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John Zukowsky

New Military Museums

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Museum architecture has blossomed over the past few decades. Art museums lead the way in terms of new buildings by superstar architects such as Frank Gehry, Herzog and de Meuron, Jean Nouvel, and Renzo Piano, among many more. Those facilities have received public and professional recognition through media attention and design awards. But other museum typologies exist, one such being for buildings that showcase military history and artifacts. All too often, one thinks of these as unsophisticated in their design and amateurish or antiquated in their exhibitions. Nowadays, nothing can be further from the truth. This volume examines more than thirty of them internationally that were constructed over the past two decades and more. The museums are featured in individual entries and lavish color photography. Some were designed by internationally renowned architects such as Norman Foster, Daniel Libeskind, Skidmore Owings & Merrill, and Robert A. M. Stern, but many more are the products of creative, accomplished designers. Beyond the architecture of these museums, exhibition and installation designs by noted specialist firms such as Ralph Appelbaum Associates, Koosmann.dejong, and Gallagher & Associates, among others, have raised the bar in terms of immersive experiences for their visitors.

New military museums presented within the book are examined within the context of the history of war memorials and military museums, the latter being a less well researched subject. In the end, military museums relate back to antique sculptural commemorations of victorious campaigns and martial leaders, collections and displays of war trophies, and the search to find useful architectural memorials, the latter especially so after the World Wars of the twentieth century.

Architectural historian John Zukowsky has an earned doctorate from Binghamton University. While curator of architecture for The Art Institute of Chicago (1978–2004), he organized a number of award-winning exhibitions accompanied by major books. After that, he held executive positions within military-related museums such as the Intrepid Sea, Air & Space Museum and the Pritzker Military Museum and Library. Since 2012 he has authored several books about architecture and design, including *Why on Earth Would Anyone Build That* (2015), *Building Chicago: The Architectural Masterworks* (2016), and *Architecture Inside – Out: Understanding How Buildings Work* (2018).

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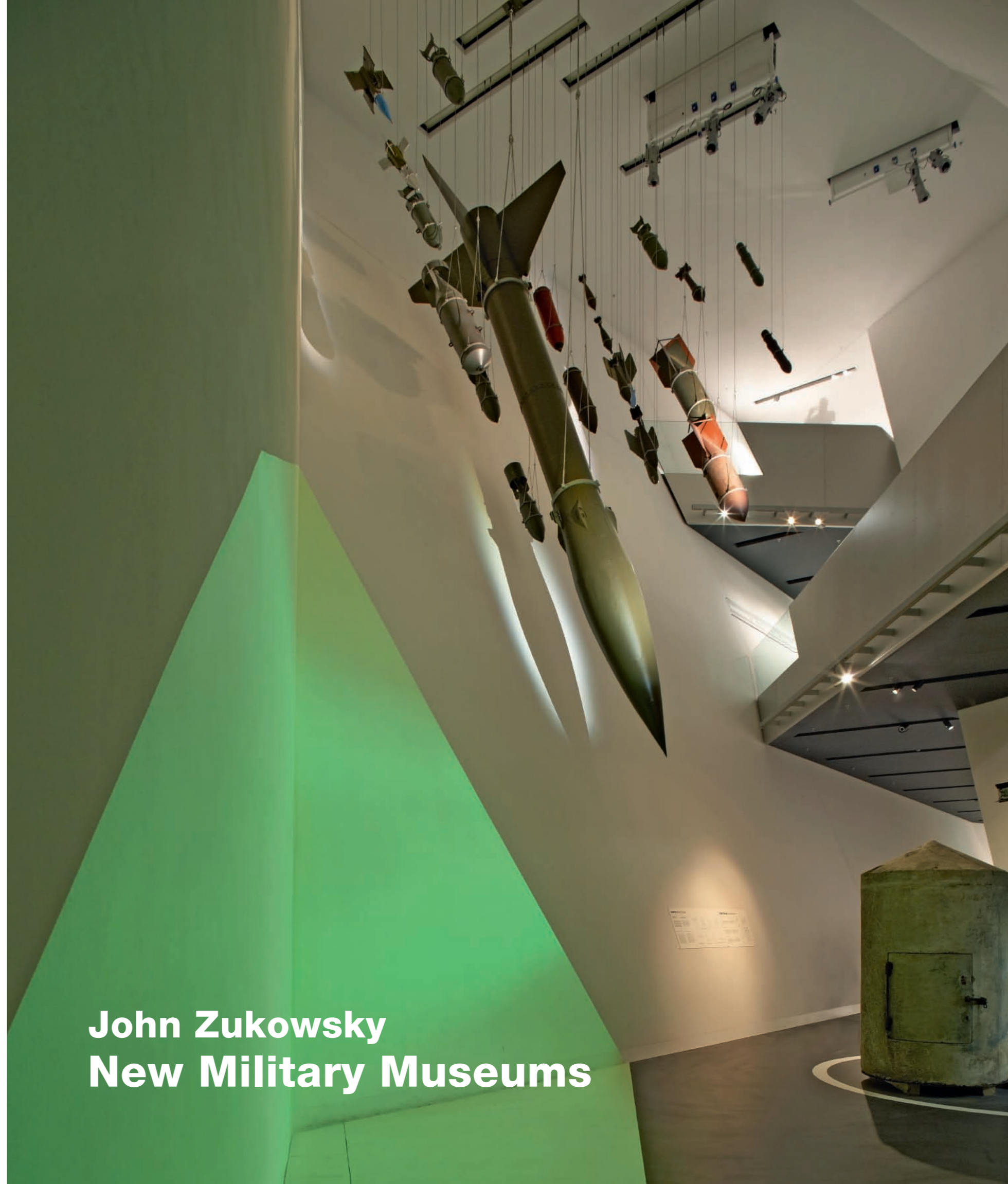
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Capt. Dave Truitt

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New military museums: honoring service and sacrifice

Art museums are often considered to be the epitome of museum architecture. I should know, I worked at one for more than two and a half decades in the last quarter of the twentieth century. All you have to do is browse the architecture and design magazines over that time period to see that this is true. From the 1970s through the first decade of the twenty-first century, the whole world witnessed a host of them being constructed – many of them by »A-list« architects. In the United States, these include the National Gallery of Art addition designed by I.M. Pei and the Metropolitan Museum's new Sackler Wing to house the Temple of Dendur by Roche and Dinkeloo, both opening 1978. Newer ones include Renzo Piano's Modern Wing of the Art Institute of Chicago (2009) and his Whitney Museum of American Art (2015), along with Norman Foster's Art of the Americas Wing at the Museum of Fine Arts in Boston (2010), and more recently the Broad Museum (2015) by Diller, Scofidio and Renfro.

This phenomenon was not only seen within America's borders. Perhaps the most famous examples are Parisian, such as the Centre George Pompidou (1977) by Piano and Rogers, the Musée d'Orsay (1986) by Gae Aulenti, and the Grand Louvre (1989) by I.M. Pei. Frank Gehry's Guggenheim Bilbao (1997) in Spain brought this to another level. The latter inspired a two-decade long competitive building boom by »star architects« designing major art museums that recently witnessed the completion of Jean Nouvel's Louvre Abu Dhabi (2017) in the United Arab Emirates. When you think about it, high profile architects have almost always been the ones to build major art museums even before then, especially in the International Modernist era after World War II (1939–45). Buildings such as Frank Lloyd Wright's Guggenheim Museum in New York (1959), Ludwig Mies van der Rohe's New National Gallery in Berlin (1968), and Louis Kahn's Kimbell Art Museum (1971) in Ft. Worth are in just about every architectural survey. This doesn't mean that history or science museums have been completely ignored over those decades. Examples that come to my mind are the Holocaust Memorial Museum (1993) in Washington by James Ingo Freed of I.M. Pei (illus. 1) with its dramatic exhibitions by Ralph Appelbaum, the I.M. Pei addition to the Zeughaus in Berlin (2006) to create the Deutsches Historisches Museum in Berlin, the Cité des Sciences et de l'Industrie (2006) in Paris by Adrien Fainsilber, and David Adjaye's National Museum of African American History and Culture (2016) in Washington, also with Appelbaum-designed installations.

Even though you would find some science centers or history museums touted within this sequence, the art museum most certainly received the lion's share of magazine publicity in terms of recognizing professionalism of presentation. This also goes beyond big-budget major facilities cited above to somewhat smaller ones that have received acclaim in their own time, from Philip Johnson's Munson-Williams-Proctor Arts Institute (1960) in Utica, New York to the Glass Pavilion of the Toledo Museum of Art (2006) in Ohio by Kazuyo Sejima and Ryue Nishizawa, and Shigeru Ban's Aspen Art Museum (2014) in Colorado.

By comparison, when we think of military museums, we often think of a stereotype of antiquated buildings and their exhibit installations as staid or amateurish. Military museums, however, have had a design renaissance since the 1990s. Perhaps this relates to a greater appreciation of military service and sacrifice since the successful coalition in the Gulf War of 1991. This is so not only in the United States but also throughout the world, and especially in the United Kingdom, in part, because of lottery support of museums. This book intends to visually survey examples from the early 1990s through the present in terms of this newfound appreciation, especially as regards new architecture and exhibition design. I believe it is the first such volume to do so. Although not a definitive survey, it brings together museums from across the globe, done over the past twenty-five years. It is my hope that readers will view newer military museums as significant as other museum types in terms of the sophistication of their buildings and installations. Before we embark on this pictorial survey, it would be good to review some historic architectural examples that commemorate the military, either in free-standing sculptural memorials or actual buildings. This will not be a comprehensive survey of war memorials nor like museums, yet the ones discussed in this introduction will help to provide a context for understanding those museum buildings being done today.

The war memorial, past and present

A number of military museums use words such as commemorate, honor, inspire and educate within their mission statements and taglines. Their exhibits and missions are often both commemorative, as well as memorializing. War memorials themselves have a prolific past that dates back millennia, with examples in Egyptian obelisks, and Roman triumphal arches and victory columns. Specific monuments such as the Arch of Titus c. 81CE and Trajan's Column of 113CE are directly associated with Imperial military victories. These are illustrated with narratives of conquest, depicted in relief sculptures on those triumphal forms. The triumphal arch, victory column, and even variations on the obelisk, are forms long associated with historicist war memorials in the nineteenth and twentieth centuries. They can be seen across the globe commemorating various wars, leaders, and their combatants. Some of these are obvious to tourists. They include: the Bunker Hill Battle Monument (1843) in Boston, Massachusetts, an obelisk 221 feet (67 m.) high designed by Solomon Willard; the 169 foot (51.6 m) high Nelson Column (1843) in London's Trafalgar Square, designed by William Railton and others, and dedicated to Admiral Horatio Nelson's 1805 victory; the 219 foot (66.89 m) high Siegesaule or Victory Column in Berlin (1873) by Heinrich Strack, with the gilt bronze statue of *Victoria* by Friedrich Drake, all commemorating Otto von Bismarck's wars to unify Germany; and the 164 foot (50 m.) high Arc de Triomphe (1836) at the Champs-Élysées in Paris, designed by Jean-François-Thérèse Chalgrin in 1806 to commemorate Napoleon's victory over Russia and Austria at Austerlitz.

Variations on these major landmarks can be found across the globe. Perhaps the largest may



1. The Holocaust Museum, Washington, D.C., 1993. Photo: Carol M. Highsmith Archive, Library of Congress, Prints and Photographs Division.
2. Thiepval Memorial, Thiepval, France, 1932. Photo: shutterstock.com.
3. Bavarian War Memorial, Munich, 1924. Photo: shutterstock.com.
4. Indiana War Memorial Museum, Indianapolis, 1933. Photo: Carol M. Highsmith Archive, Library of Congress, Prints and Photographs Division.
5. Soldier Field, Chicago, 2003. Photo: shutterstock.com.



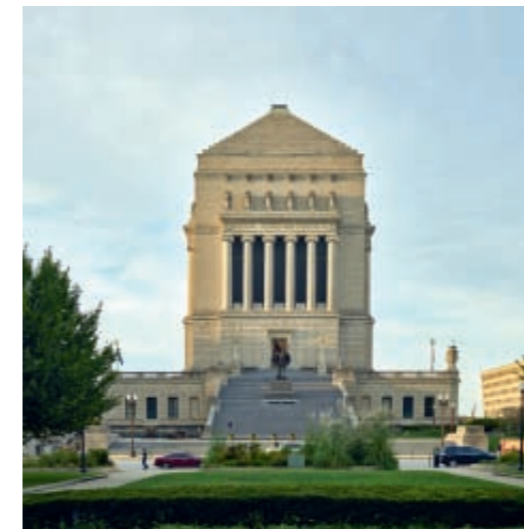
be ones that commemorate World War I (1914 to 1918). This proverbial »war to end all wars« experienced more than 18 million civilians and military personnel dead and 23 million wounded. This was a staggering number that was more than four to five times the deaths during the Napoleonic Wars a century earlier. World War I memorials include large and small-scale variants of columns, obelisks, and triumphal arches as well as more Modernist plinths and slabs. They include the powerful Thiepval Memorial (1932), a monumentally arched, 140 foot high (43m) stone and brick monument. It was created by Sir Edwin Lutyens to commemorate more than 72,000 missing British and South African troops during the Battle of the Somme in 1916 (illus. 2). Others were either subject referenced or more abstract, the latter influenced by the increasing simplicity of Modernist design in the 1920s. The stylized ship-like prow of the 236foot high (72 m) Marine Ehrenmal or Naval Memorial (1936) in Laboe near Kiel, by Gustav August Munzer, is dedicated to all navy personnel who died in wars. Modernist planar ones include the simple slabs of the War Memorial (1924) in Munich's Hofgarten by Thomas Wechs and Eberhard Finsterwalder or the War Memorial (1931) stele in Hamburg's Rathaus marketplace by Klaus Hoffmann and Ernst Barlach. The Munich example (illus. 3) reminds us of the tension between Modernist and realist memorial representations. Here the sculpted fallen German soldier is seen akin to a medieval knight's tomb within a rectilinear masonry chapel.

Perhaps because of the conflict's scale and the desire to create numerous memorials of various size, the period during those interwar years witnessed what may be the start of buildings being dedicated as memorials to the war. For instance, Soldier Field (illus. 5) in Chicago was originally built as the Municipal Grant Park Stadium (1924) by architects Holabird and Roche, though it was dedi-

cated two years later during the Army–Navy football game to commemorate Chicago's war dead. A 2003 renovation involved restoration of the stadium's massive Doric arcade, creation of a Medal of Honor section, installation of a 250 foot (76.2 m) long memorial wall, and restoration and installation of a famed Doughboy statue by sculptor E.M. Viquesney. Other useful memorial buildings were constructed at this time in America, including what are early examples of military memorial museums in a more modern sense of the word, despite being traditional in appearance.

One is the Indiana War Memorial Plaza and Indiana War Memorial Museum. It was begun 1919 and dedicated 1933 even before completion, designed by Cleveland architects Walker and Weeks with New York sculptor Henry Hering. (illus. 4). This landscaped and planned 24-acre (9.7 ha) space in Indianapolis contains the museum housed within a massive building whose design is based on the legendary Mausoleum at Halicarnassus (ca. 350 BCE), one of the great wonders of the ancient world. Another early example is the severely classicist Soldiers' Memorial Military Museum (1936) in St. Louis, Missouri, built by local architects Mauran, Russell & Crowell to showcase war trophies from the Great War. In some ways those two examples in Indianapolis and St. Louis were an extension of the Grand Army of the Republic/GAR halls of an earlier generation. The GAR was founded 1866 as an association of Civil War (1861–65) veterans of the Union armed forces. In the last decade of the nineteenth century they had 490,000 members.

One such GAR meeting hall was within the 1897 Chicago Public Library by Shepley, Rutan and Coolidge. There, Civil War memorabilia and artifacts were displayed as war trophies. Roman trophy-relief sculptures still adorn entry arches to the GAR hall, now a room for changing art exhibitions which is in what is currently the Chicago Cul-



tural Center. The Pittsburgh Soldiers and Sailors Memorial Hall and Museum by Henry Hornbostel (1910) was an outgrowth of the GAR there. Its museum collection focused early on the Civil War and Battle of Gettysburg, but also continues with artifacts through today. Its classicist building design prefigures the Indianapolis memorial in some ways. Those buildings from the first decades of the twentieth century were paralleled in this museum function by the Liberty Memorial (1926), later National World War I Memorial and Museum, in Kansas City (see p. 40).

The American memorial museums above were followed by the Australian War Memorial (1941) in Canberra, that nation's capital (illus. 6). It houses the domed Hall of Memory with the Australian tomb of the unknown soldier on the upper level, with museum exhibits, and a research center at the ground and lower levels. It was the brain-child of Australia's official historian of World War I Charles Bean and long-time director Major John Treloar. A 1927 competition produced no clear winner but Sydney competitors Emil Sodersten and John Crust partnered together here to prepare the design. Today, the museum features an active program of exhibitions, several of which were created by Australian exhibit designers Freeman Ryan Design. In all, it seems that what we know as a modern military museum has antecedents created mostly after World War I, in part, because they also served as war memorials.

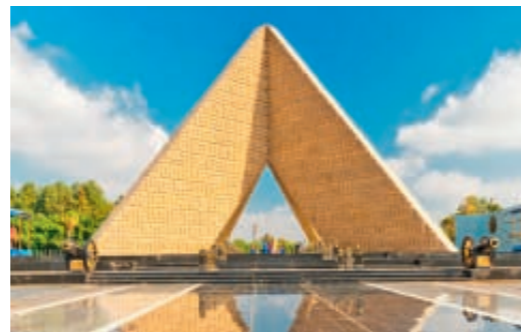
As with the tension between abstract and classicist or realistic memorial representations, which continued into the future, the so-called functional or living memorial also saw an expansion of use after the next world conflict. World War II (1939 to 1945) was a global one that witnessed the death of more than 60 million. We shall examine some of those later within this discussion. For our purposes now, sculptural freestanding memorials continued to be built to honor the dead for that and several wars throughout the twentieth century. They included traditional architectural and sculptural forms as well as new abstract, dynamic shapes that also have specific military references. Of realistic traditional sculptures, perhaps the most internationally recognizable are two that also reflect the postwar Cold War between west and east – the United States and its allies, and the Soviet Union and its Warsaw Pact. The heroic figures of Felix de Weldon's *Marine Corps Memorial* (1954) outside Washington, D.C. achieved iconic status because of its relationship with the famed 1945 photo of the Iwo Jima flag raising by Joe Rosenthal. The colossal monument titled *The Motherland Calls* (1967) outside Volgograd, formerly Stalingrad, was created by sculptor Yevgeny Vuchetich and engineer Nikolai Nikitin. When built, it was the largest sculpture in the world at 279 feet (85 m) high. The architecture below houses a tomb for two heroes of the Battle of Stalingrad, Marshall Vasily Ivanovich Chuikov and Red Army sniper Vasily Zaytsev, the latter memorialized in the feature film *Enemy at the Gates* (2001).

Other memorials of the same era include military hardware almost as an extension of exhibiting the war trophy. Only now it is the trophy of the victor, not the vanquished – as in the Soviet War memorial in Berlin's Tiergarten (1945) by architect Mikhail Gorvits and sculptors Vladimir Tsigal and

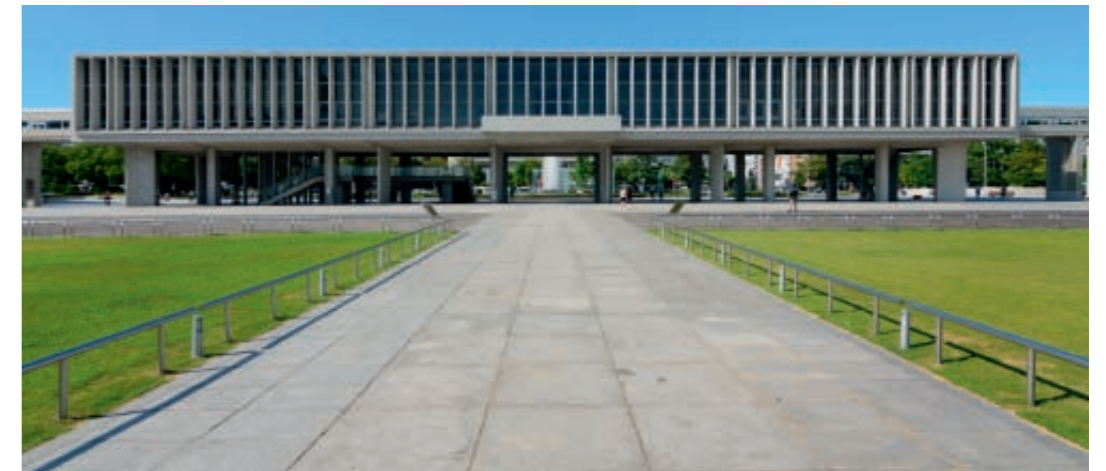
Lev Kerbel. Stylized classicist architecture built from masonry of the Reich Chancellery and a sculpted soldier are flanked by artillery pieces and T-34/76 tanks on pedestals (illus. 7). The monument commemorates and memorializes the 2,000 Soviet soldiers who died and were buried here in the liberation of Berlin during World War II. It is joined by other Soviet war memorials in the city commemorating the 80,000 soldiers who died here in that struggle. Perhaps the most famous is the large memorial in Berlin's Treptower Park (1949), also built with stones from the Reich Chancellery as a memorial to the 7,000 Russian soldiers buried there.

This reliance on traditional figural sculptures or references to actual wartime artifacts, especially for military memorials, continues to reappear even after the public has been exposed to abstract sculptural and architectural forms over several decades. Such abstract geometric forms are the basis of memorials such as Egypt's concrete Tomb of the Unknown Soldier (1975), 120 feet (36.6 m) high, by artist Sami Rafi. It commemorates those who died in the 1973 October War. It also houses the tomb of President Anwar Sadat who commissioned the memorial in 1974 (illus. 8). The 246 foot-long (75 m) angular black granite walls of the Vietnam Veterans Memorial (1982) in Washington designed by Maya Lin slash into the landscape, visually symbolizing that war as a wound in the nation (illus. 9). Yet both of those monuments also recall specific associations from the past despite their seemingly abstract forms: the former of the great pyramids of Egypt, and the latter, the simple private first-class stripe of an American infantry soldier. One of the newer non-representational ones is the International Bomber Command Memorial (2015) in Lincoln, England (illus. 10) designed by Stephen Palmer of Place Architecture. The 102 foot (31 m) high monument looks quite abstract but it also references the size and shape of Avro Lancaster bomber wings from World War II. The grounds include a 2018 visitor center as one would find today on a historic battlefield, with interpretive interactive exhibitions designed by Redman Design. In a way, the Bomber Command spire prompts us to cite the various abstract compositions of steel pieces from the ruined World Trade Center destroyed in the terrorist attacks of September 11, 2001. These are used in countless 9/11 memorials at varying scales across the United States and beyond.

Despite this international acceptance of artistic abstraction over the past six decades, others consider geometric forms still not enough to memorialize a war, tragic event, or heroic people. Witness the backlash to the Vietnam Veteran's Memorial which eventually led to figural sculptures being installed (1984) in the complex. The subsequent creation of the Korean War Veterans Memorial (1995) in Washington, D.C., coordinated by Cooper-Lecky Architects, with its nineteen realistic stainless-steel soldiers created by sculptor Frank Gaylord, or the retro-classicist, granite World War II Memorial (illus. 11) won in 1997 competition by Austrian-American architect Friedrich St. Florian (dedicated 2004), all reinforce that conservatism when it comes to war memorials of this type.



6. Australian War Memorial, Canberra, 1941. Photo: shutterstock.com.
7. Soviet War Memorial, Tiergarten, Berlin, 1945. Photo: shutterstock.com.
8. Egyptian Tomb of the Unknown Soldier, Cairo, 1974. Photo: shutterstock.com.
9. Vietnam Veterans Memorial, Washington, D.C. Photo: Carol M. Highsmith's America, Library of Congress, Prints and Photographs Division.
10. Spire of the International Bomber Command Centre, Canwick Hill, Lincoln, England, 2018. Photo: Tim Burton, SH Structures.
11. World War II Memorial, Washington, D.C., 2004. Carol M. Highsmith's America, Library of Congress, Prints and Photographs Division.
12. Peace Museum, Hiroshima, 1955. Photo: shutterstock.com.



World War II and the living memorial

We have already referenced some post-World War I examples when buildings serve as war memorials, including some memorial buildings that have museums within. After the Second World War, the trend intensified for functional memorials as veterans' organizations spearheaded efforts to support buildings that promoted peace and reconciliation. This happened in the United States in 1944 even before the end of the war, with the American Legion publishing plans and elevations by Tennessee architect Eli M. Tinsdale for local posts that could serve as community centers. Likewise, the American Commission for Living War Memorials also published, in 1944 and 1945, booklets of plans and photos in order to inspire communities to build parks, sports, and health facilities, appropriately labeled with memorial plaques. War memorial arenas and stadia followed across the country. Nations built memorials as athletic, religious, recreational, or informal educational facilities. These include a modernist Canadian War Memorial Gymnasium from 1951 at the University of British Columbia, designed by Sharp, Thompson, Berwick and Pratt. Long recognized international examples related to peace and reconciliation include: the Peace Park and Museum in Hiroshima (1955) by Kenzo Tange; the Kaiser Wilhelm Memorial Church in Berlin (1961) by Egon Eiermann; and Sir Basil Spence's Coventry Cathedral (1962). Tange's work in Hiroshima (illus. 12) serves as one of the early post World War II examples of a military-related museum, though in an indirect way, memorializing civilian victims rather than combatants. Its clean, modernist design ushered in a new era of Japanese architecture, signaling to the world that Japan has joined the postwar western world in its embrace of Modernist design.

Modernist designs followed in other memorial buildings, and two deserve mention. The first is the Eero Saarinen-designed Milwaukee County War Memorial (1957) in Wisconsin. It functioned as a meeting space for veterans groups and the community, but also as the first home of the Milwaukee Art Museum before various expansions, including their 2001 building by Santiago Calatrava. Artist Edmund D. Lewandowski created the mosaic mural two years after the building's completion. The 1,800 square foot (167 sq. m) mosaic contains more than a million pieces which include date references to the American involvement in World War II and the Korean War. When installed,

it was then the largest mosaic in the United States.

Even more important both as a monument and as a work of architecture is the U.S.S. *Arizona* Memorial at Pearl Harbor (1962) designed by Albert Preis (see p. 22). The memorial was built as a public-private partnership of more than \$ 500,000, including donations of \$ 64,000 from an Elvis Presley benefit concert. As part of the building requirements, Preis created an expressive bridge-like structure that could accommodate 200 people for a contemplative visit above the submerged battleship *Arizona*. The ship sunk on December 7, 1941 during the Japanese attack on Pearl Harbor that precipitated America's entry into the war. The memorial is a national one to all who died there that day. Its design is more an open-air chapel than bridge, being approached only through a naval launch. Beyond being a memorial visited by two million people each year, it is the centerpiece of what later became an open air military museum, with the nearby former battleship *Missouri* as well as the naval air station at Ford Island, now site of the Pacific Aviation Museum. Although a visitor center was constructed 1980 and then expanded 2010, it is a background building in design, compared to this memorial which raised the bar for military memorial design in the United States as well as, eventually, design of military museums. Its seaside location has required several concrete repair campaigns, the latest in 2018.

The military museum: ancient origins and modern manifestations

Arguably, the military museum ultimately derives from display of war booty – war trophies of vanquished armies brought home by victors to celebrate their triumphs, often depicted within relief narratives in ancient monuments. But what was the first museum dedicated to the collection and display of such material? It is difficult to say. Museums in a conceptual way date back to the Greek word *mouseion*, or muses, though we really cannot determine what they looked like in antiquity, even in Plato's famed library and museum. In the seventeenth and eighteenth centuries they were more like cabinets of curiosities, and indeed some may have held military artifacts. Scholars credit regiments as having collections of battle standards and war trophies. One of the earliest of



regimental museum collections was said to have been at the Imperial Tyrolean Jager Regiment in Austria from the early 1800s. Another early museum collection and permanent building was one within the Royal Arsenal in Woolwich, England – the Repository for Military Machines. Created after 1770, it showcased artillery pieces to the public in the Rotunda of 1820, designed by John Nash. The objects displayed there became the core of the Royal Artillery Museum nearby. After 2016 they were placed in storage as part of the planning for the Salisbury Plain Heritage Center, designed by Purcell Architects and scheduled to open 2020. Nash's historic Rotunda, however, still remains but is not open to the public.

The Woolwich example is a good one as a precedent for a purpose built military museum, open to the public. Perhaps an even better one in terms of collection is the Royal Armouries in the Tower of London, the oldest continually operating museum of arms and armaments back to the 1680s. And in terms of the first national army museum, it is likely to be the French Army Museum or Musée de l'Armée. It was established officially in 1905 within the gigantic Hôtel national des Invalides in Paris, which also contains Napoleon's tomb. Both the London and Paris institutions have comprehensive collections that date back through the Middle Ages and also document artifacts up through today.

The first half of the twentieth century and particularly the interwar years saw the establishment of other military museums from Moscow to Madrid, many in buildings that were inherited rather than commissioned. The post-World War II era, however, was also important in establishing and re-purposing other buildings related to militaria, particularly on important military sites such as battlefields. These can serve a variety of functions, and at some historic battlefields, principally as interpretive centers for the public.

During 1942/43, German architect Friedrich Tamms designed anti-aircraft gun emplacements atop castle-like, concrete bomb shelters. They housed thousands during Allied bombing raids of Berlin, Hamburg, and Vienna. These and some smaller counterparts by others around Germany and occupied Europe sometimes proved too difficult to demolish in the postwar era. They were often adapted to other functions, from film and radio studios, to art galleries, and even restaurants and bars. These conversions continue today, one of the more notable being the Museumscenter Blåvand, now opened as the Tirpitz Museum, in Varde Denmark (2017). It was designed by Bjarke Ingels, Jakob Lange, and David Zahle of BIG, with Tinker imagineers creating the visitor experience (illus. 13). The core of the new museum building is the unfinished ruin of the Tirpitz bunker, with the concrete and glass museum sliced into the earth. It now houses interactive exhibitions and media presentations about the site, before, during and after the war. In some ways this dramatic renewal bears comparison with the archaeological presentation of the Louvre's original castle walls when I.M. Pei created not only the Louvre Pyramid (1999) but also the underground mall that connects the museums wings and has services related to retail, food, and parking. As with that Parisian example, this dramatic redo is intended to make it a tourist attraction in Denmark.

When speaking of military sites, new interpretive centers were also built in relation to historic battlefields. As with museums they may incorporate artifacts within their displays but their focus is about interpreting the historic site that exists outside their doors, either through exhibits or media presentations. They also often include restaurants, cafes and retail stores for their public. A less well-known but important recent example is the Culloden Battlefield Visitor Center (2007) designed by Gareth Hoskins Architects with Ralph Appelbaum Associates creating the exhibitions (illus. 14). An earlier significant one existed in Richard Neutra's Gettysburg Visitor Center (1962) in Pennsylvania. The building was part of an initiative to create modern visitor centers at American national parks in the 1960s. After much debate and preservation controversy, it was demolished 2013 since its function as a visitor center was replaced at a nearby site by a contextual, historicist building, designed by Warehaus (2008/09). (Compare illus. 15, with p. 64.)

Perhaps the most amazing battlefield museum is the one in Volgograd, Russia, which commemorates one of the major turning points of World War II, the Battle of Stalingrad. The battle which lasted from August 23, 1942 through February 2, 1943 killed both Axis soldiers and Russians to a total of some 1.9 million casualties, decimating the entire city as well. The memorial museum built to commemorate this Russian victory found its conceptual origins even before the end of the battle, first opening in 1948. What exists today is a research center and museum of more than 3,500 artifacts and major dioramas along with a spectacular painted 360-degree panorama. This is the largest painting in Russia at 372x50 feet (120x 16 m). That depiction of the battle is augmented by three-dimensional dioramas in the foreground. The museum and panorama rotunda (illus. 16) was the design work of architect Vadim Maslyayev, finished 1985. The complex also has a 1903 ruined mill in situ from the battle as well as a reproduction, installed 2013, of the Barmaley fountain of dancing children. This was memorialized in a famous 1942 photograph of Stalingrad's ruins taken by Emmanuel Evzerikhin.

In some ways, interpretive centers at concentration camps and military cemeteries also are part of this tradition of battlefield museums and similar centers. One of the bolder designed ones is the Hinzert Museum and Document Centre (2005) at the former Hinzert Concentration Camp in Germany. Nikolaus Hirsch and Wolfgang Lorch created the angular structure from 3,000 welded Corten-steel panels. Several contemporary centers also commemorate the Allied invasion of occupied France on D-Day, June 6, 1944. Two are discussed within this volume, the Canadian Juno Beach Centre (2003; see p. 30) by Brian Chamberlain and the American Cemetery Visitor Center, Normandy (2007; see p. 52) by the Smith Group JJR and Gallagher & Associates.

Beyond interpretive centers at war-related sites, purpose-built major military museums saw a rise in the 1970s and 80s. Prominent ones include the National Army Museum in London (1971; see p. 104) by William Holford & Partners, and the National Army Museum (1978) in New Zealand. The latter is the Queen Elizabeth II Army Memorial Museum in Waiouru, New Zealand, built by the 2nd Field



13. Tirpitz Museum, Blåvand, Denmark, 2017. Photo: dpa picture alliance/Alamy Stock Photo.
14. Culloden Visitor Center, Inverness, Scotland, 2007. Photo: John Peter Photography/Alamy Stock Photo.
15. Gettysburg Battlefield Visitor Center, Gettysburg, Pennsylvania, 1962 (demolished). Photo: Library of Congress, Prints & Photographs Division, HABS PA-6709.
16. Volgograd State Panoramic Museum for the Battle of Stalingrad, 1985. Photo: shutterstock.com.
17. National Army Museum, Waiouru, New Zealand, 1978, with Centurion tank in the foreground. Photo: shutterstock.com.
18. Imperial War Museum, London. Photo: shutterstock.com.
19. Imperial War Museum, London. Lobby renovation, 1989. Photo: incamerastock/Alamy Stock Photo.
20. Stuart Light Tank in a Diorama on the Battle of Buna-Gona in World War II, Wisconsin Veterans Museum, Madison, Wisconsin. Photo: Daderot, Wikimedia.



Squadron of the Royal New Zealand Engineers (illus. 17). Both of those museums are constructed in what was then popular Brutalist concrete forms that project a fortress or barrack-like image to the visitor. Museums such as those were important in establishing the design credibility of such public military museums. One of the most important of these is the Imperial War Museum/IWM in London. As with some of its international counterparts, it was founded 1917 as a World War I memorial museum. It has been housed in its present location within the former Bethlem Royal Hospital in London since 1936, its trademark dome being the 1846 work of Sydney Smirke. The fifteen-inch naval guns from the former World War I battleships HMS *Ramillies* and HMS *Resolution* were installed after 1967. They symbolically guard the entry (illus. 18) and visually rebrand the building's function. Over the next decades the Imperial War Museum became a leader of such institutions, expanding collections and sites to include the War Cabinet Rooms and heavy cruiser HMS *Belfast*, both in London, and an aviation collection at the former Royal Air Force field of Duxford in Cambridgeshire (see p. 18). The main campus, however, witnessed major expansions and renovations in 1986–89 by Arup (illus. 19) as well as most recently by Foster + Partners (see p. 80). The IWM's 1989 installation and gallery renovations, constructed through 1995, gave visitors an exciting glimpse into the future regarding immersive battle scenes, touch screen interactives and historically accurate flight simulator experiences that are commonplace in today's military museums. For the main lobby, Arup created a lightweight steel structure with a barrel vault atop where aircraft might be hung.

During subsequent years the museum hosted exhibits whose cutting-edge designs and themes helped broaden their audience, even in terms of architecture. Subjects ranged from the 1996 show »From the Bomb to the Beatles« on postwar Britain, designed by Sir Terrence Conran, to the 1997 American Air Museum at Duxford designed by Norman Foster (see p. 18), through the reconstruction of a 1940s house (2001–11) that was part of a television series, as well as the 2002 opening of the IWM North in Manchester, designed by Daniel Libeskind (see p. 26). The IWM was the pathfinder military museum in terms of examining the role of the military in relation to society. This is something that was subsequently taken up by other museums in their permanent installations, such as the Militärhistorisches Museum der Bundeswehr in Dresden (p. 72) and the National Army Museum in London (p. 104). The IWM's focus on visitor experience and customer service, expanded audiences, and the ability to offer a wide range of popular activities and exhibitions over all their facilities, brings them consistently to the forefront of military museums over the decades. Their sites are visited by more than 2.4 million people annually – certainly attendance on a par with many major museums elsewhere.

Military museum exhibition design: beyond mannequins and dioramas

Unlike design collections within art museums that display chairs and cars on pedestals, keeping you at arm's reach from those precious artifacts, mili-

tary museum exhibits today derive from both history and science museums, in their attitudes towards visitor interactions with machines. Visitors go to museums to learn the truth about history through original artifacts and stories about real people. This sometimes causes problems with the display of real artifacts compared with replicas and theatrical creations or stage sets, as well as intermingles the touch and do-not-touch experiences for museum goers. Understandably, this causes some confusion and can send mixed messages if museums are not cautious. In one instance, a visitor questioned me about a display that showed wooden constructions to represent concrete sidewalks, asking if the streets were made of wood, how come they didn't burn in the disaster depicted. Visitors often take stage sets and theatrical environments literally, as they do with mannequins and dioramas, perhaps because they are in museums, as opposed to seeing sets within a play or feature film. Although replica aircraft and military machines are sometimes used in museum displays, in contrast with focusing on original artifacts, we might also be reminded that replicas have long been used in military exhibits to give people a sense of scale and context. The same might be said of dioramas. So the situation is more grey than black and white when it comes to theatrical contexts within military museum displays.

I suppose these are three-dimensionalized representations of scenes formerly depicted centuries earlier in massive two-dimensional history paintings done in oil on canvas. In the United States, one of the most famous is by French artist Paul Dominique Phillipoteaux in his 1883, 360-degree painting of Pickett's Charge at the Battle of Gettysburg, 1863. It, as other such encyclopedic views, were displayed within cylindrical buildings called cycloramas, this one from 1883 being first shown in Chicago. Another painted in 1884 was displayed in Boston. That one is the only one to survive, being displayed for years at the Gettysburg visitor center up through today (see p. 64).

Along with some panoramic history paintings and cycloramic art, dioramas within museums were first used in the nineteenth century, though within a natural history context to show representations of animals in their habitat. The process of showing a snapshot scene within a frame, illuminated from within or behind, is related to early photography as well as paintings on translucent surfaces. Indeed, the word diorama is credited to photography pioneer Louis Daguerre. The tradition of creating scenes in three dimensions also relates to the long-time popularity of smaller scale miniatures. And the connection to model railroads, toy soldiers, and military hobbyists today is a natural one. When represented full size within military museums, some of these events are more successful than others, and mannequin features range from hyper-realistic to somewhat unconvincing. In whatever form, they often help provide the human connection to a historic event.

As hinted before, the full-size diorama of a military scene (illus. 20) is akin to what large scale history paintings were in the nineteenth century in their attempts to bring a historic event to life. With those theatrical sets today, a lot depends on budget regarding how realistic the scenography can



appear, as in the National Museum of the Marine Corps with life cast features in their mannequins. When the Art Institute of Chicago reinstalled their arms and armor collection in 2017, they even re-created knights jousting on mannequin horses by carefully replicating the forms of medieval war horses as based on their Lipizzaner descendants from a nearby farm. Whatever the reason, visitors are drawn to these three-dimensional snapshots of history, and they expect to see them within military museums. As one youngster exclaimed when he realized that we had removed mannequins from display, he questioned »where are your dummies?« Even when I had explained somewhat ironically that he would have a lifetime to meet or see any number of »dummies«, a successful museum visit to him required that they be out on the floor in some action scene that would help illuminate the subject and space.

Likewise, museums that operate military hardware like the Flying Heritage Collection (p. 58) outside Seattle and the Tank Museum (p. 68) in Bovington, England, along with others that organize events that include reenactors, all attempt to expand the human connection to those military machines. Although perhaps not as accessible as visitors who get rides in Model-T Fords at the Henry Ford Museum, those who attend these events get to see military hardware up-close and in action, and reenactors are sometimes the ones who actively participate.

The need for theatrical installations informs many of the exhibition designs of newer museums even beyond military ones. Nowadays these installations are created by superb designers with talents equal to any prominent architect; some represented within this book are Ralph Appelbaum Associates, Christopher Chadbourne, Event Communications, Gallagher & Associates, Haley Sharpe, the Hettema Group, Koosman.deJong, Luci Creative, and Redman Design. An important extension of the theatricality of their installation designs are IMAX theaters, introductory film presentations, three-dimensional experiences, and interactive electronic programs. All of these are hallmarks of our own age and our own experiences with theme parks, tourist attractions, and personal media devices such as smartphones and tablets. These dynamic interpretive methods are essential-

ly an ultimate outgrowth of antique dioramas and humanity's need to learn about people like us within historic contexts.

The military museum, today and tomorrow

We have acknowledged the impact that the Imperial War Museum has had on the field of military museums in our era. Likewise, holocaust memorial museums have had an equal impact. They have raised the bar regarding architectural and exhibition design, but also created museum experiences that go beyond objects to expressing the emotive qualities of individual human stories – something that is commonplace today in most military museums. Arguably, the first major museum of this type was the Holocaust Memorial Museum (1993) in Washington by James Ingo Freed of I. M. Pei with exhibition installation by Ralph Appelbaum. The emotional content within as well as the professional display drew praise from critics and the general public alike. In terms of pure architectural impact, Daniel Libeskind's Jewish Museum (2001) and Peter Eisenman's Holocaust Memorial (2004), both in Berlin, are among the most powerful. Libeskind's angular design (illus. 21) and resultant spaces provide visitors with a disconcerting journey emblematic of the Jewish experience there, and the loss of Jewish cultural contributions to the city, during World War II. Eisenman's maze of 2,711 concrete slabs projects the overwhelming inhumanity of the holocaust. Whether using simplified geometric rectilinear or angular design forms and spaces, most military museums today are part of that overall contemporary pattern, though traditional architectural forms can still be seen in a few recent examples within this volume. And, Libeskind's Berlin commission led to other high-profile museums, including military ones represented in this book, in Manchester and Dresden (see pp. 26, 72).

In the United States, architect Bartholomew Voorsanger designed a series of important pavilions over a multi-year period in recent years for the National World War II Museum in New Orleans (see p. 114). Begun as a D-Day museum, this institution is one of the American leaders in this muse-

21. Jewish Museum, Berlin, 2001. Photo: Günter Schneider.

22. Proposed United Arab Emirates National Military Museum, Abu Dhabi, designed 2008 and later. Photo: Voorsanger Architects PC and Voorsanger Architects Archive.

23. The Great Patriotic War Museum, Minsk, Belarus, 2014. Photo: shutterstock.com.

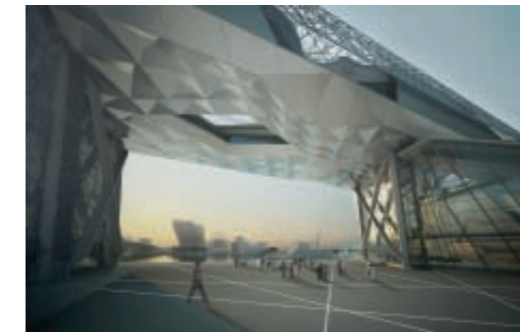
24. Saudi Air Force Museum, Riyadh, 1992 and later, with F-15D gate guard. Photo: Ahmed Said Hassan.

um type, creating a campus of museum, educational, and theater buildings. They make a major cultural tourism contribution to that city with an annual attendance of more than 700,000 visitors. Like figures can be found at the National Museum of the U.S. Air Force outside Dayton (see p. 92) at more than 800,000 visitors each year. Even museums in other suburban locations such as the National Museum of the Marine Corps have an average annual attendance of 500,000. Military museums based in major urban environments fare even better each year, with annual numbers of over a million visitors in such places as the U.S.S. *Midway* Museum in San Diego and the *Intrepid Sea, Air & Space* Museum in New York (see p. 60). I like to think that with these fairly solid attendances, some of it relates to their striking exhibit and architectural designs, where visitors see that these examples have joined the greater family of how major museums should look and feel today.

The military museum: more than memorial

What can one say after this brief chronicling of the building type? We have determined that the origins are a bit loosely defined back to collections of war trophies by victorious armies. Examples of militaria and weapons collections date back centuries, and purpose-built structures back at least to 1820. We have seen a few examples where war memorials with museum collections date to the first decades of the twentieth century, mostly as part of an awareness to build useful memorials after the World Wars. And we have seen that this type of museum found itself in more established situations with large-scale buildings in the last decades of the twentieth century.

Museums of this type have been redefining their missions over the past decade or two, with an increasing emphasis nowadays on STEM educational programs – Science, Technology, Engineering and Math – as well as a variety of ways to attract families and repeat visitors. Some find themselves giving back to society by hosting veterans job fairs and supporting military families. And, as with art museums and science centers, all are ramping up their exhibit offerings and customer service attitudes to encourage repeat and new visitation. It is my hope that the pictorial survey which follows will give you a renewed appreciation of how far these museums have come in their architecture and exhibition presentation as they join the family of high-profile museums around the world. Some museums are just finishing up now in 2018/19. These include 3 North's American Civil War Museum in Richmond, Virginia, and the National Veterans Memorial and Museum in Columbus, Ohio by Allied Works architects with exhibits by Ralph Appelbaum Associates. Those in the planning stage, such as Bart Voorsanger's National Military Museum for the United Arab Emirates in Abu Dhabi (illus. 22), and Payette's National Coast Guard Museum and the Medal of Honor Museum by Safdie Architects, both to have exhibits created by Gallagher & Associates, will hopefully join them in construction one day. All demonstrate that creative architecture and exhibition design continues within military museums of the near future.



A note on the building selection

Museums represented within this survey present a broad range of facilities over the past two decades. They include large and small institutions, museums with static displays and those with operable military equipment, government as well as privately supported organizations, collections that range from housing miniscule memorabilia to »heavy metal« artifacts weighing many tons, and constructions themselves that include historic restorations and renovations, as well as cutting-edge new edifices. Compiling this selection required the diligent cooperation of architects, designers, institutions, and photographers. Museums published here represent their efforts as much as my own.

Unfortunately, not all visually interesting museums could be examined within the pages allocated to this volume. For some, such as the boldly geometric additions of the Mons Memorial Museum (2015) in Belgium by Atelier Pierre Hebbelinck, the intriguingly expressive Great Patriotic War Museum (illus. 23) in Minsk (2014) by Viktor Kravarenko, Leonid Levin, and others, or the artifact-rich Personal Courage Wing of the Museum of Flight in Seattle (2004) by NBBJ and SRJ, with Chris Mailander of the Museum of Flight for exhibition design, it was difficult to locate multiple, high quality views. Likewise, I could not acquire enough visual information to represent two important early aviation museums. One is Flugwerft Schleissheim outside Munich, a World War I era historic aerodrome that was restored and expanded (1992) by Pranschke, Reichert and Maluche. Another is the Royal Saudi Air Force Museum (1992) in Riyadh designed by Marks Barfield and the Zuhair Fayed partnership (illus. 24). This was one of the first new museum installation designs after the Gulf War, by an architect who also went on to create one of London's icons, the Eye. Moreover, several others were elusive to document within the span of creating this book. One is the work of famed architect Arata Isozaki for the Japanese Army Museum (designed 2005) within the Jianchuan Museum Complex in Chengdu, China. The drawings published in *GA Document* (2006) bear no relationship to buildings shown on that museum's website, though the Chinese News Network reported in 2015 that Isozaki had visited the site multiple times, being recorded there in stock photo images, and that he designed a 37,673 square foot (3,500 sq. m) exhibit space.

Those and likely others must await documentation within another volume. I apologize if there are institutions that should have been represented, their exclusion not being intentional. We remind readers, however, that our selection is not intended to be definitive but rather it seeks to demonstrate the range of contemporary design solutions to housing, displaying, and interpreting military history and artifacts. This museum building type joins other museums in the increased sophistication of their exhibition presentations. The selection is arranged chronologically, with projects just finished or under construction at the end of the sequence. In all, these museums and their exhibitions provide the general public and enthusiasts alike with professional design solutions that honor service and sacrifice around the world.

Bansei Tokko Peace Memorial Museum (originally Kaseda City Peace Memorial Hall), Minamisatsuma City, Kagoshima Prefecture, Japan, 1993

Tanseishya Co. Ltd. Architects

Although Russian pilots in both World Wars engaged in ramming German aircraft, Japanese aviators towards the end of World War II specialized in such attacks against ships, first seen systematically during the Battle of Leyte Gulf in later October 1944. The kamikaze or divine wind attacks practiced then through the end of the war caused the deaths of more than 7,000 Allied navy personnel at the price of some 3,800 Japanese pilots. The Bansei air base was established late 1944 as one of the last ones constructed for Special Attack or kamikaze pilots. From here they went on missions to Okinawa to protect the Japanese homeland by using these tactics. During the Battle of Okinawa from April to June 1945 some thirty-three naval and cargo ships were sunk or greatly damaged by 1,465 planes whose pilots died while attacking those ships.

In 1972, a memorial was built on the plaza here to commemorate Special Attack pilots who left to die for their country. The museum was opened two decades later. Both were spearheaded by the efforts of Hichiro Naemura, an instructor pilot during the war. Although its appearance relates to an abstracted version of Japanese vernacular forms, it is said to have more particular references to this site and the museum's mission. The angular-braced levels of the building have been compared to those of biplane Yokosuka K5Y trainers nick-

named »red dragonfly«, planes also surprisingly used in some kamikaze attacks. The angled or peaked roof outline is also said to have been related to the silhouette of praying hands and prayers for peace.

Artifacts within the museum contain memorabilia of the 201 soldiers and pilots who died here from American bombing runs over the base, or on Special Attack missions. Their last letters and photos are displayed on the upper floor walls and cases. The main floor recounts the history of the base and features the wreckage of a rare Aichi E-13A floatplane. It crash-landed about 1,968 feet (600 m) offshore on June 4, 1945 after returning from a reconnaissance mission over Okinawa. It was salvaged in 1992 from a depth of some 16 feet (5 m) and prepared for exhibition by the aviation workshop at Kanoya Air Base. Perhaps equally important is a photograph from May 26, 1945 which shows young Special Attack pilots based here, before they depart on their final mission.

The museum building is a relatively small one at more than 6,114 square feet (568 sq. m), but it witnesses more than 12,000 visitors each year. The Tanseishya Co. architectural firm has a long history, founded 1946 and renamed to its current one in 1959. Since then it has established offices around Japan, specializing mostly in retail and food service interiors. These include the food court at Haneda Airport's international terminal, various Subway restaurants, and McDonald's new generation stores in Japan. Recent museum work includes the Toyota Commemorative Museum of Industry and Technology (2010), and the Scmaglev and Railway Park (2011), both in Aichi.

1. Museum and memorial (right). Photo: Bansei Tokko Peace Museum.
2. Bansei's kamikaze or Special Attack Pilots, 1945. Photo: Wikipedia.
3. Aichi Type 0/E13A Reconnaissance Seaplane, captured on Kwajalein in the Marshall Islands, photographed 1944. Photo: National Archives.
4. Interior of the museum displaying salvaged Aichi Type 0 Reconnaissance Seaplane. Photo: Bansei Tokko Peace Museum.



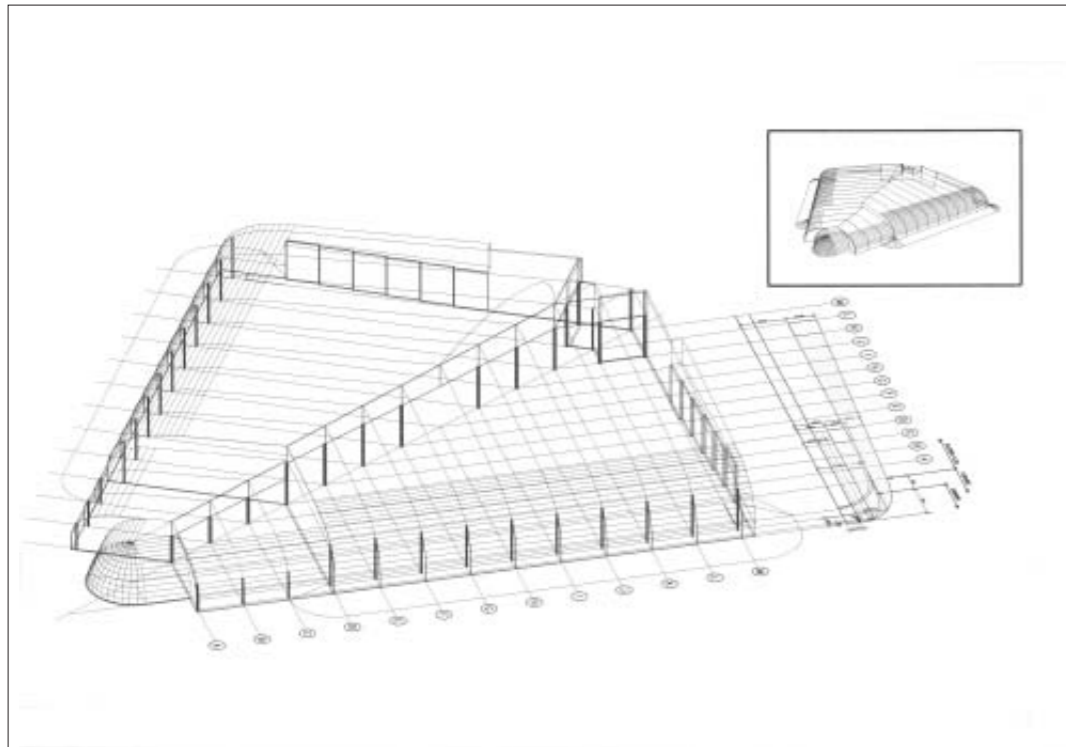


**Canadian Warplane Heritage Museum,
Hamilton, Ontario, Canada, 1996**
Chamberlain Architect Services

Founded 1972/73 by Dennis Bradley, Alan Ness, Peter Matthews, and John Weir, the four friends purchased their first aircraft, a Fairey Firefly. The collection grew within a hangar at Hamilton's John C. Munro International Airport. A 1993 fire provided the opportunity to rebuild its facility into a purpose-built museum. The Canadian Warplane Heritage Museum collects and even operates aircraft formerly flown by Canadian armed forces from the Second World War through the present. Its collection, thus, includes mostly Canadian variants of British and American aircraft. Members can reserve flights within some operable historic aircraft from trainers such as a Boeing Stearman, de Havilland Chipmunk or Tiger Moth, or North American Harvard (AT-6 Texan), or bombers such as a rare Avro Lancaster Mk.X. Acquired 1977, this plane was originally manufactured in Malton, Canada in July 1945. It was restored and flew again in 1988. Of the 7,300 built only seventeen survive today, and only two of them are operable – this and one in England. In addition to flyable planes, vintage aircraft from World War II through the jet age are displayed throughout. The 1996 construction that houses the museum was designed by Brian Chamberlain, an architect since 1978 and himself a pilot and Canadian air force veteran.

Inspired by streamlined aircraft components, Chamberlain created a curvilinear, stealth-like, delta-wing shape for the museum. It is located at the southeast corner of the airport's grounds. He designed two interlocking triangular open spaces, that create 80,000 square feet (7432 sq. m) of hangar space for their collection of some fifty aircraft. The curved roof trusses provide up to 210 feet (64 m) of exhibit and aircraft space below. The airside elevation at the north side of the delta-shape provides aircraft access to the apron, taxiways and runways. Landscaped berms surround the structure on the other sides. The program also provided space for static exhibits, workshop, museum store, offices, gallery, educational center, as well as a lounge and café.

Brian Chamberlain's firm has designed a number of buildings (see entry for the Juno Beach Centre, p. 30), including works in his own city of Burlington, Ontario as well as Tim Horton's Children's Foundation Camps in Canada and the United States. His other aviation-related works include the Jetport hangar, Cargo Centre, and Transport Canada facilities at Hamilton International airport and the air traffic control tower at Toronto's Pearson International Airport. His design team works on a number of hotels and restaurants as well, even beyond Canada.



1. Aerial view. Photo: Jan Waginski.
2. Axonometric view. Photo: Chamberlain Architect Services Limited.
3. Night view of CF-104 Starfighter as the museum gate guard. Photo: Jan Waginski.
4. Museum interior showing training aircraft in the foreground, with Lancaster and B-25 bombers in the background. Photo: Jan Waginski.

American Air Museum of the Imperial War Museum, Duxford, England, 1997

Foster Associates (today Foster + Partners); exhibition design: Redman Design

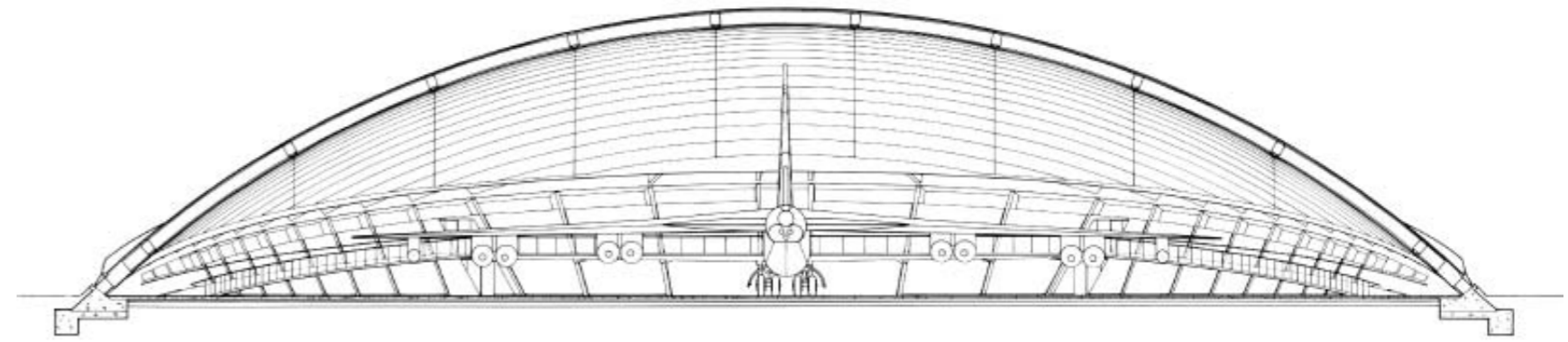
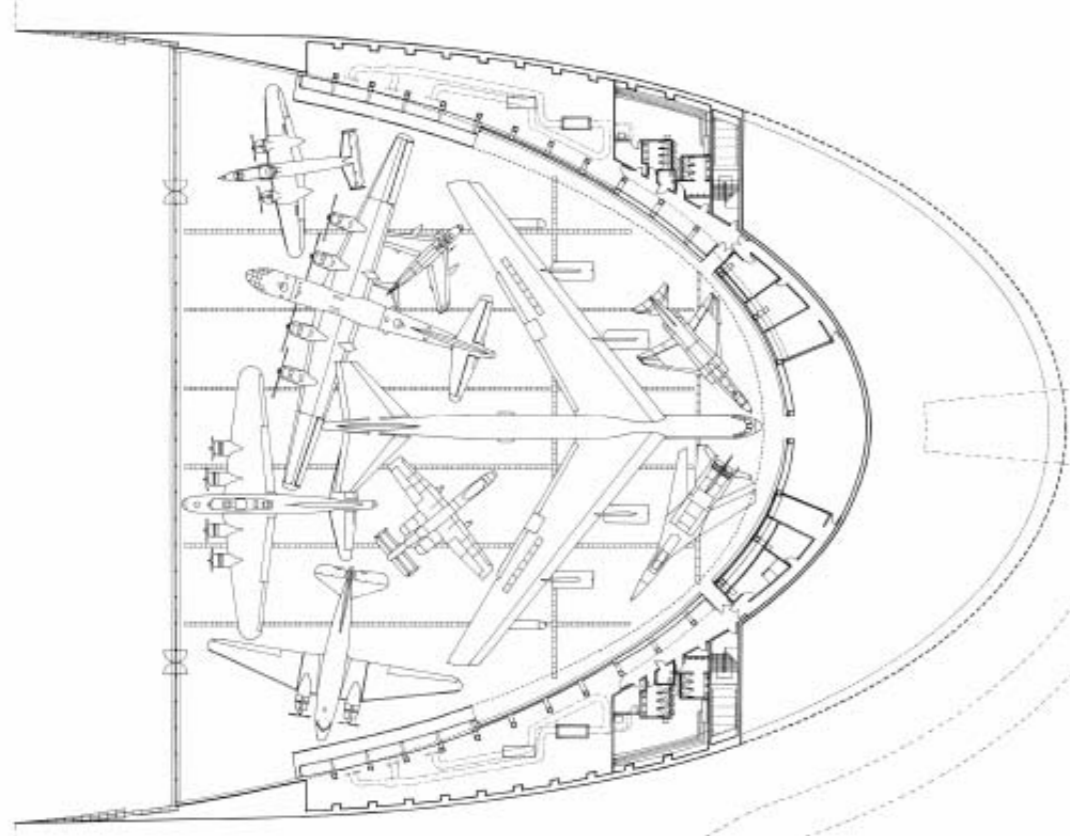
Duxford Aerodrome dates to the First World War in 1918, almost 60 miles (96.5 km) northeast of London. It was an important base for Royal Air Force/RAF and American Army Air Force squadrons in World War II. After the war, the RAF operated in the early jet age when the single concrete runway was created 1949–51, though RAF operations ceased there a decade later. In 1968 it was used for one of the locations within the feature film *Battle of Britain* as well as the 1989 film *Memphis Belle*. As part of its expansion program, the Imperial War Museum/IWM acquired the site from the Ministry of Defence in 1976. In 2008 the IWM acquired the rights to much of the surrounding property as well. Facilities adjacent to the runway are used by the IWM as well as the Duxford Aviation Society, a non-profit organization that maintains an extensive civil aviation collection here, and operators of historic aircraft such as »Classic Wings« and the »Fighter Collection«. The buildings are of historic significance dating back to the First World War, with some new additions to the airport's landscape. One such is the American Air Museum of the Imperial War Museum, an award-winning exhibition space designed by Lord Norman Foster. It is sited on the southwest side of the row of hangars and display areas used by the IWM and its partners here.

Foster, an RAF veteran as well as a pilot, created this great masterpiece of aviation museum design from 1987 to 1997. The aircraft-like nose shape of the hangar was constructed with pre-cast concrete panels. They shape a space of some 79,652 square feet (7,400 sq. m) housing what is likely the best American aircraft collection

outside the United States. The building was created in response to the program to accommodate the size of a B-52. Ramps at the interior's perimeter give more than 350,000 visitors annually a walking tour of American military aviation from World War I through the jet age Cold War. Concrete panels above contain hanging points from which to rig the aircraft. The glazed wall facing south to the runway provides ample light as well as a spectacular window from which to watch airshows. The building itself is constructed within a landscape berm. Visitors access it from a north entry, as if one enters a bunker or revetment-like hangar on a military base. Etched glass panels flanking the entry are a memorial to American airmen who died in the Second World War. Created by artist Renato Niemis and entitled *Counting the Cost*, it depicts 7,031 American planes etched on 52 glass panels, representing those crews missing in action during World War II. The museum displays were revamped in 2015/16 to include artifacts of some 85 individuals, most of which have never been exhibited before, in a £ 3 million project supported by the Historic Lottery Fund.

Foster's American Air Museum earned the 1998 Stirling Prize Royal Institute of British Architects Building of the Year Award. The jury cited »the elegant engineered form of the building and the technically driven shapes of the aeroplanes. The building itself sustains the fascination of these objects«. Foster has created iconic buildings around the world, from skyscrapers such as Commerzbank in Frankfurt (1996) and the Swiss RE Tower (2003) in London, to airport terminals in London Stansted (1991) and Hong Kong International (1998), to public buildings such as Berlin's Reichstag (1999). But he has also designed subsequent buildings to house aviation treasures, from Fortaleza Hall (2010) in Racine, Wisconsin, to the renovation of the Imperial War Museum (2014) in London.

1. Plan. Photo: Foster+Partners.
2. Section. Photo: Foster+Partners.
3. Museum exterior landside. Photo: ©Nigel Young. Foster+Partners.





4. Museum interior showing glazed wall airside, with Grumman TBM Avenger hung above a North American PBJ-1, a naval version of the B-25.
5. Museum exterior from the airside, and the tail of a Handley Page Victor bomber.
6. Museum interior showing A-10 with Stearman trainer hung above.
All photos: ©Nigel Young, Foster+Partners.

Imperial War Museum North, Manchester, England, 2002

Daniel Libeskind; exhibition design: Event and Real Studios

After a competition among several sites within northern England to host this new branch of the Imperial War Museum/IWM, the museum chose the site along the Manchester Ship Canal. This was done, in part, because of that city's industrial heritage during World War II as well as it being bombed during the Blitz, 1940. The museum then held a 1997 competition, selecting Polish-born American architect Daniel Libeskind to design the building. Libeskind created a design where three major components of the building represented three interconnected curved aluminum clad shards of a globe shattered by conflict – air, earth, and water. An anecdote used to describe this was Libeskind putting a teapot into a plastic bag, dropping it from his window, and using the broken pieces as a design source.

The 180 foot (55 m) high air shard houses the museum entrance, education space, and a viewing platform whereas the earth shard contains most of the museum galleries, and the water shard includes service spaces such as a café and entertaining space along the canal. The curved and angular spaces within relate to their exterior shapes. These were intentionally designed to be disconcerting to the visitor in a way that angular spaces at Libeskind's Jewish Museum in Berlin represent unsettling historic moments. The mu-

seum's exhibitions within the earth shard include permanent galleries in the main space, both chronological and thematic. Larger artifacts range from a Soviet T-34/85 tank to an AV-8B Harrier, a British jet used by the United States Marine Corps, and twisted steel beams from the World Trade Center in New York, destroyed by terrorist attack on September 11, 2001. The white walls in the main gallery act as screens for image projection, making the space itself a dynamic historic photomontage called *The Big Picture Show*. The museum, with support from the Arts Council, has also been commissioning fine art since 2010. These include Gerry Judah's sculpture of a war-torn landscape titled *The Crusader* (2010) and Chava Rosenzweig's ceramic stars of David titled *A star shall stride from Jacob and a sceptre bearer shall rise* (2013). Beyond permanent installation, temporary galleries are also housed within the earth shard.

The building itself came in well under budget at £ 28.5 million instead of the planned £ 40 million. Its first year witnessed more than 470,000 visitors, hitting the one million mark by August 2005. Libeskind's design received critical acclaim by the public and professionals alike. In 2009, the museum selected the firm of Topotek 1 to develop the exterior spaces of the site in a way that are visually compatible with the dynamic building. As such, camouflage patterns and landscape elevation changes were used as a source of inspiration for their work. This artistic landscaping was not implemented.

1. View from across the Manchester Ship Canal. Photo © Bitter Bredt, Jan Bitter Fotografie.
3. Main or gallery-floor plan. Photo: © Studio Daniel Libeskind.
3. Ground-floor plan. Photo: © Studio Daniel Libeskind.

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- 5, 6. Gallery view and air-shard viewing platform. Photos: © Bitter Bredt, Jan Bitter Fotografie.

