Combined Arms
Obstacle Integration

Contents

Preface ............................................................. ix

CHAPTER 1. OBSTACLES AND THE COMBINED ARMS TEAM
Historical Use of Obstacles ..................................... 1-1
Characteristics of Obstacles .................................... 1-2
Dynamics of Combat Power and Obstacle Integration . 1-3
     Maneuver .................................................. 1-3
     Firepower .................................................. 1-3
     Protection ............................................... 1-3
     Leadership ............................................... 1-4
Other Obstacle Considerations ............................... 1-4
     Obstacle Clearing .................................... 1-4
     Effects on Noncombatants ......................... 1-5

CHAPTER 2. OBSTACLE FRAMEWORK
Obstacle Classification ....................................... 2-1
Existing Obstacles ............................................. 2-1
Reinforcing Obstacles ........................................ 2-1
     Tactical Obstacles .................................... 2-1
     Directed Obstacles ................................... 2-2
     Situational Obstacles ............................... 2-2
Reserve Obstacles ............................................ 2-3
Tactical Obstacle Design .................................... 2-3

DISTRIBUTION RESTRICTION: Approved for public release; distribution is unlimited.
CHAPTER 3. OBSTACLE-INTEGRATION PRINCIPLES

Intelligence .................................................. 3-1
   Analyze the Terrain ..................................... 3-1
   Determine Enemy Force Size ............................ 3-2
   Determine Enemy Vulnerability .......................... 3-2
Obstacle Intent ............................................. 3-2
   Target ................................................. 3-2
   Obstacle Effect ...................................... 3-2
   Relative Location .................................... 3-2
Fires and Obstacle Effect ................................. 3-2
   Fires and Disrupt Effect ............................... 3-3
   Fires and Turn Effect ................................ 3-4
   Fires and Fix Effect .................................. 3-6
   Fires and Block Effect ................................. 3-8
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstacles and Operations in Depth</td>
<td>3-10</td>
</tr>
<tr>
<td>Deep Operations</td>
<td>3-10</td>
</tr>
<tr>
<td>Close Operations</td>
<td>3-10</td>
</tr>
<tr>
<td>Rear Operations</td>
<td>3-11</td>
</tr>
<tr>
<td>Obstacle Control</td>
<td>3-11</td>
</tr>
<tr>
<td>Support Current Operations</td>
<td>3-11</td>
</tr>
<tr>
<td>Maximize Subordinate Flexibility</td>
<td>3-12</td>
</tr>
<tr>
<td>Facilitate Future Operations</td>
<td>3-12</td>
</tr>
<tr>
<td>Echelons of Obstacle Planning</td>
<td>3-13</td>
</tr>
<tr>
<td>Corps-Level Planning</td>
<td>3-13</td>
</tr>
<tr>
<td>Division-Level Planning</td>
<td>3-14</td>
</tr>
<tr>
<td>Brigade-Level Planning</td>
<td>3-15</td>
</tr>
<tr>
<td>Task-Force-Level Planning</td>
<td>3-16</td>
</tr>
<tr>
<td>Company-Team-Level Planning</td>
<td>3-16</td>
</tr>
</tbody>
</table>

### CHAPTER 4. OBSTACLE PLANNING AT CORPS, DIVISION, AND BRIGADE LEVELS

<table>
<thead>
<tr>
<th>Sub-Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision-Making Process and Obstacles</td>
<td>4-1</td>
</tr>
<tr>
<td>Mission Analysis</td>
<td>4-1</td>
</tr>
<tr>
<td>Determine Facts and Develop Assumptions</td>
<td>4-3</td>
</tr>
<tr>
<td>Intelligence Estimate</td>
<td>4-4</td>
</tr>
<tr>
<td>Logistics Estimate</td>
<td>4-4</td>
</tr>
<tr>
<td>Fire-Support Estimate</td>
<td>4-4</td>
</tr>
<tr>
<td>Engineer Estimate</td>
<td>4-4</td>
</tr>
<tr>
<td>Analyze Higher Headquarters' Mission and Commander's Intent</td>
<td>4-4</td>
</tr>
<tr>
<td>Intent</td>
<td>4-5</td>
</tr>
<tr>
<td>AOs and Deception</td>
<td>4-5</td>
</tr>
<tr>
<td>Tasks</td>
<td>4-5</td>
</tr>
<tr>
<td>Limitations</td>
<td>4-5</td>
</tr>
<tr>
<td>Assets Available</td>
<td>4-5</td>
</tr>
<tr>
<td>Risks</td>
<td>4-5</td>
</tr>
<tr>
<td>Time Analysis</td>
<td>4-5</td>
</tr>
<tr>
<td>Analyze Relative Combat Power</td>
<td>4-6</td>
</tr>
<tr>
<td>Issue Commander's Guidance</td>
<td>4-6</td>
</tr>
<tr>
<td>Course-of-Action Development</td>
<td>4-6</td>
</tr>
<tr>
<td>Course-of-Action Analysis</td>
<td>4-7</td>
</tr>
<tr>
<td>Decision and Execution</td>
<td>4-9</td>
</tr>
<tr>
<td>Recommendation and Decision</td>
<td>4-9</td>
</tr>
<tr>
<td>Plans and Orders</td>
<td>4-9</td>
</tr>
<tr>
<td>Execution and Supervision</td>
<td>4-10</td>
</tr>
<tr>
<td>Division Defensive Scenario</td>
<td>4-11</td>
</tr>
<tr>
<td>Mission Analysis</td>
<td>4-11</td>
</tr>
</tbody>
</table>
CHAPTER 5. OBSTACLE PLANNING AT TASK-FORCE LEVEL AND BELOW

Obstacle Planning at Task-Force Level ........................................ 5-1
Mission Analysis ................................................................. 5-1
  Determine Facts and Develop Assumptions .......................... 5-1
  Analyze Relative Combat Power ....................................... 5-2
  Analyze Higher Headquarters' Mission and Commander's Intent .. 5-2
  Issue Commander's Guidance .......................................... 5-2
Course-of-Action Development ............................................. 5-2
  Fires Analysis .................................................................. 5-3
  Obstacle Intent Integration ............................................. 5-3
  Obstacle Priorities .......................................................... 5-3
Course-of-Action Analysis ..................................................... 5-3
  Mobility Requirements ................................................... 5-4
  Obstacle Design and Resourcing ......................................... 5-4
Decision and Execution ....................................................... 5-4
  Scheme-of-Obstacles Overlay .......................................... 5-5
  Obstacle-Execution Matrix ............................................. 5-5
Task-Force Obstacle Scenario .............................................. 5-5
Obstacle Planning Below Task-Force Level ......................... 5-8
  Coordination with the Maneuver Commander ...................... 5-9
  Siting the Obstacle ....................................................... 5-11
  Obstacle Turnover and Transfer ...................................... 5-13

CHAPTER 6. RESERVE OBSTACLES

Employment Principles ....................................................... 6-1
Responsibilities ................................................................. 6-1
  Authorizing Commander ................................................ 6-2
  Guard Commander .......................................................... 6-3
  Firing Commander .......................................................... 6-3
Reserve-Obstacle Planning Considerations ........................................ 6-3
  Additional Facts and Assumptions .............................................. 6-6
  Fires Analysis ........................................................................... 6-7
  Obstacle Intent Integration ......................................................... 6-7
  Obstacle Priorities .................................................................... 6-8
  Mobility Requirements ............................................................. 6-8
  Obstacle Design and Resourcing ................................................. 6-8
  Decision and Execution ............................................................. 6-8
  Scheme-of-Obstacles Overlay .................................................... 6-8

Obstacle-Execution Matrix .......................................................... 6-8
Demolition Order ........................................................................ 6-11
Rehearsals .................................................................................. 6-11

CHAPTER 7. SITUATIONAL OBSTACLES

Employment Principles ................................................................ 7-1
  Identify the Need ....................................................................... 7-1
  Plan for Resources ..................................................................... 7-1
  Integrate with Friendly Fires ...................................................... 7-2
  Plan the Obstacles ..................................................................... 7-2
  Identify Execution Triggers ....................................................... 7-2
  Withhold Execution Until Needed ............................................. 7-2

Situational Obstacles in the Defense .......................................... 7-2
Situational Obstacles in the Offense ........................................... 7-2
Situational Obstacle Planning ...................................................... 7-4
  Mission Analysis ...................................................................... 7-4
  Course-of-Action Development ............................................... 7-5

Course-of-Action Analysis .......................................................... 7-5
  Fires Analysis .......................................................................... 7-6
  Obstacle Intent Integration ....................................................... 7-7
  Obstacle Priorities .................................................................... 7-7
  Mobility Requirements ............................................................ 7-7
  Obstacle Design and Resourcing ............................................. 7-7

Decision and Execution ............................................................... 7-9
  Scheme-of-Obstacles Overlay ................................................ 7-9
  Situational -Obstacle-Execution Matrix .................................. 7-9
  Rehearsals ............................................................................... 7-9
  Execution .................................................................................. 7-12

CHAPTER 8. PROTECTIVE OBSTACLES

Types of Protective Obstacles ...................................................... 8-1
  Hasty Protective Obstacles ....................................................... 8-1
  Deliberate Protective Obstacles ................................................. 8-1
Employment Guidelines .......................................................... 8-1
Integrating .............................................................................. 8-2
Emplacing Unit ........................................................................ 8-2
Emplacing Authority ............................................................... 8-2
Planning Level ......................................................................... 8-2
Resourcing ............................................................................... 8-2
Reporting, Recording, and Tracking ...................................... 8-3
Protective-Obstacle Planning .................................................. 8-3
Mission Analysis ...................................................................... 8-3
     Protective-Obstacle Bands .................................................. 8-3
     Band One .......................................................................... 8-3
     Band Two .......................................................................... 8-3
     Band Three ........................................................................ 8-4
     Band Four .......................................................................... 8-4
     Protective-Obstacle Capabilities ....................................... 8-4
Course-of-Action Development ............................................. 8-5
Course-of-Action Analysis ..................................................... 8-5
Decision and Execution .......................................................... 8-5
     Fires and Observation ......................................................... 8-5
     Obstacle Integration ........................................................... 8-5
     Obstacle Priorities .............................................................. 8-5
     Mobility Requirements ...................................................... 8-5
Obstacle Design and Resourcing .......................................... 8-7
     Band One .......................................................................... 8-8
     Band Two .......................................................................... 8-9
     Band Three ........................................................................ 8-9
     Band Four .......................................................................... 8-9
Sources for Materials ............................................................. 8-9
     Unit Basic Load ................................................................. 8-9
     Push Packages ................................................................... 8-9
     Requisitioned Material ....................................................... 8-9
     Other Design Considerations ............................................. 8-10
     Employment in Depth ......................................................... 8-10
     Obstacle Protection ........................................................... 8-10
Protective-Obstacle Overlay .................................................. 8-11

APPENDIX A. INDIVIDUAL OBSTACLES

Individual Obstacle Types ..................................................... A-1
Demolition Obstacles ............................................................ A-1
     Bridges ............................................................................. A-1
     Road Craters ...................................................................... A-1
Abatis ................................................. A-2
Constructed Obstacles .......................... A-2
Wire Obstacles ..................................... A-2
Tetrahedrons and Hedgehogs .................. A-4
Antitank Ditches .................................. A-4
Land Mines ......................................... A-5
Conventional Mines ................................ A-5
Scatterable Mines ................................. A-6
Improvised Obstacles ............................. A-6
Complex Obstacles ............................... A-6
Phony Obstacles ................................... A-6
Individual Obstacle Designs .................... A-7
Armor Threat ....................................... A-7
Width ................................................ A-7
Depth ............................................... A-7
Antitank Mines ................................... A-7
Antipersonnel Mines ............................. A-8
Antihandling Devices ............................ A-8
Irregular Outer Edges (IOEs) .................... A-8
Light Threat ....................................... A-8
Width ................................................ A-8
Depth ............................................... A-8
Antitank Mines ................................... A-8
Antipersonnel Mines ............................. A-8
Antihandling Devices ............................ A-8
Irregular Outer Edges ............................ A-8
Individual Obstacle Array ........................ A-9

APPENDIX B. OBSTACLE NUMBERING, REPORTING, RECORDING, AND TRACKING

Obstacle Numbering ................................ B-1
Obstacle Reporting ................................ B-4
Report of Intention ................................ B-5
Obstacle-Control Measures ..................... B-5
Operation Plan .................................... B-5
Report of Initiation ............................... B-5
Report of Completion ............................ B-5
Additional Reports ............................... B-5
Report of Progress ............................... B-5
Report of Transfer ............................... B-8
Obstacle Recording ............................... B-8
Obstacle Tracking ................................................................. B-8

APPENDIX C. OBSTACLE RESOURCING AND SUPPLY OPERATIONS

Obstacle Resourcing .......................................................... C-1
  Requirement-Based Resourcing ....................................... C-1
  Capability-Based Resourcing ......................................... C-5

Obstacle Supply Operations ............................................... C-6
  Obstacle Resupply Nodes ............................................. C-9
    Class IV/Class V Supply Point .................................... C-9
    Mine Dump .................................................................... C-10
  Obstacle Resupply Rules ............................................. C-11

Obstacle Supply Locations ................................................ C-11
  Carrying Capacity ....................................................... C-11
  Traffic Circuit ............................................................ C-11
  Camouflage and Cover ................................................ C-11
  Defense ........................................................................ C-11
  Time ............................................................................. C-11
  Operators ................................................................... C-11

Obstacle Material Resupply Methods ................................... C-11
  Supply Point ................................................................. C-13
    Advantages ............................................................... C-13
    Disadvantages ........................................................ C-13
  Service Station .......................................................... C-13
    Advantages ............................................................... C-14
    Disadvantages ........................................................ C-14
  Tailgate ....................................................................... C-16
    Advantages ............................................................... C-17
    Disadvantages ........................................................ C-17

GLOSSARY ........................................................................... Glossary-1

REFERENCES ..................................................................... References-1

INDEX ............................................................................... Index-1
Preface

Field Manual (FM) 90-7 is intended for the combined arms commander and staff. It encompasses doctrine established in FMs 5-100, 6-20 series, 71-100, 100-5, and 100-7. The doctrine presented in the following chapters seeks to develop the full potential of obstacles as a component of combat power. Each chapter contains tactics, techniques, and procedures (TTP) that take the doctrinal foundation and provide the “How To” connection.

This manual initially defines and establishes the principles for obstacle operations then applies them at echelons from corps to company team, concentrating on essential TTPs. Chapter 2 provides the key obstacle terms that will be used throughout the manual. Chapter 3 covers obstacle integration theory. Chapter 4 covers obstacle planning from corps through brigade level. Chapter 5 covers obstacle planning from task force (TF) through company team level. Chapters 4 and 5 build on the foundations in Chapters 1 through 3 and establish echelon-specific TTPs. Chapters 6 through 8 provide considerations for specific types of obstacles.

Three appendixes provide the additional tools that facilitate successful planning and execution. Appendix A provides information on individual obstacles. Appendix B addresses the critical activities in reporting, recording, and tracking. Finally, Appendix C describes obstacle resourcing and supply.

Throughout this manual, the terms brigade, TF, and company team are used to refer to all friendly brigade-, battalion-, and company-size units (to include cavalry units) unless otherwise noted. The terms regiment, battalion, and company are used only when referring to enemy units unless otherwise noted.

This publication implements international Standardization Agreement (STANAG) 2017.

The proponent for this publication is Headquarters (HQ), United States (US) Army Training and Doctrine Command (TRADOC). Submit comments and recommendations on Department of the Army (DA) Form 2028 and forward it to: Commandant, US Army Engineer School, ATTN: ATSE-T-PD-P, Fort Leonard Wood, MO 65473-6500.

Unless otherwise stated, masculine nouns and pronouns do not refer exclusively to men.
Obstacles are any characteristics of the terrain that impede the mobility of a force. Some obstacles, such as mountains, rivers, railway embankments, and urban areas, exist before the onset of military operations. Military forces create other obstacles to support their operations. Commanders use these obstacles to support their scheme of maneuver. When integrated with maneuver and fires, obstacles can create a decisive battlefield effect. Obstacle plans must mature as the commanders' plans mature.

HISTORICAL USE OF OBSTACLES

History shows that obstacles rarely have a significant effect on the enemy if units do not integrate them with friendly fires. The following historical vignette from World War II is an example of obstacles that were not integrated with fires.

In February 1942, an engineer lieutenant with two noncommissioned officers (NCOs) received orders to supervise the installation of a minefield to support the defense of an American infantry battalion near the Kasserine Pass in Tunisia. The lieutenant set off at 1930 hours with a truckload of mines, to link up with one of the infantry battalion's companies. The company was to provide him with a work detail to install the mines and, more importantly, provide the location of the minefield.

At 2330 hours, he arrived at the infantry company command post (CP), but no one at the CP could tell him the whereabouts of the work detail. Nor could anyone tell him where the minefield should go or what role the minefield was to play in the defense. The company executive officer (XO) told the engineer to go down the road in the direction of the enemy. He assured the lieutenant that somewhere along the road he would meet someone who undoubtedly was waiting for him.

At 0130 hours, the lieutenant returned to the CP after searching along the road and finding no one. He insisted on speaking with the infantry company commander who was sleeping. The infantry company commander told the lieutenant that he would provide him with a forty-man detail, led by an infantry lieutenant who would show the engineer where to install the minefield.

At 0330 hours, the infantry lieutenant showed up with a twelve-man detail. Apologizing for the small number of men, the infantry lieutenant also told the engineer