ANEXO 4 – ESTUDO DE TRÁFEGO

EIV URE VALORIZA

URE VALORIZA ENERGIA SPE SANTOS/SP

ESTUDO DE TRÁFEGO

(Outubro/ 2019)

URE Valoriza Energia SPE

SANTOS/SP

ESTUDO DE TRÁFEGO

Relatório Final

(Outubro/ 2019)

SUMÁRIO

APRESENTAÇÃO

A TTC Engenharia de Tráfego e de Transportes Ltda. foi contratada pela SGW Services para a elaboração do Estudo de Tráfego integrante do Estudo de Impacto Ambiental (EIA) e Relatório de Impacto Ambiental (RIMA), para a Unidade de Recuperação de Energia (URE Valoriza Santos), a qual irá utilizar resíduos sólidos urbanos (RSU) resultante da coleta pública realizada em 7 municípios da Baixada Santista.

O empreendimento em questão possui as seguintes características:

- **Tipo de Uso:** Unidade de Recuperação de Energia - URE
- **Local:** km 254+900 da Rodovia Cônego Domênico Rangoni (SP-055)

O relatório foi elaborado com base nas informações fornecidas pelo empreendedor quanto ao cronograma implantação do empreendimento, dados atuais de entradas e saídas de caminhões transportadores de resíduos para o Aterro CGR Terrestre Ambiental, e dados futuros das entradas e saídas dos caminhões de resíduos da URE Valoriza Energia SPE, nos tipos de atividades a serem desenvolvidas no empreendimento. Baseou-se também em dados obtidos em contagens de fluxo realizadas na Rodovia Cônego Domênico Rangoni; além de reuniões e esclarecimentos realizados entre as equipes técnicas da TTC e da SGW Services.

O estudo do empreendimento teve como escopo básico:

- Levantamento das características físicas e operacionais do empreendimento e do sistema viário de acesso;
- Levantamento das distribuições modal, temporal e espacial, das viagens geradas pelo empreendimento;
- Identificação da contribuição do tráfego gerado pelo empreendimento na operação atual e futura, considerando o acréscimo de tráfego gerado pela implantação do referido empreendimento.

São Paulo, Outubro de 2019

TTC Engenharia de Tráfego e de Transportes Ltda.

1. CARACTERIZAÇÃO

1.1. Localização

A URE Valoriza Energia SPE será implantada no município de Santos, no Estado de São Paulo, no km 254,9 da pista leste, sentido Guarujá, da Rodovia Cônego Domênico Rangoni (SP-055), onde a velocidade regulamentada é de 90km/h. A localização do empreendimento é apresentada na Figura 1.1

Figura 1.1 – Localização

Fonte: **SGW Services**

1.2. Características do Empreendimento

O empreendimento em estudo é uma Unidade de Recuperação de Energia (URE) que utilizará resíduos sólidos urbanos provenientes da coleta pública realizada em 7 dos 9 municípios da Baixada Santista, os quais atualmente são encaminhados para o aterro CGR Terrestre.

Os resíduos sólidos urbanos, RSU, que serão tratados termicamente para geração de energia na URE Valoriza serão provenientes da coleta de resíduos realizada nos municípios de Santos, São Vicente, Guarujá, Cubatão, Mongaguá, Bertioga e Praia Grande pelas empresas Terracom (pertencente ao Grupo Terrestre Ambiental) e Transluc.

O acesso ao empreendimento será pelo acesso existente na Rodovia Cônego Domênico Rangoni, conforme apresentado na Figura 1.2.

Figura 1.2 – Acesso ao Empreendimento

Fonte: **TTC**

1.3. Operação Atual

1.3.1. Transporte de Resíduos

As empresas , responsáveis pela logística de coleta, transbordo e descarga do RSU no CGR Terrestre, contam com uma frota de 61 veículos conforme detalhado na planilha a seguir. O transporte desses resíduos será mantido, não havendo alterações após a implantação da URE Valoriza.

Tabela 1.1 – Frota Utilizada no Transporte de Resíduos

FROTA EMPREGADA PELA TERRACOM/ TRANSLUC PARA TRANSPORTE DE RESÍDUOS DOS MUNICÍPIOS PARA A TERRESTRE									
Município	Coletor 15m³	Coletor 19m³	Carreta (30t)	Agregados (basculantes)		Poliguindaste	Carreta (29t)	Observações	
			V=55m³	Trucado	Toco	Caçamba V=4,8m³	V=25m³		
Bertioga			2						
Guarujá			7						
Santos			8						
Cubatão	2	8		5	6	2			
São Vicente	9	11							
Praia Grande							média 8vg/dia	Não é Terracom	
Mongaguá			1						

Fonte: **Terrestre Ambiental**

Esta frota opera nos períodos diurno e noturno para atender a demanda de coleta e disposição de resíduos no aterro continuamente.

No quadro abaixo apresentamos dados de entrada de veículos no aterro CGR Terrestre durante os 3 primeiros meses do ano de 2019.

Tabela 1.2 – Dados de Entrada e Saída do Aterro: Atual

Mês	Total Viagens Entrada	Média Viagens Dia	Média Viagens Hora	Horário Trabalho	
				Início	Final
Janeiro	4.660	155	8	07:20	23:40
Fevereiro	3.650	130	6	07:20	23:40
Março	3.952	132	7	07:20	23:40

Fonte: **Terrestre Ambiental**

Segundo dados da Terrestre Ambiental, na hora mais carregada do dia 01 de julho de 2019, uma segunda-feira, dia da semana com maior fluxo no aterro, entraram no aterro 19 caminhões. A Tabela abaixo demonstra os municípios de origem e a quantidade de caminhões de cada um na hora mais carregada.

Tabela 1.3 – Viagens por Município na Hora Mais Carregada

MUNICÍPIO DE ORIGEM	ENTRADAS
BERTIOGA	1
CUBATÃO	9
SANTOS	2
GUARUJÁ	2
MONGAGUÁ	2
PRAIA GRANDE	3

Fonte: **TTC com dados da Terrestre Ambiental**

1.3.2. Número de Funcionários na Operação Atual

O CGR Terrestre conta com cerca de 92 colaboradores envolvidos na operação do aterro, divididos em dois turnos de 8 horas, conforme apresentado na Tabela 1.4.

Tabela 1.4 –Funcionários na Operação Atual

1	HORÁRIO DE TRABALHO ATUAL - ATERRO SANITÁRIO CGR TERRESTRE									
	Mão de Obra	Segunda-feira a Sábado				Domingo				Nº de Funcionários
		Entrada	Saída	Entrada	Saída	Entrada	Saída	Entrada	Saída	
	Turno 01	07:20			15:40	07:20			15:40	92
	Turno 02	15:20			23:40					

Fonte: **Terrestre Ambiental**

A maioria dos funcionários acessa o CGR Terrestre utilizando o sistema de transporte fornecido pela empresa nos dois turnos: dois ônibus, que partem de Cubatão, e uma van, que parte de Santos na área das barcas de Vicente de Carvalho.

Apenas uma pequena parcela, cerca de cinco funcionários, utilizam veículo próprio para se deslocar até o local de trabalho.

1.4. Fase de Implantação

Durante a fase de implantação do empreendimento, o serviço de coleta de resíduos será mantido com o mesmo fluxo de caminhões.

1.4.1. Transporte de Equipamentos e Materiais

Todo o transporte de equipamentos e materiais necessários para a implantação da URE serão de responsabilidade da Valoriza Energia e serão realizados por empresas especializadas em movimentação de cargas dentro das normas vigentes.

Para as cargas especiais, devido ao peso, comprimento ou largura os transportes serão realizados em conformidade com o disposto no Código de Trânsito Brasileiro, com todas as providências de licenciamentos e pagamento de taxas necessárias para o tráfego.

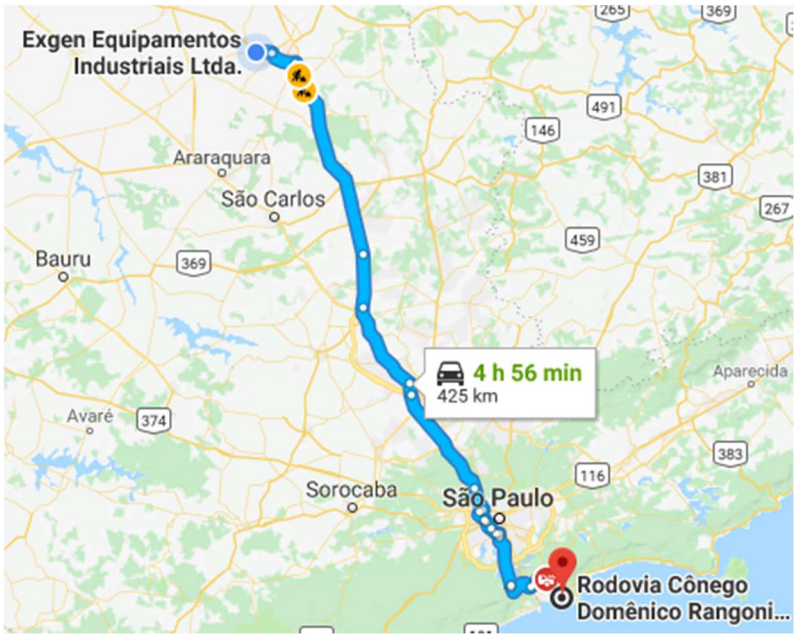
A previsão para a execução deste transporte é de 36 meses a partir da liberação das bases de fundações no canteiro de obras.

No planejamento da Valoriza Energia, todos os materiais, insumos e consumíveis enviados ao canteiro de obras serão recebidos, conferidos e armazenados em suas devidas áreas de acondicionamento, obedecendo procedimentos padrão para garantir a qualidade, a proteção e o controle de utilização e rastreabilidade.

Para a execução dos serviços de transportes, levou-se em consideração que todos os equipamentos, periféricos e acessórios pertencentes ao projeto serão expedidos a partir do Município de Sertãozinho, SP, onde se localiza a empresa de EPC (Engineering, Procurement e Construction) que irá executar as obras de implantação do empreendimento. A Exgen Equipamentos, empresa parceira da Ribeirão Energia, com parque industrial no Município de Sertãozinho, deverá produzir a caldeira e seus componentes, estruturas metálicas, *pipe rack*s e acessórios em geral. A expedição dos equipamentos e componentes adquiridos na Exgen e fabricados por outros fornecedores serão expedidos diretamente das unidades fabris para o canteiro de obra.

Estes materiais serão transportados através das rodovias Carlos Tonani, Rodo Anel Viário Sul – Ribeirão Preto, Anhanguera, Bandeirantes, Rodo Anel Viário Sul – São Paulo, Imigrantes ou Anchieta e Conego Domenico Rangoni, local de implantação do projeto, conforme apresentado na Figura 1.3.

Figura 1.3 – Percurso do Transporte de Equipamentos entre Exgen e URE Valoriza



Fonte: **Valoriza Energia**

Na Tabela 1.5 são apresentados os totais de viagens de máquinas e equipamentos que serão utilizados durante a fase de implantação da URE.

Tabela 1.5 – Tráfego de Máquinas e Equipamentos na Fase de Implantação

EQUIPAMENTOS IMPLANTAÇÃO URE VALORIZA						
Equipamentos	**Aplicação**	**Quantidade**	**Transporte**	**Rota**	**Periodicidade**	**Observação**
Retroescavadeira	Construção Civil	2	Prancha/Rodoviário	1	2 Viagens	Uma viagem na mobilização e outra na desmobilização
Caminhões Betoneiras – Concreto		360	Rodoviário	2	2 viagens/dia	-
Escavadeiras		1	Prancha/Rodoviário	1	2 Viagens	Uma viagem na mobilização e outra na desmobilização
Tratores		1	Prancha/Rodoviário	1	2 Viagens	
Trator Esteira D6		1	Prancha/Rodoviário	1	2 Viagens	
Caminhão Basculante		5	Rodoviário	1	2 Viagens	
Caminhão Pipa		1	Rodoviário	1	2 Viagens	
Perfuratrizes para Estacas		2	Carreta/Rodoviário	1	2 Viagens	
Rolo Compressor		1	Prancha/Rodoviário	1	2 Viagens	
Bombas de concreto		1	Carreta/Rodoviário	1	2 Viagens	
Bombas de água		2	Carreta/Rodoviário		2 Viagens	
Serra para corte de madeiras		2	Container/Rodoviário	1	2 Viagens	Uma viagem na mobilização e outra na desmobilização
Vibradores para concreto		5				
Ferramental para armadores		5				
Ferramental para Carpinteiros		5				
Ferramental para Pedreiros		5				

Equipamento para Topografia		2				
Betoneiras		5				
Guindaste Pequeno Porte – 25 Ton	Montagem Mecânica	2	Rodoviário	3	2 Viagens	Uma viagem na mobilização e outra na desmobilização
Guindaste Médio Porte – 50 Ton		1	Rodoviário	3	2 Viagens	
Guindaste Médio Porte – 80 Ton		1	Rodoviário	3	2 Viagens	
Guindaste Grande Porte – 110 Ton		1	Rodoviário	3	2 Viagens	
Guindaste Grande Porte – 250 Ton		1**	Rodoviário	4	8 Viagens	
Caminhão Munck 15 Ton		3	Rodoviário	3	2 Viagens	
Retificadoras de Solda 400 Amp		20	Container/Rodoviário	3	2 Viagens	Uma viagem na mobilização e outra na desmobilização
Retificadoras de Solda 600 Amp		3				
Máquinas de Corte – Plasma		2				
Conjunto Oxi Corte Completos – Maçarico		10				
Esmerilhadeira 7”		20				
Esmerilhadeira 4 ½”		20				
Furadeira de Bancada		2				
Furadeira Manual		5				
Calandra para chapas		1				
Mandrilhadora		2				

Painéis Elétricos		10				
Ferramental para Caldeireiros / Montadores		20				
Ferramental para Soldadores		20				
Ferramental para Mecânicos		2				
Ferramental para Alinhamento e Nivelamento		1				
Andaimes Tubo Roll		300				
Talha 3,0 Ton		5				
Catraca 15 Ton		5				
Plataforma Elevatória		1	Prancha/Rodoviário	3	2 Viagens	Uma viagem na mobilização e outra na desmobilização
Aparelho de Ultrason		1	Rodoviário	3	2 Viagens	
Maquina Manual para Curvar Tubos	Elétrica e Automação	1	Container/Rodoviário	3	2 Viagens	Uma viagem na mobilização e outra na desmobilização
Rosqueadeira		1				
Ferramental para Eletricistas		10				
Ferramental para Instrumentistas		10				
Utilitário e Automóveis	Gerenciamento	3	Rodoviário	5	4 viagens	2 viagens por dia, 2 automóveis (ida pela manhã e retorno no final do dia)
Utilitário e Automóveis	Gerenciamento	2	Rodoviário	5A	4 viagens	2 viagens na semana (ida na segunda-feira e retorno na sexta-feira)

Fonte: **Ribeirão Energia**

As rotas citadas na tabela anterior são detalhadas na Tabela 1.6 a seguir.

Tabela 1.6 – Tráfego de Equipamentos

Trafego Equipamentos Construção Civil + Montadoras da URE e Gerenciamento - 36 Meses													
	Destinos				Horário Circulação		Conduções		Rotas	Dias Uteis Trabalhados	Número de Viagens (Previsão)	Tipo	
Área	Quantidade	Santos	Sertãozinho	S. Bernardo	Entrada	Saída	Quant.	Tipo				Leve	Pesado
Equipamentos Construções Civis	11	11	0	0	7:30 as 10:30	10:30 as 16:00	11	Carretas	1	780	22	0	22
Betoneiras de Concreto	360	360	0	0	7:30 as 10:30	10:30 as 16:00	360	Caminhão Betoneira	2	780	720	0	720
Equipamentos Montagens	10	0	10	0	7:30 as 10:30	10:30 as 16:00	10	Carretas	3	780	20	0	20
Guindaste Pesado	8	0	0	8	6:30 as 7:30	15:00 as 17:00	8	Guindaste Pesado	4	780	8	0	8
Gerenciamento de Obra	312	0	312	0	8:00 as 13:00	16:00 as 21:00	2	Automóvel	5	156 Semanas	624	624	0

Fonte: **Ribeirão Energia**

1.4.2. Número de Funcionários na Fase de Implantação

Durante a fase de implantação da URE, o número de funcionários, incluído profissionais da construção civil, montagem mecânica, elétrica / automação e gerenciamento de obra poderá atingir 188, dependendo das etapas da obra, conforme apresentado na Tabela 1.7.

Tabela 1.7 –Funcionários Durante a Implantação da URE

Trafego Funcionários Implantação da URE - 36 Meses													
Funcionários (Pico dos Trabalhos)		Transportes Funcionários			Horário Circulação		Conduções		Rotas	Dias Uteis Trabalhados	Número de Viagens (Previsão)	Tipo	
Área	Quantidade	Santos	Guarujá	V. Carvalho	Entrada	Saída	Quant.	Tipo				Leve	Pesado
Construções Civis	65	65	0	0	6:30 as 7:30	17:00 as 18:00	4	3 Ônibus + 1 Automóvel	2	780	6.240	1.560	4.680
Montagem Mecânica	70	0	70	0	6:30 as 7:30	17:00 as 18:00	4	3 Ônibus + 1 Automóvel	5A	780	6.240	1.560	4.680
Montagem Elétrica / Automação	45	0	45	0	6:30 as 7:30	17:00 as 18:00	3	2 Ônibus + 1 Automóvel	5A	780	4.680	1.560	3.120
Gerenciamento de Obra	8	0	8	0	7:00 as 8:00	18:00 as 18:30	2	Automóvel	5A	780	3.120	3.120	0

Fonte: **Ribeirão Energia**

Na Tabela 1.8 são detalhadas as rotas de acesso de equipamentos e funcionários ao empreendimento na fase de implantação, também ilustradas na Figura 1.4 à Figura 1.15.

Tabela 1.8 – Rotas de Acesso ao Empreendimento

ROTA 1 – Terrestre Ambiental/ URE			
Número de Viagens	22 Viagens		
Rotas		Veículos	
		Leves	Pesados
Ponto de Saída - V1	Rod. Cônego Domênico Rangoni, 611	0	11
Ponto de Chegada - V1	Rod. Cônego Domênico Rangoni, Km 254,9		
Ponto de Saída - V2	Rod. Cônego Domênico Rangoni, Km 254,9	0	11
Ponto de Chegada - V2	Rod. Cônego Domênico Rangoni, 611		

ROTA 2 – Terracon/ URE			
Número de Viagens	6.240 Viagens		
Rotas		Veículos	
		Leves	Pesados
Ponto de Saída - V1	Rod. Cônego Domênico Rangoni, Km 264	780	2.340
Ponto de Chegada - V1	Rod. Cônego Domênico Rangoni, Km 254,9		
Ponto de Saída - V2	Rod. Cônego Domênico Rangoni, Km 254,9	780	2.340
Ponto de Chegada - V2	Rod. Cônego Domênico Rangoni, Km 264		

ROTA 3 – Exgen/ URE			
Número de Viagens	20 Viagens		
Rotas		Veículos	
		Leves	Pesados
Ponto de Saída - V1	Av. Marginal Antonio Aragão, 411	0	10
Ponto de Chegada - V1	Rod. Cônego Domênico Rangoni, Km 254,9		
Ponto de Saída - V2	Rod. Cônego Domênico Rangoni, Km 254,9	0	10
Ponto de Chegada - V2	Av. Marginal Antonio Aragão, 411		

ROTA 4 – São Bernardo do Campo/ URE			
Número de Viagens	8 Viagens		
Rotas		Veículos	
		Leves	Pesados
Ponto de Saída - V1	Município de São Bernardo do Campo	0	4
Ponto de Chegada - V1	Rod. Cônego Domênico Rangoni, Km 254,9		
Ponto de Saída - V2	Rod. Cônego Domênico Rangoni, Km 254,9	0	4
Ponto de Chegada - V2	Município de São Bernardo do Campo		

ROTA 5 – Exgen/ URE			
Número de Viagens	624 Viagens		
Rotas		Veículos	
		Leves	Pesados
Ponto de Saída - V1	Av. Marginal Antonio Aragão, 411	312	0
Ponto de Chegada - V1	Rod. Cônego Domênico Rangoni, Km 254,9		
Ponto de Saída - V2	Rod. Cônego Domênico Rangoni, Km 254,9	312	0
Ponto de Chegada - V2	Av. Marginal Antonio Aragão, 411		

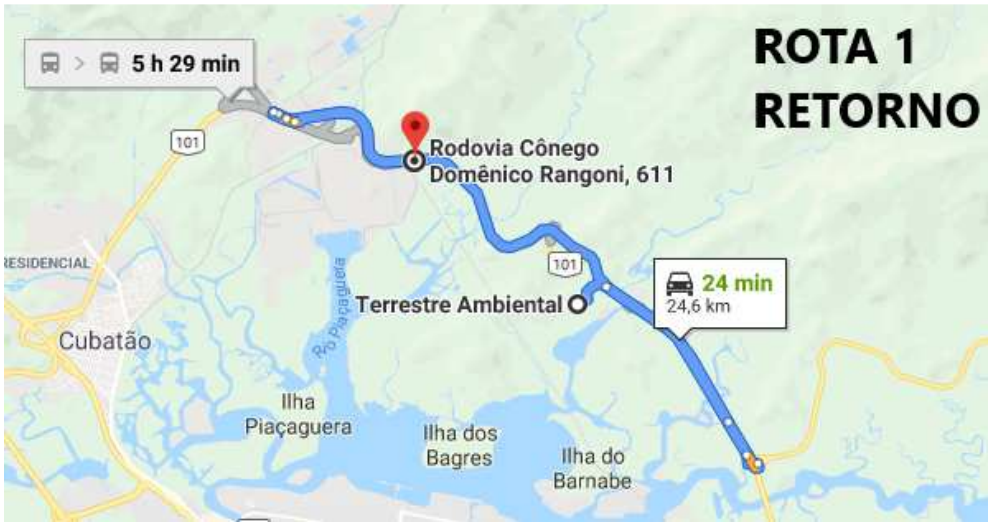
ROTA 5 A – URE/ Guarujá			
Número de Viagens	14.040 Viagens		
Rotas		Veículos	
		Leves	Pesados
Ponto de Saída – V3	Município do Guarujá	3.120	3.900
Ponto de Chegada – V3	Rod. Cônego Domênico Rangoni, Km 254,9		
Ponto de Saída – V4	Rod. Cônego Domênico Rangoni, Km 254,9	3.120	3.900
Ponto de Chegada – V4	Município do Guarujá		

Fonte: **Ribeirão Energia**

Figura 1.4 – Rota 1: V1

Fonte: **Ribeirão Energia**

Figura 1.5 – Rota 1: V2



Fonte: **Ribeirão Energia**

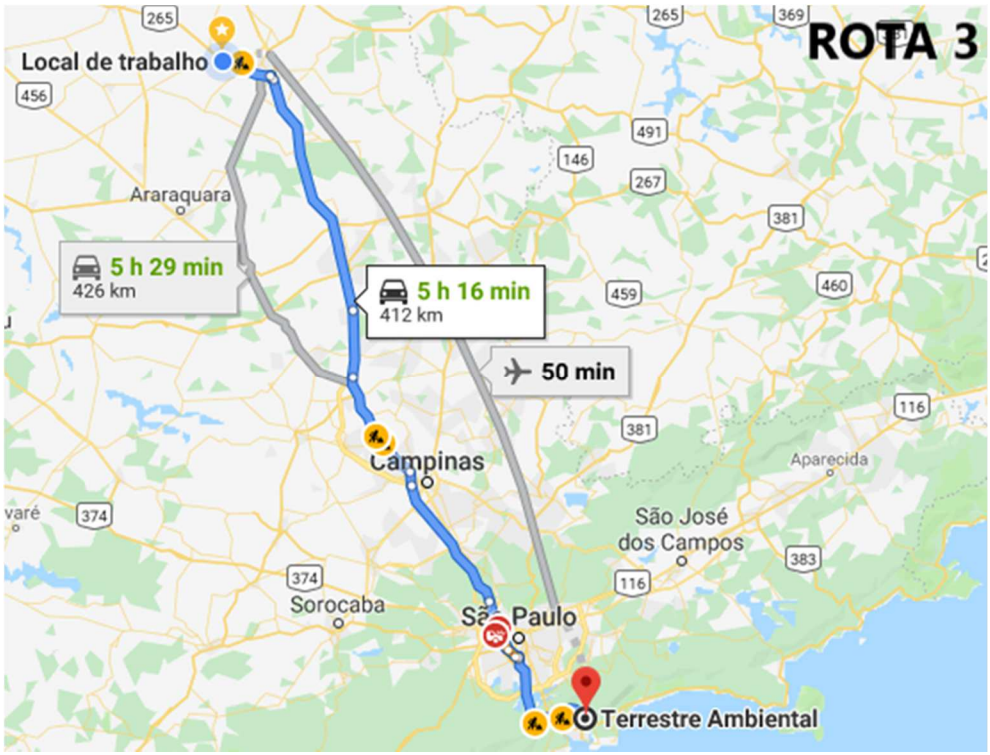
Figura 1.6 – Rota 2: V1

Fonte: **Ribeirão Energia**

Figura 1.7 – Rota 2: V2

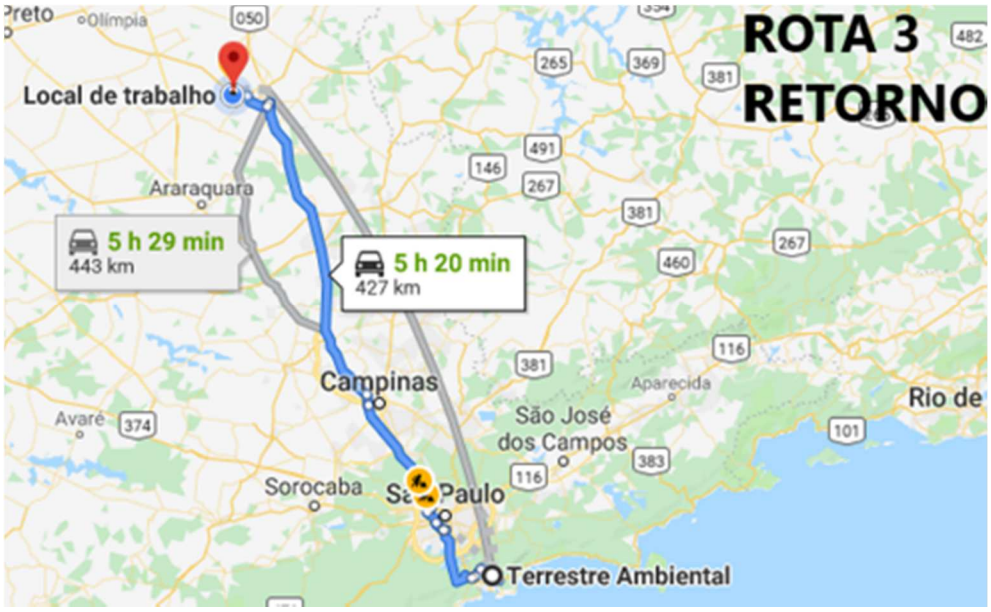
Fonte: **Ribeirão Energia**

Figura 1.8 – Rota 3: V1



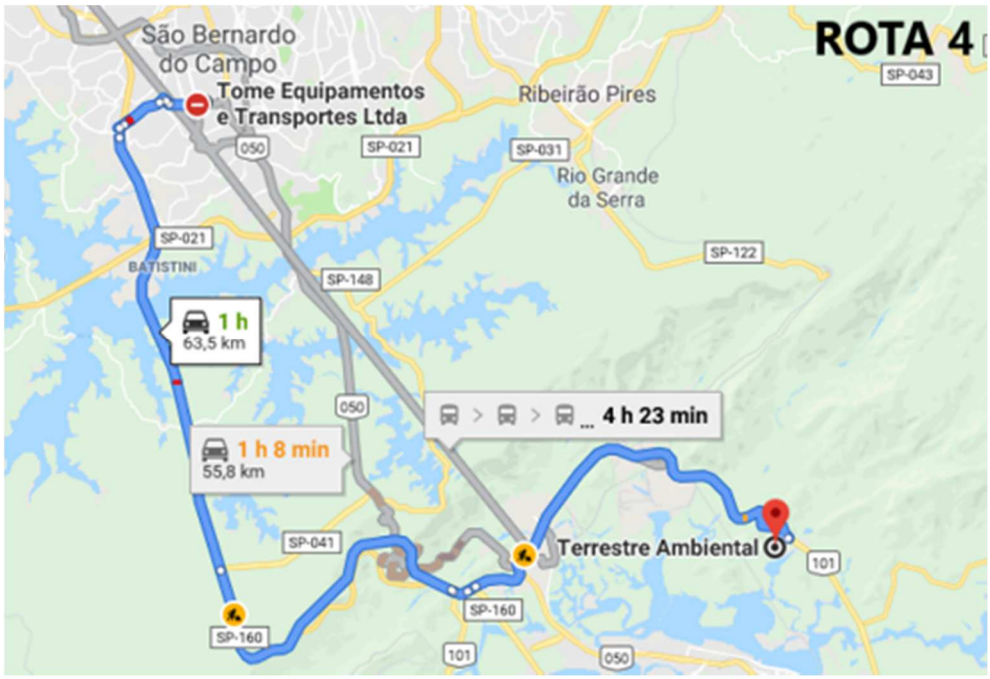
Fonte: **Ribeirão Energia**

Figura 1.9 – Rota 3: V2



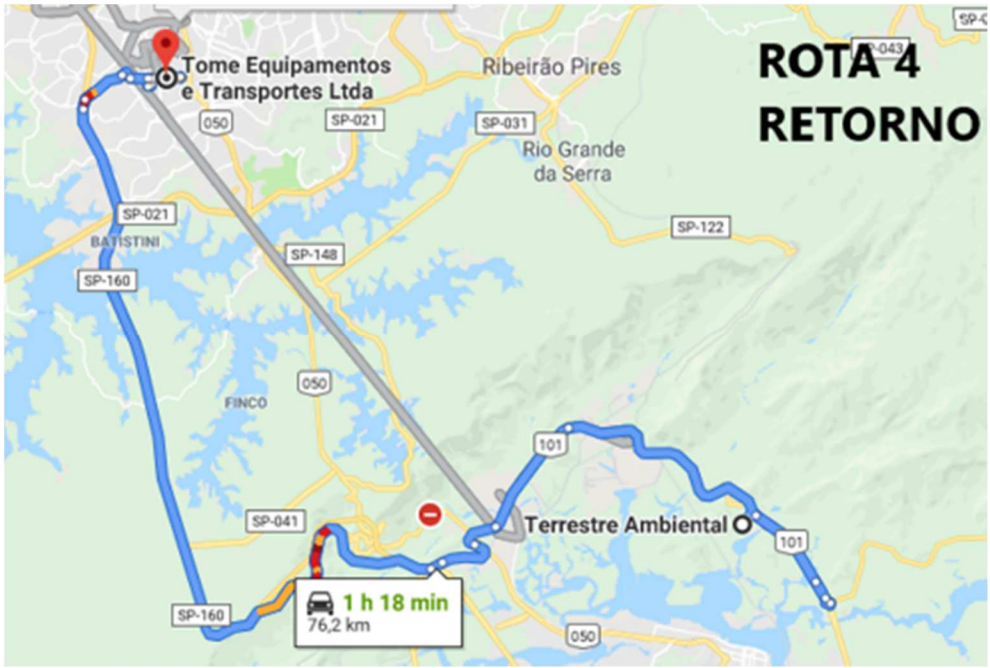
Fonte: **Ribeirão Energia**

Figura 1.10 – Rota 4: V1



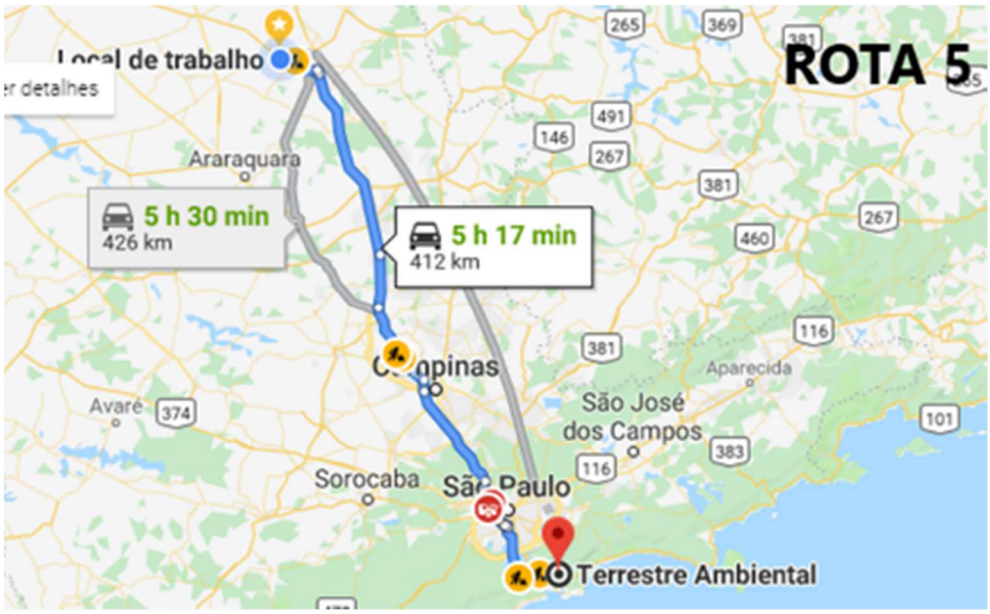
Fonte: **Ribeirão Energia**

Figura 1.11 – Rota 4: V2



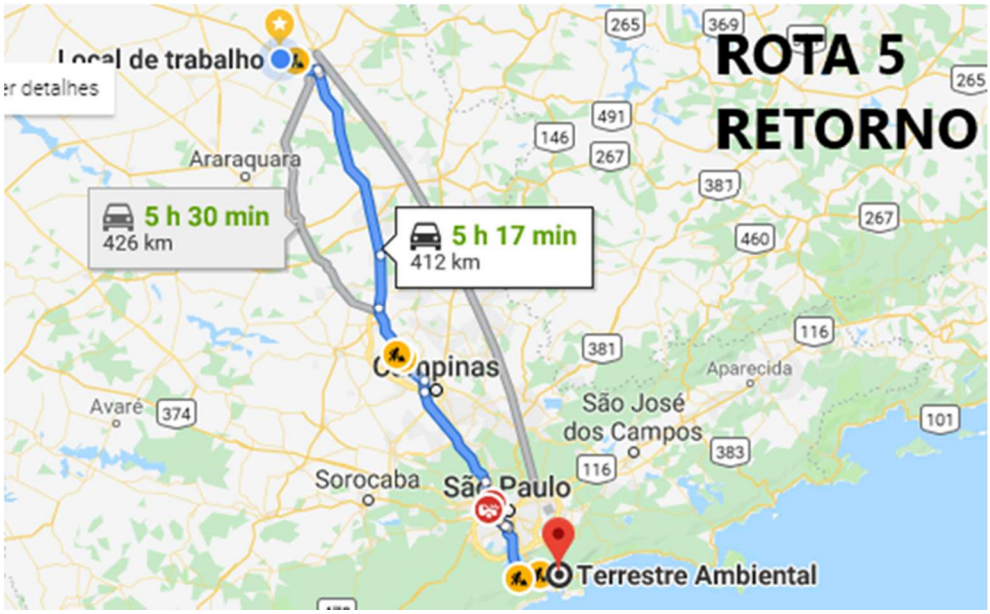
Fonte: **Ribeirão Energia**

Figura 1.12 – Rota 5: V1



Fonte: **Ribeirão Energia**

Figura 1.13 – Rota 5: V2



Fonte: **Ribeirão Energia**

Figura 1.14 – Rota 5 A: V3

Fonte: **Ribeirão Energia**

Figura 1.15 – Rota 5 A: V4

Fonte: **Ribeirão Energia**

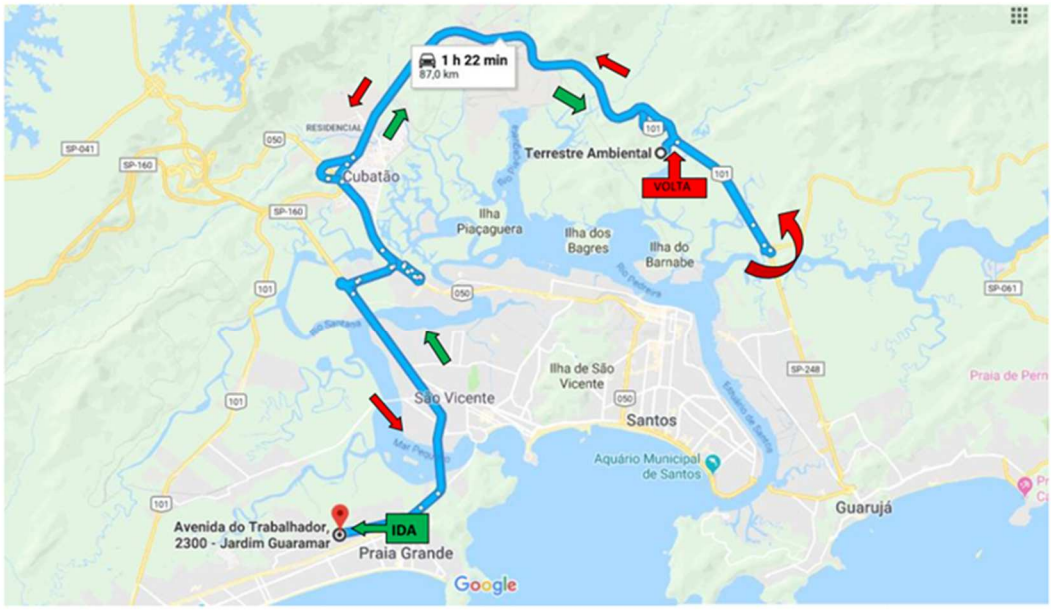
1.5. Operação Futura

1.5.1. Coleta e Transporte de Resíduos

Na operação futura, será mantida a frota de veículos existentes, que continuarão coletando os resíduos dos municípios de Santos, Guarujá, Cubatão, Mongaguá, Bertioga e Praia Grande. Atualmente o aterro não recebe resíduos do município de São Vicente, mas futuramente poderá passar a receber resíduos deste município.

Nas figuras a seguir são apresentados os trajetos que serão percorridos pelos veículos para cada um dos municípios citados.

Figura 1.16 – Trajeto do Transbordo: Praia Grande



Endereço: Avenida do Trabalhador, 2.300 – Jardim Guaramar - Praia Grande/SP.

Fonte: **Ribeirão Energia**

Figura 1.17 – Trajeto do Transbordo: Mongaguá

Endereço: Rua Estrela do Mar, 591-649 - Cidade Balneário Marinho - Mongaguá/SP.

Fonte: **Ribeirão Energia**

Figura 1.18 – Trajeto São Vicente

O Transbordo de São Vicente está desativado, estamos utilizando o endereço da garagem da Terracom.

Endereço: Rua Frei Gaspar, 3092 – Parque São Vicente – São Vicente/SP.

Fonte: **Ribeirão Energia**

Figura 1.19 – Trajeto do Transbordo: Guarujá

Endereço: Avenida Antenor Pimentel, s/n – Morrinhos – Guarujá/SP.

Fonte: **Ribeirão Energia**

Figura 1.20 – Trajeto do Transbordo: Santos

Endereço: Rua C, s/n – Alemoa – Santos/SP.

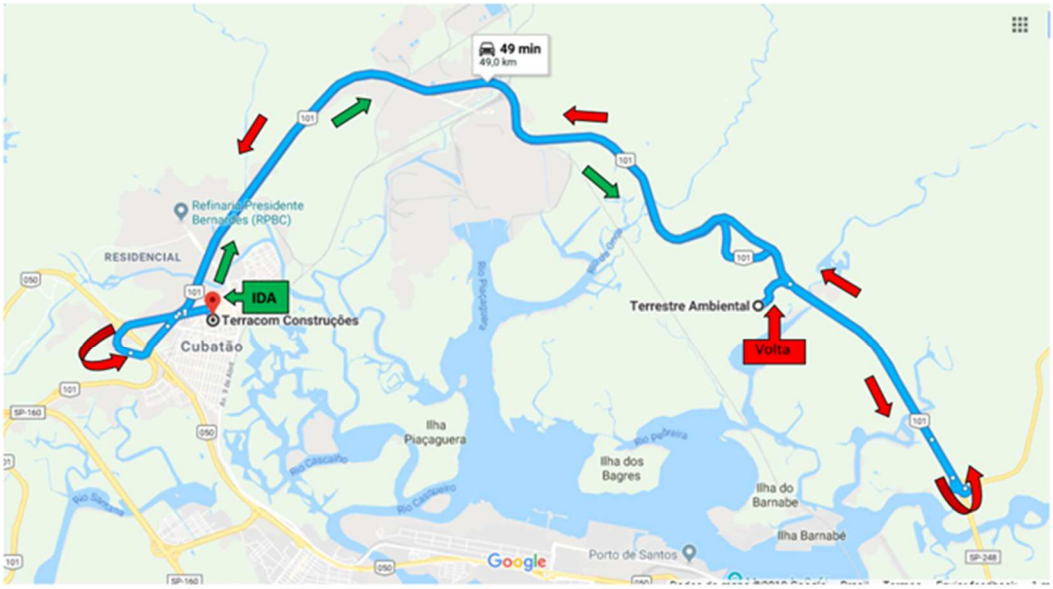
Fonte: **Ribeirão Energia**

Figura 1.21 – Trajeto do Transbordo: Bertioga

Endereço: Rodovia Manoel Hipólito Rego Km 227 – Bertioga/SP.

Fonte: **Ribeirão Energia**

Figura 1.22 – Trajeto Cubatão



Não há Transbordo de resíduos no município, estamos utilizando o endereço da garagem da Terracom.

Endereço: Rua Professora Ana Dias, 162 - Vila Paulista, Cubatão/SP.

Fonte: **Ribeirão Energia**

1.5.2. Número de Funcionários na Fase de Operação do Empreendimento

Na Tabela 1.9 apresenta-se o número de funcionários na Fase de Operação da URE, que deverá operar em três turnos de 8 horas cada.

Tabela 1.9 –Funcionários na Fase de Operação Futura da URE

	HORÁRIO DE TRABALHO - OPERAÇÃO URE VALORIZA									
	Mão de Obra	Segunda-feira a Sábado				Domingo				Nº de Funcionários
		Entrada	Saída	Entrada	Saída	Entrada	Saída	Entrada	Saída	
3	Turno 01	07:20			15:40	07:20			15:40	88
	Turno 02	15:20			23:40	15:20			23:40	
	Turno 03	23:20			07:20	23:20			07:20	
	Comercial	07:20			16:20	NA			NA	

Fonte: **Ribeirão Energia**

Observa-se que o número de funcionários é muito próximo do atual. Assim, estima-se que serão mantidas as viagens do transporte de passageiros existente.

Na Tabela 1.10 é apresentado o quadro detalhado de funcionários da URE.

Tabela 1.10 – Quadro de Funcionários da URE

QUADRO DE FUNCIONÁRIOS		Nível	Regime Mão de Obra	Regime Trabalho	Número de Funcionários por Turno	Número Total Funcionários 88	Detalhamento Funções
Gerência Geral - Coordenação Operacional / Manutenção							
1	Gerente/ Coordenador	Superior	MI - 1	Comercial	1	1	Gerenciamento Operacional da URE Gerenciamento Plano de Manutenção da URE Gerenciamento Plano de Fornecimento Combustíveis e Insumos Gerenciamento Planto de Controle Ambiental Gerenciamento Indicadores de Performance e Custos da URE
Operação URE - Utilidades							
2	Líder de Turno Geração de Vapor e Energia Elétrica	Técnico	MD	Escala	1	3	Supervisiona atividades relacionadas a operação dos equipamentos, responsável pela disciplina e elabora escalas de trabalhos dos colaboradores. Auxilia na geração do plano de manutenção da URE.
3	Operador de Sala - Sistema Transporte de RSU, Bioestabilizadores e Transporte de CDR	Técnico	MD	Escala	1	3	Acompanha o funcionamento dos equipamentos via Supervisório e realiza ajustes quando necessário via computador ou solicita ao operador de campo para ajustes *in loco*.
4	Operador de Sala - ETA/ ETA Desmi, Caldeira e seus Periféricos + Sistema de Tratamento dos Gases	Técnico	MD	Escala	1	3	Acompanha o funcionamento dos equipamentos via Supervisório e realiza ajustes quando necessário via computador ou solicita ao operador de campo para ajustes *in loco*.
5	Operador de Sala- Turbogerador, Torres de Resfriamento e Exportação de Energia	Técnico	MD	Escala	1	3	Acompanha o funcionamento dos equipamentos via Supervisório e realiza ajustes quando necessário via computador ou solicita ao operador de campo para ajustes *in loco*.
6		Técnico	MD	Escala	1	3	Acompanha o funcionamento dos equipamentos (Bombas/ Ventiladores/ Válvulas

	Operador ETA/ ETA Desmi e Torre de Resfriamento						Acompanha a qualidade de água e realiza ajustes conforme parâmetros exigidos
7	Operador de Campo - Caldeira/ Tratamento de Gás	Técnico	MD	Escala	1	3	Acompanha o funcionamento dos equipamentos e periféricos da caldeira, sendo roscas de cinzas, bombas d´água, grelhas de queima, desaerador, etc.
8	Operador de Campo - Turbina e Condensador	Técnico	MD	Escala	1	3	Acompanha o funcionamento dos equipamentos e periféricos da turbina e condensador, instrumentos, válvulas, bombas e manobras como troca de filtros de água e óleo, etc.
9	Operador de Pá Carregadeira	Médio	MD	Escala	1	3	Efetua a mistura e alimentação de combustível dentro do silo de armazenamento
10	Operador de Ponte Rolante e Garra Hidráulica	Médio	MD	Escala	2	6	Opera Ponte Rolante e Garra Hidráulica na alimentação do sistema de transporte de RSU - Alimentação do Abre Saco
11	Operador campo - recebimento RSU/ Sistema Transportes/ Tratamento	Médio	MD	Escala	2	8	Opera e acompanha o funcionamento dos equipamentos responsáveis pela mistura e alimentação de combustível (RSU) na caldeira.
12	Ajudante Prático	Médio	MD	Escala	1	3	Auxilia processo operacional da planta Executa limpezas nas áreas operacionais da planta - Caldeira, Turbo, Gerador, etc.
13	Operador de campo - resíduos gerados	Médio	MD	Escala	1	3	Responsável pela retirada transporte e armazenagem dos resíduos.
Apoio Operacional							
14	Técnico em Laboratório	Técnico	MD	Escala	1	3	Responsável pela coleta e análise de água, condensados, CDR e resíduos. Responsável pela qualidade de fluidos e resíduos e realiza ajustes conforme parâmetros exigidos por normas e fabricantes de equipamentos e insumos. Emite laudos laboratoriais.
15	Técnico Meio Ambiente	Técnico	MI	Comercial	1	1	Responsável pelo gerenciamento ambiental da URE seguindo as normas e demais legislações aplicáveis à operação. Gerenciamento dos programas e planos ambientais, bem como do monitoramento das águas subterrâneas e superficias.
16	Assistente Administrativo	Técnico	MI - 1	Comercial	1	1	Auxilia e apoia o processo administrativo da planta térmica. Atende as necessidades burocráticas para compras, RH, etc.
17	Almoxarife	Técnico	MI - 1	Comercial	1	1	Responsável pelo recebimento, armazenagem, controle de estoque e distribuição de insumos, consumíveis, peças de reposição, etc.
Manutenção							
18	Supervisor Mecânica, Elétrica e Instrumentação	Superior	MI	Comercial	1	1	Coordena o Plano de Manutenção da Planta Térmica Responsável pela distribuição de tarefas das equipes de manutenção Elabora e acompanha controles e cronogramas de manutenções preventivas e corretivas.
19	Mecânico	Técnico	MI	Escala	1	3	Executa manutenção em equipamentos mecânicos, verificando causas de defeitos e/ ou substituindo peças danificadas.
20	Caldereiro/ Montador	Técnico	MI	Comercial	1	1	Executa manutenção em equipamentos danificados pelo uso. Fabrica e monta novos equipamentos e dispositivos. Manutenção em Geral.
21	Eletricista NR10	Técnico	MI	Escala	1	3	Executa manutenção em equipamentos elétricos verificando causa de defeitos e/ou substituindo peças danificadas pelo uso. Manutenção preventiva e corretiva. Manutenção em alta e baixa tensão.
22	Soldador Tig/ Eletrodo Revestido	Técnico	MI	Comercial	1	1	Executa soldagens qualificadas com eletrodos, arames Mig e varetas Tig em máquinas, tubulações de alta e baixa pressão, estruturas industriais e equipamentos diversos.
23	Ajudante Prático	Médio	MI	Escala	4	12	Auxiliar na execução de atividades do departamento de manutenção.

24	Instrumentista	Técnico	MI	Escala	1	3	Executa manutenção em equipamentos e instrumentos de automação, verificando causas de defeitos e/ ou substituindo peças danificadas. Regulagem de instrumentos conforme parâmetros operacionais.
Administrativo/ Serviços Gerais							
25	Técnico Segurança Trabalho	Técnico	MI - 1	Comercial	1	1	Responsável pela segurança dos trabalhadores da URE, aplicando as normas trabalhistas (NRs do Ministério do Trabalho), incluindo uso de EPI´s, segurança no uso dos equipamentos da URE, controle dos dispositivos de segurança na execução de tarefas, ergonomia elaboração de PPRA e PCMSO, etc.
26	Supervisor de Recursos Humanos	Superior	MI	Comercial	1	1	Recrutamento e seleção (triagem de currículos, entrevistas, testes). Treinamento e desenvolvimento da equipe. Cargos e salários (estrutura e descrição de cargos e funções, pesquisa salarial, política de remuneração, promoção e reajustes). Remuneração e benefícios. Folha de pagamento (admissão, controle de ponto, cálculos de folha, férias, rescisões) Relações trabalhistas (negociação com sindicato, processos trabalhistas).
27	Portaria Central/ Balanceiro	Médio	MI - 1	Escala	1	4	Responsável pelo controle de entrada e saída de funcionários e visitantes na URE. Responsável pelo controle de entrada e pesagem dos veículos de transporte de RSU, insumos e consumíveis.
28	Vigilante Segurança Patrimonial	Médio	MI	Escala	1	4	Responsável pela vigilância patrimonial da URE.
29	Auxiliar de Limpeza	Médio	MI	Comercial	2	2	Executa tarefas de limpeza e organização das áreas da URE.
30	Motorista	Médio	MI	Comercial	1	1	Apoio aos departamentos da URE.

Fonte: **Ribeirão Energia**

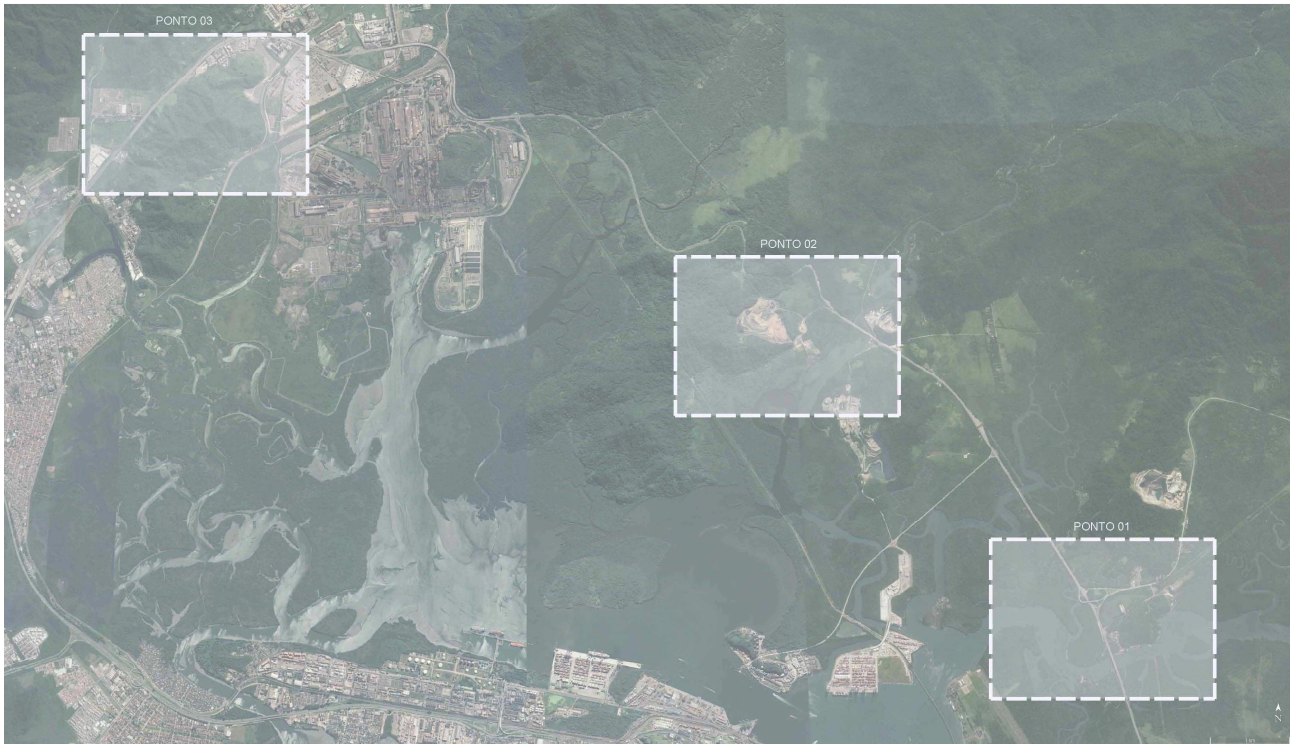
2. FLUXO DE PASSAGEM

2.1. Fluxo de Passagem Existente

Foram realizadas contagens veiculares classificadas na seção da rodovia e em movimentos específicos pelas rotas a serem utilizadas pelo empreendimento em um dia típico, das 06h – 22h, classificados em auto, ônibus, caminhão e moto realizada nos dias 25 e 27 de junho do 2019.

Nas figuras a seguir são apresentados os locais e movimentos contados e no ANEXO 1 podem ser consultadas as tabelas com a tabulação completa das contagens.

Figura 2.1 – Localização dos pontos de contagem



Fonte: **TTC**

Figura 2.2 – Movimentos de Contagem: Ponto 1

Fonte: **TTC**

Figura 2.3 – Movimentos de Contagem: Ponto 2

Fonte: **TTC**

Figura 2.4 – Movimentos de Contagem: Ponto 3

Fonte: **TTC**

Na Tabela 2.1, Tabela 2.2, Tabela 2.3 e Tabela 2.4 são apresentados os valores horários das contagens e no capítulo 7 ANEXOS são apresentados os dados coletados de 15 em 15 minutos.

Tabela 2.1 – Resumo das contagens: Movimentos 1 a 3 – 2019

VOLUME POR MOVIMENTO												
Hora	MOVIMENTO 1				MOVIMENTO 2				MOVIMENTO 3			
	Auto	Ônibus	Cam.	Moto	Auto	Ônibus	Cam.	Moto	Auto	Ônibus	Cam.	Moto
06:00 - 07:00	243	**16**	181	**185**	16	0	101	2	57	0	23	13
07:00 - 08:00	305	10	152	115	5	0	72	2	90	1	24	7
08:00 - 09:00	257	3	223	45	6	0	106	1	116	0	19	9
09:00 - 10:00	260	4	232	39	10	0	128	0	**121**	1	18	9
10:00 - 11:00	219	6	167	41	10	0	128	0	91	0	**27**	7
11:00 - 12:00	238	2	230	23	15	**3**	131	0	93	1	10	7
12:00 - 13:00	165	2	190	18	9	0	97	0	82	1	9	6
13:00 - 14:00	255	4	186	48	9	0	103	1	72	1	19	5
14:00 - 15:00	235	6	**262**	77	13	0	135	0	58	1	19	7
15:00 - 16:00	308	2	181	46	10	0	107	2	65	1	12	**14**
16:00 - 17:00	328	6	243	34	**19**	0	125	1	68	0	7	6
17:00 - 18:00	**355**	7	206	82	18	1	**152**	**3**	74	0	8	8
18:00 - 19:00	287	4	181	61	11	1	53	2	69	1	7	11
19:00 - 20:00	165	8	157	35	7	0	43	0	49	0	6	8
20:00 - 21:00	93	3	124	15	4	0	46	1	24	**2**	0	0
21:00 - 22:00	90	3	94	14	1	0	39	0	21	0	1	1
Total	**3803**	**86**	**3009**	**878**	**163**	**5**	**1566**	**15**	**1150**	**10**	**209**	**118**

Elaboração: **Cambury – Adaptação TTC** Cam.: Caminhões

Tabela 2.2 – Resumo das contagens: Movimentos 4 a 6 – 2019

VOLUME POR MOVIMENTO												
Hora	MOVIMENTO 4				MOVIMENTO 5				MOVIMENTO 6			
	Auto	Ônibus	Cam.	Moto	Auto	Ônibus	Cam.	Moto	Auto	Ônibus	Cam.	Moto
06:00 - 07:00	**5**	**0**	0	0	43	1	5	9	139	5	244	54
07:00 - 08:00	3	**0**	0	0	66	1	6	10	**363**	7	**316**	85
08:00 - 09:00	3	**0**	**2**	0	83	1	9	2	281	7	226	13
09:00 - 10:00	3	**0**	1	0	96	1	12	5	304	10	242	28
10:00 - 11:00	1	**0**	0	0	111	0	20	8	283	3	229	21
11:00 - 12:00	4	**0**	0	0	94	0	21	6	235	6	230	24
12:00 - 13:00	4	**0**	0	0	93	1	20	4	253	2	228	32
13:00 - 14:00	1	**0**	0	0	102	0	21	**14**	253	7	195	24
14:00 - 15:00	3	**0**	1	1	117	1	23	6	183	8	260	20
15:00 - 16:00	2	**0**	0	1	144	**2**	26	12	174	5	237	43
16:00 - 17:00	4	**0**	0	1	**149**	1	**32**	11	198	7	266	32
17:00 - 18:00	4	**0**	0	1	142	1	20	12	312	9	222	**92**
18:00 - 19:00	**5**	**0**	0	1	111	1	15	2	225	9	227	77
19:00 - 20:00	3	**0**	0	0	69	1	9	6	238	**13**	192	39
20:00 - 21:00	**5**	**0**	0	0	32	0	5	1	150	7	159	16
21:00 - 22:00	0	**0**	0	**2**	23	1	3	6	128	6	154	14
Total	**50**	**0**	**4**	**7**	**1475**	**13**	**247**	**114**	**3719**	**111**	**3627**	**614**

Elaboração: **Cambury – Adaptação TTC** Cam.: Caminhões

Tabela 2.3 – Resumo das contagens: Movimentos 7 a 9 – 2019

VOLUME POR MOVIMENTO												
Hora	MOVIMENTO 7 - ENTRADA NO ATERRO				MOVIMENTO 8 - SAÍDA DO ATERRO				MOVIMENTO 9			
	Auto	Ônibus	Cam.	Moto	Auto	Ônibus	Cam.	Moto	Auto	Ônibus	Cam.	Moto
06:00 - 07:00	0	0	0	**0**	0	0	0	**0**	10	4	9	9
07:00 - 08:00	**5**	**2**	14	**0**	2	0	7	**0**	18	18	21	**14**
08:00 - 09:00	1	0	13	**0**	2	0	13	**0**	16	**33**	23	0
09:00 - 10:00	2	0	11	**0**	1	0	19	**0**	20	4	30	2
10:00 - 11:00	2	0	**18**	**0**	3	0	13	**0**	**21**	1	29	4
11:00 - 12:00	4	0	**18**	**0**	3	0	**20**	**0**	9	3	32	1
12:00 - 13:00	1	0	15	**0**	2	0	14	**0**	11	0	38	0
13:00 - 14:00	4	0	14	**0**	0	0	14	**0**	15	4	28	4
14:00 - 15:00	1	0	11	**0**	4	0	9	**0**	15	5	**45**	5
15:00 - 16:00	0	0	15	**0**	0	**1**	11	**0**	14	6	30	2
16:00 - 17:00	2	0	10	**0**	2	0	17	**0**	15	2	31	6
17:00 - 18:00	2	0	2	**0**	**5**	**1**	4	**0**	14	0	39	3
18:00 - 19:00	1	0	4	**0**	0	0	3	**0**	6	2	32	2
19:00 - 20:00	1	0	2	**0**	0	0	4	**0**	4	2	22	9
20:00 - 21:00	0	0	2	**0**	0	0	4	**0**	1	0	22	4
21:00 - 22:00	0	0	0	**0**	0	0	0	**0**	5	1	18	3
Total	**26**	**2**	**149**	**0**	**24**	**2**	**152**	**0**	**194**	**85**	**449**	**68**

Elaboração: **Cambury – Adaptação TTC** Cam.: Caminhões

Tabela 2.4 – Resumo das contagens: Movimentos 10 e 11 – 2019

VOLUME POR MOVIMENTO								
Hora	MOVIMENTO 10				MOVIMENTO 11			
	Auto	Ônibus	Cam.	Moto	Auto	Ônibus	Cam.	Moto
06:00 - 07:00	15	11	17	3	105	12	9	28
07:00 - 08:00	30	13	16	7	**187**	**26**	12	**75**
08:00 - 09:00	28	17	11	6	46	13	15	9
09:00 - 10:00	26	16	14	5	39	13	**22**	4
10:00 - 11:00	35	10	19	3	38	10	16	5
11:00 - 12:00	36	13	**27**	7	27	10	13	6
12:00 - 13:00	31	12	22	5	42	8	15	15
13:00 - 14:00	27	13	22	6	23	12	12	8
14:00 - 15:00	29	7	17	8	34	9	13	12
15:00 - 16:00	54	16	18	7	38	12	16	6
16:00 - 17:00	91	13	22	29	29	10	11	4
17:00 - 18:00	**139**	**28**	19	**52**	28	13	16	3
18:00 - 19:00	50	14	21	12	29	11	18	9
19:00 - 20:00	32	10	19	13	20	10	17	4
20:00 - 21:00	10	9	14	1	15	9	17	1
21:00 - 22:00	12	10	11	7	11	10	7	3
Total	**645**	**212**	**289**	**171**	**711**	**188**	**229**	**192**

Elaboração: **Cambury – Adaptação TTC** Cam.: Caminhões

A partir dos movimentos de contagem, estimou-se o volume na seção da rodovia no sentido de Guarujá (pista leste) e Cubatão (pista oeste), conforme apresentado na Tabela 2.5.

Tabela 2.5 – Volume na Rodovia SP-055 – 2019

VOLUME POR MOVIMENTO									
HORÁRIO	PISTA OESTE - CUBATÃO				PISTA LESTE - GUARUJÁ				TOTAL
	Auto	Ônibus	Caminhão	VEIC. EQ.	Auto	Ônibus	Caminhão	VEIC. EQ.	VEIC. EQ.
06:00 - 07:00	297	17	287	753	212	5	368	772	1.525
07:00 - 08:00	373	11	230	735	458	8	412	1.088	1.823
08:00 - 09:00	343	4	336	853	403	7	351	940	1.793
09:00 - 10:00	363	5	371	927	435	11	388	1.034	1.961
10:00 - 11:00	339	6	315	821	384	3	384	965	1.785
11:00 - 12:00	343	5	382	924	343	10	371	915	1.838
12:00 - 13:00	263	3	307	728	344	3	334	850	1.578
13:00 - 14:00	365	4	310	836	334	8	317	822	1.658
14:00 - 15:00	362	7	419	1.001	254	9	414	889	1.890
15:00 - 16:00	460	4	314	937	249	6	356	792	1.729
16:00 - 17:00	492	7	400	1.103	285	7	398	893	1.995
17:00 - 18:00	**511**	**9**	**378**	**1.092**	**404**	**10**	**382**	**992**	**2.084**
18:00 - 19:00	404	6	249	787	305	11	287	752	1.539
19:00 - 20:00	238	9	209	565	294	13	241	675	1.240
20:00 - 21:00	124	3	175	391	178	9	205	499	890
21:00 - 22:00	114	4	136	324	150	6	194	450	774
Total	**5.391**	**104**	**4.818**	**12.774**	**5.032**	**126**	**5.402**	**13.324**	**26.098**

Elaboração: **TTC**

Observa-se que a hora com maior volume na Rodovia, em veículos equivalentes, é entre 17h00 e 18h00, que será a hora analisada.

2.2. Fatores Aplicados aos Dados de Fluxo

O fator de crescimento do fluxo, com base nas informações dos últimos dez anos fornecidas pelo Índice **ABCR, da Associação Brasileira de Concessionárias de Rodovias**, disponíveis no portal http://www.abcr.org.br/Conteudo/Secao/23/sao+paulo.aspx foi de 2,3% ao ano. Por meio desse fator, os valores atuais do fluxo de passagem são extrapolados para o cenário futuro referente ao ano de 2020, ano de início de implantação da URE, 2023, ano da conclusão da implantação da URE, e 2033, dez anos após a conclusão da implantação do empreendimento.

Mediante a aplicação do fator de crescimento do fluxo de passagem sobre os valores dos movimentos de contagem obtidos em 2019 demonstrados nas Tabelas anteriores, obtêm-se os valores das Tabelas seguintes.

Tabela 2.6 – Resumo das contagens: Movimentos 1 a 3 – 2020

VOLUME POR MOVIMENTO												
Hora	MOVIMENTO 1				MOVIMENTO 2				MOVIMENTO 3			
	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto
06:00 - 07:00	249	**16**	185	**189**	16	0	103	2	58	0	24	13
07:00 - 08:00	312	10	156	118	5	0	74	2	92	1	25	7
08:00 - 09:00	263	3	228	46	6	0	108	1	119	0	19	9
09:00 - 10:00	266	4	237	40	10	0	131	0	**124**	1	18	9
10:00 - 11:00	224	6	171	42	10	0	131	0	93	0	**28**	7
11:00 - 12:00	243	2	235	24	15	**3**	134	0	95	1	10	7
12:00 - 13:00	169	2	194	18	9	0	99	0	84	1	9	6
13:00 - 14:00	261	4	190	49	9	0	105	1	74	1	19	5
14:00 - 15:00	240	6	**268**	79	13	0	138	0	59	1	19	7
15:00 - 16:00	315	2	185	47	10	0	109	2	66	1	12	**14**
16:00 - 17:00	336	6	249	35	**19**	0	128	1	70	0	7	6
17:00 - 18:00	**363**	7	211	84	18	1	**156**	**3**	76	0	8	8
18:00 - 19:00	294	4	185	62	11	1	54	2	71	1	7	11
19:00 - 20:00	169	8	161	36	7	0	44	0	50	0	6	8
20:00 - 21:00	95	3	127	15	4	0	47	1	25	**2**	0	0
21:00 - 22:00	92	3	96	14	1	0	40	0	21	0	1	1
Total	**3.891**	**88**	**3.078**	**898**	**167**	**5**	**1.602**	**15**	**1.176**	**10**	**214**	**121**

Elaboração: **TTC**

Tabela 2.7 – Resumo das contagens: Movimentos 4 a 6 – 2020

VOLUME POR MOVIMENTO												
Hora	MOVIMENTO 4				MOVIMENTO 5				MOVIMENTO 6			
	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto
06:00 - 07:00	**5**	**0**	0	0	44	1	5	9	142	5	250	55
07:00 - 08:00	3	**0**	0	0	68	1	6	10	**371**	7	**323**	87
08:00 - 09:00	3	**0**	**2**	0	85	1	9	2	287	7	231	13
09:00 - 10:00	3	**0**	1	0	98	1	12	5	311	10	248	29
10:00 - 11:00	1	**0**	0	0	114	0	20	8	290	3	234	21
11:00 - 12:00	4	**0**	0	0	96	0	21	6	240	6	235	25
12:00 - 13:00	4	**0**	0	0	95	1	20	4	259	2	233	33
13:00 - 14:00	1	**0**	0	0	104	0	21	**14**	259	7	199	25
14:00 - 15:00	3	**0**	1	1	120	1	24	6	187	8	266	20
15:00 - 16:00	2	**0**	0	1	147	**2**	27	12	178	5	242	44
16:00 - 17:00	4	**0**	0	1	**152**	1	**33**	11	203	7	272	33
17:00 - 18:00	4	**0**	0	1	145	1	20	12	319	9	227	**94**
18:00 - 19:00	**5**	**0**	0	1	114	1	15	2	230	9	232	79
19:00 - 20:00	3	**0**	0	0	71	1	9	6	243	**13**	196	40
20:00 - 21:00	**5**	**0**	0	0	33	0	5	1	153	7	163	16
21:00 - 22:00	0	**0**	0	**2**	24	1	3	6	131	6	158	14
Total	**51**	**0**	**4**	**7**	**1.509**	**13**	**253**	**117**	**3.805**	**114**	**3.711**	**628**

Elaboração: **TTC**

Tabela 2.8 – Resumo das contagens: Movimentos 7 a 9 – 2020

VOLUME POR MOVIMENTO												
Hora	MOVIMENTO 7 - ENTRADA NO ATERRO				MOVIMENTO 8 - SAÍDA DO ATERRO				MOVIMENTO 9			
	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto
06:00 - 07:00	0	0	0	**0**	0	0	0	**0**	10	4	9	9
07:00 - 08:00	**5**	**2**	14	**0**	2	0	7	**0**	18	18	21	**14**
08:00 - 09:00	1	0	13	**0**	2	0	13	**0**	16	**34**	24	0
09:00 - 10:00	2	0	11	**0**	1	0	19	**0**	20	4	31	2
10:00 - 11:00	2	0	**18**	**0**	3	0	13	**0**	**21**	1	30	4
11:00 - 12:00	4	0	**18**	**0**	3	0	**20**	**0**	9	3	33	1
12:00 - 13:00	1	0	15	**0**	2	0	14	**0**	11	0	39	0
13:00 - 14:00	4	0	14	**0**	0	0	14	**0**	15	4	29	4
14:00 - 15:00	1	0	11	**0**	4	0	9	**0**	15	5	**46**	5
15:00 - 16:00	0	0	15	**0**	0	**1**	11	**0**	14	6	31	2
16:00 - 17:00	2	0	10	**0**	2	0	17	**0**	15	2	32	6
17:00 - 18:00	2	0	2	**0**	**5**	**1**	4	**0**	14	0	40	3
18:00 - 19:00	1	0	4	**0**	0	0	3	**0**	6	2	33	2
19:00 - 20:00	1	0	2	**0**	0	0	4	**0**	4	2	23	9
20:00 - 21:00	0	0	2	**0**	0	0	4	**0**	1	0	23	4
21:00 - 22:00	0	0	0	**0**	0	0	0	**0**	5	1	18	3
Total	**27**	**2**	**152**	**0**	**25**	**2**	**156**	**0**	**198**	**87**	**459**	**70**

Elaboração: **TTC**

Tabela 2.9 – Resumo das contagens: Movimentos 10 e 11 – 2020

VOLUME POR MOVIMENTO								
Hora	MOVIMENTO 10				MOVIMENTO 11			
	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto
06:00 - 07:00	15	11	17	3	107	12	9	29
07:00 - 08:00	31	13	16	7	**191**	**27**	12	**77**
08:00 - 09:00	29	17	11	6	47	13	15	9
09:00 - 10:00	27	16	14	5	40	13	**23**	4
10:00 - 11:00	36	10	19	3	39	10	16	5
11:00 - 12:00	37	13	**28**	7	28	10	13	6
12:00 - 13:00	32	12	23	5	43	8	15	15
13:00 - 14:00	28	13	23	6	24	12	12	8
14:00 - 15:00	30	7	17	8	35	9	13	12
15:00 - 16:00	55	16	18	7	39	12	16	6
16:00 - 17:00	93	13	23	30	30	10	11	4
17:00 - 18:00	**142**	**29**	19	**53**	29	13	16	3
18:00 - 19:00	51	14	21	12	30	11	18	9
19:00 - 20:00	33	10	19	13	20	10	17	4
20:00 - 21:00	10	9	14	1	15	9	17	1
21:00 - 22:00	12	10	11	7	11	10	7	3
Total	**660**	**217**	**296**	**175**	**727**	**192**	**234**	**196**

Elaboração: **TTC**

Tabela 2.10 – Volume na Rodovia SP-055 - 2020

VOLUME POR MOVIMENTO									
Hora	PISTA OESTE - CUBATÃO				PISTA LESTE - GUARUJÁ				TOTAL
	Auto	Ônibus	Caminhão	VEIC. EQ.	Auto	Ônibus	Caminhão	VEIC. EQ.	VEIC. EQ.
06:00 - 07:00	304	**17**	294	926	217	5	376	980	1.906
07:00 - 08:00	382	11	235	875	**469**	8	421	**1.328**	2.203
08:00 - 09:00	351	4	344	1.047	412	7	359	1.145	2.191
09:00 - 10:00	371	5	380	1.141	445	11	397	1.261	2.402
10:00 - 11:00	347	6	322	1.004	393	3	393	1.185	2.188
11:00 - 12:00	351	5	391	1.143	351	10	380	1.130	2.273
12:00 - 13:00	269	3	314	903	352	3	342	1.041	1.945
13:00 - 14:00	373	4	317	1.016	342	8	324	1.007	2.023
14:00 - 15:00	370	7	**429**	1.242	260	9	**424**	1.125	2.367
15:00 - 16:00	471	4	321	1.121	255	6	364	995	2.117
16:00 - 17:00	503	7	409	**1.336**	292	7	407	1.120	2.456
17:00 - 18:00	**523**	9	387	1.315	413	10	391	1.215	**2.530**
18:00 - 19:00	413	6	255	935	312	11	294	922	1.857
19:00 - 20:00	243	9	214	690	301	**13**	247	820	1.510
20:00 - 21:00	127	3	179	491	182	9	210	620	1.111
21:00 - 22:00	117	4	139	403	153	6	198	563	966
Total	**5.515**	**106**	**4.929**	**15.586**	**5.148**	**129**	**5.526**	**16.459**	**32.045**

Elaboração: **TTC**

Tabela 2.11 – Resumo das contagens: Movimentos 1 a 3 – 2023

VOLUME POR MOVIMENTO												
Hora	MOVIMENTO 1				MOVIMENTO 2				MOVIMENTO 3			
	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto
06:00 - 07:00	266	**18**	198	**203**	18	0	111	2	62	0	25	14
07:00 - 08:00	334	11	167	126	5	0	79	2	99	1	26	8
08:00 - 09:00	282	3	244	49	7	0	116	1	127	0	21	10
09:00 - 10:00	285	4	254	43	11	0	140	0	**133**	1	20	10
10:00 - 11:00	240	7	183	45	11	0	140	0	100	0	**30**	8
11:00 - 12:00	261	2	252	25	16	**3**	143	0	102	1	11	8
12:00 - 13:00	181	2	208	20	10	0	106	0	90	1	10	7
13:00 - 14:00	279	4	204	53	10	0	113	1	79	1	21	5
14:00 - 15:00	257	7	**287**	84	14	0	148	0	64	1	21	8
15:00 - 16:00	337	2	198	50	11	0	117	2	71	1	13	**15**
16:00 - 17:00	359	7	266	37	**21**	0	137	1	74	0	8	7
17:00 - 18:00	**389**	8	226	90	20	1	**167**	**3**	81	0	9	9
18:00 - 19:00	314	4	198	67	12	1	58	2	76	1	8	12
19:00 - 20:00	181	9	172	38	8	0	47	0	54	0	7	9
20:00 - 21:00	102	3	136	16	4	0	50	1	26	**2**	0	0
21:00 - 22:00	99	3	103	15	1	0	43	0	23	0	1	1
Total	**4.166**	**94**	**3.296**	**962**	**179**	**5**	**1.715**	**16**	**1.260**	**11**	**229**	**129**

Elaboração: **TTC**

Tabela 2.12 – Resumo das contagens: Movimentos 4 a 6 - 2023

VOLUME POR MOVIMENTO												
Hora	MOVIMENTO 4				MOVIMENTO 5				MOVIMENTO 6			
	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto
06:00 - 07:00	**5**	**0**	0	0	47	1	5	10	152	5	267	59
07:00 - 08:00	3	**0**	0	0	72	1	7	11	**398**	8	**346**	93
08:00 - 09:00	3	**0**	**2**	0	91	1	10	2	308	8	248	14
09:00 - 10:00	3	**0**	1	0	105	1	13	5	333	11	265	31
10:00 - 11:00	1	**0**	0	0	122	0	22	9	310	3	251	23
11:00 - 12:00	4	**0**	0	0	103	0	23	7	257	7	252	26
12:00 - 13:00	4	**0**	0	0	102	1	22	4	277	2	250	35
13:00 - 14:00	1	**0**	0	0	112	0	23	**15**	277	8	214	26
14:00 - 15:00	3	**0**	1	1	128	1	25	7	200	9	285	22
15:00 - 16:00	2	**0**	0	1	158	**2**	28	13	191	5	260	47
16:00 - 17:00	4	**0**	0	1	**163**	1	**35**	12	217	8	291	35
17:00 - 18:00	4	**0**	0	1	156	1	22	13	342	10	243	**101**
18:00 - 19:00	**5**	**0**	0	1	122	1	16	2	246	10	249	84
19:00 - 20:00	3	**0**	0	0	76	1	10	7	261	**14**	210	43
20:00 - 21:00	**5**	**0**	0	0	35	0	5	1	164	8	174	18
21:00 - 22:00	0	**0**	0	**2**	25	1	3	7	140	7	169	15
Total	**55**	**0**	**4**	**8**	**1.616**	**14**	**271**	**125**	**4.074**	**122**	**3.973**	**673**

Elaboração: **TTC**

Tabela 2.13 – Resumo das contagens: Movimentos 7 a 9 - 2023

VOLUME POR MOVIMENTO												
Hora	MOVIMENTO 7 - ENTRADA NO ATERRO				MOVIMENTO 8 - SAÍDA DO ATERRO				MOVIMENTO 9			
	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto
06:00 - 07:00	0	0	0	**0**	0	0	0	**0**	11	4	10	10
07:00 - 08:00	**5**	**2**	15	**0**	2	0	8	**0**	20	20	23	**15**
08:00 - 09:00	1	0	14	**0**	2	0	14	**0**	18	**36**	25	0
09:00 - 10:00	2	0	12	**0**	1	0	21	**0**	22	4	33	2
10:00 - 11:00	2	0	**20**	**0**	3	0	14	**0**	**23**	1	32	4
11:00 - 12:00	4	0	**20**	**0**	3	0	**22**	**0**	10	3	35	1
12:00 - 13:00	1	0	16	**0**	2	0	15	**0**	12	0	42	0
13:00 - 14:00	4	0	15	**0**	0	0	15	**0**	16	4	31	4
14:00 - 15:00	1	0	12	**0**	4	0	10	**0**	16	5	**49**	5
15:00 - 16:00	0	0	16	**0**	0	**1**	12	**0**	15	7	33	2
16:00 - 17:00	2	0	11	**0**	2	0	19	**0**	16	2	34	7
17:00 - 18:00	2	0	2	**0**	**5**	**1**	4	**0**	15	0	43	3
18:00 - 19:00	1	0	4	**0**	0	0	3	**0**	7	2	35	2
19:00 - 20:00	1	0	2	**0**	0	0	4	**0**	4	2	24	10
20:00 - 21:00	0	0	2	**0**	0	0	4	**0**	1	0	24	4
21:00 - 22:00	0	0	0	**0**	0	0	0	**0**	5	1	20	3
Total	**28**	**2**	**163**	**0**	**26**	**2**	**167**	**0**	**213**	**93**	**492**	**74**

Elaboração: **TTC**

Tabela 2.14 – Resumo das contagens: Movimentos 10 e 11 - 2023

VOLUME POR MOVIMENTO								
Hora	MOVIMENTO 10				MOVIMENTO 11			
	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto
06:00 - 07:00	16	12	19	3	115	13	10	31
07:00 - 08:00	33	14	18	8	**205**	**28**	13	**82**
08:00 - 09:00	31	19	12	7	50	14	16	10
09:00 - 10:00	28	18	15	5	43	14	**24**	4
10:00 - 11:00	38	11	21	3	42	11	18	5
11:00 - 12:00	39	14	**30**	8	30	11	14	7
12:00 - 13:00	34	13	24	5	46	9	16	16
13:00 - 14:00	30	14	24	7	25	13	13	9
14:00 - 15:00	32	8	19	9	37	10	14	13
15:00 - 16:00	59	18	20	8	42	13	18	7
16:00 - 17:00	100	14	24	32	32	11	12	4
17:00 - 18:00	**152**	**31**	21	**57**	31	14	18	3
18:00 - 19:00	55	15	23	13	32	12	20	10
19:00 - 20:00	35	11	21	14	22	11	19	4
20:00 - 21:00	11	10	15	1	16	10	19	1
21:00 - 22:00	13	11	12	8	12	11	8	3
Total	**707**	**232**	**317**	**187**	**779**	**206**	**251**	**210**

Elaboração: **TTC**

Tabela 2.15 – Volume na Rodovia SP-055 - 2023

VOLUME POR MOVIMENTO									
Hora	PISTA OESTE - CUBATÃO				PISTA LESTE - GUARUJÁ				TOTAL
	Auto	Ônibus	Caminhão	VEIC. EQ.	Auto	Ônibus	Caminhão	VEIC. EQ.	VEIC. EQ.
06:00 - 07:00	325	**19**	314	991	232	5	403	1.049	2.041
07:00 - 08:00	409	12	252	937	**502**	9	451	**1.422**	2.358
08:00 - 09:00	376	4	368	1.121	441	8	384	1.226	2.346
09:00 - 10:00	398	5	406	1.221	477	12	425	1.351	2.572
10:00 - 11:00	371	7	345	1.075	421	3	421	1.268	2.343
11:00 - 12:00	376	5	418	1.224	376	11	406	1.210	2.434
12:00 - 13:00	288	3	336	967	377	3	366	1.115	2.082
13:00 - 14:00	400	4	340	1.088	366	9	347	1.078	2.166
14:00 - 15:00	397	8	**459**	1.330	278	10	**453**	1.205	2.535
15:00 - 16:00	504	4	344	1.201	273	7	390	1.066	2.266
16:00 - 17:00	539	8	438	**1.431**	312	8	436	1.199	2.630
17:00 - 18:00	**560**	10	414	1.408	443	11	418	1.301	**2.709**
18:00 - 19:00	443	7	273	1.001	334	12	314	987	1.988
19:00 - 20:00	261	10	229	738	322	**14**	264	879	1.617
20:00 - 21:00	136	3	192	526	195	10	225	664	1.190
21:00 - 22:00	125	4	149	432	164	7	213	602	1.034
Total	**5.905**	**114**	**5.278**	**16.689**	**5.512**	**138**	**5.917**	**17.623**	**34.311**

Elaboração: **TTC**

Tabela 2.16 – Resumo das contagens: Movimentos 1 a 3 - 2033

VOLUME POR MOVIMENTO												
Hora	MOVIMENTO 1				MOVIMENTO 2				MOVIMENTO 3			
	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto
06:00 - 07:00	334	**22**	249	**254**	22	0	139	3	78	0	32	18
07:00 - 08:00	420	14	209	158	7	0	99	3	124	1	33	10
08:00 - 09:00	354	4	307	62	8	0	146	1	160	0	26	12
09:00 - 10:00	358	6	319	54	14	0	176	0	**166**	1	25	12
10:00 - 11:00	301	8	230	56	14	0	176	0	125	0	**37**	10
11:00 - 12:00	327	3	316	32	21	**4**	180	0	128	1	14	10
12:00 - 13:00	227	3	261	25	12	0	133	0	113	1	12	8
13:00 - 14:00	351	6	256	66	12	0	142	1	99	1	26	7
14:00 - 15:00	323	8	**360**	106	18	0	186	0	80	1	26	10
15:00 - 16:00	424	3	249	63	14	0	147	3	89	1	17	**19**
16:00 - 17:00	451	8	334	47	**26**	0	172	1	94	0	10	8
17:00 - 18:00	**488**	10	283	113	25	1	**209**	**4**	102	0	11	11
18:00 - 19:00	395	6	249	84	15	1	73	3	95	1	10	15
19:00 - 20:00	227	11	216	48	10	0	59	0	67	0	8	11
20:00 - 21:00	128	4	171	21	6	0	63	1	33	**3**	0	0
21:00 - 22:00	124	4	129	19	1	0	54	0	29	0	1	1
Total	**5.232**	**118**	**4.139**	**1.208**	**224**	**7**	**2.154**	**21**	**1.582**	**14**	**288**	**162**

Elaboração: **TTC**

Tabela 2.17 – Resumo das contagens: Movimentos 4 a 6 - 2033

VOLUME POR MOVIMENTO												
Hora	MOVIMENTO 4				MOVIMENTO 5				MOVIMENTO 6			
	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto
06:00 - 07:00	**7**	**0**	0	0	59	1	7	12	191	7	336	74
07:00 - 08:00	4	**0**	0	0	91	1	8	14	**499**	10	**435**	117
08:00 - 09:00	4	**0**	**3**	0	114	1	12	3	387	10	311	18
09:00 - 10:00	4	**0**	1	0	132	1	17	7	418	14	333	39
10:00 - 11:00	1	**0**	0	0	153	0	28	11	389	4	315	29
11:00 - 12:00	6	**0**	0	0	129	0	29	8	323	8	316	33
12:00 - 13:00	6	**0**	0	0	128	1	28	6	348	3	314	44
13:00 - 14:00	1	**0**	0	0	140	0	29	**19**	348	10	268	33
14:00 - 15:00	4	**0**	1	1	161	1	32	8	252	11	358	28
15:00 - 16:00	3	**0**	0	1	198	**3**	36	17	239	7	326	59
16:00 - 17:00	6	**0**	0	1	**205**	1	**44**	15	272	10	366	44
17:00 - 18:00	6	**0**	0	1	195	1	28	17	429	12	305	**127**
18:00 - 19:00	**7**	**0**	0	1	153	1	21	3	310	12	312	106
19:00 - 20:00	4	**0**	0	0	95	1	12	8	327	**18**	264	54
20:00 - 21:00	**7**	**0**	0	0	44	0	7	1	206	10	219	22
21:00 - 22:00	0	**0**	0	**3**	32	1	4	8	176	8	212	19
Total	**69**	**0**	**6**	**10**	**2.029**	**18**	**340**	**157**	**5.116**	**153**	**4.990**	**845**

Elaboração: **TTC**

Tabela 2.18 – Resumo das contagens: Movimentos 7 a 9 - 2033

VOLUME POR MOVIMENTO												
Hora	MOVIMENTO 7 - ENTRADA NO ATERRO				MOVIMENTO 8 - SAÍDA DO ATERRO				MOVIMENTO 9			
	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto
06:00 - 07:00	0	0	0	**0**	0	0	0	**0**	14	6	12	12
07:00 - 08:00	**7**	**3**	19	**0**	3	0	10	**0**	25	25	29	**19**
08:00 - 09:00	1	0	18	**0**	3	0	18	**0**	22	**45**	32	0
09:00 - 10:00	3	0	15	**0**	1	0	26	**0**	28	6	41	3
10:00 - 11:00	3	0	**25**	**0**	4	0	18	**0**	**29**	1	40	6
11:00 - 12:00	6	0	**25**	**0**	4	0	**28**	**0**	12	4	44	1
12:00 - 13:00	1	0	21	**0**	3	0	19	**0**	15	0	52	0
13:00 - 14:00	6	0	19	**0**	0	0	19	**0**	21	6	39	6
14:00 - 15:00	1	0	15	**0**	6	0	12	**0**	21	7	**62**	7
15:00 - 16:00	0	0	21	**0**	0	**1**	15	**0**	19	8	41	3
16:00 - 17:00	3	0	14	**0**	3	0	23	**0**	21	3	43	8
17:00 - 18:00	3	0	3	**0**	**7**	**1**	6	**0**	19	0	54	4
18:00 - 19:00	1	0	6	**0**	0	0	4	**0**	8	3	44	3
19:00 - 20:00	1	0	3	**0**	0	0	6	**0**	6	3	30	12
20:00 - 21:00	0	0	3	**0**	0	0	6	**0**	1	0	30	6
21:00 - 22:00	0	0	0	**0**	0	0	0	**0**	7	1	25	4
Total	**36**	**3**	**205**	**0**	**33**	**3**	**209**	**0**	**267**	**117**	**618**	**94**

Elaboração: **TTC**

Tabela 2.19 – Resumo das contagens: Movimentos 10 e 11 - 2033

VOLUME POR MOVIMENTO								
Hora	MOVIMENTO 10				MOVIMENTO 11			
	Auto	Ônibus	Caminhão	Moto	Auto	Ônibus	Caminhão	Moto
06:00 - 07:00	21	15	23	4	144	17	12	39
07:00 - 08:00	41	18	22	10	**257**	**36**	17	**103**
08:00 - 09:00	39	23	15	8	63	18	21	12
09:00 - 10:00	36	22	19	7	54	18	**30**	6
10:00 - 11:00	48	14	26	4	52	14	22	7
11:00 - 12:00	50	18	**37**	10	37	14	18	8
12:00 - 13:00	43	17	30	7	58	11	21	21
13:00 - 14:00	37	18	30	8	32	17	17	11
14:00 - 15:00	40	10	23	11	47	12	18	17
15:00 - 16:00	74	22	25	10	52	17	22	8
16:00 - 17:00	125	18	30	40	40	14	15	6
17:00 - 18:00	**191**	**39**	26	**72**	39	18	22	4
18:00 - 19:00	69	19	29	17	40	15	25	12
19:00 - 20:00	44	14	26	18	28	14	23	6
20:00 - 21:00	14	12	19	1	21	12	23	1
21:00 - 22:00	17	14	15	10	15	14	10	4
Total	**887**	**292**	**398**	**235**	**978**	**259**	**315**	**264**

Elaboração: **TTC**

Tabela 2.20 – Volume na Rodovia SP-055 - 2033

VOLUME POR MOVIMENTO									
Hora	PISTA OESTE - CUBATÃO				PISTA LESTE - GUARUJÁ				TOTAL
	Auto	Ônibus	Caminhão	VEIC. EQ.	Auto	Ônibus	Caminhão	VEIC. EQ.	VEIC. EQ.
06:00 - 07:00	409	**23**	395	1.245	292	7	506	1.318	2.563
07:00 - 08:00	513	15	316	1.176	**630**	11	567	**1.786**	2.962
08:00 - 09:00	472	6	462	1.407	554	10	483	1.539	2.947
09:00 - 10:00	499	7	510	1.534	598	15	534	1.696	3.230
10:00 - 11:00	466	8	433	1.350	528	4	528	1.593	2.943
11:00 - 12:00	472	7	526	1.537	472	14	510	1.520	3.057
12:00 - 13:00	362	4	422	1.215	473	4	459	1.400	2.615
13:00 - 14:00	502	6	426	1.366	459	11	436	1.354	2.720
14:00 - 15:00	498	10	**576**	1.670	349	12	**570**	1.513	3.183
15:00 - 16:00	633	6	432	1.508	343	8	490	1.339	2.846
16:00 - 17:00	677	10	550	**1.797**	392	10	548	1.506	3.303
17:00 - 18:00	**703**	12	520	1.768	556	14	526	1.634	**3.402**
18:00 - 19:00	556	8	343	1.257	420	15	395	1.239	2.497
19:00 - 20:00	327	12	288	927	404	**18**	332	1.103	2.030
20:00 - 21:00	171	4	241	660	245	12	282	834	1.494
21:00 - 22:00	157	6	187	542	206	8	267	757	1.299
Total	**7.416**	**143**	**6.628**	**20.958**	**6.922**	**173**	**7.431**	**22.132**	**43.090**

Elaboração: **TTC**

3. COMPOSIÇÃO DOS CENÁRIOS DE ANÁLISE

O impacto do empreendimento foi avaliado em diferentes cenários que representam as alterações no fluxo de passagem em diferentes fases.

Na Tabela 3.1 é apresentada a composição dos diferentes cenários de análise, totalizando 4 cenários.

Destaca-se que na contagem realizada, o empreendimento já operava como aterro, mas como é impossível verificar a quantidade de veículos com destino ou origem no Aterro dentro dos veículos contados, optou-se por acrescentar a demanda atual e prevista para o futuro sobre o fluxo atual sem reduzir a demanda possivelmente contada no levantamento, o que poderia gerar certa duplicidade de viagens, mantendo certa margem de segurança quanto ao impacto futuro.

Tabela 3.1 – Composição dos Cenários de Análise do Impacto

Composição dos Cenários		Ano	Cenários
Situação Atual	Fluxo de passagem no ano de realização das Contagens + Viagens do Aterro	2019	**Cenário 1**
Implantação	Fluxo de passagem no ano de início de implantação + Viagens do Aterro + Viagens dos veículos da Obra	2020	**Cenário 2**
Operação Futura	Fluxo de passagem no ano de conclusão da implantação + Viagens da URE	2023	**Cenário 3**
Operação Futura	Fluxo de passagem 10 anos após início da operação total + Viagens da URE	2033	**Cenário 4**

Fonte: **TTC**

Considerou-se que a implantação da URE terá início no ano de 2020 e será concluída em 36 meses, ou seja, até 2023. Além disso, foi feita a análise para 10 anos após a o início da operação total da URE.

4. ESTIMATIVA DE DEMANDA

No presente capítulo são abordadas as seguintes etapas:

- Geração de viagens;
- Divisão Modal;
- Distribuição temporal.

Há ainda a etapa de distribuição espacial das viagens, apresentada no Capítulo 1 para cada etapa de operação.

4.1. Geração de Viagens

As viagens geradas pelo empreendimento foram obtidas através das contagens veiculares classificadas e informações da operação atual fornecidas pelo empreendedor.

Com base nas informações da Terrestre Ambiental, obteve-se a quantidade de viagens por município na hora de maior fluxo no aterro. Essa proporção foi aplicada ao total de veículos da hora mais carregada obtida na contagem veicular classificada.

Na Tabela 4.1 são apresentados os volumes de entrada e saída de veículos utilizados na operação do empreendimento como aterro ou URE.

Tabela 4.1 – Volumes de Entrada e Saída de Veículos da Operação

HORA CRÍTICA			
DESTINO	**ENTRADA**	**SAÍDA**	**PROPORÇÃO**
Bertioga	1	1	4%
Guarujá	1	2	8%
Santos	1	2	8%
Cubatão	7	6	35%
São Vicente	5	5	27%
Praia Grande	2	2	12%
Mongaguá	1	2	8%
Total	**18**	**20**	**100%**

Fonte: ***Ribeirão Energia*** *- Elaboração*: **TTC**

O volume total de caminhões na hora mais carregada, obtido na contagem, representa 5% do total de caminhões da hora mais carregada da rodovia.

Considera-se a troca de turno a hora de maior fluxo de veículos de transporte de funcionários, conforme apresentado na Tabela 4.2.

Tabela 4.2 – Volumes de Entrada e Saída de Veículos de Transporte de Funcionários

HORA CRÍTICA		
VEÍCULO	**ENTRADA**	**SAÍDA**
Ônibus	2	2
Van	1	1
Carro	5	5
Total	**8**	**8**

Elaboração: **TTC**

Na Tabela 4.3 são apresentados os volumes de entrada e saída dos veículos da obra, utilizados durante a fase implantação da URE.

Tabela 4.3 – Volumes de Entrada e Saída de Veículos de Obra

VIAGENS POR DIA				
ROTA	**MOBILIZAÇÃO**		**DESMOBILIZAÇÃO**	
	LEVE	**PESADO**	**LEVE**	**PESADO**
ROTA 1	0	0	0	0
ROTA 2	1	3	1	3
ROTA 3	0	0	0	0
ROTA 4	0	0	0	0
ROTA 5	0	0	0	0
ROTA 5 A	4	5	4	5
Total	**5**	**8**	**5**	**8**

Fonte: ***Ribeirão Energia*** *- Elaboração*: **TTC**

A estimativa de viagens durante a fase de implantação da URE foi feita a partir das informações fornecidas pelo empreendedor e apresentadas no item 1.4.

Uma vez que as viagens de máquinas e equipamentos, na fase de implantação, resultavam em menos de uma viagem por dia, foram desconsideradas deste estudo.

4.2. Divisão Modal

Na Tabela 4.4 apresenta-se a divisão modal da demanda gerada pelo empreendimento objeto deste estudo.

Tabela 4.4 – Divisão Modal para Estudo de Tráfego

Veículos	%
Leve	27,50 %
Pesado	72,50 %

Elaboração: **TTC**

4.3. Distribuição Temporal

Como não há informações precisas da flutuação horária dos fluxos de entrada e saída dos veículos de coleta e dos veículos que serão utilizados durante a fase de implantação, considerou-se a situação hipotética mais crítica: que toda a demanda estimada irá circular na hora de maior fluxo da rodovia.

5. ANÁLISE DO IMPACTO

A capacidade do viário existente é testada por meio da estimativa dos níveis de serviço mediante dois conjuntos de dados, os quais consideram a soma dos volumes gerados pelo empreendimento (*CAPÍTULO 4* - ESTIMATIVA DE DEMANDA) ao fluxo de passagem atual e o previsto para o futuro (*CAPÍTULO 2* – FLUXO DE PASSAGEM).

A partir dessas informações avalia-se a capacidade de suporte do dispositivo utilizado pelo empreendimento para os movimentos de retorno nos cenários estudados conforme *Capítulo 3*– COMPOSIÇÃO DOS CENÁRIOS DE ANÁLISE.

As análises foram feitas utilizando a densidade para a rodovia, levando em consideração os intervalos dos níveis de serviço recomendados pelo *HCM (Highway Capacity Manual)* na edição 2010.

A análise do desempenho do sistema viário é realizada utilizando o conceito de Nível de Serviço (NS), que é uma grandeza associada à sensação de conforto percebido pelo condutor ao transitar por uma via, sendo dividido em seis classes que variam de A até F, conforme ilustrado na Figura 5.1.

Figura 5.1 – Imagem ilustrativa dos diferentes Níveis de Serviço (NS)

Nível de Serviço A (ótimo)

Nível de Serviço B (bom)

Nível de Serviço C (aceitável)

Nível de Serviço D (regular)

Nível de Serviço E (ruim)

Nível de Serviço F (péssimo)

Fonte: HCM(2010)

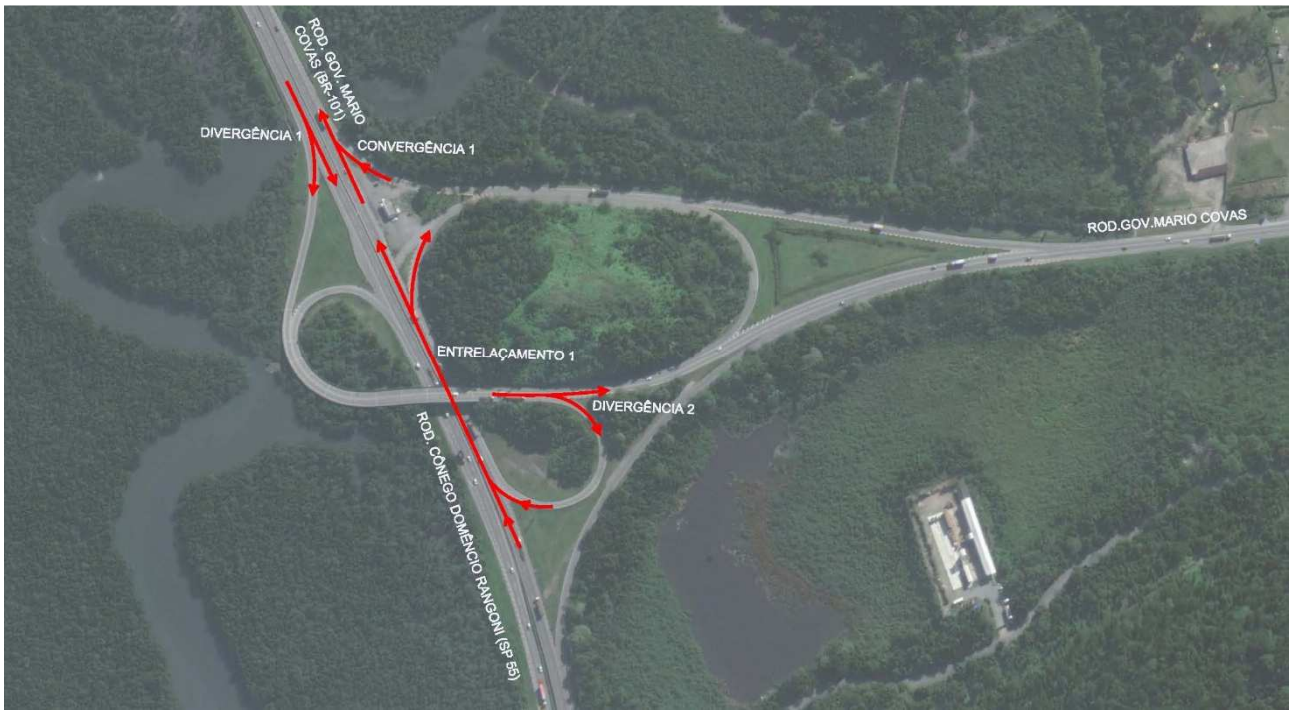
A presença de interseções em nível localizadas dentro ou mesmo fora dos limites da faixa de domínio é capaz de afetar a operação da rodovia. Para analisar a qualidade da operação de

interseções em nível próximas a rodovias, é utilizado o *software SIDRA Intersection (Signalised and unsignalised Intersection Design and Research Aid)*, utilizando a metodologia do *HCM2010*.

5.1. Segmentos Analisados

Foram analisados os segmentos onde os veículos circulam para acessar ou deixar a área do empreendimento, conforme apresentado na Figura 5.2.

Figura 5.2 – Segmentos Estudados

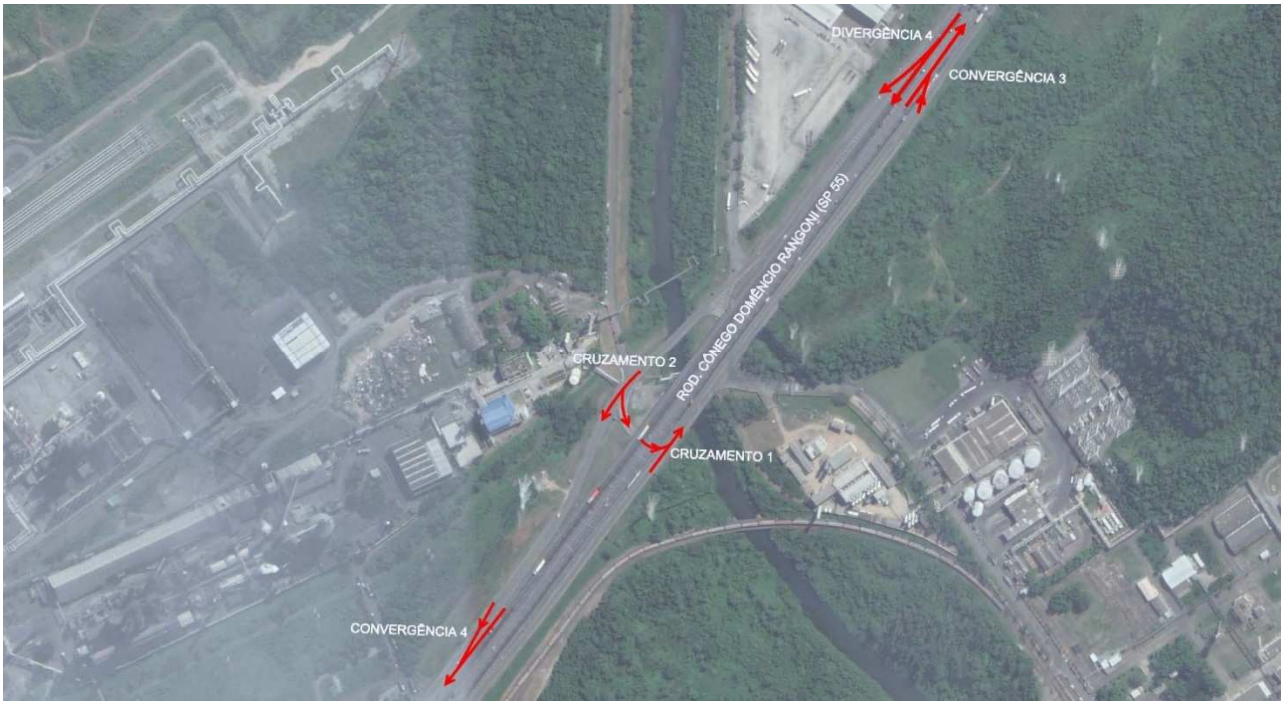


Fonte: **TTC**

Figura 5.3 – Segmentos Estudados

Fonte: **TTC**

Figura 5.4 – Segmentos Estudados



Fonte: **TTC**

Foram analisadas 4 convergências, 4 divergências, 1 entrelaçamento e 2 cruzamentos, além das seções da rodovia, antes e após o acesso ao empreendimento.

Ressalta-se que o volume de veículos de coleta de resíduos, já está incorporado nos dados das contagens veiculares classificadas. Entretanto, devido à dificuldade em determinar um horário preciso de sua circulação, o volume dos veículos de coleta foi somado ao fluxo de passagem obtido nas pesquisas.

5.2. Resultados

Na Tabela 5.1 a seguir são apresentados os resultados obtidos aplicando-se a metodologia do *HCM2010,* para cada um dos cenários analisados.

Tabela 5.1 – Níveis de Serviço

PONTO	CENÁRIO 1	CENÁRIO 2	CENÁRIO 3	CENÁRIO 4
Convergência 1	B	B	B	B
Convergência 2	B	B	B	B
Convergência 3	A	A	A	A
Convergência 4	A	A	A	A
Divergência 1	A	A	B	B
Divergência 2	A	A	A	A
Divergência 3	A	A	A	B
Divergência 4	A	B	B	B
Cruzamento 1	A	A	A	A
Cruzamento 2	A	A	A	A
Entrelaçamento	A	A	A	A
Seção 1 - Sentido Guarujá (Sent.1)	A	B	B	B
Seção 1 - Sentido Cubatão (Sent. 2)	B	B	B	B
Seção 2 - Sentido Guarujá (Sent.1)	B	B	B	C
Seção 2 - Sentido Cubatão (Sent. 2)	B	B	B	C

Fonte: **TTC**

Observa-se que, para todos os cenários analisados, todos os pontos apresentaram Níveis de Serviço “A” (ótimo), “B” (bom) ou “C” (aceitável), ou seja, todos os pontos da rodovia por onde os veículos do empreendimento irão circular (área de influência direta) operam dentro dos padrões qualidade ideais, mesmo para os anos futuros.

Ressalta-se que o aterro já está em operação e seu volume já estava contemplado no fluxo de passagem obtido nas contagens veiculares classificadas, ou seja, o empreendimento só provocará um incremento real no volume de tráfego durante a implantação da URE. Entretanto, devido à incerteza da distribuição das viagens da operação do empreendimento, seu maior volume horário foi acrescentado às contagens em todos os cenários.

Os relatórios com os dados de saída dos softwares HCS 2010 e Sidra Intersection são apresentados no capítulo 7 ANEXOS.

6. CONCLUSÃO

Neste documento foram avaliadas as condições de acesso à Unidade de Recuperação de Energia – URE Valoriza Energia, que será implantada no km 254,9 da Rodovia Cônego Domênico Rangoni, na pista leste, no município de Santos, em área lindeira ao aterro CGR Terrestre.

Foram levantadas as características da implantação e da operação do empreendimento, incluindo frota, número de viagens e rotas utilizadas pelos veículos do empreendimento.

Para caracterizar o tráfego de passagem, foram realizadas contagens veiculares classificadas no mês de junho de 2019, que foram extrapoladas para o ano de 2020 (ano de início de implantação do empreendimento), para o ano de 2023 (ano do fim da implantação do empreendimento) e 2033 (10 anos após a conclusão da implantação).

A partir disso, foram construídos cenários com base na demanda gerada, informações da operação atual do empreendimento e das características da operação futura. Em seguida foram estimadas as distribuições espaciais, com base nas rotas fornecidas pelo empreendedor e avaliadas as condições de tráfego para cada um dos cenários.

A avaliação do desempenho do sistema viário foi realizada utilizando o *HCM (Highway Capacity Manual)* e *Sidra Intersection* que contêm conceitos, diretrizes e procedimentos computacionais para calcular a capacidade e qualidade das malhas viárias.

6.1. Avaliação Final

Com a identificação das rotas utilizadas pelos veículos do empreendimento na área diretamente afetada (ADA), foi realizada a análise dos pontos de convergência, divergência, entrelaçamento, cruzamento e das seções da Rodovia Cônego Domênico Rangoni.

A rodovia que dá acesso à área do futuro empreendimento apresenta uma grande movimentação de veículos de carga, devido à intensa atividade portuária da região, sendo que a contribuição do empreendimento é de apenas 5% considerando o trecho de maior concentração das viagens, área de influência direta, localizado entre os dispositivos de retorno para ambos sentidos da rodovia. Vale destacar a possível duplicidade da demanda, uma vez que a contagem pode ter contabilizado os veículos atuais que se dirigem ao aterro e que serão utilizados pela URE e que não existem dados de distribuição temporal diária rotineira das operações futuras e das viagens para implantação, portanto foram consideradas viagens em uma mesma hora pico, conflitante com a hora pico da rodovia, o que gera uma grande margem de segurança nos resultados.

Os resultados obtidos com a aplicação da metodologia do *HCM 2010* indica que com o acréscimo do volume de tráfego do empreendimento, na situação atual, durante a implantação da URE e na fase de operação da URE, o sistema viário do entorno irá operar em condições de tráfego adequadas inclusive no cenário previsto para o ano de 2033, considerando inclusive o crescimento vegetativo com base em dados da ABCR.

7. ANEXOS

ANEXO 01

Tabulação das Contagens

CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 248	SENTIDO:	1 - SÃO PAULO	PONTO:	1

DATA:	25/6/2019	TEMPO	BOM	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	49	5	62	38	**154**	14:15	64	3	66	27	**160**
06:30	69	5	33	42	**149**	14:30	61	1	60	29	**151**
06:45	67	3	48	58	**176**	14:45	55	1	65	13	**134**
07:00	58	3	38	47	**146**	15:00	55	1	71	8	**135**
07:15	96	2	38	32	**168**	15:15	82	0	57	4	**143**
07:30	69	4	32	32	**137**	15:30	65	0	59	17	**141**
07:45	76	3	39	32	**150**	15:45	68	1	46	8	**123**
08:00	64	1	43	19	**127**	16:00	93	1	19	17	**130**
08:15	57	0	43	11	**111**	16:15	86	2	62	4	**154**
08:30	63	1	54	8	**126**	16:30	72	0	61	9	**142**
08:45	67	0	73	13	**153**	16:45	68	2	64	12	**146**
09:00	70	2	53	13	**138**	17:00	102	2	56	9	**169**
09:15	54	1	66	7	**128**	17:15	83	1	33	12	**129**
09:30	67	2	51	9	**129**	17:30	88	3	44	21	**156**
09:45	67	0	52	14	**133**	17:45	78	3	47	31	**159**
10:00	72	1	63	9	**145**	18:00	106	0	82	18	**206**
10:15	66	2	55	16	**139**	18:15	79	1	44	21	**145**
10:30	39	1	26	10	**76**	18:30	74	0	43	18	**135**
10:45	62	0	38	8	**108**	18:45	79	3	38	15	**135**
11:00	52	3	48	7	**110**	19:00	55	0	56	7	**118**
11:15	58	0	66	4	**128**	19:15	34	2	57	16	**109**
11:30	63	0	66	4	**133**	19:30	53	4	33	11	**101**
11:45	66	1	47	12	**126**	19:45	49	2	39	5	**95**
12:00	51	1	51	3	**106**	20:00	29	0	28	3	**60**
12:15	27	1	41	0	**69**	20:15	38	1	42	6	**87**
12:30	25	0	44	1	**70**	20:30	24	0	26	3	**53**
12:45	65	0	66	8	**139**	20:45	17	0	28	5	**50**
13:00	48	1	39	9	**97**	21:00	14	2	28	1	**45**
13:15	55	2	53	7	**117**	21:15	16	2	24	3	**45**
13:30	53	0	42	8	**103**	21:30	12	0	18	1	**31**
13:45	72	0	52	15	**139**	21:45	9	1	26	4	**40**
14:00	75	2	39	18	**134**	22:00	53	0	26	6	**85**
SUBTOTAL					**4064**	SUBTOTAL					**3712**

TOTAL GERAL	**7776**

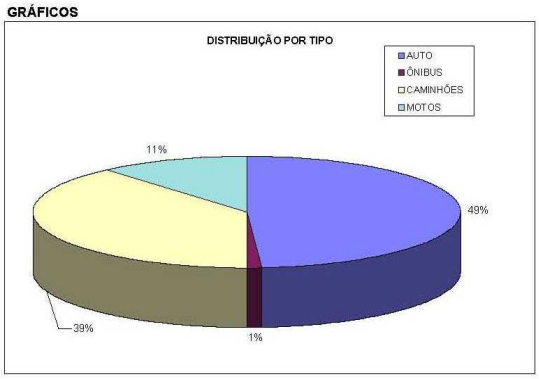
VOLUME HORÁRIO

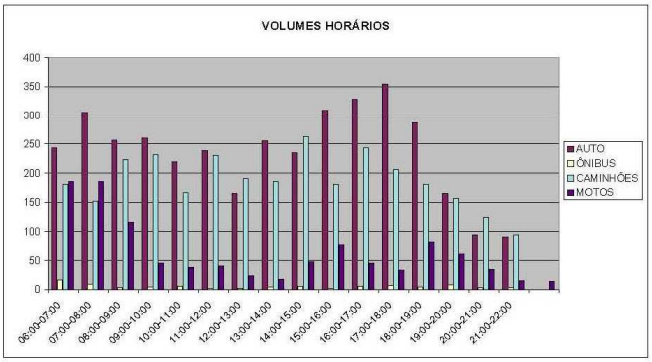
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	243	16	181	185	**625**
07:00-08:00	305	10	152	115	**582**
08:00-09:00	257	3	223	45	**528**
09:00-10:00	260	4	232	39	**535**
10:00-11:00	219	6	167	41	**433**
11:00-12:00	238	2	230	23	**493**
12:00-13:00	165	2	190	18	**375**
13:00-14:00	255	4	186	48	**493**
SUBTOTAL	1942	47	1561	514	**4064**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	235	6	262	77	**580**
15:00-16:00	308	2	181	46	**537**
16:00-17:00	328	6	243	34	**611**
17:00-18:00	355	7	206	82	**650**
18:00-19:00	287	4	181	61	**533**
19:00-20:00	165	8	157	35	**365**
20:00-21:00	93	3	124	15	**235**
21:00-22:00	90	3	94	14	**201**
SUBTOTAL	1861	39	1448	364	**3712**

TOTAL GERAL	3803	86	3009	878	7776

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 248	SENTIDO:	2 - RETORNO PARA SÃO PAULO	PONTO:	1

DATA:	25/6/2019	TEMPO	BOM	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	8	0	26	0	**34**
06:30	2	0	25	2	**29**
06:45	4	0	28	0	**32**
07:00	2	0	22	0	**24**
07:15	2	0	15	1	**18**
07:30	2	0	15	0	**17**
07:45	1	0	22	0	**23**
08:00	0	0	20	1	**21**
08:15	0	0	18	0	**18**
08:30	1	0	28	1	**30**
08:45	1	0	22	0	**23**
09:00	4	0	38	0	**42**
09:15	1	0	25	0	**26**
09:30	4	0	21	0	**25**
09:45	2	0	32	0	**34**
10:00	3	0	50	0	**53**
10:15	0	0	45	0	**45**
10:30	3	0	35	0	**38**
10:45	5	0	26	0	**31**
11:00	2	0	22	0	**24**
11:15	2	1	21	0	**24**
11:30	0	2	8	0	**10**
11:45	9	0	76	0	**85**
12:00	4	0	26	0	**30**
12:15	5	0	28	0	**33**
12:30	3	0	22	0	**25**
12:45	0	0	24	0	**24**
13:00	1	0	23	0	**24**
13:15	3	0	26	0	**29**
13:30	1	0	30	0	**31**
13:45	4	0	17	1	**22**
14:00	1	0	30	0	**31**
SUBTOTAL					**955**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:15	1	0	37	0	**38**
14:30	5	0	47	0	**52**
14:45	5	0	32	0	**37**
15:00	2	0	19	0	**21**
15:15	2	0	22	0	**24**
15:30	0	0	27	0	**27**
15:45	5	0	33	1	**39**
16:00	3	0	25	1	**29**
16:15	4	0	24	0	**28**
16:30	3	0	28	0	**31**
16:45	5	0	31	0	**36**
17:00	7	0	42	1	**50**
17:15	4	0	39	0	**43**
17:30	5	1	66	0	**72**
17:45	2	0	21	0	**23**
18:00	7	0	26	3	**36**
18:15	7	0	16	1	**24**
18:30	2	1	17	1	**21**
18:45	1	0	12	0	**13**
19:00	1	0	8	0	**9**
19:15	2	0	16	0	**18**
19:30	2	0	7	0	**9**
19:45	1	0	16	0	**17**
20:00	2	0	4	0	**6**
20:15	1	0	7	0	**8**
20:30	0	0	8	0	**8**
20:45	2	0	17	0	**19**
21:00	1	0	14	1	**16**
21:15	1	0	13	0	**14**
21:30	0	0	10	0	**10**
21:45	0	0	10	0	**10**
22:00	0	0	6	0	**6**
SUBTOTAL					**794**

TOTAL GERAL	**1749**

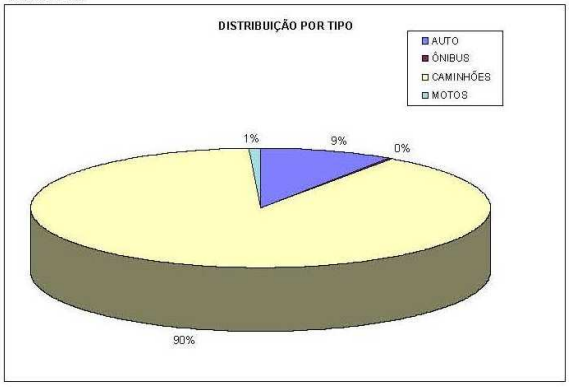
VOLUME HORÁRIO

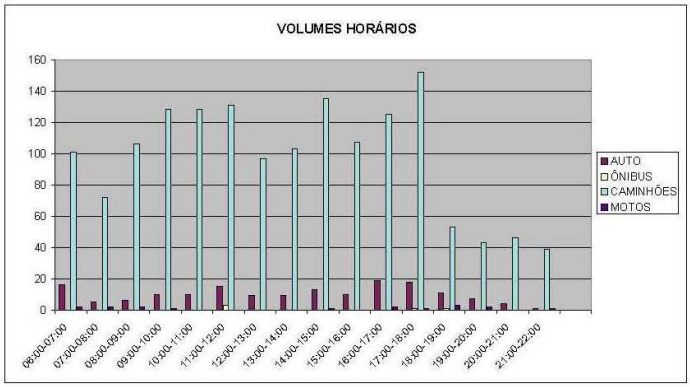
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	16	0	101	2	**119**
07:00-08:00	5	0	72	2	**79**
08:00-09:00	6	0	106	1	**113**
09:00-10:00	10	0	128	0	**138**
10:00-11:00	10	0	128	0	**138**
11:00-12:00	15	3	131	0	**149**
12:00-13:00	9	0	97	0	**106**
13:00-14:00	9	0	103	1	**113**
SUBTOTAL	80	3	866	6	**955**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	13	0	135	0	**148**
15:00-16:00	10	0	107	2	**119**
16:00-17:00	19	0	125	1	**145**
17:00-18:00	18	1	152	3	**174**
18:00-19:00	11	1	53	2	**67**
19:00-20:00	7	0	43	0	**50**
20:00-21:00	4	0	46	1	**51**
21:00-22:00	1	0	39	0	**40**
SUBTOTAL	83	2	700	9	**794**

TOTAL GERAL	163	5	1566	15	1749

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 248	SENTIDO:	3 - BERTIOGA /SÃO SEBASTIÃO	PONTO:	1

DATA:	25/6/2019	TEMPO	BOM	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	6	0	3	1	**10**	14:15	14	0	7	2	**23**
06:30	22	0	4	2	**28**	14:30	11	0	4	2	**17**
06:45	19	0	10	4	**33**	14:45	16	0	4	1	**21**
07:00	10	0	6	6	**22**	15:00	17	1	4	2	**24**
07:15	21	0	5	4	**30**	15:15	20	0	4	1	**25**
07:30	19	0	6	1	**26**	15:30	12	1	4	10	**27**
07:45	23	1	11	0	**35**	15:45	19	0	3	2	**24**
08:00	27	0	2	2	**31**	16:00	14	0	1	1	**16**
08:15	22	0	5	2	**29**	16:15	18	0	0	2	**20**
08:30	23	0	5	0	**28**	16:30	17	0	3	2	**22**
08:45	37	0	2	3	**42**	16:45	16	0	3	2	**21**
09:00	34	0	7	4	**45**	17:00	17	0	1	0	**18**
09:15	25	0	2	1	**28**	17:15	13	0	1	1	**15**
09:30	40	0	4	3	**47**	17:30	17	0	4	1	**22**
09:45	18	0	9	2	**29**	17:45	25	0	1	4	**30**
10:00	38	1	3	3	**45**	18:00	19	0	2	2	**23**
10:15	19	0	9	0	**28**	18:15	25	0	3	2	**30**
10:30	26	0	9	3	**38**	18:30	10	0	2	2	**14**
10:45	24	0	4	2	**30**	18:45	20	1	1	4	**26**
11:00	22	0	5	2	**29**	19:00	14	0	1	3	**18**
11:15	28	0	1	0	**29**	19:15	13	0	0	2	**15**
11:30	23	0	3	0	**26**	19:30	13	0	1	0	**14**
11:45	20	0	4	4	**28**	19:45	10	0	3	1	**14**
12:00	22	1	2	3	**28**	20:00	13	0	2	5	**20**
12:15	23	0	2	1	**26**	20:15	5	2	0	0	**7**
12:30	16	1	1	2	**20**	20:30	9	0	0	0	**9**
12:45	20	0	4	2	**26**	20:45	9	0	0	0	**9**
13:00	23	0	2	1	**26**	21:00	1	0	0	0	**1**
13:15	20	0	9	2	**31**	21:15	4	0	1	0	**5**
13:30	28	1	5	1	**35**	21:30	5	0	0	1	**6**
13:45	6	0	3	1	**10**	21:45	3	0	0	0	**3**
14:00	18	0	2	1	**21**	22:00	9	0	0	0	**9**
SUBTOTAL					**939**	SUBTOTAL					**548**

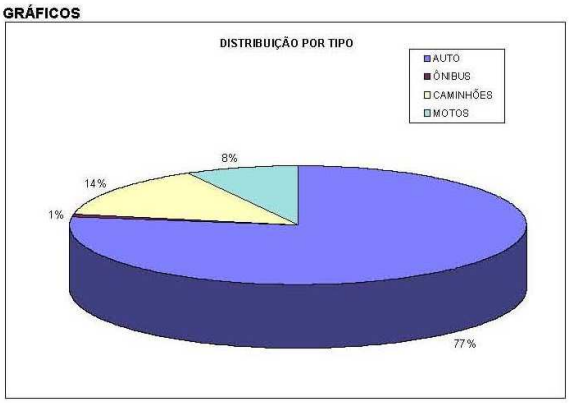
TOTAL GERAL	**1487**

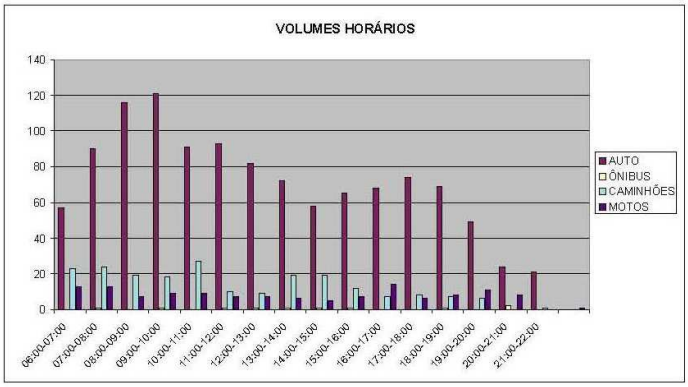
VOLUME HORÁRIO

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	57	0	23	13	**93**	14:00-15:00	58	1	19	7	**85**
07:00-08:00	90	1	24	7	**122**	15:00-16:00	65	1	12	14	**92**
08:00-09:00	116	0	19	9	**144**	16:00-17:00	68	0	7	6	**81**
09:00-10:00	121	1	18	9	**149**	17:00-18:00	74	0	8	8	**90**
10:00-11:00	91	0	27	7	**125**	18:00-19:00	69	1	7	11	**88**
11:00-12:00	93	1	10	7	**111**	19:00-20:00	49	0	6	8	**63**
12:00-13:00	82	1	9	6	**98**	20:00-21:00	24	2	0	0	**26**
13:00-14:00	72	1	19	5	**97**	21:00-22:00	21	0	1	1	**23**
SUBTOTAL	722	5	149	63	**939**	SUBTOTAL	428	5	60	55	**548**

TOTAL GERAL	**1150**	**10**	**209**	**118**	**1487**

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 248	SENTIDO:	4- RETORNO PARA GUARUJÁ	PONTO:	1

DATA:	25/6/2019	TEMPO	BOM	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	1	0	0	0	1	14:15	1	0	0	1	2
06:30	3	0	0	0	3	14:30	1	0	0	0	1
06:45	0	0	0	0	0	14:45	1	0	0	0	1
07:00	1	0	0	0	1	15:00	0	0	1	0	1
07:15	1	0	0	0	1	15:15	0	0	0	0	0
07:30	0	0	0	0	0	15:30	2	0	0	0	2
07:45	0	0	0	0	0	15:45	0	0	0	1	1
08:00	2	0	0	0	2	16:00	0	0	0	0	0
08:15	0	0	0	0	0	16:15	1	0	0	0	1
08:30	0	0	0	0	0	16:30	1	0	0	1	2
08:45	2	0	1	0	3	16:45	1	0	0	0	1
09:00	1	0	1	0	2	17:00	1	0	0	0	1
09:15	0	0	1	0	1	17:15	0	0	0	0	0
09:30	1	0	0	0	1	17:30	2	0	0	1	3
09:45	1	0	0	0	1	17:45	0	0	0	0	0
10:00	1	0	0	0	1	18:00	2	0	0	0	2
10:15	1	0	0	0	1	18:15	2	0	0	0	2
10:30	0	0	0	0	0	18:30	1	0	0	1	2
10:45	0	0	0	0	0	18:45	0	0	0	0	0
11:00	0	0	0	0	0	19:00	2	0	0	0	2
11:15	1	0	0	0	1	19:15	2	0	0	0	2
11:30	1	0	0	0	1	19:30	0	0	0	0	0
11:45	2	0	0	0	2	19:45	1	0	0	0	1
12:00	0	0	0	0	0	20:00	0	0	0	0	0
12:15	2	0	0	0	2	20:15	2	0	0	0	2
12:30	0	0	0	0	0	20:30	0	0	0	0	0
12:45	0	0	0	0	0	20:45	2	0	0	0	2
13:00	2	0	0	0	2	21:00	1	0	0	0	1
13:15	0	0	0	0	0	21:15	0	0	0	0	0
13:30	1	0	0	0	1	21:30	0	0	0	1	1
13:45	0	0	0	0	0	21:45	0	0	0	1	1
14:00	0	0	0	0	0	22:00	0	0	0	0	0
SUBTOTAL					27	SUBTOTAL					34

TOTAL GERAL	61

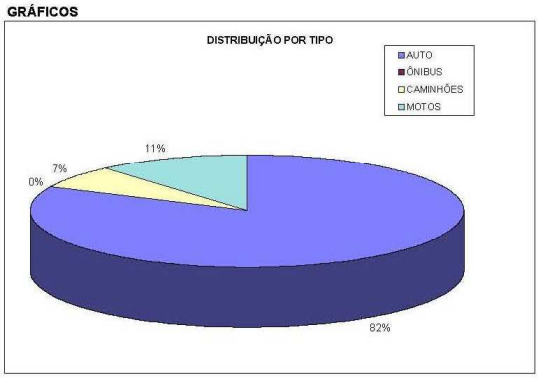
VOLUME HORÁRIO

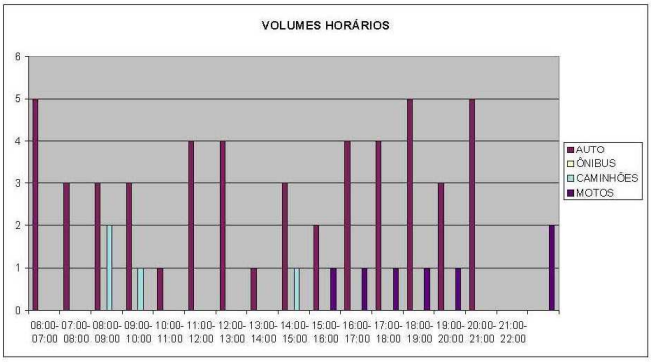
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	5	0	0	0	**5**
07:00-08:00	3	0	0	0	**3**
08:00-09:00	3	0	2	0	**5**
09:00-10:00	3	0	1	0	**4**
10:00-11:00	1	0	0	0	**1**
11:00-12:00	4	0	0	0	**4**
12:00-13:00	4	0	0	0	**4**
13:00-14:00	1	0	0	0	**1**
SUBTOTAL	24	0	3	0	**27**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	3	0	1	1	**5**
15:00-16:00	2	0	0	1	**3**
16:00-17:00	4	0	0	1	**5**
17:00-18:00	4	0	0	1	**5**
18:00-19:00	5	0	0	1	**6**
19:00-20:00	3	0	0	0	**3**
20:00-21:00	5	0	0	0	**5**
21:00-22:00	0	0	0	2	**2**
SUBTOTAL	26	0	1	7	**34**

TOTAL GERAL	**50**	**0**	**4**	**7**	**61**

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 248	SENTIDO:	5- VEM DE BERTIOGA SENTIDO SÃOPAULO	PONTO:	1

DATA:	25/6/2019	TEMPO	BOM	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	7	0	1	2	**10**	14:15	33	0	4	2	**39**
06:30	9	1	3	3	**16**	14:30	20	1	8	2	**31**
06:45	10	0	0	1	**11**	14:45	38	0	5	2	**45**
07:00	17	0	1	3	**21**	15:00	26	0	6	0	**32**
07:15	18	0	2	2	**22**	15:15	44	2	8	3	**57**
07:30	16	0	1	3	**20**	15:30	28	0	5	1	**34**
07:45	16	1	0	2	**19**	15:45	43	0	4	4	**51**
08:00	16	0	3	3	**22**	16:00	29	0	9	4	**42**
08:15	12	0	5	0	**17**	16:15	34	0	4	4	**42**
08:30	26	0	0	1	**27**	16:30	52	0	11	1	**64**
08:45	20	1	2	0	**23**	16:45	34	1	11	5	**51**
09:00	25	0	2	1	**28**	17:00	29	0	6	1	**36**
09:15	29	0	1	1	**31**	17:15	42	1	7	4	**54**
09:30	28	0	4	0	**32**	17:30	36	0	4	2	**42**
09:45	20	1	1	3	**25**	17:45	33	0	4	2	**39**
10:00	19	0	6	1	**26**	18:00	31	0	5	4	**40**
10:15	42	0	13	5	**60**	18:15	29	1	2	-2	**30**
10:30	9	0	4	0	**13**	18:30	24	0	1	0	**25**
10:45	33	0	1	1	**35**	18:45	34	0	7	2	**43**
11:00	27	0	2	2	**31**	19:00	24	0	5	2	**31**
11:15	26	0	6	2	**34**	19:15	22	1	2	2	**27**
11:30	32	0	5	2	**39**	19:30	14	0	1	1	**16**
11:45	14	0	5	1	**20**	19:45	22	0	3	1	**26**
12:00	22	0	5	1	**28**	20:00	11	0	3	2	**16**
12:15	26	1	6	2	**35**	20:15	4	0	1	1	**6**
12:30	11	0	6	0	**17**	20:30	11	0	2	0	**13**
12:45	33	0	6	1	**40**	20:45	8	0	2	0	**10**
13:00	23	0	2	1	**26**	21:00	9	0	0	0	**9**
13:15	18	0	5	1	**24**	21:15	8	0	0	1	**9**
13:30	18	0	5	3	**26**	21:30	8	0	2	1	**11**
13:45	35	0	7	5	**47**	21:45	2	1	0	1	**4**
14:00	31	0	4	5	**40**	22:00	5	0	1	3	**9**
			SUBTOTAL		**865**				SUBTOTAL		**984**

TOTAL GERAL	1849

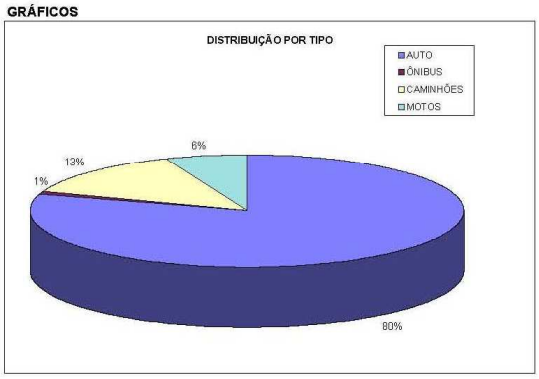
VOLUME HORÁRIO

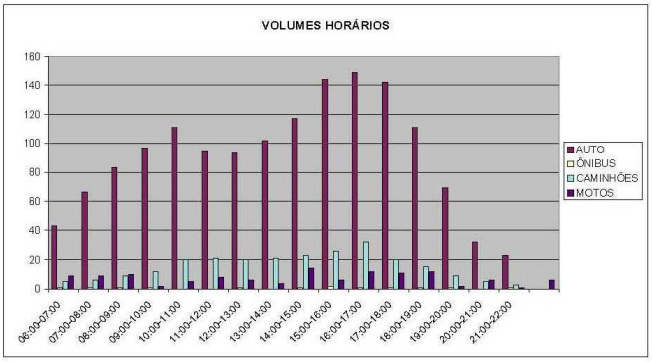
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	43	1	5	9	**58**
07:00-08:00	66	1	6	10	**83**
08:00-09:00	83	1	9	2	**95**
09:00-10:00	96	1	12	5	**114**
10:00-11:00	111	0	20	8	**139**
11:00-12:00	94	0	21	6	**121**
12:00-13:00	93	1	20	4	**118**
13:00-14:00	102	0	21	14	**137**
SUBTOTAL	688	5	114	58	**865**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	117	1	23	6	**147**
15:00-16:00	144	2	26	12	**184**
16:00-17:00	149	1	32	11	**193**
17:00-18:00	142	1	20	12	**175**
18:00-19:00	111	1	15	2	**129**
19:00-20:00	69	1	9	6	**85**
20:00-21:00	32	0	5	1	**38**
21:00-22:00	23	1	3	6	**33**
SUBTOTAL	787	8	133	56	**984**

TOTAL GERAL	1475	13	247	114	1849

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 248	SENTIDO:	6 - GUARUJÁ	PONTO:	1

DATA:	25/6/2019	TEMPO	BOM	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	26	1	88	2	**117**	14:15	39	4	65	4	**112**
06:30	33	2	63	10	**108**	14:30	40	1	85	1	**127**
06:45	33	1	42	15	**91**	14:45	40	1	63	5	**109**
07:00	47	1	51	27	**126**	15:00	64	2	47	10	**123**
07:15	61	0	66	14	**141**	15:15	41	0	73	4	**118**
07:30	92	2	76	12	**182**	15:30	45	0	54	11	**110**
07:45	95	1	67	41	**204**	15:45	50	2	57	13	**122**
08:00	115	4	107	18	**244**	16:00	38	3	53	15	**109**
08:15	58	4	34	2	**98**	16:15	47	1	52	3	**103**
08:30	65	1	62	6	**134**	16:30	22	1	52	11	**86**
08:45	62	1	66	3	**132**	16:45	70	3	81	10	**164**
09:00	96	1	64	2	**163**	17:00	59	2	81	8	**150**
09:15	78	3	98	2	**181**	17:15	45	1	70	39	**155**
09:30	70	2	6	11	**89**	17:30	83	3	38	15	**139**
09:45	75	3	72	2	**152**	17:45	75	4	52	21	**152**
10:00	81	2	66	13	**162**	18:00	109	1	62	17	**189**
10:15	67	0	46	4	**117**	18:15	32	1	59	16	**108**
10:30	86	1	63	2	**152**	18:30	69	2	51	21	**143**
10:45	58	1	55	6	**120**	18:45	63	3	59	18	**143**
11:00	72	1	65	9	**147**	19:00	61	3	58	22	**144**
11:15	63	0	53	8	**124**	19:15	50	0	70	12	**132**
11:30	50	2	78	4	**134**	19:30	71	8	56	7	**142**
11:45	70	3	51	8	**132**	19:45	64	1	32	14	**111**
12:00	52	1	48	4	**105**	20:00	53	4	34	6	**97**
12:15	65	0	49	5	**119**	20:15	30	4	37	1	**72**
12:30	56	0	53	7	**116**	20:30	47	1	52	5	**105**
12:45	59	1	61	9	**130**	20:45	30	0	47	4	**81**
13:00	73	1	65	11	**150**	21:00	43	2	23	6	**74**
13:15	61	0	42	2	**105**	21:15	30	1	35	10	**76**
13:30	61	1	41	7	**110**	21:30	31	0	41	2	**74**
13:45	55	3	46	15	**119**	21:45	38	2	44	0	**84**
14:00	76	3	66	0	**145**	22:00	29	3	34	2	**68**
SUBTOTAL					**4349**	SUBTOTAL					**3722**

TOTAL GERAL	**8071**

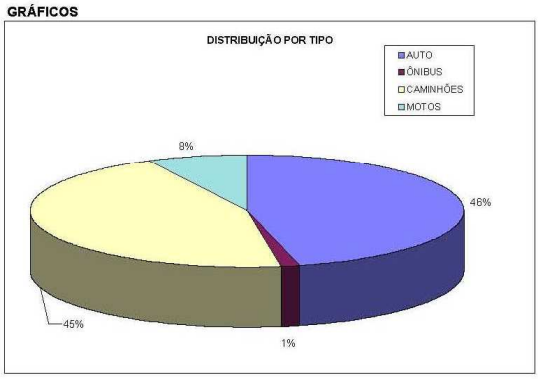
VOLUME HORÁRIO

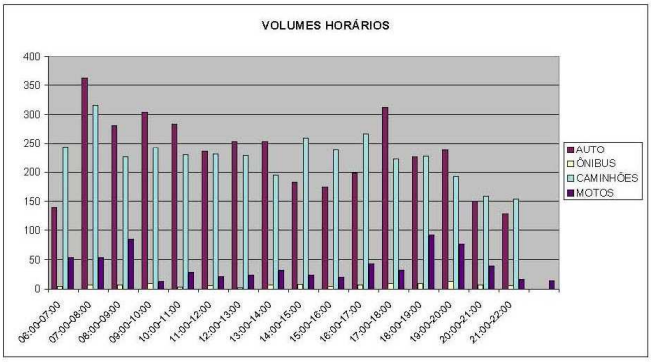
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	139	5	244	54	**442**
07:00-08:00	363	7	316	85	**771**
08:00-09:00	281	7	226	13	**527**
09:00-10:00	304	10	242	28	**584**
10:00-11:00	283	3	229	21	**536**
11:00-12:00	235	6	230	24	**495**
12:00-13:00	253	2	228	32	**515**
13:00-14:00	253	7	195	24	**479**
SUBTOTAL	2111	47	1910	281	**4349**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	183	8	260	20	**471**
15:00-16:00	174	5	237	43	**459**
16:00-17:00	198	7	266	32	**503**
17:00-18:00	312	9	222	92	**635**
18:00-19:00	225	9	227	77	**538**
19:00-20:00	238	13	192	39	**482**
20:00-21:00	150	7	159	16	**332**
21:00-22:00	128	6	154	14	**302**
SUBTOTAL	1608	64	1717	333	**3722**

TOTAL GERAL	3719	111	3627	614	8071

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	(via interna para Aterro Sanitário) RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 253	SENTIDO:	7 - ATERRO	PONTO:	2

DATA:	27/6/2019	TEMPO	GAROA	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	0	0	0	0	**0**	14:15	0	0	0	0	**0**
06:30	0	0	0	0	**0**	14:30	0	0	5	0	**5**
06:45	0	0	0	0	**0**	14:45	0	0	1	0	**1**
07:00	0	0	0	0	**0**	15:00	1	0	5	0	**6**
07:15	2	2	5	0	**9**	15:15	0	0	6	0	**6**
07:30	0	0	1	0	**1**	15:30	0	0	5	0	**5**
07:45	1	0	3	0	**4**	15:45	0	0	4	0	**4**
08:00	2	0	5	0	**7**	16:00	0	0	0	0	**0**
08:15	0	0	6	0	**6**	16:15	1	0	4	0	**6**
08:30	0	0	3	0	**3**	16:30	0	0	2	0	**2**
08:45	1	0	4	0	**5**	16:45	1	0	3	0	**4**
09:00	0	0	0	0	**0**	17:00	0	0	1	0	**1**
09:15	0	0	4	0	**4**	17:15	1	0	0	0	**1**
09:30	0	0	5	0	**5**	17:30	0	0	1	0	**1**
09:45	2	0	1	0	**3**	17:45	0	0	1	0	**1**
10:00	0	0	1	0	**1**	18:00	1	0	0	0	**1**
10:15	0	0	3	0	**3**	18:15	0	0	1	0	**1**
10:30	1	0	5	0	**6**	18:30	1	0	0	0	**1**
10:45	1	0	4	0	**5**	18:45	0	0	2	0	**2**
11:00	0	0	6	0	**6**	19:00	0	0	1	0	**1**
11:15	1	0	7	0	**8**	19:15	1	0	1	0	**2**
11:30	0	0	6	0	**6**	19:30	0	0	0	0	**0**
11:45	3	0	3	0	**6**	19:45	0	0	1	0	**1**
12:00	0	0	2	0	**2**	20:00	0	0	0	0	**0**
12:15	1	0	6	0	**7**	20:15	0	0	2	0	**2**
12:30	0	0	4	0	**4**	20:30	0	0	0	0	**0**
12:45	0	0	1	0	**1**	20:45	0	0	0	0	**0**
13:00	0	0	4	0	**4**	21:00	0	0	0	0	**0**
13:15	1	0	2	0	**3**	21:15	0	0	0	0	**0**
13:30	1	0	4	0	**5**	21:30	0	0	0	0	**0**
13:45	1	0	5	0	**6**	21:45	0	0	0	0	**0**
14:00	1	0	3	0	**4**	22:00	0	0	0	0	**0**
SUBTOTAL					**124**	SUBTOTAL					**53**

TOTAL GERAL	**177**

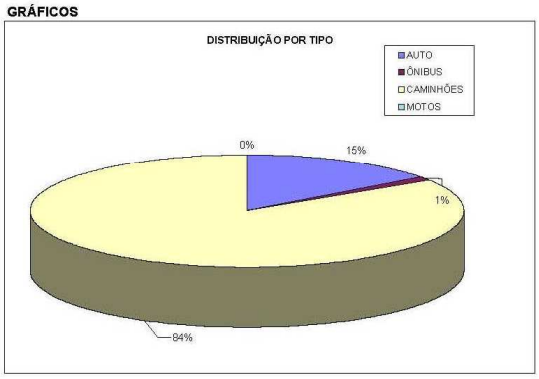
VOLUME HORÁRIO

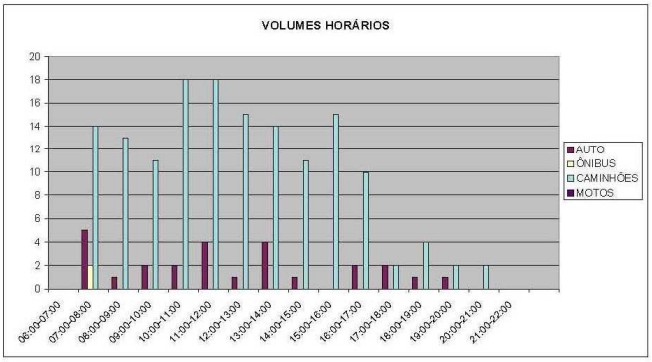
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	0	0	0	0	**0**
07:00-08:00	5	2	14	0	**21**
08:00-09:00	1	0	13	0	**14**
09:00-10:00	2	0	11	0	**13**
10:00-11:00	2	0	18	0	**20**
11:00-12:00	4	0	18	0	**22**
12:00-13:00	1	0	15	0	**16**
13:00-14:00	4	0	14	0	**18**
SUBTOTAL	19	2	103	0	**124**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	1	0	11	0	**12**
15:00-16:00	0	0	15	0	**15**
16:00-17:00	2	0	10	0	**12**
17:00-18:00	2	0	2	0	**4**
18:00-19:00	1	0	4	0	**5**
19:00-20:00	1	0	2	0	**3**
20:00-21:00	0	0	2	0	**2**
21:00-22:00	0	0	0	0	**0**
SUBTOTAL	7	0	46	0	**53**

TOTAL GERAL	**26**	**2**	**149**	**0**	**177**

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	(via interna para Aterro Sanitário) RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 253	SENTIDO:	8 - RODOVIA	PONTO:	2

DATA:	27/6/2019	TEMPO	GAROA	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	0	0	0	0	**0**	14:15	2	0	3	0	**5**
06:30	0	0	0	0	**0**	14:30	1	0	2	0	**3**
06:45	0	0	0	0	**0**	14:45	0	0	2	0	**2**
07:00	0	0	0	0	**0**	15:00	1	0	2	0	**3**
07:15	0	0	5	0	**5**	15:15	0	0	1	0	**1**
07:30	0	0	0	0	**0**	15:30	0	0	6	0	**6**
07:45	1	0	1	0	**2**	15:45	0	0	2	0	**2**
08:00	1	0	1	0	**2**	16:00	0	1	2	0	**3**
08:15	2	0	7	0	**9**	16:15	0	0	6	0	**6**
08:30	0	0	1	0	**1**	16:30	1	0	3	0	**4**
08:45	0	0	2	0	**2**	16:45	1	0	5	0	**6**
09:00	0	0	3	0	**3**	17:00	0	0	3	0	**3**
09:15	0	0	6	0	**6**	17:15	3	1	3	0	**7**
09:30	0	0	5	0	**5**	17:30	2	0	0	0	**2**
09:45	0	0	6	0	**6**	17:45	0	0	0	0	**0**
10:00	1	0	2	0	**3**	18:00	0	0	1	0	**1**
10:15	1	0	0	0	**1**	18:15	0	0	1	0	**1**
10:30	0	0	5	0	**5**	18:30	0	0	0	0	**0**
10:45	1	0	4	0	**5**	18:45	0	0	1	0	**1**
11:00	1	0	4	0	**5**	19:00	0	0	1	0	**1**
11:15	1	0	4	0	**5**	19:15	0	0	2	0	**2**
11:30	1	0	7	0	**8**	19:30	0	0	2	0	**2**
11:45	0	0	4	0	**4**	19:45	0	0	0	0	**0**
12:00	1	0	5	0	**6**	20:00	0	0	0	0	**0**
12:15	0	0	1	0	**1**	20:15	0	0	1	0	**1**
12:30	1	0	4	0	**5**	20:30	0	0	1	0	**1**
12:45	1	0	5	0	**6**	20:45	0	0	0	0	**0**
13:00	0	0	4	0	**4**	21:00	0	0	2	0	**2**
13:15	0	0	5	0	**5**	21:15	0	0	0	0	**0**
13:30	0	0	2	0	**2**	21:30	0	0	0	0	**0**
13:45	0	0	3	0	**3**	21:45	0	0	0	0	**0**
14:00	0	0	4	0	**4**	22:00	0	0	0	0	**0**
SUBTOTAL					**113**	SUBTOTAL					**65**

TOTAL GERAL	**178**

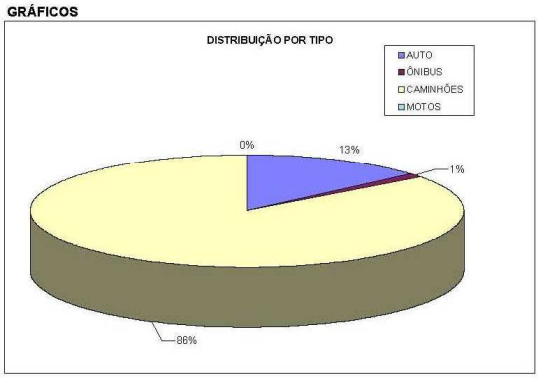
VOLUME HORÁRIO

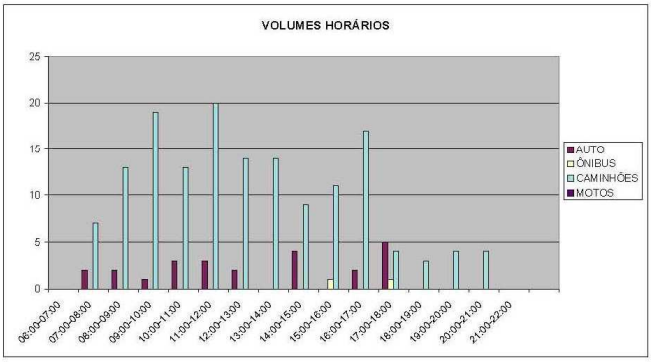
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	0	0	0	0	**0**
07:00-08:00	2	0	7	0	**9**
08:00-09:00	2	0	13	0	**15**
09:00-10:00	1	0	19	0	**20**
10:00-11:00	3	0	13	0	**16**
11:00-12:00	3	0	20	0	**23**
12:00-13:00	2	0	14	0	**16**
13:00-14:00	0	0	14	0	**14**
SUBTOTAL	13	0	100	0	**113**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	4	0	9	0	**13**
15:00-16:00	0	1	11	0	**12**
16:00-17:00	2	0	17	0	**19**
17:00-18:00	5	1	4	0	**10**
18:00-19:00	0	0	3	0	**3**
19:00-20:00	0	0	4	0	**4**
20:00-21:00	0	0	4	0	**4**
21:00-22:00	0	0	0	0	**0**
SUBTOTAL	11	2	52	0	**65**

TOTAL GERAL	24	2	152	0	178

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 267,5	SENTIDO:	9 - RETORNO GUARUJÁ	PONTO:	3

DATA:	27/6/2019	TEMPO	GAROA	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	2	1	2	1	**6**	14:15	2	0	10	1	**13**
06:30	2	0	3	2	**7**	14:30	4	0	18	1	**23**
06:45	2	2	2	2	**8**	14:45	5	1	10	2	**18**
07:00	4	1	2	4	**11**	15:00	4	4	7	1	**16**
07:15	5	2	1	6	**14**	15:15	1	1	3	0	**5**
07:30	3	3	5	1	**12**	15:30	2	3	15	1	**21**
07:45	5	7	5	5	**22**	15:45	6	2	7	0	**15**
08:00	5	6	10	2	**23**	16:00	5	0	5	1	**11**
08:15	4	13	4	0	**21**	16:15	3	0	11	3	**17**
08:30	1	15	2	0	**18**	16:30	7	1	7	2	**17**
08:45	9	1	7	0	**17**	16:45	2	0	8	1	**11**
09:00	2	4	10	0	**16**	17:00	3	1	5	0	**9**
09:15	7	3	6	1	**17**	17:15	7	0	9	0	**16**
09:30	4	0	10	0	**14**	17:30	2	0	4	0	**6**
09:45	6	1	8	1	**16**	17:45	3	0	17	1	**21**
10:00	3	0	6	0	**9**	18:00	2	0	9	2	**13**
10:15	4	1	7	3	**15**	18:15	2	0	6	0	**8**
10:30	5	0	4	0	**9**	18:30	0	2	7	1	**10**
10:45	2	0	9	0	**11**	18:45	1	0	11	0	**12**
11:00	10	0	9	1	**20**	19:00	3	0	8	1	**12**
11:15	2	2	2	0	**6**	19:15	1	2	6	3	**12**
11:30	0	0	11	0	**11**	19:30	1	0	3	0	**4**
11:45	2	0	7	0	**9**	19:45	0	0	8	1	**9**
12:00	5	1	12	1	**19**	20:00	2	0	5	5	**12**
12:15	3	0	17	0	**20**	20:15	0	0	7	1	**8**
12:30	4	0	6	0	**10**	20:30	1	0	6	1	**8**
12:45	1	0	10	0	**11**	20:45	0	0	4	0	**4**
13:00	3	0	5	0	**8**	21:00	0	0	5	2	**7**
13:15	5	1	8	1	**15**	21:15	1	0	0	0	**1**
13:30	1	0	7	1	**9**	21:30	0	0	6	1	**7**
13:45	4	2	4	0	**10**	21:45	3	0	7	1	**11**
14:00	5	1	9	2	**17**	22:00	1	1	5	1	**8**
SUBTOTAL					**431**	SUBTOTAL					**365**

TOTAL GERAL	**796**

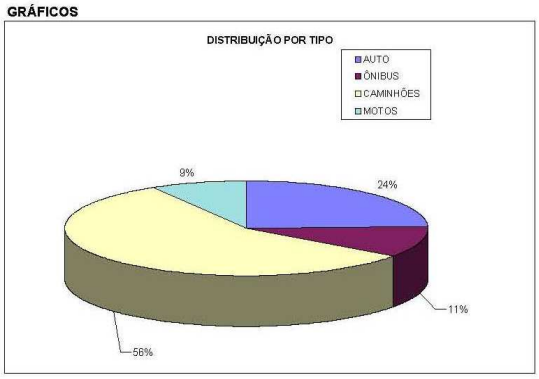
VOLUME HORÁRIO

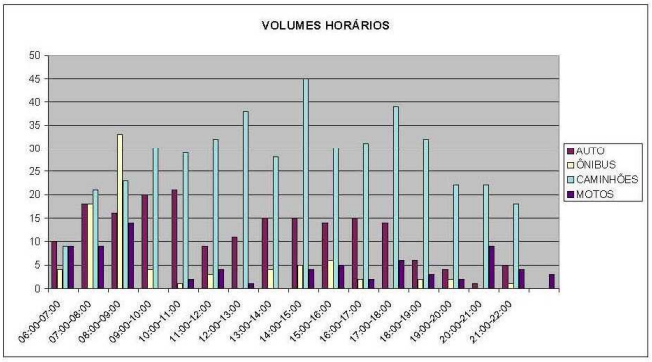
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	10	4	9	9	**32**
07:00-08:00	18	18	21	14	**71**
08:00-09:00	16	33	23	0	**72**
09:00-10:00	20	4	30	2	**56**
10:00-11:00	21	1	29	4	**55**
11:00-12:00	9	3	32	1	**45**
12:00-13:00	11	0	38	0	**49**
13:00-14:00	15	4	28	4	**51**
SUBTOTAL	120	67	210	34	**431**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	15	5	45	5	**70**
15:00-16:00	14	6	30	2	**52**
16:00-17:00	15	2	31	6	**54**
17:00-18:00	14	0	39	3	**56**
18:00-19:00	6	2	32	2	**42**
19:00-20:00	4	2	22	9	**37**
20:00-21:00	1	0	22	4	**27**
21:00-22:00	5	1	18	3	**27**
SUBTOTAL	74	18	239	34	**365**

TOTAL GERAL	194	85	449	68	796

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 267,5	SENTIDO:	10 - SÃO PAULO - MARGINAL	PONTO:	3

DATA:	27/6/2019	TEMPO	GAROA	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	4	3	8	2	**17**	14:15	3	4	2	4	**13**
06:30	5	4	4	1	**14**	14:30	7	2	2	2	**13**
06:45	3	4	2	0	**9**	14:45	8	1	6	2	**17**
07:00	3	0	3	0	**6**	15:00	11	0	7	0	**18**
07:15	12	1	5	2	**20**	15:15	16	7	2	4	**29**
07:30	8	6	6	2	**22**	15:30	15	3	5	1	**24**
07:45	6	2	4	3	**15**	15:45	10	3	5	1	**19**
08:00	4	4	1	0	**9**	16:00	13	3	6	1	**23**
08:15	8	4	2	2	**16**	16:15	18	1	5	6	**30**
08:30	2	7	2	1	**12**	16:30	19	3	5	5	**32**
08:45	11	6	3	3	**23**	16:45	32	5	8	11	**56**
09:00	7	0	4	0	**11**	17:00	22	4	4	7	**37**
09:15	3	4	4	3	**14**	17:15	39	5	7	5	**56**
09:30	5	4	4	1	**14**	17:30	47	8	6	28	**89**
09:45	9	4	4	0	**17**	17:45	44	12	5	15	**76**
10:00	9	4	2	1	**16**	18:00	9	3	1	4	**17**
10:15	9	1	7	1	**18**	18:15	17	1	8	3	**29**
10:30	7	4	1	0	**12**	18:30	9	6	11	5	**31**
10:45	12	3	1	2	**18**	18:45	13	3	0	3	**19**
11:00	7	2	10	0	**19**	19:00	11	4	2	1	**18**
11:15	7	2	6	1	**16**	19:15	12	0	4	5	**21**
11:30	8	4	1	3	**16**	19:30	8	3	1	3	**15**
11:45	7	5	9	2	**23**	19:45	7	4	8	3	**22**
12:00	14	2	11	1	**28**	20:00	5	3	6	2	**16**
12:15	14	3	7	3	**27**	20:15	1	1	5	1	**8**
12:30	8	3	8	0	**19**	20:30	2	2	5	0	**9**
12:45	5	1	4	0	**10**	20:45	3	5	1	0	**9**
13:00	4	5	3	2	**14**	21:00	4	1	3	0	**8**
13:15	2	4	6	1	**13**	21:15	1	3	1	0	**5**
13:30	8	3	9	3	**23**	21:30	4	3	6	3	**16**
13:45	5	4	5	1	**15**	21:45	7	4	4	3	**18**
14:00	12	2	2	1	**17**	22:00	0	0	0	1	**1**
SUBTOTAL					**523**	SUBTOTAL					**794**

TOTAL GERAL	**1317**

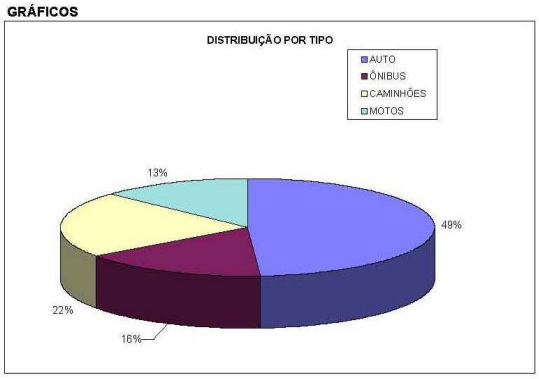
VOLUME HORÁRIO

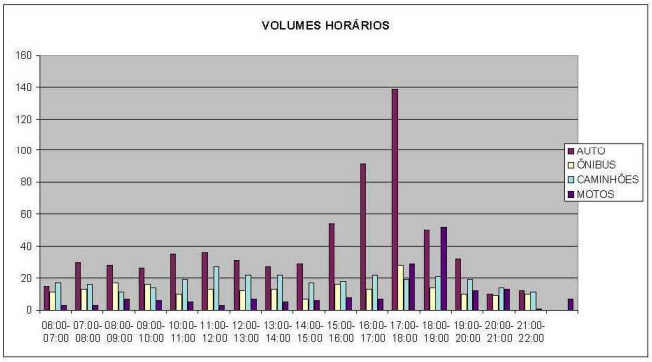
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	15	11	17	3	**46**
07:00-08:00	30	13	16	7	**66**
08:00-09:00	28	17	11	6	**62**
09:00-10:00	26	16	14	5	**61**
10:00-11:00	35	10	19	3	**67**
11:00-12:00	36	13	27	7	**83**
12:00-13:00	31	12	22	5	**70**
13:00-14:00	27	13	22	6	**68**
SUBTOTAL	228	105	148	42	**523**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	29	7	17	8	**61**
15:00-16:00	54	16	18	7	**95**
16:00-17:00	91	13	22	29	**155**
17:00-18:00	139	28	19	52	**238**
18:00-19:00	50	14	21	12	**97**
19:00-20:00	32	10	19	13	**74**
20:00-21:00	10	9	14	1	**34**
21:00-22:00	12	10	11	7	**40**
SUBTOTAL	417	107	141	129	**794**

TOTAL GERAL	645	212	289	171	1317

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 267,5	SENTIDO:	11 - GUARUJÁ (MARGINAL)	PONTO:	3

DATA:	27/6/2019	TEMPO	GARÚA	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	8	1	1	1	**11**	14:15	5	2	3	5	**15**
06:30	14	1	1	1	**17**	14:30	9	0	2	2	**13**
06:45	25	5	4	6	**40**	14:45	9	2	4	1	**16**
07:00	58	5	3	20	**86**	15:00	11	5	4	4	**24**
07:15	60	5	5	30	**100**	15:15	6	2	4	1	**13**
07:30	46	5	3	27	**81**	15:30	8	2	2	0	**12**
07:45	40	5	2	9	**56**	15:45	8	2	3	3	**16**
08:00	41	11	2	9	**63**	16:00	16	6	7	2	**31**
08:15	10	4	2	3	**29**	16:15	8	1	4	1	**14**
08:30	11	2	6	3	**22**	16:30	5	3	2	1	**11**
08:45	8	3	4	2	**17**	16:45	8	5	4	1	**18**
09:00	8	4	3	1	**16**	17:00	8	1	1	1	**11**
09:15	10	3	7	0	**20**	17:15	7	3	5	0	**15**
09:30	10	7	3	1	**21**	17:30	7	6	5	1	**19**
09:45	12	2	5	1	**20**	17:45	9	1	2	1	**13**
10:00	7	1	7	2	**17**	18:00	5	3	4	1	**13**
10:15	6	4	6	1	**17**	18:15	6	3	5	1	**15**
10:30	12	1	4	1	**18**	18:30	5	4	4	4	**17**
10:45	7	1	1	1	**10**	18:45	7	1	4	1	**13**
11:00	13	4	5	2	**24**	19:00	11	3	5	3	**22**
11:15	4	2	2	0	**8**	19:15	7	3	3	0	**13**
11:30	9	3	1	3	**16**	19:30	5	2	1	1	**9**
11:45	7	1	2	0	**10**	19:45	5	3	10	3	**21**
12:00	7	4	8	3	**22**	20:00	3	2	3	0	**8**
12:15	12	2	6	3	**23**	20:15	1	4	5	0	**10**
12:30	10	2	4	2	**18**	20:30	7	1	6	1	**15**
12:45	10	2	5	7	**24**	20:45	4	2	3	0	**9**
13:00	10	2	0	3	**15**	21:00	3	2	3	0	**8**
13:15	7	4	2	2	**15**	21:15	1	3	1	1	**6**
13:30	5	2	2	1	**10**	21:30	4	2	2	1	**9**
13:45	5	3	5	4	**17**	21:45	5	1	3	0	**9**
14:00	6	3	3	1	**13**	22:00	1	4	1	1	**7**
SUBTOTAL					**875**	SUBTOTAL					**445**

TOTAL GERAL	**1320**

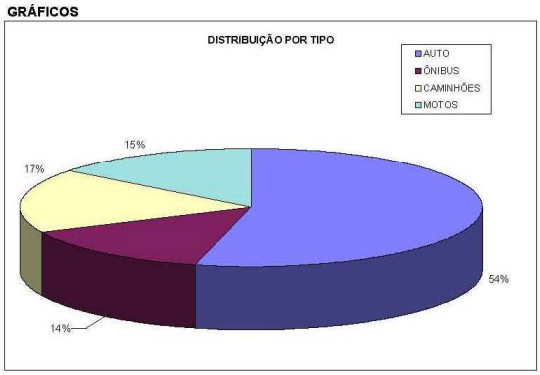
VOLUME HORÁRIO

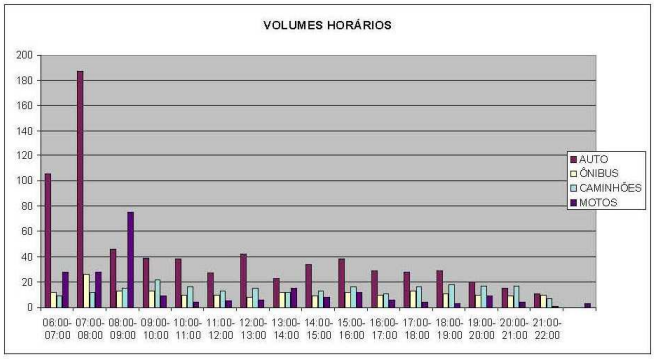
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	105	12	9	28	**154**
07:00-08:00	187	26	12	75	**300**
08:00-09:00	46	13	15	9	**83**
09:00-10:00	39	13	22	4	**78**
10:00-11:00	38	10	16	5	**69**
11:00-12:00	27	10	13	6	**56**
12:00-13:00	42	8	15	15	**80**
13:00-14:00	23	12	12	8	**55**
SUBTOTAL	507	104	114	150	**875**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	34	9	13	12	**68**
15:00-16:00	38	12	16	6	**72**
16:00-17:00	29	10	11	4	**54**
17:00-18:00	28	13	16	3	**60**
18:00-19:00	29	11	18	9	**67**
19:00-20:00	20	10	17	4	**51**
20:00-21:00	15	9	17	1	**42**
21:00-22:00	11	10	7	3	**31**
SUBTOTAL	204	84	115	42	**445**

TOTAL GERAL	711	188	229	192	1320

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 248	SENTIDO:	1 - SÃO PAULO	PONTO:	1

DATA:	25/6/2019	TEMPO	BOM	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	49	5	62	38	**154**	14:15	64	3	66	27	**160**
06:30	69	5	33	42	**149**	14:30	61	1	60	29	**151**
06:45	67	3	48	58	**176**	14:45	55	1	65	13	**134**
07:00	58	3	38	47	**146**	15:00	55	1	71	8	**135**
07:15	96	2	38	32	**168**	15:15	82	0	57	4	**143**
07:30	69	4	32	32	**137**	15:30	65	0	59	17	**141**
07:45	76	3	39	32	**150**	15:45	68	1	46	8	**123**
08:00	64	1	43	19	**127**	16:00	93	1	19	17	**130**
08:15	57	0	43	11	**111**	16:15	86	2	62	4	**164**
08:30	63	1	54	8	**126**	16:30	72	0	61	9	**142**
08:45	67	0	73	13	**153**	16:45	68	2	64	12	**146**
09:00	70	2	53	13	**138**	17:00	102	2	56	9	**169**
09:15	54	1	66	7	**128**	17:15	83	1	33	12	**129**
09:30	67	2	51	9	**129**	17:30	88	3	44	21	**156**
09:45	67	0	52	14	**133**	17:45	78	3	47	31	**159**
10:00	72	1	63	9	**145**	18:00	106	0	82	18	**206**
10:15	66	2	55	16	**139**	18:15	79	1	44	21	**145**
10:30	39	1	26	10	**76**	18:30	74	0	43	18	**135**
10:45	62	0	38	8	**108**	18:45	79	3	38	15	**135**
11:00	52	3	48	7	**110**	19:00	55	0	56	7	**118**
11:15	58	0	66	4	**128**	19:15	34	2	57	16	**109**
11:30	63	0	66	4	**133**	19:30	53	4	33	11	**101**
11:45	66	1	47	12	**126**	19:45	49	2	39	5	**95**
12:00	51	1	51	3	**106**	20:00	29	0	28	3	**60**
12:15	27	1	41	0	**69**	20:15	38	1	42	6	**87**
12:30	25	0	44	1	**70**	20:30	24	0	26	3	**53**
12:45	65	0	66	8	**139**	20:45	17	0	28	5	**50**
13:00	48	1	39	9	**97**	21:00	14	2	28	1	**45**
13:15	55	2	53	7	**117**	21:15	16	2	24	3	**45**
13:30	53	0	42	8	**103**	21:30	12	0	18	1	**31**
13:45	72	0	52	15	**139**	21:45	9	1	26	4	**40**
14:00	75	2	39	18	**134**	22:00	53	0	26	6	**85**
SUBTOTAL					**4064**	SUBTOTAL					**3712**

TOTAL GERAL	**7776**

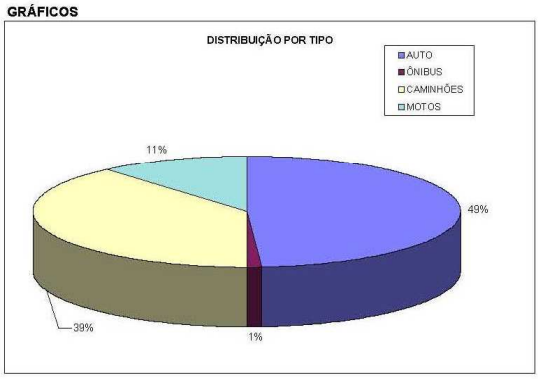
VOLUME HORÁRIO

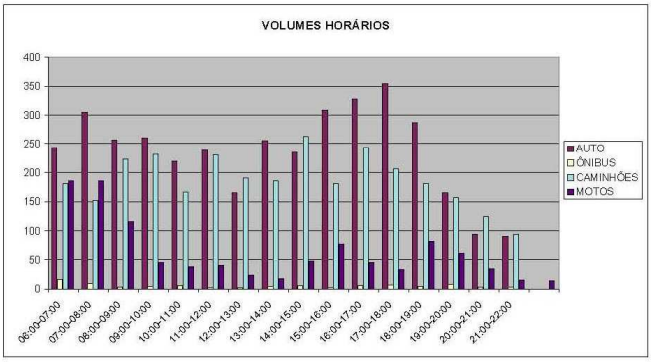
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	243	16	181	185	**625**
07:00-08:00	305	10	152	115	**582**
08:00-09:00	257	3	223	45	**528**
09:00-10:00	260	4	232	39	**535**
10:00-11:00	219	6	167	41	**433**
11:00-12:00	238	2	230	23	**493**
12:00-13:00	165	2	190	18	**375**
13:00-14:00	255	4	186	48	**493**
SUBTOTAL	1942	47	1561	514	**4064**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	235	6	262	77	**580**
15:00-16:00	308	2	181	46	**537**
16:00-17:00	328	6	243	34	**611**
17:00-18:00	355	7	206	82	**650**
18:00-19:00	287	4	181	61	**533**
19:00-20:00	165	8	157	35	**365**
20:00-21:00	93	3	124	15	**235**
21:00-22:00	90	3	94	14	**201**
SUBTOTAL	1861	39	1448	364	**3712**

TOTAL GERAL	3803	86	3009	878	7776

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 248	SENTIDO:	2 - RETORNO PARA SÃO PAULO	PONTO:	1

DATA:	25/6/2019	TEMPO	BOM	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	8	0	26	0	**34**
06:30	2	0	25	2	**29**
06:45	4	0	28	0	**32**
07:00	2	0	22	0	**24**
07:15	2	0	15	1	**18**
07:30	2	0	15	0	**17**
07:45	1	0	22	0	**23**
08:00	0	0	20	1	**21**
08:15	0	0	18	0	**18**
08:30	1	0	28	1	**30**
08:45	1	0	22	0	**23**
09:00	4	0	38	0	**42**
09:15	1	0	25	0	**26**
09:30	4	0	21	0	**25**
09:45	2	0	32	0	**34**
10:00	3	0	50	0	**53**
10:15	0	0	45	0	**45**
10:30	3	0	35	0	**38**
10:45	5	0	26	0	**31**
11:00	2	0	22	0	**24**
11:15	2	1	21	0	**24**
11:30	0	2	8	0	**10**
11:45	9	0	76	0	**85**
12:00	4	0	26	0	**30**
12:15	5	0	28	0	**33**
12:30	3	0	22	0	**25**
12:45	0	0	24	0	**24**
13:00	1	0	23	0	**24**
13:15	3	0	26	0	**29**
13:30	1	0	30	0	**31**
13:45	4	0	17	1	**22**
14:00	1	0	30	0	**31**
SUBTOTAL					**955**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:15	1	0	37	0	**38**
14:30	5	0	47	0	**52**
14:45	5	0	32	0	**37**
15:00	2	0	19	0	**21**
15:15	2	0	22	0	**24**
15:30	0	0	27	0	**27**
15:45	5	0	33	1	**39**
16:00	3	0	25	1	**29**
16:15	4	0	24	0	**28**
16:30	3	0	28	0	**31**
16:45	5	0	31	0	**36**
17:00	7	0	42	1	**50**
17:15	4	0	39	0	**43**
17:30	5	1	66	0	**72**
17:45	2	0	21	0	**23**
18:00	7	0	26	3	**36**
18:15	7	0	16	1	**24**
18:30	2	1	17	1	**21**
18:45	1	0	12	0	**13**
19:00	1	0	8	0	**9**
19:15	2	0	16	0	**18**
19:30	2	0	7	0	**9**
19:45	1	0	16	0	**17**
20:00	2	0	4	0	**6**
20:15	1	0	7	0	**8**
20:30	0	0	8	0	**8**
20:45	2	0	17	0	**19**
21:00	1	0	14	1	**16**
21:15	1	0	13	0	**14**
21:30	0	0	10	0	**10**
21:45	0	0	10	0	**10**
22:00	0	0	6	0	**6**
SUBTOTAL					**794**

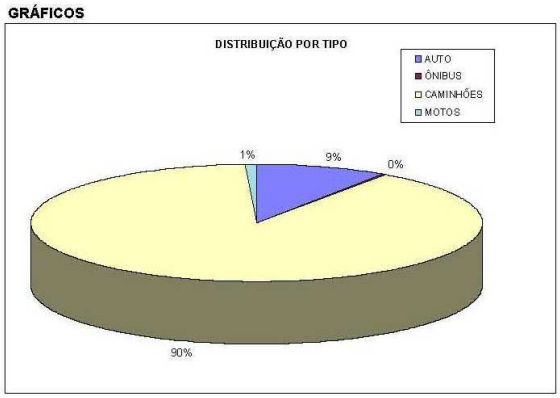
TOTAL GERAL	**1749**

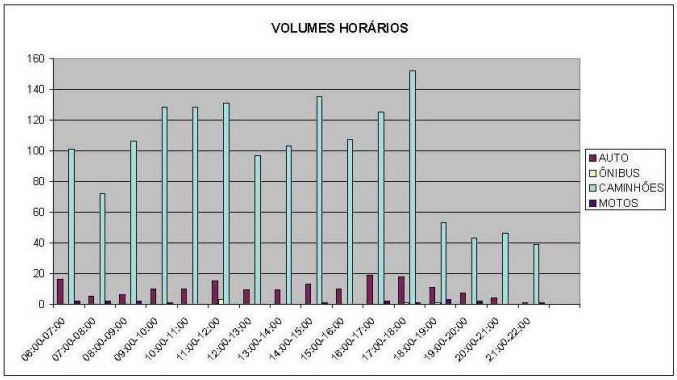
VOLUME HORÁRIO

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	16	0	101	2	**119**	14:00-15:00	13	0	135	0	**148**
07:00-08:00	5	0	72	2	**79**	15:00-16:00	10	0	107	2	**119**
08:00-09:00	6	0	106	1	**113**	16:00-17:00	19	0	125	1	**145**
09:00-10:00	10	0	128	0	**138**	17:00-18:00	18	1	152	3	**174**
10:00-11:00	10	0	128	0	**138**	18:00-19:00	11	1	53	2	**67**
11:00-12:00	15	3	131	0	**149**	19:00-20:00	7	0	43	0	**50**
12:00-13:00	9	0	97	0	**106**	20:00-21:00	4	0	46	1	**51**
13:00-14:00	9	0	103	1	**113**	21:00-22:00	1	0	39	0	**40**
SUBTOTAL	80	3	866	6	**955**	SUBTOTAL	83	2	700	9	**794**

TOTAL GERAL	163	5	1566	15	1749

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 248	SENTIDO:	3 - BERTIOGA /SÃO SEBASTIÃO	PONTO:	1

DATA:	25/6/2019	TEMPO	BOM	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	6	0	3	1	**10**	14:15	14	0	7	2	**23**
06:30	22	0	4	2	**28**	14:30	11	0	4	2	**17**
06:45	19	0	10	4	**33**	14:45	16	0	4	1	**21**
07:00	10	0	6	6	**22**	15:00	17	1	4	2	**24**
07:15	21	0	5	4	**30**	15:15	20	0	4	1	**25**
07:30	19	0	6	1	**26**	15:30	12	1	4	10	**27**
07:45	23	1	11	0	**35**	15:45	19	0	3	2	**24**
08:00	27	0	2	2	**31**	16:00	14	0	1	1	**16**
08:15	22	0	5	2	**29**	16:15	18	0	0	2	**20**
08:30	23	0	5	0	**28**	16:30	17	0	3	2	**22**
08:45	37	0	2	3	**42**	16:45	16	0	3	2	**21**
09:00	34	0	7	4	**45**	17:00	17	0	1	0	**18**
09:15	25	0	2	1	**28**	17:15	13	0	1	1	**15**
09:30	40	0	4	3	**47**	17:30	17	0	4	1	**22**
09:45	18	0	9	2	**29**	17:45	25	0	1	4	**30**
10:00	38	1	3	3	**45**	18:00	19	0	2	2	**23**
10:15	19	0	9	0	**28**	18:15	25	0	3	2	**30**
10:30	26	0	9	3	**38**	18:30	10	0	2	2	**14**
10:45	24	0	4	2	**30**	18:45	20	1	1	4	**26**
11:00	22	0	5	2	**29**	19:00	14	0	1	3	**18**
11:15	28	0	1	0	**29**	19:15	13	0	0	2	**15**
11:30	23	0	3	0	**26**	19:30	13	0	1	0	**14**
11:45	20	0	4	4	**28**	19:45	10	0	3	1	**14**
12:00	22	1	2	3	**28**	20:00	13	0	2	5	**20**
12:15	23	0	2	1	**26**	20:15	5	2	0	0	**7**
12:30	16	1	1	2	**20**	20:30	9	0	0	0	**9**
12:45	20	0	4	2	**26**	20:45	9	0	0	0	**9**
13:00	23	0	2	1	**26**	21:00	1	0	0	0	**1**
13:15	20	0	9	2	**31**	21:15	4	0	1	0	**5**
13:30	28	1	5	1	**35**	21:30	5	0	0	1	**6**
13:45	6	0	3	1	**10**	21:45	3	0	0	0	**3**
14:00	18	0	2	1	**21**	22:00	9	0	0	0	**9**
SUBTOTAL					**939**	SUBTOTAL					**548**

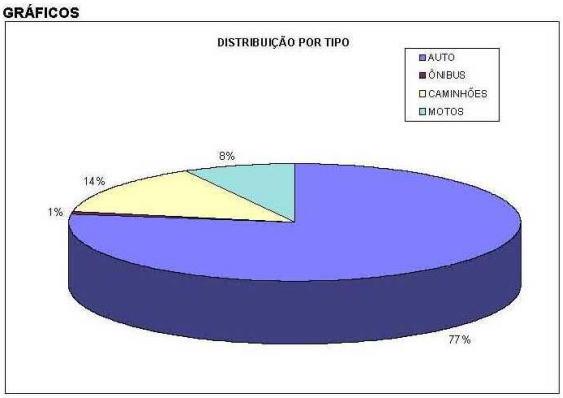
TOTAL GERAL	**1487**

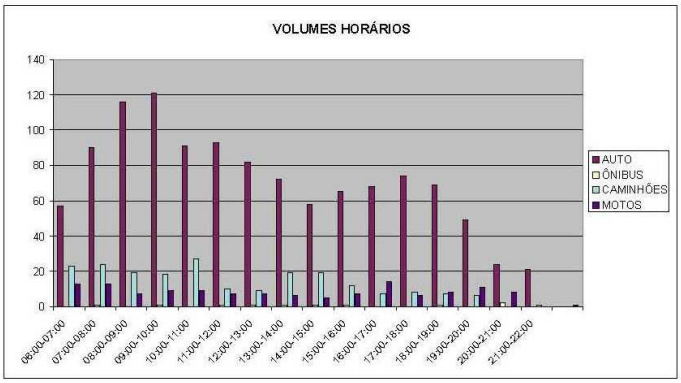
VOLUME HORÁRIO

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	57	0	23	13	**93**	14:00-15:00	58	1	19	7	**85**
07:00-08:00	90	1	24	7	**122**	15:00-16:00	65	1	12	14	**92**
08:00-09:00	116	0	19	9	**144**	16:00-17:00	68	0	7	6	**81**
09:00-10:00	121	1	18	9	**149**	17:00-18:00	74	0	8	8	**90**
10:00-11:00	91	0	27	7	**125**	18:00-19:00	69	1	7	11	**88**
11:00-12:00	93	1	10	7	**111**	19:00-20:00	49	0	6	8	**63**
12:00-13:00	82	1	9	6	**98**	20:00-21:00	24	2	0	0	**26**
13:00-14:00	72	1	19	5	**97**	21:00-22:00	21	0	1	1	**23**
SUBTOTAL	722	5	149	63	**939**	SUBTOTAL	428	5	60	55	**548**

TOTAL GERAL	1150	10	209	118	1487

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 248	SENTIDO:	4- RETORNO PARA GUARUJÁ	PONTO:	1

DATA:	25/6/2019	TEMPO	BOM	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	1	0	0	0	**1**	14:15	1	0	0	1	**2**
06:30	3	0	0	0	**3**	14:30	1	0	0	0	**1**
06:45	0	0	0	0	**0**	14:45	1	0	0	0	**1**
07:00	1	0	0	0	**1**	15:00	0	0	1	0	**1**
07:15	1	0	0	0	**1**	15:15	0	0	0	0	**0**
07:30	0	0	0	0	**0**	15:30	2	0	0	0	**2**
07:45	0	0	0	0	**0**	15:45	0	0	0	1	**1**
08:00	2	0	0	0	**2**	16:00	0	0	0	0	**0**
08:15	0	0	0	0	**0**	16:15	1	0	0	0	**1**
08:30	0	0	0	0	**0**	16:30	1	0	0	1	**2**
08:45	2	0	1	0	**3**	16:45	1	0	0	0	**1**
09:00	1	0	1	0	**2**	17:00	1	0	0	0	**1**
09:15	0	0	1	0	**1**	17:15	0	0	0	0	**0**
09:30	1	0	0	0	**1**	17:30	2	0	0	1	**3**
09:45	1	0	0	0	**1**	17:45	0	0	0	0	**0**
10:00	1	0	0	0	**1**	18:00	2	0	0	0	**2**
10:15	1	0	0	0	**1**	18:15	2	0	0	0	**2**
10:30	0	0	0	0	**0**	18:30	1	0	0	1	**2**
10:45	0	0	0	0	**0**	18:45	0	0	0	0	**0**
11:00	0	0	0	0	**0**	19:00	2	0	0	0	**2**
11:15	1	0	0	0	**1**	19:15	2	0	0	0	**2**
11:30	1	0	0	0	**1**	19:30	0	0	0	0	**0**
11:45	2	0	0	0	**2**	19:45	1	0	0	0	**1**
12:00	0	0	0	0	**0**	20:00	0	0	0	0	**0**
12:15	2	0	0	0	**2**	20:15	2	0	0	0	**2**
12:30	0	0	0	0	**0**	20:30	0	0	0	0	**0**
12:45	0	0	0	0	**0**	20:45	2	0	0	0	**2**
13:00	2	0	0	0	**2**	21:00	1	0	0	0	**1**
13:15	0	0	0	0	**0**	21:15	0	0	0	0	**0**
13:30	1	0	0	0	**1**	21:30	0	0	0	1	**1**
13:45	0	0	0	0	**0**	21:45	0	0	0	1	**1**
14:00	0	0	0	0	**0**	22:00	0	0	0	0	**0**
SUBTOTAL					**27**	SUBTOTAL					**34**

TOTAL GERAL	**61**

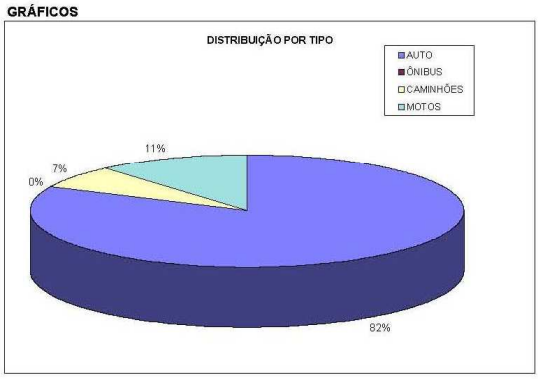
VOLUME HORÁRIO

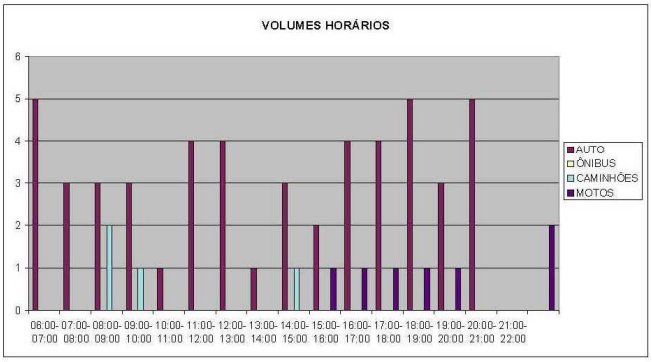
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	5	0	0	0	**5**
07:00-08:00	3	0	0	0	**3**
08:00-09:00	3	0	2	0	**5**
09:00-10:00	3	0	1	0	**4**
10:00-11:00	1	0	0	0	**1**
11:00-12:00	4	0	0	0	**4**
12:00-13:00	4	0	0	0	**4**
13:00-14:00	1	0	0	0	**1**
SUBTOTAL	24	0	3	0	**27**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	3	0	1	1	**5**
15:00-16:00	2	0	0	1	**3**
16:00-17:00	4	0	0	1	**5**
17:00-18:00	4	0	0	1	**5**
18:00-19:00	5	0	0	1	**6**
19:00-20:00	3	0	0	0	**3**
20:00-21:00	5	0	0	0	**5**
21:00-22:00	0	0	0	2	**2**
SUBTOTAL	26	0	1	7	**34**

TOTAL GERAL	50	0	4	7	61

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 248	SENTIDO:	5- VEM DE BERTIOGA SENTIDO SÃOPAULO	PONTO:	1

DATA:	25/6/2019	TEMPO	BOM	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	7	0	1	2	**10**	14:15	33	0	4	2	**39**
06:30	9	1	3	3	**16**	14:30	20	1	8	2	**31**
06:45	10	0	0	1	**11**	14:45	38	0	5	2	**45**
07:00	17	0	1	3	**21**	15:00	26	0	6	0	**32**
07:15	18	0	2	2	**22**	15:15	44	2	8	3	**57**
07:30	16	0	1	3	**20**	15:30	28	0	5	1	**34**
07:45	16	1	0	2	**19**	15:45	43	0	4	4	**51**
08:00	16	0	3	3	**22**	16:00	29	0	9	4	**42**
08:15	12	0	5	0	**17**	16:15	34	0	4	4	**42**
08:30	26	0	0	1	**27**	16:30	52	0	11	1	**64**
08:45	20	1	2	0	**23**	16:45	34	1	11	5	**51**
09:00	25	0	2	1	**28**	17:00	29	0	6	1	**36**
09:15	29	0	1	1	**31**	17:15	42	1	7	4	**54**
09:30	28	0	4	0	**32**	17:30	36	0	4	2	**42**
09:45	20	1	1	3	**25**	17:45	33	0	4	2	**39**
10:00	19	0	6	1	**26**	18:00	31	0	5	4	**40**
10:15	42	0	13	5	**60**	18:15	29	1	2	-2	**30**
10:30	9	0	4	0	**13**	18:30	24	0	1	0	**25**
10:45	33	0	1	1	**35**	18:45	34	0	7	2	**43**
11:00	27	0	2	2	**31**	19:00	24	0	5	2	**31**
11:15	26	0	6	2	**34**	19:15	22	1	2	2	**27**
11:30	32	0	5	2	**39**	19:30	14	0	1	1	**16**
11:45	14	0	5	1	**20**	19:45	22	0	3	1	**26**
12:00	22	0	5	1	**28**	20:00	11	0	3	2	**16**
12:15	26	1	6	2	**35**	20:15	4	0	1	1	**6**
12:30	11	0	6	0	**17**	20:30	11	0	2	0	**13**
12:45	33	0	6	1	**40**	20:45	8	0	2	0	**10**
13:00	23	0	2	1	**26**	21:00	9	0	0	0	**9**
13:15	18	0	5	1	**24**	21:15	8	0	0	1	**9**
13:30	18	0	5	3	**26**	21:30	8	0	2	1	**11**
13:45	35	0	7	5	**47**	21:45	2	1	0	1	**4**
14:00	31	0	4	5	**40**	22:00	5	0	1	3	**9**
SUBTOTAL					**865**	SUBTOTAL					**984**

TOTAL GERAL	**1849**

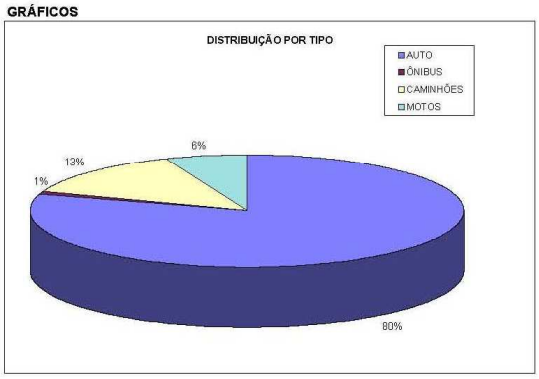
VOLUME HORÁRIO

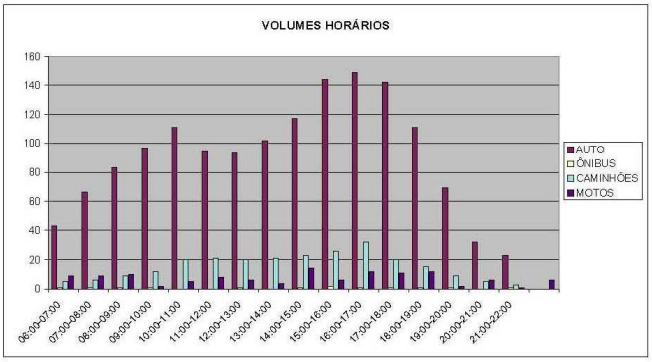
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	43	1	5	9	**58**
07:00-08:00	66	1	6	10	**83**
08:00-09:00	83	1	9	2	**95**
09:00-10:00	96	1	12	5	**114**
10:00-11:00	111	0	20	8	**139**
11:00-12:00	94	0	21	6	**121**
12:00-13:00	93	1	20	4	**118**
13:00-14:00	102	0	21	14	**137**
SUBTOTAL	688	5	114	58	**865**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	117	1	23	6	**147**
15:00-16:00	144	2	26	12	**184**
16:00-17:00	149	1	32	11	**193**
17:00-18:00	142	1	20	12	**175**
18:00-19:00	111	1	15	2	**129**
19:00-20:00	69	1	9	6	**85**
20:00-21:00	32	0	5	1	**38**
21:00-22:00	23	1	3	6	**33**
SUBTOTAL	787	8	133	56	**984**

TOTAL GERAL	1475	13	247	114	1849

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 248	SENTIDO:	6 - GUARUJÁ	PONTO:	1

DATA:	25/6/2019	TEMPO	BOM	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	26	1	88	2	**117**	14:15	39	4	65	4	**112**
06:30	33	2	63	10	**108**	14:30	40	1	85	1	**127**
06:45	33	1	42	15	**91**	14:45	40	1	63	5	**109**
07:00	47	1	51	27	**126**	15:00	64	2	47	10	**123**
07:15	61	0	66	14	**141**	15:15	41	0	73	4	**118**
07:30	92	2	76	12	**182**	15:30	45	0	54	11	**110**
07:45	95	1	67	41	**204**	15:45	50	2	57	13	**122**
08:00	115	4	107	18	**244**	16:00	38	3	53	15	**109**
08:15	58	4	34	2	**98**	16:15	47	1	52	3	**103**
08:30	65	1	62	6	**134**	16:30	22	1	52	11	**86**
08:45	62	1	66	3	**132**	16:45	70	3	81	10	**164**
09:00	96	1	64	2	**163**	17:00	59	2	81	8	**150**
09:15	78	3	98	2	**181**	17:15	45	1	70	39	**155**
09:30	70	2	6	11	**89**	17:30	83	3	38	15	**139**
09:45	75	3	72	2	**152**	17:45	75	4	52	21	**152**
10:00	81	2	66	13	**162**	18:00	109	1	62	17	**189**
10:15	67	0	46	4	**117**	18:15	32	1	59	16	**108**
10:30	86	1	63	2	**152**	18:30	69	2	51	21	**143**
10:45	58	1	55	6	**120**	18:45	63	3	59	18	**143**
11:00	72	1	65	9	**147**	19:00	61	3	58	22	**144**
11:15	63	0	53	8	**124**	19:15	50	0	70	12	**132**
11:30	50	2	78	4	**134**	19:30	71	8	56	7	**142**
11:45	70	3	51	8	**132**	19:45	64	1	32	14	**111**
12:00	52	1	48	4	**105**	20:00	53	4	34	6	**97**
12:15	65	0	49	5	**119**	20:15	30	4	37	1	**72**
12:30	56	0	53	7	**116**	20:30	47	1	52	5	**105**
12:45	59	1	61	9	**130**	20:45	30	0	47	4	**81**
13:00	73	1	65	11	**150**	21:00	43	2	23	6	**74**
13:15	61	0	42	2	**105**	21:15	30	1	35	10	**76**
13:30	61	1	41	7	**110**	21:30	31	0	41	2	**74**
13:45	55	3	46	15	**119**	21:45	38	2	44	0	**84**
14:00	76	3	66	0	**145**	22:00	29	3	34	2	**68**
SUBTOTAL					**4349**	SUBTOTAL					**3722**

TOTAL GERAL	**8071**

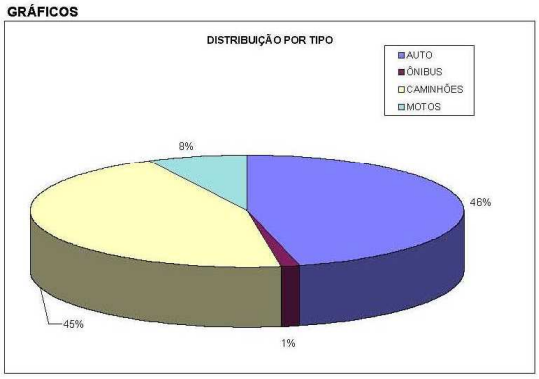
VOLUME HORÁRIO

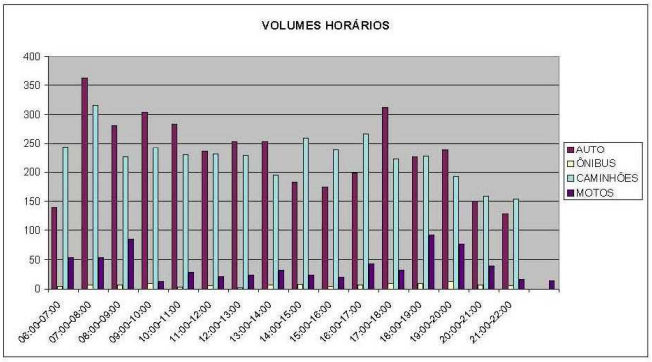
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	139	5	244	54	**442**
07:00-08:00	363	7	316	85	**771**
08:00-09:00	281	7	226	13	**527**
09:00-10:00	304	10	242	28	**584**
10:00-11:00	283	3	229	21	**536**
11:00-12:00	235	6	230	24	**495**
12:00-13:00	253	2	228	32	**515**
13:00-14:00	253	7	195	24	**479**
SUBTOTAL	2111	47	1910	281	**4349**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	183	8	260	20	**471**
15:00-16:00	174	5	237	43	**459**
16:00-17:00	198	7	266	32	**503**
17:00-18:00	312	9	222	92	**635**
18:00-19:00	225	9	227	77	**538**
19:00-20:00	238	13	192	39	**482**
20:00-21:00	150	7	159	16	**332**
21:00-22:00	128	6	154	14	**302**
SUBTOTAL	1608	64	1717	333	**3722**

TOTAL GERAL	3719	111	3627	614	8071

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	(via interna para Aterro Sanitário) RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 253	SENTIDO:	7 - ATERRO	PONTO:	2

DATA:	27/6/2019	TEMPO	GAROA	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	0	0	0	0	**0**	14:15	0	0	0	0	**0**
06:30	0	0	0	0	**0**	14:30	0	0	5	0	**5**
06:45	0	0	0	0	**0**	14:45	0	0	1	0	**1**
07:00	0	0	0	0	**0**	15:00	1	0	5	0	**6**
07:15	2	2	5	0	**9**	15:15	0	0	6	0	**6**
07:30	0	0	1	0	**1**	15:30	0	0	5	0	**5**
07:45	1	0	3	0	**4**	15:45	0	0	4	0	**4**
08:00	2	0	5	0	**7**	16:00	0	0	0	0	**0**
08:15	0	0	6	0	**6**	16:15	1	0	4	0	**6**
08:30	0	0	3	0	**3**	16:30	0	0	2	0	**2**
08:45	1	0	4	0	**5**	16:45	1	0	3	0	**4**
09:00	0	0	0	0	**0**	17:00	0	0	1	0	**1**
09:15	0	0	4	0	**4**	17:15	1	0	0	0	**1**
09:30	0	0	5	0	**5**	17:30	0	0	1	0	**1**
09:45	2	0	1	0	**3**	17:45	0	0	1	0	**1**
10:00	0	0	1	0	**1**	18:00	1	0	0	0	**1**
10:15	0	0	3	0	**3**	18:15	0	0	1	0	**1**
10:30	1	0	5	0	**6**	18:30	1	0	0	0	**1**
10:45	1	0	4	0	**5**	18:45	0	0	2	0	**2**
11:00	0	0	6	0	**6**	19:00	0	0	1	0	**1**
11:15	1	0	7	0	**8**	19:15	1	0	1	0	**2**
11:30	0	0	6	0	**6**	19:30	0	0	0	0	**0**
11:45	3	0	3	0	**6**	19:45	0	0	1	0	**1**
12:00	0	0	2	0	**2**	20:00	0	0	0	0	**0**
12:15	1	0	6	0	**7**	20:15	0	0	2	0	**2**
12:30	0	0	4	0	**4**	20:30	0	0	0	0	**0**
12:45	0	0	1	0	**1**	20:45	0	0	0	0	**0**
13:00	0	0	4	0	**4**	21:00	0	0	0	0	**0**
13:15	1	0	2	0	**3**	21:15	0	0	0	0	**0**
13:30	1	0	4	0	**5**	21:30	0	0	0	0	**0**
13:45	1	0	5	0	**6**	21:45	0	0	0	0	**0**
14:00	1	0	3	0	**4**	22:00	0	0	0	0	**0**
SUBTOTAL					**124**	SUBTOTAL					**53**

TOTAL GERAL	**177**

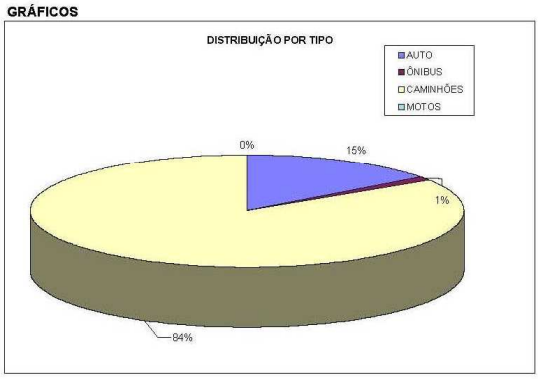
VOLUME HORÁRIO

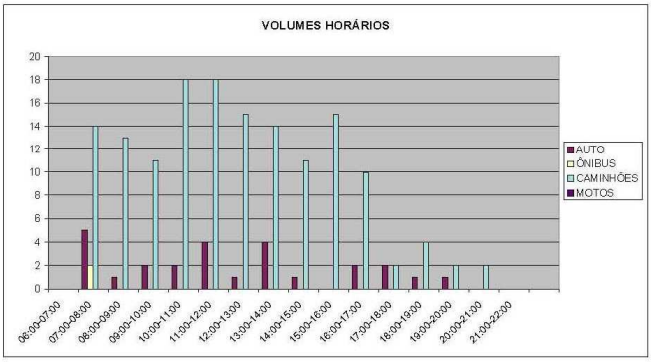
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	0	0	0	0	**0**
07:00-08:00	5	2	14	0	**21**
08:00-09:00	1	0	13	0	**14**
09:00-10:00	2	0	11	0	**13**
10:00-11:00	2	0	18	0	**20**
11:00-12:00	4	0	18	0	**22**
12:00-13:00	1	0	15	0	**16**
13:00-14:00	4	0	14	0	**18**
SUBTOTAL	19	2	103	0	**124**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	1	0	11	0	**12**
15:00-16:00	0	0	15	0	**15**
16:00-17:00	2	0	10	0	**12**
17:00-18:00	2	0	2	0	**4**
18:00-19:00	1	0	4	0	**5**
19:00-20:00	1	0	2	0	**3**
20:00-21:00	0	0	2	0	**2**
21:00-22:00	0	0	0	0	**0**
SUBTOTAL	7	0	46	0	**53**

TOTAL GERAL	**26**	**2**	**149**	**0**	**177**

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	(via interna para Aterro Sanitário) RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 253	SENTIDO:	8 - RODOVIA	PONTO:	2

DATA:	27/6/2019	TEMPO	GAROA	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	0	0	0	0	**0**	14:15	2	0	3	0	**5**
06:30	0	0	0	0	**0**	14:30	1	0	2	0	**3**
06:45	0	0	0	0	**0**	14:45	0	0	2	0	**2**
07:00	0	0	0	0	**0**	15:00	1	0	2	0	**3**
07:15	0	0	5	0	**5**	15:15	0	0	1	0	**1**
07:30	0	0	0	0	**0**	15:30	0	0	6	0	**6**
07:45	1	0	1	0	**2**	15:45	0	0	2	0	**2**
08:00	1	0	1	0	**2**	16:00	0	1	2	0	**3**
08:15	2	0	7	0	**9**	16:15	0	0	6	0	**6**
08:30	0	0	1	0	**1**	16:30	1	0	3	0	**4**
08:45	0	0	2	0	**2**	16:45	1	0	5	0	**6**
09:00	0	0	3	0	**3**	17:00	0	0	3	0	**3**
09:15	0	0	6	0	**6**	17:15	3	1	3	0	**7**
09:30	0	0	5	0	**5**	17:30	2	0	0	0	**2**
09:45	0	0	6	0	**6**	17:45	0	0	0	0	**0**
10:00	1	0	2	0	**3**	18:00	0	0	1	0	**1**
10:15	1	0	0	0	**1**	18:15	0	0	1	0	**1**
10:30	0	0	5	0	**5**	18:30	0	0	0	0	**0**
10:45	1	0	4	0	**5**	18:45	0	0	1	0	**1**
11:00	1	0	4	0	**5**	19:00	0	0	1	0	**1**
11:15	1	0	4	0	**5**	19:15	0	0	2	0	**2**
11:30	1	0	7	0	**8**	19:30	0	0	2	0	**2**
11:45	0	0	4	0	**4**	19:45	0	0	0	0	**0**
12:00	1	0	5	0	**6**	20:00	0	0	0	0	**0**
12:15	0	0	1	0	**1**	20:15	0	0	1	0	**1**
12:30	1	0	4	0	**5**	20:30	0	0	1	0	**1**
12:45	1	0	5	0	**6**	20:45	0	0	0	0	**0**
13:00	0	0	4	0	**4**	21:00	0	0	2	0	**2**
13:15	0	0	5	0	**5**	21:15	0	0	0	0	**0**
13:30	0	0	2	0	**2**	21:30	0	0	0	0	**0**
13:45	0	0	3	0	**3**	21:45	0	0	0	0	**0**
14:00	0	0	4	0	**4**	22:00	0	0	0	0	**0**
SUBTOTAL					**113**	SUBTOTAL					**65**

TOTAL GERAL	**178**

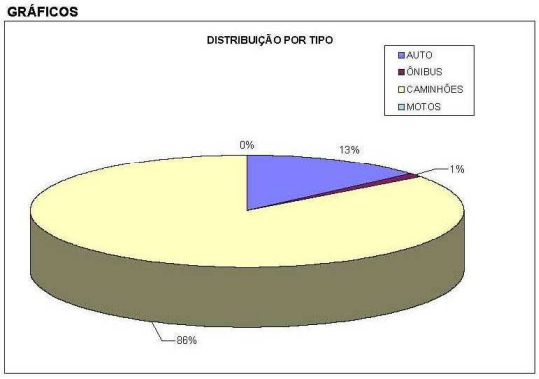
VOLUME HORÁRIO

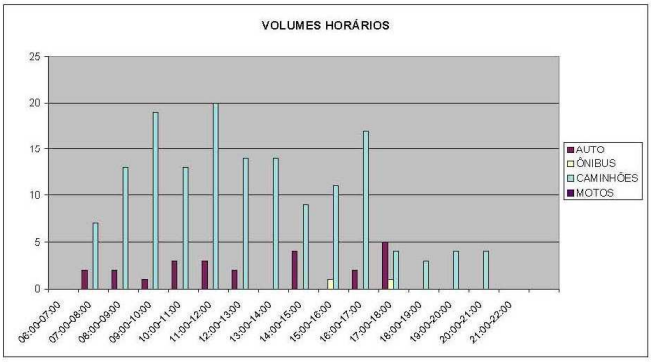
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	0	0	0	0	**0**
07:00-08:00	2	0	7	0	**9**
08:00-09:00	2	0	13	0	**15**
09:00-10:00	1	0	19	0	**20**
10:00-11:00	3	0	13	0	**16**
11:00-12:00	3	0	20	0	**23**
12:00-13:00	2	0	14	0	**16**
13:00-14:00	0	0	14	0	**14**
SUBTOTAL	13	0	100	0	**113**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	4	0	9	0	**13**
15:00-16:00	0	1	11	0	**12**
16:00-17:00	2	0	17	0	**19**
17:00-18:00	5	1	4	0	**10**
18:00-19:00	0	0	3	0	**3**
19:00-20:00	0	0	4	0	**4**
20:00-21:00	0	0	4	0	**4**
21:00-22:00	0	0	0	0	**0**
SUBTOTAL	11	2	52	0	**65**

TOTAL GERAL	**24**	**2**	**152**	**0**	**178**

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 267,5	SENTIDO:	9 - RETORNO GUARUJÁ	PONTO:	3

DATA:	27/6/2019	TEMPO	GAROA	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	2	1	2	1	**6**	14:15	2	0	10	1	**13**
06:30	2	0	3	2	**7**	14:30	4	0	18	1	**23**
06:45	2	2	2	2	**8**	14:45	5	1	10	2	**18**
07:00	4	1	2	4	**11**	15:00	4	4	7	1	**16**
07:15	5	2	1	6	**14**	15:15	1	1	3	0	**5**
07:30	3	3	5	1	**12**	15:30	2	3	15	1	**21**
07:45	5	7	5	5	**22**	15:45	6	2	7	0	**15**
08:00	5	6	10	2	**23**	16:00	5	0	5	1	**11**
08:15	4	13	4	0	**21**	16:15	3	0	11	3	**17**
08:30	1	15	2	0	**18**	16:30	7	1	7	2	**17**
08:45	9	1	7	0	**17**	16:45	2	0	8	1	**11**
09:00	2	4	10	0	**16**	17:00	3	1	5	0	**9**
09:15	7	3	6	1	**17**	17:15	7	0	9	0	**16**
09:30	4	0	10	0	**14**	17:30	2	0	4	0	**6**
09:45	6	1	8	1	**16**	17:45	3	0	17	1	**21**
10:00	3	0	6	0	**9**	18:00	2	0	9	2	**13**
10:15	4	1	7	3	**15**	18:15	2	0	6	0	**8**
10:30	5	0	4	0	**9**	18:30	0	2	7	1	**10**
10:45	2	0	9	0	**11**	18:45	1	0	11	0	**12**
11:00	10	0	9	1	**20**	19:00	3	0	8	1	**12**
11:15	2	2	2	0	**6**	19:15	1	2	6	3	**12**
11:30	0	0	11	0	**11**	19:30	1	0	3	0	**4**
11:45	2	0	7	0	**9**	19:45	0	0	8	1	**9**
12:00	5	1	12	1	**19**	20:00	2	0	5	5	**12**
12:15	3	0	17	0	**20**	20:15	0	0	7	1	**8**
12:30	4	0	6	0	**10**	20:30	1	0	6	1	**8**
12:45	1	0	10	0	**11**	20:45	0	0	4	0	**4**
13:00	3	0	5	0	**8**	21:00	0	0	5	2	**7**
13:15	5	1	8	1	**15**	21:15	1	0	0	0	**1**
13:30	1	0	7	1	**9**	21:30	0	0	6	1	**7**
13:45	4	2	4	0	**10**	21:45	3	0	7	1	**11**
14:00	5	1	9	2	**17**	22:00	1	1	5	1	**8**
SUBTOTAL					**431**	SUBTOTAL					**365**

TOTAL GERAL	**796**

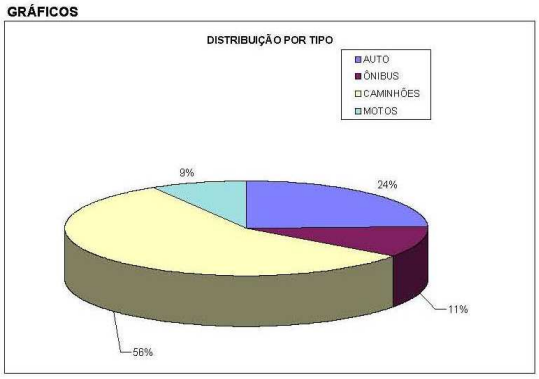
VOLUME HORÁRIO

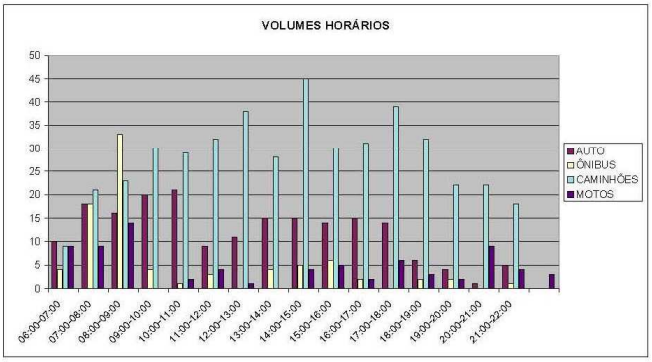
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	10	4	9	9	**32**
07:00-08:00	18	18	21	14	**71**
08:00-09:00	16	33	23	0	**72**
09:00-10:00	20	4	30	2	**56**
10:00-11:00	21	1	29	4	**55**
11:00-12:00	9	3	32	1	**45**
12:00-13:00	11	0	38	0	**49**
13:00-14:00	15	4	28	4	**51**
SUBTOTAL	120	67	210	34	**431**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	15	5	45	5	**70**
15:00-16:00	14	6	30	2	**52**
16:00-17:00	15	2	31	6	**54**
17:00-18:00	14	0	39	3	**56**
18:00-19:00	6	2	32	2	**42**
19:00-20:00	4	2	22	9	**37**
20:00-21:00	1	0	22	4	**27**
21:00-22:00	5	1	18	3	**27**
SUBTOTAL	74	18	239	34	**365**

TOTAL GERAL	194	85	449	68	796

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 267,5	SENTIDO:	10 - SÃO PAULO - MARGINAL	PONTO:	3

DATA:	27/6/2019	TEMPO	GAROA	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	4	3	8	2	**17**	14:15	3	4	2	4	**13**
06:30	5	4	4	1	**14**	14:30	7	2	2	2	**13**
06:45	3	4	2	0	**9**	14:45	8	1	6	2	**17**
07:00	3	0	3	0	**6**	15:00	11	0	7	0	**18**
07:15	12	1	5	2	**20**	15:15	16	7	2	4	**29**
07:30	8	6	6	2	**22**	15:30	15	3	5	1	**24**
07:45	6	2	4	3	**15**	15:45	10	3	5	1	**19**
08:00	4	4	1	0	**9**	16:00	13	3	6	1	**23**
08:15	8	4	2	2	**16**	16:15	18	1	5	6	**30**
08:30	2	7	2	1	**12**	16:30	19	3	5	5	**32**
08:45	11	6	3	3	**23**	16:45	32	5	8	11	**56**
09:00	7	0	4	0	**11**	17:00	22	4	4	7	**37**
09:15	3	4	4	3	**14**	17:15	39	5	7	5	**56**
09:30	5	4	4	1	**14**	17:30	47	8	6	28	**89**
09:45	9	4	4	0	**17**	17:45	44	12	5	15	**76**
10:00	9	4	2	1	**16**	18:00	9	3	1	4	**17**
10:15	9	1	7	1	**18**	18:15	17	1	8	3	**29**
10:30	7	4	1	0	**12**	18:30	9	6	11	5	**31**
10:45	12	3	1	2	**18**	18:45	13	3	0	3	**19**
11:00	7	2	10	0	**19**	19:00	11	4	2	1	**18**
11:15	7	2	6	1	**16**	19:15	12	0	4	5	**21**
11:30	8	4	1	3	**16**	19:30	8	3	1	3	**15**
11:45	7	5	9	2	**23**	19:45	7	4	8	3	**22**
12:00	14	2	11	1	**28**	20:00	5	3	6	2	**16**
12:15	14	3	7	3	**27**	20:15	1	1	5	1	**8**
12:30	8	3	8	0	**19**	20:30	2	2	5	0	**9**
12:45	5	1	4	0	**10**	20:45	3	5	1	0	**9**
13:00	4	5	3	2	**14**	21:00	4	1	3	0	**8**
13:15	2	4	6	1	**13**	21:15	1	3	1	0	**5**
13:30	8	3	9	3	**23**	21:30	4	3	6	3	**16**
13:45	5	4	5	1	**15**	21:45	7	4	4	3	**18**
14:00	12	2	2	1	**17**	22:00	0	0	0	1	**1**
SUBTOTAL					**523**	SUBTOTAL					**794**

TOTAL GERAL	**1317**

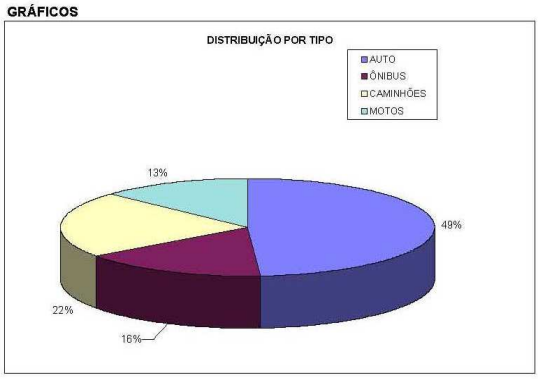
VOLUME HORÁRIO

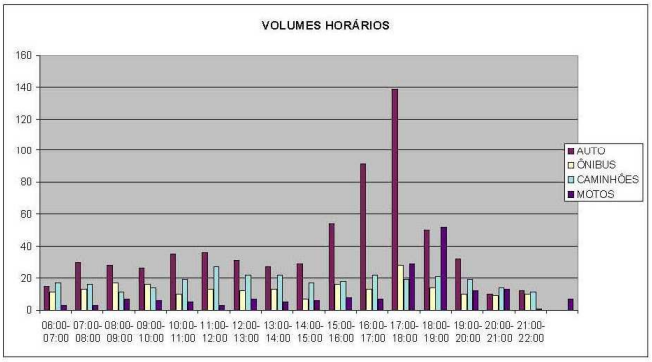
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	15	11	17	3	**46**
07:00-08:00	30	13	16	7	**66**
08:00-09:00	28	17	11	6	**62**
09:00-10:00	26	16	14	5	**61**
10:00-11:00	35	10	19	3	**67**
11:00-12:00	36	13	27	7	**83**
12:00-13:00	31	12	22	5	**70**
13:00-14:00	27	13	22	6	**68**
SUBTOTAL	228	105	148	42	**523**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	29	7	17	8	**61**
15:00-16:00	54	16	18	7	**95**
16:00-17:00	91	13	22	29	**155**
17:00-18:00	139	28	19	52	**238**
18:00-19:00	50	14	21	12	**97**
19:00-20:00	32	10	19	13	**74**
20:00-21:00	10	9	14	1	**34**
21:00-22:00	12	10	11	7	**40**
SUBTOTAL	417	107	141	129	**794**

TOTAL GERAL	645	212	289	171	1317

GRÁFICOS





CONTAGEM VOLUMÉTRICA DE VEÍCULOS

VIA:	RODOVIA CÔNEGO DOMÊNIGO RANGONI - KM 267,5	SENTIDO:	11 - GUARUJÁ (MARGINAL)	PONTO:	3

DATA:	27/6/2019	TEMPO	GARÚA	TRÁFEGO:	NORMAL

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL	HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:15	8	1	1	1	**11**	14:15	5	2	3	5	**15**
06:30	14	1	1	1	**17**	14:30	9	0	2	2	**13**
06:45	25	5	4	6	**40**	14:45	9	2	4	1	**16**
07:00	58	5	3	20	**86**	15:00	11	5	4	4	**24**
07:15	60	5	5	30	**100**	15:15	6	2	4	1	**13**
07:30	46	5	3	27	**81**	15:30	8	2	2	0	**12**
07:45	40	5	2	9	**56**	15:45	8	2	3	3	**16**
08:00	41	11	2	9	**63**	16:00	16	6	7	2	**31**
08:15	10	4	2	3	**29**	16:15	8	1	4	1	**14**
08:30	11	2	6	3	**22**	16:30	5	3	2	1	**11**
08:45	8	3	4	2	**17**	16:45	8	5	4	1	**18**
09:00	8	4	3	1	**16**	17:00	8	1	1	1	**11**
09:15	10	3	7	0	**20**	17:15	7	3	5	0	**15**
09:30	10	7	3	1	**21**	17:30	7	6	5	1	**19**
09:45	12	2	5	1	**20**	17:45	9	1	2	1	**13**
10:00	7	1	7	2	**17**	18:00	5	3	4	1	**13**
10:15	6	4	6	1	**17**	18:15	6	3	5	1	**15**
10:30	12	1	4	1	**18**	18:30	5	4	4	4	**17**
10:45	7	1	1	1	**10**	18:45	7	1	4	1	**13**
11:00	13	4	5	2	**24**	19:00	11	3	5	3	**22**
11:15	4	2	2	0	**8**	19:15	7	3	3	0	**13**
11:30	9	3	1	3	**16**	19:30	5	2	1	1	**9**
11:45	7	1	2	0	**10**	19:45	5	3	10	3	**21**
12:00	7	4	8	3	**22**	20:00	3	2	3	0	**8**
12:15	12	2	6	3	**23**	20:15	1	4	5	0	**10**
12:30	10	2	4	2	**18**	20:30	7	1	6	1	**15**
12:45	10	2	5	7	**24**	20:45	4	2	3	0	**9**
13:00	10	2	0	3	**15**	21:00	3	2	3	0	**8**
13:15	7	4	2	2	**15**	21:15	1	3	1	1	**6**
13:30	5	2	2	1	**10**	21:30	4	2	2	1	**9**
13:45	5	3	5	4	**17**	21:45	5	1	3	0	**9**
14:00	6	3	3	1	**13**	22:00	1	4	1	1	**7**
SUBTOTAL					**875**	SUBTOTAL					**445**

TOTAL GERAL	**1320**

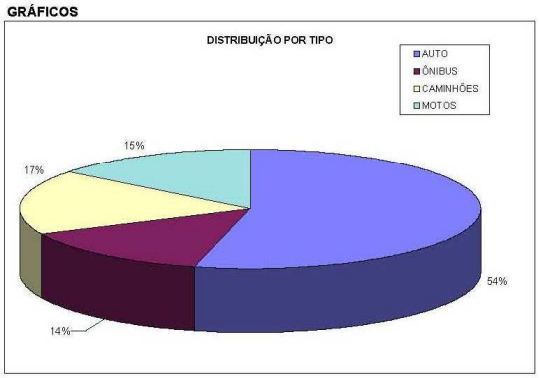
VOLUME HORÁRIO

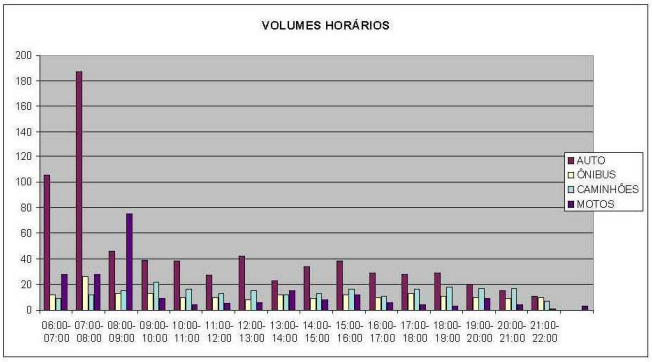
HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
06:00-07:00	105	12	9	28	**154**
07:00-08:00	187	26	12	75	**300**
08:00-09:00	46	13	15	9	**83**
09:00-10:00	39	13	22	4	**78**
10:00-11:00	38	10	16	5	**69**
11:00-12:00	27	10	13	6	**56**
12:00-13:00	42	8	15	15	**80**
13:00-14:00	23	12	12	8	**55**
SUBTOTAL	507	104	114	150	**875**

HORA	AUTO	ÔNIBUS	CAMINHÕES	MOTOS	TOTAL
14:00-15:00	34	9	13	12	**68**
15:00-16:00	38	12	16	6	**72**
16:00-17:00	29	10	11	4	**54**
17:00-18:00	28	13	16	3	**60**
18:00-19:00	29	11	18	9	**67**
19:00-20:00	20	10	17	4	**51**
20:00-21:00	15	9	17	1	**42**
21:00-22:00	11	10	7	3	**31**
SUBTOTAL	204	84	115	42	**445**

TOTAL GERAL	711	188	229	192	1320

GRÁFICOS





ANEXO 02

Relatórios do HCS 2010

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	C1
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 1 - Situação Atual	Analysis Year	2019
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 623	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 760	V_D = veh/h
	Ramp Volume, V_R: 164	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	760	0.95	Level	51	0	0.797	1.00	1004
Ramp	164	0.95	Rolling	13	0	0.837	1.00	206
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1004 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1210	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1210	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 10.9 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.303 (Exibit 13-11)

S_R = 60.1 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 60.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	C1
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 2 - Implantação	Analysis Year	2020

Project Description: Estudo de Tráfego - URE Valoriza

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 623	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 791	V_D = veh/h
	Ramp Volume, V_R: 168	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	791	0.95	Level	51	0	0.797	1.00	1045
Ramp	168	0.95	Level	13	0	0.939	1.00	188
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1045 pc/h

V_3 or V_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1233	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1233	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 11.1 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.303 (Exibit 13-11)

S_R = 60.1 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 60.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

HCS2010™ Version 6.3 Generated: 02/10/2019 16:12

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	C1
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 3 - Operação Futura	Analysis Year	2023
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 623	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 833	V_D = veh/h
	Ramp Volume, V_R: 180	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	833	0.95	Level	51	0	0.797	1.00	1100
Ramp	180	0.95	Level	13	0	0.939	1.00	202
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1100 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1302	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1302	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 11.6 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.304 (Exibit 13-11)

S_R = 60.1 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 60.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	C1
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 4 - Operação Futura	Analysis Year	2033
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 623	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 1046	V_D = veh/h
	Ramp Volume, V_R: 226	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1046	0.95	Level	51	0	0.797	1.00	1382
Ramp	226	0.95	Level	13	0	0.939	1.00	253
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1382 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1635	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1635	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 14.2 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.310 (Exibit 13-11)

S_R = 59.9 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 59.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	C2
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 1 - Situação Atual	Analysis Year	2019
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 426	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 786	V_D = veh/h
	Ramp Volume, V_R: 37	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	786	0.95	Level	49	0	0.803	1.00	1030
Ramp	37	0.95	Level	73	0	0.733	1.00	53
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1030 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1083	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1083	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 11.2 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.311 (Exibit 13-11)

S_R = 59.9 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 59.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

HCS2010™ Version 6.3 Generated: 02/10/2019 16:14

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	C2
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 2 - Implantação	Analysis Year	2020
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 426	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 804	V_D = veh/h
	Ramp Volume, V_R: 51	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	804	0.95	Level	49	0	0.803	1.00	1054
Ramp	51	0.95	Level	70	0	0.741	1.00	72
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1054 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1126	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1126	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 11.6 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.312 (Exibit 13-11)

S_R = 59.9 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 59.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	C2
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 3 - Operação Futura	Analysis Year	2023
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 426	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 861	V_D = veh/h
	Ramp Volume, V_R: 41	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	861	0.95	Level	49	0	0.803	1.00	1128
Ramp	41	0.95	Level	73	0	0.733	1.00	59
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1128 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1187	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1187	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 12.0 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.312 (Exibit 13-11)

S_R = 59.9 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 59.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	C2
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 4 - Operação Futura	Analysis Year	2033
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 426	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 1081	V_D = veh/h
	Ramp Volume, V_R: 51	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1081	0.95	Level	49	0	0.803	1.00	1417
Ramp	51	0.95	Level	73	0	0.733	1.00	73
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1417 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1490	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1490	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 14.4 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

M_S = 0.317 (Exibit 13-11)

S_R = 59.8 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 59.8 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	C3
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 1 - Situação Atual	Analysis Year	2019

Project Description: Estudo de Tráfego - URE Valoriza

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 1500	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 680	V_D = veh/h
	Ramp Volume, V_R: 113	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	680	0.95	Level	47	0	0.810	1.00	884
Ramp	113	0.95	Level	62	0	0.763	1.00	156
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 884 pc/h

V_3 or V_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1040	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1040	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 4.1 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

M_S = 0.257 (Exibit 13-11)

S_R = 61.3 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 61.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	C3
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 2- Implantação	Analysis Year	2020

Project Description: Estudo de Tráfego - URE Valoriza

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 1500	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 709	V_D = veh/h
	Ramp Volume, V_R: 129	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	709	0.95	Level	47	0	0.810	1.00	922
Ramp	129	0.95	Level	62	0	0.763	1.00	178
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 922 pc/h

V_3 or V_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1100	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1100	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 4.6 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

M_S = 0.258 (Exibit 13-11)

S_R = 61.3 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 61.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	C3
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 3 - Operação Futura	Analysis Year	2023
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 1500	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 745	V_D = veh/h
	Ramp Volume, V_R: 124	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	745	0.95	Level	47	0	0.810	1.00	969
Ramp	124	0.95	Level	62	0	0.763	1.00	171
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 969 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1140	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1140	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 4.9 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

M_S = 0.258 (Exibit 13-11)

S_R = 61.3 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 61.3 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	C3
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 4 - Operação Futura	Analysis Year	2033
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 1500	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 935	V_D = veh/h
	Ramp Volume, V_R: 155	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	935	0.95	Level	47	0	0.810	1.00	1216
Ramp	155	0.95	Level	62	0	0.763	1.00	214
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1216 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1430	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1430	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 7.1 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

M_S = 0.262 (Exibit 13-11)

S_R = 61.2 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 61.2 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	C4
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 1 - Situação Atual	Analysis Year	2019

Project Description: Estudo de Tráfego - URE Valoriza

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 1312	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 682	V_D = veh/h
	Ramp Volume, V_R: 186	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	682	0.95	Level	47	0	0.810	1.00	887
Ramp	186	0.95	Level	25	0	0.889	1.00	220
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 887 pc/h

V_3 or V_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1107	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1107	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 5.8 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

M_S = 0.267 (Exibit 13-11)

S_R = 61.1 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 61.1 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	C4
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 2 - Implantação	Analysis Year	2020

Project Description: Estudo de Tráfego - URE Valoriza

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 1312	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 702	V_D = veh/h
	Ramp Volume, V_R: 190	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	702	0.95	Level	47	0	0.810	1.00	913
Ramp	190	0.95	Level	25	0	0.889	1.00	225
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 913 pc/h

V_3 or V_{av34} = 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1138	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1138	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 6.0 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

M_S = 0.268 (Exibit 13-11)

S_R = 61.0 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 61.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} = pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	C4
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 3 - Operação Futura	Analysis Year	2023
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 1312	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 747	V_D = veh/h
	Ramp Volume, V_R: 204	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	747	0.95	Level	47	0	0.810	1.00	971
Ramp	204	0.95	Level	25	0	0.889	1.00	242
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 971 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1213	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1213	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 6.6 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

M_S = 0.269 (Exibit 13-11)

S_R = 61.0 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 61.0 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	C4
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 4 - Operação Futura	Analysis Year	2033

Project Description: Estudo de Tráfego - URE Valoriza

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A: 1312	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D:	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 938	V_D = veh/h
	Ramp Volume, V_R: 256	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	938	0.95	Level	47	0	0.810	1.00	1219
Ramp	256	0.95	Level	25	0	0.889	1.00	303
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 using Equation (Exhibit 13-6)

V_{12} = 1219 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}	1522	Exhibit 13-8		No

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}	1522	Exhibit 13-8	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 9.0 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

M_S = 0.273 (Exibit 13-11)

S_R = 60.9 mph (Exhibit 13-11)

S_0 = N/A mph (Exhibit 13-11)

S = 60.9 mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = using Equation (Exhibit 13-7)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F		Exhibit 13-8		
$V_{FO} = V_F - V_R$		Exhibit 13-8		
V_R		Exhibit 13-10		

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

D_s = (Exhibit 13-12)

S_R = mph (Exhibit 13-12)

S_0 = mph (Exhibit 13-12)

S = mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	D1
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 1 - Situação Atual	Analysis Year	2019
Project Description	Estudo de Tráfego - URE Valoriza		

Site Information

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☐ Yes	☐ On
☑ No	☐ Off	Deceleration Lane Length L_D	490	☑ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	823	L_{down} =	ft
V_u =	veh/h	Ramp Volume, V_R	277	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	68.0		
		Ramp Free-Flow Speed, S_{FR}	25.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	823	0.95	Level	50	0	0.800	1.00	1083
Ramp	277	0.95	Level	65	0	0.755	1.00	386
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 1083 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1083	Exhibit 13-8	4760	No
$V_{FO} = V_F - V_R$	697	Exhibit 13-8	4760	No
V_R	386	Exhibit 13-10	1900	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1083	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 9.2 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

D_S = 0.593 (Exhibit 13-12)

S_R = 52.6 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.6 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	D1
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 2 - Implantação	Analysis Year	2020
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☐ Yes	☐ On
☑ No	☐ Off	Deceleration Lane Length L_D	490	☑ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	855	L_{down} =	ft
V_u =	veh/h	Ramp Volume, V_R	287	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	68.0		
		Ramp Free-Flow Speed, S_{FR}	25.0		

Conversion to pc/h Under Base Conditions

	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	855	0.95	Level	50	0	0.800	1.00	1125
Ramp	287	0.95	Level	65	0	0.755	1.00	400
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 1125 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1125	Exhibit 13-8	4760	No
$V_{FO} = V_F - V_R$	725	Exhibit 13-8	4760	No
V_R	400	Exhibit 13-10	1900	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1125	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 9.5 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

D_S = 0.594 (Exhibit 13-12)

S_R = 52.6 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.6 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	D1
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 3 - Operação Futura	Analysis Year	2023
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	490
Freeway Volume, V_F	902
Ramp Volume, V_R	303
Freeway Free-Flow Speed, S_{FF}	68.0
Ramp Free-Flow Speed, S_{FR}	25.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	902	0.95	Level	50	0	0.800	1.00	1187
Ramp	303	0.95	Level	65	0	0.755	1.00	423
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R = mph (Exhibit 13-11)
S_0 = mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = 1.000 using Equation (Exhibit 13-7)
V_{12} = 1187 pc/h
V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1187	Exhibit 13-8	4760	No
$V_{FO} = V_F - V_R$	764	Exhibit 13-8	4760	No
V_R	423	Exhibit 13-10	1900	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1187	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$
D_R = 10.1 (pc/mi/ln)
LOS = B (Exhibit 13-2)

Speed Determination

D_S = 0.596 (Exhibit 13-12)
S_R = 52.5 mph (Exhibit 13-12)
S_0 = N/A mph (Exhibit 13-12)
S = 52.5 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	D1
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 4 - Operação Futura	Analysis Year	2033
Project Description	Estudo de Tráfego - URE Valoriza		

Site Information

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	490
Freeway Volume, V_F	1132
Ramp Volume, V_R	381
Freeway Free-Flow Speed, S_{FF}	68.0
Ramp Free-Flow Speed, S_{FR}	25.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1132	0.95	Level	50	0	0.800	1.00	1489
Ramp	381	0.95	Level	65	0	0.755	1.00	531
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R = mph (Exhibit 13-11)
S_0 = mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = 1.000 using Equation (Exhibit 13-7)
V_{12} = 1489 pc/h
V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1489	Exhibit 13-8	4760	No
$V_{FO} = V_F - V_R$	958	Exhibit 13-8	4760	No
V_R	531	Exhibit 13-10	1900	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1489	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$
D_R = 12.6 (pc/mi/ln)
LOS = B (Exhibit 13-2)

Speed Determination

D_S = 0.606 (Exhibit 13-12)
S_R = 52.2 mph (Exhibit 13-12)
S_0 = N/A mph (Exhibit 13-12)
S = 52.2 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	D3
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 1 - Situação Atual	Analysis Year	2019
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 525	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 815	V_D = veh/h
	Ramp Volume, V_R: 29	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	815	0.95	Level	50	0	0.800	1.00	1072
Ramp	29	0.95	Level	76	0	0.725	1.00	42
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 1072 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1072	Exhibit 13-8	4760	No
$V_{FO} = V_F - V_R$	1030	Exhibit 13-8	4760	No
V_R	42	Exhibit 13-10	1900	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1072	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 8.7 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

D_S = 0.562 (Exhibit 13-12)

S_R = 53.4 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 53.4 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	D3
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 2 - Implantação	Analysis Year	2020
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp		Number of Lanes, N	2	Downstream Adj Ramp	
☐ Yes	☐ On	Acceleration Lane Length, L_A		☐ Yes	☐ On
☑ No	☐ Off	Deceleration Lane Length L_D	525	☑ No	☐ Off
L_{up} =	ft	Freeway Volume, V_F	847	L_{down} =	ft
V_u =	veh/h	Ramp Volume, V_R	43	V_D =	veh/h
		Freeway Free-Flow Speed, S_{FF}	68.0		
		Ramp Free-Flow Speed, S_{FR}	25.0		

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	847	0.95	Level	50	0	0.800	1.00	1114
Ramp	43	0.95	Level	71	0	0.738	1.00	61
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 1114 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1114	Exhibit 13-8	4760	No
$V_{FO} = V_F - V_R$	1053	Exhibit 13-8	4760	No
V_R	61	Exhibit 13-10	1900	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1114	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 9.1 (pc/mi/ln)

LOS = A (Exhibit 13-2)

Speed Determination

D_S = 0.563 (Exhibit 13-12)

S_R = 53.3 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 53.3 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	D3
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 3 - Operação Futura	Analysis Year	2023
Project Description	Estudo de Tráfego - URE Valoriza		

Site Information

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	525
Freeway Volume, V_F	893
Ramp Volume, V_R	32
Freeway Free-Flow Speed, S_{FF}	68.0
Ramp Free-Flow Speed, S_{FR}	25.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	893	0.95	Level	50	0	0.800	1.00	1175
Ramp	32	0.95	Level	76	0	0.725	1.00	46
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R = mph (Exhibit 13-11)
S_0 = mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = 1.000 using Equation (Exhibit 13-7)
V_{12} = 1175 pc/h
V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1175	Exhibit 13-8	4760	No
$V_{FO} = V_F - V_R$	1129	Exhibit 13-8	4760	No
V_R	46	Exhibit 13-10	1900	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1175	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$
D_R = 9.6 (pc/mi/ln)
LOS = A (Exhibit 13-2)

Speed Determination

D_S = 0.562 (Exhibit 13-12)
S_R = 53.4 mph (Exhibit 13-12)
S_0 = N/A mph (Exhibit 13-12)
S = 53.4 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	D3
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 4 - Operação Futura	Analysis Year	2033
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 525	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 1121	V_D = veh/h
	Ramp Volume, V_R: 40	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1121	0.95	Level	50	0	0.800	1.00	1475
Ramp	40	0.95	Level	76	0	0.725	1.00	58
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 1475 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1475	Exhibit 13-8	4760	No
$V_{FO} = V_F - V_R$	1417	Exhibit 13-8	4760	No
V_R	58	Exhibit 13-10	1900	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1475	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 12.2 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_S = 0.563 (Exhibit 13-12)

S_R = 53.4 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 53.4 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	D4
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 1 - Situação Atual	Analysis Year	2019
Project Description	Estudo de Tráfego - URE Valoriza		

Site Information

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	525
Freeway Volume, V_F	924
Ramp Volume, V_R	242
Freeway Free-Flow Speed, S_{FF}	68.0
Ramp Free-Flow Speed, S_{FR}	25.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	924	0.95	Level	44	0	0.820	1.00	1187
Ramp	242	0.95	Level	36	0	0.847	1.00	301
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R = mph (Exhibit 13-11)
S_0 = mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = 1.000 using Equation (Exhibit 13-7)
V_{12} = 1187 pc/h
V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1187	Exhibit 13-8	4760	No
$V_{FO} = V_F - V_R$	886	Exhibit 13-8	4760	No
V_R	301	Exhibit 13-10	1900	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1187	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$
D_R = 9.7 (pc/mi/ln)
LOS = A (Exhibit 13-2)

Speed Determination

D_S = 0.585 (Exhibit 13-12)
S_R = 52.8 mph (Exhibit 13-12)
S_0 = N/A mph (Exhibit 13-12)
S = 52.8 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	D4
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 2 - Implantação	Analysis Year	2020
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 525	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 958	V_D = veh/h
	Ramp Volume, V_R: 257	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	958	0.95	Level	44	0	0.820	1.00	1230
Ramp	257	0.95	Level	37	0	0.844	1.00	321
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 1230 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1230	Exhibit 13-8	4760	No
$V_{FO} = V_F - V_R$	909	Exhibit 13-8	4760	No
V_R	321	Exhibit 13-10	1900	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1230	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 10.1 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_S = 0.587 (Exhibit 13-12)

S_R = 52.7 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.7 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	D4
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 3 - Operação Futura	Analysis Year	2023
Project Description	Estudo de Tráfego - URE Valoriza		

Site Information

Inputs

Upstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{up} = ft
V_u = veh/h

Number of Lanes, N	2
Acceleration Lane Length, L_A	
Deceleration Lane Length L_D	525
Freeway Volume, V_F	1012
Ramp Volume, V_R	265
Freeway Free-Flow Speed, S_{FF}	68.0
Ramp Free-Flow Speed, S_{FR}	25.0

Downstream Adj Ramp
☐ Yes ☐ On
☑ No ☐ Off
L_{down} = ft
V_D = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1012	0.95	Level	44	0	0.820	1.00	1300
Ramp	265	0.95	Level	36	0	0.847	1.00	329
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$
L_{EQ} = (Equation 13-6 or 13-7)
P_{FM} = using Equation (Exhibit 13-6)
V_{12} = pc/h
V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$
D_R = (pc/mi/ln)
LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)
S_R = mph (Exhibit 13-11)
S_0 = mph (Exhibit 13-11)
S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$
L_{EQ} = (Equation 13-12 or 13-13)
P_{FD} = 1.000 using Equation (Exhibit 13-7)
V_{12} = 1300 pc/h
V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)
Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No
Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No
If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1300	Exhibit 13-8	4760	No
$V_{FO} = V_F - V_R$	971	Exhibit 13-8	4760	No
V_R	329	Exhibit 13-10	1900	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1300	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$
D_R = 10.7 (pc/mi/ln)
LOS = B (Exhibit 13-2)

Speed Determination

D_S = 0.588 (Exhibit 13-12)
S_R = 52.7 mph (Exhibit 13-12)
S_0 = N/A mph (Exhibit 13-12)
S = 52.7 mph (Exhibit 13-13)

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RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / Site Information

Analyst	TTC Engenharia	Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Agency or Company		Junction	D4
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 4 - Operação Futura	Analysis Year	2033
Project Description	Estudo de Tráfego - URE Valoriza		

Inputs

Upstream Adj Ramp		Downstream Adj Ramp
☐ Yes ☐ On	Number of Lanes, N: 2	☐ Yes ☐ On
☑ No ☐ Off	Acceleration Lane Length, L_A:	☑ No ☐ Off
L_{up} = ft	Deceleration Lane Length L_D: 525	L_{down} = ft
V_u = veh/h	Freeway Volume, V_F: 1271	V_D = veh/h
	Ramp Volume, V_R: 333	
	Freeway Free-Flow Speed, S_{FF}: 68.0	
	Ramp Free-Flow Speed, S_{FR}: 25.0	

Conversion to pc/h Under Base Conditions

	V (Veh/hr)	PHF	Terrain	%Truck	%Rv	f_{HV}	f_p	v = V/PHF x f_{HV} x f_p
Freeway	1271	0.95	Level	44	0	0.820	1.00	1632
Ramp	333	0.95	Level	36	0	0.847	1.00	414
UpStream								
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = using Equation (Exhibit 13-6)

V_{12} = pc/h

V_3 or V_{av34} pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☐ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☐ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_{FO}		Exhibit 13-8		

Flow Entering Merge Influence Area

	Actual	Max Desirable		Violation?
V_{R12}		Exhibit 13-8		

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/mi/ln)

LOS = (Exhibit 13-2)

Speed Determination

M_S = (Exibit 13-11)

S_R = mph (Exhibit 13-11)

S_0 = mph (Exhibit 13-11)

S = mph (Exhibit 13-13)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 using Equation (Exhibit 13-7)

V_{12} = 1632 pc/h

V_3 or V_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is V_3 or V_{av34} > 2,700 pc/h? ☐ Yes ☑ No

Is V_3 or V_{av34} > 1.5 * V_{12}/2 ☐ Yes ☑ No

If Yes, V_{12a} = pc/h (Equation 13-16, 13-18, or 13-19)

Capacity Checks

	Actual	Capacity		LOS F?
V_F	1632	Exhibit 13-8	4760	No
$V_{FO} = V_F - V_R$	1218	Exhibit 13-8	4760	No
V_R	414	Exhibit 13-10	1900	No

Flow Entering Diverge Influence Area

	Actual	Max Desirable		Violation?
V_{12}	1632	Exhibit 13-8	4400:All	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.009\ L_D$

D_R = 13.6 (pc/mi/ln)

LOS = B (Exhibit 13-2)

Speed Determination

D_S = 0.595 (Exhibit 13-12)

S_R = 52.5 mph (Exhibit 13-12)

S_0 = N/A mph (Exhibit 13-12)

S = 52.5 mph (Exhibit 13-13)

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Estudo de Tráfego - URE Valoriza

FREEWAY WEAVING WORKSHEET

General Information

Analyst	TTC Engenharia
Agency/Company	
Date Performed	02/10/2019
Analysis Time Period	Cenário 1 - Situação Atual

Site Information

Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Weaving Segment Location	E1
Analysis Year	2019

Project Description *Estudo de Tráfego - URE Valoriza*

Inputs

Weaving configuration	One-Sided	Segment type	C-D Roadway/ Multilane Highways
Weaving number of lanes, N	3		
Weaving segment length, L_S	1772ft	Freeway minimum speed, S_{MIN}	25
Freeway free-flow speed, FFS	68 mph	Freeway maximum capacity, C_{IFL}	2400
		Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	fp	v (pc/h)
V_{FF}	564	0.95	38	0	1.5	1.2	0.840	1.00	706
V_{RF}	194	0.95	89	0	1.5	1.2	0.692	1.00	295
V_{FR}	4	0.95	0	0	1.5	1.2	1.000	1.00	4
V_{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0
V_{NW}	706							V =	1005
V_W	299								
VR	0.298								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	299 lc/h
Interchange density, ID	0.0 int/mi	Weaving lane changes, LC_W	434 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	528 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	962 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	0

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	1005 pc/h	Weaving intensity factor, W	0.140
Weaving segment capacity, c_w	5319 veh/h	Weaving segment speed, S	63.8 mph
Weaving segment v/c ratio	0.159	Average weaving speed, S_W	62.7 mph
Weaving segment density, D	5.3 pc/mi/ln	Average non-weaving speed, S_{NW}	64.2 mph
Level of Service, LOS	A	Maximum weaving length, L_{MAX}	5557 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Estudo de Tráfego - URE Valoriza

FREEWAY WEAVING WORKSHEET

General Information

Analyst	TTC Engenharia
Agency/Company	
Date Performed	02/10/2019
Analysis Time Period	Cenário 2 - Implantação

Site Information

Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Weaving Segment Location	E1
Analysis Year	2020

Project Description *Estudo de Tráfego - URE Valoriza*

Inputs

Weaving configuration	One-Sided	Segment type	C-D Roadway/ Multilane Highways
Weaving number of lanes, N	3		
Weaving segment length, L_S	1772ft	Freeway minimum speed, S_{MIN}	25
Freeway free-flow speed, FFS	68 mph	Freeway maximum capacity, C_{IFL}	2400
		Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	fp	v (pc/h)
V_{FF}	577	0.95	38	0	1.5	1.2	0.840	1.00	723
V_{RF}	211	0.95	87	0	1.5	1.2	0.697	1.00	319
V_{FR}	4	0.95	0	0	1.5	1.2	1.000	1.00	4
V_{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0
V_{NW}	723							V =	1046
V_W	323								
VR	0.309								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	323 lc/h
Interchange density, ID	0.0 int/mi	Weaving lane changes, LC_W	458 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	532 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	990 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	0

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	1046 pc/h	Weaving intensity factor, W	0.143
Weaving segment capacity, c_w	5297 veh/h	Weaving segment speed, S	63.6 mph
Weaving segment v/c ratio	0.166	Average weaving speed, S_W	62.6 mph
Weaving segment density, D	5.5 pc/mi/ln	Average non-weaving speed, S_{NW}	64.0 mph
Level of Service, LOS	A	Maximum weaving length, L_{MAX}	5678 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Estudo de Tráfego - URE Valoriza

FREEWAY WEAVING WORKSHEET

General Information

Analyst	TTC Engenharia
Agency/Company	
Date Performed	02/10/2019
Analysis Time Period	Cenário 3 - Operação Futura

Site Information

Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Weaving Segment Location	E1
Analysis Year	2023

Project Description *Estudo de Tráfego - URE Valoriza*

Inputs

Weaving configuration	One-Sided	Segment type	C-D Roadway/ Multilane Highways
Weaving number of lanes, N	3		
Weaving segment length, L_S	1772ft	Freeway minimum speed, S_{MIN}	25
Freeway free-flow speed, FFS	68 mph	Freeway maximum capacity, C_{IFL}	2400
		Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	fp	v (pc/h)
V_{FF}	618	0.95	38	0	1.5	1.2	0.840	1.00	774
V_{RF}	213	0.95	89	0	1.5	1.2	0.692	1.00	324
V_{FR}	4	0.95	0	0	1.5	1.2	1.000	1.00	4
V_{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0
V_{NW}	774							V =	1102
V_W	328								
VR	0.298								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	328 lc/h
Interchange density, ID	0.0 int/mi	Weaving lane changes, LC_W	463 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	542 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	1005 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	0

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	1102 pc/h	Weaving intensity factor, W	0.144
Weaving segment capacity, c_w	5319 veh/h	Weaving segment speed, S	63.5 mph
Weaving segment v/c ratio	0.174	Average weaving speed, S_W	62.6 mph
Weaving segment density, D	5.8 pc/mi/ln	Average non-weaving speed, S_{NW}	63.9 mph
Level of Service, LOS	A	Maximum weaving length, L_{MAX}	5559 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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Estudo de Tráfego - URE Valoriza

FREEWAY WEAVING WORKSHEET

General Information

Analyst	TTC Engenharia
Agency/Company	
Date Performed	02/10/2019
Analysis Time Period	Cenário 4 - Operação Futura

Site Information

Freeway/Dir of Travel	Rod. Cônego Domênico Rangoni
Weaving Segment Location	E1
Analysis Year	2033

Project Description *Estudo de Tráfego - URE Valoriza*

Inputs

Weaving configuration	One-Sided	Segment type	C-D Roadway/ Multilane Highways
Weaving number of lanes, N	3		
Weaving segment length, L_S	1772ft	Freeway minimum speed, S_{MIN}	25
Freeway free-flow speed, FFS	68 mph	Freeway maximum capacity, C_{IFL}	2400
		Terrain type	Level

Conversions to pc/h Under Base Conditions

	V (veh/h)	PHF	Truck (%)	RV (%)	E_T	E_R	f_{HV}	fp	v (pc/h)
V_{FF}	776	0.95	38	0	1.5	1.2	0.840	1.00	972
V_{RF}	267	0.95	89	0	1.5	1.2	0.692	1.00	406
V_{FR}	6	0.95	0	0	1.5	1.2	1.000	1.00	6
V_{RR}	0	0.95	0	0	1.5	1.2	1.000	1.00	0
V_{NW}	972							V =	1384
V_W	412								
VR	0.298								

Configuration Characteristics

Minimum maneuver lanes, N_{WL}	2 lc	Minimum weaving lane changes, LC_{MIN}	412 lc/h
Interchange density, ID	0.0 int/mi	Weaving lane changes, LC_W	547 lc/h
Minimum RF lane changes, LC_{RF}	1 lc/pc	Non-weaving lane changes, LC_{NW}	583 lc/h
Minimum FR lane changes, LC_{FR}	1 lc/pc	Total lane changes, LC_{ALL}	1130 lc/h
Minimum RR lane changes, LC_{RR}	lc/pc	Non-weaving vehicle index, I_{NW}	0

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment flow rate, v	1384 pc/h	Weaving intensity factor, W	0.158
Weaving segment capacity, c_w	5319 veh/h	Weaving segment speed, S	62.6 mph
Weaving segment v/c ratio	0.219	Average weaving speed, S_W	62.1 mph
Weaving segment density, D	7.4 pc/mi/ln	Average non-weaving speed, S_{NW}	62.8 mph
Level of Service, LOS	A	Maximum weaving length, L_{MAX}	5559 ft

Notes

a. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments".
b. For volumes that exceed the weaving segment capacity, the level of service is "F".

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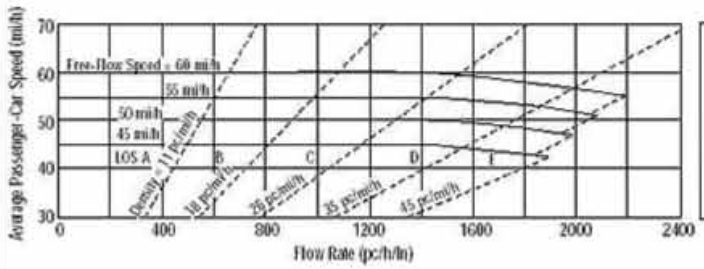
MULTILANE HIGHWAYS WORKSHEET(Direction 2)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	TTC Engenharia	Highway/Direction to Travel	Rod. Cônego Domênico Rangoni
Agency or Company		From/To	SP055 - Pedágio
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 1 - Situação Atual	Analysis Year	2019

Project Description: Estudo de Tráfego - URE Valoriza

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1128	Peak-Hour Factor, PHF	0.95
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Level
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	f_{HV}	1.000

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	0	f_A (mi/h)	0.0
Median Type, M	Divided	f_M (mi/h)	0.0
FFS (measured)		FFS (mi/h)	50.0
Base Free-Flow Speed, BFFS	50.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	593	Required Number of Lanes, N	
Speed, S (mi/h)	50.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	11.9	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

Bicycle Level of Service

Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	593.7
Effective width, W_v (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.16
Bicycle level of service (Exhibit 15-4)	B

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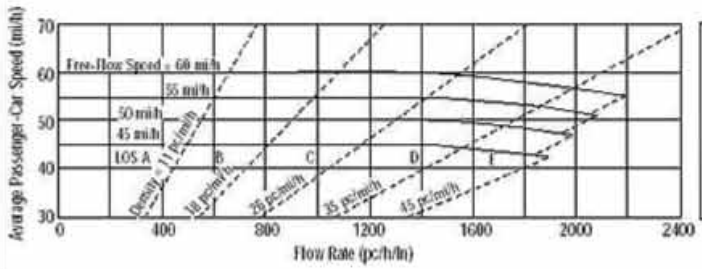
MULTILANE HIGHWAYS WORKSHEET(Direction 2)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	TTC Engenharia	Highway/Direction to Travel	Rod. Cônego Domênico Rangoni
Agency or Company		From/To	SP055 - Pedágio
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 2 - Implantação	Analysis Year	2020

Project Description: Estudo de Tráfego - URE Valoriza

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1171	Peak-Hour Factor, PHF	0.95
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Level
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	f_{HV}	1.000

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	0	f_A (mi/h)	0.0
Median Type, M	Divided	f_M (mi/h)	0.0
FFS (measured)		FFS (mi/h)	50.0
Base Free-Flow Speed, BFFS	50.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	616	Required Number of Lanes, N	
Speed, S (mi/h)	50.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	12.3	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

Bicycle Level of Service

Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	616.3
Effective width, W_v (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.18
Bicycle level of service (Exhibit 15-4)	B

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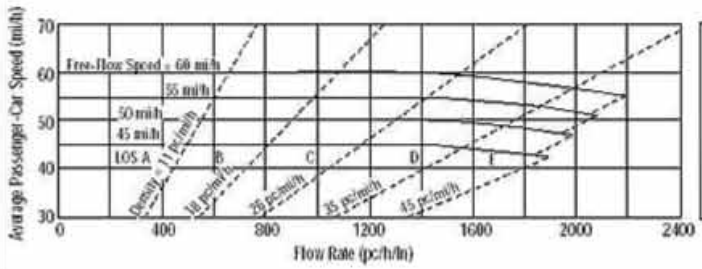
MULTILANE HIGHWAYS WORKSHEET(Direction 2)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	TTC Engenharia	Highway/Direction to Travel	Rod. Cônego Domênico Rangoni
Agency or Company		From/To	SP055 - Pedágio
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 3 - Operação Futura	Analysis Year	2023

Project Description: Estudo de Tráfego - URE Valoriza

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1236	Peak-Hour Factor, PHF	0.95
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Level
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	f_{HV}	1.000

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	0	f_A (mi/h)	0.0
Median Type, M	Divided	f_M (mi/h)	0.0
FFS (measured)		FFS (mi/h)	50.0
Base Free-Flow Speed, BFFS	50.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	650	Required Number of Lanes, N	
Speed, S (mi/h)	50.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	13.0	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

Bicycle Level of Service

Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	650.5
Effective width, W_v (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.20
Bicycle level of service (Exhibit 15-4)	B

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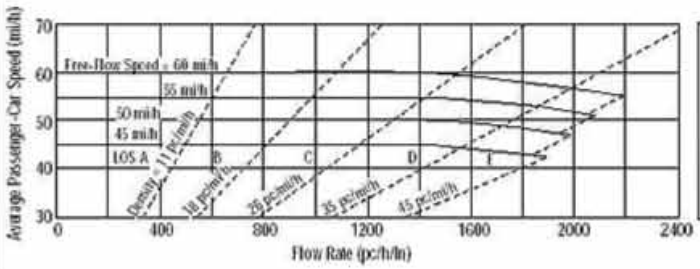
MULTILANE HIGHWAYS WORKSHEET(Direction 2)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	TTC Engenharia	Highway/Direction to Travel	Rod. Cônego Domênico Rangoni
Agency or Company		From/To	SP055 - Pedágio
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 4 - Operação Futura	Analysis Year	2033

Project Description: Estudo de Tráfego - URE Valoriza

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1552	Peak-Hour Factor, PHF	0.95
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Level
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	f_{HV}	1.000

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	0	f_A (mi/h)	0.0
Median Type, M	Divided	f_M (mi/h)	0.0
FFS (measured)		FFS (mi/h)	50.0
Base Free-Flow Speed, BFFS	50.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	816	Required Number of Lanes, N	
Speed, S (mi/h)	50.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	16.3	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

Bicycle Level of Service

Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*816.8*
Effective width, W_v (Eq. 15-29) ft	*24.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*2.32*
Bicycle level of service (Exhibit 15-4)	*B*

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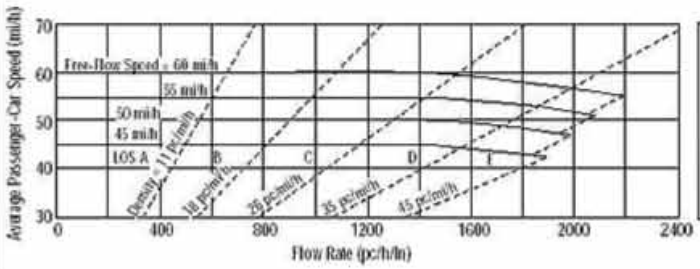
MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	TTC Engenharia	Highway/Direction to Travel	Rod. Cônego Domênico Rangoni
Agency or Company		From/To	SP055 - Pedágio
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 1 - Situação Atual	Analysis Year	2019

Project Description: Estudo de Tráfego - URE Valoriza

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1030	Peak-Hour Factor, PHF	0.95
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Level
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	f_{HV}	1.000

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	0	f_A (mi/h)	0.0
Median Type, M	Divided	f_M (mi/h)	0.0
FFS (measured)		FFS (mi/h)	50.0
Base Free-Flow Speed, BFFS	50.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	542	Required Number of Lanes, N	
Speed, S (mi/h)	50.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	10.8	Max Service Flow Rate (pc/h/ln)	
LOS	A	Design LOS	

Bicycle Level of Service

Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*542.1*
Effective width, W_v (Eq. 15-29) ft	*24.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*2.11*
Bicycle level of service (Exhibit 15-4)	*B*

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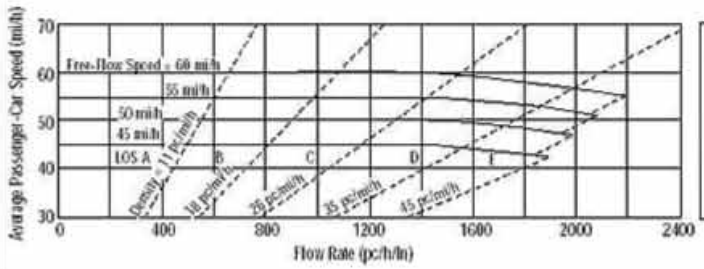
MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	TTC Engenharia	Highway/Direction to Travel	Rod. Cônego Domênico Rangoni
Agency or Company		From/To	SP055 - Pedágio
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 2 - Implantação	Analysis Year	2020

Project Description: Estudo de Tráfego - URE Valoriza

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1071	Peak-Hour Factor, PHF	0.95
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Level
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	f_{HV}	1.000

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	0	f_A (mi/h)	0.0
Median Type, M	Divided	f_M (mi/h)	0.0
FFS (measured)		FFS (mi/h)	50.0
Base Free-Flow Speed, BFFS	50.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	563	Required Number of Lanes, N	
Speed, S (mi/h)	50.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	11.3	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

Bicycle Level of Service

Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	563.7
Effective width, W_v (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.13
Bicycle level of service (Exhibit 15-4)	B

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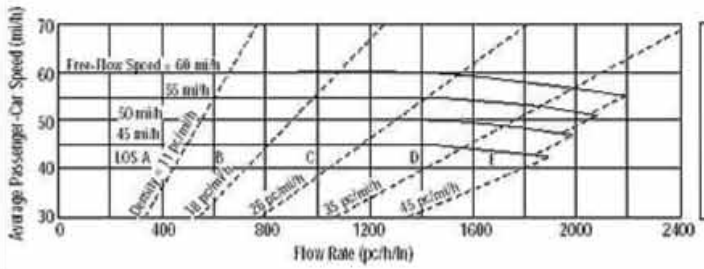
MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information

Analyst	TTC Engenharia
Agency or Company	
Date Performed	02/10/2019
Analysis Time Period	Cenário 3 - Operação Futura

Site Information

Highway/Direction to Travel	Rod. Cônego Domênico Rangoni
From/To	SP055 - Pedágio
Jurisdiction	
Analysis Year	2023

Project Description: Estudo de Tráfego - URE Valoriza

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1128	Peak-Hour Factor, PHF	0.95
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Level
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	f_{HV}	1.000

Speed Inputs

Lane Width, LW (ft)	12.0
Total Lateral Clearance, LC (ft)	12.0
Access Points, A (A/mi)	0
Median Type, M	Divided
FFS (measured)	
Base Free-Flow Speed, BFFS	50.0

Calc Speed Adj and FFS

f_{LW} (mi/h)	0.0
f_{LC} (mi/h)	0.0
f_A (mi/h)	0.0
f_M (mi/h)	0.0
FFS (mi/h)	50.0

Operations

Operational (LOS)

Flow Rate, v_p (pc/h/ln)	593
Speed, S (mi/h)	50.0
D (pc/mi/ln)	11.9
LOS	B

Design

Design (N)

Required Number of Lanes, N

Flow Rate, v_p (pc/h)

Max Service Flow Rate (pc/h/ln)

Design LOS

Bicycle Level of Service

Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	593.7
Effective width, W_v (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.16
Bicycle level of service (Exhibit 15-4)	B

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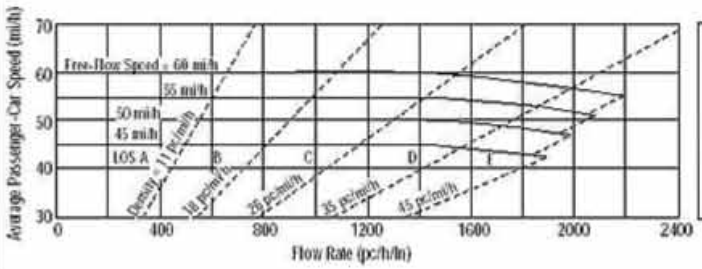
MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	TTC Engenharia	Highway/Direction to Travel	Rod. Cônego Domênico Rangoni
Agency or Company		From/To	SP055 - Pedágio
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 4 - Operação Futura	Analysis Year	2033

Project Description: Estudo de Tráfego - URE Valoriza

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1417	Peak-Hour Factor, PHF	0.95
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Level
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	1.2
E_T	1.5	f_{HV}	1.000

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	0	f_A (mi/h)	0.0
Median Type, M	Divided	f_M (mi/h)	0.0
FFS (measured)		FFS (mi/h)	50.0
Base Free-Flow Speed, BFFS	50.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	745	Required Number of Lanes, N	
Speed, S (mi/h)	50.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	14.9	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

Bicycle Level of Service

Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	745.8
Effective width, W_v (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.27
Bicycle level of service (Exhibit 15-4)	B

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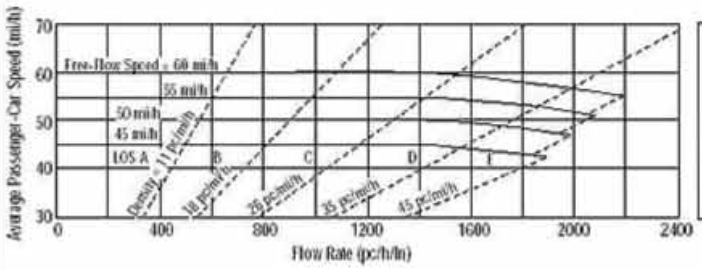
MULTILANE HIGHWAYS WORKSHEET(Direction 2)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	TTC Engenharia	Highway/Direction to Travel	Rod. Cônego Domênico Rangoni
Agency or Company		From/To	Rio Jurubatuba - Túneis
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 1 - Situação Atual	Analysis Year	2019

Project Description: Estudo de Tráfego - URE Valoriza

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1536	Peak-Hour Factor, PHF	0.95
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Rolling
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	2.0
E_T	2.5	f_{HV}	1.000

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	0	f_A (mi/h)	0.0
Median Type, M	Divided	f_M (mi/h)	0.0
FFS (measured)		FFS (mi/h)	56.0
Base Free-Flow Speed, BFFS	56.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	808	Required Number of Lanes, N	
Speed, S (mi/h)	55.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	14.7	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

Bicycle Level of Service

Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	808.4
Effective width, W_v (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.31
Bicycle level of service (Exhibit 15-4)	B

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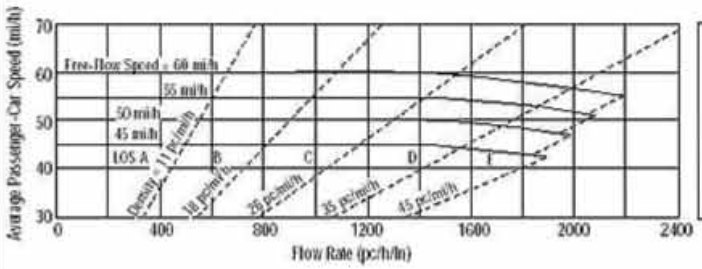
MULTILANE HIGHWAYS WORKSHEET(Direction 2)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	TTC Engenharia	Highway/Direction to Travel	Rod. Cônego Domênico Rangoni
Agency or Company		From/To	Rio Jurubatuba - Túneis
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 2 - Implantação	Analysis Year	2020

Project Description: Estudo de Tráfego - URE Valoriza

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1596	Peak-Hour Factor, PHF	0.95
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Rolling
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	2.0
E_T	2.5	f_{HV}	1.000

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	0	f_A (mi/h)	0.0
Median Type, M	Divided	f_M (mi/h)	0.0
FFS (measured)		FFS (mi/h)	56.0
Base Free-Flow Speed, BFFS	56.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	840	Required Number of Lanes, N	
Speed, S (mi/h)	55.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	15.3	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

Bicycle Level of Service

Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	840.0
Effective width, W_v (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.33
Bicycle level of service (Exhibit 15-4)	B

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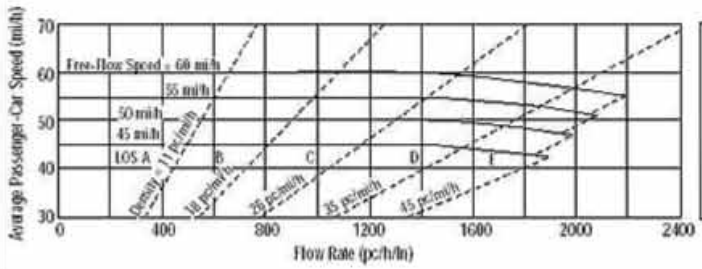
MULTILANE HIGHWAYS WORKSHEET(Direction 2)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	TTC Engenharia	Highway/Direction to Travel	Rod. Cônego Domênico Rangoni
Agency or Company		From/To	Rio Jurubatuba - Túneis
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 3 - Operação Futura	Analysis Year	2023

Project Description: Estudo de Tráfego - URE Valoriza

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1683	Peak-Hour Factor, PHF	0.95
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Rolling
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	2.0
E_T	2.5	f_{HV}	1.000

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	0	f_A (mi/h)	0.0
Median Type, M	Divided	f_M (mi/h)	0.0
FFS (measured)		FFS (mi/h)	56.0
Base Free-Flow Speed, BFFS	56.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	885	Required Number of Lanes, N	
Speed, S (mi/h)	55.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	16.1	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

Bicycle Level of Service

Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	885.8
Effective width, W_v (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.36
Bicycle level of service (Exhibit 15-4)	B

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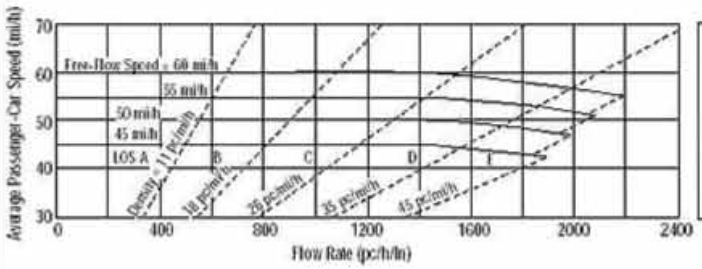
MULTILANE HIGHWAYS WORKSHEET(Direction 2)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	TTC Engenharia	Highway/Direction to Travel	Rod. Cônego Domênico Rangoni
Agency or Company		From/To	Rio Jurubatuba - Túneis
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 4 - Operação Futura	Analysis Year	2033

Project Description: Estudo de Tráfego - URE Valoriza

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	2113	Peak-Hour Factor, PHF	0.95
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Rolling
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	2.0
E_T	2.5	f_{HV}	1.000

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	0	f_A (mi/h)	0.0
Median Type, M	Divided	f_M (mi/h)	0.0
FFS (measured)		FFS (mi/h)	56.0
Base Free-Flow Speed, BFFS	56.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	1112	Required Number of Lanes, N	
Speed, S (mi/h)	55.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	20.2	Max Service Flow Rate (pc/h/ln)	
LOS	C	Design LOS	

Bicycle Level of Service

Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*1112.1*
Effective width, W_v (Eq. 15-29) ft	*24.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*2.48*
Bicycle level of service (Exhibit 15-4)	*B*

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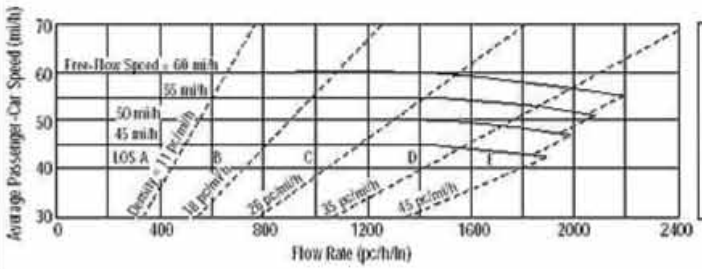
MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	TTC Engenharia	Highway/Direction to Travel	Rod. Cônego Domênico Rangoni
Agency or Company		From/To	Rio Jurubatuba - Túneis
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 1 - Situação Atual	Analysis Year	2019

Project Description: Estudo de Tráfego - URE Valoriza

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1429	Peak-Hour Factor, PHF	0.95
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Rolling
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	2.0
E_T	2.5	f_{HV}	1.000

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	0	f_A (mi/h)	0.0
Median Type, M	Divided	f_M (mi/h)	0.0
FFS (measured)		FFS (mi/h)	56.0
Base Free-Flow Speed, BFFS	56.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	752	Required Number of Lanes, N	
Speed, S (mi/h)	55.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	13.7	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

Bicycle Level of Service

Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	752.1
Effective width, W_v (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.28
Bicycle level of service (Exhibit 15-4)	B

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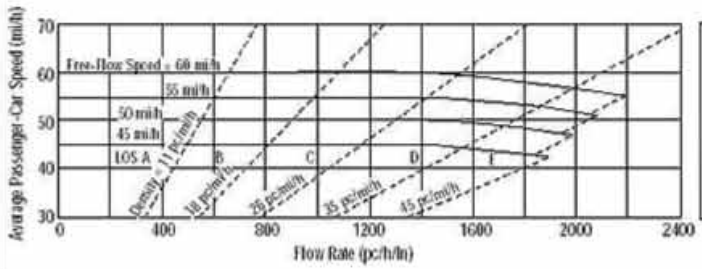
MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	TTC Engenharia	Highway/Direction to Travel	Rod. Cônego Domênico Rangoni
Agency or Company		From/To	Rio Jurubatuba - Túneis
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 2 - Implantação	Analysis Year	2020

Project Description: Estudo de Tráfego - URE Valoriza

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1486	Peak-Hour Factor, PHF	0.95
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Rolling
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	2.0
E_T	2.5	f_{HV}	1.000

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	0	f_A (mi/h)	0.0
Median Type, M	Divided	f_M (mi/h)	0.0
FFS (measured)		FFS (mi/h)	56.0
Base Free-Flow Speed, BFFS	56.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	782	Required Number of Lanes, N	
Speed, S (mi/h)	55.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	14.2	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

Bicycle Level of Service

Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	782.1
Effective width, W_v (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.30
Bicycle level of service (Exhibit 15-4)	B

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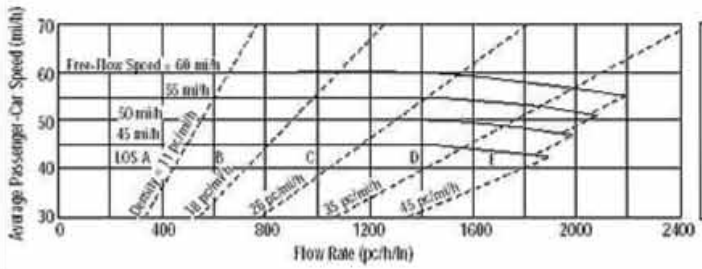
MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	TTC Engenharia	Highway/Direction to Travel	Rod. Cônego Domênico Rangoni
Agency or Company		From/To	Rio Jurubatuba - Túneis
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 3 - Operação Futura	Analysis Year	2023

Project Description: Estudo de Tráfego - URE Valoriza

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1565	Peak-Hour Factor, PHF	0.95
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Rolling
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	2.0
E_T	2.5	f_{HV}	1.000

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	0	f_A (mi/h)	0.0
Median Type, M	Divided	f_M (mi/h)	0.0
FFS (measured)		FFS (mi/h)	56.0
Base Free-Flow Speed, BFFS	56.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	823	Required Number of Lanes, N	
Speed, S (mi/h)	55.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	15.0	Max Service Flow Rate (pc/h/ln)	
LOS	B	Design LOS	

Bicycle Level of Service

Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	823.7
Effective width, W_v (Eq. 15-29) ft	24.00
Effective speed factor, S_t (Eq. 15-30)	4.79
Bicycle level of service score, BLOS (Eq. 15-31)	2.32
Bicycle level of service (Exhibit 15-4)	B

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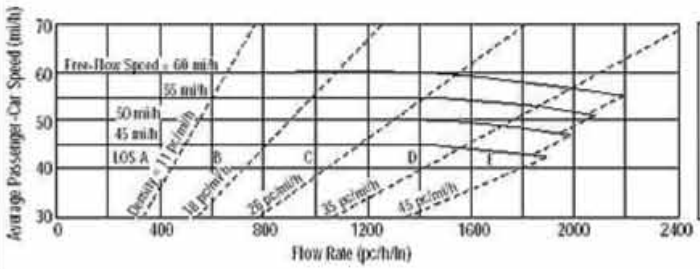
MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	Output
Operational (LOS)	FFS, N, v_p	LOS, S, D
Design (N)	FFS, LOS, v_p	N, S, D
Design (v_p)	FFS, LOS, N	v_p, S, D
Planning (LOS)	FFS, N, AADT	LOS, S, D
Planning (N)	FFS, LOS, AADT	N, S, D
Planning (v_p)	FFS, LOS, N	v_p, S, D

General Information		Site Information	
Analyst	TTC Engenharia	Highway/Direction to Travel	Rod. Cônego Domênico Rangoni
Agency or Company		From/To	Rio Jurubatuba - Túneis
Date Performed	02/10/2019	Jurisdiction	
Analysis Time Period	Cenário 4 - Operação Futura	Analysis Year	2033

Project Description: Estudo de Tráfego - URE Valoriza

☐ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1965	Peak-Hour Factor, PHF	0.95
AADT(veh/h)		%Trucks and Buses, P_T	0
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Rolling
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	2.0
E_T	2.5	f_{HV}	1.000

Speed Inputs		Calc Speed Adj and FFS	
Lane Width, LW (ft)	12.0	f_{LW} (mi/h)	0.0
Total Lateral Clearance, LC (ft)	12.0	f_{LC} (mi/h)	0.0
Access Points, A (A/mi)	0	f_A (mi/h)	0.0
Median Type, M	Divided	f_M (mi/h)	0.0
FFS (measured)		FFS (mi/h)	56.0
Base Free-Flow Speed, BFFS	56.0		

Operations		Design	
Operational (LOS)		Design (N)	
Flow Rate, v_p (pc/h/ln)	1034	Required Number of Lanes, N	
Speed, S (mi/h)	55.0	Flow Rate, v_p (pc/h)	
D (pc/mi/ln)	18.8	Max Service Flow Rate (pc/h/ln)	
LOS	C	Design LOS	

Bicycle Level of Service

Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*1034.2*
Effective width, W_v (Eq. 15-29) ft	*24.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*2.44*
Bicycle level of service (Exhibit 15-4)	*B*

HCS 2010™ Version 6.3 Generated: 02/10/2019 16:50

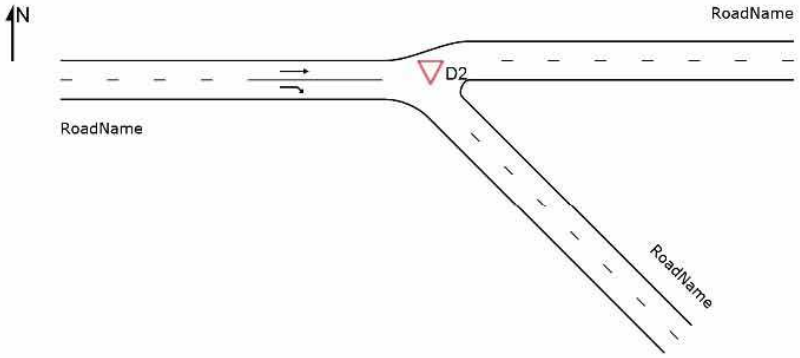
ANEXO 03

Relatórios Sidra Intersection 8.0

SITE LAYOUT

Site: D2 [Divergência 2 - Cenário1]

Divergência 2
Site Category: (None)
Giveway / Yield (Two-Way)



Organisation: TTC ENGENHARIA DE TRAFEGO E TRANSPORTES | Created: quarta-feira, 2 de outubro de 2019 17:59:33
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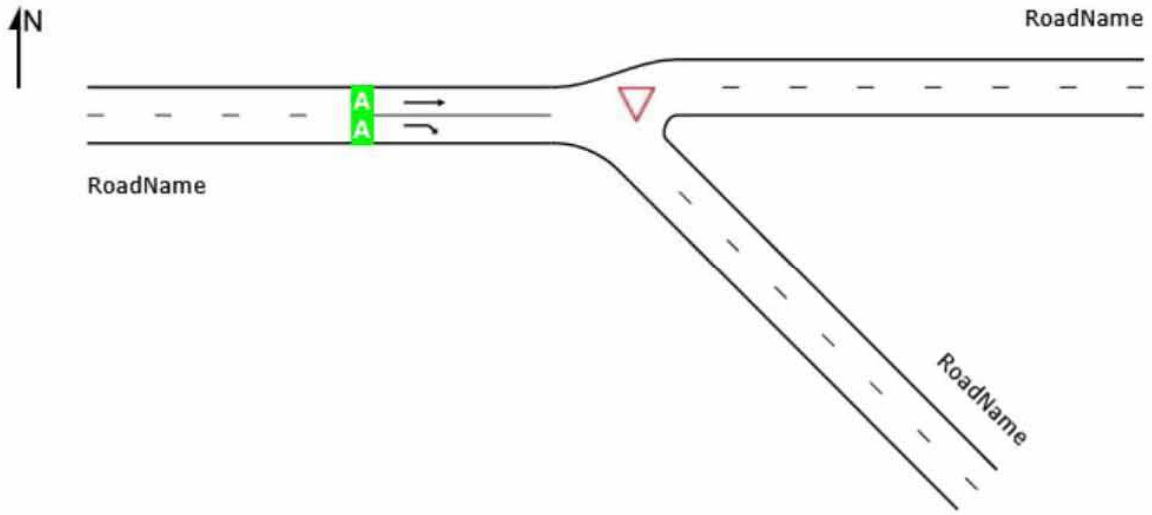
LANE LEVEL OF SERVICE

Lane Level of Service

Site: D2 [Divergência 2 - Cenário1]

Divergência 2
Site Category: (None)
Giveway / Yield (Two-Way)

	Approaches	Intersection
	West	
LOS	NA	NA



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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MOVEMENT SUMMARY

Site: D2 [Divergência 2 - Cenário1]

Divergência 2
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
West: RoadName												
11	T1	88	10,7	0,048	0,0	LOS A	0,0	0,0	0,00	0,00	0,00	40,0
12a	R1	200	90,5	0,156	4,4	LOS A	0,0	0,0	0,00	0,52	0,00	36,2
Approach		288	66,1	0,156	3,1	NA	0,0	0,0	0,00	0,36	0,00	37,4
All Vehicles		288	66,1	0,156	3,1	NA	0,0	0,0	0,00	0,36	0,00	37,4

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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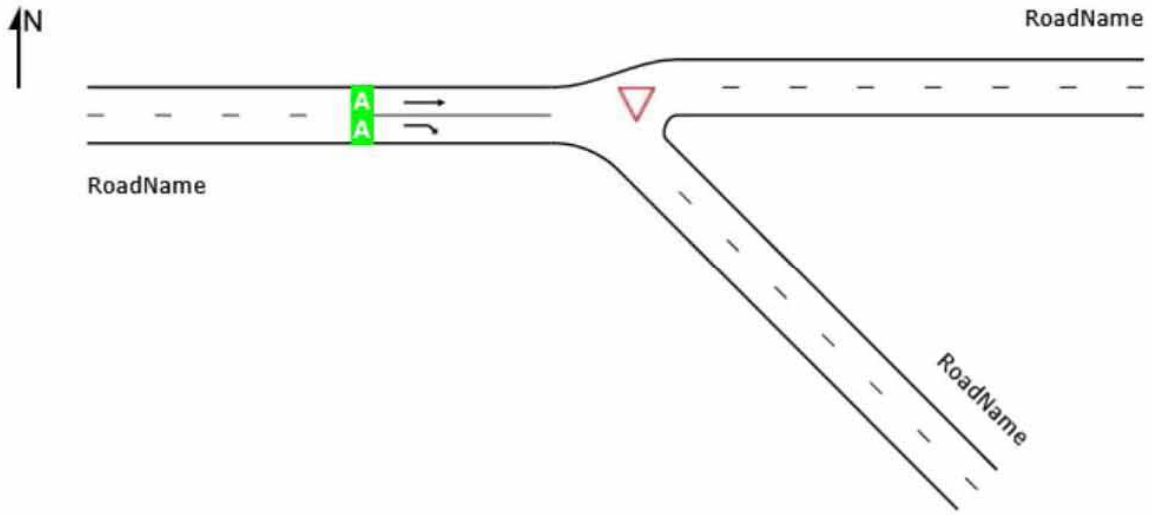
LANE LEVEL OF SERVICE

Lane Level of Service

Site: D2 [Divergência 2 - Cenário2]

Divergência 2
Site Category: (None)
Giveway / Yield (Two-Way)

	Approaches	Intersection
	West	
LOS	NA	NA



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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MOVEMENT SUMMARY

Site: D2 [Divergência 2 - Cenário2]

Divergência 2
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
West: RoadName												
11	T1	91	10,5	0,049	0,0	LOS A	0,0	0,0	0,00	0,00	0,00	40,0
12a	R1	208	90,4	0,163	4,4	LOS A	0,0	0,0	0,00	0,52	0,00	36,2
Approach		299	66,2	0,163	3,1	NA	0,0	0,0	0,00	0,36	0,00	37,4
All Vehicles		299	66,2	0,163	3,1	NA	0,0	0,0	0,00	0,36	0,00	37,4

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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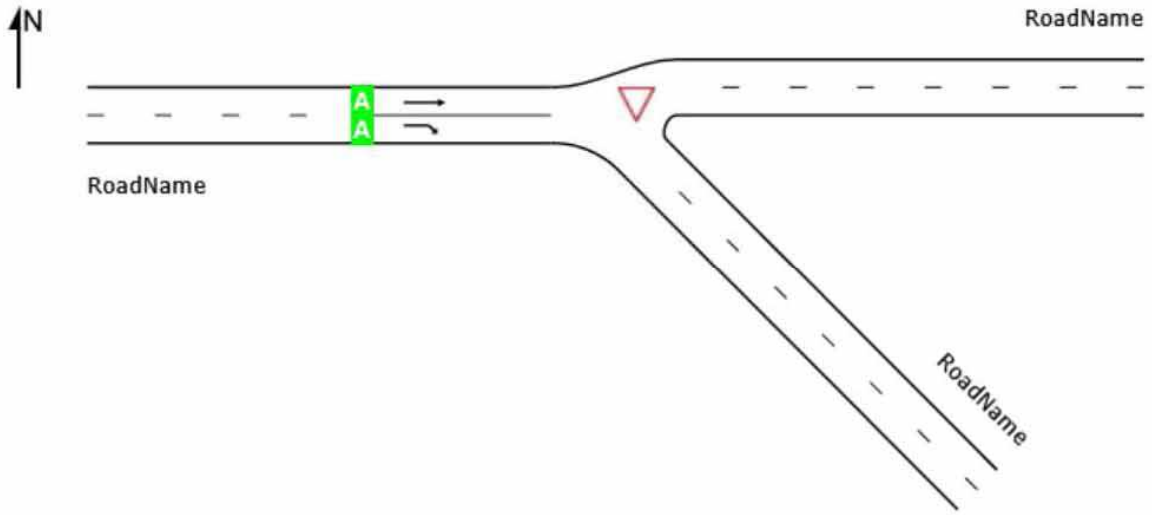
LANE LEVEL OF SERVICE

Lane Level of Service

Site: D2 [Divergência 2 - Cenário3]

Divergência 2
Site Category: (None)
Giveway / Yield (Two-Way)

	Approaches	Intersection
	West	
LOS	NA	NA



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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MOVEMENT SUMMARY

Site: D2 [Divergência 2 - Cenário3]

Divergência 2
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
West: RoadName												
11	T1	97	10,9	0,052	0,0	LOS A	0,0	0,0	0,00	0,00	0,00	40,0
12a	R1	219	90,4	0,171	4,5	LOS A	0,0	0,0	0,00	0,52	0,00	36,2
Approach		316	66,0	0,171	3,1	NA	0,0	0,0	0,00	0,36	0,00	37,4
All Vehicles		316	66,0	0,171	3,1	NA	0,0	0,0	0,00	0,36	0,00	37,4

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
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HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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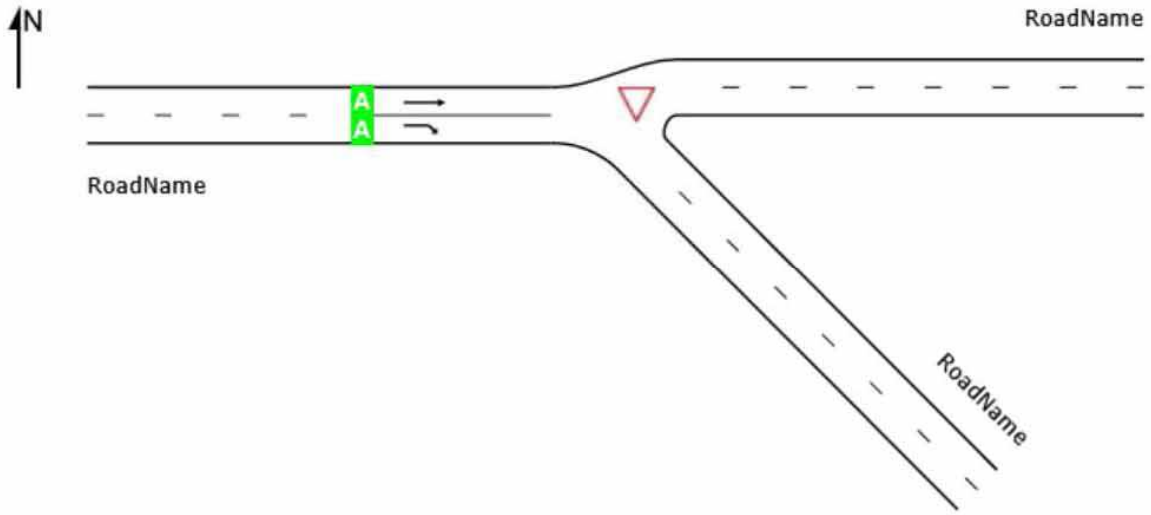
LANE LEVEL OF SERVICE

Lane Level of Service

▽ Site: D2 [Divergência 2 - Cenário4]

Divergência 2
Site Category: (None)
Giveway / Yield (Two-Way)

	Approaches	Intersection
	West	
LOS	NA	NA



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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MOVEMENT SUMMARY

Site: D2 [Divergência 2 - Cenário4]

Divergência 2
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
West: RoadName												
11	T1	122	10,3	0,066	0,0	LOS A	0,0	0,0	0,00	0,00	0,00	40,0
12a	R1	275	90,8	0,215	4,5	LOS A	0,0	0,0	0,00	0,52	0,00	36,2
Approach		397	66,0	0,215	3,1	NA	0,0	0,0	0,00	0,36	0,00	37,4
All Vehicles		397	66,0	0,215	3,1	NA	0,0	0,0	0,00	0,36	0,00	37,4

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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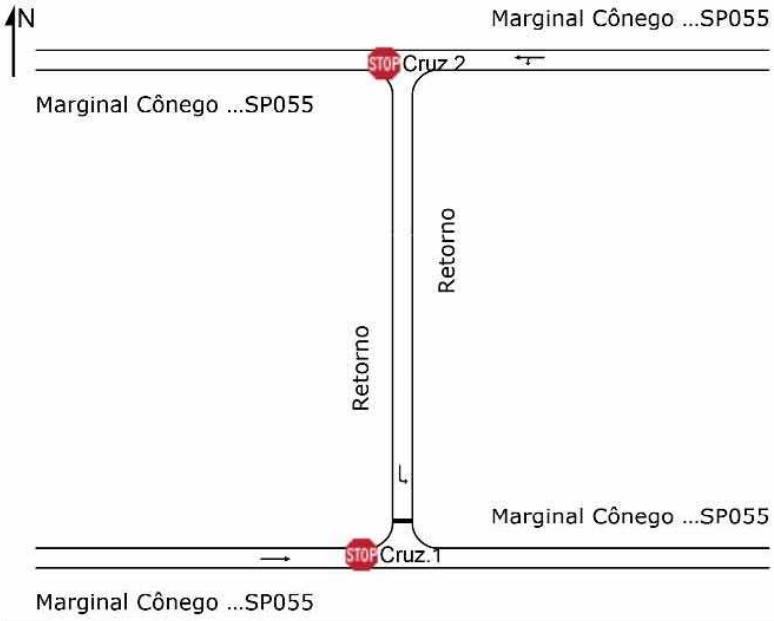
NETWORK LAYOUT

Network: N101 [Cruzamentos - Cenário 1]

New Network
Network Category: (None)



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
Cruz.1	NA	Cruzamento 1 - Cenário 1
Cruz.2	NA	Cruzamento 2 - Cenário 1

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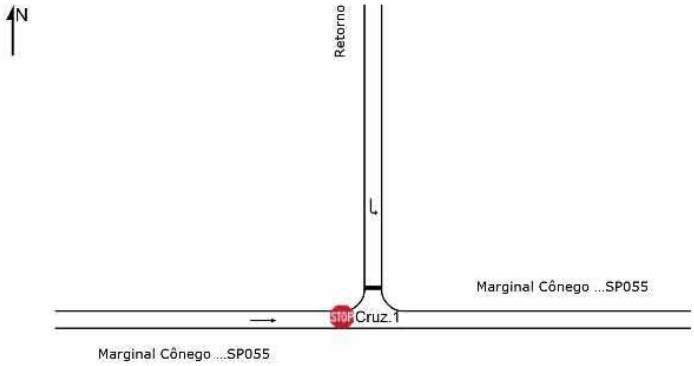
SITE LAYOUT

Site: Cruz.1 [Cruzamento 1 - Cenário 1]

New Site
Site Category: (None)
Stop (Two-Way)



Organisation: TTC ENGENHARIA DE TRAFEGO E TRANSPORTES | Created: quarta-feira, 2 de outubro de 2019 18:05:20
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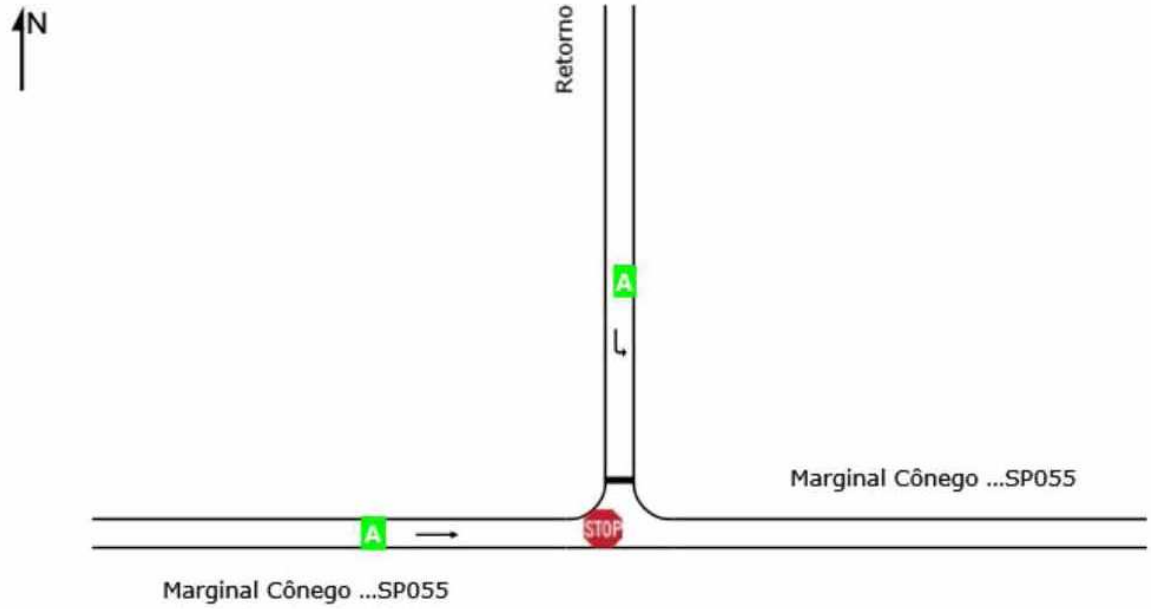
LANE LEVEL OF SERVICE

Lane Level of Service

Site: Cruz1 [Cruzamento 1 - Cenário 1]

New Site
Site Category: (None)
Stop (Two-Way)

	Approaches		Intersection
	North	West	
LOS	A	NA	NA



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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MOVEMENT SUMMARY

Site: Cruz.1 [Cruzamento 1 - Cenário 1]

New Site
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
North: Retorno												
7	L2	59	73,2	0,068	8,7	LOS A	0,2	2,6	0,18	0,96	0,18	34,7
Approach		59	73,2	0,068	8,7	LOS A	0,2	2,6	0,18	0,96	0,18	34,7
West: Marginal Cônego Domênico Rangoni - SP055												
11	T1	60	50,9	0,039	0,0	LOS A	0,0	0,0	0,00	0,00	0,00	40,0
Approach		60	50,9	0,039	0,0	NA	0,0	0,0	0,00	0,00	0,00	40,0
All Vehicles		119	61,9	0,068	4,3	NA	0,2	2,6	0,09	0,47	0,09	37,7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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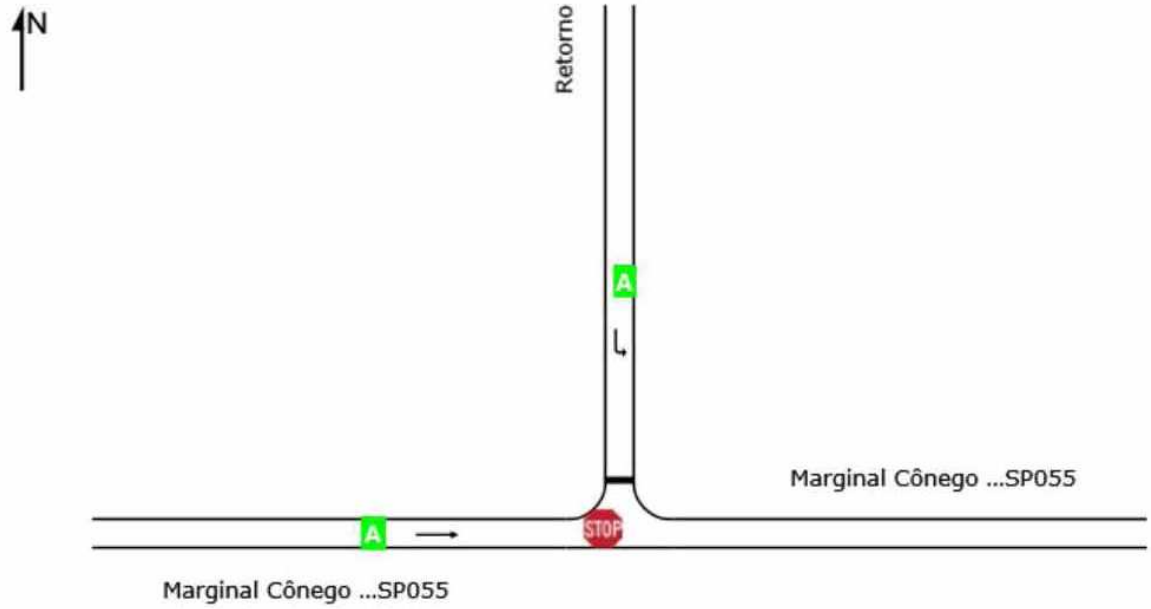
LANE LEVEL OF SERVICE

Lane Level of Service

Site: Cruz1 [Cruzamento 1 - Cenário 2]

New Site
Site Category: (None)
Stop (Two-Way)

	Approaches		Intersection
	North	West	
LOS	A	NA	NA



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 2010).
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SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

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Project: H:\PGTC_30 - URE Cubatão\TEC\Sidra\PGTC30_Cruzamentos_rev1.sip8

MOVEMENT SUMMARY

Site: Cruz.1 [Cruzamento 1 - Cenário 2]

New Site
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
North: Retorno												
7	L2	74	71,4	0,085	8,7	LOS A	0,3	3,2	0,19	0,95	0,19	34,7
Approach		74	71,4	0,085	8,7	LOS A	0,3	3,2	0,19	0,95	0,19	34,7
West: Marginal Cônego Domênico Rangoni - SP055												
11	T1	62	50,8	0,040	0,0	LOS A	0,0	0,0	0,00	0,00	0,00	40,0
Approach		62	50,8	0,040	0,0	NA	0,0	0,0	0,00	0,00	0,00	40,0
All Vehicles		136	62,0	0,085	4,7	NA	0,3	3,2	0,10	0,52	0,10	37,5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
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Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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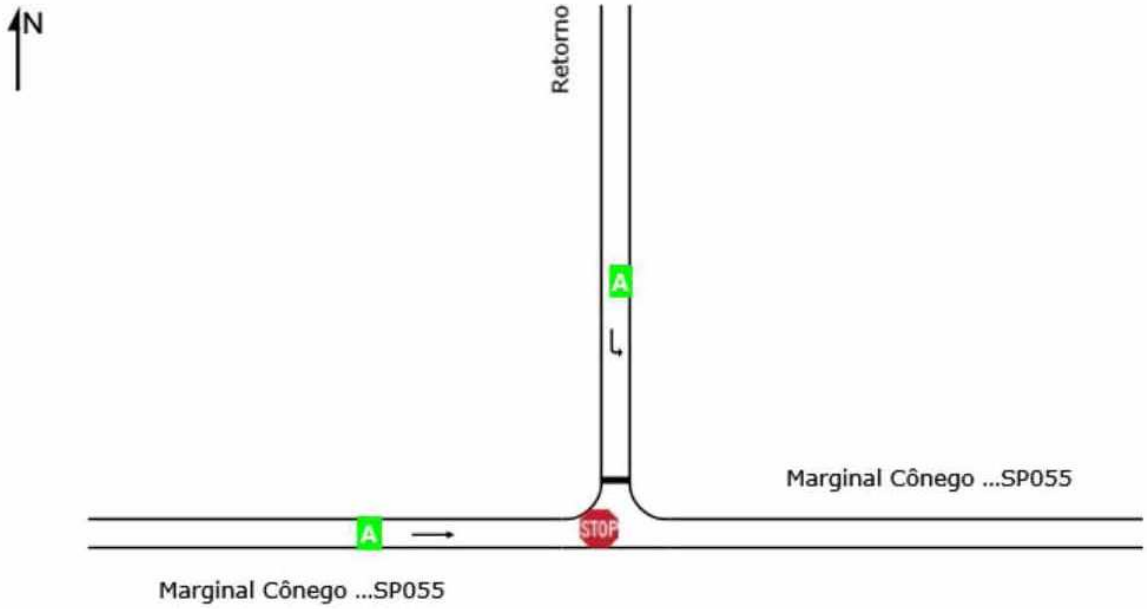
LANE LEVEL OF SERVICE

Lane Level of Service

Site: Cruz1 [Cruzamento 1 - Cenário 3]

New Site
Site Category: (None)
Stop (Two-Way)

	Approaches		Intersection
	North	West	
LOS	A	NA	NA



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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MOVEMENT SUMMARY

Site: Cruz.1 [Cruzamento 1 - Cenário 3]

New Site
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
North: Retorno												
7	L2	64	73,8	0,075	8,8	LOS A	0,2	2,8	0,19	0,95	0,19	34,6
Approach		64	73,8	0,075	8,8	LOS A	0,2	2,8	0,19	0,95	0,19	34,6
West: Marginal Cônego Domênico Rangoni - SP055												
11	T1	66	50,8	0,043	0,0	LOS A	0,0	0,0	0,00	0,00	0,00	40,0
Approach		66	50,8	0,043	0,0	NA	0,0	0,0	0,00	0,00	0,00	40,0
All Vehicles		131	62,1	0,075	4,3	NA	0,2	2,8	0,09	0,47	0,09	37,7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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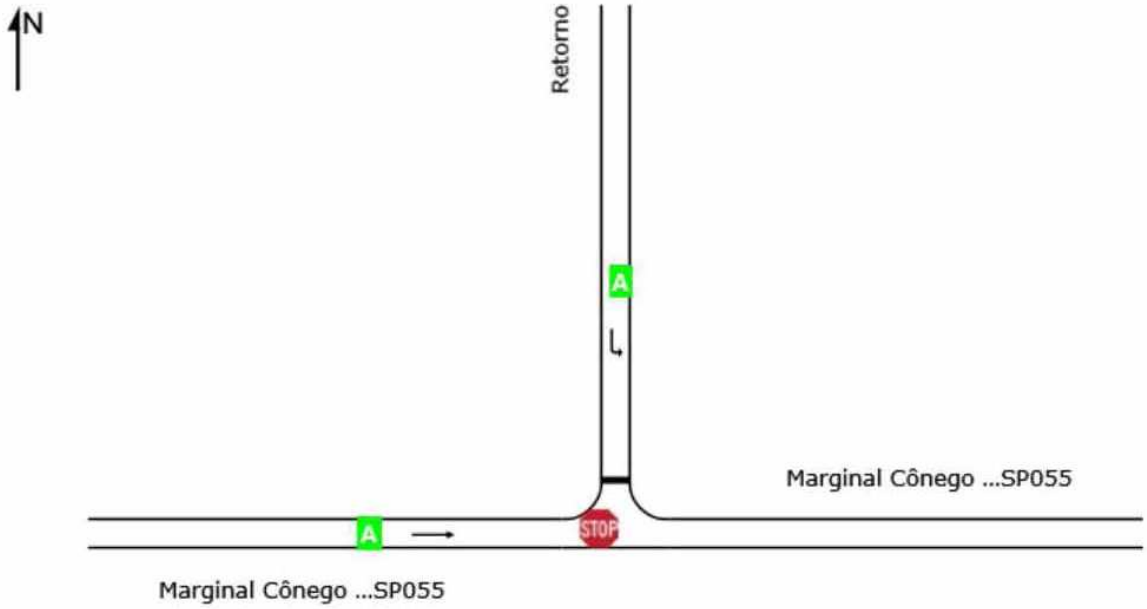
LANE LEVEL OF SERVICE

Lane Level of Service

Site: Cruz1 [Cruzamento 1 - Cenário 4]

New Site
Site Category: (None)
Stop (Two-Way)

	Approaches		Intersection
	North	West	
LOS	A	NA	NA



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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MOVEMENT SUMMARY

Site: Cruz.1 [Cruzamento 1 - Cenário 4]

New Site
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
North: Retorno												
7	L2	81	72,7	0,097	8,9	LOS A	0,3	3,7	0,22	0,95	0,22	34,6
Approach		81	72,7	0,097	8,9	LOS A	0,3	3,7	0,22	0,95	0,22	34,6
West: Marginal Cônego Domênico Rangoni - SP055												
11	T1	83	50,6	0,053	0,0	LOS A	0,0	0,0	0,00	0,00	0,00	40,0
Approach		83	50,6	0,053	0,0	NA	0,0	0,0	0,00	0,00	0,00	40,0
All Vehicles		164	61,5	0,097	4,4	NA	0,3	3,7	0,11	0,47	0,11	37,7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
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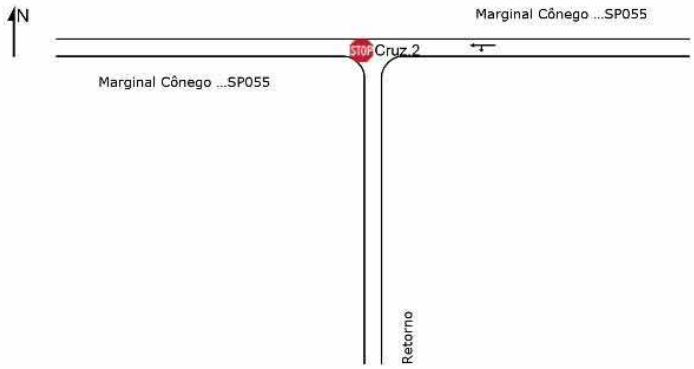
SITE LAYOUT

Site: Cruz.2 [Cruzamento 2 - Cenário 1]

New Site
Site Category: (None)
Stop (Two-Way)



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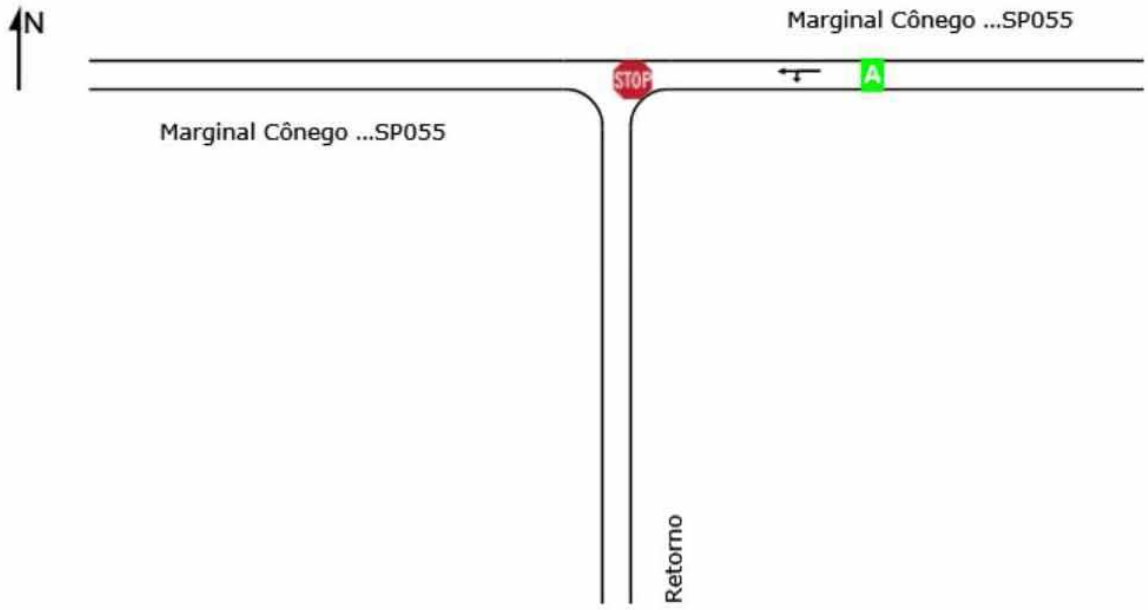
LANE LEVEL OF SERVICE

Lane Level of Service

Site: Cruz2 [Cruzamento 2 - Cenário 1]

New Site
Site Category: (None)
Stop (Two-Way)

	Approaches	Intersection
	East	
LOS	NA	NA



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
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MOVEMENT SUMMARY

Site: Cruz.2 [Cruzamento 2 - Cenário 1]

New Site
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Marginal Cônego Domênico Rangoni - SP055												
4	L2	59	73,2	0,199	4,4	LOS A	0,0	0,0	0,00	0,10	0,00	33,7
5	T1	255	36,4	0,199	0,0	LOS A	0,0	0,0	0,00	0,10	0,00	39,7
Approach		314	43,3	0,199	0,8	NA	0,0	0,0	0,00	0,10	0,00	39,0
All Vehicles		314	43,3	0,199	0,8	NA	0,0	0,0	0,00	0,10	0,00	39,0

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
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Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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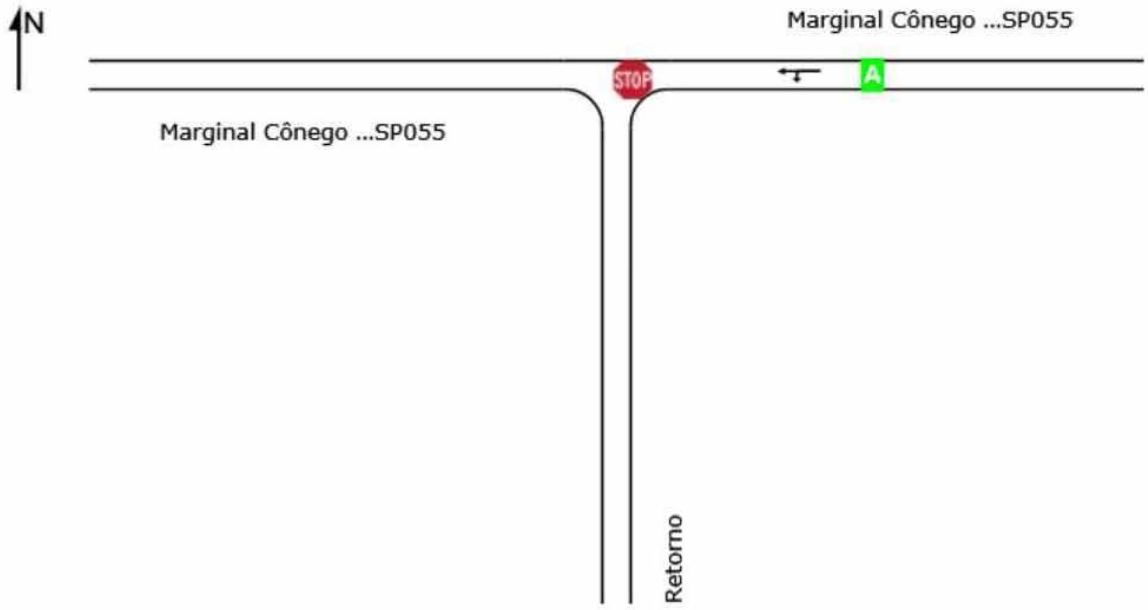
LANE LEVEL OF SERVICE

Lane Level of Service

Site: Cruz2 [Cruzamento 2 - Cenário 2]

New Site
Site Category: (None)
Stop (Two-Way)

	Approaches	Intersection
	East	
LOS	NA	NA



Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
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MOVEMENT SUMMARY

Site: Cruz.2 [Cruzamento 2 - Cenário 2]

New Site
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Marginal Cônego Domênico Rangoni - SP055												
4	L2	74	71,4	0,214	4,4	LOS A	0,0	0,0	0,00	0,12	0,00	33,6
5	T1	261	36,3	0,214	0,0	LOS A	0,0	0,0	0,00	0,12	0,00	39,6
Approach		335	44,0	0,214	1,0	NA	0,0	0,0	0,00	0,12	0,00	38,8
All Vehicles		335	44,0	0,214	1,0	NA	0,0	0,0	0,00	0,12	0,00	38,8

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
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HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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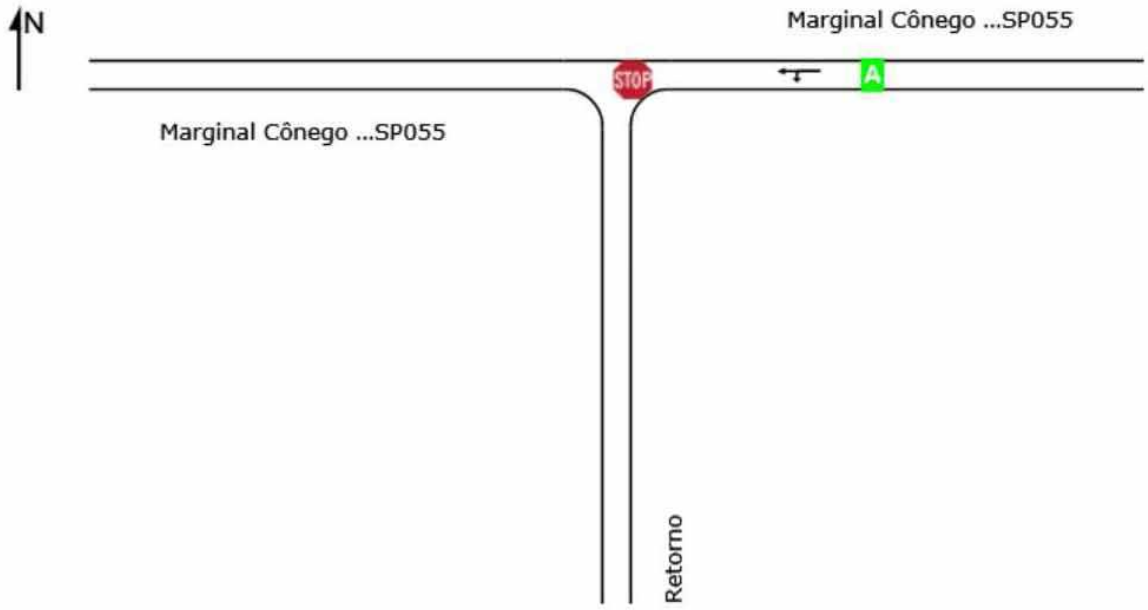
LANE LEVEL OF SERVICE

Lane Level of Service

Site: Cruz.2 [Cruzamento 2 - Cenário 3]

New Site
Site Category: (None)
Stop (Two-Way)

	Approaches	Intersection
	East	
LOS	NA	NA



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MOVEMENT SUMMARY

Site: Cruz.2 [Cruzamento 2 - Cenário 3]

New Site
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Marginal Cônego Domênico Rangoni - SP055												
4	L2	64	73,8	0,218	4,4	LOS A	0,0	0,0	0,00	0,10	0,00	33,6
5	T1	279	36,2	0,218	0,0	LOS A	0,0	0,0	0,00	0,10	0,00	39,7
Approach		343	43,3	0,218	0,8	NA	0,0	0,0	0,00	0,10	0,00	39,0
All Vehicles		343	43,3	0,218	0,8	NA	0,0	0,0	0,00	0,10	0,00	39,0

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
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HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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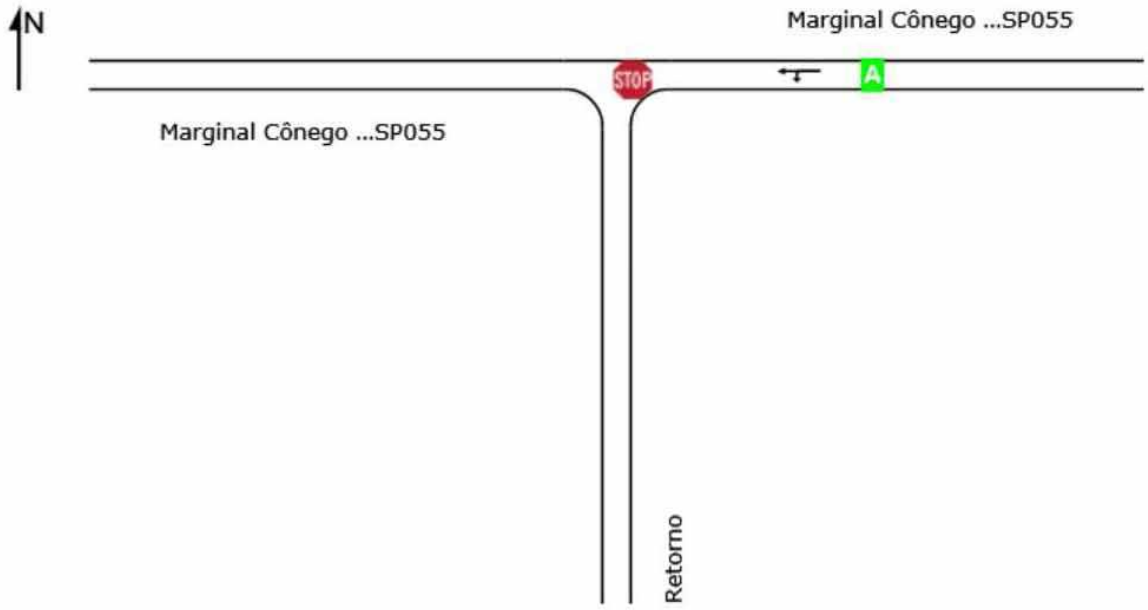
LANE LEVEL OF SERVICE

Lane Level of Service

Site: Cruz2 [Cruzamento 2 - Cenário 4]

New Site
Site Category: (None)
Stop (Two-Way)

	Approaches	Intersection
	East	
LOS	NA	NA



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MOVEMENT SUMMARY

Site: Cruz.2 [Cruzamento 2 - Cenário 4]

New Site
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
East: Marginal Cônego Domênico Rangoni - SP055												
4	L2	81	72,7	0,274	4,4	LOS A	0,0	0,0	0,00	0,10	0,00	33,7
5	T1	351	36,3	0,274	0,0	LOS A	0,0	0,0	0,00	0,10	0,00	39,7
Approach		432	43,2	0,274	0,8	NA	0,0	0,0	0,00	0,10	0,00	39,0
All Vehicles		432	43,2	0,274	0,8	NA	0,0	0,0	0,00	0,10	0,00	39,0

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
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