



BIKE PAL FINAL REPORT

Opening Sophienstrasse for contra-flow cycling

Exposee

This report summarizes the process of implementation of the BIKE PAL project „Opening Sophienstrasse for contra-flow cycling“.

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Project idea

In the context of the European Transport Safety Council project BIKE PAL, which aims at raising awareness for bicycle safety, the improvement of a key street for cyclists between two neighborhoods of downtown Munich was studied.

Sophienstrasse is a wide one-way street which connects the Technical University of Munich and the colleges of Music and Theater to the central downtown transport hub at Karlsplatz. Currently university-bound cyclists must take a lengthy detour in order to avoid the grid of one-way streets which are not open for counter flow cycling.

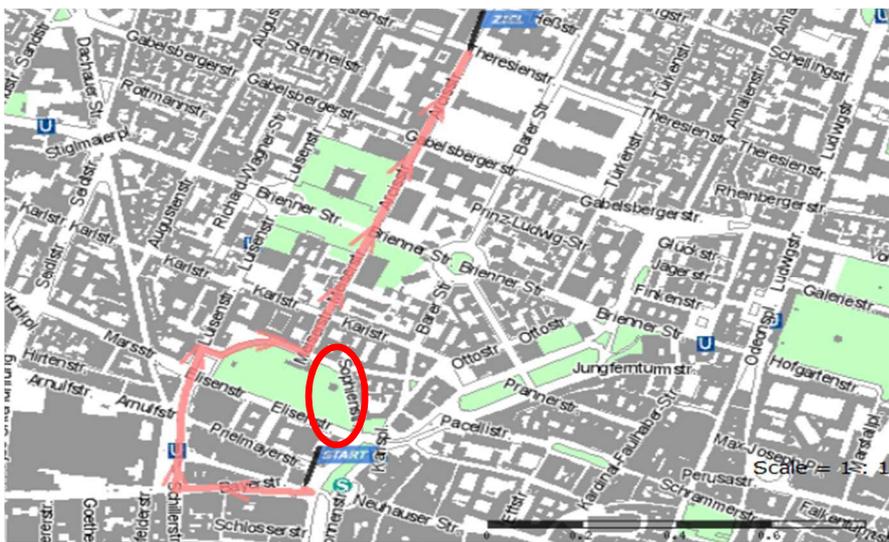


Figure 1: Cyclist going from Karlsplatz city center to the university must take a long detour

Due to the location close to the old botanical garden, the street is highly frequented by pedestrians. Especially at the southern intersection many pedestrians and cyclists meet. A major problem here is that cyclists frequently use the sidewalk, which is for two reasons; on the one hand, because when waiting at the traffic light there is not enough room for them to line up next to the cars, and on the other hand, because there is no other possibility to go from south to north on that street. Cyclists therefore cycle on the sidewalk when going northward in direction contrary to the direction of car-traffic. The picture below shows the situation on the southern part of the street where Sophienstrasse ends at the entrance of the old botanical garden. Many cyclists step on the sidewalk from the street if there is little space for them to stand next to the cars at the traffic light.



Figure 2: Cyclists going southward do not have space to wait next to cars on the traffic light and therefore change to the sidewalk, which is highly frequented by pedestrians and other cyclists coming from the east.

The following picture shows the situation where cyclists travel northbound in the opposite direction of car traffic. Since no bicycle facilities are available they use the sidewalk on this route. This behavior is forbidden by the regulations and might endanger both the cyclists and the pedestrians using the sidewalk.



Figure 3: Cyclists going northbound use the sidewalk, there are no legal facilities for this route in Sophienstrasse

The project idea therefore is to change the layout of Sophienstrasse in a way that would allow cyclists to travel easily from south to north without endangering themselves and pedestrians. Also for the cyclists going southbound the situation needs to be improved to make them stay on the street and feel safe next to the cars.

General Configuration of Sophienstrasse

Sophienstrasse is a wide one-way street with car parking on one side. The whole street forms a curve around a park, the old botanical garden. The speed is limited to 30 km/h, the restriction is resolved a few meters before the intersection in the south. Drivers are only allowed to go from north to south. The part of Sophienstrasse examined in this project starts in the north where Arcostrasse ends at Sophienstrasse coming from the east. This is the point where Sophienstrasse becomes a one-way street. Cars from Arcostrasse can turn into Sophienstrasse using the two-way part of Sophienstrasse or keep straight. Sophienstrasse has no lane markings, only at the northern junction with Arcostrasse there is a traffic island to prevent cars from turning in the middle of the street, in the south at the junction with Elisenstrasse and Lenbachplatz, where Sophienstrasse leads to the ring road around Munich's city center, there are three lanes, on all of these, drivers can keep straight, on the right one also right turning is allowed. The width of the street varies between 7.30 m in the north, 8.80 m at its widest part, and 8.60 m at the southern junction. There is enough space for a

Painted counter-flow cycle lane, only in the southern junction some space would have to be taken away from car-lanes. The sidewalks are narrow with a width of about three meters, which makes it impossible to implement the counter-flow cycle path on the sidewalk, the available space is not enough to fulfill the requirements for this kind of solution. The following figure displays the layout of the examined part of Sophienstrasse including all dimensions.

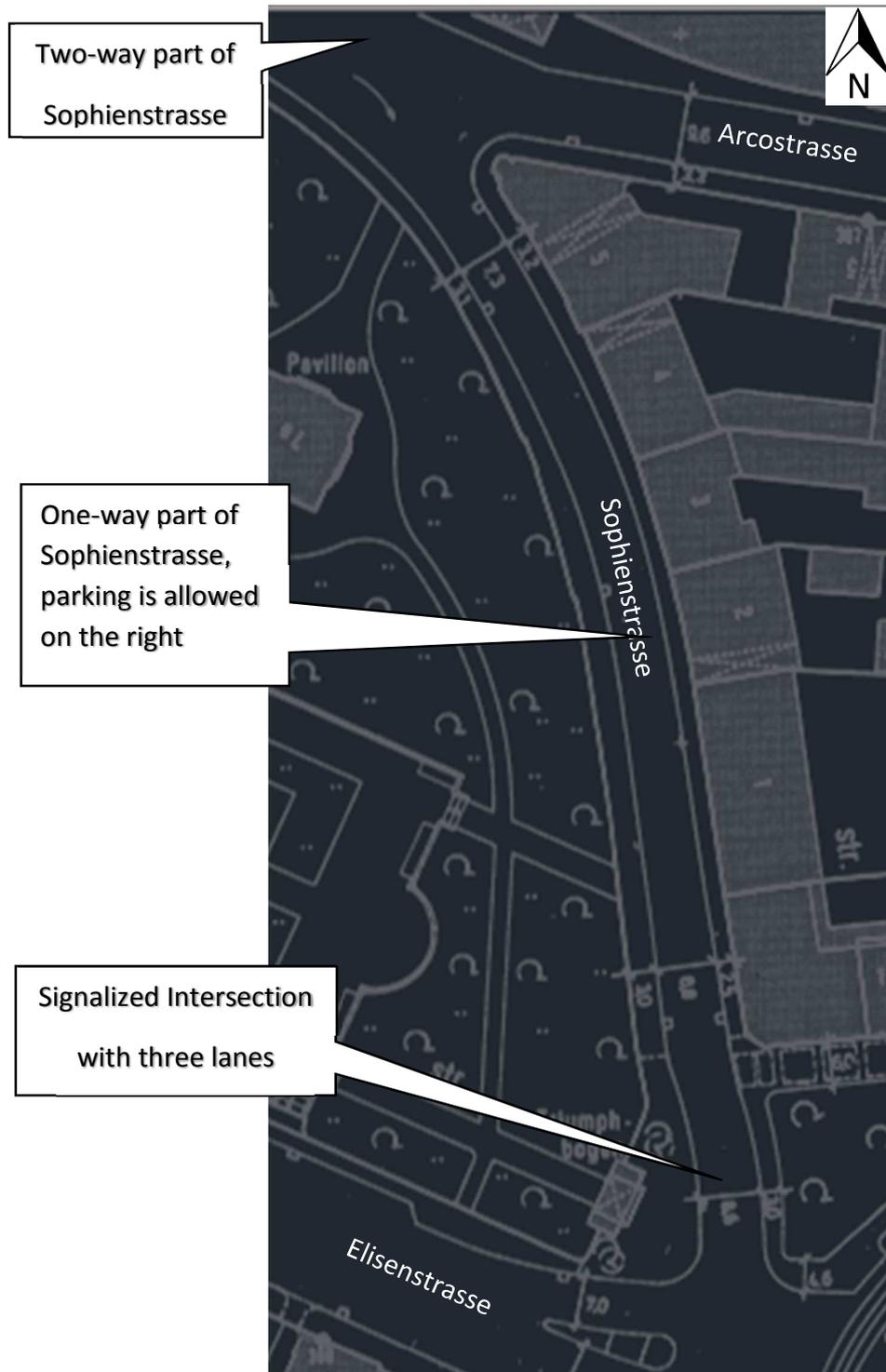


Figure 4: Planning Picture of Sophienstrasse

The picture below shows the signalized intersection with Eisenstrasse and Lenbachplatz in the south with three lanes marked for cars.



Figure 5: Sophienstrasse leads to Karlsplatz, a complicated junction, heavily trafficked by cycles, pedestrians and cars.

The whole plan of the southern intersection of Sophienstrasse can be seen in the picture below. There are not only major streets with several lanes each, but also tram lines crossing that intersection. For pedestrians and cyclists that intersection is rather difficult to cross. On the eastern side, there is no possibility to cross from north to south at all for pedestrians or cyclists.

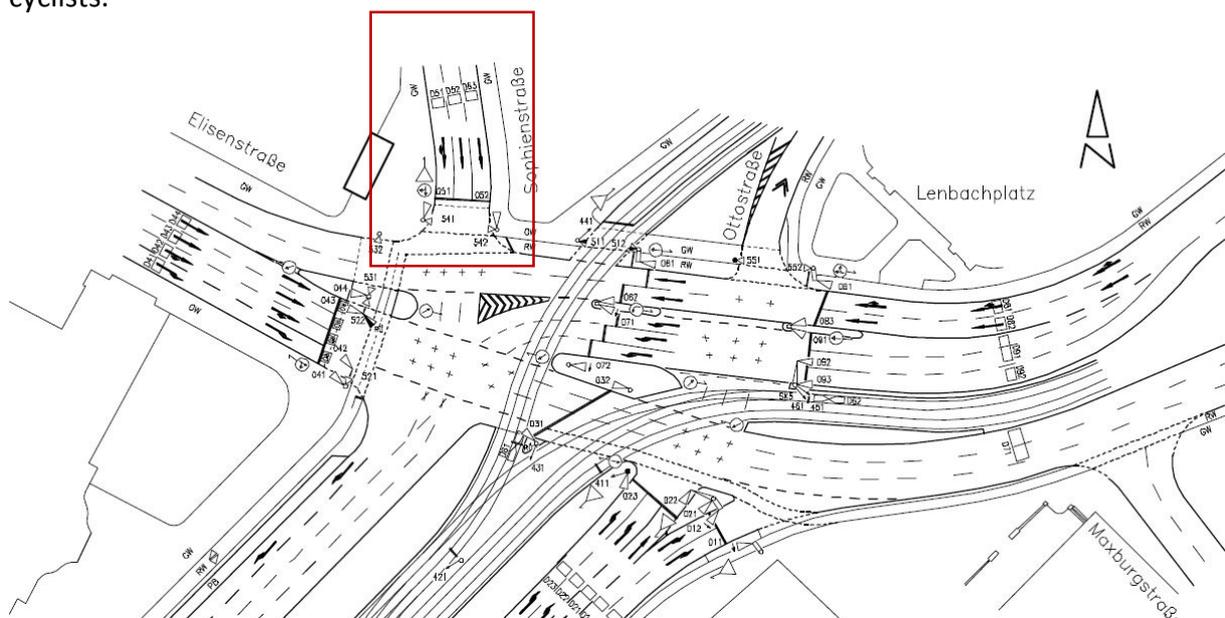


Figure 6: The intersection in the southern end of Sophienstrasse has a rather difficult configuration.

Also the northern junction with Arcostrasse is rather difficult, since the angle between Arcostrasse, where cars can turn left coming from the east, is sharp. Would a cyclist come from the south, which is currently not allowed, there might be problems for the cars to see the cyclists if they keep on turning that sharp. This is why, if a counter-flow lane is introduced at Sophienstrasse, there would have to be changes in the configuration of the triangle junction of Sophienstrasse and Arcostrasse as well.

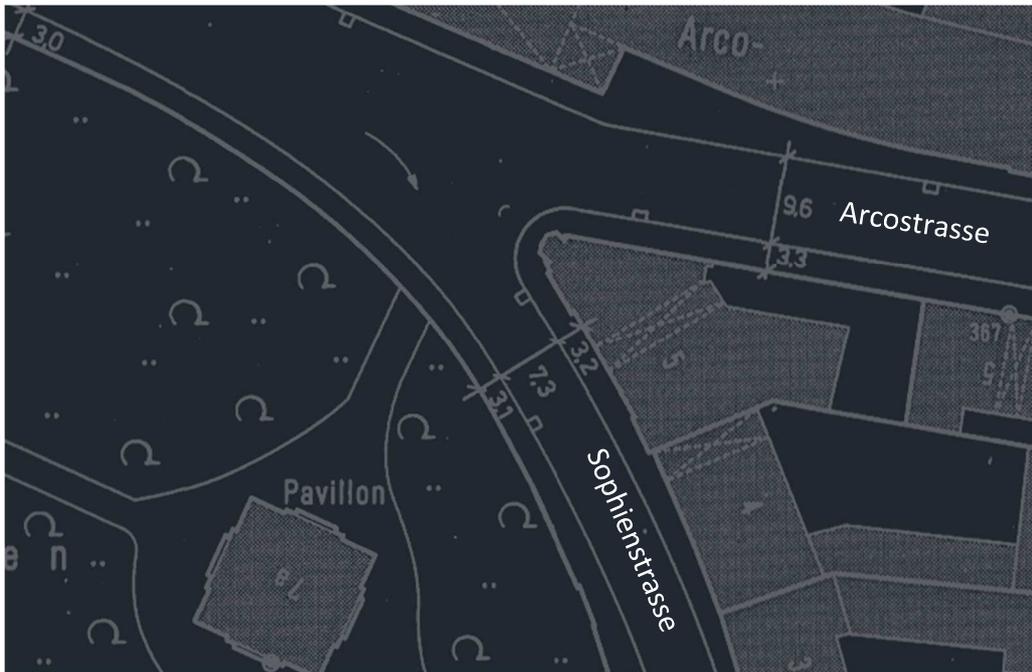


Figure 7: Intersection Sophienstrasse/Arcostrasse

First steps

The first contact in Munich to implement measures to improve cycling facilities, is the responsible team for the marketing campaign “Radlhauptstadt München” (cycling capital Munich), who support all activities aimed at making cycling more attractive and safe in the city of Munich. Also the city officials for construction and for transport planning were important to contact. First of all, an investigation was carried out in order to find out the general opinion about the project idea and get to know similar activities which have already been carried out to improve the situation for cyclists on the street. In fact, there were some activities a few years ago, when the representatives of the respective city department requested the investigation of the possibility to implement a bicycle facility for counter-flow riding in Sophienstrasse. By that time, however, the idea was to create a cycle path on the sidewalk and make the pedestrians share the space with the cyclists. That idea has been

rejected due to the little space available on the sidewalk and the high number of pedestrians using it, which would make the situation even more dangerous and would not be according to the regulations which require some minimum spacing for these kinds of facilities. The final report for that investigation said, however, that a counter-flow lane on the street might be possible but was not further investigated by that time.

In order to convince the responsible city department of transport planning of the idea that more room for cyclists is needed on Sophienstrasse and space has to be taken from car lanes, on-street car counts as well as questionnaires were carried out.

Questionnaires with cyclists at Sophienstrasse

A questionnaire was conducted in order to find out how safe cyclists feel driving on Sophienstrasse and if there is a general need for a possibility to ride from south to north on Sophienstrasse.

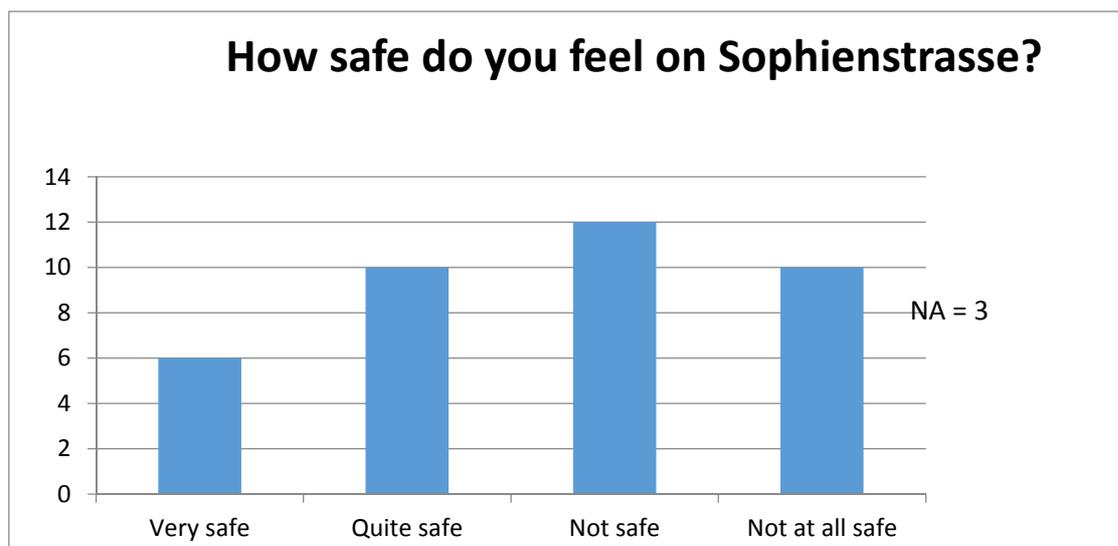


Figure 8: The majority of cyclists does not feel safe on Sophienstrasse

In total, 41 cyclists on Sophienstrasse were asked their opinion on the safety for cyclists on that street, cyclists using the street in all directions were asked. As depicted in the figure above, the clear majority does not feel safe riding a bike on Sophienstrasse.

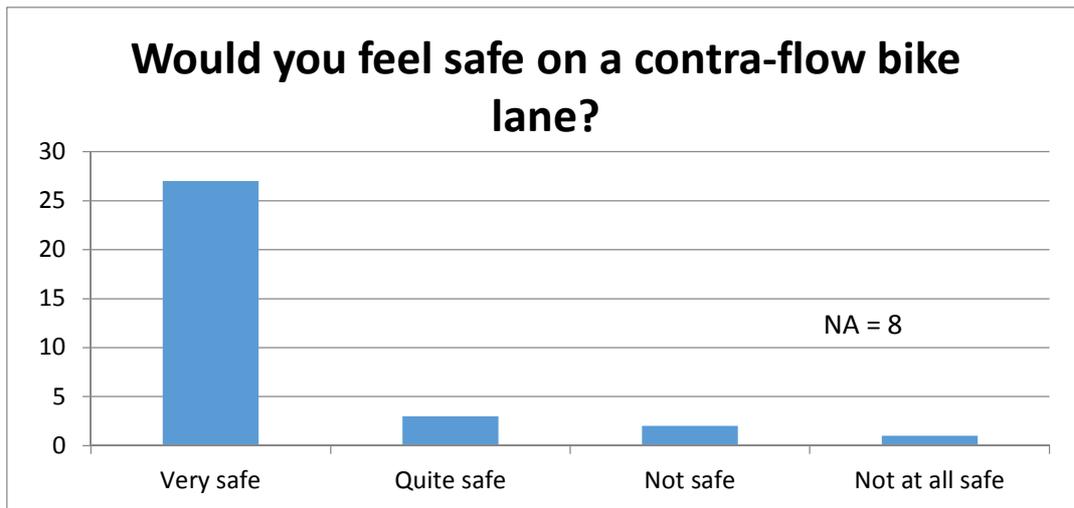


Figure 9: Answers to the question whether cyclists would feel safe using a counter-flow lane on Sophienstrasse

Cyclists were additionally asked about how they would like the idea of being able on using the street in counter-flow direction. As the statistics above show, a great majority would like that idea and states that they would feel safe riding on such a lane.

Car counts at Sophienstrasse

During several peak hours in the morning as well as in the afternoon, car counts were carried out in order to find out how many cars use Sophienstrasse and how the cycle times are designed for cars exiting Sophienstrasse in the southern part heading towards Karlsplatz, where they enter the ring road around the city center of Munich.

The main goal of the car count was to justify the planned reduction in number of lanes for the cars. If the number of cars per hour does not reach a number to justify three lanes, it might be easier to implement the cycle lane. On the other hand, also cycle times of the traffic light in the south of Sophienstrasse were evaluated in order to see whether a lower number of lanes would create congestion at Sophienstrasse because of cars having to wait more than one cycle at the traffic light.

Traffic counts showed that the number of cars during peak hour is about 300 to 400 vehicles per hour. During peak hours Sophienstrasse was in congested state due to the fact that Sonnenstrasse, the street which Sophienstrasse leads to in the south, reached its capacity limit. Cars therefore queued at Sophienstrasse not to congest the intersection.

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What can be noticed was that not only many cars use Sophienstrasse, but the number of pedestrians and cyclists is very high as well. Furthermore, the demand for an option for cyclists going from south to north is represented in the counting results, since many cyclists already now ride the street from south to north illegally.

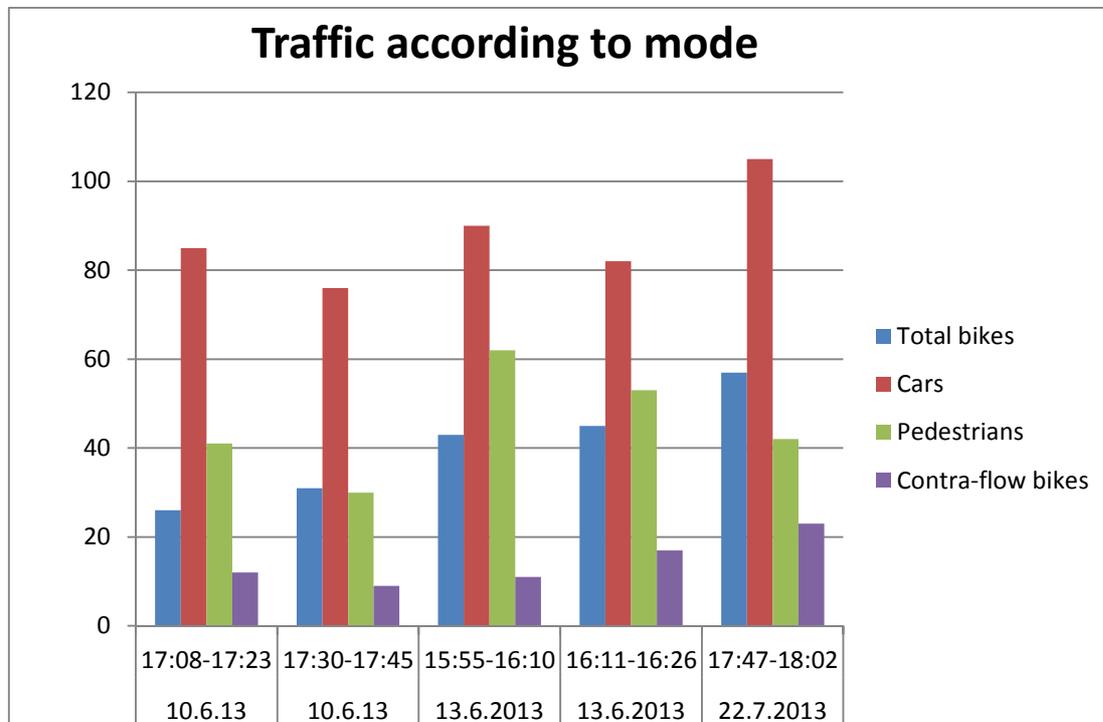


Figure 10: Traffic on Sophienstrasse according to mode per 15 minutes during peak hours on several days

During September, utility maintenance along Sophienstrasse caused the left hand lane of the one-way street to be closed for traffic. This closed lane would be the future contra-flow bicycle lane. The following graph shows the queue that resulted from reducing the normal 3 lane street configuration at the Karlsplatz junction to 2 lanes.

Only during a 10 minute interval there were vehicles which had to wait two cycles in order to exit onto Karlsplatz. The queue became approximately 30 vehicles, and 15 vehicles per cycle managed to pass through green. However, this problem was aggravated by congestion on the Karlsplatz junction. Cars sometimes had to wait at Sophienstrasse even on green due to stopped traffic in the junction.

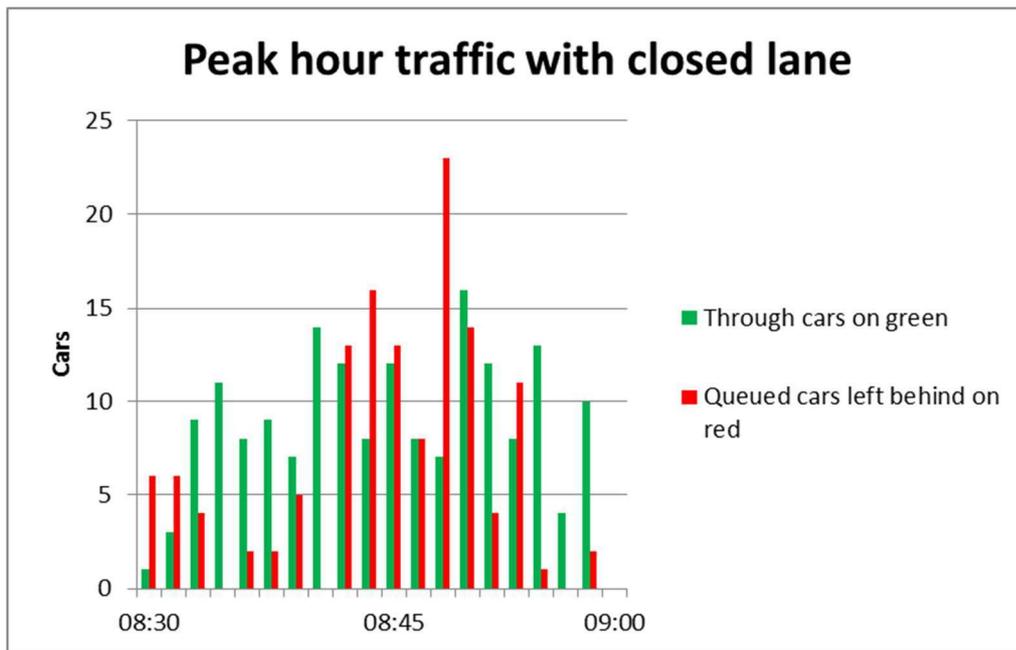


Figure 11: Sophtienstrasse morning peak hour traffic with closed lane. Wednesday September 11, 2013

The green time lasted about 11.5 seconds and did not change throughout the traffic counts. The average queue was 6 to 7 vehicles and 1 to 2 vehicles could cross the intersection additionally without waiting. On average, it happens three times per hour, that a vehicle cannot cross the intersection on green and has to wait twice. The reasons were either congestion on Sonnenstrasse, or because the vehicles were waiting behind others which were turning right. Right-turners usually have to wait due to the high amount of pedestrians and cyclists crossing Elisenstrasse, these have green at the same time as cars from Sophtienstrasse. The number of right-turners is rather low with an average of 20 vehicles per hour, which corresponds to about 6% of all vehicles using Sophtienstrasse.

Proposals for the new configuration of Sophtienstrasse

Several options for the implementation of a contra-flow lane for cyclists were taken into consideration and evaluated according to their feasibility. Especially the two junctions in the beginning and end of the street had to be examined carefully. The junction in the north, where Sophtienstrasse hits Arcostrasse is difficult due to the small angle in which drivers from Arcostrasse come into Sophtienstrasse. In order to prevent accidents, high visibility between cyclists using the contra-flow lane and drivers coming from Arcostrasse has to be guaranteed. One possible option of the layout of that intersection is shown in the figure below. In this case, cyclists would have to stop at Arcostrasse standing in a right angle to be able to look into

Arcostrasse and give way to the drivers coming from the right. This option might be problematic though, since it is possible that cyclists whose destination is further north would just cross the junction without taking care of cars from the right.



Figure 12: Proposal for a new configuration of the junction Sophienstrasse/Arcostrasse

Another possibility would be to turn Sophienstrasse into the main direction so that drivers coming from Arcostrasse would always have to wait. In this case, the bike lane could go on the whole way on Sophienstrasse up to the next junction with Katharina-von-Bora-Strasse. Cyclists could now stay on the bike lane and cars from Arcostrasse would have to give way, a sign would in this case be necessary to warn drivers indicating that cyclists might come from the left.

The space that is created on the junction in every case has to be kept free of parking cars, since this again would lower the visibility between the two directions.

In the southern junction not only the contra-flow cycle lane shall be implemented but also some space for cyclists going southward. If both are implemented on the space of the street, some of the space has to be taken away from drivers. One could also think about putting some part of the contra-flow lane on the sidewalk and let it go on at the street where the differentiation between lanes ends.

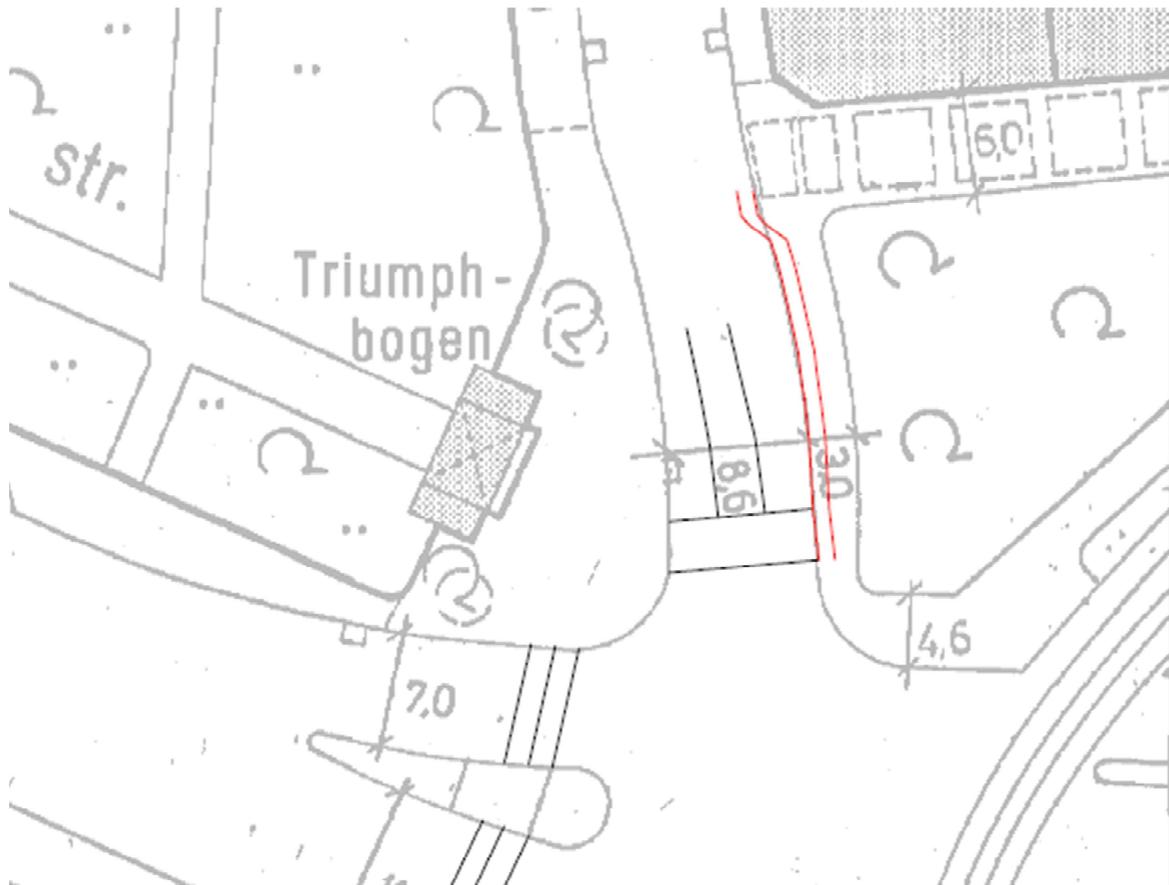


Figure 13: Possible implementation of a contra-flow lane on Sophienstrasse which would not reduce the number of lanes for cars

This solution would take space away from pedestrians on the east side of Sophienstrasse, which is only 3 m wide. This solution is therefore not preferable. Additionally, when reducing the number of car-lanes to two, there would be space to implement a cycle lanes on both sides of the southern intersection of Sophienstrasse.

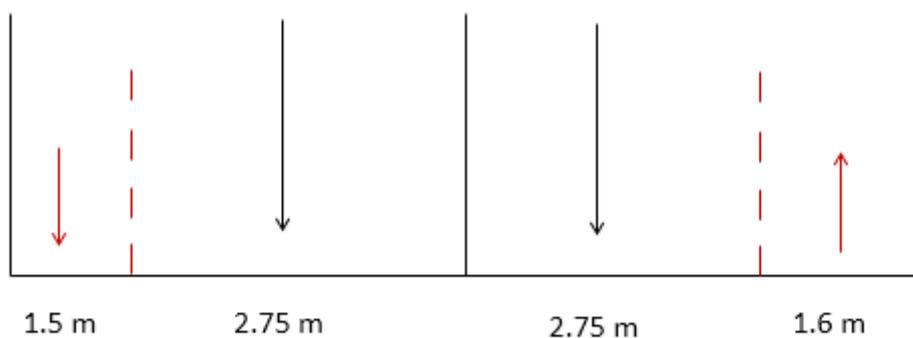


Figure 14: Proposed new configuration of the southern intersection of Sophienstrasse at the traffic light

The accessibility would be very good for cyclists coming from the east, since they could easily turn into Sophienstrasse. For cyclists from Karlsplatz, on the other hand, it would be more difficult since they come from a two-way cycle path on the west side of Sonnenstrasse. Thus, they would have to cross two streets, Elisenstrasse and Sophienstrasse, in order to get to the cycle lane on Sophienstrasse. A change in the signalization might improve that situation, for instance if cyclists were allowed to enter Sophienstrasse directly at a time where left turners from Lenbachplatz have green light.

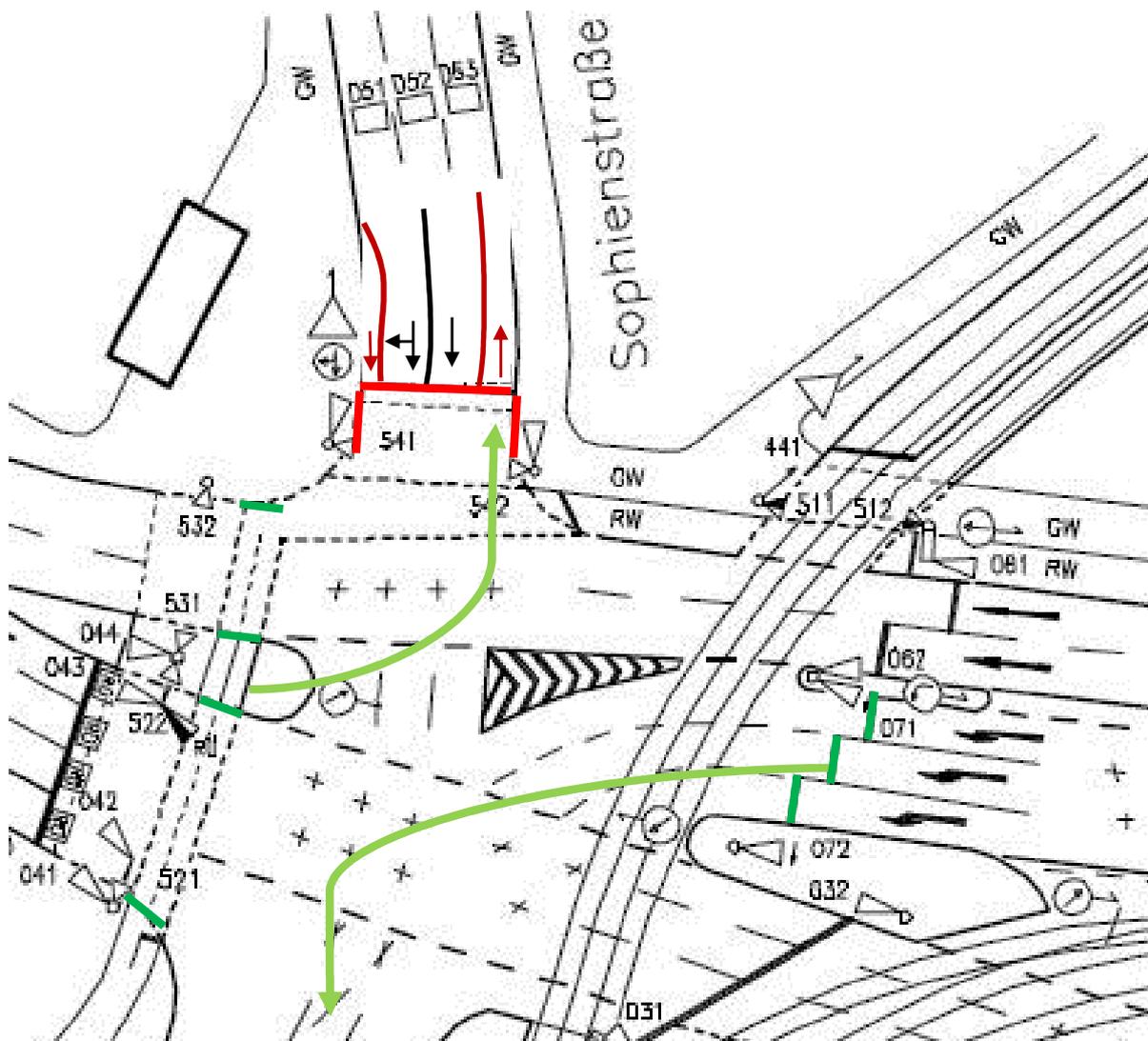


Figure 15: proposed new phase in the signal plan at the southern intersection of Sophienstrasse

An implementation of this proposal might be problematic due to the high costs associated with a new traffic light and a change in the signal plans of a whole intersection.

Implementation steps

After the in-depth pre-study was carried out, the results were shown to the responsible city planners of the city of Munich. The meeting was organized by the representative of the cycling campaign “Radlhauptstadt München”. Invited were the officials responsible for opening contra-flow lanes, as well as city planners responsible for difficult intersections in the city and traffic signal control. Also the university supervisors took part in the meeting. After presenting the results of the car counts and questionnaires, the project idea and different solutions were discussed. The planners showed interest to cooperate and evaluated the ideas as very valuable. At the same time, the fact that the intersection is very difficult and all other problems which had occurred, when a comparable project was discussed in 2009, were evaluated again. The main problem which was identified was that the accessibility of a possible contra-flow lane on Sophienstrasse would be difficult. As described above, cyclists coming from Karlsplatz would have to cross two signalized streets in order to get onto the cycle lane. The representatives, though, agreed with the existence of the problem and the possibility of changing the situation for cyclists. Finally, during the meeting all parties could agree on the following:

- The study area is a very difficult section of Munich’s transport network
- The whole section is highly frequented by drivers of cars but also for cyclists and pedestrians it is very important
- The situation for pedestrians and cyclists in that section needs improvement
- A contra-flow lane on Sophienstrasse is generally a good option and is evaluated to be feasible to implement
- For a better accessibility of this possible contra-flow lane, some more changes on the whole section need to be realized
- The project on Sophienstrasse is easy to implement since only lane markings need to be done, all the rest is necessary but can be done step-by-step while the layout of Sophienstrasse would not change anymore

The conclusion was thus that the project on Sophienstrasse can be implemented right away. After that, in a bigger project the whole section of Lenbachplatz needs to be changed. The change of Lenbachplatz would not influence the layout of Sophienstrasse anymore, which is why this can be completed before,

As a next step the city authorities had to plan the new layout of Sophienstrasse. After that, this plan is presented to the representatives of the respective neighborhood of Munich, who then decide on whether they want the project to be implemented or not.

The meeting with representatives of the city district Maxvorstadt, the location of Sophienstrasse, took place on January 28th 2014. Some members of the committee of representatives of Maxvorstadt took part in that meeting and discussed the situation on Sophienstrasse and agreed on the changes that need to be done. The city authorities resented the plan in the following figure.

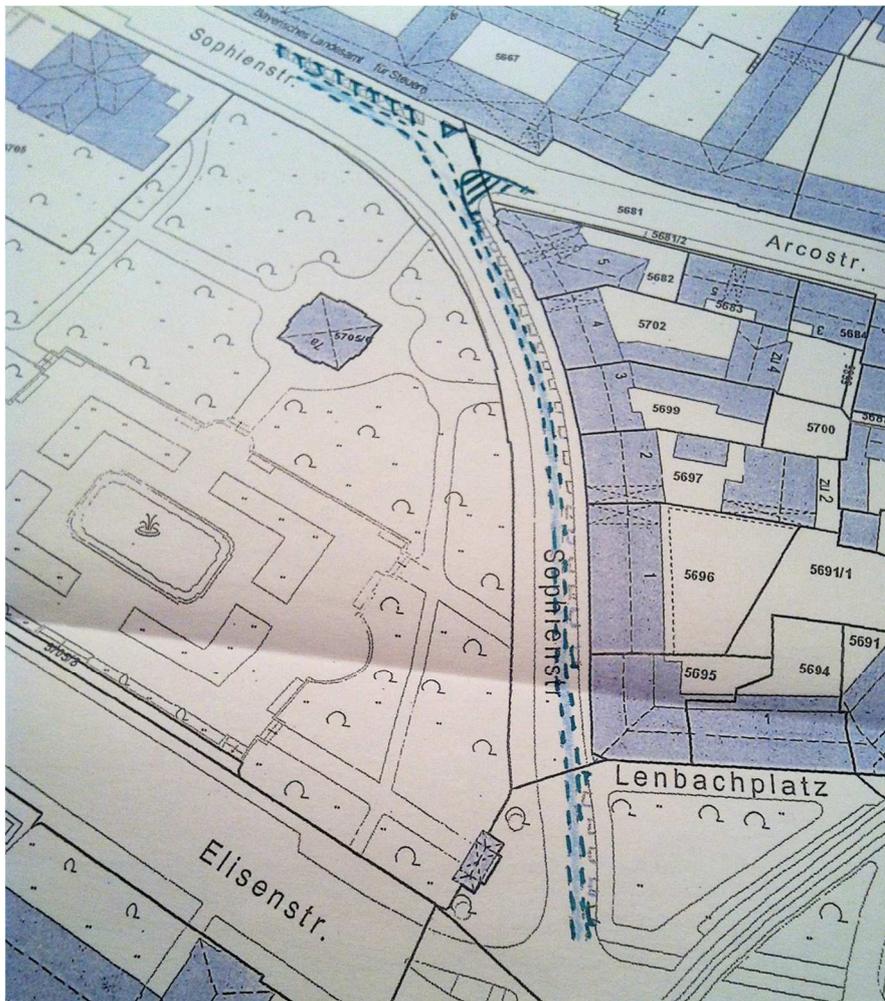


Figure 16: Plan for the new configuration of Sophienstrasse presented by the city authorities to the committee of the district of Maxvorstadt

This plan though, did not include the space for cyclists in southward direction to line up in front of the traffic light. Instead, it included additional parking space on the eastern side of the street. The Bike Pal group then presented the idea of the additional lane markings for

cyclists going southward, which was the option which the committee members liked better and agreed on. The plan from the city authorities was changed accordingly.

After some representatives were part of the meeting on site, these presented the idea to the whole board of representatives of the city district Maxvorstadt. The committee decided with a majority that the project shall be implemented.¹

Bezirksausschuss des 3. Stadtbezirkes



Maxvorstadt



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München

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Tal 13, 80331 München

An alle

Mitglieder des BA 3 und

Behörden

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München, 12.03.02.2013

**Niederschrift der öffentlichen Sitzung des
Bezirksausschusses 3 Maxvorstadt am 11.03.2014
im Palais Pinakothek, Türkenstraße 4, 80333 München**

Beginn: 19.30 Uhr
Ende: 21.38 Uhr

Vorsitzender: Herr Dr. Holl
Protokoll: Frau Schäffler

- A Allgemeines
1. Begrüßung, Feststellung der Anwesenheit und der Beschlussfähigkeit
2. Beschluss über die endgültige Tagesordnung
Auf Wunsch von Herrn Selikovsky sollen
TOP C 2.1.5, Öffnung der Sophienstraße für den gegenläufigen Radverkehr und
TOP C 2.3.1, Faltblatt Gaststätten zusätzlich aufgenommen werden.
Frau Mathies beantragt,
TOP E 1.1, Antrag vom 10.03.2014, Veranstalten einer Führung zu den bekanntesten
Bauten von Leo-von-Klenze im April 2014 zusätzlich aufzunehmen.
Frau Gehling wünscht, dass unter
TOP B 4.3.3 vom Bürgergutachten zum Museumsviertel berichtet wird.
Der so geänderten Tagesordnung wird mehrheitlich zugestimmt.
3. Genehmigung der Niederschrift der letzten Sitzung

[...]

¹ The protocol of the meeting on March 11th can be found under the following link:
<http://www.muenchen.info/ba/03/aktuelles/bas/index.htm>

Der UA schlägt einstimmig Zustimmung vor.
Abstimmungsergebnis: einstimmig zugestimmt
2.1.5 Öffnung Sophienstraße für gegenläufigen Radverkehr
Der UA schlägt einstimmig Zustimmung vor.
Abstimmungsergebnis: mehrheitlich zugestimmt
2.2 Öffentlicher Raum
2.2.1 Kommunalreferat, Anhörung
Stellungnahme zur Thematik „Benennung von Straßen und Wegen in Grünanlagen“
Der UA sieht keinen Bedarf auf dem Gebiet des BA 3 Maxvorstadt.

Figure 17: Excerpt of the protocol from the committee meeting on March, 11th 2014

As a final step, the decision is sent back to the city department which then assigned the work which has to be carried out to the construction department. In this case, only lane markings were necessary to implement the project. Still, the implementation took some time because road works were going on at Sophienstrasse since the water and heating supply of the city of Munich renewed the underground pipelines and by digging in Sophienstrasse. After having finalized that work, the construction department re-painted the lanes on Sophienstrasse. The works were finished on Wednesday, 28th of May 2014.

In the following chapter, pictures show the final new configuration of Sophienstrasse after the implementation of the counter-flow cycle lane, the space for bikes going southward, the markings preventing cars from Arcostrasse turning too sharp into Sophienstrasse as well as all necessary signs.

Final configuration after the implementation of the project

The lane markings at Sophienstrasse took place on May 28th 2014. The configuration proposed was implemented, containing a contra-flow lane for cyclists, a lane in southward direction for the bikes to line up at the traffic light, a space on the junction Sophienstrasse/Arcostrasse to prevent cars from turning too sharp into Sophienstrasse, as well as all necessary signs. The following pictures show the new configuration of Sophienstrasse after the implementation of the BIKE PAL project.

The sign in the southern end of Sophienstrasse makes clear this is a one-way street where cars are not allowed to enter from one side. The additional sign allowing cyclists to enter was added after the implementation of the contra-flow lane.



Figure 18: The sign allows cyclists to enter Sophienstrasse in contra-flow direction

The view into Sophienstrasse from the south before the implementation was much less cycle-friendly.



Figure 19: View into Sophienstrasse from the south before the implementation

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At the traffic light in the southern end of Sophienstrasse, the number of lanes for cars was reduced from three to two. Not only space was given to the cyclists passing the street in contra-flow direction but also in the southward direction an extra lane for the bike to line up next to the cars in front of the traffic light was implemented, see the figure below.



Figure 20: new configuration in the southern end of Sophienstrasse

Before the implementation there was hardly any space for cyclists in the southern end of Sophienstrasse.

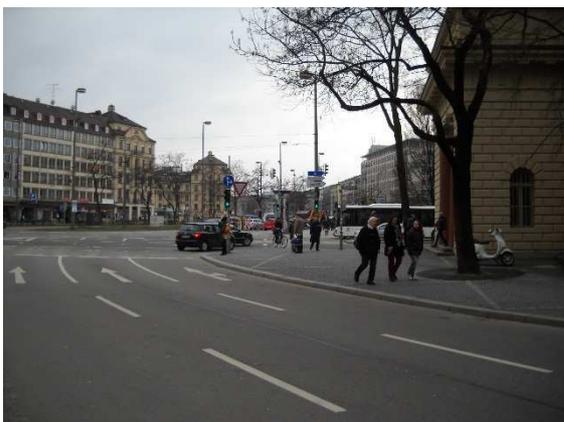


Figure 21: Southern junction of Sophienstrasse before the implementation

Along the street the width of the lane for cars was reduced to give enough space for the contra-flow lane. The lane is marked according to the rules of a so-called “Schutzstreifen”, which is not exclusively for cyclists but can in necessary cases be driven on by cars. Here this is especially necessary due to the parking behind the lane, additionally there is some space left between the car parking and the bike-lane to give enough room to people getting out of parked cars and prevent opening doors from these hit cyclists.



Figure 22: The contra-flow bike lane on Sophienstrasse

Before the implementation there was not so much room for cyclists on Sophienstrasse.



Figure 23: View into Sophienstrasse from the north before the implementation

The lane goes all the way around up to the northernmost point of Sophienstrasse. The intersection with Arcostrasse was also changed. Here, markings on the street shall prevent drivers coming from Arcostrasse from turning too sharp into Sophienstrasse. Additionally to the markings on the street, also metal plates prevent people from parking on that part of the street.



Figure 24: Junction Sophienstrasse/Arcostrasse after implementation of the contra-flow lane

The situation before the implementation was much more unsafe due to lower visibility caused by illegally parked cars.



Figure 25: Intersection Sophienstrasse/Arcostrasse before the implementation

Additionally, Sophienstrasse has become the main street so that drivers from Arcostrasse have to give the right of way to drivers coming from Sophienstrasse. An extra sign informs the drivers from Arcostrasse about cyclists that might come from the left.



Figure 26: Sophienstrasse turned in to the street with the right of way, an additional sign informs drivers coming from Arcostrasse about cyclists who might come from the left

Before the implementation drivers from Arcostrasse could only barely look into the southern part of Sophienstrasse.



Figure 27: View from Arcostrasse before the implementation of the project

Finally, cyclists can use Sophienstrasse in both directions with appropriate and safe infrastructure.



Figure 28: Cyclists using the new infrastructure