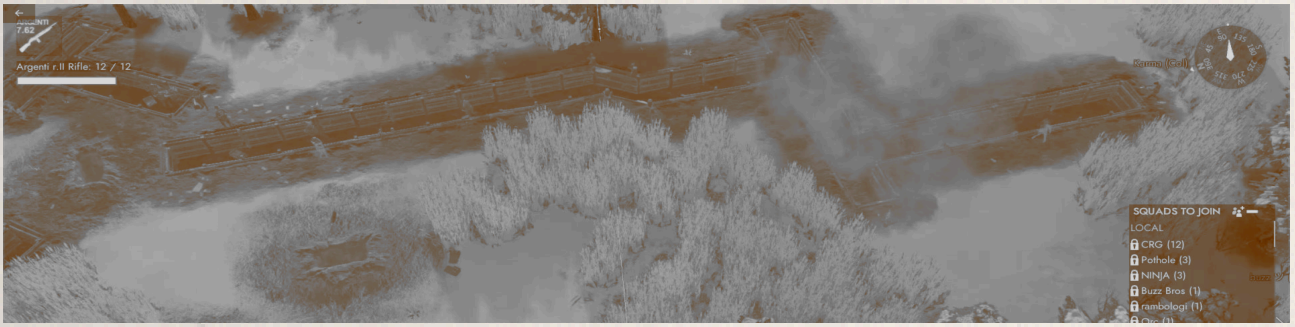
Bismarck's field manual

Guide to making field fortifications

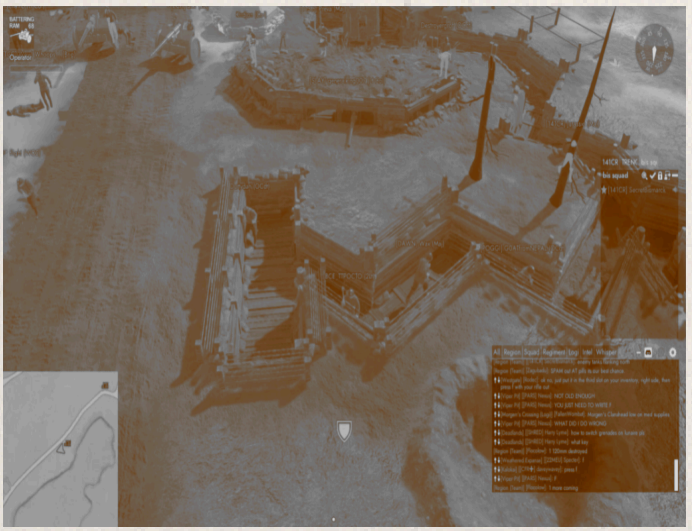
Introduction

This manual is meant to give recruits an overview of tools they might find available on the frontline and how to best use them to keep themselves and more importantly their base alive. It was created on orders of high command of Colonial Republic after an influx of field reports stating that forward positions were getting overrun as a consequence of simplistic or outdated field fortifications.



Lack of stable forward bases was observed as one of the leading causes of lost momentum on the frontlines. Their frequent loss burdened the supply lines because of war material contained in them as well as let that war material fall into enemy hands. The unstable front would turn into no man's land that forced any counter-offensive launched by the Colonial army to lose much of its steam before reaching the enemy strongholds and outposts.

The high command decided to use the northern front during 103rd Caovish - Mesean conflict and eastern front during 104th Caovish - Mesean conflict as testing grounds to further their understanding of field engineering. The results obtained showed great promise and the methods used were compiled in this manual as standard issue. The manual contains standard patterns developed as well as considerations on how to deploy them.



Elementary entrenchments

Basic Trench

Basic fortification built with a shovel. Requires no resources and takes 80 seconds to be built by a single soldier with a shovel. The basic trench has 4 connection points, 2 at far sides and 2 in the middle of it, those connection points can be used to connect it to a bunker, an octagon or a trench connector

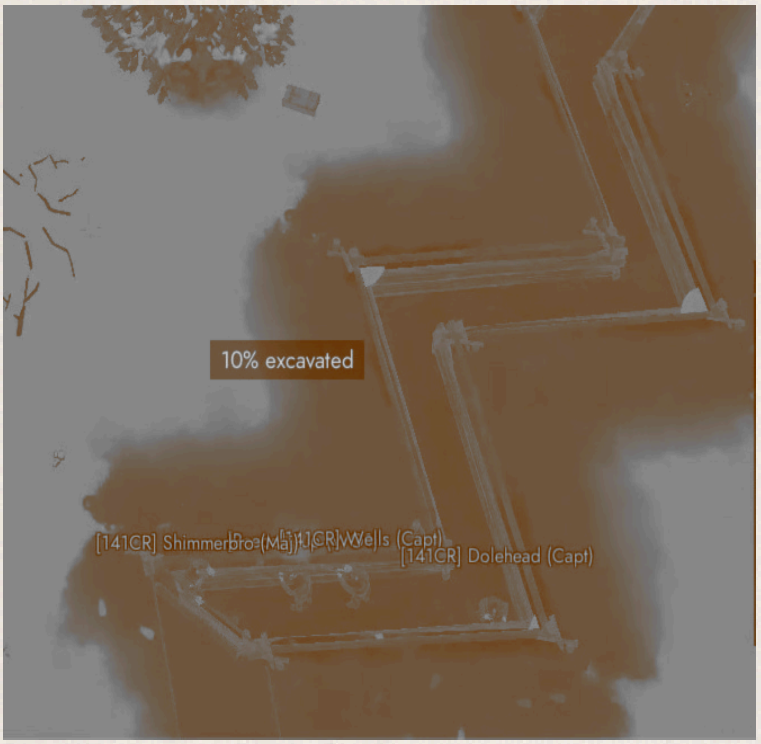
It offers great cover for any infantry inside it while letting them hide in it by crouching. Basic trench is extremely resistant to any non-demolition damage, with extra resistances against artillery. A single t1 trench takes 11 standard 40mm tank rounds to take down, 79 120mm shells or 39 150mm shells. For comparison a standard 3x1 2RG bunker takes 9, 13 and 6 respectively. Upon its destruction it leaves a husk that can be traversed and still offers some cover, it can be rebuilt with a shovel. Basic trenches can also be filled in with a shovel.

The trench itself can be reinforced with Bmats to upgrade it to t2 for extra health with downside being it would need Bmats to be rebuilt and ACV to be filled in. T2 trench can be upgraded with concrete to t3 trench that vastly improves its durability. Basic trench can also be augmented with barbed wire or sandbags in 8 sections of its wall. Barbed wire is used to significantly slow down an enemy should he try to get inside while sandbags are used to block line of fire of people inside the trench, not letting enemies fire on your positions should they invade it. It can have a metal beam bridge over its middle to let soldiers and vehicles cross it and it can sport ramps on the 2 far sides which are used for soldiers to quickly get out of the trench. T3 trench can be made into a tunnel. Removal of modifications is impossible for the enemy if the trench is connected to a friendly base.

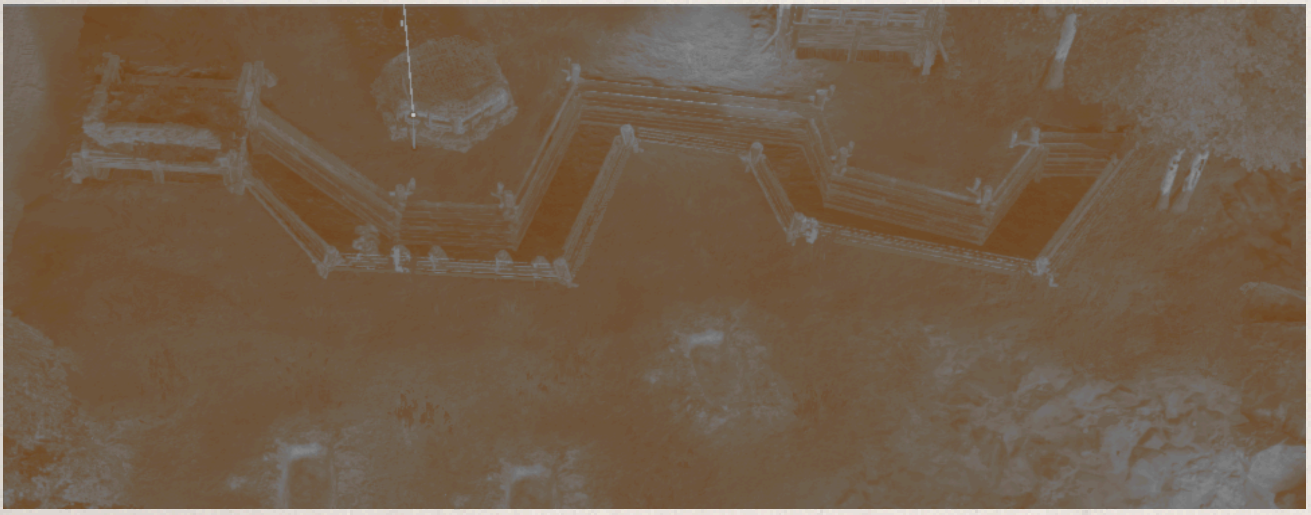
Trench connector

Built with a shovel. Similar to basic trench but its shape and length can be altered when placing. It requires no resources and takes 100 seconds to be built by a single soldier with a shovel. The trench connector has only 2 connection points at its ends and thus often requires to be paired with basic trenches to form trench networks.

A trench connector is just as sturdy as the basic trench regardless of its length and shares all other characteristics of a basic trench except that it cannot be augmented with a ramp or the bridge. Barbed wire and sandbags can only be put on 2 of its 4 sides. One way it diverges from the basic trench is that it can be built under roads or rails, this type of trench connectors is used so that bunker garrisons and trench connectors can be connected to the core even if the road would block a normal trench and they have no physical representation.

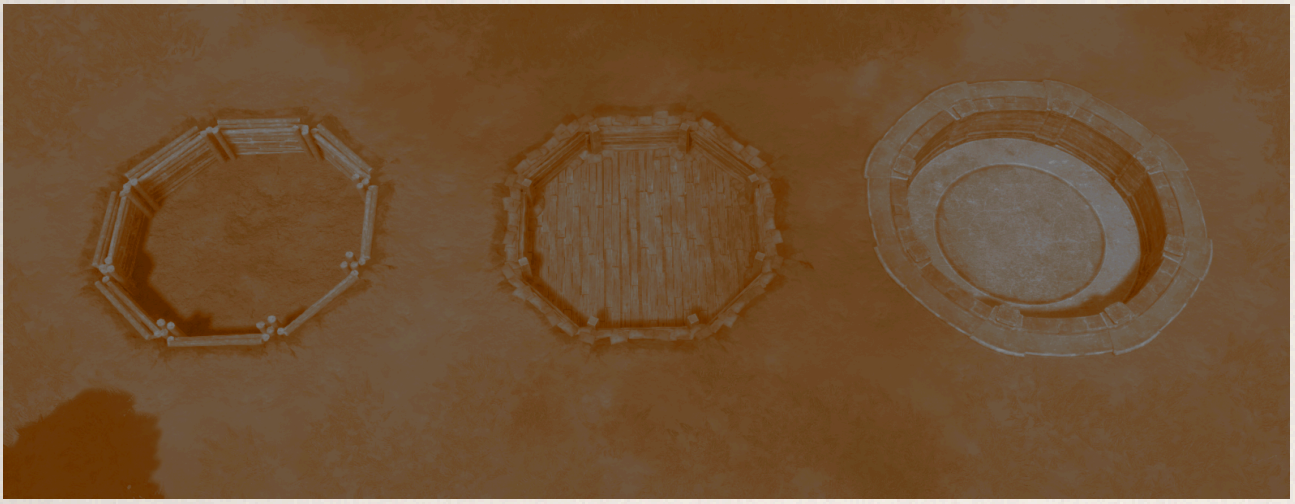


By combining trenches and trench connectors we can make a variety of offensive and defensive patterns designed to make the playing field uneven in our favor.



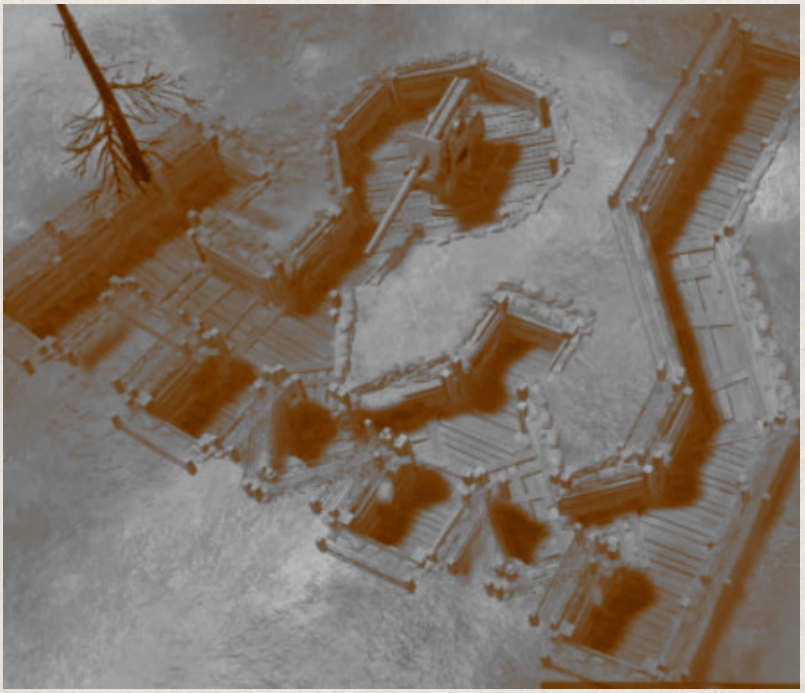
Octagon

An octagon can be built with the shovel. It requires no resources and takes 80 seconds to be built by a single soldier with a shovel. Octagon has 8 connection points. They are mainly used for housing various emplacements at key points inside the trenchline.



Emplacements are heavy weapons that cannot move on their own. Colonial army has access to Serra, BEAT, Ruptura and Thunderbolt (artillery) emplacements. An octagon's main purpose is to function as a hardpoint in the trench network. It does that by multiplying the health of any emplacements placed within it 4x while not increasing the cost of repair, making emplacements last significantly longer.

Octagon is just as sturdy as basic trench and shares all other characteristics except being able to modify it with metal bridge or ramps. Barbed wire and sandbags can be placed on all 8 sides. Most widespread use of emplacements is to serve as the line of AT defense using BEATs. Network without octagons has to rely on infantry AT to fend off armor.



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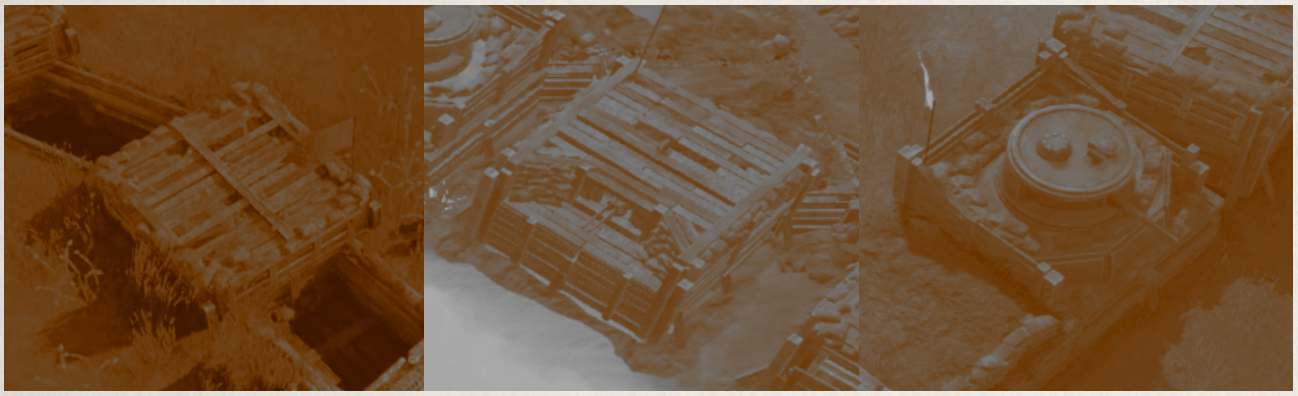
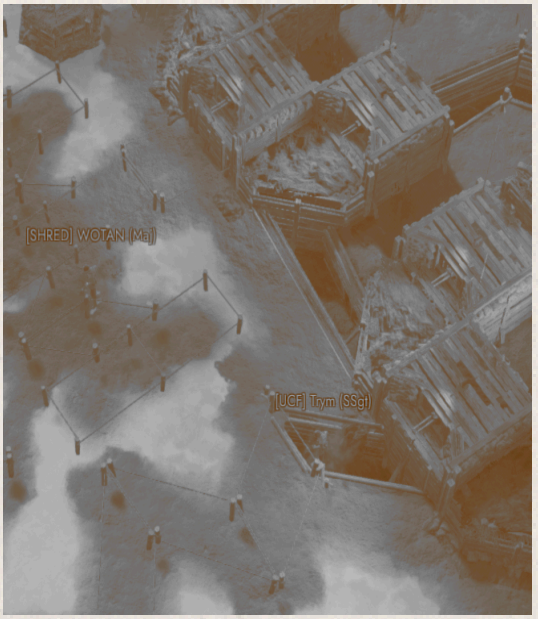
Bunkers

Bunkers represent the primary way to hold onto friendly territory. They do so by automatically shooting at any enemy that comes into their range while taking a significant amount of effort to both build and destroy. Bunker fortifications are a whole other topic so this manual will focus on details relevant to bunkers deployed in forward positions which are much simpler due to the inability to make large and complex bunkers right at the frontline.



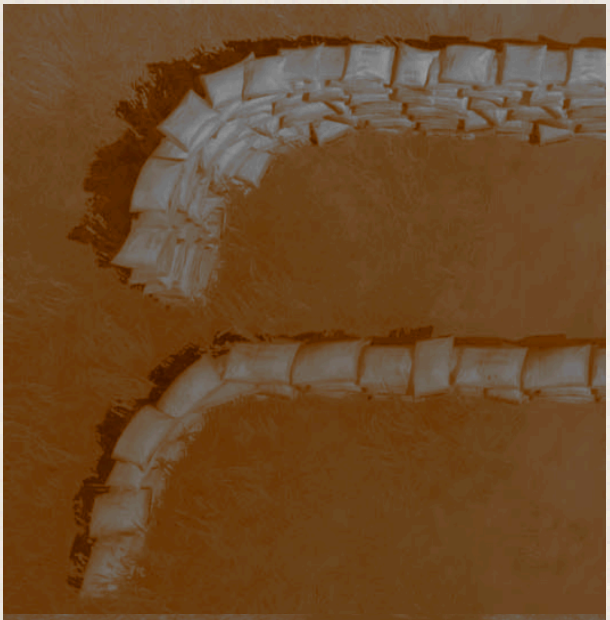
A frontline bunker can utilize rifle garrisons, machine gun garrisons and AT garrisons. Rifle garrison has 360 coverage but its damage and range are lacking. Machnegun garrison has good range and great damage but limited firing arc in front of it. AT garrison is meant to kill tanks that try to assault the bunker, it's so good at it that tanks will not try to attack it unless they can avoid its 180 degree firing arc, its weakness is that it does not retaliate against infantry unless they are using tripod weapons.

Besides garrisons a bunker piece can be modified by putting sandbags on top of it, putting doors so it's accessible by trench, putting firing ports so infantry can fire out and putting ladders so infantry can climb in and out. Do note that the more pieces a bunker has and the more garrisons it has the harder it will be to repair it and the health of it will suffer diminishing returns. A 2 piece bunker takes the same amount of time to repair as repairing 2 1-piece bunkers while not having twice the health. Engine rooms improve garrisons attached to them via power lines. Frontline use of bunkers is to take ground. Once the front pushes up, building bunkers will secure the gains and offer cover to defenders.



Miscellaneous light defenses

Sandbags can be made single stacked or double stacked. Single stacked sandbags can also be used as firing steps to fire over double stacked ones. They can be destroyed by regular ordnance but also by being run over with a truck or anything heavier. Health of a section scales with length. Main point of standalone sandbags is that they are very cheap and very fast to build. They are often able to fit into spots other defenses cant, thus are often seen at urban areas and bridgefights

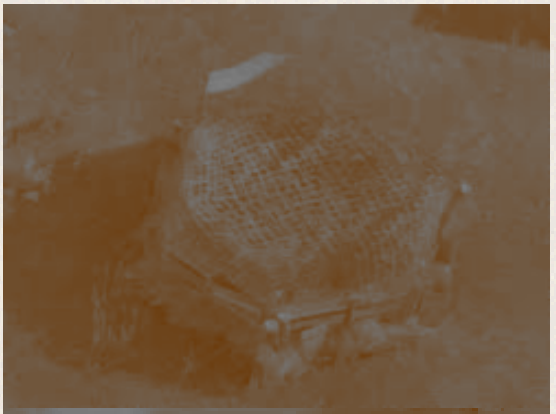


Barbed wire can be placed in form of a wire or a fence. Wire will slow down any enemy that tries to cross it while fence will outright block passage. They are easy to build and near impervious to damage except being able to be removed by a wrench or a hydra charge. They are often used to block access or to cover gaps other defenses couldnt fit. It can also be used to invalidate a piece of cover by putting barbed wire in place where infantry that uses it would stand.

Tripod weapons are some of the heaviest weapon infantry can wield, with more range and damage than handheld small arms. In defensive positions of particular interest are tripod machineguns and ISGs for their ability to ignore cover. If placed in key positions they are able to create killzones that the enemy can't advance over until the tripod weapon is taken out or otherwise incapacitated.

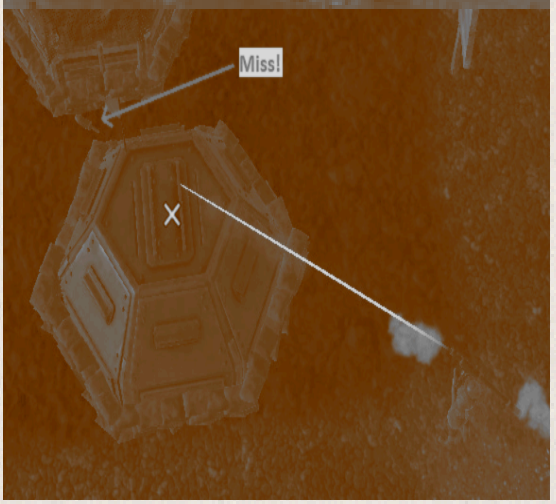
Pillboxes are small cheap defensive structures that shoot at enemies automatically like bunkers do but they trade health for fast setup. Their main use is to build fast automatic defenses to hold ground, to hold certain angles bunkers cannot fit, to cover a lot of ground for second line defenses (defenses against partisans or opportunistic flanks) or to function as shooting positions for infantry. Soldier can get inside friendly pillboxes and he will be immune to everything except gas, if the pillbox dies he will die too.

Rifle pillboxes offer 360 coverage but damage and range are lacking. They are also easiest to kill, being vulnerable even to 12.7 caliber. Build them to cover areas but do not expect them to live past anything with the ability to damage them.

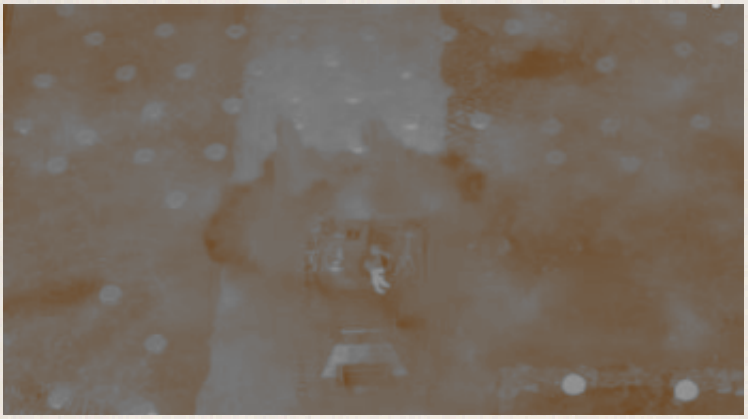


Machine Gun pillboxes are stronger and longer ranged but suffer from limited firing arc, when they unlock they are generally better than rifle pill boxes especially since they are immune to 12.7 caliber but will often require multiple of them to cover the same area a rifle pillbox would. Their notable feature is being able to kill infantry inside trenches effectively and is thus great for covering them

AT pillboxes are armed with AT rifles and can do a significant amount of damage should the enemy trigger them and not either move away or kill the pillbox. That said, they are also often insufficient to deter even a single tank since they die far faster than they can kill the tank. They still function as second line AT defense, and as firing positions for infantry with 360 arc of fire and immunity to 12.7.



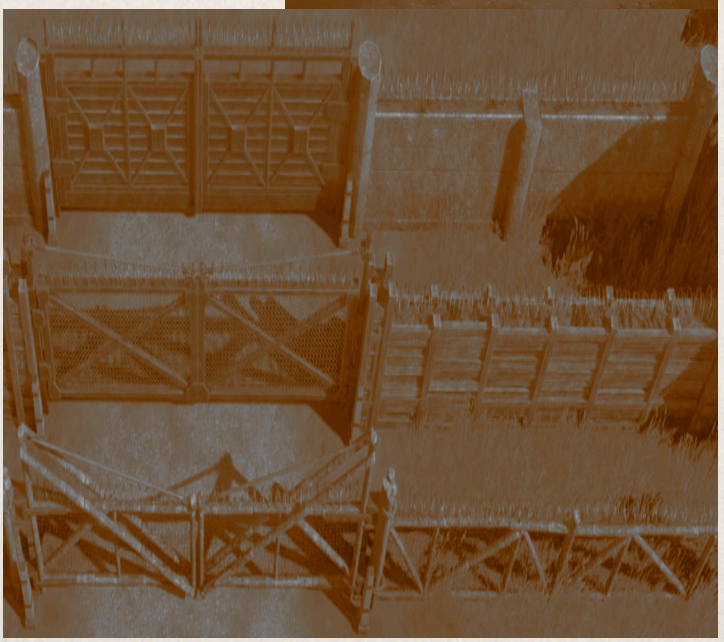
Mines are an extremely cheap tool to hinder enemy armor. Mines only activate when an armored car or a tank drives over them, friendly or enemy. Friendly mines are always visible while enemy mines are invisible to soldiers inside armored vehicles if placed offroad.



Running over a mine will deal significant damage to the tank and guarantees tracking. You cannot put 2 mines within a couple of meters of each other making a tank unlikely to die in a minefield directly. They can be removed by wrenching or with Hydras whisper. They despawn themselves after 48 hours. Mines can be used in minefields to stop enemy armor from advancing or scattered about, making it risky for enemy armor to play offroad but not stopping the movement.

Watchtowers will mark the enemy within 80m range on the map if the weather is clear, less if its not, they are extremely useful as having knowledge of where enemy is can often let you ambush them and stop opportunistic attacks on less defended areas

Walls and Gates are deceptively simple defenses that can be used in a lot of different ways. A large wall is an easy way to keep partisans or raiders out. T1 wall stops movement but not bullets and unlike wire fence it cant be wrenched although it is easily killed by explosives. A gate prevents enemy from going through but allows friendlies letting you better control an area. T3 gate doesn't need to dry letting you make a quickly deployable extremely sturdy fortification.

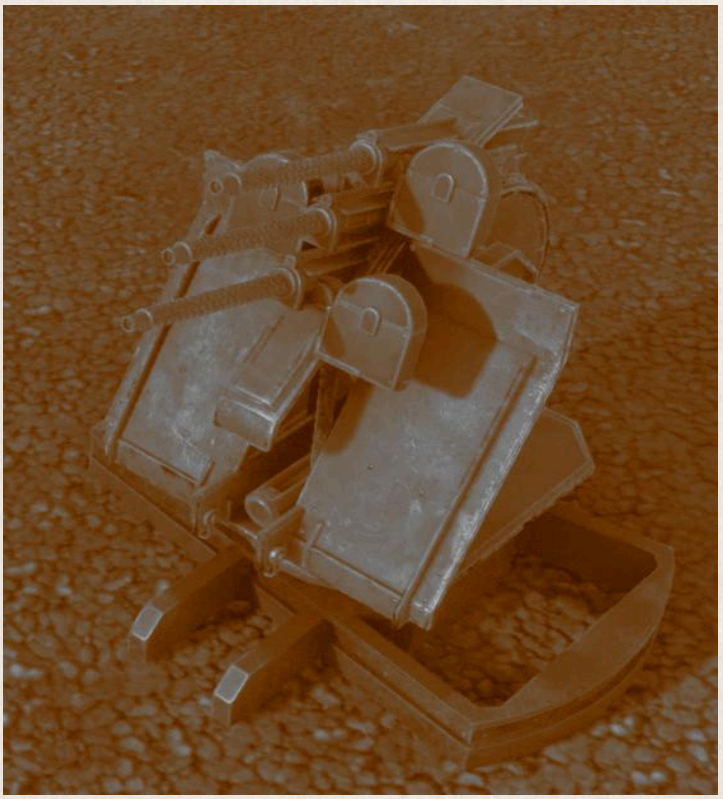


Emplacements

Emplacements strongest immobile defenses infantry can crew. They need to be placed using a crane, complicating their setup. If placed within an octagon their health is multiplied 4x while retaining the same cost of repair, making them easily repairable and incredibly tanky if manned and repaired, often requiring them to be overrun with infantry or overwhelmed with armor to be taken down. That said, it is still viable to be placed outside an octagon should some placement provide great angle while not being able to fit an octagon Inside trench networks they function as hardpoints. Killing the octagon it's placed in kills the emplacements themselves.

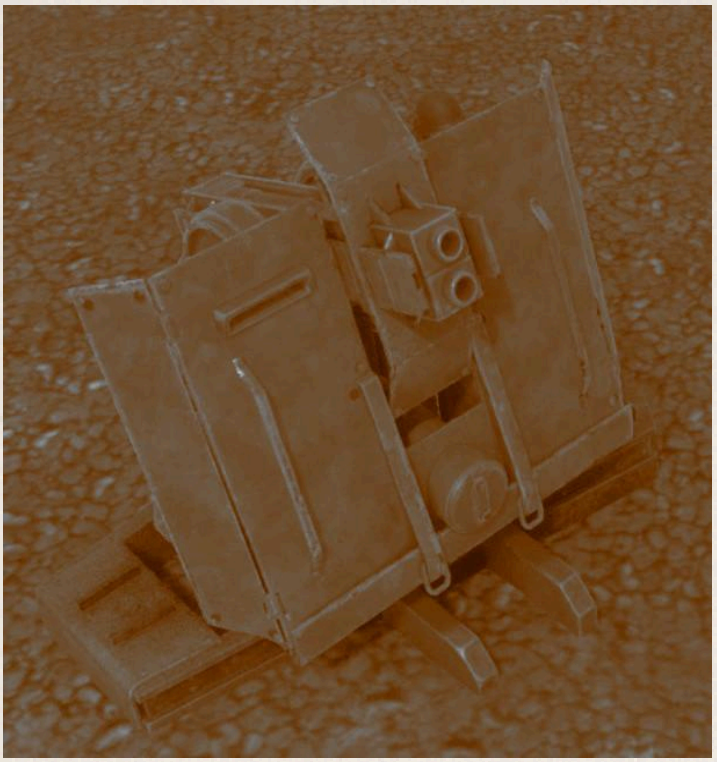
“Serra” aka EMG

Emplaced machinegun is the first emplacement unlocked featuring a super accurate triple machine gun that will kill any and all infantry that is in range of it. Early war it will stop most pushes while late war they are used to protect angles that are swarming with infantry but not as easily accessible to tanks. It costs only 100 bmats at a construction yard, meaning that basically all of its logistical cost is in transportation. If you have construction yard close by do not be afraid to put them in spots where they will die more easily as their cost is largely decreased.



Main threat to them are enemy vehicles as anything stronger than an armored car or FMG will not be threatened by it and will destroy it as long as it has enough ammo to do so. Even in that situation it will take a significant amount of time to kill it if it's being repaired, allowing friendly vehicles to come to the rescue.

“Polybolos” aka BEAT



Bonesaw Emplaced Anti-Tank is your main emplaced weapon throughout the war. Featuring a 45m range double bonesaw launcher that shoots in an arc it will be a credible threat to all armor.

The arc and travel time means that, if skilled enough, tanks can poke it without retaliation by going in and out before the shots land. Good feature of shooting in an arc is that the BEAT can shoot over obstacles, letting it be placed in positions where it can shoot at advancing enemy but enemy can't shoot back.

A BEAT is essential to making the trenchline be able to hold back armor as BEAT can only be taken down by being overwhelmed with armor or overrun with infantry, both of which infantry in the trenchline can help prevent. BEATs have great synergy with armor as BEAT provides safe space where the enemy won't rush your armor while friendly armor can stop the BEAT from getting overwhelmed.

Similar to EMG the BEAT only costs 125 bmats at construction yard, with transportation making up most of its logistical cost. This means that they can be used very aggressively with techniques such as BEAT hopping where infantry makes octagons far up on the frontline and then puts BEATs in them, “hopping” from one octagon to another. In defensive capacity due to its low cost it can be spammed to hold back enemy armor if you cant bring your own to the field.

Big concern for BEATs are Outlaws as they can kill the octagon with their 45m range 40mm cannons without being retaliated. Should an outlaw start doing so, killing him should be made a priority. This situation can be avoided by having a trench in front of the BEAT from which infantry can shoot AT at the Outlaw.

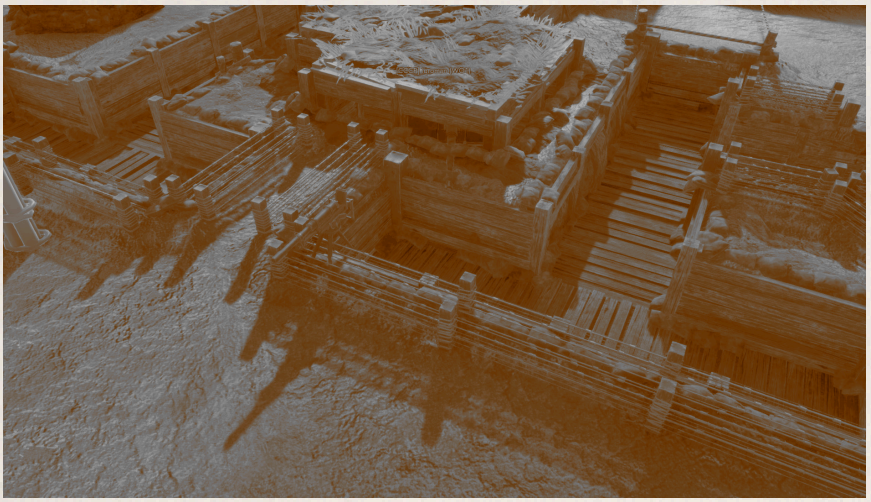
Ruptura

Strongest collie defensive weapon in the game. Requires a facility and resources equivalent to a tank to produce as well as needing facility made 75mm shells to fire. Characterized by having only enough space for 1 shell in the chamber and 1 in the inventory, very slow turning speed, incredible health and lack of any protection for the gunner. The 45m range high velocity 75mm cannon can 2 shot sub-BT armor and the gun has so much health that it's easier to kill the octagon than the gun itself.

Lack of gunner protection means he can be decrewed by infantry in range or even tanks from the front, combined with slow turn speed the Ruptura is prone to being overwhelmed. The lack of ammo capacity makes it so Ruptura has to have a dedicated loader and some type of ammo storage near it to function. Do not use this gun if logistical support or coordination on the front is insufficient.

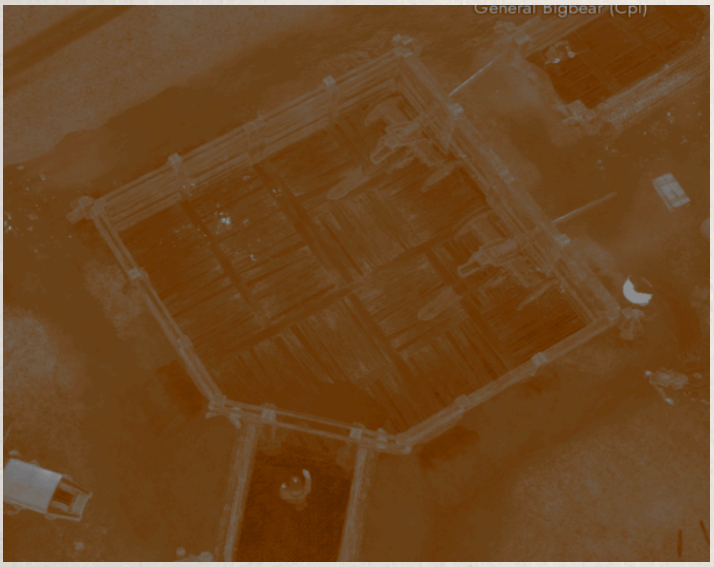
In most cases BEAT offers good enough protection but Ruptura will produce much more casualties among the enemy tanks making the area around it a great place to engage enemy armor.

LTG



LTG or Larp anti-Tank Garrison is different in nature compared to above emplacements as it is a push gun (FAT, Smelter or Stygian) emplaced inside a bunker. The bunker will protect the push gun inside until it dies killing all the crew inside but not the gun itself. In comparison to conventional emplacements the LTG is harder to repair, man and operate as well as much more vulnerable to infantry but has a benefit of integrating well with bunker defenses, being more clandestine and offering stronger directional defense as it allows multiple push guns to be emplaced within a single bunker. The push guns **cannot move under garrisons** making them unable to integrate well with conventional bunker designs.

They are made by driving the push gun through a T2 bunker corner husk which is deeper than other husks and then repairing the corner or dehusking it. While inside the push gun is hard to maneuver so it can more easily be overwhelmed. Bunker should be built in a way that minimizes blind spots and once Outlaw is unlocked it's smart to invest in Smelters so it's harder to get hit without retaliation.



LTGs are good when the enemy comes from one direction or when there are no BEATs or Rupturas available. Integrating them into trench networks also gives friendly infantry a safe position to cover the nearby trenches from but should the enemy get inside the bunker they can lock the push guns or even use them against your own side so tread with caution.

Considerations of good defensive positions

There are a lot of subtle considerations that go beyond raw statistics that make some defenses great and some defenses terrible. The effectiveness of defenses is often hard to observe mainly due to difficulty of connecting causes to consequences. Here is a summary of some considerations a combat engineer should pay attention to if he wants his defenses to be effective.

Defenses give control

Main point of defenses is to give the friendly side control of space and to provide a safe position to launch attacks out of. We do so by making automatic defenses, bunkers and pillboxes. When making defenses you want to make sure that they stop the enemy from moving into the territory you want to protect. If you have a bunker base you want bunkers around it to stop the enemy from getting inside, if you want to keep the trenchline you want pillboxes covering it so the enemy can't get in. If you have a logi road you want pillboxes on it so it cant be partisaned. If possible you want to occupy as many choke points as you can so that you need to build less defenses to keep the enemy out. Lack of control often results in arty pallets or guns dying, armor getting stolen or killed outside combat, enemy partizaning the logi road etc.

Cost to you vs Cost to the enemy

If control was all that is important then the best tactic would be to just build a wall of bunkers across the map and be done with it. These situations actually happened and all they resulted in was the expensive wall getting breached in one place rendering it ineffective and getting rolled up. Good defenses cost the enemy more to breach than you to set up. A BEAT you can deliver in ten minutes and costs bmats might kill an enemy tank and hold the enemy for an hour. The concrete bunker you spent an hour building might cost the enemy days to breach. Well placed defenses will make the enemy spend more time taking it down then for you to set up. Badly placed defenses will get taken down quicker than the length of setup and may even cause other defenses to fall faster. For example building a line of pillboxes on the front getting shelled will just die as side effect of enemy hitting your infantry.

Defenses are a buffer

Defenses do not defend themselves, every single defense in the game has a way of getting killed without any retaliation, defenses defend defenders. Enemy will walk over the trench with no occupants. Bunkers without AT will get rolled by tanks with no retaliation. Even concrete bunkers can be suppressed and have havoc charges used on them with 0 retaliation. What defenses do is act as a buffer, they give you time. If you have a bunker covering your trench the enemy has to kill it before entering the trench. It gives you time to go and kill whoever is trying to kill the bunker. Late war if enemy tanks are trying to destroy your defenses you need your own tanks to keep them off. If the enemy is using arty on your defenses it gives you time to set up and counter fire. Whatever you do, don't just let the enemy freely hit your defenses. The more defenses you let die the less buffer there will be between your base and the enemy.

Spawns influence numbers

We established that defenses need people to work, the more people the better they work. Foxhole is a numbers game and the number of people on the field is influenced by 3 factors. Total number of friendlies vs enemies, spawn timers and proximity to your base vs proximity to enemy base. Friendly and enemy numbers you can't influence, spawn timers try to balance out number imbalance but what you can influence is proximity to the base. It's simple, the closer the spawn is the more people you will have. This means that your defenses are strongest around your spawn points, your control is strongest around spawn points and it is easier to extend down roads since that is where people group up. This also means if you want to push one of the best ways of doing so is building bunkers that are closer to the fighting.

Map vision strengthens response

Watchtowers and observation bunkers will automatically spot the enemy on the map, this gives you time to respond as well as warn you of their actions. By providing vision over the area you want to control people will respond easier thus making defenses stronger thus strengthening your control. Because of that it's often cheaper to provide vision to control an area than make a wall of automatic defenses. This is especially important when armor comes into play since with map vision friendly armor will avoid getting harmed by infantry and will respond to any plays made by the enemy quicker.

Hardpoints over No-mans land

When building defenses it's more worthwhile to pick a location and turn it into a hardpoint than to sprawl loose trenches and bunkers all over the battlefield. A hardpoint will be easier to make because of smaller size and harder to overtake because its defenses will synergise with each other while the enemy will lack cover, severely hindering his efforts in overwhelming the hardpoint. Meanwhile if you sprawl defenses those defenses will be defeated 1 by 1, needing much more numbers to achieve the same level of protection. The field will be left with loose trenches and bunker husks offering the enemy cover when attacking and bogging you down when counterattacking.

Use the terrain or the enemy will

Real life terrain features don't quite translate to the battlefield as you would expect but terrain is just as important to use effectively. Roads are main directions of attack, stopping the enemies at the road means stopping their push. Making the enemy attack from high ground will mean their tracked tanks won't be able to retreat. Plugging narrow paths infantry can come from with barbed wired trenches will let your infantry keep them off more effectively. Adversely, digging trenches under a hill will mean the enemy will be able to massacre anybody inside from said hill. Learning and recognizing these interactions allows an engineer to make the strongest defense possible with minor changes in shape causing major changes in effect.

Control your effort

Not every defense warrants extreme effort put into making it. A front can always use more of you so picking your battles is essential to being effective. An anti-partisan defense can do with just pillboxes. Temporary offensive bunkers can do with 3x1 bunkers as a start. On the other end if you know enemy will come from a certain direction and that they will come hard consider making BEAT, LTG or even a Ruptura positions, dense trenchworks that will resist enemy fire, copious amounts of barbed wire to stop infantry advance and minefields to harm enemy armor.

When to build, what to build

Battlefield conditions are far from perfect. A lot of defenses are very hard to set up under fire and defenses that are under fire are most valuable. Frequently you won't have the luxury of setting up defenses in peace but even rushed defense is vastly preferable over no defense. Knowing when to make defenses under fire and when it's more worthwhile to exploit the calm behind the frontline to efficiently set up a well designed fallback point can make a big difference. While forward defenses are essential to keeping momentum, making hardpoints behind the push will ensure you break the enemy's momentum in case they get reinforced.

Field defenses are temporary

When deciding the scope of what he wants to build a builder needs to take into account how much value he will get from them. Before AT garrisons are teched or a town hall/relic base reaches t3 the position is temporary and any positions you make more than likely won't exist tomorrow. They will disappear due to general entropy. Decay, attritional damage during combat, friendlies doing redesign or unanswered enemy assault will ensure that they will be unrecognizable.

Defenses gain value while they are under assault and from control they exert on the surrounding area. Builder needs to determine how likely is his position to come under assault in short term, how much value you gain from controlling the surrounding area, how much value you gain from permanent defenses (AT garrisons, t3 bases and concrete) that your team can set up because your defenses held the area long enough.

Time is on your side

Defenses gain strength the longer they are in place, towns and bunker bases get stronger with time. Bunkers will tech permanent AI, AT garrisons and eventually concrete which will shrug off any casual assault. Towns will be much harder to take down at t3 and eventually the logi buildings and safehouses will come online, giving you strategic advantage in the hex. This is how you take ground, you push the enemy and then hold long enough for the defenses to get stronger, eventually shifting from field defenses to permanent ones.

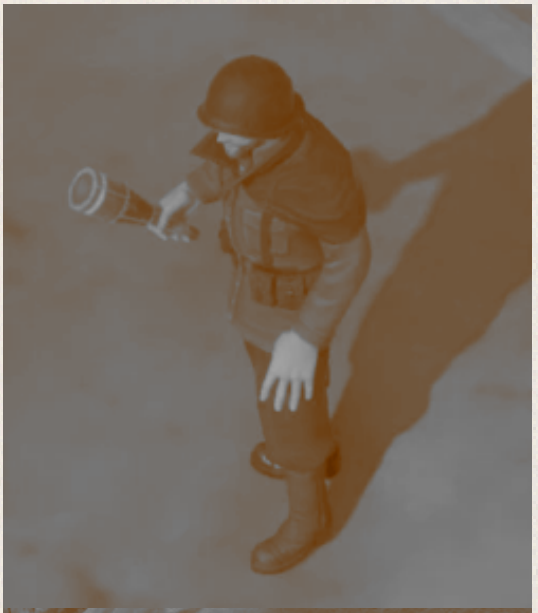
Methods of assault

To give context to defensive patterns discussed in the next chapter we first need to talk about the methods the enemy has at their disposal to take them down. The amount of use and effectiveness of these methods varies wildly with enemy competency but nonetheless all of the methods should be taken into consideration as defenses that are effective against one method may utterly fail at stopping another.

Infantry weapons

Weapons infantry have at their disposal are characterized by their relatively small capacity but also relatively high difficulty of stopping them. Unless your infantry can take them down enemy infantry can erode lighter defenses such as watchtowers, pillboxes and smaller bunkers. In significant enough numbers they also pose a threat to more serious defenses.

Mammon is an anti structure grenade that is extremely cheap and can be carried by regular infantry. Mammons let them take down isolated defenses and fighting against them is a battle of attrition as builders keep rebuilding what mammons kill. Thankfully due to short range they pose little threat to bigger defenses and smaller defenses that cover each other sufficiently protect against them. That said, if a bigger defense becomes sufficiently exposed a mammon rush will take it down.



Foebreaker is a rocket launcher mounted on a tripod, sees little use in late war but is the main way of building destruction for a couple of days after it's unlocked. It is mainly used in frontal assaults and at that time ISGs are the best defense against them.

Cutler is the best anti structure weapon the enemy has at its disposal. A single infantry with it has decent capacity for destruction and great range to deliver it. Cutlers can attack most defenses without retaliation and the main way of stopping them is for infantry to kill them. For this reason the best defense against them are trenches in front of your defenses from which infantry has a position to shoot at them. This isn't viable in places where infantry isn't constantly at so we have to rely on watchtowers spotting them and infantry checking the map and going after them in most cases.

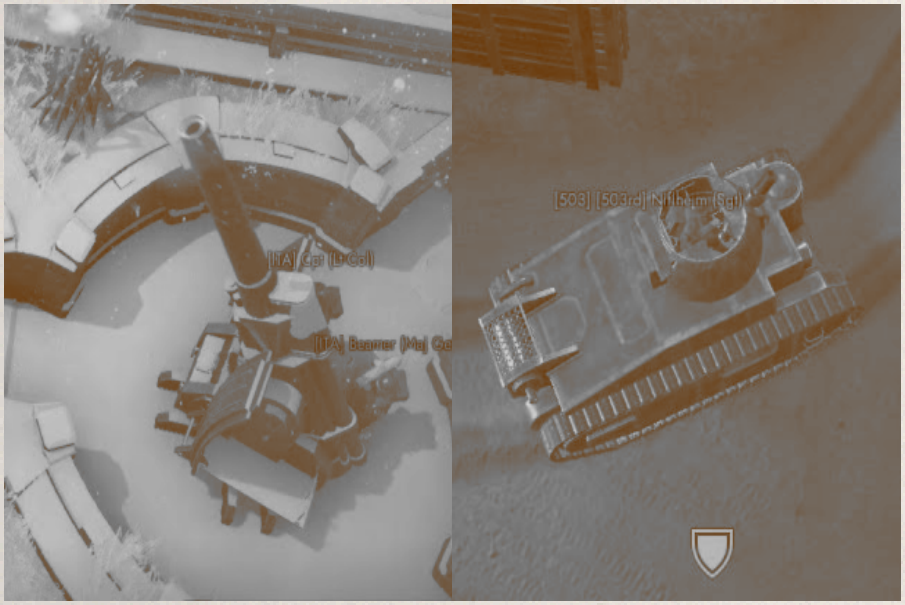
Satchels and Havoc charges require enemy infantry to run up to your defenses to place them. They deal demolition damage which in context of field defenses deals immense damage to trenches and octagons. Havoc charges require 2 people and are very hard to set up as one person needs to plant the charge, the second person plants a detonator on top of it and they activate it by shooting.

For all of its downsides, havoc does a ridiculous amount of damage. A single one being enough to destroy multiple trenches in its blast radius. A satchel on the other hand doesn't do a lot of damage but can be planted quickly by a single person. If he is willing to move slowly a single person can even carry 9 satchels on him. Surpassing damage capacity of a Havoc but increasing the difficulty of planting them all.

Artillery

Artillery is the best way of converting large amounts of material into damage. Expensive to run but found on any front. Artillery batteries can severely suppress your forces from great distances. Large operations without fail will feature an artillery barrage accompanying land assault. Artillery can also be used to great effect by the defending side to suppress enemy lines and target enemy spawn.

Mortars and Mortar tanks feature large capacity for destruction but are limited in range making them vulnerable to friendly infantry and tanks. **120mm artillery** is relatively cheap and will tie up a lot of people by forcing them to repair defenses, causing material and morale attrition as well as effectively suppressing groups of enemy infantry. **150mm artillery** is significantly more expensive but can outpace the repairer's efforts and lay waste to any field defenses under its fire. Once its unlocked builders must adapt as a lot of defenses that could withstand lighter artillery falter under 150mm.



Field defenses do not have a way of directly countering artillery but what they can do is diminish their effect and help friendly artillery in their efforts to silence enemy guns. These measures rely heavily on aspiring field engineers knowing the nuances of artillery operation.

Countering Artillery

Artillery is static while firing. Countering it means you are forcing it to move as the guns can't fire while doing so. If you are unable to make enemy artillery move you can take measures to reduce its effectiveness.

The primary way of countering it is **counter-artillery**. What field engineers can do to help the counter-artillery is make an artillery position away from other defenses from which friendly artillery can shoot while not getting hit by enemy artillery already shelling the front. An artillery position consists of light defenses to protect against enemy raiders, pits for the artillery guns and watchtowers to give advanced warning. Optionally ammo rooms which can withstand more enemy fire and also allow artillery crews to forgo the need for pallets and just bring crates in the truck. Counter-artillery will shell the enemy battery, potentially killing pallets of ammo and the guns themselves, forcing the enemy to either use more people to repair and withstand the barrage or move and stop shooting.

Second way of countering artillery is **raiding** the enemy battery. The enemy's own artillery battery will have defenses but the quantity and quality of those defenses varies from absolutely nothing to artillery positions inside concrete bases surrounded by howitzers. If enemy defenses are closer to the former than it is possible to raid it with an infantry squad, mortars or a tank. Ammo pallets are especially vulnerable and even the mental effect of a failed attack can cause enemy artillery crew to move. Raiding is the best way to deal with mortars as they have to come close to be within range.

The third way is simply **mitigating the damage**. Trench networks will severely reduce its effect on infantry as well as withstanding a ridiculous number of hits before going down. Making smaller bunkers and making them less dense will make them faster to repair and will make them get hit less. Having trenches close to bunkers will let trenches absorb some hits. Making watchtowers to find and kill enemy spotters will make them less accurate. Bunker cores are prime targets for enemy artillery so having trenches that lead out of it will save a lot of lives that would have been lost by running out of spawn across open ground. Moving pallets, artillery positions and fuel tanks away from the bunker core will avoid them getting destroyed as collateral. A great idea is to have a redundant core away from the main one as arty will fire only on one of them so if it dies you have backup and infantry can spawn out of the backup to avoid casualties. Once artillery unlocks, building a mass of t2 bunkers densely packed together stops being viable, expect only the core and trenches to survive a serious barrage so plan accordingly.

Vehicles

Out of all the methods of destruction vehicles are most straightforward and hardest to counter. While infantry can be dealt with simply by your own infantry holding the ground and while arty needs other elements to put up the pressure if they want any hope of out-damaging enemy repairers,vehicles are self contained war machines. Most of the time holding back enemy vehicles will translate to stopping the enemy push.

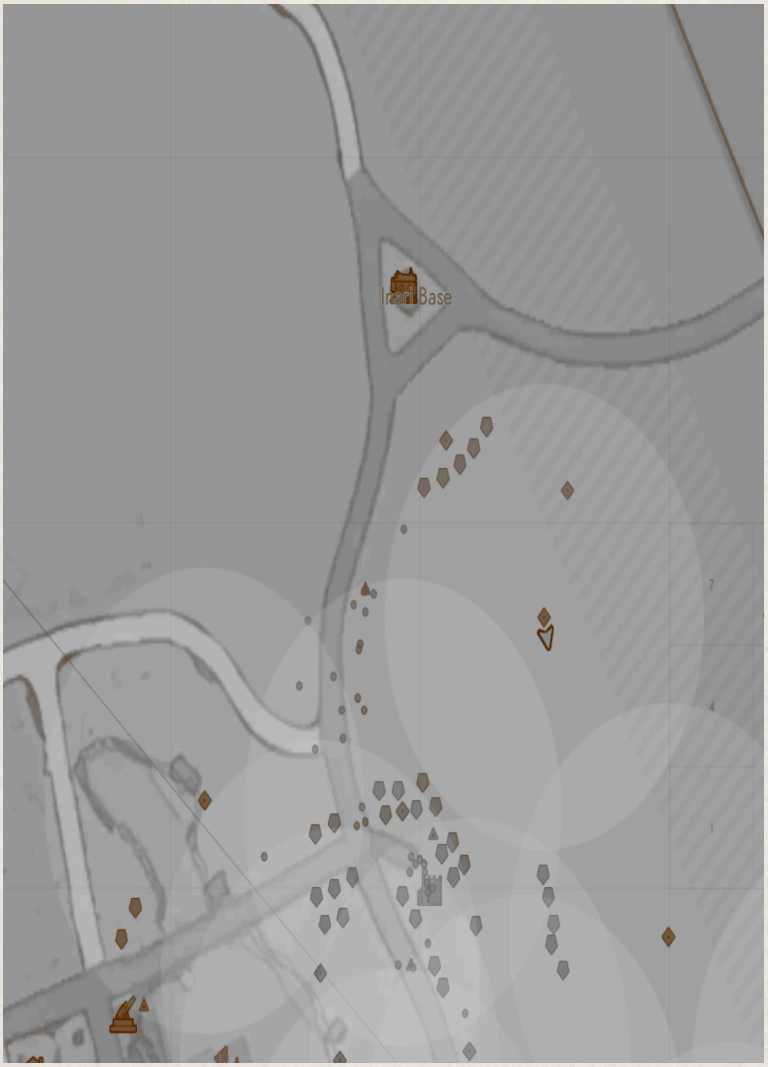
To defend against enemy vehicles you have to protect friendly bunkers to hold control of the area and you need to help friendly tanks fight enemy counterparts. Other than **AT garrisons** which can deal with the vast majority of vehicles on their own, every other defense in the face of vehicles should be considered a buffer. Once you lose every buffer in front of your spawn enemy vehicles will have an easy time taking it down.

Most of the time on the front you won't have access to AT garrisons, instead the frontline needs to incorporate **manned defenses** such as BEATs, LTGs and Rupturas. In front of manned AT defenses trenches can be used to great effect: infantry inside them will protect the manned defenses from enemy infantry while remaining highly resistant to enemy vehicles. The infantry inside the trenches should also bring AT weapons so the enemy has a hard time overwhelming the manned defenses with their armor because of the additional threat posed by infantry. Well designed trench networks can hold back significant amounts of armor on their own simply by relying on their AT weapons.

Designing defenses can be a challenge since AT defenses often don't work well against infantry so the builder needs to **overlap** both AT and anti-infantry defenses as well as make sure terrain features don't allow the enemy to attack them without retaliation,

Second way of defending against enemy armor is by **helping friendly armor**. Friendly armor often needs to have space to deploy in a line and needs to have paths to move around. Making a choke point for friendly armor with your defenses is an easy way of getting them killed. Friendly armor benefits a lot from the safe space provided by AT defenses. Having AT defenses in place for friendly armor to play around lets them have a safe space to retreat and additional source of damage if the enemy engages within AT defenses range. That relationship goes both ways, AT defenses can survive significantly longer if there is even just a threat of friendly armor nearby as friendly armor can see of enemy tanks attempting to poke the AT defenses.

It is especially important to **cover roads** as those are the primary paths enemy armor will take to attack. That said it is not uncommon for them to flank and go offroad. In that case they are unlikely to have significant infantry support so friendly infantry can go out and try to kill or disable them. To catch those flanking vehicles and provide great help to friendly armor in general it is essential to build **watchtowers** covering the surroundings. If enemy tanks get caught on the map while flanking they will be at great risk of getting flanked and destroyed themselves before they can do any damage. If your tankline is covered by watchtowers enemy infantry will have a very hard time sneaking up and harming them.



Mines are a great asset against enemy armor. Making a minefield will force the enemy to wrench the mines before they can pass and you can build defenses that will stop the minefields from getting wrenched. If put far offroad they can also make a battlefield uneven as friendly tanks will be able to see those mines and avoid them while enemy armor is liable to run into them, get tracked and die.

Defensive patterns

The following section will be a compilation of patterns the colonial army came up with and are considered effective. A lot of the time they will have to be adapted to exact terrain as well as engineers preferences but they nonetheless provide a solid design engineers can use it to make solid defenses without much thinking.

Trench patterns

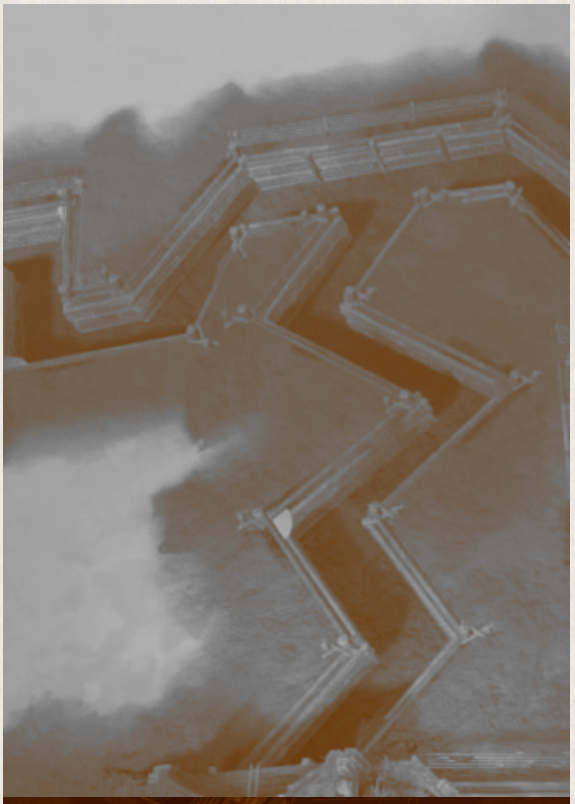
The following section contains a collection of **trench patterns**. Trenches provide extreme protection to friendly infantry against other infantry. It's often required for enemy infantry to **breach** your trench if they want to kill friendlies inside it with small arms. Trenches are quite modular so it's key to know how to combine the available pieces and satisfy certain general requirements.

Most important quality of a trench is for it to be hard to breach, once breached it should be hard for the enemy to clear out and once cleared out you want it to be easy to retake. Putting **barbed wire** on the trench, making sure the enemy **doesn't have cover** in front of your trench and shaping so that it **sprawls parallel** to the enemy forces so that the enemy has to cross more ground within rifle range to get inside makes the trench harder to breach. Putting **bends and turns** will mitigate the effect of grenades and enemy infantry that got inside the trench won't be able to clear it out quickly. Increasing the **size** of the network will make it harder for enemies to take over in entirety while making it harder for friendlies to stop breachers. **Limiting the amount of passages and dead ends** will make it harder to take over the trench and give less places for the enemy to hole up in. Covering even a part of the trench with **AI defenses** will make it a necessity for the enemies to take those out before they can properly hold it. Using **sandbags, natural cover next to the trench or reinforcement trenches** will ensure if taken over the trench will still make the terrain favor defenders. Trench fighting is significantly influenced by numbers so trenches near **friendly spawns** will be significantly in favor of defenders. Keep in mind the enemy **can't modify** trenches attached to friendly bunker bases.

Bad trenches can pose **significant hindrance to friendlies**. At worst they will provide a solid firing position to the enemy right next to friendly defenses. To avoid these situations it's important for the field engineer to pay attention and see what works and what doesn't, it's more of an art than exact science.

Reinforcement trench

A reinforcement trench is an irregular trench, often a zigzag, that runs towards friendly lines perpendicular to the parallel trenchline. Its purpose is to offer a safe path friendly infantry can take to get inside the parallel trench. In case an enemy has vehicles or infantry in the opposite trench watching over the friendly trench the reinforcement trench will ensure friendlies don't have to run across open ground and risk getting shot to reinforce it.



In case the enemy has already made a breach the reinforcement trench makes the network give advantage to defenders as friendly reinforcements will come through it under cover while enemy reinforcements are liable to get shot from friendlies in the reinforcement trench. If connected to the friendly base the reinforcement trench will stop the enemy from removing trench modifications such as barbed wire

To fully take over the network the enemy will have to take over the whole reinforcement trench that is often covered by AI defenses, outfitted with sandbags or put into favorable positions for friendlies to breach it. If the enemy cannot secure the reinforcement trench they gain no advantage from being in the trenchline and will eventually get cleared out.

It's easy to incorporate this pattern and it synergises well with other patterns. One thing that field engineers should be vary of is putting bunkers into part of the reinforcement trench (or any trench in general). It may sound like a good idea but bunkers are far less tanky than trenches, if the bunker gets dehusked the reinforcement trench will be disconnected and rendered ineffective. Consider making multiple reinforcement trenches for redundancy.

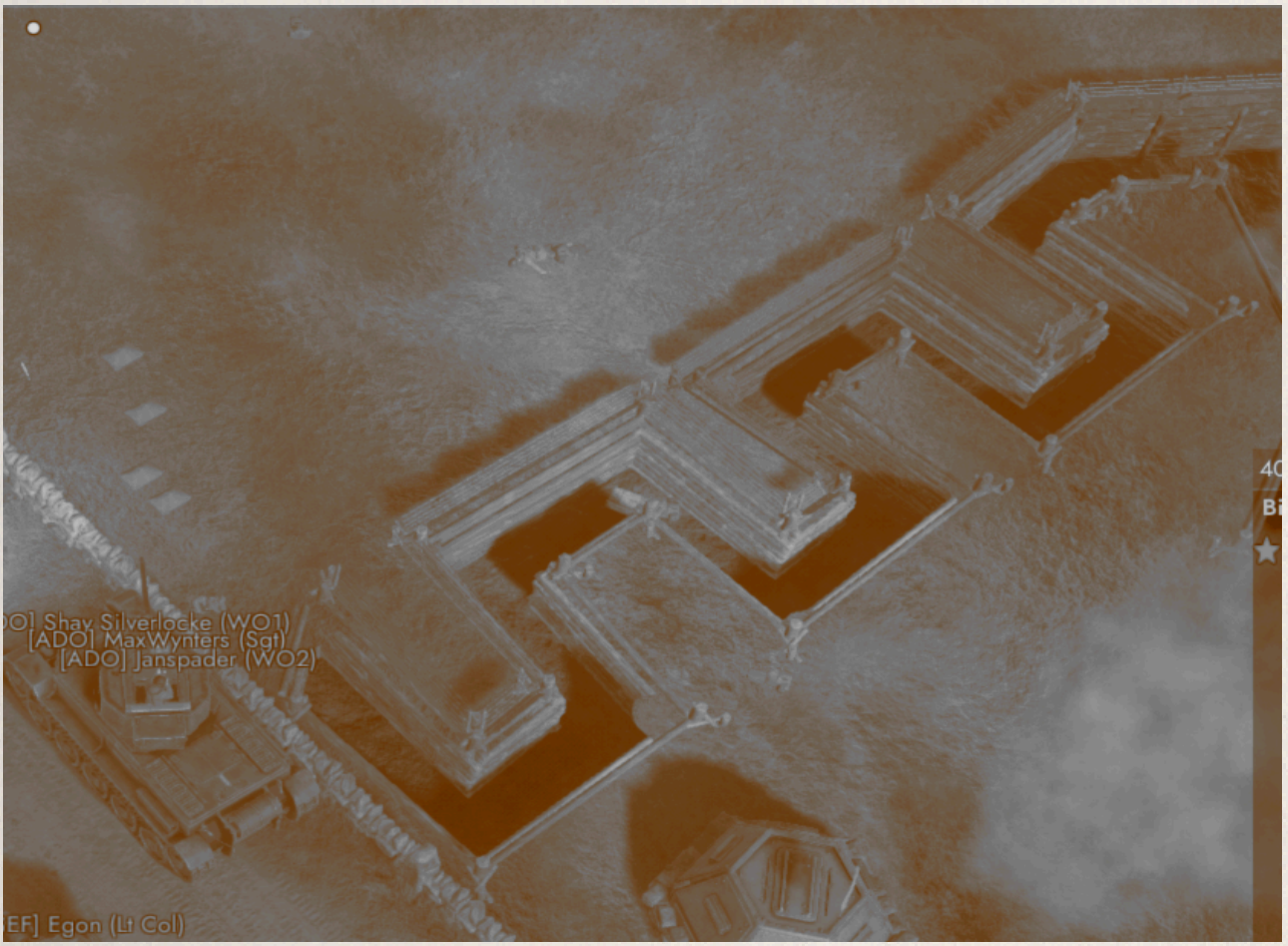
Sir Beef's Trench

Probably the best trench design with current tools available, Sir Beefs trench features 2 vertical straight trenches connected with 2 connectors forming a V. Its dense so its health per length is excellent. The pattern can be bent to form a curve. If placed right a friendly from the normal trench can aim down the trench connector from cover and stop any number of enemies who breached the trench from advancing.

Used for making the trenchline parallel to the enemy. It can be modified with sandbags at the back to stop the enemy from using the trench, it can attach reinforcement trenches or garrisons. If the trench connectors are lengthened, pillboxes can be placed between straight trenches. The pattern can easily integrate with other defenses due to the large number of connection points.

P-pattern

Trench pattern that uses trench connectors to achieve 90 degree angles. offers exceptional protection from enemies that breach the trench as well as an ability to pack trenches with incredible density, giving them more health per length and making them harder to destroy. Usually used as a parallel trench.

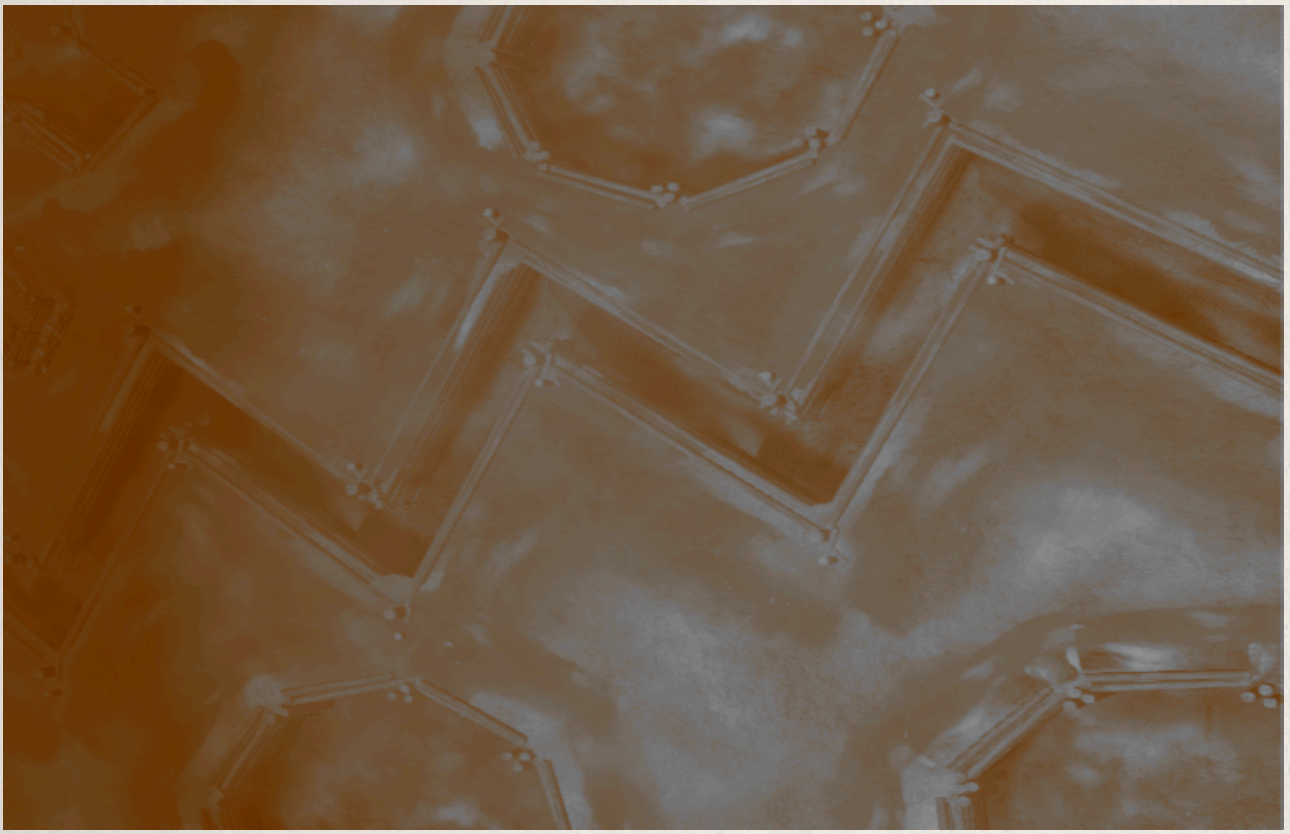


It being made from only trench connectors means that enemies can't connect their own trench to it and friendlies can't mess it up with random trenches attached. One great thing about the pattern is that it features no dead ends, places in the trenchline that the enemy is hard to flush out of. Because of that enemy will have a very hard time surviving if cut off from reinforcements.

Another notable feature about this pattern is its resistance to bayonetters. A bayonetter will have to run down a significant distance to its target due to the amount of bends present while being able to approach only through a single narrow connector that is easy to cover.

The ZigZag

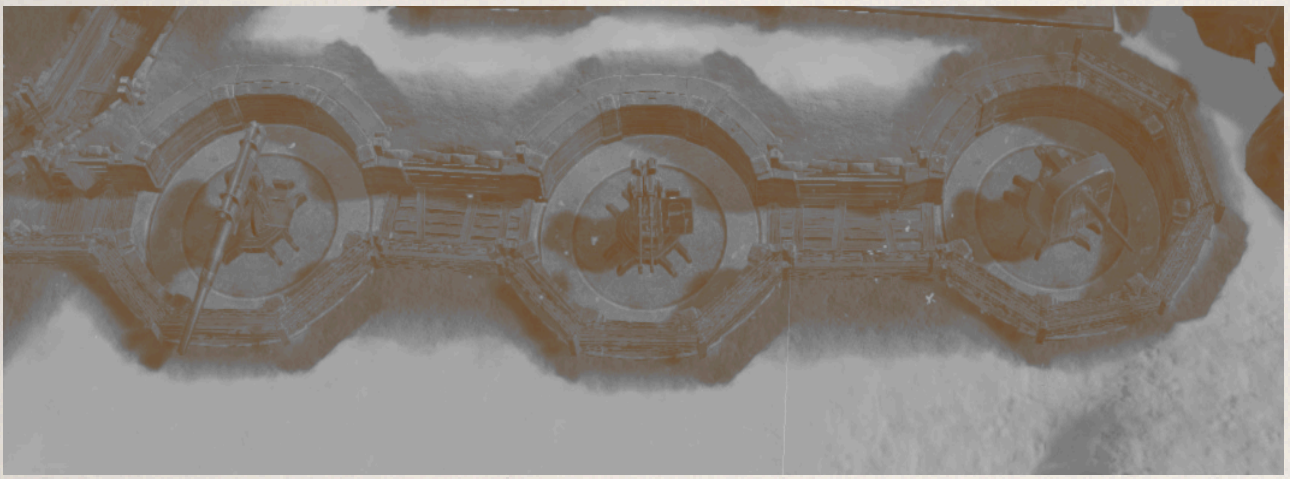
Similar in shape to reinforcement trench but meant to serve as a pattern for parallel trench. Made using angled trench connectors, its main strength is its simplicity. Compared to other patterns it can be laid out and dug fast, even under enemy fire. Due to the ability to determine the length of the section it can be made to be dug fast or the engineer can maximize the health and number of bends by making shorter connectors. It can be used as perpendicular trench in form of a sapping trench to get closer to the enemy while under cover and once the enemy line is taken over or the parallel trench at the end of it is dug it turns into a reinforcement trench.



The pattern is very useful for its versatility. It has an easier time going around natural features and other defenses letting the field engineer make a good trenchline in bad terrain. What it does lack are connection points, a feature it shares with P-pattern, the field engineer will have to think carefully how he intends to integrate it with defenses that aren't trenches. The pattern can also be made a bit asymmetrical with alternating longer and shorter connectors. If given enough angle the trench will be too narrow for 2 soldiers to pass through except at the connection points, forcing the enemy that gets into it to go through it 1 by 1.

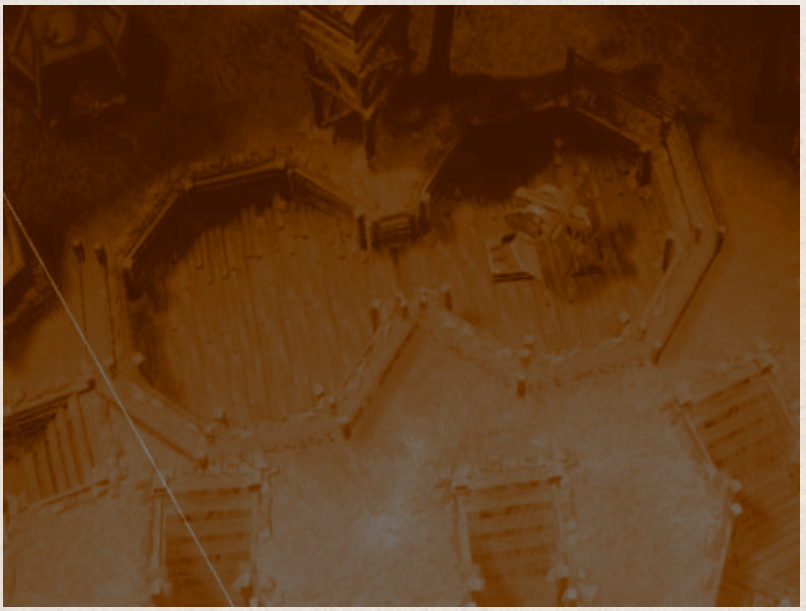
The Ring

The Ring is a line of octagons connected by short connectors or even no connectors at all. It is meant to maximize the number of emplacements per area. Main purpose of those emplacements is to stop enemy armor. Its much harder to overwhelm multiple emplacements at the same time and the pattern offers a lot of redundancy. Main threat to it is infantry so its recommended to have a trenchline in front of it to protect it against infantry with cutlers or grenade launchers



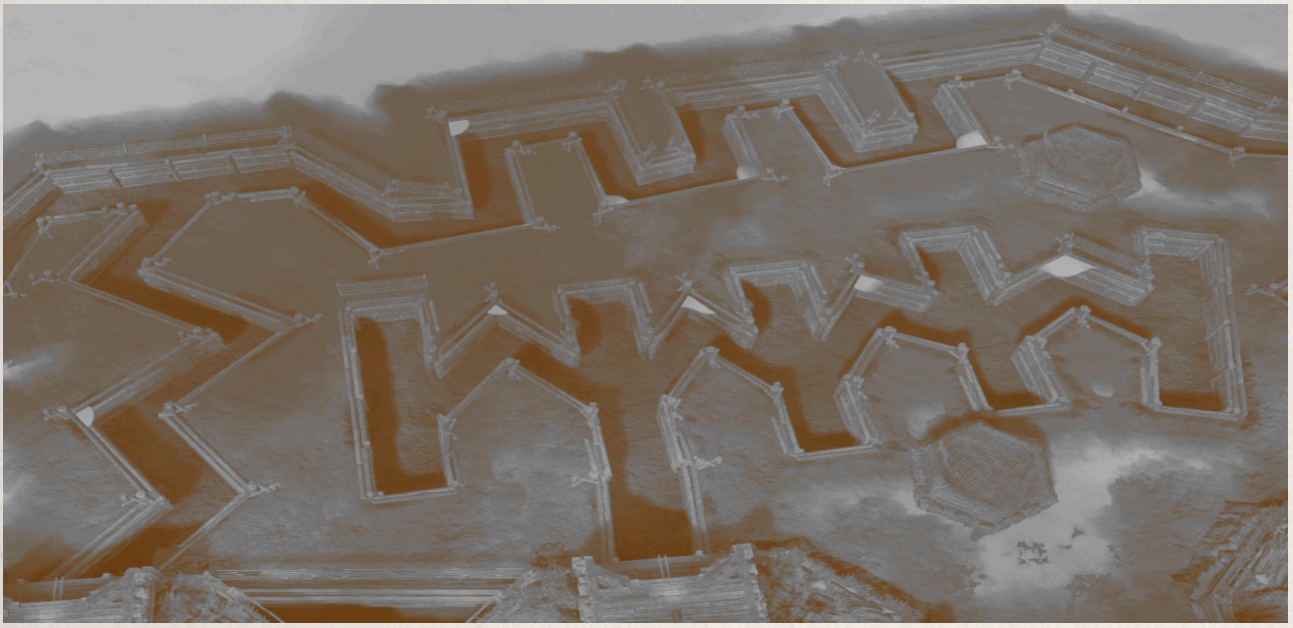
Lengthy rings are most often seen in front of permanent defenses, curving all around the base and acting as buffers for the bunkers behind them. Large amounts of emplacements needed are the reason this pattern is not seen often in field defenses but that doesn't diminish its effectiveness once fielded. Even 2 or 3 emplacements in a ring close together will stop all but the most serious armored assaults.

This pattern is especially effective if there is a construction yard or depot containing emplacements close by as the cost of setting it up will be much reduced and should some emplacement be taken out it can quickly be replaced. it's often not a bad idea to have emplacements in reserve or at secondary positions ready to replace ones lost.



Covering position

This pattern consists of 2 trench lines that are disconnected from each other. The first trenchline is the fighting position while a second smaller trenchline exists so that in case the front one gets taken over friendlies from the second trenchline have a position to throw grenades out of and to cut off enemy reinforcements with small arms. Enemy has to take over both to remove the defender's advantage.



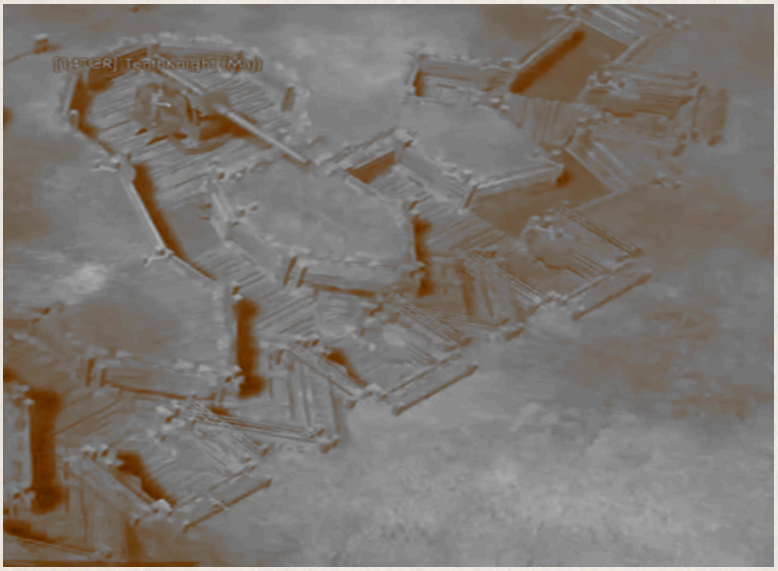
Covering position can be as small as a single octagon with barbed wire and sandbags or as large as a separate trenchline. Only requirement regardless of shape is for the 2 trench lines to be separated, ideally on barbed wire on both sides. The point of covering position isn't for friendlies to rush out of and take back the trenchline but to cut off reinforcements and lob grenades into the main trenchline that is likely to be severely damaged by the time covering position sees any use.

Same principles apply if the builder wants to use pillboxes or bunkers as covering position. Such layered defenses are often effective as well made defenses that cover each other will offer extreme resistance until the enemy overruns the whole thing. Moreover the first layer is more likely to get completely destroyed, thus offering attackers no position to fight from while defenders can use the backup position.

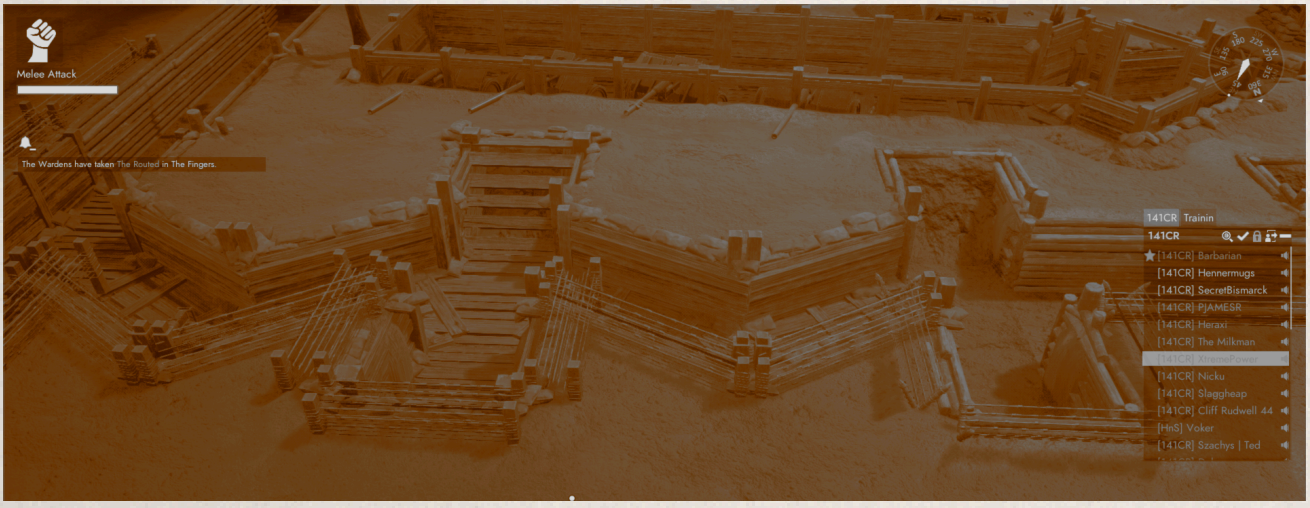
Protected AT defense

An octagon with emplacement and nothing in front of it is liable to get hit by enemy infantry and tanks without friendly infantry being able to help. By putting the octagon behind the trenchline friendly infantry from the trenchline will be able to protect it against infantry and stop it from being overwhelmed by armor. Due to how ranges work the emplacement wont be able to protect said infantry from armor but it is extremely inefficient for enemy armor to be shooting at the trenches due to massive resistances the trench has

To take out the octagon enemy has to either take over trenches with infantry, blow all of them up with explosives or survive the retaliation from infantry with AT while overwhelming the emplacement which is no small task. To prevent it it is essential for infantry to bring AT if going inside the trenchline and to keep the trenchline repaired so enemy armor cant blow it up.



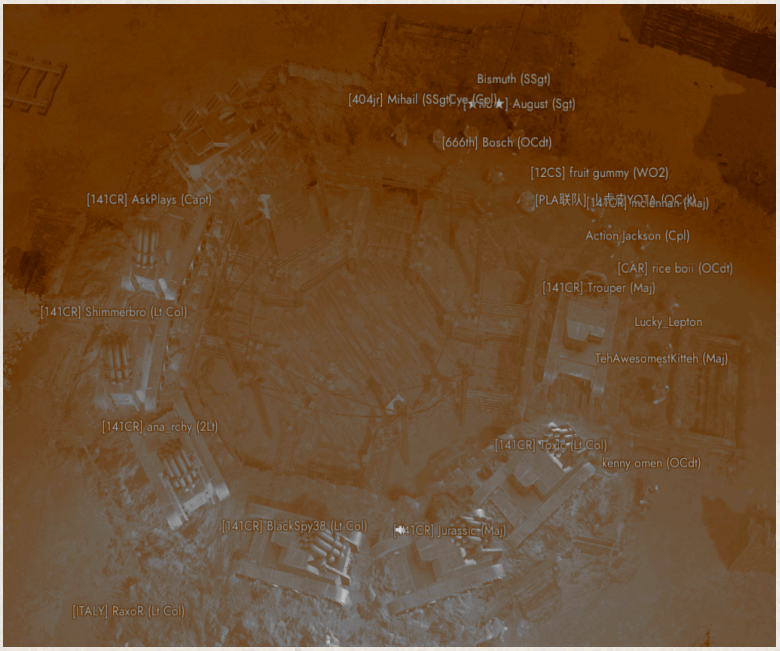
Same principle applies when you want to protect bunkers. Having trenches in front of them and not having the bunkers you want to protect be the first line of defense will massively improve their survivability. Layered defenses will help each other and survive a lot longer as a whole.



Bunker patterns

Bunker patterns are a much larger and more researched topic compared to trench patterns. Patterns used in field engineering differ from those with AT garrisons used in bases near the front and both of those differ from patterns made of concrete. The bigger the bunker the more health it has but the size also makes it multiplicatively harder to repair. Without howitzers that require concrete it can't defend against artillery and without AT garrisons it can't defend against armor. This manual will be only explaining those used right at the front, without AT garrisons or concrete. These bunkers are characterized by their small size, speedy building and quick repair because bigger bunkers are more susceptible to artillery and without AT garrisons their health means nothing if enemy armor can just sit and shoot at them.

Highly modular tools soldiers are given offer a lot of freedom but also a lot of room for error. Biggest constraint when making bunkers is the fact that the garrisons that bunkers are mainly used for cannot be adjacent. Main challenge is ensuring good coverage and good firepower while keeping the costs and the size down. A good pattern will feature a good ratio of garrison pieces to other bunker pieces in a bunker island.

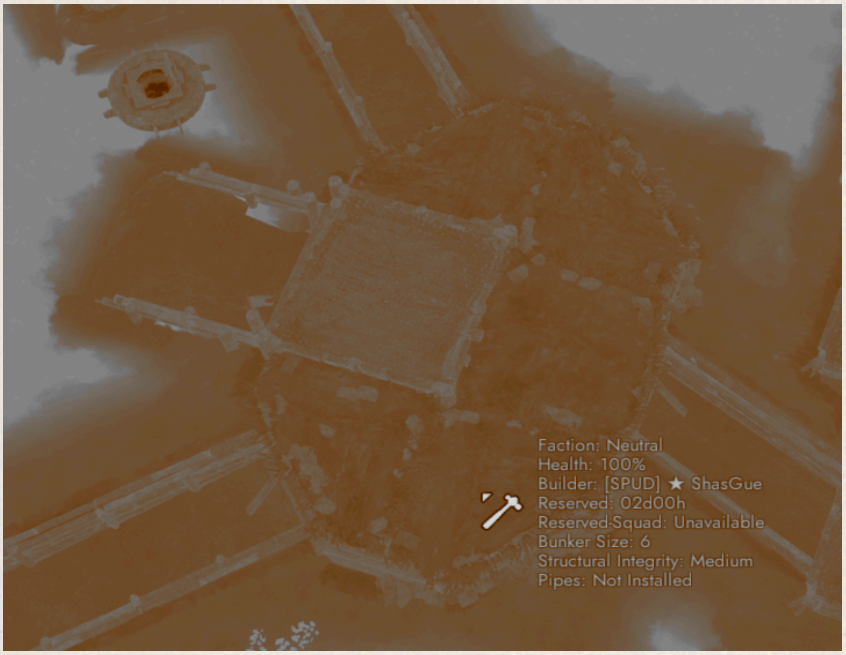


Other than building field engineers are also tasked with maintaining and repairing defenses. This extends beyond bunkers but trenches and miscellaneous defenses require far less babysitting in comparison. When repairing you want to prioritize the bunker core, emplacements and bigger bunker pieces. Sometimes its not worth it to repair, if dense t2 bunkers are under artillery fire and you cannot outrepair the damage to them all focusing on only a couple will ensure at least something will survive the barrage. Likewise rebuilding bunkers while the enemy is actively shooting at you or the enemy tank is about to roll up isn't viable most of the time, why rebuild something that will die a second later. Optionally engine rooms in their isolated bunkers can massively improve the capabilities of all garrisons attached to them.

6-piece Core

Bunker base is an upgrade that can only be put on a bunker with at least 6 pieces. That number also happens to be the most optimal number of pieces in a bunker core. This may seem pedantic but having that ratio of total health and speed of repair massively increases cores survivability. 5 blank pieces and the core itself will be able to sustain a decent number of hits while having good enough speed of repair to outlast a serious artillery barrage

Basic pattern consists of 4 corner pieces and 2 blank pieces of which one houses the core. The corners allow for infantry to interact with the core from connecting trenches and for builders to modify the core with howitzers in case it lasts long enough. While an engineer might be tempted, adding any garrisons to the core is a bad idea that should only be done in dire circumstances.

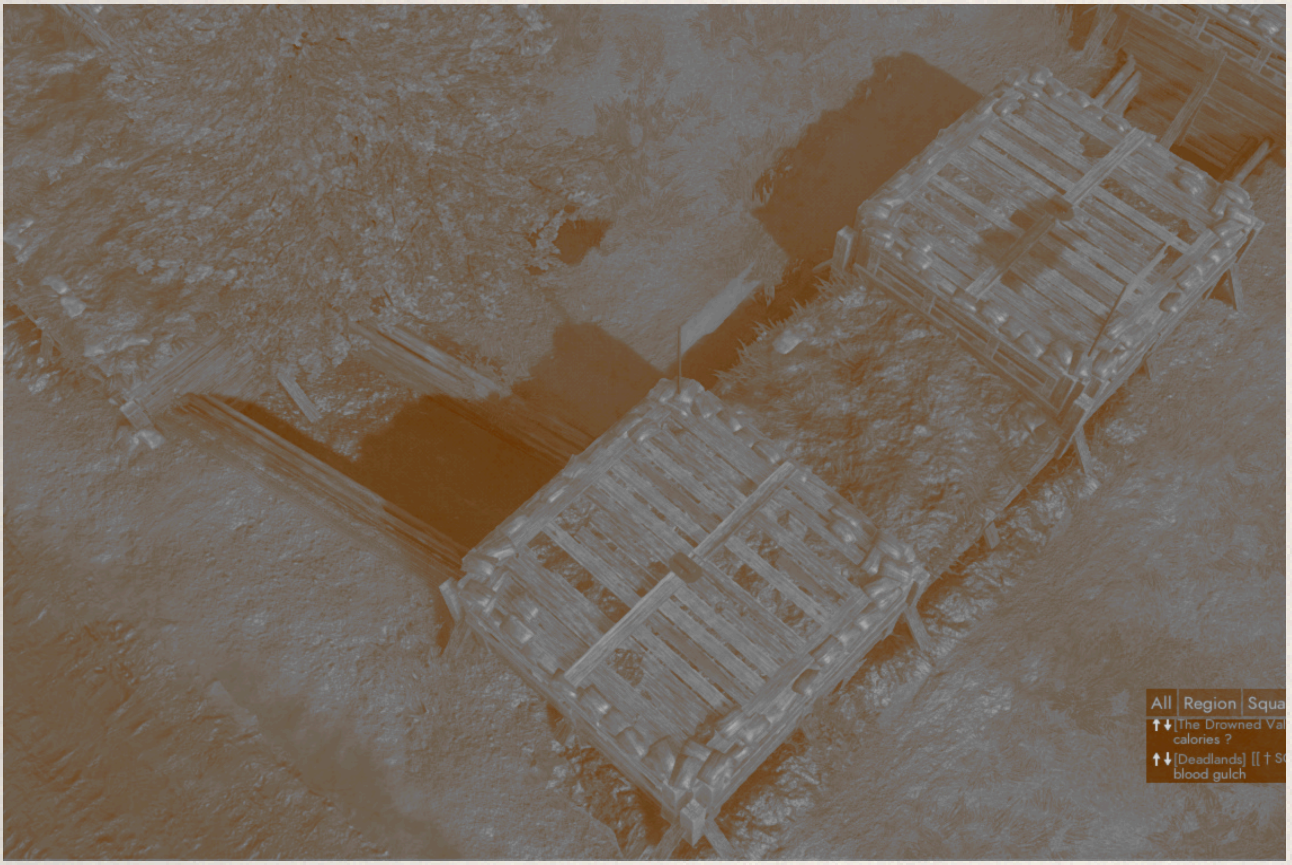


A garrison will make the core much harder to repair leaving it more vulnerable to artillery that is bound to rain down on it at some point. Adding garrisons can help in dire situations but adding engine rooms never helps. Engine rooms make the core so much harder to repair putting it in can be equated to grieving the team.

When adding modifications, particularly hatches, ramps, doors and firing ports beware that those will let the enemy shoot at the repairers or get inside the core easily in case they get close. For that reason in case there is a door that for example leads to a trench so infantry has cover from enemy artillery it should be removed when enemies get too close so they cannot use it as a way into the core.

The 3x1

Basic bunker you will find everywhere, a 3x1 is a bunker made out of 2 garrisons connected by a normal or a corner piece. It offers the best ratio of garrisons relative to size and is quick to build and repair. Newly built or second line bunkers will often be surrounded by these as they offer better survivability against arty than bigger patterns while being much less susceptible to infantry compared to single piece garrisons. Against armor it offers the same performance as bigger and smaller pieces and by same performance It should be specified that they will just die.



Variations of this pattern can be made to work in different circumstances. Generally placement and number of bunkers heavily depend on exact layout of defenses and surrounding terrain. It is a strong recommendation to upgrade any bunker piece that will sport a garrison to t2 as t2 bunkers are far more survivable than t1. Even though t1 bunkers are built using only a shovel it's often not worth your time to keep rebuilding them.

Other patterns focusing on garrisons wont be covered as they are more rarely seen and the immense number of designs along with varied preferences amongst builders is outside the scope of this manual,

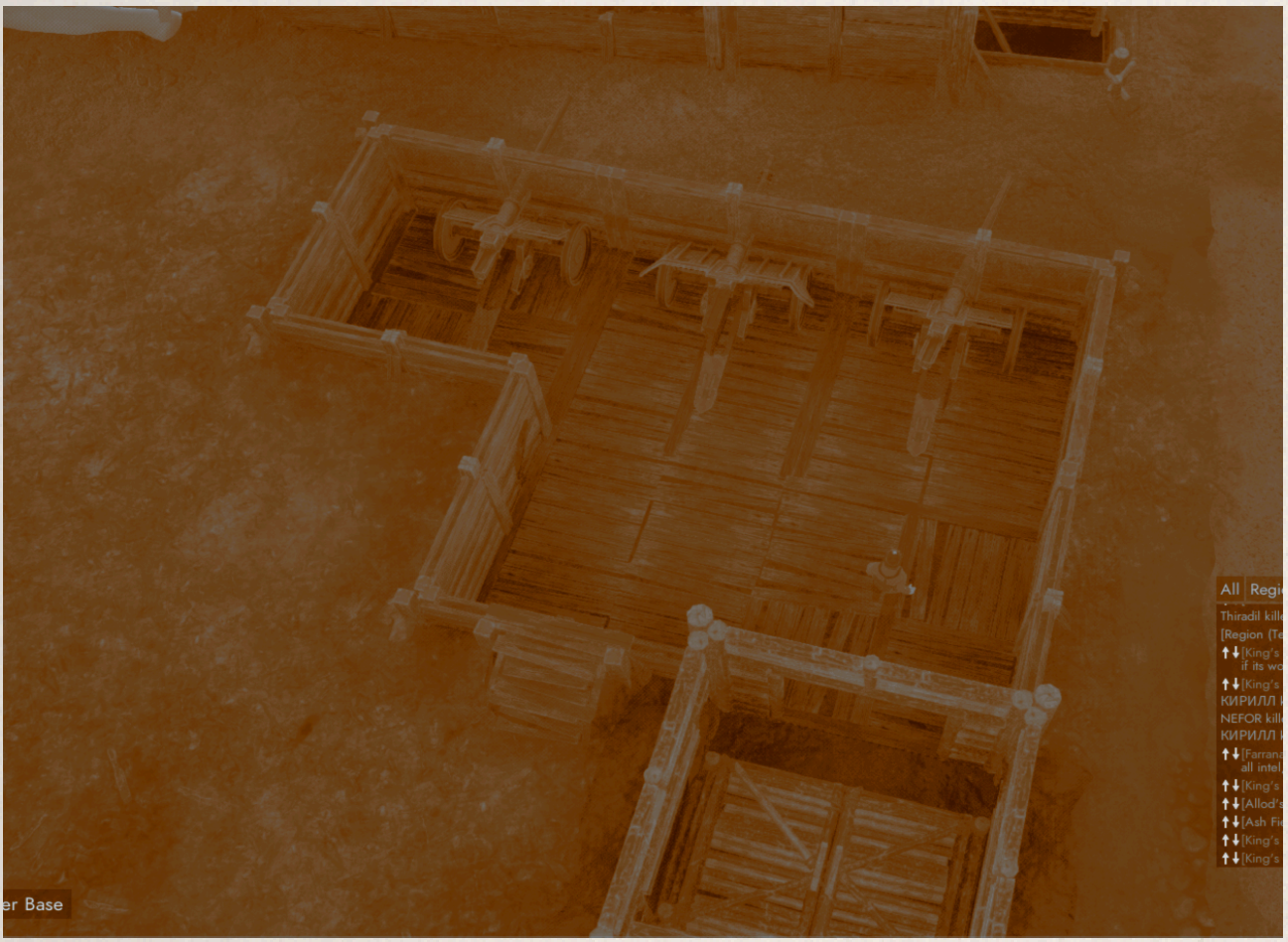
Independent Observation bunker

Observation bunker is sturdier and longer ranged watchtower. Enemy will constantly be taking watch towers down so obs towers are a way to have a sturdier source of map intel. They require an engine room to function so it's common to see them put into 2 piece bunkers consisting of the engine room and observation bunker itself. Alternative solution is to separate the engine room and observation bunker and connect them with pipes. Either of the solutions are good but field engineers should avoid the quick and dirty solution of putting observation bunker pieces inside the bunkers with garrisons. They will take the spot of an actual garrison and make the whole bunker harder to repair.

Observation bunkers show their value when the enemy is determined to take down watchtowers. It may cost more up front but it saves the builder the cost of constantly rebuilding watchtowers.

The Broadside

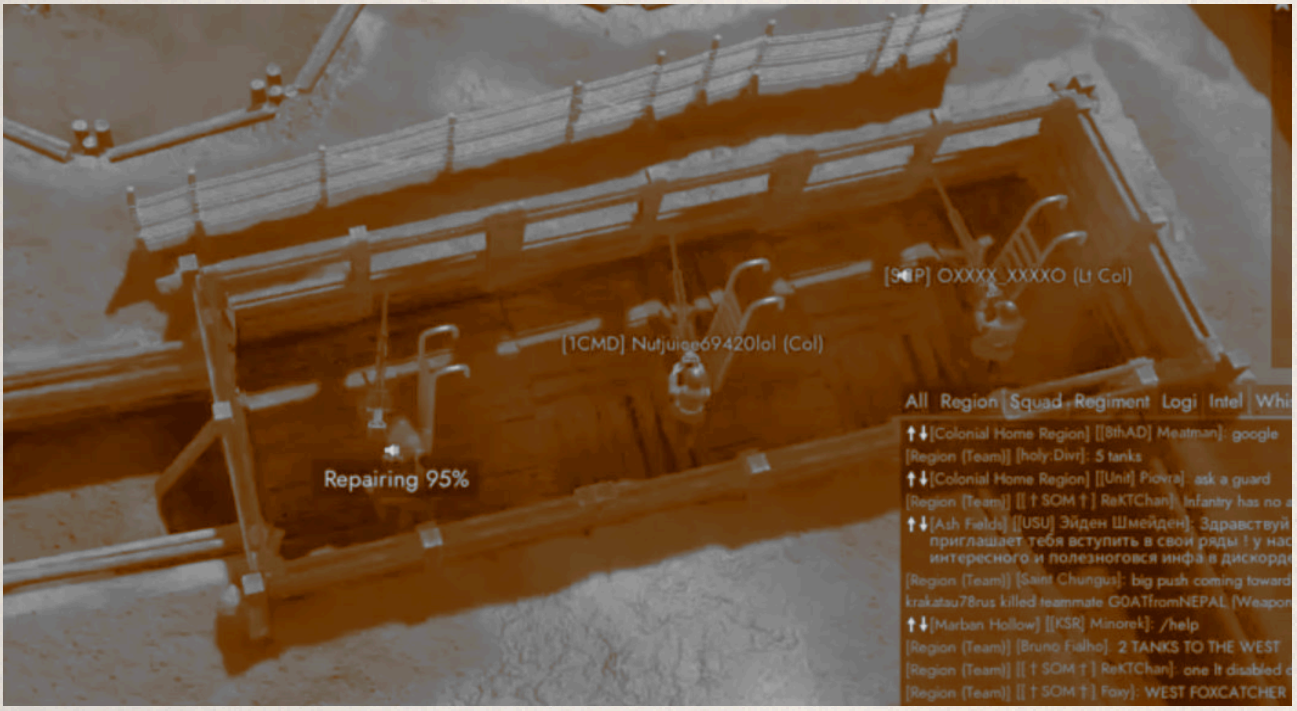
Variation of LTG that houses multiple push guns inside a single bunker. Due to the large number of people needed to crew it fully and general lack of space a lot of push guns won't be mobile and will rely on the enemy coming from the direction they are facing to shoot them. The vastly increased cost and difficulty of operation is accepted to vastly increase the firepower towards a single direction. Best used in chokepoints and near roads. The number of guns is variable but field engineers should keep in mind the diminishing returns as each gun adds more cost, makes it harder to operate and does not increase the health of the bunker in any way.



The push guns cannot move under garrisons and each requires at least a single bunker piece. Because of that Broadsides often cant incorporate any garrisons on them. Lack of garrisons is not only a downside though. Not putting garrisons on LTGs and Broadsides will make them tankier and much easier to repair which are key qualities for something whose job is to get hit.

Tripod bunkers

Tripod weapons can be put into bunkers by making a hatch with a ladder (ladder initially faces east when placing the bunker so rotate it to face the direction that won't obstruct the weapon), getting the first tripod put under the ladder using the firing port and cinematic camera, putting the second tripod on top of the first through the hatch for extra height and finally putting the weapon you want on. This pattern is strongest in early war but loses power as vehicles are unlocked. Can be added to any bunker as long as there is a blank piece on it which makes it useful to place where garrisons aren't available or where extra range from tripod weapons can cover angles small arms can't.



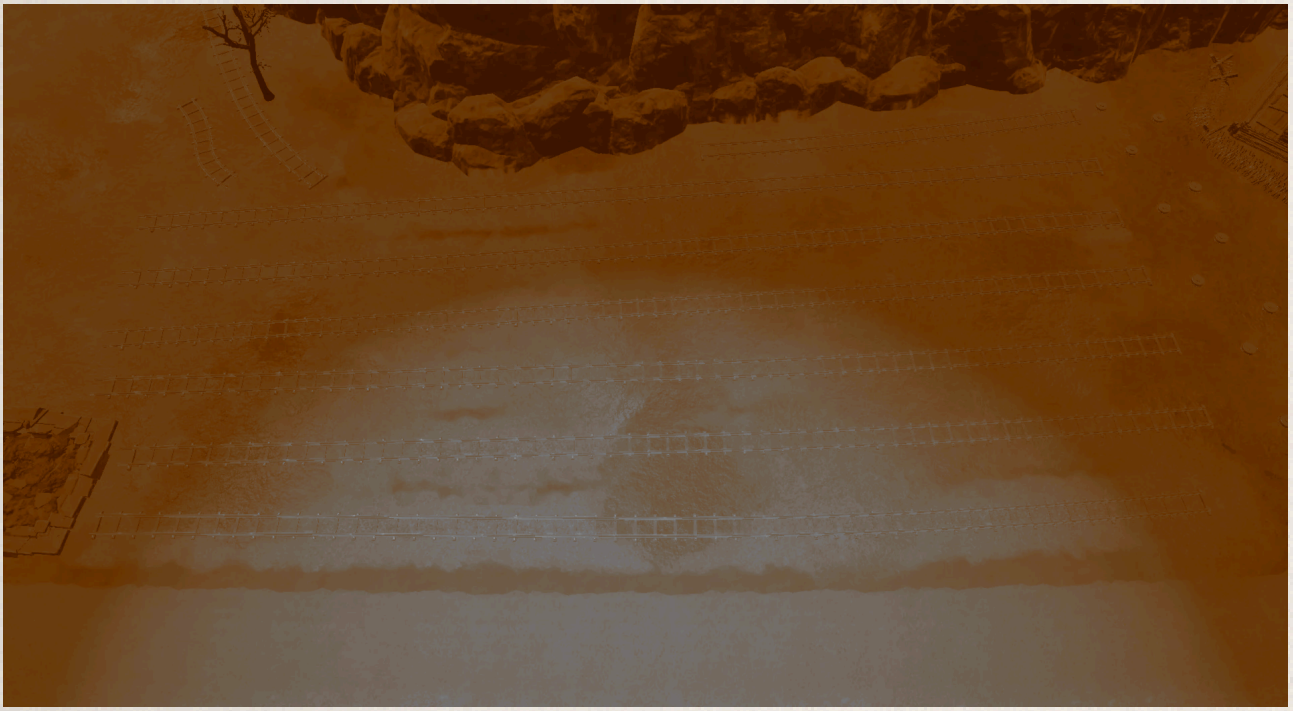
Killing the bunker kills the tripod weapon but they will retain their modifications after being rebuilt, allowing you to put the new one right back in. The point of the pattern is to make tripod weapons survive more and it accomplishes that job wonderfully, only downside is that late war tripods aren't powerful so the space needed for tripod bunkers can often be better used for other defenses. That said they can fit in certain spots such as bunker cores and ubiquitous 3x1s without needing extra accommodation, do note that while a tripod weapon is present the ladder will be unusable.

Miscellaneous patterns

These patterns are auxiliary in nature. They are often deployed around the other defenses to squeeze as much value out of nooks and crannies other defenses couldnt fit in or help defenders in niche situations by offering extra options.

Reinforced ground

Done by laying small railway tracks in front of your defenses. Its purpose is to force the enemy to spend a significant amount of effort to destroy them if they want to build any defenses or cover in front of your lines. Fast and cheap to make, often the enemy won't purposefully destroy the tracks and will die in droves while trying to rush across open ground.



To make the track Cmats are required which can be found in the nearest facility. Trench lines especially benefit a lot from having reinforced ground in front of them as the enemy won't be able to make a sapping trench and get within grenade range. Barbed wire can be added to the mix to further make it difficult for the enemy to hit your defenses.

Reinforced ground can also be made over roads. It causes all vehicles going over it on and off road to slow down so it can help immensely in blunting the enemy push. Slowed vehicles are much easier to handle and much more vulnerable to tracking. By making some rails higher field engineers can make artificial obstacles for enemy armor.

Pipebombs

Mines usually have a restriction where they cannot be placed within a very short distance of each other. This makes it so a tank is very unlikely to run over multiple mines. This restriction can be worked around using teamwork. If multiple people place the mines at the same time they can stack them and form a pipebomb. 3 people are needed to make a pipebomb capable of killing light tanks and 4 people are needed to make a pipebomb capable of killing medium tanks. Its prohibitively expensive in effort required to make minefields made of pipebombs and they will often get wrenched with priority but if done a denser minefield will provide more buffer and force the enemy to take more time wrenching while pipebombs offroad may catch enemy armor off guard and kill or severely damage it.

Field engineers' job is to place as many mines and to the best of his ability while also wrenching enemy mines and barbed wire that is stopping friendly infantry and armor from advancing. In case of enemy trenches barbed wire and sandbags aren't removed with a wrench but with a hammer and 20 bmats. Making even a small opening in enemy trench modifications can let friendlies breach it with greater ease.

Proper minefields aka IEDs

Normally placed mines are trivially easy to spot as they are only invisible to enemies inside armored vehicles and only if placed offroad. Even those aren't a major hindrance as the crew can dismount for a brief moment, spot all the mines and go back inside the tank. This relegates mines to the role of buffer zones where a mass of them is placed to stop enemy armor from going over them but it only delays their passage as enemy infantry will get to work on wrenching them. Second use is to scatter them about the flanks, making enemy tanks uncomfortable if they attempt to flank.

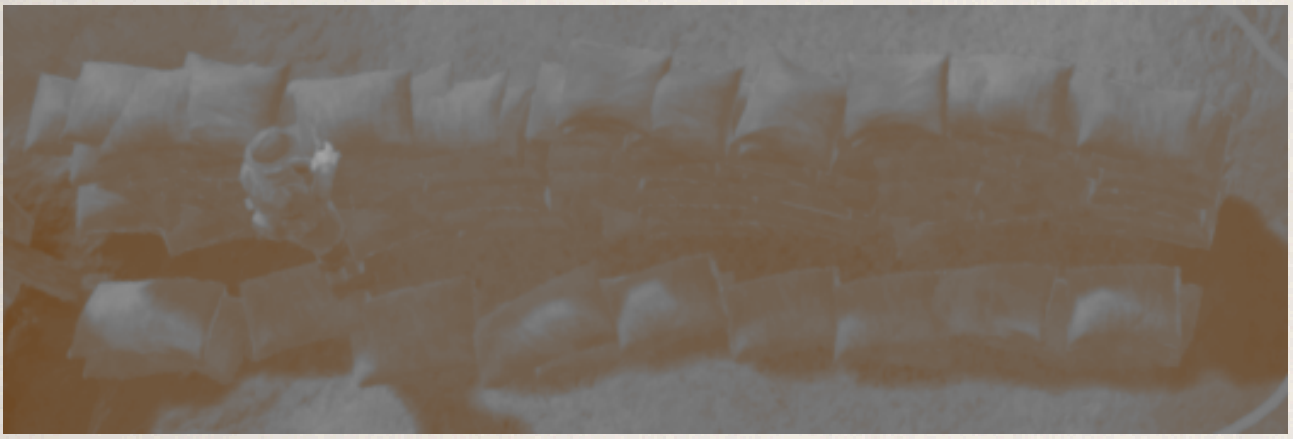
By placing a provisional road over the mines, adjusting its height with mouse wheel, you can obscure them enough that enemies will have a hard time spotting them. This gives them a real chance of actually being ran over by enemy armor.

The less are placed the harder they are to spot so IEDs synergise well with pipebombs. Combining them you can make a decently clandestine trap that will kill any tank driving over it. If lacking people another option is to place mines tighter by aiming while placing, walking away from the nearest mine and as soon as mine placement starts turning around 180 degrees so that mine gets placed slightly closer than normally possible, by doing this solo or with another engineer you can make a strip of mines dense enough to kill a medium tank but downside of it is that it's much more visible than a pipebomb.

The materials from the road itself can be recovered by demolishing the road within 4 days of placement, making the cost of using IEDs pretty low.

Sandbag firing steps

Putting a single sandbag behind a double sandbag will let friendly infantry use it as a firing step and shoot at the enemy from good cover. Fast to deploy while also fitting in places easier than a trench they are often found on hills and within towns



When placing sandbags and barbed wire field engineers have to keep in mind that they are light and temporary defenses. They will get removed eventually but will cause enemy harm in the meantime. Instead of using all available materials, field engineers have to try and put them where they are most useful and leave the rest of the material as replacements when defenses go down. Building sandcastles and large fields of barbed wire will all get removed as soon as a tank or a truck passes or an enemy with a wrench comes close so being able to replace them quickly is key.

Barbed wire survives a lot longer in places with friendly infantry around. Sandbags last a lot longer away from the roads where a vehicle won't run them over. The sandbags and barbed wire are also used to modify trenches and should be used for that purpose with priority over standalone versions.

Sandbags and barbed wire can be made at a factory but if a field engineer uses a lot of them or if factories are far away he should consider building a minimal facility for their production. With facilities nearby large quantities of material can be delivered and defenses in the whole hex gain a significant boost. With more sandbags and wire more trenches will be improved and more obstacles for the enemy can be spammed.

Tech trench & Underground trench

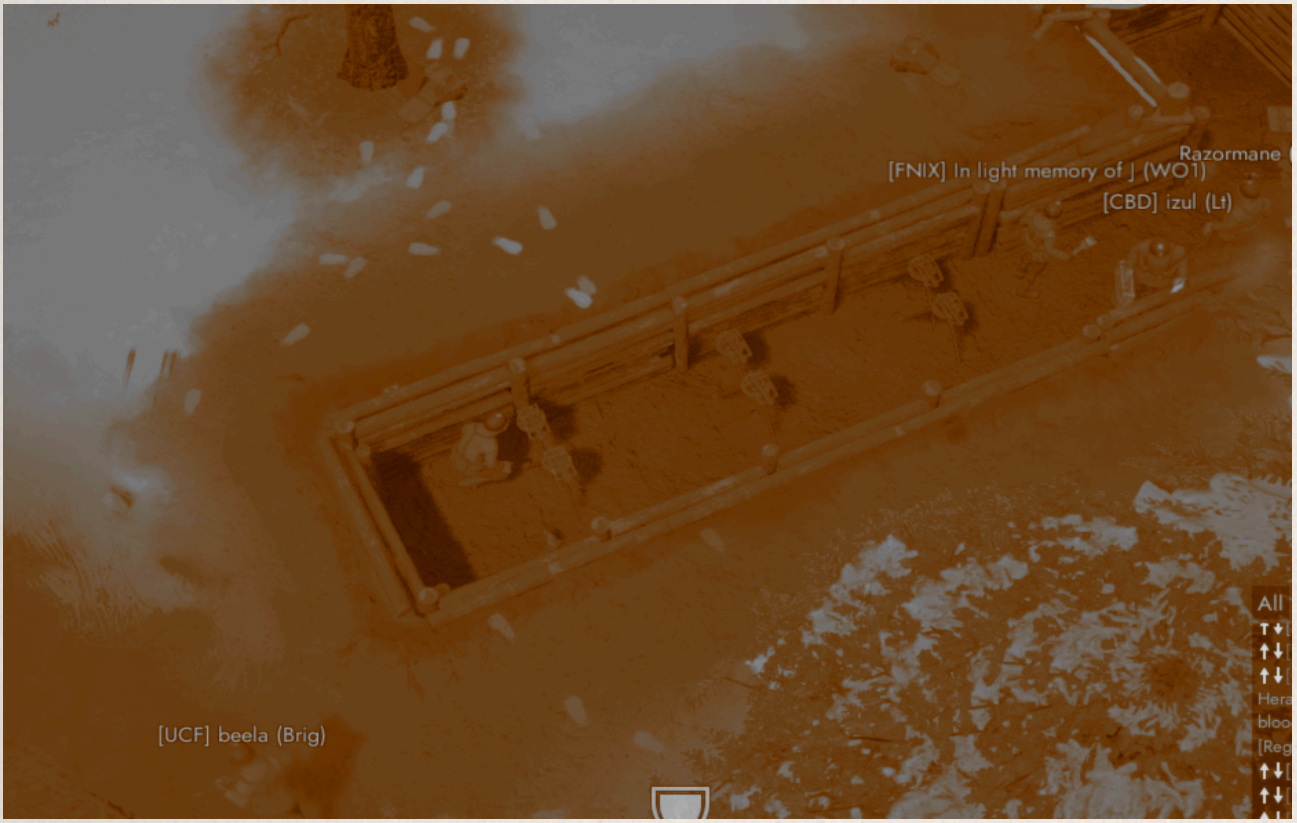
A bunker piece is limited in what it can be modified with by the tech of bunker cores within 40 connections of it. If you want to put an AT garrison on it one of the cores within 40 connections (with each piece of bunker or trench on the path counting as connection) has to have AT garrisons teched. This usually means that the core bunker is built next to has to tech it but using a technique called tech trenching you can borrow the modifications of a more advanced core.

You do so by extending a trench from the more advanced core all the way towards where you want to make your defenses. Normal trench is the longest but 40 connections will run out eventually after about 380m making this sharing of tech limited by distance. To extend that range you can make underground trenches. underground trenches are made by making 2 trenches away from each other, making a temporary small rail between them. digging an underground trench between the two that can extend much longer than normal trench and demolishing the rail after. Using the combination of these techniques you can extend the range of tech sharing by over 500m. Potentially making quite a sturdy defensive position on recently taken ground.

By themselves underground trenches can make connections within the bunker base while letting vehicles and soldiers pass unhindered. They can also be used in trench lines to ensure that the enemy can't remove its modifications without obvious connection to the bunker, making it more difficult to cut off.

Internal cover

Tripods, while not offering cover bonus, will stop bullets. Since they can be put pretty much anywhere a field engineer can repurpose them from weapon platforms to deployable cover. By putting them inside trenches you can increase the amount of cover it provides. They will both make it more difficult for enemies to clear out the trench as well as make it significantly more resistant to grenades.

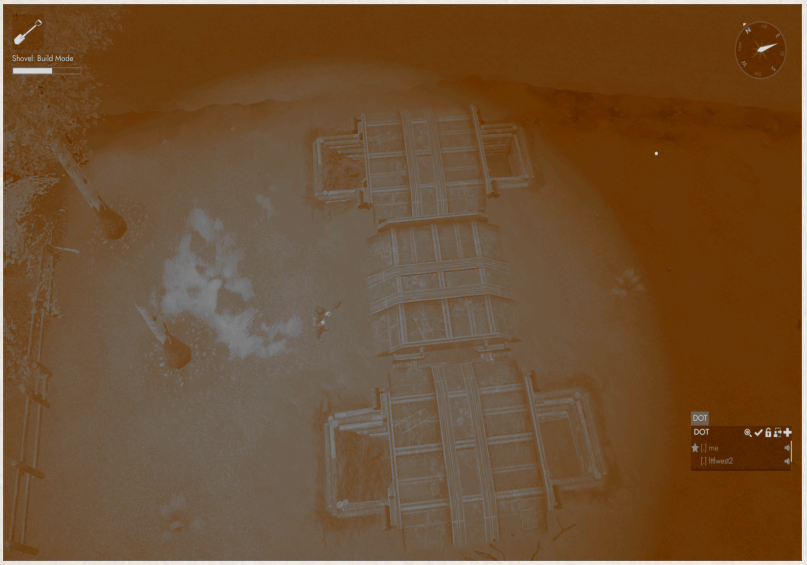


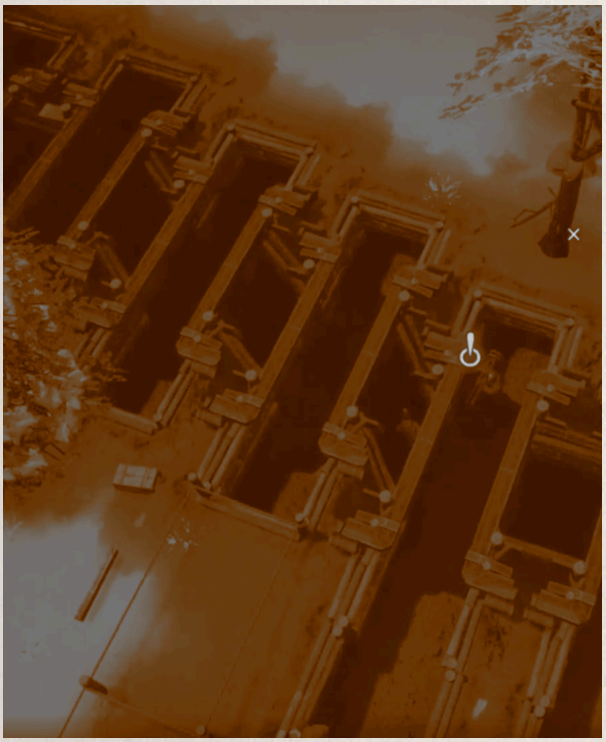
The tripods can also be turned back to weapon platforms if a tripod weapon is available. Tripod weapons are extremely useful for defenders, especially the tripod machinegun as it allows soldiers without small arms to hop on it and spray down the attackers. The machineguns ability to hit people within trenches can make it a lot easier to clear out a trench without grenades. The range lets the soldiers behind defenses pose a threat to enemies much further than they normally could. Putting them at the edge of trenchline as well as defenses behind it will ensure wherever the enemy is he is liable to get hit. Do note that grouping them up isn't as useful as one might think. A single infantry that gets too close can dismantle all of them and a single tank can quickly take them all out. Spreading tripod weapons around the defense is the most effective way to keep them alive.

Trench tunnels

Usually a trench with steel bridge cannot be connected in 2 middle points but if field engineer connects a trench first, puts fill in blueprint on the connecting trench, puts on trench bridge on the first one and shoots the fill in blueprint it's possible to have a trench connecting under the trench bridge.

Main advantage is protection against grenades, artillery and tanks. With the tunnels enemy tanks wont be able to kill people repairing the trenches and thus wont be able to kill the trenches. Surviving against tanks is this trenches main use. Against grenades it limits their entry points while allowing more room to escape than normal trenches with bunker roofs.





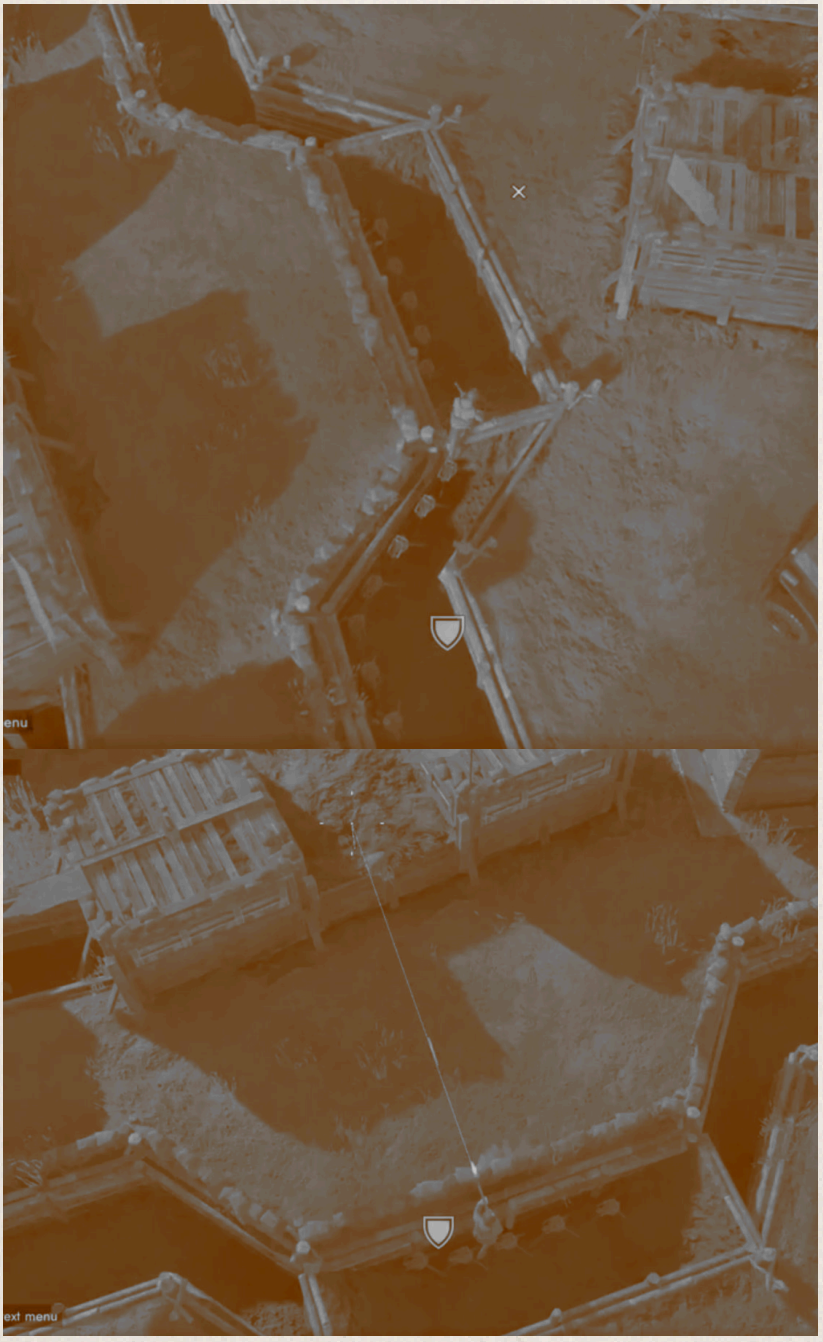
Trenches have immense resistances and can often outrepair enemy armor trying to destroy it but if repairers are exposed then they will be the first ones killed and the trench will go afterwards. More conventional way of protecting the repairers is putting sandbags facing the enemy on parts of the trench, letting the repairers be protected by sandbags while infantry can shoot at the enemy from uncovered parts

*Let it be noted that this pattern and the next pattern aren't as viable as the other ones and their main purpose is to be fun while showcasing that such real world concepts can be translated onto the field

Trench firing step

The firing step lets soldiers inside the trench either fire out while in cover by walking on tripods or being completely safe on dirt ground. It is done by laying the tripods near the edge, adding sandbags facing the enemy and putting a ramp that will let a soldier run on top of the tripod line. By using a similar method to the trench tunnel a field engineer can put a ramp between two connected trenches, thus letting soldiers climb onto the tripod line even from the middle of the trench.

While requiring a lot of tripods, the tripods are cheap. Main benefit of this pattern is that the enemy won't be able to see all the enemies inside the trench and enemy tanks will not be able to shoot friendlies repairing, making it incredibly resistant against vehicles. The hiding infantry can also give a nasty surprise with RPGs to any tank that strays too close. Lack of sight will also make it hard for the enemy to throw grenades accurately



This pattern can be quite useful if there is not a lot of space around as space is needed to make tankier trenches. With this the lower number of trenches will be able to fit into the small area needed and still be very resistant against tanks by relying on people repairing to keep it alive

Snare Trap

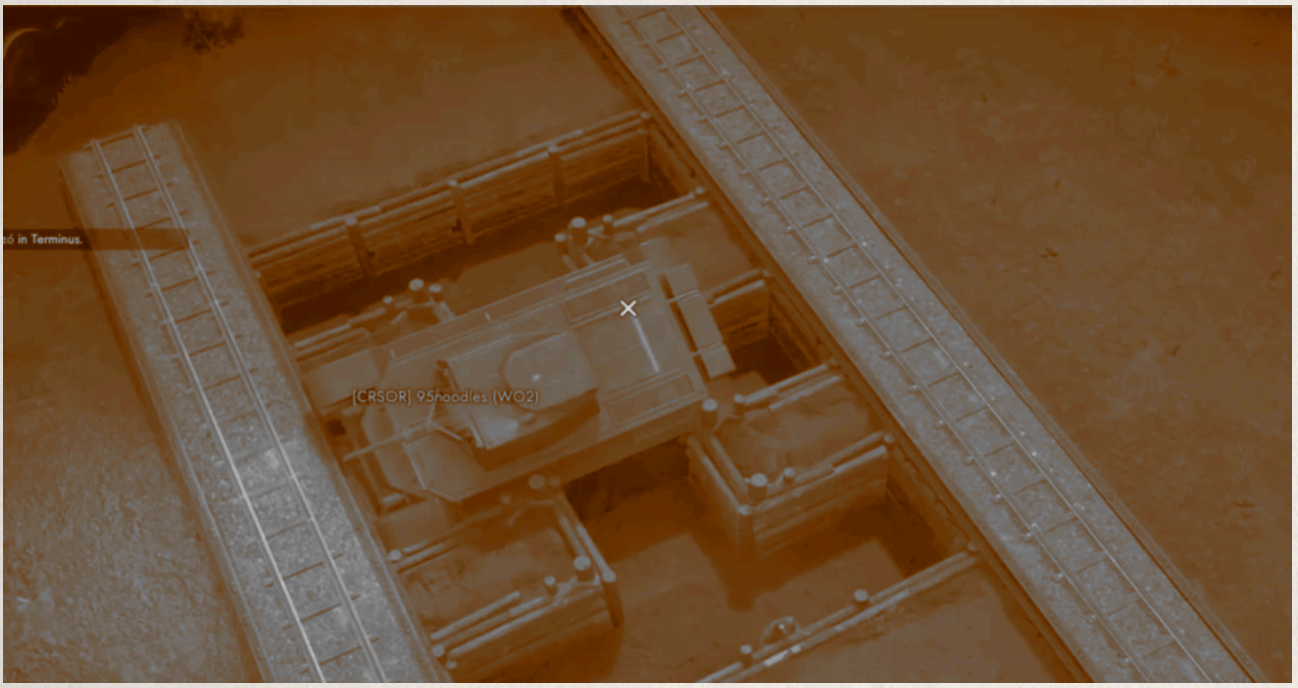
Snare trap is a piece of small rail raised (using scroll wheel) and placed parallel to enemy lines. Its purpose is to trap the enemy tank driving over it. Normally a tank can drive over it easily but once tracked the rail will stop him, trapping him and making for an easy kill. Due to rail having variable length a field engineer can choose to use long pieces for cheap and fast setup or to make the snare trap out of multiple smaller segments to make it tankier. The trap itself should be laid in places far enough that enemy tanks will cross but not so far that friendlies can exploit the tank that gets trapped before he can repair.

Multiple rows of raised rail can be made to create a snare field, covering a bigger area and providing multiple spaces the enemy tank could get trapped at. Take care as the same trap can cause harm to friendly tanks too. Friendly arty won't damage the snare trap but will track enemy tanks, causing them to get stuck.

The track can be placed over roads though not as high, this will cause only tracked enemy tanks who didn't build up speed to get stuck. With careful placement and lower tracks used to further slow down the tank the snare trap can be used on roads too.

Anti-Tank Ditch

Anti tank ditch is a particularly shaped trench with 2 raised rails capping it off. Its purpose is to make it extremely uncomfortable for enemy tanks to pass while potentially getting them stuck for a short period of time inside vertical parts of the trench. If an enemy tank gets tracked the trenches and rails make it impossible to reverse. While not tracked enemy tanks will have trouble crossing especially when under pressure, making them unwilling to go over it for that reason.



Since the enemy cannot see the infantry inside the ditch they can hide with AT weapons, waiting for enemy tanks to pass so they could track them and make them unable to retreat. Due to shape of the trench enemy gunner that is trapped will have hard time defending against that infantry and the crew would have to hop out at weird places, falling into the trench and being easy pray to waiting infantry

While quite time expensive to build, the ditch will take an extreme amount of explosives to remove and cannot be wrenched as you can with a minefield, consider putting it near roads, and in places you don't want enemy tanks to come from such as flanks and chokepoints.

*this pattern was not extensively battle tested yet

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Chalkboard

I hope you guys liked the guide, there are many things left out such as most basic how to and the really advanced stuff concerning various interactions but i tried to keep the guide aimed not at the newbies or the vets but average foxholer

There is a lot I would have liked to add in but the guide is already 40+ pages long which is really stretching it. I guess nuances will have to be skipped over somewhat

If there are any request for any specific stuff i can add them in a new section

The manual will probably be changed a bit as i correct horrible grammar and add some minor stuff but the essence should be there

Note: For naval update this manual will receive a revision, adding a bunch of new stuff that was discovered, i will post a link when its finished