

Photographic bicycle counts

Photographic bicycle counts combines the reliability of the automated processes with the practical and low-cost practice of manual bike counts.

This new method of bicycle counting was developed to respond to the needs of cyclists groups as well as civic organizations as partners in the process of local bikeway planning.

The translation of this manual, originally produced in Portuguese by a non-profit organization in Rio de Janeiro, Brazil by the name of Transporte Ativo (Active Transport), was meant to target the same goals in other countries. Furthermore, it offers a low-cost and efficient way to monitor the flow of bicycle traffic.

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Why count cyclists?

- ⦿ New urban political tendencies stipulate higher mode splits for cycling
- ⦿ Will new bicycle facilities generate more bicycle traffic? If so, how much?
- ⦿ Financing infrastructure will require more controlled and structured methods to justify expenditures
- ⦿ The relative success of promotion campaigns need to be determined
- ⦿ Counts help engineers design layouts according to needs, making efficient use of limited resources and time
- ⦿ Seasonal variations in cycling should be assessed
- ⦿ Cycling counts will allow engineers to plan maintenance priorities appropriately
- ⦿ Tourist and visitor circulation patterns should be quantified
- ⦿ The attraction of any given destination should be determined
- ⦿ A ranking of locations by usage is important, especially for benefit-cost studies



Throughout the world, bicycle counts have been incompletely and infrequently performed. Unlike the established methodology for counting motor vehicles, monitoring cycle use is still in its infancy. In addition, bicycle counts have usually been a difficult, expensive and labor-intensive task for transit authorities.

From an urban policy perspective, growth in bicycle traffic (rather than motor vehicle traffic) is desirable, as the bicycle is the most efficient vehicle in terms of road space, parking space, fuel consumption and emissions. Increased bicycle use can reduce the need for new and expensive road infrastructure, which improves the efficiency of the overall transport system.

Once cycling is supported at a policy level by local, regional and national governments, cost-effective methods of monitoring cycling activity will be needed to monitor the effectiveness of existing and future policies.

Local authorities should develop a robust system for monitoring and evaluating cycling activities throughout their area to enable targets to be set for future growth.

It is essential that data on cycling activities is recorded both before and after the introduction of new measures aimed at increasing cycling. This applies as much to soft (promotion etc) as hard (infrastructure) measures as well as changes in policy. Not only does the subsequent evaluation help justify the expenditure it also helps demonstrate the value of further investment.

As such, reliable bicycle traffic data will improve the accuracy of these analyses. This will be beneficial to not only bicycle facilities, but also for any project where bicycle traffic is a factor.

While city engineering and planning staff have a clear interest in bicycle counts, other groups may also find this data useful. Community health officials are naturally interested in promoting healthy lifestyles. Counts would give them some idea as to how many residents are cycling on a regular basis. Moreover, counts that include age categories may also be helpful to the health care professionals, trying to gauge the level of activity achieved by the growing number of senior citizens. The number of school-aged cyclists would be of interest to school officials for example, primarily for safe routes to school programs and safety education. Police departments would find value in the data for enforcement and safety reasons. Advocacy groups would find counts useful as they push for cycle-friendly measures in certain areas.

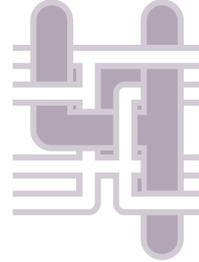
Reliability

To be meaningful, the process of monitoring cycling levels has to address a number of issues.

Bicycle use does not exhibit the same inflexible demand characteristics that enable conclusions to be reached about motor traffic levels based on one annual count. This means that in order to establish statistically significant results a number of counts have to

be done. Usually one needs to reach around a thousand cyclists counted at one point or one small area, to reach any kind of statistical significance. Counts are often stretched out over several days to reach this number. Clearly, this can impose a considerable burden on local authorities.

Fortunately, a range of techniques available to address these issues is outlined below.



General concepts:

 when, where and how to do it



Reasons to monitor bicycle traffic

There are four primary reasons why bicycle counts should be an essential and regular activity:

1. Conditions and trend analysis

record the current number of cyclists as this number tends to vary over time. As such, in order to set sensible targets, transit authorities must first accurately assess the current level of cycling in their areas.

2. Network planning

helps prioritize improvements and find locations needing attention

3. Accident analysis

develops exposure measures

4. Demand forecasting

calibrates models and identifies potential audience to support such efforts

Where to do the counts

Ideal locations are streets and pathways that are in a bicycle plan and are in close proximity to existing or proposed activity centers. Popular bike routes also should be considered, whether they are arterials with bike lanes, bridges, or popular trails.

A cordon count, surrounding a specific area, can be effective at measuring changes to one particular region. Occasionally it may be preferable to use a random sampling methodology to get an improved city-wide sample that can be extrapolated to the entire region.

When to do them

When to conduct the counting may depend upon the location of the site. If near a school, counts should be done on weekdays during their peak hours. Travel patterns generally vary over the course of the week.

Mondays and Fridays should be avoided. Counts should, therefore, be limited to Tuesday through Thursday, and not on holidays or when schools are not in session. However, if counts will be collected at or near popular recreation destinations, weekend or holiday counts would prove most beneficial.

For all locations, the best times to conduct counts are during the spring and fall months. Summer months tend to be during vacations and unpredictable levels of cycling. Cooler conditions in the winter can deter all but the most devoted cyclists. As such, counts also should take place on mild, sunny days. The date, weather conditions, and whether there was a holiday or special event nearby (such as a concert or sports event) should be included on the tally sheets.

Many surveyors deemed it necessary to supplement the automated counts with manual survey information to distinguish between cyclists and pedestrians and provide demographic characteristics, such as age, gender and reason for travel.

How to record

- Data should be collected systematically to enable a comparison of patterns over time.
- Data should be collected in a similar manner throughout a larger area (even nationwide) to allow comparison and aggregation.



Automated counts

The technologies investigated were:

1. **passive infrared detectors** - detect radiation emitted by people and animals
2. **active infrared detectors** - send out beams of infrared radiation that, when crossed, determine the presence and position of the obstruction
3. **radio beam detectors** - operate in a similar way as active infrared detectors, using radio waves rather than light waves
4. **underground pressure counters** - detect changes in surface pressure from passing vehicles or pedestrians by converting the pressure into an electric signal.
5. **pneumatic tube counters** - above-ground pressure counters
6. **video-image processing** - detect changes in pre-defined zones of interest as recorded by video cameras
7. **inductive loop detectors** - identify the electromagnetic signals of bicycles riding past using copper wire embedded in the ground



Advantages

All of the products that were reviewed count cyclists but many are also able to:

- ◆ record the direction of travel, speed and even position of bicycles; and
- ◆ distinguish between bicycles and motor vehicles and therefore can be used in mixed-traffic situations; and
- ◆ distinguish between cyclists and pedestrians and therefore is appropriate for shared-use, off-road paths where the numbers of pedestrians are also required.

Automated counters can count in wet and dry weather, day or night, and for long periods (weeks or months)

Disadvantages

- ◆ Most counters range in price from \$1000 to \$10,000, which does not include installation costs.
- ◆ They are also susceptible to theft and vandalism and occasionally thunderstorms will give false positive readings.

To obtain more detailed information about automated counting methods, refer to references sited at the end of this manual.

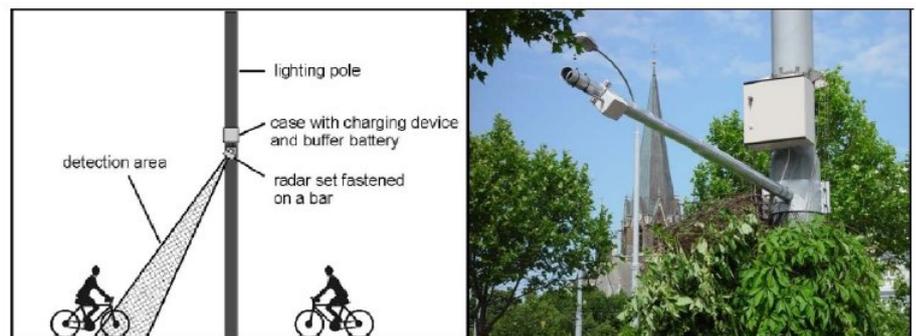


Figure 3: Functioning principle and detailed view of permanent bicycle traffic counting points
http://www.eltis.org/docs/studies/203_BERGER%20Velo%20Monitoring%20Vienna.pdf



Manual bicycle counts

Types

- Multi-locations, intersections or mid-blocks
- Cordon counts: a region is encircled by counters and cyclist numbers are measured
- Screen-line counts: every street along one roadway "line" will be measured for cyclists, usually a roadway along the border of residents (origins) and businesses (destinations)
- Cyclist (personal) interviews
- Bicycle parking
- Census data
- Travel surveys, often limited to one area

Advantages

- Low cost (if labor is cheap, otherwise can be cost-prohibitive)
- Contrary to automated methods, some information that can be obtained with simple observation of passing cyclists include:

- Gender
- Age group
- Helmet usage
- Sidewalk usage
- Types of cyclists and bicycles
- Whether cargo was carried on the bicycle



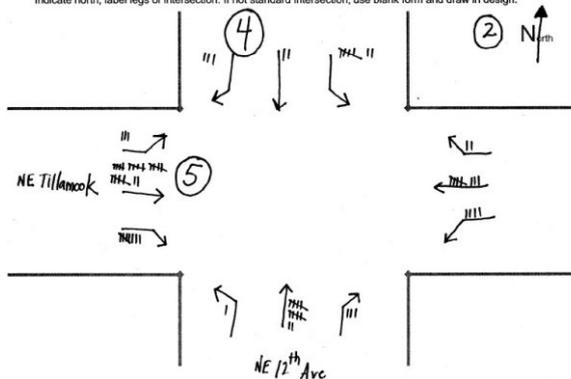
Disadvantages

- Specialized training is required
- Dependent on weather conditions

The use of sidewalks as bikeways could signal the need for on-street improvements.

	Male	Female	Total
	 		59
			16
<i>totals</i> →	45	30	75

Indicate movement thru intersection by using arrows to show direction of travel (left turns, through, etc.). Indicate north, label legs of intersection. If not standard intersection, use blank form and draw in design.



Example of a form used in a manual bike count by the Department of Transportation in Portland, Oregon, USA



Photographic Counts

Photographic counts was developed by a Brazilian non-profit, Transporte Ativo (Active Transport), so as to create an alternative method that is easy and inexpensive that combines low cost and the flexibility of manual counts with reliability of automated counters.



Equipment

If different cameras are used, all should be synchronized with the date and time.

The camera should be preset so that the date and hour are shown upon printing. Some newer cameras may not have this function. If that is the case, and in efforts to complete an accurate report, one should locate the corresponding information in the digital photo archive.



ATTENTION! The consumption of energy or battery is significant, as the camera is never shut off. As such, a large reserve is

necessary. In 12 hours of camera use it is estimated that 3 sets of batteries could be needed. If there are no extra batteries, ideally one should use different cameras that use the same memory card so they can be easily interchangeable between the cameras.

Photographs

The pictures should be taken with 3 megapixels. This way the camera acts more quickly with the next picture and does not require as much space on the hard drive or on the memory card while still maintaining the necessary picture quality.

Typical counts have occupied anywhere between 800MB and 1.5GB of space. As a precautionary measure, the memory cards used should be large enough to hold this much memory.

Turn off the function that displays the picture once it is taken. This will reduce the time it takes for the camera to take the next picture. There are moments where several consecutive pictures will be taken. If it is preferred, use the "sport" mode. 📷

No single picture should be taken with the zoom feature as it is difficult to focus and the surrounding area is cut off. In addition

to affecting the reporting, it fails to show where the cyclist is coming from.

Also, never use the flash during evening shots. Using the flash not only drastically exhausts the battery life, but it can be extremely distracting to the cyclists and can cause other conflicts. As such, find the best mode setting that will permit good quality pictures with little light. Use a tripod to improve the quality of the photos. Also, if possible, try to regulate the speed at which the lens opens. One can do so by exploring the panning technique.



IMPORTANT: Keep photos on the memory card until the report's author has stored them in at least two separate medias.





Locale



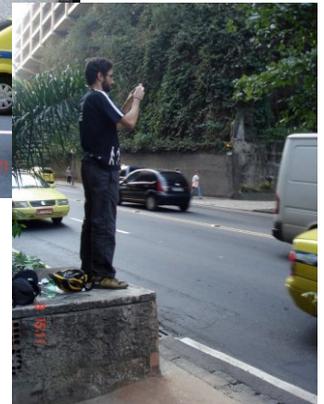
Define and study beforehand the “counting area.” The “counting area” is where counts will be taken. Corner areas should include the entire counting area.

The image shown here highlights the “counting area” and suggested surveyor positioning, in green.

All pictures are taken from the same place for each location. This is extremely important when reporting. See pictures here.



[Click on the images to see more pictures online](#)



Once a locale is selected, make sure that you can shoot from any angle.

Sometimes cyclists will pass behind you.

If the street is very wide, it is helpful to have more than one surveyor for each position.



Select a stretch of road space where pictures can be taken within the counting area. It is important to note that varying the positions from which pictures are taken will complicate reporting. In several situations it may not be possible to photograph the cyclist at a given point. In these cases, the picture must be taken however possible. See examples in this [camera icon](#) online album.



Counting Method

If unable to take a picture of a cyclist, take a picture of the street and direction they went so as to not lose the count and direction. If possible, record additional facts such as if the cyclist is: male or female, if they are on the sidewalk, street, wearing a helmet, or cycling in the wrong direction, the type of bicycle and whether they were carrying any cargo.

The cyclist should always be counted if they pass the counting area even if the same cyclist passes several times. In automated counts for example, no distinction or identification is made and as such all cyclists are recorded.

Pictures should be taken per every cyclist even when there is more than one cyclist at the same time. While the pictures will be almost identical, there should be separate pictures for different cyclists. As a result, at the end of the count, the number of pictures and cyclists should coincide.

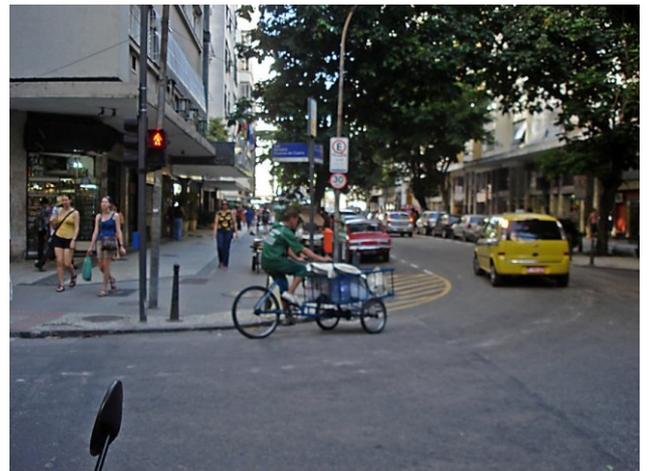


In the picture above, there are five cyclists in the counting area at the same time. Click on the image and see the sequence of the pictures of cyclists in the album.

Surveyors participating in the counting shall too be counted if arrived by bicycle since they would have entered the counting area.

Cyclists that come close to the counting area but do not enter should not be counted. Also, if a cyclist comes in the cyclist area only once, they should only be counted once.

Counts taken at corners will need additional observation points. In this case, in order to identify the originating route, one should photograph the cyclist in the middle of the curve.



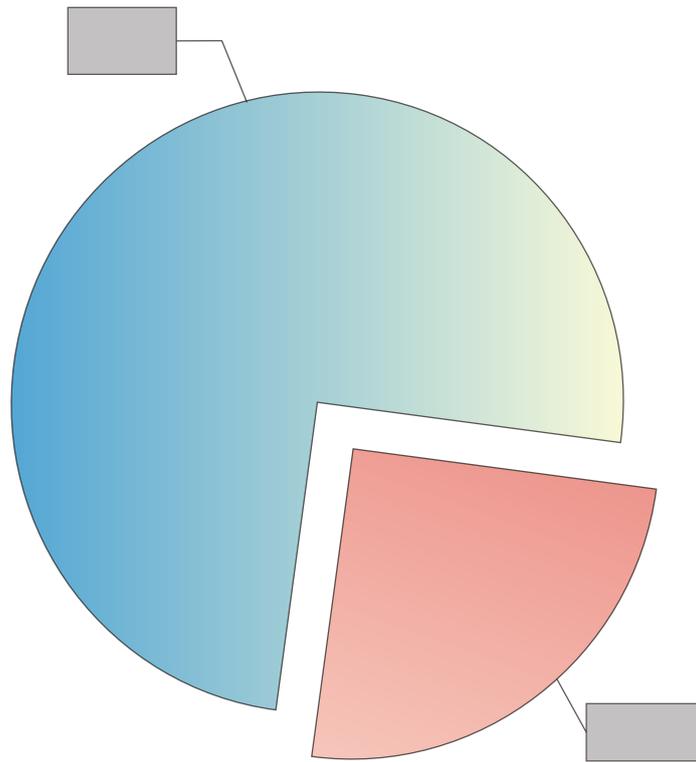
If someone questions why, simply explain that a bike count is being done to see what improvements could be made in that given area. Reactions will vary and many are positive.

It is possible to do counts with just one surveyor. However, the help of others is greatly recommended. The surveyor should always remain focused on passing cyclists so as to not let even one pass by uncounted. If more than one surveyor is present, they may share information regarding approaching cyclists, yet conversation should be limited so as to avoid error in counting.

The benefit of photographic counting allows you to return to the picture whenever necessary to observe new details. For example, look at samples in [attachments I and II](#) of a count taken in Rio de Janeiro, Brazil.

It is recommended to video the cyclists with a digital video set up on a tripod to complement the photos.

Lastly, during the count take advantage and record those on skateboards, skates or similar methods.



How to do the report

Transporte Ativo can provide a report template, made available on your [website](#), that can be edited accordingly with text, objects, maps, headers, and footers

IMPORTANT: Keep photos on the memory card until the report's author has stored them in at least two separate medias.





The report is explicitly technical in nature. As such, personal opinions should be avoided. Relevant comments such as, “cyclists are close to rails,” can be registered.

The first and most difficult phase is classifying all the pictures by time. If there are two pictures of the same cyclist, during the same time, use the best one. If however, there is only one picture for two cyclists, that picture should be duplicated in the album so that there is equal number of pictures as cyclists. If preferred, provide an explanation in the title of the picture. Normally, this is not recommended as this generates a considerable amount of additional work. For example, in one count there can be upwards of 500 cyclists. Yet, in specific cases, titles may become necessary.

A web album is needed so as to confirm all cyclists photographed. Once published, the album can be subject to auditing, if necessary. There are several online programs both with fees and free of cost. They include: iWebAlbum, Web Photo Album, Easy Website Photo Gallery and others. Transporte Ativo uses Web Album Generator: <http://www.ornj.net/webalbum/>

All pictures should be published in their original form free of cropping or special effects. Due to spacing issues, pictures will be automatically reduced. It should be understood and as such is explicitly advised that original photographs, in high definition, are available in case someone should request them.

A great advantage of photographic counting is the ability to return to the picture album whenever necessary to identify and quantify details previously left out.

In [attachments 1 and 2](#) of the count taken on a street in Rio de Janeiro, details were only added 6 months after the count.

To allow different methods of visualization, the report can be divided in three sections:

Graphics: Use the graphics from the template, substituting details such as names of streets, number of cyclists and percentages. The most relevant details required by most Transit Authorities in any given count are: destination, age range, gender, cyclists per hour and preferred route (street, sidewalk, wrong way). Other details can be included as necessary.

Photographs: Use photographs with good lighting that are polished and cropped for the best visual effect. Use relevant pictures only. For example, for the first hour of the count, between 6:00-7:00, choose pictures only taken within this hour. It is recommended to include photographs that call attention to significant details like number of cyclists with helmets, carts, types of bicycles, etc. Always include the web address where all the pictures from the count are made available.

Numbers: In this section, repeat the details from item 2 (above), however, with just numbers.

Finalize the report with a contact email and we ask that you please not forget to add the following:

This count was completed according to methodology developed by Associação Transporte Ativo www.ta.org.br





References

This manual was developed by Associação Transporte Ativo (Active Transport Association).

The introduction and general concepts were based on documents:

<http://www.nzta.govt.nz/resources/sustainable-transport/cycle-counting-in-nz/appendix-3.html>

http://www.ipenz.org.nz/ipenztg/papers/2002_pdf/34_MacBeth.pdf

<http://www.ecan.govt.nz/publications/General/CycleTrafficCounting.pdf>

http://www.eltis.org/docs/studies/203_BERGER%20Velo%20Monitoring%20Vienna.pdf

http://www.mtc.ca.gov/library/2001_rtp/downloads/bike/final_plan/toolbox-count.doc

http://www.dft.gov.uk/adobepdf/165240/244921/244924/TAL_1-99

http://www.dft.gov.uk/cyclingengland/site/wp-content/uploads/2008/10/c05_monitoring.pdf

<http://www.portlandonline.com/transportation/index.cfm?c=44671>

The spreadsheet models, report and digital version of this Manual and the counts made by Transporte Ativo are available online:

<http://www.ta.org.br/contagens>

See also Transporte Ativo blog:

<http://blog.transporteativo.org.br/category/contagem/>

Photographic bicycle counts

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