Survey of pedestrian infrastructure at signalled intersections in Pune

Study conducted in September 2021

Report by
Harshad Abhyankar (harshad.abhyankar@savepunetraffic.org)

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1. Introduction

Save Pune Traffic Movement (SPTM) is a Non-Government Organization promoting transport projects that make it safe, convenient and attractive to use sustainable modes, viz., walking, public transportation and cycling.

Pune city is growing by leaps and bounds. Using these "sustainable" modes is becoming challenging day by day, largely because our transport planning does not focus on these modes as much as it should. As an example, even though walking is the most basic mode of transportation and a fundamental right, facilities for pedestrians are largely unsafe, inconvenient and unattractive.

Data from fatal road crashes in Pune shows that about 30% of the victims of road crash fatalities in Pune are pedestrians. This amounts to about 75-80 pedestrian fatalities annually. Some of these fatalities happen when people cross roads and some when people are simply walking along roads.

Pedestrians can cross roads at intersections (whether controlled by signals or not) as well as mid-block. Grade separated facilities like foot-overbridges or underpasses are provided at a handful places. However, they largely remain unused because pedestrians find it inconvenient to use them. Much has been discussed about this issue, which is outside the scope of this survey.

Talking about at-grade facilities to cross a road, signal controlled intersections are among the relatively safer facilities available in Pune. The following infrastructure contributes to the safety of pedestrians at signal controlled intersections:

1. Clean and conspicuous zebra and stop line markings, which clearly indicate where exactly the vehicles need to stop.
2. Working pedestrian signal aspects (lights).
3. A sufficiently long "pedestrian phase" in the signal cycle, so that pedestrians can complete crossing the road before vehicles get a green signal.
4. Some mechanism that indicates to pedestrians whether it is safe to start crossing a road now, or whether they should wait for the next signal cycle.
5. Audio indication for visually challenged persons.

SPTM supports data-driven decisions for transportation projects. Therefore, instead of relying on statements like "The zebra markings in Pune are better now", SPTM has decided to conduct a survey every year to see which of this infrastructure is provided at signal controlled intersections in Pune. In addition to assessing how safe these intersections are for pedestrians, the surveys will also indicate whether the situation is improving every year.

1.1. A note on the survey report this year (2021)

The first edition of this survey was done in 2020. A detailed report on that survey can be found at: https://savepunetraffic.org/wp-content/uploads/2021/06/Report-on-intersections-survey.pdf

The method of conducting the survey and analyzing the data will be retained year on year, making comparison possible. The annexures of this report describe the method in a nutshell. Readers are advised to refer to the survey report of 2020 for further details.

This year's report focuses more on comparing the findings with the earlier year(s) and spotting any trends.

2. Objectives of the study

1. To assess whether intersections in Pune provide basic infrastructure for pedestrians to cross roads safely.
2. To spot any trends by comparing the findings with benchmarks established in the earlier years.

3. Findings of the survey: 2021

The following 3 maps show scores of all intersections covered by the survey. In all maps, red indicates 0% to 33%, yellow indicates 33% to 67% and green indicates 67% to 100%.

Figure 1: Overall score of the intersections

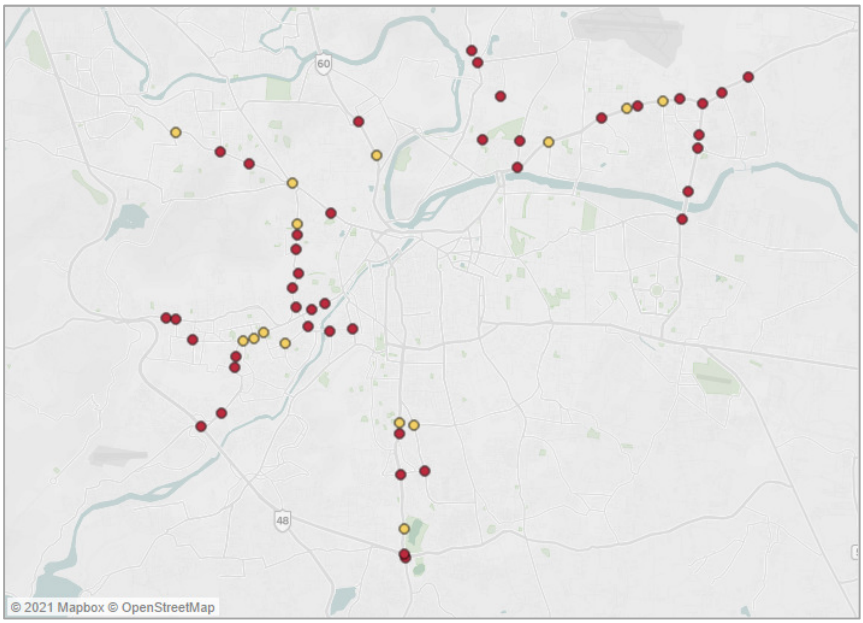
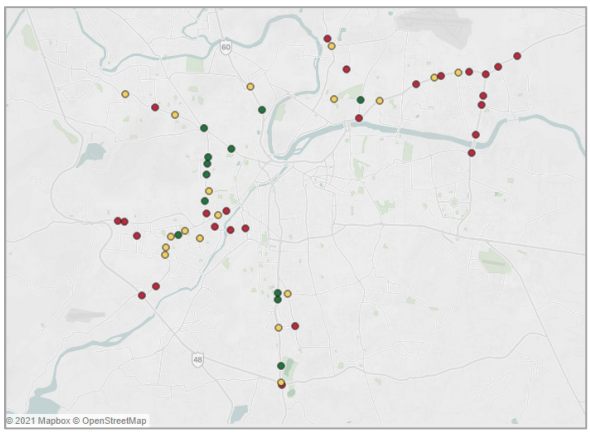
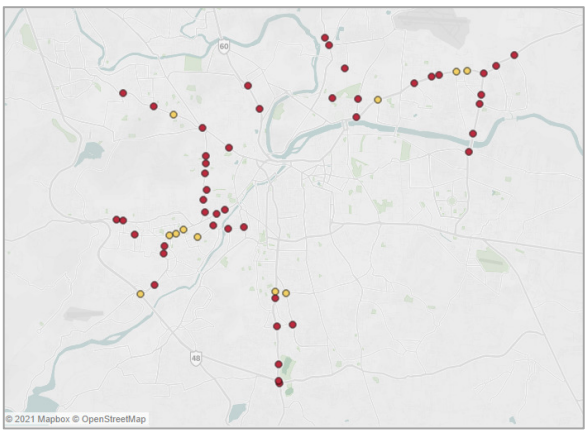


Figure 2: Road markings score (left) and Pedestrian signals score (right)





Some observations from the findings are summarized in the table below:

Table 1: Summary of pedestrian safety scores of the 56 intersections surveyed

	Overall score	Road markings score	Pedestrian signals score
Pune average	22%	38%	16%
High scores	No intersection scored 67% or more, 5 scored 50% or more	8 intersections scored 100%	No intersections scored 50% or more
Low scores	9 intersection scored 0	18 intersections scored 0	23 intersections scored 0

The average 'pedestrian phase' at the signals was found to be 6.6 seconds.

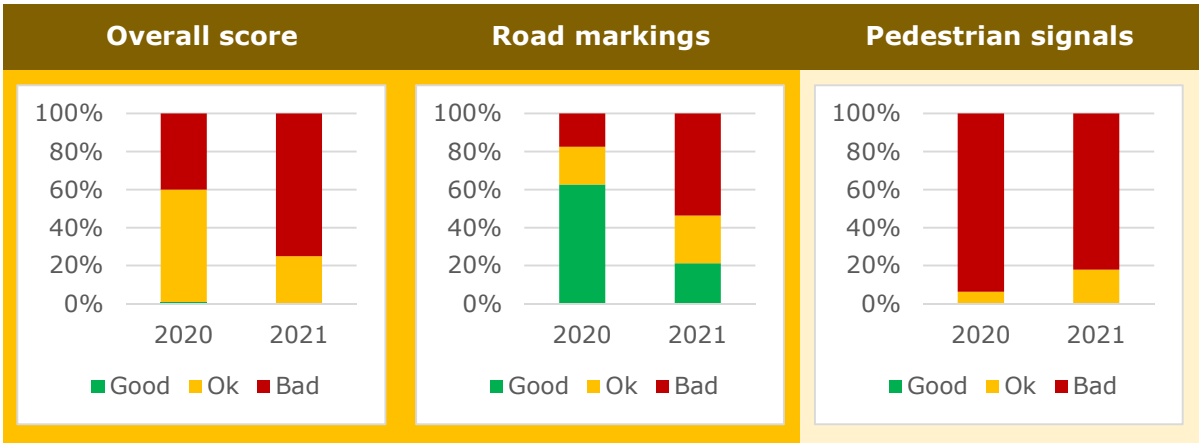
3.1. Interpreting the findings

2020 was the first year when SPTM conducted and produced a detailed report. Since this is the second year of the survey, it is time to compare the results with the previous year and do a comparison.

The charts below represent the percentage of chowks in the following 3 categories:

A. With scores 67% or more,
B. With scores between 33% and 67%,
C. With scores less than 33%

This comparison is done for overall scores, as well as for road markings and pedestrian signals.



The following inferences may be drawn from these charts:

1. **Overall score**: The overall state of pedestrian-oriented infrastructure has deteriorated in Pune from 2020 to 2021. Most of the slippage is due to worsened road markings.
2. **Road markings**: The zebras and stop lines were much better in 2020. However, it may be noted that the survey in 2020 covered the most important 110 chowks in Pune. The 56 intersections surveyed in 2021 have a fair mix of all types of intersections. This may have affected the score of road markings.
3. **Pedestrian signals**: There seems to be a marginal improvement in the condition of pedestrian signals. However, the chart does not capture that the average duration of pedestrian phase of the 110 chowks surveyed in 2020 was about 11 seconds, which has dropped to just 6.6 seconds in 2021. Then again, this observation about the pedestrian phase may be a result of the most important signals being surveyed in 2020, as compared to a mixed bag in 2021.

4. Conclusion and recommended steps

Based on the findings of these survey, the concerned authorities need to take certain actions to improve pedestrians' safety at signalled intersections.

1. PMC Road Department and Ward offices should continue painting and maintaining the zebra and stop line markings, improving their score continuously.
2. Pune Traffic Police should promptly report malfunctioning pedestrian signals to PMC.
3. PMC Electrical Department should also proactively repair failed pedestrian signal aspects.
4. PMC Electrical Department should ensure that the signals are programmed to provide at least the minimum pedestrian phase duration, derived using formulas provided in IRC:93. They must do this regardless of any opinion to the contrary, whether by general public or Traffic Police or any other entity.
5. In spite of the above, pedestrians will need some indication to tell them whether it is safe to start crossing the road at a given instant. PMC should invest in pedestrian signals with timer, which seems to be the best among the available options. If required, the signal controllers would have to be changed to provide such indication.
6. PMC should ensure that audio indication is supplied so that visually challenged persons can know whether it is safe to cross a road. This is a mandatory requirement as per the Rights of Persons with Disabilities Act, 2016. Such indication must be installed in all new signals, or retrofitted in old signals if possible – else the signal controllers would have to be changed to provide audio indication.

And of course, NGOs like SPTM and others should relentlessly push these authorities to take the required steps.

5. Acknowledgement

SPTM would like to thank Persistent Foundation for coordinating bandwidth from employees of Persistent Systems Ltd to conduct the surveys this year. The surveyors spent their personal free time to provide us the data, for which we are indebted to them. Their help will go a long way in determining steps that our city should take to make our pedestrians safer.

6. Annexure 1: Data table

Note: The points awarded for "Status of road markings" can be 2, 1 or 0. Description may be found in Annexure 2.

Table 2: Summary of pedestrian safety scores of the 107 intersections surveyed

Sr no	Name of the intersection	No of arms	Working pedestrian signals	Pedestrian phase, seconds	Status of road markings				
					Road 1	Road 2	Road 3	Road 4	Road 5
1	Abhimanashree	3	2	20	1	1	0	0	0
2	Ahilyadevi	4	7	0	2	2	0	0	0
3	All Saints Church	4	0	14	1	1	1	1	0
4	Ambedkar Jn Warje	5	0	0	0	0	0	0	0
5	Ambedkar Jn Yerawada	4	0	0	1	1	1	1	0
6	Apnaghar	3	0	0	0	0	0	0	0
7	Ashish Garden	3	0	10	0	0	0	0	0
8	Athavale Junction	4	0	0	1	0	1	0	0
9	Baal shiwaji	3	0	0	0	0	0	0	0
10	Baner Aundh T Junction	3	5	10	1	0	0	0	0
11	Chandan Nagar	3	10	10	1	0	0	0	0
12	Chandralok Hospital	3	10	10	1	1	1	0	0
13	Commerce Zone	4	0	0	0	0	0	0	0
14	Dahanukar Colony	3	0	0	1	1	0	0	0
15	Dargah (Nagar Road)	3	3	10	0	0	0	0	0
16	Dattamandir	3	5	10	0	0	0	0	0
17	Dharmaveer Sambhaji Chowk- Kalas	4	0	0	0	0	0	0	0
18	Golf Club	4	0	0	2	2	2	2	0
19	Gunjan	4	0	0	0	0	0	0	0
20	Hotel Mahabaleshwar	3	6	10	1	1	1	0	0
21	Hutatma Rajguru (Karishma)	4	4	13	2	2	1	0	0

Sr no	Name of the intersection	No of arms	Working pedestrian signals	Pedestrian phase, seconds	Status of road markings				
					Road 1	Road 2	Road 3	Road 4	Road 5
22	Indirashankar Nagari	3	0	10	1	0	0	0	0
23	Karnataka High school	4	16	6	1	1	1	1	0
24	Karve Statue	4	6	10	2	2	0	1	0
25	Katraj Bypass	3	0	15	1	1	0	0	0
26	Katraj Dudh Dairy	3	4	10	2	2	2	0	0
27	Katraj Jakat Naka	4	0	0	0	0	0	0	0
28	Keshavnagar Mundhawa	4	0	0	0	0	0	1	0
29	Kharadi Bypass	3	1	15	0	0	0	0	0
30	Kokan Express	4	0	6	2	0	2	1	0
31	Kothrud Depot	4	1	12	1	1	0	0	0
32	LC- Bhandarkar Rd	3	0	0	1	1	1	0	0
33	LC- Prabhat Rd	3	0	0	2	2	0	0	0
34	Mahadev mandir	4	0	0	0	0	0	0	0
35	Mahesh Society	4	0	10	0	0	0	0	0
36	Marriot SB Road Bhosale Chowk	4	1	12	1	2	2	2	0
37	Mrutyunjay Mandir	3	2	11	2	2	1	0	0
38	Patrakaar Nagar	4	0	0	2	2	2	2	0
39	Poultry Farm	4	0	10	2	2	2	2	0
40	Radisson Blue Kharadi	4	4	10	0	0	0	0	0
41	Rasa Shala Karve Road	4	0	0	0	0	0	0	0
42	Rawat Brothers	3	6	15	2	2	2	0	0
43	Reliance Mart Kharadi	4	4	10	0	0	0	0	0
44	Senadatta LBS Road	3	0	0	1	0	0	0	0
45	Sharda Arcade	3	0	0	2	2	2	0	0
46	Shastri Nagar Jn	5	14	10	2	1	2	1	0

Sr no	Name of the intersection	No of arms	Working pedestrian signals	Pedestrian phase, seconds	Status of road markings				
					Road 1	Road 2	Road 3	Road 4	Road 5
47	Somnath Nagar	3	6	5	0	0	0	0	0
48	Suryamukhi Datta Mandir	3	0	0	2	2	0	0	0
49	Swatantrya Chowk	4	0	0	1	1	1	1	0
50	Tata Guard Room	3	8	12	1	1	0	0	0
51	University	4	6	14	2	2	2	2	0
52	Vadgaon Sheri Phata	4	0	6	0	2	0	0	0
53	Vetaal Baba	4	0	0	2	2	2	2	0
54	Viman Nagar	3	6	12	1	1	1	0	0
55	Vishrantwadi Chowk	4	0	0	1	1	1	1	0
56	Warje Flyover	4	6	20	0	0	0	0	0

7. Annexure 2: More about the surveys

Please see the 2020 report at this location for more details of topics covered in the Annexures:

https://savepunetraffic.org/wp-content/uploads/2021/06/Report-on-intersections-survey.pdf.

7.1. Methodology

About 250-260 intersections in Pune have traffic signals. It was understood that about 25-30 of these signals were kept switched off by PMC at the request of Pune Traffic Police (although there may or may not have been any objective reason for this action).

SPTM's attempt will be to survey all chowks with functioning signals. However, it may depend on the availability of surveyors. Yet, we will survey at least 25% of such intersections.

7.1.1. Data collection

The data required for this study was collected using on-site observations. An online survey form was used to record quantitative data, including the GPS location of the intersection. The surveyors filled in the form from their mobile phones from the site. This method ensured that no further data entry was required. The data was then exported to MS-Excel for easy processing.

7.1.1.1. Road markings

The data collection form required the surveyors to rate the road markings (Zebra and stop line) on each arm of the intersection in one of the 3 options below:

1. Perfect: Bright zebra and stop line (2 points).
2. Just ok. Might need a coat of paint in a few weeks (1 point).
3. Too faint or no zebra / stop line (0 points).

7.1.1.2. Pedestrian signals

The form required the surveyors to count the number of installed and working pedestrian signal aspects.

The surveyors were also required to measure the duration of the "pedestrian phase" in the signal cycle, in seconds.

The pedestrians also need-

1. A way to understand whether it is safe to start crossing a road now, or whether they should wait for the next signal cycle.
2. An audio indication to tell a visually challenged person whether it is safe to cross the road.

These two are missing at virtually all intersections in Pune. So no data was collected in this regard; but these points are considered in the analysis.

7.1.2. Analysis

7.1.2.1. Scoring the infrastructure

The 5 types of infrastructure pedestrians need to make the intersection safer to cross are as follows:

1. Road markings (Good zebra and stop line)
2. Working pedestrian signal aspects
3. Sufficient pedestrian phase timing
4. A mechanism that tells a pedestrian whether it is safe to start crossing now
5. Audio indication to tell a visually challenged person whether it is safe to cross the road

7.1.2.2. Weightage of the infrastructure

Certain weightage was assigned to the 5 types of infrastructure.

The weightage distribution was 30-20-20-15-15 for the 5 types of infrastructure required.

7.2. Processing survey findings

7.2.1. Data entry and calculations

No data entry was required since the survey form was online. The data collection table was exported to MS-Excel for data processing.

The following quotients were calculated for the 5 types of infrastructure mentioned earlier:

1. Road markings quotient
2. Pedestrian signal aspects quotient
3. Pedestrian phase quotient
4. Proper indication quotient
5. Audio alert quotient

Each quotient has a maximum value of 1.00. Each quotient was multiplied by its respective weight to obtain its respective score. All scores were added to arrive at a total score out of 100 for each intersection that reflected how safe the infrastructure in that intersection is for pedestrians.