Interreg Baltic Sea Region

EUROPEAN REGIONAL DEVELOPMENT FUND

EUROPEAN UNION

HUPMOBILE

Hamburg | Bezirksamt Altona

Feasibility Study

Teufelsbrücker Platz 2021

HUPMOBILE – Holistic Urban and Peri-urban Mobility
Report, 2021

Imprint

This publication has been developed within the European project **HUPMOBILE – Holistic Urban and Peri-urban Mobility.**

The HUPMOBILE consortium consisted of the following partners: Aalto University (FI), Free and Hanseatic City of Hamburg (DE), City of Riga – Municipal Agency "Riga Energy Agency" (LV), City of Tallinn (EE), City of Turku and Union of the Baltic Cities - Sustainable Cities Commission (FI), Royal Institute of Technology (SE), ITL DIGITAL LAB (EE)

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Contract: HUPMOBILE – Holistic Urban and Peri-urban Mobility Project no. R105

Title: Feasibility Study: Teufelsbrücker Platz 2021

Version: December 2021

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Project note

The EU co-funded project **HUPMOBILE – Holistic Urban and Peri-urban Mobility** (2019–2021) brings together municipalities, universities and other expert organisations in their efforts to develop a holistic approach to the planning, implementation, optimisation and management of integrated, sustainable mobility solutions in the Baltic Sea port cities.

The carried-out activities enable major urban mobility stakeholders such as city authorities, as well as infrastructure providers and transport providers to assess and integrate innovative mobility options into their mobility management plans and policies. The developed HUPMOBILE framework allows the planning and implementation of well-functioning interfaces and links in urban- and peri-urban transport considering the different transportation flows in the local context.

Within HUPMOBILE, partner cities plan, test and implement innovative sustainable urban mobility for both people and goods (i.e. freight, cargo logistics and delivery), which are easily adaptable for follower cities. These include greener urban logistics and combinations of goods- and passenger traffic, intelligent traffic systems-based services, tools for stakeholder participation, and new tools for transportation mobility management and Mobility-as-a-Service (MaaS).

Inhalt

1. Introduction

1.1. Elbe´s hiking and cycling path: Section at Teufelsbrück´s Platz

1.1.1. Active mobility as the focus of design

The EU project HUPMOBILE[1] (Holistic Urban and Peri-Urban Mobility) deals intensively with mobility in public spaces, focusing on intelligent transport solutions (ITS = Intelligent Transport Solutions). In the context of this project, a feasibility study of Teufelsbrücker Platz is to be developed to investigate the mobility and traffic-related conflicts on the plaza.

As a junction between Westerpark, Wesselhöfpark and Jenischpark, the Teufelsbrücker Platz forms the starting point of Altona's "green lung", while the function of the square as a traffic node and specifically as a steppingstone to the opposite shoreline of the Elbe where important industries are located. Since the commuting in this area mainly addresses the needs of employees to the nearby industries, during rush hours there is heavy use of the plaza and the safe and quick transition between means of transportation (bus, ferry, bike, and pedestrians) for a big number of commuters during short, fixed time intervals that match the bus and ferry schedule needs to be ensured. Moreover, the transition from the bicycle path to bike-on-ferry or bike parking on plaza or on pontoon, and all this in the critical zone of bike stop waiting zone to ferry stop waiting zone on pontoon is the main topic of investigation for this feasibility study.

Finally, the plaza is a popular destination, especially on weekends and public holidays: Teufelsbrück's Platz is at those times a transportation hub, and a place where people imbed themselves in time, looking at the landscape, having a swim, or getting a beer at the nearby restaurant. Consequently, the quality of placemaking and open-space design of the plaza are also important components for this feasibility study.

1.1.2. Promoting active mobility

Active mobility refers to modes of locomotion that take place through one's own muscle power, such as walking or cycling. The EU project HUPMOBILE deals with environmentally friendly and sustainable mobility concepts. The project focuses primarily on the idea of increasingly shifting transit traffic by

[1] www.hupmobile-project.eu

commuters to environmentally friendly means of transport. This means, in other words, active mobility applies to ways of locomotion that involves using one's individual muscle power, such as walking or cycling.

This feasibility study is conducted in the context of the EU project HUPMOBILE (Holistic Urban and Peri-Urban Mobility), the focus is on developing intelligent transport systems (ITS=Intelligent Transport Solutions[2]) and innovative solution concepts[3]. Furthermore, the EU project HUPMOBILE deals with environmentally friendly and sustainable mobility concepts, and it focuses primarily on transit traffic by commuters and the resulting air pollution. Minimization of these environmentally friendly alternatives such as public transport or bike, scooter & car sharing concepts is promoted through this work. The HUPMOBILE project is divided into three phases:

1. development of (digital) tools, simulation models, methods and guidelines that contribute to the realization of the goal "sustainable transport",

2. testing of different transport concepts in five pilot regions,

3. development of transferable recommendations for action for other European regions.

1.2. Historical background Teufelsbrück

Teufelsbrück is the name of the area where the Flottbek stream flows into the Elbe. According to the legend, the ford where the Elbchaussee now runs was often the site where accidents happened, and wheels broke. For this reason, this location was commissioned for a bridge. The carpenter who was building the bridge had troubles implementing the design, and hence, requested the help of the devil and in return promised him the soul of the first living creature that would cross the bridge. Knowing this, the priest of Nienstedten who was commissioned to inaugurate the bridge, let a hare as the first living creature to cross the bridge. Today, a devil statue with a hare on the Teufelsbrücker Platz keeps the memory of this legend alive.

[2] www.hupmobile-project.eu
[3] www.umweltbundesamt.de/themen/verkehr-laerm/nachhaltige-mobilitaet/aktive-mobilitaet

1.3. Historical background Elbchaussee

The Elbchaussee is the road along the Elbe River in Hamburg that stretches from Ottensen to Blankenese. The original sandy road was extended as a causeway by a road-building association at the end of the 1820s. On Sundays and public holidays, the association collected tolls from all users, except for pedestrians. For this purpose, several barriers were placed along the Elbchaussee. On April 1st, 1890, the city of Altona took over the eastern part of the Elbchaussee, and the barriers and tolls were abolished.

During the industrialization, the associated increase in automobile traffic was increasingly perceived as a nuisance and a curfew was adopted for automobile traffic around Teufelsbrück on Sundays and holidays. This curfew was extended to the entire Elbchaussee in 1911. After the war, the road was largely used and widened by British occupation forces. The curfew was abolished during this period. In the early 1950s, the Elbchaussee was transformed from a private road to a normal public road and the previous owners were compensated. Today, one can see part of this history of affluence in the Elbchaussee area in the quality of the adjacent historic villas.

1. Elbchaussee von Louis Gurlitt, um 1860

2. Elbchaussee Hamburg, August 2015

3. Landhaus Schiller an der Elbchaussee, 1843

1.4. The river Elbe

With a length of 1094.26 km, the Elbe is the twelfth longest river in Europe and stretches from the Czech Republic through eastern Germany, towards Hamburg and finally flows into the North Sea at Cuxhaven. The river is divided to the Upper Elbe, the Middle Elbe, the Lower Elbe, the Estuary and Outer Elbe. The Upper Elbe is the section of the Elbe that runs through the Czech Republic. From there, the Middle Elbe extends as a lowland river through the North German Lowlands. The Lower Elbe is the section of the Elbe influenced by the tide. This begins at the point where the river branches off into the northern and southern Elbe. Off the North Sea coast, the estuary forms the

mouth of the Elbe. The continuation of the estuary is called the Outer Elbe. This differs from the Wadden Sea in depth, current direction and velocity, and low salinity.

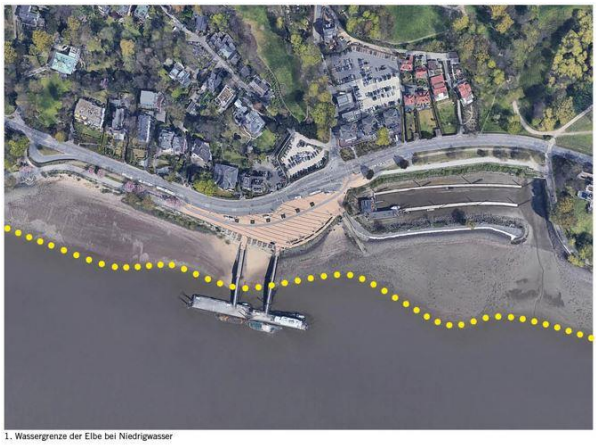
1. Verlauf der Elbe

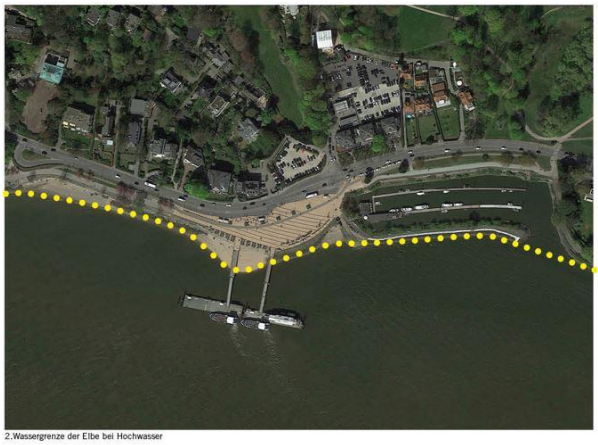

2. Wattenmeer bei Cuxhaven


3. Übergang von der Elbe zur Nordsee bei Cuxhaven

1.5. Tides of the Elbe

The Elbe is a tidal water body. This means that it is influenced by tides and the water level varies between low and high water. Within six hours, the water level rises with the tide from low water to high water. With the ebb tide, it drops back to low water level within the following six hours. The difference in water level is about 3.66 meters. Furthermore, the Elbe is considered a federal waterway, which means that in terms of waterway law, it falls under the category of a federal inland waterway and serves general traffic.

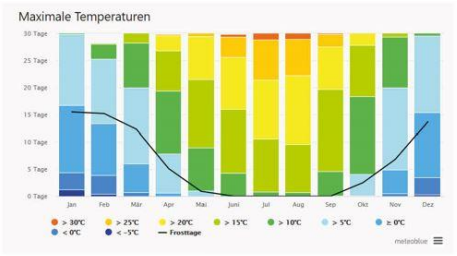

1. Wassergrenze der Elbe bei Niedrigwasser


2.Wassergrenze der Elbe bei Hochwasser

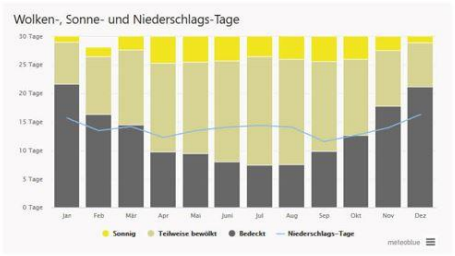
1.6. The climate in Hamburg

The climate in Hamburg is rather mild and moderate. The maximum average temperature in the summer is 25°C. The number of sunny days is between two and six days per month, with a high amount of precipitation. The annual average temperature is 8.5°C with a precipitation rate of 738 mm. February is the month with the least precipitation, with 42mm. Contrary to that, August is the wettest month of the year with 79 mm of precipitation. With an average temperature of 17.3 °C, July is the warmest month. The coldest month is January with an average of -0.2°C. According to Kößen

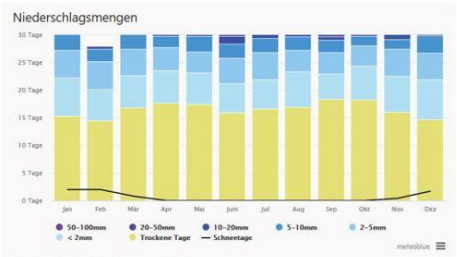
and Geiger, the climate is classified as Cfb. In the brochure is possible to see the wind rose for Hamburg that shows which wind direction and strength prevails for how many hours a year: specifically, the diagram shows that during the year, westerly winds dominate[4].



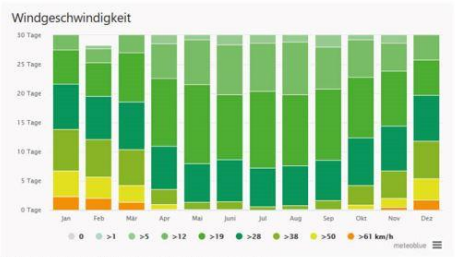
1. Hamburg Maximale Temperaturen über das Jahr



2. Hamburg Wolken-, Sonne- und Niederschlags-Tage über das Jahr



3. Hamburg Niederschlagsmengen über das Jahr



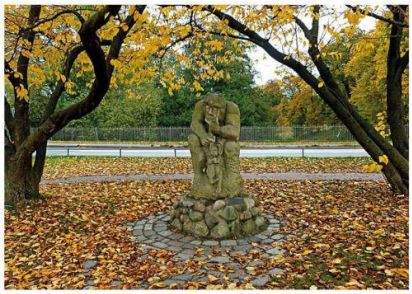
4. Hamburg Durchschnittliche Windgeschwindigkeit über das Jahr

1.7. Seasonality

Due to its proximity to the Elbe River and Jenischpark, Teufelsbrück is an attractive destination. In the spring and summer months, it is especially popular with families and cyclists. But also, in the cold season Teufelsbrück is easily a place with a high quality of stay. The ferry terminal forms the junction between Hamburg and Blankenese and can be reached by the harbour ferry via Finkenwerder, the HVV (Hamburger Verkehrsbund) buses or via the Elbe hiking trail by bike or on foot. Various restaurants invite everyone to stay and enjoy the Platz and the view during a tour along the Elbe.


1. Teufelsstatue unter blühenden Bäumen im Frühling

2. Fähre bei Teufelsbrück im Sommer


3. Teufelsstatue unter Laubdach im Herbst


4. Vogelperspektive auf den Teufelsbrücker Platz im Winter

[4] https://de.climate-data.org/europa/deutschland/hamburg/hamburg-69/

1.8. Banks of the Elbe

The flat bank facing the Elbe forms a gentle transition between the built-up area and the river. Sand, stone, and vegetation form a natural bank. The pillared willows typical of the area can also be found here. Shallow sandbanks invite one to linger. The site, which is only slightly elevated, is regularly subject to flooding during storm surges. Flood protection facilities and gates are in place towards the land.


2. Natürliches, flaches Ufer zur Elbe


3. Blick vom Teufelsbrückerplatz auf den Steg


4. Sandbank am Teufelsbrücker Platz


5. Blick vom Steg auf den Teufelsbrücker Platz

1.9. Viewpoints

The site of the aircraft manufacturer Airbus[5] is located on the opposite side of the Elbe. Teufelsbrück is particularly popular with plane spotters, as it lies directly below the aircraft's approach path[6].


2. Fähranlegestelle Teufelsbrück


3. Flugzeug im Landeanflug über Teufelsbrück


4. Wartehäuschen am Fähranlegeplatz Teufelsbrück


5. Blick auf das Airbusgelände mit Landebahn

Around 4,500 Airbus employees use the ferry connection from Teufelsbrück to the Airbus plant in Finkenwerder every day. Due to the limited capacity of the bicycle parking spaces at the Teufelsbrück pier, the number of bicycles transported on Line 68 is up to 600 per day for seasonal reasons. This presents HADAG[7] (HADAG Seetouristik und Fährdienst AG, literally "HADAG Sea-tourism and Ferry service" is a local public transport company in Hamburg, Germany) with a major challenge and means that the limit for bicycle transport is often reached, especially in the summer months.

[5] https://www.airbus.com/careers/apprentices-and-pupils/in-deutschland/in-deutschland-training-standorte/standort-hamburg.html
[6] www.ganz-hamburg.de/stadtleben/hier-ist-der-deubel-zu-haus-der-anleger-teufelsbrueck
[7] https://hadag.de/de/

1.10. Traffic


2. Elbchaussee Teufelsbrück


3. Platz Teufelsbrück


4. Bushaltestelle Teufelsbrück


5. Elbchaussee Teufelsbrück

The Teufelsbrücker Platz, which was re-designed in 2008, is centrally located on the well-known Elbchaussee. This forms the connection from Ottensen to Blankenese Directly at the square is the bus stop, where the bus lines X21 and 392 run. There is also a cab stand and a StadtRAD station. The Elbe River Bicycle and Hiking Trail runs across the square, highlighted by different color on the paving surface.

1.11. Teufelsbrücker Platz

The shoreline of the plaza is defined by long, continuing, rounded wooden benches. Between the benches are shady Swedish whitebeam trees (*Sorbus intermedia*) are placed, while on the western side of the square, 59 bicycle leaning bars are installed along the river. The biking parking bows are aligned parallel to the riverbank and as a result form a boundary of the plaza towards the water on the western side. On the northern edge of the plaza, and extended area for a series of bus stops is located, along the road. Separating the road, and bus stop waiting zone a row of trees consisting of oaks is placed. These trees are planted in square planting beds with underplanting. On the north area of this tree alley, the bike path is located. Lastly, the limited number of bicycle parking spaces leads to so-called "wild parking", as shown in the brochure respectively, and most unfortunately, scooters and bicycles are parked in areas not designated for this purpose.


2. Lange Holzbank am Elbufer


3. „Wild parkende" Roller vor Sorbus intermedia


4. Bushaltestelle mit Eichen


5. Fahrradanlehnbügel entlang des Elbufers

1.12. Vegetation and furnishing elements

The urban equipment on the plaza consists of the following urban furniture elements: firstly, the long wooden bench that is located along the bank of the Elbe is the most eye-catching element of the plaza that forms a visual spatial edge towards the river. This bench invites people to linger and provides an excellent place to sit and enjoy the view of the Elbe. Secondly, an information board which provides information about the urban cultural landscape of the high Elbe bank in the Teufelsbrück area, is located near the bus stop waiting zone in the north of the plaza. Lastly, a clock element is placed at the bus stop waiting zone, in a location that renders it an orientation element as it shows the time to public transport users and passers-by.

On the topic of the existing vegetation on the plaza, we have the following species: local oak trees stretch along the northern edge of the plaza, planted in square planting beds. They are accompanied by a perennial mix of blue catmint (*Nepeta fassenii*) and the ground cover rose Sorrento (*Rosa sorrento*). In the southern edge of the plaza, we have Swedish whitebeam trees (*Sorbus intermedia*), in the area between the benches.

1.13. Case study: Fietsflat Amsterdam

After an extensive case study research on bike parking buildings in the city, and especially on a river pontoon, we investigated whether there are comparable practical examples of bicycle parking buildings on the water that function well in terms of their functionality and integration into the environment. Many case studies have been brought in the foreground but only one case study fits the nature of this project and is presented here: a bicycle parking garage on the water in Amsterdam has been identified. This case study shows that a bicycle parking facility on the water is possible, implementable, already constructed, well-functioning, and it represents a space-saving alternative for a bicycle parking garage on land.

The 100-meter-long, 14-meter-wide, and three-story-high bicycle parking garage was designed in April 2001 as a temporary bicycle parking facility but is still in operation today.

The goal of the architects was to include as many parking spaces as possible in the most space-saving way possible. The structure had to be designed in such a way that the previously redesigned quay would not be damaged, and the boats could still turn on the adjacent canal. As a special feature of the construction is on the one hand the constructive anti-theft protection, which is created by an inclination of the floor, and on the other hand the height of the floors which makes cycling possible on all floors.

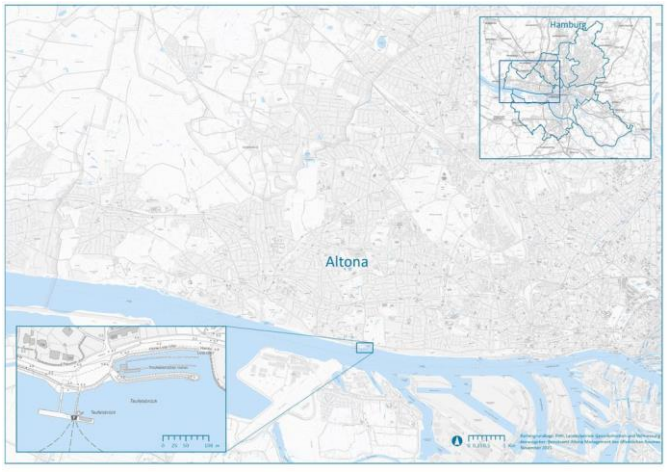
2. Analysis

2.1. Location

Teufelsbrück's Platz is located south of Jenischpark on the Elbchaussee in Flottbek, Hamburg. Its geographic location renders it a transit node to connect bus and ferry, but also as a stopping point along a pedestrian and bicycle pathway at the edges of the Elbe, strengthened further by the adjacency to the bike and pedestrian paths of Jenisch Park. The bicycle path is strongly represented on the paving of the plaza with a separate lane and material. Furthermore, along the Elbchaussee Street the bus stops are located. The raised plating beds on their southern side of the bus stop waiting area form a visual boundary between the square and the bus stops.

1. Lage in Deutschland

The plaza extends to the Elbe and touches the river at the base of the slope. On the upper level on the plaza, at the river's edge, we have a bicycle parking spaces in between and on the western side of the bridges two bridges that lead to the existing Pontoon that is owned and operated by the HPA (Hamburg Port Authority). The bicycle racks are arranged parallel to the riverbank, forming an edge to the Elbe. This area is free of paving and covered by a water-bound path surface. On the eastern side of the bridge, long curved wooden benches are aligned in an arc shape that defines the bank edge. Here one has an excellent view of the ferry dock and the southern bank of the Elbe, while seating in between Swedish whitebeam trees that can provide limited shading.



2. Lage des Teufelsbrücker Platzes innerhalb Hamburgs

Finally, the embankment to the bank of the Elbe is formed with natural elements and material, forming small bays with bathing beaches at low tide, planted with willows native to the area.

2.2. Land use plan

A special feature of Teufelsbrücker Platz is that it is part of two municipalities. It belongs to both the Nienstedten[8] and Othmarschen[9] districts and, hence, based on two different development plans, which determine the urban use of the square. Design-relevant specifications for the square area are not defined in either of the two development plans and thus, they both play only a subordinate role for a possible redesign of the square.

1. B-Pläne der Gemarkungen Nienstedten und Othmarschen

2.3. Landscape protection

Teufelsbrücker Platz is also located in a landscape conservation area. From the 'Altona Balcony' (Altonaer Balkon) to the state border in Rissen, the entire Elbe slope on the north bank of the Elbe is part of this landscape conservation area[10]. Part of the protected area is also the Jenischpark with the valley of the Flottbek, which is the only remaining tidal floodplain in Hamburg and thus it constitutes a valuable habitat that needs to be preserved[11]. Around 20% of the state area in Hamburg is currently designated as landscape conservation areas.

1. Landschaftsschutzgebiete


2. Blick durch den Jenischpark


3. Elbufer mit Kopfweiden


4. Feuchtwiesen im Jenischpark

[8] www.daten-hamburg.de/infrastruktur_bauen_wohnen/bebauungsplaene/pdfs/bplan/Nienstedten10.pdf
[9] www.daten-hamburg.de/infrastruktur_bauen_wohnen/bebauungsplaene/pdfs/bplan/Othmarschen1.pdf
[10] https://geoportal-hamburg.de/geo-online/#
[11] https://www.juris.de/bsha/document/jlr-AltonaLSchTSchVHApP2

2.4. Green Connectivity

Teufelsbrücker Platz is adjacent to the junction between Westerpark, Wesselhöfpark and Jenischpark and is therefore considered the starting point of Altona's "green lung". Interestingly, the natural design of the Elbe bank along the plaza visually blends into the surroundings.

The Elbe and its floodplains are habitat for a rich animal and plant world, the existence of which largely depends on the intactness of the landscape structure as well as the water balance and the uses of the river ecosystems. As a resting, migrating, and wintering area, the Elbe, its tributaries, and their floodplains are of great importance for many bird species. Wet meadows and floodplains, such as those found in the vicinity of Teufelsbrücker Platz, are popular breeding grounds.

Moreover, Teufelsbrücker Platz is in the tide-influenced zone of the lower reaches of the Elbe. Here, the oxygen content in the water is lower and thus the nutrient content is higher. The water temperature also increases with proximity to the river mouth; all these factors are typical for ecosystem edges, and in this case form the basis for creating habitat areas of a great variety of species.

1. Grünverbindungen

2. Ost-Zugang zum Teufelsbrücker Platz

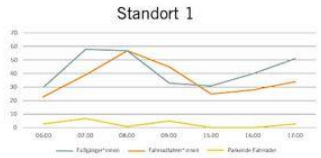
3. Hafenweg

4. Elbufer

2.5. Pedestrian and cyclist utilization

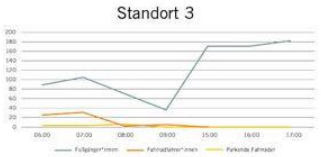
To be able to specify the mobility and traffic-related requirements for the design of Teufelsbrücker Platz more precisely, two studies to calculate of the users of the square were carried out. From a count conducted by the Altona District Office on May 5, 2021, time intervals were used to determine how many pedestrians, cyclists, and parked bicycles were at the three marked locations.

The study took place during COVID 19 Pandemic (the third wave in Germany), so the numbers may differ from normal conditions. Specifically, about the study: at the location 1, the curves of bicyclists and pedestrians are very similar, and the activity of these two user groups is very high. The number of parked bicycles, on the other hand, is very low. At the location 2, more bicyclists use the site in the earlier morning hours, but from 9 am onwards, the curve of pedestrians increases significantly. The number of parked bicycles is also low here. User activity at site 3 is very different from the first two sites. At the location 3, pedestrian use predominates, while bicyclist activity or parked bicycles is very low. To sum up, the bicyclist activity predominates at this location, but the location is also used by many pedestrians, while parked bicycles are scarce. This study does not represent the weekly situation on the plaza in the before-COVID 19 work-life.

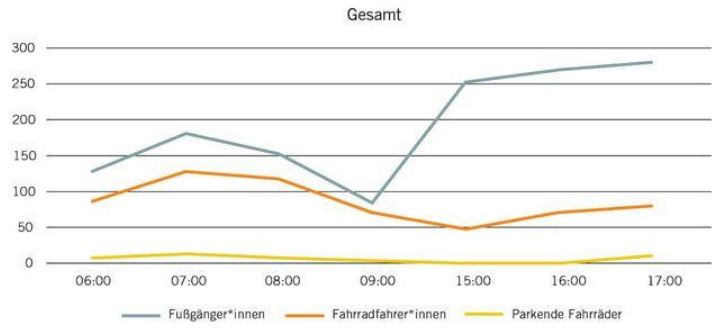


1. Auswertung des Fuß- und Radverkehrs an Standort 1

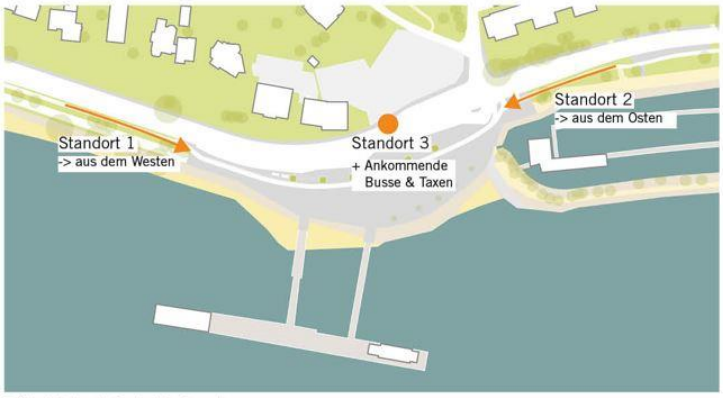
2. Auswertung des Fuß- und Radverkehrs an Standort 2



3. Auswertung des Fuß- und Radverkehrs an Standort 3



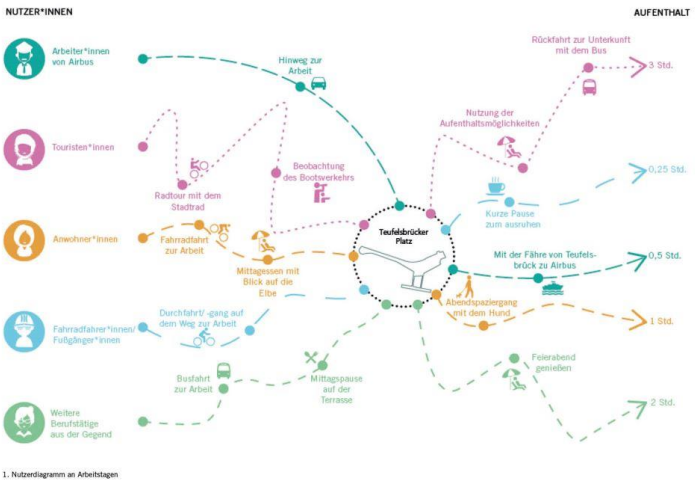
4. Auswertung des Fuß- und Radverkehrs am gesamten Standort Teufelsbrücker Platz



5. Übersichtsplan der Standorte der Auswertungen

2.6. Work Activities

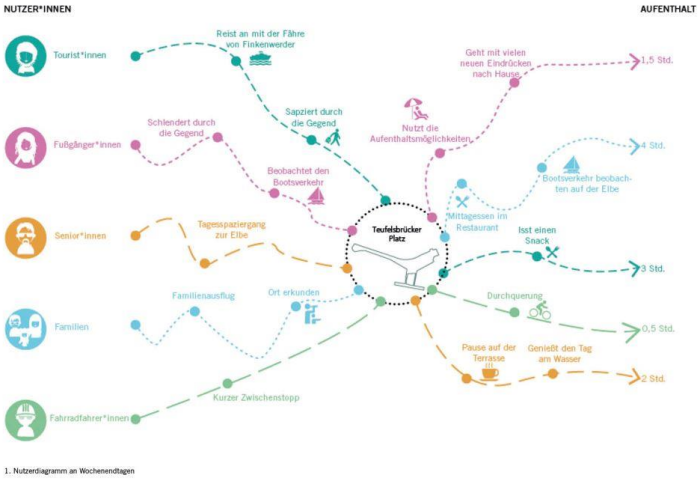
Different user groups are using the Teufelsbrücker Platz during a workday. According to the study, individual user groups and the total number of users at different times of day on site, was not carried out. (The following descriptions are based on assumptions made after several site visits and on-site observations.) For illustration purposes, the five most important user groups are shown as examples. On workdays, especially in the morning and afternoon/evening hours, Airbus workers dominate the pedestrian and bicycle traffic on the square and the pontoons. This leads to conflicts of use with the other user groups, especially with pedestrians, since the cyclists cross the square and usually do not dismount. The proportion of other users who cycle directly to the square, stop here, and park their bicycles (recreational athletes, tourists, other professionals, etc.) is significantly lower compared to the number of Airbus workers. On workdays, the square is also used as a place for recreational activities, especially when the weather is good. Conflicts of use occur mainly in the afternoon and early evening, when the square is used not only by visitors but also by Airbus workers, and cyclists increasingly cross the square and use the bridges to the pontoons despite the bollards.



1. Nutzerdiagramm an Arbeitstagen

2.7. Weekend Activities

The activities and uses on the Teufelsbrücker Platz on weekends somewhat differ from the use on weekdays. One important difference is that the user group of tourists and leisure-seeking Hamburg residents of all generations make up most users on weekends. They come to Teufelsbrück by ferry, bicycle, car or on foot, for example to enjoy the view from one of the restaurants, to spend time directly on the square or to use the ferry for the onward journey to Finkenwerder. The diagram in the report exemplifies the variety of different uses of the square, which are relevant for the functionality and design.



1. Nutzerdiagramm an Wochenendtagen

2.8. Visual connectivity

Due to its location, Teufelsbrücker Platz is a popular place for excursions since it offers a good overview of the Elbe and the southern bank of the Elbe. From there one can look out to continuous passing ships and freighters. Moreover, the benches along the Elbe riverbank bicycle and hiking trail offer occasional resting opportunities. At the Airbus factory airport opposite, not only the distinctive BelugaXL freighters take off, but new Airbus planes also take off here. This is a specific attraction for airplane-photography hobbyists, and it is an excellent and a rare location to take photos of such planes. Moreover, the long, curved wooden benches along the banks of the Elbe invite visitors to linger, stay longer in the plaza and imbed themselves in time. Other special elements include the outdoor terraces of the restaurants "Engel" and "Dübelsbrücker Kajüt" that also offer a sweeping view of the surrounding area. In the evening, one can enjoy the sunset from the Teufelsbrücker Platz, which bathes the place in an orange light, and again this is one of the few areas that one can have a good view of the sunset in Hamburg, because of the geographical orientation of the city and the river.

1. Sichtbeziehungen


2. Ausblick auf das Airbus-Gelände


3. Aussichtspunkt


4. Ausblick auf Fähranleger und Riiano Hotel

2.9. Circulation Network – Bicycles

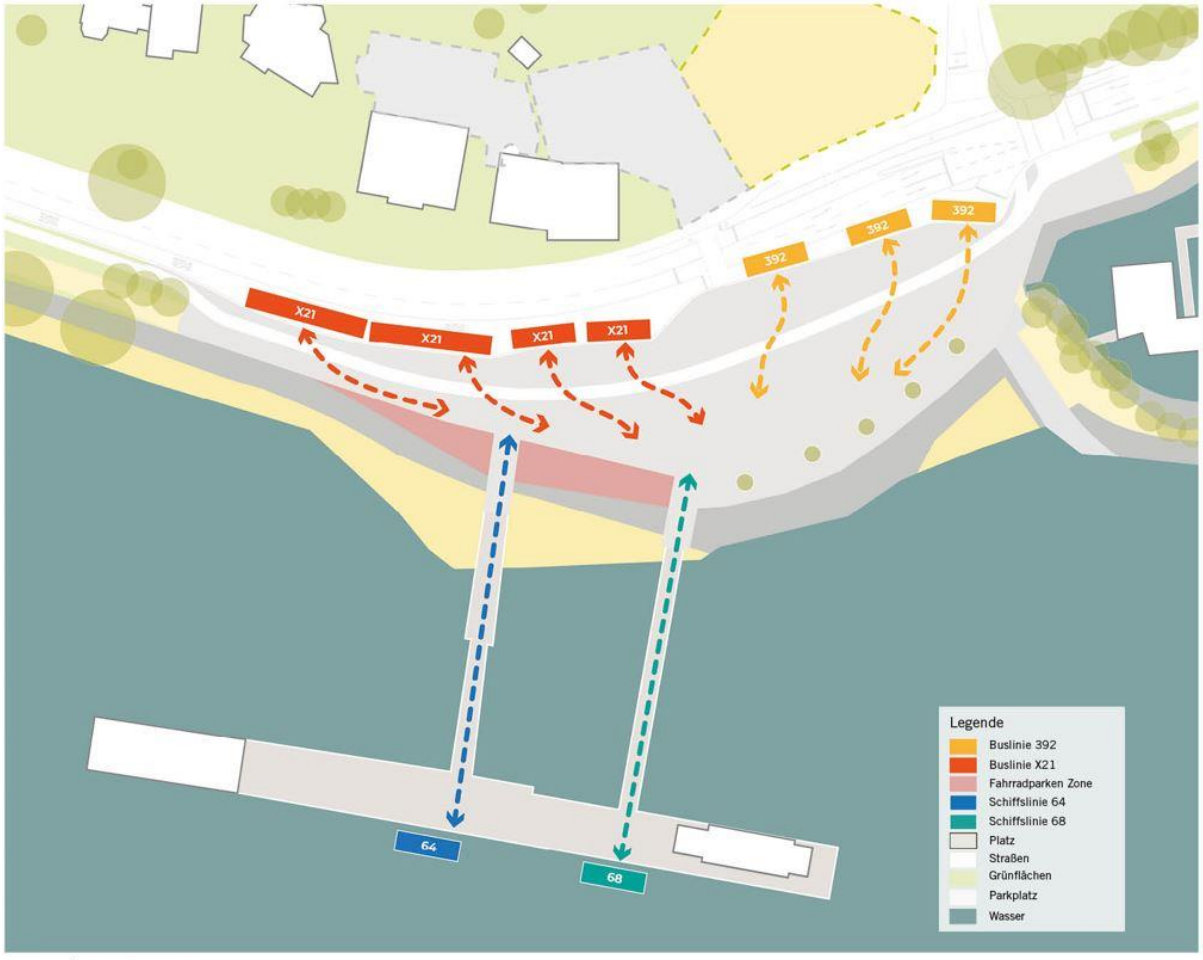
From Teufelsbrück, around 4,500 employees of the Airbus plant use the ferry to the plant site on the opposite bank of the Elbe on weekdays (as of 2019). The number of bicycle parking spaces is limited to around 150, as a result the so-called "wild parking" in areas not designated for this purpose. While there is a strict ban on parking bicycles on the ferry landing platform, and signs draw attention to a chargeable removal of illegally parked bikes, people use random areas of the plaza and the area between linear benches to park their bikes, but also even vespas.

During weekends, Teufelsbrücker Platz is a transit area for day-trip visitors. The connection to the public transport network makes it easy to reach, and the number of bicycle parking spaces currently available is sufficient for the weekend period. An increase in bicycle traffic is to be expected during the mobility transition, appropriate solutions are required regarding the topic of "active mobility" (walking, cycling, public transport use) for weekdays especially and commuting employees for the adjacent industries.

2.10. Circulation Network – Local public transport

On weekdays, in addition to the intensive use of bicycles described above, the area is also characterized by intensive use of local public transport (bus use). Especially during rush hours, it is important to guide commuters to the ferries in time and in short intervals. At weekends, public transport is consequently used significantly less.

The Teufelsbrücker Platz serves as a continuous connection to the city, especially for cyclists, and is considered one of the most popular long-distance bike paths in Germany. In addition, the combination of bus (and/or bicycle) and ferry guarantees a varied and attractive possibility of leisure traffic in the direction of Finkenwerder or Altes Land. The bus lines 392 (U S Ohlsdorf/Teufelsbrücker Platz) and X21 (S Klein Flottbek/ Teufelsbrück) take visitors to Teufelsbrücker Platz. By ferry, one can reach Teufelsbrück via line 64 across Rüschpark from Finkenwerder. Line 68 runs between the Teufelsbrück ferry pier and Airbus (ship's pier). It forms an essential connection for Airbus employees from the northern bank of the Elbe to the company premises.



1. Verkehr - Öffentlicher Nahverkehr

2.11. Comparative study of bus and ferry schedules

During peak times in workdays, Teufelsbrücker Platz is a place of a high frequency of commuters as a transit area.

Employees of Airbus and other companies pass the place on their way to work; they typically arrive by bus or ferry and must change at Teufelsbrücker Platz for the ferry on line 68. In the morning this can require a waiting time of up to 10 minutes. In the evenings, waiting times are only 5-7 minutes, although the ferry service from the Airbus site to Teufelsbrück is limited to a frequency of 35 minutes from 6:45 p.m. onwards.

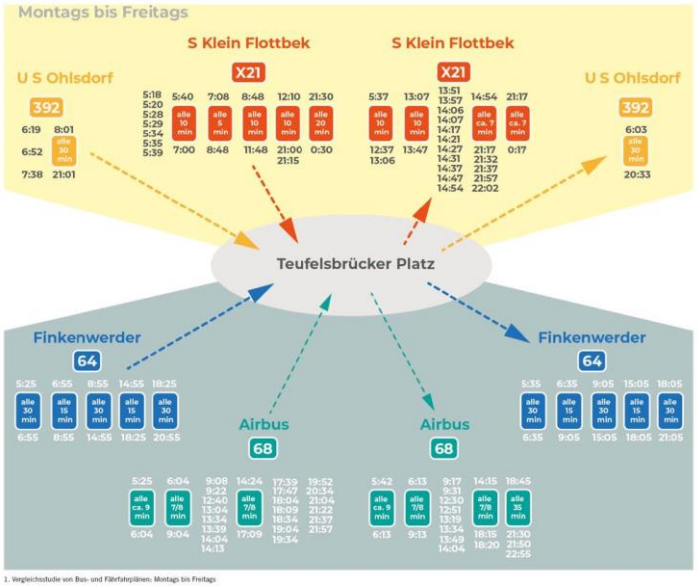
The Bus line 392 comes relatively infrequently with a frequency of 30 min. in both directions. The Line X21 comes at peak times between 7:00 am and 9:00 am, and between 3:00 pm and 9:00 pm at 5–10-minute intervals. Also, the ferry of line 64 comes at peak times every 15 min. instead of every 30 min.

On Saturdays, public transport is significantly reduced and focuses mainly on transporting tourists and residents.

The service of line 68 to the Airbus company premises is out of service on Saturdays as well as on Sundays and public holidays.

When changing public transport means, from the bus to the ferry and vice versa, waiting times of up to 25 minutes may occur. The Bus line 392 runs every 30 minutes in both directions. Ferry line 64 also arrives at the ferry terminal every 30 minutes. The Line X21 runs every 30 minutes from 9:30 am, every 10 minutes during the day until 6:40 pm, every 15 minutes between 7:02 pm and 9:02 pm, and every 20 minutes between 9:22 pm and 11:52 pm. Between midnight and 5:30 a.m., service on both bus lines is suspended. An exception is line X21, which offers trips in the direction of Teufelsbrücker Platz at 0:10 and 0:30 and in the direction of Flottbek at 0:12. Also on Sundays and holidays, the operation of the ferry line 68 is suspended.

Finally, when changing bus lines 392 and X21, there may be waiting times of up to 20 minutes at Teufelsbrücker Platz. Ferry line 64 and bus line 392 also run every 30 minutes on Sundays. Bus line X21 runs every 30 minutes in both directions between 6:00 am and 10:00 am and every 10 minutes until 7:00 pm. In the evenings until 21:00, line X21 runs every 15 minutes and until 24:00 every 20 minutes. The line does not operate between 24:00 and 6:00. Trips at 0:10 and 0:30 in the direction of Teufelsbrücker Platz and at 0:12 and 5:28 in the direction of Flottbek are the exception.



2.12. Traffic – Public Transport

After analysing the frequency of buses and ferries on weekdays compared to weekends, the spatial needs for the different activities become apparent of the square and its role in the urban space become clearer. In the diagram, on the designated page of the report, the spatial location, in relation to the schedule of public transport, is shown[12], how small this space is in relation to the number of users and the frequency of their movements, and how this space primarily functions as a very active transportation hub[13].

2.13. Circulation Network – Cars

During the week, Teufelsbrücker Platz is a transit point for numerous employees of various companies who commute here to work across the Elbe. Two parking lots on the northern side of the Elbchaussee offer parking spaces for cars. However, the number of parking spaces is limited. The Elbchaussee Street, which has a single lane in both directions, has been widened by a bus lane in the Teufelsbrücker Platz bus stop (ferry). This is intended to prevent traffic congestion, especially at peak times. Finally, a gas station is located on Baron-Voght-Strasse, which branches off to the north from Elbchaussee Street.

1. Sichtbeziehungen


2. Bushaltestelle an der Elbchaussee

3. Blick auf den Parkplatz


4. Blick in die Baron-Voght-Straße mit Tankstelle

[12] https://hadag.de/de/linien/64/#timetable
[13] https://www.nimmbus.de/fahrplanbuch/plaene/392H-1.htm

2.14. Activities on the Teufelsbrücker Platz

The open space design of Teufelsbrücker Platz makes it a popular place to spend time, because of the variety of activities it provides with its design that is open and connected to the different circulation systems and the landscape system of the river Elbe as a demonstrated in the previous pages of the report. Main activities on the plaza are the following: the Elbe River bike and hiking path that runs across the square is especially popular with day trippers in the summer months; the square is also the starting point for ferry trips or walks along the Elbe and through the adjacent Jenischpark; and finally, visitors can stop at the restaurants (Restaurant Engel and Teufelbrücker Kajüt) and enjoy the sun on the outdoor terraces in summer.

Between the bridges is a small sandy beach where that city dwellers or visitors can refresh themselves in the shallow waters of the Elbe (it should be noted that the Elbe is not an official bathing water, because sometimes dangerous currents can form). Lastly, along the banks of the Elbe there are many opportunities to get a view of the Elbe and the southern bank of the Elbe. Here the visitors can observe the shipping traffic and get the opportunity to spot the airplanes from close distance.

1. Sichtbeziehungen

2. Radfahrrende auf dem Teufelsbrücker Platz

3. „Blick auf die Terrasse der „Dübelsbrücker Kajüt"

4. Badestrand

2.15. Lighting plan analysis

The existing lighting on the plaza partly covers the needs of circulation safety on the plaza and is primarily focused on the need for lighting for the car circulation zone. A separate study within the Interreg project LUCIA has been developed for the city of Hamburg, in terms of this Interreg Baltic Sea Region project. [14]

1. Beleuchtung


2. Mittelhohe Mastleuchten zum „Dübelbrücker Kajüt"


3. Mastleuchten entlang der Brücke


4. Pollerleuchten neben Stufen

Along the street, on the side of Teufelsbrücker Platz, there are pole lights about 6m high that illuminate the street space at night and ensure traffic safety. With the redesign of the edge the Elbchaussee Street that is currently under development, some conflicts come up regarding the arrangement of the lights. In the area of the bus stop, mast luminaires are installed on both sides of the street. This provides a sense of security for users of public transport.

In the western area of Teufelsbrücker Platz, the height difference to the bus stop is overcome by two steps. Bollard lights have been installed to the right and left of the steps to ensure that they can also be used in the dark. These serve as orientation and are intended to minimize the risk of tripping. In the eastern area of the square there is a row of approx. 2.5m high pole lights. These form an entrance situation for visitors at night and light the way to the restaurant "Dübelsbrücker Kajüt" east of the square. Moreover, a row of approx. 5m high mast lights along the bridges to the ferry landing stage also serve as orientation and are also intended to prevent the risk of accidents in the dark, functioned and planned by HPA. Finally, the benches along the banks of the Elbe are underlit and thus form a striking eye-catcher in the dark; these fall under the category of effect lighting fixtures.

[14] www.lucia-project.eu The district of Altona accomplished the LUCIA Interreg project from 2019-2021

2.16. Vegetation

The plaza in a context that is a generally very vegetated and green environment, because of the proximity to Jenischpark and Wesselhöftpark, the landscape is characterized by green structures.

On Teufelsbrücker Platz, along the street are six oak trees with underplanting, which form a visual edge towards the street. Between the benches along the waterfront, a row of Swedish whitebeam trees (*Sorbus intermedia*) that partly provide shade. The bank facing the Elbe is designed in a natural way and partially vegetated with the pollarded willows. The embankment at the harbor is also very well vegetated with species that can tolerate temporary flooding are found here in particular. Finally, zooming out at the larger area of plaza connected to the Elbe riverbank bicycle and hiking path in the west, an alley of ornamental cherry trees brings a different more park-like character of the area.

1. Vegetation

2. Reihe aus Sorbus intermedia entlang des Elbufers

3. Quercus robur mit Unterpflanzung entlang der Elbchaussee

4. Uferbepflanzung am Hafen

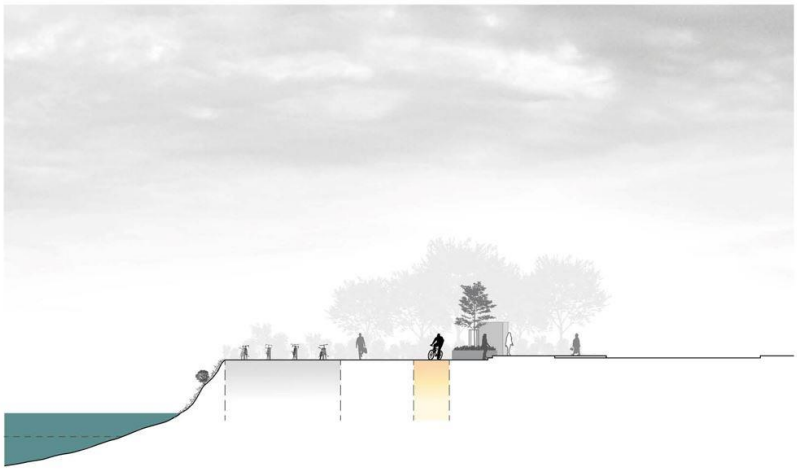
2.17. Section A-A´

This illustration shows a section through Teufelsbrücker Platz with the adjacent street and access to the ferry landing platform. The space of the plaza is demonstrated here, and area available between the plaza and the ferry platform. Moreover, the bicycle and pedestrian path that runs across the square is shown, and the bus waiting zone and the bus stop locations on the street. A loose row of trees with underplanting accompanies the street forming a visual boundary is demonstrated here, and at the same time functions as a separation between the waiting area of the bus stops and the recreational area of the Teufelsbrücker Platz.

2. Schnitt AA´

2.18. Section B-B´

This illustration shows a section through the eastern area of Teufelsbrücker Platz shows a height difference in the area where the buses stop. The level different of 30cm is split in two steps and can also be managed barrier-free from the side. It can also be seen that the embankment in this area is much steeper.



2. Schnitt BB'

2.19. Teufelsbrücker Platz Design Challenges

The analysis of all the different systems that play are a role in the uses, character, constraints and needs of the plaza aims to the identification of the main design challenges of the project, that are presented here as follows.

1. The area of Teufelsbrücker Platz is a heavily used open space where contradictory uses intertwine in a small space. The new redesign of the plaza edge towards the street, the waiting area of the bus stops is extended to compensate for the massive flows of commuters at rush hour and to offer them space for this use. However, the conflict with the crossing pedestrian traffic through the bike path remains unchanged and cannot be resolved on the plaza area itself, as the bike way cannot be moved in the street area, because of space constraints but also the functionality of the bus stops. The consideration for relocating the bike lane to the street space can be brought again in the foreground to discuss with the city. The location of the bike path can be optimized to better incorporate the edge of the square in the north into the use of the square and thus increase the quality of place-making and experience of the plaza.

2. Furthermore, the need to minimize the risk of slipping on the existing pavement is an essential topic to be considered for the redesign of the plaza. The paving could be easily replaced with a new pavement be installed that has an R-value of 11 according to DIN 51130 (this value corresponds to the specifications for fountains and water features, an area comparably influenced by water).

3. The existing trees on the bus stop area show recognizable dead spots and a clearly inhibited growth; causes may vary and would need to be specified as part of a tree survey and soil investigation. Replanting of site appropriate trees is recommended.

4. Finally, the lack of sufficient bicycle parking on the east side of the square remains a problematic issue, especially for commuters. Accordingly, it is important to provide sufficient parking spaces and thus prevent "wild parking". This will be the main part of this feasibility study investigation in the concept phase.

1. Defizite

2. „Wildes Parken" hinter den Holzbänken

3. Begrenzter Wartebereich an der Bushaltestelle

4. Begrenzte Fahrradstellplätze

2.20. Teufelsbrücker Platz Design Opportunities

The final step of the analysis is the definition of the design opportunities that will be the base for the development of the concept starting from the next chapter. With the intention to meet the mobility and traffic-related requirements for the design of Teufelsbrücker Platz, various measures are necessary, which integrate synergistically and be supplemented by further measures to improve the quality of stay and placemaking on the plaza.

1. The potential of relocating the bicycle lane into the road space needs to be examined by traffic engineers, because if applicable it can free the plaza from the bike use and the conflict of bus commuters versus bike commuters. If not possible to relocate we consider essential recommendation to ensure that the intersection area is very visible and avoid taller plantings or other visibility barriers.

2. Since the plaza is so heavily used as a transit node for commuting and a bike parking area, we recognize that it is highly essential to build a bicycle parking garage on the waterfront. Alternative scenarios have already been investigated on the plaza or adjacent areas, but due to the number of bicycle parking spaces to be provided, locating them on the plaza is considered unrealistic. Consequently, we currently we see the potential of a bike parking building on a pontoon in the water. The capacity of this building and the location is to be investigated further in this study.

3. Widening the bridge to the pontoon, if possible (to be discussed with HPA that has ownership of the bridges and the way they function). Consideration of separation of bicycle and pedestrian access will be presented later in the report.

4. A new paving material on the plaza can bring the potential of less slippery and safer surfaces.

5. New planting could be placed as the northern edge of the plaza to strengthen the plaza character. Renewal of the planting with site-appropriate trees based on the recommendations of a soil and tree survey for the site.

6. Finally, we recognize a great potential in improving the quality of stay of the plaza including the change in the northern edge of the plaza, rethinking the size of the essential bike areas on the plaza, and strengthening the diversity of uses with additional seating and recreational facilities in the riverbank area.

1. Potentiale


2. Badestrand zwischen den Brücken

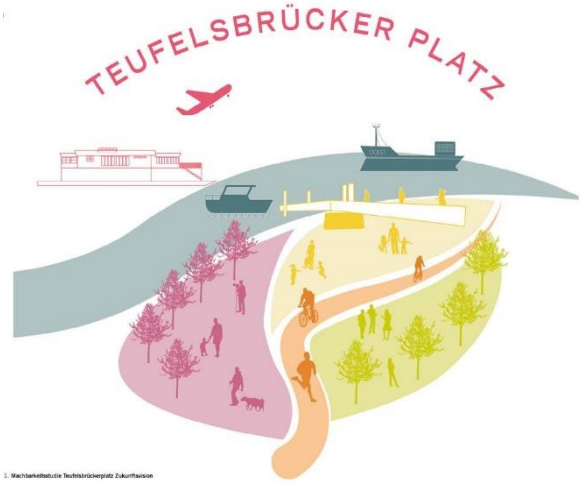
3. Gastronomie „Engel“ auf dem Fähranleger


4. Blick in den Hafen

3. Concept

3.1. Feasibility study Teufelsbrücker Platz - Future Vision

Teufelsbrücker Platz is an outlook plaza that functions as a balcony over the Elbe River with an excellent view over the river and the harbor. Despite the size of the square, the intensity of uses and the number of daily visitors is very high. Competing uses and schedules, as well as different speeds and directions of public transport, lead to conflicts of use, especially at peak time during the workdays. Movement on the square from the bus stop to the ferry platform through the bike path, creating a barrier for commuters at this point. The need for bicycle parking encroaches on the limited space of the square and conflicts with the open space and social uses of the square. Repeated observations of users of the plaza during site visits conducted as part of the study suggest that in addition to its function as an important transit hub, the plaza is also readily used as a place for people to spend time across generations. It can be assumed that the location on the water with its viewing opportunities in connection with the ferry dock, the direct connection to the Elbe hiking trail and the adjacent, attractive green spaces contribute significantly to the popularity of the place.



3.2. Open Space Goals

This feasibility study for Teufelsbrücker Platz addresses four open space goals for the redesign of the plaza area. These goals reflect a focus on addressing the specific deficiencies identified in the analysis, but also highlight opportunities already identified in the opportunities diagram. The goals are as follows:

- **Active social life in the plaza**: The square is understood as an open free space with a variety of different social activities. Locals and tourists come here to visit the square or on transit to other places.

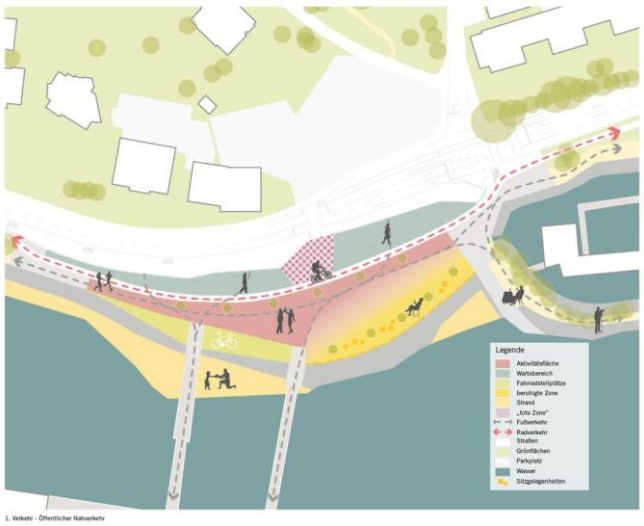
- **Traffic and Transit Node**: The square functions as a very important transit hub for various modes of public transportation and is connected to a heavily used bike lane. Organizing the square to meet the needs of all the different modes of transportation is essential.

- **A Balcony to the Elbe**: The square plays a special role primarily as a vantage point over the Elbe River and the harbour. This feature of the square gives it a special character and makes it a translocal destination with its own identity.

- **Smart design**: The functional, intelligent, sustainable, and economically efficient approach in the selection of the materiality of the square elements, but also the structure of the space.

3.3. Goal 1 Active social life on the square

The Teufelsbrücker Platz can be divided into different sub-areas in terms of its possible uses. The area of the bus stops along the street serve as a waiting and entrance area. Visitors to the square usually stay here for a short time. In the middle of the two bus stops, there is a "dead zone" that is hardly used or not used at all, since the flow of movement is limited to the routes from the bus to the ferry or in an east-west direction across the square. The main activity zone is in the middle of the square, forming the transition between the entrance area, the cycle path, and the calm plaza area, and it merges seamlessly with the recreation area. Individual seating groups in the quiet area provide a view of the Elbe River as well as of what is happening on the square. The small beach sections along the banks of the Elbe are particularly popular with families, and here visitors can stop for a bite to eat on the terraces of the restaurants.

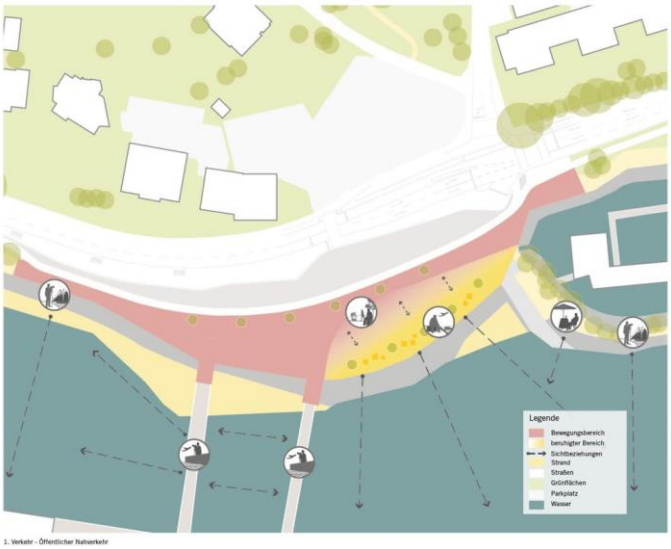


3.4. Goal 2: Traffic and transit node

The Teufelbrücker Platz mainly functions as a transit space for commuting workers from opposite industries and Airbus. This creates flows of movement from the bus stations to the ferry pier and back. In addition, there are pedestrian movements leading to the ferry pier from both the west and the east. This creates wedge-shaped flows of movement that lead towards the centre of the square and the ferry. The cycle path forms the west-east connection across the square. The area of the bicycle parking spaces and the calm area along the bank form the edges of the flow of people. A second variant could be considered, in direct relation to the bike parking pontoon of 600 additional bicycle parking spaces, is that the plaza area could be extended to include the central zone of the plaza at the water edge, between the two bridges. In this option, the calm plaza area could be extended and adding additional seating and green elements to strengthen the view corridor to the Elbe could be possible.

3.5. Goal 3: A Balcony to the Elbe

The zoning of Teufelsbrücker Platz also creates different areas with different views. On the eastern side of the square, along the banks of the Elbe, there is a calm area with a variety of seating options. Here, visitors can look out to the shipping traffic and airplanes. From there, there is a good view of the busy area in the middle of the square and vice versa. The transition between the two areas is fluid: to the east and west of the square are promenades along the Elbe, from where one can also look out over the Elbe. The bridges to the ferry pier form a special vantage point. Here, one, not only has a view of the Elbe and the southern bank of the Elbe, but also of Teufelsbrücker Platz, while there is also the visual relationship between the two bridges that makes visiting this area and looking around very interesting



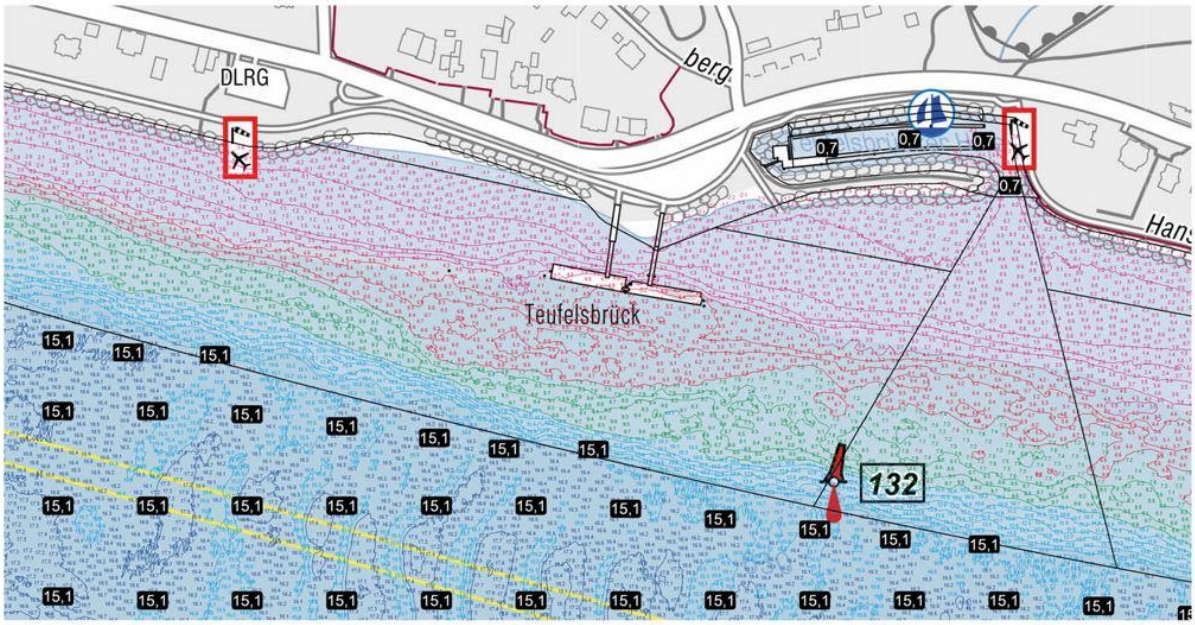
3.6. Goal 4: Smart Design

When designing Teufelsbrücker Platz, the focus is primarily on intelligent and sustainable design, if possible, with local material and contractors. To this end, the pavement is to be replaced with a robust, non-slippery material to ensure greater road safety. In addition, the entire square is to be raised to a higher level. It should be examined whether the small set of steps in the west of the square can be dissolved, which would also benefit accessibility at the same time. The cycle path remains a prominent axis on the square and continues to provide the east-west connection between Rissen/Wedel/Blankenese and Altona. Moreover, the existing trees show visible signs of damage, and they should be examined as part of a tree and soil survey. Finally, it is recommended that new, site-appropriate trees be planted based on the recommendations of the tree survey.

3.7. Teufelsbrück Elbe´s depth plan

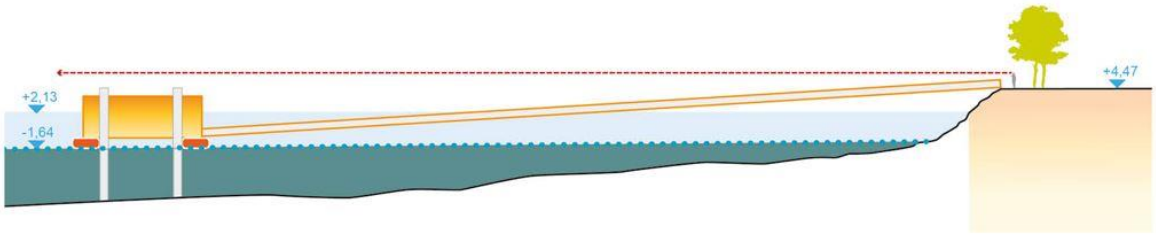
For this project, a major challenge is how to integrate the excessive need for bicycle parking on the plaza or in adjacent locations that is needed from the high number of employees that use this plaza to go to their work. As the city of Hamburg wants to promote the theme of active mobility and to give new innovative solutions for their citizens, this location becomes critical for the city to find a solution since the area is small in comparison to the heavy use and the amount of bike parking needed. Different studies in the past from the city or interested companies that want to provide good solutions for their employees, have investigated the location of a bike parking building, and as the space on the plaza is so limiting and the only available adjacent plot is used for car parking, the only solution that those studies came up with has been to locate the bike parking building on a pontoon on the Elbe. This brings a series of new challenges regarding functionality, the depth needed for the river and the pontoon to install such a building, and finally the maximum number of bike parking spots that this building could hold. Each of these topics need to be investigated in relation to potential conflicts, as for example the height of the bike parking building on the pontoon on a tidal river can end up providing a significant view barrier to the Elbe from the Elbe promenade.

A look at the analytical depth plan of this section of the Elbe shows that any pontoon extension would require excavation. We tried to investigate the size of the standard pontoon sizes to see how this could be possible and we recognized the standard pontoon size on the Elbe to be 60 m long, 12 m wide and 1.5 m deep. We have also included in this report a smaller option with a pontoon size of 48 m length, 12 m width and 1.5 m depth. The final option being considered is a pontoon 70 m long, 12 m wide and 1.5 m deep, but we have no information on whether this pontoon is suitable for such use in this part of the Elbe. As illustrated on the diagram in the report, it is not possible to realize a new pontoon without excavation.

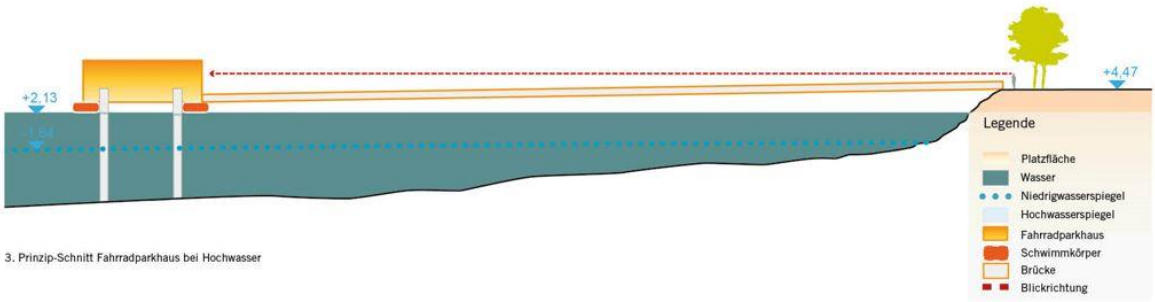


3.8. Height level bike parking

The bicycle parking garage at Teufelsbrücker Platz is to be placed in such a way that it blends into the landscape as unobtrusively as possible. Since it is to be located on the water, it will be influenced by the tides. The height differences can be seen in the schematic sections. The pontoon is supported by floats that allow the bicycle parking garage to adjust to the height level at high or low tide. The structure is firmly anchored to the ground by bollards. A flexible bridge allows access to the bicycle parking building. The water level fluctuates between -1.64 NN and 2.13 NN. This results in a height difference of approx. 3.77m. Thus, the field of vision of the users of the Teufelsbrücker Platz is impaired during high water.



2. Prinzip-Schnitt Fahrradparkhaus bei Niedrigwasser



3. Prinzip-Schnitt Fahrradparkhaus bei Hochwasser

3.9. Height level bike parking – two story

In a two-story bicycle parking garage, the height ratios change. In this principal section, the height conditions at low and high water and the effect on the user's field of vision are shown again. Here it can be seen that the field of vision is impaired by the pontoon both at high and low tide. Unfortunately, we see on the indicative sections that the expect height of a two-story parking building, although it is not designed in detail at this stage and the pontoon height is also generically estimated, that in cuts the view to the Elbe in both low and high tide situations. This is not a favorable situation for the living quality of the open space of the city.

3.10. Teufelsbrücker Platz – Feasibility study, a future Vision

To conclude, the Teufelsbrücker Platz feasibility study has demonstrated a series of conflicts for the different users, from bikes to bus commuters, to tourists, and has provided different approaches to

organize the different conflicts of use on this limited space. The overall intention from the city of Hamburg is to provide diverse leisure facilities at Teufelsbrücker Platz and ideally to increase the recreational quality of the square, while solving some major infrastructure conflicts that the geographical location and the use of the plaza as a traffic node provide. In doing so, the public transport system should be relieved, especially on weekdays. In addition, the ineffective use of space on Teufelsbrücker Platz is to be compensated for by the construction of additional bicycle parking spaces. The location of the bus stops, and the ferry landing create a strong direction of circulation for pedestrian and bikers to the water that compete with those of bicycle traffic on the plaza that run parallel to the water. To this end, a traffic study is recommended to take place to examine whether the bicycle lane can be moved to the street. Alternatively, in a future redesign of the bike lane location, it should be ensured that the intersection of the bus stop and the cycle path can be very easily recognizable by all users. Diverse interest groups and a wide range of activities in and around the plaza at weekends provide the need for a quality "shared space" area, that in this report has been demonstrated that it is possible and how.

3.11. Teufelsbrücker Platz: Lessons learnt for similar projects in other European Cities

Through this feasibility study a series of lessons learnt have come up that can benefit similar projects in Germany and other European Cities, with a special focus on the Baltic Sea Region. Shifting the design thinking for commuting in the city in conventional ways to an active mobility network brings a series of new challenges in urban space.

There are situations in our cities that despite the will and legislative efforts of our legislators for the minimization of car circulation, the use of the car cannot be further minimized because of the importance of the specific circulation axis in the larger network of the city, like the example of the Elbchaussee street. This constraint becomes more prominent when combined with another geographical constraints, like in our situation the river Elbe; the edge of the water is a physical barrier that together with the importance of the car traffic connection create more pressure on the available public space to provide solutions for all the different means of transportation and users: bus stops, bus waiting area, pedestrian commuting zone, boat waiting area, bike commuting zone, bike parking zone, the plaza area and touristic enjoyment of the view area. All these uses need to find space in the limited public area that is available in every situation, and in this case is the Teufelsbrücker Platz. This small project has been able to give us lessons and insights that when space becomes tighter, the priorities for the design decisions can become clearer.

1. The main lesson learnt from this study is the importance to gather early in the process all critical information from the different stakeholders to understand the needs, constraints, and regulations that the different entities need the project to comply with (traffic planners, AM specialists, port authority, public transportation authority regarding scheduling and size of vehicles, etc.).

2. The second lesson is to prioritize the importance of the different stakeholder needs from a quality of space perspective. For example, in this feasibility study, the interest of maintaining the view over the river Elbe as the most important value of the plaza itself and maintaining or, even, extending a

spatial quality experience on the plaza are in the focus. Consequently, diminishing the quality of these design values is seen critically, and proposals are developed showing different options that take into consideration the impact of the location and the dimension of the bike parking building in relation to the view of the Elbe. Finding space for the support of bike transportation and parking follows the constraints of the view of the Elbe.

3. Furthermore topics of public safety come at the forefront, to evaluate the feasibility of the design decisions. In this case, the safety of the paved surface and circulation safety for pedestrian and bikers at night are also relevant topics to be investigated further with a higher priority as well. Public lighting is considered but its functionality for AM needs to be improved.

4.Likewise, topics of biodiversity, light pollution and climate adaptation are important to be investigated even in a small way in such an urban small plaza, regarding the increase of the available green spaces or number of trees, the planting palette, the continuous green network, integrating light design with biodiversity and sustainability considerations, and finally the material of the paving regarding permeability and sustainability, such as local sourcing of the material, material durability and resilience.

5. Finally, an important lesson learnt from this feasibility study is the development of alternative options –apart from the solution on water- and different scenarios for bike parking needs, demonstrating the importance to take into consideration the changes in work life and employee-lifestyle because of the COVID-19 pandemic. In our case this meant the development of 3 different scenarios for the need of parking spots in the bike parking building.

In our opinion the different European cities can benefit from this investigation of design alternatives.