

# Effectiveness of Janmarg BRT *in* Ahmedabad, India

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# Ahmedabad

Ahmedabad (also spelled "Ahmadabad" and pronounced "Amdavad" in Gujarati<sup>1</sup>) is in Gujarat, a province in northwest India shown in Figure 1. Ahmedabad City covers 1,866 sq km (720 sq mi).<sup>2</sup> This district area is governed by the Ahmedabad Municipal Corporation (AMC) which oversees the Janmarg system<sup>3</sup> and had a population of over 7 million at the time of the last census in 2011.<sup>4</sup> The main metropolitan area of the city is less than a quarter of that - a mere 464 sq km (179 sq mi). It is this smaller area that is served by Ahmedabad's Bus Rapid Transit System (BRTS) the Janmarg under the supervision of Ahmedabad Janmarg Limited (AJL). Nearly 5.6 million of the district's total 7 million people lived within this metropolitan boundary in 2011.<sup>5</sup>

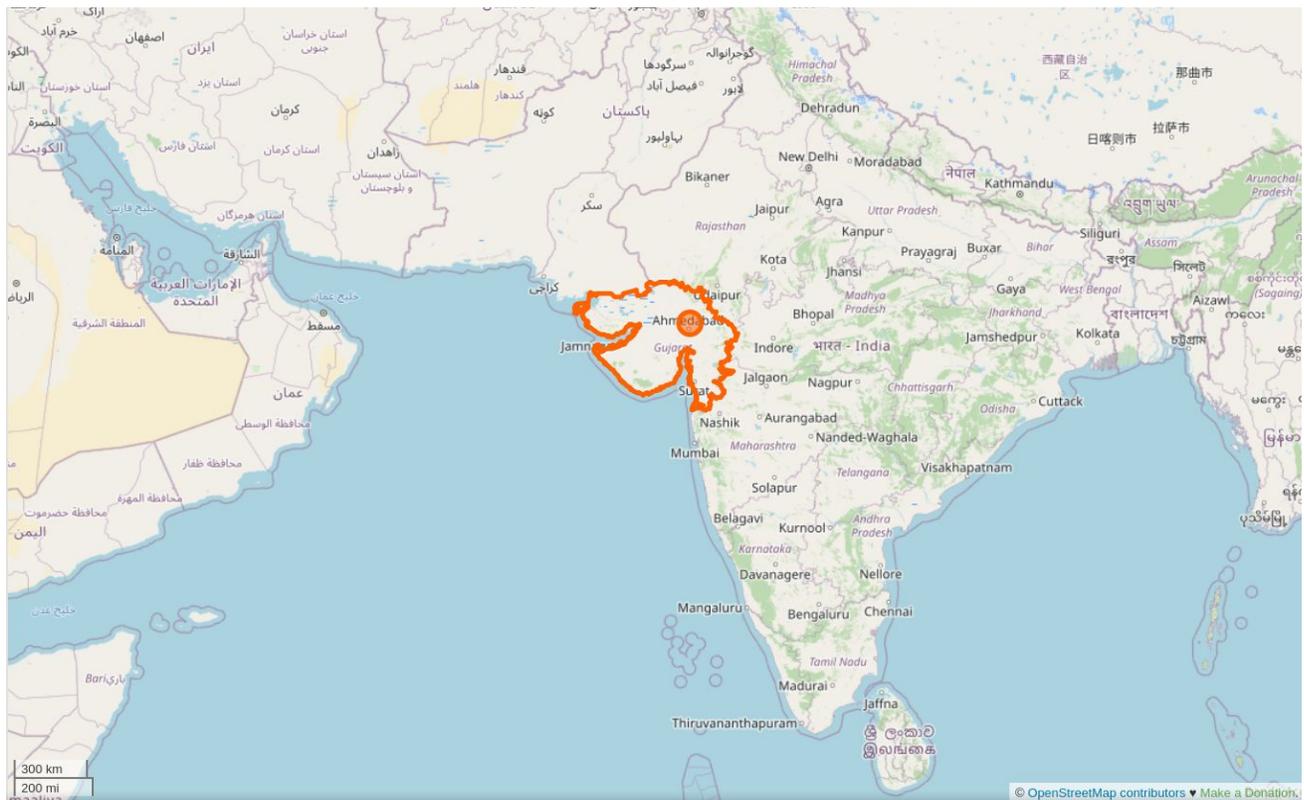


Figure 1. Map of India, with the state of Gujarat outlined in red. A circle denotes the location of Ahmedabad.<sup>6</sup>

<sup>1</sup> Jitendra Dave, "Is it Ahmedabad or Amdavad? No one knows for sure", *DNA India*, 2012-Mar-28.

<sup>2</sup> Office of the Registrar General & Census Commissioner, India, *Primary Census Abstract Data- Gujarat*. Retrieved from [http://censusindia.gov.in/2011census/hlo/pca/PCA\\_Data\\_Gujarat.html](http://censusindia.gov.in/2011census/hlo/pca/PCA_Data_Gujarat.html) on 2020-04-26.

<sup>3</sup> AMC. (2011). Janmarg BRT Homepage. Accessed 2020-04-20, from <http://ahmedabadbrts.org/>

<sup>4</sup> Office of the Registrar General & Census Commissioner, India, *Primary Census Abstract Data- Gujarat*.

<sup>5</sup> Ahmedabad, <https://en.wikipedia.org/w/index.php?title=Ahmedabad&oldid=952869578> (Accessed 2020-04-26)

<sup>6</sup> Map data copyrighted OpenStreetMap contributors and available from <https://www.openstreetmap.org>

## Population Overview

Of the total population, less than 30% were listed as employed in 2011 - only about 1.6 million individuals. Almost 90% of the workforce is male (on a gender binary scale)<sup>7</sup> and nearly 60% of them were commuting less than 5 km (3.1 mi).

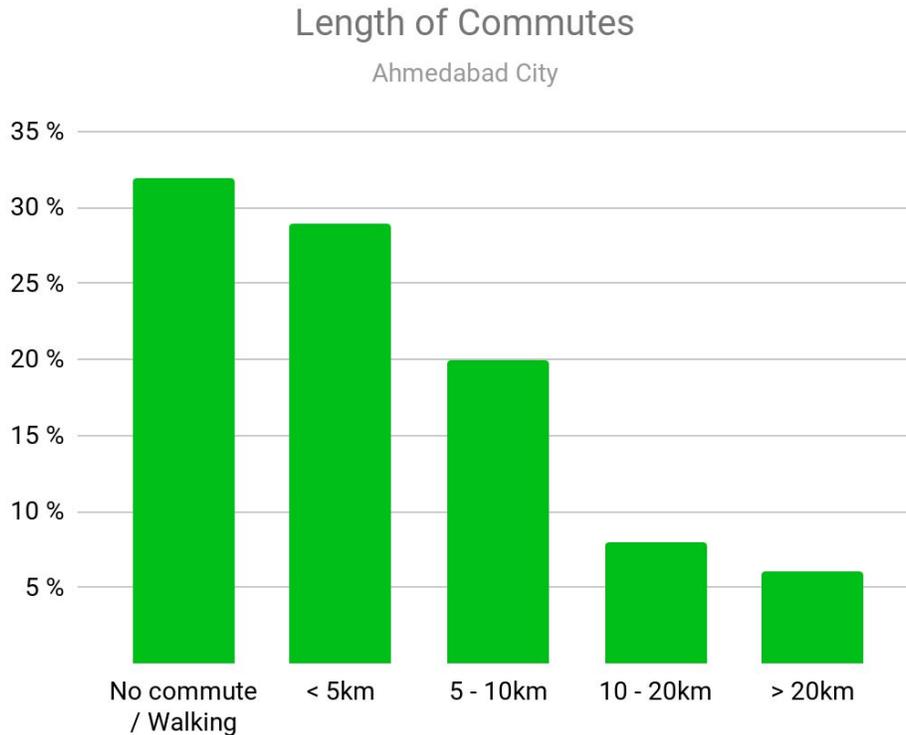


Figure 2. Commute lengths in Ahmedabad, by percentage.<sup>8</sup>

Because the total employment figures for the city are so low, this is not even one-fifth of the total city population, and is only for work commutes. It does not account for other activities that may be done further from the home and require access to some type of transit. People who do not work also engage in transit-based activities, e.g. visiting relatives, grocery shopping, travel for pleasure. Any transit system serving the area will need to be built to serve all 5.6 million people, no matter how often or where they travel. This is a tall order for any agency to have to coordinate and accommodate.

<sup>7</sup> Final Population Totals. Census India 2011. Retrieved from [http://www.dataforall.org/dashboard/censusinfoindia\\_pca/](http://www.dataforall.org/dashboard/censusinfoindia_pca/)

<sup>8</sup> Vaidik Dalal (7 Nov 2017) How does India commute to work? How India Lives. Retrieved from <https://howindialives.com/news/india-commute-work/> on 2020-04-29.

## Transit System Overview

Ahmedabad already had a "regular" bus system run by the Amdavad Municipal Transport Service. Known simply as AMTS and started in 1947, the system has 706 buses on 173 routes (not including Janmarg). This network covers most of the city, as well as beyond the city boundary, as shown in Figure 3. Due to its extensive size, it carries nearly 6 lakh (hundred thousand) people per day - four times as many as Janmarg. With only a three-fold increase in fleet size, either the AMTS buses are overcrowded, or the Janmarg is operating well under capacity (or both). The downside of such a large system is that some of the bus routes only run every two hours; the maximum headway (time between buses) on the whole BRTS is designed to be 15 minutes at a maximum.

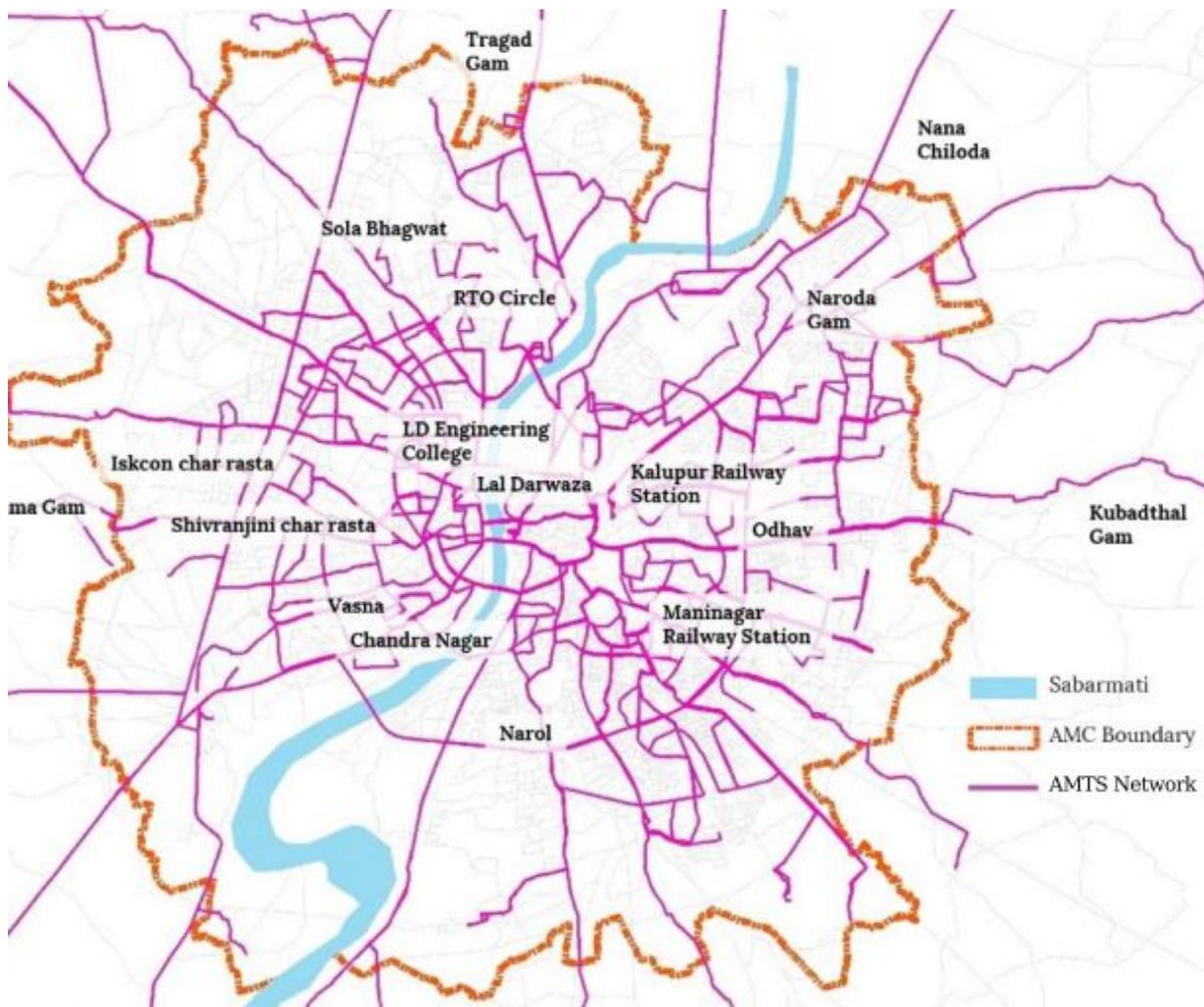


Figure 3. Map of Ahmedabad City with AMTS routes.<sup>9</sup>

<sup>9</sup> Dhok, Divyanka. (17 Nov 2019). *Assessing the Impact of Shift of AMTS buses on the BRTS Corridor*. Presented at the 12th Urban Mobility India Conference & Expo. Retrieved from <http://urbanmobilityindia.in/Conference/Archive.aspx> on 2020-04-26.

As of June 2018, Janmarg had 14 lines (11 linear, 2 circular, and one shuttle) on 125 km (78 miles) of system roads. Of those, 89 km (55 miles) are dedicated BRT lanes. 149 of the total 162 stations are BRT stations with level boarding, pre-collected fares, and other requirements for full BRT compliance.<sup>10</sup> The system, whose name means "the people's way" in the official language Gujarati,<sup>11</sup> carried between 1.35 and 1.5 lakh (hundred thousand) people per day as of March 2018.<sup>12</sup> Having been only operational for about eight years at that point<sup>13</sup>, it seems to be an effective and well-used system.

## Intentions

The Janmarg BRTS was conceived and built as a local initiative, designed by the local CEPT University (formerly the Centre for Environmental Planning and Technology) to be responsive to local conditions. Several alternatives were being considered at the same time, including an expansion of the Metro that is also taking place,<sup>14</sup> as part of a multi-part approach recommended by state, municipal, and city agencies. The study produced by this group was aimed at relieving congestion relief via improvements to "regional rail, metro, parking policies, improvements to the existing AMTS as well as provisions for a new citywide high-end BRT system."<sup>15</sup> The primary objective for BRTS was to "reduce congestion and improve access in the city of Ahmedabad by offering a 'new' transportation system."<sup>16</sup>

The plan for the design of Janmarg, as stated by the AMC in a 2012 report, was to "connect busy places but avoid busy roads." The underlying idea here is to use alternate routes to provide smooth, speedy access between common destinations. The most common destination is the city center, so the objectives

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<sup>10</sup> Ahmedabad Bus Rapid Transit System, [https://en.wikipedia.org/w/index.php?title=Ahmedabad\\_Bus\\_Rapid\\_Transit\\_System&oldid=944699668](https://en.wikipedia.org/w/index.php?title=Ahmedabad_Bus_Rapid_Transit_System&oldid=944699668) (Accessed 2020-04-26)

<sup>11</sup> UNFCC, *Momentum For Change Activities in 2012*, [https://unfccc.int/files/secretariat/momentum\\_for\\_change/application/pdf/mfc\\_report.pdf](https://unfccc.int/files/secretariat/momentum_for_change/application/pdf/mfc_report.pdf) (Accessed 2020-04-16)

<sup>12</sup> Ahmedabad Bus Rapid Transit System, Wikipedia.

<sup>13</sup> *Ahmedabad: After 10-year journey, BRT grabbed road space but not commuters*. (25 Nov 2019) Times of India. Retrieved from <https://timesofindia.indiatimes.com/city/ahmedabad/articleshow/72214374.cms> on 2020-05-11.

<sup>14</sup> Gujarat Metro Rail Corporation Limited. *Milestone*. Retrieved from <https://www.gujaratmetrorail.com/milestone/> on 2020-05-02.

<sup>15</sup> Rizvi, Andrea and Sclar, Elliot. Research in Transportation Economics Volume 48, December 2014, Pages 194-204. *Implementing bus rapid transit: A tale of two Indian cities*. Department of Urban Planning, Columbia University, New York, USA. Available online 11 October 2014. Retrieved from <https://doi.org/10.1016/j.retrec.2014.09.043> on 2020-04-27.

<sup>16</sup> *Ibid*.

of any transit project must include high levels of service to the area. However, the city has "dispersed land use, leading to multiple origin destinations with smaller trip lengths. No single corridor would have high demand."<sup>17</sup> There was also a strong "potential of the BRT to contribute to redevelopment of the city's abandoned textile mills into modern commercial and industrial production space."<sup>18</sup> The combination of connecting unused spaces with popular ones along less congested routes is a nearly impossible task.

While these major city development goals were being discussed in the BRT planning phase, there were also smaller considerations included. Individual stop locations were carefully placed away from intersections to minimize impact on flowing traffic, where they were not fully separate stations, and to avoid interactions with turning vehicles.<sup>19</sup> Ideally, BRTS would provide a level of service (frequency, comfort, trip duration, etc.) comparable to Metrorail; it would be a high-speed, high-capacity public transit system.<sup>20</sup> Other system goals included increased reliability, "eco-friendly service," smart cards for fares, parking facilities, and connecting important origins and destinations. All of this was intended to boost regional economic activity while reducing emissions.<sup>21</sup>

Perhaps the biggest support for the program came from one person in particular - Shri Narendra Modi. Chief Minister of Gujarat from 2001 to 2014, he personally championed the BRT and Metrorail development projects, and was present at the opening of both systems.<sup>22</sup>

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<sup>17</sup> Swamy, H M Shivanand (6 Sept 2012) 3. *BRTS in India – Future Challenges*. Presented at the Asia BRTS 1st Conference. Retrieved from <http://asiabrts.org/ConferencePresentation.html> on 2020-04-29.

<sup>18</sup> Rizvi, Andrea. (2014) *How Planning Process Impacts Bus Rapid Transit Outcomes: A Comparison of Experiences in Delhi and Ahmedabad, India*. [Ph.D., Columbia University] Columbia Academic Commons. <https://doi.org/10.7916/D8N29V3Q> (Shivanand Swamy, September 11, 2012, Interview with author)

<sup>19</sup> Rizvi, Andrea. (2014)

<sup>20</sup> Swamy, H M Shivanand (6 Sept 2012).

<sup>21</sup> Ankit Kathuria, Manoranjan Parida, Ch. Ravi Sekhar & Anshuman Sharma (2016) *A review of bus rapid transit implementation in India*, Cogent Engineering, 3:1, 1241168 <https://doi.org/10.1080/23311916.2016.1241168>

<sup>22</sup> "Ride BRTS and save money: Modi," DNA India, 15 Oct 2009. Retrieved from <https://www.dnaindia.com/india/report-ride-brts-and-save-money-modi-1299186> on 2020-05-09.

"Ahmedabad Metro to open for public on Wednesday," Times of India, 5 Mar 2019. Retrieved from <https://timesofindia.indiatimes.com/city/ahmedabad/articleshow/68263112.cms> on 2020-05-09.

# Barriers

## Private Vehicles

Car ownership is a two-fold barrier to transit systems. In a hot city like Ahmedabad where walking or bicycling is an unattractive option, people are used to driving in the comfort of their own air conditioned cars.<sup>23</sup> This in turn creates traffic congestion, which traps not only private vehicles but also buses. Sitting in an unairconditioned bus is avoidable if you own a car; you might not get there any faster, but you'll be more comfortable while you wait.

Ahmedabad City had ownership rates for two- and four-wheeled vehicles higher than both the national and Gujarat state averages, according to the 2011 census data. Understanding the drivers of this trend, as well as comparing it to numbers from the upcoming 2021 census, could help reveal more information about how transit in Ahmedabad City does or does not serve the needs of the residents.

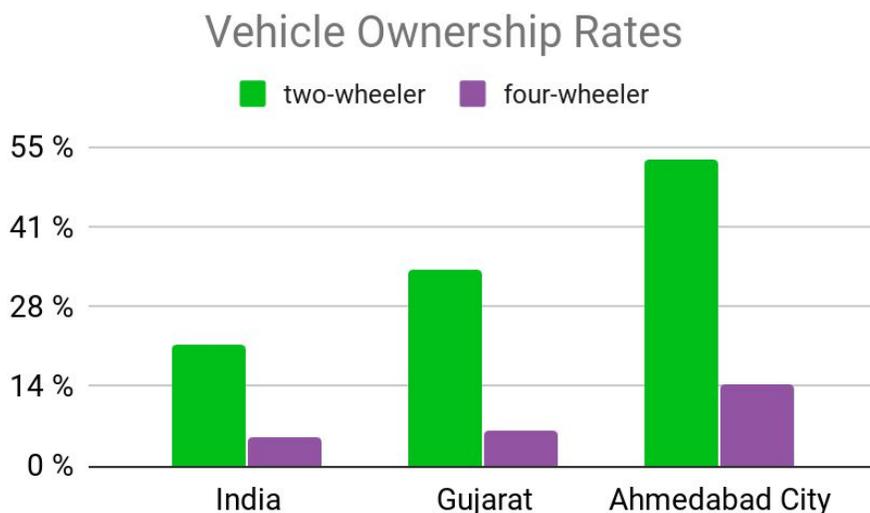


Figure 4. Vehicle ownership rates of two- and four-wheelers at the country, state, and city level.<sup>24</sup>

Even as late as 2013, 44% of trips in Ahmedabad City are still taken by individuals' two- or four-wheeled motor vehicles and 5% by auto-rickshaw; only 15% were using public transport of any kind.<sup>25</sup> If everyone in

<sup>23</sup> Manas Dasgupta "Ahmedabad is on a roll," The Hindu, 1 Jul 2016. Retrieved from <https://www.thehindu.com/news/national/ahmedabad-is-on-a-roll/article3728194.ece> on 2020-05-03.

<sup>24</sup> "Ahmadabad City, SUB-DISTRICT in Gujarat, Assets." Retrieved from <https://howindialives.com/gram/geoprofile.php?geographyid=529070> on 2020-05-05. (Free account required.)

<sup>25</sup> Government of India Ministry of Housing and Urban Affairs. *Handbook of Urban Statistics 2019*. Retrieved from <http://mohua.gov.in/pdf/5c80e2225a124Handbook%20of%20Urban%20Statistics%202019.pdf> on 2020-04-30.

the city were to take one trip per day, it would amount to around 2.5 million trips by two- and four-wheeled individual vehicles, with not quite one million trips on public transport. (That's still more than twice San Francisco BART's average daily total ridership in 2016<sup>26</sup> and only accounts for one trip per person per day. New York City probably comes close, with an average daily subway ridership of 5.6 million in 2016.<sup>27</sup>) Even though walking and cycling trips add up to 36% of the mode share in Ahmedabad in 2013, it is nearly 10% less than the private auto trips; public transit usage isn't even half the lower figure.

## Overcrowding



Figure 5. A major road in Ahmedabad at evening peak.<sup>28</sup>

Overcrowding of vehicles on the roads is no surprise. With the AMTS buses stuck in traffic, it's also no surprise that usage is low. In this environment, removing lanes to dedicate them to BRTS has been controversial. The belief that more lanes makes more space not more traffic seems to hold here as well, and the system has been criticised for making traffic worse since the beginning.<sup>29</sup> Unfortunately, even 2018 traffic conditions hadn't improved in Ahmedabad although BRTS had been operational for nearly 10 years. The morning peak traffic is some of the worst in India, according to a study run by CEPT, the organization

<sup>26</sup> San Francisco Bay Area Rapid Transit, *Ridership Reports*. <https://www.bart.gov/about/reports/ridership> (Accessed 2020-04-29)

<sup>27</sup> New York City Metropolitan Transportation Authority, *Subway Ridership At A Glance*. <http://web.mta.info/nyct/facts/ridership/> (Accessed 2020-04-29)

<sup>28</sup> Paul John, "Ahmedabad has slowest peak hour traffic," 19 Jul 2018. Retrieved from <https://timesofindia.indiatimes.com/city/ahmedabad/articleshow/65046972.cms> on 2020-05-10.

<sup>29</sup> Tanushree Bhatia, "Ahmedabad: BRTS records 15% hike in daily passengers after mega traffic drive," DNA India, 23 Aug 2018. Retrieved from <https://www.dnaindia.com/ahmedabad/report-ahmedabad-brts-records-15-hike-in-daily-passengers-after-mega-traffic-drive-2653479> on 2020-05-10.

behind the initial design of the Janmarg. And it is likely to only get worse without better promotion of public transit.<sup>30</sup> Although the BRTS runs in dedicated corridors, many individual drivers just got right back into the lanes, tying up the system in the same traffic it was supposed to avoid and alleviate.<sup>31</sup>

Overcrowding is not just an issue for the roadways.<sup>32</sup> In a survey conducted by researchers along the BRTS route in 2014, fifty-eight percent of the BRTS users said that they feel unsafe due to crowding.<sup>33</sup> Crowding also changes a rider's perception of the system, and adds a non-monetary cost to the ride which the researchers define as the "generalized cost."

The generalised cost of travel in the BRTS route for an average user comes to around Rs [Indian rupees] 41 when the average fare was Rs 12. However, the value of time for AMTS users ... worked out to be Rs 34, when the average fare the respondents paid was just Rs 9. ...The implication is that reducing overcrowding will not only increase patronage and 'image' of the public transport system but will also bring down the economic costs to the society.



Figure 6. An overcrowded AMTS bus cannot even close its doors, yet more people are getting on. <sup>34</sup>

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<sup>30</sup> Paul John, 2018.

<sup>31</sup> Harita Dave, "No more intrusions : BRTS to get faster," Ahmedabad Mirror, 5 Jun 2019. Retrieved from <https://ahmedabadmirror.indiatimes.com/ahmedabad/articleshow/69656259.cms> on 2020-04-27.

<sup>32</sup> Hemington James, "BRTS Slammed for Overcrowding," Ahmedabad Mirror, 14 Jun 2014. Retrieved from <https://ahmedabadmirror.indiatimes.com/ahmedabad/articleshow/38197841.cms> on 2020-05-10.

<sup>33</sup> Varun Varghese, Bhargav Adhvaryu, *Measuring Overcrowding in Ahmedabad Buses: Costs and Policy Implications*, Transportation Research Procedia, Volume 17, 2016, Pages 145-154, ISSN 2352-1465, <https://doi.org/10.1016/j.trpro.2016.11.070>.

<sup>34</sup> *Ibid.*

## Pedestrian and Bicycle Spaces

Walking in Ahmedabad is a dangerous proposition. In 2014, a survey of 211 accidents in Ahmedabad involving 384 road users found that, although pedestrians (considered to be anyone involved in an accident not in/on a vehicle) were only involved in 5% of the incidents, they accounted for 12% of the fatalities and 14% of the serious injuries.<sup>35</sup> A promising step was taken in 2012 when ITDP partnered with a local social responsibility and advocacy group in Ahmedabad to build wider awareness of safety issues for pedestrians, cyclists, and public transit users in the city. A group of 23 people spent three hours walking around the city, observing both their own difficulties and the movement of other pedestrians.

Participants noted that most footpaths have so many obstructions that pedestrians are forced to walk in the carriageway next to fast-moving motor vehicles, risking their lives. Illegal parking is rampant and blocks the footpaths.

"This is an eye opening exercise," said Niral Bhatt, Head of Human Resources for Idea Cellular, one of the participants, "now we know why people walk on roads. There is hardly any existing footpath on Parimal Garden road. There are small patches of it which are in utter neglect. We are more sensitized about pedestrians now."<sup>36</sup>

Bicycle infrastructure is also lacking, especially provisions for getting bicycles onto the bus. It's already overcrowded with people, and with traffic so tightly packed on the roads external bike racks would be more of a liability than anything. Anyone who bikes to a bus station will need somewhere safe to leave their bicycle, as well as a safe path to get to the station. While there is a strong "pedal tribe" in Ahmedabad, nearly everyone has been hit by a car while cycling.<sup>37</sup> There have been several plans for cycle tracks (dedicated bike lanes) both in conjunction with BRTS and independently, but none of them seem to have

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<sup>35</sup> *Ahmedabad and Gandhinagar Road Accident Study*. (17 Aug 2015) Prepared by JP Research India PVT LTD, for Commissioner Of Transport, Govt. Of Gujarat. Retrieved from <http://www.rassi.org.in/pdf/Ahmedabad%20Urban%20Accident%20Study%20report%202015.pdf> on 2020-05-11.

<sup>36</sup> Kumar Manish (5 Sept 2012) *ITDP and 4th Wheel Raise Awareness of Pedestrian Safety in Ahmedabad, India*. ITDP Transport Matters. Retrieved from <https://www.itdp.org/2012/09/05/itdp-and-4th-wheel-raise-awareness-of-pedestrian-safety-in-ahmedabad-india/> on 2020-04-22.

<sup>37</sup> Parth Shashtri (3 Jun 2019) *Infrastructure potholes slow eager pedal tribe*. Times of India. Retrieved from <https://timesofindia.indiatimes.com/city/ahmedabad/articleshow/69625482.cms> on 2020-05-11.

panned out for various reasons. In 2011, road space and security concerns at the ISRO Space Applications Centre were cited as reasons for removing the cycle track along that section of the BRT corridor.<sup>38</sup> During the planning phase in 2009, though, AJL claimed that cyclists were a priority<sup>39</sup> and fought to keep paths for bicycles along popular corridors despite commercial pressure to remove it.<sup>40</sup> The major complaint today is that the tracks that did manage to be built are not contiguous, are used for parking or by hawkers, merge in and out of footpaths and traffic lanes, and the pavers used to distinguish them from other paths have aged in ways that create a poor cycling surface.<sup>41</sup>

A study on BRTS in India by Darshini Mahadevia, dean of the school of planning and public policy at the Centre for Environment Planning and Technology (CEPT) University in Ahmedabad, shows that Ahmedabad BRTS stretches for 78 km but only 26.2 per cent of the network has cycle tracks. Out of these not all are fit for use—only 65 per cent of the cycle tracks are free of open manholes and storm water drains, encroachments and potholes. Similarly, while 83.7 per cent of the BRTS has footpaths, only half of them are unobstructed and open for use by pedestrians.<sup>42</sup>

Although there seem to have been good steps taken to make improvements to pedestrian and bicycle spaces, there is a lot more work that needs to be done to make the network usable for the purposes it is supposed to serve.

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<sup>38</sup> *BRTS cycle-track discarded over space, security concerns.* (23 Jun 2011) Times of India. Retrieved from <https://timesofindia.indiatimes.com/city/ahmedabad/articleshow/9328205.cms> on 2020-05-11.

<sup>39</sup> Kumar Manish (12 Nov 2009) *Cycle track to nowhere.* Times of India. Retrieved from <https://timesofindia.indiatimes.com/city/ahmedabad/articleshow/5220881.cms> on 2020-05-11.

<sup>40</sup> *Business groups want BRTS cycle track out.* (28 Sep 2009). Times of India. Retrieved from <https://timesofindia.indiatimes.com/city/ahmedabad/articleshow/5063229.cms> on 2020-05-11.

<sup>41</sup> Lakshmi Patel (29 May 2018) *Is AMC going off track with new cycle lane project?* Ahmedabad Mirror. Retrieved from <https://ahmedabadmirror.indiatimes.com/ahmedabad/articleshow/64360433.cms> on 2020-05-11.

<sup>42</sup> Ruchita Bansal (11 Jun 2015) *Lost track.* Down to Earth. Retrieved from <https://www.downtoearth.org.in/coverage/lost-track-41777> on 2020-05-11.

# Effectiveness

The initial intentions of AMTS in developing the Janmarg have been summed up as :

- fast service
- reliable service
- smart card facility for fares
- provision of pay and park facilities<sup>43</sup>
- accepted and owned by people
- improvement in air quality
- safe and high quality pedestrian infrastructure<sup>44</sup>

Below I will focus on service, the smart Janmitra card, and last-mile facilities for pedestrians and cyclists as factors for evaluating the effectiveness of the Janmarg.

## Service

Areas of Ahmedabad City that produce transit demand (Figure 7) and the destinations (Figure 8) are spread across the whole city with no particular pattern. Widely distributed patterns like this make it difficult to plan routes - everyone is going in every direction all the time. However, some trends do begin to emerge from these images. The east and west sides of the city have both high production and attraction factors, and there's also a strong attraction in the center. The BRT routes were built on the city's existing ring road structure with some lines going through the city center (Figure 9) and seem to capture most of this movement. Although the BRTS map is not to scale, comparing the basic shapes of the three show definite similarities and overlap. Coupled with the overcrowding of the roads, it's easy to see how this is a city of everyone moving in every direction at all times. There are no clear paths of less traffic on which to route buses, or even to carve out a dedicated lane for them on streets that are already overflowing.

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<sup>43</sup> Ankit Kathuria, Manoranjan Parida, Ch. Ravi Sekhar & Anshuman Sharma (2016).

<sup>44</sup> M.Thennarasan (29 Sept 2014) 9. *Making of Janmarg Amdavad*. Presented at the UNESCAP Regional Expert Meeting & 2nd Asia BRTS Conference. Retrieved from <http://asiabrts.org/ConferencePresentation2014.html> on 2020-04-19.

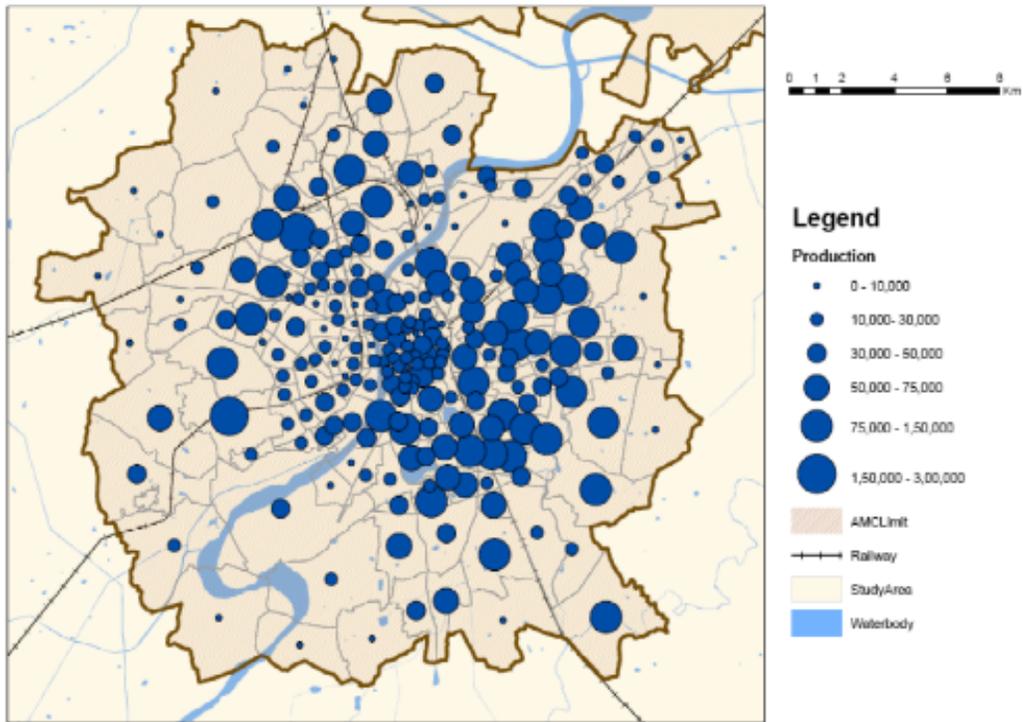


Figure 7. Demand production sites in Ahmedabad.<sup>45</sup>

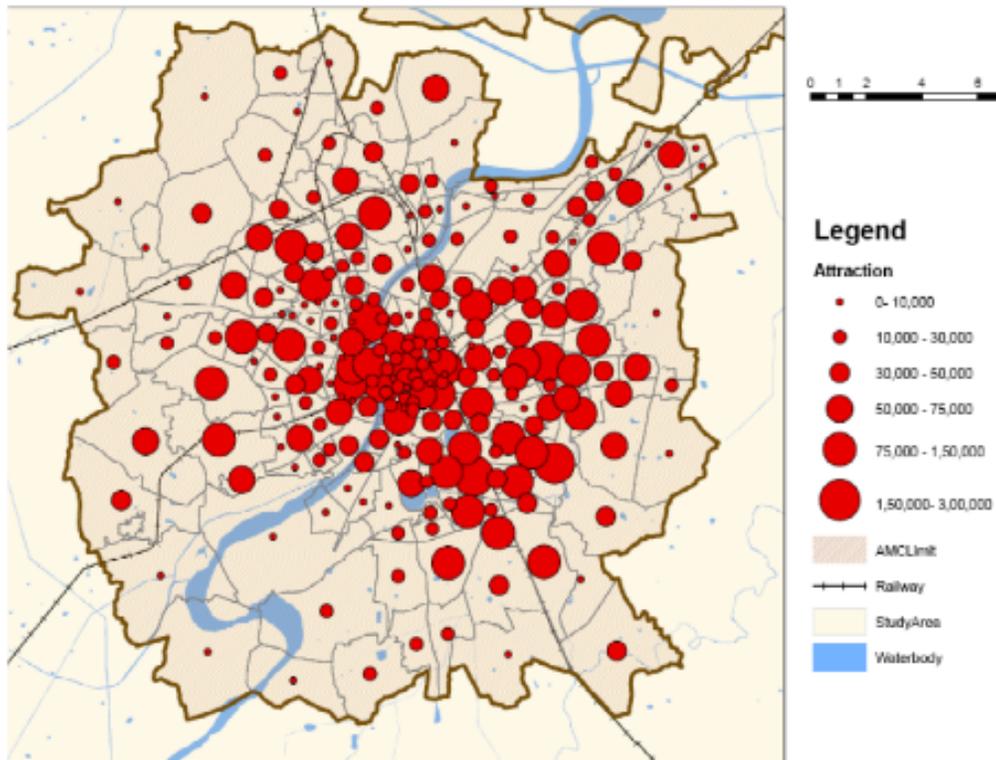


Figure 8. Attraction/destination sites in Ahmedabad.<sup>46</sup>

<sup>45</sup> Swamy, H M Shivanand (6 Sept 2012) 3. *BRTS in India – Future Challenges*. Presented at the Asia BRTS 1st Conference. Retrieved from <http://asiabrts.org/ConferencePresentation.html> on 2020-04-29.

<sup>46</sup> *Ibid.*

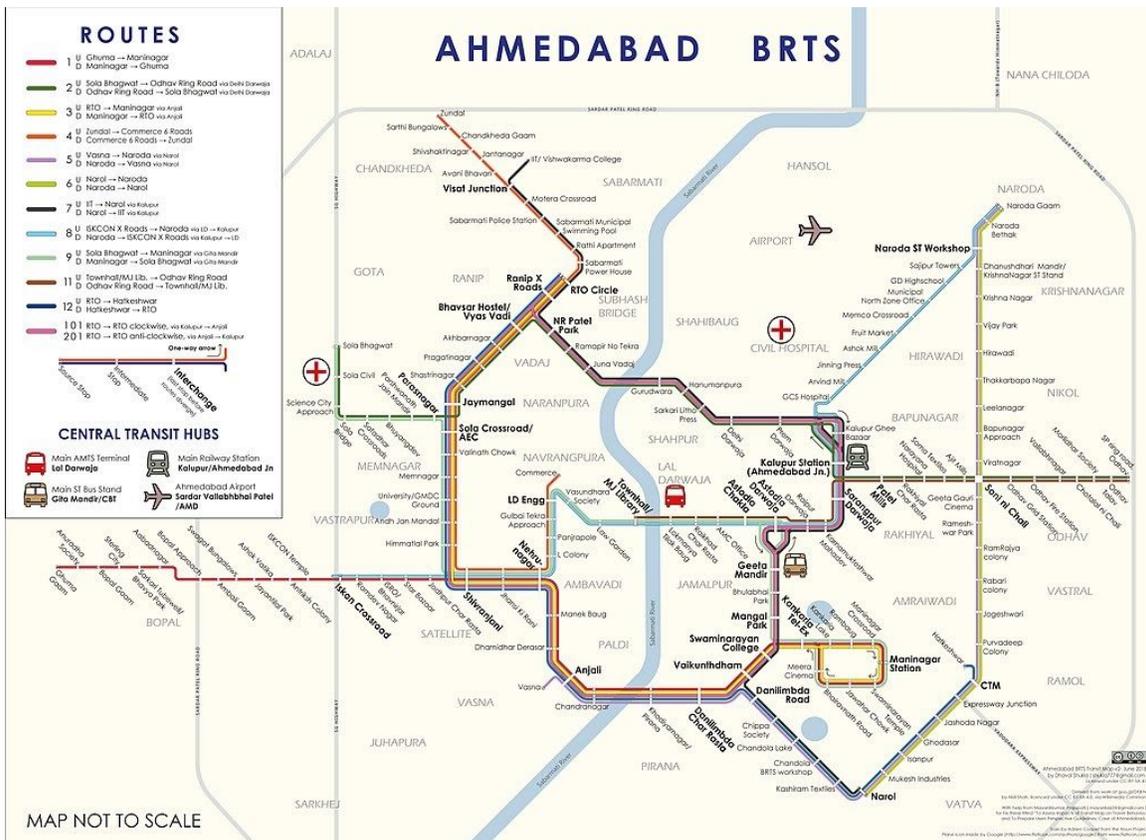


Figure 9. Map of the Ahmedabad BRTS in 2018. <sup>47</sup>

One project launched in the summer of 2019 aims to help speed up BRTS - RFID barriers across the dedicated lanes to keep out unauthorized vehicles. Ahmedabad Municipal Commissioner Vijay Nehra summarized it as follows :

The time taken to cover the distance between points A and B has to be lesser while travelling on a (BRTS) bus than in a private vehicle. That is how you shift people to public transport. But because of people driving in the BRTS lane, this objective is not fully achieved. The traditional approach had been to deploy security personnel to stop violators and issue e-memos, but under the Smart City project, we have thought of a technology-based initiative where we will use RFID gates. This will lead to greater discipline in the BRTS corridor and also huge savings in terms of the security staff that we deploy.<sup>48</sup>

<sup>47</sup> Wikimedia Commons contributors, 'File:Brts wiki map final 1 june 2018.jpg', *Wikimedia Commons, the free media repository*, [https://commons.wikimedia.org/w/index.php?title=File:Brts\\_wiki\\_map\\_final\\_1\\_june\\_2018.jpg](https://commons.wikimedia.org/w/index.php?title=File:Brts_wiki_map_final_1_june_2018.jpg) [accessed 10 May 2020]

<sup>48</sup> Harita Dave, 2019.

While it seems like a good policy, potential downsides are individuals who are not aware of the gates getting stuck and having to reverse out, assuming no one else has boxed them in. This would create even more of a traffic blockage unless the gates can be opened without the bus to let the other vehicles through, but that creates an easily exploitable loophole through which the BRT corridor becomes something akin to a toll lane for regular vehicles. This program was instituted in 2019, so not enough data has been released yet to determine if it has been effective in preventing unauthorized use of the BRTS corridor lanes.

Frequency and reliability of service are two issues that were difficult to track down. Headway numbers quoted from 2017 indicate anything from three minutes (minimum during peak) to 12 minutes (maximum off peak).<sup>49</sup> A survey conducted in late 2019 did not identify significant issues in bus frequency for Janmarg.<sup>50</sup> There is one small note of request for improvement of frequency, but not more than that, indicating that perhaps it is adequate for those who brave the other hurdles and use the BRTS. First and last mile connectivity, particularly for pedestrians, and distance to bus stops were the biggest barriers.

## Smart Card

Implementation of the smart card payment seems to be the most easily-defined success of Janmarg. The Janmitra card can be used for fares on BRTS, AMTS, the airport shuttle, and soon the metro, too. A 10% discount rate applies to BRTS fares purchased on Janmitra. It can even be used to pay municipal fees like property tax, for recreational services at the riverfront, and shopping just like a regular debit card.<sup>51</sup> Available at over 1000 retailers, nearly 30,000 cards had been issued as of 17 May 2018.<sup>52</sup> Launched in 2017, the biggest complaint against it is the same as any cashless tracking system anywhere - user privacy. This seems to be a particularly bad contract with a private bank, however; the contract allows the

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<sup>49</sup> *BRT to expand fleet, but will people get on board?* Times of India. Retrieved from <https://timesofindia.indiatimes.com/city/ahmedabad/articleshow/72930422.cms> on 2020-05-07.

<sup>50</sup> *Ahmedabad's public transport misses the bus.* (22 Oct 2019) Times of India. Retrieved from <https://timesofindia.indiatimes.com/city/ahmedabad/articleshow/71696212.cms> on 2020-05-11.

<sup>51</sup> *AMC launches all-in-one Jan Mitra card.* (14 Oct 2017) Times of India. Retrieved from <https://timesofindia.indiatimes.com/city/ahmedabad/articleshow/61073551.cms> on 2020-05-11.

<sup>52</sup> Ministry of Housing and Urban Affairs (8 June 2018) *Smart Cities Mission : Cities Presentations*. Presentation to the Consultative Committee (Urban Development). Retrieved from <http://smartcities.gov.in/upload/presentation/5b28b978e7c1cConsultative%20Committee%20Consolidated%20PPT%20v5%2008Jun18.pdf> on 2020-05-10.

bank permission to make promotional calls for their products and services to anyone who applies for a card. The bank has defended itself against this criticism, saying that it's part of the standard card contract. AMC even threatened to cancel the contract if the bank didn't change the terms<sup>53</sup> but the same bank is listed as still being the provider<sup>54</sup> at the time of writing.

## First/Last Mile Connections

Barely a year after the Janmarg system first opened, issues of last mile connectivity and bicycle access were being raised. Bicycle sharing plans were floated, and several providers were contracted to provide dockless rental bikes around the city, the most popular being the "Ride by the River" program. Planned system expansions have not yet generated data or significant online public comment.

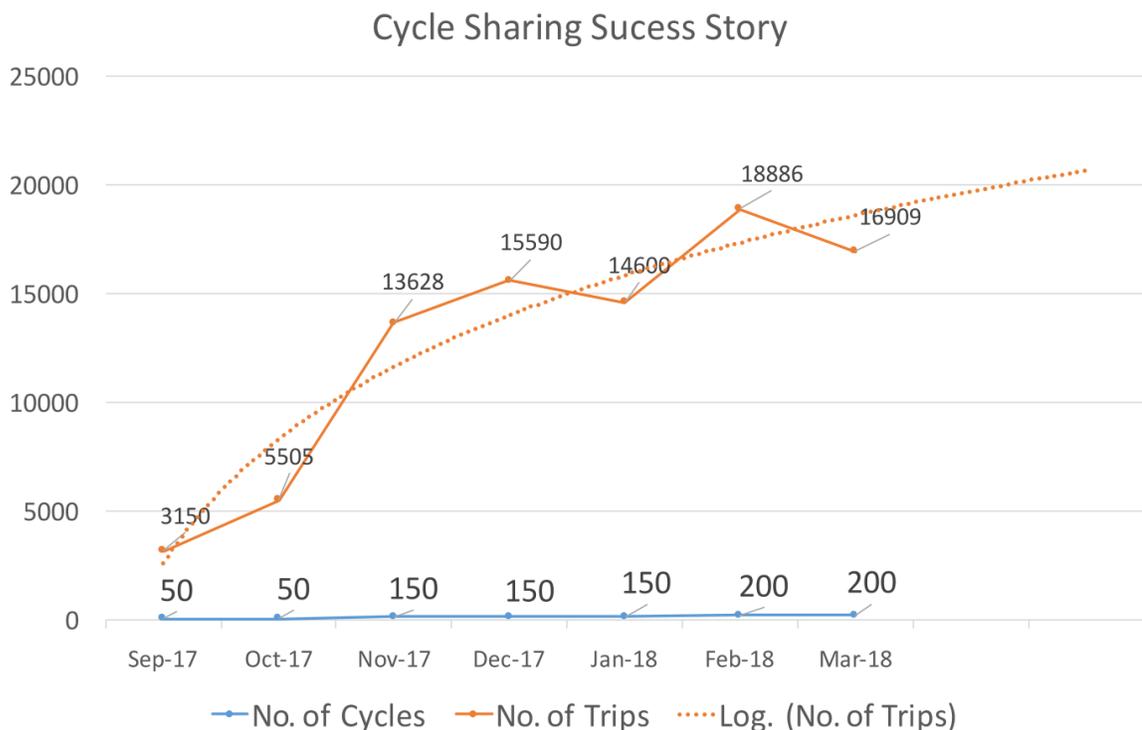


Figure 10. Graph of cycle trips between September 2017 and March 2018 on the Ride by the River cycle sharing program. <sup>55</sup>

While integrating bike rental services is one way to improve last-mile connectivity, the safety of getting to and from the stations is still a low point. Several interviews turned up issues of better pedestrian

<sup>53</sup> Harita Dave (24 Sep 2018) *Janmitra card is privacy's enemy*. Ahmedabad Mirror. Retrieved from <https://ahmedabadmirror.india-times.com/ahmedabad/articleshow/65926192.cms> on 2020-05-11.

<sup>54</sup> AJL, *About Janmitra Card*. Retrieved from <http://125.17.144.54:8082/information/smart-card/> on 2020-05-11.

<sup>55</sup> Ministry of Housing and Urban Affairs (8 June 2018) *Smart Cities Mission : Cities Presentations*.

crossings as well as onboard issues of overcrowding and access to seats for those who need them. A lackluster "we will look into it" response from the Janmarg General Manager does not go far to reassure anyone that these issues will be addressed.<sup>56</sup> By 2018, some cycle track plans "wherever possible" were back, in particular for CG Road<sup>57</sup> - an area that was intended for redevelopment of all kinds.<sup>58</sup>

First and last mile connection options continue to be a blocking issue for potential Janmarg riders. CEPT university conducted a survey of 511 commuters across the city, and 60% responded that the reason they didn't use BRTS was the difficulty in getting to or from a stop. In a separate question about what improvements could be made to the system, 34% wanted more conveniently located stops. Many of the 42% who wanted reduced journey time could also be added to that; while circuitous routes and awkward transfers are the major culprit, convenient bus stops do also reduce travel time. 88% of respondents cited first and last mile connectivity as a major barrier to using any public transit in the first place. Suggestions for improvement include boarding and destination analysis to build more appropriate routes.<sup>59</sup>

## Conclusions

Designed with lofty goals of "moving people, not traffic,"<sup>60</sup> Janmarg was modeled after the wildly successful TransMilenio in Bogotá.<sup>61</sup> A heavily criticised system, it continues to fight an uphill battle against high levels of car ownership, traffic congestion, and land uses that are not friendly to transit development or pedestrianism. AJL and AMC continue to invest in system expansion and marketing, and the buses continue to move huge numbers of people every day.

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<sup>56</sup> Aboli Vaze (16 Dec 2019) *Ahmedabad BRTS completed a year in october: 'A lot still needs to be done for safety of passengers'* The Indian Express. Retrieved from <https://indianexpress.com/article/cities/ahmedabad/ahmedabad-brts-completed-a-year-in-october-a-lot-still-needs-to-be-done-for-safety-of-passengers-6168938/> on 2020-05-09.

<sup>57</sup> Lakshmi Patel (1 Jan 2018) *Five major offerings for street-smart Amdavadis in 2018*. Ahmedabad Mirror. Retrieved from <https://ahmedabadmiraor.indiatimes.com/ahmedabad/articleshow/62319092.cms> on 2020-05-11.

<sup>58</sup> *Ahmedabad Municipal Corporation to give Chimanlal Girdharlal Road a facelift*. (20 Dec 2017). Times of India. Retrieved from <https://timesofindia.indiatimes.com/city/ahmedabad/articleshow/62141175.cms> on 2020-04-30.

<sup>59</sup> *Ahmedabad's public transport misses the bus*. (22 Oct 2019) Times of India.

<sup>60</sup> Dario Hidalgo (27 Aug 2009) *Ahmedabad's Janmarg: Changing the Game for BRT Systems in India*. The CityFix. Retrieved from <https://thecityfix.com/blog/ahmedabads-janmarg-changing-the-game-for-brt-systems-in-india/> on 2020-04-30.

<sup>61</sup> Dario Hidalgo (30 Nov 2011) *Visiting TransMilenio with Prof. Swamy, the Brains Behind Ahmedabad's BRT System*. The CityFix. Retrieved from <https://thecityfix.com/blog/visiting-transmilenio-with-prof-swamy-the-brains-behind-ahmedabads-brt-system/> on 2020-05-11.

Unfortunately, the citizens of Ahmedabad do not feel it has lived up to those promises. Ridership numbers have not increased much since 2011<sup>62</sup>, even with Rs 1,100 crore (11 billion Indian rupees, or nearly 145 million US dollars) having been poured into the project over that time. Barely 30% of the jobs in Ahmedabad are accessible by BRTS. 112 of the 116 stations are in areas that have low intersection density, preventing easy pedestrian access to the stations. The majority of Janmarg riders switched from AMTS, but that is also due to AMTS discontinuing service along many of the BRTS corridors, leaving these travelers with no other options. Although 25% of riders have switched from auto-rickshaws, and another 11.7% from private vehicles, the small Janmarg ridership numbers still have not managed to move the needle on traffic jams.<sup>63</sup>

Difficulties with first/last mile connectivity and the higher cost of tickets seem to be the major barriers facing the Janmarg at all times.<sup>64</sup> AMTS continues to add more buses to the system<sup>65</sup>, including electric ones,<sup>66</sup> even while planning to pull out some of the dedicated corridors.<sup>67</sup> These changes seem to be at odds with each other, as well as with the intentions of the BRTS as a whole. The addition of more vehicles to the fleet will hopefully address the overcrowding issues, but it seems as if they will be back in the regular crowd of mixed traffic.

More interior space but continuing to battle the road congestion will likely not bring more commuters onto BRTS. A more comprehensive, pedestrian-first plan is needed - if no one else is willing or able to get to the station, it doesn't matter how many more buses are added to the system. Hopefully AMTS and AJL planners will be able to work together for the unified vision they initially set out for Janmarg.

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<sup>62</sup> Ahmedabad: After 10-year journey, BRT grabbed road space but not commuters. (25 Nov 2019).

<sup>63</sup> Ahmedabad: BRTS fails to link homes with workplaces. (29 Nov 2019) Times of India. Retrieved from <http://timesofindia.indiatimes.com/articleshow/72284999.cms> on 2020-05-03.

<sup>64</sup> City's BRTS didn't enhance public transport usage (5 Jan 2016) Times of India. Retrieved from <https://timesofindia.indiatimes.com/city/ahmedabad/articleshow/50450129.cms> on 2020-05-11.

<sup>65</sup> BRT to expand fleet, but will people get on board? (23 Dec 2019) Times of India. Retrieved from <https://timesofindia.indiatimes.com/city/ahmedabad/articleshow/72930422.cms> on 2020-05-11.

<sup>66</sup> Binita Parikh (26 Sep 2019) India gets its first public battery swapping station as Ahmedabad launches 18 e-buses. Citizen Matters. Retrieved from <https://citizenmatters.in/ahmedabad-brts-electric-bus-launch-and-plans-14015> on 2020-05-11.

<sup>67</sup> AMC to remove 3 BRTS corridors. (16 Nov 2019) Ahmedabad Mirror. Retrieved from <https://ahmedabadmirror.indiatimes.com/ahmedabad/articleshow/72078053.cms> on 2020-05-11.