

Urban Warfare and the Urban Warfighter of 2025

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Panama City, Kuwait City, Mogadishu, Port-au-Prince, Grozny, Sarajevo, Kinshasa, Baghdad. For the past decade, newspaper headlines have proclaimed the news of wars and peacekeeping operations in distant cities, while TV screens have flashed vivid depictions of brutal combat in city streets around the world. Images of dead American soldiers being dragged through the streets of Mogadishu and beheaded Russian soldiers in Chechnya have provided a marked contrast to the almost sterile video of precision-guided munitions finding their mark against tanks arrayed in the open desert or entering the windows of enemy buildings. However, of all the words and images transmitted over the past 10 years, those depicting the aggressive street fighting that took place in Mogadishu, Somalia, in October 1993 have come to epitomize the current genre of urban warfare literature.[1] After the Somalia intervention was over, cities were declared dangerous and foreboding places where it is nearly impossible to conduct the American way of war. The only solution in the future seems to be to avoid entering cities at all costs.

Unfortunately, if demographers and political strategists are correct, the reality is that many, if not most, of the military operations of the next two decades will be conducted in and around large urban areas. Cities--and those connected clusters of cities called "conurbations"--increasingly will be the political, economic, social, and cultural epicenters around the world. The control of large urban areas will be critical to the successful accomplishment of strategic, operational, and tactical objectives in future conflicts. Therefore, the US Army must be prepared to engage in wars against competent enemy forces that have decided to conduct operations from within and around large cities.

Our overall thesis is that high-technology weapon systems will fundamentally alter the course of urban warfare in the future. While, like today, soldiers will continue to be the most important element of urban operations, we must radically change the way they fight. The sheer economics of creating the high-tech force of 2025 will preclude us from having the large numbers required to conduct urban warfare the old-fashioned way. Even if we did have large numbers of soldiers, we are unwilling to see them killed on the scale that has historically marked urban operations in large cities. Therefore, the requirement to conduct future military operations in large cities with smaller forces demands that we produce individual soldiers with a much greater range of capabilities than exists today. We believe that the transformation of the current infantry soldier into a truly lethal urban warrior requires the development of a "2025 Urban Warfighter System" that is equal parts man and machine. Given the right doctrine, equipment, training, and leadership, US

military forces will become urban warfighters par excellence, enabling us to break the current urban warfare impasse.

The Many Faces of Future Urban Operations

Urban operations will wear many faces in the future. Some will look like traditional peacekeeping operations, some the peace enforcement operations that currently command our attention, some the epic urban combat of such struggles as the Battle for Stalingrad. General Charles Krulak has described the landscape of future urban operations as a "three block war." According to Krulak's depiction of the urban battlespace, we can expect to be providing humanitarian assistance in one part of the city, conducting peacekeeping operations in another, and fighting a highly lethal mid-intensity battle in yet a third part of the city.[2]

The focus of the present article is the last of Krulak's three scenarios, large-scale combat in cities against a competent foe. In the future, peacekeeping and, to a lesser extent, peace enforcement operations will remain essentially police actions, requiring a long-term, highly visible, traditional infantry "presence" to create an aura of normalcy and stability. On the other hand, we believe that mid-intensity war in urban areas can be successfully prosecuted using rapid strikes conducted by specialized urban forces equipped with future advanced technology systems. In this article, we will briefly outline our vision of future urban operations, examine the capabilities required to achieve this vision, and discuss the development of the advanced Urban Warfighter System that will help provide these capabilities.

The Challenge of War in Urban Areas

The current consensus is that urban areas tend to negate the technological advantages of US forces, thereby forcing them to adopt unfamiliar or low-tech methods of waging war. Enemy warriors operating in urban areas can engage in a wide variety of asymmetric methods to slow the tempo of military operations, create large numbers of US casualties, and, through a variety of barbaric means, attempt to break the will of the American people to continue the fight.[3] Rather than seeking to achieve victory, the enemy needs only to avoid defeat.

Continuing with the consensus view, we are told that urban areas favor an "under-modernized force" and tend to give a decided advantage to the defender rather than the attacker.[4] US soldiers are often described as ill prepared (in equipment, doctrine, training, and psychology) for the type of fighting that will occur if an enemy chooses to fight in urban terrain.[5] This view is clearly not without empirical evidence. The difficulties that US and other military forces have encountered when conducting military operations in urban terrain during recent years have been well documented. These include the challenge of communications, the vulnerability of rotary-wing aircraft and armor to individual weapons, and the lack of tactical mobility ordinarily available to dismounted infantry.[6]

Most urban warfare experts believe that current technology may enable US forces to improve their effectiveness at close-quarters combat when it takes place, but they can still expect relatively high numbers of friendly and noncombatant casualties and significant collateral damage to urban structures. In the best of times, urban warfare will require large numbers of traditional infantry soldiers and will be extremely difficult for Americans to win.

Many of the assessments suggesting the problematic outcomes of efforts by US forces to conduct operations in urban areas presuppose that these forces will be fighting paramilitary elements operating in their own backyard. While this is indeed a difficult scenario, the most likely mid-intensity scenario that US forces will confront may be an enemy invasion and occupation of a city within a country whose population is generally favorably disposed to the United States. Like the United States, few potential enemies will have the forces necessary to secure large urban areas in their entirety. Instead, they will attempt to attack and seize the critical nodes that make the city important from either a military or political perspective. Once this has occurred, enemy forces will need to provide local security for these forces and protect the key nodes they hold.

In this situation, US forces are frequently given only two logical alternatives. The first option, and that which senior military officers have shown a special predilection toward in recent Army After Next wargames, is to avoid contesting for the cities altogether. To this way of thinking, US forces should seek to engage the enemy in open terrain where our technological superiority gives us an overwhelming advantage. Unfortunately, this option inhibits the ability of US forces to bring a military campaign to rapid conclusion and allows the enemy just the type of refuge he was seeking when he chose to enter the city. The enemy has control of the city and he is spared attacks from US forces.

An alternative option described as the "indirect approach" has recently been proposed by Major General Robert Scales. This approach requires the establishment of a loose cordon, or siege line, around an enemy-occupied city. Though rarely, or even never, actually entering the city, US and coalition forces would use precision weapons "to strike selected point targets, key leadership, and weapons of mass destruction" within the surrounded city. Eventually, the city would collapse upon the enemy, thereby causing his defeat.[7]

Both of these alternatives have merit. In some circumstances, it may be possible to avoid engaging enemy forces in cities altogether or to defeat them through the use of large-scale sieges. However, we expect that there will be frequent situations in the future when the confluence of political necessity, humanitarian concerns, and military requirements will force us to engage and rapidly defeat sizable enemy combat forces that have taken up positions within a large urban area. In these situations, we will have to physically enter the urban area and achieve our aims while protecting our own forces, the urban infrastructure, and noncombatants within the battlespace.

The Nature of Future High-Tech Urban Warfare

The two characteristics that define urban operations and make them different from operations in open terrain are the physical infrastructure of the city and its occupants. Therefore, in most instances, the urban battles of the future will place the joint force commander under tight constraints to avoid excessive collateral damage and to limit the number of noncombatant casualties. Within these constraints, commanders must still accomplish a dizzying array of tasks. They must identify the location of key nodes and enemy positions within the city. They must isolate the urban area both externally and internally. They must penetrate the urban battlespace across both the physical and informational dimensions. Finally, they must conduct decisive operations to destroy or remove enemy forces occupying positions within the urban complex.[8] Since urban combat operations will often consist of a series of small, widely dispersed engagements, the United States must seek to adapt its urban forces specifically for these types of engagements.[9] This will require dramatic increases in knowledge, speed, and precision engagement capabilities.[10] It will also require a significantly different type of advanced urban warfighter.

Knowledge will be a key enabler in future urban combat operations. These operations will require a significantly greater level of situational awareness than can be achieved with current C4ISR systems. (C4ISR is an acronym for "command, control, communications, computers, intelligence, surveillance, and reconnaissance.") Urban forces must be able to establish and maintain near real-time visibility of key enemy positions and enemy activities within and between those positions. They must also have precise and constantly updated information about the status of critical physical structures within the city and the migration of militarily significant noncombatant populations. Perhaps most important, they must have precise, real-time positional and status information about widely dispersed friendly forces.

Achieving *speed*, a high operational tempo, in urban areas has always been difficult owing to the challenges of command and control and the problems associated with maneuvering within the urban landscape. While there will always be times when urban fighters need to move dismounted for very short distances, urban warfare will more frequently require high-speed dashes around, into, and across dense urban areas. This will be possible through the synchronization of advanced information systems, robotics, and a new high-speed armored urban combat vehicle. As the Russian debacle in Chechnya confirms, the current risk to armor in urban terrain is very high.[11] However, urban assault forces that know the precise location of enemy concentrations will be able to avoid these concentrations and possible ambush sites while still maintaining freedom of movement throughout the city. Extremely high-speed tactical mobility will enable urban forces to isolate enemy concentrations and destroy them whether they are in hidden positions, on the move to reinforce, or falling back to alternate positions.[12] Urban forces must also be capable of insertion directly into the urban area or extraction from it using next-generation rotorcraft capable of transporting both personnel and their armored urban combat vehicles.

The third component that will make high-speed future urban operations a reality is enhanced *precision engagement* systems. Like tactical mobility, precision engagement

has been difficult in urban areas owing to the dense, amorphous, vertically extended nature of the structures, the requirement to avoid unnecessary collateral damage, and the need to protect noncombatants. While there will continue to be a role for traditional indirect fire systems in future urban operations, the vast majority of urban precision engagement capability in the future will come from robotic or unmanned systems operating within the city. These systems must be capable of semi-autonomous movement within the urban battlespace and be equipped with both high-speed and extended loitering capabilities. These systems must be capable of providing rapid, precise lethal and non-lethal fires and be able to "occupy" areas of the city that have great military significance, but which do not require a physical human presence.

In the final determination, precision munitions will be an important piece of the urban fight, but will always remain mere enablers of successful urban operations. We cannot win an urban fight without projecting some type of physical presence into the immediate urban battlespace at some time during the operation.[13] This presence will be provided by the 2025 Urban Warfighter System.

The 2025 Urban Warfighter System

Future high-speed urban operations require a radically new land combat capability. While to many it will likely appear to be an evolutionary offspring of the existing Land Warrior concept, the 2025 Urban Warfighter System must be a revolutionary new man-machine fighting system with self-contained C4ISR, lethality, mobility, survivability, and sustainability far exceeding those of the current and near-term systems.

The core of the Urban Warfighter System is a body suit with integral C4ISR, engagement, and active survivability systems. It provides immediate access to a variety of non-line-of-sight munitions and contains mobility enhancements allowing operation in horizontal and vertical dimensions at speeds greatly exceeding today's maximums. Individual sensors will provide constant physiological readings both to the soldier wearing the suit and to appropriate monitoring entities.

C4ISR. The Urban Warfighter System must provide the individual with a comprehensive situational awareness capability. This implies easy-to-use, integrated communications and navigational systems that can provide real-time updates to the soldier and to relevant friendly elements. The system must also be able to connect with and employ a wide variety of robotic systems, UAVs (unmanned aerial vehicles), and other sensor systems to determine who or what is in the buildings or streets around him--day or night. He needs to be able to communicate and "see" through walls. This capability will dramatically increase survivability and allow a very small number of soldiers essentially to "occupy" a large building or even a city block.[14]

Lethality. The 2025 urban warfighter must have an unprecedented level of lethality across a broad spectrum of capabilities. In addition to precision lethal fire provided by his next-generation individual assault weapon, he should be able to access digital, voice, or

possibly even thought-activated fires from a variety of robotic systems operating semi-autonomously within the urban battlespace.[15]

He also must have direct access to precision fire support from distant platforms when larger engagement opportunities present themselves. Additionally, the future urban warfighter needs to possess nonlethal weapons to assure crowd control and minimize collateral damage in certain situations.

Mobility. In addition to that provided by the advanced urban combat vehicle, the individual soldier will require enhanced individual mobility in both the horizontal and vertical dimensions. Some of this capability will be provided by UGVs (unmanned ground vehicles) that will carry much of the load currently borne by the soldier. Small, individual aerial assault systems can also be used to provide soldiers with a dramatically improved ability to move vertically and horizontally. With only small R&D investments, the 2025 Urban Warfighter System can include a Vertical Assault Urban Light Transporter (VAULT) that will give a soldier the ability to "leap" to the top of three- or four-story buildings and "jump" long distances over rubble at speeds of up to 30 knots.

At a minimum, the individual fighting load must be dramatically lightened by severely reducing the inherent weight of the load components and by reducing logistical needs. For instance, ammunition could be made of lighter materials and less of it may be needed because of reliance on precision fires from UGVs and UAVs.

Survivability. Because of the relatively small numbers of soldiers that will be available to the commander for urban operations, each one must be extremely survivable. By 2025, uniforms themselves must help guarantee survival. They must be light, non-bulky, and offer protection from bullets, CB (chemical-biological) agents, cold, and heat; they must also offer low signature and "chameleon" camouflage.

The medical community needs to produce immunizations that will protect against the diseases often associated with urban squalor. They must also produce immunizations and antidotes that eliminate the threat posed by a wide variety of CB agents. In the event that a soldier is wounded within the urban area, we will need robotic aerial and ground evacuation vehicles that allow for immediate extraction with only minimal soldier assistance. Finally, fratricide must be made a thing of the past. The urban warfighter needs to be able to quickly and accurately identify friendlies, the enemy, and noncombatants. "Smart" munitions may be developed to assist in this effort.

Sustainability. The warfighter needs to carry lighter and more concentrated rations, enabling him to subsist for at least a week when operations preclude stopping for resupply. Individual water purification is a must because the potability of city water supplies will always be suspect. Batteries cannot continue to slow the warrior down in terms of both their weight and their efficacy. Lightweight, long-duration, high-energy power sources must be found.

At the macro level, the anticipated revolution in logistical distribution systems needs to occur. New systems designed to support forces engaged in urban operations must incorporate the technologies that UAVs and precision cargo airdrop systems have to offer.

The Human Component. Just as the technology of the 2025 Urban Warfighter System will be radically different from that of Land Warrior, the human component of the system must look much different from its 1999 counterpart. Biotechnology holds numerous promises for making that happen. New biotechnical processes will allow accurate screening for an array of potential qualities--e.g. leadership, decisionmaking, memory, courage, and susceptibility to stress, disease, or even CB agents.[16] While they cannot alone determine who will be the next generation of successful warriors, these biotechnical assessments should assist us in identifying areas that individual training programs should focus on. Finally, while training and simulations can be used to develop both inherent and learned skills, "performance enhancers" can also play a distinctive role when and where appropriate.

Enabling Technologies

The limited scope of this article precludes detailed discussion of the technologies that underlie the capabilities of the proposed Urban Warfighter System. The technological concepts and premises we suggest, however, have already been described in other sources.[17] Many of the required technologies will be on hand by 2025, especially those that have widespread military application and also are of interest to the commercial world, information systems offering a prime example. Not too many years ago, the world was skeptical about the future of biotechnology breakthroughs, but newsmakers such as the human genome project and the successful cloning of Dolly the sheep have removed any doubt that biotechnology will radically alter our lives. Researchers also have made significant progress in other enabling areas such as nanotechnology and micro-electro-mechanical-systems, the disciplines that will help generate lightweight, strong, and protective systems and materials.

However, our current R&D strategies still need to focus more sharply on developing technologies and systems designed specifically for urban warfare. Unless the military actively decides that some forces must be tailored for operations in urban terrain, and that the Urban Warfighter System is a valid future requirement, the needed systems will not materialize. To have the technical know-how is not enough; the systems have to be specified and developed, and that will not be an overnight process. Given the economic realities of today, there has to be a conscious and well-thought-out plan for determining the technological requirements of future urban operations and for getting the military-unique research off the ground.

Future Urban Warfare Capabilities and the Army Imperatives

The shift to a high-technology version of urban warfare would have significant and wide-ranging strategic implications for the Army. A brief look at a few likely effects will help illustrate this situation.

Quality People. Just as is the case today, future warfare will require highly motivated and well-trained soldiers with a wide range of skills. Experts predict that developments in information technology and sophisticated weapons will continue to increase the complexity of the future battlefield. The urban warfighter will have to be the most competent of all soldiers given the extreme intellectual, physical, psychological and emotional challenges associated with urban operations.

The emotional demands of urban warfare may lead to a requirement for individuals with maturity and experience levels significantly higher than those currently expected of most junior personnel. Thus the physical-psychological profile of the urban force may begin to shift to reflect that of special forces organizations. The ramification here is that the military simply cannot afford to lose the huge investment it will be making in any individual soldier and may have to completely revamp personnel acquisition, promotion, and pay systems to accommodate an older, more specialized force.

Leader Development. Future urban operations will present leaders with an expanded array of tactical and operational challenges. Leaders at all levels must be prepared to operate in an environment that, by its very nature, presents them with a much greater degree of decentralization and nonlinearity than is the case today. They must also be capable of responding to the rapidly changing, multidimensional situational awareness requirements that will dominate urban operations. Leaders must be taught to use flexible and nontraditional information sources and decisionmaking approaches when confronted with the challenges of the urban environment. Adaptability will be a key leadership trait and must be inculcated at every level of command.

We must strengthen and expand the leader development opportunities we make available to our junior commissioned and noncommissioned officers to prepare them for high-speed, distributed, nonlinear urban operations. The flatter organizations necessary for future urban operations will give junior leaders far heavier decisionmaking responsibilities than they have today. They must develop the skills necessary to see and respond to a broad range of challenges across the spectrum of conflict. They will have access to a relatively small number of personnel with an extensive array of weaponry, including nonlethals, that they will have to employ in a variety of difficult scenarios. Junior leaders must therefore develop a high level of trust and confidence in themselves and in the abilities of their subordinates. This can be achieved only if we keep units together for extended periods of time.

Finally, leaders at all levels will also be required to engage in extensive cross-cultural communications and to integrate interagency and nongovernmental organizations into every facet of their military operations. As part of the leader development process, they must be exposed to a wide variety of nonmilitary organizations, cultures, and requirements throughout every stage of professional military education.

Doctrine. Current Army doctrine largely ignores the urban environment except within the context of small-scale stability and support operations. When it does address it, existing doctrine primarily examines the tactical level of warfare and presents urban conflict essentially as a series of small-unit combat actions designed to seize individual rooms and buildings. Little attention is given to the conduct of large-scale land operations on complex urban terrain or to the joint, coalition, and interagency integration requirements associated with it. Future doctrine must address urban requirements as thoroughly as it does operations in other environments.

Numerous doctrinal changes will be required to conduct urban operations in the manner we have discussed throughout this article. The concepts that apply to urban operations must be a natural extension of the emerging overarching concept described as *advanced full dimensional operations*. Future urban concepts must be evaluated within the context of the current experimentation plan to allow for the spiral development of organizations, doctrine, and equipment comparable to that of the Army XXI heavy divisions. We will also need flexible doctrine for the conduct of information warfare and for the use of nonlethal weapons against both enemy forces and noncombatants. The personnel and leadership challenges associated with these two issues could be immense.

Doctrinal concepts for logistics also will require profound changes in the way supplies are delivered. The logistics community must be able to provide support to large numbers of small units widely dispersed throughout an urban environment. Existing consumption rate tables will likely have no meaning in the new urban environment and so will need to be totally reformulated. Medical support concepts must also be revamped to take advantage of robotic evacuation vehicles, telemedicine, and self-contained life support systems.

Force Mix. The hybrid Army of the future will contain a mix of light, medium, heavy, and special operations forces. Unfortunately, while they provide a broad spectrum of capability, none of these forces has been specifically designed for urban combat. That must change if we are to be successful in future urban operations. We must begin to explore the effect of alternative organizational structures on our ability to fight in urban areas. The widely dispersed nature of these operations in large cities will likely call for smaller organizations that are much more self-contained and autonomous than those existing in the current force structure. These organizations will contain a mix of capabilities drawn from light, mechanized, and air assault forces. These urban forces must be built around the future advanced Urban Warfighter System and contain organic armored ground assault and aviation systems capable of high-speed operations within the urban area. These specialized forces can be developed from current general purpose conventional forces and added to or replace brigade-sized components of existing divisional structures.

The Army must also consider the extent to which it will want to use reserve component and coalition forces for the conduct of future urban operations. There are some aspects of future urban warfare, such as the requirement for small-unit operations, that suggest a large role for properly trained and equipped company-size National Guard units as a

component of specialized urban forces. There are also a number of requirements during the later stages of urban operations for which reserve component forces are ideally suited. Coalition forces, on the other hand, are frequently assigned the mission of urban operations for strategic political purposes. Therefore, we must be prepared to operate with forces that are unlikely to have the same level of modernization or doctrinal concepts that US forces will bring to the table.

Modern Equipment. The materiel requirements for future urban warfare center on the need to possess protection, situational awareness, mobility, and precision lethality capabilities comparable to those likely to exist for operations in open terrain. However, as previously mentioned, few current systems have been designed for operations in an urban environment. We need to immediately expand our limited research efforts in urban warfare technologies to include systems that have promise for the mid- to far-term future. The development and integration of the individual components of the Urban Warfighter System should be the most important system priority. The focus of future urban systems should also include an examination of aviation and ground systems currently under development to see if they have utility as part of a future urban force.

In addition to the traditional challenge to move, shoot, and communicate in cities in the conventional sense, urban warfare presents another set of unique requirements. Forces operating in urban terrain will also be faced with enemy forces using asymmetrical approaches to urban warfare that include the use of human shields and chemical and biological warfare. US forces must be equipped to counter these threats and to provide some measure of protection and support for both themselves and the local population throughout the military operation.

This combination of common and unique battlefield needs means we must aggressively assess whether the common systems currently under development can be employed "as is" or require modification. Few systems include urban operations within their requirements statements, so they will likely fail the test. In many cases, the Army must be prepared to develop and purchase urban-specific systems that will enable forces to successfully conduct high-speed distributed urban operations against a competent foe.

Training. The need to revolutionize the way we train for urban operations is almost universally acknowledged. We need to develop the capability to conduct large-scale, joint urban operations on a scale similar to the exercises conducted at the National Training Center. Unfortunately, given the current impracticality of creating large, realistic urban training facilities, most urban operations will have to be planned and rehearsed using models and simulations. These simulations are yet to be built. We should be willing to commit the resources necessary to create a virtual "Urban Training Center" that uses advanced training technologies to integrate live, small-unit, combat-in-the-cities training with realistic brigade and division simulations and with joint command and control exercises.

On a more individual note, while the Urban Warfighter System's weapons, C4I suite, and other equipment will be user friendly, it does not mean the soldier's facility with it will be

instant or automatic. The sheer number of systems involved will introduce a measure of complexity demanding extensive familiarization and training. A voice-activated computer that synthesizes information may be easy to use in principle, but the management of information will still be a complex task involving feedback from UAVs, robots, and other sensing or navigational devices. Weapons, lethal and nonlethal, will also be sophisticated pieces of hardware placing unique demands upon the soldier. Finally, each urban warfighter must have the skills and flexibility necessary to accomplish the wide variety of rapidly changing missions likely to occur if the "three block war" scenario accurately depicts the future of urban warfare.

Conclusion

Today we cannot see into the urban battlespace, we cannot communicate in it, we cannot move in it, and, because of the requirement to limit noncombatant casualties and physical damage, we cannot effectively shoot into it. While near-term fixes are in the works, they will only improve our ability to fight tomorrow's battles with yesterday's technology.[18] We are calling here for a revolution in how we organize, train, and equip ourselves for urban operations in the future.

We recognize that not everyone agrees with this plea for greater emphasis on the development of advanced technology solutions for the vexing problem of future urban operations, or even for military operations in general.[19] Nonetheless, the US military cannot allow itself to be deceived. Future urban operations will not be limited to stability operations against lightly armed paramilitary forces. We will fight real wars against real enemies in real cities. We must be prepared to fight and win these wars with the same level of effectiveness that we expect to achieve when we are engaging a large enemy armored force arrayed in rows across the desert sands. The advanced technology systems of the future will enable us to win the urban fight only if they are part of a broad effort that includes doctrinal innovations and fundamental changes in the way we organize, train, and equip our soldiers for urban warfare.

The 2025 Urban Warfighter System, when coupled with radical changes in how we prepare for and conduct military operations in urban terrain, will fundamentally alter the nature of urban warfare in the far-term future. The enhanced capabilities of future urban forces must enable relatively small numbers of highly trained soldiers to defeat significant enemy concentrations seeking to conduct operations within the confines of large urban areas. US forces must be able to successfully accomplish their missions while significantly reducing both collateral damage and the risk to US and noncombatant personnel to acceptable levels.

NOTES

1. Timothy L. Thomas, "The Caucasus Conflict and Russian Security: The Russian Armed Forces Confront Chechnya III. The Battle for Grozny, 1-26 January 1995," *The Journal of Slavic Military Studies*, 10 (March 1997), 78.
2. Charles C. Krulak, "The Three Block War: Fighting In Urban Areas," presented at National Press Club, Washington, D.C., 10 October 1997, *Vital Speeches of the Day*, 15 December 1997, p. 139.
3. For a summary view of the major arguments for this approach, see David Tucker, "Fighting Barbarians," *Parameters*, 28 (Summer 1998), 69-79. Also Lester W. Grau, "Bashing the Laser Range Finder With a Rock," *Military Review*, 77 (May-June 1997), 42-48.
4. Robert H. Scales, Jr., "The Indirect Approach: How US Military Forces Can Avoid the Pitfalls of Future Urban Warfare," *Armed Forces Journal International*, 136 (October 1998), 71-72.
5. Ralph Peters, "Our Soldiers, Their Cities," *Parameters*, 26 (Spring 1996), 43.
6. See especially William G. Rosenau, "Every Room Is a New Battle: The Lessons of Modern Urban Warfare," *Studies in Conflict & Terrorism*, 20 (1997), 371-94; and Russell Glenn, "Marching Under Darkening Skies: The American Military and the Impending Urban Operations Threat--A Status Check," RAND, DRR-1787-A, January 1998.
7. Scales, p. 74.
8. Many of these concepts are currently being developed in conjunction with the creation of Joint Pub 3-06, *Urban Operations*.
9. Rosenau, p. 386.
10. For a complete discussion of these concepts, see "Knowledge and Speed: Battle Forces and the U.S. Army of 2025, The 1998 Annual Report on the Army After Next Project to the Chief of Staff of the Army," 7 December 1998, pp. 8-11.
11. According to one report, "In one column alone, 102 out of 120 armored personnel carriers and 20 out of 26 tanks were destroyed by Chechen anti-tank fire." See Timothy L. Thomas, "The Russian Armed Forces Confront Chechnya: The Battle for Grozny, 1-26 January 1995 (part 1)," *Low Intensity Conflict & Law Enforcement*, 5 (Winter 1996), 411.
12. For a more extensive discussion about the possible uses of armor in urban terrain, see Ralph Peters, "The Future of Armored Warfare," *Parameters*, 27 (Autumn 1997), 50-59.
13. This limitation also applies to military operations in open terrain. For a detailed discussion of the limitations without land forces see Paul Van Riper and Robert H.

Scales, Jr., "Preparing for War in the 21st Century," *Parameters*, 27 (Autumn 1997), 4-14.

14. The Army is currently working on solving the situational awareness problems that have plagued forces operating in urban areas throughout much of recent history. The Situational Awareness System is "a computer and communications enhancement package for the Army's Land Warrior system that is expected to be fielded in three years. It will link together teams of 8-12 soldiers, an ideal size for the type of widely dispersed small unit operations that will define future urban operations." George I. Seffers, "Power on the Front Line," *Defense News*, 27 July - 3 August 1998, p. 19. For a compact, up-to-date status report on the Army's battle dress uniform of the future, see "News Call," *Army*, April 1999, p. 59.

15. Micro air vehicles and urban robots are already being developed for use by special operations forces. By 2025, much-enhanced versions of these capabilities will be resident throughout urban forces. George I. Seffers, "Special Operations Forces Want to Deploy With Robots," *Defense News*, 13-19 April 1998, p. 3.

16. "Biotechnology Workshop 2020, May 29-30, 1996: Analytic Report," SAIC Document No. 96-6968 (McLean, Va.: Science Applications International Corporation, undated), pp. 13-32.

17. "Infantry Branch Concept," US Army Infantry Center, Fort Benning, Ga., October 1997, and "J8, Land and Littoral Warfare Division Phase I Urban Operations Study, Phase I Final Report," 14 January 1999.

18. Current research and experimental efforts include the Military Operations in Urban Terrain Advanced Concept Technology Demonstration (MOUT ACTD), the USMC Urban Warrior experiments, and the upcoming Joint Contingency Force Advanced Warfighting Experiment. James A. Lasswell, "Wall to Wall: Sea Dragon's Next Phase Explores Urban Warfighting Tactics for the 21st Century," *Armed Forces Journal International*, January 1998, pp. 36-39.

19. Some continue to argue, perhaps correctly at this stage, that the Revolution in Military Affairs (RMA) is more rhetoric than revolution. For a summary of the main points why this may be so, see Michael O'Hanlon, "Can High Technology Bring U.S. Troops Home?" *Foreign Policy*, No. 113 (Winter 1998-99), 72-86.

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