

Memo on Bridges and Quay Walls

Amsterdam is faced with a great task to repair the bridges and quays in the city. From the total of approximately 1800 bridges and 600 kilometres of quays, banks and slopes of the city, the programme Bridges and Quay Walls aims at the objects with a relatively high risk profile, these being objects which are important for the functioning of the city or whereby the chance of security issues is large. The municipality focusses on 829 road bridges and approximately 205 km of quay walls founded on deeper soil layers.

In spite of the fact that parts of the area do not meet legal requirements, this does not mean they are unsafe. But such an observation does contribute to the purpose and necessity of a programmatic approach. However, not all of these structures are expected to have an acute risk of collapse. The number of incidents and calamities has remained limited until now despite daily heavy loads. It is a priority to reduce the risk of incidents through prevention and to limit the consequences in case of calamities through adequate and fast actions. The municipality also aims to prevent overloading in order to extend the lifespan of the bridges and quay walls.

Weighing up and decisions

When making choices about safety measures and renovation projects, the municipality weighs safety, accessibility and quality of life against each other. Safety is paramount, followed by accessibility and quality of life. Safety measures are taken as a matter of urgency if research gives cause to do so.

Cloo Committee

The Cloo Committee's opinion on the approach to bridges, quays and tunnels (February 2019) refers to the need for acceleration and scaling up by a factor of 20. This should be interpreted more broadly than strictly implementing 20 times as many renewal projects. At all levels within the approach, the municipality must accelerate and scale up: putting the knowledge of the objects in order at a significantly faster rate, and being able to implement safety measures more quickly. To this end, the municipality innovates and optimises working methods and processes and closely cooperates with partners inside and outside the municipality. This is what the factor of 20 stands for.

Documents are available which give a good picture of the approach of the municipality of Amsterdam with regard to safety, accessibility and quality of life. This memorandum only deals with the aspect of safety.

First Looking back and Looking forward.

(translation below the picture)

2012



Normen aangescherpt voor rijkswegen - 1e doorvertaling naar Amsterdamse situatie.

2015



Start programma Constructieve Veiligheid Bruggen - waarmee een start wordt gemaakt met het hertijken aan de nieuwe normen van de 272 bruggen van de voormalige dienst Infrastructuur, Verkeer en Vervoer

2015 Rapport rekenkamer bruggen - waarin de rekenkamer kritisch is op de doelmatigheid en doeltreffendheid van het beleid voor beheer en onderhoud van bruggen in Amsterdam.

2017



1 Amsterdam Heel & Schoon - eerste stappen naar stadsbreed assetmanagement en verbeterd inzicht in de beheeropgave voor alle stedelijke assets.



2017 2018

Diverse Incidenten waarbij kademuren zijn bezweken, onder andere bij het Entrepotdok, de Marnixstraat en de Nassaukade.

2017 Start programma Toekomstbestendige Kademuren - waarbij een onderzoeks-, vernieuwings- en innovatieprogramma is opgestart voor de circa 200 km Amsterdamse kademuren.

2017 tot heden - diverse veiligheidsmaatregelen waarbij parkeerplaatsen zijn opgeheven, bomen gesnoeid en bruggen en kademuren versterkt.



Brief Plet-Heintunnel - waarin wordt gerapporteerd over de financiële overschrijdingen bij de renovaties van de U-tunnel en Plet-Heintunnel. Deze overschrijdingen waren voor het college aanleiding om een onderzoek te laten uitvoeren naar de achterliggende problematiek van de financiële overschrijdingen bij civiele constructies in deze stad (kademuren, bruggen en tunnels).

Mai 2018 Coalitieakkoord - extra financiële middelen voor enerzijds voor het onderzoek naar de staat van bruggen en kademuren en anderzijds voor de herstelwerkzaamheden hiervan.



2018

Factor 20

2019

Februari 2019 Onderzoek 'Factor 20' van externe commissie Cloo - de gemeente wordt geadviseerd avander in te zetten op het ontlasten en renoveren van bruggen en kademuren om de veiligheid van bewoners en bezoekers te kunnen waarborgen. Daarnaast adviseert de commissie Cloo onder andere om de programmatische aanpak te versterken en op te schalen met een factor 20.



2019

Start programma Bruggen en Kademuren - een nieuwe programmaorganisatie die voortbouwt op de programma's Constructieve Veiligheid Bruggen en Toekomstbestendige Kademuren.

2019



Uitvoeringsprogramma Bruggen en Kademuren - stadsbreed overzicht van alle brug- en kademuurprojecten tot en met 2023. Er staan 27 bruggen en 4,5 kilometer kademuur op het vernieuwingsprogramma.

Actieplan Bruggen en Kademuren - eerste uiteenzetting door het programma van de aanpak op het gebied van veiligheid.



2019

2019



Dashboard programma Bruggen en Kademuren - eerste beknopte overzicht van de voortgang op de programmadoelen.

2020



Programmaplan Bruggen en Kademuren - verdere uitwerking van de aanpak zoals geschiedt in het actieplan en de organisatieprincipes.



2020

2020 en verder - verdere uitwerking van werkwijzen en processen in deelplannen en werkinstructies, samenwerkingsafspraken met onze partners, vormgeven van het strategisch partnerschap, actualisatie van het uitvoeringsprogramma 2020 - 2024, het afsluiten van diverse raamcontracten, zoals de samenwerkingsovereenkomst Ingenieursdiensten en het Innovatiepartnerschap Kademuren.

2012 Standards tightened for national roads. First translation to the Amsterdam situation.

2015 Start of the Structural Safety Bridges programme - a start on calibrating the 272 bridges of the former Infrastructure, Traffic and Transport Department to the new standards.

2015 Report of the audit office for bridges - in which the audit office is critical of the efficiency and effectiveness of the policy for managing and maintaining bridges in Amsterdam.

June 2017 Amsterdam Heel & Schoon – first steps towards a citywide asset management and improved understanding of the management task for all city assets.

2017-2018 Several incidents whereby quay walls have collapsed at, inter alia, Entrepotdok, Marnixstraat and Nassaukade.

2017 until the present - Various safety measures whereby parking spaces were removed, trees pruned and bridges and quay walls reinforced.

Letter Piet Hein Tunnel – in which it is reported about the financial overruns during the renovations of the IJ Tunnel and Piet Hein Tunnel. These overruns prompted the Municipal Executive to have a study carried out into the underlying problem of financial overruns of civil constructions in this city (quay walls, bridges and tunnels).

May 2018 - Coalition agreement - additional funding for the study of the state of bridges and quay walls and, on the other hand, for their restoration.

February 2019. Investigation 'Factor 20' of the Cloo Committee. The municipality is advised to put more effort into the relief and renovation of bridges and quay walls in order to guarantee the safety of residents and visitors. In addition, the Cloo Committee recommends, among other things, strengthening and scaling up the programmatic approach by a factor of 20.

February 2019. Start programme Bridges and Quay Walls. A new programme organisation that builds on the Constructive Safety Bridges and Future-proof Quay Walls programmes.

July 2019. Action Plan Bridges and Quay Walls - first presentation by the programme of the approach to safety.

July 2019. Implementation programme Bridges and Quay Walls - city-wide overview of all bridge and quay wall projects up to and including 2023. There are 27 bridges and 4.5 km of quay walls on the renewal programme.

December 2019. Dashboard programme Bridges and Quay Walls - first concise overview of the progress on the programme objectives.

2020 and beyond - further implementation of working methods and processes in sub-plans and work instructions, cooperation agreements with our partners, shaping the strategic partnership, updating the 2020 - 2024 implementation programme, concluding various framework contracts, such as the engineering services cooperation agreement and the Quay Walls innovation partnership.

The documents mentioned in the overview are available. The most important topics relating to Security have been taken from the documents and included in this memo, inter alia.

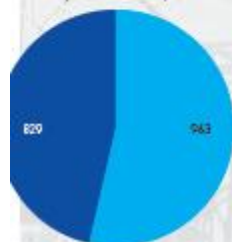
The scope of the programme

The Bridges and Quay Walls programme has various fields of activity which are concerned with investigating and weighing up Safety. This memo outlines the way in which the Bridges and Quay Walls programme investigates and weighs up the Safety of the bridges and quay walls and the measures to be taken.

Legenda

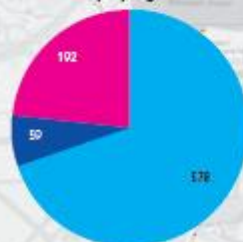
- Bruggen binnen scope
- Kademuren binnen scope

Bruggen
(in totaal 1792)



In scope beheerorganisatie
In scope programma

Bruggen
in scope programma



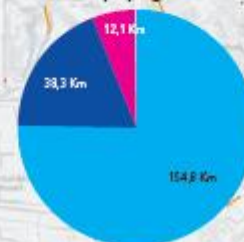
Vaste bruggen
Beveegbare bruggen
Viaducten en onderdoorgangen

Kades
(in totaal 640,6 Km)



In scope beheerorganisatie
In scope Programma

Kades
in scope programma



Walmuur
Damwand
Glooiing

Legend:

Bridges within scope
Quay walls within scope

Bridges (in total 1792)
In scope management organisation
In scope programme

Bridges in scope programme
Fixed bridges
Moveable bridges
Flyovers and subways

Quays
(in total 640.6 km)
In scope management organisation
In scope programme

Quays in scope programme
Rampart
Sheet piling
Slope

Insight, prioritisation and implementation

The Bridges and Quay Walls programme aims to repair the current overdue maintenance of the structures and speed up work towards a functioning city with safe and future-proof bridges and quay walls. The approach consists of investigations, monitoring, weighing up and decisions, limiting, strengthening, renewing, accelerating and developing, connecting and controlling.

We distinguish three main steps in this process.

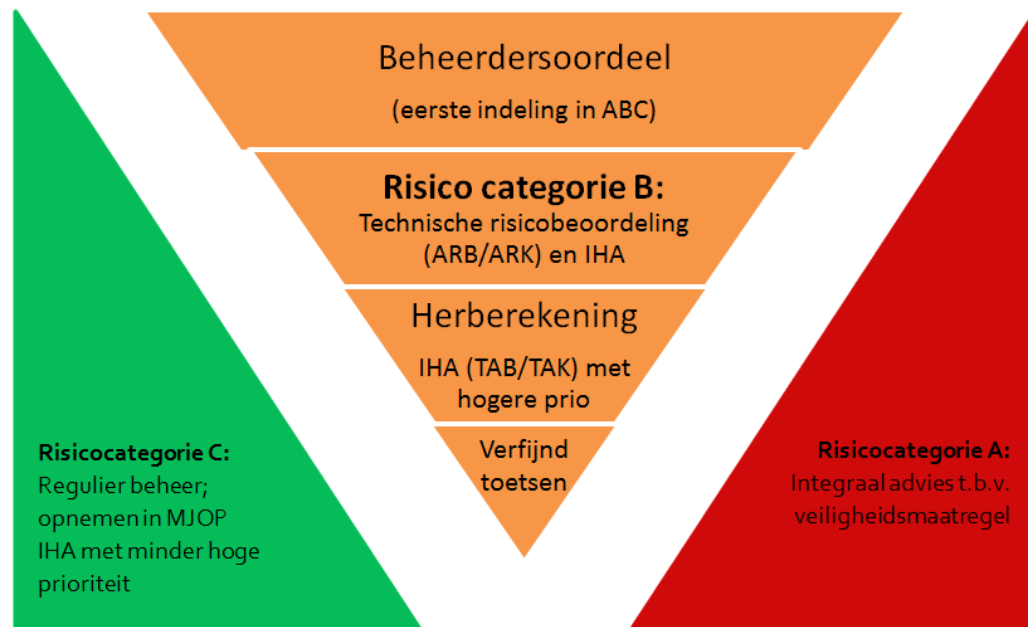
- **Acquiring insight:** by investigating and monitoring bridges and quay walls, more is known about the state of the constructions, what use they can handle and what the remaining life span is.
- **Prioritizing and giving direction:** on the basis of research and an analysis of the impact of possible measures on accessibility and liveability in the city, it is carefully weighed up and determined where what safety measures are needed and when to renew where.
- **Implementation:** when the safety of a bridge or quay wall requires immediate action, use is restricted or the structure is temporarily reinforced. Bridges and quay walls in poor condition are renewed.

The classification of all bridges and quay walls into categories provides an initial insight into the state of the area. This also confirms the suspicion of a large degree of overdue work. When acting on the basis of the principle of "Safety first", a distinction is made between four types of measures, which may be used individually or combined: monitoring the construction, limiting the use of the construction, strengthening the construction and investigations.

Definitions

- Safe construction: A construction is safe if it can withstand the maximum permitted load without measures.
- Unsafe construction: A construction is unsafe if it can no longer cope with the maximum permitted load.
- Safety risks: The risk of a structure collapsing as a result of the current load times the safety consequences. Consequences for the accessibility of the city are not included.
- Safety risk categories:
 - o Red: the state seems so bad that the risk of collapse or the result of collapse is so great that intensive monitoring is sensible and a fast and qualitative research must be carried out into whether action (strengthening, limiting and/or renewing) is necessary;
 - o Orange: the state is as yet unknown, so further research is needed to determine the risk of collapse and how action should be taken;
 - o Green: the construction is resistant to current use, so regular management and maintenance seems sufficient to guarantee safety.

The memo describes steps in which risk is steered from a situation where little is known about the area and work is done towards a situation where it is known which structures are safe, which are unsafe and where safety measures must be taken to ensure safe use. The image shows work going from coarse to fine, starting with a largely unknown situation and working towards a situation in which it is known which objects are safe and which are not. Ultimately, the programme leaves behind a green area.



Management judgment (first division into ABC)

Risk category B: Technical risk assessment
(ARB/ARK) and IHA

Recalculation IHA (TAB/TAK) with higher
priority

Refined testing

Risk category C: Regular management;
include in MJOP IHA with less high priority

Risk category A: Integral advice on behalf of
security measure

Underlying assessment frameworks

- Amsterdam Risk Assessment Bridges (ARB)
- Amsterdam risk assessment Quay walls (ARK)
- Assessment framework Amsterdam Bridges (TAB 2.0)
- Assessment framework Amsterdam Quay Walls (TAK)
- Integrated assessment framework management measures

1. Management judgement based on expert judgement

On the basis of the manager's judgement, an initial safety risk classification is made in the categories made under definitions. This initial classification has a high degree of uncertainty because the classification has been made on the basis of limited information available. However,

the knowledge of the experts is a good basis for follow-up research. The first risk classification based on manager's judgement is continuously being tightened up in the risk map (more on this later).

2. Qualitative risk assessment bridges and quay walls

For the objects in the orange safety risk category, a more detailed risk classification is made on the basis of all available technical information from the assets, available technical inspections, archives and monitoring information. This is based on the ARB and ARK assessment frameworks. The ARB and ARK describe the standards and starting points used in this step. Usually, the qualitative risk assessment is sufficient to draw up an upkeep analysis. On the basis of the qualitative risk assessment, the objects are again subdivided more accurately into the categories red, orange and green. Objects with risk assessment red go to step 5 and objects with risk category green go to step 6.

Parallel to the process of assessment by in-house specialists, various second opinions by internal and external experts are organised on the approach. Both on the process (can it be imitated), the technical assessment (is it valid) and on the measures (are they proportional). These experts come, among others, from the engineering office of the municipality of Rotterdam, TNO, province, Rijkswaterstaat and knowledge institutes. This is in addition to the structural embedding of cross-sections in the organisation and governance. The results of the second opinions lead to a tightening of the categorisation, the risk assessment and the scenarios for measures. After completion of the second step in the process there will be a supported categorisation of the entire area and a focus on the highest risks within the orange category. This, too, is an iterative process which will be tightened up now, soon and later.

3. Recalculation

For objects which are given the risk assessment orange, the qualitative risk assessment should be followed by an assessment of whether a recalculation of added value is necessary. Recalculations are time, costs and capacity intensive and still do not give a definitive answer about safety afterwards. A framework is being worked on to determine for which constructions it is worthwhile to switch to recalculation. Recalculations are being carried out on the basis of the Amsterdam Bridges Assessment Framework (TAB) and the Amsterdam Quay Walls Assessment Framework (TAK). On the basis of this recalculation, the risk category may be adjusted again.

4. Refined testing

Sometimes it may be useful for orange category objects to zoom in even deeper on elements of the object in order to determine the constructive state even more precisely. Refined testing is also done according to TAB and TAK.

5. Integral advice management measure

For objects in risk category red, an integral assessment is made about the safety measure to be taken on the basis of technical advice and environmental impact advice. Rough technical research accelerates the determination of whether and which safety measures are necessary on the basis of all available technical information and monitoring data. The environmental impact analysis maps out the impact of the various possible safety measures on the environment. On the basis of the integral advice for safety measures, a decision is made as to which safety measure should be taken to guarantee safety. On the basis of the rough technical research the risk profile of an object may also be adjusted to category B for further investigation in case the object functions more safely than expected. Here, too, it must be carefully assessed whether it is worth the investment.

6. Regular management

The objects that are classified in risk category green will be included in the current Long-range Maintenance Planning. This means that these objects go through the same assessments as the objects in the orange risk category, but with a lower priority. Meanwhile, for the objects in the green and orange risk category, major and daily maintenance is carried out normally by the regular management organisation. For objects in the red category, only daily maintenance is carried out.

Monitoring

The bridges and quay walls are closely monitored. Monitoring bridges and quay walls provides important insight into the stability of a construction. This gives the municipality more knowledge about the structural condition of the bridges and quay walls and an important insight into the stability of a construction. The monitoring, just like the investigations, is risk-based.

The categorisation forms the basis for the monitoring of objects. The monitoring strategy describes the frequency at which the objects in the various categories are measured. The bridges and quay walls in the highest risk category are monitored most frequently. If an object falls into a different category, this automatically changes the monitoring regime. An object may also be placed in a different category on the basis of monitoring. When and how this happens is also described in the monitoring strategy.

Methods for monitoring

The most commonly used method is the placement of measuring bolts. These are stainless steel bolts with a diameter of 6 millimetres. The measuring bolts are placed in the bridge deck or in the quay wall. By measuring the height from the street at different times, it is possible to follow whether and how much a bridge or quay wall moves. Measuring takes place 1 to 5 times a year for bridges and 5 to 12 times a year for quay walls. Together with market parties and knowledge institutes, innovative methods such as satellite measurements or 3D scans using drones are also used.

The Voorportaal (Front Portal): integral assessment and decisions on safety measures

Together with the management organisation, the municipality formed a team: the Voorportaal (Front Portal). The Voorportaal is a collaboration between various teams within the bridges and quay walls programme: Technology, Environment, Prevention and Intervention, Monitoring, Traffic & Public Space. The Voorportaal makes the integral considerations about safety measures. This team focuses on all bridges and quay walls in the scope of the programme. Management measures are also applied by the Voorportaal.

These management measures include, for example:

- Reinforcing the bridge or quay by, for example, placing safety structures;
- limiting the load on the bridge or quay by, for example, closing off streets and parking bays;
- guarding the bridge or quay by monitoring deformation.

The choice as to which management measures have to be taken is made by considering them integrally in the Voorportaal consultation. Integral because all participating parties contribute to the advice:

- Technology: determining where the bridge or quay is good or bad in terms of constructive safety and making a proposal about limiting and/or strengthening and guarding it.
- Environment: determining the impact of limiting and/or strengthening.
- Prevention & Intervention: determining the feasibility of implementing the management measures.

After the assessment has been established, this is recorded in an Integral Advice (IA). After approval by the PB&K management, this will be laid down in a management measure decree (BBM). These management measures are then implemented by Prevention and Intervention (and by Team Monitoring). This also includes an advice on programming renewal.



Guarding

- Monitoring
- Inspection
- Satellite data

Investigating

- Dive inspection
- Technical inspections
- Archive research
- Calculations

Reinforcing

- Sheet piling
- Auxiliary constructions
- Urgent repairs

Restricting

- (Heavy) traffic
- Parking removed
- Tram very slowly
- Total closure

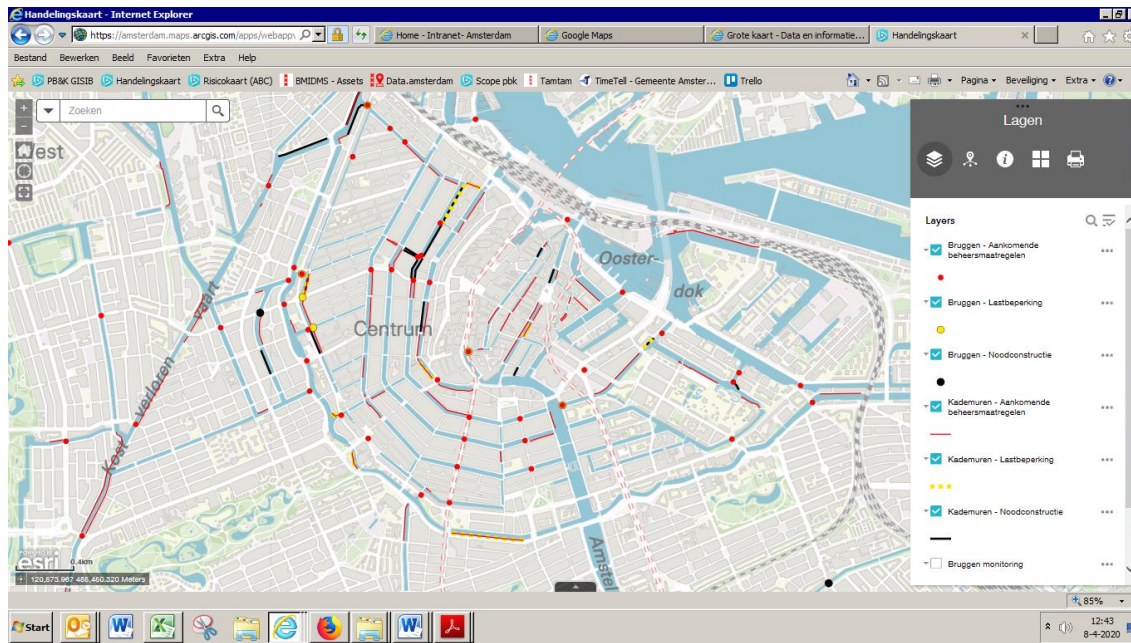
Renewing

- Scaling up replacement to approx. 2 km quay walls and 6 to 8 bridges a year
- Optimising processes and working methods
- Innovative building methods
- Together with market, knowledge institutes and colleague governments

An older **quay wall** consists of a brick wall supported by a wooden floor. The wooden floor is supported by cross beams on wooden posts. Research has shown that these beams and posts are sometimes partly rotten or broken off. Sometimes measures have to be taken by reinforcing the quay wall with a steel sheet piling in the canal or by renewing the quay.

A **bridge** may be reinforced by, for example, installing steel tubular piles as a support. It is also possible to reinforce the foundation of the bridge or to reduce the load by allowing less heavy vehicles.

Safety is paramount in everything the municipality does.



Action map

Interested parties are actively informed about where strengthening, restricting and also renewal takes place. All security measures are included in a digital map. The action card keeps track of which reaches in the Voorportaal are being treated and have been completed.

Explanation of the colours:

- Red: What is being treated or in progress in the Voorportaal at Prevention & Intervention.
- Yellow: Where load restrictions have been realised outside by Prevention and Intervention.
- Black: Where safety constructions (emergency constructions) have been realised outside by Prevention and Intervention.
- Blue: Which bridges or quay walls are guarded through monitoring of deformation

Trello

If a bridge or quay enters the Voorportaal process, Trello keeps track of where it is in the Voorportaal and P&I process.

- Backlog: Entry of the Front Portal with prioritisation in time, processing in planning and processing in the action map.
- Technology: Drawing up Technical Advice (TA)
- Environment: Drawing up environmental advice (OA).
- Voorportaal consultation: Determining in consultation which management measures to take.
- Integral advice (IA): Recording of consideration and advice in a report.
- Management measure decree (BBM): After approval by the management, IA is converted into a decision.
- Implementation Prevention and Intervention: Preparation and implementation of management measures will be limited or reinforced.
- Completed: Implementation of mitigation or reinforcement is ready outside and incorporated in the action map.

Risk map

At the moment, a risk map is being drawn up to include pipelines. Here too, targeted inspections are being carried out with divers to inspect the foundations under water, so that action may be taken there as well: limiting the load or reinforcing the structure.

In addition, talks are being held with the Service Desk, City Works and V&OR to pick up "soft signals" from the city. Reports from the public space are passed on, so that action may be taken if necessary. These signals are taken very seriously.

Specific and generic security measures

Restricting the use of bridges and quay walls is one of the ways to ensure the safety. A distinction is made between specific safety measures for high-risk constructions and generic measures that are currently seen particularly in the inner city. However, these are measures that always have an impact on the use and the environment.

Specific

When research shows that a construction does not meet the requirements of current use, lowering the load on the construction is a safety measure that is often implemented first. On the one hand, because this quickly reduces the risk of calamities and, on the other hand, because these measures are generally quick to implement. Think, for example, of the removal of parking spaces, the banning of heavy traffic and/or public transport by means of a height portal or folding gate, total closure of a road by means of a physical restriction or the felling or substantial pruning of trees. The restrictive measures remain in force until another measure such as reinforcement or renewal has been taken. In practice, this means that certain bridges and quay walls are temporarily restricted but not reinforced because this is not necessary. An example of a bridge that will not be reinforced is bridge 110 near Lijnbaansgracht and Lauriergracht. Until it is renewed, this bridge will only be accessible to cyclists and pedestrians.

Generic

The bridges and quay walls are not built for use by heavy traffic. This improper use causes damage to the constructions. In order to extend the lifespan of the bridges and quay walls in the city and to prevent overloading and further damage, work is being done on a generic policy to restrict the load. For this reason, the rules for heavy traffic in the current 7.5 tonne zone in the city centre district have been tightened in 2020.

If it is necessary for safety reasons or if serious interests are harmed due to restrictions on accessibility or liveability, we will proceed to strengthening. By strengthening a bridge or quay wall, through emergency repairs or the installation of a safety structure the construction is stabilised and the renewal of the object is planned and properly prepared at an appropriate moment. In the meantime, parking spaces can often be used again and traffic may resume.

Accelerating reinforcement

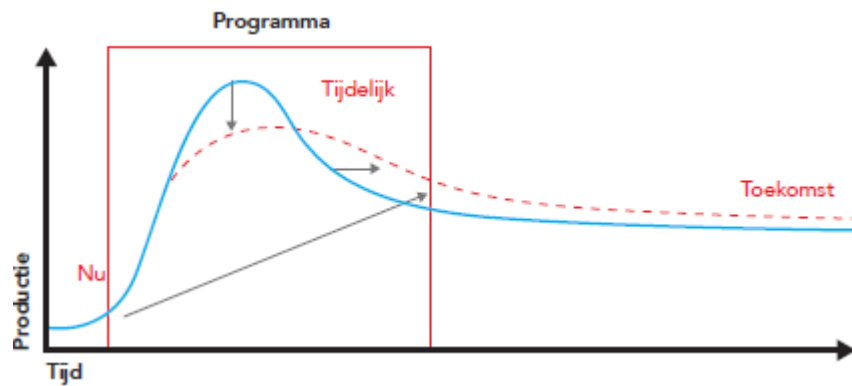
At various locations reinforcement measures have already been carried out, such as sheet piling for quay walls filled with sand and reinforcement structures under bridges. The more research results give cause to limit the use of bridges or quay walls, the greater the need for these types of measures becomes. This is why, in this phase, the municipality is focusing on increasing the number of technical solutions and reducing the lead time for preparing and implementing these measures.

Implementation period and production

In order to guarantee the safety and functionality of the city, a large part of the bridges and quay walls will be renewed. In theory, a construction will last about 100 years. In practice, it depends on many factors when a structure reaches the end of its lifespan. Renewing bridges and quay walls takes a lot of time. On average, the preparation of a project takes two to four years and the execution often takes another year. A significant proportion of our bridges and quay walls come under UNESCO heritage or has monumental features. This means that the associated procedures must also be taken into account. By, among other things, taking stock in good time and establishing a working method for restoration, for example, opportunities for acceleration are also being sought here.

The City of Amsterdam focuses on significantly increasing production. Standardisation and innovation have been chosen. A serial approach is used and the optimum production process is sought for bridge and quay wall renovations. To this end, the municipality is making use of the implementation and innovative power of the market. We guard against stacking ambitions that lead to delays, but successful innovations are applied. The municipality is critical of its own processes and existing rules, for example how it deals with the importance attached to trees and how decision-making on projects is organised.

In recent years, an average of 1 to 2 bridges and a maximum of 500 metres of quay wall have been renewed each year, and this number will be considerably increased in the coming years. Visible attention is now focused mainly on safety, but behind the scenes work is being done to increase production.

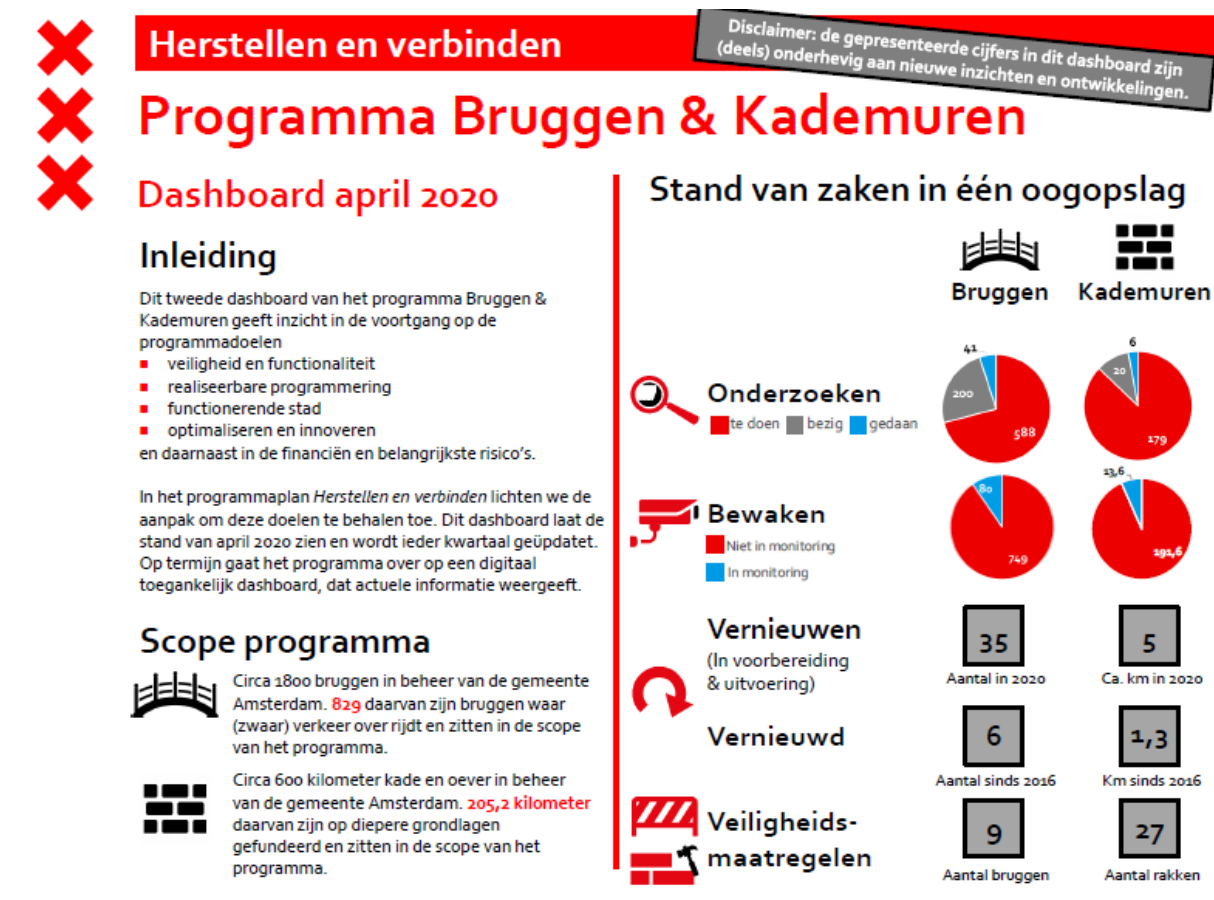


The desired production rate

Period – Time

Programme – Now – Temporarily - Future

Based on a theoretical lifespan of approximately 100 years and the size of the area, the municipality will eventually work towards a stable renewal rate of approximately 8 bridges and 2 kilometres of quay wall per annum. That is the constant line in the figure on this page. In order to catch up on overdue maintenance, there is a temporary acceleration by a factor of 20. That is the peak in the figure. The programme is responsible for this temporary acceleration. After this catching up, the management organisation will eventually be responsible for the stable pace of renewal.



Repair and connect

Disclaimer: the figures presented in this dashboard are (partially) subject to new perceptions and developments.

Programme Bridges and Quay walls

Dashboard April 2020

Introduction

This second dashboard of the programme Bridges and Quay Walls provides insight into the progress on the programme objectives.

- safety and functionality
- realisable programming
- functioning city
- optimising and innovating

as well as in finance and major risks.

In the programme plan *Repair and connect* we explain the approach to achieve these goals. This dashboard shows the status of April 2020 and is updated every quarter. In time, the programme will move to a digitally accessible dashboard that will display up-to-date information.

Scope of the programme

Approximately 1800 bridges are managed by the City of Amsterdam. 829 of these are bridges over which (heavy) traffic crosses and they are included in the scope of the programme.

Approximately 600 km of quays and banks managed by the municipality of Amsterdam. 205.2 km of these are based on deeper ground layers and are within the scope of the programme.

State of affairs at a glance

Bridges Quay walls

Assessments – needing to be done – busy - done

Guard - not in monitoring - in monitoring

Renew (in preparation and implementation) 35 number in 2020 - 5 km by 2020

Renewed 6 number since 2016 - 1.3 km since 2016

Safety measures - 9 number of bridges - 27 number of reaches



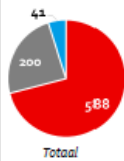
Inzicht verwerven

Veiligheid en functionaliteit

Het structureel beter inzicht in de staat van het areaal krijgen is de basis voor het kunnen sturen op veiligheid. Prioriteit heeft het verkleinen van het risico op incidenten (preventie) en het beperken van de gevolgen bij calamiteiten door adequate en snelle beheersmaatregelen.

PD

Onderzoek bruggen



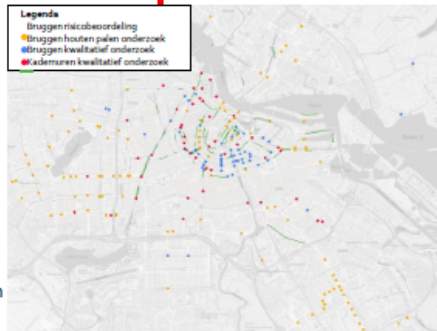
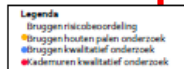
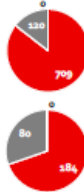
Totaal (in aantal bruggen)

• te doen • bezig • gedaan

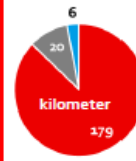
Het onderzoek naar de technische staat van bruggen loopt. In totaal zijn er nu 200 bruggen in onderzoek. Deze bruggen zijn weergegeven op de kaart en worden op de volgende drie manieren onderzocht:

- **Risicobeoordeling** – Voor 120 bruggen wordt momenteel een risicobeoordeling gemaakt. Deze beoordelingen worden naar verwachting in de loop van 2020 afgerond.
- **Groot houten palen onderzoek** – Ook worden de houten paalfunderingen van 80 bruggen momenteel onderzocht. In totaal worden de houten palen van 264 bruggen onderzocht.
- **Snel en kwalitatief onderzoek** – Bruggen met een hoog risicoprofiel worden snel en kwalitatief onderzocht op basis van de kennis die we hebben, duik- en archiefonderzoek.

In totaal zijn op dit moment 41 bruggen gemarkeerd als 'gedaan'. Deze bruggen zijn mede op basis van onderzoek geprogrammeerd voor vernieuwing of zijn reeds recent vernieuwd.



Onderzoek kademuren



Totaal (in aantal kilometer kademuur)

• te doen • bezig • gedaan

Kademuur in onderzoek

Momenteel onderzoeken we ca. 20 kilometer kademuur, waarbij boven de waterlijn zichtbare schade is waargenomen. Dit is snel en kwalitatief onderzoek dat we risico-gestuurd uitvoeren, onder andere via duik- en archief-onderzoeken. De uitkomsten van deze onderzoeken zullen in het komend half jaar bekend worden. Onderstaand is weergegeven waar de onderzoeken plaatsvinden.

Kademuur onderzoek gereed

Bij ca. 3 km kademuur is op basis van kwalitatief onderzoek een veiligheidsmaatregel getroffen. Dit betekent ook dat de kademuur op termijn vernieuwd moet worden. In totaal is er nu mede op basis van onderzoek ca. 5 km gepland voor vernieuwing. Samen met de kademuren die recent vernieuwd zijn, is voor deze 6 km het onderzoek afgerond.

Gaining insight

Safety and functionality

Gaining structurally better insight into the state of the area is the basis for being able to steer towards safety. Priority is given to reducing the risk of incidents (prevention) and limiting the consequences in the event of calamities through adequate and rapid management measures.

Research bridges

Total (in number of bridges)

needing to be done – busy - done

Research into the technical state of bridges is under way. A total of 200 bridges are now under investigation. These bridges are shown on the map and are being investigated in the following three ways:

Risk assessment - A risk assessment is currently being made for 120 bridges. These assessments are expected to be completed in the course of 2020.

Large wooden piles study - the wooden pile foundations of 80 bridges are under investigation now. In total, the wooden piles of 264 bridges are under investigation.

Rapid and qualitative research

Bridges with a high risk profile are examined quickly and qualitatively on the basis of the knowledge we have, diving and archive investigation.

A total of 41 bridges are currently marked as "done". These bridges have either been programmed for renewal on the basis of research or have already been renewed recently.

Investigation quay walls

Total (in number of kilometres of quay wall)

needing to be done – busy - done

Quay wall under investigation

We are currently investigating approximately 20 km of quay wall, where visible damage has been observed above the waterline. This is a fast and qualitative investigation that we perform in a risk-based way, inter alia, through diving and archive investigation. The results of these investigations will be known in the next six months. Below is a summary of where the investigations take place.

Quay wall investigation completed

At approximately 3 km of quay wall a safety measure has been taken on the basis of a qualitative investigation. This also means that the quay wall will have to be renewed in due course. A total of about 5 km are planned for renewal, partly based on investigation. Together with the quay walls that have recently been renewed, the research for these 6 km has been completed.



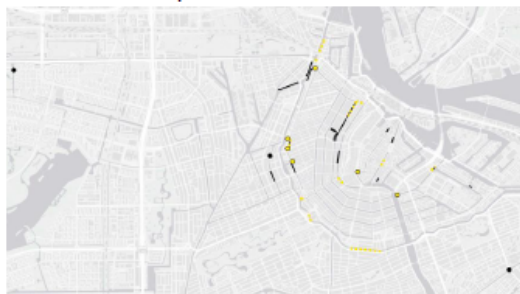
Uitvoeren

Veiligheid en functionaliteit

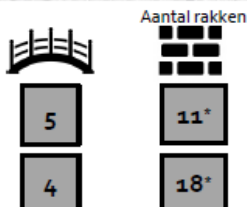
Om veiligheid te kunnen waarborgen, moeten we structureel beter inzicht in de staat van het areaal krijgen. Prioriteit heeft het verkleinen van het risico op incidenten (preventie) en het beperken van de gevolgen bij calamiteiten door adequate en snelle beheersmaatregelen.

Veiligheidsmaatregelen

Beperken en versterken



Lastbeperkingen in geel
Versterkingen in zwart



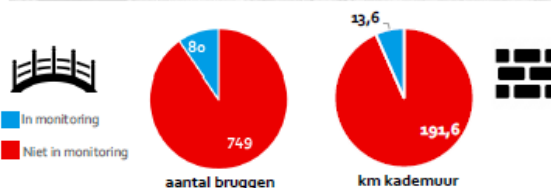
Lastbeperkingen

Versterkingen

* In totaal hebben we bij 27 rakken maatregelen getroffen. Bij 2 rakken hebben we beperkt én versterkt.

Wanneer uit onderzoek blijkt dat een constructie niet geschikt is voor het huidige gebruik, worden veiligheidsmaatregelen getroffen. Denk aan parkeerplaatsen opheffen, (gedeeltelijke) afsluiting, bomen kappen en/ of een verstevigingsconstructie plaatsen.

Bewaken



Het bewaken van bruggen en kademuren geeft belangrijk inzicht in de stabiliteit van de constructie. Bovenstaand is weergegeven waar en hoeveel objecten momenteel gemonitord worden. We monitoren bepaalde kades nu minder dan in Q4-2019, omdat sommige kademuren veilig zijn gebleken. Van de 50 bruggen worden er 20 frequent gemonitord. In de komende maanden zullen we 80 nieuwe bruggen gaan bewaken.

Execution

Safety and functionality

In order to be able to guarantee safety, we need a better structural understanding of the state of the area. Priority is given to reducing the risk of incidents (prevention) and limiting the consequences in the event of calamities through adequate and rapid management measures.

Safety measures

Limiting and strengthening

Load restrictions in yellow - Reinforcements in black

Load restrictions 5 11*

Reinforcements 4 18*

** In total, we have taken action on 27 reaches. For two reaches, we have both limited and strengthened*

If investigations show that a construction is not suitable for its current use, safety measures are taken. Think of lifting parking spaces, (partial) closure, felling trees and/or installing a reinforcement construction.

Guarding

In monitoring

Not in monitoring

number of bridges

kilometres quay wall

Guarding bridges and quay walls provides important insight into the stability of the construction. The above shows where and how many objects are now monitored. We now monitor certain quays less than in the fourth quarter of 2019, because some of the quay walls have proved to be safe. Out of 50 bridges, 20 are monitored frequently. In the coming months, 80 new bridges will be guarded.

Conclusion

The city of Amsterdam is facing a major task. A task which will take many years to complete. When making choices about safety measures and renewal projects, safety is paramount, followed by accessibility and quality of life. Safety measures are taken as a matter of urgency if investigations give cause to do so. As indicated, documents are available which give an even better picture of the municipality of Amsterdam's approach to safety, accessibility and quality of life.

The municipality focuses on significantly increasing the production. Standardisation and innovation have been chosen. A serial approach is used to achieve an optimal production process for bridge and quay wall renovations. For this purpose, the execution and innovative power of the market is used.

In order to increase insight into the condition of bridges and quay walls, the focus is now on carrying out risk-driven research. The constructions which are of the highest concern are the first to be examined. Monitoring bridges and quay walls provides important insight into the stability of a construction. The bridges and quay walls in the highest risk category are monitored most frequently.

The municipality of Amsterdam's approach to bridges and quay walls has changed considerably in recent years. Guarantees may never be given of course. However, measuring is knowing! Together with the pragmatic approach in which safety is paramount, the municipality has succeeded in bringing the bridges and quay walls back up to standard.