Parisar

Comprehensive Assessment of Cycle Tracks in Pune

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Executive Summary

In spite of the fact that Pune is supposed to have almost 132 km of cycle tracks, almost none of these are used by cyclists. This has unfortunately led to a call by many politicians and public to get rid of them and widen the roads instead. This is the wrong conclusion to reach for 2 main reasons.

1. Encouraging cycling is one of the key components for sustainable transportation. Many cities in the West and in Latin America as well as now China and even the United States are encouraging cycling by creating cycling infrastructure, like cycle lanes/tracks, parking for cycles, public bicycle schemes, no vehicle days etc. The Govt. of India has recognized the need to promote cycling as an eco-friendly and fuel saving mode of transport in cities and is part of the National Action Plan on Climate Change under the Sustainable Habitats Mission. More significantly the National Urban Transport Policy has strongly emphasized the need to promote non-motorized transport and funding under JnNURM is linked to this. Pune's Comprehensive Mobility Plan has set an ambitious target of 50% of all trips to be by non-motorized transport (walking and cycling) by 2030. So promotion of cycling is not a whimsical fad, but in fact a serious commitment by the country and the city.
2. Cycle tracks are not used because they are not usable. They have been poorly designed, poorly implemented and poorly maintained. They lack continuity, are not comfortable to ride and not even very safe. Pune has a large number of cyclists (though they may be invisible to those who travel by motorized vehicles) and an even larger number that would cycle, if only it were safe, pleasant and convenient to do so. Hence the answer is not to remove the cycle tracks, but to fix them!

Parisar presents in this report the results of a comprehensive survey of cycle tracks in the city. We started with an RTI to find out what was planned to be built and what has actually been built (on paper at least). Of the 132 km of cycle tracks said to be completed, we surveyed in detail 87.5 km, the rest we deemed to be not worthy of even being called cycle tracks. (For e.g. we were told that there is a cycle track on both sides of the road from Gunjan Talkies to the Yerawada Jail, yet we find no evidence of any such cycle track!). During the survey we noted down every obstruction, looked at the lighting, shade and intersections. We looked at the adjacent footpaths. (Often people walk on a cycle track when there is no walkable footpath, thus obstructing cyclists). We finally scored each cycle track on the basis of three parameters that we think matter the most to a cyclist, namely **Continuity**, **Comfort** and **Safety** (score of 0 is good, 100 is the worst).

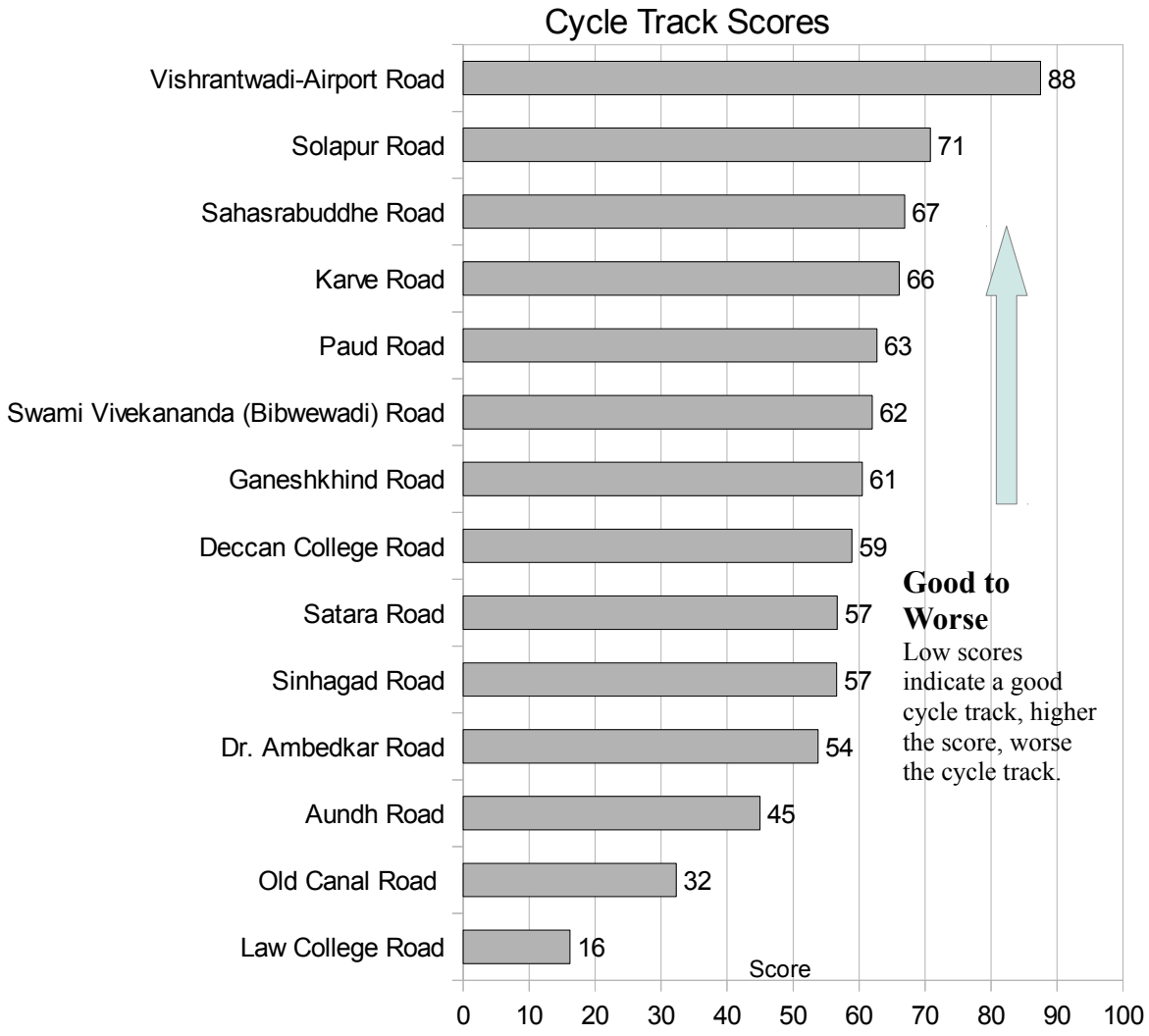
The results will not surprise. All the cycle tracks scored badly on every aspect. Only the short Law College road cycle track and the Old Canal road cycle track scored okay.

One of the main conclusions is that the cycle tracks have very badly designed and have a huge number of obstructions (not encroachments, as is usually assumed). Cycle tracks have missing portions and the sections that exist are not connected to one another. Unused cycle tracks are then encroached, which in turn makes them even less usable.

The main recommendations we make are that there needs to be a dedicated agency for the design, implementation and maintenance of cycle tracks. There is a need to have a cycle track design manual. Cyclists and cycling groups should be used in monitoring and evaluation of cycle tracks. Finally we recommend that there should be periodic assessment of cycle tracks along the lines suggested in this study and targets set to improve the overall quality of cycle tracks. We believe that all this can be achieved at a very small cost. Small investments can make a huge difference to the quality of NMT infrastructure, including cycle tracks, and benefit the maximum (and often most

vulnerable and poorer) people.

If this is done, we are confident that more and more people will not only start using the cycle tracks, thus increasing their safety, but that more people will choose this eco-friendly and healthy mode of transport.



1 Introduction

A study in 2008 by Wilbur Smith and Associates commissioned by the Ministry of Urban Development indicated clearly that the modal share of non-motorized transport is rapidly declining, especially in small and medium towns.

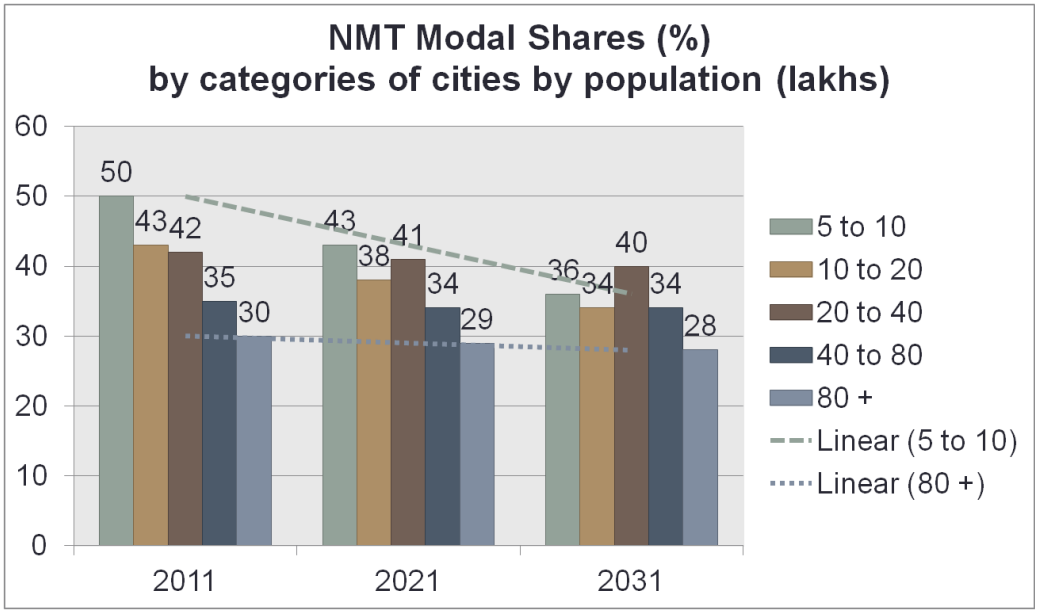


Illustration 1: Projected NMT Modal Shares by city size (population)

The National Urban Transport Policy[1] published by the Ministry has given special importance to non-motorized transport modes as these are not only non-polluting but also serve the needs of the urban poor. Recognizing that these modes are neglected and have become less safe the Urban Transport Policy calls for equitable allocation of road space by "reserving lanes and corridors exclusively for public transport and non-motorized modes of travel"

With the launch of the Jawaharlal Nehru National Urban Renewal Mission (JnNURM), the Ministry while sanctioning funds to cities to build Bus Rapid Transit (BRT) systems, also made the construction of dedicated cycle tracks along the bus corridors mandatory. As a result, Pune, which under the JnNURM has been sanctioned 1051 crores to build 115.67 km of BRT[2] has also built cycle tracks along most of these corridors.

However it quickly turned out that poorly designed, poorly constructed and poorly maintained cycle tracks were all but unusable by cyclists, which either fell into disuse or were encroached. This in turn made it even less likely to be used by cyclists. City councilors (corporators) were quick to realize that cycle tracks are not being used, but instead of trying to ascertain the reasons for this, assumed that this was due to the fact that cyclists either do not exist or do not care for having segregated cycle tracks and asked for their removal, in order to provide more space for vehicular traffic.

In order to scientifically assess the quality of cycle tracks in the city Parisar undertook the job of developing a toolkit to quantify the state of the tracks. This was based on an earlier study done by a Dutch intern[3], who had modified a more comprehensive toolkit used in the Netherlands.

1 http://urbanindia.nic.in/policies/TransportPolicy.pdf
2 Consists of 4 packages namely Pilot (17 km), Phase I (48.77 km), CYG (36 km) and Alandi road (13.9 km) - http://jnnurm.nic.in/wp-content/uploads/2010/12/Project-implementation-status-UIG.pdf
3 Measuring the Quality of Bicycle Routes in Pune – Peter Sanders, Oct 2008

2 Cycle Track Assessment Toolkit

2.1 Parameters

Based on both field work and literature review we have come to the conclusion that there are essentially three criteria[4] which are requisites for a good cycle track. They are:

1. **Continuity** – It has been realized during the study that continuity is the most important aspect to take care of to encourage cyclists to use the cycle track. In the study it accounts for the parameters that impede the continuous cyclability on the track. If the cyclist faces factors of discontinuity on the usage of cycle track, it is almost certain that the cyclist would use the carriage way on those roads. In fact one could state that, if the cycle track on a given road is not continuous, it is not complete/ready to be used.

2. **Safety** – Safety is an essential concern for any infrastructure development. If the track is not build keeping certain safety factors in mind it will not only restrict the cyclists from using the tracks but also be hazardous to the safety of a cyclist using the track. One of the main reasons, along with free flow of traffic, to build a cycle track is to provide a safe environment for the slow moving cycle traffic but if the tracks are not designed keeping the safety of the cyclist in mind, it defeats the purpose greatly.

3. **Comfort** – If the track is not comfortable, due to whatever reasons, in comparison to the motor carriageway, the cyclist will always prefer the use of the carriageway instead of the track. Making the cycle track comfortable for use is again an integral part of the design of the tracks and must be emphasized upon to get better ridership.

Having said this we also recognize the importance of a complete **network**, such that cycle tracks connect to one another (rather than being disjoint pieces) and exist where cyclists need to go (usually based on an O-D survey of cyclists in the city). However for the time being we are focusing on the quality of the tracks themselves, so that cyclists at least start using what currently exists.

Each of the three parameters above are in turn determined by the following sub-parameters

1 Continuity

1.1 **Total obstructions** – These are the obstructions that completely block the cycle track with their presence and as a result do not allow the cyclist to proceed on the it.

1.2 **Cycle track missing –** This is when the cycle track is missing on a any road. By missing it means that the cycle track has not been built for a particular or multiple stretches, at the time of built.

1.3 **Cycle track signage –** It is important as part of design of cycle tracks to have a signage indicating the presence of cycle tracks at the intersection.

1.4 **Marking to show cycle track continuation –** At wide intersections or in case the cyclist is turning right to access a cycle track perpendicular to the current direction of travel, it is important, as per design, to have marking on the carriage-way identifying the direction in which the track continues.

2 Safety

4 Cycle tracks in the Netherlands are assessed on the basis of the following five parameters; Coherence, Directness, Attractiveness, Safety and Comfort. These have been modified for the purpose of this study.

2.1 **Buffer Zone** – There must be a differentiation with either the presence of curb or a green strip. The purpose of the buffer zone is to keep the cyclists safe from the fast moving motorized traffic on the carriage-way.

2.2 **Light after dark –** The cycle track must be illuminated well at night. Lack of lighting will result in poor visibility of the cycle track. Unlike motorized vehicles, cycles do not have lights fixed on them for viewing the path a cyclist is using. Hence, there must be sufficient street lighting on the cycle track to make it them usable after sunset.

2.3 **Traffic calming device –** This parameter identifies the presence of any traffic calming devices at the intersections. Traffic calming devices prevent collisions between cyclists and motorized vehicles by slowing motorized vehicles as they are approaching an intersection where there is cycle track.

2.4 **Partial Obstruction –** These are obstructions that occupy up to half of the cycle track width. As a result a cyclist may attempt to ride past them (unlike in the case of a total obstruction) and may fall, skid or bump into the obstructions and thus present a safety issue.

3 Comfort

3.1 **Track surface –** This parameter captures the type of material used to construct the cycle track surface. The material used must provide sufficient friction and aid in a smooth ride. The material used must be same as that used for the carriageway.

3.2 **Geometry of cycle track –** This parameter takes account of the level at which the cycle track is built. As per the cycle tracks observed in Pune, they seem to be at the same level as the road, same level as footpath and level segregated from the footpath and road. A cycle track built at the same level as road is the most comfortable of the lot. In case it is level higher than the road, if the cyclist is on the right hand side of the track he/she is at a high risk of a fall due to the height difference between carriageway and cycle track.

3.3 **Cyclist slowed down –** This parameter accounts for the undesirable factors on the track surface that slow a cyclist down while using the track. Example, dirt, debris, broken surfaces etc.. The factors that comprise this aspect are present generally due to lack of maintenance.

3.4 **Width of cycle track –** This is the measurement of the width of the cycle track. The width of the cycle track determines the comfort of using the cycle track. Track must be wide enough for 2 cyclists to ride along-side or cross-over, while on the track.

3.5 **Tapering of cycle track at intersections –** This parameter accounts for the design of the cycle track at intersections. It was observed that many tracks have a tapering edge at intersections. This reduces the width of the track in order to give a turning radius for vehicles on the carriageway.

3.6 **Shade in the day –** Accounts for the amount of shade present on the cycle track during the day. Wherever possible there must be green cover along the cycle tracks. During Indian summers the sun is too sharp and the presence of trees will not only prevent the exposure from sun but also improve the air quality in the city.

2.2 Survey

2.2.1 Cycle Tracks

In total Pune has approximately 132 km of cycle tracks, on 20 roads. Parisar had filed an RTI (Right to Information) application seeking information on the cycle tracks built in Pune. In the reply to the

RTI, Parisar came to know there are 18 cycle tracks built in Pune. 12 out of these 18 cycle tracks were surveyed by Parisar. The other 6 out of 18 were inspected before the survey. Parisar realized that those 6 tracks were not even fit to be called a cycle tracks. These 6 tracks did not have any signage/marking to state the presence of a cycle track. These tracks are just wide footpaths and can not be justified as cycle tracks. Hence, they were eliminated from the study.

No information has been received from PMC about the details of 2 other tracks (Aundh Road and Swami Vivekananda (Bibvewadi) Road). Due to lack of information on the proposed built length, whether the track is proposed to be built on both sides or only one side, only the visible portions of the track were surveyed.

Table 3.1: List of Roads Surveyed

No.	Road Name	Comment	Surveyed
1	Ganesh Khind Road	Official information received.	Yes
2	Karve Road		
3	Satara Road		
4	Paud Road		
5	Sinhagad Road		
6	Deccan College Road		
7	Vishrantwadi-Airport Road		
8	Law College Road		
9	Dr. Ambedkar Path		
10	Sahastrabudhe Road		
11	Old Canal Road		
12	Solapur Road		
13	Aundh Road	No official information about these tracks available. Only physically visible track considered.	
14	Swami Vivekananda Road (Bibwewadi Road)		
15	Alandi Road	Cycle track either completely missing or simply part of footpath.	No
16	Baner Road		
17	Old Mumbai-Pune Highway		
18	Airport Road		
19	Sangamwadi Road		
20	Nagar Road		

The tracks that have not been considered for this current study, could be taken up at a later stage using the same methodology.

2.2.2 Segments

For each cycle track surveyed, the entire length of the cycle track was broken down into segments. Each segment was about 500 meters, but was longer or shorter in case an obvious break point was identified close to 500 meters (for instance, if a major intersection was found at 420 meters, then the

segment was broken at that point). This can have a slight impact on the scoring, but it not a major factor.

During the course of the survey three types of observations were made: Obstructions, Geometry and Intersections.

2.2.3 Obstructions

Fixed Obstructions

1. Tree
2. Pole (CCTV, traffic signal, direction sign board, electrical pole)
3. Telephone Panel
4. Electrical Panel
5. Bus Stand
6. Built Encroachment

Movable obstructions

7. Hawkers
8. Garbage Bins
9. Construction Material
10. Traffic Barricades
11. People Sitting
12. Hoardings & Banners

Parked Vehicles, Due to:

13. Religious Place
14. Restaurant or Eatery
15. Auto Garage
16. Generally: Retail shop, residential or any other reason

Cycle Track Missing

17. Length of missing cycle track

Track Surface

18. Gravel, Debris, Dirt.
19. Loose Interlocking Blocks
20. Broken Surface
21. Tree roots
22. Surface Undulations (water stagnation)
23. Manholes
24. Exposed Underground Cables

Overhead Obstructions

25. Cables
26. Branches

Each of these obstructions is classified as one of the following:

1. **Cyclist Slowed Down** – In this situation an obstruction will slow down a cyclist. The cyclist will not have to stop or get off his bicycle. This is a consequence due to cycle track surface issues, example, broken surface
2. **Partial Obstruction** – This is a situation wherein an obstruction may slow a cyclist down by making 0meter to 0.75meters of the width of cycle track inaccessible by the cyclist. Typically, this consequence is due to to the presence of a tree, telephone panel or pole on the cycle track
3. **Total Obstruction** – This is a situation wherein an obstruction forces an average cyclist to stop, get off his/her bicycle or even get off the cycle track in order to continue on the cycle track. Typically, this is a consequence due to the presence of bus stands, built encroachment or cycle track missing.

2.2.4 Geometry and Environment

1. **Width of Cycle Track (in meters) –** Width of the cycle track plays an integral role in the usability of the track by cyclists. It is recommended to have a cycle track with a minimum width for 2 cyclists to comfortable ride alongside or cross-over (>2metres)[5].
2. **Length of the Segment (in meters) -** Cycle tracks on each road were split into 500m segments and the survey (cycle track condition) was conducted for every such segment. This allowed us to gauge the condition of a cycle track for a standardized length. The average of the scores of the segments on each road were used to arrive at the rating for the entire cycle track.
3. **Light after dark –** This parameter plays an essential role in defining the usability of the cycle track after sunset. There must be sufficient light on the cycle tracks at night for their usage. Insufficient light, lack of visibility, will force the cyclist to use the road. It will also create a safety hazard for a cyclist.
4. **Shade during day** – Identifies the amount of shade present over the cycle track. This parameter is utilized to assess the comfort level of using the cycle track. During Indian summers, the sun is extremely sharp and to minimize the exposure from the sun and maintain body heat it is essential to have tree cover. It not only benefits the cyclist but also improves the urban green space; the city breathes better.
5. **Geometry of the track** – This parameter identifies the basic design of the cycle track, In Pune, cycle tracks are of the following kind: Same level as the road, same level as footpath or level segregated from footpath and road. The ideal geometry of the cycle track is same level as the road with curbs to separate cycle tracks from carriage way. This keeps the tracks free from motorized vehicles and would prevent the people from walking on the tracks too.

2.2.5 Intersections

Intersection designs are critical for cycle tracks to be usable. The following criteria determine the

5 IRC: 11-1962 “Recommended Practice for the Design and Layout of Cycle Tracks” Section 11 requires a minimum width of 2m for a cycle track and 3m if overtaking is to be provided for or for an additional lane for 2-way flow.

quality (and score) for a typical intersection

1. **Ramp to get on/off the cycle track** - When the cycle track encounters an intersection there must be comfortable ramps to get off the cycle track and get back on it. This is absolutely essential in the case of cycle tracks that are built at higher gradient from the road level.
2. **Markings to show track continuation** – When a cyclist reaches an intersection and needs to continue on the cycle track, there need to be markings on the road surface to ensure the continuation of the cycle track. This defines the directionality of the track too.
3. **Cycle Track Signage** – It is important to have cycle track signage at intersections to identify the presence and the direction in which the cycle track continues.
4. **Discontinuity** – There must be no obstruction, that forces the cyclist to get off his bicycle or the cycle track, present at intersections.
5. **Tapering of tracks** – Some intersections cut into the cycle tracks to provide a smoother turning radius for the vehicles entering intersection. As a result, the width of the cycle track is reduced forcing the cyclist to shift onto the footpath or road. Such situations can be a cause of accidents at these intersections. Shorter turning radii are also recommended so as to slow down vehicles making turns.
6. **Traffic Calming Devices** – Speed breakers or rough road surface need to be part of the design at intersections to gradually slow down the vehicles using the intersection, to avoid conflict between cyclist and automobiles.

The survey sheets used to capture the data can be found in Appendix 1 : Survey Sheets

2.3 Scoring

2.3.1 Converting Observations to Scores

Scores are based on a penalty point system. For each segment every parameter can contribute a score in the range of 0 to 100 with 0 indicating an ideal value and 100 representing the worst possible score.
Some parameters are judged for the entire segment, such as “Light After Dark” and get scored at 0, 50 or a 100 points based on 3 possible values ('Well Lit', 'Partially Lit' and 'Not Lit'). This is based on a subjective assessment.
Some parameters are based on the total counts for the segment, such as obstructions. Here we have followed the criteria that ranges of total counts correspond to a certain score. Above a certain threshold count, the score given is the full 100 penalty points.

Table 2.3: Cycle Track Segment – Scoring Criteria

Parameter	Levels/Ranges	Score	Explanation
1.Buffer Zone/ Any kind of Differentiation of the Cycle tracks which makes it safer for the pedestrians	Segregated	0	No buffer zone or segregation gets 100 penalty points
	Buffer Zone	0	
	No buffer zone or segregation	100	
2.Light After Dark	Yes	0	
	Partial	50	
	No	100	
3.Traffic calming devices at intersections	Present	0	

	Absent at 1 intersection	50	
	Absent at 2 intersections	75	
	Absent at 3 or more intersections	100	
4. Total Obstructions (in number)	<5	0	For any one segment more than 10 total obstructions gets 100 penalty points
	5 - 10	50	
	>10	100	
5. Missing Ramps	Present	0	
	Absent at >=1 points	25	
	Absent at >=3 points	50	
	Absent at >=5 points	100	
6. Missing Signage and Markings	Present	0	
	Absent at 1 Intersection	50	
	Absent at 2 Intersections	75	
	Absent at 3 or more intersections	100	
7. Track Surface	Concrete	0	Interlocking blocks are considered inappropriate and hence get 100 penalty points
	Asphalt	0	
	Interlocking Blocks	100	
8. Partial Obstructions (in numbers)	<5	0	The scoring follows the same pattern as the total obstructions, but the range for partial obstructions and cyclist slowed down obstructions are progressively higher
	5 – 10	50	
	10 – 15	75	
	>15	100	
9. Cyclist Slowed Down (in numbers)	<5	0	
	5 – 10	50	
	10 – 20	75	
	>20	100	
10.Shade	Yes	0	
	Partial	50	
	No	100	

2.3.2 Weightages

The score of the category (Comfort, Continuity and Safety) is calculated by combining the scores for each parameter in that category.

$score_{category}$ = Average of all scores for each parameter in that category

For every segment the total missing length is determined. For the missing length a score of 100 (worst possible score) is assigned. The total score for the segment is then calculated combining the

score for the missing length.

$$segment\ score_{category} = \frac{100 \times (missing\ length\ of\ segment) + [score_{category}] \times (non missing\ length\ of\ segment)}{length\ of\ segment}$$

Each category is assigned a weight factor to account for the fact that each category has a different number of parameters and the importance of that category as far as the cyclist is concerned. The weights assigned are

Category	Weight
Safety	1
Comfort	1.25
Continuity	1.5

The three category scores are combined into a single total score using these weights

$$\text{total segment score} = \frac{\sum (segment\ score_{category} \times weight_{category})}{\sum weight_{category}}$$

The scores of each segment so calculated is also finally combined into a single score for the road. In doing so a length averaged weight factor is used (since the length of each segment is not the same)

$$score_{road} = \frac{\sum (total\ segment\ score) * (segment\ length)}{\sum (segment\ length)}$$

Finally we look at the range of the scores and assign a simple to understand grade or condition, shown in the table below.

Table 2.4: Explanation of Condition of the Road

Score	Condition	Explanation
0 – 20	Good	Cyclable. But may still have a few problems. Minor repairs required.
20 – 40	OK	Cyclable. Many problems. Cyclist will need to dismount occasionally. Needs fair amount of work to be done
40 – 60	Poor	Not cyclable. Many problems. Cyclist will need to dismount often. Needs a lot of work to be done.
60 – 80	Bad	Not cyclable. Too many problems. Cyclist will need to dismount very often. Needs major amount of work.
80 – 100	Very Bad	Calling this a cycle track is a stretch. Too many problems. Cyclist may not even mount the track. In some cases may have to be redone.

3 Cycle Tracks in Pune

The presence of cycle tracks in Pune is like no other city in India. Pune is the only city that has as much as 140 km of cycle tracks. However, it is really unfortunate that none of the cycle tracks are usable. The following sections will indicate the exact reasons why they are not used by cyclists.

No.	Road Name	Proposed length by PMC (m)		
		LHS	RHS	Total
1	Ganesh Khind Road	2,890	2,890	5,780
2	Karve Road	6,500	6,500	13,000
3	Satara Road	5,805	5,775	11,580
4	Paud Road	4,030	4,030	8,060
5	Sinhangad Road	4,761	4,761	9,522
6	Deccan College Road	1,720	1,720	3,440
7	Vishrantwadi-Airport Road	2,233	2,233	4,466
8	Law College Road	260	0	260
9	Dr. Ambedkar Path	2,430	2,430	4,860
10	Sahasrabuddhe Road	1,811	0	1,811
11	Old Canal Road	2,161	0	2,161
12	Solapur Road	9,670	9,276	18,946
13	Aundh Road*	0	1090	1090
14	Swami Vivekananda (Bibwewadi) Road*	2504	0	2504
	Total surveyed			**87,480**
15	Alandi Road	6,020	6,020	12,040
16	Baner Road	4,750	4,750	9,500
17	Old Mumbai-Pune Highway	2,250	2,250	4,500
18	Airport Road	2,230	2,230	4,460
19	Sangamwadi Road	1,460	1,460	2,920
20	Nagar Road	5,980	5,200	11,180
	Total not surveyed			**44,600**
	TOTAL length of cycle tracks			**132,080**

* length assumed to be what was measured on the ground from start point to end point as no official information about these tracks was available

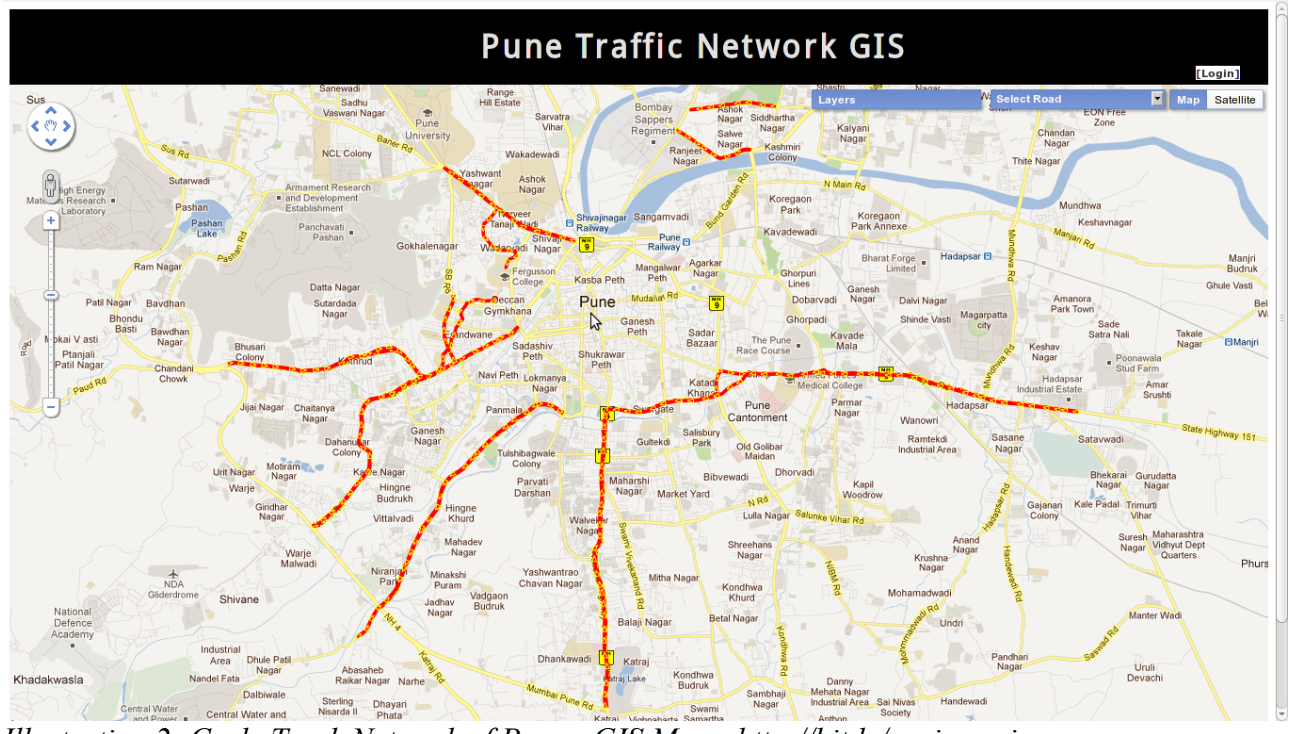


Illustration 2: Cycle Track Network of Pune - GIS Map - http://bit.ly/parisar-gis

3.1 Types of Cycle Tracks

Cycle tracks in Pune are of 2 types, those along the designated BRT corridors (cycle tracks are mandatory as per JnNURM) and non-BRT (those built apart from BRT routes). The length of cycle tracks proposed under BRT implementation is over 115 km. JnNURM Cell of PMC is the body responsible for the construction of cycle tracks on the identified BRT routes (except for the Pilot BRT stretch which comprises Solapur and Satara roads). The JnNURM Cell does not have any design guidelines specified for the construction of cycle tracks and this can be seen in the haphazard manner in which the cycle tracks have been built.

3.2 Cycle Track Designs

Currently there are no standard design guidelines in place for the construction of a cycle track. The laying of the cycle tracks is largely left to contractors that are assigned to build them. This lack of professionalism has resulted in unfavorable cycling conditions on the tracks that have been built. Inconsistency in the design makes the design unreliable. It is important to realize the design requirements from the perspective of a cyclist. Most of the tracks in Pune are not designed with respect to the comfort, convenience or safety of a cyclist.

3.2.1 Geometry

Level segregated from carriage-way and footpath

This is a type of cycle track where the track is level segregated from the carriage way (at a height >10inches, from the carriage-way) and also level segregated from the footpath (4-6inches of height difference). It has been observed that all the tracks of this design have the track surface built with interlocking blocks. The increased height of the cycle tracks from the carriage-way pose a hazard for the cyclist. If the cyclist is on the right side of the track and is forced to stop, the cyclist will have to step on to the carriage-way, which would be >10inches below the cycle track surface.

Same level as carriage-way

These are tracks which are the same level as the road surface. The tracks of this type maybe separated with curbstones. These are the most practical tracks to have in the city, they not only reduce the cost of building/or just marking a cycle track but also they are not as hazardous as those which are at >10inch height from the carriage-way. Satara Road and Solapur road are tracks that are of this design. These tracks are part of the Pilot BRT project of Pune. The main advantage of tracks that are at the same level as the carriage-way is that they are built either with concrete or asphalt. These material types provide a better cycling surface when compared to interlocking blocks.

Same level as footpath

As the name suggests, these are tracks that are at the same level as the footpath. Cycle track on Karve Road is an example of this kind. Since the footpath and cycle tracks are at the same plane, there is always a conflict between a pedestrian and a cyclist. Pedestrian-cyclist conflict is an undesirable situation for both the pedestrian and the cyclist. Since their speeds of travel are different, pedestrian becomes a slow moving obstruction for a cyclist.

It was also observed that in such a geometry of the cycle track, surface of cycle track is built with the same material (Interlocking Blocks) as the footpath.

3.2.2 Surface

Interlocking Blocks

It has been observed that over 80% of the cycle tracks in Pune are built with interlocking blocks. Interlocking blocks are a good surface for pedestrians to walk on but certainly not a good surface to cycle on. The primary disadvantage of interlocking blocks is that it provides a bumpy ride. The constant shake that a cyclist will face while using a cycle track built with interlocking blocks is in fact a good reason for cyclists to not use that track. The cyclist not only faces discomfort riding the cycle but over a period of time there is wear induced in the functionality of the cycle. Especially the cycle that do not have shock absorbers. It was also observed that workmanship of laying interlocking blocks is not up to the mark. There are many surface undulations observed on such a track surface. During rainy season, due to water stagnation in surface undulations, the surface of cycle tracks becomes slippery for a cyclist.

Concrete

Concrete is one of the better materials to build the cycle track with. It provides a smooth surface to cycle on with sufficient friction. The cycle tracks on pilot BRT route (Satara Road and Solapur Road) have been built with concrete as the surface material. In fact the 2 cycle tracks are the better ones built in Pune. Total length of concrete tracks in Pune is approximately 16km.

Asphalt

Like concrete, asphalt is another very good option for the type of cycle track surface. Asphalt provides appropriate friction for the use of cycle. It is robust and more durable, like concrete, when compared to interlocking blocks. The tracks that are built with asphalt, in Pune, were in fact part of the carriage-way until they were utilized for building cycle tracks. Asphalt tracks in Pune are <1km in length.

Table 1: Summary of Various Designs and Surface Types

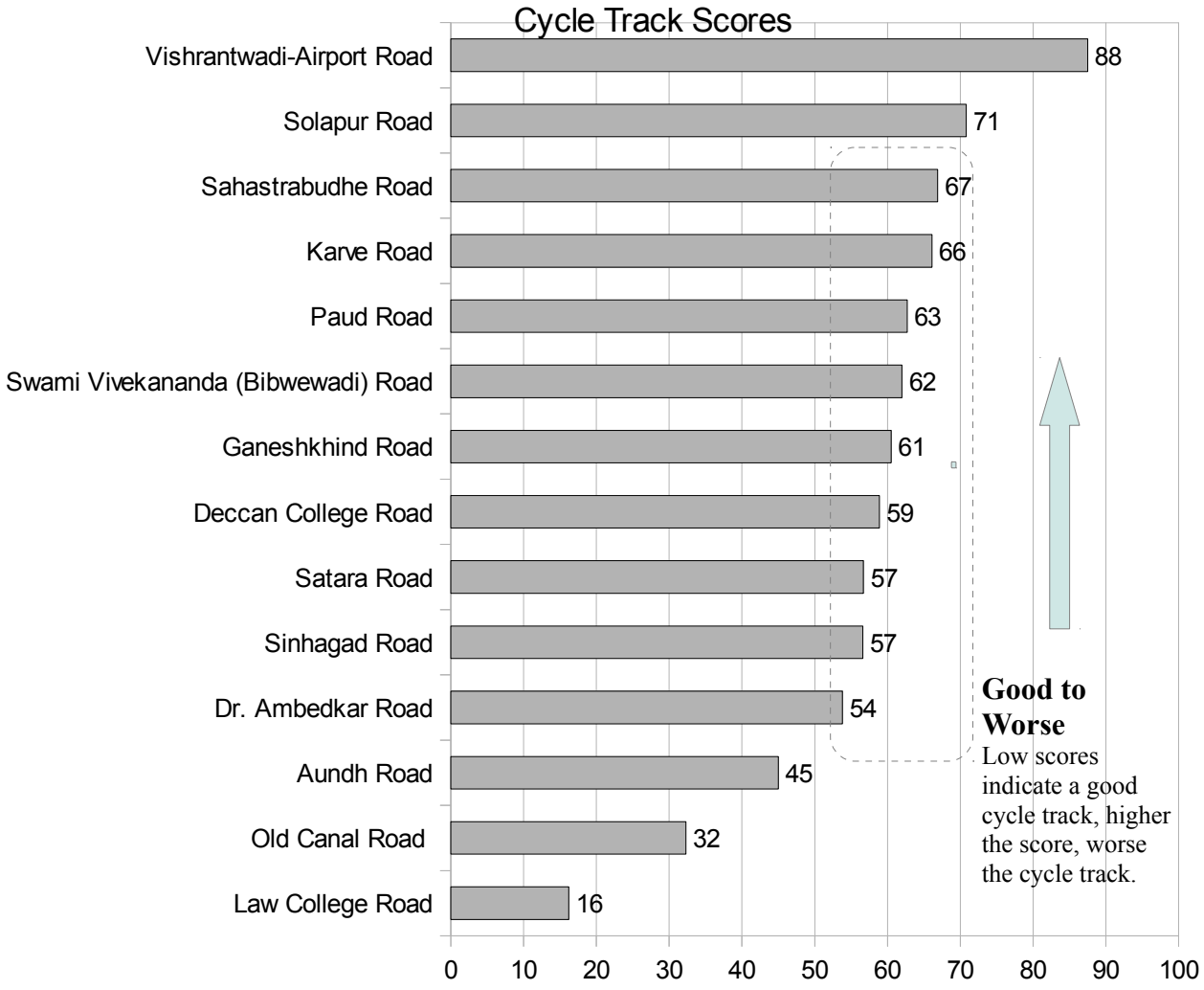
Road Name	Geometry of Cycle Track	Track Surface Material	BRT Or Non-BRT
Ganeshkhind Road	Level segregated from footpath and carriage-way	Interlocking Blocks	BRT
Karve Road	Level segregated from footpath and carriage-way and Same level as footpath	Interlocking Blocks	BRT
Satara Road	Same level as carriage-way	Concrete	BRT
Paud Road	Level segregated from footpath and carriage-way	Interlocking Blocks	BRT
Sinhangad Road	Level segregated from footpath and carriage-way	Interlocking Blocks	BRT
Deccan College Road	Level segregated from footpath and carriage-way	Interlocking Blocks	BRT
Vishrantwadi-Airport Road	Level segregated from footpath and carriage-way	Interlocking Blocks	BRT
Law College Road	Same level as carriage-way	Asphalt	Non-BRT
Dr. Ambedkar Path	Level segregated from footpath and carriage-way	Interlocking Blocks	BRT
Sahasrabuddhe Road	Same level as carriage-way	Interlocking Blocks	Non-BRT
Old Canal Road	Same level as carriage-way	Interlocking Blocks	Non-BRT
Solapur Road	Same level as carriage-way	Concrete	BRT
Alandi Road	Same level as footpath	Interlocking Blocks	BRT
Baner Road	Same level as footpath	Interlocking Blocks	BRT
Old Mumbai-Pune Highway	Same level as footpath	Interlocking Blocks	BRT
Airport Road	Same level as footpath	Interlocking Blocks	BRT
Sangamwadi Road	No Cycle Track	NA	BRT
Nagar Road	Same level as footpath	Interlocking Blocks	BRT
Aundh Road	Same level as carriage-way	Asphalt	Non-BRT
Swami Vivekananda Road	Level segregated from footpath and carriage-way	Interlocking Blocks	Non-BRT

4 Cycle Tracks Assessment

4.1 Cycle Track Scores

The following are the overall scores for the cycle tracks surveyed by Parisar.

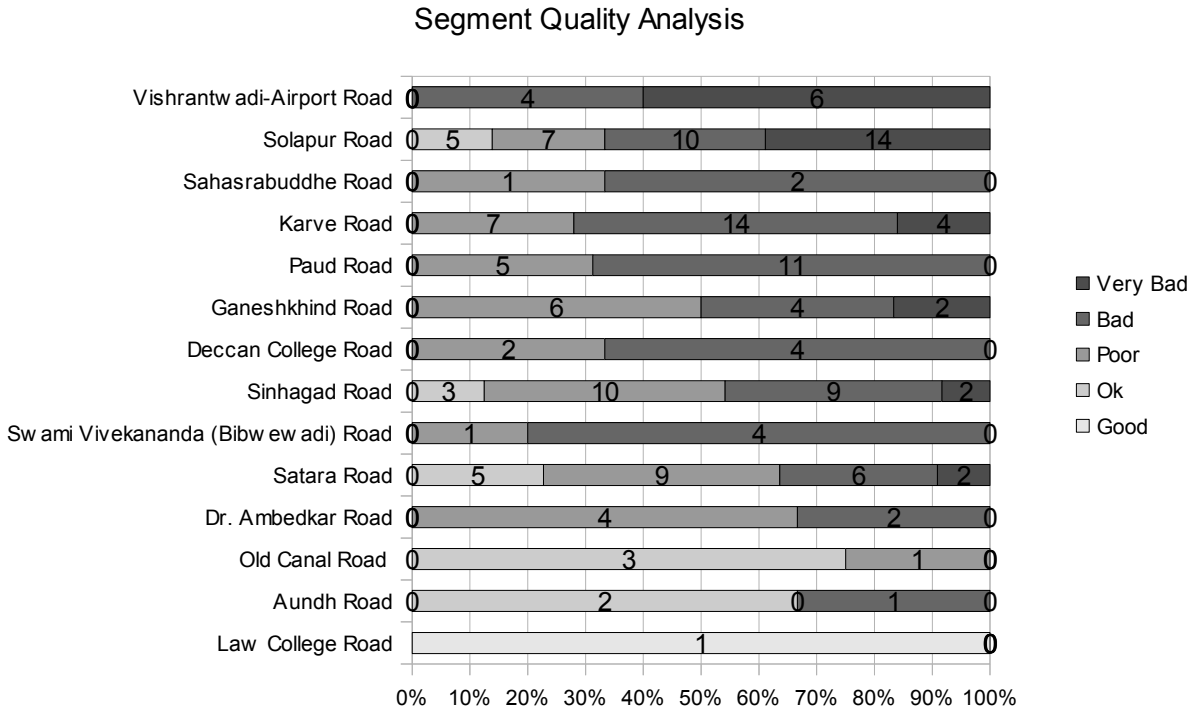
- Two cycle tracks, namely Law College Road and Old Canal Road (both non-BRT cycle tracks, built by PMC) are essentially of good quality
- Nine cycle tracks score between 54 and 67 and are already in the unusable range
- Two cycle tracks score worse than 70, with the Vishrantwadi-Airport road cycle track being the worst at a score of 88 (almost as bad as it can get). Surprisingly Solapur road, which has a concrete surface and built as part of the pilot BRT route is one of the worst cycle tracks in the city



4.2 Segment Analysis

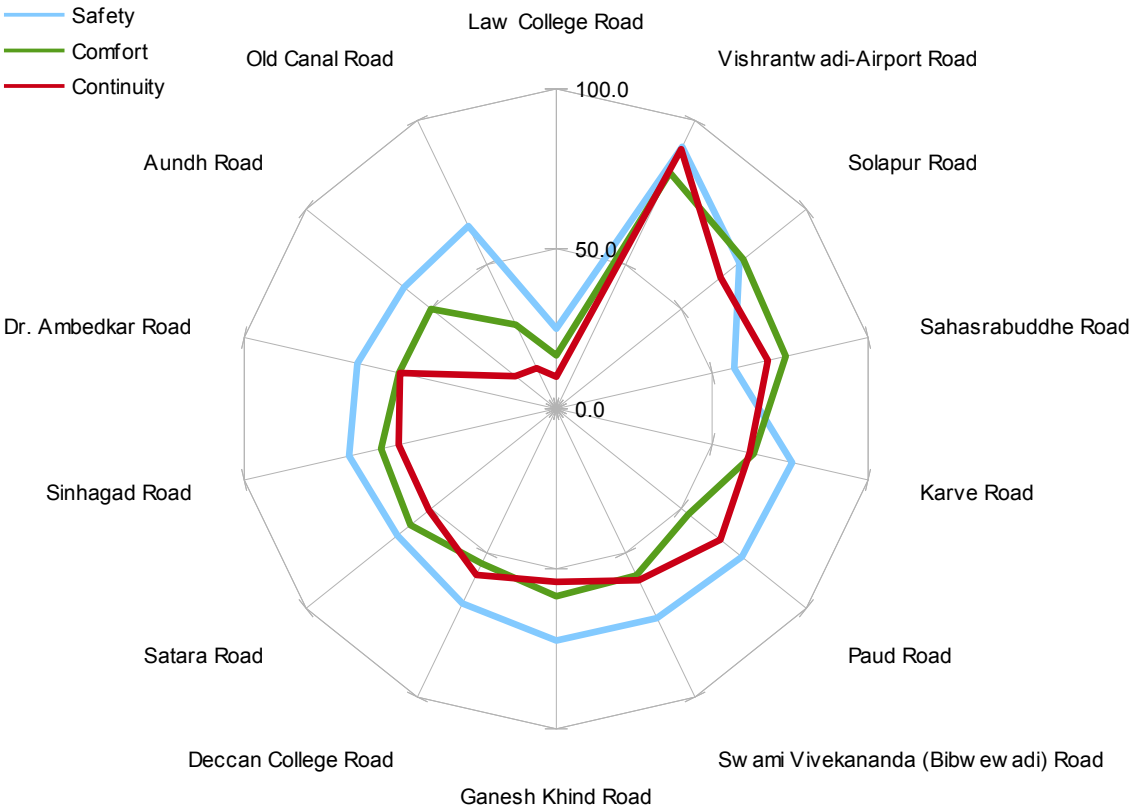
It is observed that within one road different segments can have varying quality. This can be seen in the chart below.

- Law College road has a single segment which is 'Good'. It is the only cycle track to have a 'Good' rated segment.[6]
- Vishrantwadi-Airport road has only 'Bad' and 'Very Bad' segments
- Solapur road, Satara road and Sinhagad road all have a mix of segments that vary from 'Ok' to 'Very Bad'
- All other roads have a mix of 'Poor', 'Bad' and some 'Very Bad' segments.



6 While this segment is used by children from schools in the vicinity, it still has problems that make this difficult. It has large number of partial obstructions (see section 4.5) and lack of a good footpath means that pedestrians walk on it.

4.3 Safety, Comfort and Continuity



- Generally one sees that all cycle tracks fare the worst with regards to safety (higher scores), except for Sahasrabuddhe road
- Comfort and Continuity more or less lie in the same narrow band except for the two best and two worst cycle tracks
- Continuity of Law College road (which is anyway a very small stretch) and Old Canal road cycle tracks are better
- Amongst the middle rated cycle tracks, Comfort rating of Paud road cycle track is slightly better

In general cycle tracks score better or badly on all 3 aspects of the cycle track. Hence improvements need to happen on all three things, to improve the scores for the cycle track.

4.4 Missing lengths

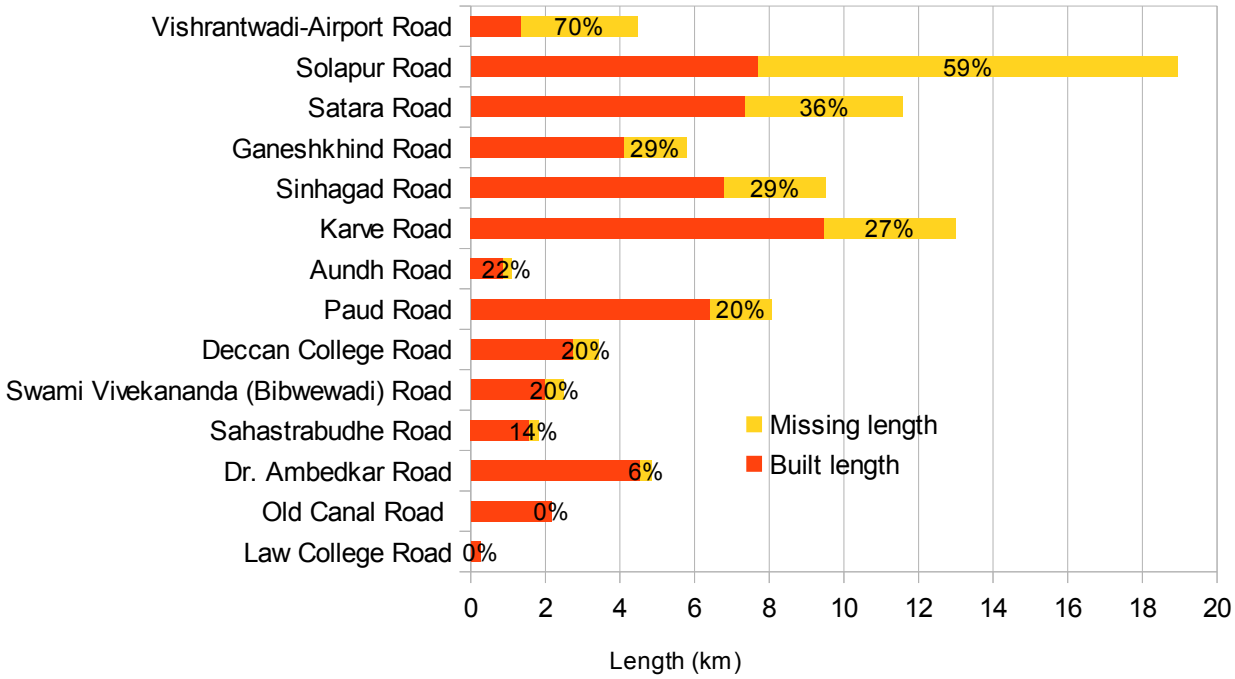
One of the major contributors to the low scores for cycle tracks are the missing parts of the cycle tracks. This not only impacts the continuity of the track, thus making it less attractive for cyclists to use, but in our grading system also attracts a full penalty of 100 points. Thus completing the missing sections will go a long way to improving the scores.

- Vishrantwadi-Airport road and Solapur road

Illustration 3: Where cycle tracks are not segregated they can still be well marked so as to maintain visual continuity for cyclists.

cycle tracks have highest % of missing portions

- Most of the others have 20% – 30% missing portions
- Only the short cycle tracks on Law College road and Old Canal road have no missing portions

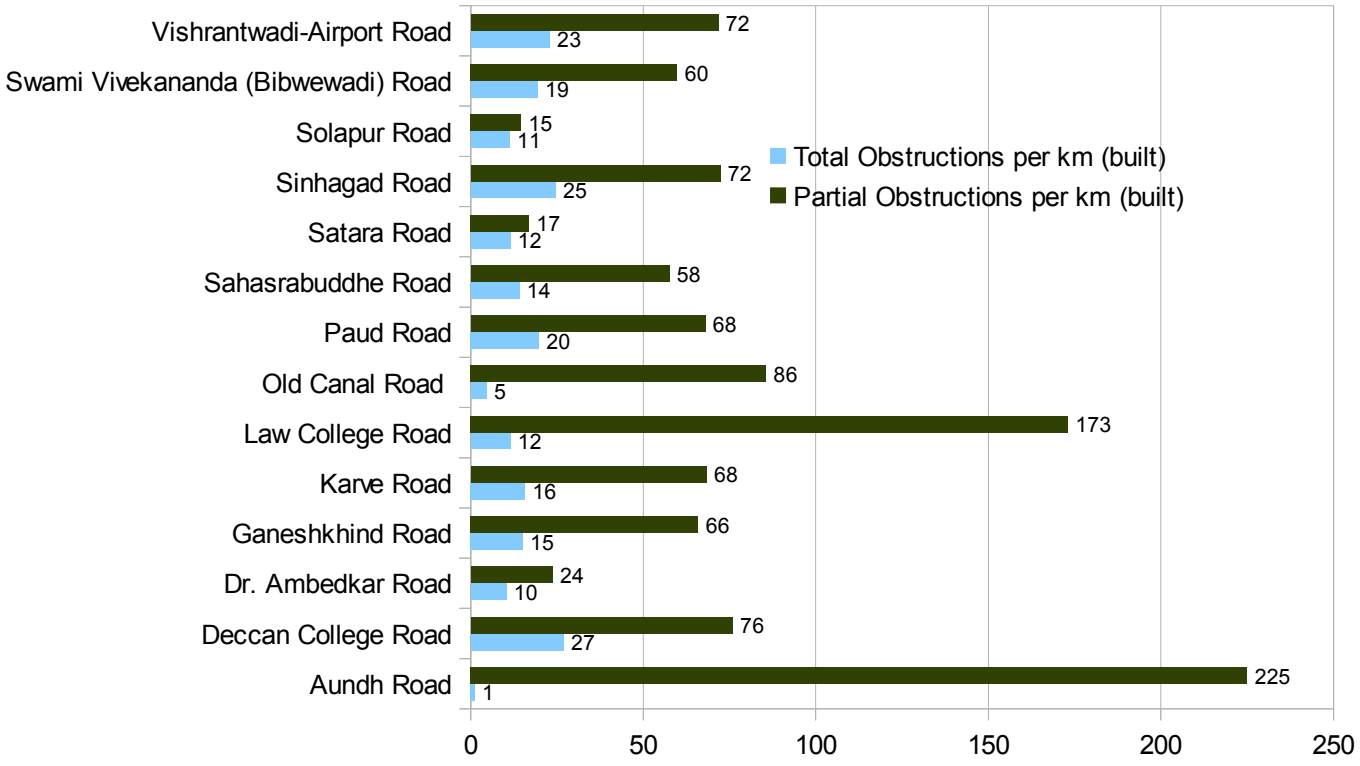


4.5 Obstructions

Both total and partial obstructions are another leading contributor to the low scores of the cycle tracks as they contribute both to the Continuity and Safety aspects of cycle tracks. These are the most visible and obvious improvement that can be made to ensure greater usability of the cycle tracks.

On the ~57 km of built cycle tracks (out of the total of 87 km) one finds a whopping 904 total obstructions and over 3000 partial obstructions (16 and 55 per km respectively)!

Road Name	Partial Obstructions	Total Obstructions
Deccan College Road	209	74
Dr. Ambedkar Road	108	47
Ganeshkhind Road	271	62
Karve Road	647	149
Law College Road	45	3
Aundh Road	192	1
Old Canal Road	185	10
Paud Road	437	127
Sahasrabuddhe Road	90	22
Satara Road	125	85
Sinhagad Road	491	167
Solapur Road	112	87
Swami Vivekanand (Bibwewadi) Road	122	39
Vishrantwadi-Airport Road	97	31
Total	**3,131**	**904**



Unless a majority of these obstructions are removed, there is no chance that cyclists will be able to use the cycle tracks.

- Aundh Road and Old Canal road have fewest total obstructions per km of build cycle track
- Most others have 10 – 20 total obstructions per km
- Deccan College road cycle track has almost 30 total

Illustration 4: Well designed cycle tracks along the Delhi BRT corridor are free from obstructions and have a smooth riding surface.

obstructions per km

- The two pilot BRT corridor cycle tracks on Solapur road and Satara road have fewest partial obstructions per built km
- All other cycle tracks have huge number (60 – 80) partial obstructions per km, which is a partial obstruction on average every 12 – 15 meters!
- Aundh road and Law College road cycle tracks despite being very short have 45 and 192 partial obstructions, thus resulting in very high number of obstructions on a per km basis

4.5.1 Enforcement Issues

The types of obstructions listed below are generally of the 'movable' type, that is they are not permanent in nature and not directly related to the design of the cycle tracks and are essentially enforcement related

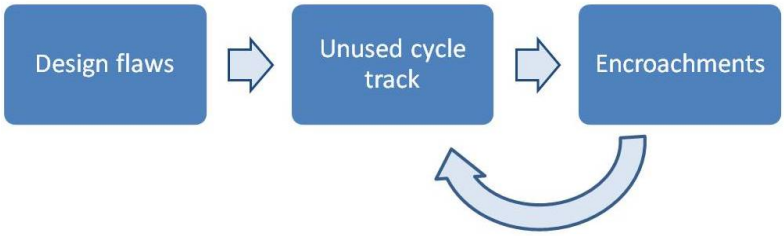
1. Construction material kept on the cycle track near the construction sites along cycle tracks.
2. Hawkers and vendors are present on the cycle track, blocking the path of a cyclist.
3. Vehicles were seen parked on the cycle track, obstructing the continuous journey of the cyclist.
4. At certain locations, people were observed to be sitting on the cycle tracks where the tracks are right outside their houses.

Picture3.5.1: Vehicles parked on Cycle Track

Picture3.5.2: People sitting on Cycle Track

Picture 3.5.3: Construction material on Cycle Track

There is a vicious cycle with regards to such encroachments. Cycle tracks are largely unused due to design issues (missing lengths, permanent obstructions, track surface etc) and are therefore unused spaces, which get encroached. Encroachments in turn leads to even less usage.



4.6 Intersections

Intersections play an integral role in providing continuity to the cyclist.

Figure 4.3.1: Schematic Representation of Intersection

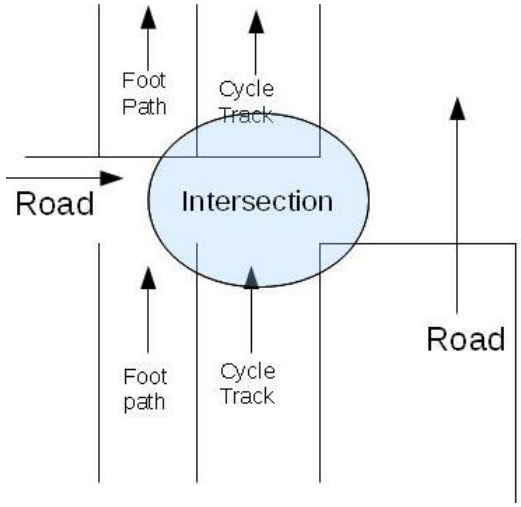


Illustration 5: Raised crossings and different materials enhance the safety of cyclists at intersections.

Issues observed at intersections:

1. No ramp has been given at many intersections (especially Karve Road) for the cyclist to proceed at an intersection. Since the design of most cycle tracks is such that they are at a height of >10 inches from the road level, it becomes imperative to provide a ramp to get off and then get back onto the cycle track to continue the journey. In case of no ramp, the cyclist must get off the bicycle and then take the cycle off the track, go across the intersection, put the cycle back on the track, get back onto the cycle and continue the journey.
2. None of the intersections seem to have a marking to show the continuity of a cycle track. This absence does not allow the motorized vehicle users to acknowledge the presence of a cycle track and realize they are nearing one. In case of no markings, it induces ambiguity in the mind of cyclist to identify where the track continues.
3. It was observed that not all the intersections had a signboard to show the presence/continuity of the cycle track at intersections. This does not allow the cyclist to identify the direction in which the cycle track continues. This is an issue primarily at intersections greater than 12 m in width, where the distance to view the other side of the intersection is far off.
4. None of the intersections have any kind of traffic calming devices. The purpose of traffic calming device is to slow down the motorized traffic at intersections. The speed at which motorized traffic moves needs to be slowed down to make the intersections a safe place for cyclists and pedestrians. The traffic calming devices could be sign boards, blinkers or raised table tops (10 m before the intersections). The type of device used can vary depending on the traffic volume on that road.

The above stated issues make the intersections on cycle tracks a dangerous environment for the cyclist.

4.6.1 Design issues at intersections

Given the current design of the cycle tracks, built at a height greater than 10 inches from the carriageway, if a cyclist wants to go from the left hand side (cycle track 1, in figure 3.6.1) of the carriageway to the right hand side to cycle track 2, as in figure 3.6.1, the cyclist must get off the cycle and then carry the bicycle off the cycle track and continue his/her journey. This is because at such situations there is the absence of a ramp to access the carriageway wherever it maybe necessary to cross-over to the other side. It is inconveniences like these that keep the cyclists from using the tracks even if the track is flawless. A better solution for this is the implementation of a cycle box (Figure 3.6.2). The cycle box prevents the collision of motor traffic and cyclists wanting to turn right at an intersection. The purpose of a cycle box is to allow the cyclists to start ahead of the motorized traffic to avoid any collisions between the two modes of transport. A delay of few seconds in the start between the 2 modes prevents any kind of collision between them.
The design of the tracks must be convenient enough for the cyclist, so that getting off the cycle during the journey is minimized. Hence, the design must incorporate features that allow maximum continuity for the cyclist.

Figure 3.6.1: Schematic representation – Intended direction of travel by the cyclist

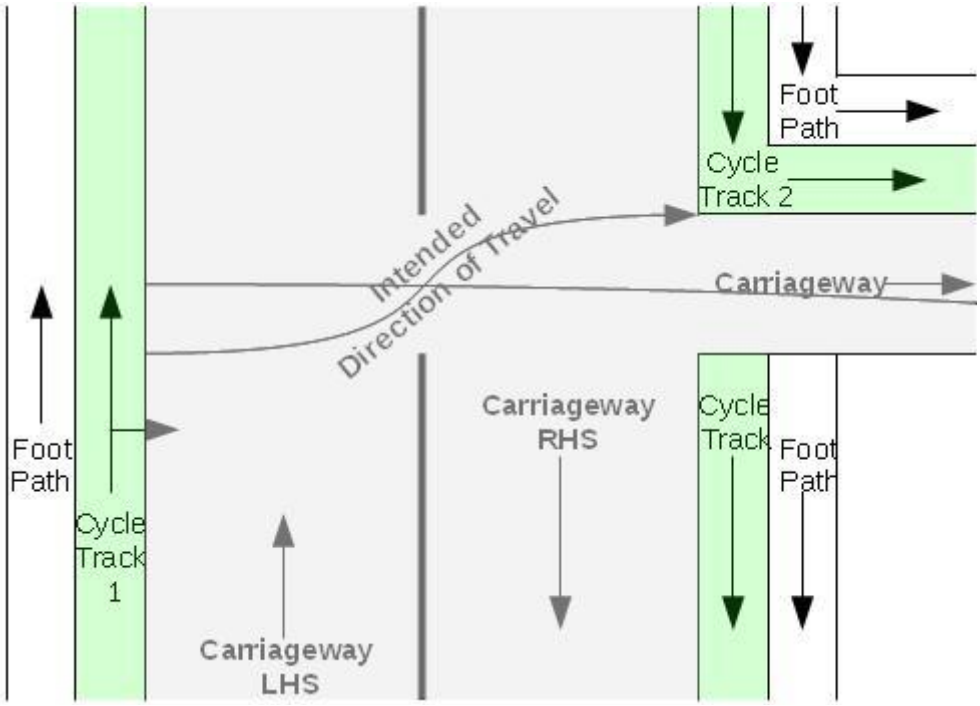


Figure 3.6.2: Schematic Representation - Cycle Box at Traffic Signal

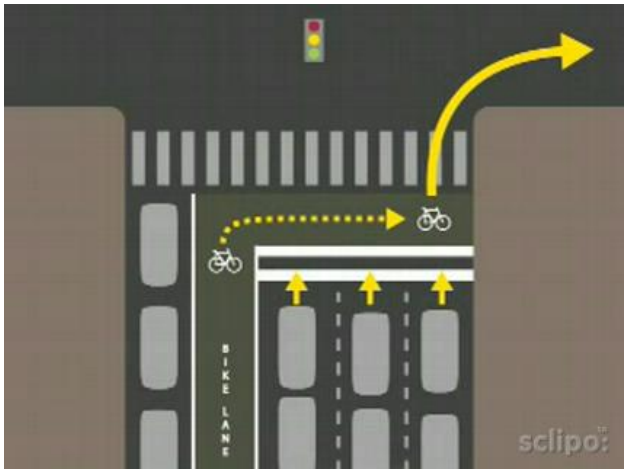


Illustration 6: A bike box is used at intersections to designate a space for cyclists to wait in front of other vehicles at a red light, and to proceed first when the light turns green.

Illustration 7: Use of a bike box for cyclists turning right or going straight in Delhi

4.7 Pedestrians on Cycle Track

In case of poor foot path design or for that matter missing foot path, pedestrians prefer to use cycle tracks for their ease of walking. A pedestrian's frame of mind is quite similar to that of a cyclist, in terms of usage of their respective path (foot path or cycle track) for commute. If a cyclist faces multiple obstructions on the cycle track, he/she would rather not use the cycle track, similarly, if a pedestrian faces multiple obstructions or missing footpath segments on his/her commute, he/she would rather not use the footpath. Instead of constantly going on and off the footpath, the pedestrian would opt walking on the cycle track.

Following are the reasons observed for a pedestrian to be using the cycle track for commute rather than the footpath:

1. If the footpath is not wide enough for 2 people to walk along side.
2. If there are multiple obstructions (Example, trees, telephone/electrical panels, missing segments, hawkers/vendors, vehicles parked, built encroachments, open man holes etc.) on the footpath.
3. If the construction material of the foot path surface is uncomfortable to walk on (lack of sufficient friction or poor footpath maintenance).

4.8 Summary

All the issues discussed above are summarized in the table below. One sees that all cycle tracks fare badly on almost all issues.

Table 5.1: Issues on Cycle Tracks Surveyed

Road Name	Continuity	Track Surface	Comfort at intersections	Pedestrians on cycle track	Movable Obstructions (Enforcement Issues)	Provision to Access roads on RHS
Ganeshkhind Road	Poor	Poor	Poor	Present	Present	Absent

Karve Road	Poor	Poor	Poor	Present	Present	Absent
Satara Road	Poor	Good	Poor	Present	Present	Absent
Paud Road	Poor	Poor	Poor	Present	Present	Absent
Sinhagad Road	Poor	Poor	Poor	Present	Present	Absent
Deccan College Road	Poor	Poor	Poor	Present	Present	Absent
Vishrantwadi-Airport Road	Poor	Poor	Poor	Present	Present	Absent
Law College Road	Poor	Good	Poor	Present	Present	Absent
Dr. Ambedkar Road	Poor	Poor	Poor	Present	Present	Absent
Sahasrabuddhe Road	Poor	Poor	Poor	Present	Present	Absent
Old Canal Road	Poor	Poor	Poor	Present	Present	Absent
Solapur Road	Poor	Good	Poor	Present	Present	Absent
Aundh Road	Poor	Good	Poor	Present	Absent	Absent
Swami Vivekananda (Bibvewadi) Road	Poor	Poor	Poor	Present	Present	Absent

5 Recommendations

This report clearly shows that there are widespread problems with the cycle tracks, which renders them unusable. If the cycle tracks are to be made usable a comprehensive set of actions need to be taken.

Road Name	Fix Surface	Construct Missing Segments	Remove Obstructions	Improve Lighting	Improve adjoining footpath	Markings Required at intersections	Remove Encroachments
Ganeshkhind Road	●	●	●	●	●	●	●
Karve Road	●	●	●	●	●	●	●
Satara Road	●	●	●	●	●	●	●
Paud Road	●	●	●	●	●	●	●
Sinhagad Road	●	●	●	●	●	●	●
Deccan College Road	●		●	●	●	●	●
Vishrantwadi-Airport Road	●	●	●	●	●	●	●
Law College Road	●		●	●	●	●	
Dr. Ambedkar Road	●	●	●	●	●	●	●
Sahasrabuddhe Road	●	●	●	●	●	●	●
Old Canal Road	●		●	●	●	●	●
Solapur Road	●	●	●	●	●	●	●
Aundh Road	●	●	●	●	●	●	●
Swami Vivekananda (Bibvewadi) Road	●	●	●	●	●	●	●

5.1 Institutional Structure

The single most essential step that is required is for there to be a dedicated agency which is responsible for the design, implementation and upkeep of the cycle tracks. Dedicated personnel who are trained with respect to cycle related infrastructure must be part of this agency. The agency should be able to hire consultants as and when needed for specialized inputs and be able to monitor work carried out by contractors. Finally this agency must have a dedicated and appropriate budget.

5.2 Cycle Track Design Manual

As has been mentioned, all the cycle tracks are of different designs and not much thought has been given to issues such as track surface materials, signages, intersection designs, illumination, shade, continuity, markings etc. For all these elements to be planned for in a scientific and consistent manner and for a high quality of work there is a need for a cycle design manual which has detailed guidelines, specifications, examples, best practices and illustrations for all things related to cycle tracks. This manual should be the basis for planning, designing and implementing the cycle tracks. The agency responsible for the cycle infrastructure in the city as well as major contractors should be familiar with this manual.

5.3 Inputs from Cycling Community

Pune still has a large number of cyclists of various kinds; school children, senior citizens, workers, informal sector workers, women and more recently cycling enthusiasts. It also has many cycling clubs and NGOs who are dedicated to promoting and supporting cycling related policies and

activities. The agency responsible for the planning, design, implementation and upkeep of cycle related infrastructure would benefit immensely by inputs from and consultations with these groups. The idea of a Cycle Helpline so that cyclists can call to report issues can also help the agency to deal with any problems in a timely manner.

> "It has been the experience that many such cycle tracks and pedestrian paths do not get used as initially envisaged. However, a view has been that this is because these facilities are designed badly and without fully recognizing the limitations and problems faced by cyclists or pedestrians. It would, therefore, be essential that such facilities be constructed after an open debate on the designs with experts and the community that is expected to use them. It is expected that such public appraisal would lead to designs that enable greater use by the potential beneficiaries." - *National Urban Transport Policy*

5.4 Periodical Assessment

The current methodology used to assess the cycle tracks should be used by the agency to continually appraise the quality of the cycle tracks and the cycle track network as a whole and set targets for improvement. The worst cycle tracks can be taken up on a priority for improvement. Budgetary allocations should be made with respect to the targets set and whether these targets are met can be determined at the end of each budget cycle. This will increase the support for cycle tracks by policy makers and the public at-large which is currently sceptical about the need and utility of cycle tracks.

6 Appendix 1 : Survey Sheets

Cycle Track Assessment – Survey sheet – Page 1

Cycle Track Assessment - Survey Sheet

Name of Surveyor: Date: Time: Direction of observation:

Start Point Landmark: End Point Landmark:

Segment: GPS Start Point: GPS End Point:

S.No.	PARAMETER	CONDITION			Length of Total Obstruction in Human Steps
		Cyclist Slowed Down	Partial Obstruction	Total Obstruction	
(I)	**Fixed Obstructions on Cycle Track**				
1	Trees				
2	Poles (cctv, traffic signal, sign board)				
3	Telephone Panel				
4	Electrical Panel				
5	Bus Stand				
6	Built Encroachment				
(II)	**Movable Obstructions on Cycle Track**				
7	Hawkers				
8	Garbage Bins				
9	Construction Material				
10	Traffic Barricade				
11	People Sitting				
12	Hoardings				
(IV)	**Parked Vehicles: Due To**				
13	Religious Landmark				
14	Restaurant/Eatery				
15	Auto Garage				
16	Generally: Retail Shops				
(V)	**Cycle Track Missing**				
(VI)	**Track Surface**				
18	Gravel, sand, debris, dirt.				
19	Loose Interlock Blocks				
20	Broken Surface				
21	Water Stagnation/Surface Undulation				
22	Tree Roots				
23	Manholes				
24	Exposed Underground Cables				
(VII)	**Overhead Obstructions**				
25	Cables				
26	Branches				
(VII)	**Footpath Rating**				

Note: 1 Human Step of the surveyor = _____ metres

Questions to be answered by the surveyor at the end of the survey:

1) Can a average cyclist use the segment without getting off the cycle or the cycle track? Yes : No

2) Which surface is better to cycle? Cycle Track : Road

3) Cycle track surface material. Interlock Blocks : Concrete : Asphalt

4) Percentage of track segment that is cyclable excluding total obstruction:

5) Were there people walking on the cycle track. Yes : No

6) Number of signages to indicate the presence of cycle track.

7) Shade: Yes : No : Partial

8) Light (after sunset): Yes : No : Partial

9) Geometry of Track: Road Level : Footpath Level : Segregated from FP&R : NA

10) Presence of Buffer Zone: Segregated : Buffer Zone : None : NA

11) Foot Path Rating (0% - No FP): 0% : 20% : 40% : 60% : 80% : 100%

12) Width of Segment (m):

13) Length of Segment (m):

Surveyor's Comments

Table 2.2: Cycle Track Assessment – Survey sheet – Page 2

S.No.	PARAMETER	CONDITION	
(VIII)	Intersection:	GPS pt.:	
1	Ramp to get off the track	Comfortable : Uncomfortable : No Ramp	
2	Ramp to get back on the track	Comfortable : Uncomfortable : No Ramp	
		Present	Absent
3	Markings to show track continuation		
4	Cycle Track Signage		
5	Traffic Calming Device		
6	Discontinuity	Yes : No : NA	
7	Tapering of Track Width at intersection	Yes : No : NA	
		Partial	Total
8	Obstruction Type:		
9	Obstruction Type:		
10	Obstruction Type:		

S.No.	PARAMETER	CONDITION	
(VIII)	Intersection:	GPS pt.:	
1	Ramp to get off the track	Comfortable : Uncomfortable : No Ramp	
2	Ramp to get back on the track	Comfortable : Uncomfortable : No Ramp	
		Present	Absent
3	Markings to show track continuation		
4	Cycle Track Signage		
5	Traffic Calming Device		
6	Discontinuity	Yes : No : NA	
7	Tapering of Track Width at intersection	Yes : No : NA	
		Partial	Total
8	Obstruction Type:		
9	Obstruction Type:		
10	Obstruction Type:		

S.No.	PARAMETER	CONDITION	
(VIII)	Intersection:	GPS pt.:	
1	Ramp to get off the track	Comfortable : Uncomfortable : No Ramp	
2	Ramp to get back on the track	Comfortable : Uncomfortable : No Ramp	
		Present	Absent
3	Markings to show track continuation		
4	Cycle Track Signage		
5	Traffic Calming Device		
6	Discontinuity	Yes : No : NA	
7	Tapering of Track Width at intersection	Yes : No : NA	
		Partial	Total
8	Obstruction Type:		
9	Obstruction Type:		
10	Obstruction Type:		

S.No.	PARAMETER	CONDITION	
(VIII)	Intersection:	GPS pt.:	
1	Ramp to get off the track	Comfortable : Uncomfortable : No Ramp	
2	Ramp to get back on the track	Comfortable : Uncomfortable : No Ramp	
		Present	Absent
3	Markings to show track continuation		
4	Cycle Track Signage		
5	Traffic Calming Device		
6	Discontinuity	Yes : No : NA	
7	Tapering of Track Width at intersection	Yes : No : NA	
		Partial	Total
8	Obstruction Type:		
9	Obstruction Type:		
10	Obstruction Type:		

S.No.	PARAMETER	CONDITION	
(VIII)	Intersection:	GPS pt.:	
1	Ramp to get off the track	Comfortable : Uncomfortable : No Ramp	
2	Ramp to get back on the track	Comfortable : Uncomfortable : No Ramp	
		Present	Absent
3	Markings to show track continuation		
4	Cycle Track Signage		
5	Traffic Calming Device		
6	Discontinuity	Yes : No : NA	
7	Tapering of Track Width at intersection	Yes : No : NA	
		Partial	Total
8	Obstruction Type:		
9	Obstruction Type:		
10	Obstruction Type:		

7 Appendix 2 : Detailed Cycle Track Analysis

7.1 Ganeshkhind Road

Cycle Track Details

Total Length Surveyed (m): 5,866

Total Number of Segments: 12

Total Built Length (m): 4,198 (72% of total length)

Width (m): 1.9

Geometry: Primarily it is level segregated from carriage-way and footpath. But about 1000mts of the track is at the same level as footpath.

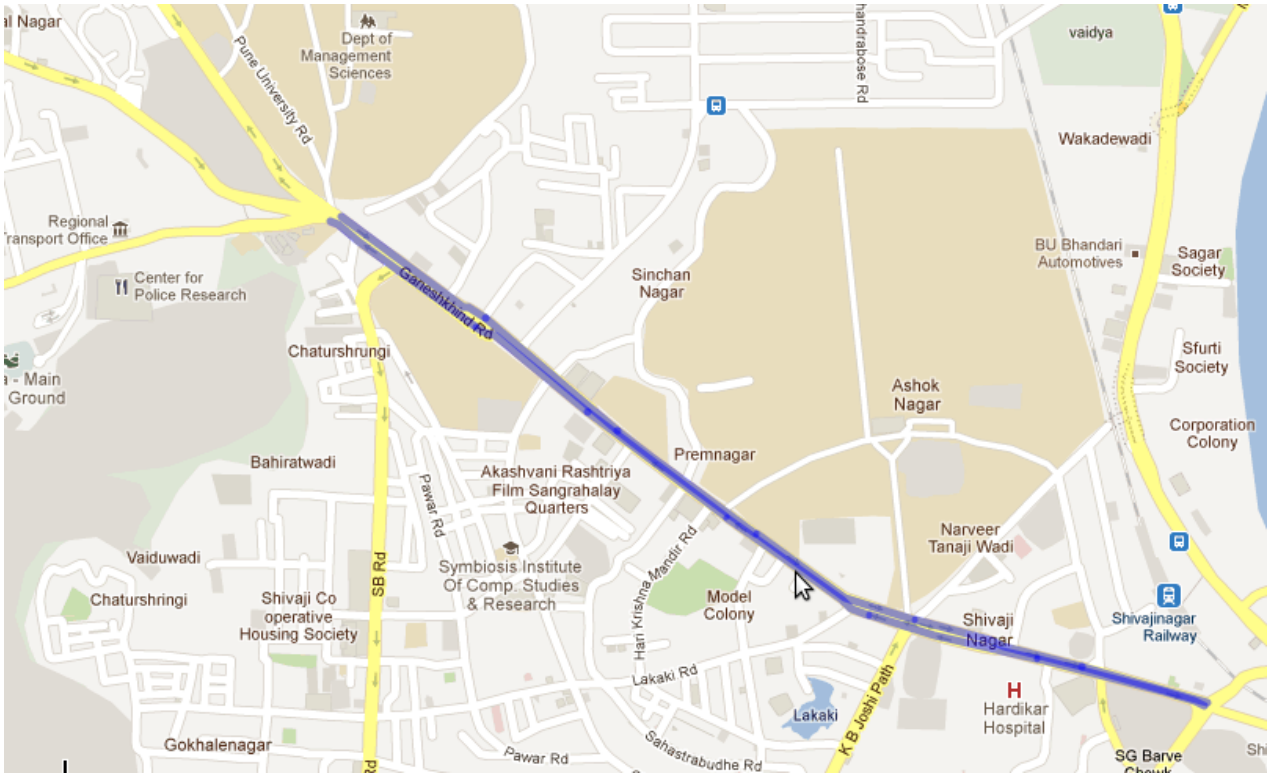
Surface Material: Interlocking Block

Number of obstructions totally blocking the track: 62

Score:

Safety	Comfort	Continuity	Overall
72	59	54	62

Map:

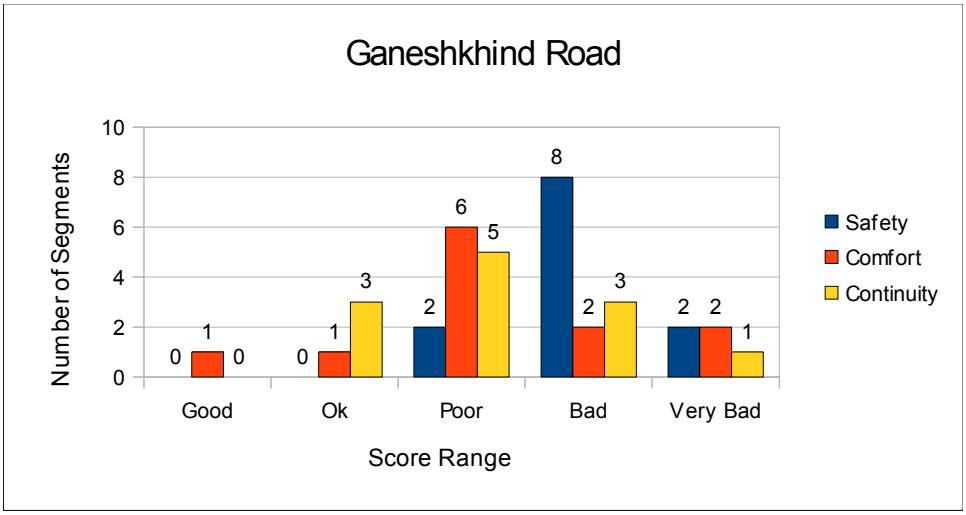


Ganeshkhind Road is one of the widest and best constructed roads in Pune with between four and six lanes in both directions. Beginning in the north-west it ends at the western edge of central Pune. It starts from the SSC Board - Shivaji Nagar State Transport Terminus Intersection at Shivaji Nagar and ends at the Pune University Circle.

The cycle track on this road is of various designs. On some segments the track is segregated from

the footpath and carriage-way, on some segments it is the same level as the footpath and there is also a segment on this track where the track (300mts) is along side the carriage-way, separated with curbstones.
The cycle track is missing on the slip roads besides the 2 flyovers on this road. However there is a bus stand on these slip roads, as a result the cyclist is prone to an encounter with a bus stopping to the left of the road.

Looking at the graph below it can be inferred that Ganeshkhind Road is not cyclable throughout the entire length of the track. The overall score of the track, 62, suggests that the road falls under the category, 'Bad'. This means that the cyclist has to often dismount from the track to continue his/her journey. Major work needs to be done to provide continuous cycle-ability on this track.



Based on the survey conducted, following is the score obtained for each segment on this road:

Segment	Safety	Comfort	Continuity
1	78	70	68
2	84	83	76
3	63	52	30
4	69	59	54
5	73	68	52
6	50	50	33
7	52	43	25
8	69	39	48
9	76	58	41
10	75	18	67
11	73	59	48
12	100	100	100

7.1.1 Issues

1. Track surface is built with interlocking blocks resulting in a uncomfortable and bumpy ride.
2. The entire track is built at >10inch height from the carriage-way. Making it unsafe for a cyclist on the right hand side to step down in case of an immediate stop.
3. The cycle track is not continuous. There are multiple segments where the cycle track goes

missing. 28% of the cycle track is missing on this road.

4. Cycle track is missing on the slip roads on the sides of the 2 flyovers on this road.
5. There are 62 obstructions that completely block the cycle track, not allowing the cyclist to continue further.
6. Due to improper footpath, pedestrians were observed walking on the cycle track.
7. Insufficient lighting on the track after sunset.

7.1.2 Recommendations

1. The tracks must be made continuous, without any breaks and missing segments.
2. On segments where the cycle track is at the same level as the footpath there must be visible marking (width of the cycle track) in colour.
3. There must ramps provided near intersections, in case the cyclist has to turn right. Example at the traffic signal near Pune Central (mall).
4. Obstructions that completely block the cycle track must be removed to aid continuous use of the cycle track.
5. Proper footpaths need to be built to keep pedestrians off the cycle track.
6. Sufficient lighting must be provided on cycle track after sunset.

A few photos to visualize the cycle track on Ganeshkhind Road

7.2 Karve Road

Cycle Track Details

Total Length Surveyed (m): 12,530

Total Number of Segments: 25

Total Built Length (m): 8,998 (72%)

Width (m): 1.3 and 1.9 (25% and 75% of length surveyed respectively)

Geometry: Same level as footpath (50% of total length), level segregated from footpath and carriage-way (50% of total length)

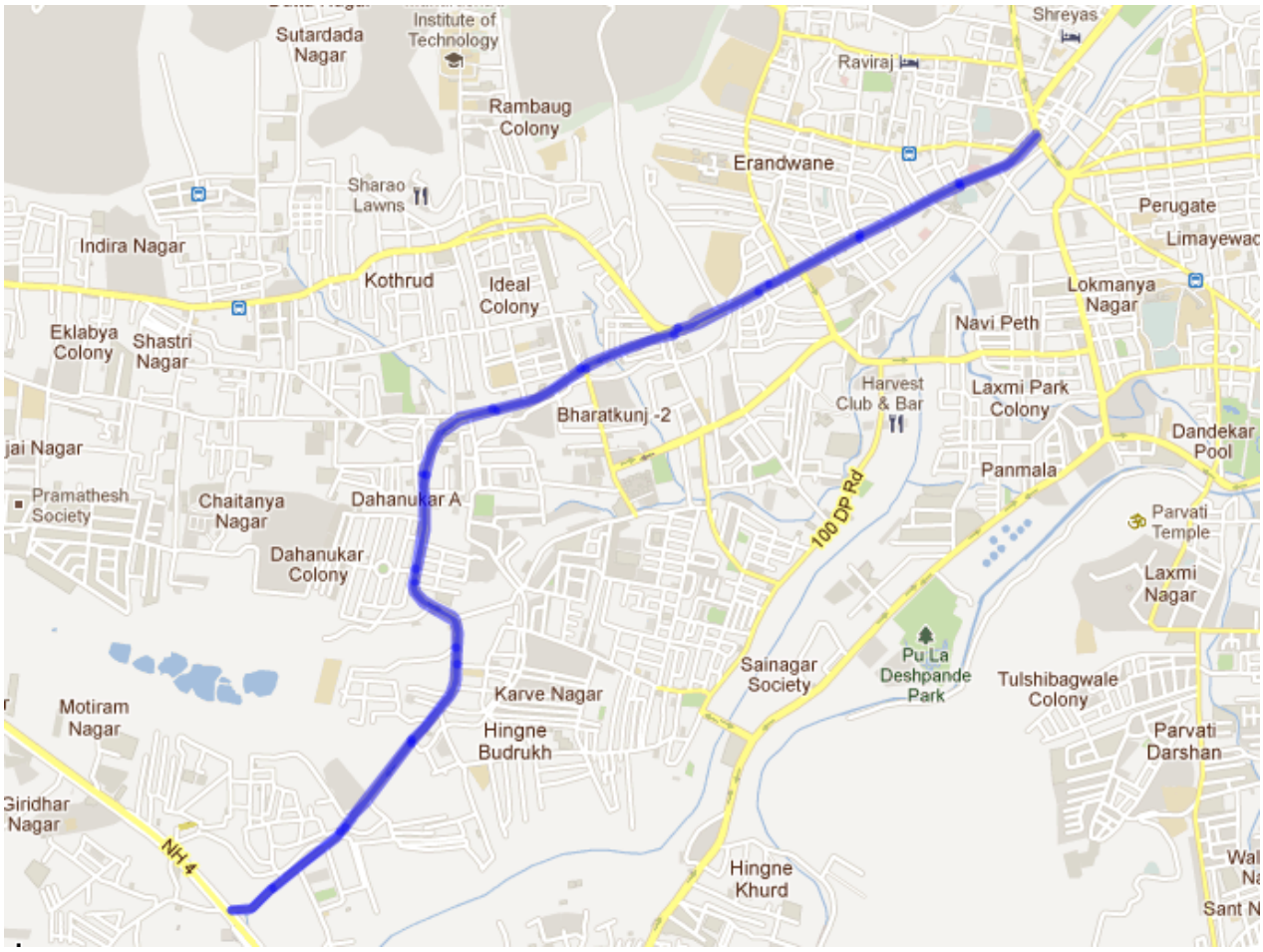
Surface Material: Interlocking Block

Number of obstructions totally blocking the track: 104

Score:

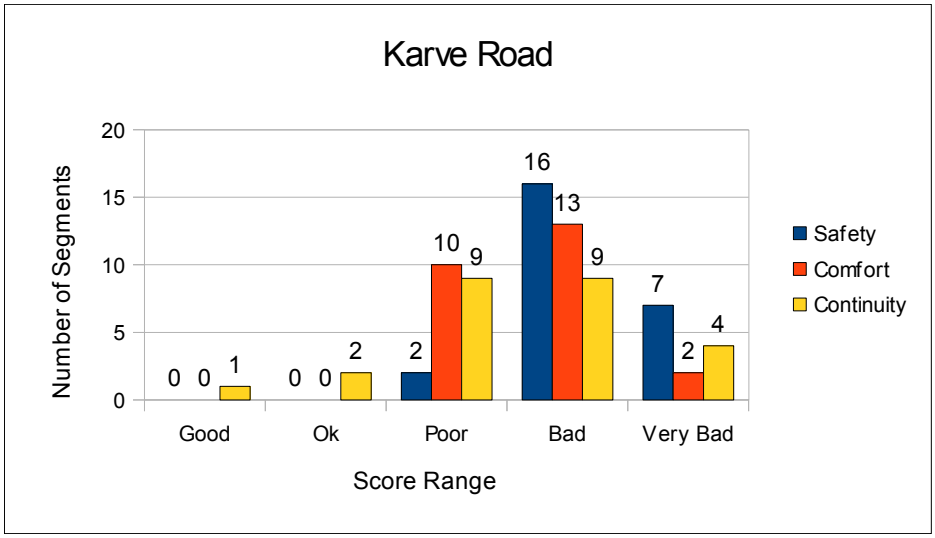
Safety	Comfort	Continuity	Overall
76	63	62	67

Map:



The road connects all the places on the west of the Mutha River and runs parallel to it. It has two lanes in both directions. It is one of the longest and busiest roads within the city, but wasn't always like that. Kothrud, the quarter where the roads runs through, was inhabited almost twenty years ago. Only with the real estate boom Kothrud became one of the most dynamic and fastest growing part of Pune.

This cycle track is same level as the footpath for half the total length and is level segregated from footpath and carriage-way for the other half. Looking at the graph below, Safety of the cyclist seems to be the biggest issue on this track. Portions where cycle track is same level as the footpath, there seems to be constant conflict between pedestrians and cyclists.



Based on the survey conducted, following is the score obtained for each segment on this road:

Segment	Safety	Comfort	Continuity
1	65	50	54
2	77	55	68
3	69	59	52
4	77	54	83
5	68	54	41
6	68	51	45
7	77	61	76
8	86	74	78
9	87	83	92
10	71	71	53
11	84	68	85
12	60	60	35
13	77	73	58
14	74	70	57
15	56	49	18
16	87	84	79
17	87	76	84
18	78	49	57
19	89	75	76
20	70	43	35
21	83	61	45

22	76	75	66
23	76	64	70
24	75	67	70
25	75	63	73

7.2.1 Issues

1. Track surface is built with interlocking blocks resulting in a uncomfortable and bumpy ride.
2. The entire track is built at >10inch height from the carriage-way. Making it unsafe for a cyclist on the right hand side to step down in case of an immediate stop.
3. The cycle track is not continuous. There are multiple segments where the cycle track goes missing.
4. There were 104 obstructions tabulated that completely block the cycle track, not allowing the cyclist to continue further.
5. The segments where cycle track is same level as the footpath there seems to be a constant conflict between pedestrians and cyclists, due to insufficient space available for both.
6. Most of the intersections on this road do not have ramps for going on or off the cycle tracks.
7. Insufficient lighting on many sections of the cycle track after sunset.

7.2.2 Recommendations

1. The tracks must be made continuous, without any breaks and missing segments.
2. Obstructions that completely block the cycle track must be removed to aid continuous use of the cycle track, especially in areas where the footpath and cycle track are at same level to minimize conflict between pedestrians and cyclists.
3. There must be ramps to get on or off the cycle track. It is extremely inconvenient for the cyclist to get on and off the cycle multiple times on the same road.
4. Cycle track and footpath must be made wide enough for 2 cyclists and 3 pedestrians to walk along-side, respectively.
5. Quality of track surface must be improved to better the current riding conditions.
6. Sections with insufficient lighting must be lit well for usability of cycle track after sunset.

7.3 Satara Road

Cycle Track Details

Total Length Surveyed (m): 11,580

Total Number of Segments: 22

Total Built Length (m): 7,372 (63% of total length)

Width (m): 2.5

Geometry: There is a buffer zone between carriage-way and cycle track. The track is more or less at the same level as carriage-way.

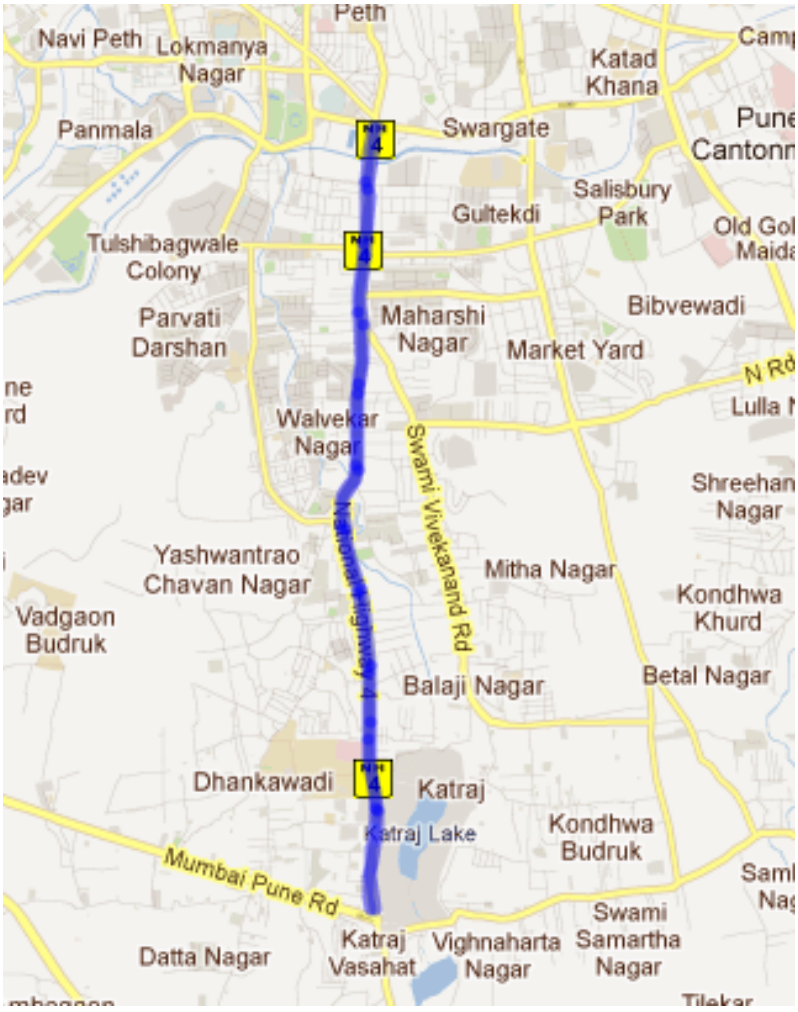
Surface Material: concrete

Number of obstructions totally blocking the track: 47

Score:

Safety	Comfort	Continuity	Overall
64	58	51	58

Map:

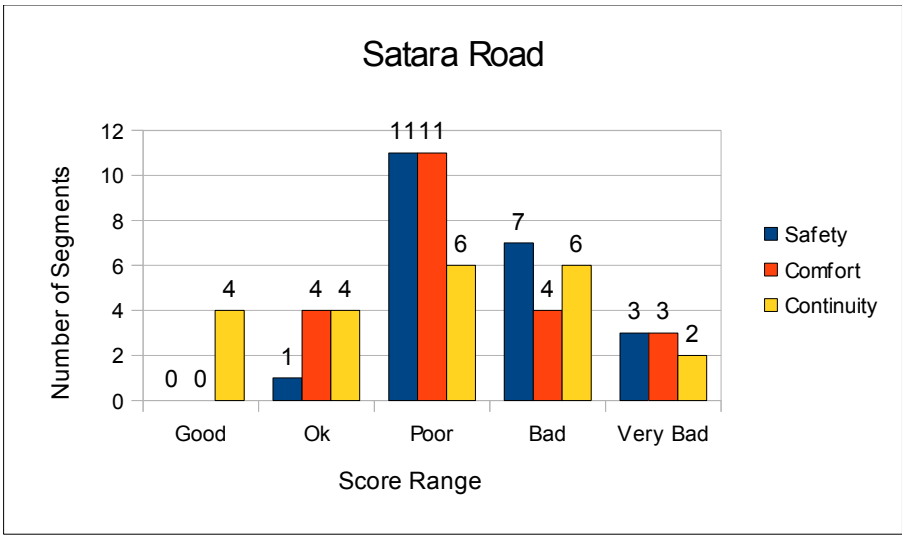


Lying in the south of the city, Satara Road connects the southern part of central Pune (Swargate Bus terminal) with the highway (NH4) to Bangalore. On both sides you'll find in total three lanes with

one reserved for the bus. This road forms part of the pilot BRT (Bus-Rapid-Transport) route of Pune.

The cycle track on this road was built as part of pilot BRT (Bus-Rapid-Transport) in Pune. It is 1 of the 2 cycle tracks which is built using concrete as surface material. This track is wide and comfortable to cycle on. The major obstructions on this track are encroachments by hawkers and parked vehicles. Due to the less width of the footpath considering the foot count on this road it was observed that most of the pedestrians use the cycle track to walk on instead of the footpath.

Looking at the graph below it can be understood that this track is continuous but it is not safe or comfortable to use this track as a cyclist. The fact that the cycle track is at the same level as carriage-way and there is a buffer zone between cycle track and carriage-way makes it safer than the design of other cycle tracks that are raised above carriage-way to differentiate between the two.



Based on the survey conducted, following is the score obtained for each segment on this road:

Segment	Safety	Comfort	Continuity
1	81	65	70
2	55	36	47
3	77	51	69
4	47	41	12
5	56	48	44
6	37	37	28
7	55	57	37
8	100	100	100
9	52	40	56
10	63	73	61
11	80	83	76
12	72	66	67
13	57	57	53
14	43	34	3
15	78	80	75
16	41	41	10
17	57	55	33
18	61	51	40
19	52	45	17
20	92	88	92
21	75	55	47

22 43 47 50

7.3.1 Issues

1. Due to less width of the footpath on this road majority of the pedestrians were observed walking on the cycle track.
2. Encroachments by hawkers, parked vehicles and pedestrians form the major obstructions to the continuity of the cyclist.
3. Minor obstructions that hinder a safe journey for the cyclist.
4. Insufficient lighting on many sections of the cycle track after sunset.

7.3.2 Recommendations

1. The width of footpaths must be increased to accomodate the foot count of pedestrians on this road.
2. Parked vehicles must be penalised for obstructing the continuity of cycle tracks. Hawkers must be given a separate zone to conduct their business.
3. Fixed obstructions of any kind must be removed to better the ridability conditions.
4. Sections with insufficient lighting must be lit well for usability of cycle track after sunset.

7.4 Paud Road

Cycle Track Details

Total Length Surveyed (m): 8,194

Total Number of Segments: 16

Total Built Length (m): 6,557 (80% of total length)

Width (m): 1.9

Geometry: Level segregated from footpath and carriage-way

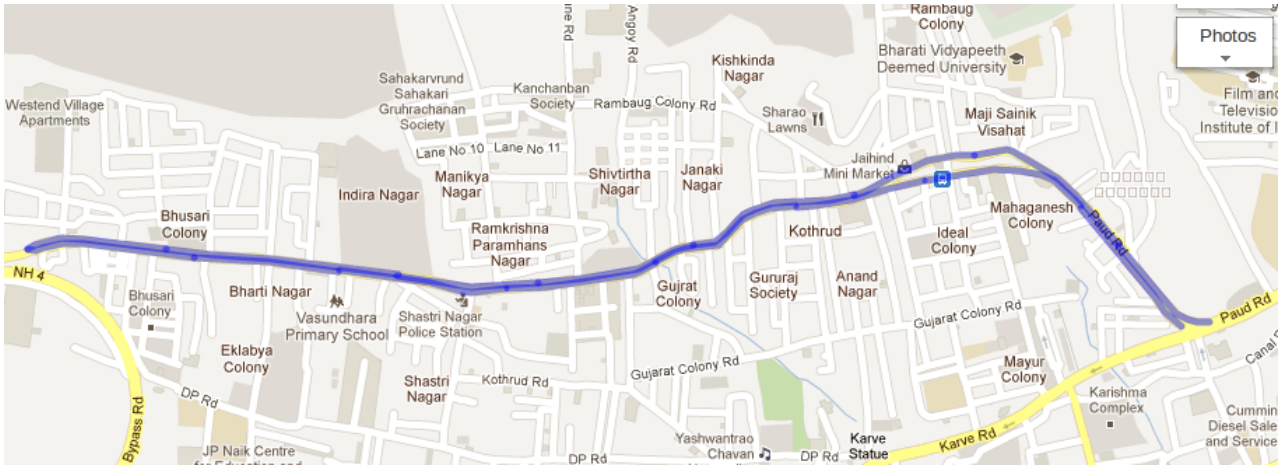
Surface Material: Interlocking Block

Number of obstructions totally blocking the track: 78

Score:

Safety	Comfort	Continuity	Overall
74	53	66	64

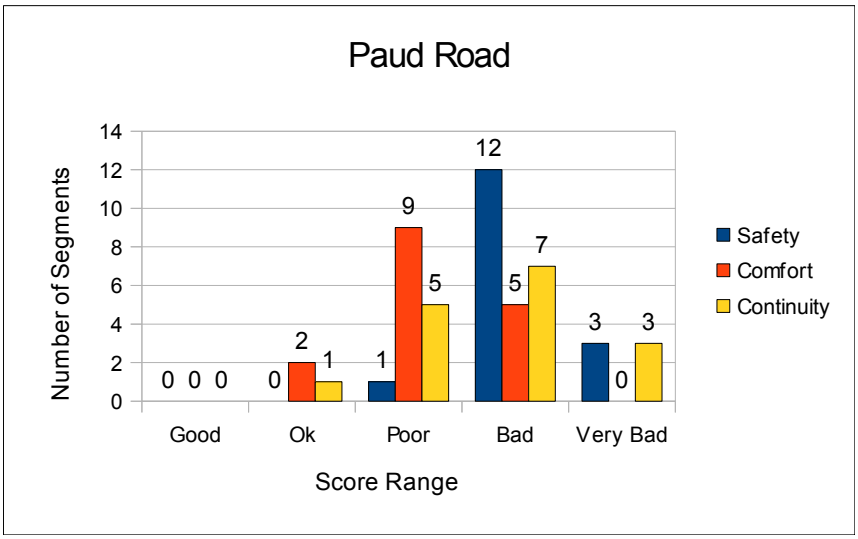
Map:



As an offshoot of Karve Road, Paud Road also runs through Kothrud (thickly populated residential area). It connects Karve Road with the Pune-Mumbai bypass. It has two lanes in either direction.

The cycle track on this road is built for 80% of the road length. However, cycle track becomes unusable for the entire length due to high number of total obstructions and multiple breaks in the track. Carriage-way serves as a continuous and more comfortable surface to cycle on.

Based on the graph below it can be observed that safety is a primary concern for the cyclist on this track. The track has a lot of lose interlocking blocks and poor surface conditions. The track is wide enough but the comfort of riding a bicycle on this track is missing, due to multiple obstructions present.



Based on the survey conducted, following is the score obtained for each segment on this road:

Segment	Safety	Comfort	Continuity
1	72	62	41
2	77	56	46
3	76	29	86
4	80	57	70
5	75	44	70
6	84	62	75
7	80	57	78
8	77	57	84
9	82	69	73
10	82	58	88
11	50	41	33
12	63	50	45
13	63	23	58
14	78	42	72
15	73	64	53
16	78	71	76

7.4.1 Issues

1. Track surface is built with interlocking blocks resulting in a uncomfortable and bumpy ride.
2. The entire track is built at >10inch height from the carriage-way. Making it unsafe for a cyclist on the right hand side to step down in case of an immediate stop.
3. The cycle track is not continuous. There are multiple segments where the cycle track goes missing.
4. There were 78 obstructions tabulated that completely block the cycle track, not allowing the cyclist to continue further.
5. There is absence of ramps at intersections for the cyclist to get on or off the cycle tracks.
6. The cycle track is encroached upon by shopkeepers and hawkers, eating into the 1.9mts of space available as cycle track.
7. Insufficient lighting on track after sunset.

7.4.2 Recommendations

1. The tracks must be made continuous, without any breaks and missing segments.
2. Obstructions that totally block the cycle track must be eliminated for better usability of tracks.
3. It must be ensured that comfortable ramps are provided at all intersections to get on and off the track.
4. It must be ensured that shopkeepers and hawkers do not occupy the cycle tracks.
5. Quality of track surface must be made better to provide a comfortable ride for the cyclist.
6. The height of the cycle track must be the same as the level of carriage-way.
7. Sufficient lighting must be provided on the track for cycling after sunset.

7.5 Sinhagad Road

Cycle Track Details

Total Length Surveyed (m): 12,719

Total Number of Segments: 24

Total Built Length (m): 9,984 (78% of total length)

Width (m): 1.9

Geometry: level segregated from footpath and carriage-way.

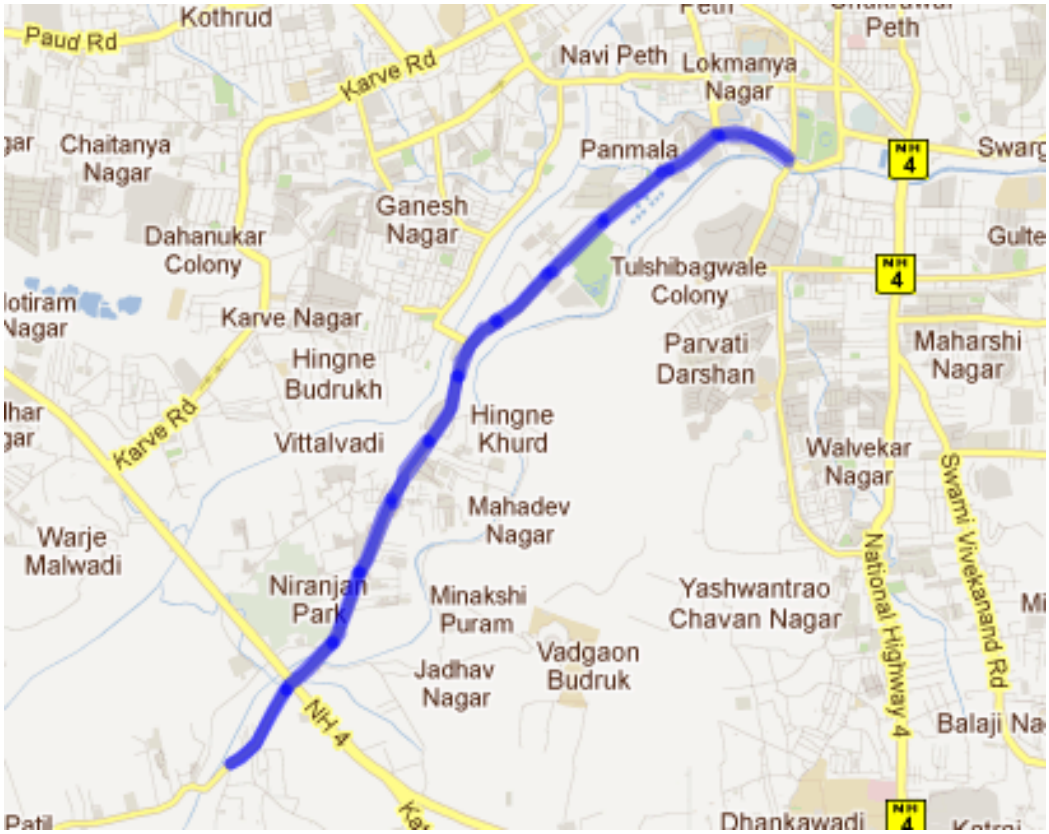
Surface Material: Interlocking Block

Number of obstructions totally blocking the track: 108

Score:

Safety	Comfort	Continuity	Overall
66	56	50	58

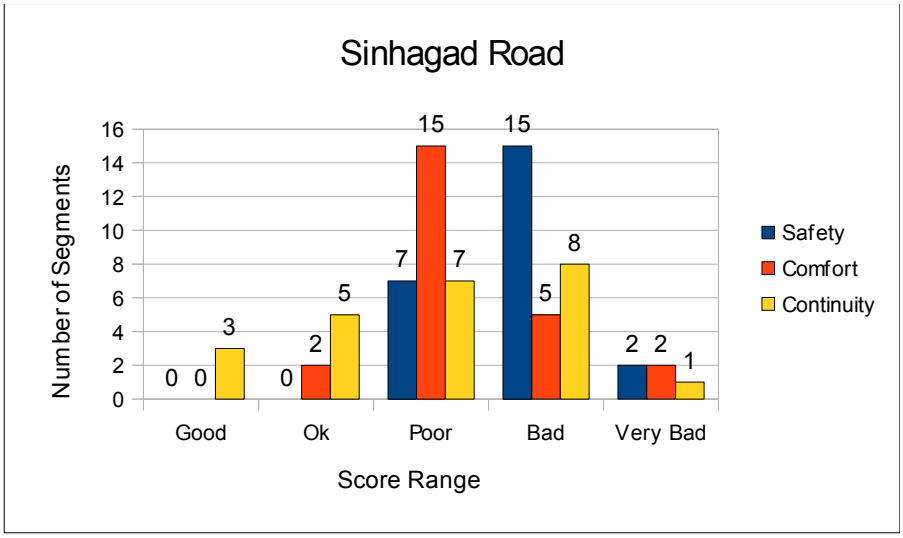
Map:



Sinhagad Road (two lanes each side) is located on the southern end of the city. It connects Satara Road towards the south and Pune-Mumbai bypass lying southwest of the city. It is one of the most congested roads in Pune due to the exodus of large populations of the middle classes from the old Peth and Gaothan areas in Pune to newly constructed flats and apartments on the way of the fort.

The cycle track on this road is level segregated from footpath and carriage-way. However, the space

available for pedestrians is not sufficient. Hence, the pedestrians choose to use the cycle track to walk instead of footpath. There are multiple obstructions present on this track that completely block the available space on cycle tracks. The missing segments on this track add to the discontinuous ride for a cyclist using the track.
Looking at the graph below it can be observed that safety and comfort are the major issues on this track. Poor track surface, broken surface and surface undulations, results in the poor comfort on this track.



Based on the survey conducted, following is the score obtained for each segment on this road:

Segment	Safety	Comfort	Continuity
1	71	46	69
2	100	100	100
3	65	57	45
4	50	33	13
5	50	33	10
6	50	50	10
7	73	61	69
8	76	57	76
9	68	63	58
10	73	57	76
11	57	51	37
12	69	70	59
13	55	51	37
14	64	52	60
15	59	53	36
16	63	57	48
17	70	59	53
18	71	53	50
19	58	50	38
20	77	62	62
21	63	42	32
22	63	42	43
23	83	82	76

24	78	71	70

7.5.1 Issues

1. Track surface is built with interlocking blocks resulting in a uncomfortable and bumpy ride.
2. The entire track is built at >10inch height from the carriage-way. Making it unsafe for a cyclist on the right hand side to step down in case of an immediate stop.
3. The cycle track is not continuous. There are multiple segments where the cycle track goes missing.
4. There were 108 obstructions tabulated that completely block the cycle track, not allowing the cyclist to continue further.
5. The cycle track is encroached upon by shopkeepers and hawkers, eating into the 1.9mts of space available as cycle track.
6. Insufficient lighting on track after sunset.

7.5.2 Recommendations

1. The tracks must be made continuous, without any breaks and missing segments.
2. Obstructions that totally block the cycle track must be eliminated for better usability of tracks.
3. It must be ensured that comfortable ramps are provided at all intersections to get on and off the track.
4. It must be ensured that shopkeepers and hawkers do not occupy the cycle tracks.
5. Quality of track surface must be made better for comfortable riding conditions.
6. Sufficient lighting must be provided wherever there is poor lighting on track after sunset.

7.6 Deccan College Road

Cycle Track Details

Total Length Surveyed (m): 3,255

Total Number of Segments: 6

Total Built Length (m): 2,567 (78% of total length)

Width (m): 1.9

Geometry: Segregated from footpath and carriage-way.

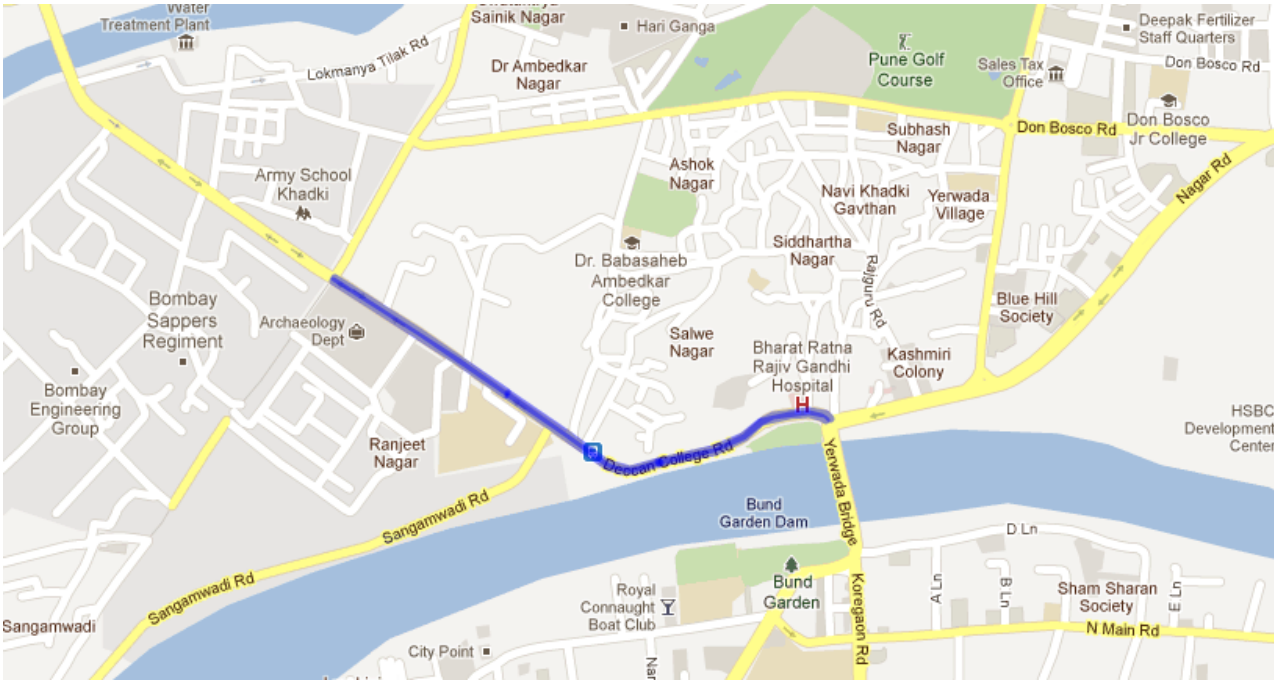
Surface Material: Interlocking Block

Number of obstructions totally blocking the track: 38

Score:

Safety	Comfort	Continuity	Overall
68	54	58	60

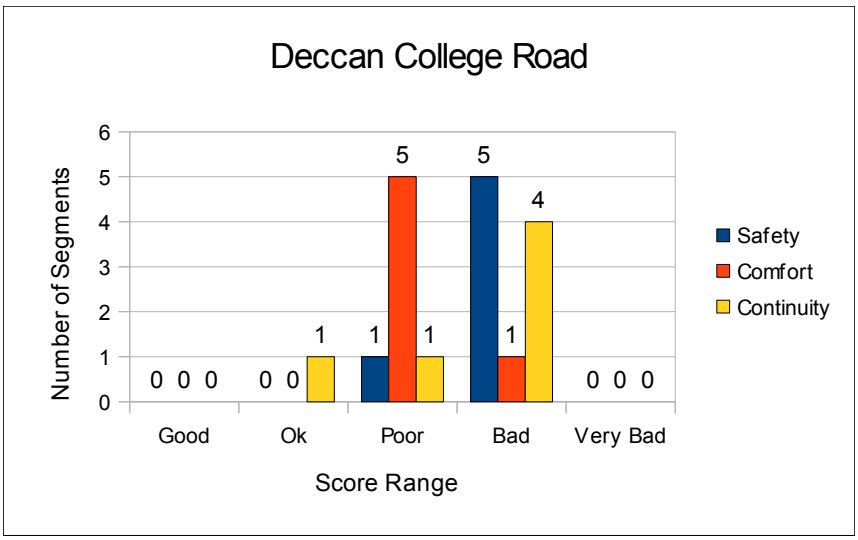
Map:



Deccan College Road is located in the north-east of Pune. It forms a major link between Vishrantwadi and Koregaon Park. This road has 2 lanes on each side.

The cycle track on this road is made with interlocking blocks. There are encroachment by shops along the cycle track on this road. There is a lot of loose gravel, debris and inter-locking blocks lying on the track. The portion where the track is missing does not have comfortable ramps or marked sign to show track continuation.

Looking at the graph below it can be observed that poor safety, comfort and continuity on this track leave the track unused by cyclist.



Based on the survey conducted, following is the score obtained for each segment on this road:

Segment	Safety	Comfort	Continuity
1	70	59	67
2	71	70	60
3	70	52	67
4	53	46	38
5	71	45	69
6	71	52	47

7.6.1 Issues

1. Track surface is built with interlocking blocks resulting in a uncomfortable and bumpy ride
2. The entire track is built at >10inch height from the carriage-way. Making it unsafe for a cyclist on the right hand side to step down in case of an immediate stop.
3. There were 38 obstructions tabulated that completely block the cycle track, not allowing the cyclist to continue further.
4. A portion of cycle track is encroached upon by shopkeepers and hawkers, eating into the 1.9mts of space available as cycle track.
5. Presence of excessive gravel, debris and loose inter-locking blocks on a portion of the track makes it unusable for bicycling.
6. Insufficient lighting after sunset.

7.6.2 Recommendations

1. The track must be cleared of any gravel, debris or loose inter-locking blocks that hinder the continuous journey of cyclist.
2. The track must be free from any obstructions that totally block the cycle track.
3. Shopkeepers must not be allowed to encroach the cycle track.
4. Quality of cycle track surface must be improved for a comfortable and not a bumpy ride.

5. Cycle track must be constructed at the same level as carriage-way.
6. Sufficient lighting must be provided for visibility ont he track after sunset.

7.7 Vishrantwadi to Airport Road

Cycle Track Details

Total Length Surveyed (m): 4,472

Total Number of Segments: 10

Total Built Length (m): 1,358 (30% of total length)

Width (m): 1.9

Geometry: Segregated from footpath and carriage-way.

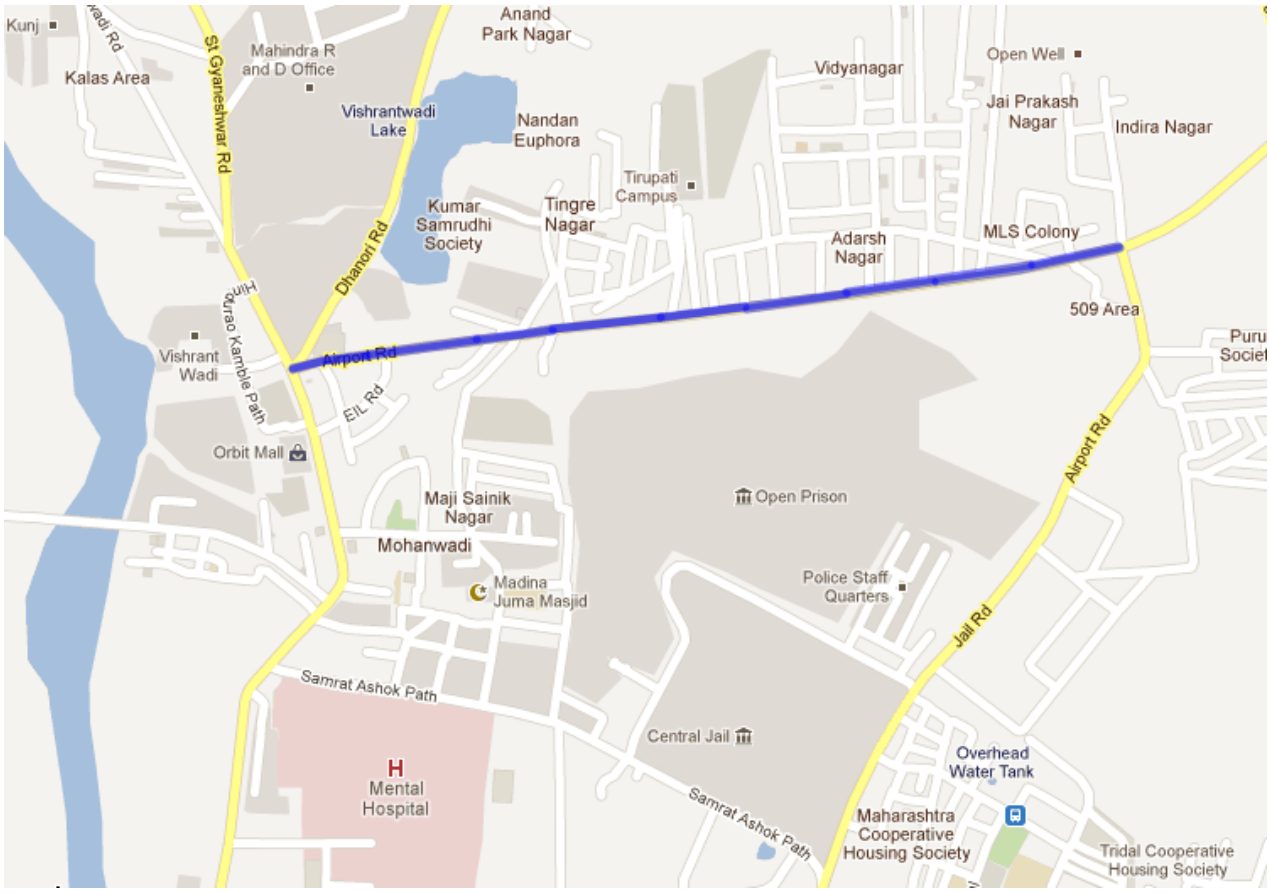
Surface Material: Interlocking Block

Number of obstructions totally blocking the track: 23

Score:

Safety	Comfort	Continuity	Overall
91	82	90	88

Map:

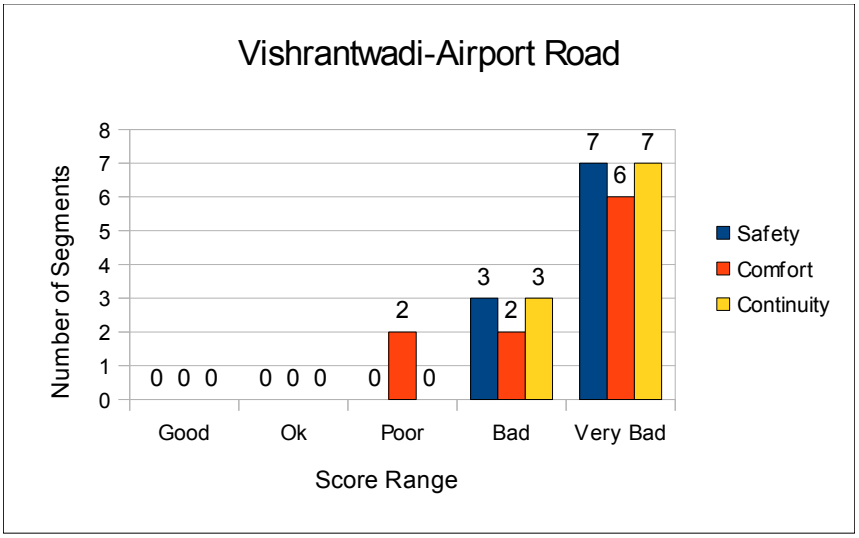


This road cuts through Vishrantwadi, a fast-growing and relatively new residential neighbourhood

to the north of the city, making it a vital link for the residents in this area. It is located 2km from the Pune airport.

The cycle track on this road is built for 30% of the entire road length (both-ways). The cycle track present has a poor built. There are 23 obstructions that totally block the cycle track and many more obstructions that partially block the cycle track. The cycle track is not used by cyclists.

Looking at the graph below it can be concluded that the built portion of the cycle track rates poor on all three criteria, safety, comfort and continuity.



Based on the survey conducted, following is the score obtained for each segment on this road:

Segment	Safety	Comfort	Continuity
1	100	100	100
2	100	100	100
3	100	100	100
4	100	100	100
5	100	100	100
6	100	100	100
7	81	65	64
8	75	42	92
9	77	47	70
10	70	70	71

7.7.1 Issues

1. Track surface is built with interlocking blocks resulting in a uncomfortable and bumpy ride.
2. The track is built at >10inch height from the carriage-way. Making it unsafe for a cyclist on the right hand side to step down in case of an immediate stop.
3. There were 23 obstructions tabulated that completely block the cycle track, not allowing the cyclist to continue further.
4. Track has a lot of broken surfaces and surface undulations leaving the track unused.
5. Cycle track is not built for 70% of the total road length (both-ways).
6. Insufficient lighting after sunset leaves the track unusable.

7.7.2 Recommendations

1. The portion of cycle track that is not yet built must be built using concrete or asphalt, not inter-locking blocks.
2. There must be comfortable ramps provided at all intersections to get on or off the cycle track.
3. Track surface must be repaired for any broken surface and surface undulation that makes the track unsafe.
4. Track must be cleared of any obstructions that totally block the cycle track.
5. Quality of track surface must be made better for comfortable riding condition.
6. Track must be built at the same level as the carriage-way.
7. Sufficient lighting must be provided to using the cycle track after sunset.

7.8 Law College Road

Cycle Track Details

Total Length Surveyed (m): 260

Total Number of Segments: 1

Total Built Length (m): 260 (100% of total length)

Width (m): 1.5

Geometry: Same level as carriage-way.

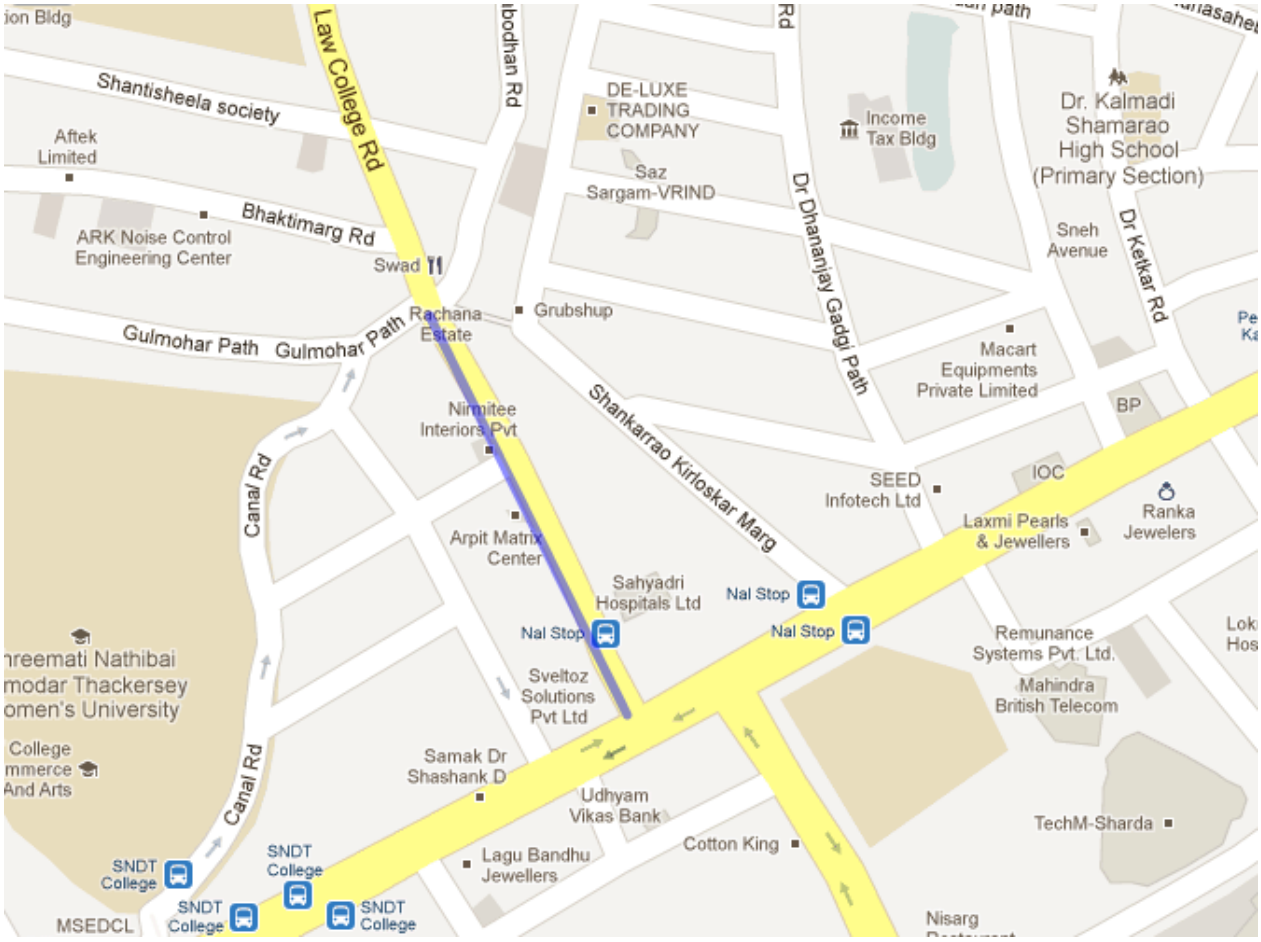
Surface Material: Asphalt

Number of obstructions totally blocking the track: 3

Score:

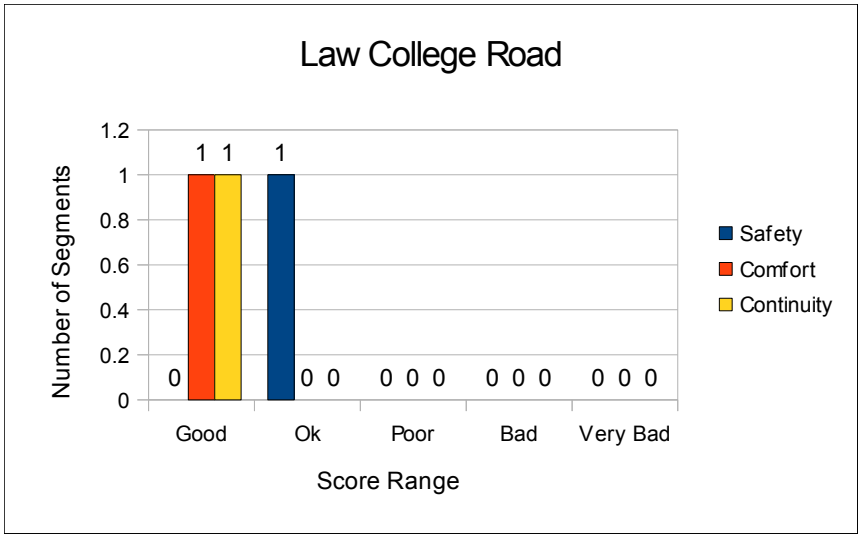
Safety	Comfort	Continuity	Overall
25	17	10	17

Map:



This road is more or less in the center of the city. The presence of many educational institutions, dense residential neighborhoods, within 1km radius of this road keeps this road busy through the day. It has only 1 lane on each side of the road.

This track is built for only 280meters of the total length of Law College Road. However, It provides an important link between cycle tracks on Old Canal Road and Karve Road. This track has multiple portions of broken surface. Bollards have been provided at the intersections on the track to restrict entry of motorized two-wheelers. The track surface is built with asphalt which makes for a better surface to cycle on that inter-locking blocks.



Based on the survey conducted, following is the score obtained for each segment on this road:

Segment	Safety	Comfort	Continuity
1	25	17	10

7.8.1 Issues

1. Multiple broken surfaces that reduce the cyclable-area of the cycle track.
2. Surface undulations due to lack of proper levelling of asphalt at the time the track was built.
3. Insufficient lighting after sunset.

7.8.2 Recommendations

1. The track surface must be repaired of any portions of broken surface or surface undulations that restrict the commute of the cyclist.
2. Sufficient lighting, for better visibility, must be provided on cycle track after sunset.

7.9 Dr. Ambedkar Path

Cycle Track Details

Total Length Surveyed (m): 3,286

Total Number of Segments: 6

Total Built Length (m): 2,976 (90% of total length)

Width (m): 1.9

Geometry: Segregated from footpath and carriage-way.

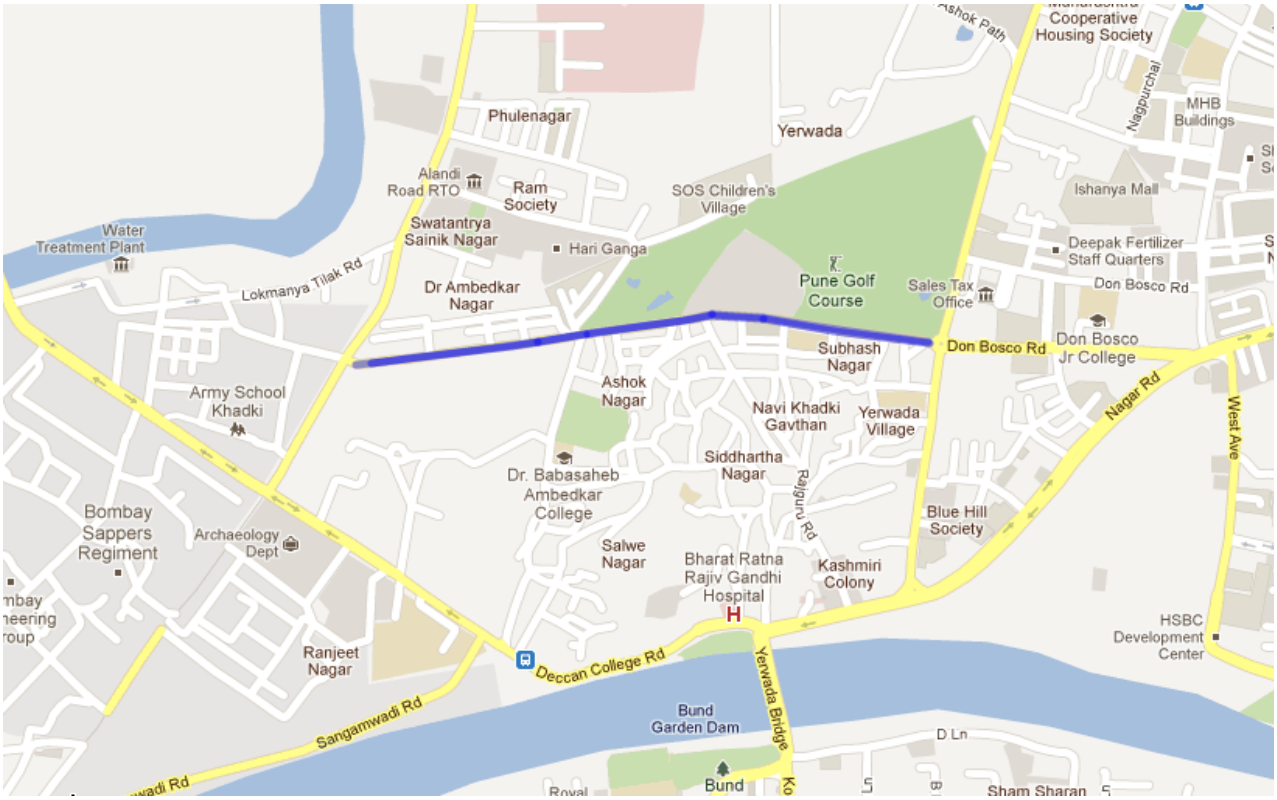
Surface Material: Interlocking Block

Number of obstructions totally blocking the track: 27

Score:

Safety	Comfort	Continuity	Overall
64	50	50	55

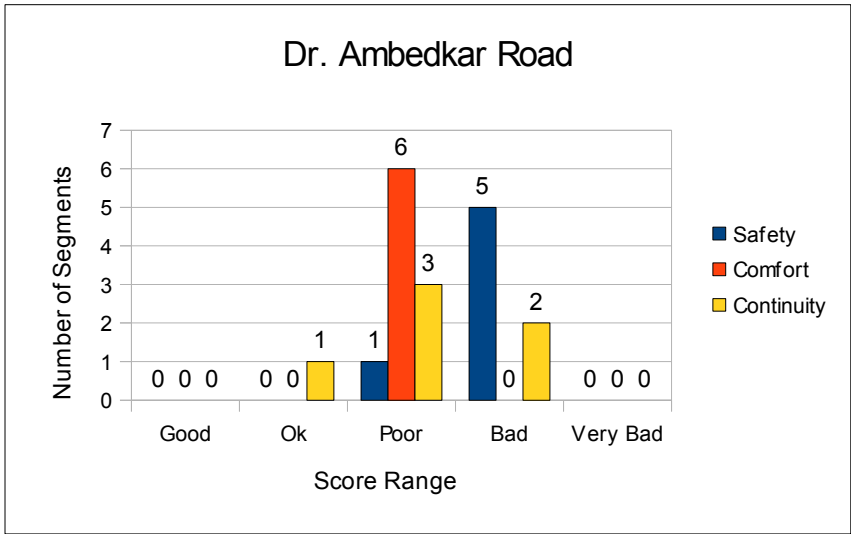
Map:



This road is in a new and upcoming residential neighborhood. It is located in north-east of the city. Currently this road does not have too much of traffic flow but it does form a vital link between Vishrantwadi and its neighboring areas.

Over 90% of the cycle track on this road has been built. The track does not have many missing segments but it does have a lot of encroachments to hinder the journey of a cyclist. Few segments of the track are alongside a slum where there are multiple obstructions.

Looking at the graph below it can be known that comfort is the primary concern on this track. Due to lack of comfort the overall score of the track is reduced to 55.



Based on the survey conducted, following is the score obtained for each segment on this road:

Segment	Safety	Comfort	Continuity
1	71	49	50
2	63	41	46
3	53	42	32
4	68	59	80
5	66	55	62
6	65	57	42

7.9.1 Issues

1. Track surface is made of inter-locking blocks which results in a bumpy ride.
2. Track surface has multiple patches of broken surface gravel that obstructs the comfortable usage of cycle track.
3. All intersections do not have ramps to get on and off the cycle track.
4. A portion of the cycle track is encroached by the slum dwelling along-side cycle track.
5. Insufficient lighting to use the cycle track after sunset.

7.9.2 Recommendations

1. The track surface must be repaired for any broken surface and cleared of any gravel.
2. Ramps must be provided at all intersections to get on and off the cycle track.
3. Encroachments must be removed.
4. Quality of track surface must be made better for comfortable riding condition.
5. Sufficient lighting must be provided for using the cycle track after sunset.

7.10 Sahasrabuddhe Road

Cycle Track Details

Total Length Surveyed (m): 1,811

Total Number of Segments: 3

Total Built Length (m): 1,563 (86% of total length)

Width (m): 1.9 (34% of total length), 1.5 (66% of total length)

Geometry: Same level as carriage-way (34% of total length), Same level as footpath (66% of total length).

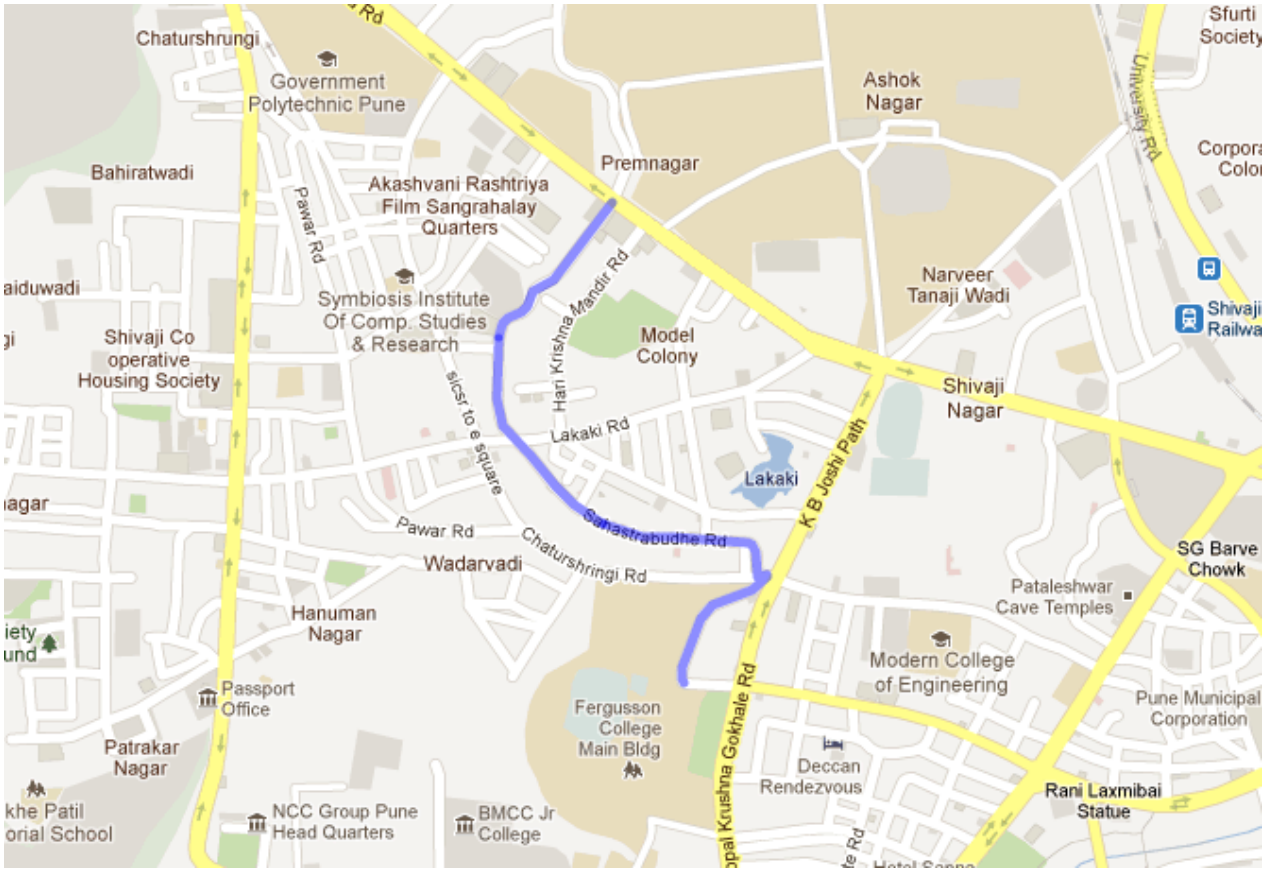
Surface Material: Interlocking Block

Number of obstructions totally blocking the track: 15

Score:

Safety	Comfort	Continuity	Overall
57	74	68	66

Map:

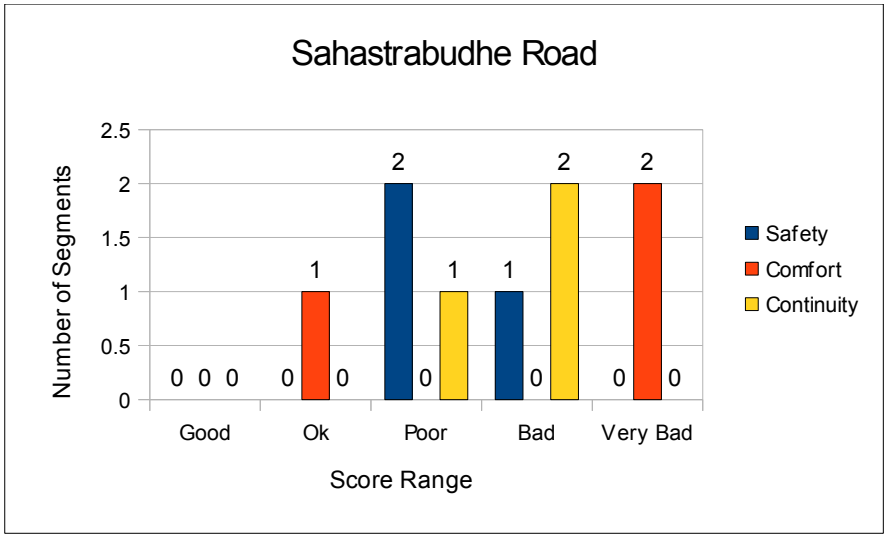


This road connects Ganeshkhind road and Fergusson College Road. There is hardly any traffic on half of this road. However, the other half (towards FC road), is bustling through the day.

This cycle track is present on only one side of the road. The first half of the cycle track is inaccessible to encroachments by slum dwellings.

It can be understood from the graph below that comfort and continuity are the primary concerns on this track. The presence of this track is not understood. The first half of the road has hardly any

motorized traffic. Hence, the presence of the track on this road is questionable.



Based on the survey conducted, following is the score obtained for each segment on this road:

Segment	Safety	Comfort	Continuity
1	44	38	67
2	60	86	58
3	63	84	75

7.10.1 Issues

1. Track surface is built with inter-locking blocks resulting in a bumpy ride.
2. One-third of the cycle track is encroached by slum dwelling.
3. A portion of the cycle track does not have a footpath on the side thereby, forcing the pedestrians to use the cycle track.
4. Track surface is poorly maintained, gravel and debris slows down a cyclist by partially blocking the width of the cycle track.
5. Insufficient lighting to use cycle track after sunset.

7.10.2 Recommendations

1. Track surface must be better maintained to allow cyclists to use the cycle track.
2. Encroachments must be removed.
3. Footpath must be provided for the portion it is missing. This will reduce the conflict between pedestrians and cyclists.
4. Quality of cycle track surface must be improved for a comfortable and not a bumpy ride.
5. Sufficient lighting must be provided for using the cycle track after sunset.

7.11 Old Canal Road

Cycle Track Details

Total Length Surveyed (m): 2,161

Total Number of Segments: 4

Total Built Length (m): 2,161 (100% of total length)

Width (m): 1.9 (50% of total length), 2.5 (50% of total length)

Geometry: Same level as footpath (50% of total length), Level segregated from footpath and carriage-way (50% of total length)

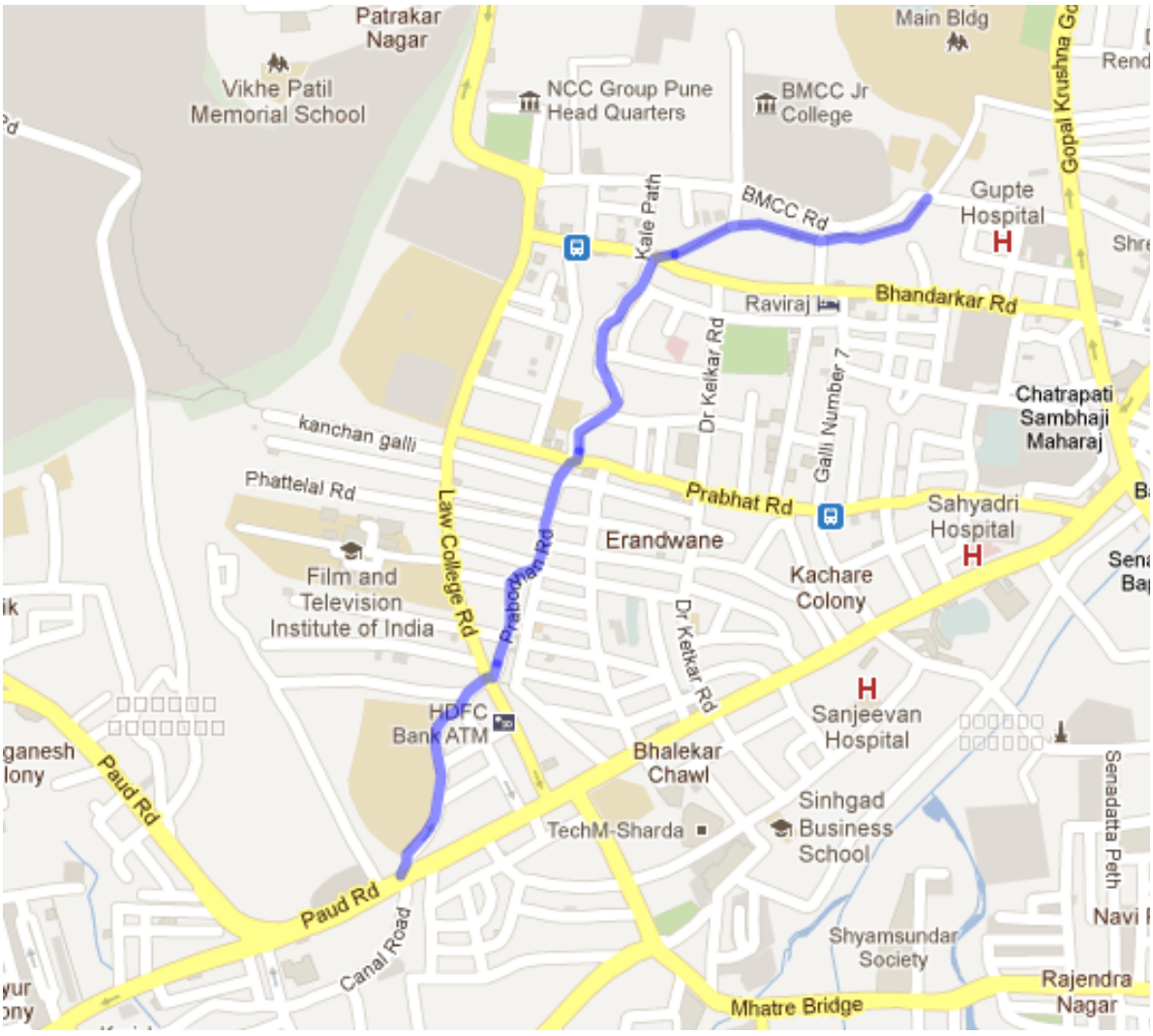
Surface Material: Interlocking Block

Number of obstructions totally blocking the track: 7

Score:

Safety	Comfort	Continuity	Overall
63	29	14	36

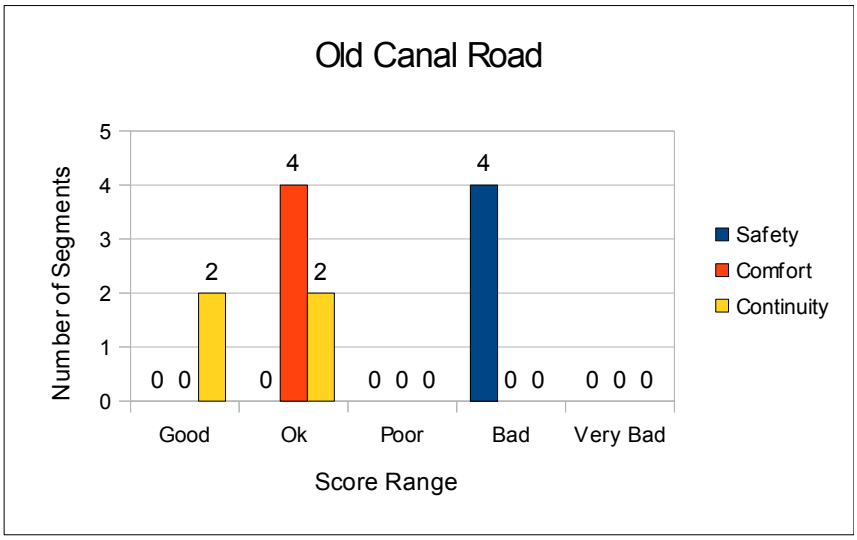
Map:



Old canal road forms a vital link commuters between Karve Nagar and Erandwane. The neighborhood in which this road is located is a link to busy neighborhoods. They are densely populated with educational institutions, residential complexes and market areas.

Half the length of this cycle track does not have a carriage-way on the side. It has a walk-way along-side. The cycle track for this stretch is as wide as 3 meters and cuts through the residential area of Erandwane. This is one of the kind portions of the cycle track in Pune.

Looking at the graph below it can be observed that the track is not so safe to cycle on. This is due to poor lighting at night and broken surface patches on the portion of the cycle track that has carriage-way on the side.



Based on the survey conducted, following is the score obtained for each segment on this road:

Segment	Safety	Comfort	Continuity
1	69	27	23
2	63	33	28
3	63	23	3
4	60	33	3

7.11.1 Issues

1. Multiple broken surface patches on the portion of cycle track which has carriage-way along-side.
2. Poor lighting leaves the track unusable at night.
3. Multiple trees on the cycle track leave a major portion of the cycle track unused.
4. About one-third of the cycle track is at the same level as footpath forcing conflict between pedestrians and cyclists.
5. About half of the length of footpath is inaccessible by pedestrians forcing them to use the cycle track.

7.11.2 Recommendations

1. The track surface must be repaired of any broken surface and total obstructions to increase the comfort and safety of the cyclist.

2. Pedestrians must be provided with sufficient space to walk to avoid conflict with cyclists.
3. Sufficient lighting must be provided on the cycle track after sunset.

7.12 Solapur Road

Cycle Track Details

Total Length Surveyed (m): 18,946

Total Number of Segments: 36

Total Built Length (m): 7,710 (40% of total length)

Width (m): 2.5

Geometry: There is a buffer zone between carriage-way and cycle track. The track is more or less at the same level as carriage-way.

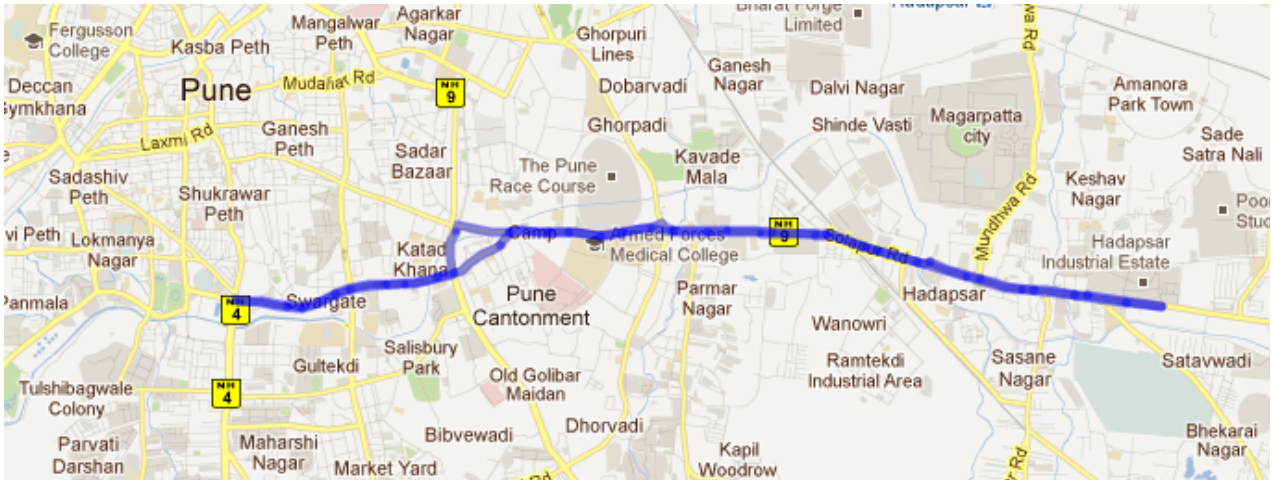
Surface Material: concrete

Number of obstructions totally blocking the track: 59

Score:

Safety	Comfort	Continuity	Overall
73	75	66	71

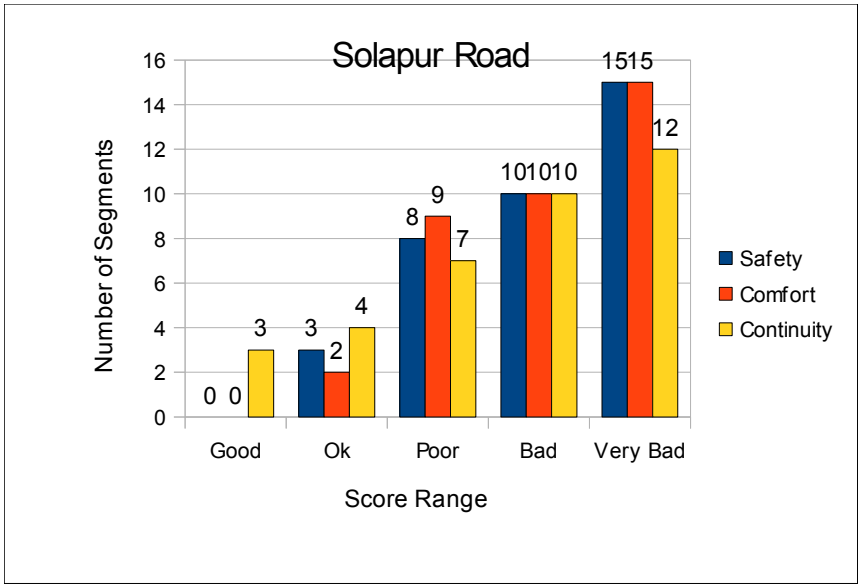
Map:



The last road in the south is Solapur road (more than nine kilometers), it connects the Swargate bus terminal with the south-east of the city. It is part of the NH9 to Machillipatnam. On a small part of this road you can find Bus-Rapid-Transport system. Every direction has two lanes, except for the BRT routes (two + one). This road has heavy traffic due to operation of Heavy vehicles like Buses and trucks.

The cycle track on this road is built as part of the pilot BRT route of Pune. The width and surface of this cycle track is much more comfortable than the tracks with inter-locking blocks on them. The cycle track is missing in the middle portions (Pune Cantonment). Bollards are provided at intersections to restrict the entry of motorized vehicles. Cycle track on each side of the road is sufficient for 2 cyclists to ride alongside. There is a presence of a safe buffer zone between cycle track and carriage-way.

Looking at the graph below it can be understood that most of the segments lack safety, comfort and continuity. The cycle track built is good with design but poorly maintained. Track is encroached by parked vehicles and hawkers as a result rating it poor for continuity.



7.12.1 Issues

1. Parked vehicles and hawkers block the continuous journey of the cylist.
2. Insufficient lighting on the cycle track after sunset.
3. Pedestians walking on the cycle track are like moving obstructions for the cyclist.
4. There are missing (unbuilt) segments on this cycle track.
5. Markings must be provided on the carriage-way at intersections to show the continuation of track.

7.12.2 Recommendations

1. Parked vehicles must be penalised and hawkers must be provided with a separate hawker/vendor zone to do business.
2. Sufficient lighting must be provided for comfortable use of track at night.
3. Wider footpath must be provided for pedestrians to walk on.
4. Unbuilt sections of the cycle track must be completed to allow the cyclist to use the cycle track.
5. Markings must be made on the carriage-way to show track continuation at missing portions and intersections.

Based on the survey conducted, following is the score obtained for each segment on this road:

Segment	Safety	Comfort	Continuity
1	74	63	49
2	86	82	75

3	100	100	100
4	57	55	55
5	73	77	66
6	84	77	72
7	100	100	100
8	59	52	50
9	57	57	50
10	86	87	81
11	48	31	25
12	45	54	14
13	25	46	17
14	33	38	32
15	20	50	13
16	72	80	71
17	85	83	78
18	70	71	67
19	100	100	100
20	100	100	100
21	100	100	100
22	100	100	100
23	45	58	24
24	59	60	48
25	61	65	50
26	80	82	75
27	54	53	26
28	100	100	100
29	66	69	56
30	100	100	100
31	76	80	69
32	100	100	100
33	100	100	100
34	86	88	84
35	70	70	60
36	72	71	63

7.13 Aundh Road

Cycle Track Details

Total Length Surveyed (m): 1,090

Total Number of Segments: 3

Total Built Length (m): 1,090

Width (m): 2

Geometry: The cycle track is segregated by curbs from the carriage-way and is at the same level as the carriage-way.

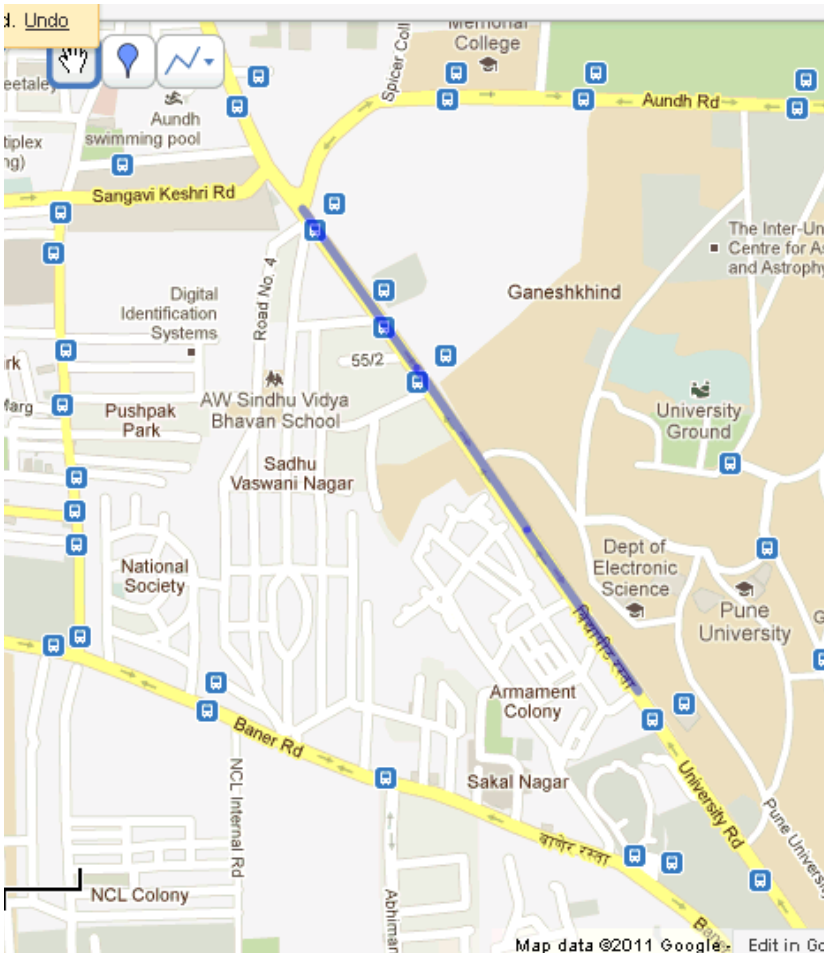
Surface Material: Asphalt

Number of obstructions totally blocking the track: 1

Score:

Safety	Comfort	Continuity	Overall
58	58	16	45

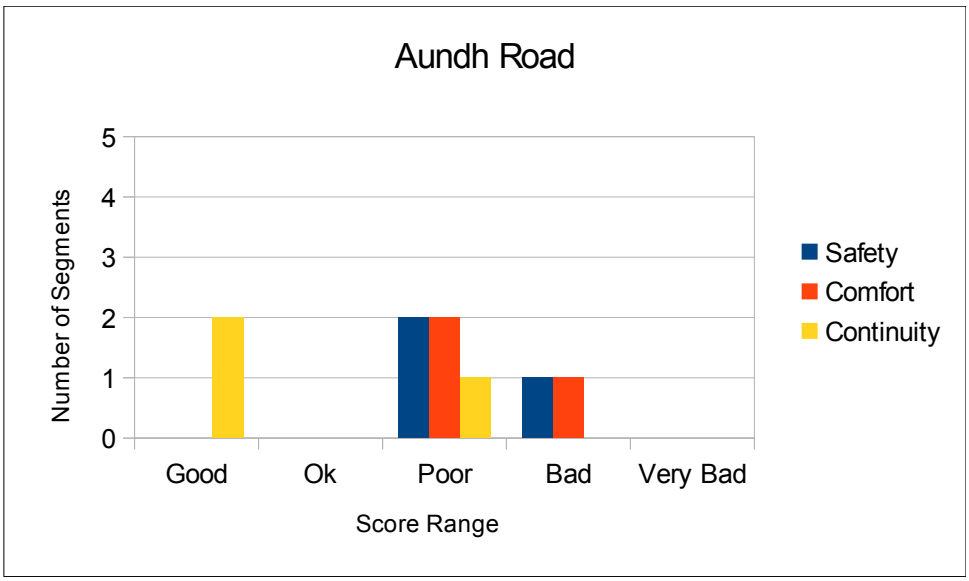
Map:



The cycle track on this road is built with asphalt, which is a better surface to cycle on. However, There are too many partial obstructions in the form of broken surface and debris that hinder the the cyclist from having a comfortable ride. Hence, the cycle track is not used by cyclists.

Also, the track on this road is left incomplete. It is built for only one-third the length of Aundh Road (from Bremin chowk to University Chowk). This partially completed cycle track is present only on one side of the road. A cycle track on this road is feasible given the current width of the road. The presence of a cycle track on this road will greatly benefit many cyclists that commute towards Wakad, Khadki and other neighboring localities.

Looking at the graph below it can be observed that this cycle track falls under the category of poor cycle track. Continuity seems to be fairly good, that is because there is only 1 total obstruction on this track. However, as mentioned above, this track is filled with partial obstructions. There were 192 partial obstruction tabulated for a length of 1,090m.



7.13.1 Issues

1. There are too many partial obstructions on this track. There are 192 partial obstructions for a length of 1,090m.
2. Poor lighting after sunset.
3. Half the width of the cycle track is left unusable due to broken surface.
4. The cycle track is not built on both sides of the road.
5. The side on which cycle track is present, it is not completed for the entire length of the road.

7.13.2 Recommendations

1. Partial obstructions must be eliminated for cyclists to use the cycle track.
2. There must be better lighting after sunset.
3. The broken surface of the track must be repaired.
4. Cycle track must be built on both sides of the road, if not the width of cycle track on one side must be increased.
5. Cycle track must be built along the entire length of the road.
6. There must be markings to signify the presence of cycle track.

Based on the survey conducted on this track, following scores were obtained.

Segments	Safety	Comfort	Continuity
1	50	50	0
2	74	74	49
3	50	50	0

7.14 Bibvewadi Road

Cycle Track Details

Total Length Surveyed (m): 2,054

Total Number of Segments: 5

Total Built Length (m): 2,054

Width (m): 1.9

Geometry: The track is level segregated from footpath and carriage-way.

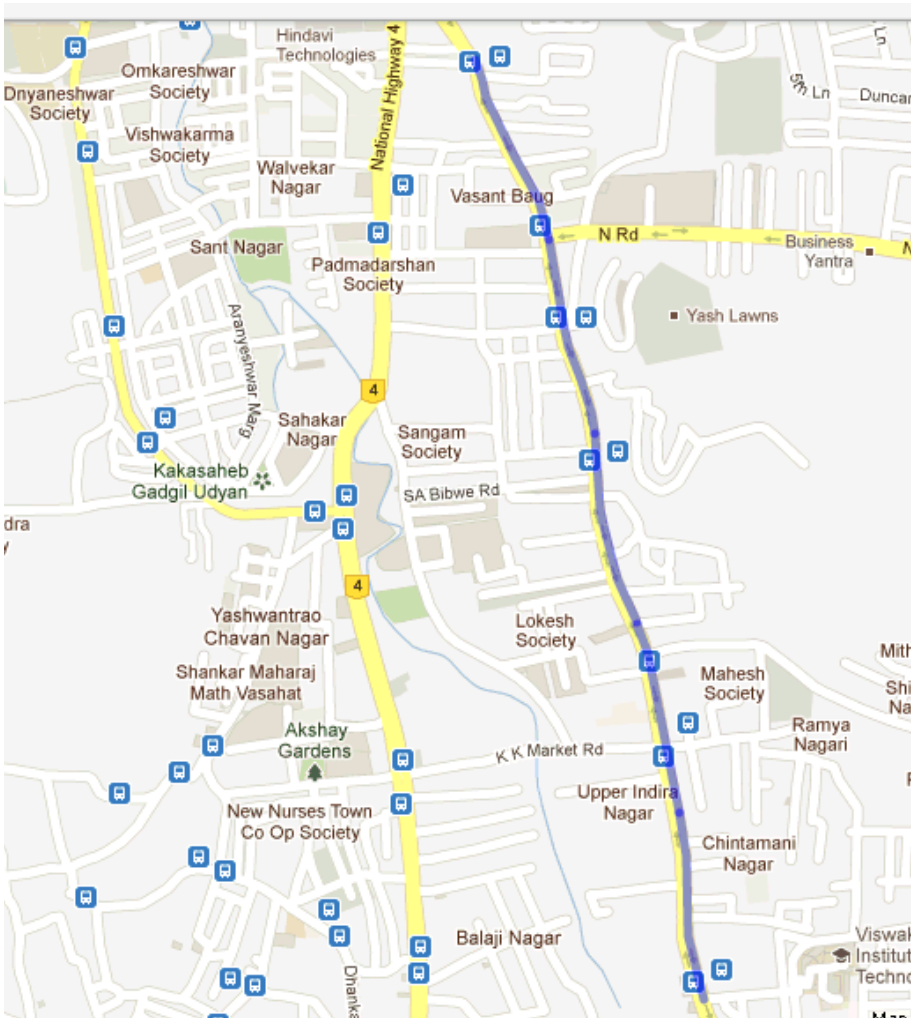
Surface Material: Inter-locking Blocks

Number of obstructions totally blocking the track: 39

Score:

Safety	Comfort	Continuity	Overall
73	58	59	62

Map:

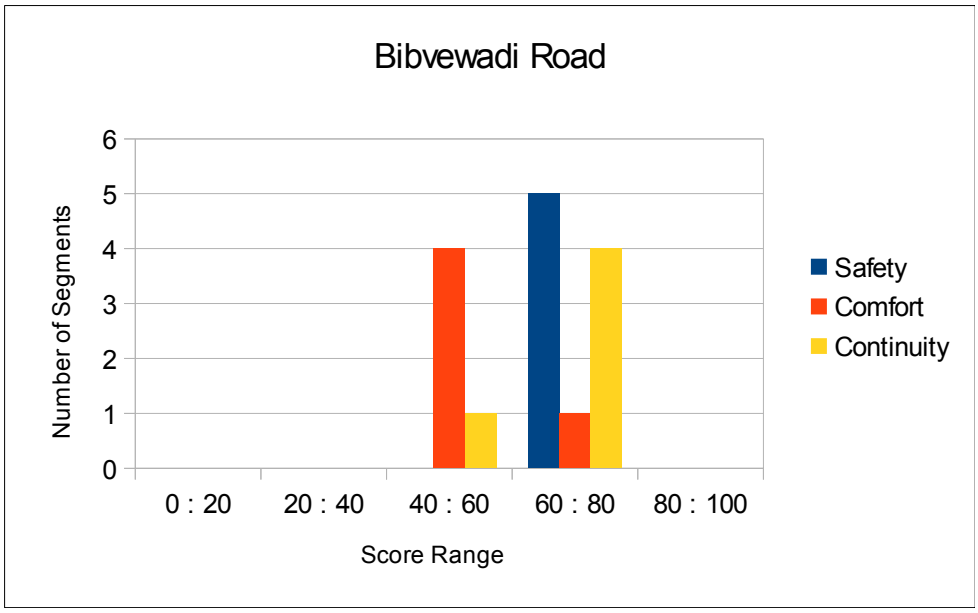


Bibvewadi Road is in a densely populated residential area. There is a large number of cyclists that

use this road. The cycle track on this road is not known to be a cycle track due to the absence of footpath and lack of signage stating the presence of the cycle track. Often, when there is no or improper footpath along the cycle track, pedestrians end up walking on cycle track for ease of walking. This track is a victim of the same.

The track is not built throughout the entire length of the road.

Looking at the graph below it can be understood that this tracks lacks safety, comfort and continuity. Therefore, even though the track is for to a length of 2km, it is left unused by cyclists and is used as a footpath instead.



7.14.1 Issues

1. The track surface is built with inter-locking blocks causing a bumpy ride.
2. Improper footpath alongside cycle track forcing pedestrians to use cycle track.
3. Multiple encroachments by hawkers and vendors on the cycle track.
4. 39 total obstructions force the cyclist to get off the cycle track.
5. 122 partial obstructions make the usage of this cycle track uncomfortable.
6. Insufficient lighting on track after dark.
7. Track is not wide enough for cyclists to overtake.
8. Cycle track built only on 1 side of the road.

7.14.2 Recommendations

1. Track surface must be made of asphalt or concrete to eliminate a bumpy ride.
2. Proper footpath must be provided along-side the track for pedestrians to walk on.
3. Encroachments must be removed from the track.
4. Track must be made free of any obstructions that block the cycle track.

5. Considering track has been built only on 1 side of the road, it must be increased in it's width.
6. There must be sufficient light on the track after sunset.

Based on the survey conducted on this track, following scores were obtained.

Segment	Safety	Comfort	Continuity
1	73	58	39
2	72	59	70
3	73	58	56
4	69	51	67
5	77	64	66