VII. Service Monitoring

Public Transport Planning and Regulation: An Introduction

Planning and Analysis Building Blocks

Schedule Building

Cost Analysis and Financial Planning

Performance Analysis

Measures & Standar

Focus of Discussion

Service Monitoring and Data Collection

Network and Route Design

Fares and Revenue: Policy, Analysis, and Collection

Market Factors and Demand Analysis

Terminology and Basic Relationships

Measures/Standards & Service Monitoring: A Two-Way Relationship

- **Obvious Relationship**
  - **Service monitoring program should support evaluation and planning needs (measures and standards)**
- **Feedback Relationship:**
  - **Measures and standards should be consistent with service monitoring capabilities and available resources**

What Route Data Are Needed for Monitoring?

- **Scheduling**
  - Passenger load onboard (maximum load point and other important locations)
  - Bus arrival/departure times at selected time points
- **Service Planning**
  - Fare revenue
  - Passenger trips
    - By time-of-day
    - Boardings and alightings by stop
  - Transferring among routes
  - Passenger characteristics, travel patterns, and attitudes

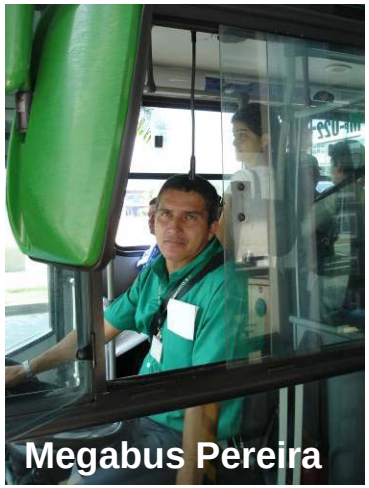
Typical Route Monitoring Techniques

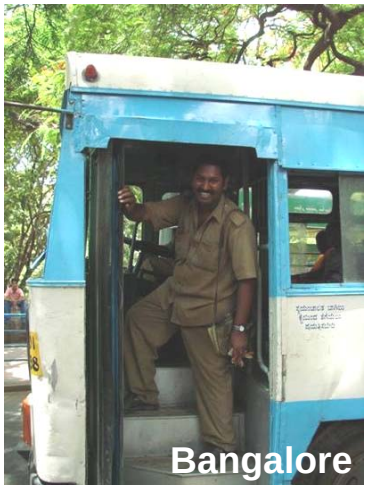
- Driver/Conductor Counts
- Point Counts
- On/Off Counts
- Station Entry/Exit Counts
- Travel Time Surveys
- Passenger Surveys

Driver/Conductor Counts

Method Drivers or conductors count passengers as part of the fare collection process. Turnstile counts may be used.

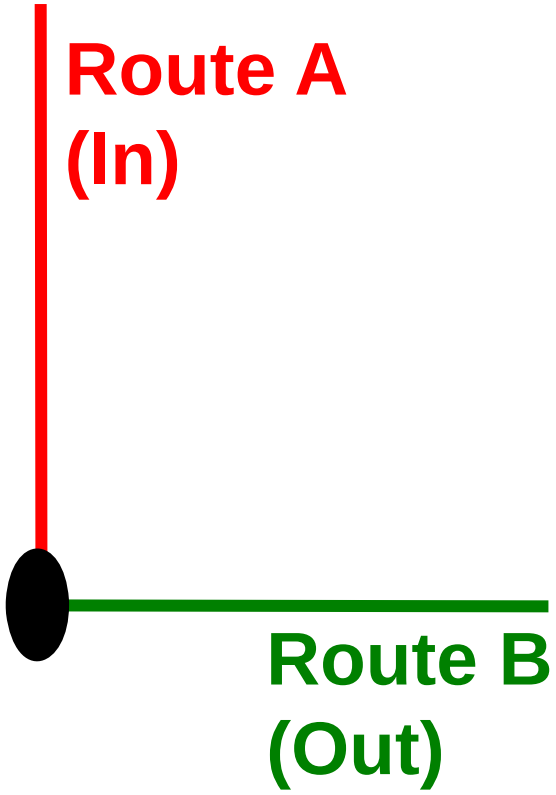
Limitation Drivers (conductors) on interlined routes must be careful to separate and record counts


Megabus Pereira


Bangalore

Driver/Conductor Counts and Interlining

- **Interlining**
  - Bus starts on Route A
  - It continues on Route B at the terminal
- **Counting Implications**
  - Counts should be taken separately on each route



Example of a Driver/Conductor Count Form

Route	*56*	**Date**	*20/12/2006*
Bus Number	*3213*	**Weather**	*Fair/28^{O}*
Schedule Number	*56-01*	**Operator**	*Zidane*

	Passengers					
Trip Number	**Adult**	**Student**	**Senior**	**Passes**	**Disabled**	**Totals**
1	*15*	*5*	*11*	*4*	*10*	*45*
2	*28*	*1*	*15*	*8*	*9*	*61*
3	*17*	*8*	*2*	*10*	*10*	*47*
4	*20*	*3*	*3*	*3*	*21*	*50*

(Some Systems Record Running Totals)

Key Data and Uses
Driver/Conductor Counts

- **Total Boardings by Trip (sometimes by fare category)**
  - **Assess productivity**
  - **Revise the service design**

- **Revenue by Trip**
  - **Assess productivity**

Point Counts

Method Data collector stands at a bus stop and records passenger load and arrival (or departure) time.

Procedure

Light Loads	Count Passengers
Heavy Loads	Count Empty Seats
Standing Loads	Count Standing Passengers and Empty Seats

Problems Tinted windows or full bus advertising may require data collector to board bus

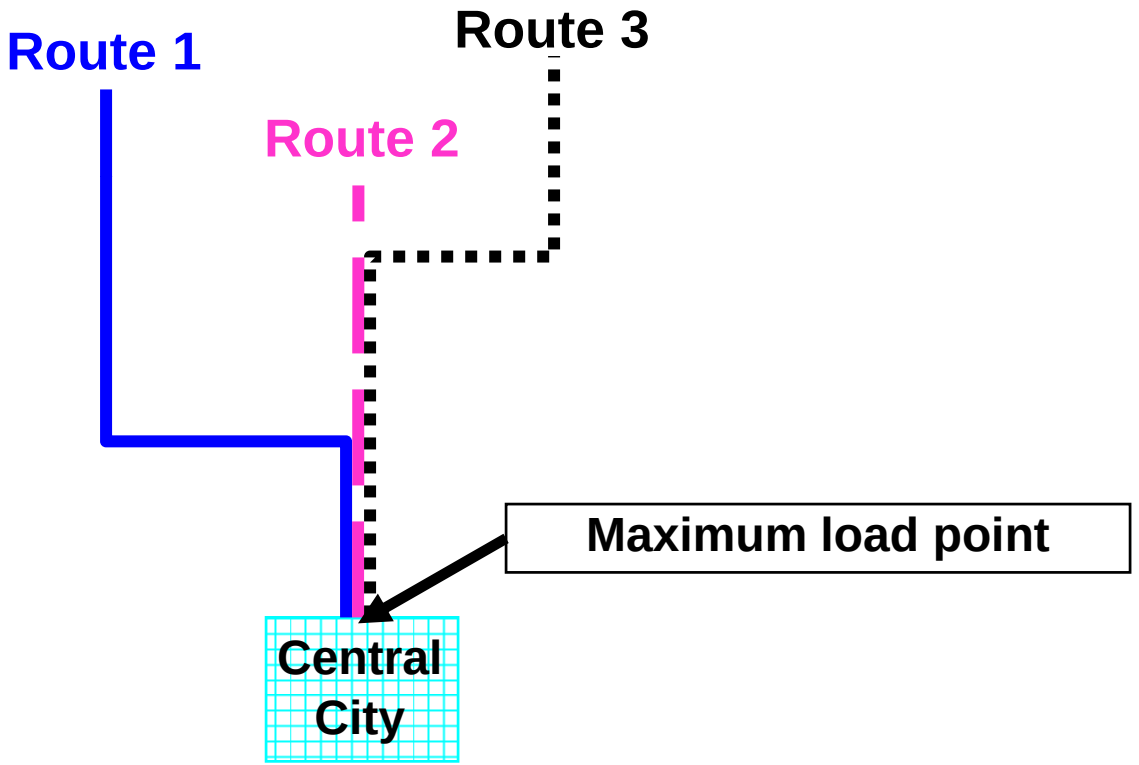
BMTC

Example of a Point Check Form

Route(s)	*36,47*	Weather	*Rain/31°*
Day	*Monday*	Collector	*Bagui*
Date	*14/02/2006*	☒ Maximum Load	
Location	*7th Ave/26th St*	☐ Arrival Time	
Direction	*Inbound*	☒ Departure Time	

Route Number	Bus Number	Scheduled Time	Actual Time	Passengers On Bus
36	*9926*	7:03	*7:05*	*40*
47	*0101*	7:05	*7:06*	*43*
47	*9709*	7:10	*7:12*	*50*
36	*0511*	7:15	*7:18*	*38*

Many Routes Can Be Covered At Once in a Radial System



Key Data and Uses Point Checks

- **Load count**
  - **Scheduling: Calculate *demand intervals***
    - **When count taken at the maximum load point**

- **Arrival (departure) times**
  - **Assess schedule adherence**
  - **Revise scheduled running times**

On/Off Counts

Method **A data collector rides the bus and, at each stop, records:**

- **Passenger ons and offs**
- **Bus arrival (departure) times at time points.**

Option **Automatic Passenger Counters**

Example of a On/Off Count Form

Route	*53*	**Date**	*30/06/2006*
Bus Number	*2456*	**Weather**	*Sun/33^{O}*
Schedule Number	*53-11*	**Observer**	*Chahiri*

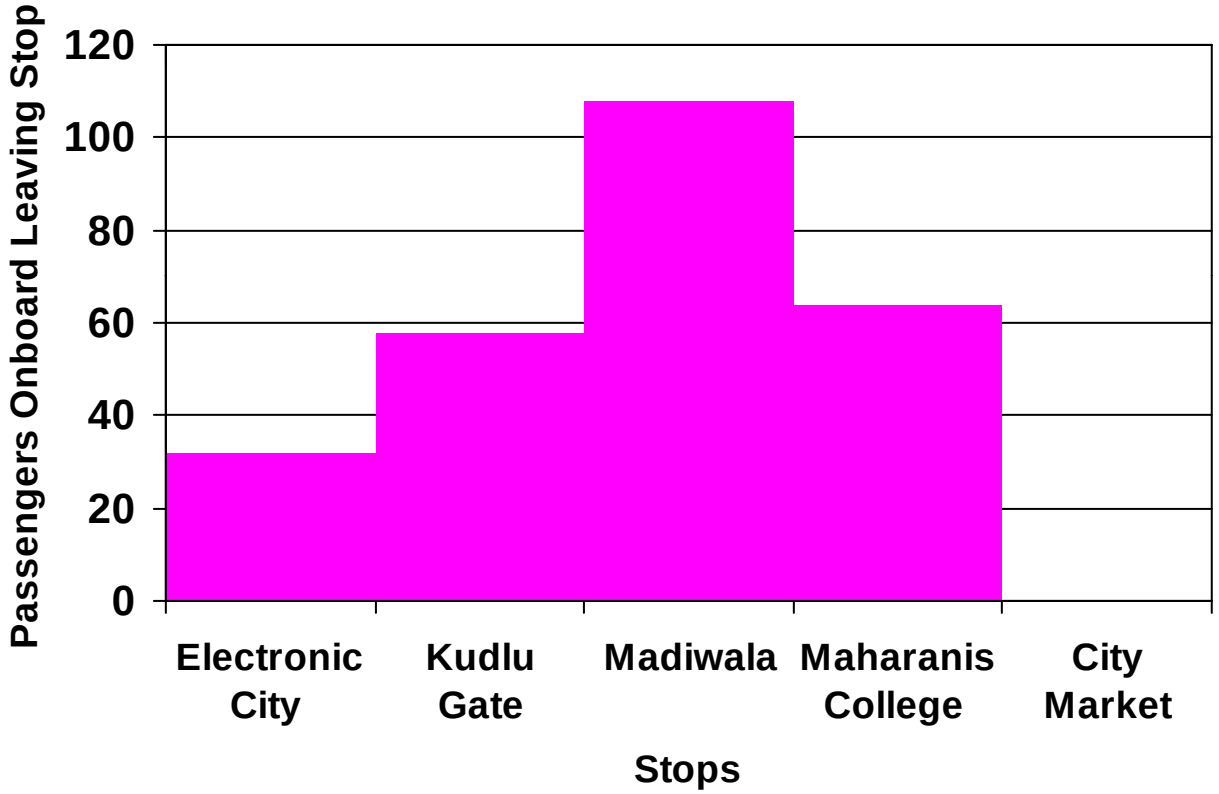
Scheduled	Actual	Stop Location	On	Off	Total	Comments
7:03	*7:03*	Marche	*16*		16	
		6th/Main	*15*	*2*	29	
7:19	*7:20*	12th/Main	*28*	*3*	54	*No sign*
		15th/Main	*3*	*25*	32	
7:30	*7:34*	City Terminal		*32*	0	
		Totals	*62*	*62*		

Key Data and Uses On/Off Counts

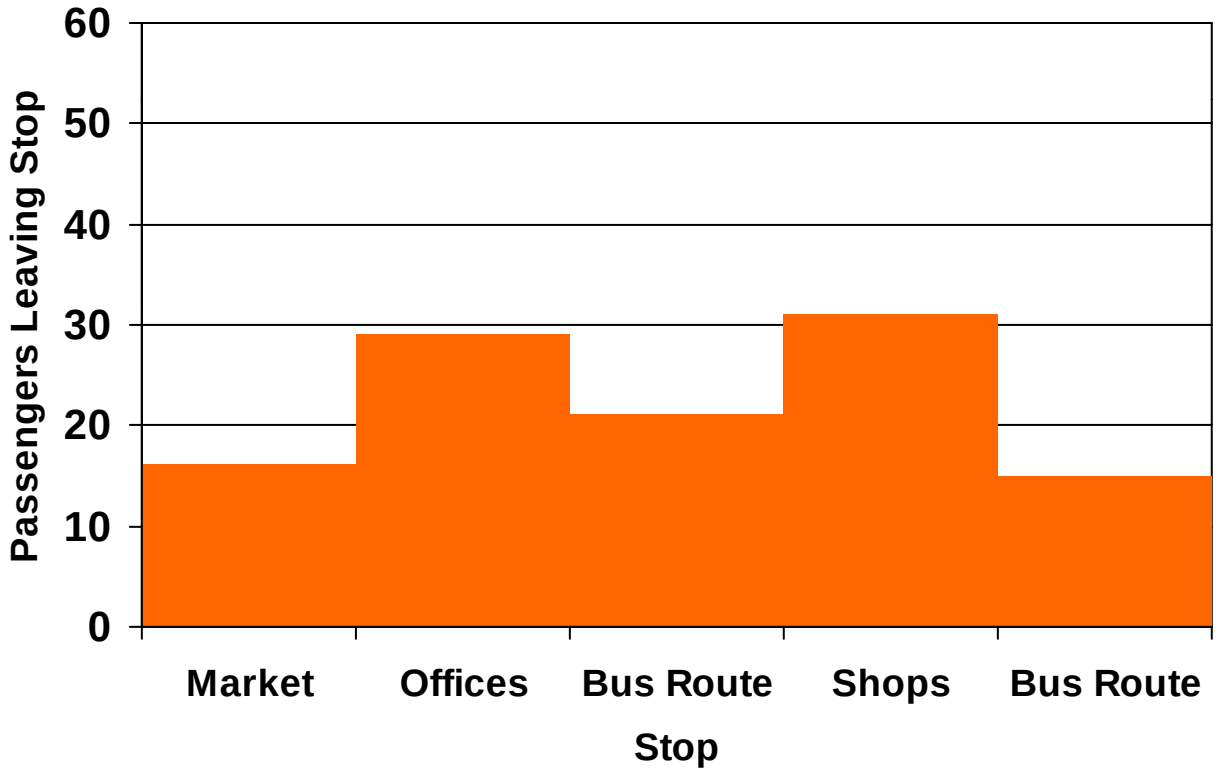
- **On and off counts by stop**
  - **Revise the service design through analysis of the passenger loading profile**
  - **Identify priority sites for passenger amenities (e.g., shelters, benches)**

- **Arrival (departure) times**
  - **Assess schedule adherence**
  - **Revise scheduled running times**

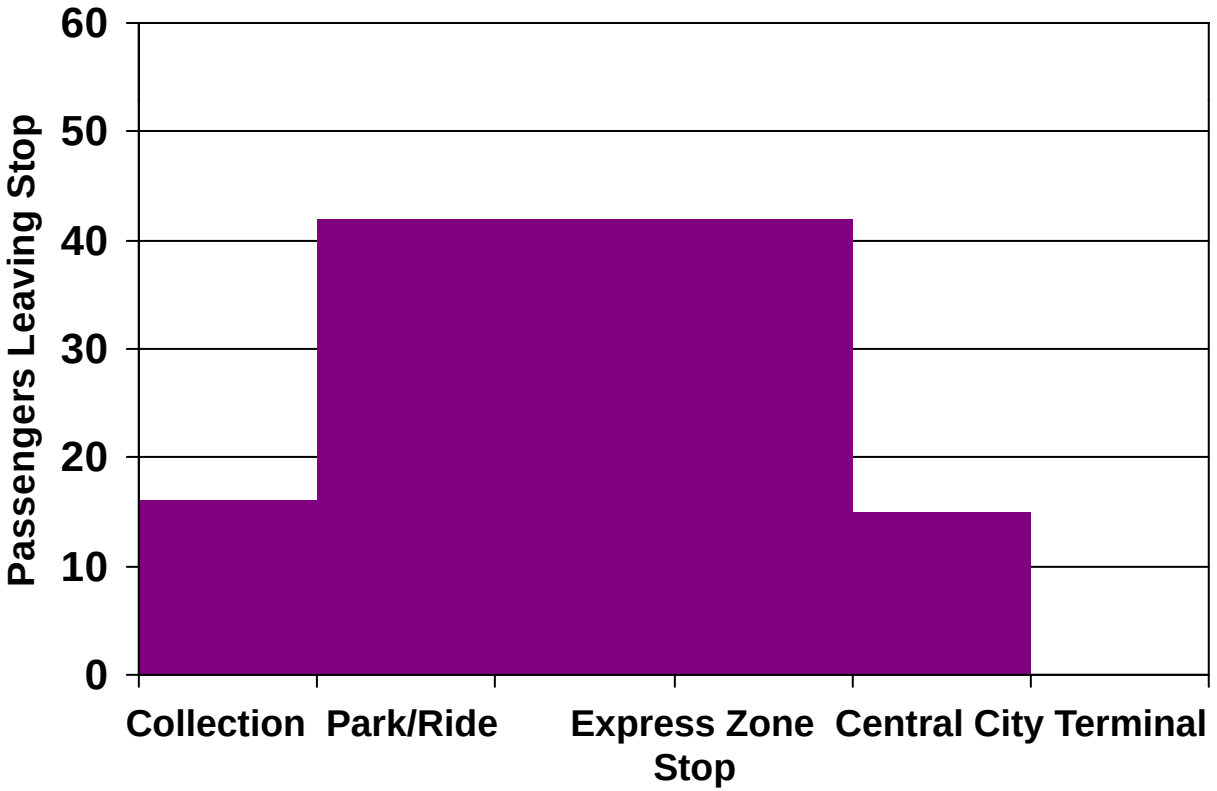
Load Profile Diagram
Radial Bus Route



Load Profile Diagram
Grid or Crosstown Bus Route

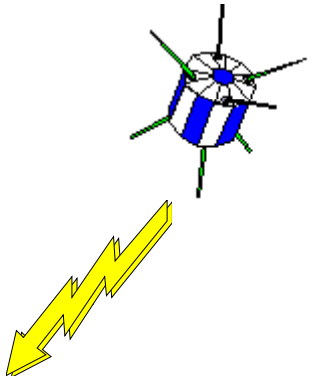


Load Profile Diagram
Express Bus Route



Automatic Passenger Counters Can Collect On/Off Data

- **Location of bus (AVL)**
  - **Global Positioning Systems (GPS)**
- **Passenger counting (APC)**
  - **Infra-red logic**
- **Time from on-board clock**



Station Entry/Exit Counts

Method

Passengers entering and exiting stations are counted using turnstiles or IC/Smartcards

Information

1. **Entering and exiting passengers by station**
2. **Can estimate travel patterns between stations (origins-destinations)**
3. **Can estimate passenger boardings and loads per route**
4. **Can estimate on/offs by station**

Megabus Pereira

Travel Time Surveys

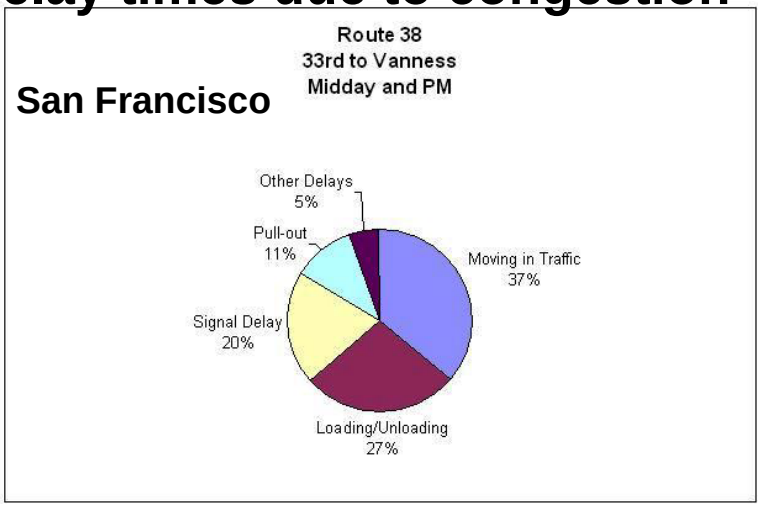
Method

Data collector records arrival/ departure times at stops, intersections, and points of delay.

Option: Can use automatic vehicle location (AVL)

Information

1. **Running times between stops**
2. **Stop dwell times**
3. **Delay times at traffic signals**
4. **Delay times due to congestion**



Passenger Surveys

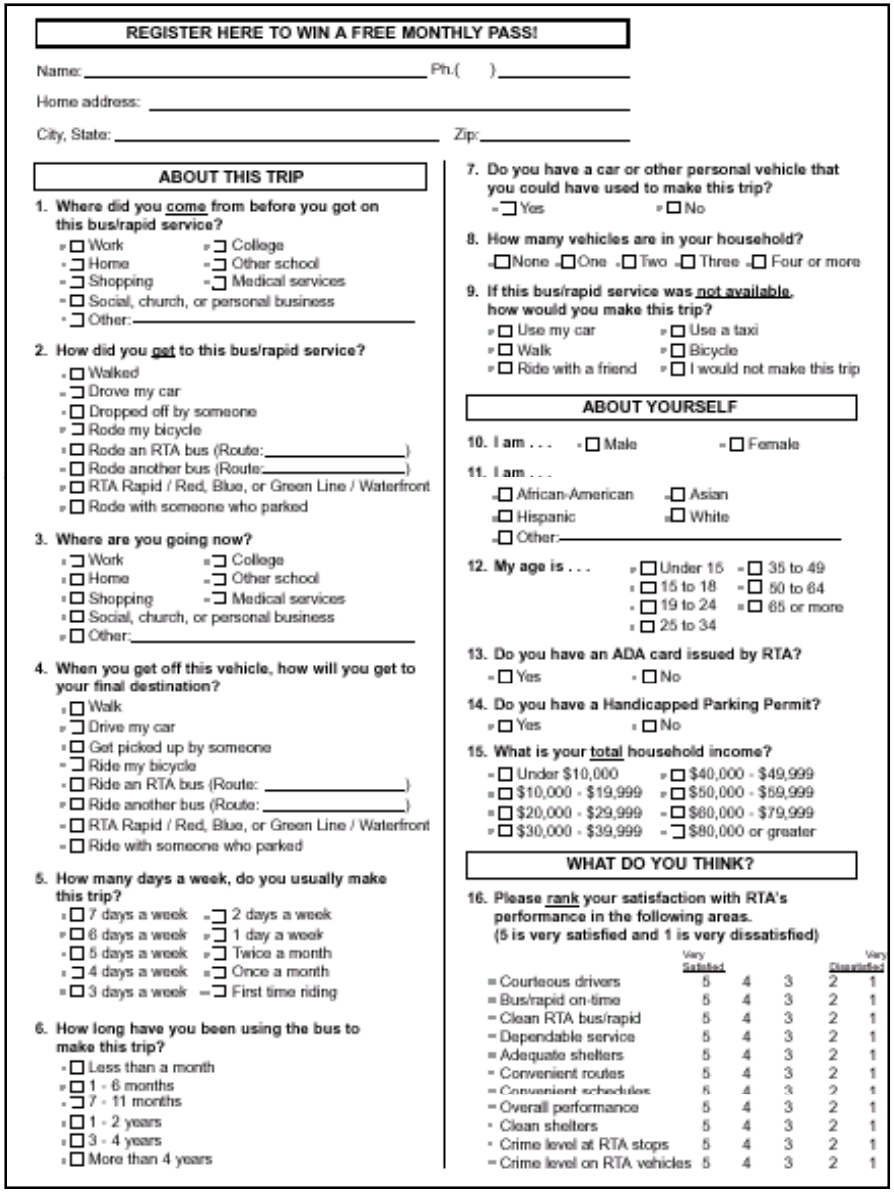
Method

Passengers are surveyed on the bus. The forms are distributed by drivers, data collectors, or special survey staff.

Information

1. **Passenger characteristics (e.g., car available, income, age, gender)**
2. **Travel patterns (e.g., purpose, origins/destinations, frequency)**
3. **Evaluation of service quality, amenities**

Example of Survey Card



REGISTER HERE TO WIN A FREE MONTHLY PASS!

Name: _____ Ph.( ) _____

Home address: _____

City, State: _____ Zip: _____

ABOUT THIS TRIP

1. **Where did you come from before you got on this bus/rapid service?**
   - ☐ Work
   - ☐ College
   - ☐ Home
   - ☐ Other school
   - ☐ Shopping
   - ☐ Medical services
   - ☐ Social, church, or personal business
   - ☐ Other: _____

2. **How did you get to this bus/rapid service?**
   - ☐ Walked
   - ☐ Drove my car
   - ☐ Dropped off by someone
   - ☐ Rode my bicycle
   - ☐ Rode an RTA bus (Route: _____)
   - ☐ Rode another bus (Route: _____)
   - ☐ RTA Rapid / Red, Blue, or Green Line / Waterfront
   - ☐ Rode with someone who parked

3. **Where are you going now?**
   - ☐ Work
   - ☐ College
   - ☐ Home
   - ☐ Other school
   - ☐ Shopping
   - ☐ Medical services
   - ☐ Social, church, or personal business
   - ☐ Other: _____

4. **When you get off this vehicle, how will you get to your final destination?**
   - ☐ Walk
   - ☐ Drive my car
   - ☐ Get picked up by someone
   - ☐ Ride my bicycle
   - ☐ Ride an RTA bus (Route: _____)
   - ☐ Ride another bus (Route: _____)
   - ☐ RTA Rapid / Red, Blue, or Green Line / Waterfront
   - ☐ Ride with someone who parked

5. **How many days a week, do you usually make this trip?**
   - ☐ 7 days a week
   - ☐ 2 days a week
   - ☐ 6 days a week
   - ☐ 1 day a week
   - ☐ 5 days a week
   - ☐ Twice a month
   - ☐ 4 days a week
   - ☐ Once a month
   - ☐ 3 days a week
   - ☐ First time riding

6. **How long have you been using the bus to make this trip?**
   - ☐ Less than a month
   - ☐ 1 - 6 months
   - ☐ 7 - 11 months
   - ☐ 1 - 2 years
   - ☐ 3 - 4 years
   - ☐ More than 4 years

7. **Do you have a car or other personal vehicle that you could have used to make this trip?**
   - ☐ Yes
   - ☐ No

8. **How many vehicles are in your household?**
   - ☐ None ☐ One ☐ Two ☐ Three ☐ Four or more

9. **If this bus/rapid service was not available, how would you make this trip?**
   - ☐ Use my car
   - ☐ Use a taxi
   - ☐ Walk
   - ☐ Bicycle
   - ☐ Ride with a friend
   - ☐ I would not make this trip

ABOUT YOURSELF

10. **I am . . .** ☐ Male ☐ Female

11. **I am . . .**
    - ☐ African-American
    - ☐ Asian
    - ☐ Hispanic
    - ☐ White
    - ☐ Other: _____

12. **My age is . . .**
    - ☐ Under 15
    - ☐ 35 to 49
    - ☐ 15 to 18
    - ☐ 50 to 64
    - ☐ 19 to 24
    - ☐ 65 or more
    - ☐ 25 to 34

13. **Do you have an ADA card issued by RTA?**
    - ☐ Yes
    - ☐ No

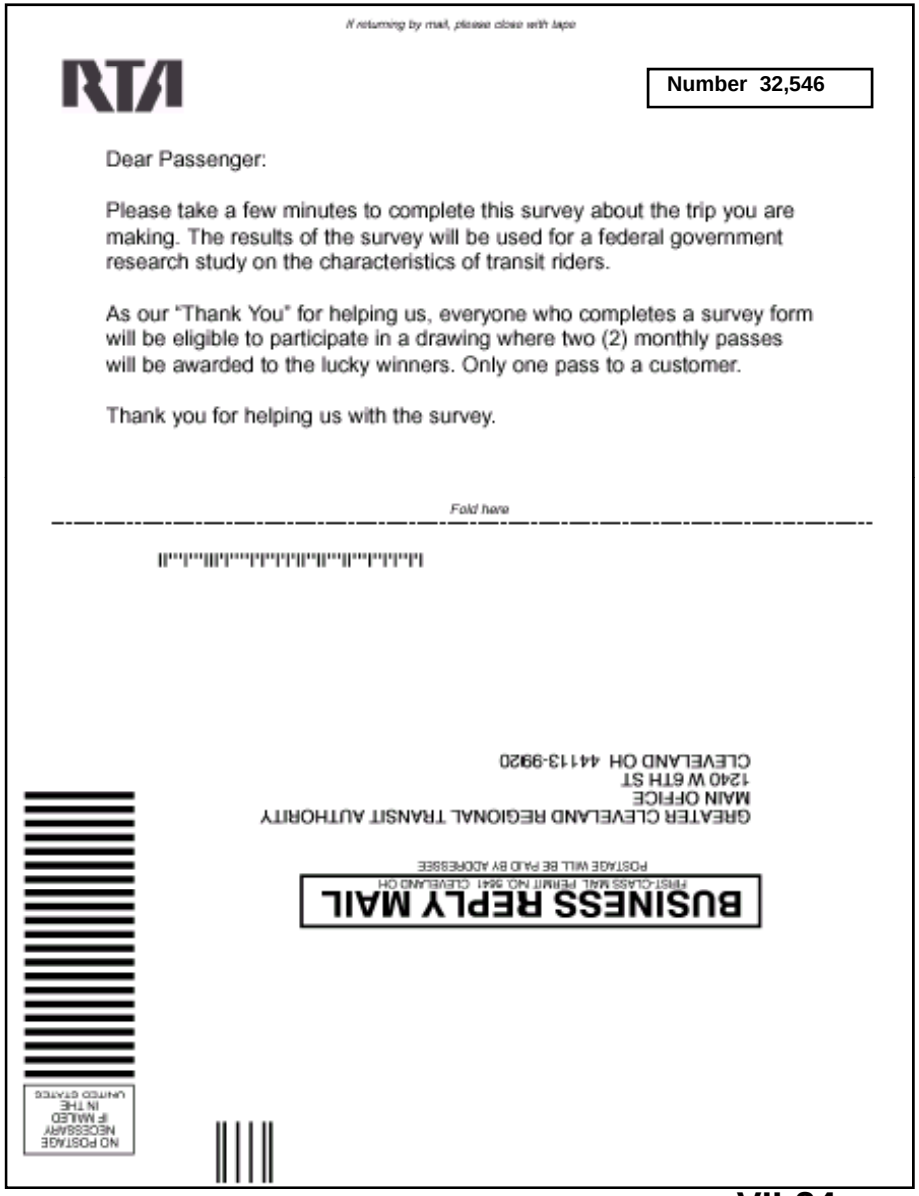
14. **Do you have a Handicapped Parking Permit?**
    - ☐ Yes
    - ☐ No

15. **What is your total household income?**
    - ☐ Under $10,000
    - ☐ $40,000 - $49,999
    - ☐ $10,000 - $19,999
    - ☐ $50,000 - $59,999
    - ☐ $20,000 - $29,999
    - ☐ $60,000 - $79,999
    - ☐ $30,000 - $39,999
    - ☐ $80,000 or greater

WHAT DO YOU THINK?

16. **Please rank your satisfaction with RTA's performance in the following areas. (5 is very satisfied and 1 is very dissatisfied)**

	Very Satisfied				Very Dissatisfied
Courteous drivers	5	4	3	2	1
Bus/rapid on-time	5	4	3	2	1
Clean RTA bus/rapid	5	4	3	2	1
Dependable service	5	4	3	2	1
Adequate shelters	5	4	3	2	1
Convenient routes	5	4	3	2	1
Convenient schedules	5	4	3	2	1
Overall performance	5	4	3	2	1
Clean shelters	5	4	3	2	1
Crime level at RTA stops	5	4	3	2	1
Crime level on RTA vehicles	5	4	3	2	1



If returning by mail, please close with tape

RTA

Number 32,546

Dear Passenger:

Please take a few minutes to complete this survey about the trip you are making. The results of the survey will be used for a federal government research study on the characteristics of transit riders.

As our "Thank You" for helping us, everyone who completes a survey form will be eligible to participate in a drawing where two (2) monthly passes will be awarded to the lucky winners. Only one pass to a customer.

Thank you for helping us with the survey.

Fold here

GREATER CLEVELAND REGIONAL TRANSIT AUTHORITY
MAIN OFFICE
1240 W 6TH ST
CLEVELAND OH 44113-9920

BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO. 9641 CLEVELAND OH
POSTAGE WILL BE PAID BY ADDRESSEE

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

Data Items Obtained By Collection Techniques

- **No one technique is sufficient**
- **Passenger surveys are critical**
- **Not all *X*'s are "equal"**

Monitoring Technique	Scheduling		Service Planning					
	Load	Arrival/ Departure Time	Fare Revenue	Boardings	Boardings by Fare Category	Boardings by Stop	Transfer Rates	Passenger Characteristics/ Travel Patterns/ Attitudes
Driver/ Conductor Count			X	X	X		X	
Point Count	X	X						
Ride Count	X	X	X	X	X	X	X	
Station Entry/Exit Counts	X			X		X	X	X
Travel Time Survey		X						
Passenger Survey			X	X	X	X	X	X

Who Should Collect Data and Monitor Performance?

- **The public authority should always monitor service and operations to assess:**
  - **Operator compliance with government policies and requirements (e.g., safety, operating contracts, concessions)**
  - **How well the public is being served**
- **The contractor/operator should monitor to:**
  - **Fine-tune services to meet changing conditions**
    - **Congestion and travel speeds**
    - **Passenger markets**

Public Authority Monitoring Options

- **Internal staff**
- **Contract to third party**

Identifying New Transit Markets
GIS is an Important Tool!

- **GIS = Geographical Information System**

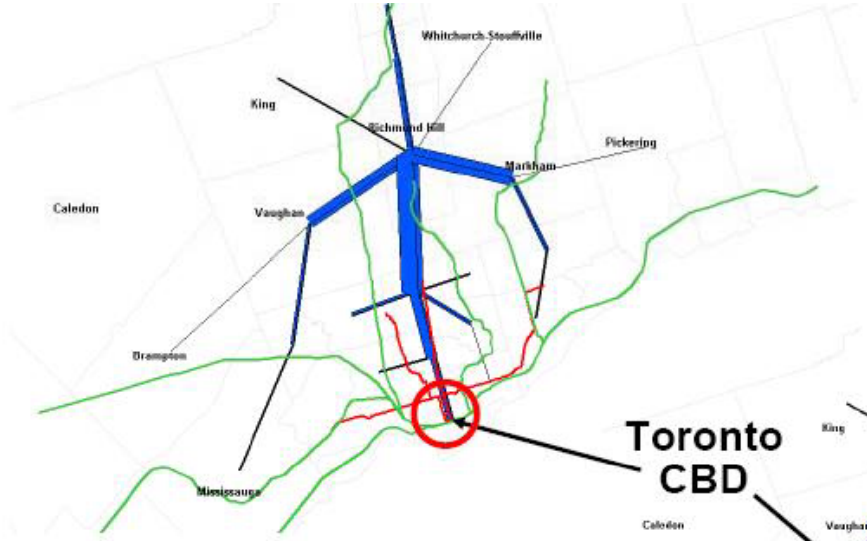
- **Integrates Key Data into One Database**
  - **Socio-Economic**
  - **Major Generators and Land Use**
  - **Origin-Destination Travel Patterns**
  - **Street Network**

GIS Techniques

- **Network Analysis**
- **Desire lines**
- **Route sketch planning**

Shiajzhuang Example Network Analysis

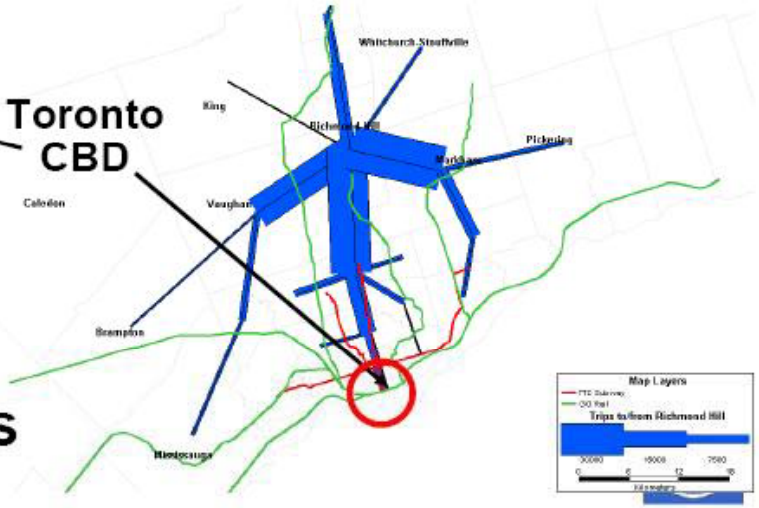
Desire Line Analysis Example



1996 Survey

Toronto CBD

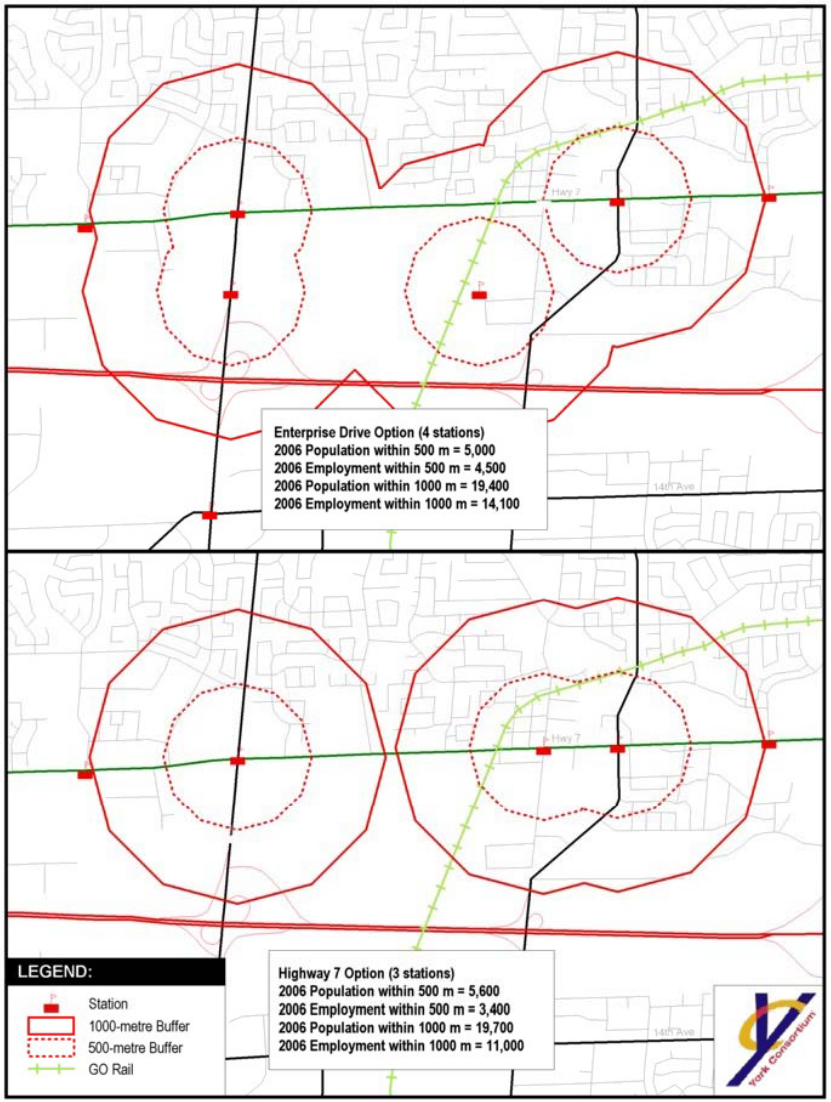
Projected 2021 Trips



Non-Toronto CBD Trips Growing Fastest

The World Bank

Route Sketch Planning Example



Summary

- **Discussed six basic monitoring techniques pertaining to existing service and users**

- ***Remember*, good data is key to:**
  - **Understanding current markets and performance**
  - **Identifying new markets**