Measure title: Priority traffic light regulation for PT in Craiova

City: Craiova Project: MODERN Measure number: 08.06

Executive summary

The measure consists in installation of the remote control devices on nine trams in order to create priority traffic lights system in three crowded crossroads of Craiova City. The priority traffic lights system is one of the measures used for shortening the travel time for public transport vehicles, trams in our case.

The system, operated by radio communication, changes the traffic lights from red to green when the trams are approaching to the crossroad and subsequently all the correlations of the priorities of the traffic lights. Due to the shortening of travel time the priority traffic lights system should be an efficient method to make public transport more attractive within urban mobility.

The Municipality of Craiova, in cooperation with Traffic Police and RAT Craiova, analyzed the traffic flow on the tram line in Craiova and defined the crossroads appropriate to implement the new priority traffic light system.

During the study phase several technical solution were analyzed; it has been selected the one based on radio module (emitter) connected to the tram onboard computer and a radio receiver placed on the traffic lights. The implementation team manufactured nine radio emitters to be placed on board of nine trams. The equipment for green light controlling were installed on the same nine trams upgraded by chopper system within the measure M01.09. IPA manufactured the radio receivers to be installed in the three crossroads linked to the green light system. The green light system was tested to verify the communication between radio emitters and receivers.

For a good operation of the system, 18 tram drivers were trained to be able to use the system. The training program consisted of theoretical knowledge about green light controlling and devices. The training reached its objective so tram drivers became able to efficiently use the system in traffic. The training has also achieved the acceptance of the tram drivers for the newly implemented system, as the system is put into function manually by the drivers.

The evaluation shows that the average tram speed increased by 14% in peak and by 13% in off-peak, and the average passenger's occupancy increased by 1% in peak and by 7% in off-peak, after the measure implementation.

The key results are as follows:

- The traffic lights priority system led to an increase of tram's speed in peak and off-peak hours. The three intersections up-dated through the project are located in the most crowded area of the city and the distances between them are almost equal.
- The traffic lights priority system contribute to shorten the travel time for public transport.
- The traffic lights priority system led to shorten travel time for public transport users, so, the average occupancy slightly increased compared with the situation before.

The figures show a slight change as opposed to the expected at the beginning of the project, because the implementation period was very short. This is due to the important work done by the Municipality in order to build an important overpass in city center which affected the tram line, dividing the line into two trunks.

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Nevertheless the traffic light priority system induced significant increase in tram speed and punctuality and consequently the following aspects will be improved:

- Punctuality, reducing the influence of other traffic interferences on the service; this should increase the attractiveness of PT among potential passengers;
- Costs, reducing working times by the drivers.

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A Introduction

A1 Objectives

The measure objectives are:

(A) High level / longer term:

- To improve the traffic flow
- To decrease the congestion in the city

(B) Strategic level:

- To optimise the traffic and reduce the crowding in the city main intersections

(C) Measure level:

- To create in Craiova a preferential traffic light regulation by endowing 9 trams with on-board devices for traffic lights priority in order to increase the average vehicle speed by 15%.

A2 Description

In Craiova, during last years the number of private cars considerably increased and so during rush hours the, traffic became very crowded. Up to now a UTC (Urban Traffic Control) has not yet installed and every traffic light system operates on its own program and scheduling. To overcome this situation, in several crossroads the Municipality decided to replace the traffic lights with roundabouts in order to reduce waiting time at traffic lights, in peak hours.

Moreover the Municipality was interested in developing a traffic lights system for cars with preset timing. This system had to be integrated with a priority traffic lights system for trams to shorten travel time on the main street of the city connecting the East and West side of the city. Craiova Municipality together with the Traffic Police department analyzed the most crowded crossroads on west east axis and selected three junctions near to the city center.

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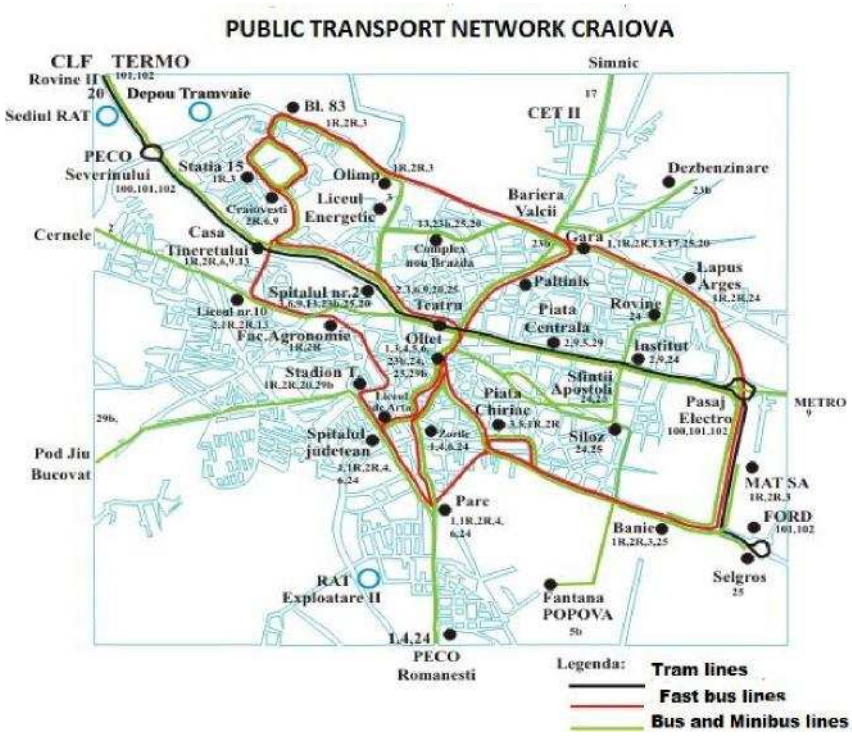

Figure A2.1 – PT network of Craiova

IPA and Municipality developed a study in order to define the better technology for the system deployment. First of all a system based on the tram detection by a magnetic sensor was examined. This system seemed to be not suitable because the tram stops are too much near to the crossroads and the system has to wait for passengers loading and unloading.

It was decided to operate on short distance radio transmitters operated by tram drivers.

The radio emitters onboard of trams communicate with radio receivers placed in the intersections by GPRS and change the red light when trams are approaching the crossroads.

The switching of the red light in green light is done by trams' drivers by pressing the button on the radio emitter placed onboard of trams.

As long as the tram passes through the crossroad with a green light, all the other vehicles and pedestrians, are not allowed passing through the crossroad.

The green light timing is about twenty seconds, enough for any tram that crosses the crossroad. Therefore, the implementation of priority traffic light regulation led to shorten the travel time, therefore the trams became more attractive for the travelers.

In the figure below it is shown a tram passing through a crossroad linked to the priority traffic light system.

Traffic light in this case is situated on the third pillar (see in Figure A2.2) and allows to the tram to take the left side direction at the end of underpass.

Figure A2.2 – traffic lights location example

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B Measure implementation

B1 Innovative aspects

Even though for main European cities, green light is a well-known and long last operated feature of the traffic management system, in Romania is little implemented; for Craiova being indeed a novelty. The system itself represents the first attempt to improve the public transport priority in traffic.The main aspects of the innovation are:

- **New physical infrastructure solutions-** Installing of on-board devices controlling the traffic lights in 3 important intersections in Craiova represents new infrastructure solution in order to reduce traffic congestion.
- **Use of new technology –** The first implementation of priority traffic light regulation leaded to a shortening of the traveling time making the trams more attractive for travelers.

B2 Research and Technology Development

Traffic and routes study

A study was made on the possibility of streamlining the traffic in the Craiova city. It was analysed actual situation din Craiova on street nerwork, traffic monitoring and management. The conclusion of this study was that Craiova has an insufficient capacity of the street network and radical changes must be taken to streamline city traffic

There are two key solutions: implementing a “green wave” system and increasing the number of roundabouts.

Finding the optimal solution for priority traffic light system in Craiova

A technical study was made to find the optimal solution for implementation of priority traffic light system

The chosen solution was radio control made with a radio module providing communication between emitter placed on bord of tram and receiver placed on the traffic light.

The remote control for the “green wave” system consists in two different parts:

- Emitter unit which is placed inside the tram
- Receiver unit which is placed in traffic intersection, nearby the automation cabinets for traffic lights(not every intersection has the “green wave” system).

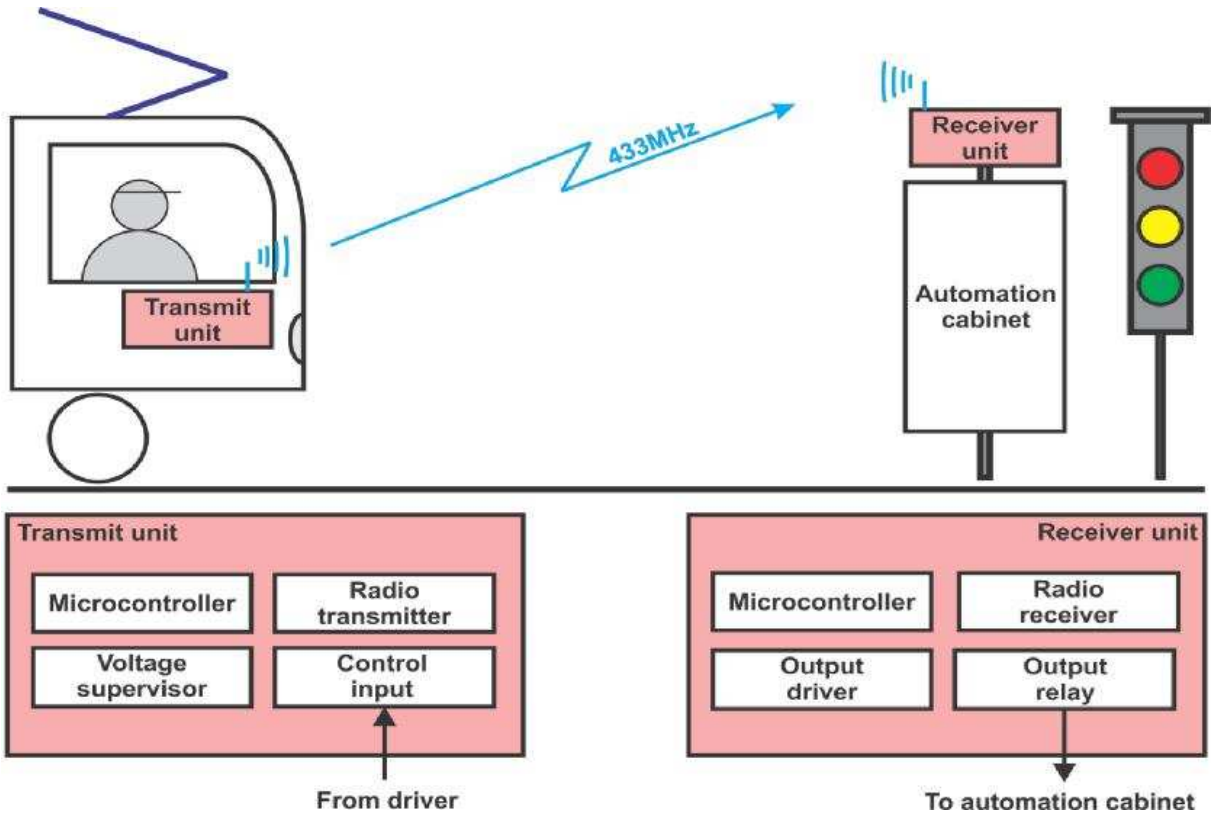

Figure B2.1 – System description

Every one of these two units has a multi-channel radio module (narrow bandwidth: 433,875MHz - 434,650MHz). The radio channel is hardware preselected.

The emitter unit is power supplied from the same source as the drive system of the tram.

In order to increase the life-time of these systems, and also to increase the time-period for maintenance, the devices were designed with high reliability parts and enclosures with a high protection degree.

Also, for a good propagation of the radio signal, helical omnidirectional antennas were used. Antennas are placed outside so the covered area in open-field is increased up to 200m distance for 10mW emission power.

The emission power is restricted to 10mW for the free bandwidth frequency (433 MHz) according to national authorities in this domain.

Because of the extreme operation conditions (regarding the ambient temperature) all electronic components have extended temperature range.

The power supply of the emitter units is a continuous voltage which must be in [16-36 Vdc) range. Technical characteristics:

- Frequency bandwidth: 433,875 - 434,650 MHz;
- Operation distance: up to 200 m;
- Number of radio channels:16 preselected channel with the possibility for extension up to 32;
- Bandwidth for each radio channel: 25 kHz;
- Power consumption: 34mA (emitter), 30mA (receiver);
- Receivers' sensitivity: -120dBm (for 12dB SINAD);
- Emitter's power: 10dBm (10mW);
- Radio modules according to EN 300 220-3 and EN 301 489-3.

Figure B2.2 – receiver and transmitter units

B3 Situation before CIVITAS

Before CIVITAS project, in Craiova there were two tram lines. Along the tram lines there were eleven crossroads, ten of those equipped with timing traffic lights.

The eleventh crossroad, placed in the East side of the city, had been endowed with "green light" system for tram operated by inductive sensors to detect the tram. The disadvantage of such a system was the traffic light keeps green light for a preset time of few seconds.

Taking into consideration that the trams had to cross the eleven crowded crossroads, Municipality decided to upgrade three of them close each other placed in the city center.

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B4 Actual implementation of the measure

The measure has been implemented in the following stages:

Stage 1: Planning and design of the measure (Oct 2008-March 2010)

In this stage, studies were made on the possibility of streamlining the traffic in the Craiova city. Municipality in cooperation with the Traffic Police and RAT Craiova choose and defined the suitable crossroads to apply priority system.

Several meetings and discussions took place between technical team from IPA Craiova and Municipality in order to integrate the measure in the Urban Development Strategy of Craiova city.

Stage 2: Technical study (June 2009 -Jan 2010)

In this stage several items were discussed, analyzed and defined; among them the most important are the ones related to the technical choice, the interaction between the system and other vehicles flow and the possible benefit.

First of all the current experiences were analyzed:

- The system now in operation in the city is based on time keeping of green light as long as the cars run with a constant legal speed of 50 km / hour, allowing crossing two intersection. This solution was not suitable because it does not to distinguish PT from other vehicles so reducing the required priority effect.
- An automatic system based on the tram detection by a magnetic sensor: this system seemed to be not suitable because the tram stops are too much near to the crossroads and the system has to wait for passengers loading and unloading.

After a deep examination about several technical solutions it was decided to use a radio module (emitter) connected to the tram onboard computer and a receiver placed on the traffic lights. This system will be operated by the tram driver only when the tram approaches the traffic light. This system was considered proper and safe to be applied on tram line.

Stage 3: Training of trams drivers for using the system (January 2010- May 2010)

The training process for trams drivers was necessary to prepare them to drive the trams with the new equipment. 18 drivers were trained in this period which means 2 drivers a tram. The training program consisted of theoretical knowledge about the devices (placed on-board of trams) which control the green light. The theoretical knowledge was completed with practical ones in the testing period.

Stage 4: Manufacture, installation and testing of green light system - (September 2010)

IPA, as the partner in charge with the implementation of the system, manufactured the nine radio emitters that were placed on board of the trams. The measure was implemented on board the nine trams with chopper system up-graded within the measure M01.09.

The same team manufactured the radio receivers installed in the three crossroads linked to the green light system.

The receivers included specific hardware and software to set communication between traffic lights and trams. In the figure above a radio emitter box placed on the right side of tram onboard is shown. On the emitter box there is a button to activate the green light when the tram is close to traffic light.

After the installation of the radio devices, the green light system was tested for two weeks. The test consisted in:

- Checking communication between receiver and emitter
- Validation of data transmitting.

During the tests it became evident that the approaching tram can shorten too much the green time to pedestrians. So it was decided to give a specific information to pedestrians about the new system. At this regard the citizens were informed through the periodical information campaign and trough the announcements inside of the public transport vehicles about the need to pay attention to the chronometer which shows how many second remain to cross the street, of course considering the spare secure time programmed in the traffic light sequences.

A small delay in traffic light operation mode (just keeping yellow light for a few seconds) has to be installed in order to keep more safe the whole operation.

Stage 5: System running (Oct 2010- March 2012)

In this stage, the 9 trams endowed with green light radio modules, started their operation in the city. The three crossroads up-graded with radio receivers are marked in red on the map below (Fig. B4.2)

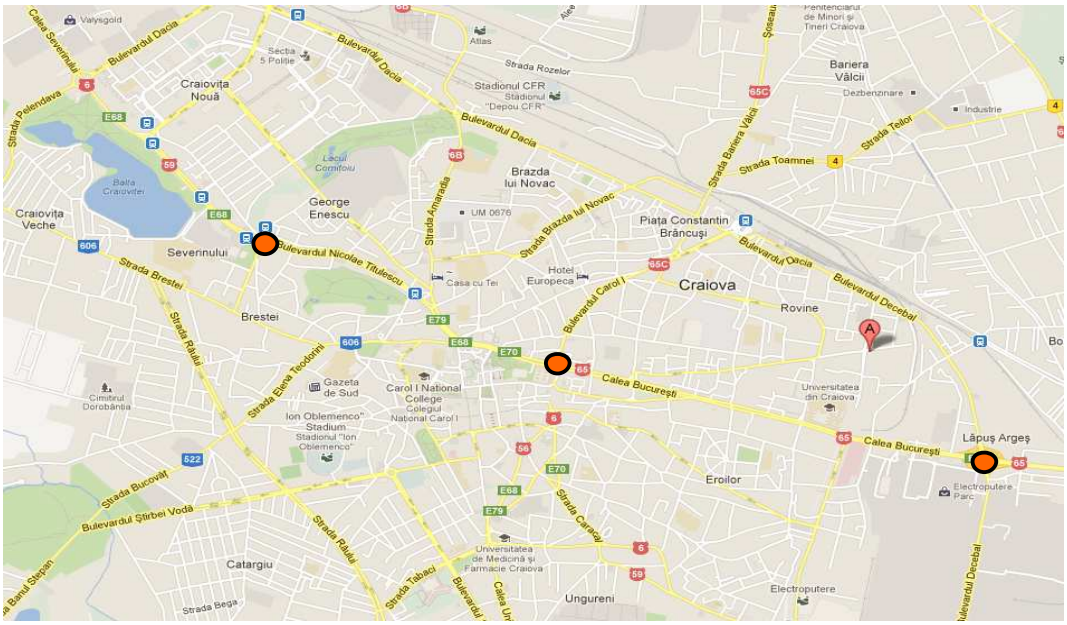

Figure B4.1 – The 3 intersections marked in red

The interruption of tram line due to the overpass construction didn't give us the possibility to perform a long evaluation period but before the start of the construction we had enough time (five months) to assess the measure results, so enough data for the evaluation of the measure were collected.

B5 Inter-relationships with other measures

The measure is related to other measures as follows:

M 01.09 Energy Saving on Tramline in Craiova- The measure M01.09 aims to implement chopper driving systems on the same nine trams endowed with green light radio modules. The passengers that use the trams with chopper driving system implemented by M01.09 tend to use them more, because the trams run faster as a result of M08.06 measure implementation. Increasing of occupancy in trams equipped with chopper systems and adapted to the "green light- traffic light priority", can lead to the increasing of revenues from tickets.

C Impact Evaluation Findings

C1 Measurement methodology

C1.1 Impacts and Indicators

Table C1.1: Indicators. Insert your own table where available, use landscape layout as necessary

No.	Impact	Indicator	Data used	Comments
2	Economy	Capital cost	Euros	The value of the equipments installed on 9 trams(emitters) and 3 intersections(receivers)
23	Congestion levels	Average vehicle speed – peak	journey time measures (h) distance for demonstration(Km)	Technic department from RAT Craiova Distance traveled in Km/ trip Time/trip(peak) speed=distance/time
24	Congestion levels	Average vehicle speed - off peak	journey time measures(h) distance for demonstration(Km)	Technic department from RAT Craiova Distance traveled in Km/ trip Time/trip(off peak) speed=distance/time
28	Vehicle occupancy	Average occupancy	Number of passengers per vehicle per trip	RAT data base Monitors' registration on tram line(101 and 102 tram lines)

Detailed description of the indicator methodologies:

Indicator 2 Capital cost- The value of equipments from the project budget

Indicator 23 (Average vehicle speed – peak)- ratio between the distance traveled and time for trip in peak.

For data collection a tram trip including the three crossroads up-graded by the measure was considered; the travel time for the considered trip was recorded. It was analyzed a way Km long of tram line; the frequency of data collection was twice a day, in peak period, in the same day of week before and after the implementation of the measure.

Indicator 24 (Average vehicle speed – off peak)- ratio between the distance traveled and time for trip in off-peak.

Data were collected using the same procedure of average speed measurements.

Indicator 28 (Average occupancy-peak/off-peak)- average number of passengers per vehicle per trip

The average occupancy indicator is measured by counting the number of passengers in off-peak and peak period of day. The frequency of data collection was twice a week in peak and twice a week in off- peak, in the same day. This indicator was measured by 2 people from RAT Company by empirical counting of passengers in tram.

A KT4D type tram eqquipped with green light system, has 38 seats, and it can transport maximum 83 passengers(100% loading). The average occupancy was calculated making ratio between passengers in the tram and the maximum number of passengers(83) .

The peak and off-peak periods of the day are following :

- 05:30- 08:00- peak 1
- 08:00-12:30 – off-peak1
- 12:30- 18:00 – peak2
- 18:00- 21:30 – off-peak 2

The average occupancy and average speed are measured in the same conditions, in the same demonstration area and in the same period of day.

C1.2 Establishing a Baseline

The year 2009 is considered a baseline, when in Craiova this measure was not implemented. At those times there was no priority traffic light regulation for public transport and the crossroads were crowded.

The data for the indicators average speed and average occupancy have been collected twice a day in peak and twice a day in off-peak, in the same day of week, between October 2009 and February 2010.

The results of baseline for each indicator are shown in the tables below:

Table C1.2.1 – Capital cost ex-ante value

Indicator	**Ex-Ante values- 2009**
Capital cost	0

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Table C1.2.2 – Average speed (peak hours) ex-ante value

Indicators and respective parameters	**Ex-Ante values- Oct 2009- Feb 2010**
Distance travelled (Km)	5 Km
Average time/trip(h)	20,4 min
Average speed in off-peak hours	15Km/h

Table C1.2.3 – Average speed (off-peak hours) ex-ante value

Indicators and respective parameters	**Ex-Ante values- Oct 2009- Feb 2010**
Distance travelled (Km)	5 Km
Average time/trip(h)	21,6 min
Average speed in peak hours	14Km/h

Table C1.2.43 – Average occupancy (off-peak hours) ex-ante value

Indicators and respective parameters	**Ex-Ante values- Oct 2009- Feb 2010**
Distance travelled (Km)	5 Km
Average No of passengers	45
Max number of passengers	83
Average occupancy off-peak hours	54%

Table C1.2.53 – Average occupancy (peak hours) ex-ante value

Indicators and respective parameters	**Ex-Ante values- Oct 2009- Feb 2010**
Distance travelled (Km)	5 Km
Average No of passengers	70
Max number of passengers	83
Average occupancy peak hours	84%

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C1.3 Building the Business-as-Usual scenario

In the absence of MODERN part-funding it is unlikely that a priority traffic light system would have been implemented in Craiova, at this stage and in the near future.

Table C1.3.1- Capital cost in BAU

Indicator	**BAU**
Capital cost	0

Table C1.3.2 - Average speed in off-peak hours in BAU

Indicator	**BAU**
Average speed in off-peak hours (Oct 2010-Feb 2011)	15Km/h

Table C1.3.3 - Average speed in peak hours in BAU

Indicator	**BAU**
Average speed in peak hours(Oct 2010-Feb 2011)	14Km/h

Table C1.3.4 - Average occupancy off-peak hours in BAU

Indicator	**BAU**
Average occupancy off-peak hours(Oct 2010-Feb 2011)	54%

Table C1.3.5- Average occupancy peak hours in BAU

Indicator	**BAU**
Average occupancy peak hours(Oct 2010-Feb 2011)	84%

C2 Measure results

The results are presented under sub headings corresponding to the areas used for indicators – economy, and transport.

C2.1 Economy

Indicator 2 – Capital cost

Indicator	Ex-Post Values
Capital cost (2010)	7'200 Euro

Table C2.1.1: Indicator values

Indicator	Before	B-a-U	After	After – Before	After – B-a-U
Indicator 2' Capital cost	0	0	7200 Euro (2010)	7'200 Euro	7'200 Euro

C2.4 Transport

In Craiova, off-peak hours are between 08:00-12:30 and 18:00- 21:30 and peak hours between 05:30-08:00 and 12:30- 18:00

The data were collected between October 2010 and February 2011. For demonstration, there were chosen the periods of day between: 09:00-10:00 and 19:00- 20:00 in off-peak and the periods between: 07:00-08:00 and 15:00-16:00 in peak. It was considered the same demonstration area as ex-ante which includes the three upgraded intersections.

The average speed and average occupancy, in peak and off-peak, show a slight increase due to the traffic lights priority system.

Table C2.4.1 shows average speed in off-peak hours

Indicators and respective parameters	Ex-Post Values Oct 2010- Feb 2011
Distance travelled (Km)	5 Km
Average time/trip(h)	17.4 min
Average speed in off-peak hours	17 Km/h

Table C2.4.2 shows average speed in peak hours

Indicators and respective parameters	**Ex-Post Values Oct 2010- Feb 2011**
Distance travelled Electroputere station-Bila station(Km)	5 Km
Average time/trip(h)	18.6 min
Average speed in peak hours	16 Km/h

Table C2.4.3-shows average occupancy off-peak hours

Indicators and respective parameters	**Ex-Post Values Oct 2010- Feb 2011**
Distance travelled (Km)	5 Km
Average No of passengers	51
Max number of passengers	83
Average occupancy off-peak hours	61%

Table C2.4.4 shows average occupancy peak hours

Indicators and respective parameters	**Ex-Post Values Oct 2010- Feb 2011**
Distance travelled Electroputere station-Bila station(Km)	5 Km
Average No of passengers	71
Max number of passengers	83
Average occupancy peak hours	85%

For what concerns the average occupancy, it is worth noting that this indicator is influenced by the measure M01.09-“ Energy saving on tramline in Craiova” operating on the same trams. The level of comfort increased after implementation of the measure 01.09 combined with the travel time decreased after the implementation of the measure 08.06 led to increasing of passengers number using the trams.

The traffic lights priority system led to a shortening of travel time for public transport users. In the autumn of 2010, 1 hypermarket placed close to “Electroputere station” was opened to the people. This station is part of “green light system”. So, the people who live in west side of the city were encouraged to use the trams to reach the location of hypermarket, due to the shortening of time per trip. Therefore,, the average occupancy increased compared with the situation before.

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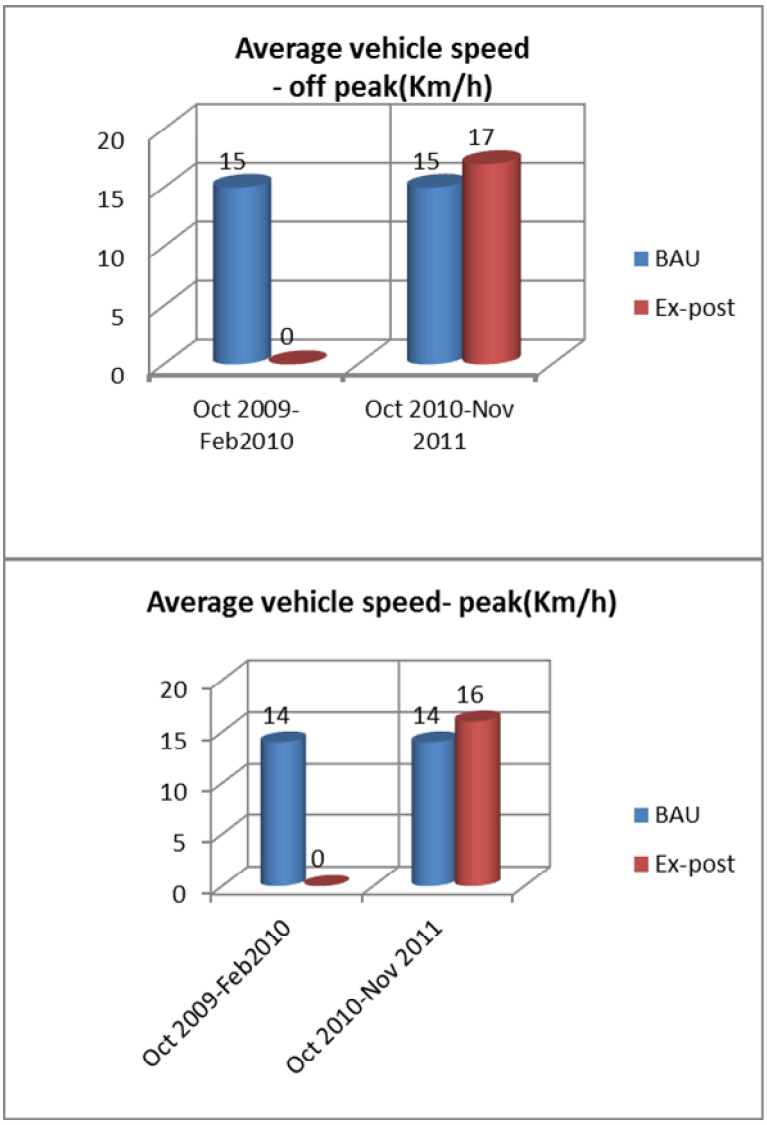

Fig C2.4.1-graphical evolution of average vehicle speed in peak/off-peak

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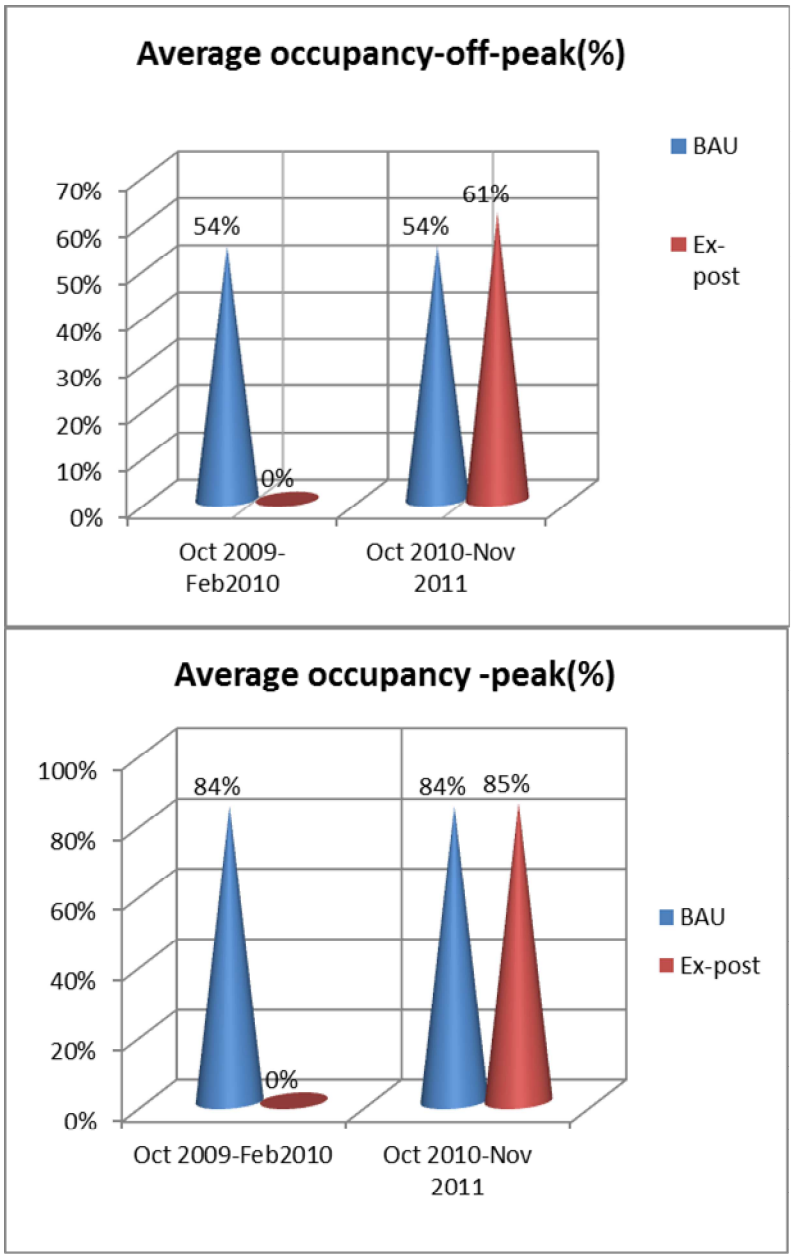

Fig C2.4.2- graphical evolution of average occupancy in peak/off-peak

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Table C2.4.1:

In this table the indicator values are listed synthetically to have an overview of the three scenarios.

Indicator	Before	B-a-U	After	After – Before	After – BaU
Indicator 28 (Average occupancy-peak)	84% in peak (Oct 2009 -Feb 2010)	84% in peak (Oct 2010 -Feb 2011)	85% in peak (Oct 2010 -Feb 2011)	Increasing by 1% in peak	Increasing by 1% in peak
Indicator 28 (Average occupancy-off-peak)	54% off-peak (Oct 2009 - Feb 2010)	54% off-peak (Oct 2010 -Feb 2011)	61% off-peak (Oct 2010 - Feb 2011)	Increasing by 7% in off peak	Increasing by 7% in off peak
Indicator 23 (Average vehicle speed–peak)	14 km/h (Oct 2009 -Feb 2010)	14 km/h (Oct 2010 -Feb 2011)	16 km/h (Oct 2010 -Feb 2011)	2Km/h	2Km/h
Indicator 24 (Average vehicle speed – off peak)	15 km/h (Oct 2009 -Feb 2010)	15 km/h (Oct 2010 - Feb 2011)	17 km/h (Oct 2010 - Feb 2011)	2Km/h	2Km/h

Note: for more details make reference to Annex 1- Indicators Calculation in ex-ante and ex-post

C3 Achievement of quantifiable targets and objectives

No.	Target	Rating
1	To endow 9 trams with on-board units for traffic lights controll To endow 3 intersections with receivers in comunication with the trams's remotes control	★★
2	To create in Craiova a preferential traffic light regulation	★★
3	To increase the average transportation speed/km by 15 % After measure implementation, the average transportation speed of the trams increased by 14 % in peak and 13 % in off- peak for a demonstration period of 5 months	★★ ★★
NA = Not Assessed O = Not Achieved ★ = Substantially achieved (at least 50%) ★★ = Achieved in full ★★★ = Exceeded		

C4 Up-scaling of results

The system developed by the measure was a pilot system. Considering the results of the measure, RAT Craiova intent to install radio receivers in the rest of 8 crossroads on the tram line, according to available budget. On the other hand, Municipality want to integrate the "green light" system in the traffic management system in Craiova.

C5 Appraisal of evaluation approach

The evaluation strategy of the measure focused on measurements of transport indicators: Average vehicle speed(peak and off-peak) and average occupancy(peak and off-peak). The evaluation activity sought to prove the advantages of priority traffic lights regulation that has been implemented in 3 crowded intersections in Craiova. In order to calculate the indicator average vehicle speed, we chosen the demonstration area as 5 Km of tramline that includes the three crossroads linked in green light system . The average vehicle speed was calculated as ratio between distance travelled and travel time. From the vehicle occupancy point of view, RAT Craiova gave the number of passengers travelling with trams in peak and off-peak period of day.

The data were collected one day weekly, twice a day in peak period and twice a day in off-peak period,in the same day, for 6 months (October 2009-March 2010) in ex-ante and 5 months (October 2010-February 2011) in ex-post. The ex-post evaluation period was shortened with one month because the Municipality began the construction of overpass and two crossrods of three were no available.

The indicator Average operating cost was cancelled because the 9 radio emitters and the receivers placed on the traffic lights do not bring additional operating cost. The priority traffic lights system consists in pasive electronic elements which do not need maintenance or spare parts at least 5 years.

The evaluation measurements for this measure proved an increasing of trams speed on the demonstration area and a slight increasing of occupancy, due to the priority traffic lights regulation.

C6 Summary of evaluation results

The key results are as follows:

Key result 1 – The traffic lights priority system led to an increase of tram's speed in peak and off-peak, by 14 % respectively 13 %. The 3 crossroads up-graded by the project are located in the most crowded area of the city and the distances between them are almost equal. The traffic lights priority system contribute to a shortening of travel time for public transport users.

Key result 2 - The traffic lights priority system led to a shortening of travel time for public transport users, so, the average occupancy slightly increased compared with the situation befor. The difference between ex-post and ex-ante measurements is not a big one because the operation period was short and the public transport users have not had time to realize the advantages of the priority system of traffic lights.

Key result 3- Average occupancy increased by 1 % in peak and 7 % in off-peak due to measure implementation combined with the effect of M01.09 (Energy saving on tramline in Craiova).

C7 Future activities relating to the measure

The traffic light priority system induced significant increase in tram speed and punctuality. The increase in Public transport speed should give several advantages for passengers and for the Company who operates this service. This advantages are relating:

- Punctuality, reducing the influence of other traffic interferences on the service. This should increase the attractiveness of PT among potential passengers;
- Costs, reducing working times by the drivers.

Therefore RAT is going to ask to implement the system to all the fleet and to other crossroads.

D Process Evaluation Findings

D.0 Focused measure

X	0	No focussed measure
2	1	Most important reason
4	2	Second most important reason
7	3	Third most important reason

D.1 Deviations from the original plan

Deviation 1- Shortening of demonstration period

Because of overpass construction in the measure demonstration area, the operation period of the priority traffic light system and thus the ex-post evaluation period were affected. The overpass construction led to the cancellation of 2 crossroads linked to priority traffic light system. Initially, 2 years period of system operation and monitoring was stipulated. This period should be reduced to five months for ex-post data collection to evaluate the measure.

D2 Barriers and drivers

D.2.1 Barriers

Preparation phase

- **Institutional** – There was new approach of municipality regarding the urban roads (setting up roundabout system in many intersection)
- **Planning** – The measure should take into account the existing upgrade of the traffic light system in Craiova
- **Spatial -** There was the risk don't find a good route for preferential traffic light because of urban roads architecture

Implementation phase

No barriers have been encountered.

Operation phase

- **Problem related** – The overpass construction led to the cancellation of 2 crossroads linked to priority traffic light system, during the construction work. This situation led to the shortening of operation period.

D.2.2 Drivers

Preparation phase

- **Positional** – The implementing team exchanged the experience with M 01.09 team because these measures will be implemented on the same trams
- **Involvement, communication –** Regular meetings helped provide a forum for discussion and development of the measure

Implementation phase

- **Institutional** – The Municipality has realised that the tram's priority system is effective one and decided to implement the priority system in more intersections in Craiova, in the future.
- **Positional** – The implementing team exchanged the experience with M 01.09 team because these measures will be implemented on the same trams.

Operation phase

- **Institutional** – The Municipality was aware about the efficiency of the tram's priority system and included the main roads of the city in a project focused on the "green light" system.

D.2.3 Activities

Preparation phase

- **Planning** – Some analisys to evaluate the possibility to integrate preferential traffic lights with existing traffic lights.

Implementation phase

No activities have been performed.

Operation phase

- **Problem related** – Collection of data for ex-post evaluation before the starting the work on the overpass, when the overall system (3 light intersections) was operational.
- **Political / strategic -** Considering that the MODERN measure is only a demonstrative action, the municipality included in the urban strategy for the next years an extended "green light" priority system on the main roads of the city.

D.3 Participation

D.3.1. Measure Partners

- **Measure partner 1 –** The Local Council of Craiova Municipality (Primaria Municipiului Craiova) was organized and functions according to Law No. 215/2001 regarding Local Public Administration with the subsequent modification and completion.

  Municipality as local government institution has, under the conditions imposed by the public administration law, the decisional right in all matters of local interest: political, social, cultural, educational and technical. Through their structures, the municipality is a complex mechanism which can produce major changes in the quality of urban life under an effective management and coordination.

  LCM was the coordinator of the project since 2009 and assumed the responsibility for the management and administration activity in the MODERN project. Between 2009-2011, LCM made the evaluation activity. In this measure, LCM chose the appropriate crossroads, in colaboration with Traffic Police and RAT

- **Measure partner 2** – IPA SA is a 47 years old Romanian industrial R & D company and is the Romanian national institute for research and development, engineering in energy, automation and IT, with a large experience in European projects in technology transfer and in information dissemination.

  IPA was responsible for the dissemination activities and carrying out the research activity and technical studies. Since 2011 IPA took over the evaluation activity.

- **Measure partner 3 - RAT** – Craiova Public Transport Company is the main public transportation operator in the whole Oltenia region.

  RAT Craiova made available the 9 trams for demonstation

D.3.2 Stakeholders

- **Stakeholder 1 – Traffic lights and traffic signs Dept. of Craiova –** modifying traffic lights in order to allow priority in intersections when the trams are approaching.
- **Stakeholder 2 – Traffic Police Department-** Analisys and involvment in the modification of traffic lights sequence temporization.

D.4 Recommendations

D.4.1 Recommendations: measure replication

- **System compatibility –** Make some studies in order to find compatibility between existing system and the < green light> system to be implemented.

D.4.2 Recommendations: process (related to barrier-, driver- and action fields)

- **City development strategy –** Take into account the urban development strategy of Municipality to avoid the delay or shortening of the measure implementation or operation period.

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Annex1 – Ex-ante values of indicators

Indicator 24 (Average vehicle speed – off peak)

The data were collected from each tram endowed with remote control device for priority traffic light

Note relating to meaning the figures in the tables:

- The period of time within 08:00-12:30 is the entire off-peak period, in the morning
- The period 09:00- 10:00 is the period when the data were collected in the morning for off-peak period
- The period of time within 18:00- 21:30 is the entire off-peak period, in the after-noon
- The period 19:00-20:00 is the period when the data were collected in the after-noon for off-peak period
- The period 05:30- 08:00 is the entire peak period, in the morning
- The period 07:00- 08:00 is the period when the data were collected in the morning for peak period
- The period 12:30- 18:00 is the entire peak period, in the after-noon
- The period 15:00- 16:00 is the period when the data were collected in the after-noon for peak period
- Distance travelled between Electroputere station and Bila station(Km) is the demonstration area with a length of 5 km
- Time/trip is the trip time measured in minutes and hours
- Speed(Km/h) is the trams speed calculated as ratio between distance travelled and the trip time

	Average speed in off-peak hours 08:00-12:30 (This is the entire off-peak period, in the morning)			09:00-10:00 (This is the period when the data were collected)			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
Line 101	5	19	0.32	15.79	Th Oct 1st	October	2009
	5	20	0.33	15.00	Mo- Oct 5th		
	5	19	0.32	15.79	Tu- Oct 13th		
	5	20	0.33	15.00	We- Oct 21st		
	5	19	0.32	15.79	Th- Oct 29th		

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	Average speed		0.32	15.47			
	Average speed in off-peak hours 18:00- 21:30			19:00-20:00			
Tram type KT4D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
Line 102	5	19	0.32	15.79	Th Oct 1st	Oct	2009
	5	21	0.35	14.29	Mo-Oct 5th		
	5	19	0.32	15.79	Tu- Oct 13th		
	5	21	0.35	14.29	We-Oct 21st		
	5	18	0.30	16.67	Th- Oct 29th		
	Average speed		0.33	15.36			
	Average speed in off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	21	0.35	14.29	Mo-Nov 2nd	Nov	2009
	5	19	0.32	15.79	Tu-Nov 10th		
	5	22	0.37	13.64	We-Nov 18th		
	5	21	0.35	14.29	Th-Nov 26th		
	5	19	0.32	15.79	Mo-Nov 30th		
	Average speed		0.34	14.76			

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	Average speed in off-peak hours 18:00- 21:30			19:00-20:00			
Tram type KT4D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 102	5	20	0.33	15.00	Mo-Nov 2nd	Nov	2009
	5	20	0.33	15.00	Tu-Nov 10th		
	5	19	0.32	15.79	We-Nov 18th		
	5	21	0.35	14.29	Th-Nov 26th		
	5	20	0.33	15.00	Mo-Nov 30th		
	Average speed		0.33	15.02			
	Average speed in off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	21	0.35	14.29	Th-Dec 3rd	Dec	2009
	5	21	0.35	14.29	Mo-Dec 7th		
	5	19	0.32	15.79	Tu-Dec 15th		
	5	20	0.33	15.00	Mo-Dec 21st		
	5	21	0.35	14.29	We-Dec 23rd		
	Average speed		0.34	14.73			

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	Average speed in off-peak hours 18:00- 21:30			19:00-20:00			
Tram type KT4D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 102	5	21	0.35	14.29	Th-Dec 3rd	Dec	2009
	5	21	0.35	14.29	Mo-Dec 7th		
	5	21	0.35	14.29	Tu-Dec 15th		
	5	22	0.37	13.64	Mo-Dec 21st		
	5	20	0.33	15.00	We-Dec 23rd		
	Average speed		0.35	14.30			
	Average speed in off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	20	0.33	15.00	We-Jan 6th	Jan	2010
	5	21	0.35	14.29	Mo-Jan 11th		
	5	21	0.35	14.29	Fr- Jan 15th		
	5	20	0.33	15.00	Tu- Jan 19th		
	5	21	0.35	14.29	Th- Jan 28 th		
	Average speed		0.34	14.57			
	Average speed in off-peak hours 18:00- 21:30			19:00-20:00			

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Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 102	5	20	0.33	15.00	We- Jan 6th	Jan	2010
	5	20	0.33	15.00	Mo- Jan 11th		
	5	21	0.35	14.29	Fr- Jan 15th		
	5	22	0.37	13.64	Tu- Jan 19th		
	5	20	0.33	15.00	Th- Jan 28 th		
	Average speed		0.34	14.58			
	Average speed in off-peak hours 08:00-12:30			09:00-10:00			
	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
	5	20	0.33	15.00	Mo- Feb 1st	Feb	2010
	5	21	0.35	14.29	Tu - Feb 9th		
	5	21	0.35	14.29	We- Feb 17th		
	5	19	0.32	15.79	Mo- Feb 22nd		
	5	21	0.35	14.29	Fr- Feb 26th		
	Average speed		0.34	14.73			
	Average speed in off-peak hours 18:00- 21:30			19:00-20:00			
	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year

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	5	21	0.35	14.29	Mo- Feb 1st	Feb	2010
	5	20	0.33	15.00	Tu - Feb 9th		
	5	21	0.35	14.29	We- Feb 17th		
	5	20	0.33	15.00	Mo- Feb 22nd		
	5	19	0.32	15.79	Fr- Feb 26th		
	Average speed		0.34	14.87			
	Average speed in off-peak hours 08:00-12:30			09:00-10:00			
	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
	5	20	0.33	15.00	Mo- Mar 1st	Mar	2010
	5	20	0.33	15.00	Tu - Mar 9th		
	5	21	0.35	14.29	We- Mar 17th		
	5	20	0.33	15.00	Th Mar 25th		
	5	21	0.35	14.29	We Mar 31st		
	Average speed		0.34	14.71			
	Average speed in off-peak hours 18:00- 21:30			19:00-20:00			
	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
	5	19	0.32	15.79	Mo- Mar 1st	Mar	2010
	5	20	0.33	15.00	Tu - Mar		

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					9th		
	5	21	0.35	14.29	We- Mar 17th		
	5	20	0.33	15.00	Th Mar 25th		
	5	20	0.33	15.00	We Mar 31st		
	Average speed		0.33	15.02			

Indicator 23 (Average vehicle speed– peak)

	Average speed in peak hours (05:30-08:00)			07:00-08:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
Line 101	5	19	0.32	15.79	Th Oct 1st	October	2009
	5	23	0.38	13.04	Mo- Oct 5th		
	5	19	0.32	15.79	Tu- Oct 13th		
	5	20	0.33	15.00	We- Oct 21st		
	5	22	0.37	13.64	Th- Oct 29th		
	Average speed			14.65			
	Average speed in peak hours 12:30-18:00			15:00-16:00			

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Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
Line 102	5	20	0.33	15.00	Th Oct 1st	Oct	2009
	5	23	0.38	13.04	Mo- Oct 5th		
	5	19	0.32	15.79	Tu- Oct 13th		
	5	22	0.37	13.64	We- Oct 21st		
	5	18	0.30	16.67	Th- Oct 29th		
	Average speed			14.83			
	Average speed in peak hours 05:30-08:00			07:00-08:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	21	0.35	14.29	Mo- Nov 2nd	Nov	2009
	5	19	0.32	15.79	Tu-Nov 10th		
	5	22	0.37	13.64	We- Nov 18th		
	5	18	0.30	16.67	Th- Nov 26th		
	5	20	0.33	15.00	Mo- Nov 30th		
	Average speed			15.08			

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	Average speed in peak hours 12:30-18:00			15:00-16:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 102	5	20	0.33	15.00	Mo- Nov 2nd	Nov	2009
	5	23	0.38	13.04	Tu-Nov 10th		
	5	22	0.37	13.64	We- Nov 18th		
	5	21	0.35	14.29	Th- Nov 26th		
	5	17	0.28	17.65	Mo- Nov 30th		
	Average speed			14.72			
	Average speed in peak hours 05:30-08:00			07:00-08:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	21	0.35	14.29	Th- Dec 3rd	Dec	2009
	5	24	0.40	12.50	Mo- Dec 7th		
	5	25	0.42	12.00	Tu- Dec 15th		
	5	20	0.33	15.00	Mo- Dec 21st		

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	5	24	0.40	12.50	We- Dec 23rd		
	Average speed			13.26			
	Average speed in peak hours 12:30-18:00			15:00-16:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 102	5	23	0.38	13.04	Th- Dec 3rd	Dec	2009
	5	23	0.38	13.04	Mo- Dec 7th		
	5	24	0.40	12.50	Tu- Dec 15th		
	5	22	0.37	13.64	Mo- Dec 21st		
	5	23	0.38	13.04	We- Dec 23rd		
	Average speed			13.05			
	Average speed in peak hours 05:30-08:00			07:00-08:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	24	0.40	12.50	We- Jan 6th	Jan	2010

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	5	23	0.38	13.04	Mo- Jan 11th		
	5	25	0.42	12.00	Fr- Jan 15th		
	5	25	0.42	12.00	Tu- Jan 19th		
	5	23	0.38	13.04	Th- Jan 28 th		
	Average speed			12.52			
	Average speed in peak hours 12:30-18:00			15:00-16:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 102	5	23	0.38	13.04	We- Jan 6th	Jan	2010
	5	23	0.38	13.04	Mo- Jan 11th		
	5	24	0.40	12.50	Fr- Jan 15th		
	5	22	0.37	13.64	Tu- Jan 19th		
	5	23	0.38	13.04	Th- Jan 28 th		
	Average speed			13.05			
	Average speed in peak hours 05:30-08:00			07:00-08:00			

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	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
	5	24	0.40	12.50	Mo- Feb 1st	Feb	2010
	5	23	0.38	13.04	Tu -Feb 9th		
	5	25	0.42	12.00	We- Feb 17th		
	5	25	0.42	12.00	Mo- Feb 22nd		
	5	24	0.40	12.50	Fr- Feb 26th		
	Average speed			12.41			
	Average speed in peak hours 12:30-18:00			15:00-16:00			
	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
	5	23	0.38	13.04	Mo- Feb 1st	Feb	2010
	5	25	0.42	12.00	Tu -Feb 9th		
	5	24	0.40	12.50	We- Feb 17th		
	5	23	0.38	13.04	Mo- Feb 22nd		
	5	23	0.38	13.04	Fr- Feb 26th		
	Average speed			12.73			

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	Average speed in peak hours 05:30-08:00			07:00-08:00			
	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
	5	22	0.37	13.64	Mo- Mar 1st	Mar	2010
	5	23	0.38	13.04	Tu -Mar 9th		
	5	25	0.42	12.00	We- Mar 17th		
	5	25	0.42	12.00	Th Mar 25th		
	5	24	0.40	12.50	We Mar 31st		
	Average speed			12.64			
	Average speed in peak hours 12:30-18:00			15:00-16:00			
	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
	5	22	0.37	13.64	Mo- Mar 1st	Mar	2010
	5	25	0.42	12.00	Tu -Mar 9th		
	5	24	0.40	12.50	We- Mar 17th		
	5	22	0.37	13.64	Th Mar 25th		

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	5	23	0.38	13.04	We Mar 31st		
	Average speed			12.96			

Indicator 28 (Average occupancy off-peak)

	Average occupancy off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
Line 101	5	45	83.00	54%	Th Oct 1st	Oct	2009
	5	49	83.00	59%	Mo- Oct 5th		
	5	42	83.00	51%	Tu- Oct 13th		
	5	51	83.00	61%	We- Oct 21st		
	5	42	83.00	51%	Th- Oct 29th		
	Average occupancy	45.8		55%			
	Average occupancy in off-peak hours 18:00-21:30			19:00-20:00			

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Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
Line 102	5	42	83.00	51%	Th Oct 1st	Oct	2009
	5	48	83.00	58%	Mo- Oct 5th		
	5	42	83.00	51%	Tu- Oct 13th		
	5	51	83.00	61%	We- Oct 21st		
	5	40	83.00	48%	Th- Oct 29th		
	Average occupancy	44.6		54%			
	Average occupancy off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 101	5	45	83.00	54%	Mo- Nov 2nd	Nov	2009
	5	52	83.00	63%	Tu-Nov 10th		
	5	46	83.00	55%	We- Nov 18th		
	5	48	83.00	58%	Th- Nov 26th		
	5	41	83.00	49%	Mo- Nov 30th		

	Average occupancy	46.4		56%			
	Average occupancy in off-peak hours 18:00-21:30			19:00-20:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no passengers	Average occupancy	day	month	year
line 102	5	40	83.00	48%	Mo- Nov 2nd	Nov	2009
	5	41	83.00	49%	Tu-Nov 10th		
	5	48	83.00	58%	We- Nov 18th		
	5	50	83.00	60%	Th- Nov 26th		
	5	42	83.00	51%	Mo- Nov 30th		
	Average occupancy	44.2		53%			
	Average occupancy off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year

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line 101	5	42	83.00	51%	Th- Dec 3rd	Dec	2009
	5	46	83.00	55%	Mo- Dec 7th		
	5	48	83.00	58%	Tu- Dec 15th		
	5	50	83.00	60%	Mo- Dec 21st		
	5	42	83.00	51%	We- Dec 23rd		
	Average occupancy	45.6		55%			
	Average occupancy in off-peak hours 18:00-21:30			19:00-20:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 102	5	40	83.00	48%	Th- Dec 3rd	Dec	2009
	5	42	83.00	51%	Mo- Dec 7th		
	5	46	83.00	55%	Tu- Dec 15th		
	5	44	83.00	53%	Mo- Dec 21st		
	5	41	83.00	49%	We- Dec 23rd		
	Average occupancy	42.6		51%			
	Average occupancy off-peak			09:00-10:00			

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	hours 08:00-12:30						
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 101	5	46	83.00	55%	We- Jan 6th	Jan	2010
	5	44	83.00	53%	Mo- Jan 11th		
	5	55	83.00	66%	Fr- Jan 15th		
	5	52	83.00	63%	Tu- Jan 19th		
	5	45	83.00	54%	Th- Jan 28 th		
	Average occupancy	48.4		58%			
	Average occupancy in off-peak hours 18:00-21:30			19:00-20:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 102	5	42	83.00	51%	We- Jan 6th	Jan	2010
	5	45	83.00	54%	Mo- Jan 11th		
	5	40	83.00	48%	Fr- Jan 15th		
	5	46	83.00	55%	Tu- Jan 19th		

	5	40	83.00	48%	Th- Jan 28 th		
	Average occupancy	42.6		51%			
	Average occupancy off-peak hours 08:00-12:30			09:00-10:00			
	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
	5	45	83.00	54%	Mo- Feb 1st	Feb	2010
	5	43	83.00	52%	Tu -Feb 9th		
	5	56	83.00	67%	We- Feb 17th		
	5	52	83.00	63%	Mo- Feb 22nd		
	5	46	83.00	55%	Fr- Feb 26th		
	Average occupancy	48.4		58%			
	Average occupancy in off-peak hours 18:00-21:30			19:00-20:00			
	Distance travelled Electroputere station-Bila	No of passengers	Maximum no of passengers	Average occupancy	day	month	year

	station(Km)						
	5	41	83.00	49%	Mo- Feb 1st	Feb	2010
	5	44	83.00	53%	Tu -Feb 9th		
	5	41	83.00	49%	We- Feb 17th		
	5	46	83.00	55%	Mo- Feb 22nd		
	5	41	83.00	49%	Fr- Feb 26th		
	Average occupancy	42.6		51%			
	Average occupancy off-peak hours 08:00-12:30			09:00-10:00			
	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
	5	45	83.00	54%	Mo- Mar 1st	Mar	2010
	5	43	83.00	52%	Tu -Mar 9th		
	5	56	83.00	67%	We- Mar 17th		
	5	52	83.00	63%	Th Mar 25th		
	5	46	83.00	55%	We Mar 31st		
	Average occupancy	48.4		58%			
	Average			19:00-			

	occupancy in off-peak hours 18:00-21:30			20:00			
	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
	5	41	83.00	49%	Mo- Mar 1st	Mar	2010
	5	44	83.00	53%	Tu -Mar 9th		
	5	41	83.00	49%	We- Mar 17th		
	5	46	83.00	55%	Th Mar 25th		
	5	41	83.00	49%	We Mar 31st		
	Average occupancy	42.6		51%			

Indicator 28 (Average occupancy in peak)

	Average occupancy in peak 05:30-08:00			07:00-08:00			

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Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
Line 101	5	70	83.00	84%	Th Oct 1st	Oct	2009
	5	60	83.00	72%	Mo- Oct 5th		
	5	65	83.00	78%	Tu- Oct 13th		
	5	60	83.00	72%	We- Oct 21st		
	5	77	83.00	93%	Th- Oct 29th		
	Average occupancy	66.4		80%			
	Average occupancy in peak hours 12:30-18:00			15:00-16:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
Line 102	5	75	83.00	90%	Th Oct 1st	Oct	2009
	5	62	83.00	75%	Mo- Oct 5th		
	5	63	83.00	76%	Tu- Oct 13th		
	5	70	83.00	84%	We- Oct 21st		
	5	78	83.00	94%	Th- Oct 29th		
	Average occupancy	69.6		84%			

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	Average speed in peak hours 05:30-08:00			07:00-08:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 101	5	72	83.00	87%	Mo- Nov 2nd	Nov	2009
	5	63	83.00	76%	Tu-Nov 10th		
	5	60	83.00	72%	We- Nov 18th		
	5	72	83.00	87%	Th- Nov 26th		
	5	77	83.00	93%	Mo- Nov 30th		
	Average occupancy	68.8		83%			
	Average speed in peak hours 12:30-18:00			15:00-16:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 102	5	75	83.00	90%	Mo- Nov 2nd	Nov	2009
	5	63	83.00	76%	Tu-Nov 10th		
	5	69	83.00	83%	We- Nov 18th		
	5	73	83.00	88%	Th- Nov		

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					26th		
	5	76	83.00	92%	Mo- Nov 30th		
	Average occupancy	71.2		86%			
	Average speed in peak hours 05:30-08:00			07:00-08:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 101	5	77	83.00	93%	Th- Dec 3rd	Dec	2009
	5	75	83.00	90%	Mo- Dec 7th		
	5	73	83.00	88%	Tu- Dec 15th		
	5	60	83.00	72%	Mo- Dec 21st		
	5	71	83.00	86%	We- Dec 23rd		
	Average occupancy	71.2		86%			
	Average speed in peak hours 12:30-18:00			15:00-16:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year

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line 102	5	76	83.00	92%	Th- Dec 3rd	Dec	2009
	5	66	83.00	80%	Mo- Dec 7th		
	5	59	83.00	71%	Tu- Dec 15th		
	5	68	83.00	82%	Mo- Dec 21st		
	5	75	83.00	90%	We- Dec 23rd		
	Average occupancy	68.8		83%			
	Average speed in peak hours 05:30-08:00			07:00-08:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 101	5	78	83.00	94%	We- Jan 6th	Jan	2010
	5	67	83.00	81%	Mo- Jan 11th		
	5	69	83.00	83%	Fr- Jan 15th		
	5	62	83.00	75%	Tu- Jan 19th		
	5	79	83.00	95%	Th- Jan 28 th		
	Average occupancy	71		86%			
	Average speed in peak hours 12:30-18:00			15:00-16:00			

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Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 102	5	76	83.00	92%	We- Jan 6th	Jan	2010
	5	71	83.00	86%	Mo- Jan 11th		
	5	62	83.00	75%	Fr- Jan 15th		
	5	67	83.00	81%	Tu- Jan 19th		
	5	76	83.00	92%	Th- Jan 28 th		
	Average occupancy	70.4		85%			
	Average speed in peak hours 05:30-08:00			07:00-08:00			
	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
	5	79	83.00	95%	Mo- Feb 1st	Feb	2010
	5	67	83.00	81%	Tu -Feb 9th		
	5	69	83.00	83%	We- Feb 17th		
	5	62	83.00	75%	Mo- Feb 22nd		
	5	80	83.00	96%	Fr- Feb 26th		
	Average occupancy	71.4		86%			

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	Average speed in peak hours 12:30-18:00			15:00-16:00			
	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
	5	81	83.00	98%	Mo- Feb 1st	Feb	2010
	5	71	83.00	86%	Tu -Feb 9th		
	5	62	83.00	75%	We- Feb 17th		
	5	67	83.00	81%	Mo- Feb 22nd		
	5	79	83.00	95%	Fr- Feb 26th		
	Average occupancy	72		87%			
	Average speed in peak hours 05:30-08:00			07:00-08:00			
	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
	5	77	83.00	93%	Mo- Mar 1st	Mar	2010
	5	67	83.00	81%	Tu -Mar 9th		
	5	69	83.00	83%	We- Mar 17th		

	5	62	83.00	75%	Th Mar 25th		
	5	76	83.00	92%	We Mar 31st		
	Average occupancy	70.2		85%			
	Average speed in peak hours 12:30-18:00			15:00-16:00			
	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
	5	76	83.00	92%	Mo- Mar 1st	Mar	2010
	5	71	83.00	86%	Tu -Mar 9th		
	5	62	83.00	75%	We- Mar 17th		
	5	67	83.00	81%	Th Mar 25th		
	5	75	83.00	90%	We Mar 31st		
	Average occupancy	70.2		85%			

Ex-post indicators values

Indicator 24 (Average speed in off-peak)

	Average speed in off-peak hours			09:00-10:00			

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	08:00-12:30						
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
Line 101	5	18	0.30	16.67	Fr-Oct 1st	Oct	2010
	5	18	0.30	16.67	Mo-Oct 4th		
	5	17	0.28	17.65	Tu-Oct 12th		
	5	19	0.32	15.79	We Oct 20th		
	5	18	0.30	16.67	Th-Oct 28th		
	Average speed			16.69			
	Average speed in off-peak hours 18:00-21:30			19:00-20:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
Line 102	5	19	0.32	15.79	Fr-Oct 1st	Oct	2010
	5	17	0.28	17.65	Mo-Oct 4th		
	5	16	0.27	18.75	Tu-Oct 12th		
	5	18	0.30	16.67	We Oct 20th		
	5	19	0.32	15.79	Th-Oct 28th		
	Average speed			16.93			

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	Average speed in off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	17	0.28	17.65	Mo- Nov 1st	Nov	2010
	5	18	0.30	16.67	Tu- Nov 9th		
	5	16	0.27	18.75	We- Nov 17th		
	5	18	0.30	16.67	Th- Nov25th		
	5	16	0.27	18.75	Tu- Nov 30th		
	Average speed			17.70			
	Average speed in off-peak hours 18:00-21:30			19:00-20:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 102	5	17	0.28	17.65	Mo- Nov 1st	Nov	2010
	5	19	0.32	15.79	Tu- Nov 9th		
	5	17	0.28	17.65	We- Nov 17th		
	5	18	0.30	16.67	Th-		

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					Nov25th		
	5	16	0.27	18.75	Tu- Nov 30th		
	Average speed			17.30			
	Average speed in off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	16	0.27	18.75	Th- Dec 2nd	Dec	2010
	5	17	0.28	17.65	Mo- Dec 6th		
	5	16	0.27	18.75	Th- Dec 9th		
	5	18	0.30	16.67	Tu- Dec 14th		
	5	17	0.28	17.65	We- Dec 22nd		
	Average speed			17.89			
	Average speed in off-peak hours 18:00-21:30			19:00-20:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year

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line 102	5	18	0.30	16.67	Th- Dec 2nd	Dec	2010
	5	16	0.27	18.75	Mo- Dec 6th		
	5	17	0.28	17.65	Th- Dec 9th		
	5	16	0.27	18.75	Tu- Dec 14th		
	5	17	0.28	17.65	We- Dec 22nd		
	Average speed			17.89			
	Average speed in off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	18	0.30	16.67	Th- Jan 6th	Jan	2011
	5	17	0.28	17.65	Mo- Jan 10th		
	5	19	0.32	15.79	Fr- Jan 14th		
	5	17	0.28	17.65	Tu- Jan 18th		
	5	18	0.30	16.67	We- Jan 26th		
	Average speed			16.88			
	Average speed in off-peak hours 18:00-21:30			19:00-20:00			

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Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 102	5	18	0.30	16.67	Th- Jan 6th	Jan	2011
	5	17	0.28	17.65	Mo- Jan 10th		
	5	19	0.32	15.79	Fr- Jan 14th		
	5	17	0.28	17.65	Tu- Jan 18th		
	5	18	0.30	16.67	We- Jan 26th		
	Average speed			16.88			
	Average speed in off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	19	0.32	15.79	Tu- Feb 1st	February	2011
	5	16	0.27	18.75	We- Feb 9th		
	5	19	0.32	15.79	Th- Feb 17th		
	5	18	0.30	16.67	Fr- Feb 25th		
	5	17	0.28	17.65	Mo- Feb 28th		
	Average speed			16.93			

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	Average speed in off-peak hours 18:00-21:30			19:00-20:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 102	5	17	0.28	17.65	Tu- Feb 1st	February	2011
	5	18	0.30	16.67	We- Feb 9th		
	5	19	0.32	15.79	Th- Feb 17th		
	5	18	0.30	16.67	Fr- Feb 25th		
	5	19	0.32	15.79	Mo- Feb 28th		
	Average speed			16.51			
	Average speed in off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	19	0.32	15.79	Monday-21st	February	2011
	5	17	0.28	17.65	Tuesday-22nd		
	5	18	0.30	16.67	Wednesday-23rd		

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	5	19	0.32	15.79	Thursday-24th		
	5	19	0.32	15.79	Friday-25th		
	Average speed			16.34			
	Average speed in off-peak hours 18:00-21:30			19:00-20:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 102	5	16	0.27	18.75	Monday-21st	February	2011
	5	18	0.30	16.67	Tuesday-22nd		
	5	19	0.32	15.79	Wednesday-23rd		
	5	16	0.27	18.75	Thursday-24th		
	5	18	0.30	16.67	Friday-25th		
	Average speed			17.32			
	Average speed in off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year

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	station(Km)						
line 101	5	18	0.30	16.67	Monday-28th	February	2011
	5	19	0.32	15.79	Tuesday-1st		
	5	18	0.30	16.67	Wednesday-2nd		
	5	17	0.28	17.65	Thursday-3rd		
	5	17	0.28	17.65	Friday-4th		
	Average speed			16.88			
	Average speed in off-peak hours 18:00-21:30			19:00-20:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 102	5	16	0.27	18.75	Monday-28th	February	2011
	5	18	0.30	16.67	Tuesday-1st		
	5	18	0.30	16.67	Wednesday-2nd		
	5	16	0.27	18.75	Thursday-3rd		
	5	18	0.30	16.67	Friday-4th		
	Average speed			17.50			

Indicator 23 (Average speed in peak)

	Average			07:00-			

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	speed in peak hours 05:30-08:00			08:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
Line 101	5	18	0.30	16.67	Fr-Oct 1st	Oct	2010
	5	18	0.30	16.67	Mo-Oct 4th		
	5	19	0.32	15.79	Tu-Oct 12th		
	5	20	0.33	15.00	We Oct 20th		
	5	19	0.32	15.79	Th-Oct 28th		
	Average speed			15.98			
	Average speed in peak hours 12:30-18:00			15:00-16:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
Line 102	5	20	0.33	15.00	Fr-Oct 1st	Oct	2010
	5	18	0.30	16.67	Mo-Oct 4th		
	5	19	0.32	15.79	Tu-Oct 12th		
	5	18	0.30	16.67	We Oct 20th		
	5	20	0.33	15.00	Th-Oct		

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					28th		
	Average speed			15.82			
	Average speed in peak hours 05:30-08:00			07:00-08:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	19	0.32	15.79	Mo- Nov 1st	Nov	2010
	5	16	0.27	18.75	Tu- Nov 9th		
	5	16	0.27	18.75	We- Nov 17th		
	5	19	0.32	15.79	Th- Nov25th		
	5	20	0.33	15.00	Tu- Nov 30th		
	Average speed			16.82			
	Average speed in peak hours 12:30-18:00			15:00-16:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year

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line 102	5	19	0.32	15.79	Mo- Nov 1st	Nov	2010
	5	19	0.32	15.79	Tu- Nov 9th		
	5	17	0.28	17.65	We- Nov 17th		
	5	20	0.33	15.00	Th- Nov25th		
	5	18	0.30	16.67	Tu- Nov 30th		
	Average speed			16.18			
	Average speed in peak hours 05:30-08:00			07:00-08:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	19	0.32	15.79	Th- Dec 2nd	Dec	2010
	5	18	0.30	16.67	Mo- Dec 6th		
	5	19	0.32	15.79	Th- Dec 9th		
	5	20	0.33	15.00	Tu- Dec 14th		
	5	19	0.32	15.79	We- Dec 22nd		
	Average speed			15.81			
	Average speed in peak hours 12:30-			15:00-16:00			

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	18:00						
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 102	5	19	0.32	15.79	Th- Dec 2nd	Dec	2010
	5	18	0.30	16.67	Mo- Dec 6th		
	5	17	0.28	17.65	Th- Dec 9th		
	5	19	0.32	15.79	Tu- Dec 14th		
	5	20	0.33	15.00	We- Dec 22nd		
	Average speed			16.18			
	Average speed in peak hours 05:30-08:00			07:00-08:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	19	0.32	15.79	Th- Jan 6th	Jan	2011
	5	18	0.30	16.67	Mo- Jan 10th		
	5	19	0.32	15.79	Fr- Jan 14th		
	5	18	0.30	16.67	Tu- Jan 18th		
	5	20	0.33	15.00	We- Jan 26th		

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	Average speed			15.98			
	Average speed in peak hours 12:30-18:00			15:00-16:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 102	5	18	0.30	16.67	Th- Jan 6th	Jan	2011
	5	18	0.30	16.67	Mo- Jan 10th		
	5	19	0.32	15.79	Fr- Jan 14th		
	5	18	0.30	16.67	Tu- Jan 18th		
	5	20	0.33	15.00	We- Jan 26th		
	Average speed			16.16			
	Average speed in peak hours 05:30-08:00			07:00-08:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	19	0.32	15.79	Tu- Feb	Feb	2011

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					1st		
	5	17	0.28	17.65	We- Feb 9th		
	5	19	0.32	15.79	Th- Feb 17th		
	5	18	0.30	16.67	Fr- Feb 25th		
	5	19	0.32	15.79	Mo- Feb 28th		
	Average speed			16.34			
	Average speed in peak hours 12:30-18:00			15:00-16:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 102	5	18	0.30	16.67	Tu- Feb 1st	Feb	2011
	5	18	0.30	16.67	We- Feb 9th		
	5	19	0.32	15.79	Th- Feb 17th		
	5	18	0.30	16.67	Fr- Feb 25th		
	5	19	0.32	15.79	Mo- Feb 28th		
	Average speed			16.32			
	Average speed in peak hours 05:30-			07:00-08:00			

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	08:00						
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	17	0.28	17.65	Monday-21st		2011
	5	18	0.30	16.67	Tuesday-22nd		2011
	5	19	0.32	15.79	Wednesday-23rd		2011
	5	20	0.33	15.00	Thursday-24th		2011
	5	19	0.32	15.79	Friday-25th		2011
	Average speed			16.18			
	Average speed in peak hours 12:30-18:00			15:00-16:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 102	5	18	0.30	16.67	Monday-21st	February	2011
	5	18	0.30	16.67	Tuesday-22nd	February	2011
	5	19	0.32	15.79	Wednesday-23rd	February	2011
	5	18	0.30	16.67	Thursday-24th	February	2011
	5	19	0.32	15.79	Friday-25th	February	2011

	Average speed			16.32			
	Average speed in peak hours 05:30-08:00			07:00-08:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 101	5	18	0.30	16.67	Monday-28th	February	2011
	5	18	0.30	16.67	Tuesday-1st	March	2011
	5	18	0.30	16.67	Wednesday-2nd	March	2011
	5	19	0.32	15.79	Thursday-3rd	March	2011
	5	18	0.30	16.67	Friday-4th	March	2011
	Average speed			16.49			
	Average speed in peak hours 12:30-18:00			15:00-16:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	time/trip(min)	time/trip(h)	speed(Km/h)	day	month	year
line 102	5	19	0.32	15.79	Monday-28th	February	2011

	5	18	0.30	16.67	Tuesday-1st	March	
	5	17	0.28	17.65	Wednesday-2nd	March	
	5	17	0.28	17.65	Thursday-3rd	March	
	5	18	0.30	16.67	Friday-4th	March	
	Average speed			16.88			

Indicator 28(Average occupancy off-peak)

	Average occupancy off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
Line 101	5	51	83.00	61.45%	Fr-Oct 1st	Oct	2010
	5	50	83.00	60.24%	Mo-Oct 4th		
	5	48	83.00	57.83%	Tu-Oct 12th		
	5	47	83.00	56.63%	We Oct 20th		
	5	50	83.00	60.24%	Th-Oct 28th		
	Average occupancy			59.28%			
	Average occupancy in off-peak hours 18:00-			19:00-20:00			

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	21:30						
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
Line 102	5	48	83.00	57.83%	Fr-Oct 1st	Oct	2010
	5	54	83.00	65.06%	Mo-Oct 4th		
	5	50	83.00	60.24%	Tu-Oct 12th		
	5	49	83.00	59.04%	We Oct 20th		
	5	51	83.00	61.45%	Th-Oct 28th		
	Average occupancy			60.72%			
	Average occupancy off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	maximum no of passengers	Average occupancy	day	month	year
line 101	5	52	83.00	62.65%	Mo- Nov 1st	Nov	2010
	5	51	83.00	61.45%	Tu- Nov 9th		
	5	46	83.00	55.42%	We- Nov 17th		
	5	45	83.00	54.22%	Th- Nov25th		
	5	51	83.00	61.45%	Tu- Nov 30th		

	Average occupancy			59.04%			
	Average occupancy in off-peak hours 18:00-21:30			19:00-20:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 102	5	47	83.00	56.63%	Mo- Nov 1st	Nov	2010
	5	49	83.00	59.04%	Tu- Nov 9th		
	5	49	83.00	59.04%	We- Nov 17th		
	5	50	83.00	60.24%	Th- Nov25th		
	5	53	83.00	63.86%	Tu- Nov 30th		
	Average occupancy			59.76%			
	Average occupancy off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year

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line 101	5	53	83.00	63.86%	Th- Dec 2nd	Dec	2010
	5	51	83.00	61.45%	Mo- Dec 6th		
	5	46	83.00	55.42%	Th- Dec 9th		
	5	47	83.00	56.63%	Tu- Dec 14th		
	5	50	83.00	60.24%	We- Dec 22nd		
	Average occupancy			59.52%			
	Average occupancy in off-peak hours 18:00-21:30			19:00-20:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 102	5	55	83.00	66.27%	Th- Dec 2nd	Dec	2010
	5	50	83.00	60.24%	Mo- Dec 6th		
	5	49	83.00	59.04%	Th- Dec 9th		
	5	47	83.00	56.63%	Tu- Dec 14th		
	5	52	83.00	62.65%	We- Dec 22nd		
	Average occupancy			60.96%			
	Average occupancy			09:00-10:00			

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	off-peak hours 08:00-12:30						
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 101	5	56	83.00	67.47%	Th- Jan 6th	Jan	2011
	5	53	83.00	63.86%	Mo- Jan 10th		
	5	50	83.00	60.24%	Fr- Jan 14th		
	5	52	83.00	62.65%	Tu- Jan 18th		
	5	50	83.00	60.24%	We- Jan 26th		
	Average occupancy			62.89%			
	Average occupancy in off-peak hours 18:00-21:30			19:00-20:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 102	5	55	83.00	66.27%	Th- Jan 6th	Jan	2011
	5	50	83.00	60.24%	Mo- Jan 10th		
	5	53	83.00	63.86%	Fr- Jan 14th		

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	5	49	83.00	59.04%	Tu- Jan 18th		
	5	53	83.00	63.86%	We- Jan 26th		
	Average occupancy			62.65%			
	Average occupancy off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 101	5	51	83.00	61.45%	Tu- Feb 1st	Feb	2011
	5	50	83.00	60.24%	We- Feb 9th		
	5	52	83.00	62.65%	Th- Feb 17th		
	5	47	83.00	56.63%	Fr- Feb 25th		
	5	50	83.00	60.24%	Mo- Feb 28th		
	Average occupancy			60.24%			
	Average occupancy in off-peak hours 18:00-21:30			19:00-20:00			

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Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 102	5	54	83.00	65%	Tu- Feb 1st	Feb	2011
	5	50	83.00	60%	We- Feb 9th		
	5	52	83.00	63%	Th- Feb 17th		
	5	53	83.00	64%	Fr- Feb 25th		
	5	50	83.00	60%	Mo- Feb 28th		
	Average occupancy			62%			
	Average occupancy off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 101	5	55	83.00	66%	Monday-21st	February	2011
	5	50	83.00	60%	Tuesday-22nd	February	2011
	5	51	83.00	61%	Wednesday-23rd	February	2011
	5	53	83.00	64%	Thursday-24th	February	2011
	5	51	83.00	61%	Friday-25th	February	2011

	Average occupancy			63%			
	Average occupancy in off-peak hours 18:00-21:30			19:00-20:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 102	5	54	83.00	65%	Monday-21st	February	2011
	5	52	83.00	63%	Tuesday-22nd	February	2011
	5	53	83.00	64%	Wednesday-23rd	February	2011
	5	50	83.00	60%	Thursday-24th	February	2011
	5	52	83.00	63%	Friday-25th	February	2011
	Average occupancy			63%			
	Average occupancy off-peak hours 08:00-12:30			09:00-10:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year

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line 101	5	54	83.00	65%	Monday-28th	February	2011
	5	53	83.00	64%	Tuesday-1st	March	2011
	5	53	83.00	64%	Wednesday-2nd	March	2011
	5	51	83.00	61%	Thursday-3rd	March	2011
	5	49	83.00	59%	Friday-4th	March	2011
	Average occupancy			63%			
	Average occupancy in off-peak hours 18:00-21:30			19:00-20:00			
Tram type KT4 D	Distance travelled Electroputere station-Bila station(Km)	No of passengers	Maximum no of passengers	Average occupancy	day	month	year
line 102	5	53	83.00	64%	Monday-28th	February	2011
	5	50	83.00	60%	Tuesday-1st	March	2011
	5	51	83.00	61%	Wednesday-2nd	March	2011
	5	52	83.00	63%	Thursday-3rd	March	2011
	5	50	83.00	60%	Friday-4th	March	2011
	Average occupancy			62%			