

## ACTION PLAN LINE DEFINITION FOR TECHNOLOGICAL UPGRADE

It is necessary to design and develop a “Technological Upgrade Plan” as an alternative which may aid achieve the goals of energy consumption reduction established in national regulation as well as the reduction of pollutant emissions of CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub>, PM, HC in route. It may be achieved by means of the introduction of hybrid and electric<sup>1</sup> technologies for the SITP (Public Transportation Integrated System), whose adequate performance shall also include strategies such as the improvement in driving practices. In addition to need above, the following considerations should be taken into account:

- ✓ The implementation process of the Public Transportation Integrated System (SITP), its articulation with phases I and II of TRANSMILENIO S.A., mass transportation system; as well as with the traditional collective public transportation system.
- ✓ The need to have a cleaner transportation system whose operation reflects a reduction of environmental issues; and helps prevent mortality and morbidity events associated to, amongst others, citizens’ respiratory diseases.

As a result, it is imperative to prepare an upgrade plan with four action lines which guide the appropriate transition from the transportation system based on current combustion technologies towards zero and low on-route emission technologies.

### Line 1. Test bank and Laboratory City.

The objective of this action line in the framework of the Plan for the Technological Upgrade of SITP is to position the city a permanent test lab for buses with zero or low on-route emission technologies and facilitate the scenario for such deployment. It will take place in the characteristic conditions of the city and it will provide an experimentation platform and a rigorous evidence process for such new technologies.

In order to attain the above objective, it is required to manage the scenarios needed to carry out the tests of vehicles with zero and low emission technologies in the city.

With the creation of the **test bank**, there will be an experimentation platform and there will also be a rigorous and replicable verification method for new technologies.

In order to develop this line, it is necessary to come up with a guide document as a reference framework to evaluate new technologies. It will include the operational, environmental and technical tests which will provide the adequate knowledge about each technology and its possible use in the Public Transportation Integrated System – SITP. The tests to be carried out in the buses are listed in the following table.

*Table 1 Test List*

TEST TYPE	ID	TESTS
OPERATIONAL	1	Typology review
	2	Brakes (include fifth wheel or accrediting vendor's certificate)

<sup>1</sup> Zero and low on-route emission technologies

TEST TYPE	ID	TESTS
	3	Turn Radius, driving skills and perception
	4	Acceleration and up-hill capabilities (include capability to reach certain speed)
ENVIRONMENTAL PERFORMANCE	5	Performance and energy efficiency on route
	6	Performance and energy efficiency in dynamometer (upon request from the managing body)
	7	Emission factors on route
	8	Emission factors in dynamometer (upon request from the managing body)
	9	Noise and thermal comfort
	10	Emissions inside the vehicle
TECHNICAL	11	Autonomy
	12	Use factor (upon request from the managing body)
	13	On-route regeneration (upon request from the managing body)

The following procedure must be followed in order to attain the goal. The procedure includes the following stages:

- **Short duration tests:** Less than three months. This stage implements the protocols needed to carry out the tests listed in the table above.
- **Long duration tests (Optional):** From three to six months. This stage puts the vehicle through normal driving conditions in the current transportation system with controls and follow-up on the environmental and operational performance by means of a Schedule defined by the managing body and the party interested in carrying out the tests at the beginning of the stage.

#### Short duration test stage.

The following steps must be followed:

Step 1: Proceed with the import process (temporary or permanent) of the vehicle in case it comes from a foreign origin.

Step 2: The vehicle must have a driving permit (Permit to transit freely, temporary plate (red) or permanent plate).

Step 3: Statement of interest and / or feasibility request to carry out the short duration test. The foresaid request may be submitted in advance by the system Car Dealers, vendors or bus suppliers jointly by the aforementioned parties, or any public or private institution willing to verify the feasibility of operating a new technology in the system. The written communication must be accompanied by the technical specifications of the vehicle, the logistic requirements for the vehicle operation and the statement which establishes that they have or will obtain the necessary resources to carry out the tests.

Step 4: *TRANSMILENIO* S.A. will provide an answer to the request of the applicant or the party interested in carrying out the tests. In case there is an affirmative answer, *TRANSMILENIO* will communicate the procedure to follow and the different stages and it will attach the Methodological Guide for the Implementation of the Test Protocols to Evaluate the

## Feasibility of the Implementation of New Technologies in Bogotá's Massive Public Transportation.

Step 5: Filing of a commitment letter and the request to start the process to apply the tests. The operator or interested party will file a communication letter before TRANSMILENIO S.A. where it states that it accepts the requirements and conditions to go ahead with the process, commits itself to carrying out the short duration tests, accepts to pay the costs associated to the application of such tests and to deliver a copy of the results and the information of the test process, which may be required by the managing body. Additionally, the following information must be attached:

- Insurance: SOAT (Traffic Accident Mandatory Insurance)
- Technical Partner to carry out the punctual tests in case it is required: They must inform the corporate name, certify competence and experience from both the staff who will participate and the institution which will carry out that kind of tests, technical and logistical infrastructure to carry out the tests.
- Proposal of the test Schedule.
- List of Key personnel who will take part in the development of the tests. (identification card and contact information).
- List of assisting staff who may require permits and / or authorizations to enter the system infrastructure (applicable to personnel other than the dealer's).

Step 6: Once TRANSMILENIO S.A. has reviewed the information, it will set up a coordination meeting to define together the schedule, type of tests, controls and follow-up to be carried out on the vehicle and delegate the parties responsible for the supervision.

Step 7: Start of Tests: During this stage and according to the schedule submitted by the dealer or applicant, as a minimum the tests listed in table 9 will be carried out.

Step 8: Finalization of the test and complete documentation from those who participated in it. Delivery of final reports and additional information required by the managing party.

### **Long duration test stage.**

Once the short duration test stage has been completed, the following additional steps should be taken to carry out the long duration tests.

Step 1: Proceed with the import renewal process (temporary or permanent) in case it is necessary.

Step 2: Proceed with the vehicle homologation process before the Ministry of Transportation.

Step 3: Register under the RUNT (National Transportation Unique Registry) at the Ministry of Transportation.

Step 4: Verify and / or complete the process to have an Operative Partner and Technical Partner to carry out the tests in case it is required.

Step 5: Request the operation card before the *Secretaría Distrital de Movilidad* (District Secretary of Mobility)

Step 6: In case the applicant is not a Dealer of the system, they can look for an operative partner to carry out the long duration tests with previous authorization from the managing body.

Step 7: Filing of a commitment letter to request the start of the process and proceed with the long duration test: The operator and other participants will file a communication letter before TRANSMILENIO S.A. where they state that they accept the requirements and the conditions to carry out the process, commit themselves to carrying out the long duration tests, accept to pay the costs associated to the application of such tests and to deliver a copy of the results and the information of the test process, which may be required by the managing body. Additionally, the following documentation must be attached:

- Insurance: SOAT (Traffic Accident Mandatory Insurance) Contractual and extra-contractual insurance policy
- Technical Partner to carry out the punctual tests in case it is required: They must inform the corporate name, certify competence and experience from both the staff who will participate and the institution which will carry out that kind of tests, technical and logistical infrastructure to carry out the tests.
- Proposal of the test Schedule and / or definition of the routes and services where the vehicle is going to operate. TRANSMILENIO S.A. reserves the right to carry out specific requirement tests, routes and additional services.
- List of Key personnel who will take part in the development of the tests. (identification card and contact information).
- List of assisting staff who may require permits and / or authorizations to enter the system infrastructure (applicable to personnel other than the dealer's).

Step 8: TRANSMILENIO S.A. will carry out the process to present the vehicle being test before the *Secretaría Distrital de Movilidad* (District Secretary of Mobility) in order to facilitate the request for the operation card of the vehicle and its registration at the SIM in the framework of the test program of new technologies for the system.

Step 9: TRANSMILENIO S.A. will file a copy of the presentation letter submitted at the *Secretaría Distrital de Movilidad* before the dealer or the party interested in carrying out the tests.

Step 10: Request an Operation Card and registration at SIM: The Dealer or the party interested in carrying out the tests will complete such process before the *Secretaría Distrital de Movilidad* by submitting the corresponding documentation which refers to the communication letter filed by TRANSMILENIO S.A.

Step 11: Complete the process to register the vehicle for regular operation before TRANSMILENIO S.A.

Step 12: Coordination meeting to start the tests: Once the vehicle has been registered before TRANSMILENIO S.A., it will set up a coordination meeting to define together the schedule, type of tests, controls and follow-up to be carried out on the vehicle to evaluate the environmental and operational performance and delegate the parties responsible for the supervision and preparation of periodical reports of the performance of the vehicle.

Step 13: Carry out the control and specific performance tests according to the schedule and prepare the periodical reports which will be submitted before TRANSMILENIO S.A. on previously agreed dates.

Step 14: End of test and complete documentation given by those who participated in it. Delivery of final reports and additional information required by the managing body.

Finally, the results obtained in the tests will be stored in a digital data bank, which will have public access as a contribution to the learning process of the city regarding zero or low on-route emission technologies.

## Line 2. Green Boulevard – Carrera Tenth - Carrera Seventh

The goal of this action line is to structure a solution in the transition to the light train or Tram. It will allow to start the organization process of transportation on that avenue with the use of zero or low on-route emission vehicles in compliance with the operational design conducted by TRANSMILENIO S.A.

The existing corridor of Seventh Carrera currently exhibits scarcity of public space and green areas. Thus, the proposed intervention should aim at the improvement of those conditions and revive the zone regarding the landscape, the environment and public space.

The length of Carrera 7<sup>th</sup> trunk up to 100<sup>th</sup> street has been conceived with the operation of exclusive left lane without overstep between 31<sup>st</sup> street up to 72 street; with preference right lane between 72<sup>nd</sup> street and 100<sup>th</sup> street; and from 100<sup>th</sup> street north, the operation would have mixed traffic with complementary routes as shown in figure 8. On the other hand, the operational connections from 20 de Julio Bus Station will allow to connect users directly between 10<sup>th</sup> Carrera and 80<sup>th</sup> street trunk; and Suba Avenue trunk.



**Figure 1** – Length of span 100th street to 170th street

The decision to not build an overtaking lane is explained by the background which framed the discussion about the solution to 7<sup>th</sup> Carrera in terms of property impact given the expansion of the corridor, work costs and the impact of the construction times, amongst others. All of the above, in addition to the definition of the First Metro Line on the east city border, supported the definition of a single-lane solution without overstep, operated by bi-articulated buses.

Keeping in mind that there is a proposal by the current administration to implement a light train or tram over the way of 7<sup>th</sup> Carrera since 19<sup>th</sup> street up to 193<sup>rd</sup> street, the time when that train will start operating has to be taken into account. It should also take into account the need of executive projects, the development of infrastructure works, the purchase of vehicles and the installation of the energy network. Thus, it will be necessary to develop a transition project from the period of implementation of the *SITP* until the start of operation of the proposal in the year 2018.

The original design of the *SITP* included 7<sup>th</sup> and 10<sup>th</sup> Carreras as Massive Transportation Corridors operated with BRT technology. In the current scenario, the corridor of 10<sup>th</sup> Carrera is now operational; and 7<sup>th</sup> Carrera is expected to have transitory operation which takes into consideration the concept of integration of the *SITP* with structured routes and Dual *Padrón* buses without an exclusive lane, which is described in the next chapter.

The dual *padrón* is a type of bus with the same capacity features than a traditional pardon (between 80 and 90 passengers) with the difference that it operates by right and left gates. They currently operate successfully this kind of services in Barranquilla and Cali.

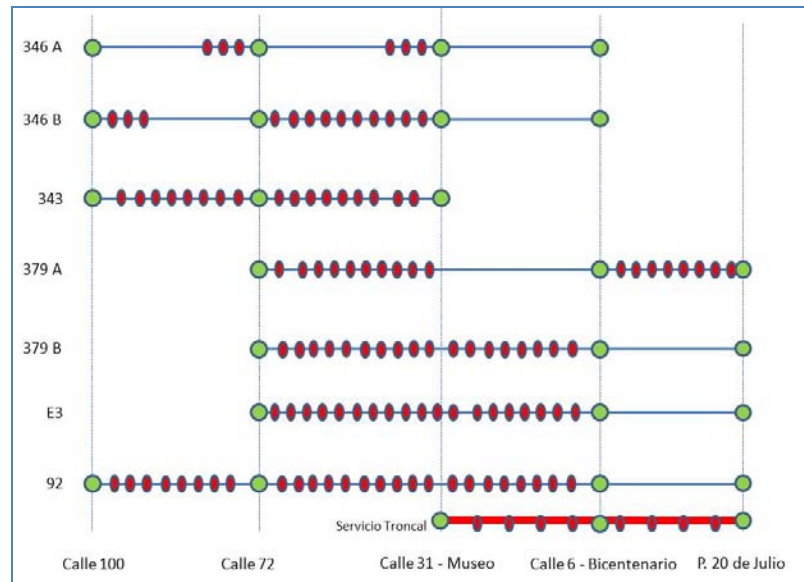
This type of operation has a series of advantages. Some of those advantages are the following:

- ✓ It keeps the *SITP* structure: the five complementary routes proposed for the bus station of 100<sup>th</sup> street turn to be urban routes. Three of them continue to arrive to 100<sup>th</sup> street and 2 of them prolong to 72<sup>nd</sup> street. The urban routes, other zone routes and the trunk services are also kept as they were originally designed for the *SITP*. This means that it guarantees the same coverage in route lines and demand for all 13 zones of the *SITP*, including Usaquén and San Cristóbal, the two areas of the influence zone of the project.
- ✓ Service flexibility: dual *padrón* operation is commonly known with the name of pretroncal (pre-trunk) operation. The dual *padrón* is designed to provide service with the right gate at the sidewalk level; and service with the high left gate at trunk stations.
- ✓ Flexibility of fleet use: at the moment when the light train or the tram start operating on 7<sup>th</sup> Carrera, the dual *padrón* fleet will provide services in the feeding routes, the complementary routes and / or new pretroncal services depending on the need. Its design enables the alternative of physical integration at any given point of the *troncales* (trunks) (bus stops and stations).
- ✓ The dual *padrón* fleet is included within the typology of the *SITP* operation. Therefore, this type of vehicle will not need to be homologated before the Ministry of Transportation.

The services designed for this operation will allow the connection between the current trunk of 10<sup>th</sup> Carrera and 7<sup>th</sup> Carrera. It will work by left gate on the trunk of 10<sup>th</sup> Carrera and on the right gate in the mixed traffic of 7<sup>th</sup> Carrera between the National Museum and 100<sup>th</sup> Street.

In order to optimize operation, the dual *padrón* service will work as express services, even while they operate in mixed traffic. They will not stop in all the bus stops of some sectors of the city in

order to improve the speed and efficiency of the operation. The next diagram shows an operation scheme with the dual *padrón*, which illustrates the operation of the seven services (with their corresponding mirrors). The green and red spots determine the stops of every one of the services. Bearing this in mind, it can be noticed that every one of the seven services is designed with different stops in such a way that greater demand may be served in a shorter period of time.



**Figure 2** – Operational Scheme of dual *padrón*

Source: TM Preparation

After conducting the analysis of transportation demand for this corridor, it can be determined that a maximum load of approximately 13500 passengers per hour in each direction is expected. This is the case close to 34<sup>th</sup> street in the South-North direction. When it arrives to 72<sup>nd</sup> street, the load decreases slightly until it comes to 10500 passengers per hour in each direction. The particular feature of 72<sup>nd</sup> street is the relative symmetry there is between the demand in one direction and the other, which may be explained by the high concentration of destinations around the financial center located on the axis of that given street. The demand at 100<sup>th</sup> street decreases to 4800 passengers in the North-South direction.

After obtaining the results of the destination assignment model, the operational design is carried out. It determines important data such as the interval between every service and the size of the fleet required to operate that segment. Based on such results, there is a need to have 200 dual *padrón* buses to operate the corridor of 7<sup>th</sup> Carrera.

**Table 2** Initial operational design of dual *padrón* services

SERVICE	ORIGIN	DESTINATION	LENGTH (KM)	TIME (MIN)	BOARDING DESIGN	VOLUME DESIGN	ADJUSTED INTERVAL	ADJUSTED FREQUENCY	REQUIRED FLEET
343 (S-N)	NATIONAL MUSEUM	100 <sup>th</sup> STREET	7,78	27,38	2065	1632	2,5	24,0	11
343 (N-S)	100 <sup>th</sup> STREET	NATIONAL MUSEUM	7,78	27,38	2412	1776	2,5	24,0	11
379A (S-N)	P. 20 JULIO	72 <sup>nd</sup> STREET	11,63	36,78	1251	721	2,5	24,0	15
379A (N-S)	72 <sup>nd</sup> STREET	P. 20 JULIO	11,63	36,78	2709	1945	2,5	24,0	15

SERVICE	ORIGIN	DESTINATION	LENGTH (KM)	TIME (MIN)	BOARDING DESIGN	VOLUME DESIGN	ADJUSTED INTERVAL	ADJUSTED FREQUENCY	REQUIRED FLEET
379B (S-N)	P. 20 JULIO	72 <sup>nd</sup> STREET	11,63	36,28	1004	644	2,5	24,0	15
379B (N-S)	72 <sup>nd</sup> STREET	P. 20 JULIO	11,63	36,28	2706	1656	2,5	24,0	15
92 (S-N)	P. 20 JULIO	100 <sup>th</sup> STREET	14,87	48,51	3529	2432	2,0	30,0	25
92 (N-S)	100 <sup>th</sup> STREET	P. 20 JULIO	14,87	48,51	5755	4293	2,0	30,0	25
E3 (S-N)	P. 20 JULIO	72 <sup>nd</sup> STREET	11,63	35,78	844	587	2,9	20,7	13
E3 (N-S)	72 <sup>nd</sup> STREET	P. 20 JULIO	11,63	36,28	2706	1656	2,9	20,7	13
346A (S-N)	BICENTENARIO	100 <sup>th</sup> STREET	10,65	33,42	1123	942	5,1	11,8	7
346A (N-S)	100 <sup>th</sup> STREET	BICENTENARIO	10,65	33,42	994	871	5,1	11,8	7
346B (S-N)	BICENTENARIO	100 <sup>th</sup> STREET	10,65	34,92	1934	1639	2,5	24,0	14
346B (N-S)	100 <sup>th</sup> STREET	BICENTENARIO	10,65	34,92	2204	1821	2,5	24,0	14
								<b>TOTAL FLEET</b>	<b>200</b>

Source: TRANSMILENIO S.A., prepared based on the transportation level

### Line 3. Technological upgrade in the zone component

The objective of this action line is to achieve the arrival and operation of buses with zero or low on-route emission technologies in the Zone Component of the Public Transportation Integrated System (SITP) and facilitate the pioneer routes so that the foresaid transportation technology may start operating in Bogotá, D.C.

The zone component is part of the SITP and the technological upgrade process. Then, twenty five (25) pioneer routes have been defined to start the implementation of the new technologies. In order to do that, technical aspects were evaluated considering the degree of slope, which is lower than 9%, and the fact that the buses have 80-passenger capacity to achieve satisfactory operation.

The table below shows a list of the 25 pioneer routes that were originally designed. They could be modified once the detailed and recognition study is carried out in the field of every one of such routes.

**Table 3** Routes with slope lower than 9%.

FINAL CODE	TYPE OF VEHICLE – SITP DESIGN	ROUTE TYPE	ORIGIN ZONE	DESTINATION ZONE	SITP ORIGIN FLEET	SITP DESTINATION FLEET
593	80	Urban	Kennedy	Neutral	24	
C33	80	Urban	Suba Oriental	Kennedy	20	19
19-6	80	Complementary	Usaquén	Usaquén	9	
19-8	80	Complementary	Usaquén	Usaquén	6	
227	80	Urbana	San Cristóbal	Tintal - Zona Franca	27	26
19-10	80	Complementary	Suba Oriental	Suba Oriental	3	
232A	80	Urban	Fontibón	Neutral	27	
C70	80	Urban	Fontibón	Kennedy	11	10



FINAL CODE	TYPE OF VEHICLE – SITP DESIGN	ROUTE TYPE	ORIGIN ZONE	DESTINATION ZONE	SITP ORIGIN FLEET	SITP DESTINATION FLEET
169	80	Urban	Suba Centro	Usaquén	18	17
300	80	Urban	Ciudad Bolívar	Suba Centro	23	23
20-1	80	Complementary	Engativá	Engativá	7	
660	80	Urban	Engativá	Neutral	24	
Z1	80	Urban	Usaquén	Kennedy	21	21
E63	80	Urban	Suba Centro	Usaquén	19	18
140	80	Urban	STREET 80	Neutral	44	
235A	80	Urban	Fontibón	Neutral	44	
C92	80	Urban	Engativá	Usaquén	15	15
20A	80	Urban	STREET 80	Neutral	29	
734	80	Urban	Kennedy	Usaquén	26	25
367	80	Urban	Bosa	Neutral	24	
571	80	Urban	Bosa	Neutral	55	
186	80	Urban	Suba Centro	Neutral	29	
C108	80	Urban	Suba Centro	Neutral	37	
C80	80	Urban	Bosa	Neutral	36	
126	80	Urban	Ciudad Bolívar	Engativá	19	19
<b>TOTAL FLEET (790)</b>					<b>597</b>	<b>193</b>

Source: TRANSMILENIO S.A.

In order to attain this objective, the following procedure has been designed and it must be followed by every one of the dealers of these routes:

The operator or operators of the aforementioned routes will present to the managing body the zero or low on-route emission technology that they have selected for their operation; along with their operation model and the development of the infrastructure needed to develop such technology.

Based on the information submitted by the operator, the District Administration shall carry out the technical, operational, financial and juridical feasibility studies which will allow the implementation or incorporation of the fleet with the new technology within the framework of SITP operation.

It is worth noting that the technical and operational studies must comply with the execution of the different protocols and tests that have been listed as necessary in line 1 of the present document (Line 1. Test bank and Laboratory City).

Additionally, this line intends to generate a continuous technological upgrade system in order to guarantee the city will have a progressive renewal process within the SITP components. This situation will come true in the replacement of automotive vehicles, which have been included as used fleet in the process of the SITP implementation.

In order for this situation to take place, the District Administration shall generate the scenarios needed to replace the used vehicles of SITP by zero or low on-route emission vehicles. This activity will be developed in the framework of their competence by the District Secretaries of Environment and Mobility; and TRANSMILENIO S.A.

#### Line 4. Technological upgrade in the trunk component.

The goal of this midterm action line is to replace the trunk operation fleet of Phases I and II of the massive transportation system by zero or low on-route emission technology buses. This process will be called “Fase de Movilidad Limpia Troncal” (“Trunk Clean Mobility Phase”). Regardless of the compliance with current environmental regulation and goals of energy efficiency established at the national level.

This line begins to take place with the coming termination of contracts of Trunk Concession of phases I and II. It will create an opportunity to replace the vehicles which currently provide the service by automotive vehicles of zero or low on-route emission technologies.

As far as the city mass transportation system is concerned, it consists of a fleet close to 1400 trunk buses. 1215 buses out of the 1400 buses belong to the concessions of phases I and II, which would be the goal of this line.

In order for the BRT system of the city to achieve the migration to zero or low on-route emission technologies, it is necessary to follow some guidelines which need to be taken into consideration from the operational point of view. They include variables such as supply, demand, infrastructure, operation parameters and system flexibility. This is a result of the degree of complexity of the trunk system and the great demand of passengers the system must serve.

#### Description of the *Sistema Troncal* (Trunk System).

The TransMilenio System is a BRT (rapid transit bus) system, which basically has to do with the operation of high occupancy buses on exclusive lanes. It is formed by a certain number of *troncales* (exclusive lane ways or trunks), which have been built and will continue to be built by phases.

Three phases have been built up to 2013 and they were built in the following order:

- ✓ **Phase I:** Autopista Norte, Avenida Caracas, 80<sup>th</sup> Street and Eje Ambiental (Environmental Axis) (2000 – 2002)
- ✓ **Phase II:** Avenida de las Américas, NQS, Avenida Suba (2003- 2005 – 2006)
- ✓ **Phase III:** 10<sup>th</sup> Carrera, 26<sup>th</sup> STREET, 6<sup>th</sup> STREET (under construction) (2012 – 2013)

6<sup>th</sup> street is currently under construction. When the construction is completed, the trunk system will have 109.3 km of total length. The table below shows the length of every one of the trunks divided by phases.

Length of System Trunks (km)		
Trunk length Phase I	Autonorte	10,3
	Caracas - Usme	18,3
	Caracas - Tunal	1,7
	80 <sup>th</sup> Street	10,1
	Eje Ambiental	1,9
	<b>Total Phase I</b>	<b>42,3</b>

Length of System Trunks (km)		
Trunk length Phase II	Américas	13
	NQS	19,3
	Suba	13
	<b>Total Fase II</b>	<b>45,3</b>
Trunk length Phase III	STREET 26 (sin aeropuerto)	12,2
	Carrera 10	7,3
	STREET 6	2,2
	<b>Total Fase III</b>	<b>21,7</b>
<b>Total length Phases I, II y III</b>		<b>109,3</b>

The system has three different types of bus stops: Single Bus Stops, Intermediate bus stops and Bus Stations. Passengers get on and off at single bus stops; Intermediate bus stops and bus stations serve this function as well besides integrating with bus transfers or feeding routes.

In the three phases of the system, there are 123 single bus stops, 9 bus stations and 8 intermediate bus stops; specifically (according to Phase and Trunks):

Single Bus Stops in the System		
<b>Bus Phase I Stops</b>	Autonorte	15
	Caracas Centro	14
	Caracas Sur	12
	80 <sup>th</sup> Street	11
	Eje Ambiental	2
	<b>Total Phase I</b>	<b>54</b>
<b>Bus Phase II Stops</b>	Américas	14
	NQS Central	11
	NQS Sur	10
	Suba	13
	<b>Total Phase II</b>	<b>48</b>
<b>Bus Phase III Stops</b>	26 <sup>th</sup> Street	13
	10 <sup>th</sup> Carrera	8
	<b>Total Phase III</b>	<b>21</b>
<b>Total Bus Stops Phases I, II y III</b>		<b>123</b>

Bus Stations in the System		
<b>Bus Stations Phase I</b>	Portal del Norte	1
	Portal de la 80	1
	Portal de Usme	1
	Portal del Tunal	1
	<b>Total Bus Stations Phase I</b>	<b>4</b>
<b>Bus Stations Phase II</b>	Portal de las Américas	1
	Portal del Sur	1
	Portal de Suba	1
	<b>Total Bus Stations Phase II</b>	<b>3</b>
<b>Bus Stations Phase III</b>	Portal El dorado	1
	Portal del 20 de Julio	1
	<b>Total Bus Stations Phase III</b>	<b>2</b>
<b>Total Bus Stations Phase I, II y III</b>		<b>9</b>

Intermediate Bus Stops in the System		
<b>Intermediate Bus Stops Phase I</b>	STREET 40 S	1
	Molinos	1
	Cra. 77	1
	Av. Cali	1
	<b>Total Intermedias F I</b>	<b>4</b>
<b>Intermediate Bus Stops Phase II</b>	Banderas	1
	General Santander	1

<b>Intermediate Bus Stops in the System</b>		
	<b>Total Intermedias F II</b>	<b>2</b>
<b>Intermediate Bus Stops Phase III</b>	Bicentenario	1
	Av. 1° de Mayo	1
	<b>Total Intermedias F III</b>	<b>2</b>
<b>Total Intermediate Bus Stops Phases I, II y III</b>		<b>8</b>

Source: TRANSMILENIO S.A.

The true success of TransMilenio System has been the implementation of express services, which have been possible with overtaking lanes at stops and traffic lights and by building double continuous lanes. Since these services are interrupted only at some stops, speed increases and the system operates more efficiently.

In order to materialize this phase, new contract processes will be structured and conducted a) in order for necessary trunk buses to start operating and, therefore, comply with the demand of the system and b) to execute the necessary infrastructure depending on the requirements of the technology to be implemented.

Furthermore, TRANSMILENIO S.A. and the District Secretary of Environment and Mobility – according to their competences and supported by the Trunk System Operators - will evaluate the performance of technology by documenting its operation, inconveniences, environmental and operational advantages and the performance of the technology and service in general terms.

(I, PASCUAL ORDUZ HIDALGO, Sworn Official Translator and Interpreter for the English-Spanish, Spanish-English languages, appointed pursuant to Resolution No. 1117 by the Ministry of Justice of Colombia, do hereby certify that the above translation fully corresponds to the original document written in Spanish. In witness whereof, I hereunto set my hand and Official seal on this 23<sup>rd</sup> day of October, 2013. Translator's contact Information: (571) 6135182, (57) 3002683504, traducciones@angloservicios.com, www.angloservicios.com)