

Railway Project

Level Crossing Traffic Counts

OCTOBER 2017

Content

1.	Introduction	2
2.	Survey features	2
3.	Photographic record of survey sites	10

Appendix I – “Level Crossing Traffic Counts - Raw Data.xlsx”

1. Introduction

Between the months of June and July of 2017, vehicle counts were performed in level crossings that will be affected for the new train project.

The following is a brief summary of the survey performed and the applied methodology.

The surveys were carried out by field staff, which has collected the traffic volumes by maneuvers and vehicle classification in the main intersections linked to the railroad project.

2. Survey features

Vehicle counts were developed in the intersections near the level crossings of the following cities:

- Montevideo
- La Paz
- Las Piedras
- Progreso
- Canelones
- 25 de Agosto
- Cardal
- 25 de Mayo
- Florida
- Sarandí grande
- Durazno

The following figure shows the survey sites, along with the main highway network in the area and the railway network analyzed in the project.

Figure 2-1 Survey sites



Railway Project

Level Crossing Traffic Counts.

In most of the intersections complete counts (from 6am to 10pm) have been carried out, whereas in low hierarchy crossings the counts performed were partial (from 7am to 10am and from 4pm to 7pm). Accumulated volumes were recorded every 15 minutes.

Table 2-1 Survey schedule

Level Crossing	Intersection	City	Type of vehicle count	Date
Ramón Álvarez	End of Road	25 de Agosto	Partial	13/06/2017
Manuel Calleros	Joaquín Suárez	25 de Agosto	Partial	13/06/2017
Juan Aguiar	Simón del Pino	25 de Agosto	Complete	14/06/2017
Fernando Beduchant	Juan Velázquez	25 de Agosto	Complete	14/06/2017
Ruta 78	Simón del Pino	25 de Agosto	Complete	15/06/2017
Parque de la Hispanidad	Parque de la Hispanidad 1	Durazno	Partial	15/06/2017
Ruta 76	Lavalleja	25 de Mayo	Complete	16/06/2017
República Argentina (Ángel Gómez)	Lavalleja	25 de Mayo	Complete	16/06/2017
Martín R. Etchegoyen	Puchet	Durazno	Complete	16/06/2017
25 de Agosto	Puchet	Durazno	Complete	16/06/2017
Jose Pedro Varela	Lavalleja	25 de Mayo	Complete	20/06/2017
Zorrila de San Martin	Lavalleja	25 de Mayo	Complete	20/06/2017
Zorrila de San Martin	Slaberry	Durazno	Complete	20/06/2017
Battle and Ordoñez	José Rosa gifuni	Canelones	Complete	21/06/2017
Brig. Gral. Juan Antonio Lavalleja	Garibaldi	Durazno	Complete	21/06/2017
Baltasar Brum	Hermenegildo Melo	Canelones	Complete	22/06/2017
Damaso Antonio Larranaga	Monsenor Arrospide	Durazno	Complete	22/06/2017
Acuña de Figueroa (Ruta 64)	Camino Las Violetas	Canelones	Complete	23/06/2017
Acuña de Figueroa (Ruta 64)	Francisco Soca	Canelones	Complete	23/06/2017
Brig. Gral. Fructuoso Rivera	Capurro	Durazno	Partial	23/06/2017
Vecinal (ANCAP)	Vecinal 1	Durazno	Partial	23/06/2017
General Artigas	Camino Fuster	Canelones	Partial	26/06/2017
General Artigas	Hermenegildo López	Canelones	Partial	26/06/2017
Gral. Aparicio Saravia	18 de Mayo	Durazno	Partial	26/06/2017
Zorrilla de San Martin	Camino Fuster	Canelones	Partial	27/06/2017
Zorrilla de San Martin	Dr Francisco Soca	Canelones	Complete	27/06/2017
Colombia	Paraguay	Montevideo	Complete	27/06/2017
María Stagnero de Munar	Juan Tolentino González	Canelones	Partial	28/06/2017
Cristóbal Cendan	Euduro Melo	Canelones	Partial	28/06/2017
San Fructuoso	Rambla	Montevideo	Complete	28/06/2017
San Fructuoso	Mendoza	Montevideo	Complete	28/06/2017
Ruta 11	Wilson Ferreira	Canelones	Complete	29/06/2017
Ruta 11	Camino Fuster	Canelones	Complete	29/06/2017
María Orticochea	Versalles	Montevideo	Complete	29/06/2017
Cno. Ariel (Sayago station)	Garzón	Montevideo	Complete	29/06/2017
Cno. Ariel (Sayago station)	Sayago	Montevideo	Complete	29/06/2017
Cnel. Francisco Tajés	Paraguay	Montevideo	Complete	30/06/2017
Zelmar Michelinni	Pando	Canelones	Complete	30/06/2017

Railway Project

Level Crossing Traffic Counts.

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Level Crossing	Intersection	City	Type of vehicle count	Date
Zelmar Michelinni	Álamo de Suárez	Canelones	Complete	30/06/2017
Av. Dr. Carlos Maria de Pena	Atanalsildo Suárez	Montevideo	Partial	03/07/2017
Av. Islas Canarias	Versalles	Montevideo	Complete	03/07/2017
Carlos Princivalle	Rambla	Montevideo	Complete	04/07/2017
Carlos Princivalle	Farías	Montevideo	Complete	04/07/2017
12 De Diciembre	Rambla	Montevideo	Complete	05/07/2017
12 De Diciembre	Uruguayana	Montevideo	Complete	05/07/2017
Pablo Zufriategui (Yatay station)	Uruguayana	Montevideo	Complete	06/07/2017
Pablo Zufriategui (Yatay station)	Agraciada	Montevideo	Complete	06/07/2017
Av. José Battle and Ordoñez	Libertad	La Paz	Complete	10/07/2017
Av. José Battle and Ordoñez	Luis Alberto de Herrera	La Paz	Complete	10/07/2017
Javier de Viana	Libertad	La Paz	Complete	10/07/2017
Javier de Viana	Luis Alberto de Herrera	La Paz	Complete	10/07/2017
Cno. Carmelo Colman	César Mayo Gutiérrez	Montevideo	Complete	11/07/2017
Cno. Carmelo Colman	García Pardo	Montevideo	Complete	11/07/2017
Cno. Carlos A. Lopéz	Pascacio Báez o Fortet	Montevideo	Complete	11/07/2017
José Ellauri	Alfonso Espínola	Las Piedras	Completo	11/07/2017
José Artigas	Raúl Cabaña Núñez	Cardal	Complete	12/07/2017
Camino Uruguay (a la Cuchilla Pereira)	César Mayo Gutiérrez	La Paz	Complete	12/07/2017
Camino Abrevadero (Sauce)	Siripó and Yamandú	La Paz	Complete	12/07/2017
Caracé	Siripó and Yamandú	La Paz	Complete	12/07/2017
Aparicio Saravia	Alfonso Espínola	Las Piedras	Completo	12/07/2017
Ruta 77	North of Cardal	Cardal	Complete	13/07/2017
Garibaldi	Libertad	La Paz	Complete	13/07/2017
Garibaldi	Luis Alberto de Herrera	La Paz	Complete	13/07/2017
Teresa Muñoz	Libertad	La Paz	Complete	13/07/2017
Teresa Muñoz	Luis Alberto de Herrera	La Paz	Complete	13/07/2017
Gral. Flores (Instrucciones XIII)	Pilar Cabrera	Las Piedras	Completo	13/07/2017
Del Comercio	Libertad	La Paz	Partial	14/07/2017
Del Comercio	Luis Alberto de Herrera	La Paz	Partial	14/07/2017
Atanasio Sierra	Alfonso Espínola	Las Piedras	Partial	14/07/2017
Atanasio Sierra	Arturo Zorrilla	Las Piedras	Partial	14/07/2017
José Batlle and Ordóñez	Pilar Cabrera	Las Piedras	Completo	14/07/2017
Av. Artigas	Florencio Sánchez	Florida	Complete	17/07/2017
Paraguay	Enrique Pouey	Progreso	Complete	17/07/2017
Paraguay	Soriano	Progreso	Complete	17/07/2017
Zorrilla de San Martin	"Lanera Piedra Alta" Access	Florida	Partial	19/07/2017
24 de Abril	Lorenzo d'Auria	Florida	Complete	19/07/2017
Avenida Brasil	Av. José Artigas	Progreso	Complete	19/07/2017
Durazno	Senador A Paz	Progreso	Complete	19/07/2017
Francisco Soca	Alfonso Espínola	Las Piedras	Completo	19/07/2017
Calleros	19 de Junio	Florida	Complete	21/07/2017

Railway Project

Level Crossing Traffic Counts.

Level Crossing	Intersection	City	Type of vehicle count	Date
Cno. Gral. Hornos	Atanalsildo Suárez	Montevideo	Complete	21/07/2017
Cno. Gral. Hornos	Filadelfia	Montevideo	Partial	21/07/2017
Av. Dr. Carlos Maria de Pena	Versalles	Montevideo	Complete	21/07/2017
G. Lazaeta	Lorenzo d'Auria	Florida	Complete	24/07/2017
Andresito	19 de Junio	Florida	Complete	24/07/2017
Av. Artigas	Alfonso Espínola	Las Piedras	Completo	24/07/2017
Camino Rural	Ruta 5	Florida	Partial	25/07/2017
Casavalle	Waldemar Hansen	Montevideo	Complete	25/07/2017
Hudson	Waldemar Hansen	Montevideo	Complete	25/07/2017
Colombia	Rambla	Montevideo	Complete	27/07/2017
José Batlle and Ordóñez	Lorenzo d'Auria	Florida	Complete	27/07/2017
Independencia	Lorenzo d'Auria	Florida	Complete	27/07/2017
Baltasar Brum	Pilar Cabrera	Las Piedras	Completo	27/07/2017
Cnel. Francisco Tajés	Rambla Sud America	Montevideo	Complete	28/07/2017
Wilson Ferreira Aldunate	Pilar Cabrera	Las Piedras	Completo	28/07/2017
NN (Mevir Access)	Artigas	Sarandí Grande	Parcial	28/07/2017
NN (Access to Sarandí's Cemetery)	Artigas	Sarandí Grande	Parcial	28/07/2017
Blanes Viale (Liber Seregni)	Alfonso Espínola	Las Piedras	Completo	31/07/2017
Rómulo Caorsi	Artigas	Sarandí Grande	Completo	31/07/2017
Luis Alberto de Herrera	Alfonso Espínola	Las Piedras	Completo	01/08/2017
José María Osorio	Artigas	Sarandí Grande	Completo	02/08/2017
Juan Antonio Lavalleja	18 de Julio	Sarandí Grande	Completo	03/08/2017
Artigas Machado Ribas	18 de Julio	Sarandí Grande	Completo	04/08/2017

The vehicles were classified in the following categories:

- Motorbikes
- Cars and Vans
- Single-Unit Trucks
- Truck/Trailer (Single-Unit truck pulling a trailer) or Tractor/Semi Trailer (Truck tractor pulling a trailer)

The turning movement coding is based on the recommendation of the “Transportation Research Board” from the “National Research Council” of the United States of America, with the exception that maneuvers 1, 2, 3, 4, 5 and 6 have the direction of the level crossing street (instead of the main road).

The following figures show the encodings used for the intersections surveyed in this study:

Figure 2-2 Four-leg intersection

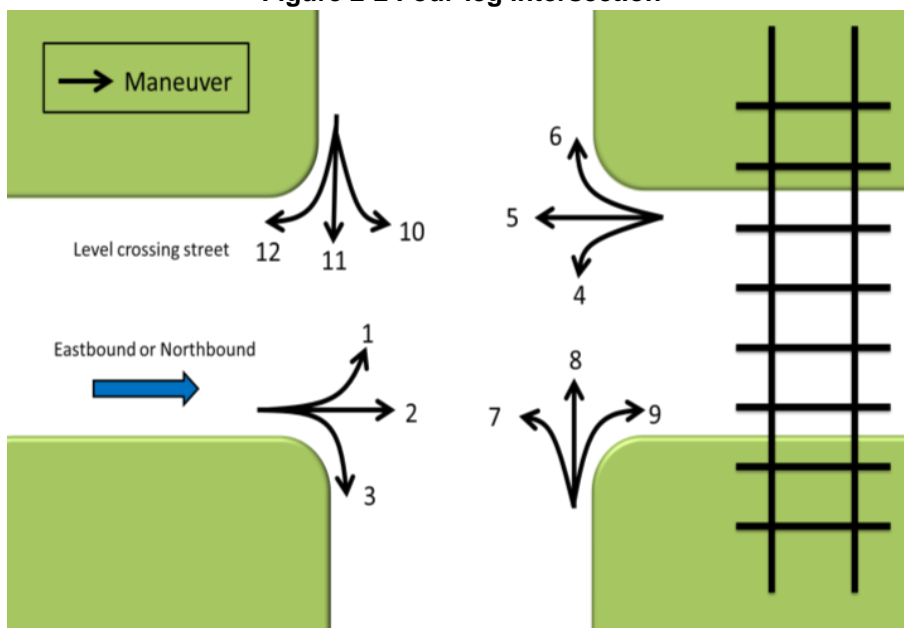


Figure 2-3 T-Intersection (Type 1)

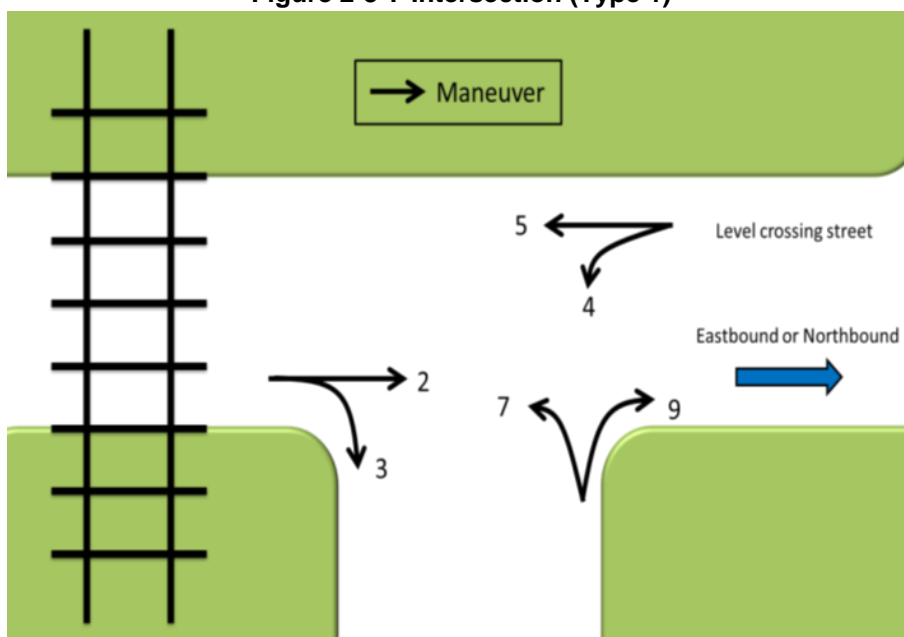


Figure 2-4 T-Intersection (Type 2)

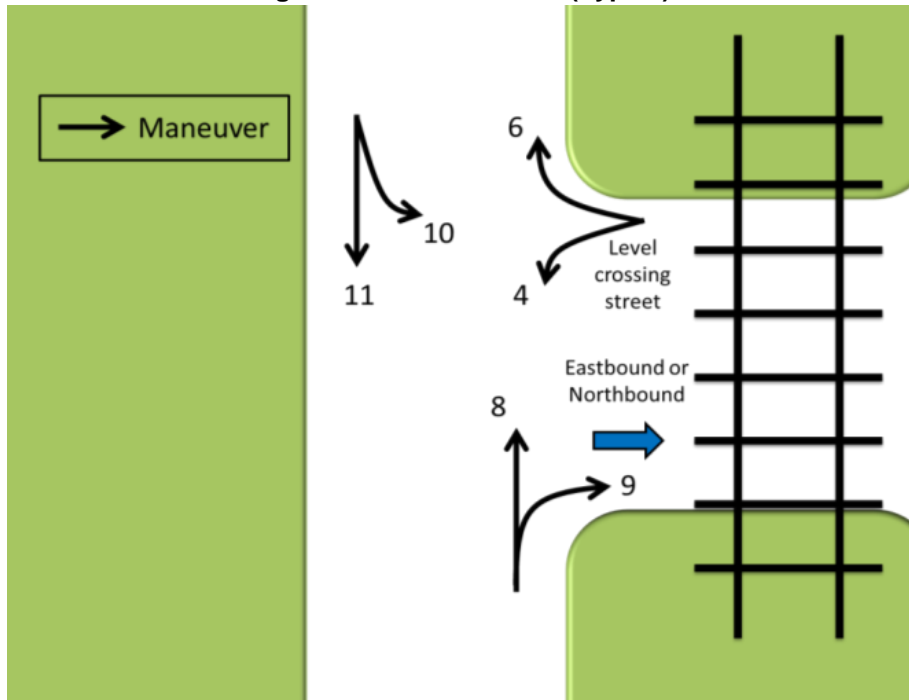


Figure 2-5 T-Intersection (Type 3)

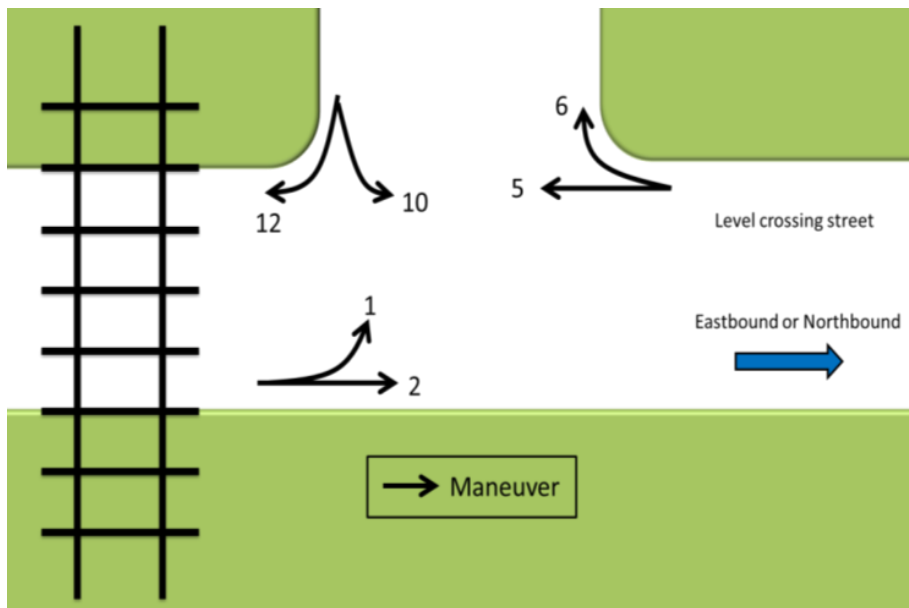
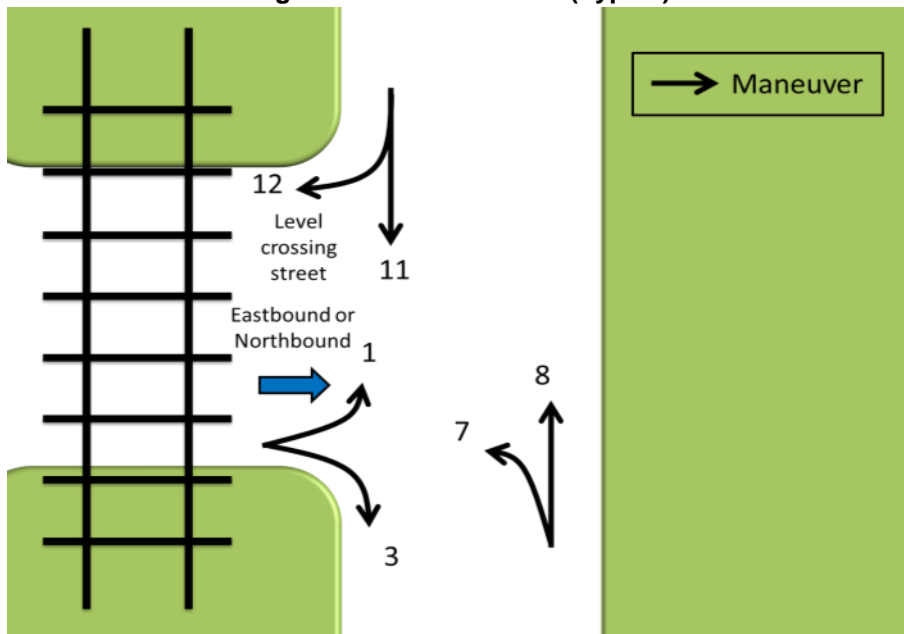


Figure 2-6 T-Intersection (Type 4)



The results are presented in a single database (Appendix 1), in which the accumulated traffic volumes are recorded in 15-minute intervals, differentiated by maneuver and vehicle typology.

The header of the database is as follows:

- City/Town
 - City in which the survey was done
- Level Crossing Street
 - Name of the street which has a level crossing and belongs to the intersection in which the survey was made
- Intersection
 - Name of the other street belonging to the intersection in which the survey was made
- Date
 - Date of survey
- Maneuver
 - Number of maneuver according to the encoding described in this chapter
- Hour
 - Survey hour for that row
- Quarter of an hour
 - Quarter of an hour for that row and for the hour presented in the previous column
- Motorbikes
 - Accumulated volume of motorcycles for the quarter of an hour of that row
- Cars and Vans
 - Accumulated volume of cars and vans for the quarter of an hour of that row
- Buses
 - Accumulated volume of buses for the quarter of an hour of that row
- Simple Trucks
 - Accumulated volume of single-unit trucks for the quarter of an hour of that row
- Articulated Trucks
 - Accumulated volume of Truck/Trailer (Single-Unit truck pulling a trailer) and Tractor/Semi Trailer (Tractor pulling a trailer) for the quarter of an hour of that row

Likewise, the hourly flow value of the peak hour is given for all the level crossings surveyed. These results are split by direction, and are obtained from volume of the 15-minute interval with the greatest traffic multiplied by four, in each level crossing.

3. Photographic record of survey sites

The following images show some of the sites in which the previously described traffic counts were performed.

Figure 3-1 Colombia and Paraguay (Montevideo)

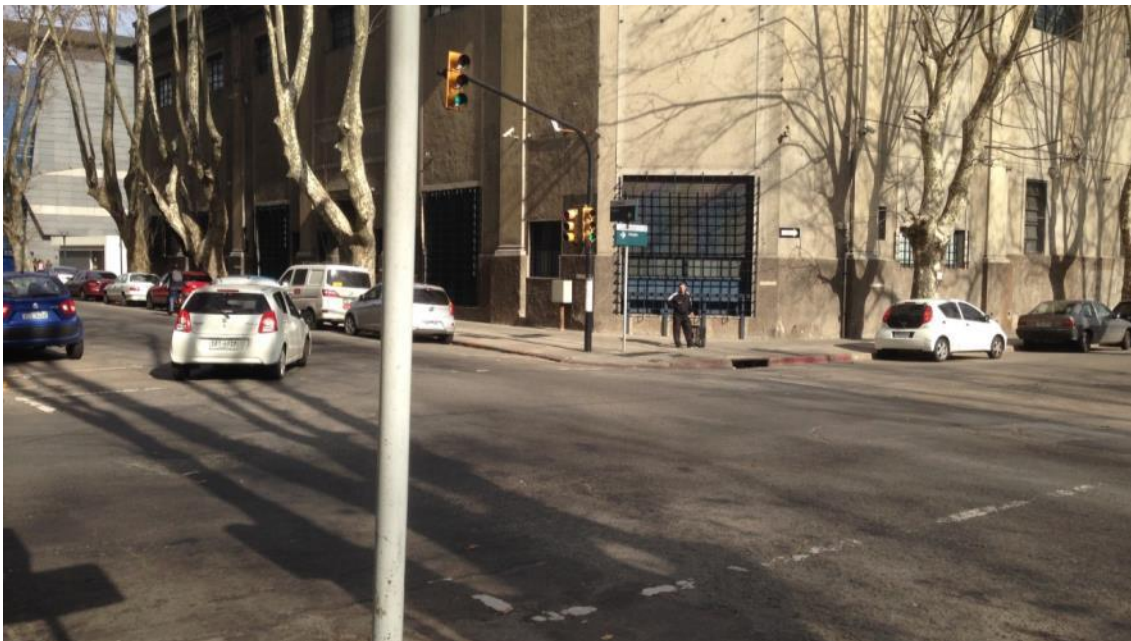


Figure 3-2 Colombia and Rambla (Montevideo)

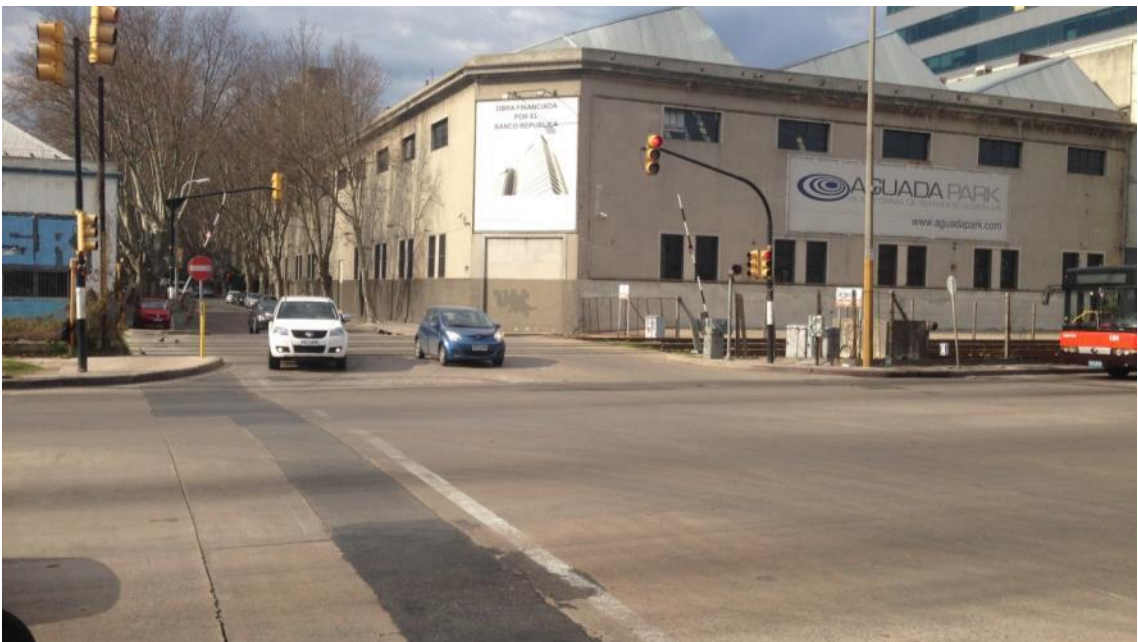


Figure 3-3 Tajes and Paraguay (Montevideo)



Railway Project

Level Crossing Traffic Counts.

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Figure 3-4 Tajes and Rambla (Montevideo)



Figure 3-5 San Fructuoso and Mendoza (Montevideo)



Figure 3-6 San Fructuoso and Rambla (Montevideo)



Figure 3-7 Princivalle and Farías (Montevideo)

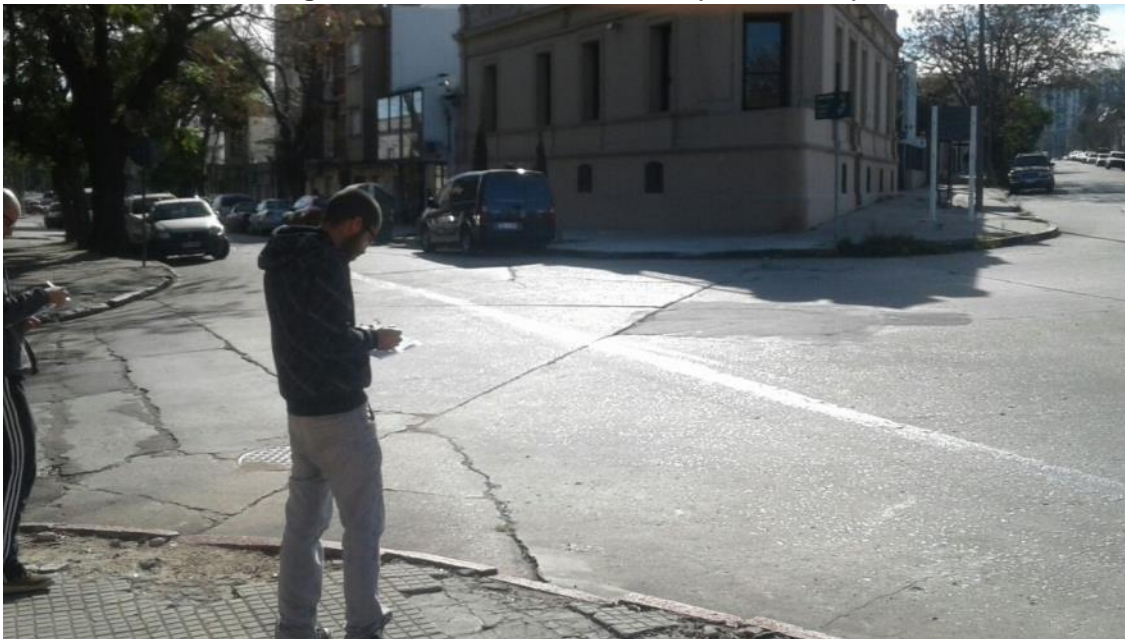




Figure 3-8 Princivalle and Rambla (Montevideo)





Figure 3-9 12 de Diciembre and Uruguayana (Montevideo)



Railway Project

Level Crossing Traffic Counts.



Figure 3-10 12 de Diciembre and Rambla (Montevideo)





Figure 3-11 Carlos María de Pena and Antanasildo Suárez (Montevideo)

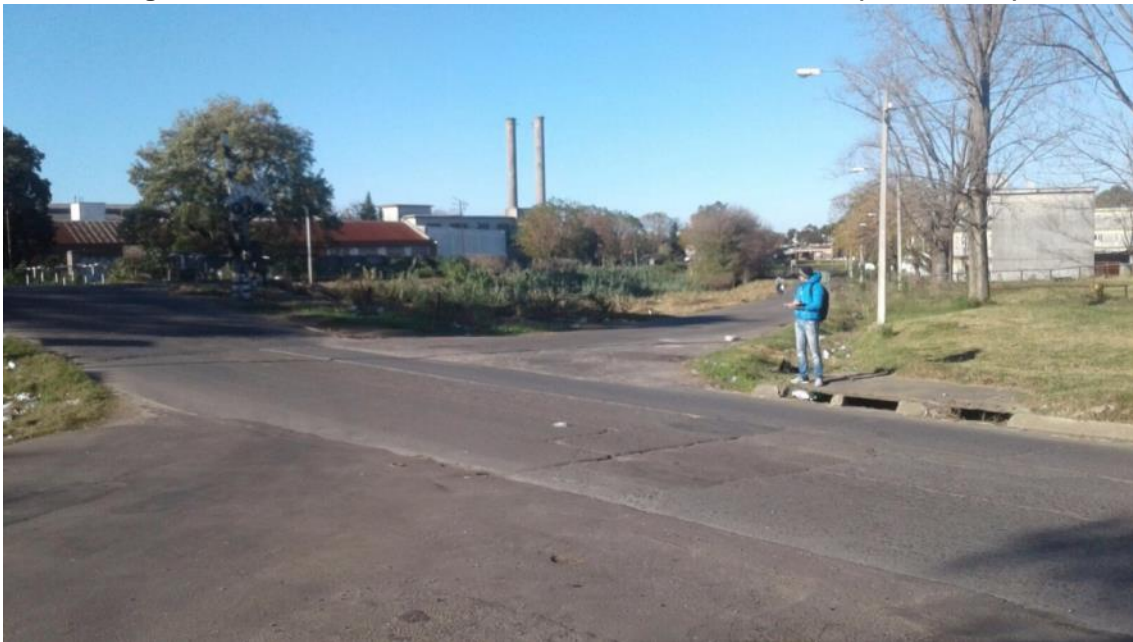




Figure 3-12 Martín Orticochea and Versalles (Montevideo)





Figure 3-13 Ariel and Sayago (Montevideo)



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Level Crossing Traffic Counts.

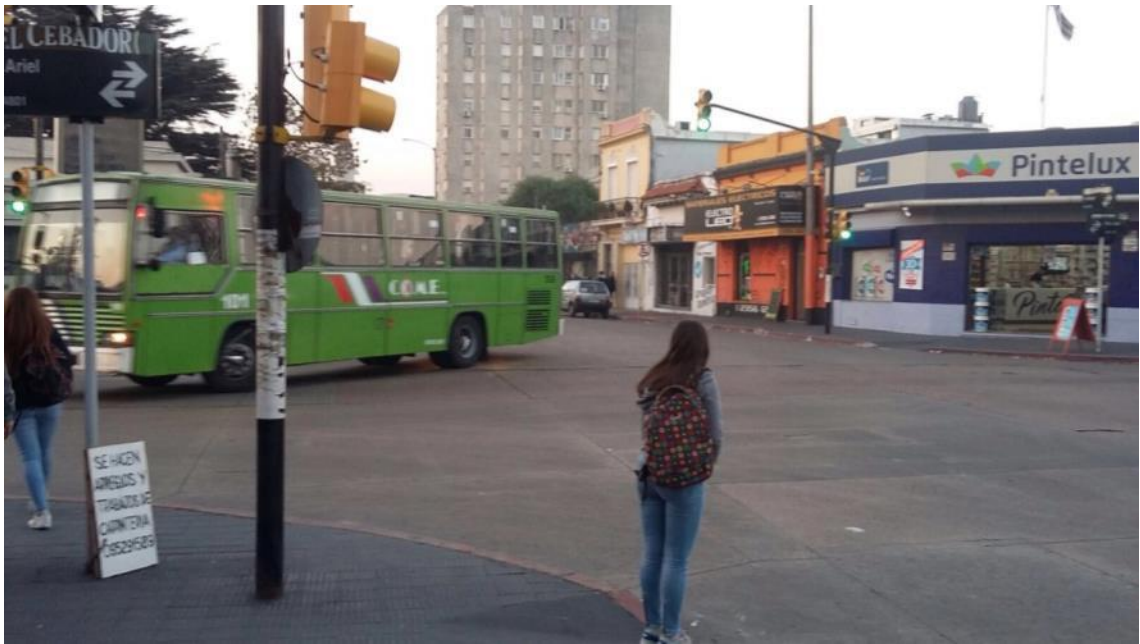


Figure 3-14 Ariel and Av. Garzón (Montevideo)



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Figure 3-15 Colman and César Mayo Gutiérrez (Montevideo)



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Level Crossing Traffic Counts.



Figure 3-16 López and Pascacio Báez (Montevideo)





Figure 3-17 Camino a la Cuchilla and César Mayo Gutiérrez (La Paz)



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Level Crossing Traffic Counts.

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Figure 3-18 Abrevadero and Siripó (La Paz)



Figure 3-19 Caracé and Siripó (La Paz)



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Level Crossing Traffic Counts.

Figure 3-20 Garibaldi and Luis Alberto de Herrera/Libertad (La Paz)



Figure 3-21 Teresa Muñoz and Luis Alberto de Herrera/Libertad (La Paz)



Figure 3-22 Del Comercio and Luis Alberto de Herrera/Libertad (La Paz)



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Level Crossing Traffic Counts.

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Figure 3-23 AtanasioSierra and Alfonso Espinola/Zorrilla (Las Piedras)



Figure 3-24 José Ellauri and Alfonso Espínola (Las Piedras)



Figure 3-25 Aparicio Saravia and Alfonso Espínola (Las Piedras)



Figure 3-26 Baltasar Brum and Pilar Cabrera (Las Piedras)



Figure 3-27 Francisco Soca and Alfonso Espínola (Las Piedras)



Figure 3-28 Gral. Flores and Pilar Cabrera (Las Piedras)



Figure 3-29 José Artigas and Alfonso Espínola (Las Piedras)



Figure 3-30 Batlle y Ordóñez and Pilar Cabrera (Las Piedras)



Figure 3-31 Luis Alberto de Herrera and Alfonso Espínola (Las Piedras)



Figure 3-32 Wilson Ferreira Aldunate and Pilar Cabrera (Las Piedras)



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Figure 3-33 Blanes Viale and Alfonso Espínola (Las Piedras)



Figure 3-34 Paraguay and Soriano (Progreso)



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Figure 3-35 Paraguay and Pouey (Progreso)



Figure 3-36 Av. Brasil and Av. Artigas (Progreso)



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Figure 3-37 Durazno and Senador La Paz (Progreso)



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Figure 3-38 Zelmar Michelini and Pando (Canelones)



Figure 3-39 Zelmar Michelini and Alamo de Suárez (Canelones)





Figure 3-40 Batlle y Ordóñez and José Rosa Gifuni (Canelones)





Figure 3-41 Baltasar Brum and Hermenegildo Melo (Canelones)





Figure 3-42 Acuña de Figueroa and Francisco Soca (Canelones)



Figure 3-43 Zorrilla de San Martín and Camino Fuster (Canelones)



Figure 3-44 Zorrilla de San Martín and Francisco Soca (Canelones)



Figure 3-45 Gral. Artigas and Hermenegildo López (Canelones)



Figure 3-46 Gral. Artigas and Camino Fuster (Canelones)



Figure 3-47 Route 11 and Wilson Ferreira (Canelones)



Figure 3-48 Route 11 and Camino Fuster (Canelones)



Figure 3-49 María Stagnero de Munar and Juan Toletino González (Canelones)



Figure 3-50 Cristóbal Cendan and Euduro Melo (Canelones)



Figure 3-51 Ramón Alvarez, end of road (25 de Agosto)



Figure 3-52 Manuel Calleros and Joaquín Suárez (25 de Agosto)



Figure 3-53 Juan Aguiar and Simón del Pino (25 de Agosto)





Figure 3-54 Fernando Beduchant and Juan Velázquez (25 de Agosto)



Figure 3-55 Route 78 and Simón del Pino (25 de Agosto)



Figure 3-56 Route 76 and Lavalleja (25 de Mayo)

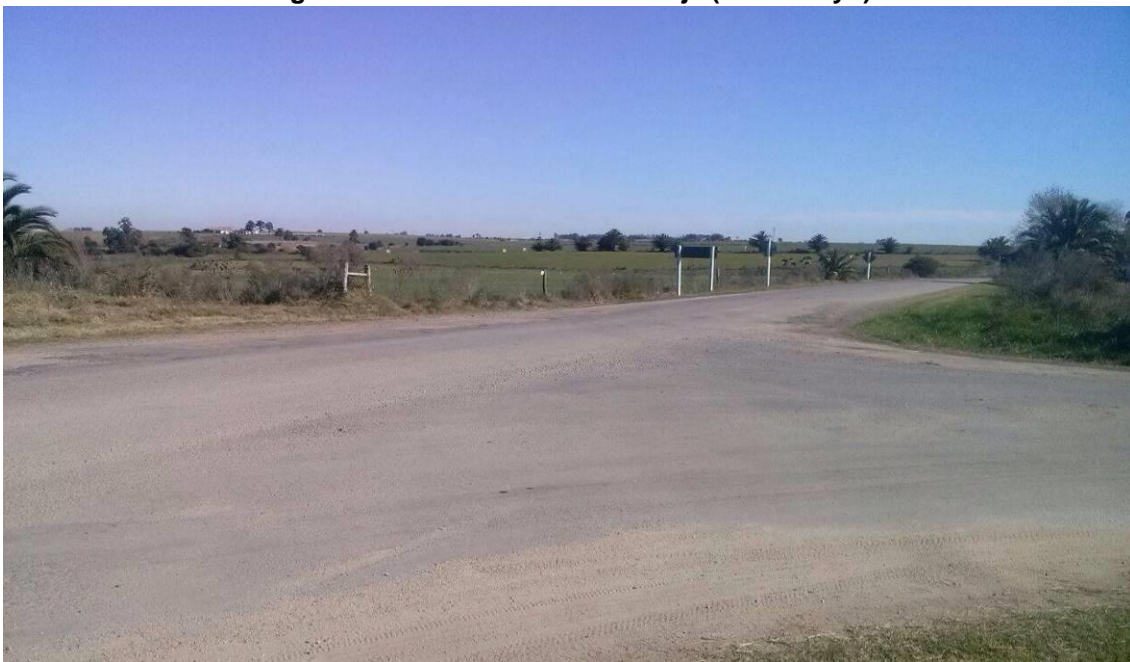


Figure 3-57 República Argentina and Lavalleja (25 de Mayo)



Figure 3-58 José Pedro Varela and Lavalleja (25 de Mayo)





Figure 3-59 Zorrilla de San Martín and Lavalleja (25 de Mayo)



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Level Crossing Traffic Counts.

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Figure 3-60 Zorrilla de San Martín and Access to Lanero Piedra Alta (Florida)





Figure 3-61 José Artigas and Florencio Sánchez (Florida)





Figure 3-62 Batlle y Ordóñez and Lorenzo D'Auria (Florida)





Figure 3-63 Independencia and Lorenzo D'Auria (Florida)

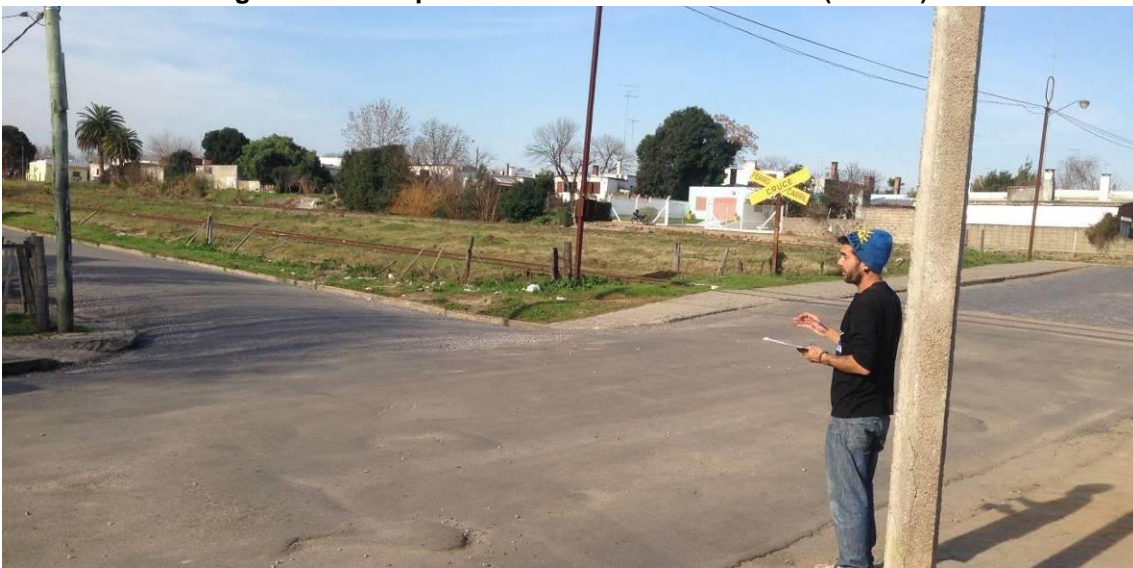


Figure 3-64 Calleros and 19 de Junio (Florida)



Figure 3-65 Calleros and Lorenzo D'Auria (Florida)



Figure 3-66 Lazaeta and Lorenzo D'Auria (Florida)

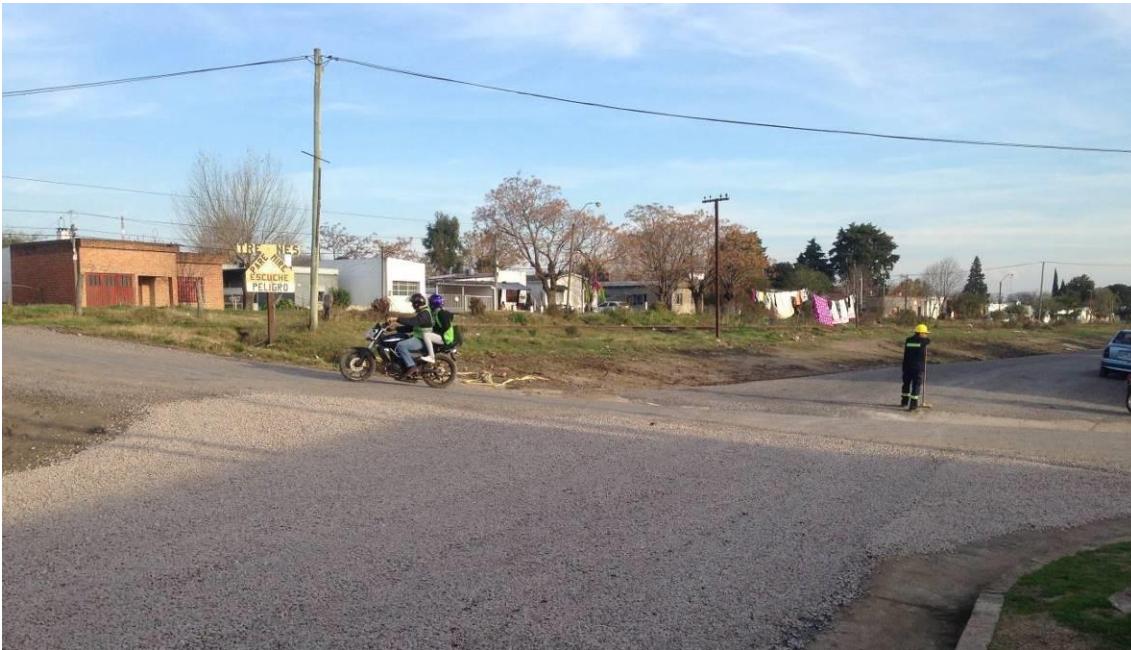


Figure 3-67 Andresito and 19 de Junio (Florida)



Figure 3-68 24 de Abril and Lorenzo D'Auria (Florida)



Figure 3-69 Rural Road and Route 5 (Florida)



Figure 3-70 Parque de la Hispanidad (Durazno)



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Level Crossing Traffic Counts.

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