DOWNLOAD PDF THE SCIENCE OF FORTRESS WARFARE

Chapter 1 : blog.quintoapp.com: Customer reviews: Fire & Stone: The Science of Fortress Warfare,

*Fire And Stone: The Science of Fortress Warfare [Christopher Duffy] on blog.quintoapp.com *FREE* shipping on qualifying offers. A six-volume set covers sieges from the ancient and modern worlds, discussing their impact on regional and international affairs.*

Several years ago the Army sent me and my family to Germany for three years While there I toured several of the old forts built during the seventeenth and eighteenth centuries. The engineering, the purposes behind their construction, how the sieges were conducted, nothing. I realized that my knowledge of European warfare effectively ended in th I have long been a military history buff. Centuries of vegetation, vandalism, urban growth, and decay had rendered many of the forts almost non-exsistent. Fire and Stone has helped to correct much of this. It is definitely a technical work and one written more for specialists then the general reader. But it never ascends to a level where the amatuer is simply left in the dirt. It has a wealth of drawings and diagrams, photographs, and schematics. The captions are well written and extremely helpful. There is also a very complete glossary at the back of the book which is not only a necessity but a god send. All to often it seems that authors forget such little details. Without the glossary this book would be impossible to follow. Numerous French, Latin, German, and Spanish terms for the various fortifications and their appendages are used, sometimes different names for the same structure are used! The glossary is an absolute must. The second half of the book is concerns the conduct of a siege for both the besieger and the besieged. Like the first half this part also shows the same attention to detail but never forgets the reader. All in all I have to give this book very high marks. Though it appeals only to a small sector of history buffs I recommend it. And if you have ever visited some of the old forts in Canada, such as Fort Henry in Kingston, Ontario, and marveled at the old fortress and its layout this book just might be for you as well. In some respects it is a very old fashioned work, but thouroughly informative and enjoyable.

Chapter 2 : FIRE AND STONE: THE SCIENCE OF FORTRESS WARFARE, - Peters Fraser and Dunlop (F

Fire And Stone: The Science of Fortress Warfare User Review - Not Available - Book Verdict. Two military histories on the cheap. ÃƒÆ'Ã‚Â¯Ãƒâ€šÃ‚Â¿Ãƒâ€šÃ‚Â½DeRose offers a portrait of a trio of submarine officers who directly engaged the enemy rather than passively perform reconnaissance missions.

The final form is generally conceded to have been perfected by Vauban from The evolution began with simple addition of cutaway ports and guns to existing, late medieval stone fortifications. This permitted counter-battery fire against siege engines and cannon. That gave the whole fortress a crenellated appearance of alternating low walls and hard salients that were difficult to knock down with cannon and took longer still to approach with labor-intensive siege works. The new structures also allowed defensive cannon to be mounted on strong walls or inside squat towers and roundels. In addition, infantry defenders commanded fields of enfilading musket fire that daunted any brash assault by attackers. Finally, geometric bastions were built into the curtain, with more added later beyond the curtain as separate outworks. Bastions were the key innovation, maximizing the effect of sweeping fields of cross fire while defending against enfilade. These principles and design innovations led to grand efforts at complete fortification by a number of Italian towns during the late Italian Renaissance, but the expense proved so vast few were completed. The style spread outside Italy, once nearby locales such as Monferrat and Geneva built single, impressive, massive works. Other fortresses were soon built in Hungary and Dalmatia, though not as densely or as well, as the artillery threat in those theaters was not as great. The real breakthrough came along the southern border of the United Provinces, where dozens of smaller artillery fortresses were erected to provide a layered defense-in-depth that proved unbeatable by the Spanish, or later by the French. France took the lead in fortress design and construction in the late 17th century, establishing a new French school that was dominant internationally for over a century or more thereafter. Most fortresses built in northwest Europe from this time were five- or six-bastioned works mounting up to sixty cannon and perhaps 30 mortars and perriers. In the 16th century the new bastions certainly restored a balance between offense and defense that had been broken by siege cannon in the 15th century. This restored balance lasted into the late 18th century. Yet, even a long-term shift in favor of defense should not be exaggerated: In addition the new bastions were hugely expensive: It is important to note that fortresses served an offensive as well as defensive function: Thus, the French advanced into the Netherlands and Rhineland in the ss, building or securing fortresses as they moved. Similarly, the Prussians marched south into Silesia and against Austria in the s, utilizing fortress bases along the way. Trace italienne-style fortresses traveled overseas along with European trade expansion and colonial conquest. Yet these were limited applications. In most colonies and other scattered enclaves where Europeans built artillery fortresses overseas, they did so mainly to ward off other Europeans who had modern artillery. Otherwise, old styles of fortification without full bastions usually sufficed against extant native firepower and tactics. Outside the Ottoman Empire, non- European armies during this period almost never possessed the heavy artillery needed for successful siege warfare against even older, more primitive European military architecture. This was a highly risky, and therefore nearly always wounding or deadly, form of assault. To counter the escalade, the revetment was often made 30 feet or more high, forcing assault ladders to become longer and hence too heavy to be raised, and the climb too long and slow for attackers to survive strong defensive fire. The practice survived invention and early diffusion of designs for the artillery fortress, but petered out over the second half of the 17th century in the face of repeated carnage inflicted on attackers by enfilade fire from bastions. In the 18th century, a few attempts at escalade were made in stealth at night, as a form of insult. They provided bridgeheads across riverine frontiers or kept open traditional invasion routes, as a threat or in fact. They were positioned at the entrances to valleys, along land and river trade routes, blocking mountain passes, and across border rivers and canals. French armies simplified logistics by permitting the pre-positioning of rudimentary magazines along the line of advance or near the frontier, at jump-off points for invasions of Germany or Flanders. Cities and major towns were also fortified, often walled or at least hosting a citadel, some from medieval times. These artillery fortresses doubled as defenses and police garrisons holding down rebellious populations. Fortresses

and lines also denied or enabled collection of contributions. Smaller European fortresses did not always follow the elaborate style of 18th-century works. And even large fortifications outside Europe might not deploy the new bastions and other artillery-fortress techniques, as they did not generally face heavy cannon other than from European or Ottoman attackers. During the 17th century, the Militargrenze frontier between Austria and the Ottoman Empire was spotted with 90 fortresses, but most were of a rudimentary form of bastion additions to preexisting stone, or even wooden forts. As late as the s, Ottoman armies fighting in Ukraine easily overcame primitive forts made of wood-framed earthen walls. By the midth century, however, all advanced militaries were heavily and lastingly influenced by the elaborate innovations introduced in the late 17th century by the brilliant Vauban, as well as his near-peers Coehoorn and Dahlberg. This presented a stepped profile, so that detached works such as ravelins could be fired over by defenders manning the rear ramparts and bastions. There was a different attitude to fortification in the east, where the Polish Army, but especially the Russian Army and Swedish Army, emphasized mobility over fixed defenses. Karl XII and Peter I went so far as to tear down existing fortifications and remove garrisons, in favor of concentrating forces in larger field armies. A common ploy was for disguised soldiers to jam a heavy cart inside the gate of a town or fortress so that the portcullis would not close. Two years earlier an Austrian force successfully made its way through an unguarded aqueduct to spring full-grown into the center of Cremona. The best countermeasures against ruses and insult were alert sentries and cavalry scouting, storm bells, and maintaining a clear zone of servitude around a fortress. It imitated the two lines formed by infantry in battle. Among the main fortresses of the second, interior line were Gravelines, St. This is a profound alteration of the Military Revolution thesis originally proposed by Michael Roberts in Kingra, particularly with respect to the claimed causal link between the new fortress design and increases in army sizes during this period.

Chapter 3 : Fire and stone : the science of fortress warfare, (Book,) [blog.quintoapp.com]

Provides a detailed analysis of the arts of fortification and siegecraft as they were carried on between and , a period when fortress warfare exercised an often decisive influence upon strategy, politics and urban life.

The American Civil War In the American Civil War, field fortifications emerged as an essential of warfare, with both armies employing entrenchments to an extent never before seen. Troops learned to fortify newly won positions immediately; employing spades and axes carried in their packs, they first dug rifle pits and then expanded them into trenches. Early in the war, General Robert E. Two notable sieges , that of Vicksburg , Miss. In the Cold Harbor , Va. Grant sent his troops against Confederate earthworks, he lost 14, men in 13 days. Field mines and booby traps were used extensively, and trench mortars were developed to lob shells into opposing trenches. World War I The lesson taught by accurate, long-range fire from entrenched positions in the American Civil War was lost on European commanders. Even the bitter experiences of appalling losses in the Crimean, Franco-German, and South African Boer wars failed to lessen an ardour for the theory of the offensive that was so fervent as to leave little concern for defensive tactics in the field. Few took notice of the immense casualties the Turks inflicted from behind field fortifications in the Russo-Turkish War of â€”78, and even though the Russo-Japanese War soon after the turn of the century underscored the lethal power of the machine gun and breech-loading rifled artillery, most European commanders saw the increased firepower as more a boon to the offensive than to the defensive. The fallacy of the faith in offensive firepower was soon convincingly demonstrated. Once the French had checked the German right wing at the Marne River , the fighting degenerated into what was in effect a massive siege. For miles 1, kilometres , from Switzerland to the North Sea , the landscape was soon scarred with opposing systems of zigzag, timber-revetted, sandbag-reinforced trenches, fronted by tangles of barbed wire sometimes more than feet 45 metres deep and featured here and there by covered dugouts providing shelter for troops and horses and by observation posts in log bunkers or concrete turrets. The trench systems consisted of several lines in depth, so that if the first line was penetrated, the assailants were little better off. Rail and motor transport could rush fresh reserves forward to seal off a gap faster than the attackers could continue forward. The fighting involved masses of men, masses of artillery, and masses of casualties. Toxic gasesâ€”asphyxiating, lachrymatory, and vesicantâ€”were introduced in a vain effort to break the dominance of the defense, which was so overpowering that for more than two years the opposing lines varied less than 10 miles in either direction. During the winter of â€”17, the Germans prepared a reserve trench system, the Hindenburg Line , containing deep dugouts where the men could take cover against artillery fire and machine guns emplaced in concrete shelters called pillboxes. Approximately two miles behind the forward line was a second position, almost as strong. The Hindenburg Line resisted all Allied assaults in , including a vast British mining operation under the Messines Ridge in Belgium that literally blew up the ridge, inflicting 17, casualties at one blow; the advance failed to carry beyond the ridge. Permanent fortification, â€”45 World War I Most defensive thinking on the eve of World War I was reserved for the permanent fort, which was designed to canalize enemy advance and to afford time for national mobilization. The leading fortification engineer of the time was a Belgian , Henri Brialmont. At Antwerp his defense system was even more dense. He protected the big guns of his forts with turrets of steel and developed disappearing cupolas. Some forts were pentagonal, others triangular, with much of the construction underground. In building defenses along the frontier facing Germany , French engineers emulated Brialmont, with particularly strong clusters of fortresses at Verdun and Belfort. Namur , also heavily fortified, resisted the powerful Big Bertha guns for only four days. The reinforced concrete of the forts was thicker than any theretofore used, the disappearing guns bigger and more heavily armoured. Ditches, embedded steel beams, and minefields guarded against tank attack. A large part of the works were completely underground. Outposts were connected to the main forts by concrete tunnels. But, because French and British military leaders were convinced that if war came again with Germany the Allies would fight in Belgium, the French failed to extend the line to the sea, relying instead on an outmoded system of unconnected fortresses left over from before World War I. It was this weakness that the Germans subsequently exploited in executing a

modified version of the Schlieffen plan, cutting in behind the permanent defenses and defeating France without having to come to grips with the Maginot Line. Later extended northward to the Dutch frontier and southward along the Rhine to Switzerland, the West Wall was not a thin line of big forts but a deep band, up to five miles thick, of more than 3, small, mutually supporting pillboxes, observation posts, and troop shelters. The Germans did not rely on the West Wall to halt an attack but merely to delay it until counterattacks by mobile reserves could eliminate any penetration. The value of their concept remains undetermined; the line was not attacked until late , after the German armies had incurred severe defeats and lacked adequate reserves. The West Wall nevertheless forced Allied troops into costly attacks to eliminate it. Other fort series Elsewhere in World War II many fortifications similar to these two basic types were built. German capture of the most elaborate and allegedly impregnable of the Belgian forts, Eben Emael , in a matter of hours in the first two days of the campaign against France and the Low Countries in startled the world. Arriving silently on the night of May 10 in gliders, troops landed atop the fort and began systematically to destroy turrets and casemates. Soon after daylight they were joined by men arriving by parachute. Around noon of May 11 the 1,man garrison surrendered. Despite at least comparable surprise and the same so-called blitzkrieg methods, the Germans required more time to penetrate the more dispersed forts of the Stalin Line in the Soviet Union. The delay gained two months of invaluable time for the Soviet troops, without which they might well have been unable to stop the Germans at the gates of Moscow. German channel defenses The Germans employed Fritz Todt, the engineer who had designed the West Wall, and thousands of impressed labourers to construct permanent fortifications along the Belgian and French coasts facing the English Channel; this was the Atlantic Wall. The line consisted primarily of pillboxes and gun emplacements embedded in cliffsides or placed on the waterfronts of seaside resorts and ports. Included were massive blockhouses with disappearing guns, newsreels of which the Germans sent out through neutral sources in an effort to awe their adversaries, but the numbers of big blockhouses actually were few. Embedded in the sand of the beaches below the high-tide mark were numerous obstacles, varying in shape and depth, some topped with mines. Barbed wire and antitank and antipersonnel mines interlaced the whole. On the French southwestern and southern coasts similar, though less formidable , defenses were erected. When the Allies landed in force on the Cotentin Peninsula of Normandy on D-Day â€”June 6, â€”they found the defenses far less formidable than they had anticipated. This was attributable to a number of reasons. The Germans had constructed the strongest defenses in the Pas-de-Calais region facing the narrowest part of the English Channel and had stationed their most battleworthy troops there; demands of other fighting fronts had siphoned many of the best German troops from France; the Germans lacked air and naval support; Allied airpower was so strong that movement of German reserves was seriously impeded; landings of Allied airborne troops behind the beaches spread confusion in German ranks; and the Germans were deluded into believing the invasion was a diversion, that a second and larger invasion was to follow in the Pas-de-Calais. Only at one of the two American beaches, given the code name Omaha , was the success of the landing ever in doubt, partly because of rough seas, partly because of the chance presence of an elite German division, and partly because of the presence of high bluffs. Paradoxically, the Allies had less difficulty with the highly publicized beach defenses than they had later with field fortifications based on the Norman hedgerows, earthen embankments several feet thick and five feet high that local farmers through the centuries had erected around thousands of irregularly shaped little fields to fence their cattle and protect their crops from strong ocean winds. Nuclear fortification At the close of World War II most military theorists considered that permanent fortifications of the type previously employed were economically impracticable in view of their vulnerability to the incredible power of nuclear explosives and the methods, such as vertical envelopment from the air, that might be employed to reduce them. Important exceptions to this generalization were the reinforced concrete and deep tunnels used to protect strategic-missile launch facilities. Probably the most important and most characteristic of these works was the missile silo, a tubular structure of heavily reinforced concrete sunk into the ground to serve as a protective installation and launch facility for a single intercontinental ballistic missile ICBM. Launch crews were protected in similarly constructed underground bunkers nearby. Elaborate calculations on the number of ICBM warheads needed to destroy a hardened silo with a given degree of certainty became an integral part of the strategic calculus in the s. In this way,

permanent fortifications resumed their previous place of importance in strategic calculations. Elaborate defensive works were proposed to protect them. One basing scheme involved a network of fortified missile shelters connected by roads or railroad tracks. Huge, closed missile transporters would shuttle the missiles from one shelter to another in such a manner that the enemy would not know which shelters were occupied and which were empty. An even more extreme plan for protecting the U. The proposal, called dense pack, would exploit this phenomenon by packing a large number of super-hardened ICBM silos closely together in a single location. Other permanent fortifications of the nuclear age were designed as headquarters sites or command and control installations. For example, a joint U. The system and the aircraft and missiles supporting it were controlled from a vast underground complex embedded in the rock of Cheyenne Mountain near Colorado Springs , Colo.

Chapter 4 : blog.quintoapp.com:Customer reviews: Fire and Stone: Science of Fortress Warfare,

Find helpful customer reviews and review ratings for Fire & Stone: The Science of Fortress Warfare, at blog.quintoapp.com Read honest and unbiased product reviews from our users.

Venetian Works of Defence between the 16th and 17th centuries: Stato da Terra â€" western Stato da Mar Roman forts and hill forts were the main antecedents of castles in Europe , which emerged in the 9th century in the Carolingian Empire. The Early Middle Ages saw the creation of some towns built around castles. These cities were only rarely protected by simple stone walls and more usually by a combination of both walls and ditches. From the 12th century hundreds of settlements of all sizes were founded all across Europe, which very often obtained the right of fortification soon afterwards. The founding of urban centres was an important means of territorial expansion and many cities, especially in eastern Europe , were founded precisely for this purpose during the period of Eastern Colonisation. These cities are easy to recognise due to their regular layout and large market spaces. The fortifications of these settlements were continuously improved to reflect the current level of military development. The town of Palmanova , encircled by the Venetian Defensive Systems. The finest examples are, among others, in Nicosia Cyprus and Palmanova Italy , which proved to be futile but still stand to this day. Development after introduction of firearms[edit] Medieval-style fortifications were largely made obsolete by the arrival of cannons on the 14th century battlefield. Fortifications in the age of black powder evolved into much lower structures with greater use of ditches and earth ramparts that would absorb and disperse the energy of cannon fire. Walls exposed to direct cannon fire were very vulnerable, so were sunk into ditches fronted by earth slopes. This placed a heavy emphasis on the geometry of the fortification to allow defensive cannonry interlocking fields of fire to cover all approaches to the lower and thus more vulnerable walls. Table of a typical bastion fort , The development of bastion forts resulted from the increased use of cannons and firearms in the 14th century. The evolution of this new style of fortification can be seen in transitional forts such as Sarzanello [28] in North West Italy which was built between and Sarzanello consists of both crenellated walls with towers typical of the medieval period but also has a ravelin like angular gun platform screening one of the curtain walls which is protected from flanking fire from the towers of the main part of the fort. Another example are the fortifications of Rhodes which were frozen at so that Rhodes is the only European walled town that still shows the transition between the classical medieval fortification and the modern ones. The result was star shaped fortifications with tier upon tier of hornworks and bastions , of which Fort Bourtange is an excellent example. There are also extensive fortifications from this era in the Nordic states and in Britain , the fortifications of Berwick-upon-Tweed and the harbour archipelago of Suomenlinna at Helsinki being fine examples. Star forts did not fare well against the effects of high explosive and the intricate arrangements of bastions, flanking batteries and the carefully constructed lines of fire for the defending cannon could be rapidly disrupted by explosive shells. The ditch and counter scarp of Fort Delimara. Built in , Delimara was built as a typical polygonal fort ditches and counter scarps made to be very deep, vertically sided, and cut directly into the rocks. Worse, the large open ditches surrounding forts of this type were an integral part of the defensive scheme, as was the covered way at the edge of the counter scarp. The ditch was extremely vulnerable to bombardment with explosive shells. In response, military engineers evolved the polygonal style of fortification. The ditch became deep and vertically sided, cut directly into the native rock or soil, laid out as a series of straight lines creating the central fortified area that gives this style of fortification its name. Wide enough to be an impassable barrier for attacking troops, but narrow enough to be a difficult target for enemy shellfire, the ditch was swept by fire from defensive blockhouses set in the ditch as well as firing positions cut into the outer face of the ditch itself. The profile of the fort became very low indeed, surrounded outside the ditch covered by caponiers by a gently sloping open area so as to eliminate possible cover for enemy forces, while the fort itself provided a minimal target for enemy fire. The entrypoint became a sunken gatehouse in the inner face of the ditch, reached by a curving ramp that gave access to the gate via a rolling bridge that could be withdrawn into the gatehouse. The tunnels of Fort de Mutzig , German fortifications built in By the 19th century, tunnels were used to connect blockhouses and

firing points in the ditch to the fort. Much of the fort moved underground. Deep passages and tunnels now connected the blockhouses and firing points in the ditch to the fort proper, with magazines and machine rooms deep under the surface. The guns, however, were often mounted in open emplacements and protected only by a parapet ; both in order to keep a lower profile and also because experience with guns in closed casemates had seen them put out of action by rubble as their own casemates were collapsed around them. Gone were citadels surrounding towns: From now on a ring of forts were to be built at a spacing that would allow them to effectively cover the intervals between them. The new forts abandoned the principle of the bastion, which had also been made obsolete by advances in arms. The outline was a much simplified polygon, surrounded by a ditch. These forts, built in masonry and shaped stone, were designed to shelter their garrison against bombardment. One organizing feature of the new system involved the construction of two defensive curtains: Traditional fortification however continued to be applied by European armies engaged in warfare in colonies established in Africa against lightly armed attackers from amongst the indigenous population. A relatively small number of defenders in a fort impervious to primitive weaponry could hold out against high odds, the only constraint being the supply of ammunition. Due to the threat of aerial warfare , the buildings were placed at a distance from each other, making it difficult to find from the air. Steel -and- concrete fortifications were common during the 19th and early 20th centuries. However the advances in modern warfare since World War I have made large-scale fortifications obsolete in most situations. In the s and s, some fortifications were built with designs taking into consideration the new threat of aerial warfare , for example Fort Campbell in Malta. Many historical fortifications were demolished during the modern age, but a considerable number survive as popular tourist destinations and prominent local landmarks today. The downfall of permanent fortifications had two causes: The ever-escalating power, speed, and reach of artillery and air power meant that almost any target that could be located could be destroyed, if sufficient force were massed against it. From World War II , bunker busters were used against fortifications. By , nuclear weapons were capable of destroying entire cities, and produced dangerous radiation. This led to the creation of civilian nuclear air raid shelters. The second weakness of permanent fortification was its very permanency. Because of this it was often easier to go around a fortification and, with the rise of mobile warfare in the beginning of World War II, this became a viable offensive choice. When a defensive line was too extensive to be entirely bypassed, massive offensive might could be massed against one part of the line allowing a breakthrough, after which the rest of the line could be bypassed. This was not the case with the Maginot Line ; it was designed to force the Germans to invade other countries Belgium or Switzerland to go around it, and was successful in that sense. The development of bunker busters , bombs designed to penetrate hardened targets buried underground, led to a decline in the use of fortifications. Instead field fortification rose to dominate defensive action. Unlike the trench warfare which dominated World War I , these defences were more temporary in nature. This was an advantage because since it was less extensive it formed a less obvious target for enemy force to be directed against. If sufficient power were massed against one point to penetrate it, the forces based there could be withdrawn and the line could be re-established relatively quickly. Instead of a supposedly impenetrable defensive line, such fortifications emphasized defence in depth , so that as defenders were forced to pull back or were overrun, the lines of defenders behind them could take over the defence. Because the mobile offensives practised by both sides usually focused on avoiding the strongest points of a defensive line, these defences were usually relatively thin and spread along the length of a line. The defence was usually not equally strong throughout however. The strength of the defensive line in an area varied according to how rapidly an attacking force could progress in the terrain that was being defendedâ€”both the terrain the defensive line was built on and the ground behind it that an attacker might hope to break out into. This was both for reasons of the strategic value of the ground, and its defensive value. This was possible because while offensive tactics were focused on mobility, so were defensive tactics. The dug in defences consisted primarily of infantry and antitank guns. Defending tanks and tank destroyers would be concentrated in mobile " Fire Brigades " behind the defensive line. If a major offensive was launched against a point in the line, mobile reinforcements would be sent to reinforce that part of the line that was in danger of failing. Thus the defensive line could be relatively thin because the bulk of the fighting power of the defenders was not concentrated in the line itself but rather in the mobile reserves. A

notable exception to this rule was seen in the defensive lines at the Battle of Kursk during World War II , where German forces deliberately attacked into the strongest part of the Soviet defences seeking to crush them utterly. Thus such terrain had to be defended at all cost. Cheyenne Mountain is an example of a midth century fortification built deep in a mountain. After World War II, ICBMs capable of reaching much of the way around the world were developed, and so speed became an essential characteristic of the strongest militaries and defenses. Missile silos were developed, so missiles could be fired from the middle of a country and hit cities and targets in another country, and airplanes and air carriers became major defenses and offensive weapons leading to an expansion of the use of airports and airstrips as fortifications. Mobile defenses could be had underwater, too, in the form of nuclear submarines capable of firing missiles. Some bunkers in the mid to late 20th century came to be buried deep inside mountains and prominent rocks, such as Gibraltar and the Cheyenne Mountain Complex. On the ground itself, minefields have been used as hidden defences in modern warfare, often remaining long after the wars that have produced them have ended. Demilitarized zones along borders are arguably another type of fortification, although a passive kind, providing a buffer between potentially hostile militaries. Counter-insurgency[edit] Just as in colonial periods, comparatively obsolete fortifications are still used for low-intensity conflicts. Much like in the 18th and 19th century, because the enemy is not a powerful military force with the heavy weaponry required to destroy fortifications, walls of gabion , sandbag or even simple mud can provide protection against small arms and anti-tank weapons - although such fortifications are still vulnerable to mortar and artillery fire. Forts[edit] Forts in modern usage often refer to space set aside by governments for a permanent military facility; these often do not have any actual fortifications, and can have specializations military barracks, administration, medical facilities, or intelligence. However, there are some modern fortifications that are referred to as forts. These are typically small semi permanent fortifications. In urban combat they are built by upgrading existing structures such as houses or public buildings. In field warfare they are often log, sandbag or gabion type construction. Such forts are typically only used in low level conflict, such as counterinsurgency conflicts or very low level conventional conflicts, such as the Indonesiaâ€”Malaysia confrontation , which saw the use of log forts for use by forward platoons and companies. The reason for this is that static above ground forts can not survive modern direct or indirect fire weapons larger than mortars, RPGs and small arms. The citadel is the largest still in military operation in North America. While many forts in Canada have been converted in use including historical museums , several forts in Canada continue to be used by Canadian Armed Forces , including Fort Frontenac as the Canadian Army Command and Staff College. The Citadelle of Quebec , a citadel a part of the ramparts of Quebec City , is the largest citadel in North America still in use for military purposes. In British North America, and subsequently on western frontier of the United States, prior to the 20th century the term fort was increasingly used for any military base of operations regardless of how fortified it was. Military forts in the American Old West during the Indian Wars were often lightly fortified enclosures, with log or adobe walls. In many areas the term fort was used to refer to any European or U. Many of these outposts were simply a trading post , with a stockade and possibly blockhouses added, or a combination of a trading post and an Army post. Prisons and others[edit] Fortifications designed to keep the inhabitants of a facility in rather than out can also be found, in prisons , concentration camps , and other such facilities, with supermaxes having some of the strongest of those.

Chapter 5 : Bastion fort - Wikipedia

Note: Citations are based on reference standards. However, formatting rules can vary widely between applications and fields of interest or study. The specific requirements or preferences of your reviewing publisher, classroom teacher, institution or organization should be applied.

Origins[edit] Fortification plan of Coevorden , laid out in a radial pattern within polygonal fortifications and extensive outer earthworks as reconstructed in the early seventeenth century by Maurice, Prince of Orange Their predecessors, medieval fortresses , were usually placed on high hills. From there, arrows were shot at the enemies, and the higher the fortress was, the further the arrows flew. For the invading force, these fortifications proved quite difficult to overcome, and accordingly, fortresses occupied a key position in warfare. Passive ring-shaped enceinte fortifications of the Medieval era proved vulnerable to damage or destruction by cannon fire, when it could be directed from outside against a perpendicular masonry wall. In addition, an attacking force that could get close to the wall was able to conduct undermining operations in relative safety, as the defenders could not shoot at them from nearby walls. In contrast, the bastion fortress was a very flat structure composed of many triangular bastions , specifically designed to cover each other, and a ditch. In order to counteract the cannonballs, defensive walls were made lower and thicker. To counteract the fact that lower walls were easier to climb, the ditch was widened so that attacking infantry were still exposed to fire from a higher elevation, including enfilading fire from the bastions. The outer side of the ditch was usually provided with a glacis to deflect cannonballs aimed at the lower part of the main wall. Further structures, such as ravelins , tenailles , hornworks or crownworks , and even detached forts could be added to create complex outer works to further protect the main wall from artillery, and sometimes provide additional defensive positions. They were built of many materials, usually earth and brick , as brick does not shatter on impact from a cannonball as stone does. The French army was equipped with new cannon and bombards that were easily able to destroy traditional fortifications built in the Middle Ages. Star forts were employed by Michelangelo in the defensive earthworks of Florence , and refined in the sixteenth century by Baldassare Peruzzi and Vincenzo Scamozzi. The design spread out of Italy in the s and s. It was employed heavily throughout Europe for the following three centuries. Italian engineers were heavily in demand throughout Europe to help build the new fortifications. Elvas , in Portugal is considered by some to be the best surviving example of the Dutch school of fortifications. Slopes[edit] When the newly-effective maneuverable siege cannon came into military strategy in the fifteenth century, the response from military engineers was to arrange for the walls to be embedded into ditches fronted by earthen slopes so that they could not be attacked by destructive direct fire and to have the walls topped by earthen banks that absorbed and largely dissipated the energy of plunging fire. Where conditions allowed, as in Fort Manoel in Malta , the ditches were cut into the native rock, and the wall at the inside of the ditch was simply unquarried native rock. As the walls became lower, they also became more vulnerable to assault. Dead zone[edit] The rounded shape that had previously been dominant for the design of turrets created "dead space", or "dead" zones see figure , which were relatively sheltered from defending fire, because direct fire from other parts of the walls could not be directed around the curved wall. To prevent this, what had previously been round or square turrets were extended into diamond-shaped points to give storming infantry no shelter. The ditches and walls channeled attacking troops into carefully constructed killing grounds where defensive cannon could wreak havoc on troops attempting to storm the walls, with emplacements set so that the attacking troops had no place to shelter from the defensive fire. Enfilade[edit] A further and more subtle change was to move from a passive model of defence to an active one. The lower walls were more vulnerable to being stormed, and the protection that the earthen banking provided against direct fire failed if the attackers could occupy the slope on the outside of the ditch and mount an attacking cannon there. Therefore, the shape was designed to make maximum use of enfilade or flanking fire against any attackers who should reach the base of any of the walls. The indentations in the base of each point on the star sheltered cannons. Those cannons would have a clear line of fire directly down the edge of the neighboring points, while their point of the star was protected by fire from the base of those points.

The evolution of these ideas can be seen in transitional fortifications such as Sarzana in northwest Italy. Forward batteries commanded the slopes which defended walls deeper in the complex from direct fire. The defending cannon were not simply intended to deal with attempts to storm the walls, but to actively challenge attacking cannon and deny them approach close enough to the fort to engage in direct fire against the vulnerable walls. Defenders could move relatively safely in the cover of the ditch and could engage in active countermeasures to keep control of the glacis , the open slope that lay outside the ditch, by creating defensive earthworks to deny the enemy access to the glacis and thus to firing points that could bear directly onto the walls and by digging counter mines to intercept and disrupt attempts to mine the fort walls. Compared to medieval fortifications , forts became both lower and larger in area, providing defence in depth , with tiers of defences that an attacker needed to overcome in order to bring cannon to bear on the inner layers of defences. Firing emplacements for defending cannon were heavily defended from bombardment by external fire, but open towards the inside of the fort, not only to diminish their usefulness to the attacker should they be overcome, but also to allow the large volumes of smoke that the defending cannon would generate to dissipate. Fortifications of this type continued to be effective while the attackers were armed only with cannon, where the majority of the damage inflicted was caused by momentum from the impact of solid shot. Because only low explosives such as black powder were available, explosive shells were largely ineffective against such fortifications. The development of mortars , high explosives , and the consequent large increase in the destructive power of explosive shells and thus plunging fire rendered the intricate geometry of such fortifications irrelevant. Warfare was to become more mobile. It took, however, many years to abandon the old fortress thinking. Table of Fortification, from the Cyclopaedia Construction[edit] Bastion forts were very expensive. For this reason, bastion forts were often improvised from earlier defences. Medieval curtain walls were torn down, and a ditch was dug in front of them. The earth used from the excavation was piled behind the walls to create a solid structure. Improvisation could also consist of lowering medieval round towers and infilling them with earth to strengthen the structures. It was also often necessary to widen and deepen the ditch outside the walls to create a more effective barrier to frontal assault and mining. Engineers from the s were also building massive, gently sloping banks of earth called glacis in front of ditches so that the walls were almost totally hidden from horizontal artillery fire. The main benefit of the glaces was to deny enemy artillery the ability to fire point blank. The lower the angle of elevation, the higher the stopping power. Plan of bastion fortress Plan of Geneva in The colossal fortifications, among the most important in Europe, were demolished ten years later Olomouc c. Effectiveness[edit] The first major battle which truly showed the effectiveness of trace Italienne was the defence of Pisa in against a combined Florentine and French army. With the original medieval fortifications beginning to crumble to French cannon fire, the Pisans constructed an earthen rampart behind the threatened sector. It was discovered that the sloping earthen rampart could be defended against escalade and was also much more resistant to cannon fire than the curtain wall it had replaced. The second siege was that of Padua in Finding that their cannon fire made little impression on these low ramparts, the French and allied besiegers made several bloody and fruitless assaults and then withdrew. The new type of fortification also played a role in the numerous Mediterranean wars, slowing down the Ottoman expansion. Although Rhodes had been partially upgraded to the new type of fortifications after the siege, it was still conquered in ; nevertheless it was a long and bloody siege, and the besieged had no hope of outside relief because the island was close to the Ottoman power base and far from any allies. On the other hand, the Ottomans failed to take Corfu in in no small part because of the new fortifications, and several attempts spanning almost two centuries another major one was in also failed. Fort Saint Elmo played a critical role in the Ottoman siege of when it managed to hold out heavy bombardment for over a month. Eventually it fell, but the Ottoman casualties were very high, and it bought time for the relief force which arrived from Sicily to relieve the rest of the besieged island. The star fort therefore played a crucial and decisive role in the siege. The now ancient fortifications were still of some value at this point. Ultimately, Parker argues, "military geography", in other words, the existence or absence of the trace Italienne in a given area, shaped military strategy in the early modern period. This is a profound alteration of the Military Revolution thesis originally proposed by Michael Roberts in Kingra, particularly with respect to the claimed causal link between the new

fortress design and increases in army sizes during this period. In the 20th century, with the development of maneuverable tanks and aerial warfare during and after the First World War, fixed fortifications became and have remained less important than in previous centuries.

Chapter 6 : The Unfathomable Fortress | Command and Conquer Wiki | FANDOM powered by Wikia

Details about Fire and Stone: The Science of Fortress Warfare, ExLi brary Be the first to write a review. Fire and Stone: The Science of Fortress Warfare, ExLi brary.

Chapter 7 : Artillery fortress | Weapons and Warfare

FIRE AND STONE: THE SCIENCE OF FORTRESS WARFARE, â€" Buy it here PUBLISHER: Greenhill Books PUBLICATION DATE May

Chapter 8 : Fire and Stone: The Science of Fortress Warfare, ExLibrary | eBay

Fire and Stone: The Science of Fortress Warfare, by Christopher Duffy starting at $ Fire and Stone: The Science of Fortress Warfare, has 3 available editions to buy at Half Price Books Marketplace.

Chapter 9 : Fortification - Wikipedia

Buy a cheap copy of Fire And Stone: The Science of Fortress book by Christopher Duffy. , hardcover reprint edition (of a book first published in), Castle Books / Book Sales, NY, pages Free shipping over $