or open hatches).

   b) Lower oil skimmer(s) if provided to remove all the accumulated oil or pump the oil layer out of the vault.

   c) Remove water from the vault.

   d) Clean the vault by flushing with a hose and examine the plates for blockage.

   e) Remove accumulated sludge with a vacuum truck or positive displacement pump such as an air operated diaphragm pump. Dispose of the sludge properly as it will contain some hydrocarbons.

   f) To re-start operations, follow the steps in Section 5.1 Initial Start-up.

   NOTE: If sludge level is 6" or more in the inlet chamber, the cleaning interval should be shortened. If less that 6" depth, interval can be increased.

2) After approximately (3) three months in operation, the Separator vault and plates should be cleaned. Inspect the inlet chamber and the entrance to the plate packs. If sludge is accumulating in the inlet chamber verify if accumulation is taking place in the plate pack entrance. If no sludge is apparent in the plate packs, clean inlet chamber and proceed with "Start-up" as defined in Section 5.1 - Initial Start-Up. If sludge is apparent in the plates of a depth 3" or less from the bottom, flush plates with water hose and return to operation. If sludge is 3" or greater, clean plates and establish a more frequent cleaning schedule or a method to reduce the inflow of solids. Minimum maintenance should not extend past three-month intervals.

Generally cleaning of the plate packs without removing them from the vault is recommended if it is possible to access the top of the plates safely. Two methods may be used to clean the plates:

NOTE: **DO NOT** disassemble the plate packs.

5.3 Maintenance (cont.)

a) Cleaning in place with a pressurized cleaning wand: To clean the plates, connect an (optional) cleaning wand to regular city water pressure. Check the wand to ensure that the inlet screen is in place. The wand should be provided with a valve to start and stop the water flow. A positive displacement "Sandpiper" type pump or vacuum truck should be provided for removal of the solids (along with some water) after they have been fluidized by the cleaning process.

The procedure used is as follows:

1. Using the cleaning wand or a hose, fluidize the dirt in the inlet chamber and suck it out
with the pump, along with some water.

2. Insert the wand in one of the cleaning holes in the row nearest the inlet of the pack. Start
water flow through the wand to begin moving the solids out of the inlet end of the pack into the area immediately in front of the plates where the pump could remove them.

3. Push the wand gently down into the cleaning hole until it reaches bottom, maintaining water flow through the wand. Move the wand up and down through the hole to ensure that the plates in the vicinity of the hole are thoroughly cleaned.

4. Move the wand to another cleaning hole in the same row and repeat the process.

5. Continue cleaning the area served by each hole in turn until the entire pack area has been cleaned of solids.

Repeat steps 1-5 above for each pack.

a) Flushing with fire hose or steam:

Clean the plate pack assemblies by flushing with water from the sides. A 1-1/2 inch fire hose at 10-15 psi or a standard garden hose at normal city water pressure (30-35 psi) are effective cleaning tools. In a similar manner, steam can also be used to flush plate packs, but CARE MUST BE TAKEN TO NOT GET THE PLATES TOO HOT. **NOTE**: Plates do not need to be cleaned until white. A thin coating of oil does not harm performance of the system.

It may be necessary to remove some or all of the packs for cleaning outside of the vault if the fire hose method is utilized.

In addition to cleaning the plates, clean the skimmers and oil removal pipes (if provided) by flushing with a hose and hot water.

Hose down the interior of the vault and remove any oil and solids with the vacuum hose.

NOTE: Caution should be taken that cleaning does not result in a pollution problem.

5.4 Re-installation of coalescing plate packs (if they have been removed).

To replace the plates, follow this procedure:

1) The plate packs are designed to fit snugly within the separator.

2) Position plate packs in the same configuration (rows) as when removed.

3) Install plate packs one at a time, one row in length and one row in width, being sure the outer packs are adequately sealed against the vault wall in the same manner as before they were removed.

4) After all packs are installed, check to ensure that the packs are even and touching, forming one (or two if provided) rows of packs across the channel and that they are securely butted against the backing angle at the bottom of the separator. Please see Figure 2 for a sketch of this angle installation. Install the upper channel to ensure the plates are secured in place.

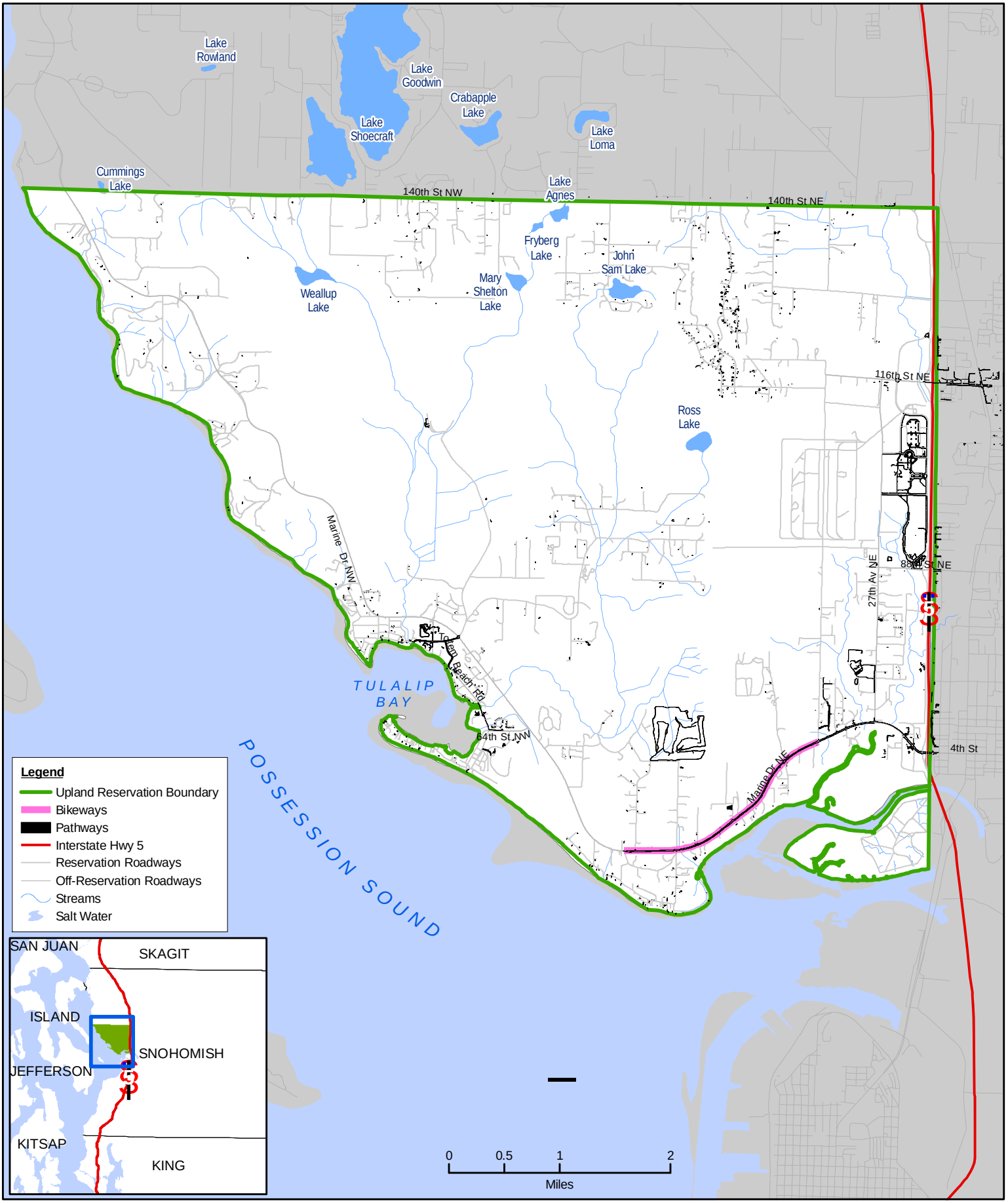
5) Secure hold down channel per Figure 2, ensuring it is snugly in place.

6) Check to see that no possibility of fluid by-passing can occur around the plates and the side wall of the tank as well as between plate pack assemblies since this could adversely affect the efficiency of the separator.

7) Re-start the separator as outlined in section 5. 1, Initial Start-Up.

APPENDIX E

Existing Non-Motorized Inventory



Appendix E Existing Pathways and Bikeways

Tulalip Data Services

Oct 17, 2008

Disclaimer:
Tulalip Data Services (TDS) provides this data "as is."
TDS does not make any guarantees or warranties concerning the accuracy of the information contained in the geographic data.
TDS assumes no liability or responsibility for errors or inaccuracies.

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Data Source:
Snohomish County Department of Planning and Development Services
Tulalip Tribes Community Development, Tulalip Data Services GIS

Map Path: M:\GISData\Maps\Projects\CompPlan\2008\10-17-08\7-4_Bikeway_10-17-08.mxd