

ANEJO Nº5 ESTUDIO DE TRÁFICO

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APÉNDICE DE CÁLCULO

1. INTRODUCCIÓN

El objeto de este documento es la realización del estudio de tráfico de las calles afectadas por la futura Estación de Intercambio Riberas de Loiola.

Las afecciones derivadas de la implantación del nuevo intercambiador se ciñen a un sector específico del Paseo de Zorroaga, comprendido entre la calle Toribio Alzaga y la calle Víctor Hugo.

Se repone en su totalidad el sector del Paseo de Zorroaga afectado por la nueva infraestructura respetando las dimensiones de su sección transversal actual así como sus diferentes espacios (aceras, aparcamientos y carriles bici). La reposición se realiza conforme al siguiente detalle, incluyendo mejoras en algunos casos:

- Se respetan los accesos a las calles aledañas (Ternuako y Pescadores Gran Sol) así como los espacios de aparcamiento actuales, aparcamientos en línea en la totalidad de la margen izquierda del Paseo de Zorroaga (sentido tráfico Rotonda de Loiola - Plaza del Padre Donostia).
- Se mantienen la totalidad de los carriles dedicados a la circulación vehicular;
 - Mejorando la situación actual al introducir un carril adicional en la margen derecha del Paseo de Zorroaga (sentido tráfico Plaza del Padre Donostia – Rotonda de Loiola) entre la calle Toribio Alzaga y la futura estación.
- Se repone en su totalidad el bidegorri bidireccional que discurre por la margen derecha del Paseo de Zorroaga;
 - Mejorando la situación actual al proyectar un bidegorri completamente segregado de los vehículos a motor. En la actualidad el carril bici discurre adosado a la vía.
- Se conservan en su totalidad los espacios destinados al peatón, reponiendo las aceras en la totalidad del tramo afectado en ambos sentidos.

El impacto de la nueva infraestructura en su entorno, desde el punto de vista del tráfico rodado, es mínimo. Esto se debe a que la demanda en el intercambiador procede en su gran mayoría (90%) de trasbordos entre las redes de Cercanías y Euskotren.

Adicionalmente, **la reposición del Paseo de Zorroaga inicialmente proyectada, mejorará en ciertos aspectos la situación del tráfico actual** tal y como se ha comentado con anterioridad.

No obstante, a continuación se evalúa el funcionamiento del tráfico en el Paseo de Zorroaga en el entorno de la futura Estación de Intercambio Riberas de Loiola para **diferentes horizontes temporales** de proyecto (años 2025, 2035, 2040, 2045, 2050 y 2055) conforme a lo prescrito en el **Manual de Capacidad de Carreteras de 2010 – Highway Capacity Manual 2010 (HCM 2010).**

2. ÁREA DE ESTUDIO Y SITUACIÓN ACTUAL

2.1. ÁREA DE ESTUDIO

Tal y como se ha mencionado anteriormente, las afecciones derivadas de la implantación del nuevo intercambiador se ciñen a un sector específico del Paseo de Zorroaga, comprendido entre la calle Toribio Alzaga y la calle Víctor Hugo.



Área de estudio: Paseo de Zorroaga entre las calles Toribio Alzaga y Víctor Hugo

2.2. SITUACIÓN ACTUAL

2.2.1. SECCIÓN TRANSVERSAL

La situación actual de la **margen derecha del Paseo de Zorroaga** (sentido tráfico Plaza del Padre Donostia – Rotonda de Loiola) tiene dos zonas claramente diferenciadas:

- **Zona 1:** Entre la calle Toribio Alzaga y la estructura de cruce con las vías ADIF, en dónde el paseo dispone de **un carril para tráfico rodado** con un **bidegorri bidireccional adosado**.
- **Zona 2:** Entre la estructura de cruce con las vías ADIF y la calle Víctor Hugo, en dónde el paseo dispone de **dos carriles para tráfico rodado** con un **bidegorri bidireccional segregado**.



Paseo de Zorroaga entre las calles Toribio Alzaga y cruce con las vías ADIF



Sección tipo Paseo de Zorroaga entre las calles Toribio Alzaga y cruce con las vías ADIF – Zona 1
(vista en sentido Plaza Padre Donostia a Rotonda de Loiola)



Sección tipo Paseo de Zorroaga entre la estructura de cruce con las vías ADIF y la calle Víctor Hugo – Zona 2

(vista en sentido Plaza Padre Donostia a Rotonda de Loiola)



Paseo de Zorroaga entre la estructura de cruce con las vías ADIF y la calle Víctor Hugo

Por su parte, la configuración actual de la **margen izquierda del Paseo de Zorroaga** (sentido tráfico Rotonda de Loiola – Plaza del Padre Donostia) queda definida por un **carril para tráfico rodado y zona de aparcamiento adyacente**. La zona de aparcamiento corresponde con la tipología en línea o paralelo en la práctica totalidad del tramo. No obstante, se ha identificado una zona con aparcamiento en batería de alrededor de 70 metros en las proximidades de la intersección con la calle Toribio Alzaga.

Ambas márgenes cuentan con una **plataforma aproximada de 5,40 metros de anchura**. En el caso de la **margen izquierda** (sentido tráfico Rotonda de Loiola – Plaza del Padre Donostia), el espacio dedicado al **aparcamiento en línea se sitúa en torno a 1,70 metros**, arrojando un **carril de circulación de anchura aproximada de 3,70 metros** (1,70 + 3,70). Para la **margen derecha** del Paseo de Zorroaga (sentido tráfico Plaza del Padre Donostia – Rotonda de Loiola):

- **Zona 1:** Entre la calle Toribio Alzaga y la estructura de cruce con las vías ADIF:
 - **Carril de circulación de 3,40 metros de anchura con un bidegorri bidireccional adosado de 2,00 metros aproximadamente** (3,40 + 2,00).
- **Zona 2:** Entre la estructura de cruce con las vías ADIF y la calle Víctor Hugo:
 - **Dos carriles para tráfico rodado de 2,70 metros cada uno** (2,70 + 2,70).

Entre el borde de la calzada y los bordillos, tanto del lado de las aceras como de la mediana, se disponen caces de bordillo de anchura no superior a 0,30 metros.

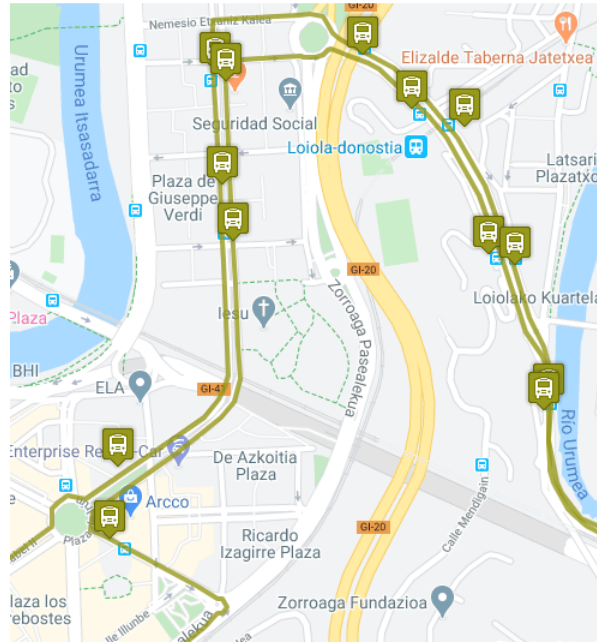
A lo largo de todo el sector se dispone una **mediana de 1,50 metros de anchura aprox.** que separa ambas márgenes.

2.2.2. LÍNEAS DE AUTOBÚS

El tramo del Paseo de Zorroaga objeto de estudio no forma parte de ningún itinerario de autobús (d-bus) de las distintas líneas que operan en el área metropolitana de Donostia. Se listan a continuación las líneas que operan en las proximidades del tramo. Se incluye también itinerario y paradas en las proximidades del tramo de estudio:

– **Líneas Zona Centro:**

- Línea 26: Amara-Martutene



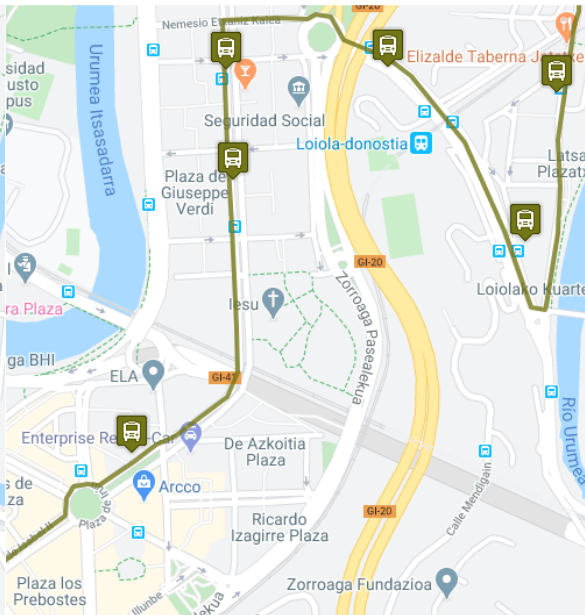
Línea 26: Amara-Martutene

– **Líneas Interzonales:**

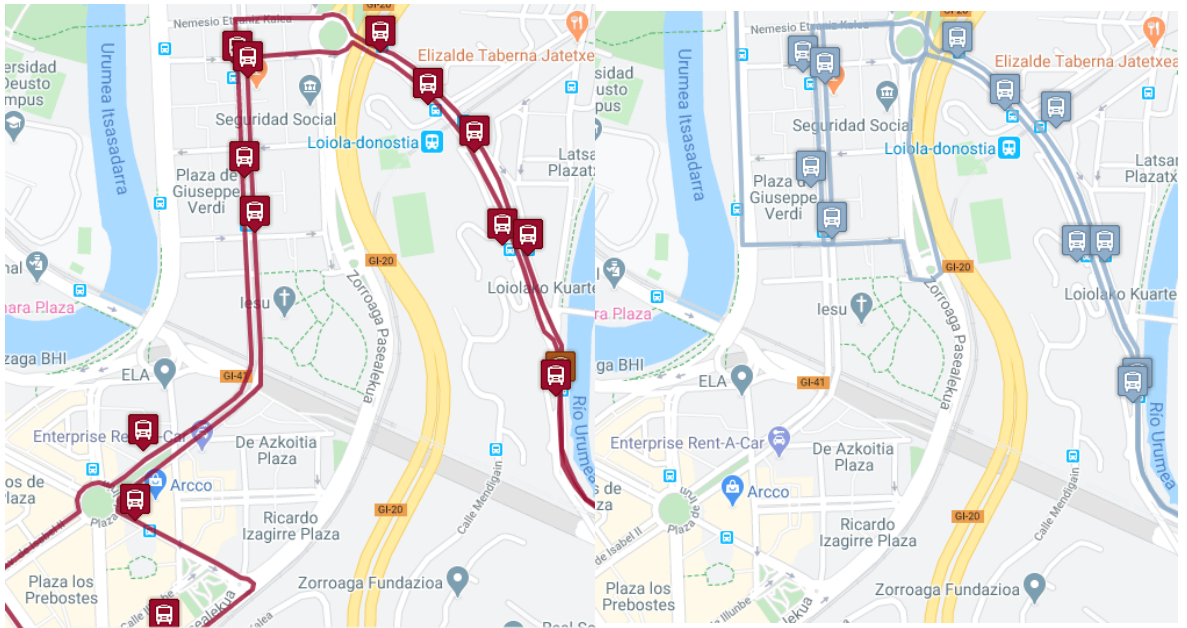
- Línea 24: Altza–Gros–Antiguo-Intxaurreondo
- Línea 27: Altza–Intxaurreondo–Antiguo-Gros
- Línea 31: Intxaurreondo–Ospitaleak-Altza
- Línea 41: Gros–Egia-Martutene



Línea 24: Altza–Gros–Antiguo-Intxaurreondo



Línea 27: Altza–Intxaurreondo–Antiguo-Gros

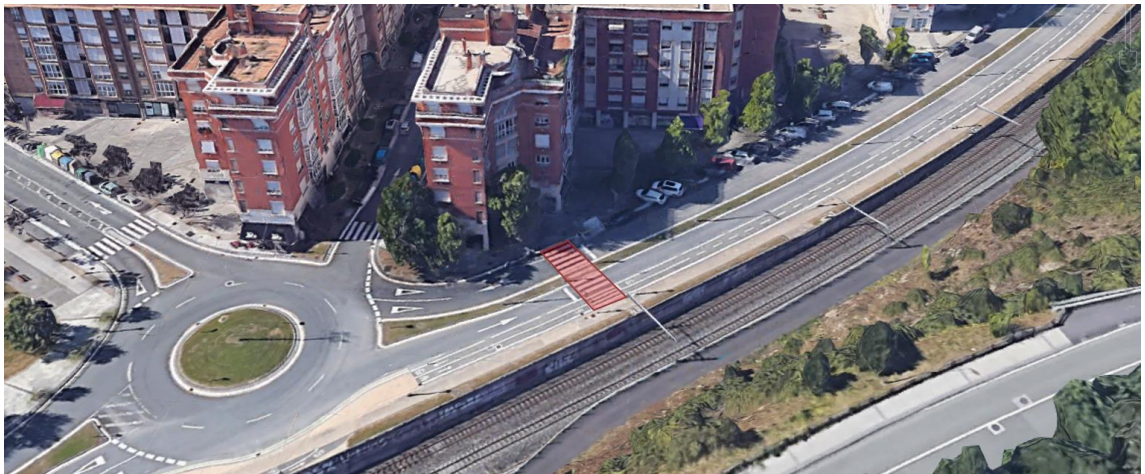


Línea 31: Intxaurreondo–Ospitaleak-Altza

Línea 41: Gros–Egia-Martutene

2.2.3. PASOS DE PEATONES

El único paso de peatones del Paseo de Zorroaga en el área de estudio se localiza en las proximidades de la intersección con la calle Toribio Alzaga.



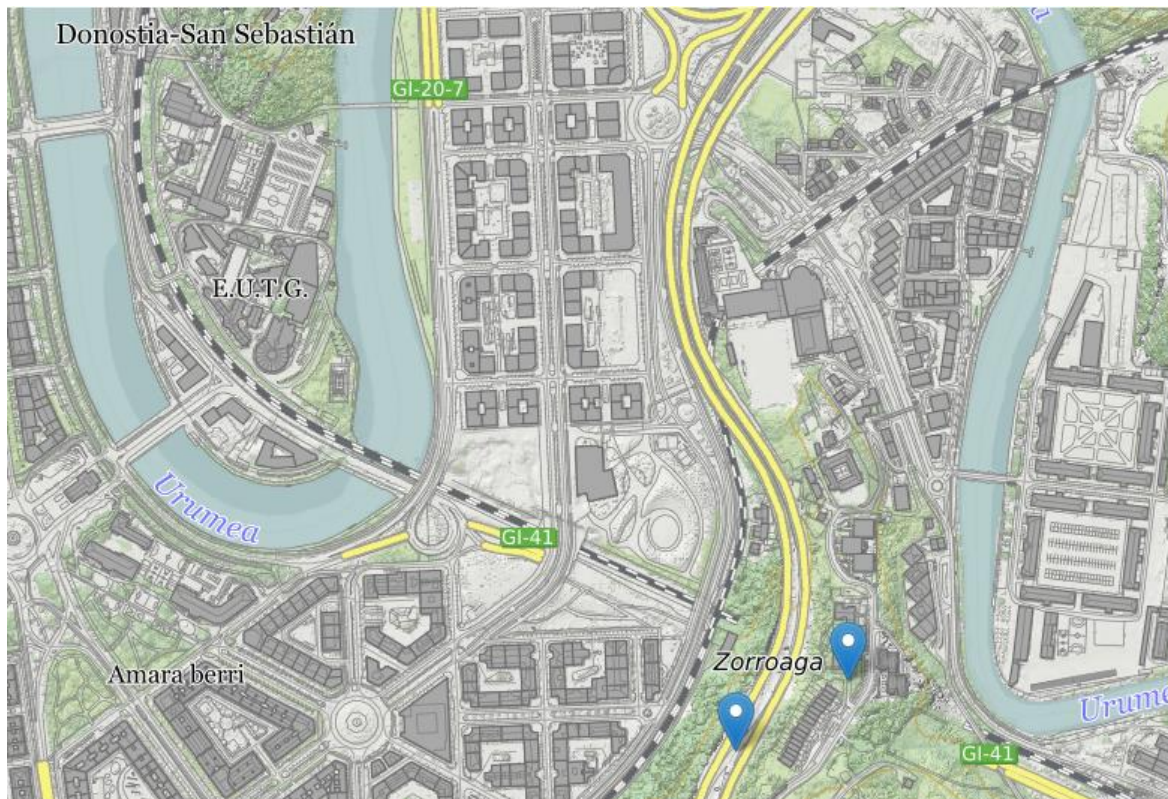
Paso de peatones en las proximidades de la intersección con la calle Toribio Alzaga.

3. TRÁFICO

Para caracterizar el tráfico en el tramo del Paseo de Zorroaga afectado por la futura Estación de Intercambio Riberas de Loiola se cuenta con los siguientes datos:

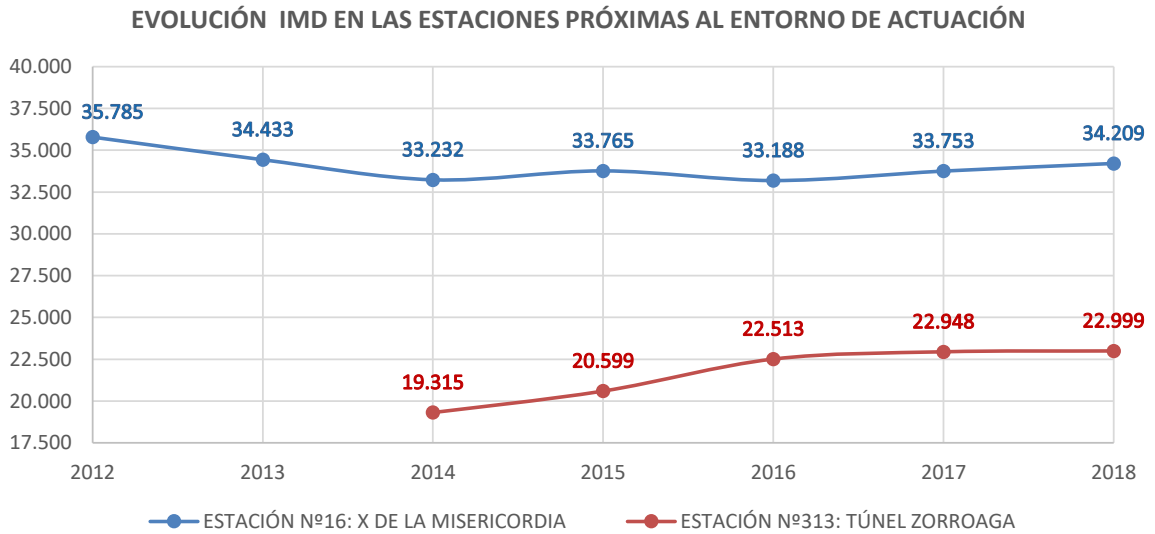
- **Diputación Foral de Gipuzkoa:**
 - **Información de aforos en las carreteras de Gipuzkoa**
 - Estación Nº 16: X de la Misericordia
 - Estación Nº 313: Túnel de Zorroaga
- **Estudios de tráfico con datos de aforo disponibles en el Paseo de Zorroaga:**
 - **Remodelación del acceso a Amara por Carlos I.** Estudio de tráfico (2012).
 - **Aforos automáticos** de las **espiras** dispuestas por el Ayuntamiento de Donostia
 - **Conteos manuales puntuales** llevados a cabo por el propio Ayuntamiento de Donostia en el ámbito de estudio
 - **Estudio de tráfico del entorno de la Estación de Autobuses de Riberas de Loiola.** Donostia – San Sebastián (2012)
 - **Intensidades de hora punta** (08.00 – 09.00 horas) obtenidas a partir de la campaña de **aforos**.

En la siguiente figura se refleja la **ubicación de las estaciones de aforo** arriba referidas:

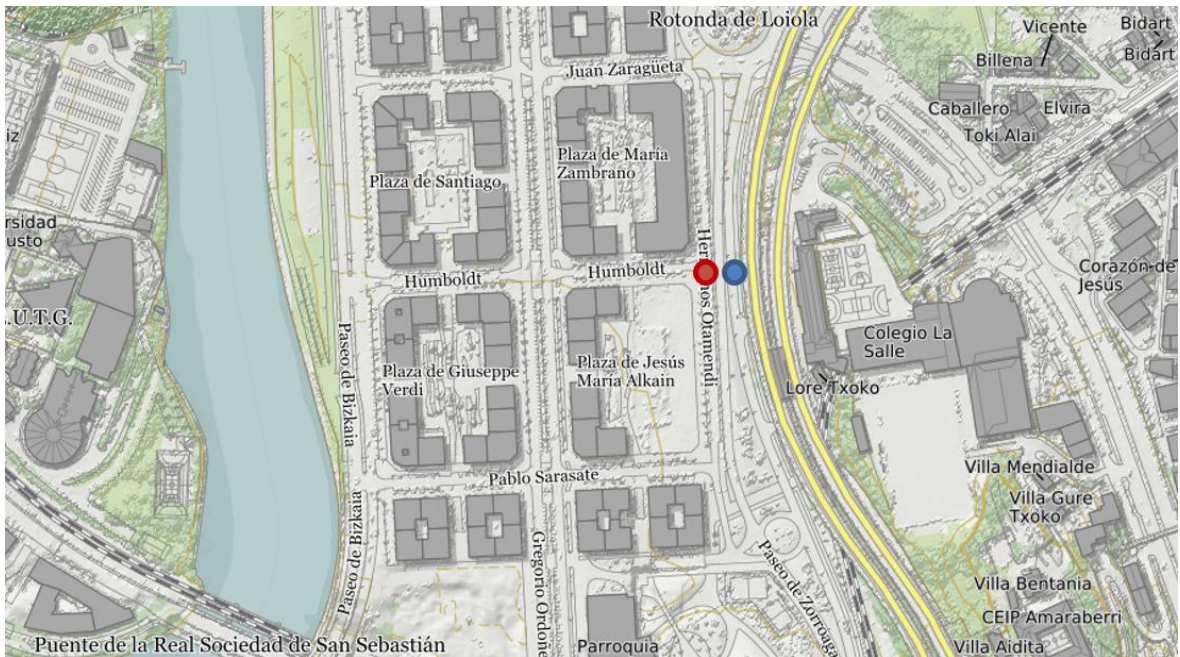


A la izquierda, Estación Nº 16: X de la Misericordia. A la derecha, Estación Nº 313: Túnel de Zorroaga

El siguiente gráfico recoge la evolución del tráfico en dichas estaciones, en el periodo 2012-2018:



La siguiente imagen ubica los **puntos de los aforos realizados en el Paseo de Zorroaga** incluidos en los estudios disponibles anteriormente citados:



En rojo, aforo en Paseo de Zorroaga - Entrada. En azul, aforo en Paseo de Zorroaga - Salida

Las intensidades horarias registradas en el año 2012 para el tráfico de hora punta (08.00 – 09.00 horas) en estos puntos del Paseo de Zorroaga fueron:

Ubicación	I (veh/h)	I (veh/h)	I (veh/h)
	08:00 – 08:30	08:30 – 09:00	08:00 – 09:00
Paseo de Zorroaga - Entrada	328	263	591
Paseo de Zorroaga - Salida	373	371	744

4. ESTIMACIÓN Y PROGNÓISIS DE TRÁFICO

Los escenarios temporales modelizados son los siguientes:

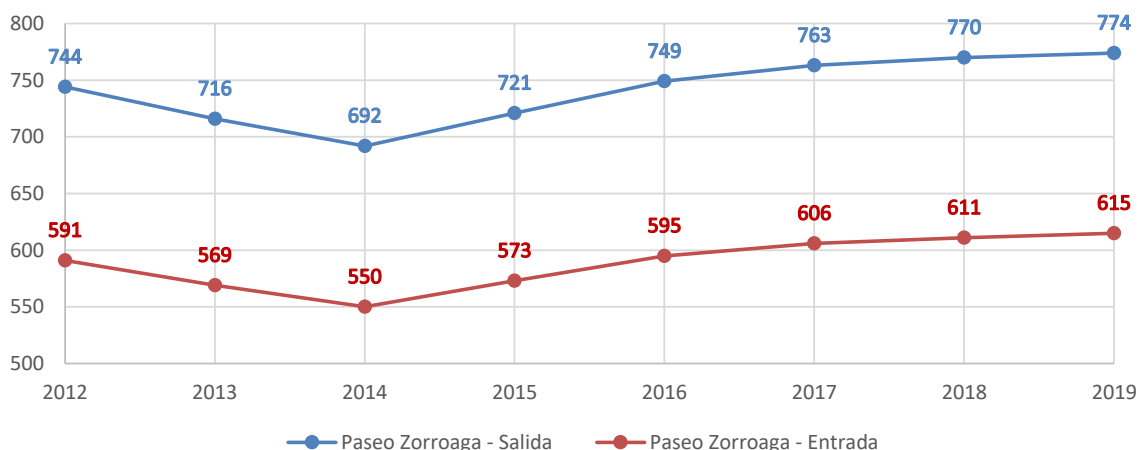
- El año 2025, como fecha prevista de entrada en servicio del futuro intercambiador de Riberas de Loiola.
- El año 2035 para valorar el funcionamiento de la infraestructura.

A partir de estos años modelizados, se ha generado una serie de 30 años (2025-2055).

4.1. PASEO DE ZORROAGA

Los tráficos aforados en el Paseo de Zorroaga en el año 2012 se actualizaron al año 2019 a partir de los datos de crecimiento medio registrados en las estaciones N° 16: X de la Misericordia y N° 313: Túnel de Zorroaga, obteniendo los siguientes resultados:

EVOLUCIÓN INTENSIDADES DE TRÁFICO EN EL PASEO DE ZORROAGA
PERIODO 2012-2019



Tal y como se ha citado anteriormente, del **análisis de demanda** se deduce que **el tráfico inducido** por la futura Estación de Intercambio Riberas de Loiola **es muy bajo**, por tanto, **no se ha tenido en cuenta a la hora de realizar la prognosis de tráfico**.

Los **crecimientos de tráfico** considerados están en consonancia con lo prescrito en la **Orden FOM/3317/2010**, de 17 de diciembre, por la que se aprueba la *Instrucción sobre las medidas específicas para la mejora de la eficiencia en la ejecución de las obras públicas de infraestructuras ferroviarias, carreteras y aeropuertos del Ministerio de Fomento*.

– Incrementos de tráfico a utilizar en estudios:

- Periodo 2017 en adelante: Incremento anual acumulativo del 1,44%

En la tabla adjunta se refleja la **evolución del tráfico** en el Paseo de Zorroaga bajo estas hipótesis:

Año	Intensidad salida (veh/h)	Intensidad entrada (veh/h)
2019	774	615
2020	785	624
2021	796	633

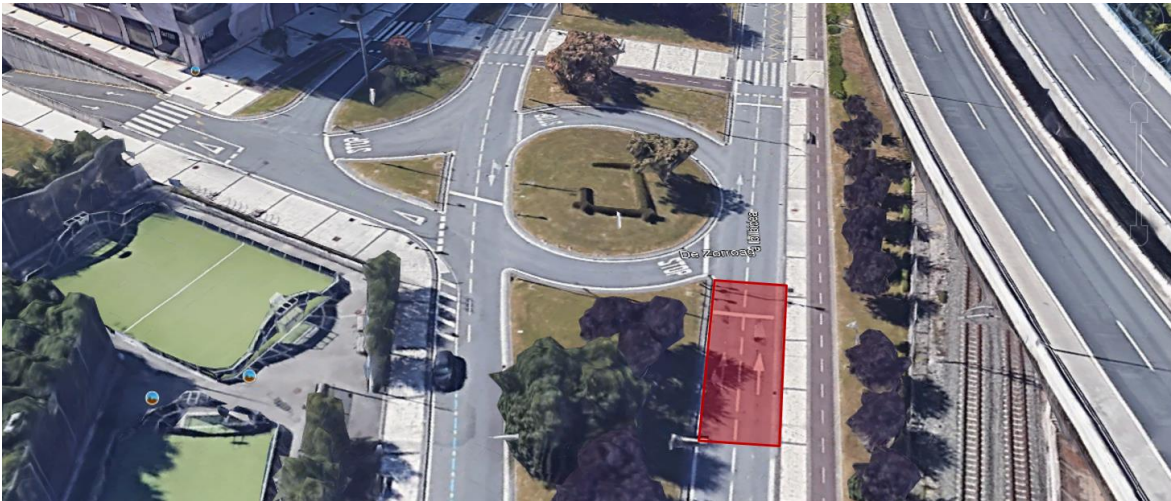
Año	Intensidad salida (veh/h)	Intensidad entrada (veh/h)
2022	807	642
2023	819	651
2024	831	660
2025	843	670
2026	855	680
2027	867	690
2028	879	700
2029	892	710
2030	905	720
2031	918	730
2032	931	741
2033	944	752
2034	958	763
2035	972	774
2036	986	785
2037	1.000	796
2038	1.014	807
2039	1.029	819
2040	1.044	831
2041	1.059	843
2042	1.074	855
2043	1.089	867
2044	1.105	879
2045	1.121	892
2046	1.137	905
2047	1.153	918
2048	1.170	931
2049	1.187	944
2050	1.204	958
2051	1.221	972
2052	1.239	986
2053	1.257	1.000
2054	1.275	1.014
2055	1.293	1.029

4.2. INTERSECCIONES

Para evaluar el funcionamiento del tráfico en el tramo del Paseo de Zorroaga afectado por la futura Estación de Intercambio Riberas de Loiola es necesario determinar previamente el **comportamiento de las intersecciones que limitan, en los extremos, el segmento urbano** estudiado

El comportamiento del tráfico de cada una de las márgenes (calzadas) queda condicionado por el **tipo de intersección que limita la calzada “aguas abajo”** (*downstream intersection*).

El funcionamiento de la **margen derecha del Paseo de Zorroaga** (sentido tráfico Plaza del Padre Donostia – Rotonda de Loiola) queda condicionado por una **intersección semaforizada** (*signalized intersection*).



Intersección semaforizada aguas abajo de la margen derecha del Paseo de Zorroaga

Por su parte, el funcionamiento de la **margen izquierda del Paseo de Zorroaga** (sentido tráfico Rotonda de Loiola – Plaza del Padre Donostia) queda condicionado por una **glorieta** (*roundabout*) donde **convergen** el propio **Paseo de Zorroaga**, la calle **Toribio Alzaga** y calle de la **Real Compañía Guipuzcoana de Caracas**.



Glorieta aguas abajo de la margen izquierda del Paseo de Zorroaga

Para determinar la **matriz Origen-Destino de los movimientos en la glorieta** se ha recurrido a los **modelos** desarrollados en el estudio "**Remodelación del acceso a Amara por Carlos I. Estudio de tráfico (2012)**".

A partir de los datos de tráfico recogidos en los **aforos del estudio** de la remodelación del acceso a Amara por Carlos I se realiza la **matriz de viajes** de una **glorieta de cuatro (4) patas** conforme al siguiente detalle:

- Pata Norte (*North leg*): Calle Compañía Guipuzcoana de Caracas
- Pata Este (*East leg*): Paseo de Zorroaga – Tramo de estudio
- Pata Sur (*South leg*): Paseo de Zorroaga – Sur
- Pata Oeste (*West leg*): Calle Toribio Alzaga

Matriz de Viajes Glorieta Año 2012

	North Leg	East Leg	South Leg	West Leg	
North Leg	0	0	0	0	0
East Leg	35	0	451	105	591
South Leg	46	575	14	135	770
West Leg	43	169	169	2	383
	124	744	634	242	

La **actualización de los tráficos** al año 2019 y crecimientos considerados para realizar la **prognosis** siguen los **mismos criterios descritos en el capítulo anterior**:

- Actualización al año 2019 a partir de los datos de crecimiento medio registrados en las estaciones N° 16 y N° 313.
- Inducción de tráfico despreciable.
- Incremento de tráfico anual acumulativo del 1,44%

Se presentan a continuación las matrices de viaje en la glorieta para los años más representativos del estudio:

Matriz de Viajes Glorieta Año 2019

	North Leg	East Leg	South Leg	West Leg	
North Leg	0	0	0	0	0
East Leg	37	0	469	109	615
South Leg	48	598	15	141	802
West Leg	45	176	176	3	400
	130	774	660	253	

Matriz de Viajes Glorieta Año 2025

	North Leg	East Leg	South Leg	West Leg	
North Leg	0	0	0	0	0
East Leg	40	0	511	119	670
South Leg	52	651	16	154	873
West Leg	49	192	192	3	436
	141	843	719	276	

Matriz de Viajes Glorieta Año 2030

	North Leg	East Leg	South Leg	West Leg	
North Leg	0	0	0	0	0
East Leg	43	0	549	128	720
South Leg	56	699	18	165	938
West Leg	53	206	206	4	469
	152	905	773	297	

Matriz de Viajes Glorieta Año 2035

	North Leg	East Leg	South Leg	West Leg	
North Leg	0	0	0	0	0
East Leg	47	0	590	137	774
South Leg	60	751	19	177	1.007
West Leg	57	221	221	4	503
	164	972	830	318	

Matriz de Viajes Glorieta Año 2040

	North Leg	East Leg	South Leg	West Leg	
North Leg	0	0	0	0	0
East Leg	50	0	633	148	831
South Leg	65	806	20	190	1.081
West Leg	61	238	238	4	541
	176	1.044	891	342	

Matriz de Viajes Glorieta Año 2045

	North Leg	East Leg	South Leg	West Leg	
North Leg	0	0	0	0	0
East Leg	54	0	680	158	892
South Leg	70	866	22	204	1.162
West Leg	65	255	255	4	579
	189	1.121	957	366	

Matriz de Viajes Glorieta Año 2055

	North Leg	East Leg	South Leg	West Leg	
North Leg	0	0	0	0	0
East Leg	62	0	785	182	1.029
South Leg	80	999	25	236	1.340
West Leg	75	294	294	5	668
	217	1.293	1.104	423	

5. NIVELES DE SERVICIO EN EL PASEO DE ZORROAGA

5.1. METODOLOGÍA

El cálculo del **nivel de servicio del segmento urbano** afectado por la futura Estación de Intercambio Riberas de Loiola se ha realizado conforme a lo prescrito en el **Manual de Capacidad de Carreteras de 2010 – Highway Capacity Manual 2010 (HCM 2010)**, concretamente, atendiendo a la metodología de cálculo desarrollada en los siguientes capítulos (*):

- Capítulo 17: Segmentos de calles urbanas (*Chapter 17: Urban Street Segments*).
- Capítulo 18: Intersecciones semaforizadas (*Chapter 18: Signalized Intersections*).
- Capítulo 21: Glorietas (*Chapter 21: Roundabouts*).
- Capítulo 31: Intersecciones semaforizadas - Suplemento (*Chapter 31: Signalized Intersections - Supplemental*).
- Capítulo 33: Glorietas - Suplemento (*Chapter 33: Roundabouts - Supplemental*).

(*) *Nótese que la numeración de los capítulos está referida a la versión americana del manual HCM 2010*

Se realiza **un análisis por separado de cada margen del Paseo de Zorroaga**. Cada una de las **márgenes está ligada a una intersección que la limita en el extremo “aguas abajo”**, glorieta para la margen izquierda e intersección semaforizada para la margen derecha, tal y como prescribe el **HCM 2010** para el **modo automóvil**:

“...separately specified for each direction of travel and for each boundary intersection.”

El análisis se realiza **respetando las dimensiones de la sección transversal actuales**, tanto del **Paseo de Zorroaga como de las intersecciones**, a excepción de la margen derecha del Paseo de Zorroaga (sentido tráfico Plaza del Padre Donostia – Rotonda de Loiola) entre la calle Toribio Alzaga y la futura estación, dónde se proyecta un carril circulatorio adicional.

Para determinar el **flujo de peatones en el entorno de la estación** se toma como referencia lo descrito en el estudio de demanda **“menos de un 10% de viajes que acceden al intercambiador andando desde el exterior”**.

Año	Cercanías	EuskoTren	Intercambiador	Acceso andando exterior estación
2.025	3.931	3.458	7.389	739
2.035	4.551	4.013	8.564	857

Viajeros subidos en el Intercambiador. Transporte público

Para cuantificar el impacto que tendría modificar el itinerario de las **rutas urbanas de autobús** que discurren por las proximidades del intercambiador de Riberas de Loiola con una **parada en la nueva infraestructura** se recurre a lo estimado en el estudio de demanda.

Los resultados obtenidos indican que **se reduce ligeramente la demanda de Euskotren**

ya que una parte de usuarios del entorno urbano de Donostia optaría por acceder al intercambiador en autobús para conectar con la red de Cercanías.

Año	Cercanías	EuskoTren	Intercambiador	Acceso Bus
2.025	3.942	3.130	7.072	317
2.035	4.366	3.816	8.182	382

Test de sensibilidad. Transporte público con implementación de nuevas paradas de autobús

En ausencia de datos disponibles, se han tomado los **valores por defecto** (*default values*) recomendados en los subcapítulos **3. Applications – Default Values** de los capítulos del manual HCM 2010 anteriormente señalados:

- Factor de Hora Punta (*Peak Hour Factor*): 0,92
- Tasa de saturación de tráfico base:
 - Para un área metropolitana con población superior a 250.000: 1.750 pc/h/ln
- Duración del ciclo semaforizado: 30 segundos por cada fase crítica
- Porcentaje de camiones y autobuses en el flujo vehicular: 3%

El **límite de velocidad** en el tramo se establece en **50 Km/h**.

5.2. CÁLCULO

El **nivel de servicio (Level of Service - LOS)** de un segmento urbano se calcula a partir de la **velocidad de recorrido ($S_{T,seg}$)** como **porcentaje de la velocidad libre (S_{f0})** así como del **ratio volumen - capacidad (v/c)** del movimiento pasante (*through movement*) en la intersección frontera (*boundary intersection*).

$S_{T,seg} / S_{f0}$	Nivel de Servicio (LOS) por v/c ratio	
	$v/c \leq 1$	$v/c > 1$
(%)		
> 85	A	F
> 67 - 85	B	F
> 50 - 67	C	F
> 40 – 50	D	F
> 30 – 40	E	F
≤ 30	F	F

Umbral del nivel de servicio (LOS) para el modo automóvil

Los siguientes párrafos caracterizan cada nivel de servicio:

- Nivel de servicio A (LOS A): Operación en flujo libre. Los vehículos no tienen obstáculo para maniobrar dentro del flujo de tráfico.
- Nivel de servicio B (LOS B): La capacidad de maniobra dentro del flujo de tráfico está ligeramente restringida. Los retrasos en la intersección frontera son insignificantes.

- Nivel de servicio C (LOS C): La capacidad de maniobra y cambio de carril en zonas centrales del segmento urbano están más restringidas que en el nivel de servicio B (LOS B). Comienzan a generarse colas en la intersección frontera que contribuyen a reducir la velocidad de recorrido.
- Nivel de servicio D (LOS D): Las condiciones del flujo de tráfico comienzan a ser inestables. Pequeños incrementos en la intensidad de tráfico derivan en incrementos sustanciales en los retrasos así como disminución de la velocidad de recorrido.
- Nivel de servicio E (LOS E): Operación inestable y retrasos significativos.
- Nivel de servicio F (LOS F): Velocidad de recorrido extremadamente baja. Congestión en la intersección frontera. Retrasos altos y largas colas.

Se ha computado el **nivel de servicio en ambos márgenes del segmento urbano** (modo automóvil) para los **diferentes horizontes temporales** de proyecto (años 2025, 2035, 2040, 2045, 2050 y 2055), obteniendo los siguientes resultados:

5.2.1. MARGEN DERECHA PASEO DE ZORROAGA

Margen derecha del Paseo de Zorroaga (sentido tráfico Plaza del Padre Donostia – Ronda de Loiola) ligada a **intersección semaforizada** (*signalized intersection*).

2025	Paseo - MD	$S_{T,seg}$	26,01 mi/h	41,86 Km/h
		S_{f0}	37,53 mi/h	60,40 Km/h
		$S_{T,seg} / S_{f0}$	69,30%	
		v / c	0,54	
		LOS	B	
		Maniobrabilidad ligeramente restringida		
	Intersección	v / c	0,64	
Estatus Intersección (relación con capacidad)		Operación por debajo de la capacidad Retrasos bajos a moderados		

2035	Paseo - MD	$S_{T,seg}$	25,34 mi/h	40,79 Km/h
		S_{f0}	37,53 mi/h	60,40 Km/h
		$S_{T,seg} / S_{f0}$	67,53%	
		v / c	0,62	
		LOS	B	
		Maniobrabilidad ligeramente restringida		
	Intersección	v / c	0,74	
Estatus Intersección (relación con capacidad)		Operación por debajo de la capacidad Retrasos bajos a moderados		

2040	Paseo - MD	$S_{T,seg}$	24,92 mi/h	40,11 Km/h
		S_{f0}	37,53 mi/h	60,40 Km/h
		$S_{T,seg} / S_{f0}$	66,40%	
		v / c	0,67	
		LOS	B	
	Maniobrabilidad ligeramente restringida			
	Intersección	v / c	0,79	
		Estatus Intersección (relación con capacidad)	Operación por debajo de la capacidad	
			Retrasos bajos a moderados	

2045	Paseo - MD	$S_{T,seg}$	24,42 mi/h	39,29 Km/h
		S_{f0}	37,53 mi/h	60,40 Km/h
		$S_{T,seg} / S_{f0}$	65,05%	
		v / c	0,72	
		LOS	C	
	Maniobrabilidad y cambios de carril en sectores medios del segmento urbano más restringidos			
	Intersección	v / c	0,85	
		Estatus Intersección (relación con capacidad)	Operación por debajo de la capacidad	
			Retrasos bajos a moderados	

2055	Paseo - MD	$S_{T,seg}$	22,91 mi/h	36,86 Km/h
		S_{f0}	37,53 mi/h	60,40 Km/h
		$S_{T,seg} / S_{f0}$	61,03%	
		v / c	0,83	
		LOS	C	
	Maniobrabilidad y cambios de carril en sectores medios del segmento urbano más restringidos			
	Intersección	v / c	0,98	
		Estatus Intersección (relación con capacidad)	Operación próxima a capacidad	
			Retrasos moderados a altos	

5.2.2. MARGEN IZQUIERDA PASEO DE ZORROAGA

Margen izquierda del Paseo de Zorroaga (sentido tráfico Rotonda de Loiola – Plaza del Padre Donostia) ligada a **glorieta** (*roundabout*).

2025	Paseo - MI	$S_{T,seg}$	26,58 mi/h	42,78 Km/h
		S_{f0}	37,28 mi/h	60,00 Km/h
		$S_{T,seg} / S_{f0}$	71,29%	
		v / c	0,44	
		LOS	B	
		Maniobrabilidad ligeramente restringida		
	Intersección	$d_{intersección}$	3,82 s/veh	
	LOS	A		

2035	Paseo - MI	$S_{T,seg}$	25,06 mi/h	40,32 Km/h
		S_{f0}	37,28 mi/h	60,00 Km/h
		$S_{T,seg} / S_{f0}$	67,21%	
		v / c	0,52	
		LOS	B	
		Maniobrabilidad ligeramente restringida		
	Intersección	$d_{intersección}$	6,11 s/veh	
	LOS	A		

2040	Paseo - MI	$S_{T,seg}$	24,11 mi/h	38,80 Km/h
		S_{f0}	37,28 mi/h	60,00 Km/h
		$S_{T,seg} / S_{f0}$	64,66%	
		v / c	0,57	
		LOS	C	
		Maniobrabilidad y cambios de carril en sectores medios del segmento urbano más restringidos		
	Intersección	$d_{intersección}$	8,69 s/veh	
	LOS	A		

2045	Paseo - MI	S_{T,seg}	22,96 mi/h	36,94 Km/h
		S_{f0}	37,28 mi/h	60,00 Km/h
		S_{T,seg} / S_{f0}	61,57%	
		v / c	0,63	
		LOS	C	
	Maniobrabilidad y cambios de carril en sectores medios del segmento urbano más restringidos			
	Intersección	d intersección	13,48 s/veh	
LOS		B		

2055	Paseo - MI	S_{T,seg}	19,68 mi/h	31,67 Km/h
		S_{f0}	37,28 mi/h	60,00 Km/h
		S_{T,seg} / S_{f0}	52,79%	
		v / c	0,76	
		LOS	C	
	Maniobrabilidad y cambios de carril en sectores medios del segmento urbano más restringidos			
	Intersección	d intersección	32,68 s/veh	
LOS		D		

6. CONCLUSIONES

Se repone en su totalidad el sector del Paseo de Zorroaga afectado por la nueva infraestructura respetando las dimensiones de su sección transversal actual así como sus diferentes espacios (aceras, aparcamientos y carriles bici).

Adicionalmente, cabe destacar que, **la reposición del Paseo de Zorroaga inicialmente proyectada, mejorará en ciertos aspectos la situación del tráfico actual:**

- Introduce un carril adicional en la margen derecha del Paseo de Zorroaga (sentido tráfico Plaza del Padre Donostia – Rotonda de Loiola) entre la calle Toribio Alzaga y la futura estación.
- Se repone en el bidegorri bidireccional que discurre por la margen derecha del Paseo de Zorroaga completamente segregado del tráfico. En la actualidad el carril bici discurre adosado a la vía.

El impacto de la nueva infraestructura en su entorno, desde el punto de vista del tráfico rodado, es bajo.

- Tráfico inducido despreciable. El trasvase de transporte privado a transporte público, en todo el ámbito de estudio se estima entorno al 5%.
- Menos del 10% de viajes que acceden al intercambiador se realizará andando desde el exterior.
- El impacto que tendría la ubicación de una parada de autobús en las proximidades de la estación reduciría ligeramente la demanda de Euskotren. Se estima que en el año 2035 el volumen de usuarios que accedería vía bus sería inferior a 400 (impacto mínimo).

La demanda en el intercambiador procede en su gran mayoría (90%) de trasbordos entre las redes de Cercanías y Euskotren.

Los **niveles de servicio (LOS)** obtenidos a lo largo del periodo de estudio son **óptimos en ambas márgenes del Paseo de Zorroaga.**

En el **2035**, año fijado para valorar el funcionamiento de la infraestructura, **ambas márgenes del Paseo de Zorroaga operan con un LOS B**, es decir, la **capacidad de maniobra** dentro del flujo de tráfico está **ligeramente restringida** y los **retrasos en la intersección frontera son insignificantes.**

En el año 2055, fin de la serie de análisis, **ambas márgenes del Paseo de Zorroaga registran un LOS C**, la **capacidad de maniobra y cambio de carril en zonas centrales del segmento urbano están más restringidas** que en el LOS B y **comienzan a generarse colas en la intersección frontera** que contribuyen a reducir la velocidad de recorrido.

APÉNDICE DE CÁLCULO

1.1. PASEO DE ZORROAGA - MARGEN DERECHA

URBAN STREET SEGMENT: PASEO DE ZORROAGA - MARGEN DERECHA**Year of analysis: 2025****STEP 1: DETERMINE TRAFFIC DEMAND ADJUSTMENTS**

Capacity Constraint	CHECK
Volume Balance	CHECK
Origin-Destination Distribution	CHECK
Spillback Occurrence	CHECK

STEP 2: DETERMINE RUNNING TIME**A. DETERMINE FREE-FLOW SPEED**

Speed Limit S_{pl}	mi/h	31,07	50,00	Km/h
Speed Constant S_0	mi/h	40,20		
Segment length - Direction 1 l_1	mi	0,340	542,00	m
Segment length - Direction 2 l_2	mi	0,350	560,00	m
Segment length L	mi	0,345	ft	1.821,60
Proportion of link length with restrictive median p_{rm}	decimal	1,00		
Proportion of segment with curb (right hand side) p_{curb}	decimal	1,00		
Adjustment for cross section f_{cs}	mi/h	-	2,67	
Access Points	U	-		
Access Density D_a	points /mi	-		
Adjustment for access points f_A	mi/h	-		
Base free-flow speed S_{f0}	mi/h	37,53	60,40	Km/h
Distance between adjacent signalized intersections L_s	ft	1.821,60		
Signal spacing adjustment factor f_l	-	0,97		
Free-Flow Speed S_f	mi/h	36,54	58,80	Km/h

B. COMPUTE ADJUSTMENT FOR VEHICLE PROXIMITY

Midsegment demand flow rate v_m	veh/h	843,00		
Number of through lanes on the segment in the subject direction N_{th}	ln	2,00		
Proximity adjustment factor f_v	-	1,03		

C. COMPUTE DELAY DUE TO TURNING VEHICLES

Midsegment volume	veh/h/ln	421,50		
Trough vehicle delay	s/veh/pt	0,16		
Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	-		

D. COMPUTE DELAY DUE TO OTHER SOURCES

delay due to other sources along the segment d_{other}	s/veh	-		
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E. COMPUTE SEGMENT RUNNING TIME

Start-up lost time l_1	s	2,00		
Control-type adjustment factor f_x	-	1,00		
Segment length L	ft	1.821,60		
Free-Flow Speed S_f	mi/h	36,54		
Proximity adjustment factor f_v	-	1,03		
Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	-		
delay due to other sources along the segment d_{other}	s/veh	-		
Segment Running Time t_R	s	35,75		

STEP 5: DETERMINE THROUGH DELAY

Control delay	s/veh	12,00		
Geometric delay	s/veh	-		
Through delay d_t	s/veh	12,00		

STEP 6: DETERMINE THROUGH STOP RATE

Volume-to-capacity ratio v/c	-	0,54		
Trough stop rate (if YIELD controlled) h	stops/veh	-		
Trough stop rate (if signalized) h	stops/veh	1,08		

STEP 7: DETERMINE TRAVEL SPEED

Segment length L	ft	1.821,60		
Segment Running Time t_R	s	35,75		
Through delay d_t	s/veh	12,00		
Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	26,01	41,86	km/h

STEP 8: DETERMINE SPATIAL STOP RATE

Segment length L	ft	1.821,60		
Trough stop rate h	stops/veh	1,08		
Full stop rate due to other sources h_{other}	stops/veh	-		
Spatial stop rate for the segment H_{seg}	stops/mi	3,13		

STEP 9: DETERMINE LEVEL OF SERVICE

Volume-to-capacity ratio v/c	-	0,54		
Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	26,01	41,86	Km/h
Base free-flow speed S_{f0}	mi/h	37,53	60,40	Km/h
$S_{T,seg} / S_{f0}$	%	69,30%		
LEVEL OF SERVICE	LOS		B	

URBAN STREET SEGMENT: PASEO DE ZORROAGA - MARGEN DERECHA**Year of analysis: 2035****STEP 1: DETERMINE TRAFFIC DEMAND ADJUSTMENTS**

Capacity Constraint	CHECK
Volume Balance	CHECK
Origin-Destination Distribution	CHECK
Spillback Occurrence	CHECK

STEP 2: DETERMINE RUNNING TIME**A. DETERMINE FREE-FLOW SPEED**

Speed Limit S_{pl}	mi/h	31,07	50,00	Km/h
Speed Constant S_0	mi/h	40,20		
Segment length - Direction 1 l_1	mi	0,340	542,00	m
Segment length - Direction 2 l_2	mi	0,350	560,00	m
Segment length L	mi	0,345	ft	1.821,60
Proportion of link length with restrictive median p_{rm}	decimal	1,00		
Proportion of segment with curb (right hand side) p_{curb}	decimal	1,00		
Adjustment for cross section f_{cs}	mi/h	-	2,67	
Access Points	U	-		
Access Density D_a	points /mi	-		
Adjustment for access points f_A	mi/h	-		
Base free-flow speed S_{f0}	mi/h	37,53	60,40	Km/h
Distance between adjacent signalized intersections L_s	ft	1.821,60		
Signal spacing adjustment factor f_l	-	0,97		
Free-Flow Speed S_f	mi/h	36,54	58,80	Km/h

B. COMPUTE ADJUSTMENT FOR VEHICLE PROXIMITY

Midsegment demand flow rate v_m	veh/h	972,00
Number of through lanes on the segment in the subject direction N_{th}	ln	2,00
Proximity adjustment factor f_v	-	1,03

C. COMPUTE DELAY DUE TO TURNING VEHICLES

Midsegment volume	veh/h/ln	486,00
Trough vehicle delay	s/veh/pt	0,23
Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	-

D. COMPUTE DELAY DUE TO OTHER SOURCES

delay due to other sources along the segment d_{other}	s/veh	-
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E. COMPUTE SEGMENT RUNNING TIME

Start-up lost time l_1	s	2,00
Control-type adjustment factor f_x	-	1,00
Segment length L	ft	1.821,60
Free-Flow Speed S_f	mi/h	36,54
Proximity adjustment factor f_v	-	1,03
Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	-
delay due to other sources along the segment d_{other}	s/veh	-
Segment Running Time t_R	s	35,91

STEP 5: DETERMINE THROUGH DELAY

Control delay	s/veh	13,10
Geometric delay	s/veh	-
Through delay d_t	s/veh	13,10

STEP 6: DETERMINE THROUGH STOP RATE

Volume-to-capacity ratio v/c	-	0,62
Trough stop rate (if YIELD controlled) h	stops/veh	-
Trough stop rate (if signalized) h	stops/veh	1,25

STEP 7: DETERMINE TRAVEL SPEED

Segment length L	ft	1.821,60		
Segment Running Time t_R	s	35,91		
Through delay d_t	s/veh	13,10		
Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	25,34	40,79	km/h

STEP 8: DETERMINE SPATIAL STOP RATE

Segment length L	ft	1.821,60
Trough stop rate h	stops/veh	1,25
Full stop rate due to other sources h_{other}	stops/veh	-
Spatial stop rate for the segment H_{seg}	stops/mi	3,62

STEP 9: DETERMINE LEVEL OF SERVICE

Volume-to-capacity ratio v/c	-	0,62		
Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	25,34	40,79	Km/h
Base free-flow speed S_{f0}	mi/h	37,53	60,40	Km/h
$S_{T,seg} / S_{f0}$	%	67,53%		
LEVEL OF SERVICE	LOS	B		

URBAN STREET SEGMENT:		PASEO DE ZORROAGA - MARGEN DERECHA			
Year of analysis:		2040			
STEP 1:		DETERMINE TRAFFIC DEMAND ADJUSTMENTS			
	Capacity Constraint	CHECK			
	Volume Balance	CHECK			
	Origin-Destination Distribution	CHECK			
	Spillback Occurrence	CHECK			
STEP 2:		DETERMINE RUNNING TIME			
A. DETERMINE FREE-FLOW SPEED					
	Speed Limit S_{pl}	mi/h	31,07	50,00	Km/h
	Speed Constant S_0	mi/h	40,20		
	Segment length - Direction 1 l_1	mi	0,340	542,00	m
	Segment length - Direction 2 l_2	mi	0,350	560,00	m
	Segment length L	mi	0,345	ft	1.821,60
	Proportion of link length with restrictive median p_{rm}	decimal	1,00		
	Proportion of segment with curb (right hand side) p_{curb}	decimal	1,00		
	Adjustment for cross section f_{cs}	mi/h	-	2,67	
	Access Points	U	-		
	Access Density D_a	points /mi	-		
	Adjustment for access points f_A	mi/h	-		
	Base free-flow speed S_{f0}	mi/h	37,53	60,40	Km/h
	Distance between adjacent signalized intersections L_s	ft	1.821,60		
	Signal spacing adjustment factor f_l	-	0,97		
	Free-Flow Speed S_f	mi/h	36,54	58,80	Km/h
B. COMPUTE ADJUSTMENT FOR VEHICLE PROXIMITY					
	Midsegment demand flow rate v_m	veh/h	1.044,00		
	Number of through lanes on the segment in the subject direction N_{th}	ln	2,00		
	Proximity adjustment factor f_v	-	1,03		
C. COMPUTE DELAY DUE TO TURNING VEHICLES					
	Midsegment volume	veh/h/ln	522,00		
	Trough vehicle delay	s/veh/pt	0,28		
	Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	-		
D. COMPUTE DELAY DUE TO OTHER SOURCES					
	delay due to other sources along the segment d_{other}	s/veh	-		
E. COMPUTE SEGMENT RUNNING TIME					
	Start-up lost time l_1	s	2,00		
	Control-type adjustment factor f_x	-	1,00		
	Segment length L	ft	1.821,60		
	Free-Flow Speed S_f	mi/h	36,54		
	Proximity adjustment factor f_v	-	1,03		
	Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	-		
	delay due to other sources along the segment d_{other}	s/veh	-		
	Segment Running Time t_R	s	36,00		
STEP 5:		DETERMINE THROUGH DELAY			
	Control delay	s/veh	13,84		
	Geometric delay	s/veh	-		
	Through delay d_t	s/veh	13,84		
STEP 6:		DETERMINE THROUGH STOP RATE			
	Volume-to-capacity ratio v/c	-	0,67		
	Trough stop rate (if YIELD controlled) h	stops/veh	-		
	Trough stop rate (if signalized) h	stops/veh	1,34		
STEP 7:		DETERMINE TRAVEL SPEED			
	Segment length L	ft	1.821,60		
	Segment Running Time t_R	s	36,00		
	Through delay d_t	s/veh	13,84		
	Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	24,92	40,11	km/h
STEP 8:		DETERMINE SPATIAL STOP RATE			
	Segment length L	ft	1.821,60		
	Trough stop rate h	stops/veh	1,34		
	Full stop rate due to other sources h_{other}	stops/veh	-		
	Spatial stop rate for the segment H_{seg}	stops/mi	3,88		
STEP 9:		DETERMINE LEVEL OF SERVICE			
	Volume-to-capacity ratio v/c	-	0,67		
	Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	24,92	40,11	Km/h
	Base free-flow speed S_{f0}	mi/h	37,53	60,40	Km/h
	$S_{T,seg} / S_{f0}$	%	66,40%		
	LEVEL OF SERVICE	LOS		C	

URBAN STREET SEGMENT:		PASEO DE ZORROAGA - MARGEN DERECHA			
Year of analysis:		2045			
STEP 1:		DETERMINE TRAFFIC DEMAND ADJUSTMENTS			
	Capacity Constraint	CHECK			
	Volume Balance	CHECK			
	Origin-Destination Distribution	CHECK			
	Spillback Occurrence	CHECK			
STEP 2:		DETERMINE RUNNING TIME			
A. DETERMINE FREE-FLOW SPEED					
	Speed Limit S_{pl}	mi/h	31,07	50,00	Km/h
	Speed Constant S_0	mi/h	40,20		
	Segment length - Direction 1 l_1	mi	0,340	542,00	m
	Segment length - Direction 2 l_2	mi	0,350	560,00	m
	Segment length L	mi	0,345	ft	1.821,60
	Proportion of link length with restrictive median p_{rm}	decimal	1,00		
	Proportion of segment with curb (right hand side) p_{curb}	decimal	1,00		
	Adjustment for cross section f_{cs}	mi/h	-	2,67	
	Access Points	U	-		
	Access Density D_a	points /mi	-		
	Adjustment for access points f_A	mi/h	-		
	Base free-flow speed S_{f0}	mi/h	37,53	60,40	Km/h
	Distance between adjacent signalized intersections L_s	ft	1.821,60		
	Signal spacing adjustment factor f_l	-	0,97		
	Free-Flow Speed S_f	mi/h	36,54	58,80	Km/h
B. COMPUTE ADJUSTMENT FOR VEHICLE PROXIMITY					
	Midsegment demand flow rate v_m	veh/h	1.121,00		
	Number of through lanes on the segment in the subject direction N_{th}	ln	2,00		
	Proximity adjustment factor f_v	-	1,04		
C. COMPUTE DELAY DUE TO TURNING VEHICLES					
	Midsegment volume	veh/h/ln	560,50		
	Trough vehicle delay	s/veh/pt	0,34		
	Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	-		
D. COMPUTE DELAY DUE TO OTHER SOURCES					
	delay due to other sources along the segment d_{other}	s/veh	-		
E. COMPUTE SEGMENT RUNNING TIME					
	Start-up lost time l_1	s	2,00		
	Control-type adjustment factor f_x	-	1,00		
	Segment length L	ft	1.821,60		
	Free-Flow Speed S_f	mi/h	36,54		
	Proximity adjustment factor f_v	-	1,04		
	Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	-		
	delay due to other sources along the segment d_{other}	s/veh	-		
	Segment Running Time t_R	s	36,10		
STEP 5:		DETERMINE THROUGH DELAY			
	Control delay	s/veh	14,77		
	Geometric delay	s/veh	-		
	Through delay d_t	s/veh	14,77		
STEP 6:		DETERMINE THROUGH STOP RATE			
	Volume-to-capacity ratio v/c	-	0,72		
	Trough stop rate (if YIELD controlled) h	stops/veh	-		
	Trough stop rate (if signalized) h	stops/veh	1,44		
STEP 7:		DETERMINE TRAVEL SPEED			
	Segment length L	ft	1.821,60		
	Segment Running Time t_R	s	36,10		
	Through delay d_t	s/veh	14,77		
	Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	24,42	39,29	km/h
STEP 8:		DETERMINE SPATIAL STOP RATE			
	Segment length L	ft	1.821,60		
	Trough stop rate h	stops/veh	1,44		
	Full stop rate due to other sources h_{other}	stops/veh	-		
	Spatial stop rate for the segment H_{seg}	stops/mi	4,17		
STEP 9:		DETERMINE LEVEL OF SERVICE			
	Volume-to-capacity ratio v/c	-	0,72		
	Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	24,42	39,29	Km/h
	Base free-flow speed S_{f0}	mi/h	37,53	60,40	Km/h
	$S_{T,seg} / S_{f0}$	%	65,05%		
	LEVEL OF SERVICE	LOS	C		

URBAN STREET SEGMENT:		PASEO DE ZORROAGA - MARGEN DERECHA			
Year of analysis:		2055			
STEP 1:		DETERMINE TRAFFIC DEMAND ADJUSTMENTS			
	Capacity Constraint	CHECK			
	Volume Balance	CHECK			
	Origin-Destination Distribution	CHECK			
	Spillback Occurrence	CHECK			
STEP 2:		DETERMINE RUNNING TIME			
A. DETERMINE FREE-FLOW SPEED					
	Speed Limit S_{pl}	mi/h	31,07	50,00	Km/h
	Speed Constant S_0	mi/h	40,20		
	Segment length - Direction 1 l_1	mi	0,340	542,00	m
	Segment length - Direction 2 l_2	mi	0,350	560,00	m
	Segment length L	mi	0,345	ft	1.821,60
	Proportion of link length with restrictive median p_{rm}	decimal	1,00		
	Proportion of segment with curb (right hand side) p_{curb}	decimal	1,00		
	Adjustment for cross section f_{cs}	mi/h	-	2,67	
	Access Points	U	-		
	Access Density D_a	points /mi	-		
	Adjustment for access points f_A	mi/h	-		
	Base free-flow speed S_{f0}	mi/h	37,53	60,40	Km/h
	Distance between adjacent signalized intersections L_s	ft	1.821,60		
	Signal spacing adjustment factor f_l	-	0,97		
	Free-Flow Speed S_f	mi/h	36,54	58,80	Km/h
B. COMPUTE ADJUSTMENT FOR VEHICLE PROXIMITY					
	Midsegment demand flow rate v_m	veh/h	1.293,00		
	Number of through lanes on the segment in the subject direction N_{th}	ln	2,00		
	Proximity adjustment factor f_v	-	1,04		
C. COMPUTE DELAY DUE TO TURNING VEHICLES					
	Midsegment volume	veh/h/ln	646,50		
	Trough vehicle delay	s/veh/pt	0,56		
	Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	-		
D. COMPUTE DELAY DUE TO OTHER SOURCES					
	delay due to other sources along the segment d_{other}	s/veh	-		
E. COMPUTE SEGMENT RUNNING TIME					
	Start-up lost time l_1	s	2,00		
	Control-type adjustment factor f_x	-	1,00		
	Segment length L	ft	1.821,60		
	Free-Flow Speed S_f	mi/h	36,54		
	Proximity adjustment factor f_v	-	1,04		
	Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	-		
	delay due to other sources along the segment d_{other}	s/veh	-		
	Segment Running Time t_R	s	36,33		
STEP 5:		DETERMINE THROUGH DELAY			
	Control delay	s/veh	17,90		
	Geometric delay	s/veh	-		
	Through delay d_t	s/veh	17,90		
STEP 6:		DETERMINE THROUGH STOP RATE			
	Volume-to-capacity ratio v/c	-	0,83		
	Trough stop rate (if YIELD controlled) h	stops/veh	-		
	Trough stop rate (if signalized) h	stops/veh	1,66		
STEP 7:		DETERMINE TRAVEL SPEED			
	Segment length L	ft	1.821,60		
	Segment Running Time t_R	s	36,33		
	Through delay d_t	s/veh	17,90		
	Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	22,91	36,86	km/h
STEP 8:		DETERMINE SPATIAL STOP RATE			
	Segment length L	ft	1.821,60		
	Trough stop rate h	stops/veh	1,66		
	Full stop rate due to other sources h_{other}	stops/veh	-		
	Spatial stop rate for the segment H_{seg}	stops/mi	4,81		
STEP 9:		DETERMINE LEVEL OF SERVICE			
	Volume-to-capacity ratio v/c	-	0,83		
	Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	22,91	36,86	Km/h
	Base free-flow speed S_{f0}	mi/h	37,53	60,40	Km/h
	$S_{T,seg} / S_{f0}$	%	61,03%		
	LEVEL OF SERVICE	LOS	C		

1.2. INTERSECCIÓN SEMAFORIZADA PASEO DE ZORROAGA - MARGEN DERECHA

SIGNALIZED INTERSECTIONS - PLANNING LEVEL ANALYSIS

1 VOLUME AND SIGNAL INPUT													
Year of analysis: 2025		NORTH BOUND - NB			SOUTH BOUND - SB			EAST BOUND - EB			WEST BOUND - WB		
Required Data		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Movement volume V	veh/h	-	670	-	-	843	-	-	-	-	-	-	-
Percentage of Heavy Vehicles in the lane group P _{HV}	%	-	3,00	-	-	3,00	-	-	-	-	-	-	-
Equivalent number of through cars for each heavy vehicle E _T	-	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00
Equivalency factor for Heavy Vehicles E _{HV}	-	1,00	1,03	1,00	1,00	1,03	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Peak Hour Factor PHF	-	-	0,92	-	-	0,92	-	-	-	-	-	-	-
Equivalency factor for Peaking Characteristics E _{PHF}	-	1,00	1,09	1,00	1,00	1,09	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Right Turns E _{RT}	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Left Turns E _{LT}	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
On-Street Parking Presence	-	-	NO	-	-	NO	-	-	-	-	-	-	-
Equivalency factor for Parking Activity E _p	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Lane Utilization E _{LU}	-	1,00	1,05	1,00	1,00	1,05	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Other Conditions E _{other}	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalent Through Movement Flow Rate v_{adj}	tpc/h	-	788	-	-	991	-	-	-	-	-	-	-
Number of Lanes	U	-	2,00	-	-	2,00	-	-	-	-	-	-	-
Lane use (exclusive or shared)	-	-	Exclusive	-	-	Exclusive	-	-	-	-	-	-	-
Lane flow rate v	tpc/h/ln	-	394	-	-	496	-	-	-	-	-	-	-
Critical lane flow rate V _c	tpc/h/ln	-	394	-	-	496	-	-	-	-	-	-	-
Critical lane group (indicate with "1")	-	-	1	-	-	1	-	-	-	-	-	-	-
Critical lane group flow rate v_c	tpc/h/ln	-	394	-	-	496	-	-	-	-	-	-	-
Cycle length per phase C _i	s	-	30,00	-	-	30,00	-	-	-	-	-	-	-
Total Cycle length C	s	-	-	-	-	-	-	-	-	-	-	-	60,00
Phase lost time I _t	s	-	4,00	-	-	4,00	-	-	-	-	-	-	-
Base saturation flow rate S ₀	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	1.900
Intersection capacity c_i	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	1.393
Sum of critical lane flow rates V _c	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	890
Critical Intersection Volume-to-Capacity ratio X _c	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	0,64
Intersection status (relationship to capacity)	-	Under	All demand is able to be accommodated. Delays are low to moderate										

< 0,85 Under All demand is able to be accommodated. Delays are low to moderate
 0,85-0,98 Near Demand for critical lane groups is near capacity and some lane groups require more than one cycle to clear the intersection. Delays are moderate to high
 > 0,98 Over Demand for critical lane groups is just able to be accommodated within a cycle but often requires multiple cycles to clear the intersection. Delays are high and queues are long

2 DELAY AND LEVEL OF SERVICE													
Required Data		NORTH BOUND - NB			SOUTH BOUND - SB			EAST BOUND - EB			WEST BOUND - WB		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Total effective green time g _{tot}	s	-	-	-	-	-	-	-	-	-	-	-	52,00
Critical lane group flow rate v _c	tpc/h/ln	-	394	-	-	496	-	-	-	-	-	-	-
Effective green time for critical lane group g _c	s	-	23,02	-	-	28,98	-	-	-	-	-	-	-
Green-to-cycle length ratio g/C	-	-	0,38	-	-	0,48	-	-	-	-	-	-	-
Number of Lanes	U	-	2,00	-	-	2,00	-	-	-	-	-	-	-
Base saturation flow rate S ₀	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	1.900
Lane group capacity c	tpc/h	-	1.457	-	-	1.835	-	-	-	-	-	-	-
Lane flow rate v	tpc/h/ln	-	394	-	-	496	-	-	-	-	-	-	-
Volume-to-capacity ratio X	-	-	0,54	-	-	0,54	-	-	-	-	-	-	-
Intersection Capacity C_{sum}	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	1.646
Progression adjustment factor PF	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Uniform delay d ₁	s/veh	-	14,38	-	-	10,85	-	-	-	-	-	-	-
Incremental delay d ₂	s/veh	-	1,45	-	-	1,15	-	-	-	-	-	-	-
Control delay d = d₁ + d₂	s/veh	-	15,82	-	-	12,00	-	-	-	-	-	-	-

SIGNALIZED INTERSECTIONS - PLANNING LEVEL ANALYSIS

1 VOLUME AND SIGNAL INPUT														
Year of analysis:		2035	NORTH BOUND - NB			SOUTH BOUND - SB			EAST BOUND - EB			WEST BOUND - WB		
Required Data			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Movement volume V	veh/h	-	774	-	-	972	-	-	-	-	-	-	-	-
Percentage of Heavy Vehicles in the lane group P _{HV}	%	-	3,00	-	-	3,00	-	-	-	-	-	-	-	-
Equivalent number of through cars for each heavy vehicle E _T	-	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00
Equivalency factor for Heavy Vehicles E _{HV}	-	1,00	1,03	1,00	1,00	1,03	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Peak Hour Factor PHF	-	-	0,92	-	-	0,92	-	-	-	-	-	-	-	-
Equivalency factor for Peaking Characteristics E _{PHF}	-	1,00	1,09	1,00	1,00	1,09	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Right Turns E _{RT}	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Left Turns E _{LT}	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
On-Street Parking Presence	-	-	NO	-	-	NO	-	-	-	-	-	-	-	-
Equivalency factor for Parking Activity E _p	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Lane Utilization E _{LU}	-	1,00	1,05	1,00	1,00	1,05	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Other Conditions E _{other}	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalent Through Movement Flow Rate v_{adj}	tpc/h	-	910	-	-	1.143	-	-	-	-	-	-	-	-
Number of Lanes	U	-	2,00	-	-	2,00	-	-	-	-	-	-	-	-
Lane use (exclusive or shared)	-	-	Exclusive	-	-	Exclusive	-	-	-	-	-	-	-	-
Lane flow rate v	tpc/h/ln	-	455	-	-	572	-	-	-	-	-	-	-	-
Critical lane flow rate V _c	tpc/h/ln	-	455	-	-	572	-	-	-	-	-	-	-	-
Critical lane group (indicate with "1")	-	-	1	-	-	1	-	-	-	-	-	-	-	-
Critical lane group flow rate v_c	tpc/h/ln	-	455	-	-	572	-	-	-	-	-	-	-	-
Cycle length per phase C _i	s	-	30,00	-	-	30,00	-	-	-	-	-	-	-	-
Total Cycle length C	s	-	-	-	-	-	-	-	-	-	-	-	-	60,00
Phase lost time I _t	s	-	4,00	-	-	4,00	-	-	-	-	-	-	-	-
Base saturation flow rate S ₀	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.900
Intersection capacity c_i	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.393
Sum of critical lane flow rates V _c	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.027
Critical Intersection Volume-to-Capacity ratio X _c	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	0,74
Intersection status (relationship to capacity)	-	Under	All demand is able to be accommodated. Delays are low to moderate											

< 0,85 Under All demand is able to be accommodated. Delays are low to moderate
 0,85-0,98 Near Demand for critical lane groups is near capacity and some lane groups require more than one cycle to clear the intersection. Delays are moderate to high
 > 0,98 Over Demand for critical lane groups is just able to be accommodated within a cycle but often requires multiple cycles to clear the intersection. Delays are high and queues are long

2 DELAY AND LEVEL OF SERVICE														
Required Data			NORTH BOUND - NB			SOUTH BOUND - SB			EAST BOUND - EB			WEST BOUND - WB		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Total effective green time g _{tot}	s	-	-	-	-	-	-	-	-	-	-	-	-	52,00
Critical lane group flow rate v _c	tpc/h/ln	-	455	-	-	572	-	-	-	-	-	-	-	-
Effective green time for critical lane group g _c	s	-	23,04	-	-	28,96	-	-	-	-	-	-	-	-
Green-to-cycle length ratio g/C	-	-	0,38	-	-	0,48	-	-	-	-	-	-	-	-
Number of Lanes	U	-	2,00	-	-	2,00	-	-	-	-	-	-	-	-
Base saturation flow rate S ₀	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.900
Lane group capacity c	tpc/h	-	1.459	-	-	1.834	-	-	-	-	-	-	-	-
Lane flow rate v	tpc/h/ln	-	455	-	-	572	-	-	-	-	-	-	-	-
Volume-to-capacity ratio X	-	-	0,62	-	-	0,62	-	-	-	-	-	-	-	-
Intersection Capacity C_{sum}	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.646
Progression adjustment factor PF	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Uniform delay d ₁	s/veh	-	14,97	-	-	11,49	-	-	-	-	-	-	-	-
Incremental delay d ₂	s/veh	-	2,02	-	-	1,61	-	-	-	-	-	-	-	-
Control delay d = d₁ + d₂	s/veh	-	16,99	-	-	13,10	-	-	-	-	-	-	-	-

SIGNALIZED INTERSECTIONS - PLANNING LEVEL ANALYSIS

1 VOLUME AND SIGNAL INPUT														
Year of analysis:		2040	NORTH BOUND - NB			SOUTH BOUND - SB			EAST BOUND - EB			WEST BOUND - WB		
Required Data			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Movement volume V	veh/h	-	831	-	-	1.044	-	-	-	-	-	-	-	-
Percentage of Heavy Vehicles in the lane group P _{HV}	%	-	3,00	-	-	3,00	-	-	-	-	-	-	-	-
Equivalent number of through cars for each heavy vehicle E _T	-	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00
Equivalency factor for Heavy Vehicles E _{HV}	-	1,00	1,03	1,00	1,00	1,03	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Peak Hour Factor PHF	-	-	0,92	-	-	0,92	-	-	-	-	-	-	-	-
Equivalency factor for Peaking Characteristics E _{PHF}	-	1,00	1,09	1,00	1,00	1,09	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Right Turns E _{RT}	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Left Turns E _{LT}	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
On-Street Parking Presence	-	-	NO	-	-	NO	-	-	-	-	-	-	-	-
Equivalency factor for Parking Activity E _p	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Lane Utilization E _{LU}	-	1,00	1,05	1,00	1,00	1,05	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Other Conditions E _{other}	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalent Through Movement Flow Rate v_{adj}	tpc/h	-	977	-	-	1.228	-	-	-	-	-	-	-	-
Number of Lanes	U	-	2,00	-	-	2,00	-	-	-	-	-	-	-	-
Lane use (exclusive or shared)	-	-	Exclusive	-	-	Exclusive	-	-	-	-	-	-	-	-
Lane flow rate v	tpc/h/ln	-	489	-	-	614	-	-	-	-	-	-	-	-
Critical lane flow rate V _c	tpc/h/ln	-	489	-	-	614	-	-	-	-	-	-	-	-
Critical lane group (indicate with "1")	-	-	1	-	-	1	-	-	-	-	-	-	-	-
Critical lane group flow rate v_c	tpc/h/ln	-	489	-	-	614	-	-	-	-	-	-	-	-
Cycle length per phase C _i	s	-	30,00	-	-	30,00	-	-	-	-	-	-	-	-
Total Cycle length C	s	-	-	-	-	-	-	-	-	-	-	-	-	60,00
Phase lost time I _t	s	-	4,00	-	-	4,00	-	-	-	-	-	-	-	-
Base saturation flow rate S ₀	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.900
Intersection capacity c_i	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.393
Sum of critical lane flow rates V _c	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.103
Critical Intersection Volume-to-Capacity ratio X _c	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	0,79
Intersection status (relationship to capacity)	-	Under	All demand is able to be accommodated. Delays are low to moderate											

< 0,85 Under All demand is able to be accommodated. Delays are low to moderate
 0,85-0,98 Near Demand for critical lane groups is near capacity and some lane groups require more than one cycle to clear the intersection. Delays are moderate to high
 > 0,98 Over Demand for critical lane groups is just able to be accommodated within a cycle but often requires multiple cycles to clear the intersection. Delays are high and queues are long

2 DELAY AND LEVEL OF SERVICE														
Required Data			NORTH BOUND - NB			SOUTH BOUND - SB			EAST BOUND - EB			WEST BOUND - WB		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Total effective green time g _{tot}	s	-	-	-	-	-	-	-	-	-	-	-	-	52,00
Critical lane group flow rate v _c	tpc/h/ln	-	489	-	-	614	-	-	-	-	-	-	-	-
Effective green time for critical lane group g _c	s	-	23,05	-	-	28,95	-	-	-	-	-	-	-	-
Green-to-cycle length ratio g/C	-	-	0,38	-	-	0,48	-	-	-	-	-	-	-	-
Number of Lanes	U	-	2,00	-	-	2,00	-	-	-	-	-	-	-	-
Base saturation flow rate S ₀	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.900
Lane group capacity c	tpc/h	-	1.460	-	-	1.833	-	-	-	-	-	-	-	-
Lane flow rate v	tpc/h/ln	-	489	-	-	614	-	-	-	-	-	-	-	-
Volume-to-capacity ratio X	-	-	0,67	-	-	0,67	-	-	-	-	-	-	-	-
Intersection Capacity C_{sum}	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.646
Progression adjustment factor PF	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Uniform delay d ₁	s/veh	-	15,32	-	-	11,87	-	-	-	-	-	-	-	-
Incremental delay d ₂	s/veh	-	2,46	-	-	1,97	-	-	-	-	-	-	-	-
Control delay d = d₁ + d₂	s/veh	-	17,78	-	-	13,84	-	-	-	-	-	-	-	-

SIGNALIZED INTERSECTIONS - PLANNING LEVEL ANALYSIS

1 VOLUME AND SIGNAL INPUT														
Year of analysis:		2045	NORTH BOUND - NB			SOUTH BOUND - SB			EAST BOUND - EB			WEST BOUND - WB		
Required Data			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Movement volume V	veh/h	-	892	-	-	1.121	-	-	-	-	-	-	-	-
Percentage of Heavy Vehicles in the lane group P _{HV}	%	-	3,00	-	-	3,00	-	-	-	-	-	-	-	-
Equivalent number of through cars for each heavy vehicle E _T	-	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00
Equivalency factor for Heavy Vehicles E _{HV}	-	1,00	1,03	1,00	1,00	1,03	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Peak Hour Factor PHF	-	-	0,92	-	-	0,92	-	-	-	-	-	-	-	-
Equivalency factor for Peaking Characteristics E _{PHF}	-	1,00	1,09	1,00	1,00	1,09	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Right Turns E _{RT}	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Left Turns E _{LT}	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
On-Street Parking Presence	-	-	NO	-	-	NO	-	-	-	-	-	-	-	-
Equivalency factor for Parking Activity E _p	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Lane Utilization E _{LU}	-	1,00	1,05	1,00	1,00	1,05	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Other Conditions E _{other}	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalent Through Movement Flow Rate v_{adj}	tpc/h	-	1.049	-	-	1.318	-	-	-	-	-	-	-	-
Number of Lanes	U	-	2,00	-	-	2,00	-	-	-	-	-	-	-	-
Lane use (exclusive or shared)	-	-	Exclusive	-	-	Exclusive	-	-	-	-	-	-	-	-
Lane flow rate v	tpc/h/ln	-	525	-	-	659	-	-	-	-	-	-	-	-
Critical lane flow rate V _c	tpc/h/ln	-	525	-	-	659	-	-	-	-	-	-	-	-
Critical lane group (indicate with "1")	-	-	1	-	-	1	-	-	-	-	-	-	-	-
Critical lane group flow rate v_c	tpc/h/ln	-	525	-	-	659	-	-	-	-	-	-	-	-
Cycle length per phase C _i	s	-	30,00	-	-	30,00	-	-	-	-	-	-	-	-
Total Cycle length C	s	-	-	-	-	-	-	-	-	-	-	-	-	60,00
Phase lost time l _t	s	-	4,00	-	-	4,00	-	-	-	-	-	-	-	-
Base saturation flow rate S ₀	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.900
Intersection capacity c_i	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.393
Sum of critical lane flow rates V _c	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.184
Critical Intersection Volume-to-Capacity ratio X _c	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	0,85
Intersection status (relationship to capacity)	-	Under	All demand is able to be accommodated. Delays are low to moderate											

< 0,85 Under All demand is able to be accommodated. Delays are low to moderate
 0,85-0,98 Near Demand for critical lane groups is near capacity and some lane groups require more than one cycle to clear the intersection. Delays are moderate to high
 > 0,98 Over Demand for critical lane groups is just able to be accommodated within a cycle but often requires multiple cycles to clear the intersection. Delays are high and queues are long

2 DELAY AND LEVEL OF SERVICE														
Required Data			NORTH BOUND - NB			SOUTH BOUND - SB			EAST BOUND - EB			WEST BOUND - WB		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Total effective green time g _{tot}	s	-	-	-	-	-	-	-	-	-	-	-	-	52,00
Critical lane group flow rate v _c	tpc/h/ln	-	525	-	-	659	-	-	-	-	-	-	-	-
Effective green time for critical lane group g _c	s	-	23,06	-	-	28,94	-	-	-	-	-	-	-	-
Green-to-cycle length ratio g/C	-	-	0,38	-	-	0,48	-	-	-	-	-	-	-	-
Number of Lanes	U	-	2,00	-	-	2,00	-	-	-	-	-	-	-	-
Base saturation flow rate S ₀	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.900
Lane group capacity c	tpc/h	-	1.460	-	-	1.833	-	-	-	-	-	-	-	-
Lane flow rate v	tpc/h/ln	-	525	-	-	659	-	-	-	-	-	-	-	-
Volume-to-capacity ratio X	-	-	0,72	-	-	0,72	-	-	-	-	-	-	-	-
Intersection Capacity C_{sum}	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.646
Progression adjustment factor PF	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Uniform delay d ₁	s/veh	-	15,72	-	-	12,31	-	-	-	-	-	-	-	-
Incremental delay d ₂	s/veh	-	3,08	-	-	2,47	-	-	-	-	-	-	-	-
Control delay d = d₁ + d₂	s/veh	-	18,80	-	-	14,77	-	-	-	-	-	-	-	-

SIGNALIZED INTERSECTIONS - PLANNING LEVEL ANALYSIS

1 VOLUME AND SIGNAL INPUT														
Year of analysis:		2055	NORTH BOUND - NB			SOUTH BOUND - SB			EAST BOUND - EB			WEST BOUND - WB		
Required Data			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Movement volume V	veh/h	-	1.029	-	-	1.293	-	-	-	-	-	-	-	-
Percentage of Heavy Vehicles in the lane group P _{HV}	%	-	3,00	-	-	3,00	-	-	-	-	-	-	-	-
Equivalent number of through cars for each heavy vehicle E _T	-	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00	2,00
Equivalency factor for Heavy Vehicles E _{HV}	-	1,00	1,03	1,00	1,00	1,03	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Peak Hour Factor PHF	-	-	0,92	-	-	0,92	-	-	-	-	-	-	-	-
Equivalency factor for Peaking Characteristics E _{PHF}	-	1,00	1,09	1,00	1,00	1,09	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Right Turns E _{RT}	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Left Turns E _{LT}	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
On-Street Parking Presence	-	-	NO	-	-	NO	-	-	-	-	-	-	-	-
Equivalency factor for Parking Activity E _p	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Lane Utilization E _{LU}	-	1,00	1,05	1,00	1,00	1,05	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalency factor for Other Conditions E _{other}	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Equivalent Through Movement Flow Rate v_{adj}	tpc/h	-	1.210	-	-	1.520	-	-	-	-	-	-	-	-
Number of Lanes	U	-	2,00	-	-	2,00	-	-	-	-	-	-	-	-
Lane use (exclusive or shared)	-	-	Exclusive	-	-	Exclusive	-	-	-	-	-	-	-	-
Lane flow rate v	tpc/h/ln	-	605	-	-	760	-	-	-	-	-	-	-	-
Critical lane flow rate v _c	tpc/h/ln	-	605	-	-	760	-	-	-	-	-	-	-	-
Critical lane group (indicate with "1")	-	-	1	-	-	1	-	-	-	-	-	-	-	-
Critical lane group flow rate v_c	tpc/h/ln	-	605	-	-	760	-	-	-	-	-	-	-	-
Cycle length per phase C _i	s	-	30,00	-	-	30,00	-	-	-	-	-	-	-	-
Total Cycle length C	s	-	-	-	-	-	-	-	-	-	-	-	-	60,00
Phase lost time l _t	s	-	4,00	-	-	4,00	-	-	-	-	-	-	-	-
Base saturation flow rate S ₀	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.900
Intersection capacity c_i	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.393
Sum of critical lane flow rates V _c	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.365
Critical Intersection Volume-to-Capacity ratio X _c	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	0,98
Intersection status (relationship to capacity)	-	Near	Demand for critical lane groups is near capacity and some lane groups require more than one cycle to clear the intersection. Delays are moderate to high											

< 0,85 Under All demand is able to be accommodated. Delays are low to moderate
 0,85-0,98 Near Demand for critical lane groups is near capacity and some lane groups require more than one cycle to clear the intersection. Delays are moderate to high
 > 0,98 Over Demand for critical lane groups is just able to be accommodated within a cycle but often requires multiple cycles to clear the intersection. Delays are high and queues are long

2 DELAY AND LEVEL OF SERVICE														
Required Data			NORTH BOUND - NB			SOUTH BOUND - SB			EAST BOUND - EB			WEST BOUND - WB		
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Total effective green time g _{tot}	s	-	-	-	-	-	-	-	-	-	-	-	-	52,00
Critical lane group flow rate v _c	tpc/h/ln	-	605	-	-	760	-	-	-	-	-	-	-	-
Effective green time for critical lane group g _c	s	-	23,05	-	-	28,95	-	-	-	-	-	-	-	-
Green-to-cycle length ratio g/C	-	-	0,38	-	-	0,48	-	-	-	-	-	-	-	-
Number of Lanes	U	-	2,00	-	-	2,00	-	-	-	-	-	-	-	-
Base saturation flow rate S ₀	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.900
Lane group capacity c	tpc/h	-	1.459	-	-	1.833	-	-	-	-	-	-	-	-
Lane flow rate v	tpc/h/ln	-	605	-	-	760	-	-	-	-	-	-	-	-
Volume-to-capacity ratio X	-	-	0,83	-	-	0,83	-	-	-	-	-	-	-	-
Intersection Capacity C_{sum}	tpc/h/ln	-	-	-	-	-	-	-	-	-	-	-	-	1.646
Progression adjustment factor PF	-	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
Uniform delay d ₁	s/veh	-	16,70	-	-	13,39	-	-	-	-	-	-	-	-
Incremental delay d ₂	s/veh	-	5,59	-	-	4,50	-	-	-	-	-	-	-	-
Control delay d = d₁ + d₂	s/veh	-	22,29	-	-	17,90	-	-	-	-	-	-	-	-

2.1. PASEO DE ZORROAGA - MARGEN IZQUIERDA

URBAN STREET SEGMENT		PASEO DE ZORROAGA - MARGEN IZQUIERDA			
Year of analysis:		2025			
STEP 1:		DETERMINE TRAFFIC DEMAND ADJUSTMENTS			
Capacity Constraint	CHECK				
Volume Balance	CHECK				
Origin-Destination Distribution	CHECK				
Spillback Occurrence	CHECK				
STEP 2:		DETERMINE RUNNING TIME			
A. DETERMINE FREE-FLOW SPEED					
Speed Limit S_{pl}	mi/h	31,07	50,00	Km/h	
Speed Constant S_0	mi/h	40,20			
Segment length - Direction 1 l_1	mi	0,340	542,00	m	
Segment length - Direction 2 l_2	mi	0,350	560,00	m	
Segment length L	mi	0,345	ft	1.821,60	
Proportion of link length with restrictive median p_{rm}	decimal	1,00			
Proportion of segment with curb (right hand side) p_{curb}	decimal	1,00			
Adjustment for cross section f_{CS}	mi/h	-	2,67		
Access Points	U	1,00			
Access Density D_a	points /mi	3,00			
Adjustment for access points f_A	mi/h	-	0,25		
Base free-flow speed S_{f0}	mi/h	37,28	60,00	Km/h	
Distance between adjacent signalized intersections L_s	ft	1.821,60			
Signal spacing adjustment factor f_l	-	0,97			
Free-Flow Speed S_f	mi/h	36,32	58,45	Km/h	
B. COMPUTE ADJUSTMENT FOR VEHICLE PROXIMITY					
Midsegment demand flow rate v_m	veh/h	670,00			
Number of through lanes on the segment in the subject direction N_{th}	ln	1,00			
Proximity adjustment factor f_v	-	1,05			
C. COMPUTE DELAY DUE TO TURNING VEHICLES					
Midsegment volume	veh/h/ln	670,00			
Trough vehicle delay	s/veh/pt	0,36			
Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	0,36			
D. COMPUTE DELAY DUE TO OTHER SOURCES					
delay due to other sources along the segment d_{other}	s/veh	-			
E. COMPUTE SEGMENT RUNNING TIME					
Start-up lost time l_1	s	2,50			
Control-type adjustment factor f_x	-	0,44			
Segment length L	ft	1.821,60			
Free-Flow Speed S_f	mi/h	36,32			
Proximity adjustment factor f_v	-	1,05			
Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	0,36			
delay due to other sources along the segment d_{other}	s/veh	-			
Segment Running Time t_R	s	36,44			
STEP 5:		DETERMINE THROUGH DELAY			
Control delay	s/veh	10,29			
Geometric delay	s/veh	-			
Through delay d_t	s/veh	10,29			
STEP 6:		DETERMINE THROUGH STOP RATE			
Volume-to-capacity ratio v/c	-	0,44			
Trough stop rate (if YIELD controlled) h	stops/veh	0,44			
Trough stop rate (if signalized) h	stops/veh	-			
STEP 7:		DETERMINE TRAVEL SPEED			
Segment length L	ft	1.821,60			
Segment Running Time t_R	s	36,44			
Through delay d_t	s/veh	10,29			
Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	26,58	42,78	km/h	
STEP 8:		DETERMINE SPATIAL STOP RATE			
Segment length L	ft	1.821,60			
Trough stop rate h	stops/veh	0,44			
Full stop rate due to other sources h_{other}	stops/veh	-			
Spatial stop rate for the segment H_{seg}	stops/mi	1,27			
STEP 9:		DETERMINE LEVEL OF SERVICE			
Volume-to-capacity ratio v/c	-	0,44			
Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	26,58	42,78	Km/h	
Base free-flow speed S_{f0}	mi/h	37,28	60,00	Km/h	
$S_{T,seg} / S_{f0}$	%	71,29%			
LEVEL OF SERVICE	LOS	B			

URBAN STREET SEGMENT		PASEO DE ZORROAGA - MARGEN IZQUIERDA			
Year of analysis:		2035			
STEP 1:		DETERMINE TRAFFIC DEMAND ADJUSTMENTS			
Capacity Constraint	CHECK				
Volume Balance	CHECK				
Origin-Destination Distribution	CHECK				
Spillback Occurrence	CHECK				
STEP 2:		DETERMINE RUNNING TIME			
A. DETERMINE FREE-FLOW SPEED					
Speed Limit S_{pl}	mi/h	31,07	50,00	Km/h	
Speed Constant S_0	mi/h	40,20			
Segment length - Direction 1 l_1	mi	0,340	542,00	m	
Segment length - Direction 2 l_2	mi	0,350	560,00	m	
Segment length L	mi	0,345	ft	1.821,60	
Proportion of link length with restrictive median p_{rm}	decimal	1,00			
Proportion of segment with curb (right hand side) p_{curb}	decimal	1,00			
Adjustment for cross section f_{CS}	mi/h	-	2,67		
Access Points	U	1,00			
Access Density D_a	points /mi	3,00			
Adjustment for access points f_A	mi/h	-	0,25		
Base free-flow speed S_{f0}	mi/h	37,28	60,00	Km/h	
Distance between adjacent signalized intersections L_s	ft	1.821,60			
Signal spacing adjustment factor f_l	-	0,97			
Free-Flow Speed S_f	mi/h	36,32	58,45	Km/h	
B. COMPUTE ADJUSTMENT FOR VEHICLE PROXIMITY					
Midsegment demand flow rate v_m	veh/h	774,00			
Number of through lanes on the segment in the subject direction N_{th}	ln	1,00			
Proximity adjustment factor f_v	-	1,05			
C. COMPUTE DELAY DUE TO TURNING VEHICLES					
Midsegment volume	veh/h/ln	774,00			
Trough vehicle delay	s/veh/pt	0,58			
Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	0,58			
D. COMPUTE DELAY DUE TO OTHER SOURCES					
delay due to other sources along the segment d_{other}	s/veh	-			
E. COMPUTE SEGMENT RUNNING TIME					
Start-up lost time l_1	s	2,50			
Control-type adjustment factor f_x	-	0,52			
Segment length L	ft	1.821,60			
Free-Flow Speed S_f	mi/h	36,32			
Proximity adjustment factor f_v	-	1,05			
Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	0,58			
delay due to other sources along the segment d_{other}	s/veh	-			
Segment Running Time t_R	s	37,03			
STEP 5:		DETERMINE THROUGH DELAY			
Control delay	s/veh	12,54			
Geometric delay	s/veh	-			
Through delay d_t	s/veh	12,54			
STEP 6:		DETERMINE THROUGH STOP RATE			
Volume-to-capacity ratio v/c	-	0,52			
Trough stop rate (if YIELD controlled) h	stops/veh	0,52			
Trough stop rate (if signalized) h	stops/veh	-			
STEP 7:		DETERMINE TRAVEL SPEED			
Segment length L	ft	1.821,60			
Segment Running Time t_R	s	37,03			
Through delay d_t	s/veh	12,54			
Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	25,06	40,32	km/h	
STEP 8:		DETERMINE SPATIAL STOP RATE			
Segment length L	ft	1.821,60			
Trough stop rate h	stops/veh	0,52			
Full stop rate due to other sources h_{other}	stops/veh	-			
Spatial stop rate for the segment H_{seg}	stops/mi	1,52			
STEP 9:		DETERMINE LEVEL OF SERVICE			
Volume-to-capacity ratio v/c	-	0,52			
Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	25,06	40,32	Km/h	
Base free-flow speed S_{f0}	mi/h	37,28	60,00	Km/h	
$S_{T,seg} / S_{f0}$	%	67,21%			
LEVEL OF SERVICE	LOS	B			

URBAN STREET SEGMENT		PASEO DE ZORROAGA - MARGEN IZQUIERDA			
Year of analysis:		2040			
STEP 1:		DETERMINE TRAFFIC DEMAND ADJUSTMENTS			
Capacity Constraint	CHECK				
Volume Balance	CHECK				
Origin-Destination Distribution	CHECK				
Spillback Occurrence	CHECK				
STEP 2:		DETERMINE RUNNING TIME			
A. DETERMINE FREE-FLOW SPEED					
Speed Limit S_{pl}	mi/h	31,07	50,00	Km/h	
Speed Constant S_0	mi/h	40,20			
Segment length - Direction 1 l_1	mi	0,340	542,00	m	
Segment length - Direction 2 l_2	mi	0,350	560,00	m	
Segment length L	mi	0,345	ft	1.821,60	
Proportion of link length with restrictive median p_{rm}	decimal	1,00			
Proportion of segment with curb (right hand side) p_{curb}	decimal	1,00			
Adjustment for cross section f_{CS}	mi/h	-	2,67		
Access Points	U	1,00			
Access Density D_a	points /mi	3,00			
Adjustment for access points f_A	mi/h	-	0,25		
Base free-flow speed S_{f0}	mi/h	37,28	60,00	Km/h	
Distance between adjacent signalized intersections L_s	ft	1.821,60			
Signal spacing adjustment factor f_l	-	0,97			
Free-Flow Speed S_f	mi/h	36,32	58,45	Km/h	
B. COMPUTE ADJUSTMENT FOR VEHICLE PROXIMITY					
Midsegment demand flow rate v_m	veh/h	831,00			
Number of through lanes on the segment in the subject direction N_{th}	ln	1,00			
Proximity adjustment factor f_v	-	1,06			
C. COMPUTE DELAY DUE TO TURNING VEHICLES					
Midsegment volume	veh/h/ln	831,00			
Trough vehicle delay	s/veh/pt	0,74			
Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	0,74			
D. COMPUTE DELAY DUE TO OTHER SOURCES					
delay due to other sources along the segment d_{other}	s/veh	-			
E. COMPUTE SEGMENT RUNNING TIME					
Start-up lost time l_1	s	2,50			
Control-type adjustment factor f_x	-	0,57			
Segment length L	ft	1.821,60			
Free-Flow Speed S_f	mi/h	36,32			
Proximity adjustment factor f_v	-	1,06			
Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	0,74			
delay due to other sources along the segment d_{other}	s/veh	-			
Segment Running Time t_R	s	37,42			
STEP 5:		DETERMINE THROUGH DELAY			
Control delay	s/veh	14,10			
Geometric delay	s/veh	-			
Through delay d_t	s/veh	14,10			
STEP 6:		DETERMINE THROUGH STOP RATE			
Volume-to-capacity ratio v/c	-	0,57			
Trough stop rate (if YIELD controlled) h	stops/veh	0,57			
Trough stop rate (if signalized) h	stops/veh	-			
STEP 7:		DETERMINE TRAVEL SPEED			
Segment length L	ft	1.821,60			
Segment Running Time t_R	s	37,42			
Through delay d_t	s/veh	14,10			
Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	24,11	38,80	km/h	
STEP 8:		DETERMINE SPATIAL STOP RATE			
Segment length L	ft	1.821,60			
Trough stop rate h	stops/veh	0,57			
Full stop rate due to other sources h_{other}	stops/veh	-			
Spatial stop rate for the segment H_{seg}	stops/mi	1,66			
STEP 9:		DETERMINE LEVEL OF SERVICE			
Volume-to-capacity ratio v/c	-	0,57			
Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	24,11	38,80	Km/h	
Base free-flow speed S_{f0}	mi/h	37,28	60,00	Km/h	
$S_{T,seg} / S_{f0}$	%	64,66%			
LEVEL OF SERVICE	LOS	C			

URBAN STREET SEGMENT **PASEO DE ZORROAGA - MARGEN IZQUIERDA**

Year of analysis: **2045**

STEP 1: DETERMINE TRAFFIC DEMAND ADJUSTMENTS

Capacity Constraint	CHECK
Volume Balance	CHECK
Origin-Destination Distribution	CHECK
Spillback Occurrence	CHECK

STEP 2: DETERMINE RUNNING TIME

A. DETERMINE FREE-FLOW SPEED

Speed Limit S_{pl}	mi/h	31,07	50,00	Km/h
Speed Constant S_0	mi/h	40,20		
Segment length - Direction 1 l_1	mi	0,340	542,00	m
Segment length - Direction 2 l_2	mi	0,350	560,00	m
Segment length L	mi	0,345	ft	1.821,60
Proportion of link length with restrictive median p_{rm}	decimal	1,00		
Proportion of segment with curb (right hand side) p_{curb}	decimal	1,00		
Adjustment for cross section f_{CS}	mi/h	-	2,67	
Access Points	U	1,00		
Access Density D_a	points /mi	3,00		
Adjustment for access points f_A	mi/h	-	0,25	
Base free-flow speed S_{f0}	mi/h	37,28	60,00	Km/h
Distance between adjacent signalized intersections L_s	ft	1.821,60		
Signal spacing adjustment factor f_l	-	0,97		
Free-Flow Speed S_f	mi/h	36,32	58,45	Km/h

B. COMPUTE ADJUSTMENT FOR VEHICLE PROXIMITY

Midsegment demand flow rate v_m	veh/h	892,00
Number of through lanes on the segment in the subject direction N_{th}	ln	1,00
Proximity adjustment factor f_v	-	1,07

C. COMPUTE DELAY DUE TO TURNING VEHICLES

Midsegment volume	veh/h/ln	892,00
Trough vehicle delay	s/veh/pt	0,97
Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	0,97

D. COMPUTE DELAY DUE TO OTHER SOURCES

delay due to other sources along the segment d_{other}	s/veh	-
--	-------	---

E. COMPUTE SEGMENT RUNNING TIME

Start-up lost time l_1	s	2,50
Control-type adjustment factor f_x	-	0,63
Segment length L	ft	1.821,60
Free-Flow Speed S_f	mi/h	36,32
Proximity adjustment factor f_v	-	1,07
Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	0,97
delay due to other sources along the segment d_{other}	s/veh	-
Segment Running Time t_R	s	37,89

STEP 5: DETERMINE THROUGH DELAY

Control delay	s/veh	16,21
Geometric delay	s/veh	-
Through delay d_t	s/veh	16,21

STEP 6: DETERMINE THROUGH STOP RATE

Volume-to-capacity ratio v/c	-	0,63
Trough stop rate (if YIELD controlled) h	stops/veh	0,63
Trough stop rate (if signalized) h	stops/veh	-

STEP 7: DETERMINE TRAVEL SPEED

Segment length L	ft	1.821,60		
Segment Running Time t_R	s	37,89		
Through delay d_t	s/veh	16,21		
Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	22,96	36,94	km/h

STEP 8: DETERMINE SPATIAL STOP RATE

Segment length L	ft	1.821,60
Trough stop rate h	stops/veh	0,63
Full stop rate due to other sources h_{other}	stops/veh	-
Spatial stop rate for the segment H_{seg}	stops/mi	1,83

STEP 9: DETERMINE LEVEL OF SERVICE

Volume-to-capacity ratio v/c	-	0,63		
Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	22,96	36,94	Km/h
Base free-flow speed S_{f0}	mi/h	37,28	60,00	Km/h
$S_{T,seg} / S_{f0}$	%	61,57%		
LEVEL OF SERVICE	LOS	C		

URBAN STREET SEGMENT		PASEO DE ZORROAGA - MARGEN IZQUIERDA			
Year of analysis:		2055			
STEP 1:		DETERMINE TRAFFIC DEMAND ADJUSTMENTS			
Capacity Constraint	CHECK				
Volume Balance	CHECK				
Origin-Destination Distribution	CHECK				
Spillback Occurrence	CHECK				
STEP 2:		DETERMINE RUNNING TIME			
A. DETERMINE FREE-FLOW SPEED					
Speed Limit S_{pl}	mi/h	31,07	50,00	Km/h	
Speed Constant S_0	mi/h	40,20			
Segment length - Direction 1 l_1	mi	0,340	542,00	m	
Segment length - Direction 2 l_2	mi	0,350	560,00	m	
Segment length L	mi	0,345	ft	1.821,60	
Proportion of link length with restrictive median p_{rm}	decimal	1,00			
Proportion of segment with curb (right hand side) p_{curb}	decimal	1,00			
Adjustment for cross section f_{CS}	mi/h	-	2,67		
Access Points	U	1,00			
Access Density D_a	points /mi	3,00			
Adjustment for access points f_A	mi/h	-	0,25		
Base free-flow speed S_{f0}	mi/h	37,28	60,00	Km/h	
Distance between adjacent signalized intersections L_s	ft	1.821,60			
Signal spacing adjustment factor f_l	-	0,97			
Free-Flow Speed S_f	mi/h	36,32	58,45	Km/h	
B. COMPUTE ADJUSTMENT FOR VEHICLE PROXIMITY					
Midsegment demand flow rate v_m	veh/h	1.029,00			
Number of through lanes on the segment in the subject direction N_{th}	ln	1,00			
Proximity adjustment factor f_v	-	1,08			
C. COMPUTE DELAY DUE TO TURNING VEHICLES					
Midsegment volume	veh/h/ln	1.029,00			
Trough vehicle delay	s/veh/pt	1,77			
Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	1,77			
D. COMPUTE DELAY DUE TO OTHER SOURCES					
delay due to other sources along the segment d_{other}	s/veh	-			
E. COMPUTE SEGMENT RUNNING TIME					
Start-up lost time l_1	s	2,50			
Control-type adjustment factor f_x	-	0,76			
Segment length L	ft	1.821,60			
Free-Flow Speed S_f	mi/h	36,32			
Proximity adjustment factor f_v	-	1,08			
Delay due to left and right turns from street into access point intersection d_{ap}	s/veh	1,77			
delay due to other sources along the segment d_{other}	s/veh	-			
Segment Running Time t_R	s	39,31			
STEP 5:		DETERMINE THROUGH DELAY			
Control delay	s/veh	23,80			
Geometric delay	s/veh	-			
Through delay d_t	s/veh	23,80			
STEP 6:		DETERMINE THROUGH STOP RATE			
Volume-to-capacity ratio v/c	-	0,76			
Trough stop rate (if YIELD controlled) h	stops/veh	0,76			
Trough stop rate (if signalized) h	stops/veh	-			
STEP 7:		DETERMINE TRAVEL SPEED			
Segment length L	ft	1.821,60			
Segment Running Time t_R	s	39,31			
Through delay d_t	s/veh	23,80			
Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	19,68	31,67	km/h	
STEP 8:		DETERMINE SPATIAL STOP RATE			
Segment length L	ft	1.821,60			
Trough stop rate h	stops/veh	0,76			
Full stop rate due to other sources h_{other}	stops/veh	-			
Spatial stop rate for the segment H_{seg}	stops/mi	2,21			
STEP 9:		DETERMINE LEVEL OF SERVICE			
Volume-to-capacity ratio v/c	-	0,76			
Travel speed of through vehicles for the segment $S_{T,seg}$	mi/h	19,68	31,67	Km/h	
Base free-flow speed S_{f0}	mi/h	37,28	60,00	Km/h	
$S_{T,seg} / S_{f0}$	%	52,79%			
LEVEL OF SERVICE	LOS	C			

2.2. GLORIETA PASEO DE ZORROAGA - MARGEN IZQUIERDA

Year of analysis:		2025					
STEP 1 & STEP 2: CONVERT MOVEMENT DEMAND VOLUMES TO FLOW RATES ADJUST FLOW RATES TO HEAVY VEHICLES							
NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
V _{SBR}	- veh/h	V _{WBR}	40 veh/h	V _{NBR}	650 veh/h	V _{EBR}	192 veh/h
V _{SBT}	- veh/h	V _{WBT}	119 veh/h	V _{NBT}	52 veh/h	V _{EBT}	192 veh/h
V _{SBL}	- veh/h	V _{WBL}	511 veh/h	V _{NBL}	154 veh/h	V _{EBL}	49 veh/h
V _{SBU}	- veh/h	V _{WBU}	- veh/h	V _{NBU}	16 veh/h	V _{EBU}	3 veh/h
PHF	0,92	PHF	0,92	PHF	0,92	PHF	0,92
E _T	2,00	E _T	2,00	E _T	2,00	E _T	2,00
P _T	NBR: 0,0300 NBT: 0,0300 NBL: 0,0300 NBU: 0,0300	P _T	WBR: 0,0300 WBT: 0,0300 WBL: 0,0300 WBU: 0,0300	P _T	SBR: 0,0300 SBT: 0,0300 SBL: 0,0300 SBU: 0,0300	P _T	EBR: 0,0300 EBT: 0,0300 EBL: 0,0300 EBU: 0,0300
f _{HV}	0,971	f _{HV}	0,971	f _{HV}	0,971	f _{HV}	0,971
V _{SBR,pce}	- pc/h	V _{WBR,pce}	45 pc/h	V _{NBR,pce}	728 pc/h	V _{EBR,pce}	215 pc/h
V _{SBT,pce}	- pc/h	V _{WBT,pce}	133 pc/h	V _{NBT,pce}	58 pc/h	V _{EBT,pce}	215 pc/h
V _{SBL,pce}	- pc/h	V _{WBL,pce}	572 pc/h	V _{NBL,pce}	172 pc/h	V _{EBL,pce}	55 pc/h
V _{SBU,pce}	- pc/h	V _{WBU,pce}	- pc/h	V _{NBU,pce}	18 pc/h	V _{EBU,pce}	3 pc/h
STEP 3: DETERMINE CIRCULATING AND EXITING FLOW RATES							
Circulating NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
V _{c,SB,pce}	898 pc/h	V _{c,WB,pce}	306 pc/h	V _{c,NB,pce}	273 pc/h	V _{c,EB,pce}	590 pc/h
Exiting NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00
Bypass YES	-	Bypass YES	-	Bypass YES	-	Bypass YES	-
Type 1 - yielding	-	Type 1 - yielding	1,00	Type 1 - yielding	1,00	Type 1 - yielding	1,00
Type 2 - nonyielding	-	Type 2 - nonyielding	-	Type 2 - nonyielding	-	Type 2 - nonyielding	-
V _{SBR,pce}	-	V _{WBR,pce}	45,00	V _{NBR,pce}	728,00	V _{EBR,pce}	215,00
V _{SBT,pce}	-	V _{WBT,pce}	133,00	V _{NBT,pce}	58,00	V _{EBT,pce}	215,00
V _{SBL,pce}	-	V _{WBL,pce}	572,00	V _{NBL,pce}	172,00	V _{EBL,pce}	55,00
V _{SBU,pce}	-	V _{WBU,pce}	-	V _{NBU,pce}	18,00	V _{EBU,pce}	3,00
V _{ex,pce,NB}	158,00 pc/h	V _{ex,pce,EB}	943,00 pc/h	V _{ex,pce,SB}	805,00 pc/h	V _{ex,pce,WB}	308,00 pc/h
STEP 4: DETERMINE ENTRY FLOW RATES BY LANE							
NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00
Bypass YES	-	Bypass YES	-	Bypass YES	-	Bypass YES	-
Type 1 - yielding	-	Type 1 - yielding	1,00	Type 1 - yielding	1,00	Type 1 - yielding	1,00
Type 2 - nonyielding	-	Type 2 - nonyielding	-	Type 2 - nonyielding	-	Type 2 - nonyielding	-
Nº of Lanes Entry	1,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	1,00
Designated Lane Assignment:		Designated Lane Assignment:		Designated Lane Assignment:		Designated Lane Assignment:	
LT-TR	-	LT-TR	-	LT-TR	-	LT-TR	-
L-LTR	-	L-LTR	-	L-LTR	-	L-LTR	-
LTR-R	-	LTR-R	-	LTR-R	-	LTR-R	-

$v_U + v_L$	-	$v_U + v_L$	572,00	$v_U + v_L$	190,00	$v_U + v_L$	58,00
$v_T + v_{R,e}$	-	$v_T + v_{R,e}$	178,00	$v_T + v_{R,e}$	786,00	$v_T + v_{R,e}$	430,00
$v_{R,e}$	-	$v_{R,e}$	45,00	$v_{R,e}$	728,00	$v_{R,e}$	215,00
$v_U + v_L + v_T$	-	$v_U + v_L + v_T$	705,00	$v_U + v_L + v_T$	248,00	$v_U + v_L + v_T$	273,00
$v_U + v_L > v_T + v_{R,e}$	-	$v_U + v_L > v_T + v_{R,e}$	-	$v_U + v_L > v_T + v_{R,e}$	-	$v_U + v_L > v_T + v_{R,e}$	-
$v_{R,e} > v_U + v_L + v_T$	-	$v_{R,e} > v_U + v_L + v_T$	-	$v_{R,e} > v_U + v_L + v_T$	-	$v_{R,e} > v_U + v_L + v_T$	-
ELSE	-	ELSE	-	ELSE	-	ELSE	-
$v_T + v_{R,e} > v_U + v_L$	-	$v_T + v_{R,e} > v_U + v_L$	-	$v_T + v_{R,e} > v_U + v_L$	-	$v_T + v_{R,e} > v_U + v_L$	-
ELSE	-	ELSE	-	ELSE	-	ELSE	-
$v_U + v_L + v_T > v_{R,e}$	-	$v_U + v_L + v_T > v_{R,e}$	-	$v_U + v_L + v_T > v_{R,e}$	-	$v_U + v_L + v_T > v_{R,e}$	-
ELSE	-	ELSE	-	ELSE	-	ELSE	-
$v_{e,SB,pce}$	-	$v_{e,WB,pce}$	750,00	$v_{e,NB,pce}$	976,00	$v_{e,EB,pce}$	488,00
$v_{e,SB,LEFT,pce}$	-	$v_{e,WB,LEFT,pce}$	352,50	$v_{e,NB,LEFT,pce}$	458,72	$v_{e,EB,LEFT,pce}$	229,36
$v_{e,SB,RIGHT,pce}$	-	$v_{e,WB,RIGHT,pce}$	397,50	$v_{e,NB,RIGHT,pce}$	517,28	$v_{e,EB,RIGHT,pce}$	258,64
O.K.		O.K.		O.K.		O.K.	

STEP 5: DETERMINE THE CAPACITY OF EACH ENTRY LANE AND BYPASS LANE

ENTRY LANE CAPACITY NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Nº of Lanes Entry	1,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	1,00
Conflicting Circulating Lanes	2,00	Conflicting Circulating Lanes	2,00	Conflicting Circulating Lanes	2,00	Conflicting Circulating Lanes	2,00
$v_{e,SB,pce}$	-	$v_{e,WB,pce}$	-	$v_{e,NB,pce}$	-	$v_{e,EB,pce}$	488,00
$v_{e,SB,LEFT,pce}$	-	$v_{e,WB,LEFT,pce}$	352,50	$v_{e,NB,LEFT,pce}$	458,72	$v_{e,EB,LEFT,pce}$	-
$v_{e,SB,RIGHT,pce}$	-	$v_{e,WB,RIGHT,pce}$	397,50	$v_{e,NB,RIGHT,pce}$	517,28	$v_{e,EB,RIGHT,pce}$	-
$v_{c,SB,pce}$	898	$v_{c,WB,pce}$	306	$v_{c,NB,pce}$	273	$v_{c,EB,pce}$	590
$C_{e,pce,SB}$	603	$C_{e,pce,WB}$	-	$C_{e,pce,NB}$	-	$C_{e,pce,EB}$	748
$C_{e,L,pce,SB}$	-	$C_{e,L,pce,WB}$	898	$C_{e,L,pce,NB}$	921	$C_{e,L,pce,EB}$	-
$C_{e,R,pce,SB}$	-	$C_{e,R,pce,WB}$	912	$C_{e,R,pce,NB}$	933	$C_{e,R,pce,EB}$	-

BYPASS CAPACITY NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00
Bypass YES	-	Bypass YES	-	Bypass YES	-	Bypass YES	-
Conflicting EXITING Lanes	-	Conflicting EXITING Lanes	2,00	Conflicting EXITING Lanes	2,00	Conflicting EXITING Lanes	1,00
$v_{ex,pce,NB}$	158,00	$v_{ex,pce,EB}$	943,00	$v_{ex,pce,SB}$	805,00	$v_{ex,pce,WB}$	308,00
$C_{bypass,pce}$	-	$C_{bypass,pce}$	-	$C_{bypass,pce}$	-	$C_{bypass,pce}$	-

STEP 6: DETERMINE PEDESTRIAN IMPEDANCE TO VEHICLES

NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Nº of Lanes Entry	1,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	1,00
$v_{c,SB,pce}$	898	$v_{c,WB,pce}$	306	$v_{c,NB,pce}$	273	$v_{c,EB,pce}$	590
n_{ped}	50,00	n_{ped}	150,00	n_{ped}	50,00	n_{ped}	50,00
f_{ped}	1,000	f_{ped}	0,899	f_{ped}	0,955	f_{ped}	0,993

STEP 7: CONVERT LANE FLOW RATES AND CAPACITIES INTO VEHICLES PER HOUR											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
$C_{e,pce}$	603	pc/h	$C_{e,pce}$	-	pc/h	$C_{e,pce}$	-	pc/h	$C_{e,pce}$	748	pc/h
$C_{e,L,pce}$	-	pc/h	$C_{e,L,pce}$	898	pc/h	$C_{e,L,pce}$	921	pc/h	$C_{e,L,pce}$	-	pc/h
$C_{e,R,pce}$	-	pc/h	$C_{e,R,pce}$	912	pc/h	$C_{e,R,pce}$	933	pc/h	$C_{e,R,pce}$	-	pc/h
$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h
f_{ped}	1,000		f_{ped}	0,899		f_{ped}	0,955		f_{ped}	0,993	
f_{HV}	-		f_{HV}	0,971		f_{HV}	0,971		f_{HV}	0,971	
C_{SB}	-	veh/h	C_{WB}	-	veh/h	C_{NB}	-	veh/h	C_{EB}	721	veh/h
$C_{SB,L}$	-	veh/h	$C_{WB,L}$	784	veh/h	$C_{NB,L}$	854	veh/h	$C_{EB,L}$	-	veh/h
$C_{SB,R}$	-	veh/h	$C_{WB,R}$	796	veh/h	$C_{NB,R}$	866	veh/h	$C_{EB,R}$	-	veh/h
C_{bypass}	-	veh/h	C_{bypass}	-	veh/h	C_{bypass}	-	veh/h	C_{bypass}	-	veh/h
$V_{e,SB,pce}$	-	pc/h	$V_{e,WB,pce}$	-	pc/h	$V_{e,NB,pce}$	-	pc/h	$V_{e,EB,pce}$	488	pc/h
$V_{e,SB,LEFT,pce}$	-	pc/h	$V_{e,WB,LEFT,pce}$	353	pc/h	$V_{e,NB,LEFT,pce}$	459	pc/h	$V_{e,EB,LEFT,pce}$	-	pc/h
$V_{e,SB,RIGHT,pce}$	-	pc/h	$V_{e,WB,RIGHT,pce}$	398	pc/h	$V_{e,NB,RIGHT,pce}$	517	pc/h	$V_{e,EB,RIGHT,pce}$	-	pc/h
$V_{bypass,pce}$	-	pc/h	$V_{bypass,pce}$	-	pc/h	$V_{bypass,pce}$	-	pc/h	$V_{bypass,pce}$	-	pc/h
f_{HV}	-		f_{HV}	0,971		f_{HV}	0,971		f_{HV}	0,971	
V_{SB}	-	veh/h	V_{WB}	-	veh/h	V_{NB}	-	veh/h	V_{EB}	474	veh/h
$V_{SB,LEFT}$	-	veh/h	$V_{WB,LEFT}$	342	veh/h	$V_{NB,LEFT}$	445	veh/h	$V_{EB,LEFT}$	-	veh/h
$V_{SB,RIGHT}$	-	veh/h	$V_{WB,RIGHT}$	386	veh/h	$V_{NB,RIGHT}$	502	veh/h	$V_{EB,RIGHT}$	-	veh/h
V_{bypass}	-	veh/h	V_{bypass}	-	veh/h	V_{bypass}	-	veh/h	V_{bypass}	-	veh/h

STEP 8: COMPUTE THE VOLUME-TO-CAPACITY RATIO FOR EACH LANE											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
X_{SB}	-		X_{WB}	-		X_{NB}	-		X_{EB}	0,66	
$X_{SB,LEFT}$	-		$X_{WB,LEFT}$	0,44		$X_{NB,LEFT}$	0,52		$X_{EB,LEFT}$	-	
$X_{SB,RIGHT}$	-		$X_{WB,RIGHT}$	0,48		$X_{NB,RIGHT}$	0,58		$X_{EB,RIGHT}$	-	
$X_{bypass,SB}$	-		$X_{bypass,WB}$	-		$X_{bypass,NB}$	-		$X_{bypass,WB}$	-	

STEP 9: COMPUTE THE AVERAGE CONTROL DELAY FOR EACH LANE											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
d_{SB}	-	s/veh	d_{WB}	-	s/veh	d_{NB}	-	s/veh	d_{EB}	17,32	s/veh
$d_{SB,LEFT}$	-	s/veh	$d_{WB,LEFT}$	10,29	s/veh	$d_{NB,LEFT}$	11,32	s/veh	$d_{EB,LEFT}$	-	s/veh
$d_{SB,RIGHT}$	-	s/veh	$d_{WB,RIGHT}$	11,13	s/veh	$d_{NB,RIGHT}$	12,63	s/veh	$d_{EB,RIGHT}$	-	s/veh
d_{bypass}	-	s/veh	d_{bypass}	-	s/veh	d_{bypass}	-	s/veh	d_{bypass}	-	s/veh

STEP 10: DETERMINE LOS FOR EACH LANE ON EACH APPROACH											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
LOS	-		LOS	-		LOS	-		LOS	LOS C	
LOS _{LEFT,LANE}	-		LOS _{LEFT,LANE}	LOS B		LOS _{LEFT,LANE}	LOS B		LOS _{LEFT,LANE}	-	
LOS _{RIGHT,LANE}	-		LOS _{RIGHT,LANE}	LOS B		LOS _{RIGHT,LANE}	LOS B		LOS _{RIGHT,LANE}	-	
LOS _{bypass}	-		LOS _{bypass}	-		LOS _{bypass}	-		LOS _{bypass}	-	

STEP 11: COMPUTE THE AVERAGE CONTROL DELAY AND DETERMINE LOS FOR EACH APPROACH AND THE ROUNDABOUT AS A WHOLE											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
d _{approach,SB}	-	s/veh	d _{approach,WB}	-	s/veh	d _{approach,NB}	-	s/veh	d _{approach,EB}	17,32	s/veh
LOS	-		LOS	-		LOS	-		LOS	LOS C	

INTERSECTION		
d _{intersection}	3,82	s/veh
LOS	LOS A	

STEP 12: COMPUTE 95TH PERCENTILE QUEUES FOR EACH LANE											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
Q _{95,SB}	-	veh	Q _{95,WB}	-	veh	Q _{95,NB}	-	veh	Q _{95,EB}	4,96	veh
Q _{95,SB,LEFT}	-	veh	Q _{95,WB,LEFT}	2,23	veh	Q _{95,NB,LEFT}	3,08	veh	Q _{95,EB,LEFT}	-	veh
Q _{95,SB,RIGHT}	-	veh	Q _{95,WB,RIGHT}	2,68	veh	Q _{95,NB,RIGHT}	3,82	veh	Q _{95,EB,RIGHT}	-	veh
Q _{95,SB,bypass}	-	veh	Q _{95,WB,bypass}	-	veh	Q _{95,NB,bypass}	-	veh	Q _{95,EB,bypass}	-	veh

Year of analysis:		2035					
STEP 1 & STEP 2: CONVERT MOVEMENT DEMAND VOLUMES TO FLOW RATES ADJUST FLOW RATES TO HEAVY VEHICLES							
NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
V _{SBR}	- veh/h	V _{WBR}	47 veh/h	V _{NBR}	750 veh/h	V _{EBR}	221 veh/h
V _{SBT}	- veh/h	V _{WBT}	137 veh/h	V _{NBT}	60 veh/h	V _{EBT}	221 veh/h
V _{SBL}	- veh/h	V _{WBL}	590 veh/h	V _{NBL}	177 veh/h	V _{EBL}	57 veh/h
V _{SBU}	- veh/h	V _{WBU}	- veh/h	V _{NBU}	19 veh/h	V _{EBU}	4 veh/h
PHF	0,92	PHF	0,92	PHF	0,92	PHF	0,92
E _T	2,00	E _T	2,00	E _T	2,00	E _T	2,00
P _T	NBR: 0,0300 NBT: 0,0300 NBL: 0,0300 NBU: 0,0300	P _T	WBR: 0,0300 WBT: 0,0300 WBL: 0,0300 WBU: 0,0300	P _T	SBR: 0,0300 SBT: 0,0300 SBL: 0,0300 SBU: 0,0300	P _T	EBR: 0,0300 EBT: 0,0300 EBL: 0,0300 EBU: 0,0300
f _{HV}	0,971	f _{HV}	0,971	f _{HV}	0,971	f _{HV}	0,971
V _{SBR,pce}	- pc/h	V _{WBR,pce}	53 pc/h	V _{NBR,pce}	840 pc/h	V _{EBR,pce}	247 pc/h
V _{SBT,pce}	- pc/h	V _{WBT,pce}	153 pc/h	V _{NBT,pce}	67 pc/h	V _{EBT,pce}	247 pc/h
V _{SBL,pce}	- pc/h	V _{WBL,pce}	661 pc/h	V _{NBL,pce}	198 pc/h	V _{EBL,pce}	64 pc/h
V _{SBU,pce}	- pc/h	V _{WBU,pce}	- pc/h	V _{NBU,pce}	21 pc/h	V _{EBU,pce}	4 pc/h
STEP 3: DETERMINE CIRCULATING AND EXITING FLOW RATES							
Circulating NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
V _{c,SB,pce}	1.037 pc/h	V _{c,WB,pce}	354 pc/h	V _{c,NB,pce}	315 pc/h	V _{c,EB,pce}	682 pc/h
Exiting NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00
Bypass YES	-	Bypass YES	-	Bypass YES	-	Bypass YES	-
Type 1 - yielding	-	Type 1 - yielding	1,00	Type 1 - yielding	1,00	Type 1 - yielding	1,00
Type 2 - nonyielding	-	Type 2 - nonyielding	-	Type 2 - nonyielding	-	Type 2 - nonyielding	-
V _{SBR,pce}	-	V _{WBR,pce}	53,00	V _{NBR,pce}	840,00	V _{EBR,pce}	247,00
V _{SBT,pce}	-	V _{WBT,pce}	153,00	V _{NBT,pce}	67,00	V _{EBT,pce}	247,00
V _{SBL,pce}	-	V _{WBL,pce}	661,00	V _{NBL,pce}	198,00	V _{EBL,pce}	64,00
V _{SBU,pce}	-	V _{WBU,pce}	-	V _{NBU,pce}	21,00	V _{EBU,pce}	4,00
V _{ex,pce,NB}	184,00 pc/h	V _{ex,pce,EB}	1.087,00 pc/h	V _{ex,pce,SB}	929,00 pc/h	V _{ex,pce,WB}	355,00 pc/h
STEP 4: DETERMINE ENTRY FLOW RATES BY LANE							
NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00
Bypass YES	-	Bypass YES	-	Bypass YES	-	Bypass YES	-
Type 1 - yielding	-	Type 1 - yielding	1,00	Type 1 - yielding	1,00	Type 1 - yielding	1,00
Type 2 - nonyielding	-	Type 2 - nonyielding	-	Type 2 - nonyielding	-	Type 2 - nonyielding	-
Nº of Lanes Entry	1,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	1,00
Designated Lane Assignment:		Designated Lane Assignment:		Designated Lane Assignment:		Designated Lane Assignment:	
LT-TR	-	LT-TR	-	LT-TR	-	LT-TR	-
L-LTR	-	L-LTR	-	L-LTR	-	L-LTR	-
LTR-R	-	LTR-R	-	LTR-R	-	LTR-R	-

$v_U + v_L$	-	$v_U + v_L$	661,00	$v_U + v_L$	219,00	$v_U + v_L$	68,00				
$v_T + v_{R,e}$	-	$v_T + v_{R,e}$	206,00	$v_T + v_{R,e}$	907,00	$v_T + v_{R,e}$	494,00				
$v_{R,e}$	-	$v_{R,e}$	53,00	$v_{R,e}$	840,00	$v_{R,e}$	247,00				
$v_U + v_L + v_T$	-	$v_U + v_L + v_T$	814,00	$v_U + v_L + v_T$	286,00	$v_U + v_L + v_T$	315,00				
$v_U + v_L > v_T + v_{R,e}$	-	$v_U + v_L > v_T + v_{R,e}$	-	$v_U + v_L > v_T + v_{R,e}$	-	$v_U + v_L > v_T + v_{R,e}$	-				
$v_{R,e} > v_U + v_L + v_T$	-	$v_{R,e} > v_U + v_L + v_T$	-	$v_{R,e} > v_U + v_L + v_T$	-	$v_{R,e} > v_U + v_L + v_T$	-				
ELSE	-	ELSE	-	ELSE	-	ELSE	-				
$v_T + v_{R,e} > v_U + v_L$	-	$v_T + v_{R,e} > v_U + v_L$	-	$v_T + v_{R,e} > v_U + v_L$	-	$v_T + v_{R,e} > v_U + v_L$	-				
ELSE	-	ELSE	-	ELSE	-	ELSE	-				
$v_U + v_L + v_T > v_{R,e}$	-	$v_U + v_L + v_T > v_{R,e}$	-	$v_U + v_L + v_T > v_{R,e}$	-	$v_U + v_L + v_T > v_{R,e}$	-				
ELSE	-	ELSE	-	ELSE	-	ELSE	-				
$v_{e,SB,pce}$	-	pc/h	$v_{e,WB,pce}$	867,00	pc/h	$v_{e,NB,pce}$	1.126,00	pc/h	$v_{e,EB,pce}$	562,00	pc/h
$v_{e,SB,LEFT,pce}$	-	pc/h	$v_{e,WB,LEFT,pce}$	407,49	pc/h	$v_{e,NB,LEFT,pce}$	529,22	pc/h	$v_{e,EB,LEFT,pce}$	264,14	pc/h
$v_{e,SB,RIGHT,pce}$	-	pc/h	$v_{e,WB,RIGHT,pce}$	459,51	pc/h	$v_{e,NB,RIGHT,pce}$	596,78	pc/h	$v_{e,EB,RIGHT,pce}$	297,86	pc/h
	O.K.		O.K.		O.K.		O.K.		O.K.		O.K.

STEP 5: DETERMINE THE CAPACITY OF EACH ENTRY LANE AND BYPASS LANE

ENTRY LANE CAPACITY NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG					
Nº of Lanes Entry	1,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	1,00				
Conflicting Circulating Lanes	2,00	Conflicting Circulating Lanes	2,00	Conflicting Circulating Lanes	2,00	Conflicting Circulating Lanes	2,00				
$v_{e,SB,pce}$	-	pc/h	$v_{e,WB,pce}$	-	pc/h	$v_{e,NB,pce}$	-	pc/h	$v_{e,EB,pce}$	562,00	pc/h
$v_{e,SB,LEFT,pce}$	-	pc/h	$v_{e,WB,LEFT,pce}$	407,49	pc/h	$v_{e,NB,LEFT,pce}$	529,22	pc/h	$v_{e,EB,LEFT,pce}$	-	pc/h
$v_{e,SB,RIGHT,pce}$	-	pc/h	$v_{e,WB,RIGHT,pce}$	459,51	pc/h	$v_{e,NB,RIGHT,pce}$	596,78	pc/h	$v_{e,EB,RIGHT,pce}$	-	pc/h
$v_{c,SB,pce}$	1.037	pc/h	$v_{c,WB,pce}$	354	pc/h	$v_{c,NB,pce}$	315	pc/h	$v_{c,EB,pce}$	682	pc/h
$C_{e,pce,SB}$	547	pc/h	$C_{e,pce,WB}$	-	pc/h	$C_{e,pce,NB}$	-	pc/h	$C_{e,pce,EB}$	701	pc/h
$C_{e,L,pce,SB}$	-	pc/h	$C_{e,L,pce,WB}$	867	pc/h	$C_{e,L,pce,NB}$	892	pc/h	$C_{e,L,pce,EB}$	-	pc/h
$C_{e,R,pce,SB}$	-	pc/h	$C_{e,R,pce,WB}$	882	pc/h	$C_{e,R,pce,NB}$	906	pc/h	$C_{e,R,pce,EB}$	-	pc/h

BYPASS CAPACITY NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG					
Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00				
Bypass YES	-	Bypass YES	-	Bypass YES	-	Bypass YES	-				
Conflicting EXITING Lanes	-	Conflicting EXITING Lanes	2,00	Conflicting EXITING Lanes	2,00	Conflicting EXITING Lanes	1,00				
$v_{ex,pce,NB}$	184,00	pc/h	$v_{ex,pce,EB}$	1.087,00	pc/h	$v_{ex,pce,SB}$	929,00	pc/h	$v_{ex,pce,WB}$	355,00	pc/h
$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h

STEP 6: DETERMINE PEDESTRIAN IMPEDANCE TO VEHICLES

NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG					
Nº of Lanes Entry	1,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	1,00				
$v_{c,SB,pce}$	1.037	pc/h	$v_{c,WB,pce}$	354	pc/h	$v_{c,NB,pce}$	315	pc/h	$v_{c,EB,pce}$	682	pc/h
n_{ped}	50,00	p/h	n_{ped}	172,00	p/h	n_{ped}	50,00	p/h	n_{ped}	50,00	p/h
f_{ped}	1,000		f_{ped}	0,897		f_{ped}	0,958		f_{ped}	0,993	

STEP 7: CONVERT LANE FLOW RATES AND CAPACITIES INTO VEHICLES PER HOUR											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
$C_{e,pce}$	547	pc/h	$C_{e,pce}$	-	pc/h	$C_{e,pce}$	-	pc/h	$C_{e,pce}$	701	pc/h
$C_{e,L,pce}$	-	pc/h	$C_{e,L,pce}$	867	pc/h	$C_{e,L,pce}$	892	pc/h	$C_{e,L,pce}$	-	pc/h
$C_{e,R,pce}$	-	pc/h	$C_{e,R,pce}$	882	pc/h	$C_{e,R,pce}$	906	pc/h	$C_{e,R,pce}$	-	pc/h
$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h
f_{ped}	1,000		f_{ped}	0,897		f_{ped}	0,958		f_{ped}	0,993	
f_{HV}	-		f_{HV}	0,971		f_{HV}	0,971		f_{HV}	0,971	
C_{SB}	-	veh/h	C_{WB}	-	veh/h	C_{NB}	-	veh/h	C_{EB}	676	veh/h
$C_{SB,L}$	-	veh/h	$C_{WB,L}$	754	veh/h	$C_{NB,L}$	830	veh/h	$C_{EB,L}$	-	veh/h
$C_{SB,R}$	-	veh/h	$C_{WB,R}$	768	veh/h	$C_{NB,R}$	843	veh/h	$C_{EB,R}$	-	veh/h
C_{bypass}	-	veh/h	C_{bypass}	-	veh/h	C_{bypass}	-	veh/h	C_{bypass}	-	veh/h
$V_{e,SB,pce}$	-	pc/h	$V_{e,WB,pce}$	-	pc/h	$V_{e,NB,pce}$	-	pc/h	$V_{e,EB,pce}$	562	pc/h
$V_{e,SB,LEFT,pce}$	-	pc/h	$V_{e,WB,LEFT,pce}$	407	pc/h	$V_{e,NB,LEFT,pce}$	529	pc/h	$V_{e,EB,LEFT,pce}$	-	pc/h
$V_{e,SB,RIGHT,pce}$	-	pc/h	$V_{e,WB,RIGHT,pce}$	460	pc/h	$V_{e,NB,RIGHT,pce}$	597	pc/h	$V_{e,EB,RIGHT,pce}$	-	pc/h
$V_{bypass,pce}$	-	pc/h	$V_{bypass,pce}$	-	pc/h	$V_{bypass,pce}$	-	pc/h	$V_{bypass,pce}$	-	pc/h
f_{HV}	-		f_{HV}	0,971		f_{HV}	0,971		f_{HV}	0,971	
V_{SB}	-	veh/h	V_{WB}	-	veh/h	V_{NB}	-	veh/h	V_{EB}	546	veh/h
$V_{SB,LEFT}$	-	veh/h	$V_{WB,LEFT}$	396	veh/h	$V_{NB,LEFT}$	514	veh/h	$V_{EB,LEFT}$	-	veh/h
$V_{SB,RIGHT}$	-	veh/h	$V_{WB,RIGHT}$	446	veh/h	$V_{NB,RIGHT}$	579	veh/h	$V_{EB,RIGHT}$	-	veh/h
V_{bypass}	-	veh/h	V_{bypass}	-	veh/h	V_{bypass}	-	veh/h	V_{bypass}	-	veh/h

STEP 8: COMPUTE THE VOLUME-TO-CAPACITY RATIO FOR EACH LANE											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
X_{SB}	-		X_{WB}	-		X_{NB}	-		X_{EB}	0,81	
$X_{SB,LEFT}$	-		$X_{WB,LEFT}$	0,52		$X_{NB,LEFT}$	0,62		$X_{EB,LEFT}$	-	
$X_{SB,RIGHT}$	-		$X_{WB,RIGHT}$	0,58		$X_{NB,RIGHT}$	0,69		$X_{EB,RIGHT}$	-	
$X_{bypass,SB}$	-		$X_{bypass,WB}$	-		$X_{bypass,NB}$	-		$X_{bypass,WB}$	-	

STEP 9: COMPUTE THE AVERAGE CONTROL DELAY FOR EACH LANE											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
d_{SB}	-	s/veh	d_{WB}	-	s/veh	d_{NB}	-	s/veh	d_{EB}	27,76	s/veh
$d_{SB,LEFT}$	-	s/veh	$d_{WB,LEFT}$	12,54	s/veh	$d_{NB,LEFT}$	14,23	s/veh	$d_{EB,LEFT}$	-	s/veh
$d_{SB,RIGHT}$	-	s/veh	$d_{WB,RIGHT}$	13,89	s/veh	$d_{NB,RIGHT}$	16,55	s/veh	$d_{EB,RIGHT}$	-	s/veh
d_{bypass}	-	s/veh	d_{bypass}	-	s/veh	d_{bypass}	-	s/veh	d_{bypass}	-	s/veh

STEP 10: DETERMINE LOS FOR EACH LANE ON EACH APPROACH													
NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG	
LOS	-			LOS	-			LOS	-			LOS	LOS D
LOS _{LEFT,LANE}	-			LOS _{LEFT,LANE}	LOS B			LOS _{LEFT,LANE}	LOS B			LOS _{LEFT,LANE}	-
LOS _{RIGHT,LANE}	-			LOS _{RIGHT,LANE}	LOS B			LOS _{RIGHT,LANE}	LOS C			LOS _{RIGHT,LANE}	-
LOS _{bypass}	-			LOS _{bypass}	-			LOS _{bypass}	-			LOS _{bypass}	-

STEP 11: COMPUTE THE AVERAGE CONTROL DELAY AND DETERMINE LOS FOR EACH APPROACH AND THE ROUNDABOUT AS A WHOLE													
NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG	
d _{approach,SB}	-	s/veh		d _{approach,WB}	-	s/veh		d _{approach,NB}	-	s/veh		d _{approach,EB}	27,76 s/veh
LOS	-			LOS	-			LOS	-			LOS	LOS D

INTERSECTION			
d _{intersection}	6,11	s/veh	
LOS	LOS A		

STEP 12: COMPUTE 95TH PERCENTILE QUEUES FOR EACH LANE													
NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG	
Q _{95,SB}	-	veh		Q _{95,WB}	-	veh		Q _{95,NB}	-	veh		Q _{95,EB}	8,32 veh
Q _{95,SB,LEFT}	-	veh		Q _{95,WB,LEFT}	3,10	veh		Q _{95,NB,LEFT}	4,39	veh		Q _{95,EB,LEFT}	- veh
Q _{95,SB,RIGHT}	-	veh		Q _{95,WB,RIGHT}	3,80	veh		Q _{95,NB,RIGHT}	5,64	veh		Q _{95,EB,RIGHT}	- veh
Q _{95,SB,bypass}	-	veh		Q _{95,WB,bypass}	-	veh		Q _{95,NB,bypass}	-	veh		Q _{95,EB,bypass}	- veh

Year of analysis:		2040																	
STEP 1 & STEP 2:		CONVERT MOVEMENT DEMAND VOLUMES TO FLOW RATES ADJUST FLOW RATES TO HEAVY VEHICLES																	
NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG							
V _{SBR}	-	veh/h		V _{WBR}	50	veh/h		V _{NBR}	806	veh/h		V _{EBR}	238	veh/h					
V _{SBT}	-	veh/h		V _{WBT}	147	veh/h		V _{NBT}	65	veh/h		V _{EBT}	238	veh/h					
V _{SBL}	-	veh/h		V _{WBL}	633	veh/h		V _{NBL}	190	veh/h		V _{EBL}	61	veh/h					
V _{SBU}	-	veh/h		V _{WBU}	-	veh/h		V _{NBU}	20	veh/h		V _{EBU}	4	veh/h					
PHF	0,92			PHF	0,92			PHF	0,92			PHF	0,92						
E _T	2,00			E _T	2,00			E _T	2,00			E _T	2,00						
P _T	NBR	NBT	NBL	NBU	P _T	WBR	WBT	WBL	WBU	P _T	SBR	SBT	SBL	SBU	P _T	EBR	EBT	EBL	EBU
f _{HV}	0,0300	0,0300	0,0300	0,0300	f _{HV}	0,0300	0,0300	0,0300	0,0300	f _{HV}	0,0300	0,0300	0,0300	0,0300	f _{HV}	0,0300	0,0300	0,0300	0,0300
V _{SBR,pce}	-	pc/h			V _{WBR,pce}	56	pc/h			V _{NBR,pce}	902	pc/h			V _{EBR,pce}	266	pc/h		
V _{SBT,pce}	-	pc/h			V _{WBT,pce}	165	pc/h			V _{NBT,pce}	73	pc/h			V _{EBT,pce}	266	pc/h		
V _{SBL,pce}	-	pc/h			V _{WBL,pce}	709	pc/h			V _{NBL,pce}	213	pc/h			V _{EBL,pce}	68	pc/h		
V _{SBU,pce}	-	pc/h			V _{WBU,pce}	-	pc/h			V _{NBU,pce}	22	pc/h			V _{EBU,pce}	4	pc/h		
STEP 3:		DETERMINE CIRCULATING AND EXITING FLOW RATES																	
Circulating NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG							
V _{c,SB,pce}	1.113	pc/h		V _{c,WB,pce}	380	pc/h		V _{c,NB,pce}	338	pc/h		V _{c,EB,pce}	731	pc/h					
Exiting NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG							
Bypass NO	1,00			Bypass NO	1,00			Bypass NO	1,00			Bypass NO	1,00						
Bypass YES	-			Bypass YES	-			Bypass YES	-			Bypass YES	-						
Type 1 - yielding	-			Type 1 - yielding	1,00			Type 1 - yielding	1,00			Type 1 - yielding	1,00						
Type 2 - nonyielding	-			Type 2 - nonyielding	-			Type 2 - nonyielding	-			Type 2 - nonyielding	-						
V _{SBR,pce}	-			V _{WBR,pce}	56,00			V _{NBR,pce}	902,00			V _{EBR,pce}	266,00						
V _{SBT,pce}	-			V _{WBT,pce}	165,00			V _{NBT,pce}	73,00			V _{EBT,pce}	266,00						
V _{SBL,pce}	-			V _{WBL,pce}	709,00			V _{NBL,pce}	213,00			V _{EBL,pce}	68,00						
V _{SBU,pce}	-			V _{WBU,pce}	-			V _{NBU,pce}	22,00			V _{EBU,pce}	4,00						
V _{ex,pce,NB}	197,00	pc/h		V _{ex,pce,EB}	1.168,00	pc/h		V _{ex,pce,SB}	997,00	pc/h		V _{ex,pce,WB}	382,00	pc/h					
STEP 4:		DETERMINE ENTRY FLOW RATES BY LANE																	
NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG							
Bypass NO	1,00			Bypass NO	1,00			Bypass NO	1,00			Bypass NO	1,00						
Bypass YES	-			Bypass YES	-			Bypass YES	-			Bypass YES	-						
Type 1 - yielding	-			Type 1 - yielding	1,00			Type 1 - yielding	1,00			Type 1 - yielding	1,00						
Type 2 - nonyielding	-			Type 2 - nonyielding	-			Type 2 - nonyielding	-			Type 2 - nonyielding	-						
Nº of Lanes Entry	1,00			Nº of Lanes Entry	2,00			Nº of Lanes Entry	2,00			Nº of Lanes Entry	1,00						
Designated Lane Assignment:				Designated Lane Assignment:				Designated Lane Assignment:				Designated Lane Assignment:							
LT-TR	-			LT-TR	-			LT-TR	-			LT-TR	-						
L-LTR	-			L-LTR	-			L-LTR	-			L-LTR	-						
LTR-R	-			LTR-R	-			LTR-R	-			LTR-R	-						

$v_U + v_L$	-	$v_U + v_L$	709,00	$v_U + v_L$	235,00	$v_U + v_L$	72,00
$v_T + v_{R,e}$	-	$v_T + v_{R,e}$	221,00	$v_T + v_{R,e}$	975,00	$v_T + v_{R,e}$	532,00
$v_{R,e}$	-	$v_{R,e}$	56,00	$v_{R,e}$	902,00	$v_{R,e}$	266,00
$v_U + v_L + v_T$	-	$v_U + v_L + v_T$	874,00	$v_U + v_L + v_T$	308,00	$v_U + v_L + v_T$	338,00
$v_U + v_L > v_T + v_{R,e}$	-	$v_U + v_L > v_T + v_{R,e}$	-	$v_U + v_L > v_T + v_{R,e}$	-	$v_U + v_L > v_T + v_{R,e}$	-
$v_{R,e} > v_U + v_L + v_T$	-	$v_{R,e} > v_U + v_L + v_T$	-	$v_{R,e} > v_U + v_L + v_T$	-	$v_{R,e} > v_U + v_L + v_T$	-
ELSE	-	ELSE	-	ELSE	-	ELSE	-
$v_T + v_{R,e} > v_U + v_L$	-	$v_T + v_{R,e} > v_U + v_L$	-	$v_T + v_{R,e} > v_U + v_L$	-	$v_T + v_{R,e} > v_U + v_L$	-
ELSE	-	ELSE	-	ELSE	-	ELSE	-
$v_U + v_L + v_T > v_{R,e}$	-	$v_U + v_L + v_T > v_{R,e}$	-	$v_U + v_L + v_T > v_{R,e}$	-	$v_U + v_L + v_T > v_{R,e}$	-
ELSE	-	ELSE	-	ELSE	-	ELSE	-
$v_{e,SB,pce}$	-	$v_{e,WB,pce}$	930,00	$v_{e,NB,pce}$	1.210,00	$v_{e,EB,pce}$	604,00
$v_{e,SB,LEFT,pce}$	-	$v_{e,WB,LEFT,pce}$	437,10	$v_{e,NB,LEFT,pce}$	568,70	$v_{e,EB,LEFT,pce}$	283,88
$v_{e,SB,RIGHT,pce}$	-	$v_{e,WB,RIGHT,pce}$	492,90	$v_{e,NB,RIGHT,pce}$	641,30	$v_{e,EB,RIGHT,pce}$	320,12
O.K.		O.K.		O.K.		O.K.	

STEP 5: DETERMINE THE CAPACITY OF EACH ENTRY LANE AND BYPASS LANE

ENTRY LANE CAPACITY NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Nº of Lanes Entry	1,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	1,00
Conflicting Circulating Lanes	2,00	Conflicting Circulating Lanes	2,00	Conflicting Circulating Lanes	2,00	Conflicting Circulating Lanes	2,00
$v_{e,SB,pce}$	-	$v_{e,WB,pce}$	-	$v_{e,NB,pce}$	-	$v_{e,EB,pce}$	604,00
$v_{e,SB,LEFT,pce}$	-	$v_{e,WB,LEFT,pce}$	437,10	$v_{e,NB,LEFT,pce}$	568,70	$v_{e,EB,LEFT,pce}$	-
$v_{e,SB,RIGHT,pce}$	-	$v_{e,WB,RIGHT,pce}$	492,90	$v_{e,NB,RIGHT,pce}$	641,30	$v_{e,EB,RIGHT,pce}$	-
$v_{c,SB,pce}$	1.113	$v_{c,WB,pce}$	380	$v_{c,NB,pce}$	338	$v_{c,EB,pce}$	731
$C_{e,pce,SB}$	518	$C_{e,pce,WB}$	-	$C_{e,pce,NB}$	-	$C_{e,pce,EB}$	677
$C_{e,L,pce,SB}$	-	$C_{e,L,pce,WB}$	850	$C_{e,L,pce,NB}$	877	$C_{e,L,pce,EB}$	-
$C_{e,R,pce,SB}$	-	$C_{e,R,pce,WB}$	866	$C_{e,R,pce,NB}$	892	$C_{e,R,pce,EB}$	-

BYPASS CAPACITY NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00
Bypass YES	-	Bypass YES	-	Bypass YES	-	Bypass YES	-
Conflicting EXITING Lanes	-	Conflicting EXITING Lanes	2,00	Conflicting EXITING Lanes	2,00	Conflicting EXITING Lanes	1,00
$v_{ex,pce,NB}$	197,00	$v_{ex,pce,EB}$	1.168,00	$v_{ex,pce,SB}$	997,00	$v_{ex,pce,WB}$	382,00
$C_{bypass,pce}$	-	$C_{bypass,pce}$	-	$C_{bypass,pce}$	-	$C_{bypass,pce}$	-

STEP 6: DETERMINE PEDESTRIAN IMPEDANCE TO VEHICLES

NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Nº of Lanes Entry	1,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	1,00
$v_{c,SB,pce}$	1.113	$v_{c,WB,pce}$	380	$v_{c,NB,pce}$	338	$v_{c,EB,pce}$	731
n_{ped}	50,00	n_{ped}	183,00	n_{ped}	50,00	n_{ped}	50,00
f_{ped}	1,000	f_{ped}	0,896	f_{ped}	0,959	f_{ped}	0,993

STEP 7: CONVERT LANE FLOW RATES AND CAPACITIES INTO VEHICLES PER HOUR											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
$C_{e,pce}$	518	pc/h	$C_{e,pce}$	-	pc/h	$C_{e,pce}$	-	pc/h	$C_{e,pce}$	677	pc/h
$C_{e,L,pce}$	-	pc/h	$C_{e,L,pce}$	850	pc/h	$C_{e,L,pce}$	877	pc/h	$C_{e,L,pce}$	-	pc/h
$C_{e,R,pce}$	-	pc/h	$C_{e,R,pce}$	866	pc/h	$C_{e,R,pce}$	892	pc/h	$C_{e,R,pce}$	-	pc/h
$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h
f_{ped}	1,000		f_{ped}	0,896		f_{ped}	0,959		f_{ped}	0,993	
f_{HV}	-		f_{HV}	0,971		f_{HV}	0,971		f_{HV}	0,971	
C_{SB}	-	veh/h	C_{WB}	-	veh/h	C_{NB}	-	veh/h	C_{EB}	653	veh/h
$C_{SB,L}$	-	veh/h	$C_{WB,L}$	739	veh/h	$C_{NB,L}$	816	veh/h	$C_{EB,L}$	-	veh/h
$C_{SB,R}$	-	veh/h	$C_{WB,R}$	753	veh/h	$C_{NB,R}$	830	veh/h	$C_{EB,R}$	-	veh/h
C_{bypass}	-	veh/h	C_{bypass}	-	veh/h	C_{bypass}	-	veh/h	C_{bypass}	-	veh/h
$V_{e,SB,pce}$	-	pc/h	$V_{e,WB,pce}$	-	pc/h	$V_{e,NB,pce}$	-	pc/h	$V_{e,EB,pce}$	604	pc/h
$V_{e,SB,LEFT,pce}$	-	pc/h	$V_{e,WB,LEFT,pce}$	437	pc/h	$V_{e,NB,LEFT,pce}$	569	pc/h	$V_{e,EB,LEFT,pce}$	-	pc/h
$V_{e,SB,RIGHT,pce}$	-	pc/h	$V_{e,WB,RIGHT,pce}$	493	pc/h	$V_{e,NB,RIGHT,pce}$	641	pc/h	$V_{e,EB,RIGHT,pce}$	-	pc/h
$V_{bypass,pce}$	-	pc/h	$V_{bypass,pce}$	-	pc/h	$V_{bypass,pce}$	-	pc/h	$V_{bypass,pce}$	-	pc/h
f_{HV}	-		f_{HV}	0,971		f_{HV}	0,971		f_{HV}	0,971	
V_{SB}	-	veh/h	V_{WB}	-	veh/h	V_{NB}	-	veh/h	V_{EB}	586	veh/h
$V_{SB,LEFT}$	-	veh/h	$V_{WB,LEFT}$	424	veh/h	$V_{NB,LEFT}$	552	veh/h	$V_{EB,LEFT}$	-	veh/h
$V_{SB,RIGHT}$	-	veh/h	$V_{WB,RIGHT}$	479	veh/h	$V_{NB,RIGHT}$	623	veh/h	$V_{EB,RIGHT}$	-	veh/h
V_{bypass}	-	veh/h	V_{bypass}	-	veh/h	V_{bypass}	-	veh/h	V_{bypass}	-	veh/h

STEP 8: COMPUTE THE VOLUME-TO-CAPACITY RATIO FOR EACH LANE											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
X_{SB}	-		X_{WB}	-		X_{NB}	-		X_{EB}	0,90	
$X_{SB,LEFT}$	-		$X_{WB,LEFT}$	0,57		$X_{NB,LEFT}$	0,68		$X_{EB,LEFT}$	-	
$X_{SB,RIGHT}$	-		$X_{WB,RIGHT}$	0,64		$X_{NB,RIGHT}$	0,75		$X_{EB,RIGHT}$	-	
$X_{bypass,SB}$	-		$X_{bypass,WB}$	-		$X_{bypass,NB}$	-		$X_{bypass,WB}$	-	

STEP 9: COMPUTE THE AVERAGE CONTROL DELAY FOR EACH LANE											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
d_{SB}	-	s/veh	d_{WB}	-	s/veh	d_{NB}	-	s/veh	d_{EB}	39,50	s/veh
$d_{SB,LEFT}$	-	s/veh	$d_{WB,LEFT}$	14,10	s/veh	$d_{NB,LEFT}$	16,49	s/veh	$d_{EB,LEFT}$	-	s/veh
$d_{SB,RIGHT}$	-	s/veh	$d_{WB,RIGHT}$	15,90	s/veh	$d_{NB,RIGHT}$	19,85	s/veh	$d_{EB,RIGHT}$	-	s/veh
d_{bypass}	-	s/veh	d_{bypass}	-	s/veh	d_{bypass}	-	s/veh	d_{bypass}	-	s/veh

STEP 10: DETERMINE LOS FOR EACH LANE ON EACH APPROACH															
NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG			
LOS	-			LOS	-			LOS	-			LOS	LOS E		
LOS _{LEFT,LANE}	-			LOS _{LEFT,LANE}	LOS B			LOS _{LEFT,LANE}	LOS C			LOS _{LEFT,LANE}	-		
LOS _{RIGHT,LANE}	-			LOS _{RIGHT,LANE}	LOS C			LOS _{RIGHT,LANE}	LOS C			LOS _{RIGHT,LANE}	-		
LOS _{bypass}	-			LOS _{bypass}	-			LOS _{bypass}	-			LOS _{bypass}	-		

STEP 11: COMPUTE THE AVERAGE CONTROL DELAY AND DETERMINE LOS FOR EACH APPROACH AND THE ROUNDABOUT AS A WHOLE															
NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG			
d _{approach,SB}	-	s/veh		d _{approach,WB}	-	s/veh		d _{approach,NB}	-	s/veh		d _{approach,EB}	39,50	s/veh	
LOS	-			LOS	-			LOS	-			LOS	LOS E		

INTERSECTION			
d _{intersection}	8,69	s/veh	
LOS	LOS A		

STEP 12: COMPUTE 95TH PERCENTILE QUEUES FOR EACH LANE															
NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG			
Q _{95,SB}	-	veh		Q _{95,WB}	-	veh		Q _{95,NB}	-	veh		Q _{95,EB}	11,23	veh	
Q _{95,SB,LEFT}	-	veh		Q _{95,WB,LEFT}	3,70	veh		Q _{95,NB,LEFT}	5,39	veh		Q _{95,EB,LEFT}	-	veh	
Q _{95,SB,RIGHT}	-	veh		Q _{95,WB,RIGHT}	4,61	veh		Q _{95,NB,RIGHT}	7,07	veh		Q _{95,EB,RIGHT}	-	veh	
Q _{95,SB,bypass}	-	veh		Q _{95,WB,bypass}	-	veh		Q _{95,NB,bypass}	-	veh		Q _{95,EB,bypass}	-	veh	

Year of analysis:		2045					
STEP 1 & STEP 2: CONVERT MOVEMENT DEMAND VOLUMES TO FLOW RATES ADJUST FLOW RATES TO HEAVY VEHICLES							
NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
V _{SBR}	- veh/h	V _{WBR}	54 veh/h	V _{NBR}	866 veh/h	V _{EBR}	255 veh/h
V _{SBT}	- veh/h	V _{WBT}	158 veh/h	V _{NBT}	70 veh/h	V _{EBT}	255 veh/h
V _{SBL}	- veh/h	V _{WBL}	680 veh/h	V _{NBL}	204 veh/h	V _{EBL}	65 veh/h
V _{SBU}	- veh/h	V _{WBU}	- veh/h	V _{NBU}	22 veh/h	V _{EBU}	4 veh/h
PHF	0,92	PHF	0,92	PHF	0,92	PHF	0,92
E _T	2,00	E _T	2,00	E _T	2,00	E _T	2,00
P _T	NBR: 0,0300 NBT: 0,0300 NBL: 0,0300 NBU: 0,0300	P _T	WBR: 0,0300 WBT: 0,0300 WBL: 0,0300 WBU: 0,0300	P _T	SBR: 0,0300 SBT: 0,0300 SBL: 0,0300 SBU: 0,0300	P _T	EBR: 0,0300 EBT: 0,0300 EBL: 0,0300 EBU: 0,0300
f _{HV}	0,971	f _{HV}	0,971	f _{HV}	0,971	f _{HV}	0,971
V _{SBR,pce}	- pc/h	V _{WBR,pce}	60 pc/h	V _{NBR,pce}	970 pc/h	V _{EBR,pce}	285 pc/h
V _{SBT,pce}	- pc/h	V _{WBT,pce}	177 pc/h	V _{NBT,pce}	78 pc/h	V _{EBT,pce}	285 pc/h
V _{SBL,pce}	- pc/h	V _{WBL,pce}	761 pc/h	V _{NBL,pce}	228 pc/h	V _{EBL,pce}	73 pc/h
V _{SBU,pce}	- pc/h	V _{WBU,pce}	- pc/h	V _{NBU,pce}	25 pc/h	V _{EBU,pce}	4 pc/h
STEP 3: DETERMINE CIRCULATING AND EXITING FLOW RATES							
Circulating NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
V _{c,SB,pce}	1.195 pc/h	V _{c,WB,pce}	408 pc/h	V _{c,NB,pce}	362 pc/h	V _{c,EB,pce}	786 pc/h
Exiting NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00
Bypass YES	-	Bypass YES	-	Bypass YES	-	Bypass YES	-
Type 1 - yielding	-	Type 1 - yielding	1,00	Type 1 - yielding	1,00	Type 1 - yielding	1,00
Type 2 - nonyielding	-	Type 2 - nonyielding	-	Type 2 - nonyielding	-	Type 2 - nonyielding	-
V _{SBR,pce}	-	V _{WBR,pce}	60,00	V _{NBR,pce}	970,00	V _{EBR,pce}	285,00
V _{SBT,pce}	-	V _{WBT,pce}	177,00	V _{NBT,pce}	78,00	V _{EBT,pce}	285,00
V _{SBL,pce}	-	V _{WBL,pce}	761,00	V _{NBL,pce}	228,00	V _{EBL,pce}	73,00
V _{SBU,pce}	-	V _{WBU,pce}	-	V _{NBU,pce}	25,00	V _{EBU,pce}	4,00
V _{ex,pce,NB}	211,00 pc/h	V _{ex,pce,EB}	1.255,00 pc/h	V _{ex,pce,SB}	1.071,00 pc/h	V _{ex,pce,WB}	409,00 pc/h
STEP 4: DETERMINE ENTRY FLOW RATES BY LANE							
NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00
Bypass YES	-	Bypass YES	-	Bypass YES	-	Bypass YES	-
Type 1 - yielding	-	Type 1 - yielding	1,00	Type 1 - yielding	1,00	Type 1 - yielding	1,00
Type 2 - nonyielding	-	Type 2 - nonyielding	-	Type 2 - nonyielding	-	Type 2 - nonyielding	-
Nº of Lanes Entry	1,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	1,00
Designated Lane Assignment:		Designated Lane Assignment:		Designated Lane Assignment:		Designated Lane Assignment:	
LT-TR	-	LT-TR	-	LT-TR	-	LT-TR	-
L-LTR	-	L-LTR	-	L-LTR	-	L-LTR	-
LTR-R	-	LTR-R	-	LTR-R	-	LTR-R	-

$v_U + v_L$	-	$v_U + v_L$	761,00	$v_U + v_L$	253,00	$v_U + v_L$	77,00
$v_T + v_{R,e}$	-	$v_T + v_{R,e}$	237,00	$v_T + v_{R,e}$	1.048,00	$v_T + v_{R,e}$	570,00
$v_{R,e}$	-	$v_{R,e}$	60,00	$v_{R,e}$	970,00	$v_{R,e}$	285,00
$v_U + v_L + v_T$	-	$v_U + v_L + v_T$	938,00	$v_U + v_L + v_T$	331,00	$v_U + v_L + v_T$	362,00
$v_U + v_L > v_T + v_{R,e}$	-	$v_U + v_L > v_T + v_{R,e}$	-	$v_U + v_L > v_T + v_{R,e}$	-	$v_U + v_L > v_T + v_{R,e}$	-
$v_{R,e} > v_U + v_L + v_T$	-	$v_{R,e} > v_U + v_L + v_T$	-	$v_{R,e} > v_U + v_L + v_T$	-	$v_{R,e} > v_U + v_L + v_T$	-
ELSE	-	ELSE	-	ELSE	-	ELSE	-
$v_T + v_{R,e} > v_U + v_L$	-	$v_T + v_{R,e} > v_U + v_L$	-	$v_T + v_{R,e} > v_U + v_L$	-	$v_T + v_{R,e} > v_U + v_L$	-
ELSE	-	ELSE	-	ELSE	-	ELSE	-
$v_U + v_L + v_T > v_{R,e}$	-	$v_U + v_L + v_T > v_{R,e}$	-	$v_U + v_L + v_T > v_{R,e}$	-	$v_U + v_L + v_T > v_{R,e}$	-
ELSE	-	ELSE	-	ELSE	-	ELSE	-
$v_{e,SB,pce}$	-	$v_{e,WB,pce}$	998,00	$v_{e,NB,pce}$	1.301,00	$v_{e,EB,pce}$	647,00
$v_{e,SB,LEFT,pce}$	-	$v_{e,WB,LEFT,pce}$	469,06	$v_{e,NB,LEFT,pce}$	611,47	$v_{e,EB,LEFT,pce}$	304,09
$v_{e,SB,RIGHT,pce}$	-	$v_{e,WB,RIGHT,pce}$	528,94	$v_{e,NB,RIGHT,pce}$	689,53	$v_{e,EB,RIGHT,pce}$	342,91
O.K.		O.K.		O.K.		O.K.	

STEP 5: DETERMINE THE CAPACITY OF EACH ENTRY LANE AND BYPASS LANE

ENTRY LANE CAPACITY NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Nº of Lanes Entry	1,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	1,00
Conflicting Circulating Lanes	2,00	Conflicting Circulating Lanes	2,00	Conflicting Circulating Lanes	2,00	Conflicting Circulating Lanes	2,00
$v_{e,SB,pce}$	-	$v_{e,WB,pce}$	-	$v_{e,NB,pce}$	-	$v_{e,EB,pce}$	647,00
$v_{e,SB,LEFT,pce}$	-	$v_{e,WB,LEFT,pce}$	469,06	$v_{e,NB,LEFT,pce}$	611,47	$v_{e,EB,LEFT,pce}$	-
$v_{e,SB,RIGHT,pce}$	-	$v_{e,WB,RIGHT,pce}$	528,94	$v_{e,NB,RIGHT,pce}$	689,53	$v_{e,EB,RIGHT,pce}$	-
$v_{c,SB,pce}$	1.195	$v_{c,WB,pce}$	408	$v_{c,NB,pce}$	362	$v_{c,EB,pce}$	786
$C_{e,pce,SB}$	490	$C_{e,pce,WB}$	-	$C_{e,pce,NB}$	-	$C_{e,pce,EB}$	652
$C_{e,L,pce,SB}$	-	$C_{e,L,pce,WB}$	832	$C_{e,L,pce,NB}$	861	$C_{e,L,pce,EB}$	-
$C_{e,R,pce,SB}$	-	$C_{e,R,pce,WB}$	849	$C_{e,R,pce,NB}$	877	$C_{e,R,pce,EB}$	-

BYPASS CAPACITY NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00
Bypass YES	-	Bypass YES	-	Bypass YES	-	Bypass YES	-
Conflicting EXITING Lanes	-	Conflicting EXITING Lanes	2,00	Conflicting EXITING Lanes	2,00	Conflicting EXITING Lanes	1,00
$v_{ex,pce,NB}$	211,00	$v_{ex,pce,EB}$	1.255,00	$v_{ex,pce,SB}$	1.071,00	$v_{ex,pce,WB}$	409,00
$C_{bypass,pce}$	-	$C_{bypass,pce}$	-	$C_{bypass,pce}$	-	$C_{bypass,pce}$	-

STEP 6: DETERMINE PEDESTRIAN IMPEDANCE TO VEHICLES

NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Nº of Lanes Entry	1,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	1,00
$v_{c,SB,pce}$	1.195	$v_{c,WB,pce}$	408	$v_{c,NB,pce}$	362	$v_{c,EB,pce}$	786
n_{ped}	50,00	n_{ped}	194,00	n_{ped}	50,00	n_{ped}	50,00
f_{ped}	1,000	f_{ped}	0,895	f_{ped}	0,960	f_{ped}	0,993

STEP 7: CONVERT LANE FLOW RATES AND CAPACITIES INTO VEHICLES PER HOUR											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
$C_{e,pce}$	490	pc/h	$C_{e,pce}$	-	pc/h	$C_{e,pce}$	-	pc/h	$C_{e,pce}$	652	pc/h
$C_{e,L,pce}$	-	pc/h	$C_{e,L,pce}$	832	pc/h	$C_{e,L,pce}$	861	pc/h	$C_{e,L,pce}$	-	pc/h
$C_{e,R,pce}$	-	pc/h	$C_{e,R,pce}$	849	pc/h	$C_{e,R,pce}$	877	pc/h	$C_{e,R,pce}$	-	pc/h
$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h
f_{ped}	1,000		f_{ped}	0,895		f_{ped}	0,960		f_{ped}	0,993	
f_{HV}	-		f_{HV}	0,971		f_{HV}	0,971		f_{HV}	0,971	
C_{SB}	-	veh/h	C_{WB}	-	veh/h	C_{NB}	-	veh/h	C_{EB}	629	veh/h
$C_{SB,L}$	-	veh/h	$C_{WB,L}$	723	veh/h	$C_{NB,L}$	803	veh/h	$C_{EB,L}$	-	veh/h
$C_{SB,R}$	-	veh/h	$C_{WB,R}$	738	veh/h	$C_{NB,R}$	818	veh/h	$C_{EB,R}$	-	veh/h
C_{bypass}	-	veh/h	C_{bypass}	-	veh/h	C_{bypass}	-	veh/h	C_{bypass}	-	veh/h
$V_{e,SB,pce}$	-	pc/h	$V_{e,WB,pce}$	-	pc/h	$V_{e,NB,pce}$	-	pc/h	$V_{e,EB,pce}$	647	pc/h
$V_{e,SB,LEFT,pce}$	-	pc/h	$V_{e,WB,LEFT,pce}$	469	pc/h	$V_{e,NB,LEFT,pce}$	611	pc/h	$V_{e,EB,LEFT,pce}$	-	pc/h
$V_{e,SB,RIGHT,pce}$	-	pc/h	$V_{e,WB,RIGHT,pce}$	529	pc/h	$V_{e,NB,RIGHT,pce}$	690	pc/h	$V_{e,EB,RIGHT,pce}$	-	pc/h
$V_{bypass,pce}$	-	pc/h	$V_{bypass,pce}$	-	pc/h	$V_{bypass,pce}$	-	pc/h	$V_{bypass,pce}$	-	pc/h
f_{HV}	-		f_{HV}	0,971		f_{HV}	0,971		f_{HV}	0,971	
V_{SB}	-	veh/h	V_{WB}	-	veh/h	V_{NB}	-	veh/h	V_{EB}	628	veh/h
$V_{SB,LEFT}$	-	veh/h	$V_{WB,LEFT}$	455	veh/h	$V_{NB,LEFT}$	594	veh/h	$V_{EB,LEFT}$	-	veh/h
$V_{SB,RIGHT}$	-	veh/h	$V_{WB,RIGHT}$	514	veh/h	$V_{NB,RIGHT}$	669	veh/h	$V_{EB,RIGHT}$	-	veh/h
V_{bypass}	-	veh/h	V_{bypass}	-	veh/h	V_{bypass}	-	veh/h	V_{bypass}	-	veh/h

STEP 8: COMPUTE THE VOLUME-TO-CAPACITY RATIO FOR EACH LANE											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
X_{SB}	-		X_{WB}	-		X_{NB}	-		X_{EB}	1,00	
$X_{SB,LEFT}$	-		$X_{WB,LEFT}$	0,63		$X_{NB,LEFT}$	0,74		$X_{EB,LEFT}$	-	
$X_{SB,RIGHT}$	-		$X_{WB,RIGHT}$	0,70		$X_{NB,RIGHT}$	0,82		$X_{EB,RIGHT}$	-	
$X_{bypass,SB}$	-		$X_{bypass,WB}$	-		$X_{bypass,NB}$	-		$X_{bypass,WB}$	-	

STEP 9: COMPUTE THE AVERAGE CONTROL DELAY FOR EACH LANE											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
d_{SB}	-	s/veh	d_{WB}	-	s/veh	d_{NB}	-	s/veh	d_{EB}	61,36	s/veh
$d_{SB,LEFT}$	-	s/veh	$d_{WB,LEFT}$	16,21	s/veh	$d_{NB,LEFT}$	19,76	s/veh	$d_{EB,LEFT}$	-	s/veh
$d_{SB,RIGHT}$	-	s/veh	$d_{WB,RIGHT}$	18,74	s/veh	$d_{NB,RIGHT}$	25,04	s/veh	$d_{EB,RIGHT}$	-	s/veh
d_{bypass}	-	s/veh	d_{bypass}	-	s/veh	d_{bypass}	-	s/veh	d_{bypass}	-	s/veh

STEP 10: DETERMINE LOS FOR EACH LANE ON EACH APPROACH													
NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG	
LOS	-			LOS	-			LOS	-			LOS	LOS F
LOS _{LEFT,LANE}	-			LOS _{LEFT,LANE}	LOS C			LOS _{LEFT,LANE}	LOS C			LOS _{LEFT,LANE}	-
LOS _{RIGHT,LANE}	-			LOS _{RIGHT,LANE}	LOS C			LOS _{RIGHT,LANE}	LOS D			LOS _{RIGHT,LANE}	-
LOS _{bypass}	-			LOS _{bypass}	-			LOS _{bypass}	-			LOS _{bypass}	-

STEP 11: COMPUTE THE AVERAGE CONTROL DELAY AND DETERMINE LOS FOR EACH APPROACH AND THE ROUNDABOUT AS A WHOLE													
NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG	
d _{approach,SB}	-	s/veh		d _{approach,WB}	-	s/veh		d _{approach,NB}	-	s/veh		d _{approach,EB}	61,36 s/veh
LOS	-			LOS	-			LOS	-			LOS	LOS F

INTERSECTION			
d _{intersection}	13,48	s/veh	
LOS	LOS B		

STEP 12: COMPUTE 95TH PERCENTILE QUEUES FOR EACH LANE													
NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG	
Q _{95,SB}	-	veh		Q _{95,WB}	-	veh		Q _{95,NB}	-	veh		Q _{95,EB}	15,33 veh
Q _{95,SB,LEFT}	-	veh		Q _{95,WB,LEFT}	4,50	veh		Q _{95,NB,LEFT}	6,76	veh		Q _{95,EB,LEFT}	- veh
Q _{95,SB,RIGHT}	-	veh		Q _{95,WB,RIGHT}	5,71	veh		Q _{95,NB,RIGHT}	9,09	veh		Q _{95,EB,RIGHT}	- veh
Q _{95,SB,bypass}	-	veh		Q _{95,WB,bypass}	-	veh		Q _{95,NB,bypass}	-	veh		Q _{95,EB,bypass}	- veh

Year of analysis:		2055																																																					
STEP 1 & STEP 2:		CONVERT MOVEMENT DEMAND VOLUMES TO FLOW RATES ADJUST FLOW RATES TO HEAVY VEHICLES																																																					
NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG																																											
V _{SBR}	-	veh/h	V _{WBR}	62	veh/h	V _{NBR}	999	veh/h	V _{EBR}	294	veh/h	V _{SBT}	-	veh/h	V _{WBT}	182	veh/h	V _{NBT}	80	veh/h	V _{EBT}	294	veh/h	V _{SBL}	-	veh/h	V _{WBL}	785	veh/h	V _{NBL}	236	veh/h	V _{EBL}	75	veh/h	V _{SBU}	-	veh/h	V _{WBU}	-	veh/h	V _{NBU}	25	veh/h	V _{EBU}	5	veh/h	PHF	0,92	PHF	0,92	PHF	0,92	PHF	0,92
E _T	2,00		E _T	2,00		E _T	2,00		E _T	2,00		E _T	2,00		E _T	2,00		E _T	2,00		E _T	2,00		E _T	2,00		E _T	2,00		E _T	2,00		E _T	2,00		E _T	2,00		E _T	2,00															
P _T	0,0300		P _T	0,0300		P _T	0,0300		P _T	0,0300		P _T	0,0300		P _T	0,0300		P _T	0,0300		P _T	0,0300		P _T	0,0300		P _T	0,0300		P _T	0,0300		P _T	0,0300		P _T	0,0300		P _T	0,0300		P _T	0,0300		P _T	0,0300									
f _{HV}	0,971		f _{HV}	0,971		f _{HV}	0,971		f _{HV}	0,971		f _{HV}	0,971		f _{HV}	0,971		f _{HV}	0,971		f _{HV}	0,971		f _{HV}	0,971		f _{HV}	0,971		f _{HV}	0,971		f _{HV}	0,971		f _{HV}	0,971		f _{HV}	0,971		f _{HV}	0,971		f _{HV}	0,971									
V _{SBR,pce}	-	pc/h	V _{WBR,pce}	69	pc/h	V _{NBR,pce}	1.118	pc/h	V _{EBR,pce}	329	pc/h	V _{SBT,pce}	-	pc/h	V _{WBT,pce}	204	pc/h	V _{NBT,pce}	90	pc/h	V _{EBT,pce}	329	pc/h	V _{SBL,pce}	-	pc/h	V _{WBL,pce}	879	pc/h	V _{NBL,pce}	264	pc/h	V _{EBL,pce}	84	pc/h	V _{SBU,pce}	-	pc/h	V _{WBU,pce}	-	pc/h	V _{NBU,pce}	28	pc/h	V _{EBU,pce}	6	pc/h								
STEP 3:		DETERMINE CIRCULATING AND EXITING FLOW RATES																																																					
Circulating NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG																																											
V _{c,SB,pce}	1.381	pc/h	V _{c,WB,pce}	472	pc/h	V _{c,NB,pce}	419	pc/h	V _{c,EB,pce}	907	pc/h																																												
Exiting NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG																																											
Bypass NO	1,00		Bypass NO	1,00		Bypass NO	1,00		Bypass NO	1,00		Bypass YES	-		Bypass YES	-		Bypass YES	-		Bypass YES	-		Type 1 - yielding	1,00		Type 1 - yielding	1,00		Type 1 - yielding	1,00		Type 1 - yielding	1,00		Type 2 - nonyielding	-		Type 2 - nonyielding	-		Type 2 - nonyielding	-		Type 2 - nonyielding	-									
V _{SBR,pce}	-		V _{WBR,pce}	69,00		V _{NBR,pce}	1.118,00		V _{EBR,pce}	329,00		V _{SBT,pce}	-		V _{WBT,pce}	204,00		V _{NBT,pce}	90,00		V _{EBT,pce}	329,00		V _{SBL,pce}	-		V _{WBL,pce}	879,00		V _{NBL,pce}	264,00		V _{EBL,pce}	84,00		V _{SBU,pce}	-		V _{WBU,pce}	-		V _{NBU,pce}	28,00		V _{EBU,pce}	6,00									
V _{ex,pce,NB}	243,00	pc/h	V _{ex,pce,EB}	1.447,00	pc/h	V _{ex,pce,SB}	1.236,00	pc/h	V _{ex,pce,WB}	474,00	pc/h																																												
STEP 4:		DETERMINE ENTRY FLOW RATES BY LANE																																																					
NORTH LEG				EAST LEG				SOUTH LEG				WEST LEG																																											
Bypass NO	1,00		Bypass NO	1,00		Bypass NO	1,00		Bypass NO	1,00		Bypass YES	-		Bypass YES	-		Bypass YES	-		Bypass YES	-		Type 1 - yielding	1,00		Type 1 - yielding	1,00		Type 1 - yielding	1,00		Type 1 - yielding	1,00		Type 2 - nonyielding	-		Type 2 - nonyielding	-		Type 2 - nonyielding	-		Type 2 - nonyielding	-									
Nº of Lanes Entry	1,00		Nº of Lanes Entry	2,00		Nº of Lanes Entry	2,00		Nº of Lanes Entry	1,00		Designated Lane Assignment:			Designated Lane Assignment:			Designated Lane Assignment:			Designated Lane Assignment:			LT-TR	-		LT-TR	-		LT-TR	-		LT-TR	-		L-LTR	-		L-LTR	-		L-LTR	-		L-LTR	-									
Designated Lane Assignment:			Designated Lane Assignment:			Designated Lane Assignment:			Designated Lane Assignment:			LTR-R	-		LTR-R	-		LTR-R	-		LTR-R	-		LTR-R	-		LTR-R	-		LTR-R	-		LTR-R	-		LTR-R	-		LTR-R	-		LTR-R	-												

$v_U + v_L$	-	$v_U + v_L$	879,00	$v_U + v_L$	292,00	$v_U + v_L$	90,00
$v_T + v_{R,e}$	-	$v_T + v_{R,e}$	273,00	$v_T + v_{R,e}$	1.208,00	$v_T + v_{R,e}$	658,00
$v_{R,e}$	-	$v_{R,e}$	69,00	$v_{R,e}$	1.118,00	$v_{R,e}$	329,00
$v_U + v_L + v_T$	-	$v_U + v_L + v_T$	1.083,00	$v_U + v_L + v_T$	382,00	$v_U + v_L + v_T$	419,00
$v_U + v_L > v_T + v_{R,e}$	-	$v_U + v_L > v_T + v_{R,e}$	-	$v_U + v_L > v_T + v_{R,e}$	-	$v_U + v_L > v_T + v_{R,e}$	-
$v_{R,e} > v_U + v_L + v_T$	-	$v_{R,e} > v_U + v_L + v_T$	-	$v_{R,e} > v_U + v_L + v_T$	-	$v_{R,e} > v_U + v_L + v_T$	-
ELSE	-	ELSE	-	ELSE	-	ELSE	-
$v_T + v_{R,e} > v_U + v_L$	-	$v_T + v_{R,e} > v_U + v_L$	-	$v_T + v_{R,e} > v_U + v_L$	-	$v_T + v_{R,e} > v_U + v_L$	-
ELSE	-	ELSE	-	ELSE	-	ELSE	-
$v_U + v_L + v_T > v_{R,e}$	-	$v_U + v_L + v_T > v_{R,e}$	-	$v_U + v_L + v_T > v_{R,e}$	-	$v_U + v_L + v_T > v_{R,e}$	-
ELSE	-	ELSE	-	ELSE	-	ELSE	-
$v_{e,SB,pce}$	-	$v_{e,WB,pce}$	1.152,00	$v_{e,NB,pce}$	1.500,00	$v_{e,EB,pce}$	748,00
$v_{e,SB,LEFT,pce}$	-	$v_{e,WB,LEFT,pce}$	541,44	$v_{e,NB,LEFT,pce}$	705,00	$v_{e,EB,LEFT,pce}$	351,56
$v_{e,SB,RIGHT,pce}$	-	$v_{e,WB,RIGHT,pce}$	610,56	$v_{e,NB,RIGHT,pce}$	795,00	$v_{e,EB,RIGHT,pce}$	396,44
O.K.		O.K.		O.K.		O.K.	

STEP 5: DETERMINE THE CAPACITY OF EACH ENTRY LANE AND BYPASS LANE

ENTRY LANE CAPACITY NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Nº of Lanes Entry	1,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	1,00
Conflicting Circulating Lanes	2,00	Conflicting Circulating Lanes	2,00	Conflicting Circulating Lanes	2,00	Conflicting Circulating Lanes	2,00
$v_{e,SB,pce}$	-	$v_{e,WB,pce}$	-	$v_{e,NB,pce}$	-	$v_{e,EB,pce}$	748,00
$v_{e,SB,LEFT,pce}$	-	$v_{e,WB,LEFT,pce}$	541,44	$v_{e,NB,LEFT,pce}$	705,00	$v_{e,EB,LEFT,pce}$	-
$v_{e,SB,RIGHT,pce}$	-	$v_{e,WB,RIGHT,pce}$	610,56	$v_{e,NB,RIGHT,pce}$	795,00	$v_{e,EB,RIGHT,pce}$	-
$v_{c,SB,pce}$	1.381	$v_{c,WB,pce}$	472	$v_{c,NB,pce}$	419	$v_{c,EB,pce}$	907
$C_{e,pce,SB}$	430	$C_{e,pce,WB}$	-	$C_{e,pce,NB}$	-	$C_{e,pce,EB}$	599
$C_{e,L,pce,SB}$	-	$C_{e,L,pce,WB}$	793	$C_{e,L,pce,NB}$	825	$C_{e,L,pce,EB}$	-
$C_{e,R,pce,SB}$	-	$C_{e,R,pce,WB}$	812	$C_{e,R,pce,NB}$	843	$C_{e,R,pce,EB}$	-

BYPASS CAPACITY NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00	Bypass NO	1,00
Bypass YES	-	Bypass YES	-	Bypass YES	-	Bypass YES	-
Conflicting EXITING Lanes	-	Conflicting EXITING Lanes	2,00	Conflicting EXITING Lanes	2,00	Conflicting EXITING Lanes	1,00
$v_{ex,pce,NB}$	243,00	$v_{ex,pce,EB}$	1.447,00	$v_{ex,pce,SB}$	1.236,00	$v_{ex,pce,WB}$	474,00
$C_{bypass,pce}$	-	$C_{bypass,pce}$	-	$C_{bypass,pce}$	-	$C_{bypass,pce}$	-

STEP 6: DETERMINE PEDESTRIAN IMPEDANCE TO VEHICLES

NORTH LEG		EAST LEG		SOUTH LEG		WEST LEG	
Nº of Lanes Entry	1,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	2,00	Nº of Lanes Entry	1,00
$v_{c,SB,pce}$	1.381	$v_{c,WB,pce}$	472	$v_{c,NB,pce}$	419	$v_{c,EB,pce}$	907
n_{ped}	50,00	n_{ped}	214,00	n_{ped}	50,00	n_{ped}	50,00
f_{ped}	1,000	f_{ped}	0,895	f_{ped}	0,963	f_{ped}	1,000

STEP 7: CONVERT LANE FLOW RATES AND CAPACITIES INTO VEHICLES PER HOUR												
NORTH LEG			EAST LEG				SOUTH LEG			WEST LEG		
$C_{e,pce}$	430	pc/h	$C_{e,pce}$	-	pc/h	$C_{e,pce}$	-	pc/h	$C_{e,pce}$	599	pc/h	
$C_{e,L,pce}$	-	pc/h	$C_{e,L,pce}$	793	pc/h	$C_{e,L,pce}$	825	pc/h	$C_{e,L,pce}$	-	pc/h	
$C_{e,R,pce}$	-	pc/h	$C_{e,R,pce}$	812	pc/h	$C_{e,R,pce}$	843	pc/h	$C_{e,R,pce}$	-	pc/h	
$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h	$C_{bypass,pce}$	-	pc/h	
f_{ped}	1,000		f_{ped}	0,895		f_{ped}	0,963		f_{ped}	1,000		
f_{HV}	-		f_{HV}	0,971		f_{HV}	0,971		f_{HV}	0,971		
C_{SB}	-	veh/h	C_{WB}	-	veh/h	C_{NB}	-	veh/h	C_{EB}	581	veh/h	
$C_{SB,L}$	-	veh/h	$C_{WB,L}$	689	veh/h	$C_{NB,L}$	772	veh/h	$C_{EB,L}$	-	veh/h	
$C_{SB,R}$	-	veh/h	$C_{WB,R}$	706	veh/h	$C_{NB,R}$	788	veh/h	$C_{EB,R}$	-	veh/h	
C_{bypass}	-	veh/h	C_{bypass}	-	veh/h	C_{bypass}	-	veh/h	C_{bypass}	-	veh/h	
$V_{e,SB,pce}$	-	pc/h	$V_{e,WB,pce}$	-	pc/h	$V_{e,NB,pce}$	-	pc/h	$V_{e,EB,pce}$	748	pc/h	
$V_{e,SB,LEFT,pce}$	-	pc/h	$V_{e,WB,LEFT,pce}$	541	pc/h	$V_{e,NB,LEFT,pce}$	705	pc/h	$V_{e,EB,LEFT,pce}$	-	pc/h	
$V_{e,SB,RIGHT,pce}$	-	pc/h	$V_{e,WB,RIGHT,pce}$	611	pc/h	$V_{e,NB,RIGHT,pce}$	795	pc/h	$V_{e,EB,RIGHT,pce}$	-	pc/h	
$V_{bypass,pce}$	-	pc/h	$V_{bypass,pce}$	-	pc/h	$V_{bypass,pce}$	-	pc/h	$V_{bypass,pce}$	-	pc/h	
f_{HV}	-		f_{HV}	0,971		f_{HV}	0,971		f_{HV}	0,971		
V_{SB}	-	veh/h	V_{WB}	-	veh/h	V_{NB}	-	veh/h	V_{EB}	726	veh/h	
$V_{SB,LEFT}$	-	veh/h	$V_{WB,LEFT}$	526	veh/h	$V_{NB,LEFT}$	684	veh/h	$V_{EB,LEFT}$	-	veh/h	
$V_{SB,RIGHT}$	-	veh/h	$V_{WB,RIGHT}$	593	veh/h	$V_{NB,RIGHT}$	772	veh/h	$V_{EB,RIGHT}$	-	veh/h	
V_{bypass}	-	veh/h	V_{bypass}	-	veh/h	V_{bypass}	-	veh/h	V_{bypass}	-	veh/h	

STEP 8: COMPUTE THE VOLUME-TO-CAPACITY RATIO FOR EACH LANE												
NORTH LEG			EAST LEG				SOUTH LEG			WEST LEG		
X_{SB}	-		X_{WB}	-		X_{NB}	-		X_{EB}	1,25		
$X_{SB,LEFT}$	-		$X_{WB,LEFT}$	0,76		$X_{NB,LEFT}$	0,89		$X_{EB,LEFT}$	-		
$X_{SB,RIGHT}$	-		$X_{WB,RIGHT}$	0,84		$X_{NB,RIGHT}$	0,98		$X_{EB,RIGHT}$	-		
$X_{bypass,SB}$	-		$X_{bypass,WB}$	-		$X_{bypass,NB}$	-		$X_{bypass,WB}$	-		

STEP 9: COMPUTE THE AVERAGE CONTROL DELAY FOR EACH LANE												
NORTH LEG			EAST LEG				SOUTH LEG			WEST LEG		
d_{SB}	-	s/veh	d_{WB}	-	s/veh	d_{NB}	-	s/veh	d_{EB}	148,57	s/veh	
$d_{SB,LEFT}$	-	s/veh	$d_{WB,LEFT}$	23,80	s/veh	$d_{NB,LEFT}$	33,72	s/veh	$d_{EB,LEFT}$	-	s/veh	
$d_{SB,RIGHT}$	-	s/veh	$d_{WB,RIGHT}$	30,11	s/veh	$d_{NB,RIGHT}$	49,90	s/veh	$d_{EB,RIGHT}$	-	s/veh	
d_{bypass}	-	s/veh	d_{bypass}	-	s/veh	d_{bypass}	-	s/veh	d_{bypass}	-	s/veh	

STEP 10: DETERMINE LOS FOR EACH LANE ON EACH APPROACH											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
LOS	-		LOS	-		LOS	-		LOS	LOS F	
LOS _{LEFT,LANE}	-		LOS _{LEFT,LANE}	LOS C		LOS _{LEFT,LANE}	LOS D		LOS _{LEFT,LANE}	-	
LOS _{RIGHT,LANE}	-		LOS _{RIGHT,LANE}	LOS D		LOS _{RIGHT,LANE}	LOS E		LOS _{RIGHT,LANE}	-	
LOS _{bypass}	-		LOS _{bypass}	-		LOS _{bypass}	-		LOS _{bypass}	-	

STEP 11: COMPUTE THE AVERAGE CONTROL DELAY AND DETERMINE LOS FOR EACH APPROACH AND THE ROUNDABOUT AS A WHOLE											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
d _{approach,SB}	-	s/veh	d _{approach,WB}	-	s/veh	d _{approach,NB}	-	s/veh	d _{approach,EB}	148,57	s/veh
LOS	-		LOS	-		LOS	-		LOS	LOS F	

INTERSECTION		
d _{intersection}	32,68	s/veh
LOS	LOS D	

STEP 12: COMPUTE 95TH PERCENTILE QUEUES FOR EACH LANE											
NORTH LEG			EAST LEG			SOUTH LEG			WEST LEG		
Q _{95,SB}	-	veh	Q _{95,WB}	-	veh	Q _{95,NB}	-	veh	Q _{95,EB}	27,87	veh
Q _{95,SB,LEFT}	-	veh	Q _{95,WB,LEFT}	7,15	veh	Q _{95,NB,LEFT}	11,46	veh	Q _{95,EB,LEFT}	-	veh
Q _{95,SB,RIGHT}	-	veh	Q _{95,WB,RIGHT}	9,44	veh	Q _{95,NB,RIGHT}	16,02	veh	Q _{95,EB,RIGHT}	-	veh
Q _{95,SB,bypass}	-	veh	Q _{95,WB,bypass}	-	veh	Q _{95,NB,bypass}	-	veh	Q _{95,EB,bypass}	-	veh