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Preparing for the  
**PROVEN  
INEVITABLE**

**An Urban Operations Training Strategy  
for America's Joint Force**

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Prepared for the  
Office of the Secretary of Defense  
and U.S. Joint Forces Command

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# Summary

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## Overview

Urban operations have challenged and continue to challenge the world's most sophisticated militaries. Still reliant on technologies, doctrines, and training at times overly influenced by the Cold War—a period during which neither major adversary wished to fight in large metropolitan areas—operations in built-up areas have subsequently often proven unpleasantly difficult for U.S. forces. Despite the passage of more than a decade since the end of the Cold War and the momentous change in the strategic environment, the U.S. armed forces have thus far been unable to adequately reproduce the challenges their soldiers, sailors, marines, and airmen meet in the towns and cities of Afghanistan and Iraq.

That is not to imply that the Services of the U.S. military have ignored this challenge. The desperate October 1993 fighting on the streets of Mogadishu triggered U.S. Army development of a new type of urban training facility, one designed to be less like the pristine villages of northwest Europe and more akin to the chaotic environments found in densely populated areas of the developing world. The Marine Corps built “Yodaville,” an innovative training site in Arizona that vividly replicates the difficulties of engaging urban targets from aircraft. Service and joint simulation initiatives have likewise focused on efforts to better represent urban scenarios.

Such training initiatives influenced and were influenced by the simultaneous development of new Service and joint urban doctrine. Yet while both Service and joint doctrine received attention, im-

provements in urban training were almost exclusively limited to efforts within the four Services. Requests to Congress for urban training-facility construction reflected this Service centrism. As a result, the Senate Armed Services Committee requested a review of “the desired distribution and total number of [urban training] facilities, the extent to which MOUT [military operations on urbanized terrain] facilities can be shared among the military departments and active and reserve components, and whether such facilities are required at installations, such as Lackland Air Force Base, conducting basic and advanced training in addition to operational units.”<sup>1</sup> These issues are addressed as follows in the present analysis:

- “The desired distribution and total number of [urban training] facilities.” We explicitly recommend that urban training facilities capable of supporting a platoon (facilities we define as approximately 25 structures in size) be located at each home station permanently hosting a brigade or larger maneuver element. We further recommend development of four CONUS sites sufficient to train a battalion task force or larger (approximately 300 structures) and that each of the sites include a nearby air-ground urban training capability. The closeness of home-station installations and training demand are among the factors that influence our recommendations regarding the locations of these four facilities. We suggest that the facilities be located in the Kentucky–North Carolina–Georgia region; at Ft. Polk, LA; at Ft. Hood, TX; and in the U.S. southwest. These points are addressed on pages 230–240.
- “The extent to which MOUT facilities can be shared among the military departments and active and reserve components.” Our research further suggests that Service retention of urban

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<sup>1</sup> “National Defense Authorization Act for Fiscal Year 2003 Report [to Accompany S. 2514] on Authorizing Appropriations for Fiscal Year 2003 for Military Activities of the Department of Defense, for Military Construction, and for Defense Activities of the Department of Energy, to Prescribe Personnel Strengths for Such Fiscal Year for the Armed Forces, and for Other Purposes Together with Additional and Minority Views,” Senate Committee on Armed Services Report 107-151, May 9, 2002, p. 428.

training-site ownership is desirable given that the preponderance of such training will take place within the Services. However, that should by no means preclude joint use or inter-Service sharing of these facilities. Joint training either (1) does not require use of urban-specific facilities (e.g., upper-echelon headquarters training exercises), (2) can fulfill joint requirements via occasional use of Service capabilities (e.g., Joint National Training Center (JNTC) events conducted in 2004 and 2005), or (3) can be an organic part of training sponsored by a single Service. Joint usage, to include that by both active and Reserve components, is both feasible and desirable.<sup>2</sup> We further recommend that the joint community be assigned responsibility for the oversight and supervisory management of major urban training-facility scheduling; requests for funding to develop live, virtual, or constructive training capabilities; and allocation of funds provided for that development. A fuller discussion of these points appears on pages 251–256.

- “Whether such facilities are required at installations, such as Lackland Air Force Base, conducting basic and advanced training in addition to operational units.” This study deliberately maintains a focus on the establishment and maintenance of *joint* urban training capabilities. However, it also heartily endorses the traditional building-block approach to training, in which individual and smaller-unit readiness provides the foundation

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<sup>2</sup> Because the audiences for this study include both civilian and military at all echelons, the terms *requirement*, *capability*, and others such as *shortfall* are used throughout this study in accordance with their commonly understood definitions. This usage does not contradict but does at times expand word meanings beyond the specific usages noted in Joint Publication JP 1-02, *Department of Defense Dictionary of Military and Associated Terms*, April 12, 2001, as amended through May 23, 2003. For example, JP 1-02 defines a military requirement as “an established need justifying the timely allocation of resources to achieve a capability to accomplish approved military objectives, missions, or tasks.” Usage here at times includes this understanding but also appears in the sense of “something wanted or needed” (*Merriam Webster’s Collegiate Dictionary, Tenth Edition*, Springfield, MA: Merriam-Webster, 1997). The meaning of these and other terms should be apparent when taken in context. Our choice for use in a broader sense of meaning avoids reliance on other terms that have specific implications when employed in a military context but might lead to misunderstanding when read by a wider audience.

for developing preparedness at higher echelons. Recent increased emphasis on urban operations preparedness by joint and active and Reserve components is encouraging; initiatives focused on tactical-level preparation are notably so. Services should retain the responsibility and authority to determine the extent to which urban training is necessary at entry level and during advanced individual training. Such training would involve only the lowest echelons, e.g., squad clearing of rooms and air-ground controller instruction. Courses including such preparation would require limited urban-specific infrastructure. Underutilized portions of training bases or low-cost, purpose-built facilities should be sufficient to meet the majority of requirements. (The Dutch and British armies, for example, use very simple, partially open structures for room- and building-clearing instruction. The approximate 2005 cost of each such “building” was less than \$15,000 equivalent.) Some advanced individual and other school training (e.g., that supporting WMD-related instruction) will require more-substantial capabilities. As noted in the bullet immediately above, we recommend that requests for training facilities be forwarded to the joint entity assigned responsibility for reviewing such proposals and allocating funds for their construction (or their development, in the case of virtual and constructive training). The need for specialized training (in WMD) is addressed on pages 42, 111, 221–222, 227, 268.

This study identifies areas in need of redress and proposes ways in which the Services—Army, Navy, Marine Corps, and Air Force—and other critical components of national capability can better ready themselves cooperatively for future operations in cities around the world. The result is a joint urban training (JUT) strategy for the period 2005–2011. The foundation for this strategy is the current *Doctrine for Joint Urban Operations* presented in the joint publication of that name (JP 3-06). The guidance in JP 3-06 includes the valuable understand, shape, engage, consolidate, and transition (USECT) concept for joint urban operations (JUO). These five phases of an urban

operation are interdependent and overlapping. Together, they effectively articulate the nature of urban contingencies and the functions that Service and joint leaders must take into account.

We took a modular approach toward constructing the JUT strategy. A “module,” as used in this context, is a collection of resources normally associated with a type of facility, simulation, or other capability used in the design or execution of training. The modules ultimately selected collectively serve as the components of the JUT strategy developed in this study, meet all JUT requirements identified in the study to the extent feasible, and provide a means of comparing costs associated with very different capabilities. Requirement attainment, rather than dollar cost, becomes the primary metric for determining the value of a module and its suitability as a component of a comprehensive JUT strategy. Further, the modules are internally flexible. They can be adapted to allow for comparison of similar but not perfectly matched capabilities.

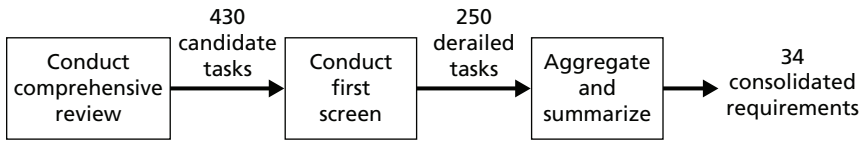
Centering the JUT strategy on modules led to a five-step analytical approach: (1) identify JUT requirements; (2) identify current and pending JUT capabilities; (3) identify the short-term (2005–2007) and longer-term (2008–2011) gaps between JUT requirements and capabilities; (4) complete initial steps toward a JUT strategy, including defining modules and assessing how well the modules address the final set of JUT requirements; and (5) complete the final steps toward a JUT strategy, including considering the costs of the modules used in developing the strategy in terms of their ability to meet JUT requirements, and address the short- and longer-term training shortfalls identified.

## **Identifying JUT Requirements**

Figure S.1 shows the three-step process by which we arrived at the final set of requirements used in the analysis.

The first step was a comprehensive review of Service and joint doctrine, various official and unofficial source materials, and input

**Figure S.1**  
**Process of Identifying Joint Urban Operations Training Requirements**



RAND MG439-S.1

from interview subjects, combatant commands, and Service representatives. This initial review produced 430 candidate tasks. The next step, conducting a first screen, eliminated tasks that were redundant or neither essentially joint nor urban; this reduced the list to 250 detailed JUT tasks. The third step consisted of further synthesis and aggregation of the 250 tasks into 34 consolidated tasks that are comprehensive (i.e., leave no pertinent tasks uncovered), of manageable scope, and appropriate to the assessment of capabilities.

It should be noted that these requirements overlap; it is infeasible to designate them in such a manner that they do not. Such is the complexity of military operational environments, a complexity increased multifold in cases where the environment involves a significant urban component. “Conduct stability operations in the urban environment” and “conduct support operations in the urban environment” are inseparable from “govern in the urban environment”; many subtasks are shared. Indeed, the same is true of “conduct stability operations” and “conduct support operations” when instability is an issue; without provision of employment, life’s necessities, and other forms of support, achievement of stability is virtually impossible. Definition of mutually exclusive requirements would be rife with artificiality—to fail in listing any of the requirements discussed below would risk leaving unidentified a critical element necessary in preparing the U.S. joint force for future contingencies.

Table S.1 shows the final set of 34 consolidated JUT requirements we derived and used in conjunction with JUT capabilities.

**Table S.1**  
**Consolidated Joint Urban Training Requirements**

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Avoid fratricide
Communicate in the urban environment
Conduct airspace coordination
Synchronize joint rules of engagement
Conduct stability operations in the urban environment
Conduct support operations in the urban environment
Conduct urban human intelligence (HUMINT) operations
Conduct urban signal intelligence (SIGINT), imagery intelligence (IMINT), measurement and signatures intelligence (MASINT), communications intelligence (COMINT), electronic intelligence (ELINT), and other intelligence efforts
Conduct urban operations exercises
Integrate urban operations with other relevant environments
Coordinate maneuvers in the urban environment
Coordinate multinational and interagency resources
Govern in the urban environment
Identify critical infrastructure nodes and system relations
Navigate in the urban environment
Plan urban operations
Provide common situational awareness
Provide fire support
Provide security during urban transition operations
Rehearse/war-game urban operations
Conduct urban noncombatant evacuation operations (NEOs)
Conduct U.S. domestic urban operations
Conduct urban combat search and rescue (CSAR)
Conduct urban operations during and after a WMD event
Consolidate success in the urban environment
Disembark, base, protect, and move in urban environments
Engage in the urban environment
Orchestrate resources during urban operations
Shape the urban environment
Sustain urban operations
Transition to civilian control
Understand the urban environment
Achieve simultaneity in meeting requirements
Conduct training across multiple levels of war

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Their ordering does not imply primacy or any other form of prioritization. Every task is essential to the development of a comprehensive JUT strategy for the period 2005–2011. All address at least one of the five USECT elements; many span several, if not all, of the demands inherent in understanding, shaping, engaging, consolidating, and transitioning during urban operations. The lack of prioritization, however, does not imply that some tasks will not be more significant than others for given JUT aspects. The tasks that are most important to a given combatant commander, subordinate joint commander, operation, or mission will vary. That variation will be reflected in the appropriate commander's joint mission-essential task list or other written guidance, including his personal prioritization of requirements to prepare for particular contingencies.

## Identifying JUT Capabilities

In identifying JUT capabilities, we focused on three capability groups that will play primary roles in the development of a JUT strategy: (1) purpose-built urban training sites (i.e., current and planned U.S. urban training sites and the capabilities found at such facilities), commonly called MOUT complexes; (2) the current and projected state of simulations, simulators, and training involving synthetic environments (hereafter collectively referred to as *simulations*); and (3) innovative or novel urban training sites. Such less-traditional approaches to urban training as those in this third category may offer benefits either in the generic sense or in cases of specific instructional needs. The approaches include the use of ships, factory complexes, abandoned urban areas, closed military installations, commercially available sites or those leased by public institutions, amusement parks, and other innovative complexes.

We relied on a wide range of sources in compiling the comprehensive list of facilities. Our ten-plus years of work in the urban operations field helped in expanding initial lists provided by the Office of the Secretary of Defense–Readiness. Searches of the U.S. armed forces Non-Classified Internet Protocol Network (NIPRNET), as

well as the Internet, expanded the roster and enhanced the information available on individual sites. These sources frequently contained references to other pertinent materials, allowing an inductive expansion of the initial source base. Additional lists provided by representatives from headquarters within the several Services and studies conducted prior to this effort further increased the number of facilities identified.

Starting with this comprehensive list of urban training sites, we then selected a set of those deemed to have the greatest potential to support joint preparation for urban operations. More specifically, sites were selected for their uniqueness or because they possessed characteristics thought to be of value in determining what JUT resources a site should possess. For these sites, we decided to gather more information through site visits or (when site visits were not feasible) off-location interviews. To facilitate this approach, we designed a site survey instrument which we used as a tool to guide the data collection effort, either sending it in advance to sites we visited or using it as part of the interview process for off-location interviews.

The selected urban training sites (both purpose-built and novel) are listed below, along with the way the information was collected (by site visit or by off-location interview). This list is not exhaustive of major urban training sites within the United States. Rather, it includes a significant sampling of urban training capabilities as well as others representative of the functions and approaches currently being employed in the preparation of American armed forces personnel for future urban undertakings:

- Camp Pendleton, CA (site visit)
- Twentynine Palms, CA (interview)
- Yodaville Training Range, Yuma, AZ (site visit)
- Yuma Proving Grounds “little Baghdad” test range, Yuma, AZ (interview)
- Nellis AFB, NV (site visit)
- Ft. Irwin, CA (site visit)
- Muscatatuck, IN (site visit)
- Joint Readiness Training Center, Ft. Polk, LA (site visit)

- Blackwater Inc., Moyock, NC, training facility (site visit)
- Ft. Knox, KY (site visit)
- 2nd Special Naval Warfare Group training facility, Norfolk, VA (site visit)
- Marine Corps Security Force training facility, Chesapeake, VA (site visit)
- Hurlburt Field, FL (site visit)
- Playas, NM (site visit)
- Dutch Army Oostdorp and Marnehuizen urban training facilities (site visits)
- British Army Copehill Down Village training facility (site visit) and Operational Training and Advisory Group (OPTAG) installation (interview)
- Bagram AFB, Afghanistan, urban training site (site visit)
- Ft. Benning, GA, McKenna MOUT site (site visit)

All the purpose-built sites identified, in both the comprehensive list and the screened list, contain some combination of five types of sites: (1) MOUT complexes; (2) urban target ranges; (3) shoot houses; (4) aerial ranges; and (5) temporary or façade ranges.

We also assessed simulation and simulated capabilities. In particular, we assessed many of the individual simulation and modeling systems—JANUS, JCATS, IUSS, OneSAF, Full Spectrum Warrior, Full Spectrum Command, Diamond, and MANA—available to the JUT community. Each of these was examined in terms of its near- and long-term application to urban operations training. We also explored enhanced versions of these systems, along with large-scale training systems that incorporate multiple simulations and can link to live exercises.

## **What Are the Shortfalls Between Requirements and Capabilities?**

Having enumerated JUT requirements and existing and planned JUT capabilities, we next examined the shortfalls between what is needed

to prepare the U.S. armed forces for urban operations and what exists in that regard. Eliminating, or at a minimum mitigating, the effects of these shortfalls is essential if America's joint force is to properly prepare for near- and longer-term challenges.

There are seven primary reasons why an organization might fail to meet a training requirement:

1. **Lack of capability.** Current capability cannot satisfy the requirement.
2. **Inadequate throughput capacity.** While capabilities are adequate to train for a requirement, there is an insufficient quantity of those capabilities available to accommodate joint training demand.
3. **Accessibility.** While there is sufficient capability and capacity, the capability is not available within the bounds of reasonable financial cost and travel time.
4. **Inadequate linkage or synchronization of capabilities.** Capabilities exist in sufficient capacity and accessibility, but they are geographically, functionally, or technologically separated to the extent that collective training requirements cannot be met. For example, live and virtual training capabilities exist that enable a pilot to engage targets in urban areas through a simulator while ground-based fire support coordinators (FSCs) occupy the area replicated on the pilot's screen. However, there is no effective link to allow the FSC and the pilot to communicate in real time and credibly appraise the effects of their respective actions or measure the utility of the interaction itself (though Voice over Internet Protocol (VoIP) technologies show considerable promise in this regard).
5. **Legal, regulatory, and policy constraints.** Environmental issues preclude using the full potential of otherwise effective JUT capabilities.
6. **Recognition of need.** If a requirement has only recently been identified, as may well be the case during periods of intense force commitment, no one may have previously recognized the need to train for it, regardless of whether a capability to do so exists.

7. **Training prioritization.** Unit commanders may choose to spend available training time or other resources on things other than JUT requirements.

The bulk of our study's JUT strategy development focused on the first four of these causes—lack of capabilities, inadequate throughput capacity, accessibility, and inadequate linkage or synchronization of capabilities, all of which relate to resource adequacy. These collectively address “what” is needed and “how much” of those capabilities will be sufficient to meet requirements.

Whether any one facility has the capability to actually address a requirement depends on a number of urban training-site characteristics that fundamentally impact a facility's potential as a joint training venue. These include the size/scope of the facility, how much urban complexity is represented at the site, types of forces accommodated, instrumentation in support of urban training, the existence of opposing force (OPFOR) and noncombatant role players, and the range of live-fire activities allowed at the site.

It is not enough to merely have a particular resource on hand for use by U.S. joint force elements. It is also essential to have a sufficient number of the required capabilities available. Adequate availability means that all personnel and organizations requiring training can obtain that training with the frequency necessary. Therefore, the problem is not only the number of capabilities, but also resource throughput capacity: How many organizations can cycle through the capability in a given unit of time?

Factors affecting throughput for a given facility include:

- Number of days needed for a unit to complete training at a facility;
- Standard of training required;
- Quality of instruction provided (related to number of days needed, as training quality will influence the time required to achieve task proficiency at a given standard);
- Potential for simultaneous use (personnel or unit training is complementary or the training resource is designed to allow for

independent but simultaneous use, e.g., separate Situation Tactical Exercises (STX) training);

- Initial level of student expertise;
- Perishability of skill(s) being taught;
- Availability of essential training augmentation (e.g., OPFOR, joint headquarters elements);
- Time necessary to maintain, adapt, or “reset” training capability between rotations;
- Amount of downtime required for trainees (e.g., leave, attendance at courses, deployments to active theaters).

Finally, environmental, safety, and other constraints limit the bounds of what can and will be accomplished through urban live training in the 2005–2011 period; thus, we assessed capabilities in terms of these constraints.

On the basis of the issues raised above and historical study, interviews with serving officers of all Services, and recent reports from active operations, we identified the shortfalls most critical to adequately preparing the U.S. joint force for urban undertakings.

As a result of these combined analyses, we also determined that the U.S. armed forces are thus far unable to adequately reproduce the challenges their soldiers, sailors, marines, and airmen meet in the towns and cities of Afghanistan and Iraq.

Several of the reasons for this shortcoming are immediately evident when one reviews the gaps between identified JUT requirements and existing live, virtual, and constructive training capabilities. The most evident is lack of size. Training in complexes of 25, 50, or even 150 buildings is inadequate preparation for actual tactical actions in which structures number in the hundreds, if not thousands or tens of thousands. That quantity of buildings implies correspondingly greater numbers of people, vehicles, infrastructures, and other elements that imbue actual cities with a complexity that is altogether lacking in current live exercises. Simulations supporting virtual and constructive training are unfortunately similarly overly simplistic. Regardless of how many buildings they might replicate, the notional behaviors of opposing forces and noncombatants fall far short of reproducing the

range of actual interactions and the scope of higher-order effects potentially precipitated by each action and decision.

Analogous oversimplification likewise inhibits the effectiveness of urban exercises that attempt to replicate the operational and strategic levels of war.<sup>3</sup> These exercises too greatly ease the burden on participants by focusing almost exclusively on combat operations, marginalizing the influence of agencies other than the Department of Defense (DoD), effectively ignoring noncombatants' support requirements or their attitudes toward the friendly force, and glossing over governing responsibilities. While much improvement is also necessary in both Service and joint tactical-level training, preparation at this stratum by and large employs the accepted building-block process of first schooling the components and then educating the larger units of which they are a part. The same cannot be said for readying those who participate in higher-level training events. Service and joint schools rarely address governing responsibilities, interfacing with indigenous populations, or urban concerns in general.

In urban operations, it is no longer enough to “train as you fight.” Winning battles is but one element of success, and often not the dominant one. Joint urban training must prepare the U.S. armed forces for the entirety of conflict's spectrum, the complete hierarchy of tactical to strategic; and it must integrate these many parts into a single whole, for that is what awaits its trainees overseas and, potentially, at home.

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<sup>3</sup> Although the levels of war are not formally delineated by echelon, a rough guide for determining what type of organization would tend to receive a given type of urban training is as follows (the overlap is deliberate):

- Strategic: joint staff, specified and unified commands, Service staffs.
- Operational level: combatant command, component, and large unit (e.g., corps, army, joint task force).
- Tactical: component organizations of corps and smaller size, smaller joint and Special Operations Forces (SOF) elements.

## Deriving JUO Training Modules

Given the identified shortfalls, we derived training modules that simultaneously include identified existing capabilities (including those pending in future years out to 2011) and those needed to close the shortfalls. We developed an original list of candidate modules and then assessed them in terms of their capability to close shortfalls. On the basis of that assessment, we eliminated some of the modules that did not adequately apply to the development of a JUO training strategy to produce the final set of modules to be used in constructing the strategy. All those removed have pertinence to Service or very limited joint applications, but their loss does not reopen any shortfalls closed in the original development of the modules.

We developed a modular approach because modules provide essential flexibility and adaptability. Instead of each individual training site or simulation being a module in and of itself, a training module consists of *categories* of facilities or simulations. This limits the number of modules to a manageable size. Defining modules in terms of categories also permits adaptation over time. Periodically editing module definitions will account for evolutions in field conditions, which means that a strategy that relies on a set of modules will not be rendered invalid as time progresses. Users can also adapt modules to account for change as capabilities change—as the joint community develops new training technologies, software, methods, or doctrine. Any financial impact of module modification can likewise be incorporated into an updated version. Thus, a training strategy that incorporates a given module can be adjusted, and the new costs associated with the strategy can be readily determined.

Table S.2 presents our first cut at training modules. The 39 modules listed are divided into five broad categories: (1) purpose-built facilities; (2) use of populated urban areas; (3) alternative/other training concepts; (4) simulation capabilities; and (5) training support elements. We then screened the 39 modules with respect to additional considerations. Only those that passed through all gradations

**Table S.2**  
**Initial List of 39 Modules**

No.	Module
<b>Purpose-Built Facilities</b>	
1	Battalion and larger purpose-built facility
2	Company purpose-built facility
3	Platoon purpose-built facility
4	Modular purpose-built facility
5	Façade-based facility
6	Commercially manufactured portable training facility
7	Hybrid facility
8	Air-ground facility
9	Shoot house
<b>Use of Populated Urban Areas</b>	
10	Terrain walks
11	Urban navigation
12	Urban simulated engagement
13	Urban live fire in populated areas
14	Use of vacant buildings in populated areas
15	Use of buildings scheduled for demolition
16	Use of public facilities during hours of closure
<b>Alternative/Other Training Concepts</b>	
17	Use of abandoned domestic urban areas
18	BRAC'd installations <sup>a</sup>
19	Ships as permanent urban training facilities
20	Mothballed ships temporarily used for urban training
21	Abandoned factories and surrounding urban infrastructure
22	Abandoned/constructed overseas urban areas
23	Use of existing other-agency and commercially available urban training facilities
24	Classroom instruction
25	Conduct of combatant command or joint task force (JTF) headquarters, large-scale schools, or multi-echelon/interagency exercises
<b>Simulation Capabilities</b>	
26	Tactical behaviors in and around structures
27	Higher-echelon planning and coordination
28	Joint, multinational, and interagency operations
29	Specialized-technology simulation
30	Scenario-variant generation
31	Physiological and other stress simulation
32	Geographically distributed joint simulation
33	Environmental degradation and urban biorhythm

**Table S.2 (continued)**

No.	Module
<b>Training Support Elements</b>	
34	Infrastructure trappings
35	OPFOR
36	Noncombatant role players
37	Targets to support urban training
38	Instrumentation/connectivity
39	Joint force headquarter(s)

<sup>a</sup>Installations subject to Base Realignment and Closure (BRAC).

of this sieving process merit possible inclusion in the ultimate training strategy design. The sieves, or categories of filters, through which the initial set of modules were viewed are:

- Does the module meet a sufficient number of JUT requirements? If so, does it provide the force with a sufficient level of proficiency?
- Are there environmental, ergonomic, or other considerations that make use of the module impractical?
- Is the module cost-effective in terms of dollars and time spent in its application to training?

In short, does a module provide sufficient joint training effectiveness to merit continued consideration as a component of a U.S. joint urban training strategy? The cost-effectiveness sieve was applied to the modules that made it through the first two sieves (cost-effectiveness is discussed in the following section).

In assessing how well a module filled each of our previously identified 34 JUT requirements, we assigned the module one of four ratings (the definitions of these ratings are our own):

- C. Permits achievement of a “crawl” standard of readiness, defined as attainment of foundation skills necessary as precursors to developing more-advanced skills or combinations of skills. A module supporting a “crawl” measure of ability would have to

support development of base-level skills translatable to application under actual operational conditions in the field.

- W. Permits achievement of a “walk” standard of readiness, defined as achievement of greater sophistication in task accomplishment and the ability to coordinate several “crawl”-level or other “walk”-level skills in servicing mission accomplishment. A module supporting attainment of a “walk” measure would require managing several skills under realistic field conditions sequentially or simultaneously as demanded by the situation.
- R. Permits achievement of a “run” standard of readiness, defined as accomplishment of complete operational preparedness (combat readiness, for missions involving combat action). A “run” status implies proficiency in all supporting tasks and the orchestration of those tasks to accomplish assigned missions. A module supporting attainment of a “run” status would have to provide sufficient challenge to replicate the most adverse operational conditions.
- S. “Supports” meeting a training requirement. A support module cannot fulfill the needs of the requirement under consideration by itself, but the use of such a module adds realism, provides additional challenges, or otherwise enhances another module in the attainment of a C, W, or R rating in servicing a requirement.

Table S.3 synthesizes the results. Leaving S entries unchanged, we assigned numerical values of 1, 2, and 3, to C, W, and R modules, respectively. Given that there are 34 requirements, the maximum score a module could achieve would be 102 (i.e., 34 times 3). As an example, the Module 1 score of 84 out of 102 is the result of 16 “run” evaluations (3s), 18 “walks” (2s), and 0 “crawls” (1s). If the module does not meet the “crawl,” “walk,” or “run” criteria for a particular requirement, it can either support other modules (receive an S rating) or not meet a requirement (be assigned a score of 0). The numerical effect is a score of 0 in either case.

**Table S.3**  
**Final List of Modules Retained**

No.	Module	Score
<b>Purpose-Built Facilities</b>		
1	Battalion and larger purpose-built facility	84
2	Company purpose-built facility	55
3	Platoon purpose-built facility	44
4	<del>Modular purpose-built facility</del>	<del>32</del>
5	<del>Facade-based facility</del>	<del>30</del>
6	<del>Commercially manufactured portable training facility</del>	<del>31</del>
7	Hybrid facility	81
8	Air-ground facility	31
9	<del>Shoot house</del>	<del>16</del>
<b>Use of Populated Urban Areas</b>		
10	Terrain walks	39
11	<del>Urban navigation</del>	<del>26</del>
12	<del>Urban simulated engagement</del>	<del>29</del>
13	<del>Urban live fire in populated area</del>	<del>18</del>
14	<del>Use of vacant buildings in populated area</del>	<del>32</del>
15	Use of buildings scheduled for demolition	41
16	Use of public facilities during hours of closure	52
<b>Alternative/Other Training Concepts</b>		
17	Use of abandoned domestic urban areas	90
18	BRAC'd installations	91
19	<del>Ships as permanent urban training facilities</del>	<del>34</del>
20	<del>Mothballed ships temporarily used for urban training</del>	<del>33</del>
21	Abandoned factories and surrounding urban infrastructure	40
22	Abandoned/constructed overseas urban areas	84
23	<del>Use of existing other agency and commercially available urban training facilities</del>	<del>34</del>
24	Classroom instruction	45
25	Conduct of combatant command or JTF headquarters, large-scale schools, or multi-echelon/interagency exercises	73
<b>Simulation Capabilities</b>		
26	Tactical behaviors in and around structures	38
27	Higher-echelon planning and coordination	43
28	Joint, multinational, and interagency operations	41
29	Specialized-technology simulation	18
30	Scenario-variant generation	1
31	<del>Physiological and other stress simulation</del>	<del>1</del>
32	Geographically distributed joint simulation	4
33	Environmental degradation and urban biorhythm	1

**Table S.3 (continued)**

No.	Module	Score
<b>Training Support Elements</b>		
34	Infrastructure trappings	2
35	OPFOR	10
36	Noncombatant role players	22
37	Targets to support urban training	1
38	Instrumentation/connectivity	3
39	Joint-force headquarter(s)	27

The crossed-out entries represent the modules that were deleted from the initial list because of their low scores during this ranking process. Several modules with very low numerical values were retained, however, because they contain many S ratings and therefore have value in conjunction with other modules that they support.

It is notable that many of these modules have application to operational challenges beyond those of urban missions. This is a sometimes less-than-obvious benefit of analyses involving urban environments: Much of the training and other preparation for urban contingencies applies to portions of the conflict spectrum well beyond operations in villages, towns, and cities. The greater densities and increased complexities found in urban areas mean that more often than not, a force prepared for action in built-up areas can readily adapt to other environments. The reverse is less often the case: Preparing for missions in deserts, jungles, or mountains leaves significant gaps in Service and joint readiness to conduct urban undertakings.

## Conducting Cost Analysis

As noted above, the modules must ultimately go through a third sieve to determine whether they are cost-effective in terms of dollars and time spent in application to training. Regardless of how effective a module is in addressing requirements, it will lead to its own demise if it does so at prohibitive cost.

To derive the costs of the modules, we followed standard DoD procedures, using a combination of engineering data, parametric analysis, analogy, and interviews with subject-matter experts. For analytical purposes, we did not include certain costs that are generally common to all modules (e.g., local transportation), nor did we include minor costs that would not be germane to the conclusions derived from the assessments, e.g., those associated with coordinating use of a facility. Operational training costs for such items as controllers and role players are provided separately, while other operational training costs for such things as range safety and scheduling are not included because they are generally encompassed in base operation budgets, regardless of the range used or the type of training conducted. Finally, the joint training tasks are not ammunition- or equipment-intensive, so costs of these items are not included.

As a starting point, we constructed a comprehensive cost-breakdown structure and then modified that structure as needed to accommodate the specific characteristics defining each of the modules. Ultimately, the assessment focuses on the life-cycle cost categories of investment (nonrecurring) and sustainment (recurring). Because detailed costs were not available for many of the modules, we used aggregate recurring and nonrecurring costs. When more than one source of costs was available for a module, we used blended costs in developing our estimate. Each module was assessed on a life-cycle basis, using standard factors for discount rates and inflation derived from the Army's FORCES cost-model website. The *DoD Facilities Costs Factors Handbook* was used as a source of data and methodology. To the extent possible, all costs were computed on a constant FY2004 dollar basis and then discounted to their net present value.

In summary, many of the training modules (primarily those eliminated from final consideration) are of marginal value for training large numbers of people because of capacity limits. Thus, they should be considered as niche training opportunities that could be part of an annual training budget or Service initiative rather than part of a long-term JUO training investment strategy.

Examining costs of the individual modules leads to the observation that the investment strategy should be based on the approaches adopted in answering the following three questions:

1. Is joint training a separate entity or an augmentation of Service preparation?
2. Should the training capabilities be built, adapted, rented, or acquired in other ways?
3. Should virtual and constructive training be alternatives or supplements?

### **Question 1. Joint Training: A Separate Entity or an Augmentation of Service Preparation?**

The structures, facilities, and simulations in which joint training takes place are almost exclusively Service structures, facilities, and simulations. The trainees might be Service individuals or units or people staffing joint headquarters. These considerations bear on how to cost the different modules for joint training. For example, if a new purpose-built facility is needed purely to satisfy a joint training requirement, its associated costs could be determined as exclusively joint. However, the cost is incremental and possibly minimal if the joint training requirement could be satisfied by adding it to an existing training regimen at a Service facility or occasionally using that facility for a joint-headquarters-controlled urban exercise. Another possibility might be that the joint requirement adds a day or more to an existing urban training regimen at an existing facility; this could ultimately require more facilities—or possibly not. It depends on throughput needs. These approaches tend to imply that the primary training audience is in most cases a Service unit or individual and that the joint training requirement is contextual to the training. However, the training audience might also be an inherently joint organization, such as a joint force headquarters. Because much training at this level will involve primarily higher-echelon staffs rather than maneuver units, deployment to a live urban training facility might not be needed. Simulation or conduct of a joint headquarters exercise at

some generic location could well be sufficient. Ultimately, the investment strategy must account for either the full cost of new JUT means or the incremental cost to existing training means.

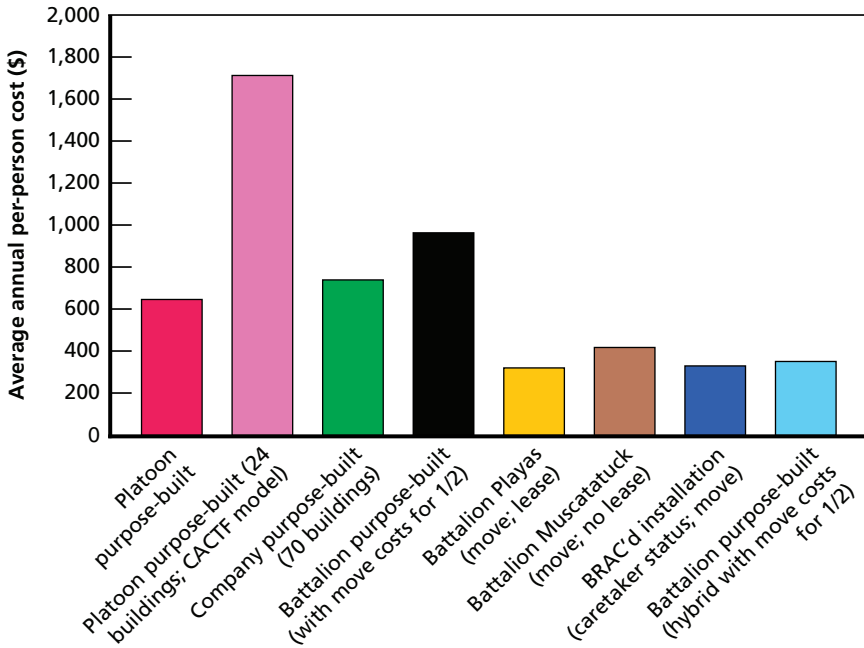
### **Question 2. Build, Adapt, Rent, or Otherwise Acquire Training Capabilities?**

There are two primary tradeoffs for an investment strategy. The first is between building training facilities and structures at installations where soldiers, sailors, airmen, and marines are located and moving them to existing facilities and structures that can be bought or leased. In essence, is it more effective to build at facilities heavily populated with user units or to move those units to fewer sites used by organizations from multiple installations? The second tradeoff is between building battalion-sized facilities and building smaller ones. Both of these options depend on troop density at installations, throughput requirements, availability of non-purpose-built facilities, and the distances to such field training capabilities.

To address this question, we analyzed selected training modules and compared their costs on an annual cost-per-person basis. Specifically, we examined three modules in which facilities are built at installations where a substantial number of tactical units are home-based. For costing purposes, no transportation expenses are associated with them. A fourth module involves movement of half the personnel that use it to its location from remote sites (i.e., installations not in the immediate vicinity of the training capability). Such travel is not an unrealistic demand given that the facility offers the opportunity for an entire battalion to train simultaneously for urban operations. Three other modules require movement of all trainees to the sites from remote home stations. The last module involves a hybrid facility, one that also hosts half of its trainees from remote locations. Figure S.2 shows these modules and their related per-person costs.

The first four modules have high initial (first-year) construction costs and substantial sustainment costs thereafter relative to the size of the unit they can host. The other four modules represent facilities capable of supporting training for up to a battalion-size unit.

**Figure S.2**  
**Average Annual Cost per Person (FY2005–FY2011) Based on a 30-Year Life Cycle**



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Several points stand out. First, the use of an abandoned commercially owned urban area, a BRAC'd facility, or other less-traditional sites tends to be notably less costly on a per-person-trained basis than more-familiar purpose-built alternatives. (It is notable that the U.S. Army is already investigating the suitability of Cannon AFB, which appeared on the spring 2005 BRAC list, as a possible large-scale urban training facility.) Second, the all-movement modules (those requiring all users to travel significant distances to train) are economical for round-trip travel of up to about 2,500 miles; they become more costly after that. Third, non-hybrid purpose-built facilities are costly, as noted, and combined arms collective training facility (CACTF) designs (given that they meet a standard of training only up to a platoon at a time) are extraordinarily so. Fourth, the calcula-

tions shown here are based on live urban training usage rates of about 210 days per year. If more days of training take place, the efficiency of the purpose-built modules increases faster than that of modules requiring movement. Fifth, the comparison is not complete until costs associated with the *total* number of these types of facilities is factored into the calculations (i.e., so that total Service and/or joint force throughput can be calculated). Increasing the total number of purpose-built facilities does not impact *average* costs as long as the facilities are used to the capacity used for computations here. However, total costs do increase as facilities increase in number. For example, if five separate, 70-building, company-size purpose-built facilities are needed to train the force, the average cost per person for this option is about \$750, the same as that for a single such facility, but the total costs quintuple.

Sensitivity analysis on movement distance and even on training-rotation duration raises a sixth and final point. Increasing movement distance increases the per-person costs of those options involving movement. Options with the most other costs change least with movement distance. Increasing movement distance from 1,000 to 3,000 miles round trip increases the per-person costs of most of the move modules to higher than that for some of the platoon and company purpose-built modules. The hybrid facility is the least expensive on a per-person basis. At a round-trip distance of 5,000 miles, the all-move modules approach the per-person costs of the battalion purpose-built module. This analysis suggests that regional movement options are more cost-effective than national ones. If movement distances tripled, (non-CACTF) platoon and company purpose-built facilities would be competitive on a cost-per-person basis.

Decreasing training-rotation duration to less than seven days has the effect of decreasing per-person cost proportionally for the purpose-built facilities (halving duration halves per-person cost) and not changing per-person cost as significantly for the options requiring movement. In contrast to the effect of movement distance above, here the recurring and nonrecurring costs are the costs that go down on a per-person basis. The platoon purpose-built facility and the company purpose-built facility become competitive with the move

options. The hybrid option is the least expensive over the broadest range of durations. Also, there is interplay between reduction in rotation duration and increases in movement distance that is not captured in this analysis. Decreases in event duration would lead to more than half of the trainees moving to fixed facilities, because facility capacity would now be higher, compared with local population density.

### **Question 3. Virtual and Constructive Training: Alternatives or Supplements?**

The potential capabilities, and the resultant value, of virtual and constructive training will continue to increase during the 2005–2011 period. However, the inherent complexity of urban areas and the difficulty of determining likely second-, third-, and higher-order effects means that computing requirements will tend to demand greater capabilities than can be provided by software advances or PC hardware in this time frame. Simulations will abet the quality of urban training, but advances in the virtual and constructive realms will be insufficient to allow them to serve in other than a complementary role to live training in most cases.

## **Developing and Implementing a DoD-Wide JUO Training Strategy**

### **Developing the Strategy**

Several guidelines and conditions influence the development of a JUO training strategy:

- The training strategy must be comprehensive.
- The training strategy must be dynamic.
- Much improvement is needed in lower tactical-level JUO training, but the greatest shortfalls are at the highest echelons.
- U.S. trainers must remain in “receive mode.”
- Joint training modules are only some of a training strategy’s building blocks.

- Systems of effective capabilities underpin successful training.
- Even the best training and the most effective training strategy can sometimes not fully prepare a force.
- Size has a quality all its own. Corollary 1: Size can be cheated. Corollary 2: If the consequences of an action in an urban area are not reflected during training, the instruction is flawed.
- Bigger is better. Bigger and denser is better yet.
- If a capability exists in the field, find a way to replicate it for training.
- The total training audience in, around, or over an urban training site may not equate to the number of personnel actually receiving substantive urban training on relevant requirements.
- Simulations, virtual and constructive training, and synthetic environments will not be capable of fully replacing live training during the 2005–2011 period.
- Promote innovation; reconsider proven methods.

Furthermore, development of JUT standards is essential. Standards are fundamental to the design and development of joint doctrine, exercises, experiments, simulations, and live training facilities. They establish uniformity across the Services and guide the development of supporting Service standards, doctrine, and training. They provide similar, if less prescriptive, guidance to the many non-U.S. militaries that look to our nation as they seek to develop their capabilities in the urban arena.

With these guidelines in mind, we developed a short-term and a longer-term strategy to meet the requirements at the R capability level. Table S.4 summarizes the results of the strategy. Five of the 34 requirements (shaded in the table) cannot be met by any of the modules developed: (1) conduct urban human intelligence (HUMINT) operations; (2) provide fire support; (3) consolidate success in the urban environment; (4) shape the urban environment; and (5) transition to civilian control. Of the 29 remaining requirements, 13 can be met in the short term by a combination of Module 25—conduct of combatant command or JTF headquarters, large-scale school, or multi-echelon/interagency exercises (12 modules)—and Module 10—

**Table S.4**  
**Summary of Short-Term and Longer-Term Strategies**

Requirements	Module Can Meet Requirement at R Level	
	Short Term	Longer Term
Avoid fratricide		Module 18
Communicate in the urban environment		Module 7
Conduct airspace coordination		Module 18
Synchronize joint rules of engagement		Module 18
Conduct stability operations in the urban environment	Module 25	
Conduct support operations in the urban environment	Module 25	
Conduct urban HUMINT operations	No module	No module
Conduct urban SIGINT, IMINT, MASINT, COMINT, ELINT, and other intelligence efforts	Neither selected module	Neither selected module
Conduct urban operations exercises	Module 25	
Integrate urban operations with other relevant environments	Module 25	
Coordinate maneuver in the urban environment		Module 18
Coordinate multinational and interagency resources	Module 25	
Govern in the urban environment	Module 25	
Identify critical infrastructure nodes and system relations	Module 25	
Navigate in the urban environment	Module 10	
Plan urban operations	Module 25	
Provide common situational awareness		Module 18
Provide fire support	No module	No module
Provide security during urban transition operations		Module 18
Rehearse/war-game urban operations		Module 18
Conduct urban noncombatant evacuation operations (NEOs)		Module 18
Conduct U.S. domestic urban operations		Module 18
Conduct urban combat search and rescue (CSAR)		Module 18
Conduct urban operations during and after a WMD event	Neither selected module	Neither selected module
Consolidate success in the urban environment	No module	No module
Disembark, base, protect, and move in urban environments		Module 18
Engage in the urban environment		Module 18
Orchestrate resources during urban operations	Module 25	
Shape the urban environment	No module	No module
Sustain urban operations		Module 18

Table S.4 (continued)

Requirements	Module Can Meet Requirement at R Level	
	Short Term	Longer Term
Transition to civilian control	No module	No module
Understand the urban environment	Module 25	
Achieve simultaneity in meeting requirements	Module 25	
Conduct training across multiple levels of war	Module 25	
<b>Total Requirements Met</b>	<b>13</b>	<b>14</b>

terrain walks (1 module). (Additionally, but not shown in Table S.4, Module 24—classroom instruction—training can lend a “walk” level of preparedness in 8 of these 12 instances and a “crawl” level in another three, an excellent example of how building-block training can provide preparation for both more-complex training events and real-world undertakings, since the classroom instruction could provide the training needed for maximizing the benefit derived from higher-echelon exercises.) There is further good news: High-level headquarters and similar exercises are fairly economical, costing an estimated \$2.9 million to \$7.1 million per event if the headquarters deploys and the event includes links to units in the field. Such deployment and outside-organization participation are often not necessary, allowing for the conduct of such events at lower cost. That these events could address more than one-third of the requirements of concern means that the return for dollar invested is excellent. Further, classroom JUO training outlays are negligible, as they are properly measured more in terms of opportunity costs than of dollar expenditures (the loss of course instruction on topics that would be covered is the time not being spent on urban material).

The thirteenth requirement that is readily within “run” training status for units in the immediate term is “navigate in an urban environment.” Module 10, terrain walks in actual urban areas, provides this opportunity, again at little cost. Nearby towns or cities offer the training environment necessary, although commanders wanting to challenge their personnel with unfamiliar terrain may choose to go farther afield.

With those 13 requirements addressed in the short term (and five that cannot be met by any module), 16 requirements remain to be met in the longer term ( $34 - 13 - 5 = 16$ ). Five modules address varying amounts of these requirements:

- Module 1: Battalion-size and larger purpose-built facility (addresses 10 of the 16);
- Module 7: Hybrid facility (addresses 9 of the 16);
- Module 17: Use of abandoned domestic urban areas (addresses 11 of the 16);
- Module 18: BRAC'd installations (addresses 13 of the 16);
- Module 22: Abandoned/constructed overseas urban areas (addresses 9 of the 16).

Of these five modules, we found Module 22 to be of limited value to this analysis. Abandoned or constructed overseas facilities should not be relied on as primary urban training capabilities (except for the occasional instance in which U.S. units are located in close proximity to such assets). Module 1 is very attractive from an availability perspective in that DoD will own such battalion-size and larger purpose-built facilities, but the high cost of this option, especially when movement is necessary for use, is a serious drawback (see Figure S.2 above). A drawback to Module 17 is that users may have to move considerable distances to use abandoned domestic urban areas. Further, availability is questionable unless DoD leases civilian-owned facilities on a long-term basis, a key concern during unpredictable times when surge training is essential, as was the case for preparation in support of operations in Iraq and Afghanistan throughout 2004 and into 2005. Restrictions on live fire and environmentally related issues are also likely at these facilities. Finally, the realistic life expectancy of these facilities is estimated to be only five years, barring considerable upkeep, meaning that DoD would inherently be relying on civilian entities to find and develop such sites repeatedly, and to do so in a manner conducive to sophisticated military exercises. The risk in that regard seems a significant one.

Given these concerns, we chose the remaining two modules, Module 18 and Module 7, for further analysis. Module 18 is immediately attractive because it addresses all but three of the outstanding requirements (13 out of 16), more than any other option. A reconsideration of how such facilities might be managed potentially enhances this attractiveness. Original BRAC'd facility cost estimates assumed use on a lease basis, with user payments being a fairly economical \$10,000 per day (average) and annual expenses being a rather low \$3 million to \$3.6 million. However, this option would be potentially even more economical if DoD were to retain ownership of one or more closed military installations, and the cost estimates would share many of the characteristics of the armed forces using an abandoned civilian area, but with the added benefit of retaining complete control. This would comprise less a BRAC than transition of an installation from one set of functions to another (e.g., from housing a headquarters to support of urban training). Benefits would be numerous, including less negative impact on the local civilian community (e.g., retention of jobs). This social/political benefit is potentially quite significant. The residents in the vicinity of Muscatatuck, IN (previously a state educational facility now employed by the National Guard for urban training), are in many ways very supportive of the military assuming responsibility for the site, because of the economic benefits continued use promises for the local community.

An added attraction of the BRAC-transition/BRAC'd facility lease option is the potential to select future and already BRAC'd facilities from locations that minimize travel times for potential user units. An offshoot of this option is the use of parts of active installations that have been abandoned or are underutilized, as was done in selecting the location for the relatively recently opened urban training site at Ft. Lewis, WA.

BRAC review procedures and other considerations would need to be revised for those facilities thought to have potential use as urban training sites if the BRAC-transition option is adopted. Moreover, as attractive as this alternative is, it suffers from the major shortfall that establishing facility availability is difficult. Base closures—in truth, any significant alteration of a military facility's status—involve

lengthy and multiple processes over which DoD has only partial control. Practical implications and military necessity will have only limited impact on decisions. This should not be an argument for abandoning initiatives to develop such resources, especially in cases of already closed locations, but common sense dictates consideration of other options.

We therefore propose Module 7—purpose-built hybrid facilities—as a backup. Such facilities support only nine of the outstanding 16 JUT requirements at a “run” level of readiness, but they include some of the same ones as Module 18 does. Module 7 also includes one—communicating in the urban environment—that is not at a “run” level in Module 18.

### **Implementing the Strategy**

We also examine some of the key considerations in developing a JUO training investment strategy, including what to build; how many facilities to build; the best locations for battalion- and larger-capable BRAC, hybrid, or other types of urban training facilities; and what should be upgraded among current capabilities.

Regarding what, how many, and where to build, we advise construction of an urban training facility capable of supporting at least a platoon at every installation that is a home station for a ground maneuver element of brigade or larger size. Such a facility should consist of 25 or more structures (depending on the underlying terrain, building type and density, and other factors); it may be purpose-built, created from existing underutilized portions of the installation, or a combination of these and other alternatives.

In addition, a minimum of four brigade-size or larger urban training complexes are needed, each with an adjacent or nearby air-ground training capability. The brigade-size sites should include some 300 structures (with the same qualifications noted above) and both OPFOR and noncombatant role-player support for all units conducting training. Based on factors such as proximity of Service home stations and major training rotations, we determined that one of these four facilities should be included in each of the following locations or regions:

- The Kentucky–North Carolina–Georgia area
- Ft. Polk, LA
- Ft. Hood, TX
- The U.S. southwest, likely in the vicinity of Twentynine Palms and Ft. Irwin, CA

Improving existing facilities (e.g., Ft. Polk’s Shugart-Gordon) is one way of creating such capabilities. Transitioning installations selected for BRAC is the most desirable option when such an alternative is available in the desired locations, and in fact we recommend that suitability for use as urban training sites be an element of consideration during BRAC review. Hybrid facilities constructed from combinations of existing building complexes, purpose-built facilities, movable façades, and the like are an alternative to BRAC facilities for creation of brigade-size training sites. Regardless of their makeup or origin, the number of supporting noncombatant role players should better replicate real-world conditions, where civilians almost inevitably outnumber combatants. (This is but one issue that needs to be addressed during the development of heretofore largely nonexistent OPFOR and noncombatant role-player doctrine.)

A building-block approach to both Service and joint urban training is crucial: Individual and lower-echelon proficiency is key to successful training at higher echelons. The recommendations for platoon- and brigade-size facilities reflect this dictate. There is a very significant need to do likewise for higher-echelon staffs and leaders. Current Service and joint classroom training fails to adequately prepare U.S. armed forces personnel for urban contingencies. Exercises for military and civilian leaders at these higher echelons are similarly too rare and, when conducted, generally fail to adequately challenge participants. The result is that the nation’s military and other leaders at the upper tactical, operational, and strategic levels require training involving the full spectrum of urban operations, including related instruction, such as that pertaining to governing, to address notable shortfalls.

Hard decisions need to be made regarding which urban-related simulations merit retention and which do not, who should have

authority for urban facility scheduling, and responsibility for both creating JUT standards and overseeing the funding of urban training initiatives. We recommend that these be assigned to a joint entity, one given responsibility for the oversight of armed-forces-wide urban training in the interest of efficiency, joint cooperation, and better training.

Four challenges should be examined in implementing the training strategy: (1) whether to build “born joint” training facilities or to employ Service capabilities in support of JUO training; (2) whether a joint entity should assume authority for coordinating range usage; (3) whether the joint community should have oversight of range funding; and (4) the need for joint urban live, virtual, and constructive training standards.

Figure S.3 provides a concise overview of how primary actions in the recommended JUT strategy should be undertaken during the 2005–2011 period. The modules associated with each action appear in parentheses after the descriptions in the first column.

Finally, Table S.5 provides an illustrative cost estimate for the proposed strategy. A number of factors will impact the actual cost of implementation, including the number of BRAC’d (versus hybrid) facilities used for urban training, the ultimate disposition of units returning to the United States from Germany and elsewhere, combatant commander decisions about whether to conduct urban-related exercises, and choices about the types and numbers of OPFOR and noncombatant role-player capabilities.

## Concluding Thoughts

Having laid the foundations for a JUO training strategy, we present some concluding thoughts on the process of developing that strategy. First, there is a **need to improve linkage of lessons from the field and joint force urban training**. Taking lessons from operations and training and passing them to those who can benefit is key to success-

**Figure S.3**  
**Overview of How Primary Actions of the JUO Training Strategy Should Be Undertaken During the 2007–2011 Period**

Event (module numbers)	2005	2006	2007	2008	2009	2010	2011
• Conduct higher-echelon joint and interagency exercises, supporting training (24, 25)	[Bar spanning 2005 to 2011]						
• Establish joint urban training and simulation standards (All)	[Bar spanning 2005 to 2006]						
• Establish and maintain JUT standards for BRAC evaluation	[Bar spanning 2005 to 2006]						
• Enhance Ft. Polk and SW U.S. facilities to battalion+ capacity (7, 8, 18, 34, 37, 38)	[Bar spanning 2006 to 2009]						
• Construct platoon facilities on all brigade+ installations (3, 34, 37)	[Bar spanning 2006 to 2009]						
• Identify Ft. Hood and E U.S. battalion+ facility sites (7, 8, 18, 34, 37, 38)	[Bar spanning 2005 to 2006]						
• Build Ft. Hood and E U.S. battalion+ sites (7, 8, 18, 34, 37, 38)	[Bar spanning 2006 to 2009]						
• Conduct JUT simulation study (26, 33)	[Bar spanning 2006 to 2007]						
• Develop JUT simulation funding programs (26, 33)	[Bar spanning 2007 to 2008]						
• Develop real-time cockpit-ground simulation replication (26, 29, 33)	[Bar spanning 2008 to 2011]						
• Develop full-spectrum operational level of war urban simulation (26, 28, 30, 32)	[Bar spanning 2006 to 2008]						
• Establish urban OPFOR and noncombatant role-player doctrine (35, 36)	[Bar spanning 2005 to 2006]						
• Construct urban WMD training facility (3, 36, 37)	[Bar spanning 2006 to 2008]						
• Improve urban targets/arrays (34, 37)	[Bar spanning 2005 to 2011]						

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fully implementing a JUO training strategy. It is both an area of demonstrated success and one requiring further enhancement. The measure of success or failure is, as always, men's and women's lives.

Second, it is critical to **avoid conducting JUO training in isolation**. Both the joint community and the Service community will be well served by supporting specific individual training in preparation for as-yet-unidentified contingencies and to complement pre-deployment instruction after arrival in a theater of operations. The

**Table S.5**  
**Estimated Costs for Sample JUT Strategy Implementation (\$ millions)**

	2005	2006	2007	2008	2009	2010	2011	Total
Headquarters/JTF exercises <sup>a</sup> (7/year)	7.6	7.5	7.3	7.1	6.9	6.8	6.6	49.8
Classroom training	0	0	0	0	0	0	0	0
Navigation training	0	0	0	0	0	0	0	0
OPFOR support for headquarters/JTF exercises <sup>b</sup>	27.0	27.0	27.0	27.0	27.0	27.0	27.0	189.0
Noncombatant role-player support for headquarters/JTF exercises <sup>c</sup>	5.3	5.3	5.3	5.3	5.3	5.3	5.3	37.1
BRAC (realigned/transition) <sup>d</sup>	0	1.5	1.4	1.3	1.3	5.4	1.2	12.1
Hybrid facility <sup>d</sup>	189.0	2.1	2.0	1.9	1.9	30.1	1.8	228.8
Platoon facility <sup>e</sup>	227.9	2.4	2.4	2.3	2.2	40.8	21.6	299.6
Air-ground facilities <sup>f</sup>	133.0	1.6	1.6	1.5	1.5	1.4	1.4	142.0
Joint headquarters support <sup>e</sup>	7.5	7.5	7.5	7.5	7.5	7.5	7.5	52.5
Fire-team simulations <sup>e</sup>	8.3	7.4	7.3	7.8	6.9	6.6	7.2	51.5
OPFOR support for BRAC/hybrid facilities <sup>g</sup>	35.4	35.4	35.4	35.4	35.4	35.4	35.4	247.8
Noncombatant role-player support for BRAC/hybrid facilities <sup>h</sup>	28.8	28.8	28.8	28.8	28.8	28.8	28.8	201.6
<b>Totals</b>	<b>669.8</b>	<b>126.5</b>	<b>126.0</b>	<b>125.9</b>	<b>124.7</b>	<b>195.1</b>	<b>143.8</b>	<b>1,511.8</b>

<sup>a</sup> Cost of headquarters exercises is (Annual cost for JTF Foxtrot alternative)(7 exercises/year).

<sup>b</sup> OPFOR support for headquarters/JTF exercises is assumed at 50 personnel (one-tenth of an OPFOR battalion) (7 exercises/year).

<sup>c</sup> Noncombatant role-player support is assumed at (25 personnel)(7 exercises/year).

<sup>d</sup> This estimate assumes one of the four battalion or larger and air-ground facilities is a BRAC (transition to urban training use) site. The remaining three are assumed to be hybrid facilities. Costs here are for the ground facility only.

<sup>e</sup> See discussion in Chapter Seven.

<sup>f</sup> One per battalion or larger ground facility. For estimate purposes, two of the four are assumed to be close to parts (thus reducing shipping costs of materials).

<sup>g</sup> It is assumed that units conducting training at platoon-size facilities provide their own OPFOR. It is also assumed that each battalion or larger training facility has a permanent active duty OPFOR company of 120 personnel. The costs are therefore  $(\$42M/site)(120/570)(4 sites) = \$35.4M$ .

<sup>h</sup> It is assumed that units conducting training at platoon-size facilities provide their own noncombatant role players. It is also assumed that each battalion or larger training facility has a permanent noncombatant role player cadre of 10 individuals at \$30,000/year, 20 specialty individuals (e.g., representing specific cultures or with particular language skills), and 300 others paid \$100/day for 210 days of training per annum. Given four sites, the annual cost is  $[\$0.300M + \$0.600M + (300)(\$100)(210)](4) = \$28.8M$ .

need to govern and the need to meet the demands for better inter-agency cooperation are but two examples of instruction that overlaps urban and other instruction. While villages, towns, and cities do impose greater and sometimes unique difficulties, those designing and conducting urban training should recognize and capitalize on instruction involving other aspects of military operations as well. Further, the many demands of urban operations have to be incorporated in higher-echelon instruction. Exercises need to replicate the difficulties inherent in coordinating air, maritime, ground, and SOF component theater fires; intelligence activities; information operations; and logistics, including passage of personnel and supplies through urban aerial and sea points of debarkation (APODs and SPODs). Service and joint headquarters at multiple echelons should practice the command and control linkages and simultaneous use of urban areas of operation, control made more difficult by the fact that such towns and cities also house the daily residences and workplaces of thousands or millions of members of the indigenous population. JTF and other headquarters will similarly need to synchronize their activities with, support, or coordinate information campaigns with Special Operations foreign internal defense (FID), civil affairs (CA), psychological operations (PSYOP), and other missions in and around urban areas.

Third, there is a need to **train for both the generic and the specific**. Every urban area is unique, but all have common characteristics. Structures have more in common than do the people who inhabit them; training in buildings that look somewhat different from those in an operational theater can still be very effective. In short, from the standpoint of building design (whether in live, virtual, or constructive capabilities), sites that possess a variety of construction types, building materials, traveled ways, infrastructure (e.g., open sewerage versus enclosed), and other elements, either within a given site or between various sites, will serve trainees well. Trainers should seek to design capabilities that can be tailored to specific environments at minimal cost in time and funds (e.g., changing signs into regional languages and altering the nature of refuse, animals, furniture, stairwell and door locations and design, rooftop profiles, and the like). Designing “generic” training sites and adapting existing sites so that they can

better reproduce conditions similar to those of current and near-term likely threat conditions will provide frames on which regionally specific details can be draped. This is true of synthetic terrain as well. (However, advances in speed and reductions in the cost of designing synthetic terrain based on actual theaters are such that calls for generic designs of synthetic terrain may diminish in the later years addressed by this strategy.)

Fourth, **there is a need to decide on the issue of instrumenting facilities to monitor performance and provide feedback during after-action reviews (AARs).** While we were uncommitted at the beginning of this study, we now tend to support greater reliance on a human-in-the-loop to monitor training. Cameras and supporting equipment are expensive both at the time of purchase and during ongoing maintenance and replacement because of upgrade demands or wear-and-tear. Instrumentation for the larger facilities called for in this study would likely be extremely expensive. Funding to support increased realism seems to provide a greater return on the training investment.

Fifth, **there is a need to decide on the value/importance of urban live-fire training.** Given the extraordinary safety precautions necessary for live-fire training, the impact on other training at an urban training site, and the too often exceptional preparation times taken to fire a low number of rounds, it is important to carefully consider the benefit gained from such training before forgoing similar training using less-than-lethal rounds. While we recognize the need for such exercises in some instances, a live-fire capability is not considered a necessary characteristic of large urban facilities designated for use in joint training.

Sixth, **there is a need to continue innovating in targetry.** Targetry innovation should be encouraged, as should the more formal developments in targetry that proceed apace with it. Targets and target arrays for pilots, in particular, could benefit from further development. To better prepare pilots for actual urban operations, moving targets must be intermixed with arrays of innocent civilians and private vehicles; dust, light, electronic, and other interference during en-

gements must be reproduced; and there must be a general increase in the complexity of the targeting process.

A JUT strategy is a starting point for more work. It provides guidance. It suggests a framework for understanding. But most of all, it imparts a responsibility to develop programs, plans, and guidance that address the many details needed to implement the strategy. It advises how those implementing should write doctrine (itself another form of guidance), spend funds, design instruction, and modify organizations in support of the objectives that initially motivated the strategy's development. In short, this study is an opportunity for many to participate in the refinement, augmentation, and constant maintenance of the JUO training strategy.