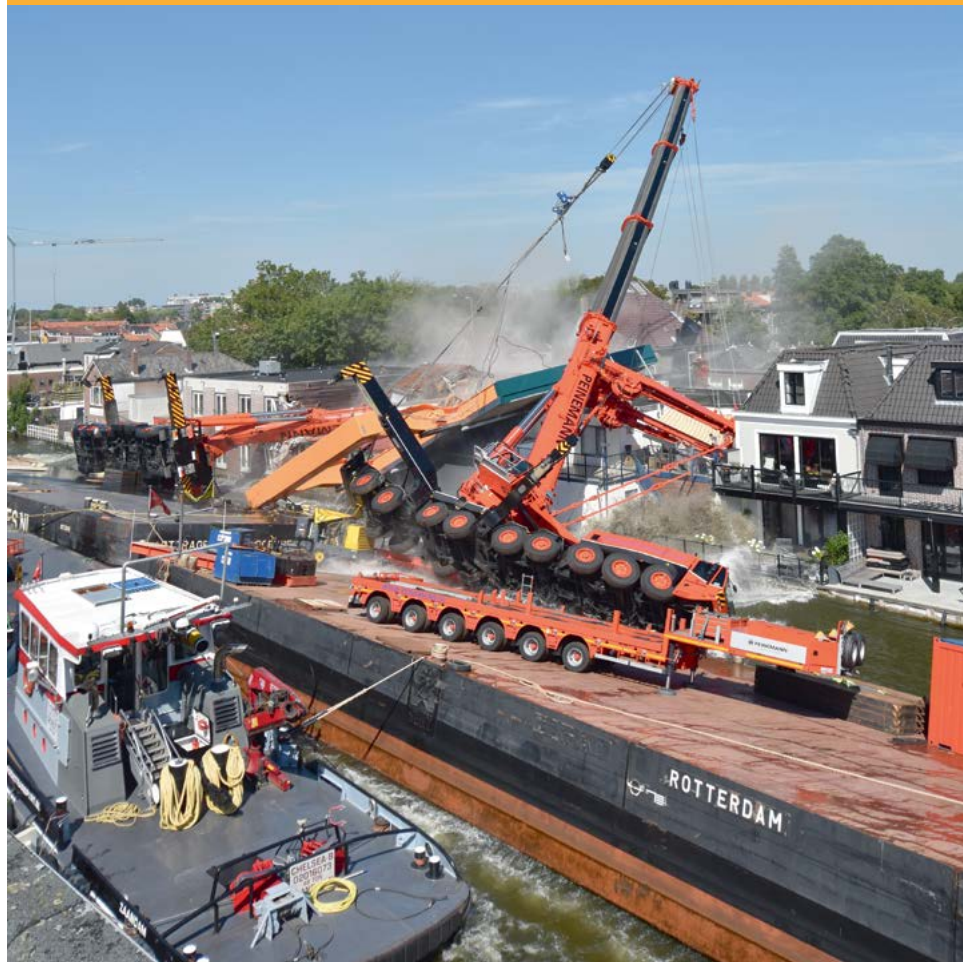




DUTCH
SAFETY BOARD

Summary

Lifting accident Alphen aan den Rijn



Summary

Lifting accident Alphen aan den Rijn

The Hague, 29 June 2016

*The reports issued by the Dutch Safety Board are open to the public.
All reports are also available on the Safety Board's website www.safetyboard.nl*

Photo cover: Photographer crane company.

Dutch Safety Board

When accidents or disasters happen, the Dutch Safety Board investigates how it was possible for them to occur, with the aim of learning lessons for the future and, ultimately, improving safety in the Netherlands. The Safety Board is independent and is free to decide which incidents to investigate. In particular, it focuses on situations in which people's personal safety is dependent on third parties, such as the government or companies. In certain cases the Board is under an obligation to carry out an investigation. Its investigations do not address issues of blame or liability.

	Dutch Safety Board		
Chairman:	T.H.J. Joustra E.R. Muller M.B.A. van Asselt		
	H.L.J. Noy (Associate member of the Board)		
Secretary Director:	C.A.J.F. Verheij		
Visiting address:	Anna van Saksenlaan 50 2593 HT The Hague The Netherlands	Postal address:	PO Box 95404 2509 CK The Hague The Netherlands
Telephone:	+31 (0)70 333 7000	Fax:	+31 (0)70 333 7077
Website:	www.safetyboard.nl		

NB: This summary is published in the Dutch and English languages. If there is a difference in interpretation between the Dutch and English versions, the Dutch text will prevail.

Summary 5

Consideration 8

Recommendations 11

On 3 August 2015, a new section of the bridge 'Koningin Julianabrug' in Alphen aan den Rijn was due to be lifted into position. A small construction crane (400 tonnes) and a large construction crane (700 tonnes) were deployed for this lifting operation. These two mobile construction cranes were each placed on a barge. The intention was to simultaneously lift the bridge section from a third barge, in a tandem lift operation. The bridge section would then be manoeuvred in between the two cranes before being tilted into an almost horizontal position. The two barges would then sail with the bridge section suspended between the two cranes to the Koningin Julianabrug, located 100 metres away from the initial lifting point. There, the bridge section was to be raised and fitted into the existing bridge structure.

While the bridge section was being manoeuvred between the two construction cranes, the two barges supporting the cranes capsized, together with the already lifted bridge section, and the entire configuration toppled into the adjacent built-up area. A number of homes and shop premises were completely destroyed. There was much consternation based on fears that people had been buried under the rubble. Miraculously, there were no persons were injured.

Insufficient stability of the lifting rig

To carry out any lifting operation safely, stability of the lifting rig is an absolutely fundamental requirement. The lifting rig as used on 3 August, in particular the barge bearing the small construction crane, was already insufficiently stable before the work was even started. As a consequence, even if the lifting operation had been carried out faultlessly, the accident could not have been avoided. The already poor stability was further reduced by the fact that a number of objects was placed on the barge carrying the smaller construction crane, and the imperfect distribution of ballast water between the compartments in the barge. Sagging of the cranes and the unfavourable interchange of forces within the lifting rig had a further negative influence on the stability. There was no margin to compensate for additional forces caused by, for example, the movement of the crane or a gust of wind, without causing the barge to slope excessively or the entire lifting rig to topple. As a consequence, an initial movement by the bridge section during the lifting work caused the barge supporting the smaller construction crane to slope to such an extent that the mast of the crane failed, causing the crane itself to topple, thereby pulling the bridge section with it, which in turn also pulled over the large construction crane.

Shortcomings in preparation for lifting operation

The accident can be explained by shortcomings in the preparation for the lifting operation by both the crane operator and the barge operator. The lifting operation was based on the lifting plan. The complexity of the tandem lifting operation using mobile cranes operating from barges was not reflected in this lifting plan. The plan failed to take into account such standard factors as wind and movement of the cranes. There were no

safety margins, as a result of which the lifting rig lacked the capacity to compensate for any uncertainties or irregularities in execution. In other respects too, the operation pushed the boundaries. Both the cranes and the barges were used beyond their specified scope of operation. The cranes were loaded up to 100% of their rated capacity, and there was no ballasting plan for the barges that would have allowed for the (timely) correction of the inclination of the cranes and/or barges.

These shortcomings in preparation were caused by an underestimation of the complexity of the lifting operation. Although both the crane operator and the barge operator had only limited experience in tandem lifting operations on water, both approached the task as a routine job. Both companies overestimated their own abilities, and systematically underestimated the risks involved. As a consequence, indications of the limited stability of the rig, which were actually present during the preparation phase, failed to result in the necessary adjustments to the lifting plan. Furthermore, the companies failed to deploy the expertise required for the correct preparation of a lifting preparation of this kind. They believed in the feasibility of the plan, as long as the work would be undertaken cautiously, and if ballasting would be undertaken in time. As a consequence, on 3 August 2015, the lifting work commenced using a lifting plan that offered insufficient stability for the safe execution of the work.

Safety risks for the surrounding area not under control

Although the renovation work was to be undertaken in an urban area, no consideration was given to the safety of the people in the vicinity of the construction site. None of the parties involved realised that the lifting of the bridge section engendered risks for the immediate surroundings or for civilians present in that area, with potentially serious consequences. The parties involved trusted on each other's expertise, and relied on the responsibility of the other parties in the chain. This pattern was reflected throughout the project organisation, from barge operator through to municipal authority.

In the risk assessments from the construction consortium entrusted with the renovation work, the lifting plan was referred to, in respect of risk management. Because no conditions or assessments were imposed on the lifting plan, the process was effectively unmanaged. No questions were asked, as a consequence of which it was not observed at any stage that the working method proposed by the crane operator meant that the safety risks were insufficiently managed. Within the construction consortium, the construction company, being the project manager, occupied a key role. It was in a position to gather the information on the basis of which the entire process could be supervised and managed. This role, however, was not fulfilled. There was no systematic or integrated process of risk management. The investigation of the Dutch Safety Board revealed that the executing parties above all viewed safety as the safety of the workers and others on the construction site, in respect of health and safety legislation, and did not consider the safety of the surrounding area.

A prior history of nuisance among local residents around the Koningin Julianabrug meant that the municipality attached considerable importance to avoiding additional inconvenience for the local residents during the renovation work. As a result, the main focus of the municipality was on limiting nuisance levels. In key areas, such as the selection process for awarding the project, the risk file, the contract, the elements of

assessment and acceptance, the priorities assumed by the municipality are reflected. As contract-awarding party, the municipality consciously distanced itself from the project's execution. The execution of the work, including the lifting work, and indeed the related safety risks for the surrounding area, remained unconsidered. The municipality accepted the lifting plan as read. As licencing authority for the renovation work, the municipality also failed to provide a safety net. The municipality considered a construction safety plan, which can be imposed as a requirement for any permit application, as unnecessary. If such a construction safety plan had been in place, the municipality could have ensured that the focus - not only of the municipality itself, but also of the construction parties - would have been aimed more on the safety of the surrounding area.

The construction sector is going through a process of fundamental transformation in which government is withdrawing and in which ever greater responsibility is placed on market parties. Although the Dutch Safety Board recognises that construction parties are themselves responsible for their activities, practice has repeatedly shown that even construction companies with a solid reputation do not always live up to this responsibility. The factors that played a role in the accident in Alphen aan den Rijn are an illustration of deeply-rooted processes that have been in place for many years.

Fragmentation of the construction process

Due to extreme specialisation, the construction process has become fragmented, resulting in a complex set of contractual relationships. In many cases, there is no central party to supervise all work activities and the related risks. In line with this observation, the Dekker Committee in 2008 noted a lack of integrated process management in construction practice: work is undertaken with various subcontractors, and there is no integrated management during the entire process.¹ On the basis of multiple investigations in the construction sector, the Dutch Safety Board has observed that since that analysis by the committee, too little has changed.

It must be accepted as a given fact that a large number of different parties are involved in any complex construction project. The crucial question is how to arrive at adequate risk management for the entire construction project, within this chain of parties. As has emerged from previous investigations by the Board,² it is still too common in construction projects for there to be a lack of a combined approach to safety. In addition, coordination and control are insufficient, and the allocation of responsibility too diffuse.

Contract-awarding parties in the construction sector often focus on the functionality of the construction work to be completed, on costs and lead times,³ rather than on the process of realisation of the construction work. Practice has shown that in many cases, contract-awarding parties leave the task of ensuring safety to the construction parties without there being any clear allocation of responsibilities between the individual construction operators. The latter is amplified by the fact that it is common for construction companies to jointly acquire an order, but then work at cross-purposes during execution.

1 Committee for a Fundamental Review of the Construction Sector, *Private where possible, public where necessary. Confidence and Responsibility in the Construction Process*, 2008. The Dutch Safety Board also referred in a previous investigation to the growth in complexity in the construction process: Dutch Safety Board, *Collapse of concrete floor B-Tower Rotterdam*, 2012.

2 Dutch Safety Board, *Collapse of roof of the extension to the FC Twente stadium in Enschede*, 2012; and Dutch Safety Board, *Collapse of floor B-Tower Rotterdam*, 2012.

3 Pilot study Guaranteeing structural safety in construction processes (K+V on behalf of the VROM Inspectorate, 2007).

Limited self-regulatory capacity

The sector recognises that greater efforts are needed to arrive at a structural improvement, and that greater attention must be given to a higher understanding of safety and a clear allocation of responsibility. Following the occurrence of incidents, the sector undertakes initiatives, which subsequently die a silent death. This includes the 'Governance Code on Safety in the Construction Industry'⁴ and the related initiatives which were to lead to more intensive cooperation following the accidents at the B-Tower and Grolsch Veste, in order to improve the safety culture in the construction sector. Actual improvement in construction practice has still not been achieved, a fact that provides clear evidence that the self-regulatory capacity of the sector is still insufficiently developed.

Towards chain management

The Board has noted that specifically the contract-awarding party can have a disciplinary effect on the parties responsible for actual execution. The Board considers it vital that contract-awarding parties for construction projects focus not only on maximum process efficiency, but also on safety. This relates to safety on the construction site but also to safety in the surrounding area. This can be achieved by using safety as a criterion in tendering procedures. This provides companies with an opportunity to distinguish themselves in a positive sense, through the way in which they intend to manage safety risks. At the same time, contract-awarding party and contractor must reach clear agreements on which party bears central responsibility for the process of identifying and managing (safety) risks within the overall project. These agreements should preferably be standardised by inclusion in the general contracting conditions. During the execution process, contract-awarding parties should then allow themselves to be convinced that this process is actually functioning adequately.

Withdrawing government retains responsibility for the surrounding environment

Government - in practice often municipal government - has a general duty of care for public safety. For construction projects in which a municipality is the contract-awarding party, this general duty of care is felt in two roles: the role of permit-issuing body and the role of contract-awarding party. It is a permanent task for municipalities to determine how they wish to fulfil this duty of care. A crucial question is how a municipality should obtain the necessary information to be able to stay in control of its core tasks at relevant moments, in combination with the way in which the municipality organises the necessary support if it does not have the required knowledge at its disposal.

As the permit-issuing body, municipalities can call upon the statutory instrument of the construction safety plan. According to a construction safety plan, a municipality is informed by the construction parties on how they intend to ensure the safety of the surrounding area during construction work. Municipalities are authorised to impose this as a condition for any application for an environmental building permission, although they are not required by law to do so. Practice shows that municipalities rarely ask for a construction safety plan, despite the fact that such a plan is the ideal means of increasing

⁴ In 2014, fifteen leading parties from construction, infrastructure and installation technology signed the 'Governance Code for Safety in the construction sector'.

awareness among the parties involved in the construction process of the safety risks for the surrounding area and of the necessity of managing those risks. Especially for construction projects in densely populated areas, the Board sees a clear advantage in making better use of the possibilities already offered in this respect by building regulations.

When it comes to the role of municipalities as contract-awarding parties, the Board does not consider it sufficient for the municipalities to pass on responsibility for the safe execution of the projects to the construction parties. Although these construction parties are best positioned to assess and manage these risks, it is still expected of the municipal authorities to (allow themselves to) be convinced that the construction parties in question have actually taken this responsibility and are actively promoting safety for the surrounding area. This applies in inner city areas in particular, where construction projects may bear considerable risks for the surrounding area.

All in all, municipalities are faced with various challenges: how to guarantee safety in situations where the municipal authorities are becoming further distanced and how to organise the knowledge necessary for actually fulfilling the responsibility for the surrounding environment, all this in times of limited resources and additional tasks for the municipality. Without disregarding the primary responsibility of the construction companies for the safe execution of the work, this investigation offers starting points for municipalities to take better account of the safety of the surrounding environment during construction projects.

To conclude

With the proposed privatisation of the assessment of the technical quality of construction work (which at present still lies with the municipal authorities), government appears to be withdrawing even further. The Private Quality Assurance Act has still to be adopted by parliament, but private assessment may take effect in 2017 for the construction of homes and other relatively simple buildings. In later stages, more complex construction projects such as hospitals and stadiums will come under the same legislation. On the basis of the current investigation and previous investigations by the Dutch Safety Board in the construction sector, there is justifiable concern as to whether the construction sector can in fact be entrusted with greater responsibility.

The Dutch Safety Board considers it of crucial importance that lessons be learned from the lifting accident in Alphen aan den Rijn. First and foremost, this applies to the companies directly involved. Secondly, improvements are needed at sector level. The Dutch Safety Board would propose the clear setting of standards in tendering procedures and construction contracts. Finally, municipalities should be more active in complying with their duty of care for the environment surrounding construction works, when issuing environmental building permits.

1. Companies involved in the lifting works in Alphen aan den Rijn

Peinemann Kranen B.V.:

In addition to measures already taken on the basis of your own investigation: increase the expertise within the company concerning the possibilities and limitations of cranes in relation to the work to be undertaken, and duly adjust your working methods so that safe use of the cranes is guaranteed.

Koninklijke Van der Wees B.V.:

Increase the expertise within the company concerning the possibilities and limitations of barges in relation to the work to be undertaken, and duly adjust your working methods so that safe use of the barges is guaranteed.

BSB Staalbouw B.V.:

In case of subcontracting, make sure you are convinced that the subcontractor takes responsibility for safe execution of the work.

Mourik Groot-Ammers B.V.:

As project manager for construction projects, ensure that you underpin your management role in respect of the chain partners in such a way that adequate risk management is performed, for the entire construction process.

2. Responsibility for risks in the construction sector

To: the Minister for Housing and the Central Government Sector

Together with the construction sector, ensure that contract-awarding parties, in the agreements they enter into with parties participating in a construction project:

1. appoint a single central party who bears responsibility for a systematic process of risk management for the entire construction process, including safety for the surrounding environment and

2. require the other parties to cooperate with one another, subject to the control of the duly appointed party, in the manner necessary for the effective organisation of that process of risk management.

The risk responsibility and cooperation obligations must be laid down clearly and coherently in the general terms and conditions⁵ accompanying agreements entered into between the contract-awarding party and the parties participating in a construction project.

3. Safety for the surrounding environment as an awarding criterion

To: the Minister for Housing and the Central Government Sector

Ensure that in tendering procedures for construction projects in urban areas, safety for the surrounding environment is included as an awarding criterion, and is further regulated in contracts.

4 Responsibility of municipalities for safety of the surrounding environment

To: the Minister for Housing and the Central Government Sector

Embed a risk-based assessment framework in the Buildings Decree that determines under which circumstances a Construction Safety Plan is required as a precondition for the awarding of an environmental permit.

Ensuring safety is one of government's core tasks. If high-risk construction projects are presented for the awarding of a permit, the municipality must make certain that safety of the area surrounding a construction is guaranteed. A legal instrument for this already exists, in the form of the construction safety plan. However, this plan is optional. The Dutch Safety Board is of the opinion that the construction safety plan could be used more often and more intensively to ensure the safety (of the surrounding environment) in construction projects. In response to the question of the circumstances in which a construction safety plan is required, the Dutch Safety Board considers it important that municipalities be supported in this process by a legally laid down assessment framework. In this manner, the risk assessment whether a construction safety plan is required will become substantiated and transparent.

⁵ Specifically this refers to the following terms and conditions: the Uniform administrative terms and conditions for the execution of civil engineering works and technical installation works 2012 (UAV 2012); the Uniform administrative conditions for integrated contract forms (UAV-gc 2005); and the General terms and conditions for consulting engineers and architects (DNR 2011).



Visiting Address
Anna van Saksenlaan 50
2593 HT The Hague
T +31(0)70 333 70 00
F +31(0)70 333 70 77

Postal Address
PO Box 95404
2509 CK The Hague

www.safetyboard.nl