Deep Dive: Towers

Introduction

There are three categories of cards in BattleForge: units, spells, and buildings. Among these, buildings are simultaneously both the least in number and least in importance. A player could make a viable deck for any game mode without including buildings, in a way that is not possible without spells and units. There are three reasons for this state of affairs. One aspect of this relates to the game modes themselves, where the player is encouraged to attack rather than defend, a second aspect relates to the nature of buildings themselves as immovable entities, and a third aspect has to do with the present strength of buildings in comparison with units and spells.

The first problem can be partially solved by giving more buildings the ability to be used offensively, such as with faster construction speeds, longer ranges, universal effects, and teleportation abilities, but this solution is not expandable beyond a few specific cases and thus does not constitute a solution for improving buildings in general. A better solution than trying to make buildings something they are not would be to add game modes where buildings excel, and this we are doing by creating defensive random PvE and defense-oriented campaign maps. All of this is also true of the second problem.

The third problem, the current underwhelming strength of buildings relative to spells and units, is the issue which is most addressable through changes to buildings themselves. Balancing buildings, and more particularly towers, will be our main focus here. In the first section, we will examine the various factors which must be considered when balancing towers and how these factors will inform our changes going forward. Next, in the second section, we will discuss examples of towers which are well-balanced and give a preview of some of our upcoming changes to bring other towers up to this level.

I. Design Considerations

Different Types of Towers

Fortresses

The majority of attack buildings are classed as towers, but a few of these bear the class fortress. All T4 attack buildings except Artillery are fortresses, as well as Stronghold and Church of Negation in T3. Fortress cards all bear the following traits: They cost 150 power or more (with the exception of Hatecaster), they have large model sizes, and they deal a lot of damage. While card classes are often unreliable development markers, the similar traits shared by fortress cards suggests the original developers intended such cards to be distinct from standard towers. The perfect examples of fortresses in action are Churches of Negation supported by Frost cards such as Kobold Engineers, and Worldbreaker Guns buffed by Skyelf Sages. In both cases, the other cards exist for the sake of enabling the fortress, not the other way around. Moving forward, we intend to change other lackluster fortresses into powerful buildings either able to stand on their own as self-sufficient defenses or as the locus around which a defense is built, such as in the case of Church of Negation.

Artillery

In addition to fortresses, there is a third category of attack buildings which we will call artillery. Buildings of this kind have a long range of at least 50m and a minimum range within which they cannot attack. Artillery, Twilight Bombard, Hammerfall, and in some sense Mortar Tower all fall within this category. Towers of this kind work better as campaign enemies than as player buildings due to their inherent limitations. These limitations, such as a slow turning speed and a firing dead zone, encourage the player to find creative ways to counter the tower which is often a kind of mini boss in the map. An example of this can be seen in the Twilight Bombard which guards the player's T3 in the map The Treasure Fleet on expert.

Twilight Bombard in The Treasure Fleet campaign map. The tower guards the terminus of the Treasure Wagon route and can single-handedly cause a player to lose the map.

The issue with player artillery buildings is that even with a 50m range, attack waves are typically strong enough to get at least a few units into the artillery dead zone. Only a single unit is required to reach the dead zone in order to kill the tower if unsupported, and this issue is exasperated by an artillery building's tendency to target the enemies farthest away, allowing closer units to approach without resistance. The original developers clearly recognized these issues and attempted to compensate for them. Artillery generates mines to kill close enemies and used to have L-knockback, Twilight Bombard has an extra-long range of 60m to give the tower more shooting time, and Hammerfall presupposes other defense units which it aids through healing or shielding. In balancing buildings of this type, which are especially in need of changes, we will aim to allow them to become an important component in a multifaced defense, but we will not modify their designs to allow them to become the sole means of defense like fortresses.

Space as a Factor

Units have three primary factors to consider when balancing to which towers add a fourth: Tier, Orb Restrictions, Power cost, and Space.

This fourth factor affects the balancing considerations of towers in a way that does not exist for units. To understand this let us look at an example with units.

Units in Battleforge typically follow a negative stat efficiency curve. For example, Harvester is the least stat efficient shadow unit in T2 and is still a very good card. Compare an army of 300 power worth of Nightcrawlers with a single 300 power Harvester. The Nightcrawlers are powerful but are able to be focused down individually and are susceptible to area of effect attacks. Despite having 33% more health in total than a Harvester, a single Lava Field will remove 59% of the total health of the Nightcrawler army while removing only 16% of a harvester's health. Every Nightcrawler which dies from the army permanently lowers the army's total attack and health, while a Harvester's damage can only be lowered temporarily and there is always the possibility of it being healed back to full strength. Additionally, while Harvester is more susceptible to CC and enemy debuffs (which are often single target), it is substantially more powerful while aided by buffs such as Life Weaving or Unholy Power. Overall, these considerations lead to units becoming less stat efficient as they increase in cost in order to remain balanced.

Now towers too are subject to a negative stat efficiency curve in terms of power costs, but they should also be subject to a positive stat efficiency curve in terms of model size. This is because towers take up space. Units also occupy space, but they allow other units to enter into that same space. With the exception of S-units mounting wall segments, your entire army can stand on the same patch of dirt. Towers have exclusionary zones where units cannot enter and where other towers cannot be built. This means that towers with smaller models are more efficient in practice than towers with larger models because more towers can be built in the same area. For example, you can place 2-3 Necroblasters in the same space that 1 Volcano can occupy. There are additionally many places where you can place a Necroblaster to defend where a Volcano cannot fit, or where a Necroblaster can be built without blocking the path while a Volcano built in the same place would block it. This leads to the conclusion that, ignoring differences of tier, 1 Volcano should be as strong as 2-3 Necroblasters in terms of stat efficiency. To offset the competing negative stat efficiency curve of power costs and the positive stat efficiency curve of model size, **towers with larger models should be more expensive than towers with smaller models.**

10 Necroblasters can fit into the same space as 2 Volcanos. Note: Necroblasters cannot attack through other Necroblasters, meaning only the towers in the front row can attack a target.

Limited Zone of Control

With a single notable exception, towers are by design immovable. This makes towers inherently inflexible and incapable of responding to threats outside their zone of control, including enemy siege units. A tower's standard range is 40m, which means it is typically able to control a circular zone of 40m radius, not accounting for terrain features which might prevent it from attacking. **For towers to be worth including in a deck and building in a map, they must be significantly more powerful than units at controlling fixed locations to compensate for their lack of mobility. Yet, towers must also not be so strong that they trivialize the existing content.** In Section II below, we have identified towers in each tier which we think strike this balance well and which will serve as our benchmarks around which to balance other towers.

Ability Radius

Many towers have passive abilities, active abilities, or both. While some of these abilities are targeted, such as Mortar Tower's "Mortar Attack", most are self-cast with a defined radius around the tower such as Deepgorge's "Cold Clutch". These self-cast abilities are measured from the tower's center and must reach the target's center to affect it. Given that towers take up a fixed area, this fixed area is functionally subtracted from the ability radius. Combine this with walls and larger unit sizes, and you get situations where an ability with a seemingly large range of 20m like Deepgorge's Cold Clutch will be unable to freeze XL units across angled wall segments. **Therefore, it is necessary that wall spacing and tower model size are both considered when determining the range and radius of tower abilities.**

Front-loaded Damage

While a unit might attack a camp and engage in prolonged combat, towers often protect against timed attack waves. Whereas units attacking a camp will want to focus the spawn building before another wave spawns on top of them, towers defend against attack waves that often spawn far away, thus generating a built-in downtime. This leads to a cyclical combat pattern for towers of wave/break/wave/break which towers are well-equipped for given their ability to self-heal through their built-in repair mechanic when not in combat. High burst damage towers are thus uniquely equipped to excel in defense scenarios because each wave is only so many units and by trimming the wave early, they both reduce total damage done to themselves and reduce any potential staying power the wave has through Ice Shields or healing, often increasing the downtime between each wave. This is especially important for towers because they are immobile and thus cannot kite backwards to absorb an attack but must receive it from a fixed location.

The damage value displayed on a card in BattleForge is that card's average damage over a 20-second period. Having a standard reference point allows the player to quickly gain a feel for a card's strength without having to account for different attack speeds or types. The existing system works well, yet the following special considerations must be made for towers.

1. Since towers cannot be selected like units, the player cannot reasonably focus-fire a group of towers onto a priority target. This means towers function off their built-in targeting much more regularly than units, which usually means they target the closest target.

    a. This has important implications for towers with knockback. Knockback can be both a blessing and a curse for towers. High knockback and a low splash radius can quickly lead to a situation where a tower can no longer damage a split squad unit. At the same time, strong knockback can prevent units from both reaching and attacking the tower, functioning as a kind of pseudo-health pool. **A tower's knockback should thus be carefully weighed against its splash radius and act as an important consideration when determining a tower's stats.**

2. A standard tower has a range of 40m while a standard ranged unit has a range of 30m. Additionally, a non-swift L or XL-unit will take 6.25 seconds to walk 40m while a non-swift S or M-unit will take 8.3 seconds to walk 40m. This means that slower attack speeds are less of a detriment for towers because towers can begin attacking before enemy units can respond and can fire for longer before enemies retaliate.

    a. This means a tower such a Necroblaster, which has a slower attack speed of 5 seconds, would still be able to attack twice before an enemy melee unit reaches it. On the other hand, a tower like Tower of Flames will only be able to attack 3 times, despite having a significantly faster attack speed. The Necroblaster would in 5 seconds deal all of its damage budgeted for a 10-second period of time, while the Tower of Flames would require 8-9 seconds to do the same. **Overall, this means that towers with higher burst damage should have lower damage totals** over a 20-second period than towers with lower burst damage. **Conversely, higher burst damage towers should have larger splash radii** to compensate for their inability to react to changing conditions as swiftly and due to their tendency to overkill their targets.

Splash Radius

Unit & Tower Size

As players and enemies increase in power and tier, so too does the average size of units increase. The same is true of towers; T3 and T4 towers are much larger on average than T1 or T2 towers. These dual aspects of increasing model size for units and for towers leads to two important considerations regarding splash radius.

Firstly, while units if required can stand on the same space, they generally do not. Each unit has a formation which governs how much space it wants between itself and other allied units, which causes ranged units to space themselves out when they begin attacking. Additionally, only a fixed number of melee units are able to attack a single target, which naturally leads to melee units spreading out, yet even melee units attacking the same target will also typically fan out. While this can be frustrating for a player when your units waste time giving themselves space, it is also nice because it makes it easier to target individual enemies and allies alike. Now larger units create larger spaces between each other. If a tower is going to be able to apply its splash damage consistently, then the splash damage of a tower must be sized in relation to the average size of the units in its tier. **Consequently, higher tier towers should have larger splash radii.**

Secondly, the size of a tower's model determines the space between the melee enemies which are attacking it. This is true for both squad and non-squad units, but it has particular importance for squad units. Ranged splash attacks can target either the center of a squad or an individual member within a squad. Either way, the total damage dealt to the squad is directly proportional to the number of squad members within the attack's splash radius. The wider the members of a given squad are spread out and the lower the tower's splash radius, the less damage the tower will deal to said squad. If the tower has a center-targeting splash attack, it becomes possible that the tower will deal zero damage per attack if the squad is spread widely enough. While this might seem to be a minor theoretical concern, in actuality squad damage mechanics have a crippling effect on several towers. For example, Infected Tower's model size is larger than its splash radius. This means that melee units which spread around an Infected Tower, and which have their center near the center of the tower itself, will take zero damage and eventually kill the tower. There are several such cases currently in the game. **Overall, these considerations suggest that a tower's splash radius must be at least equal to its model size.**

Projectile & Unit Speed

Many towers currently have non-homing projectile attacks. This means that a tower will fire at the location where the enemy was located when its attack animation began, and that the projectile will not follow the enemy as it moves. Ordinarily this is not an issue, but if the unit is moving fast enough and is far away, towers with slow projectile speeds and small splash radii will miss the enemy. Pictured before is a Defense Tower attempting to attack a Fire Stalker. The two blue circles denote the Defense Tower's previous two attacks, both of which have missed.

A Defense Tower missing a running Fire Stalker. Defense Tower has both a slow projectile speed and a low splash radius of 5m.

The factors related to splash radius discussed above will lead to many towers having their splash radius increased. In general, this should lead to this issue being resolved without the need for further changes. The towers in which this problem is likely to persist are T1 and T2 towers. At the current moment, we are not able to adjust the projectile speed of ranged attacks. Additionally, we will not be adjusting unit movement speeds due to tower targeting issues. This leaves only changes to a tower's splash radius as the solution for the problem. While we will weigh the appropriate factors to determine if a given tower's splash radius can be buffed, it is possible that in the case of some lower tier towers that we cannot responsibly increase their splash radius as doing so would cause detrimental effects to the game's balance.

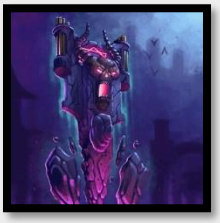
II. Practical Examples

Balancing Benchmarks

The following towers will be used as the benchmarks in their respective tiers when balancing other towers. It should be noted that Frost towers should generally be stronger than the towers of other factions.

Tier 1: Defense Tower, Phase Tower, Stranglehold

T1 towers are the best balanced of all towers in the game and are unlikely to see substantial changes. Only Fire lacks a viable defense tower. Still, both Makeshift Tower and Blaster Cannon have their uses.


Tier 2: Cannon Tower, Pyromaniac(r), Rioter's Retreat and Lost Launcher

Pyromaniac(r) and Cannon Tower denote the upper limit of strength for a T2 pure and splash tower respectively. This is appropriate as both have the built-in limitation that they cannot target air units. For more general use towers, as in those able to target both ground and air units, we think the appropriate strength is somewhere just above both affinities of Lost Launcher for attack-based towers and at the current level of Rioter's Retreat for utility-based towers.



Tier 3: Post-nerf Necroblaster (see proposed changes below)

By and large, T3 towers are underwhelming. That is not to say they are useless or unviable, but that they rarely justify their inclusion in a deck except when the player is forced by the map to include substantial T3 defenses and even then, the player often opts for unit-based defenses. An exception to this rule is Necroblaster, which is by far the best tower in the game. Necroblaster's strong stats are supposed to be compensated by a need for corpses to be able to shoot, but the cost is so low that once the Necroblaster is filled it becomes self-sufficient. We will be nerfing Necroblaster by increasing the number of corpses it requires per shot, thereby requiring players to continually feed their Necroblaster. Post-nerf, Necroblaster will denote the upper limit of strength for T3 towers.

Tier 4: Worldbreaker Gun with support

There are no T4 towers which we think fit the strength appropriate for cards of this tier when considered on their own. The closest example of a well-balanced T4 tower is Worldbreaker Gun. Yet much of the strength of WBG comes from Frost support and particularly from Skyelf Sage which provides a massive +110% damage buff to buildings. We are considering toning down the strength of the various Skyelf building buffs to allow us to buff Frost towers. The goal would be to maintain approximately the same strength for WBG when buffed by Skyelves, but with more of the strength being in the tower than in the support. The benchmark for T4 towers is somewhere between slightly and moderately above a non-supported Worldbreaker Gun.

Upcoming Changes - Preview

Below is a preview of some of the changes we are planning. These changes are still in the conceptual stage and are subject to change. We will announce more detailed changes as we get closer to release.

Stronghold:

1. Increase life points
2. Cannon Turrets:
   (a) Increase splash radius
   (b) Allow more turrets to attack a target at once.
   (c) Increase damage
3. Change Bombardment to an active ability with a power cost and a long cooldown. Deals area of effect damage with knockback. Has a long range to enable Stronghold to counter siege units on its own.
4. New Passive Ability - *To the Last!*: Stronghold will deal increasingly more damage as it becomes more damaged.

Stronghold is an Ultra-rare T3 Frost fortress. With a description like that and the name Stronghold the player might expect to encounter a powerful and immobile bastion able to hold off hordes of enemies by itself. Anyone who has seen Stronghold knows this is not true and that the card is a disappointment apart from its aesthetic design. We intend to rectify this. We are giving Stronghold two new abilities. The active ability will allow the player to defend against 50m siege units like Lost Dancers without needing an additional unit or building, and “To the Last!” will make Stronghold more deadly as it loses life points. This will synergize well with Frost building supports like Glacier Shell and Shield Building, allowing the player to keep Stronghold at a lower health threshold without endangering their defenses.

Rocket Tower:

1. Orb cost: 2 Fire --> 1 Fire, 1 Neutral
2. Decrease life points
3. Rocket Barrage:
   (a) Reduce number of rockets
   (b) Increase damage per rocket
   (c) Bugfix: Fix target homing to prevent rockets from missing.

Fire T2 currently lacks a splash tower, while Pure Fire T2 has 2 towers. We think Pyromaniac sufficiently fills the slot of T2 tower for Pure Fire, so we are transitioning Rocket Tower into a splash card. As part of this change, we will be cutting down on its large pool of life points while otherwise increasing the consistency of Rocket Tower, both in terms of knockback and damage dealing.

Stone Launcher:

1. Move from T3 to T2 and adjust damage appropriately.
2. Reduce ability power cost
3. Increase range from 40m to 50m

Stone Launcher is one of the few exclusively anti-air (AA) towers in the game. AA towers face all the issues other towers do but with the added restriction of being useful against only a small subset of enemies. This means that AA towers are used in specific maps to counter specific enemies. For example, Raven Battleships have a 50m range and are among the most common air units the player will face in campaign. If an AA tower is going to counter Ravenships in maps such as Oracle or Ocean, that tower needs to have a 50m range. We intend to make the hybrid faction AA towers available earlier and to increase their range to better match up against the units they are intended to counter.

Bandit Launcher:

1. Substantially reduce life points
2. Add *Accelerated Construction*: Construction time is reduced by 50%.
3. Firebug:
   (a) Increase radius
   (b) Potentially increase ability power cost
   (c) Increase ability damage for both affinities.

Bandit Launcher has good stats for its power cost and model size. The issue is that it directly competes with Rioter's Retreat which synergizes better with other Bandits cards. As such, we have decided to move Bandit Launcher in a different direction, oriented around fast construction and its suicidal "Firebug" ability. This will hopefully give Bandit Launcher a unique identity as a tower which can be quickly deployed in the field, including offensively.