



# **From the 110th floor to Ground Zero**

**A case study on the design of the 9/11 Memorial**

**AR2A011 Architectural History Thesis  
TU Delft**

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29-04-2021**

**Tutor: Sabina Tanović**

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## 1. Introduction

The 11th of September 2001 is known as a black page in America's history. On that Tuesday morning, four terrorist attacks using hijacked passenger planes took place; one aircraft went through the Pentagon building, another plane crashed near Shanksville, the other two hijacked planes collided with the 110 floors high Twin Towers of the World Trade Centre. After the attacks, only remnants remained of the once imposing towers. The buildings that used to be 110 storeys high had collapsed to Ground Zero. Ultimately, the most tragic consequence of these attacks was that 2997 people lost their lives (Bergen, 2020).

A memorial was built in honour of those who had died. Its design came from architect Michael Arad<sup>1</sup> of Handel Architects and landscape architect Peter Walker<sup>2</sup>. Situated next to the memorial is the National 11 September Memorial Museum, designed by the Davis Brody Bond<sup>3</sup>. The museum explains the story of 9/11 by using multimedia displays, archives, narratives and a collection of monumental artefacts.

This paper will address how the 9/11 Memorial was theoretically and visually designed to represent a traumatic historical incident. To achieve knowledge about the design, the paper will also explore several related questions in the following order. (1): What is the historical background of the memorial? In this section, the paper will provide background information about the Twin Towers. It will also explain the functions of the buildings. The paper will present the materials, as well as the construction and the logistics distribution of the two buildings. Furthermore, the paper will clarify what happened on the 11th of September. (2): How did the design process go during the rebuilding of Ground Zero? This second part will clarify the background of the rebuilding. As political tensions were high during the design process, it was a difficult challenge for many participants. (3): How is the design formed? The paper will explain how the design competition was organised and how the purpose of the memorial's design changed during the design process. (4): What is the purpose of this memorial? The paper will clarify what the architects' ideas were for the memorial and the museum. (5): How does the

memorial work architectonically? The last section of the paper discusses the architectural background using plans and sections. It will give an explanation for the choices in material, the development of the form and the routing.

To understand how the memorial is designed, the paper will also investigate the very meaning of the memorial's name, "Reflecting Absence", which refers to the traumatic past and the psychological experiences of its place, space, and time (Micieli-Voutsinas, 2017). The architect, Michael Arad, argued that the site should be a special place connected with the city. The Memorial and the Museum are well-integrated architectural designs that are inextricably connected with one another (Baptist, 2015, p.5). Everything is connected with place, space and time, as academic and cultural historian James E. Young<sup>4</sup> explained in the book *Religion, Violence, Memory and Place* (2006). Young also expounds the memorial Plaza's function as a unifying element due to its incorporation of contrasting notions of life and death, order and chaos and absence and presence. The sacred and the profane are anchored deeply in the actual events it commemorates, connecting us to the towers, to their destruction and to all the lives lost on that day (Young, 2006, as cited in Baptist, 2015).

1. Michael Arad is an architect known for his design for the National September 11 Memorial at the World Trade Centre site, titled "Reflecting Absence". His design was selected by the Lower Manhattan Development Corporation, in 2003. Arad joined Handel Architects as Partner in April 2004 where he worked on realising the Memorial design (Handel Architects, 2021).

2. Peter Walker is a landscape architect who helped Michael Arad in the Memorial's design (Young, 2006).

3. Davis Brody Bond is an architecture firm known for innovative solutions to complex design challenges. The firm has recognized many design awards and honours including the American Institute of Architects Firm Award. The firm was the Design Architect for National September 11 Memorial Museum at the World Trade Centre (Davis Brody Bond, 2021).

4. James E. Young is a Distinguished Professor Emeritus and Founding Director of the Institute for Holocaust, Genocide, and Memory Studies at the University of Massachusetts. Professor Young had major honours, awards and fellowships included the Distinction in Rebuilding New York City Award in 2011. He served as a juror of the 9/11 Memorial Competition Design. (University of Massachusetts Amherst, 2021).



## 2. Historical Context

This chapter will present the historical context of the Twin Towers. In the first part of the chapter, the paper will provide background information about the Twin Towers. In addition, it will explain the functions of the buildings and present the materials as well as the construction and the logistics distribution. The first part will then conclude with a few of the buildings' old architectural drawings. In the second part, the paper will provide background details on the attacks that took place on the 11th of September.

### 2.1 The Twin Towers

A place is characterised by its own unique architecture, which is an important medium used by nations to express their cultural identity. This cultural identity is often shown with the use of architectural landmarks. In the case of New York, the landmarks are the Statue of Liberty and the Empire State Building. They used to include with the World Trade Centre, better known as the Twin Towers. (Jones, 2006).

The Japanese-American architect Minoru Yamasaki<sup>5</sup> designed the World Trade Centre towers. The buildings were completed in 1973. These well-known towers were, for a while, the tallest buildings in the world. The towers stood at 110 stories each. They dominated the New York skyline, and they were an architectural landmark (Figure 2). They used to be an essential destination for many citizens in New York City. 200,000 People visited the World Trade Centre site on an average workday. In addition to this, 50,000 people worked in the buildings.

The buildings were symbolic of the business centre and functioned in promoting internal trade as well as catalysing economic prosperity (Pascucci, 2018).

The World Trade Centre had a significant impact on the rest of Lower Manhattan. Fourteen small and irregular blocks stood on the original site. Yamasaki saw an opportunity to demolish the old blocks and create a single large new one. This transformation improved the financial sector, traffic regulation, and pedestrian circulation around the building block. In addition to that, it created a public space (Figure 3). It was the pinnacle of urban architecture. The skyscrapers were a good fit to create a public space in the form of a plaza. Furthermore, there were a few smaller retail establishments and transportation facilities on location. Lower Manhattan had a well-organised traffic area, including subway lines. This made a good connection with Wall Street possible. (Pascucci, 2018).

Yamasaki's design created a logical building, positioning the mechanical systems at the centre of a square structural grid. The façade consisted of a silver aluminium alloy and the construction of concrete and steel. Furthermore, the building made use of materials such as wood, plastic and a significant amount of glass. (Pascucci, 2018).

Designing the construction and placing the foundations in the 500 by 1000-foot plot were the main challenges that needed to be overcome. Due to the height of the building, it was difficult to provide the construction

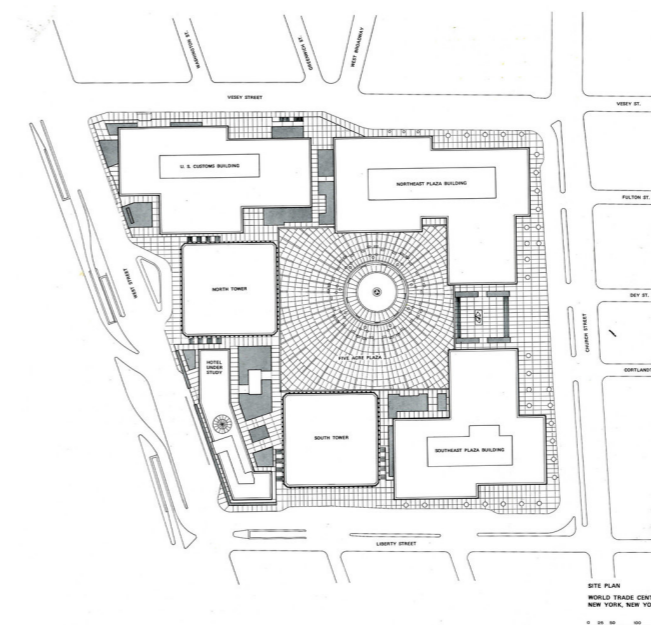


Figure 3: Site Plan World Trade Centre New York (Minoru Yamasaki Associates + Emery Roth & Sons, n.d.)

with enough strength and stability. When it came to placing the foundations, dewatering was the main issue. The Hudson River is located nearby the site, causing the surrounding soil to have a high moisture content which prevents the concrete from setting properly. The solution to this was the Slurry Wall, proposed by engineer Martin S. Kapp<sup>6</sup>, which would prevent a potential collapse. In the aftermath of the attacks however, only one was left. Additionally, waterproof reinforced concrete walls were built to avoid water leaks (Pascucci, 2018). The building also made use of sky lobbies for the construction. This allowed the buildings to be divided into thirds. The floors directly beneath the sky lobbies were used for mechanical functions. Furthermore, the structure consisted of concrete floors which were 4 inches thick and on a fluted steel deck. The columns and beams of the construction were made of steel, which was also used for prefabricated 6-foot by 8-foot inch trusses in the building's structural grid. Each façade contained 59 17-inch columns on a 40-inch grid. As a result, the narrow 22-inch windows accounted for only 30% of the façade. The exterior columns extruded 12 inches beyond the glazing, shading much of the windows and reducing energy consumption. (Pascucci, 2018).

The two towers of the World Trade Centre were both 110 floors tall. The majority of each building was used for office space. Additionally, there was underground parking for up to 2000 cars and a tall lobby and observation deck inside. Each building had a 208 by 208-foot square floorplan with slightly chamfered corners, surrounding an 87 by 135-foot core

that comprised of 47 steel columns. The buildings also had an excellent logistic distribution. Multiple stairs, elevators, bathrooms, and mechanical shafts, which provided the building's ventilation, were positioned in the middle of the building. The elevators consisted of large express elevators and elevators serving a particular part of the building's section (Figure 4). (Pascucci, 2018).

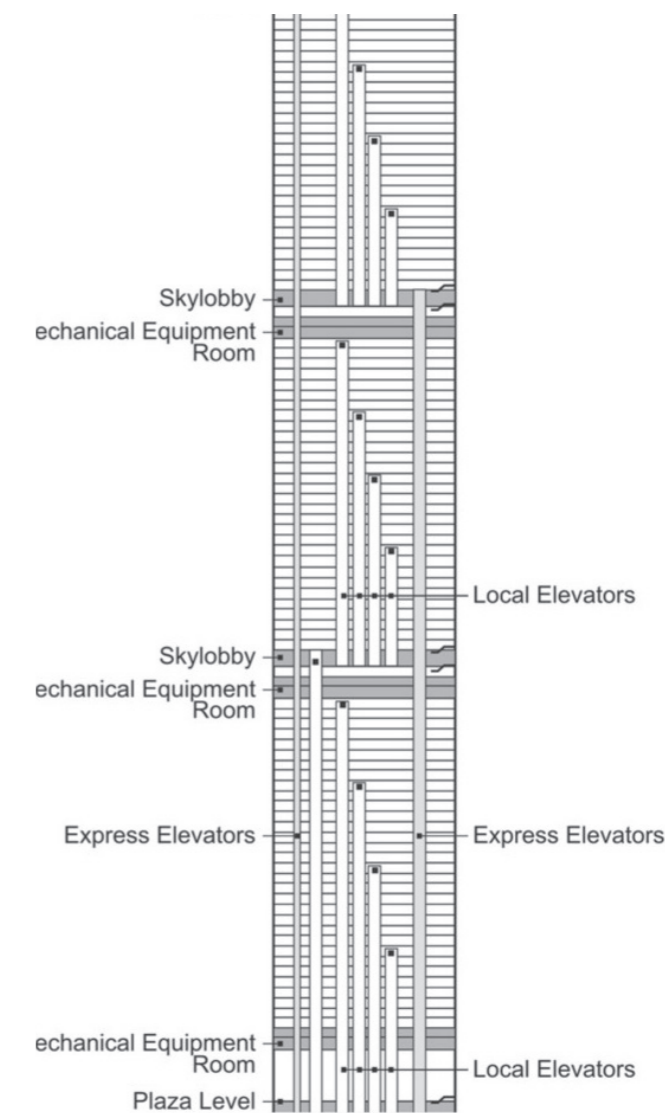


Figure 4: Schematic Section World Trade Centre (Minoru Yamasaki Associates + Emery Roth & Sons, n.d.)

5. Minoru Yamasaki (1912 – 1986) was the architect of the Twin Towers at the World Trade Centre in New York. He was considered as one of the masters of "New Formalism," infusing modern buildings with classical proportions and sumptuous materials. (Douglass-Jaimes, D, 2019).

6. Martin Kapp (1924 – 1972) was chief engineer for the New York Port Authority. (The New York Times Company, 2021).



Figure 2: Skyline of New York City (Sohm, 2009)



## 2.2 September 11, 2001

On the 11th of September 2001, several airline hijackings and suicide attacks took place. The perpetrator was believed to be the Islamic extremist group Al-Qaeda<sup>7</sup>. However, some conspiracy theorists accused members of the U.S. government of managing the attacks. Eventually, a bipartisan commission declared Al-Qaeda completely responsible for the attacks. Moreover, Osama bin Laden<sup>8</sup> also claimed that he and the rest of Al-Qaeda were responsible. Another conspiracy theory, with no evidence, claimed that Jewish people, with the support of Israel were behind the attack. Later this theory was announced as false. (Murphy, 2002 as cited in Bergen, 2020). Al-Qaeda leader Osama bin Laden is considered the mastermind of the attacks, even though Khalid Sheikh Mohammed<sup>9</sup> was the operational planner. Al-Qaeda provided the staff, money and logistic support that was necessary for the attack. (Lisle, 2004, as cited in Bergen, 2020). The group sent nineteen terrorists to cause all this terror. The attack was the deadliest in American history (Murphy, 2002, as cited in Bergen, 2020).

On the 11th of September, two planes hit the World Trade Centre's north and south towers in New York. Over 2750 people died. One plane hit the Pentagon, because of this, 184 people died. Later in Shanksville, Pennsylvania, another 40 people died. More death had been possible, if the passengers did not attempt to retake the plane. Because of them, the plane crash was earlier than initially planned. The original plan was to hit the United States Capitol building in Washington. In total, some 2977 people were killed. Many police officers and firefighters died; more than 400 emergency responders died in total. (Murphy, 2002, as cited in Bergen, 2020).

Figure 8 shows the timeline of the 11th of September, 2001. At 8:46 AM local time, the first plane pierced into the North Tower of the World Trade Centre in New York. At first, people did not realise this was the beginning of a historical terroristic attack. They thought on this point that it was an accident. They thought that it was a small commuter plane that hit the building by accident. (Bergen, 2020). This thought changed immediately after seventeen minutes when the second plane hit the South Tower. Colossal damage was caused to the towers (Figure 6 and 7). Huge fire flames enveloped the building, and the air above it became black due to all the smoke. Many people were locked in the building. They were trapped

7. Al-Qaeda is a broad-based militant Islamist organization founded by Osama bin Laden in the late 1980s. Al-Qaeda began as a logistical network to support Muslims fighting against the Soviet Union during the Afghan War; members were recruited throughout the Islamic world. The group eventually re-established its headquarters in Afghanistan (c. 1996) under the patronage of the Taliban militia. (Britannica, T. Editors of Encyclopaedia, 2019).

8. Osama bin Laden (1957 - 2011) was founder of the militant Islamist organization al-Qaeda. Furthermore he was the mastermind of numerous terrorist attacks against the United States and other Western powers, including the 2000 suicide bombing of the U.S. (Britannica, T. Editors of Encyclopaedia, 2019).

9. Khalid Sheikh Mohammed was the mastermind of the September 11 attacks on the World Trade Centre and the Pentagon in 2001. He claimed that he was responsible for the 1993 World Trade Centre bombing. (Pearson, 2019).

like mice waiting for their inevitable deadly end. They rather jumped out of the windows and faced their death in this way than die because of the fire. (Murphy, 2002).

The tallest buildings globally, an icon for the business sector and the city, were changed the 11th of September into Ground Zero (Bergen, 2020). Nothing remained of the buildings. The buildings existed of steel, glass and concrete. Despite these strong materials, everything turned into dust. No difference was visible between ashes of people and dust from the building. After the collapse many local people were covered with dust of the remains. (Sturken, 2004).

At 8:30 PM, the president of the United States, George W. Bush, spoke to the United States people about the future foreign policy. The Bush administration presented the opportunity for a strategic reorientation of the American foreign policy. The increased perception of threats and terrorism dominated the foreign policy discourse. The guiding principle of the new policy became focussing on security which was shown in the Anti-Ballistic Missile (ABM) treaty in December 2001. To succeed the fight against terrorism it was necessary to cooperate with other states. (Rudolf, 2002). On the 14th of September, President Bush made the most memorable remarks of his presidency. He spoke (2001): "I can hear you. The rest of the world hears you. And the people who knocked these buildings down will hear from all of us soon" (Figure 5). In the days after the attack, many people were in deep grief, gathering around Ground Zero. (Bergen, 2020).



Figure 5: George W. Bush at the World Trade Centre (Draper / The White House, 2001 September 14)

### Building Status

- Not affected
- Needs Cleaning
- Damage but stable
- Major structural damage
- Destroyed
- In danger of collapse

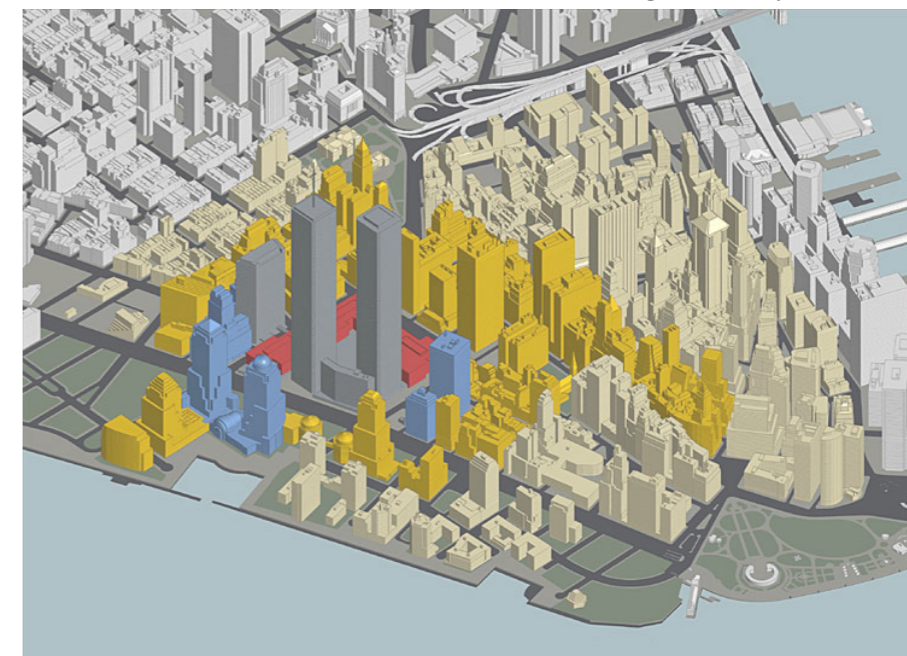


Figure 6: Building status of Lower Manhattan, New York City (Courtesy the city of New York and urban data solutions, n.d.)



Figure 7: Building status of Lower Manhattan, New York City, close-up (Courtesy the city of New York and urban data solutions, n.d.)

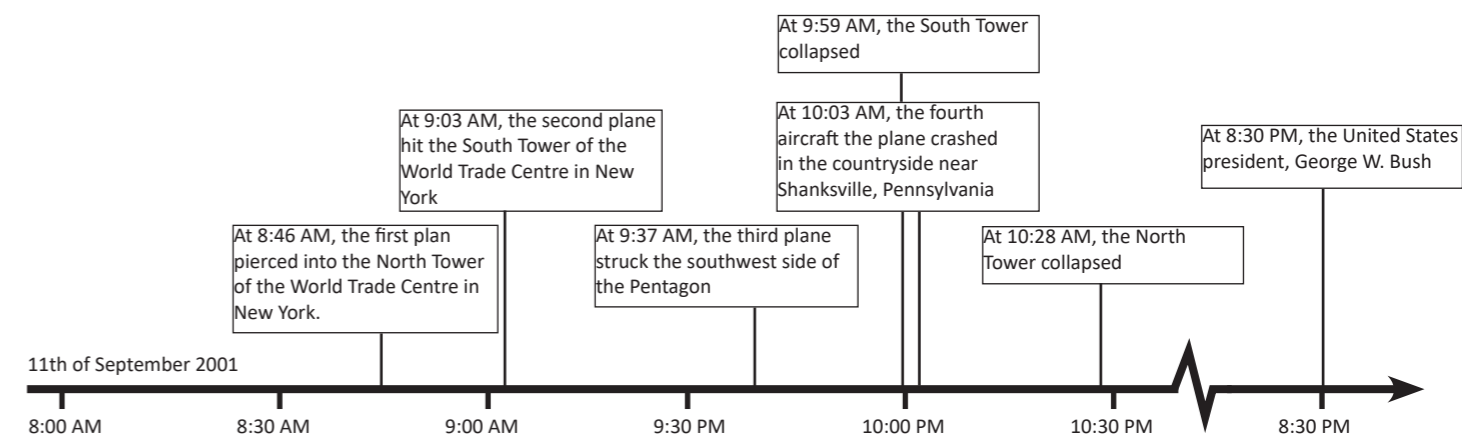


Figure 8: Timeline of the 11th of September attack (Van Minkelen, 2021)



### 3. Rebuilding Ground Zero

This chapter will present what the circumstances were during the rebuilding of Ground Zero. During the rebuilding of Ground Zero, many political discussions took place about what a suitable solution was for the program of the site. After the attack, people had a lot of emotions, and it was a difficult process to commemorate the victims.

#### 3.1 Political discussions over the rebuilding

The term Ground Zero was a confusing term. The World Trade Centre became on the one hand empty. The barren earth was the only thing that remained after the destruction, the Ground Zero (Figure 9). On the other hand the site was mentally not empty at all. Nearly four months after the attack, a public viewing platform was opened at the edge of Ground Zero. A lot of people wanted to grieve, support or respect the victims. More than a million out-of-town visitors viewed the site. (Lisle, 2004). The term Ground Zero is used as a *tabula rasa*. It functioned as a starting point. Amy Kaplan<sup>10</sup> explained Ground Zero as the bottom line, for a new purpose or function (Sturken, 2004). The rebuilding of Ground Zero was not about replacing the shapes of the World Trade Centre towers. It was about expressing the symbolic meaning of the site. (Hajer, 2005).

The buildings were an essential part of the city's view, and were referred to as iconic. The two large buildings were standing out from the other facilities (Hajer, 2005). The World Trade Centre Towers were landmark buildings that represented an identity for the city. They were classified as a symbol for the business sector in New York. It was a difficult task to replace these

voids with the former high-quality architecture. (Hajer, 2005, as cited in Jones, 2006). Besides this, the immense emotional value of Ground Zero was also an important aspect to consider. Many people experienced traumas, such as the crumbling of everything around them into dust and the fires at the World Trade Centre site that smouldered for more than three months. (Bergen, 2020). In the new context, all of this was taken into consideration.

Many actors were involved with the rebuilding of the site, because the victims came from 90 different countries. The whole world judged the rebuilding of Ground Zero. The rebuilding was seen as a reaction of America to the Islamic terroristic attack. Consequently the reconstruction of the site was a complex task. (Hajer, 2005).

Port Authority of New York and New Jersey and the developer Larry Silverstein<sup>11</sup> had the legal rights and the ownership of the site. It was a logical decision that these parties had the right to decide what happened to the space. They all had a significant interest in rebuilding the site with new offices, because the site used to function as a business sector. However, the politicians, Governor George E. Pataki<sup>12</sup> and Mayor Rudolph William Louis Giuliani<sup>13</sup>, did not approve that. Their opinion was that the rebuilding of the site with new offices would not be a credible option. Placing new offices was also an inhuman action, because this idea did not take into consideration the families of the victims and other loved ones. The rebuilding was a symbol for America, since the buildings used to be a symbol for America. The new symbol could be the solution

in these hard emotional times (The Guardian, 2004).

Pataki and Giuliani set up an impressive public organisation: the Lower Manhattan Development Corporation (LMDC<sup>14</sup>). The organisation decided that the process of rebuilding should be a shared process. They also agreed that the organisation took into account the many sensitivities during the rebuilding process. As a result of the many emotions, placing a memorial was the best solution for the rebuilding of Ground Zero. Consequently, Ground Zero became a place where people could honour and mourn the victims. (Hajer, 2005). The memorial is considered as a cultural and historical artifact that gives a meaning to the past, and what is based on present and future challenges (Brescò and Wagoner, 2019). John C. Whitehead<sup>15</sup>, the head of LMDC, suggested that the memorial could be some kind of a park. This park could be functionated as a public space, which was in line with the function of the World Trade Centre Plaza. Larry Silverstein, the developer, mentioned that he felt responsible for the rebuilding and its financing. He agreed with the idea of LMDC to make a memorial. (Hajer, 2005).

#### 3.2 The stages of mourning turned into stages of memory

After the September 11 attacks it was for many people a difficult challenge to commemorate the victims of these catastrophic events. Emotions can clearly alter the way the world is perceived, affecting people's sense of time as well as space. (Micieli-Voutsinas, 2017). To memorialise the attack, people needed first to realise where the history of the attack ended, and where their memory began. People found themselves in a situation that was unimaginable, not realising yet the impact of their loss of loved ones, and not knowing how to process their memories. (Young, 2006). The past seemed to life in the present-life of the citizens in the form of commemorations and collective mourning. The term "memorial mania" explains this, it is the understanding of the memory which have made grief in a collective place to commemorate the victims. (Brescò and Wagoner, 2019).

James E. Young explained in the book *Religion, Violence, Memory and Place* that three stages were applicable to get from the stage of mourning to the stage of memory (Young, 2006). The first stage is that people realise what

is lost. The term missing was a repeating theme. People hung up posters of missing people and the fallen towers. (Young, 2020). In the second stage, people learned what the meaning of those losses were. Different kinds of people died on September 11. For instance, an employee was commemorated differently than, for example, a fire fighter doing his civic duty. (Young, 2020). At last, the third stage, the grief of people is transformed into an object such as a memorial. In this last stage, the stages of mourning turned into the stages of memory. (Young, 2006).

After people realised what happened, their approach was evaluating what came first, for instance, the rebuilding of the towers, the new design for the World Trade Centre site or making a memorial. James E. Young was one of the jury members in the competition of the memorial's design. His opinion was that the designers first needed to figure out how the memorial process stages worked, before they made a plan for the memorial's design. Young's approach was that the designers needed to understand what the visitors had to remember when visiting Ground Zero, and how this should be achieved. Also, the designers needed to figure out which people the visitors needed to remember: locals, employees, or a fireman. Furthermore, they needed to evaluate what the social, political, religious and communal interests were. (Young, 2006).

Ground Zero became a site that barely replaced what was lost in the terror attack. It became a complex integrative design. On the one hand, space was available to remember the past, and on the other hand, the design focussed on the present life. The design became an accumulation of all the desperate experiences and needs of the people mourning. The design had the capacity to remember together, as well as the capacity to commemorate separately. The memory of the September 11 attack and the rebuilding of Ground Zero became integrated. (Young, 2006). The memorial helped the victims to have a collective memory and helped them to collective mourning. Also, it ensured that the humanity would never forget the reason of the building (Brescò and Wagoner, 2019). Architecture is not only responsible for shaping collective memories, it provides potential for the expression of new identities. (Jones, 2006).

10. Amy Kaplan (1953 - 2020) worked in the interdisciplinary field of the American studies. She focussed in her writing on culture of imperialism, comparative perspectives on the Americas, prison writing, the American novel, and mourning, memory, and war.

11. Larry Silverstein is the Chairman of Silverstein Properties, Inc., a Manhattan-based real estate development and investment firm that has developed, owned and managed 40 million square feet of office, residential, hotel and retail space.

12. George E. Pataki was governor from January 1995 till January 2007. Following September 11, 2001 terrorist attacks, Pataki led New York through a time of mourning and remembrance, and on to recovery and revitalization.

13. Rudolph William Louis Giuliani, short named as Rudy Giuliani, is a American politician and lawyer who served as mayor of New York City from 1994 till 2001. He was especially known for his handling of the September 11 attacks of 2001. He received an honorary knighthood from Queen Elizabeth II for his efforts in the wake of the attacks.

14. The Lower Manhattan Development Corporation coordinated the design process for the rebuilding of the World Trade Centre site. The LMDC focused on placing a memorial honouring the victims.

15. John C. Whitehead (1922 – 2015) was the former chairman of the Lower Manhattan Development Corporation. He helped in the rebuilding of the World Trade Centre site. He was later founding chairperson of the memorial's foundation.



## 4. The design process

This chapter will explain the design process of the memorial. A design competition was held to choose what the memorial had to be. During the process, the designers had to deal with multiple guidelines. The winning design changed in the design process. The chapter will explain the ideas of the winning architect, and how these developed.

### 4.1 The Design Competition

The design process is shown in a timeline (Figure 14). Between July and August 2002, the LMDC held 200 public meetings with 5300 participants. The rebuilding of Ground Zero was the largest public urban planning project in America. From December 2002 through to February 2003, the LMDC managed additional public campaigns. (Micieli-Voutsinas, 2017). On the 14th of August 2002, the LMDC announced a design competition, which purpose was to achieve new ideas by new actors that could help further in the design process. The goal of the competition was to develop a new flexible urban program for Ground Zero. (Hajer, 2005).

The design of the rebuilding was much more than an architectural duty. It was a civic responsibility to all the people who died (Jones, 2006). The rebuilding of the site was public, which means that it was an open and participatory process, resulting in a collaborative design study. The citizens had the opportunity to have an active role in the redesigning. In January 2003, the American citizens held a petition about the architectural design. Their opinion was that Ground Zero should mandate an urban gesture of mega national significance. The rebuilding reflected the Americans and the nation itself. The Freedom tower was inspired by the Statue of Liberty (Jones, 2006).

On the 27th of February 2003, the LMDC announced that architect Daniel Libeskind<sup>16</sup> was responsible for the new urban layout. (Hajer, 2005). His design was called "Memory Foundations". He

compared his architectural vision with his migration experience. The most impressive view he had seen was the American skyline. Libeskind's plan used the remaining footprints of the fallen towers as a part of the memorial. He also planned to restore the skyline and retain the shape of the destroyed towers. (Micieli-Voutsinas, 2017). Furthermore, in his design was the symbolic meaning of the building an important part. The redesign was about American national identity. In his idea, the rebuilding reflected liberty and democracy (Jones, 2006). In figure 10 and 11, the first sketches and ideas of the master plan from Libeskind are shown. The scale model of his masterplan is shown in figure 12.

Between November 2002 and March 2003, the Families Advisory Council of the LMDC appointed a committee in public to formulate a "Memorial Mission Statement" to guide the memorial design and the design process. This group is represented by the families of the victims, business people and other people affected by the terroristic attack. (Young, 2006).

In 2003, the LMDC cited the following points to highlight in the statement. The first point stated that the memorial needed to remember and honour the thousands of innocent men, women and children who died by the terrorist attacks of the 26th of February, 1993<sup>17</sup>, and the 11th of September, 2001. The second point, the memorial has to be a respectful place. The third point, the endurance of those who survived should be recognised, in the memorial. The courage of those who risked their own lives such as the firemen has to be remembered, and compassion has to be given to all the people who helped. As last, the fourth point, the memorial should provide closure, bring new respect to life and an inspiration for the future. (Young, 2006).

In addition, the LMDC developed programmatic guidelines and specific program elements for the

memorial, which were named the Guiding Principles and Program Elements. On the one hand, the Guiding principles must be embodied and conveyed in the memorial. However, it was possible to have various interpretations. The Guiding Principles existed out of the following points. Firstly, the memorial has to embody the goals and spirit of the Memorial Mission statement. Secondly, the memorial had also to represent the physical and personal loss of the site. Thirdly, acknowledgment has to be given to all those who helped. Furthermore, respect has to be an important part of the design and the memorial should encourage reflection and contemplation. Also, the historical background and the details of the attack in 1993 and 2001 has to be shown. Concluding with that the memorial has to inspire people to learn more about the attacks. (Young, 2006).

On the other hand, the LMDC made the Program Elements which provided the designers with specific elements that has to be included in the memorial. Nevertheless, the designers were able to use their creativity. The first point of the Program Elements stated that the memorial has to recognise each individual who was a victim of 1993 and 2001. The second point declared that the memorial also has to provide space for contemplation, such as a space for families and other loved ones. In the third point it was made clear that the memorial had to create a unique and powerful place. For instance, using the footprints of the original towers in the design. Finally, the fourth point was to make sure that the memorial displays historical authenticity. Remaining's of the buildings and the names of the people has to be shown. (Young, 2006).

On the 10th of April 2003, the LMDC announced the World Trade Centre Site Memorial Jury members (Figure 13). The jury consisted of a balanced team of architects and artists (Enrique Norten, Michael Van Valkenburgh, Maya Lin, and Martin Puryear), arts community professionals (Susan Freedman, Nancy Rosen, and Lowery Stokes Sims), academic and cultural historians (Vartan Gregorian and James E. Young), political liaisons (Patricia Harris and Michael. McKeon), a family member (Paula Grant Berry), and a resident and business community leader (Julie Menin). The last jury member, David Rockefeller was appointed to serve as an honorary member, because of his accomplishments and devotions to New York City. (Young, 2006).

On the 28th of April 2003, the LMDC announced the International Competition for a World Trade Centre Site Memorial design. The jury mentioned on this day that they wanted the designers were innovative and

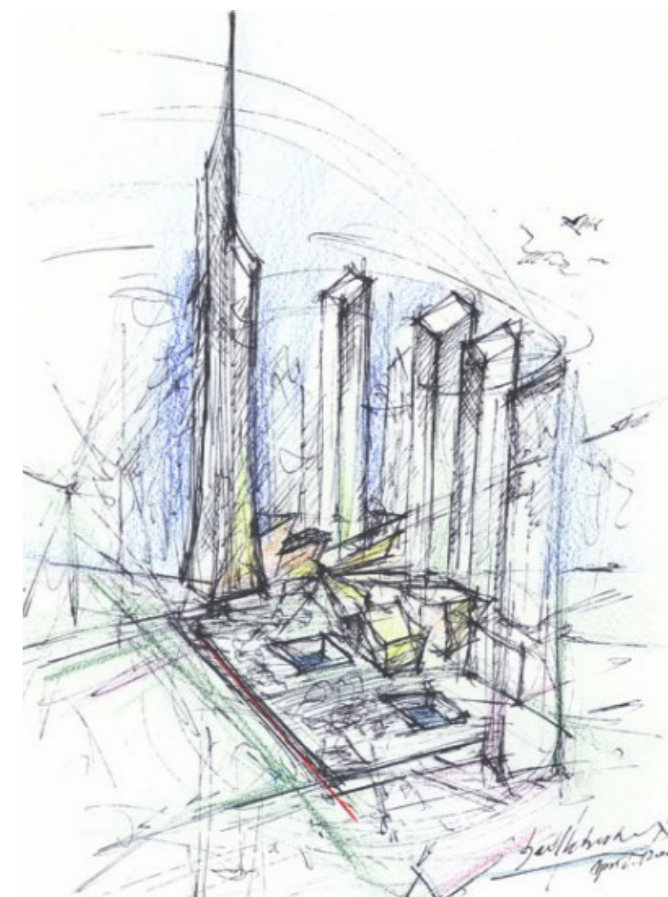


Figure 11: Sketch of Daniel Libeskind's master plan (Studio Libeskind, n.d.)



Figure 12: Scale model of Daniel Libeskind's master plan (Studio Libeskind, n.d.)

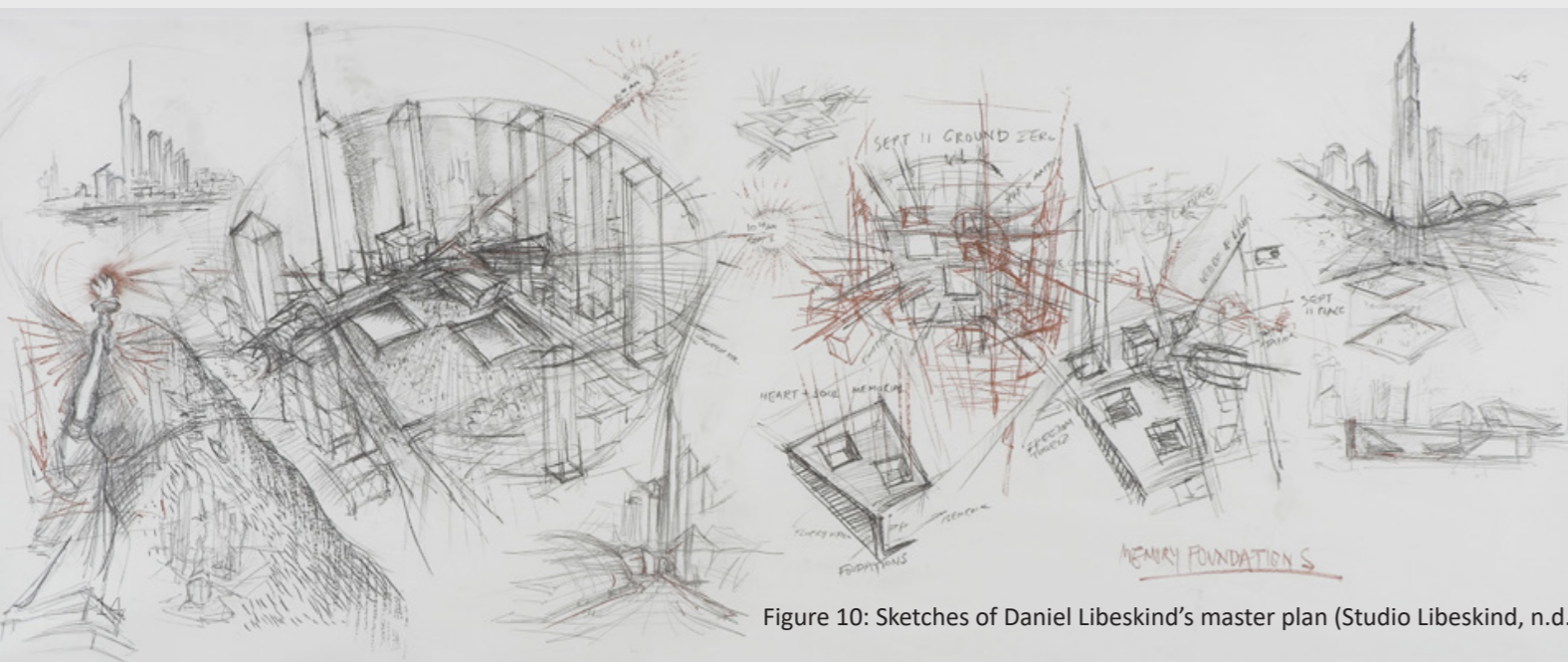


Figure 10: Sketches of Daniel Libeskind's master plan (Studio Libeskind, n.d.)

16. Daniel Libeskind is a Polish American Architect known for complex ideas into his designs. In 1960 he moved to New York City. In 1989, he won the competition to build an addition to the Berlin Museum that would house the city museum's collection of objects related to Jewish history. In 2003 Libeskind won an international competition to rebuild the World Trade Centre site in New York City. (Zukowsky, 2021).

17. On February 26, 1993, a large bomb planted by terrorists exploded in the underground garage of Two World Trade Centre, damaging the base of the building (subsequently repaired), killing 6 people, and injuring some 1,000. (Britannica, T. Editors of Encyclopaedia 2020).

18. David Rockefeller (1915 – 2017) was an American banker and philanthropist. Furthermore, he was a distinguished statesman, long-time leader in the downtown business community, and visionary behind the World Trade Centre. (LMDC, 2003)



think outside the box. All competition registrations were received by the 29th of May 2003. On that day, the LMDC had received 13,800 registrations from ninety-two countries worldwide. In mid-October, the jury selected the best eight designs. (Young, 2006).

During the design competition process, the memorial's design changed due to all the discussions between the jury and the designers. The Master Plan that Libeskind created for the site has to have some changes. The idea of Libeskind was in contrast with all the eight designs that the jury choose. In December 2003 and January 2004, the jury mentioned that the participants needed to elaborate on the details of their design. The final winner of the competition, Michael Arad, needed to work further on the context of the site. Hence, the landscape architect, Peter Walker collaborated with Michael Arad on the design. (Young, 2006, as cited in Micieli-Voutsinas, 2017).

#### 4.2 Design process of the memorial

In the following days after the 9/11 attack, Arad envisioned a memorial that incorporated the element water, because he found consolation along the Hudson River. His first idea was: "two voids tearing open a surface of water and the river failing to fill it up." (Gonzalez, 2012).

For some reason I thought about a memorial actually out in the Hudson River. . . I had this idea of these two voids that would be carved or cut or break the surface of the river, and water would spill into them and these voids would never fill up. This sense of something being torn apart and not mending. That despite all this water that flows into these voids they would never disappear and that sense of absence that I felt was persistent and made visibly persistent. I ended up figuring out a way to design this fountain that I imagined out in the Hudson River. . . . It was very much as I imagined the view might be from New Jersey looking across toward New York, with these voids in the river and the skyline beyond, and the absence in the skyline being made manifest in some way in the surface of the river. . . . I set it aside and came back to it . . . when the competition for the actual memorial site was announced. (Arad, 2010)

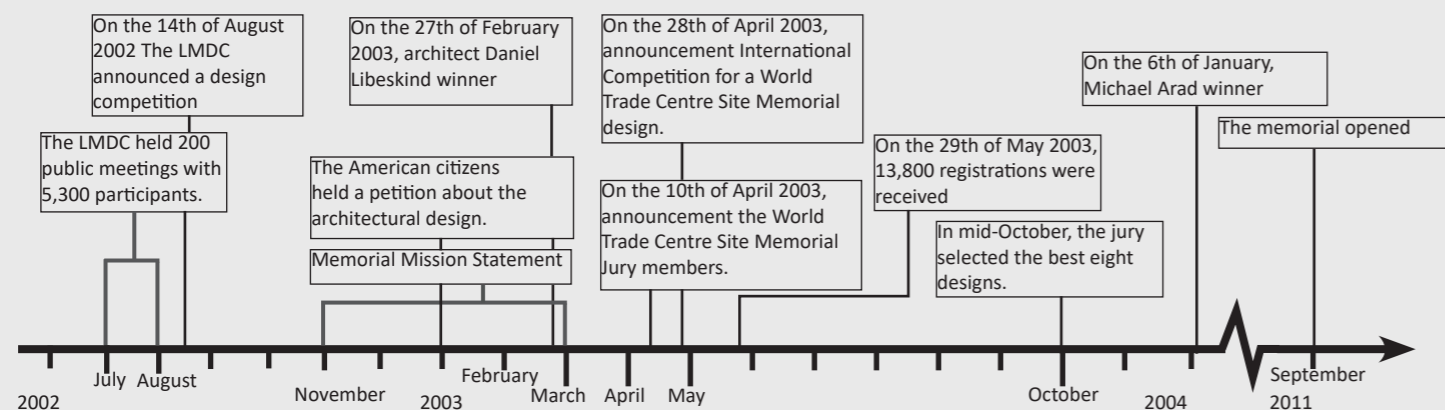


Figure 14: Timeline of the design process of the memorial (Van Minkelen, 2021)



Figure 13: The World Trade Centre Site Memorial Jury members (Young, 2003)

At the beginning of the design competition, Arad chose to ignore some of the requirements of the competition, including the master plan designed by architect Daniel Libeskind. Arad did not agree with the idea of designing a memorial beneath the ground. For the citizens of New York, public space is important. Because of this, Michael Arad disregarded Libeskind's Master plan and decided to design a plan which had an open, street level, public plaza. (Gonzalez, 2012).

In Arad's original design, a below-ground gallery was placed in the footprints of the towers. In this gallery, descending water would be over the engraved names. This part of the design was rejected in 2006. The most important aspect in the original design, was the separation between the living and the dead. The dead would be reflected under the ground and the living would be reflected above the ground (Figure 15).

In the end, Michael Arad did succeed in cooperating water in the design (Figure 16). Two square pools now surround the waterfalls. They start above ground level and end underground. The names of those who died in the attacks and recovery, are inscribed in bronze panels at the plaza overlooking the pools of water. It took several years to order the names of these victims. With guidance from the Memorial Foundation, Arad decided to arrange the names in groups according to where they were at in the time of the attacks. He also took in consideration to arrange the victims in groupings, for example people who were colleagues or friends. After the changes, the construction started and the memorial was opened in September 2011. (Gonzalez, 2012).

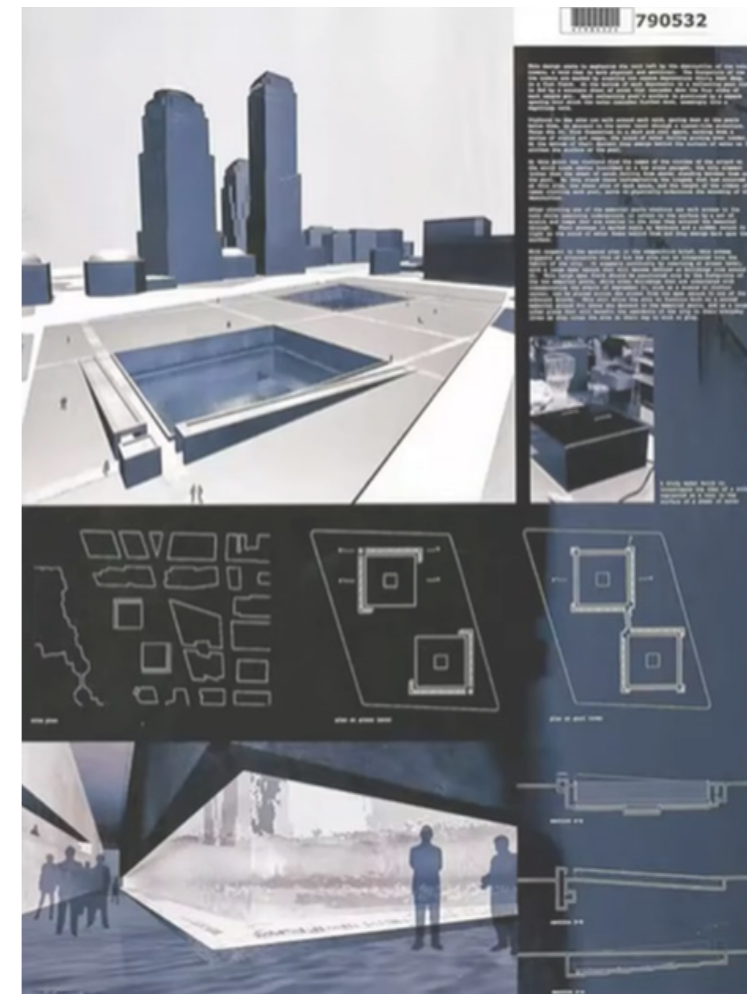


Figure 15: Michael Arad's design registration poster (Arad, 2003)

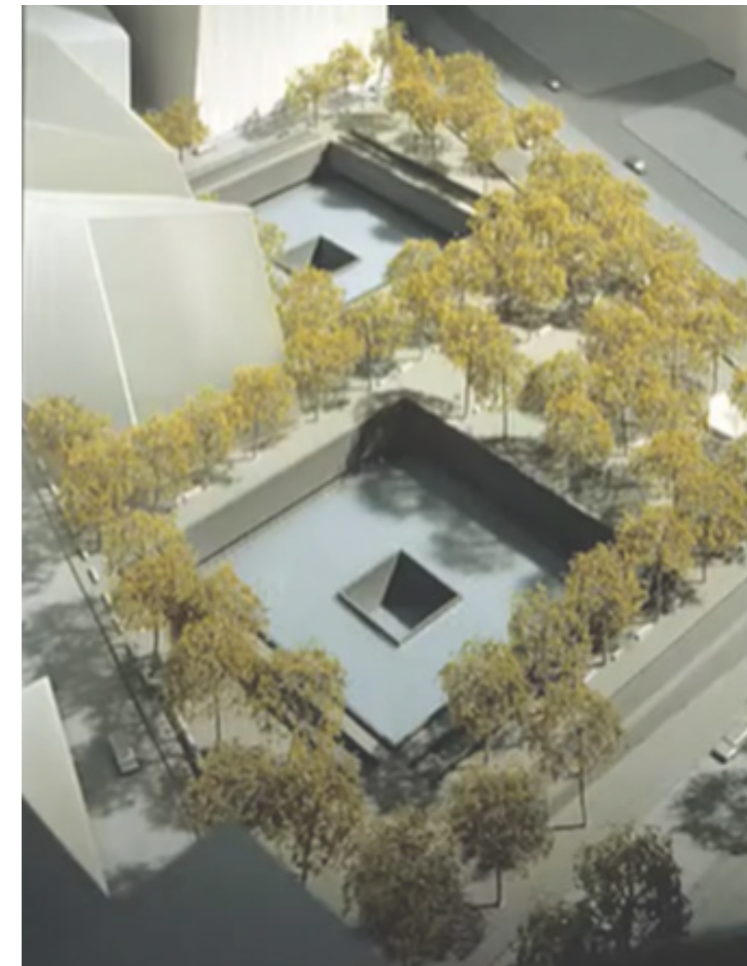


Figure 16: Michael Arad's and Peter Walker's scale model of the memorial's design (Arad, 2003)



## 5. The purpose of the Memorial Plaza

Chapter 5 will explain the purpose of the 9/11 Memorial and the 9/11 Memorial Museum on the Memorial Plaza. Providing the ideas of the architects, Michael Arad and the Davis Brody Bond, that cooperated in the design of the museum and the memorial.

### 5.1 The purpose of the memorial

The city, New York, which was once known by two immense buildings standing out from the crowd in the skyline, transformed into a broken and incomplete city. James E. Young's opinion about symbolics was that New York's symbols and the attack should not be taken literally in the rebuilding of Ground Zero. Instead, the symbolics should be elements of architecture.

Michael Arad, the architect of the memorial, designed the memorial by using these symbolic elements. The architect's inspiration came from the broken, incomplete landscape. His design is called "Reflecting Absence". In his design, two pools were situated within the fallen World Trade Centre Towers' footprints. Absence represents the wound in the city (Micieli-Voutsinas, 2017). However the absence can also refer to a meaning that is left open. To enable the people visiting the monument to form their own opinion. This idea is in line with the opinion of the postmodern architect Charles Alexander Jencks<sup>19</sup> (1980). His argument about symbolism was that the most effective way of symbolising architecture was when the meaning is left 'open' (Jones, 2006). Everything is connected with place, space and time, as academic and cultural historian James E. Young explained in the book *Religion, Violence, Memory and Place* (2006).

Young also explained that the memorial Plaza serves as a unifying element, incorporating contrasting notions of death and life, order and chaos, and absence and presence. The sacred and the profane anchored deeply in the actual events it commemorates, connecting us to the towers, to their destruction and to all the lives lost on that day (Young, 2006, as cited in Baptist, 2015).

The memorial is positioned in the footprint of the North and the South Tower. The waterfalls are located on all four sides, which create the largest human-made waterfalls in America. Arad created two voids through which water flows as if it is being filled by the water (Figure 17). (Micieli-Voutsinas, 2017). The voids of the site are a permanent symbol for many people. The people who lost someone feel an emptiness, a void, in their hearts. Just like the voids in the memorial that never fill. Seeing these voids on the former footprints in Ground Zero is a constant reminder of what happened on that day. Young clarified it as follows, "Nothing seems to remember such loss better than the gaping void itself". (Young, 2006, p. 216).

Many of the people who died on the 11th of September will always be connected to this landscape. The water that never stops falling is equal to our emotions. These emotions affect our sense of time as well as space. It happened almost twenty years ago, however it still has a significant impact on people, the water that never stops falling and the emotions that will never pass away (Micieli-Voutsinas, 2017).

The prominent waterfalls in the enormous holes resulted in a calm landscape. It is remarkable that this memorial is in the middle of a metropolis, where a lot of traffic is seen and noise heard every day. This place is almost silent; this effect makes the area even more beautiful. Around the pools, engraved in the parapets, the names of the 2977 victims of the 11th of September are displayed. (Hammond, 2020). In figure 18, a closeup of the classifying of the names is shown. Figure 19 and 20 show the memorial within the background of the World Trade Centre Towers



Figure 18: The National September 11 Memorial, the names of the victims inscribed in bronze panels (Van Minkelen, 2017)



Figure 19: The National September 11 Memorial in its surroundings (Van Minkelen, 2017)

An abacus grid of white swap oak trees is located at the site, designed by Peter Walker. The site needed more life. During the year, the trees change with the seasons. This is comparable with the cycle of lives, the human cycle. The trees, from east to west, are echoing the New York city grid. While the trees, from north to south, are random organized. On the one hand you've got the randomness of nature and on the other hand the city grid at the same time. Furthermore, how bigger the trees, how deeper the volumes of the voice would become. The memorial site is balanced between life and loss. Life is commemorated and remembered by the falling water. Loss, the fallenness of the towers, is reflected in the falling water. (Young, 2020)

19. Charles Alexander Jencks (1939 – 2019) was an architectural historian, who was regarded as the godfather of postmodernism. (Wainwright, 2019).



Figure 20: The National September 11 Memorial, in the background is the Freedom Tower located (Van Minkelen, 2017)



## 5.2 The purpose of the museum

The memorial and the museum are located at 180 Greenwich Street in lower Manhattan. The museum is designed by the architectural Davis Brody Bond. The museum was dedicated to President Barack Obama on May 15 2014, and it opened on May 21 2014 (Davis Brody Bond, 2021). Despite that the museum is partly above the ground, it is mainly located underneath. When visiting the museum, it is essential to realise whether visitors are above or beneath the ground. The designers clarified the level that visitors are on with their choice of material (Rosenfield, 2019). Above the ground, the museum consists of a glass pavilion with a geometric shape, designed by Snøhetta<sup>20</sup> between 2004 and 2014. This glass building provides a massive amount of natural daylight in the building. An interesting fact about this glass is that the visitor cannot look inside from the outside, yet the visitor can see the outside from the inside. (Bevan, 2014, as cited in Snøhetta. n.d.).

The museum consists of three main exhibitions, all situated underground. The first exhibition, the historical exhibition, is divided into three parts: The Events of the Day, Before 9/11 and After 9/11. The sections use different artefacts, images, videos, recordings or anything else that is left. For the section Events of the Day, remains from the 11th of September are shown (Figure 21). In the section Before 9/11, information on the attack context in 1993 and 2001 is clarified. Lastly, After 9/11 shows the impact that the attack had. In addition, this part of the museum commemorates the people who are missing, the recovery of people, and the rebuilding of the site. (Friedman, n.d., as cited in Micieli-Voutsinas, 2017).

The second exhibition, the Memorial Exhibition, honours those who died in the 1993 and 2001 attack. In this section, many photos of people are placed here. To achieve more knowledge on a person, it is possible to do so via the touchscreen tables. Every victim has a valuable, personal spot in the Memorial Exhibition. (Friedman, n.d., as cited in Micieli-Voutsinas, 2017).

The third exhibition is held in the Foundation Hall, the place where the Slurry Wall is located. This is a remaining wall that survived the attack. This wall is an engineering wonder because it withstood the unimaginable and gigantic destruction of the entire building (Figure 22). (Libeskind, 2003). Also, in this section, the last column is situated. (9/11 Memorial Museum, n.d.). It is important to show the visitors all the things that are left. It does not matter how big or how small that is. What matters, is that people need to embrace reality and see the facts of these attacks through their own eyes. The 11th of September 2001, a day that changed the world. A historical day which cannot be buried. (Friedman, n.d., as cited in Micieli-Voutsinas, 2017).

The architects of the museum had a challenge

20. Snøhetta is a Norwegian International architectural firm specializing in architecture, landscape architecture and interior design, with offices in Oslo and New York. (Snøhetta, 2021).



Figure 21: Artifacts of the National September 11 Museum (Van Minkelen, 2017)

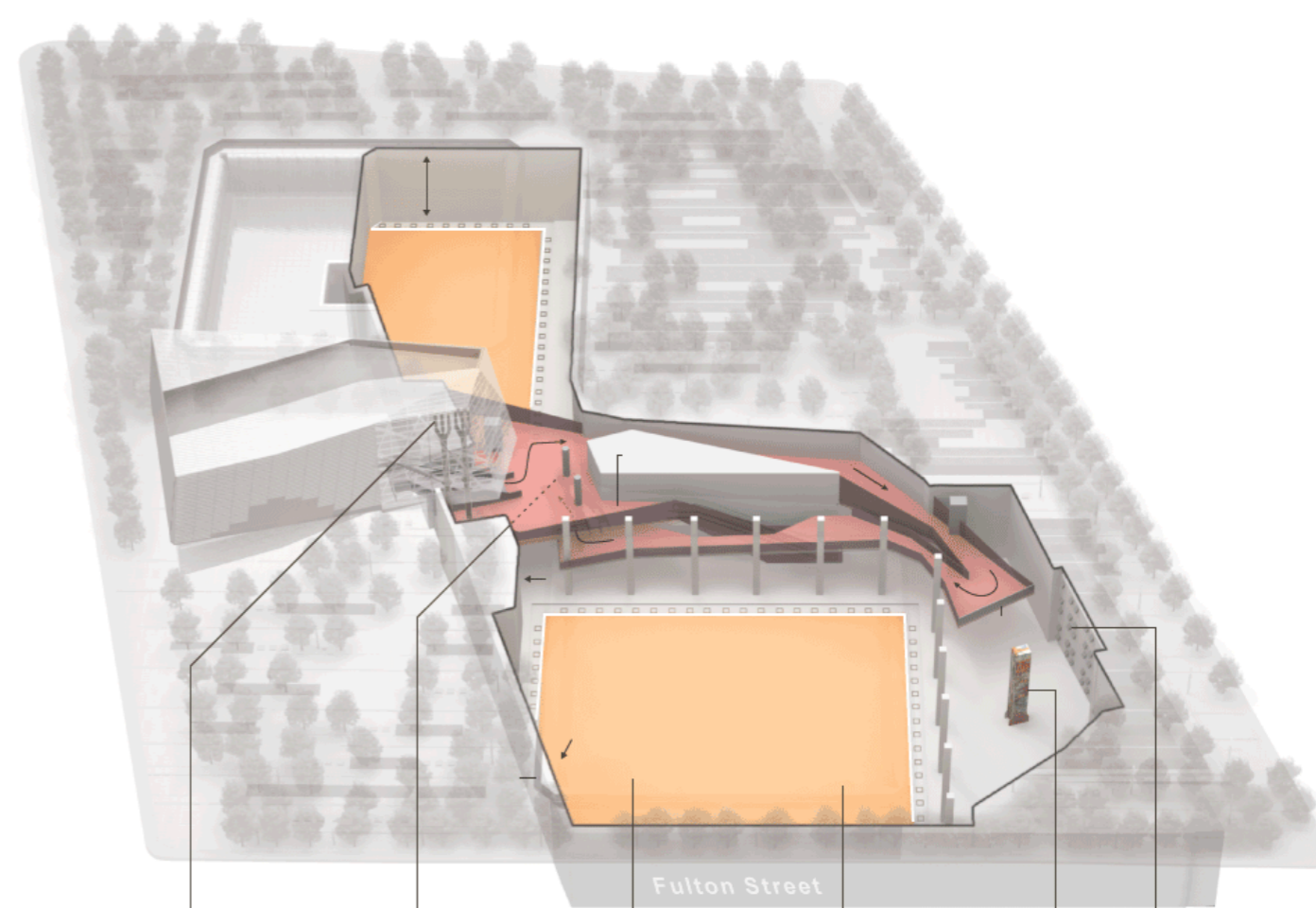
with the design. They considered the sanctity of the site; this resulted in them understanding the impact on people's emotions. Mainly, the museum's purpose is to present the history, however capturing the memories of the attack on 9/11 remains an important part. The attack has a significant impact on many people, which resulted in a very dynamic environment. The museum is designed on four principles: memory, authenticity, scale and emotion. (Friedman, n.d., as cited in Micieli-Voutsinas, 2017).

The first principle is memory. The people and visitors must remember what happened on the 11th of September and what existed on the site before. Many people visited these buildings, and for many more, it was a huge part of their lives. Moreover, the World Trade Centre Towers were a part of the New York skyline and the city itself.

The second principle is authenticity. The museum shows the historical context in multiple ways. The museum is connected with the World Trade Centre Towers' history, for instance, showing artefacts or former columns. (Rosenfield, 2019)

The third principle is the scale. Both the buildings, as well as the impact of the attack on these buildings were huge. The Foundation Hall shows this scale using long walls (18,3 Meter) and the 58-ton steel column called 'the last column'. (Rosenfield, 2019)

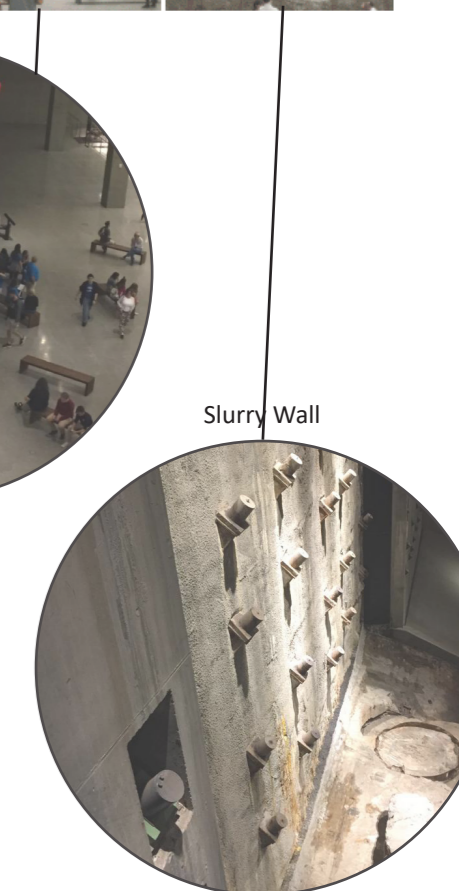
The fourth principle is emotion. The experience of the visitors was an import consideration in the design. In the museum, the visitors will see subjects with enormously emotional intensity. In the procedure, it had also been taken into account that the memorial should had places to honour people. (Rosenfield, 2019)



Survivors' Stairway



Last Column



Slurry Wall

Figure 22: Collage of the National September 11 Museum (Roberts, 2012, and Van Minkelen, 2021)



## 6. Architectural analysis of the 9/11 Memorial

Chapter 6 will present how the memorial and the museum are designed through an analysis of the materials, shaping and its routing. After that, it will explain how the plans and sections are organised. In the end, the chapter will take a closer look at the architectural details of the museum.

### 6.1 Materials

The division in the materials is based on the location. Everything that is positioned above the ground consists of light materials such as wood or glass, and the materials under the ground are heavy. These materials located underground are more robust than the light materials, they include concrete. The Davis Brody Bond did this on purpose, because in their opinion people should be aware of their surroundings (Rosenfield, 2020). This is seen at the entrance of the museum above the ground, where a staircase is placed. It starts as a wooden staircase (Figure 24), which flows in a metal ramp (Figure 25) going below the ground, ending as a concrete staircase (Figure 26). The Davis Brody Bond uses a few remnants of the former columns in the museum—the combination of this metal and concrete results in a raw character underground. (Rosenfield, 2020).

### 6.2 Forming of the shape

The Memorial Plaza gets its characteristics from the voids. On these voids, the Twin Towers were positioned. It is reasonable to form the memorial around these voids, as it is an important site filled with emotions. (Rosenfield, 2019).

The museum is connected to the memorial. The memorial and the museum are well-integrated architectural designs (Figure 23). The two are connected and are seen as one (Baptist, 2015). The museum is designed above the ground, between the two voids (Figure 27). The two exhibition halls are situated beneath the ground; both are placed in one of the gaps (Figure 28). The historical exhibition gallery is placed under the North Tower, and the memorial exhibition is set below the South Tower (Rosenfield, 2020). The museum consists of three main exhibitions, the historical exhibition (green), the Memorial Exhibition (yellow), and the Foundation Hall (blue).

The museum has an above ground entrance. The entrance is positioned in a geometrically shaped pavilion made of glass. The designer of the pavilion is Snøhetta. He was commissioned to design the only building on the site. Because it is the only building on the Memorial Plaza, the designer thought carefully about the shape. The site is surrounded by high skyscrapers, everything is vertical.

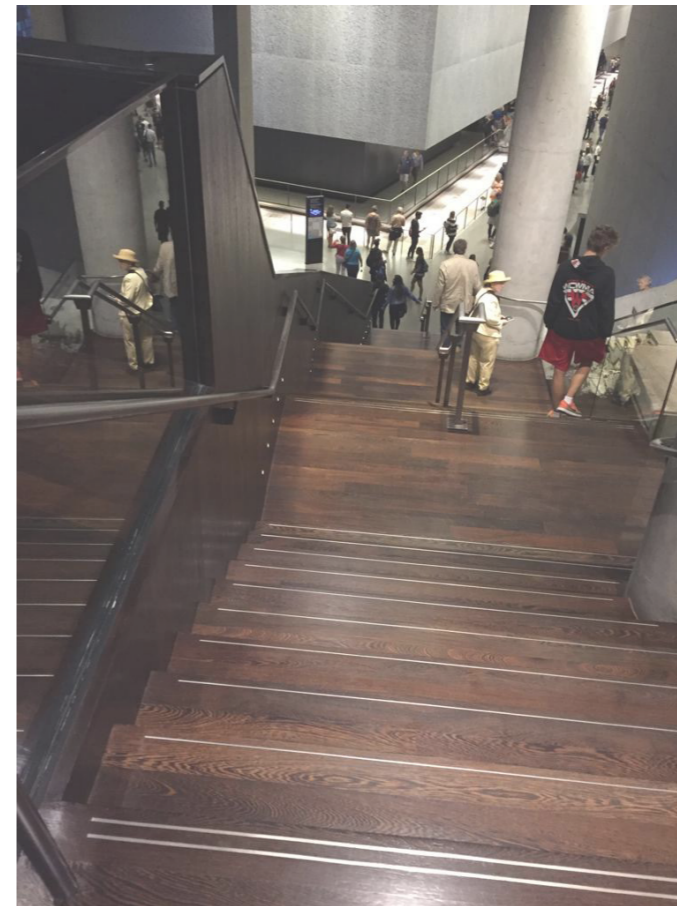


Figure 24: Wooden stairs in the National September 11 Museum (Van Minkelen, 2017)

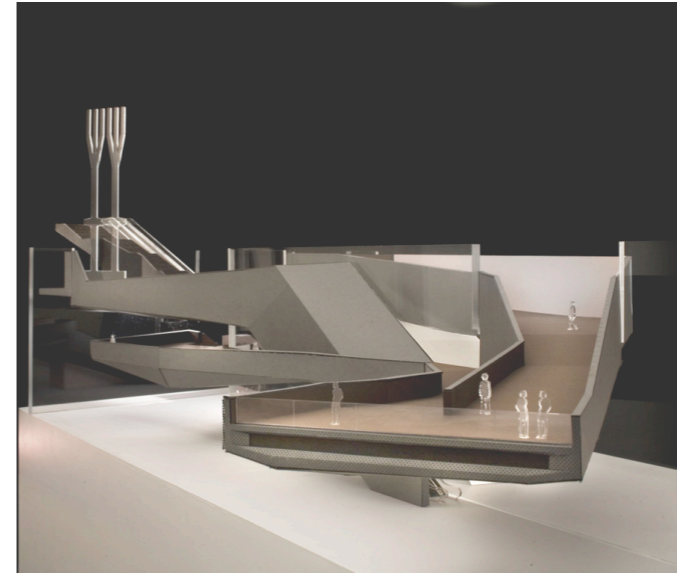


Figure 25: Close up of model of the Metal ramp in the National September 11 Museum of the "Ribbon" (Davis Brody Bond, n.d.).

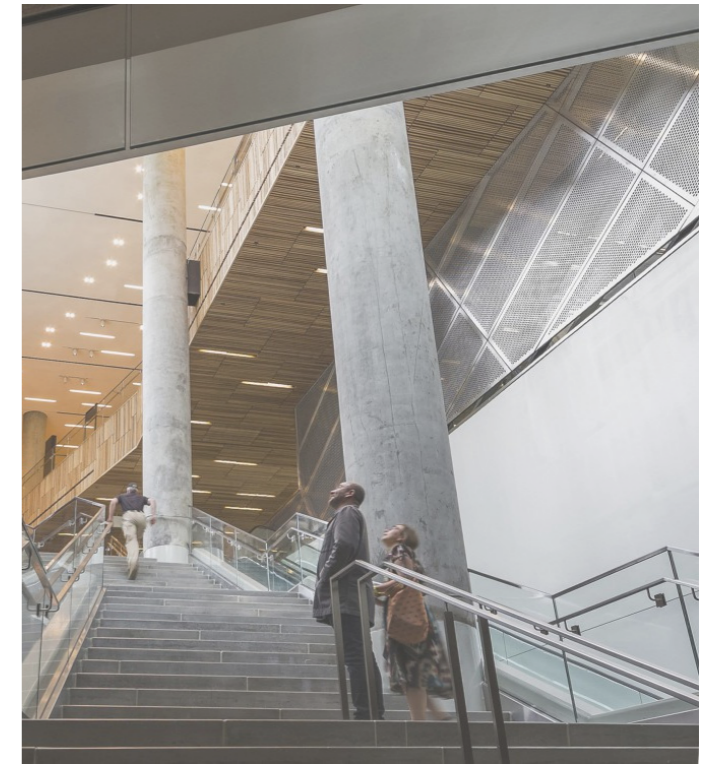


Figure 26: Concrete stairs in the National September 11 Museum (Davis Brody Bond, n.d.).

As a reaction to the surroundings, the pavilion's design is in contrast with the vertical buildings, because of its horizontal design. The building has a geometric shape, creating a lively organic shape in the area. This idea is also in contrast with the rest of the site, where the central theme is mourning and honouring the 2,997 people who died on September 11. The building is designed to help people physically engage with it, for this reason, a lot of glass is placed. People can go to the glass and touch it; however, people cannot look inside. This is comparable with the memorial, people look closely at the water, still they can never see the end. The glass makes the building visible and touchable. A vast amount of daylight is captured in the building, which in my opinion, illuminates the building. The façade also consists of reflective mirrors, resulting in different façades during the seasons (Snøhetta, n.d.). The pavilion functions as a connection point between the memorial, the museum and the site. It is a bridge between above and below the ground. (Bevan, 2014).

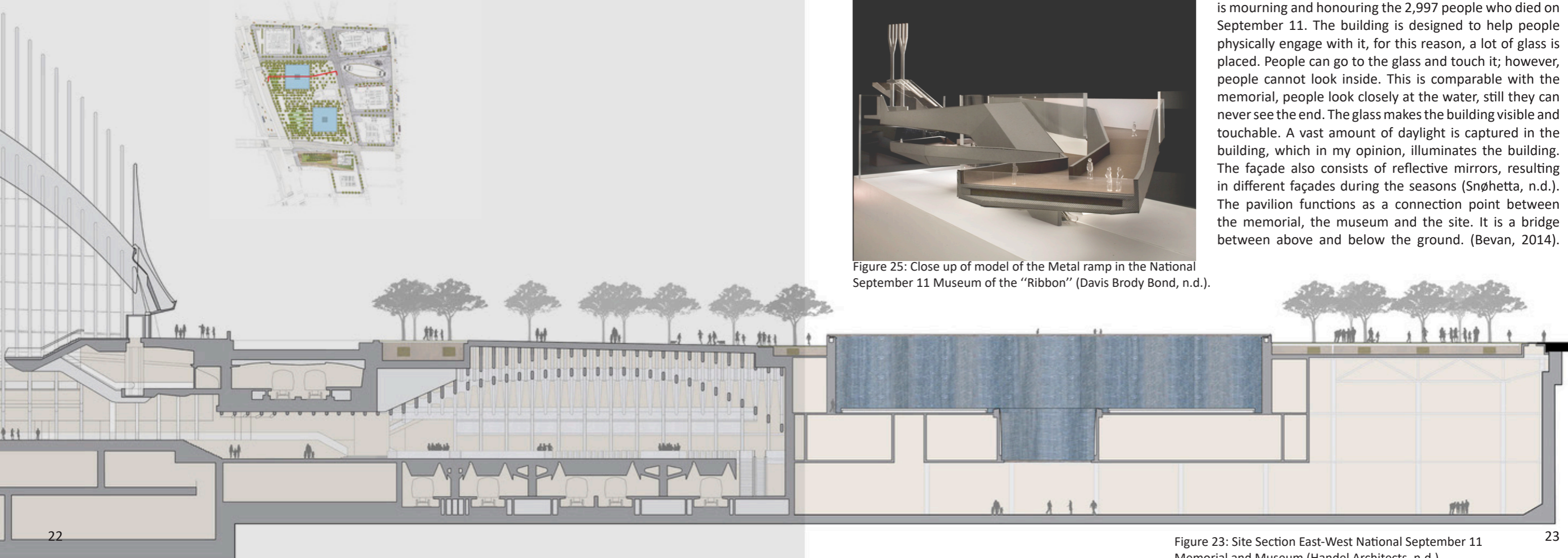


Figure 23: Site Section East-West National September 11 Memorial and Museum (Handel Architects, n.d.)



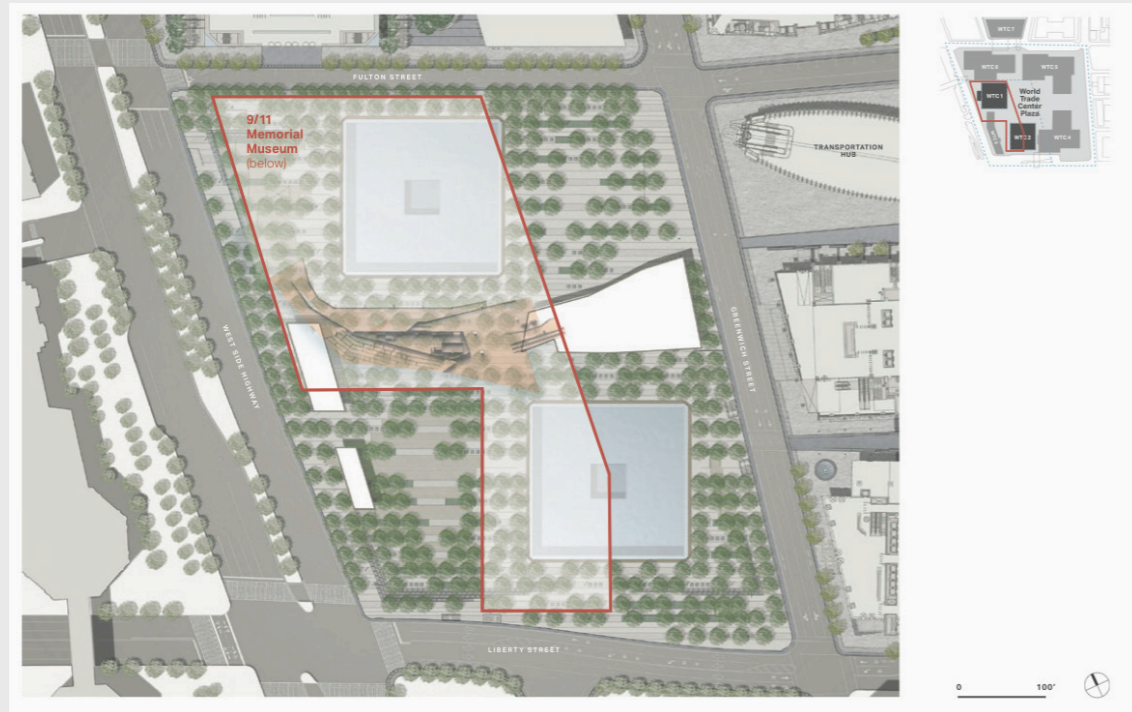


Figure 27: Site plan National September 11 Memorial and Museum (Davis Brody Bond, n.d.).



Figure 28: Function plan National September 11 Museum (Davis Brody Bond Architects and Planners, n.d., and Van Minkelen, 2021)

### 6.3 Routing

It is an important aspect for the visitor to realise where they are positioned in the building (Rosenfield, 2019). For this reason, routing plays an essential part in the visitor's experience. The main part of the museum is situated 70 feet below the ground. A metal ramp is placed to access the museum underneath the ground. The ramp, called the "Ribbon", shows the visitors historical context of the Twin Towers while going down into the ground. It shows the visitors the complete history of the Twin Towers, the attack in 1993 and the attack in 2001. In figure 29 and 30 red arrows are drawn to display the route going underground and aboveground. While walking downstairs, the visitors can see the remaining columns and foundations—these remnants show how colossal the towers were. The 'Survivors Stairs' are located at the end of the Ribbon, which hundreds of people used to escape from the building (Figure 22). This vital point is the entry to the two exhibition spaces and the Foundation Hall. (Rosenfield, 2020, as cited in Davis Brody Bond, 2021).

The experience of the museum is divided into four primary stages. First, the entrance, which is located at the Glass Pavilion (Figure 31). Second, the visitors, who go down under the ground to enter the Memorial Hall, which is followed by the two exhibition halls (Figure 32). Third, at the end of the path, "the bedrock," known as the West Chamber, which contains the original World Trade Centre's foundations. Fourth, the final stage, the route from the bedrock back to the Memorial Hall, which is followed by the memorial fountains above the ground (Figure 33). (Rosenfield, 2019).

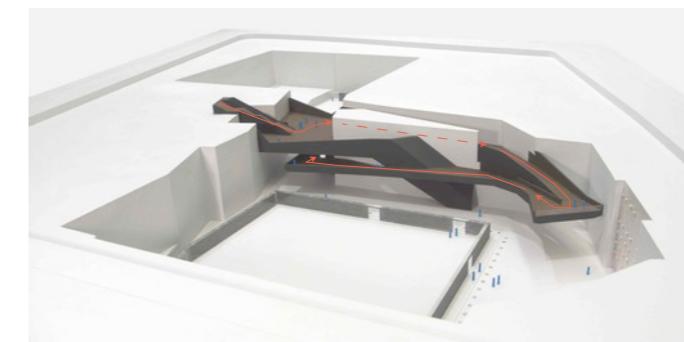


Figure 29: Routing going below the ground, Model of the "Ribbon" (Davis Brody Bond, n.d., and Van Minkelen, 2021)

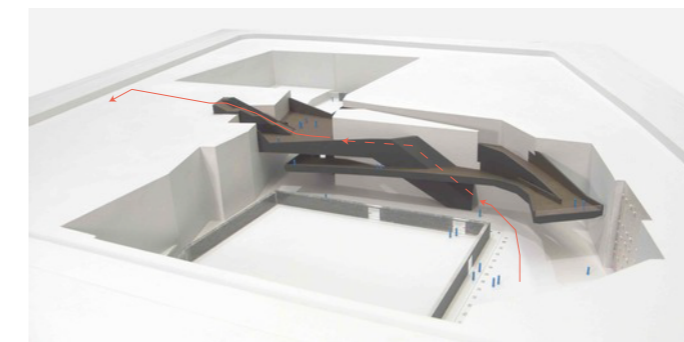


Figure 30: Routing going above the ground, Model of the "Ribbon" (Davis Brody Bond, n.d., and Van Minkelen, 2021)

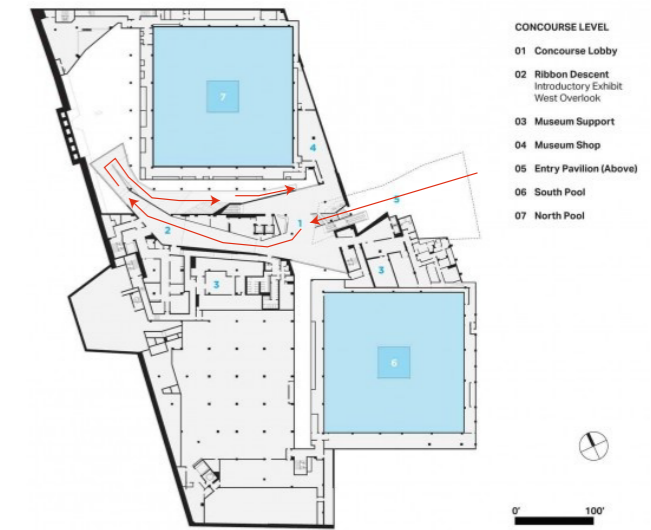


Figure 31: Routing National September 11 Museum, part 1 (Davis Brody Bond Architects and Planners, n.d., and Van Minkelen, 2021)

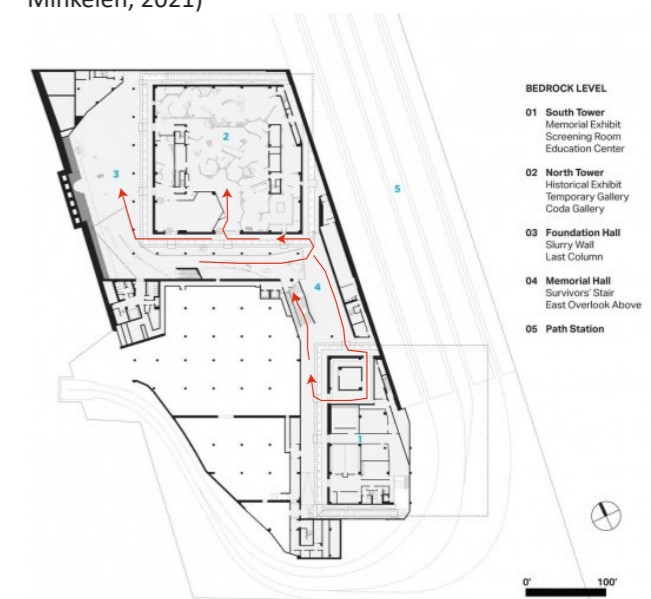


Figure 32: Routing National September 11 Museum, part 2 (Davis Brody Bond Architects and Planners, n.d., and Van Minkelen, 2021)

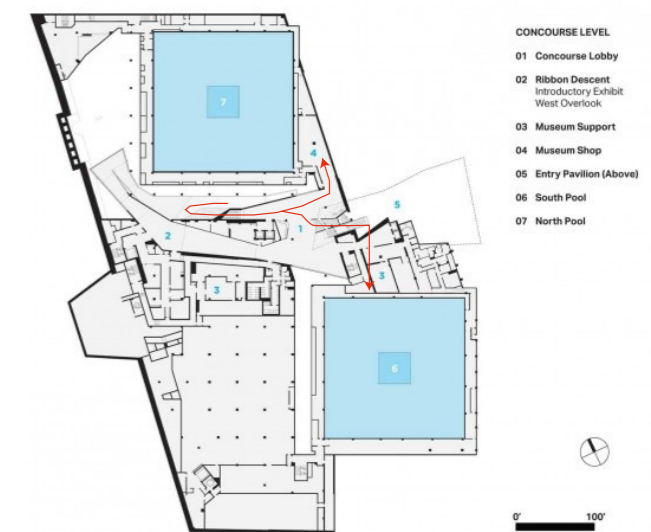


Figure 33: Routing National September 11 Museum, part 3 (Davis Brody Bond Architects and Planners, n.d., and Van Minkelen, 2021)



## Conclusion

The Japanese-American architect Minoru Yamasaki designed the World Trade Centre towers. Because of the towers, more space was available, making it possible to create a public space in the form of a plaza. The buildings were symbolic of the business centre, and functioned in promoting internal trade and catalysed economic prosperity. The towers were iconic for the architecture in New York, they operated as an important medium used by the nation to express its cultural identity. The Hudson River played an important role in the World Trade Centre design. Because of the river, the surrounding soil contained a lot of moisture. The September 11 attack was the most deadliest in American history. The tallest buildings globally abruptly collapsed into Ground Zero, due to terrorism. The term Ground Zero was a confusing term. The World Trade Centre became on the one hand empty. The barren earth was the only thing that remained after the destruction. On the other hand, the site was mentally not empty at all. People found themselves in a situation that was unimaginable, not realising yet the impact of their loss of loved ones, and not knowing how to process their memories. Also, the term Ground Zero is used as a tabula rasa. Amy Kaplan explained Ground Zero as the bottom line, for a new purpose or function.

It was a difficult task to replace these voids with the former high-quality architecture. The design of the rebuilding was much more than an architectural duty. It was a civic responsibility to all the 2997 people who died. Besides this, the immense emotional value of Ground Zero was also an important aspect to consider. Port Authority of New York and New Jersey, and the developer Larry Silverstein had the legal rights and the ownership of the site. They all had a significant interest in building new offices, because the site used to function as a business sector. Governor George E. Pataki and Mayor Rudolph William Louis Giuliani, did not approve of that idea. Instead, the rebuilding had to take into consideration the families of the victims and other loved ones. The Lower Manhattan Development Corporation agreed on that the organisation took into account the many sensitivities during the rebuilding process. John C. Whitehead, the head of LMDC, suggested the idea of making a park. This park created a public space, which was in line with the former function of the World Trade Centre Plaza.

On the 27th of February 2003, the LMDC announced that the architect Daniel Libeskind was responsible for the new urban layout. His design, "Memory Foundations", used the remaining footprints of the fallen towers as a part of the memorial. In addition, Libeskind planned to

restore the skyline and retain the shape of the destroyed towers. Furthermore, in his design, the symbolic meaning of the building was an important part. The redesign was about American national identity. In his idea, the design reflected liberty and democracy. In January 2004, the LMDC selected the design, "Reflecting Absence", of Michael Arad and Peter Walker as the winner of the International Competition for the World Trade Centre Site Memorial design. Arad did not agree with the master plan designed by architect Daniel Libeskind. His opinion was that for the citizens of New York, public space is very important. Because of this, Michael Arad disregarded Libeskind's master plan of designing a memorial beneath the ground. Therefore, he decided to design a new plan which had an open, street level, public plaza. The design had a separation between above and below the ground. This was an important aspect in the original design of Michael Arad, to make a separation between the living and the dead. The dead would be reflected under the ground and the living would be reflected above the ground. James E. Young explained that the Memorial Plaza served as a unifying element, incorporating contrasting notions of life and death, order and chaos, and presence and absence.

Another important aspect was the incorporation of water in the memorial's design. Michael Arad got his inspiration for the design from the Hudson River. Moreover, he got inspiration from the broken, incomplete landscape that remained after the attack. The towers were remembered by their bold footprints. Life was commemorated and remembered by the falling water. Furthermore, the collapsing of the towers is shown in the falling water. In addition, the falling water reflects the huge amount emotions. These emotions affect our sense of time as well as space. The water that never stops falling and the emotions that will never pass away. Another aspect that the architect used are the voids. The voids of the site are a permanent symbol for many people. The people who lost someone feel an emptiness, a void, in their hearts. Just like the voids in the memorial that never fill. Seeing these voids on the former footprints in Ground Zero is a constant reminder of what happened on that day. As Young clarified, "Nothing seems to remember such loss better than the gaping void itself". (Young, 2006, p.216).

The memorial and the museum are well-integrated architectural designs. The two are connected and are seen as one (Baptist, 2015, p.5). The museum is designed above the ground, between the two voids. Despite that the museum is partly above the ground, it is mainly located underneath. Above the ground, the museum consists of a glass pavilion with a geometric shape, designed by Snøhetta. As a reaction to the surroundings, the pavilion's design is in contrast with the vertical buildings, because of its horizontal design. The building has a geometric shape, creating a lively organic shape in the area. This idea is also in contrast with the rest of the site, where the central theme is mourning and honouring the 2,997 people who died

on September 11. The pavilion functions as a connection point between the memorial, the museum and the site. It is a bridge between the above and below the ground. When visiting the museum, it is essential to realise whether visitors are above or below the ground. The designers clarified the level that visitors are on with their choice of material. Everything that is positioned above the ground consists of light materials, and the materials under the ground are heavy. The museum is designed on four principles: memory, authenticity, scale and emotion. The first principle is memory. The people and visitors must remember what happened on the 11th of September and what existed on the site before. The second principle is authenticity. The museum must show the historical context in multiple ways. The third principle is the scale. Both the buildings, as well as the impact of the attack on these buildings were huge. The museum shows this principle with the huge artifacts such as the last column, the Survivor Stairs and the Slurry Wall. The fourth principle is emotion. The experience of the visitors is an important consideration in the design.

Both the memorial as the museum make use of a lot of contrasts and symbolics. The contrasts are used to create a balanced design. A balance between order and chaos, the presence and absence, 110 elevations high and Ground Zero, vertical and horizontal, light and heavy, and the life and death, was needed to make a design that to represent a traumatic historical incident. Architecture was a valuable medium to honour and mourn the victims of September 11. It helped in forming collective memories, and using the symbolics, it created potential for the expression of identities, democracy and liberty. In short, the architecture of the memorial appeared to be successful in setting up the right conditions for deep feelings of grief and memory.



Figure 34: An aerial view of 9/11 Memorial in New York (Lee, 2015)



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