SAFETY

The minimum safe distances for personnel in the open when detonating explosives are given in Table 6-1.

Table 6-1. Explosives minimum safe distances

EXPLOSIVES KG (LB)	SAFE DISTANCE. M (FT)	EXPLOSIVES KG (LB)	SAFE DISTANCE. M (FT)
.45 to 12.3 (1 to 27)	300 (900)	68.0 (150)	534 (1.590)
13.6 (30)	311 (930)	79.8 (175)	560 (1.680)
16.3 (35)	327 (980)	90.7 (200)	585 (1.750)
18.1 (40)	342 (1.020)	102.4 (225)	609 (1.820)
20.8 (45)	356 (1.070)	113.8 (250)	630 (1.890)
22.7 (50)	369 (1.100)	125.1 (275)	651 (1.950)
27.2 (60)	392 (1.170)	136.0 (300)	670 (2.000)
31.8 (70)	413 (1.240)	147.8 (325)	688 (2.070)
36.3 (80)	431 (1.290)	158.8 (350)	705 (2.100)
40.8 (90)	449 (1.330)	170.5 (375)	722 (2.160)
45.4 (100)	465 (1.390)	181.4 (400)	737 (2.210)
57.1 (125)	500 (1.500)	193.2 (425)	750 (2.250)
		227.3 (500)	800 (2.400)

For charges over 227.30 kg (500 lb).
distance in feet = $300 \sqrt[3]{\text{Pounds of explosives}}$

Safe distance in meters = $100 \times \sqrt[3]{\text{Pounds of explosives}}$

Minimum distance of personnel in a missile-proof shelter is 91.4 m (300 ft)

Explosives may be prematurely detonated by induced currents. Table 6-2 gives distances that transmitters may detonate explosives by transmitted-induced currents.

Table 6-2. Premature detonation by induced currents

MINIMUM SAFE DISTANCE FROM TRANSMITTER ANTENNAS	
AVERAGE OR PEAK TRANSMITTER POWER	MINIMUM DISTANCE TO TRANSMITTER
WATTS (NOTE)	M (FT)
0-30	30 (96 4)
30-50	50 (164.1)
50-100	110 (360 9)
100-250	160 (524 9)
250-500	230 (754 6)
500-1 000	305 (1.000 6)
1.000-3.000	480 (1 574 8)
3 000-5.000	610 (2 001 3)
5 000-20.000	915 (3.001 9)
20 000-50 000	1.530 (4 921 2)
50 000-100.000	3.050 (9.824 1)

NOTE When the transmission is a pulsed or pulsed continuous wave type and its pulse width is less than 10 microseconds The left hand column indicates average power for all other transmissions. including those with pulse widths greater than 10 microseconds The left hand column indicates peak power

Electric power lines Electric firing should not be performed within 155 meters of energized power transmission lines When it is necessary to conduct blasting operations at distances closer than 155 meters to electric power lines. nonelectric firing systems should be used or the power lines deenergized

CAUTION If electric blasting caps are to be transported near operating transmitters or in vehicles (including helicopters) in which a transmitter is to be operated. the caps will be placed in a metal can the cover of which must be snug fitting and lap over the body of the can to a minimum depth of one-half inch Caps will not be removed from container in proximity to operating transmitter unless the hazard has been evaluated and estimated to be acceptable (ammo can)

Misfires should be handled by the person who placed the charge. Thirty minutes must be allowed for "cook-off" on all nonelectric or buried charges. Above ground misfires should be blown in place by priming at least 1 pound of explosive placed as close as possible to the charge without disturbing it. Buried misfires should be carefully excavated to no closer than 1 foot from charge and then blown in place with at least 2 pounds of explosive. Do not attempt to move or disarm a misfire and do not abandon misfired explosives.

EXPLOSIVE CHARACTERISTICS

Table 6- 3 shows the main characteristics and uses of military explosives.

Table 6-3. Military explosives characteristics

EXPLOSIVE	USAGE	DET VEL (FPS)	RE FACTOR	SIZE, WEIGHT, AND PACKAGING
TNT	Breaching	23,000	1.00	1 lb, 48-56/Box; ½ lb, 96-106/Box
Tetrytol	Breaching	23,000	1.20	8-2½ lb/Sack; 2 Sacks/Box
C-4 M5A1 and M112	Cut and Breach	26,000	1.34	M5A1: 24-2½ lb Blks/Box M112: 30-1¼ lb Blks/Box
Sheet Exp M118 M186	Cutting	24,000	1.14	4-½ lb Sheets/Pack with 20 Packs per Box (1 Sheet 3" x ¼" x 12") 3-25 lb Rolls/Box (50' long)
Dynamite M1	Qry/Stump/Ditch	20,000	0.92	100-½ lb Sticks/Box
Det Cord	Priming	20,000 - 24,000		3-1,000' Rolls or 8-500' Rolls/Box
Crater Charge	Craters	8,900	0.42	1-40 lb Cannister/Box
Bangalore M1A2	Wire and Breaching	25,600	1.17	10-5' Sections/Box (176 lb)
Shaped Charges M2A4 M3A1	Cutting Holes	 25,600 25,600	 1.17 1.17	 4-15 lb Shaped Charges/Box 1-40 lb Shaped Charge/Box

NOTES: 1. Dynamite which is to be submerged under water for a period exceeding 24 hours must be waterproofed by sealing in plastic or dipping in pitch.
2. The C-4 which is to be used under water must be kept in packages to prevent erosion.
3. Cratering charges will malfunction in the ammonium nitrate is exposed to moisture.
4. Fumes produced by detonating or burning explosives are dangerous.

PRIMING EXPLOSIVES

Explosives may be primed with detonating cord (Figure 6-1), electrically or nonelectrically.

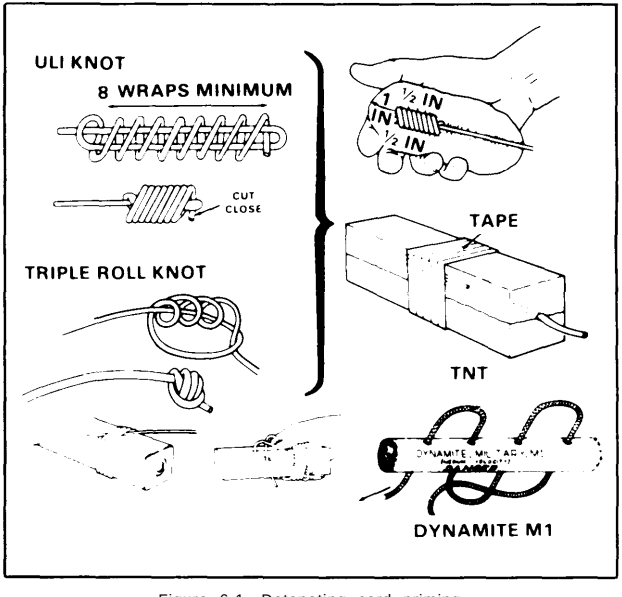


Figure 6-1. Detonating cord priming

FIRING SYSTEMS

Firing systems may be electric or nonelectric. A dual-firing system is two completely separate systems that may be dual electric, dual nonelectric, or a combination. See Figure 6-2 for details.

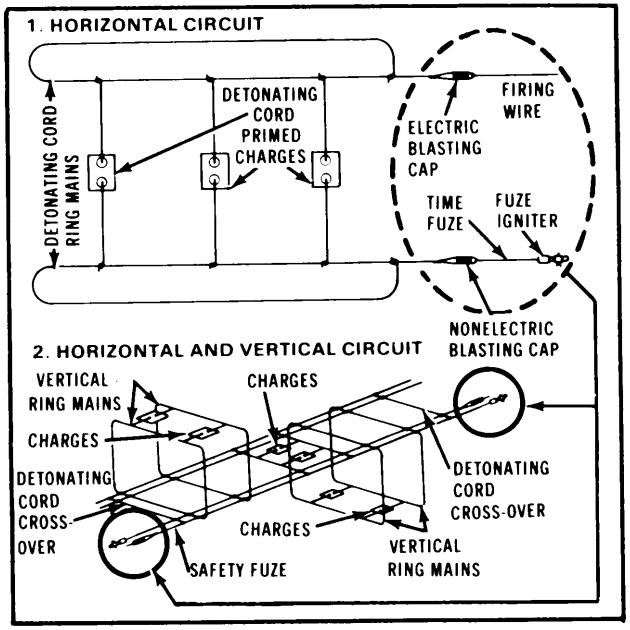


Figure 6-2. Combination dual-firing system

CHARGE CALCULATIONS

General steps are shown in Figure 6-3.

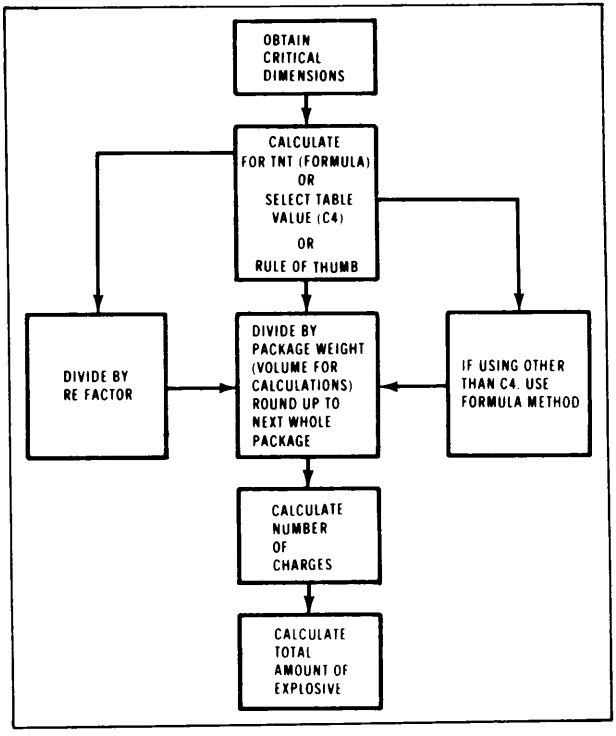


Figure 6-3. Explosive calculation steps

Steel Cutting Charges

See Figure 6-4 and Table 6-4.

FORMULA	USE
$P = \frac{1}{8} A$	Cut beams, columns, girders, steel plates, any structural steel section, bars 2 inches thick or over.
$P = D^2$	Cut high carbon or alloy steel (2 inches or less)
Where:	P = Pounds of TNT A = Cross-section area in square inches of D = Thickness or diameter in inches

Figure 6-4. Steel cutting formulas

Steel cutting rules of thumb

The required explosive is either TNT or plastic explosive (RE factor conversion is not needed.)

Rails (cut preferably at crossings switches, or curves). Cut at alternate rail splices for a distance of 500 feet.

Less than 5 inches high - use ½ pound.
Five inches or higher - use 1 pound.
Crossings and switches - use 1 pound.

Cables, chains, rods, and bars.

Up to 1 inch diameter use - 1 pound.
Over 1 inch to 2 inches - use 2 pounds.
Over 2 inches - use P = (⅛) A or suitable dimensional type charge.

NOTE: Chain and cable rules are for those under tension. Both sides of chain link must be cut.

Table 6-4. C4 needed to cut steel sections

THICKNESS OF SECTION CM (IN)	KILOGRAMS (POUNDS) OF C4 FOR RECTANGULAR STEEL SECTIONS OF GIVEN DIMENSIONS WIDTH OF SECTION IN CM (IN)													
	5.1 (2)	7.6 (3)	10.2 (4)	12.7 (5)	15.2 (6)	20.3 (8)	25.4 (10)	30.5 (12)	35.6 (14)	40.6 (16)	45.7 (18)	50.8 (20)	55.8 (22)	61 (24)
0.6 (¼)	.1 (.2)	.1 (.3)	.2 (.3)	.2 (.4)	.2 (.5)	.3 (.6)	.4 (.8)	.5 (.9)	.5 (1)	.6 (1.2)	.6 (1.3)	.7 (1.5)	.8 (1.6)	.8 (1.8)
1.0 (⅜)	.1 (.3)	.2 (.4)	.2 (.5)	.3 (.6)	.4 (.7)	.5 (.9)	.5 (1.1)	.6 (1.3)	.7 (1.5)	.8 (1.8)	.9 (2)	1 (2.1)	1.1 (2.4)	1.2 (2.6)
1.3 (½)	.2 (.3)	.2 (.5)	.3 (.6)	.4 (.8)	.5 (.9)	.6 (1.2)	.7 (1.5)	.8 (1.8)	1 (2.1)	1.1 (2.3)	1.2 (2.6)	1.3 (2.9)	1.5 (3.2)	1.6 (3.4)
1.6 (⅝)	.2 (.4)	.3 (.6)	.4 (.8)	.5 (.9)	.5 (1.1)	.7 (1.5)	.9 (1.8)	1 (2.2)	1.2 (2.5)	1.3 (2.9)	1.5 (3.2)	1.6 (3.5)	1.8 (3.9)	2 (4.3)
1.9 (¾)	.2 (.5)	.4 (.7)	.5 (.9)	.5 (1.1)	.6 (1.3)	.8 (1.8)	1 (2.1)	1.2 (2.6)	1.4 (3)	1.6 (3.4)	1.8 (3.8)	2 (4.3)	2.2 (4.7)	2.4 (5.1)
2.2 (⅞)	.3 (.6)	.4 (.8)	.5 (1.1)	.6 (1.3)	.7 (1.5)	1 (2.1)	1.2 (2.5)	1.4 (3)	1.6 (3.5)	1.8 (4)	2.1 (4.5)	2.3 (5)	2.5 (5.5)	2.7 (5.9)
2.5 (1)	.3 (.6)	.5 (.9)	.6 (1.2)	.7 (1.5)	.8 (1.8)	1.1 (2.3)	1.3 (2.9)	1.6 (3.4)	1.8 (4)	2.1 (4.5)	2.4 (5.1)	2.6 (5.6)	2.9 (6.2)	3.1 (6.8)

NOTE Rounded up to next 1/10 pound and kilogram

Use table to:
1. Measure rectangular sections of member separately
2. Find charge for each section
3. Add charges for sections to find total charge
4. If dimension is not on table, use next larger dimension

Emplacement of charge and sample problem

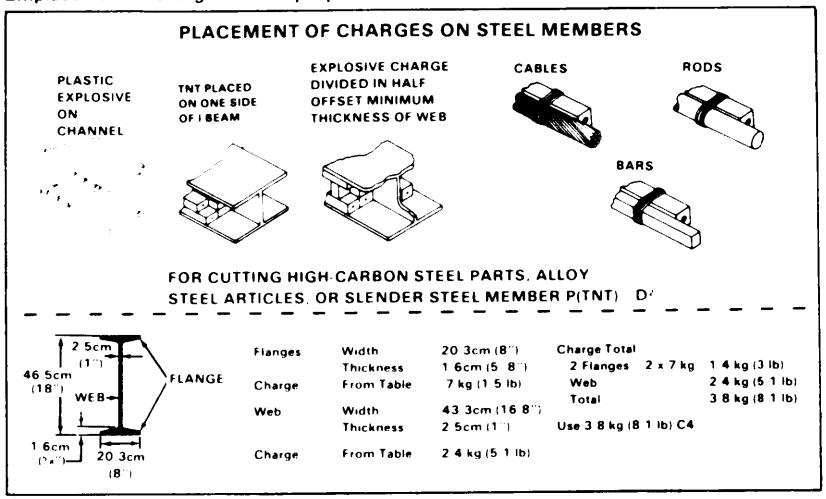


Figure 6-5. Steel cutting charges emplacement

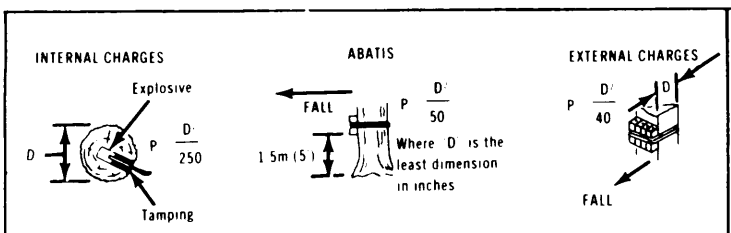
Special steel cutting charges

CHARGE TYPE	USE AND DIMENSIONS	REMARKS
BEAMS LESS THAN 2 INCHES THICK: Offset flange charge so that one edge is opposite center of C-shaped charges. Ribbon. BEAMS 2 INCHES THICK OR MORE: Offset flange charge so that one edge is opposite an edge of the C-shaped charges. PRIMING: Detonating cord primers must be of equal length	Cut flat steel up to 3" thick (Plates, beams, columns) Depth ½ thickness of target Width 3 times thickness of charge Length Same as length of cut desired	½" minimum charge thickness Cut explosive, DO NOT mold Explosive target contact must exist over entire area
DETONATION AT APEX. BASE ½ CIRCUMFERENCE. Saddle. LONG AXIS CIRCUMFERENCE. THICKNESS 1"	Cut solid bars up to 8" thick See diagram for charge dimensions	Explosive must be cut rather than molded Difficult
SHORT AXIS ½ CIRCUMFERENCE AND POINTS OF DETONATION. Diamond. 1" THICK. LONG AXIS CIRCUMFERENCE	Cut solid bars up to 8" thick See diagram for charge dimensions	Detonating cord primers at apexes must be equal length

Figure 6-6. Special steel cutting charges

Timber Cutting Charges

Figure 6- 7 shows charge placement formulas and amount of explosive. Whenever possible, a test shot should reconducted to determine the exact amount of explosive required to obtain the desired effect. Use the values or formulas given in Figure 6-7 for initial test shot. After the initial result, increase or decrease the amount of explosive as appropriate. See Figure 6-8 for stumping operations. Use ring charges as shown in Figure 6-7 when full removal is not desired.



TYPE OF CHARGE	EXPLOSIVE	LEAST DIMENSION OF TIMBER IN CM (IN)											
		15 2 (6)	20 3 (8)	25 4 (10)	30 5 (12)	38 1 (15)	45 7 (18)	53 3 (21)	61 (24)	68 6 (27)	76 2 (30)	83 8 (33)	91 4 (36)
		EXPLOSIVE IN KG (LB)											
INTERNAL	C4	3 (5)	3 (5)	3 (5)	3 (5)	5 (1)	5 (1)	7 (1 5)	9 (2)	11 (2 5)	14 (3)	16 (3 5)	18 (4)
EXTERNAL	C4	5 (1)	7 (1 5)	9 (2)	14 (3)	2 (4 5)	3 (6 5)	3 9 (8 5)	5 (11)	6 4 (14)	7 8 (17)	9 4 (20 5)	11 2 (24 5)
ABATIS	C4	5 (1)	7 (1 5)	7 (1 5)	11 (2 5)	16 (3 5)	2 3 (5)	3 2 (7)	4 1 (9)	5 (11)	6 2 (13 5)	7 5 (16 5)	8 9 (19 5)

NOTES 1 Explosive is rounded up to next 1/2 lb or 1/10 Kg
2 For external timber cutting, the charge should be twice as wide as it is high
3 The depth of borehole for internal charges should be 2D/3 and two boreholes should be used for trees over 18 inches in diameter Borehole diameter should be 2 inches to allow for explosive packing

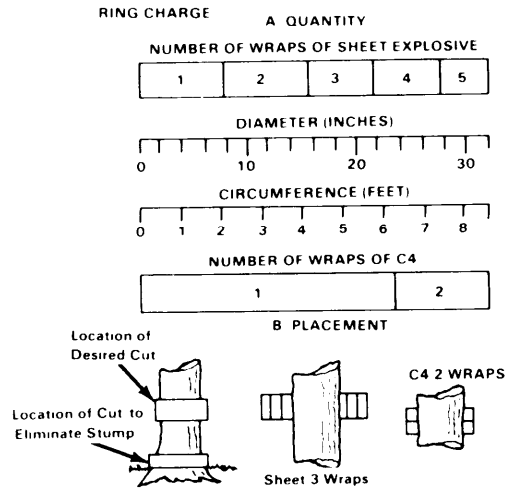


Figure 6-7 Timber cutting charges

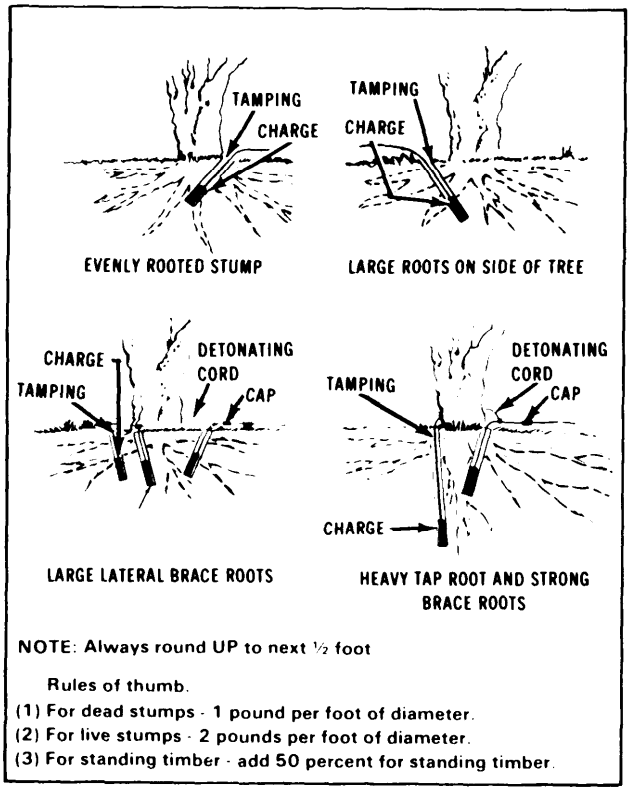


Figure 6-8. Stump blasting methods for various root structures

Breaching Charges

Table 6-5 shows quantity of explosive for reinforced concrete. Quantity for other materials may be obtained by use of a conversion factor (Table 6-5 page 6-8)

Breaching formulas: $P = R^3KC$

Where P = pounds of TNT
R = breaching radius (Figure 6-9)
K = material factor (Table 6-6)
C = tamping factor (Table 6-5)

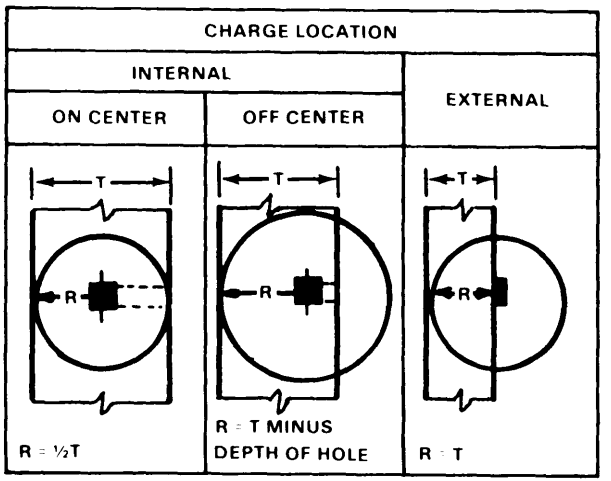


Figure 6-9. Breaching radius

Table 6-6. Values of K (material factor) for breaching charges

MATERIAL	R / M (FT)	K
Earth	All values	0.07
Poor masonry, shale, hardpan, good timber, and earth construction	Less than 1.5 (5)	0.32
	1.5 (5) or more	0.29
Good masonry, concrete block, rock	.3 (1) or less	0.88
	over .3 (1) to less than .9 (3)	0.48
	.9 (3) to less than 1.5 (5)	0.40
	1.5 (5) to less than 2.1 (7)	0.32
	2.1 (7) or more	0.27
Dense concrete, first-class masonry	.3 (1) or less	1.14
	over .3 (1) to less than .9 (3)	0.62
	.9 (3) to less than 1.5 (5)	0.52
	1.5 (5) to less than 2.1 (7)	0.41
	2.1 (7) or more	0.35
Reinforced concrete (concrete only, will not cut reinforcing steel)	.3 (1) or less	1.76
	over .3 (1) to less than .9 (3)	0.96
	.9 (3) to less than 1.5 (5)	0.80
	1.5 (5) to less than 2.1 (7)	0.63
	2.1 (7) or more	0.54

Number of charges and thickness (Table 6-7

Formula: $N = \frac{W}{2R}$

Where N = number of charges
W = width
R = breaching radius (feet)

Round off rule for N

Less than 1.25 - use 1 charge
1.25 to 2.49 - use 2 charges
2.5 or greater - round off to nearest whole number

Table 6-7. Thickness of breaching charge

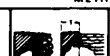
AMOUNT OF EXPLOSIVE	THICKNESS OF CHARGE
Less than 5 lb	1 in
5 lb to less than 40 lb	2 in
40 lb to less than 300 lb	4 in
300 lb or more	8 in

Thickness of breaching charge is in approximate values.

For best result, place charge in a flat square shape with flat side to target. For breaching of hard surface pavements use 1 pound of explosive for each 2 inches of surface.

Table 6-5. Breaching charge calculation

C4 BREACHING CHARGES REINFORCED CONCRETE ONLY

THICKNESS OF CONCRETE	METHODS OF PLACEMENT				
					
C FACTOR	1.0	1.0 1.0	1.8	2.0 2.0	3.6
EXPLOSIVE	C4	C4	C4	C4	C4
M (FT)	Kg (LB)	Kg (LB)	Kg (LB)	Kg (LB)	Kg (LB)
0.6 (2)	.7 (1.5)	2.8 (6)	4.8 (10.5)	5.5 (12)	9.6 (21)
0.8 (2.5)	7 (1.5)	5.3 (11.5)	9.4 (20.5)	10.3 (22.5)	18.5 (40.5)
0.9 (3)	1.4 (3)	7.5 (16.5)	13.5 (29.5)	15 (33)	26.6 (58.5)
1.1 (3.5)	2.1 (4.5)	12.1 (26.5)	21.2 (46.5)	23.5 (51.5)	42.3 (93)
1.2 (4)	2.8 (6)	17.8 (39)	31.6 (69.5)	35.0 (77)	63 (138.5)
1.4 (4.5)	3.9 (8.5)	24.8 (54.5)	44.8 (98.5)	49.6 (109)	89.4 (196.5)
1.5 (5)	5.3 (11.5)	26.9 (59)	48.2 (106)	53.7 (118)	96.4 (212)
1.7 (5.5)	6.9 (15)	35.7 (78.5)	64.4 (141.5)	71.4 (157)	128.7 (283)
1.8 (6)	7.5 (16.5)	46.2 (101.5)	83.2 (183)	92.8 (204)	166.4 (366)
2.0 (6.5)	9.6 (21)	58.9 (129.5)	106 (233)	117.5 (258.5)	211.4 (465)
2.1 (7)	12.1 (26.5)	63.2 (139)	113.5 (249.5)	126 (277)	226.4 (498)
2.3 (7.5)	14.8 (32.5)	77.5 (170.5)	139.1 (306)	154.8 (340.5)	278.1 (613)
2.4 (8)	17.8 (39)	94.1 (207)	169.1 (372)	187.8 (413)	338 (743.5)

NOTE Rounded up to the next 1/2 pound. 1/10 Kg

CONVERSION FACTOR FOR TABLE (K FACTOR. USE WITH TABLE)

EARTH	ORDINARY MASONRY. HARDPAN. SHALE. ORDINARY CONCRETE. ROCK. GOOD TIMBER. AND EARTH CONSTRUCTION	DENSE CONCRETE FIRST CLASS MASONRY
0.1	0.5	0.7

To use tables in calculating breaching charges

1. Determine the type of material in the object you plan to destroy. If in doubt, assume the material to be of the stronger type. such as. unless you know differently. assume concrete to be reinforced.
2. Measure thickness of object.
3. Decide how you will place the charge against the object. Compare your method of placement with the diagrams at the top. If there is any question as to which column to use. always use the column that will give you the greater amount of C4.
4. Use the table to determine the amount of C4 that would be required if the object were made of reinforced concrete.
5. Determine the appropriate conversion factor.
6. Multiply the number of pounds of C4 (from table) by the conversion factor.

Example

A timber earth wall 2m (6.5 ft) thick and an explosive charge placed at the base of the wall without tamping. If this wall was made of reinforced concrete. 211.4 Kg (465 lb) of C4 would be required to breach it. The conversion factor is 0.5. Multiply 211.4 Kg (465 lb) of C4 by .05 and the result is 115.7 Kg (235.2 lb) of C4 required to breach the wall.

Counterforce Charges

Counterforce charges are pairs of opposing charges to fracture small concrete or masonry blocks and columns. It is not effective against a thickness over 4 feet (Figure 6 -10).

Calculations: P = 1.5 x T
P = pounds of plastic explosive
T = thickness in feet (round UP to next ½ foot)

Example: Column 3 feet x 3 feet
P = 1.5 x 3 = 4.5 pounds

Divide by package weight and round UP to next package. Then divide charge into two equal parts. Place charges opposite to each other and detonate simultaneously.

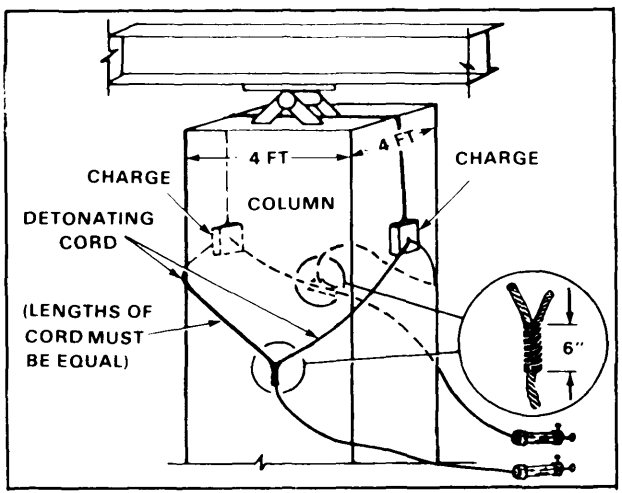
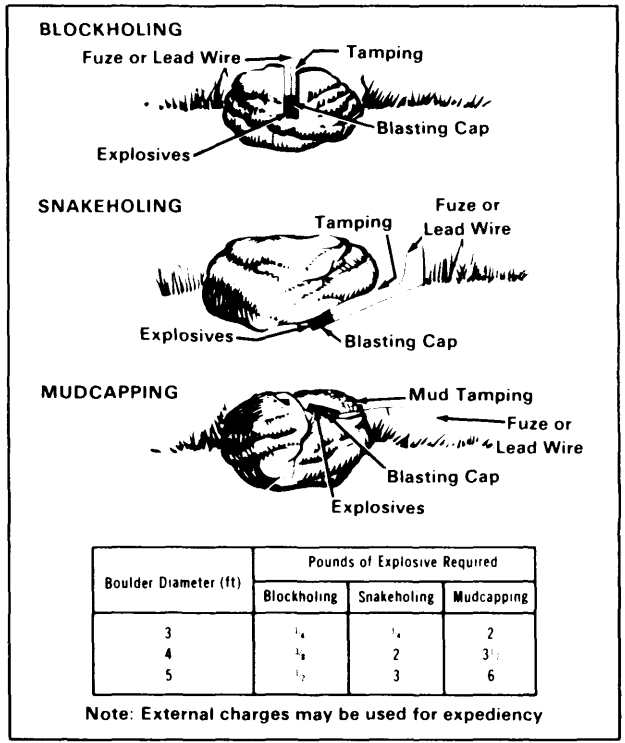


Figure 6-10. Counterforce charge

Boulder Blasting Charges



Boulder Diameter (ft)	Pounds of Explosive Required		
	Blockholing	Snakeholing	Mudcapping
3	¼	¼	2
4	⅛	2	3½
5	½	3	6

Note: External charges may be used for expediency

Figure 6-11. Boulder blasting

Cratering Charges

The three types of road craters are hasty, deliberate, and relieved face (figure 6-12 through 6-14). Road craters are usually emplaced by digging the holes by hand mechanically or with 15 or 40 pound shaped charges. These holes are then loaded with the required amount of explosive. (Place C4 on top of cratering charges.)

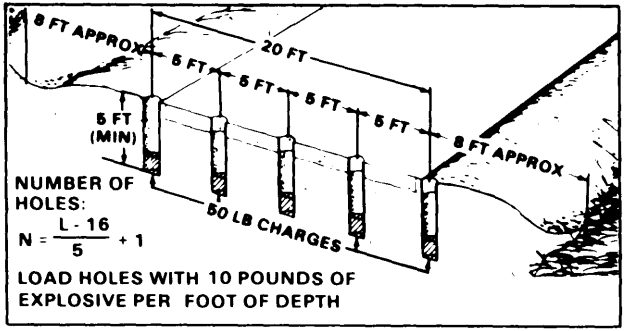


Figure 6-12. Hasty road crater

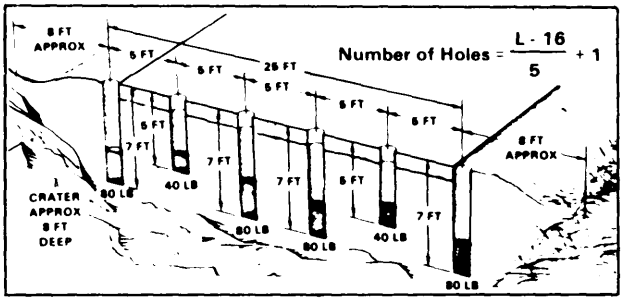


Figure 6-13. Deliberate road crater

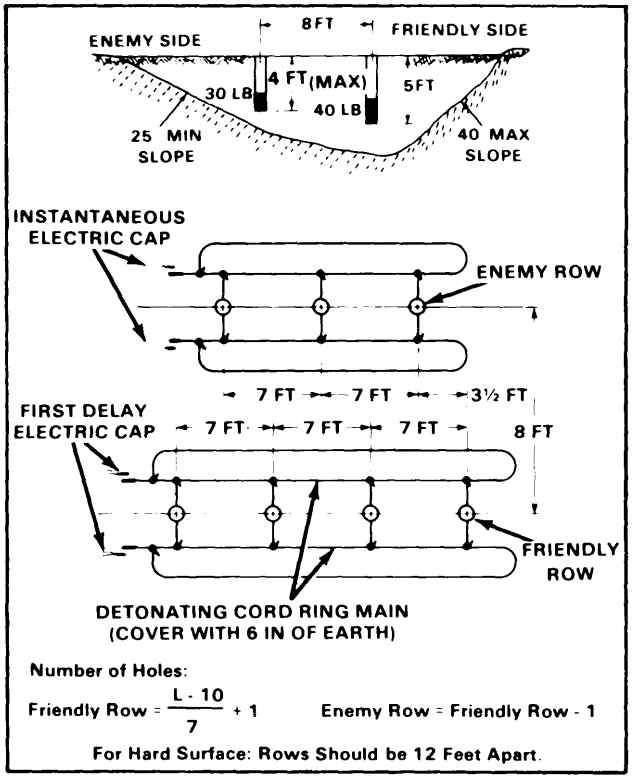


Figure 6-14. Relieved face road crater

Another method of road cratering is by using the M180 demolition cratering kit. The M180 kit consists of a shaped and a cratering charge configured to detonate as a single charge. Figure 6-15 shows the M180 configuration for road cratering. The M180 is only good for soft unfrozen soils and nonreinforced concrete. Test shots are advised.

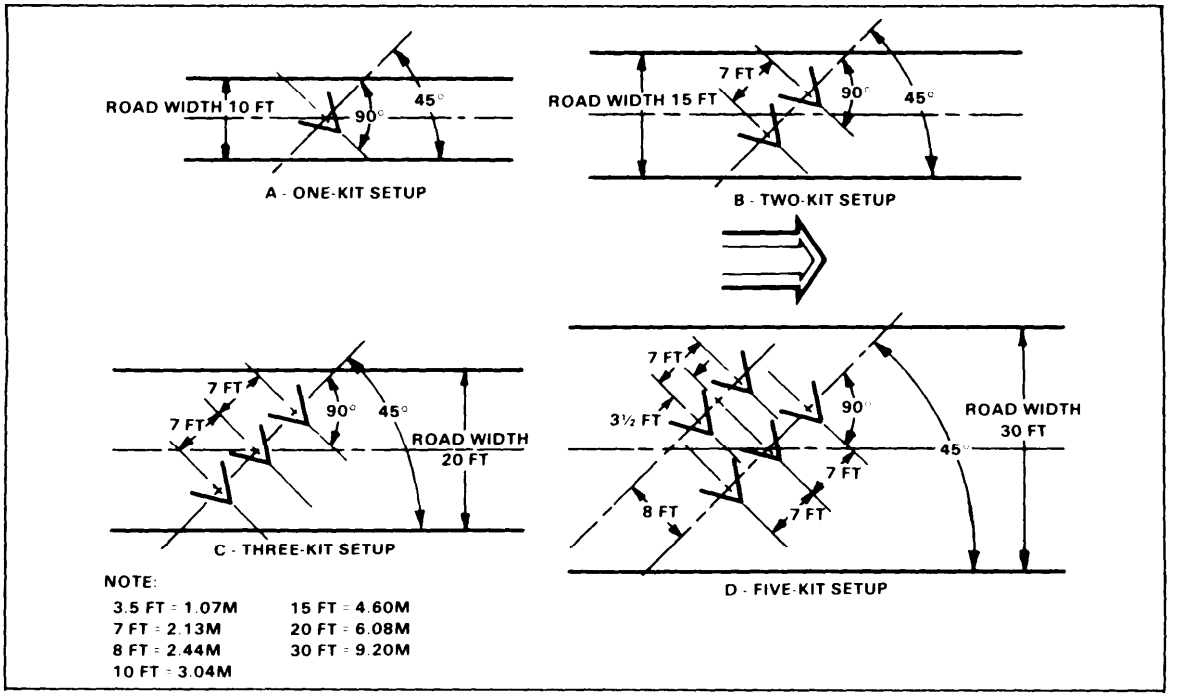


Figure 6-15. Deployment steps of M180

BRIDGE DEMOLITIONS

When bridge demolition is used to create an obstacle, the bridge should be demolished to permit the most economical reconstruction by friendly troops and make its use difficult or impossible for the enemy. Bridge demolition consideration factors are-

- Type of spans/supports
- Anticipated result of cutting spans at different points
- Critical span.
- Desired extent of destruction and repair.
- Difficulty and accessibility of desired point of cut by friendly versus enemy forces.
- Identification and measurement of each member in the plane of cut.

Abutment and Pier Demolitions

See Figures 6-16 through 6-18. Single abutment destruction should be on the friendly side.

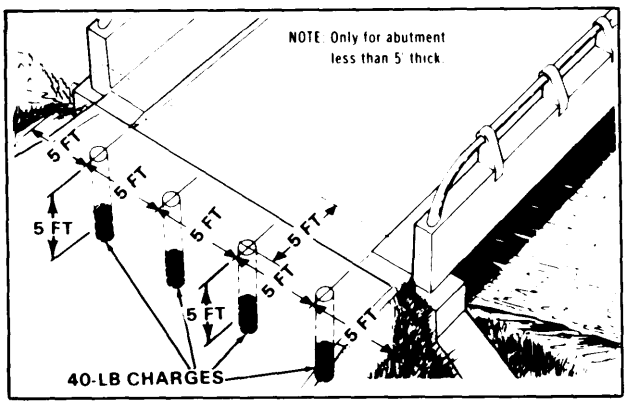


Figure 6-16. Placement of the 5-5-5-40 charge (triple-nickel-forty)

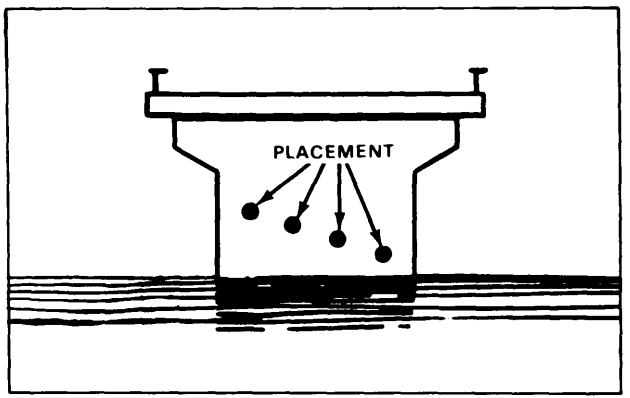


Figure 6-17. Pier demolition

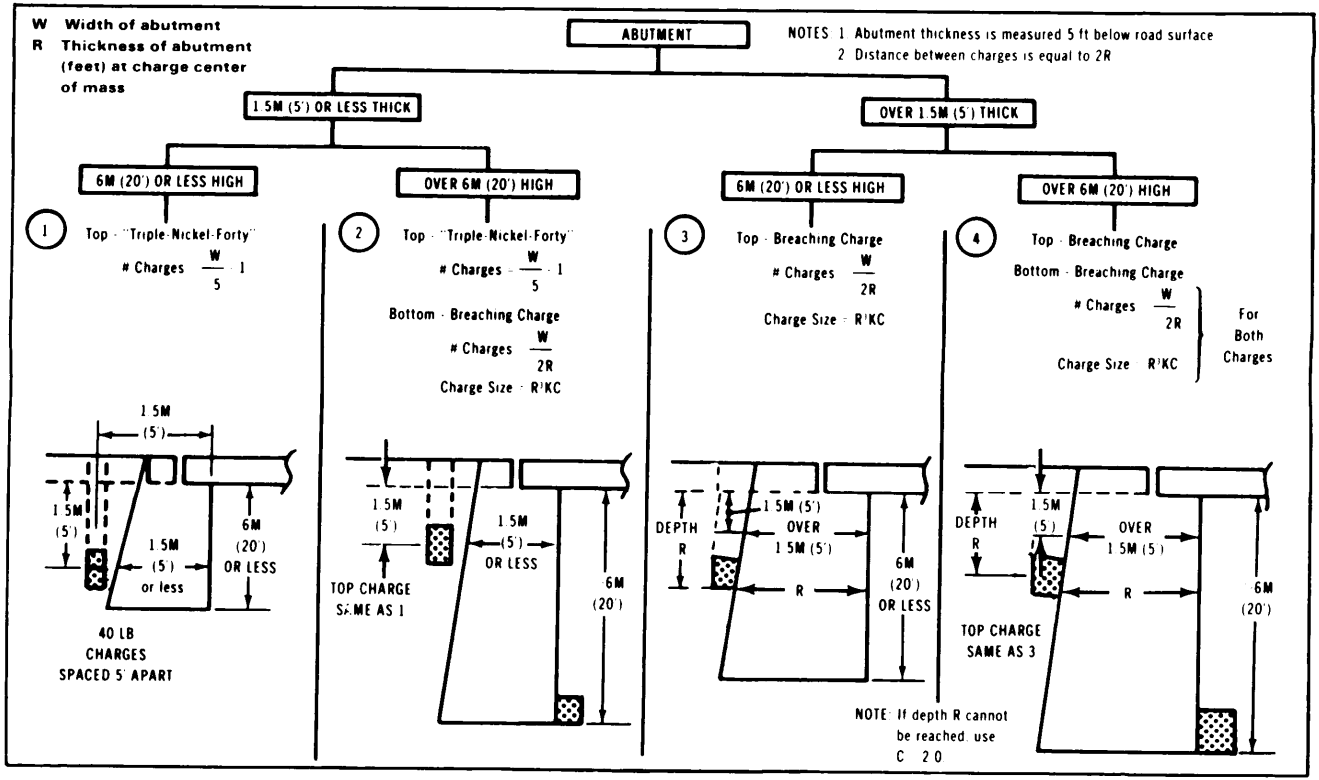


Figure 6-18. Bridge abutment demolition

Bridge Span Demolition

Figure 6-19 shows different span types and their respective plane of cut. Timber spans may be destroyed using formulas and calculations for regular timber. Figures 6-20 through 6-23 show how to destroy spans designed of steel or concrete. If total demolition is not specified in figure calculate the amount required using the appropriate table or formula.

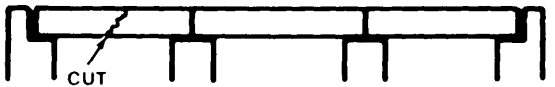
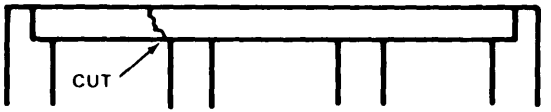
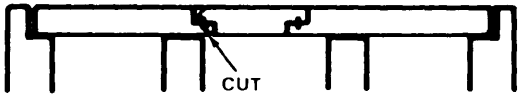
TYPE	DIAGRAM	REMARKS
Simple		- May be single or multiple In multiple, mid-span is the most critical - In shallow gaps, use multiple cuts
Continuous		- To drop more than one span cut at the ¾ point of desired spans to drop from friendly support
Cantilever		May not have suspended span - Suspended may be pin connected - Cut as not to leave a balanced section

Figure 6-19. Span type and location to drop one span

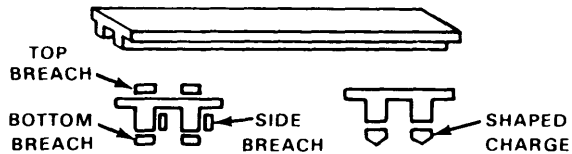
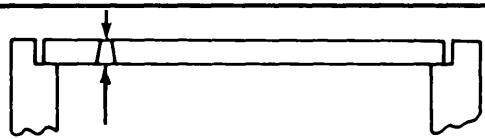
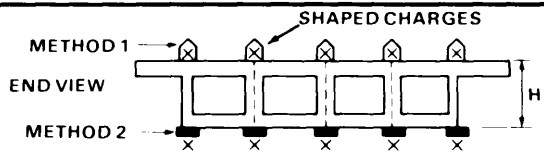
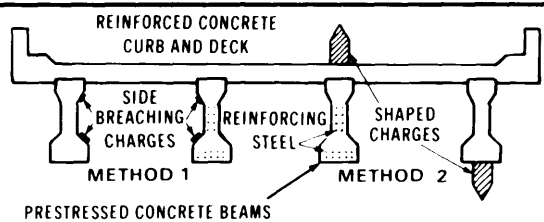
TYPE	DIAGRAM AND CHARGE EMPLACEMENT	REMARKS
Concrete T-Beam		Use either method shown in diagram.
Concrete Slab		Use breacing charges. Breach top or bottom.
Concrete Box Beam		Use external breaching charges (Method 2) or shaped charges (Method 1).
Concrete I-Beam		Use either method. Method 2 is preferred. Detonate charges simultaneously. If beam is 1 meter or less, use 3 lb on bottom flange and 2 lb on top flange.

Figure 6-20. Concrete beam span destruction

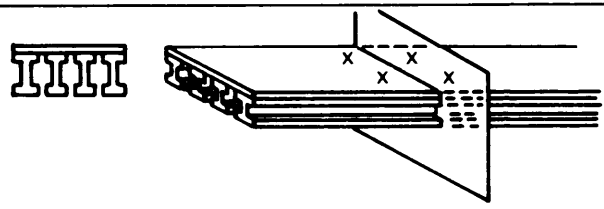
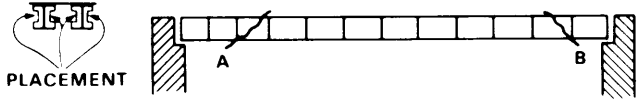
TYPE	DIAGRAM AND CHARGE EMPLACEMENT	REMARKS
Steel Stringer		Charges should be staggered to cut stringers at different lengths.
Steel Plate Girder		Method 1: Totally cut one girder at both ends. Method 2: For total distruction, cut both girders at both ends.

Figure 6-21. Steel stringer and girder span destruction

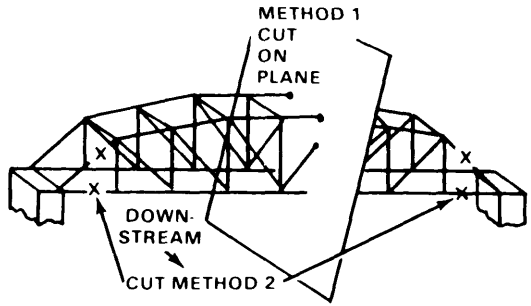
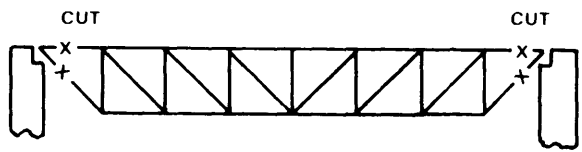
TYPE	DIAGRAM AND CHARGE EMPLACEMENT	REMARKS
Through Truss		On Method 1, cut all members on plane. On Method 2, four other charges placed upstream will drop the entire bridge.
Deck Truss		See remarks above.

Figure 6-22. Steel truss span destruction

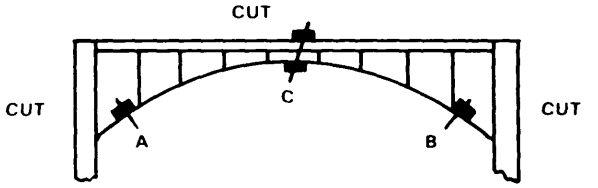
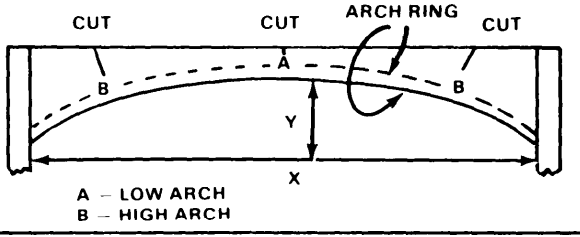
TYPE	DIAGRAM AND CHARGE EMPLACEMENT	REMARKS
Open Spandrel Arch		Must be cut at A, B, and C.
Filled Arch Bridge		Charges must be placed at the arch ring. Destroy capstone (keystone)

Figure 6-23. Arch span destruction

Demolition Reconnaissance

Figure 6-24 shows the DA Form 2203 R(Demolition Reconnaissance Report) and its use. For reconnaissance procedures, see Chapter 5.

Item No	Information Required
8	What and where it is (town vicinity of)
11	Sketch must show relative position of objects to be demolished, terrain features, safe distances, routes, and avenues of approach. Location of features of the site. One sketch must show fully dimensioned plan views, and cross-sections of object and of each memeber to be cut. (This may be listed under 12.)
12	Show plan and cross-sectional sketch of each member to be cut. Show details of chambers, line of cut, and location of charges. Show quantity of explosive per charge and metod of ignition. Sketch must show firing circuits and firing points.
13	Describe each in detail and show location on situation map sketch.

DEMOLITION RECONNAISSANCE REPORT

For use of this Form see FM 5-25; the proponent agency is TRADOC

SECTION I GENERAL

1 FILE NO	2 DML RECON REPORT NO	3 DATE	4 TIME
001	3-AD-7-P	18 MAY 86	0700

	NAME	GRADE	ORGANIZATION
5 RECON ORDERED BY	JOHN DOE	03	ACo 23rd ENGR. BN.
6 PARTY LEADER	JOE SMITH	01	A Co 23rd ENGR. BN.

7 MAP NAME	SCALE	SHEET NO	SERIES NO
INDIAN HEAD	1:50,000	5561 II	V733

8 TARGET AND LOCATION: RAILROAD BRIDGE, 15 MILES EAST OF WARREN

9 TIME OBSERVED: 0900

10 COORDINATES: PD23174891

11 GENERAL DESCRIPTION (attach sketches): 3 SIMPLE SPANS, (TWO PLATE GIRDER & ONE DECK TRUSS) INTERMEDIATE SUPPORT CONCRETE, ABUTMENTS EARTH AND WOOD CONSTRUCTION (SKETCH ALL CRITICAL DEMENSIONS)

12 NATURE OF PROPOSED DEMOLITION (attach sketches): ONE ABUTMENT AND ONE INTERMEDIATE SUPPORT (SKETCH A CROSS-SECTIONAL SKETCH AND SHOW PLACEMENT OF CHARGES AND IGNITION SYSTEM)

13 UNUSUAL FEATURES OF SITE: POWER LINES, WATER 30' DEEP (SKETCH ON SITUATION MAP SKETCH)

SECTION II ESTIMATES

14 EXPLOSIVES REQUIRED	A TYPES	B QUANTITY	C CAPS ELECTRIC	C CAPS NONELECTRIC	D DETONATING CORD	F FUSE LIGHTERS
	M112	50 PKGS			1000'	2 EA.
	M118	20 PKGS				
	Cratering Charge	— 4 EA.				
	Shape Charge	— 4 EA.		20 EA	E TIME FUSE 50'	G FIRING WIRE

15 EQUIPMENT AND TRANSPORT REQUIRED: 1-SQUAD DEMO SET; 10-1"x6"x12' PINEBOARD; 2-3TON DUMPS W/TRAILERS; 2-ROLLS DUCT TAPE; 2-POSTHOLE DIGGERS

16 PERSONNEL AND TIME REQUIRED FOR	NCO's	MEN	TIME
A PREPARING AND PLACING THE CHARGES	2	8	2 Hrs.
B ARMING AND FIRING THE DEMOLITION	1	2	2 Min.

17 TIME LABOR AND EQUIPMENT REQUIRED FOR BYPASS SPECIFY LOCATION AND METHOD: 100 FT. MGB; 1-ENGR. PLT. BY PASS 3 MILES SOUTH (Rt. 142)

* DETERMINE AVAILABILITY OF ITEMS 14, 15 AND 16 BEFORE RECONNAISSANCE

DA Form 2203-R, Aug 70

Figure 6-24. Demolition reconnaissance report

EXPEDIENT DEMOLITIONS

Improvised Cratering and Shaped Charges

Cratering charge

To make a cratering charge use a mixture of dry fertilizer (at least 33 1/3 percent nitrogen, see package contents list) and liquid (diesel fuel motor oil, or gasoline) at a ration of 25 pounds of fertilizer to a quart of liquid. Mix fertilizer with liquid and allow to soak for an hour. Place half of the charge weight in hole, place 1 pound of primed explosive, and then pour in other half of the charge.

Shaped charge

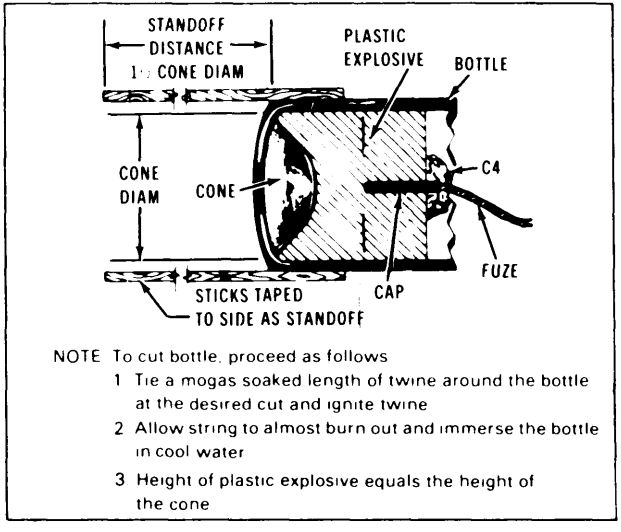


Figure 6-25. Improvised shaped charge

Satchel Charge

Melt ordinary paraffin (wax) and stir in ammonium nitrate (fertilizer) pellets. Make sure that the paraffin is hot while mixing. Before the mixture hardens add a half pound block of TNT or its equivalent as a primer. Pour the mixture into a container. Shrapnel material may be added to the mixture if desired or attached on the outside of the container to give a shrapnel effect.

Improvised Bangalore Torpedo

The principal use of an improvised bangalore torpedo is to clear paths through barbed wire entanglements using one of the three methods.

Method one

Use any length of pipe with approximately a 2-inch inside diameter and a wall thickness of at least .025 inch (24-gage). Pack the pipe with 2 pounds of explosive per foot of length. Close one end of the pipe with threaded cap, wooden plug, or damp earth.

Method two

Use any length of a U-shaped picket. Pack the inside section of the U-shaped picket with 2 pounds of explosives per foot of length. Place the steel section of the U shaped picket up.

Method three

Use any length of board. Attach 4 pounds of explosive per foot of length. Place explosives up.

Detonating Cord Wick

Use a detonating cord wlck to widen bore holes. One strand will generally widen the hole 1 inch. Tape together the desired number of strands and prime one stick of dynamite with one of the strands. (The dynamite is used to clean the hole.) Place wick and dynamite in hole. The wick must extend from the bottom of the hole to the surface. Prime wick and detonate. Ensure hole is cold before putting in any other explosives.

Expedient Time Fuze

Soak length of clean string (⅛-inch diameter) in gasoline and hang to dry. After drying, store in a tightly sealed container. Handle as little as possible and test extensively before use.