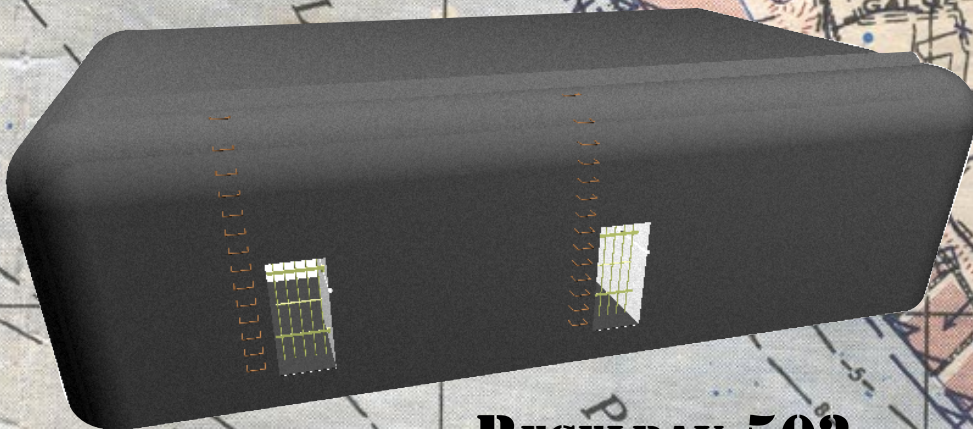
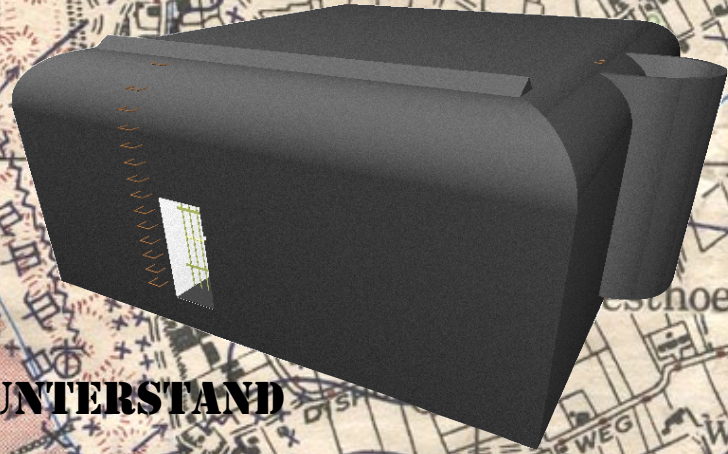


SECOND WORLD WAR GERMAN BUNKERS

**REGELBAU 501
EINFACHER GRUPPENUNTERSTAND**



**REGELBAU 502
DOPPELGRUPPENUNTERSTAND**

PART I

Photography, writing, design, layout, etc.

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Other images

Front cover map is a section of British map **Holland 1:25,000 Sheet No. 14 S.W. (W) Defence Overprint 28 Oct 44** in the possession of Huib Westerbeke.

Zoutelande map from **Plattegrond Gemeente Veere** by BV Uitgeverij Rijnland, used with permission nor commercial intentions.

Netherlands, Zeeland and Walcheren maps from **Route 66** by ROUTE 66 Geographical Information Systems, also used without permission and commercial intentions.

“Page” icon taken from one of KDE 3.0’s icon sets.

Technical stuff

The photographs in this net.book were taken using a Fujifilm 6900Zoom digital camera, while the computer graphics were created with POV-Ray 3.5 and the KPovModeler 0.20 front-end for it. The document was laid out in Palatino Linotype and **Futura XBik BT** using QuarkXPress 4.1 for Windows. The PDF was created with Adobe Acrobat Distiller 3.01 and worked on with Adobe Acrobat Exchange 3.0.

Printing tips (read this first)

This document is designed to be printed double-sided, with the even pages going on the backs of the odd ones. It is for this reason that the photographs on the odd pages, while their captions are on the even pages: printing out a large graphic on both sides of a sheet of ordinary printing paper is likely to cause the paper to ripple, which is avoided this way.

To print double-sided, you most likely will need to print out the odd pages first, then put them back into your printer to print the even pages. You can select which pages to print in the Print dialog that appears when you choose to print out the document.

Printing double-sided will require a bit of experimentation to make sure you get it right, but because of the many different types of printer in use, no definite, all-encompassing instructions can be given here.

When figuring out how to put the paper back into

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Thanks

To Stichting Bunkerbehoud, for the easy-going permission to photograph and measure their type 502 and 143 bunkers. See www.bunkerbehoud.com

the printer, the following points are what you need to pay attention to:

- The side of the paper the printer prints on;
- The paper’s orientation in the printer (to which side the top of the page points);
- Whether the pages should go in with the first page on the top or on the bottom of the stack.

Should you have access to a printer that can print double-sided as standard, just switch on that option and print the whole document in one go.

If you print to A4 paper (that is, if you live outside of North America), you should *not* have your PDF viewer resize the page to fit the paper, unless you notice a problem with parts of the photos or text disappearing in the margins.

For those using Letter-size paper, you *should* set your PDF viewer fit the page to the paper size, else you will probably miss the bottoms of most pages.

Introduction

This net.book contains photographs of a total of four different German bunkers, all located in the village of Zoutelande, on Walcheren island in the south-west of the Netherlands.

Historical background

Construction of the *Atlantikwall*, the German defensive line built on the European coastline from northern Norway to the Franco-Spanish border, was begun in 1942. In essence, it was a response to the German failure to invade Britain, the bogging down of the German offensive in Russia, as well as of the USA entering the war on the Allies' side; the idea was that by fortifying the coastline, an invasion could be repelled with far fewer troops than would otherwise be needed, thereby preventing a war on two fronts.

The island of Walcheren was heavily fortified as part of these defenses, with two main purposes in mind: the most important one was that the island guards the entrance to the Westerschelde, which is part of the estuary of the river Scheldt and forms the main approach to the large port city of Antwerp, in Belgium. In the 1940s, Antwerp was the third-largest port in the world, after New York and Hamburg. The second is that Vlissingen (or Flushing, in English), one of the two major towns on the island, had fairly extensive port facilities as well.

This led to the eventual construction of 207 true bunkers, out of a total of 245 planned, in addition to numerous lighter defensive works. To put this into perspective, Walcheren is a roughly diamond-shaped island, approximately 13 by 16 kilometers in size—in other words, that is one bunker for every square kilometer of ground ...

Many of these bunkers were built in the dunes along the south-western and north-western shores, facing the North Sea, since any shipping to Antwerp would have to approach from that direction. The area around Vlissingen was known as the

Seefront Vlissingen (Sea Front Vlissingen), and many of these were for coastal artillery, either gun bunkers or their supporting facilities such as ammunition bunkers, personnel quarters, or fire control centers.

This was also true for much of the rest of Walcheren: all in all, six batteries of coastal artillery, all operated by the *Kriegsmarine* (navy), were built into bunkers on dunes and dykes, and additional artillery (of the army, not the navy) was placed in-

land to support ground troops in case of an Allied invasion. Three navy batteries of heavy anti-aircraft guns were also emplaced on Walcheren.

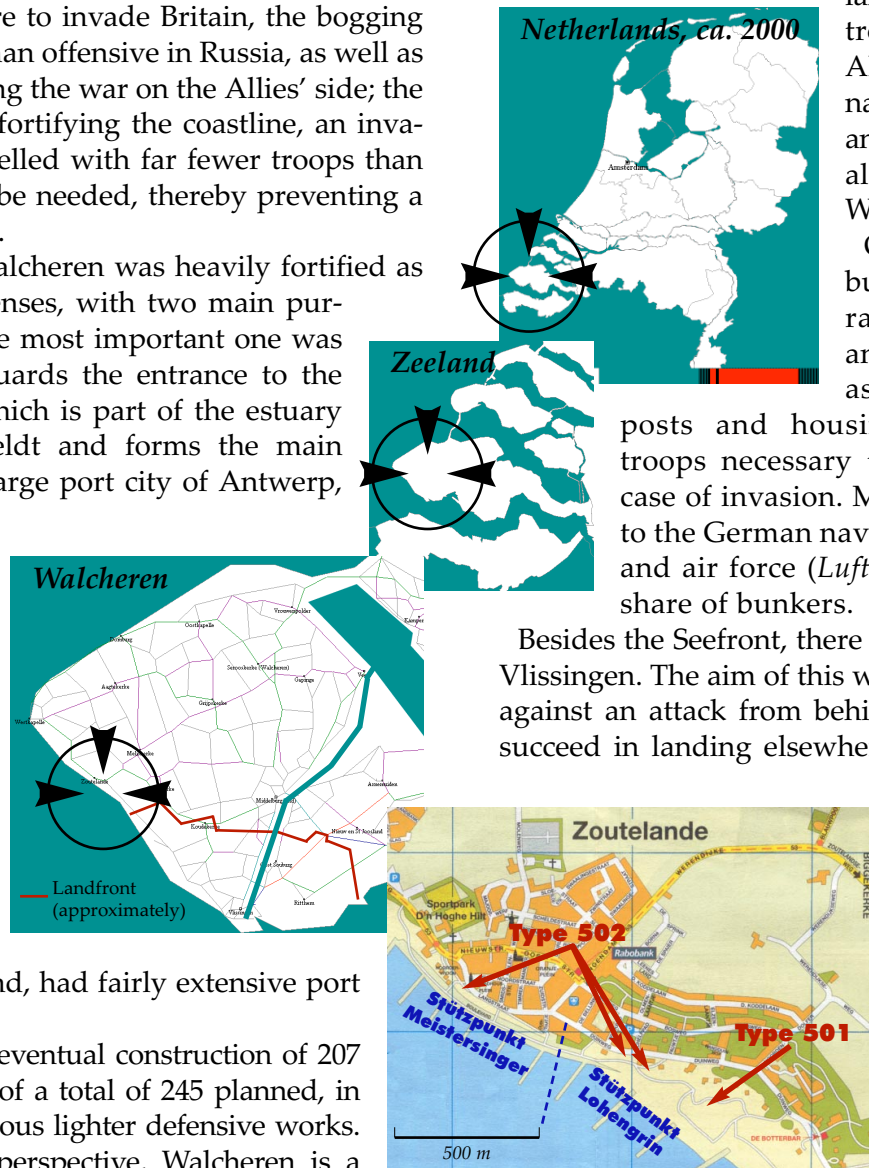
Other kinds of bunker built included radar systems and anti-aircraft platforms, as well as command

posts and housing for the ground troops necessary to protect all this in case of invasion. Much of this belonged to the German navy, but the army (*Heer*) and air force (*Luftwaffe*) also built their share of bunkers.

Besides the *Seefront*, there was also the *Landfront* Vlissingen. The aim of this was to defend the town against an attack from behind, should an enemy succeed in landing elsewhere on Walcheren. The

result of this effort was a roughly circular array of bunkers, running clockwise from the dunes to the north-west of Vlissingen to the south-eastern tip of the island—to be more precise, from the hamlet of Valkenisse in the

dunes (original plans started the line at Dishoek, closer to Vlissingen), to the town of Koudekerke, and from there to Klein Abeele on the Walcheren Canal. On the other side of the canal, it continued from Groot Abeele to the Napoleonic fortress Rammekens. This line is marked on the Walcheren map on this page.



Introduction

Atlantikwall defensive organisation

Various classifications were used to describe the importance and size of defensive areas, the smallest being the *Widerstandsnest* (Resistance Nest) that was normally defended by a single section of ten men. Three or four *Widerstandsneste* made a *Stützpunkt* (Support Point), usually defended by a platoon of troops.

A number of *Stützpunkte* together could form a *Stützpunktegruppe* (Strongpoint Group), which seems mostly to have been a classification used for some stretches of coastline between more heavily-defended areas. However, “separate” *Stützpunkte* could also be found in such places.

An area that was to be heavily fortified was known as a *Verteidigungsbereich* (Defence Area). The town of Vlissingen was one of some twenty *Verteidigungsbereiche* in Europe, and its aforementioned *Seefront* and *Landfront* were a direct consequence of this status. At least in the Netherlands, each *Verteidigungsbereich* had a *Kernwerk* (Core) that consisted of a large number of bunkers in a small area.

The classification used from 1944 for the largest fortified areas was *Festung* (Fortress), of which all of Walcheren was one. Another term used with *Festungsbereich* (roughly meaning “fortress area”) but this seems to have been a bureaucratic term whose exact meaning is hard to pin down.

To give an idea of the kind of defences a *Stützpunkt* could have, consider that all four bunkers pictured in this book were part of two *Stützpunkte* in the village of Zoutelande, on Walcheren’s south-western coast. These were named *Lohengrin* and *Meistersinger*, after German operas, as marked on the map on page 3, and had 67 and 47 permanent fortifications, respectively, according to a post-war Dutch army survey. However, far from all of these were true bunkers (of which there were 15 in all in the two *Stützpunkte*); many were much simpler shelters or weapons pits built from concrete and/or brick—though it is in addition to trenches, fox-holes, anti-tank obstacles, minefields, and related defensive works.

Liberation

In early October, 1944, the British Royal Air Force bombed the Walcheren sea dykes in four places, in order to flood most of the island, which is below sea level. This forced the German defenders onto

higher ground along the edges of the island and the villages in the interior. It also had the unfortunate effect of causing many casualties among the civilian population, who had beforehand been warned by means of leaflets dropped from aircraft, but who had nowhere to go.

On the 1st of November 1944, a three-pronged assault was made by Canadian, British and other Allied forces for the actual capture of the island. Canadian forces attempted to cross the dam connecting Walcheren to the neighboring island of Zuid Beveland (which was already in Allied hands), troops of the Kings Own Scottish Borderers performed an amphibious landing in Vlissingen, and a similar assault was made in the village of Westkapelle by Royal Marine Commandoes and Norwegians, French, Dutch and Belgians of an Inter-Allied Commando unit.

The island was defended by some 10,000 German Wehrmacht troops (mostly army and navy, plus some air force; there was no *Waffen-SS* presence), who put up a varied resistance to the Allied forces attempting to fight their way along the edges of the island. Most of the army troops were second-line, old men drafted to man fortifications (the 70th Infantry Division, nicknamed the “Stomach-complaint Division”), and so frequently gave little resistance to the Allies, but the navy troops and some army officers were quite willing to put up a fight. Despite Walcheren’s small size, it took until the 7th of November for the German forces to surrender, by which time only about half of the island had actually fallen into Allied hands.

Bunker museum

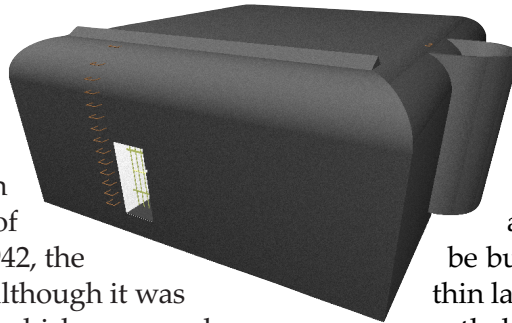
Since the summer of 2001, one of the type 502 bunkers in Zoutelande has been opened to the public as a bunker museum, together with a type 143 nearby. For those interested in visiting, it is the right-most type 502 shown on the map on page 3.

To get there, from the village center, follow the *Duinweg* street to the east; about a hundred meters after hotel De Tien Torens, take the road to the right, up the dunes. The first museum bunker is on the left, about halfway up the dune; to get to the second, go slightly further up the dune and take the footpath to the left, then keep following it.

Note that the museum bunkers are only open on Sunday and Wednesday afternoons, May through November.

Regelbau 501 • Einfacher Gruppenunterstand

The German type 501 bunker was designed in 1939, as part of the planned Westwall defences against France—the German counterpart to the French Maginot line. After construction of the Atlantikwall was started in 1942, the type 501 was built there as well, although it was later superseded by the type 621, which was roughly the same size but of more up-to-date design. At least 1,519 type 501 bunkers were built during World War II.



concrete was put into place at the same time: steel armour plates, firing ports, ventilation tubes, chimneys, etc.

If the bunker had an escape shaft, as the type 501 did, then that would be built from bricks and covered with a thin layer of concrete. Because the shaft is partly built into the bunker's outer wall, it is likely that it was constructed at this time as well.

The inside of the roof was also built together with the interior fittings, by placing steel I-beams at regular intervals (always so that they spanned the short side of a room, for strength) and putting steel plates between them. Use of wooden planks was permitted if steel was not available, but due to the fire hazard they presented, wood was not the preferred material.

Once all this had been done, an outer mould was built around the reinforcements and the concrete poured in. This was done in a single, continuous operation that went on day and night, so as to create a bunker consisting of a single block of concrete, without any seams or similar weak points. The impressions left by the planks on the concrete are very obvious on the actual bunkers, and also quite visible in the photographs in this net.book.



German bunkers could have two types of corners. One, as on this type 501, was sharp: the sides were simply built into a square shape, and so were the curved roof edges where they joined. This was fairly simple to make, as no complicated joints were needed.

A more complex, round shape was also used, as can be seen in the photographs of the type 502 bunkers on page 19. Here, the whole corner of the bunker wall was rounded, and the roof corners were built into a spherical shape. The moulds for this must have been much more difficult to build properly, but this style of corner is stronger than the square type, and so was more common.

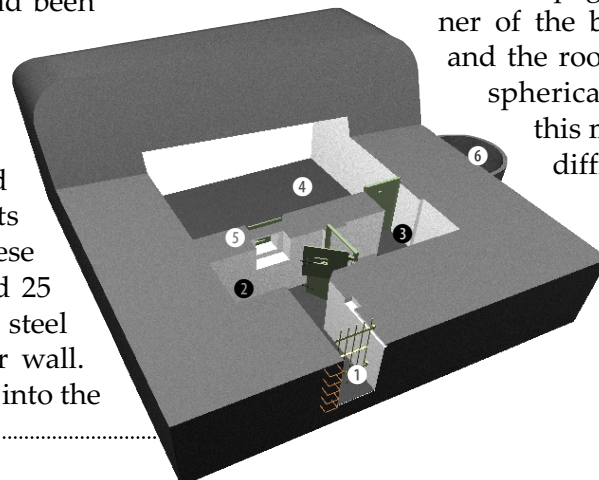
German bunker nomenclature

German bunker designations consisted of a *Regelbau* (meaning approximately “standardised construction”) number, in this case 501. The numbers were allocated in series, with bunkers designed around the same time having similar numbers. These bunkers also tended to share features of the general design, such as the way the interior was laid out, or the design of the ventilation system. The 500-series was developed for the Westwall, but was also used in the Atlantikwall.

The *Regelbau* number was followed by a description of the bunker's purpose. Here, the latter is *einfacher Gruppenunterstand*, which translates into English as “single section housing”—in other words, this is a bunker in which one section¹ of nine or ten men could live.

Bunker construction

German bunkers were made from reinforced concrete. After a site for a bunker had been selected, surveyed and, if necessary, prepared, a floor was poured from concrete. Onto this, wooden moulds for the interior were constructed from beams and planks, and the reinforcements were built up around them. These steel reinforcing bars were spaced 25 cm apart, putting about 50 kg of steel into every cubic meter of bunker wall. Anything that had to be anchored into the



¹ “Squad” in American terms.




Regelbau 501: einfacher Gruppenunterstand

Regelbau 501 described

As explained above, the type 501 bunker was designed to house a single section. As such, its main room is simple and rectangular, but the need to allow the bunker to be defended against both attackers and chemical weapons made necessary an elaborate entrance that takes up a large amount of space. The type 501 takes up approximately 9×9.9 meters of ground area, but of these 89 m², only 19½ m² are reserved for the occupants—less than a quarter of the total space. Of the rest, some 63 m² consists of walls, leaving the remaining 6½ m² for the entrance corridors, gas lock and doorways.

The whole bunker consisted of the following parts or sections; the numbers refer to the plan above and the three-dimensional cut-open views on pages 5 and 7.

① Entrance corridor

 The only way into the type 501 is through this entrance. It was located in the rear wall—that is, the wall that faced away from the direction the enemy was most likely to come from—as this prevented enemy fire from landing directly in it, either unintentionally or by design.

The corridor could be closed by a metal bar door, which served to prevent enemy troops from entering the bunker but did not obstruct the firing port from shooting at those same soldiers (see ③).

One of the major differences between the 500-series of bunkers and its successor, the 600-series, is obvious here: in the 500-series, the entrance was flat—that is to say, the bunker's floor was at the same level throughout. In the 600-series, however, the entrance was set much higher up in the wall than the floor level, with steps leading down, in order to lower the bunker's silhouette.

② Decontamination niche

In case of a chemical weapon attack, soldiers would decontaminate themselves in this part of the corridor before entering the gas lock. It is otherwise a dead end. A locker with chemical warfare equipment could be set up in this part of the bunker.

③ Gas lock

The gas lock was a means to prevent chemical weapons from entering the bunker itself, by providing a place where the soldiers could be more

thoroughly decontaminated before going into the main room. The gas lock also served as a defense against regular attacks, as it had a strong outer door, made from 3 cm thick steel, with a vision/firing port in it.

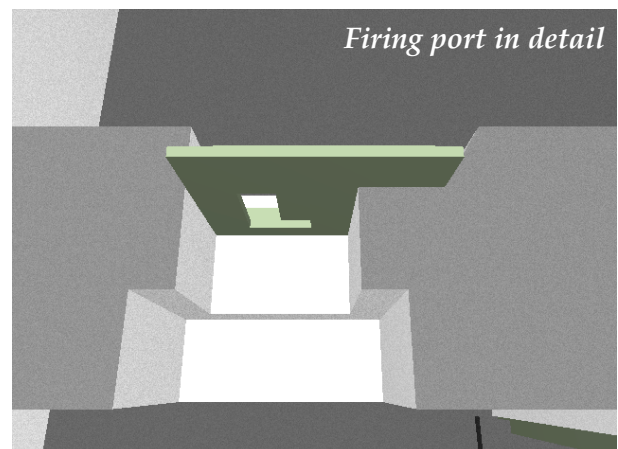
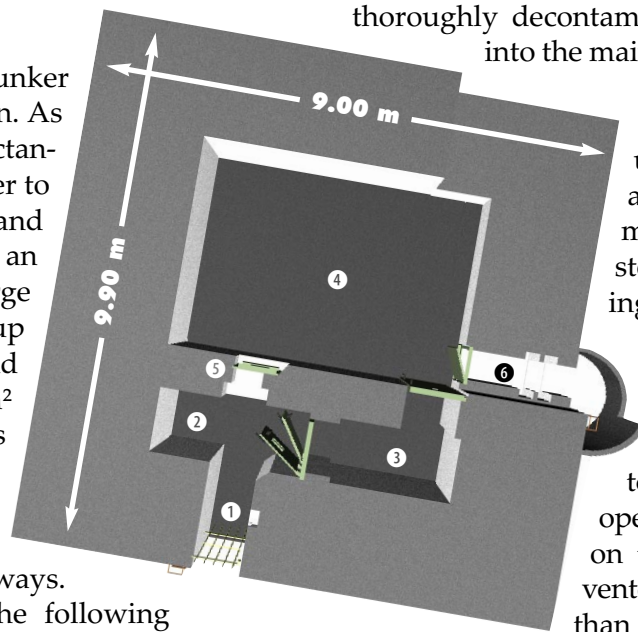
This door was in two halves, weighing almost 250 kg each, allowing the top and bottom to be opened separately (a lip on the lower door prevented it opening further than the upper one). The reason for this was that in

case debris had spilt into the corridor, it might block the lower door but generally not the upper one, allowing the bunker's occupants to get out anyway.

④ Main room

This is where the soldiers lived, and was normally fitted out with bunk beds, a table and chairs, equipment lockers, and a bunker stove, plus whatever personal touches the occupants wanted to add. This room also had a bunker ventilator mounted on the wall to provide fresh air and also to create over-pressure inside the bunker during a gas attack. This was a hand-cranked device that drew air into the bunker and, if required, through a filter.

The main room was separated from the gas lock by another steel door, but much less elaborate than the outer door. It was in one piece, and consisted of thin steel plates rivetted to a frame, instead of from a massive slab of steel. To create a gas-tight seal, a rubber gasket ran along the inside of the door frame,

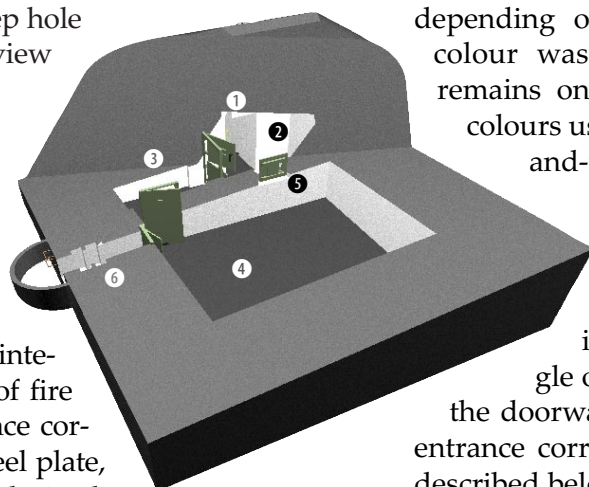


while a small, glazed peep hole in the door itself gave a view into the gas lock.

⑤ Firing port

13 & 29

To defend against attack, nearly all German bunkers had a firing port built into an interior wall, giving a field of fire straight down the entrance corridor. It consisted of a steel plate, 3 cm thick, set into a hole in the concrete of the wall. The plate had a firing hole 30×22 cm large, and closed from the inside by a sliding shutter also made from 3-cm thick steel plate. This is shown in detail at the bottom of page 6.



⑥ Escape tunnel & shaft

10 - 13

In case the gas lock's outer door was completely blocked by debris (see page xx), an escape tunnel was provided in the type 501's right side wall. This was only 60 cm wide and 80 cm high, closed by a steel door on the inside, and opened into a brick shaft of 2 m diameter built onto the outer wall. Steel rungs on the bunker wall inside the shaft allowed the escaping soldiers to climb up onto the bunker's roof.

The shaft itself was normally filled with gravel, to prevent its use by the enemy; two brick walls inside the escape tunnel prevented the gravel from spilling into the bunker. When the tunnel was to be used, the soldiers would open the steel door, smash or pull down the brick walls, and let the gravel flood into the bunker.

The illustration at the bottom of this page shows a closer view of the escape tunnel's layout when seen from straight above, with the cut-outs in the sides for the brick walls.

Painting

Contrary to popular belief, most bunkers were not left in their unpainted, grey concrete colour during World War II; the fact that they have this colour today is because the original paint has worn off due to 60 years' exposure to the weather.

If the bunker was built in the open, a large part of it was covered by earth, to both blend it into the surrounding terrain and protect it from shellfire. The exposed concrete was then camouflaged with various painted-on patterns, the exact style

depending on the surrounding area. The base colour was most likely dark yellow, as this remains on parts of surviving bunkers. Other colours used were darker, but from only black-and-white photographs it is impossible to say what they actually were; green and brown similar to those used on vehicles are probable.

The dark yellow paint extended into the entrance corridor, in a triangle on the side walls from the top edge of the doorway down to the floor. The rest of the entrance corridor was painted like the interior, as described below.

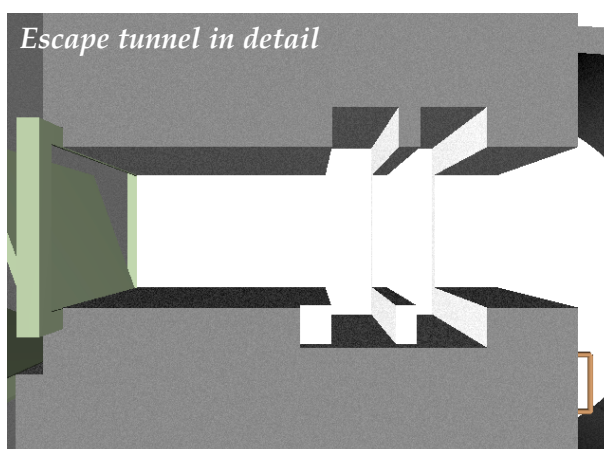
On the other hand, bunkers built in villages and towns, or near farms, were often disguised as civilian buildings. They received fake roofs, and even chimneys, made from wooden beams, planks and chicken wire, and had doors and windows painted onto their walls—often even with decorations such as curtains and flowers visible “inside”. Although most of the fake roofs are quite apparent in contemporary photographs taken from ground level, they were effective against aerial reconnaissance.

12 - 13

On the inside, bunkers were painted white; whether this was originally matt or gloss is now known, but all surviving bunkers the author has been in, were matt white (note that the museum bunker's interior has been repainted gloss white). The floor was left as bare concrete.

Interior metal fittings were a green colour, while handles were painted black. Again, the museum bunker has these in gloss finish, but it is more likely that during World War II they were actually matt.

Stencilled signs in black inside the bunker indicated the purposes of the various rooms, as well as bunker identification numbers and warning signs. On many surviving bunkers, these signs are still visible.



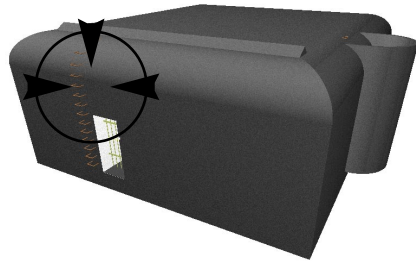
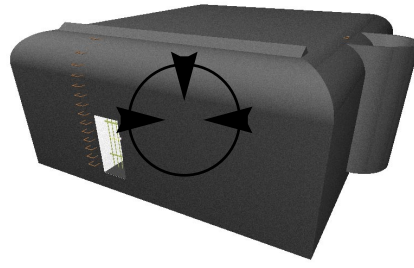
Regelbau 501: einfacher Gruppenunterstand

① **Entrance & rear wall**

Once you get close to it, this is the view you get of this particular 501. It is buried in about a meter and a half of sand, so only a small part of the entrance is visible.

This side of the bunker faces away from the sea, and will therefore be referred to as the rear wall. When the text refers to other sides, picture them as if you were standing in front of the door, looking at the bunker.

The text above the door reads “Door die” which is Dutch and translates into English as “Through that”—what it refers to, or what word is missing, is anyone’s guess, but as this bunker has long been used as a playground by local children (including the present author 15+ years ago), it could be just about anything.



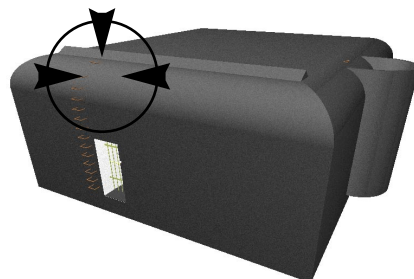
② **Metal rungs**

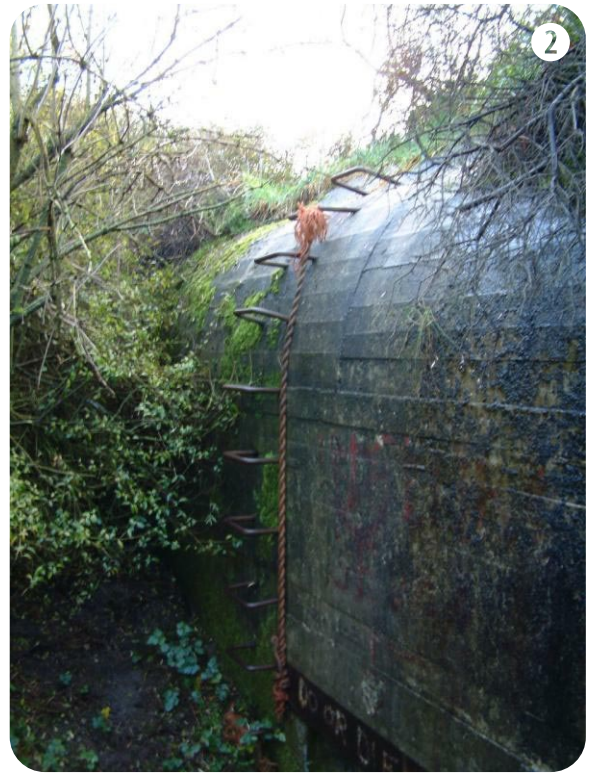
From closer to the bunker, the metal rung ladder is visible, with a length of nylon rope tied to it by someone, most likely again by playing children.

The door is not in the center, but this is very difficult to see with all the undergrowth obscuring most of the bunker.

③ **Rear roof**

Climbing the rungs leads up onto a small patch of bare roof, visible here. The dark part is the rear side of the roof ridge that is common to nearly all these bunkers. Its function is to keep the soil on top of it—German bunkers were almost invariably dug into the ground, or had earth banks built up against them, both for camouflage and to provide additional protection from enemy fire.

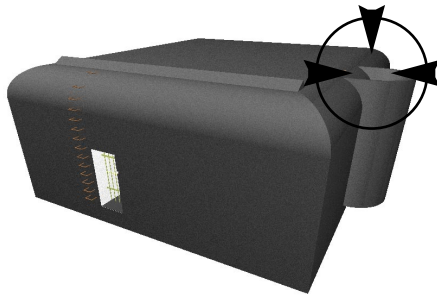
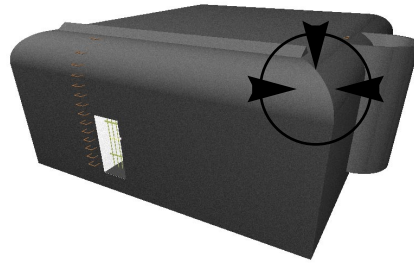




Regelbau 501: einfacher Gruppenunterstand

④ Roof corner

The only corner of this type 501 that is visible is the right rear one. It is much sharper than that of two of the type 502s (see page 19), showing different methods being used to construct the molds into which the concrete was poured.

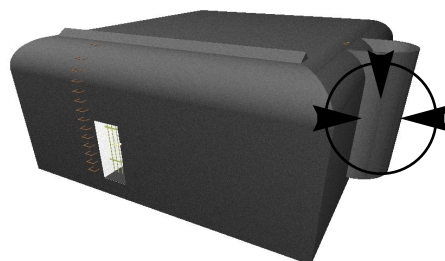


⑤ Escape shaft

This is what you see when you first approach the escape shaft from the roof of the bunker. It is nearly completely overgrown, with bushes up to 1½ m or so high around it, so if the whole area wasn't off limits, it could be dangerous. (The author once nearly fell in when coming from the other side, only seconds after warning someone else to watch out for the hole in the ground ...)

⑥ Escape shaft ladder

On the other side of the shaft, it is much easier to look straight down, because there is no curving bunker roof that you might slip down. The floor visible at the bottom of the shaft is about four meters down, but the shaft has filled up a bit since the war so it would have been somewhat deeper still originally. The whole thing is semi-circular, with a radius of about a meter. The rungs are made of much thicker steel than those of the type 502, pictured on page 20.



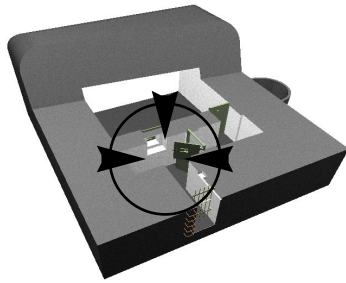
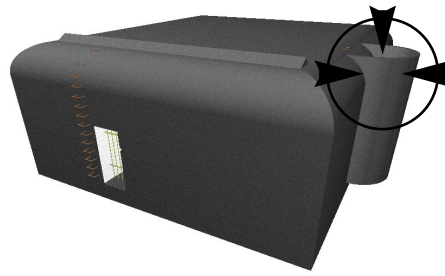


⑦ Escape shaft interior

As should hopefully be apparent, this photo was taken from inside the shaft, looking up at what's visible of the sky. The picture was taken from as low down in the shaft as was feasible, to get as much of the shaft on it as possible, but it still does not really do it justice.

The walls of the shaft consist of a roughly-applied layer of concrete over bricks, which show in a few places where the concrete has chipped away.

When the bunker was in active use, the escape shaft was filled with gravel, which prevented both enemy soldiers and enemy bombs or artillery fire coming down it.



⑨ Escape tunnel

A look into the escape tunnel shows the main room in the bunker, with junk left behind by playing children. This tunnel is only 60 cm wide and 80 cm high (without the sand on the floor), but currently has more room than the main entrance does.

The slots in the walls, visible at the front of the picture, are for the brick walls that were put into the tunnel to keep the gravel in the shaft. Should the main entrance be unusable for some reason (for example because it was blocked by debris), the soldiers inside the bunker could pull down the brick walls and let the gravel pour into the bunker's interior, after which they could escape through the shaft.

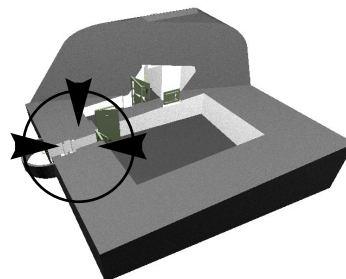
The tunnel was closed by a steel door on the inside—that is, the far side in this photograph.

⑧ Entrance corridor

This is the part of the interior visible through the front door, but you have to get down onto the ground to be able to look in. The metal parts are pretty rusted, but the original white paint is still visible.

The sign stencilled on the left wall reads **VLISS-WEST 022-253**, indicating the bunker was part of sector 22 of the Vlissingen-West defenses—that is, Stützpunkt Lohengrin to the south-east of Zoutelande—and was bunker number 253 in the Vlissingen-West network.

The firing port to defend the entrance is clearly visible, with the main room being behind it. To get there, you would have to turn right in the corridor, which leads to the gas lock. The corridor to the left is a niche in which soldiers could decontaminate themselves before entering the gas lock, which is around the corner on the right.





Regelbau 502

Doppelgruppenunterstand

The type 502 bunker is a very similar design to the type 501—in fact, it can be fairly accurately described as two type 501s grafted together side-by-side. Its name reflects this: the 501 is an *einfacher Gruppenunterstand* (single section housing), while the 502 is described as a *Doppelgruppenunterstand* (double section housing).

Just as the type 501 was superseded by the 621, the 502 was replaced by the later 622 in the Atlantikwall. At least 1,718 type 502s were built, however.

Regelbau 502 described

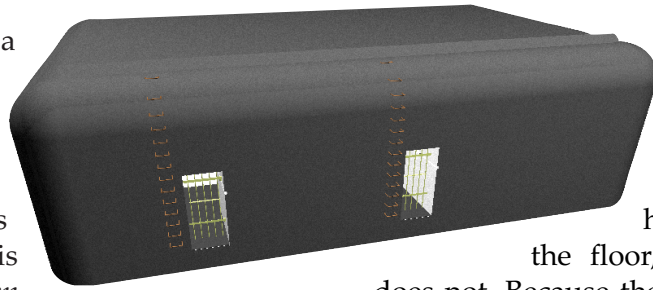
Although the type 502 is very similar to the type 501, it differs in many details—besides its larger size, of course. The numbers refer to the map and cut-outs on this and the following pages.

① Entrance corridor

20
21 These were almost identical to those in the type 501, though the corridor on the right was essentially a mirror image of that on the left. However, this is only true for the basic shape, as the two differed in details. As the plan shows, there was a niche in the right-hand wall in both corridors; this was probably for installation of a radio or field telephone, as a kind of drainpipe went straight up from the niche to the roof, though which a radio antenna could be extended. At the same time, a slot cut into the wall from the niche to the bunker's outer wall, with a pipe running through it (this is visible in the photos on page 21), either for electrical supply or for field telephone cables.

② Decontamination niche

As in the type 501, the corridor has a dead end that was intended be used as a decontamination niche. One or both might have a locker with chemical warfare equipment for just this purpose, but a



peat toilet might also be set up in them. In the type 502 bunker that has been fitted out as a museum (see p. 18 and on), the niche on the left-hand side has a drain set into

the floor, while the right-hand one does not. Because the other type 502s pictured in this net.book are inaccessible, it is not clear if this was a feature of all these bunkers, or just of this particular one—bunkers were similar to ships when it came to building them: no two are exactly the same, even though they were made to the same specifications.

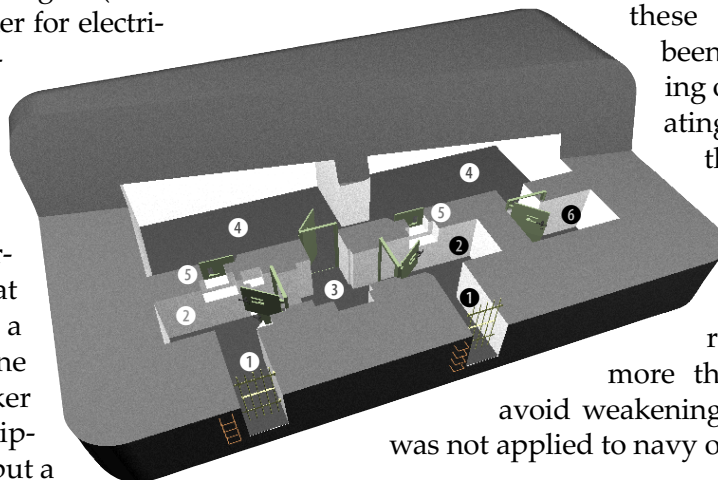
③ Gas lock

Both corridors gave access to the central gas lock, which had a two-piece, armoured door on either side as well as a gas door to close it off from the main rooms.

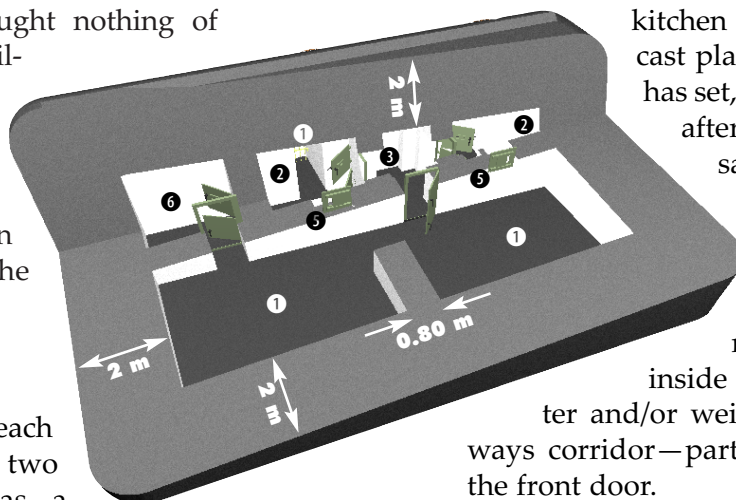
Note that the gas lock was asymmetrical: the gas door was offset to the right, and so was the extra niche in the wall opposite that door. In the museum bunker at least, the gas lock's floor was poured higher than those of the surrounding rooms and corridors, being made level with the bottoms of the door frames.

④ Main rooms

28
33 Because this bunker type was intended to house two sections, it has two main rooms separated by an 80-cm-thick concrete wall. There is no door between the two, or even a step in the floor; the dividing wall simply ends in the middle of the room. Although these two room could have been made into one by leaving out this wall, thereby creating a little bit more space, the reason for it being there anyway is because the German army had decided that bunker interior rooms should not span more than 7 meters—so as to avoid weakening the structure. This rule was not applied to navy or air force bunkers, how-



ever: the navy thought nothing of installing coastal artillery into rooms spanning fifteen meters or more, for example, which would have been unacceptable to the army.



kitchen oil will do as well), you can cast plaster into the mould; once this has set, the mould can be dismantled, after which you can cut, file and sand the plaster into the final bunker shape.

With a little more forethought, it should not be very difficult to make a mould that will leave the

inside hollow, in order to save plaster

and/or weight, or to also add the sideways corridor—part of which is visible through the front door.

To easily incorporate the plank impressions that are so obvious on the outer walls, a more difficult, but also more accurate, way to build a bunker model could be to create a mould from wooden slats and strips, replicating in miniature the way in which the real bunkers were built.

A different way to create a bunker is to build it from clay. This can be rolled into flat plates by the placing two wooden slats of the wall's intended thickness next to a blob of clay, and then using a wooden dowel or some similar object to roll it down to that thickness. The sections can be "glued" together with water, while the plank markings can be made by pushing a strip of wood into the still-wet clay. Remember, though, that clay shrinks as it dries, so this has to be taken into account when determining the model's size.

A major mistake made by many modellers is in the way bunkers are finished and placed in a diorama or on a scenic base. Plenty of models are painted in concrete greys and placed on top of the ground, or at best partially dug in. During World War II, the real bunkers were dug in as far as possible, leaving only entrances, firing ports, observation devices and ventilation shafts exposed. Even

on flat ground, a mound was thrown up around the outside.

The concrete parts that were left exposed were painted in camouflage patterns, about which more information can be found on page 7.

⑤ Firing port



In front of each of the two entrances was a defensive firing port,

of the same design as that used for the type 501; a close-up drawing can be found on page 6. The firing ports were mirrored, however, by the simple expedient of installing one upside-down compared to the other.

⑥ Store room

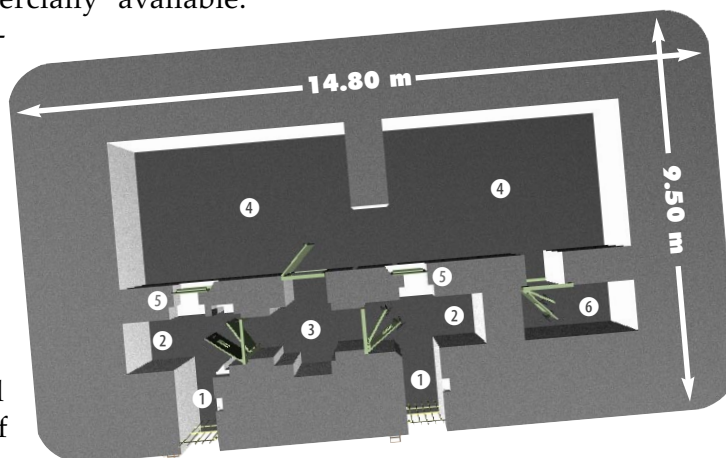


The original purpose of this room was for the installation of a steel observation cupola in the bunker's roof, but even when the type 502 was built in the Westwall, this was rarely fitted. In the Atlantikwall, it was apparently even rarer. Instead, the room was used for storage, most likely of food—the museum bunker has the room fitted out with shelves full of tin cans, which seems appropriate considering the rule that each Stützpunkt or Widerstandsnest had to be self-sufficient for up to 56 days (although this was later reduced to 30 days).

Modelling the Regelbau 501 & 502 bunkers

Models of bunkers are fairly thin on the ground, and as far as could be determined, no models of the types 501 or 502 are commercially available. Luckily, they are of a very simple design that should not be very difficult to produce from basic materials.

An easy way may be to build a mould from Lego bricks to cast a square block of the bunker's outer size, with a protrusion going into the bunker to form the entrance corridor. After coating it with a mould release agent (some kind of



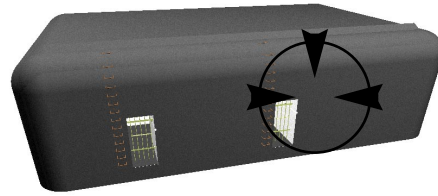
Regelbau 502: Doppelgruppenunterstand

① Rear wall right

One of the three type 502 bunkers remaining in Zoutelande, the only remaining bunker of Stützpunkt Meistersinger. Most of its right rear wall is shown, with the angled walls built onto both sides to hold the sand of the dunes back so that it would not slide down in front of the bunker. This is the only type 502 in the village that has these walls.

Civilians were allowed to shelter in this bunker during the Allied assault on Walcheren in November 1944, and the only German casualty during the liberation of the village fell here as well—an *Unteroffizier* shot by his own men, who didn't feel like offering resistance to A Troop, 48 Royal Marine Commando ...

The fence at the top of the bunker is a modern addition, but the ridge underneath it is not.

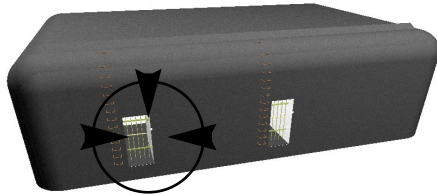


② Rear wall left

The other part of this type 502's rear wall, which faces landward—right behind the bunker are the dunes, and behind those the beach and sea.

The doors of this bunker are not original, but have been installed to keep people away from the materials stored inside. Note that the concrete beams that form the edges of a “path” to the doors are actually ribs from a World War II German concrete anti-tank obstacle.

The effects of almost 60 years' worth of exposure to the weather are very obvious; bunkers during World War II would not have looked this weathered, but were generally painted in a camouflage pattern. Wartime photographs of this particular bunker show it was painted in a pattern of sand and one or two darker colours (probably green and brown) in large patches. Plant shapes were painted on to further blend it into the surrounding dunes.

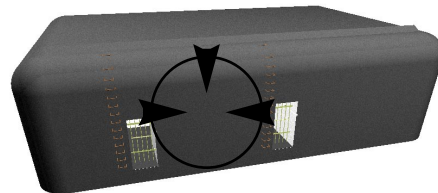


③ Rear wall left

The left front of a second type 502 bunker, about five to ten minutes' walk from the one shown above. This one, however, was part of Stützpunkt Lohengrin.

It has had its entrances closed up, making its interior inaccessible. Normally, rungs would lead up to the roof on both these bunkers, but all of them have been cut off at some point in the past. This photo shows precisely where they were, though.

The ground in front of this bunker is above floor level, as is obvious from the visible height of the doors.



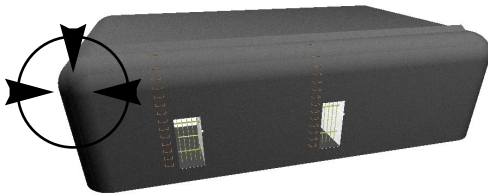
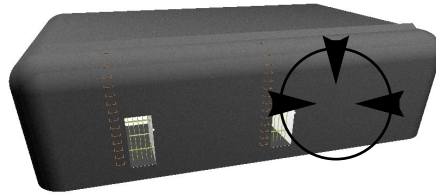


Regelbau 502: Doppelgruppenunterstand

④ Rear wall right

Due to the blocked-up entrances and lack of metal rungs, this bunker has a very clean outer wall that shows its basic shape to advantage. Comparing its air inlets to those in the other photographs on this page shows they are very different: set back into the wall, instead of being flush with it.

This bunker's roof is easily gotten onto, as it is sometimes used in summer as an auxiliary parking lot for a hotel nearby (the house visible in the background is not that hotel), but as the roof is covered by grass, there is not much point in taking pictures of it.



⑤ Roof corner

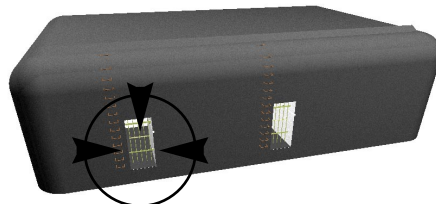
The left rear corner is exposed, showing a compound curve that must have been difficult to create a wooden mould for. The roof ridge is also just visible.

⑥ Left entrance

This is a third type 502 bunker, less than a hundred meters from the other one on this page, and is the one that was opened as a museum in the summer of 2001.

The type 502 bunker has two entrances in its front wall; the left-hand one is shown here, with the metal rungs leading up to the roof. Though rusted, bent, and in some cases broken, these are still strong enough to support a person's weight.

The paint inside the doorway is not original, but is applied in the colours and pattern that were used in World War II.

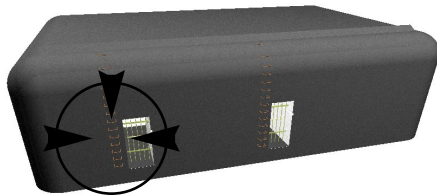
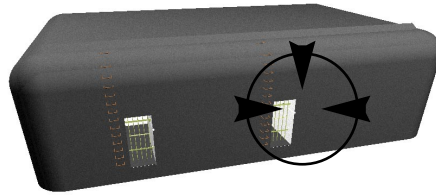




Regelbau 502: Doppelgruppenunterstand

⑥ **Right entrance**

This is the right-hand entrance, again with rungs for roof access. This door is much closer to the center of the front wall than the other one is, because of a store room that is incorporated into the wall on the right-hand side of the bunker.

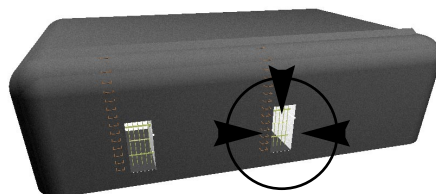


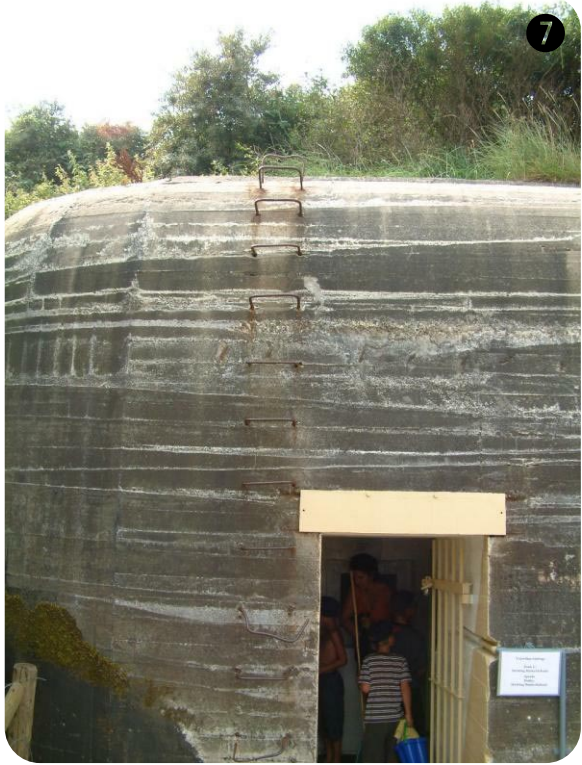
⑦ **Metal rungs**

Shown here is the ladder of metal rungs, and the overgrown bunker roof. A low concrete ridge can be seen at the top, which stops the loose soil (that is to say, the sand held together only by the plant roots) from sliding off. Note the rounded shapes of bunkers made from poured concrete, and the imprint of the wooden planks used to make the mould for it.

⑧ **Outer door**

The outer doors of German bunkers were metal grates, made from five steel bars held together by some steel profiles. The reason for this is the firing port in one of the interior walls, visible behind the door in the photograph. By constructing the door like this, it kept the enemy from entering the bunker, but at the same time did not prevent the defenders from using the firing port against anyone trying to open the door.

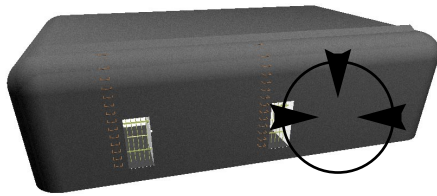
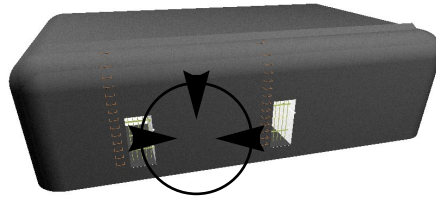




Regelbau 502: Doppelgruppenunterstand

⑨ **Air inlet**

This is one of the two air in- or outlets for the type 502 bunker, as used on the first and third ones pictured. The cast steel grill is there to prevent grenades from being thrown into it by attackers; many German bunkers of later design than the type 502 have an ingenious arrangement of two intake holes without grills, where throwing a grenade into the top hole will only cause it to roll out of the bottom one.

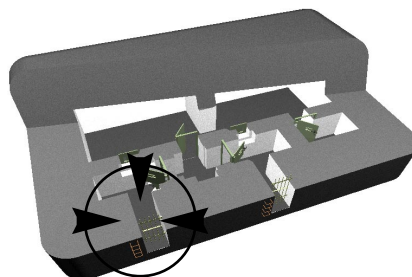


⑩ **Air inlet**

The air inlet of the second bunker is very different from those on the first, lacking the steel grilles and being set back into the wall. It is likely that a large type of grille would have been fitted into this recess, but that it has been removed since the war.

⑪ **Identification panel**

An identification panel was stencilled into the doorway of each and every German bunker. This one denotes this to be bunker number 022-248 of the Vlissingen-West defensive network. This is the museum bunker, and the panel is not original but has been repainted together with the rest of the bunker's interior—unlike the panel for bunker 022-253 that is faintly visible in photo 8 on page 13.

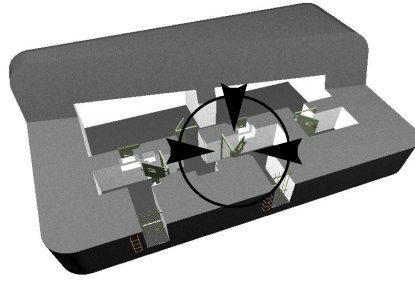




Regelbau 502: Doppelgruppenunterstand

⑫ Gas lock upper door inside

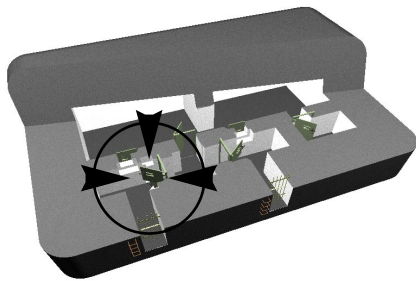
The gas lock can be accessed from both bunker entrances, and is closed by a massive, two-piece, steel door on either side. Though a bit blurry, this photo shows the upper door on the right-hand side of the bunker, with its handles and peep hole/firing port.



⑬ Gas lock upper door outside

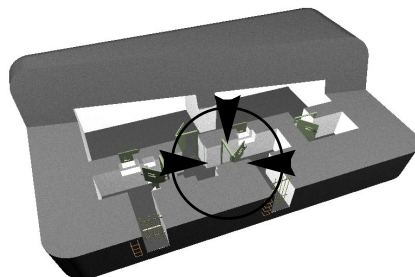
The outside of the upper door is shown here, this time on the left-hand side of the bunker (that is, the opposite of the door in photo 12).

The gas lock doors are in two sections because of the chance of debris falling into the bunker. This could block the door, so by making it in two parts, the designers tried to ensure that at least the upper part of the door could be opened to let the soldiers escape.



⑭ Gas lock lower door inside

The lower door has fewer fittings than the upper one, these being limited to a handle for pulling it shut, a lever to secure it, and a hook for hanging something on (probably a padlock when that is not in use).



12



13

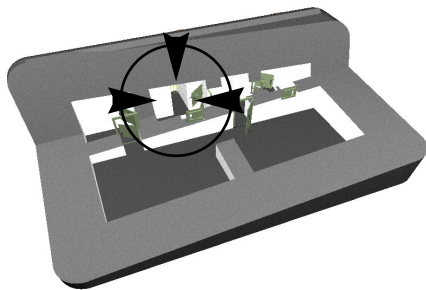
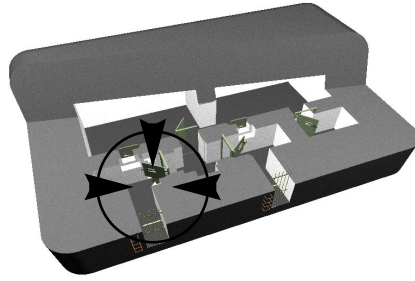


14



⑮ Gas lock lower door outside

This is the outside of the bottom door, on the left-hand side. Although details of the door are difficult to see (but there aren't many), this photo shows that the wall has its corner bevelled off; this is not so soldiers can carry large objects inside more easily, but so that the blast of an explosion outside will catch the edge of the door, and so push it shut to protect the troops inside the bunker.



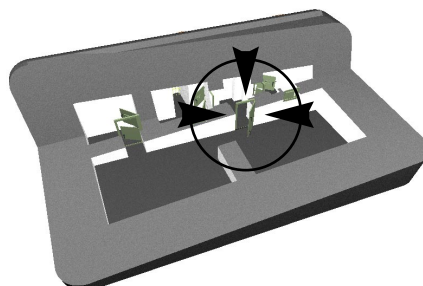
⑯ Outer door

Beyond the gas lock is the outer door, in this case the one in the right entrance, seen from the inside looking out. The purpose of the top hinge is not entirely clear, as there is no corresponding one at the bottom of the wall.

⑰ Interior gas lock door

Moving inside the bunker's main space now, this is the inside of the door which separates the gas lock from the living quarters.

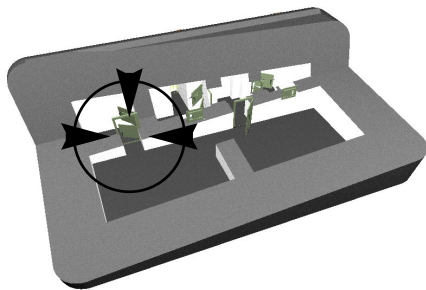
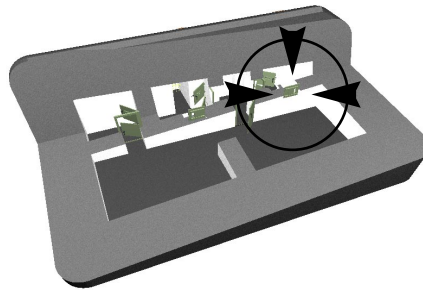
The colored pipes are part of the ventilation system, with the color denoting which direction the air flows through the pipe, and/or whether it has been filtered or not.





⑱ Firing port

A view of the firing port that covers the left entrances; a second such port covers the other entrance. It is constructed entirely from steel, the main plate being 3 cm thick and anchored into the concrete wall. The slider is also 3 cm thick, and can be locked into position by means of the mechanism that is visible in the photo. The firing hole is aligned with the center of the entrance corridor, so the port as a whole is asymmetrical.



⑲ Store room door

The type 502 had a small “spare room” off the living quarters, which was normally used for storage. In this bunker, it is closed by a set of steel exterior gas lock doors, which seems a bit much for a simple store room.

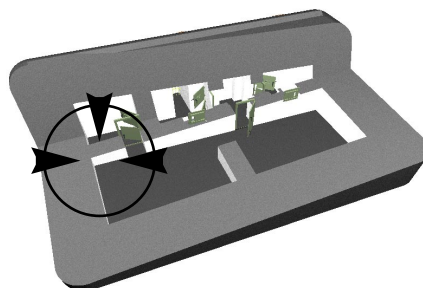
The design of the type 502 actually called for this room to be equipped with a periscope for observation.

⑳ Telephone

A close-up of the telephone hanging on the wall. The electrical cables and their fixtures are modern plastic ones, but follow the routes of the original lines.

The stove has an exhaust pipe that leads up into the wall and from there to a chimney on the roof. The closed-off pipe underneath it is for cleaning the chimney: it is difficult to get a brush through a 90° angle in a pipe, so the one below it is set at only 45°.

The sign on the wall, at the extreme right of the picture, is for the benefit of visitors the restored bunker, and reads “Supply Room” in Dutch and “Supplies” in German.



Firing port, store room door & bunker telephone

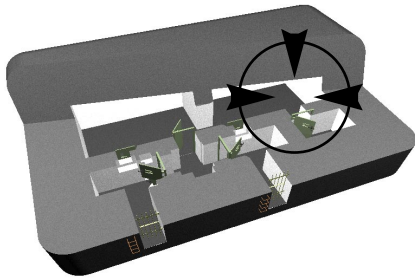
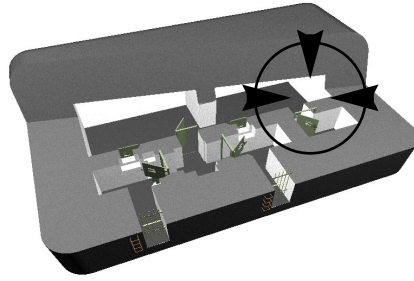


Regelbau 502: Doppelgruppenunterstand

⑪ Living quarters

The right-hand room of the bunker is fitted out as it would have been during World War II. This is the side of the living quarters toward the right rear of the bunker. On the left is a bunk bed, with a bunker stove next to it, and a telephone hanging on the wall. A table, chairs and stools like the ones shown here were present during the war as well, but just about everything else would have to be furnished by the troops themselves.

A bird cage, seen at the top of the photo, was a common item in bunkers, and the keeping of canaries or similar birds was encouraged by the German armed forces because they could provide a good warning of poison gas—either from an enemy attack or carbon monoxide from the stove.

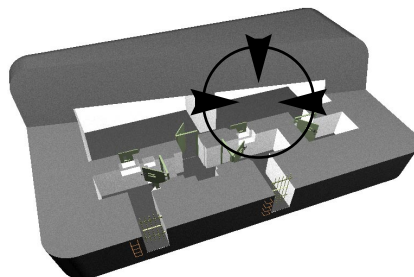


⑫ Equipment locker

Lockers like this were used for storing the soldiers' personal equipment. Here, it stands between two bunk beds, against the bunker's front wall. On top of it are a gas mask canister and a steel helmet.

⑬ Bunk beds

One of the bunk beds used by the German soldiers. It had room for three people, so two beds per room let all six men in a Gruppe sleep, though not with much room to spare: each bed is only some 175×65 cm large.

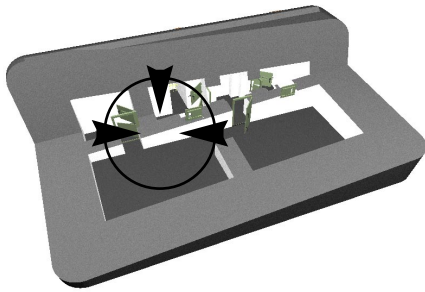
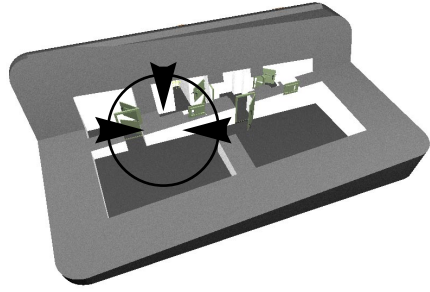


Living quarters furnishings



②④ **Air filtration device**

This apparatus, hanging on the bunker's wall, is a hand-operated ventilation system and air filter. The hand crank at the bottom makes it draw in fresh air from the outside, and circulate it around the bunker. In case of an attack with chemical weapons, a filter could be installed to remove the chemicals from the air, and the device would then be used to create overpressure inside the bunker, thereby preventing the chemical weapons from entering the building.

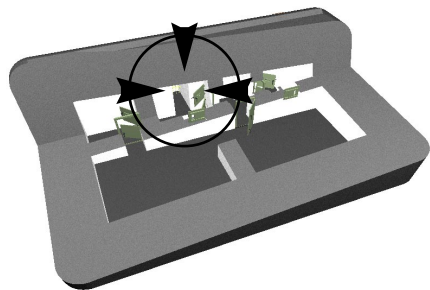


②⑤ **Air filtration device**

The filtration apparatus from the other side. Judging by the layout of the pipes, outside air is drawn into the filter through the yellow pipe, the blue pipes carry clean air from the filter to the rest of the bunker, and red pipes (not visible in this picture) vent air from inside the bunker to the outside world.

②⑥ **Roof panels**

Although it is not very visible, due to the lack of contrast on the white-painted ceiling, this photograph is an attempt to show the way the roof is constructed: steel I-beams with plates between them—the narrow strips are the flanges of the I-beams, and the pockmarked areas between them the plates that have had almost 60 years worth of rust removed from them before being painted white.





Technical data

	501	502
Capacity	10 men	20 men
First built	1939	1939
Number built	1,519	1,718
Materials needed		
Concrete	356 m ³	629 m ³
Steel reinforcement bars	21,000 kg	40,500 kg
Dimensions		
Width	9.00 m	14.80 m
Height	5.10 m	5.10 m
Depth	9.90 m	9.50 m
Exterior wall thickness	2.00 m	2.00 m
Interior wall thickness	0.80 m	0.80 m
Roof thickness	2.00 m	2.00 m

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