The Redesign of Cities for Urban Warfare Resilience and Deterrence After the Russo-Ukrainian War of 2022

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ABSTRACT

Architecture and urban planning have always been deeply involved in the design and building of defense facilities because cities have been centers of economic, political and military power since the dawn of civilization. The famous Roman architect Vitruvius was himself a military engineer before engaging with architecture. Defense walls, towers and other fortifications dominate every pre-modern city around the world. The advance in modern technology, artillery and airpower fundamentally changed this. Traditional fortifications were no match for modern firepower. Thus, military conflicts spread throughout the territory drawing the creation of new kinds of fortifications – such as bunkers and trenches. With industrialization, however, cities have become even more important as economic, industrial and political powerhouses. Their symbolic significance also is not negligible in modern conflicts and is often crucial in military planning. The battle of Stalingrad of 1942-3 stands out in this respect. With the more robust global economy, vulnerable to wider disruptions, and with new advanced precision firepower, modern military conflicts are bringing the war back to the city. The important urban centers are becoming the focus for new urban warfare. The current war in Ukraine is essentially urban warfare. Urban warfare faces both the defending and invading armies with hard choices and very specific challenges. This brings forth a need for a rethinking of the modern urban and public-architecture practices and design choices as well as urban development policies. The goal of this presentation and paper will be to bring the attention of architectural theory, and urban and architectural design to this important topic and make theoretical and policy recommendations for the lessons learned from the urban warfare of the current Russo-Ukrainian war of 2022. We aim in contributing toward a redesign of urban centers with defense, and consequently military deterrence in mind.

KEYWORDS: *urban warfare, Ukraine, war, fortification, architecture, urban planning*

INTRODUCTION

The birth of civilization seems to coincide – or was in a direct relation – with the birth of warfare. During any research into archeological sites from any civilization, the absence of fortifications would be regarded as a substantial anomaly. The concentration of wealth within emerging city centers triggered competition between the city-states, but also envy and resentment which often caused armed conflicts. The new level of organization of the city-states around effectiveness and industriousness which contributed to the concentration of wealth in the first place, also contributed to a new level of organization and effectiveness of warfare. This made the armed conflicts unprecedentedly destructive and detrimental to the losing side. This in turn, called for the use of the same organizational capabilities and the effective allocation of resourses in building fortifications which would keep the wealth generating capacities of the city-states out of reach of the ever-advancing warfare capabilities. As the means for production evolved, so did the means for destruction (warfare), but also the means of defense. Building the fortifications became one of the most important architectural and engineering endeavors of any civilization. Cities, and whole civilizations emerged and thrived due to the strength of their walls and forts, as much as due to the trade, production and poetry, art and laws.

According to Virilio and Lotringer's (1983; 2008) view on the history of cities in their book *Pure War*, fortifications created the first cities by using the force of conflict to set up the physical layout. The fortress's protective architecture articulates urban form. Fortifications are how war organizes space, and cities are how fortifications organize space (Denman, 2020, 1). Any fortified city has a definitive and concise form and delineation from its surroundings first and most importantly due to the geometrical logic of fortification. Even today, new fortification techniques are applied in numerous geographical regions, stretching beyond the urban *enceinte* into international space and changing the strategies used to protect space, even though the physical remnants of past fortifications have frequently been swallowed by growing cityscapes (Denman 2020, 2).

For the purpose of clarity, we will define fortification as an architectural strategy for delineating boundaries between inside and outside and stopping adversaries. Even with the advent of discipline and biopolitics, this is reinforced as the power of an older order—a state imaginary engaged in theatrical and desperate attempts to display sovereign power (Brown, 2010; Denman, 2020). So, not only do the fortifications play a practical role in warfare, they also have an architectural value of presenting urban and architectural designs with aesthetic and psychological effects in mind. A fort, or a defensive wall or a tower might be as much effective with the strength of its walls, as with the *wonder*, *awe* and *fear* it arises in the enemy soldiers by projecting a *sense* of strength and impenetrability. In this way, Denman (2020, 2) further regards fortification as a method of power that operates through a mix of modulated control by obstruction and enhanced detection rather than concentrating on the elusiveness of enclosure. Instead of precisely defining the inside and the outside, this fortification method involves directing movement through walled channels (Bernes, 2013). By using this approach, Denman (2020, 2) broadens the analysis of boundaries to take into account fortification logistics and underlying geometrical principles that influence the creation, organization, and surveillance of space.

Although during the last decades of globalization there was little focus on the reality of warfare, as humanity had overcome the threat of war, our understanding is that

the real threat of warfare is very much present and ominous today, especially in the current phase of the decoupling of the post- Second World War and post-cold-war global order. After a short period of Unipolar world which emerged with the fall of the Berlin Wall, a new global disorder seems to be emerging. Wars of the conquest of territories, annexations and inter-state conflicts not very different from those of the 19th century clashes of "Great Powers" seem to be becoming a norm and might become very common in the post-globalized world. On the one hand the First World War, Second World War and Cold War global conflicts between vast industrial blocks relied on the transnational spatiotemporal complex fortifications due to the massive industrial capacities and excessive demographics. On the other hand, the post-industrial conflicts during current times of a demographic crunch of the developed and developing nations, include expensive high-tech weapons systems and are temporally inserted between business cycles, and physically within complex logistical chains. Warfare constrained by these realities will be guided by the political-economic goals of quick, decisive operations to capture important cities – industrial hubs, important trade nodes and ports. The political and economic logic of nations neighboring the empires-in-the-making will be guided by the need to deny the capture of important cities and protect their productive capacities – their citizens and their infrastructure and productive capacities. So, a particular kind of military/defense architecture is about to emerge. Several armed conflicts were representing this new reality, but the current Russian military invasion of Ukraine is obviously a turning point and reference point for what is to come. The aim of this paper is first to address the historical aspects of military architecture and urban planning, then the modern withering away of the defense character of the city, and the closing of the circle in the case of Ukraine war of 2022 by the return of urban warfare and the need to redesign our urban environment, especially cities accordingly.

THE INTERSECTION OF DEFENSIVE AND URBAN PLANNING IN EARLY MODERN CITIES

Since cities have been the hubs of economic, political, and military power from the dawn of civilization, architecture and urban planning have always played a significant role in the design and construction of defense facilities. Before starting his career in architecture, for example, the renowned Roman architect Vitruvius worked as a military engineer. Every pre-modern city on the planet is dominated by defense walls, towers, and other fortifications. The fortifications essentially give shape to the cities and towns delimiting the organized and safe life of the city-dwellers from the chaotic and dangerous life outside city-walls. In early modern warfare, conceptions of linear defense and defense in depth established the geometries of fortification. However, these ideas have been increasingly giving way to a concept of non-linear defense, in which novel combinations of blockage and detection fortify space at various sizes.

One of the most thorough philosophical anayses of the idea of fortification is provided by Wendy Brown (2010). In an effort to comprehend the meaning and the history of fortifications, Brown takes into account the profusion of wall-building initiatives as well as the paradox presented by their development at a time when globalization is hailed as a defining force of political life. By erecting impenetrable borders between nations and asserting an absolute right to rule, such wall-building aims to give sovereignty a physical expression. This is also in line with the entrance of the idea of the wall in the public imagination brought forth by the populist political rhetoric of the past decade. In this sovereign imagination, Brown offers a powerful criticism of the

temporal logic—the imagined relationship between the past, present, and future. A "markedly archaic character" and an "apparently tangible, obdurate, premodern signature" can be seen in the walls (Brown 2010, 80). Walls seem to symbolize precisely the power of the no, and fortifications note an old order of power, as visible symbols of sovereignty (Brown 2010, 81). The imagined rule of the sovereign is one sustained by physical manifestations, according to the historical vision expressed (Denman 2020, 4). The prevalence of barriers and walls along international boundaries reveals a need for a sovereign authority that, if it ever had existed, is no longer present. In order to base the future on a made-up past, this sovereign imaginary views walls as an act of reclamation that enacts the military virtue of legendary combat (Denman 2020, 4).

As the advent of artillery accelerated in the early modern era, so did the architectural and urban military architecture. One of the most important transitions in this era is the change of fortifications following Charles VIII's conquest of Italy in 1494. The development of ballistics and artillery caused the development of a new form of fortification and demolished a complete paradigm of military architecture (DeLanda, 1991). The military thinking and practice following this military conflict resulted in the new concept of urban fortification – the *trace italienne* also known as *bastion fort*. This is a structure with low ramparts that were strengthened with earth to withstand cannon fire, walls and ditches that were difficult to scale, and the angle bastion, a triangular projection from the walls that allowed for a wider field of view (Kingra, 1993; Denman, 2020). This change in fortification required new ways to create and share information, skill and knowledge about defensive design (Denman 2020, 6).

The *trace italienne* had still redefined the defense of space, raising questions about whether fortification provided a precise science of security or if it required the fusion of these new geometric principles with actual military experience (Langins and Buchwald, 2004). The entire discourse of military urbanism was drawn behind the pentagonal fortress, like the head of a comet, according to Pollak (2010). When examining the evolution of military architecture at the closing of the 17th century, DeLanda (1991) asserts that the incorporation by military engineers of mathematical knowledge in the design and building of fortifications essentially launched a new era for defensive technology. One of the people most closely connected with the inventions in this new defense architecture is the military engineer is Sébastien Le Prestre de Vauban, who throughout the course of a lengthy military career used and modified theories of defensive construction. He would participate in over 50 sieges and build or improve 160 fortifications while serving Louis XIV. Vauban directly directed the establishment of an engineering corps inside the French military under Louis XIV (Duffy, 2015; Denman, 2020, 6).

The military engineer attempted to imitate pure geometric form, associating good defense with mathematically defined order. In this case, the design of the fortifications was derived from regular polygons (Denman, 2020, 6). According to Bartelson (2017) a new science of security emerged as the science of fortification, based on Euclidean geometry and mathematical accuracy. New concepts of spatial control were introduced during this age of fortification thanks to geometrical principles. Space becomes measurable, mappable, rigorously delineated, and hence controlled under Cartesian geometry (Elden, 2013, 291). When Henri Lefebvre (1992) in *The Production of Space* refers to fortifications as the formation of controlled space, forcing rectilinear or rectangular form on an existing area, he highlights this aspect of fortifications.

THE WITHERING AWAY OF THE DEFENSIVE CHARACTER OF MODERN CITIES

The fortification geometry of the modern cities was significantly altered by the further accelerating development of technology, especially artillery. Modern weapons were too powerful for ancient defenses, as well as for their modern reincarnations. As a result, as armed engagements extended across the landscape, new fortifications like bunkers and trenches were built. This new focus on the extremely destructive capabilities of modern artillery in combination with the massive and rapid movements of modern militaries gave birth to the idea of defense in depth. Defense in depth, consisting of new outworks that allowed the defenders to manage the multiple outer levels, ramparts, and ditches of a fortified town, replaced high, stone castle walls used as inflexible defensive lines (DeLanda, 1991; Denman, 2020). The move from stone to earth as the reinforcement of the walls at the size of the castle wall gave 'depth' against cannons since earth would compress under bombardment whereas stone would instantly fracture. As we scale up, the strategic level matched the flexibility of depth made possible by outworks (Denman, 2020, 8). The forts and fortress towns that even Vauban designed were not intended to hold out in isolation for all time, but rather to buy time for reinforcements to come and end the siege (Maier, 2017). The spatial depth-enabled design during the era of reinforcement increased the rigidity of earlier defenses (Denman, 2020, 8).

This new spatiotemporal restructuring of war is made clear by the military genius of Carl von Clausewitz's writings on fortification and this new defensive tactic. In his book *On War* which is now one of the main works of the western military theory canon, Clausewitz (2006) makes distinctions between various fortification types. According to Clausewitz defense is the most important aspect of a conflict and as such, it requires a variety of agentic traits. He further asserts that a quick forceful shift to the offensive—the flashing sword of vengeance—is the best moment of defense, describing it as a shield made up of well-directed strikes (Denman 2020, 9). Clausewitz (2006) further stresses this dynamism by comparing them to blocks of ice in the course of a river's flow, even in their most immobile state. As they are themselves constructed by such movement, they modify the motions of battle. Modern military fortifications are neither passive, inert, nor peaceful. They engage the opposition and make precise attacks delivered in retaliation possible. Their style of combat extends from the inside out, enabling and escalating confrontation (Denman 2020, 9).

During the late 19th century, the military engineer was aware of impending changes in the physical form and spatiality of defensive warfare. New theories regarding the connection between battle and space started to gain traction where Vauban's fortification plans had previously looked unchallengeable (Denman 2020, 9). Among these views, *Annals of a Fortress* by Eugène Viollet-le-Duc (2012) stands out. Viollet-le-Duc believes that battle would surpass the star-shaped bastion fortress's defenses, but he is unable to see the specific type of structure that will take its place. This is not indicative of a lack of critical understanding, but rather of an awareness of how war is becoming—an uncertain future for the conflict's altering design, mobilization, and experience. In the light of his awareness of the dynamism of his research subject, he considers the potential of the defensive strategy that would be part of any future conflict. Despite these limitations to his assertions, his tentative solution is to fortify in a way that is light, mobile, and adaptive rather than wearing armor that gets heavier and more cumbersome as time goes on. The ideal military can "fortify itself everywhere," while the exact material form is as yet unknown (Denman 2020, 10). An intriguing addition to the study of world war is the idea that an army may 'fortify itself everywhere' in battle (Chamayou, 2015; Hardt and Negri, 2006; Galli ,2010; Denman, 2020).

Viollet-le-Duc's speculative effort may be used to gain a deeper understanding of the spatiality of global war—the geopolitical lines of blockage, the defense in depth incorporated into global space, and the enhanced modes of detection that emerged out of lines of fire. Gregory's (2011) idea of "everywhere war" coupled with the spatiality of a "planetary garrison" echoes Viollet-le- Duc's image of an army capable of fortifying itself everywhere. Here, 'everywhere' refers to a worldwide "multi-scalar, multidimensional" battlespace rather than a flattening of space and uniformity of experience (Gregory, 2011; Denman 2020, 10).

The advance of the air force and its use in modern military conflicts triggered advance in anti-aircraft capabilities. One of the most important invention of the Second World War is certainly the radar. Radar's geometry was developed in reaction to the ballistics of aerial bombardment, replacing the geometry of the bastion stronghold, which was developed in response to the cannon's ballistic capabilities (Denman 2020, 11). The radar influenced a wide range of high-tech defense capabilities. Early warning systems, plane overflights, and underwater radar had already constructed numerous levels of fortification outside of sovereign territory; now additional layers of inside fortification might be added. This new form of sensing technology became ingrained in daily life as a result of the generating force of conflict (Denman 2020, 11). Fortification can take the shape of 'geophysical' barriers defining territorial boundaries or 'microphysical' limits on movement inside the built environment (Virilio 1994). The 'radar curtain', which alludes to the fortress's curtain wall, also acts as a form of airspace fortification. Complex relationships between time and this fragmented arrangement of space cause the pace and rhythm of movement to change in response to predictions of future risk and insecurity (Denman, 2020, 2; Davis, 2006; Duffield, 2011; Klauser, 2010).

This all contributed to something like the withering away of the modern fortifications. After the 9/11 terror attacks in New York and the global focus on countering terrorism, the multi-layered defensive structures moved in the areas previously unaccounted for. Cyberspace, as well as the media sphere, also became areas of warfare. Digital tools such as the firewalls became the new fortress and walls. At least in the halls of defense think-tanks and media outlets. The wars of the future were meant to be fought in these new areas and spaces. The hype of the Artificial Intelligence in business circles also became a topic of interest in military and defense circles. However, the escallation of the Russian military invasion against Ukraine after 8 years in February 2022 caused a dramatic change in defense thinking and planning.

THE RETURN OF URBAN WARFARE

As a result of modern technologically and an intellectually centered economy as well as industry, cities have gained even more significance as centers of the economy, industry, and politics. Their symbolic importance is likewise not insignificant in contemporary battles and is frequently essential in military strategy. In this regard, the Battle of Stalingrad in 1942–1943 stands out. Modern military conflicts are bringing the war back to the city because of the more intertwined global economy, which is more susceptible to larger disruptions and has access to new, advanced precision armament. The focus of contemporary urban warfare is shifting to the significant urban centers.

There are different reasons why a military would need to go on the defense during a campaign: to establish circumstances for the attack and reclaim the initiative, to completely destroy the enemy, to maintain decisive territory, or merely to stall the march of a numerically or technologically superior army. A well-planned and well-built urban de-

fense might decide the success or failure of attaining a strategic goal, as well as impact on the result of a battle (Spencer and Geroux, 2022). History offers several novel insights that might help a force enhance the quality of its urban defense. The following techniques were utilized in real-world urban warfare and proved to be effective as part of a larger urban defensive strategy. They include both traditional and unorthodox tactics that will aid in the improvement of both hasty and planned urban defenses (Spencer and Geroux, 2022). These techniques were employed during the last two decades of urban warfare, especially during the war against ISIS in Iraq and Syria, as well as during the Syrian civil war, but were also implemented in the current war in Ukraine.

When choosing an area defense that focuses on terrain or assigning subordinate units to use perimeter defense of key terrain in the urban area, a strong tactic is to create strongpoints by reinforcing buildings or using pre-existing structures that are already difficult to destroy, such as government buildings, apartments, office complexes, or banks. These strongpoint structures serve as mini-fortresses within the city. If the defending army has the time and the backing of an engineer, it may bring in sandbags, timber, steel girders, and other reinforcing materials to harden the structure and establish several bunkers within the fortress (Spencer and Geroux, 2022).

To facilitate barriers, engagement zones, ambushes, combat positions, and urban defenders must design the landscape. An urban defense has a significant advantage because to the abundance of military grade fortification material (such as concrete). One of the primary purposes of urban defense is to direct assaulting troops into combat zones, channel them through a limited number of approaches, and limit their ability to maneuver and mass forces. The creation of rubble by destroying structures to produce broken concrete, rebar, stones, bricks, or solid material to include debris is one approach in achieving this, and it is recognized as being contentious considering the amount of devastation it causes (Spencer and Geroux, 2022). Wehrmacht engineers in Ortona, Italy, severely razed the structures from September to December 1943 to bolster the German defense of the city (Geroux, 2020). They blew up entire houses, or lines of buildings, to produce rubble heaps up to fifteen feet high, which were then generously seeded with mines and booby traps. This rubble obstructed narrower, ox cart-width minor lanes, forcing the invading Canadians to retreat along the major road and into the main German defensive region. It also made climbing over the piles or maneuvering to help the dismounted soldiers and engineers really impossible, and it even obstructed Canadian observation along the highways (Spencer and Geroux, 2022).

Concrete barriers for car checks or infrastructure protection are common in modern cities. These obstacles provide ready-made field fortifications. They became prominent during the War on Terror and due to the fear of terrorist attacks, various types of concrete barriers were installed in front of embassies and public buildings. Concrete is one of the most effective tools in modern warfare (Spencer, 2016). Concrete reinforced with steel rebar is a very challenging fighting hurdle to overcome. Concrete barriers range in size from three-foot-tall, two-ton truck barriers used globally to twelve-foot-tall, six-ton wall portions used by the US and other forces in Iraq and Afghanistan (Spencer and Geroux, 2022). In late 2016 and early 2017, ISIS terrorists exploited concrete obstacles such as T-walls left behind by coalition forces to defend Mosul, Iraq (Knights and Mello, 2017). They employed trucks and cranes to move and place the barricades on the city's outskirts (Spencer and Geroux, 2022).

Defenders must exploit and safeguard their essential capabilities. Large weapons can be disassembled and rebuilt on a higher story of a structure to give better lines of sight and

firing angles. This also provides bunker-like protection to the defender's most lethal weaponry. During the Battle of Manila in 1945, Japanese naval defense troops retrieved anti-aircraft and naval weapons from their wrecked ships in Manila Bay and placed them in pillboxes and strongpoints across the city. During the Battle of Ortona, German defenders dismantled two antitank guns and reinstalled them on the second floors of two buildings in the Piazza Plebiscito, allowing them to destroy two Sherman tanks as they approached the square. It took the Canadians many hours to bring in more forces to ultimately destroy these two antitank gun sites (Geroux, 2020).

In urban warfare, streets and alleyways may become death traps for both attackers and defenders. To maximize their chances of survival, the defenders should try to stay disguised before and during their operation. The tactic of exploiting mouseholes—holes constructed in the interior and external walls of buildings that allow soldiers to traverse between the outside walls and inner areas of buildings—is without a doubt one of the most prevalently repeated defense strategies known in the history of urban warfare. Holes can be dug manually using sledgehammers and other instruments, or explosives can be used. Tunnels and subterranean areas can be built between fighting locations, and if an underground network already exists, it should be utilized for force protection and movement (Spencer and Geroux, 2022). German forces proved to be proficient at leveraging the city's massive underground transit, sewage, and other infrastructure networks during the Battle of Berlin in 1945. The tunnels were used to care for the injured, maintain communication lines, shelter noncombatants, and launch attacks (Spencer and Geroux, 2022).

The urban setting provides a plethora of huge items that allow defensive forces to erect barriers both inside and outside of buildings. Vehicles may be relocated to block roadways, furniture can be put into stairwells, and concertina wire and remotely detonated explosive devices can be used to obstruct simple transit between levels and into building entryways. Concrete obstacles, automobiles, buses, construction trucks, trash, furniture, and tires can be dragged into roadways and tipped over to redirect, divert, or stop enemy armored combat vehicles or dismounted infantry (Spencer and Geroux, 2022). On April 4, 2004, Mahdi militiamen and their sympathizers quickly built hasty obstacles out of refrigerators, vehicle engine blocks and axles, rolls of concertina wire, wooden furniture, heaps of burning trash, and rotting meat that stopped American HMMWVs, infantry fighting vehicles, and even M1 Abrams tanks (Raddatz, 2007).

If the opponent picks a single axis of approach or if the topography and defensive strategy successfully channel the assault into important highways, mobile anti-armor ambushes have historically proven to be quite effective. The deployment of both static and mobile locations with distinct engagement and disengagement criteria only improves an urban defensive maneuver system. Small, light, lethal hit-and-run squads armed with antitank weapons can disrupt enemy momentum and wear down advancing forces while the defenders continue to lure them into their main defensive sector (Spencer and Geroux, 2022). During the First Battle of Grozny, Chechnya, in 1994-95 (Fontenot, 2014), Chechen insurgents honed their use of anti-armor ambushes against Russian regular troops seeking to capture the city. As mobile anti-tank teams, the insurgents utilized small, unconventional squads of as few as two men. Armed only with AK-47s, grenades, and RPG-7s or RPG-18s, these components assaulted Russian armored vehicles from basements or top levels of buildings, where major tanks and other weaponry could not effectively return fire (Spencer and Geroux, 2022; Oliker, 2001). Once trapped, ambush squads would attack the weak areas of Russian tanks and armored personnel carriers, as well as the lead and trail vehicles, swiftly withdraw, and then advance up the sides to

strike the now immobilized Russian columns again. Due to these and other techniques, the Russian 131st Motorized Rifle Brigade lost 102 of 120 armored vehicles and twenty of twenty-six tanks between January 1 and January 3, 1995 (Fontenot, 2014). Only one T-80BV tank escaped the combat completely functioning from the thirty-one dispatched into Grozny with the 3rd Tank Battalion, 6th Tank Regiment (Spencer and Geroux, 2022).

LESSONS FROM UKRAINE

From the first salvos through the ongoing battle, it is clear that the urban conflict is still important in current military operations. The war started in 2014 when Russian soldiers and operatives intervened in the Ukrainian political turmoil following the Maidan protests. First Crimea was occupied and annexed to the Russian Federation which took the Ukrainian security apparatus off guard. The next phase was the creation and arming of two proxy statelets in Eastern Ukraine by Russia. The conflict between the Russian proxies and Ukrainian military evolved, but for the previous years moved into a phase of a positional – more or less, static conflict. All this changed at the end of 2011 when a large concentration of Russian military was amassed on Ukrainian borders. The official explanation was that large-scale military drills were prepared, but soon the political tensions between Russia and the West escalated and the possibility of new war in Europe become plausible. Finally, on the evening of 24th February 2022 Ukraine was attacked on multiple fronts from the Russian Federation and from Belarus. In what follows we will not discuss the causes for the war, nor the atrocities. The goal of this discussion is to dwell on the transformation of the military conflict in its historical perspective. The lessons learned from this war and the successful defense of the most important cities in Ukraine should be applied to the rethinking of the paradigm of contemporary military urbanism and the creation of safe cities. The most successful defense lies in deterrence.

Urban Maneuver plays a significant role in contemporary conflict, and also in Ukraine. Small antitank squads are deadly against armored formations. Small Ukrainian hunter-killer teams have used the urban environment to successfully shoot anti-tank guided missiles (ATGMs) onto the weakly armored roofs of Russian tanks. These squads are adaptable and nimble, and they may move in close before assaulting, similar to the tactics adopted by Chechens in Grozny in the 1990s (Phocas and Geroux, 2022). Molotov cocktails and other incendiaries are effective. Simple incendiary weapons still pose a hazard in an era of Javelins and other ATGMs. Vehicles, despite their strengths, are susceptible when driving through a crowded metropolitan environment. These homemade incendiaries may easily make their way into the engines of thin-skinned vehicles like the KAMAZ truck, requiring Russian troops to cover their radiators with tree branches for safety. Molotov cocktails may melt nonmetal components including optics. They may also enter armored vehicles' crew hatches, such as BTRs (Phocas and Geroux, 2022).

Furthermore, destroyed structures have served as an effective obstacle in regions where there was little time to establish the engagement area. These destroyed structures provide cover and concealment for Ukrainian forces, who fight enemy vehicles and soldiers from the shadows of buildings and tunnels. If vehicles deviate along an unbarricaded approach route, they will most certainly be traveling right into a death zone that has been pre-planned. Even before the invasion, Ukrainian soldiers used rubble effectively, such as when they held out for three months under the remains of the Donetsk airport in late 2014 (Phocas and Geroux, 2022).

Tanks require infantry and engineers, and tanks require infantry and engineers in urban settings. Throughout the battle, Russian armored troops have marched into urban areas

without dismounted infantry backup, using the movement of their tanks as screening and security. The ineffective employment of Russian armor in Ukraine has rekindled the debate over the use of armor in urban situations. House to House, by Staff Sergeant David Bellavia, is a successful example of combined infantry-armor movement in an urban context. American tanks and Bradley fighting vehicles were deployed as effective support-by-fire and breaching tools for the infantry during the Second Battle of Fallujah, as the infantry pushed out in front of the vehicles and defended them from insurgent antitank teams armed with rocket-propelled grenades. When compared to the Russian tactic of sending lone tanks into small alleyways without infantry backup, the flaws are evident (Phocas and Geroux, 2022).

Militaries must train for underground combat. Mariupol's siege has been a focal point of the war. For over three months, Ukrainian soldiers held to the Azovstal Steel Plant, employing its multilayer subsurface network to negate the efficacy of massed Russian artillery and armor (Bullen, 2022). These tunnels also served as a haven for thousands of individuals who are still imprisoned. The Russians proclaimed victory in Mariupol on April 21 (Polityuk, 2022), signaling that they would not deploy forces into the tunnels to take out the perhaps hundreds of Ukrainian soldiers remaining there (Phocas and Geroux 2022). Because attacking soldiers lacked the capacity to conduct underground operations, the Russian president Vladimir Putin called a halt to preserve lives (Reuters, 2022). This constraint prompted Russia to announce an early triumph, but the Ukrainians were able to maintain their resistance (Faulconbridge, 2022) while still maintaining fighting power in the region to keep the defenders penned in (Phocas and Geroux, 2022). Subterranean operations need units to be adequately trained and equipped. It must be a priority for junior leaders to ensure that they and their subordinates are tactically adept and capable of meeting the challenge of the subsurface in order to achieve their objective (Phocas and Geroux, 2022).

Armies all across the globe may learn from Mariupol's dreadful experience. In the Texas National Security Review, a military and security magazine, David Betz of King's College London and Lieutenant-Colonel Hugo Stanford-Tuck wrote that generals have generally disliked the thought of fighting in cities and have worked to avoid it. However, contemporary militaries are being compelled to do so more and more, whether they want to or not. They are considering how the best way to use contemporary weaponry in urban fighting is to learn from the past (The Economist, 2022).

CONCLUSION: CITIES AND URBAN PLANNING AFTER THE UKRAINIAN WAR OF 2022

Armed forces in urban combat must make difficult decisions and overcome highly specialized obstacles. This necessitates reconsidering contemporary urban and public architecture methods, design decisions, and urban development regulations. This paper's objective is to draw attention to this crucial issue in architectural theory, urban planning, and architectural design, and to offer theoretical and policy recommendations for the lessons that can be drawn from the current Russo-Ukrainian War's urban combat. We hope to contribute to the planning of urban areas with military deterrence and defense in mind. Urban warfare is more difficult, if not necessarily bloodier. The traditional military knowledge is that in order to overtake a fortified position, attacking forces must outnumber their adversaries three to one. According to a document released in July by the army and marines of the United States, this can increase to as much as 15:1 in metropolitan areas. These ratios should, in principle, make it easier for fewer troops to repel

many attacks, as the Ukrainians were able to achieve in Kyiv. However, this is not always the case. After all, urban defenders have their own problems to deal with. A single battalion may defend a few buildings, but each unit will struggle to see beyond its immediate surroundings, provide assistance to the others, or communicate with the others (The Economist, 2022).

The urban planners, urban authorities and architects should adapt to the new realities following the current war in Ukraine. The focus on urban warfare of western military doctrines during the "war on terror" was mainly about urban operations within cities and mostly concerning offensive operations. Municipal authorities, urban planners and architects, however, should consult the literature on urban warfare and help in designing the urban landscapes, infrastructure and buildings more adaptable to potential urban warfare and the defense of the cities. The underground transportation and infrastructure should be connected and built with defense in mind. Special consideration should be given to the buildings with a dual use, such as the Azovstal Plant in Mariupol, Ukraine, which was an important industrial facility in peace time, and one of the most important forts after the large-scale invasion in 2022. Urban planners and architects should study current conflicts, and especially the war in Ukraine and draw conclusions about urban and architectural design which will save lives and also which will act as a deterrent against potential military invasions.

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