Dept. of Defense

Pentagon

8:10 AM ET

BREAKING NEWS

LIVE

U.S. STRIKES CODENAMED 'OPERATION MIDNIGHT HAMMER'

Gen. Dan Caine | Chairman, Joint Chiefs of Staff

CNN

RMED SERVICES COMMITTEES CALL FOR DE-ESCALATION AFTER US STRIKES ON IRAN.

CNN THIS MORNING

Operation MIDNIGHT HAMMER

Operation MIDNIGHT HAMMER Timeline

B-2s Depart Whiteman AFB	Dozens of Tankers at Multiple Aerial Refuel Points	B-2s join support package in CENTCOM	Maritime Launch	Bombers and Support Package Enter Iran	Time on Target	Bombers Exit Iran	Dozens of Tankers at Multiple Aerial Refuel Points	Bombers Return Whiteman AFB
21 June ~0001 Saturday		21 June ~1700 EDT Saturday	21 June ~1700 EDT Saturday	21 June ~1800 EDT Saturday	21 June ~1840-1900 EDT Saturday	21 June ~1930 EDT Saturday		22 June Sunday

El rompe búnkers

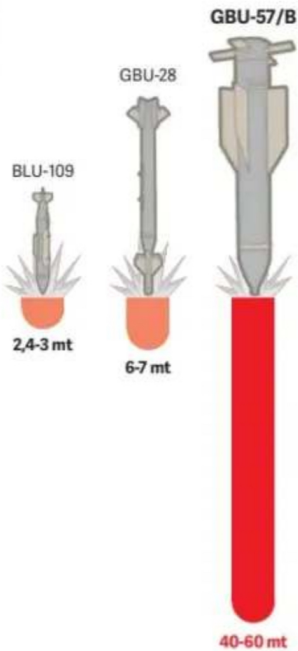
Bombardero B-2
Solo EE.UU. tiene el B-2

GBU-57/B

Fordo

- La **GBU-57/B** es capaz de perforar unos 7,6 metros de concreto reforzado y hasta 60 metros de concreto estándar, según informes.
- **La planta de Fordo** estaría ubicada entre 85 y 90 metros bajo tierra, con al menos 18 a 27 metros adicionales de profundidad.
- Una sola bomba no bastaría para alcanzar Fordo; solo ataques sucesivos podrían penetrar hasta esa profundidad.

Comparativa de alcance



Fuente NYT

CLARIN

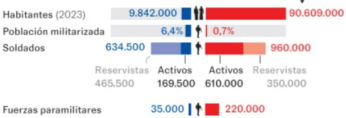
Tecnología avanzada y superioridad aérea contra misiles de largo alcance

Israel e Irán no se encuentran en una guerra tradicional, en el enfrentamiento bélico actual emplean tácticas asimétricas, donde cada rival explota sus fortalezas. Estas son las claves de este conflicto que comenzó el 13 de junio.

Israel es un país 86 veces más pequeño que Irán

1. Ejércitos terrestres

Los iraníes son una población diez veces mayor que la israelí, por lo que dispone de una capacidad de desplegar soldados muy superior. No obstante, no se contempla ninguna invasión.



2. Gasto militar

La industria bélica de Israel es líder mundial

3. Aviación de ataque

Israel cuenta con los aviones más modernos, que le han asegurado el control de los cielos al oeste de la capital.

45 F-35
196 F-16
75 F-15

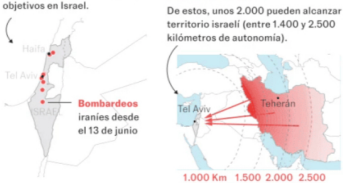
Unos 180 reactores, rusos en su mayoría, obsoletos y faltos de mantenimiento. No han intervenido.

4. Misiles y drones

Son el punto fuerte de Irán. La gran capacidad de producción, unido a su alto desarrollo tecnológico, le están permitiendo alcanzar con éxito objetivos en Israel.

Unas 3.000 unidades

De estos, unos 2.000 pueden alcanzar territorio israelí (entre 1.400 y 2.500 kilómetros de autonomía).



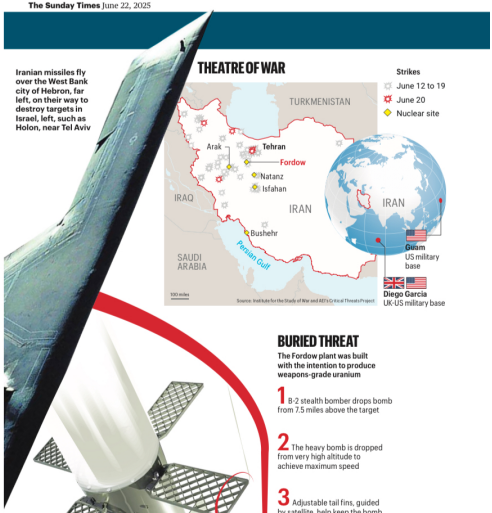
5. La defensa multicapa de Israel

Para contrarrestar la amenaza de los cohetes, Israel desarrolló un sistema de defensa aérea que desplegó en 2011. Irán está lanzando ataques simultáneos con un gran número de objetos. Un 5-10% de los misiles logra impactar.

* EE UU ayuda a Israel a interceptar misiles con su sistema THAAD.

Fuente: SIPRI, ISS, *The New Arab* y Banco Mundial.

NACHO CATALÁN / EL PAÍS



Iranian missiles fly over the West Bank city of Hebron, far left, on their way to destroy targets in Israel, left, such as Holon, near Tel Aviv

THEATRE OF WAR

BURIED THREAT

The Fordow plant was built with the intention to produce weapons-grade uranium

1. B-2 stealth bomber drops bomb from 7.5 miles above the target
2. The heavy bomb is dropped from very high altitude to achieve maximum speed
3. Adjustable tail fins, guided by satellite, help keep the bomb precisely on target
4. On impact, the bomb's extreme weight forces it up to 60m underground
5. The outer casing is made of a dense alloy, protecting the warhead from the impact with the surface
6. A delay fuse detonates the high-explosive warhead

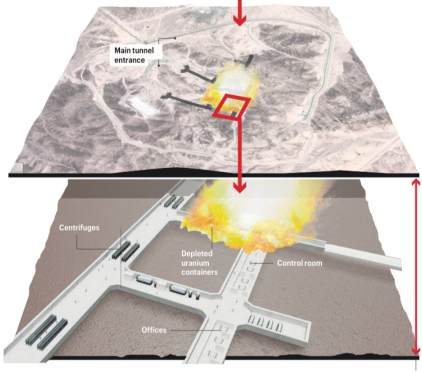
GBU-57 bunker buster

The Massive Ordnance Penetrator uses a delayed fuse, detonating only once it has penetrated deep into the surface

Length	5.8m
Warhead	5,740lb

Up to 60m of rock penetration

Fordow uranium enrichment facility

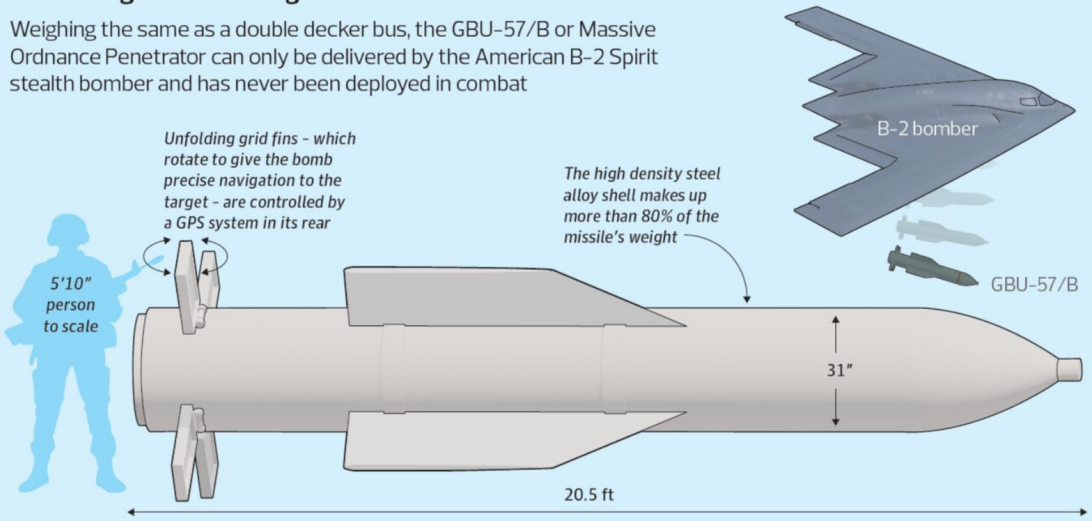


Fordow nuclear facility is believed to be up to 100m underground

Source: Orion Intel

America's ground-breaking bomb

Weighing the same as a double decker bus, the GBU-57/B or Massive Ordnance Penetrator can only be delivered by the American B-2 Spirit stealth bomber and has never been deployed in combat



The missile has no rocket – it relies on its weight and height of deployment to generate the kinetic energy required to pierce through up to 200ft of earth or 25ft of high-strength concrete.

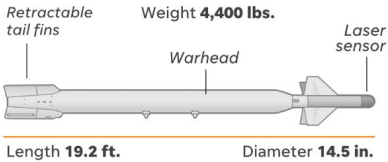
A delay fuse prevents the ordnance from exploding on impact and can be programmed to detonate the bomb at any time. The explosion causes a miniature earthquake.

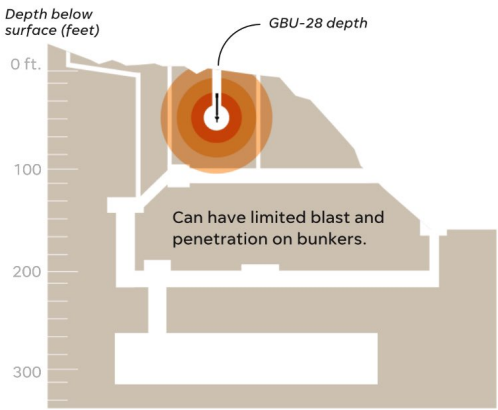
The facility at Fordow is too deep to hit directly on the first strike, but a second precise hit could bury the structure. Experts believe that there is a minimal risk of radiation leaking beyond the site.

U.S. bunker-buster bombs

GBU bunker-buster

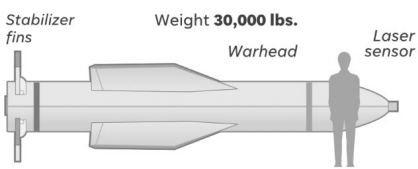
GBU-28 (Guided Bomb Unit) is a laser-guide conventional munition. The GBU-28 can penetrate 20 feet of concrete or about 100 feet of rock and dirt.





MOP bunker-buster

GBU-57A/B MOP (Massive Ordnance Penetrator) can penetrate nearly anything, even reinforced concrete and armored steel.

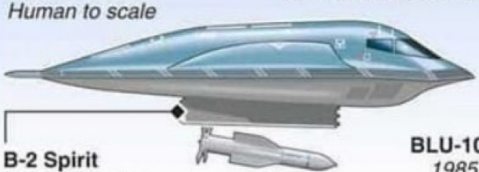


MOP
(GBU-57)

Casing: Made of hardened ferro-cobalt alloy to survive impact. Body comprises more than 80 percent of bomb's total weight

Guidance: GPS-based system for enhanced accuracy. Weapon reaches supersonic speed prior to impact

Human to scale

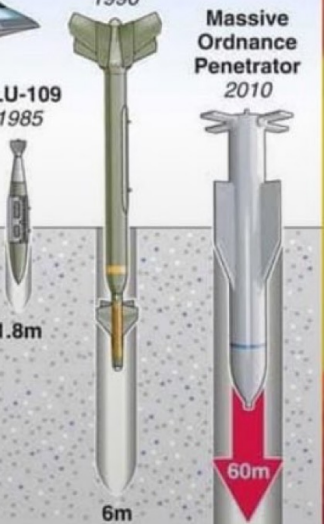


B-2 Spirit
Stealth bomber
drops weapon at high altitude.
Aircraft specially modified to carry
two bombs, one in each weapons bay

BLU-109
1985

GBU-28
1990

Massive Ordnance Penetrator
2010

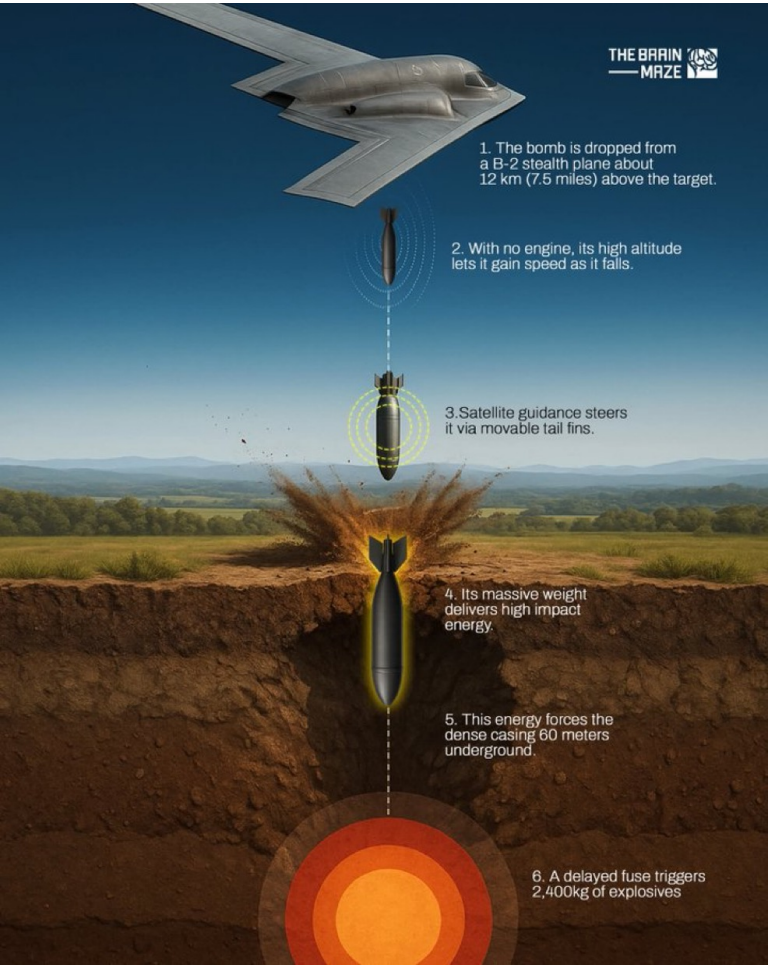


BUNKER-BUSTER COMPARISON

Penetration through reinforced concrete

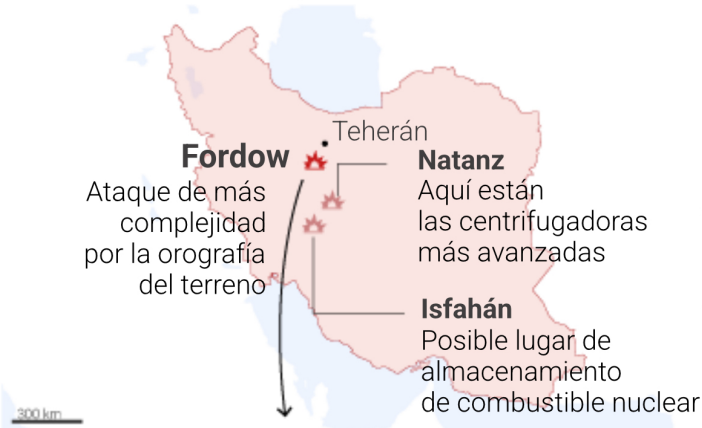
MOP SPECIFICATIONS

Length	6.2 metres
Diameter	0.8 metres
Weight	14 metric tonnes
Warhead	2.4 metric tonnes
Penetration	60m of 5,000 psi concrete 8m of 10,000 psi concrete 40m of moderately hard rock


THE BRAIN MAZE
1. The bomb is dropped from a B-2 stealth plane about 12 km (7.5 miles) above the target.
2. With no engine, its high altitude lets it gain speed as it falls.
3.Satellite guidance steers it via movable tail fins.
4. Its massive weight delivers high impact energy.
5. This energy forces the dense casing 60 meters underground.
6. A delayed fuse triggers 2,400kg of explosives

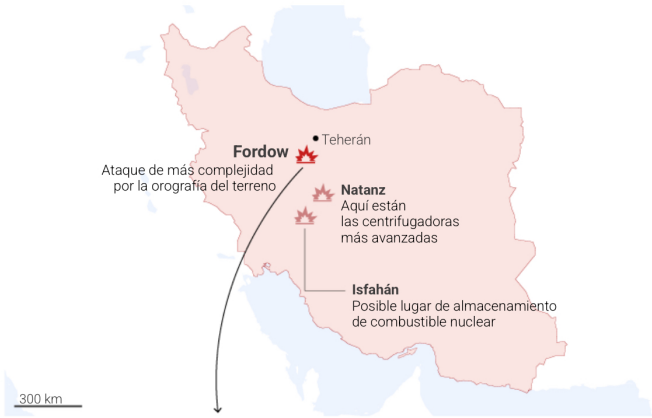
Los bombardeos de EE. UU. en Irán

Detalle de las infrestructuras de Fordow

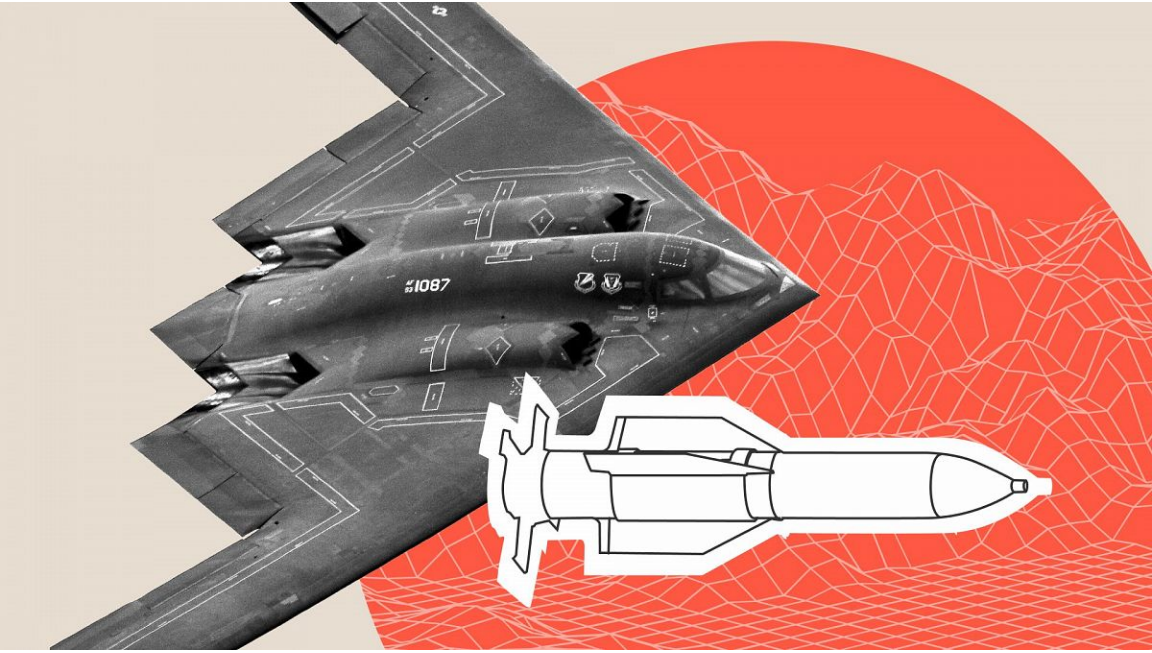


Los bombardeos de EE. UU. en Irán

Detalle de las infrestructuras de Fordow



Infografía RTVE · Fuente: Maxar Planet Labs, BBC y elaboración propia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Las principales instalaciones nucleares de Irán

Instalación de investigación
Plata de energía nuclear
Mina de uranio
Planta de conversión de uranio
Planta de enriquecimiento de uranio
Actividades nucleares no declaradas

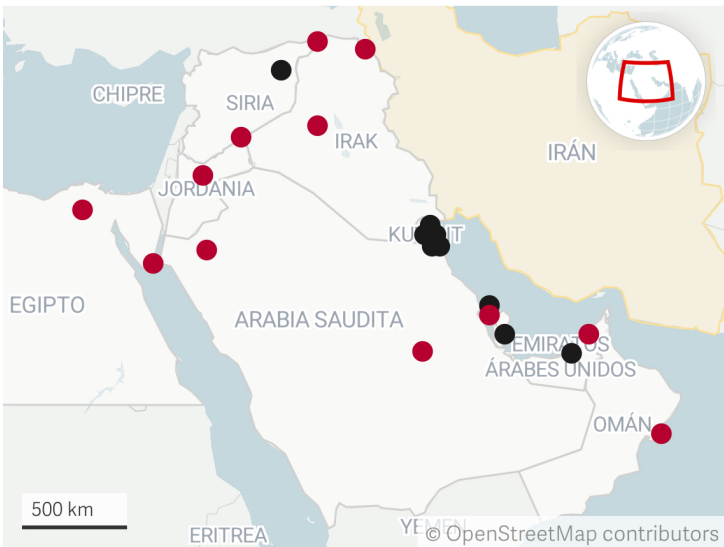
*Reactor de agua pesada para investigación parcialmente construido, conocido como Khondab

Fuente: Nuclear Threat Initiative, Organismo Internacional de Energía Atómica BBC

Bases militares de EE. UU. en Medio Oriente

Bases controladas por EE. UU.

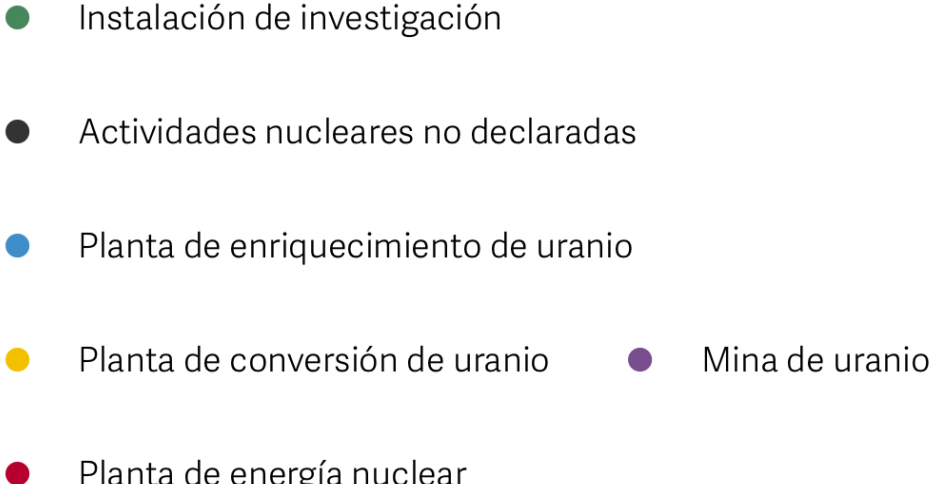
Presencia militar de EE. UU.



Fuente: **BBC**

Infografía: **Clarín**

Instalaciones nucleares iraníes



(*) Reactor de investigación de agua pesada parcialmente construido.

Fuente: **BBC (NTI - OIEA)** Infografía: **Clarín**

ESTRUCTURA DEL PODER EN IRÁN

● En el cargo
● Herido
● Muerto

Ali Jamenei
Líder Supremo
(Desde 1989)
Es la mayor autoridad política y religiosa. Su cargo, por nombramiento, es vitalicio. Puede despedir a altos funcionarios del gobierno

Ali Shamkhani
Consejero

Fuerzas armadas

Mohammad Bagueri
Jefe de Estado Mayor

Sustituido →

Abdul Rahim Mousavi
Jefe de Estado Mayor

Fuerzas armadas En tiempos de guerra

Gholam Ali Rashid
Jefe de Estado Mayor

Sustituido →

Ali Shadmani
Jefe de Estado Mayor

Ejército Regular

Abdul Rahim Mousavi
Jefe de Estado Mayor

Terrestre
● Kiomars Heydari
Marina
● Shahram Erani
Fuerza aérea
● Hamid Vahedi
Defensa aérea
● Alireza Sabahi Fard
Cuerpo Palestino de la Fuerza Quds
● Saeed Izadi

Guardia Revolucionaria

Hossein Salami
Comandante en jefe

Sustituido →

Mohammad Pak Pour
Comandante en jefe

Marina
● Ali Reza Tangsiri
Fuerza aérea
● Ali Amir Hajizadeh
Quds (extranjero)
● Esmail Qaani
Inteligencia
● Mohammad Kazemi
Alto mando en la Fuerza Al Qods
● Behnam Shahriyari

Fuerza Disciplinaria

Ahmad Reza Radan
Comandante en jefe

Comandante de la Fuerza Aérea de la Guardia Revolucionaria
● Amin for Judkhi

Científicos nucleares

Mohammad Mehdi Tehranji
Físico teórico

Fereydoun Abbasi
Científico y figura clave en el desarrollo nuclear

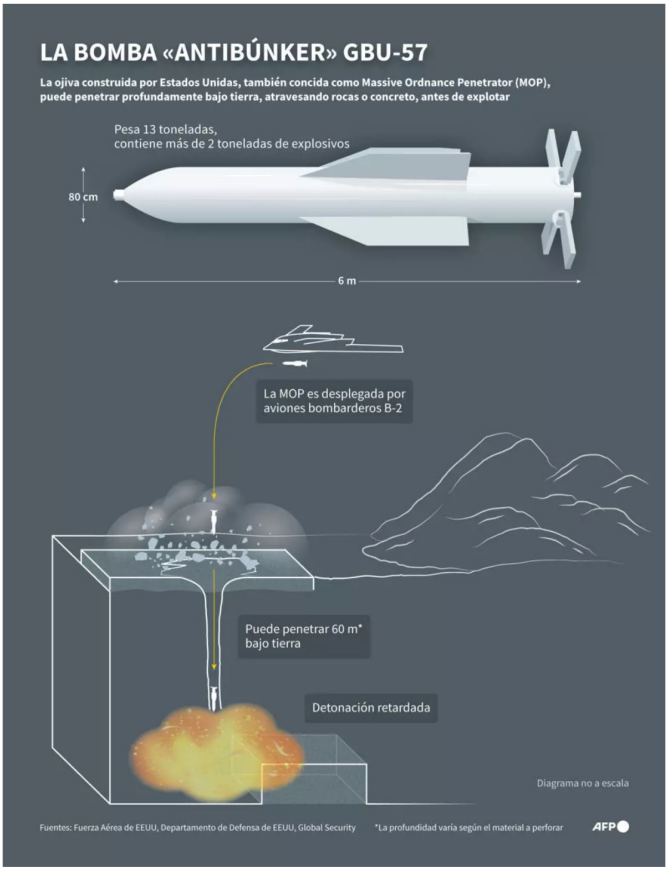
Abdulhamid Minouchehr
Dirigía la logística del enriquecimiento nuclear

Ahmadreza Zolfaghari
Profesor de ingeniería nuclear

Seyed Amirhossein Feqhi
Profesor de ingeniería nuclear

Motalleblizadeh
Especialista en investigación nuclear

Las aeronaves



Infografía que explica las características de la bomba GBU-57, también conocida como Massive Ordnance Penetrator (MOP), desarrollada por Estados Unidos para atacar estructuras subterráneas © Ioana Plesea, Paz Pizarro, Valentina Breschi, Paz Pizarro, Valentina Breschi / AFP

ESTAS SON LAS TRES INSTALACIONES NUCLEARES QUE ATACÓ EE. UU.

1 FORDO
Se lanzaron bombas antibúnkeres sobre la instalación nuclear más crítica de Irán

2 NATANZ
Los ataque israelíes ya habían dañado el mayor centro de enriquecimiento de uranio del país

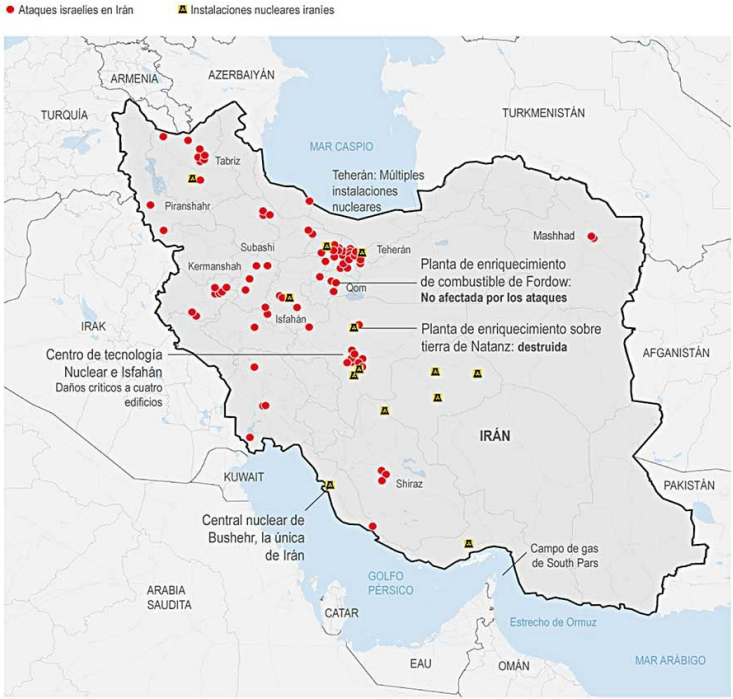
3 ISFAHÁN
Se cree que aquí se almacena combustible nuclear de grado cercano al de una bomba

Ataques estadounidenses

Ataques israelíes desde el 13 de junio

¿Dónde han sido los ataques de Israel a Irán?

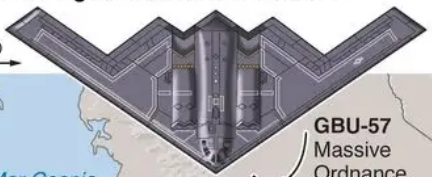
Ataques israelíes en Irán desde el 13 de junio



EUA entra en guerra con Irán

Fuerzas estadounidenses han atacado tres sitios nucleares clave en Irán, uniéndose a los ataques de Israel contra la nación y arrastrando a Estados Unidos a otra guerra en Oriente Próximo

B-2 Spirit
Bombardero furtivo



GBU-57
Massive Ordnance Penetrator (MOP)

TURQUÍA

Mar Caspio

IRÁN

Teherán

Fordow

Natanz

Isfahan

Fordow: El sitio nuclear más sólidamente fortificado de Irán es golpeado por 12 bombas rompebúnkeres lanzadas por seis bombarderos B-2

Natanz – La mayor instalación de enriquecimiento de uranio – e **Isfahan** – el mayor complejo de investigación nuclear – fueron alcanzados por 30 misiles crucero TLAM lanzados desde submarinos de la Armada de EUA

IRAK

AFGANISTÁN

KUWAIT

ARABIA SAUDÍ

Golfo Pérsico

100km
60 millas

BAHRÉIN

QATAR

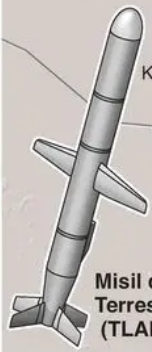
PAKISTÁN

Estrecho de Ormuz

MAR DE ARABIA

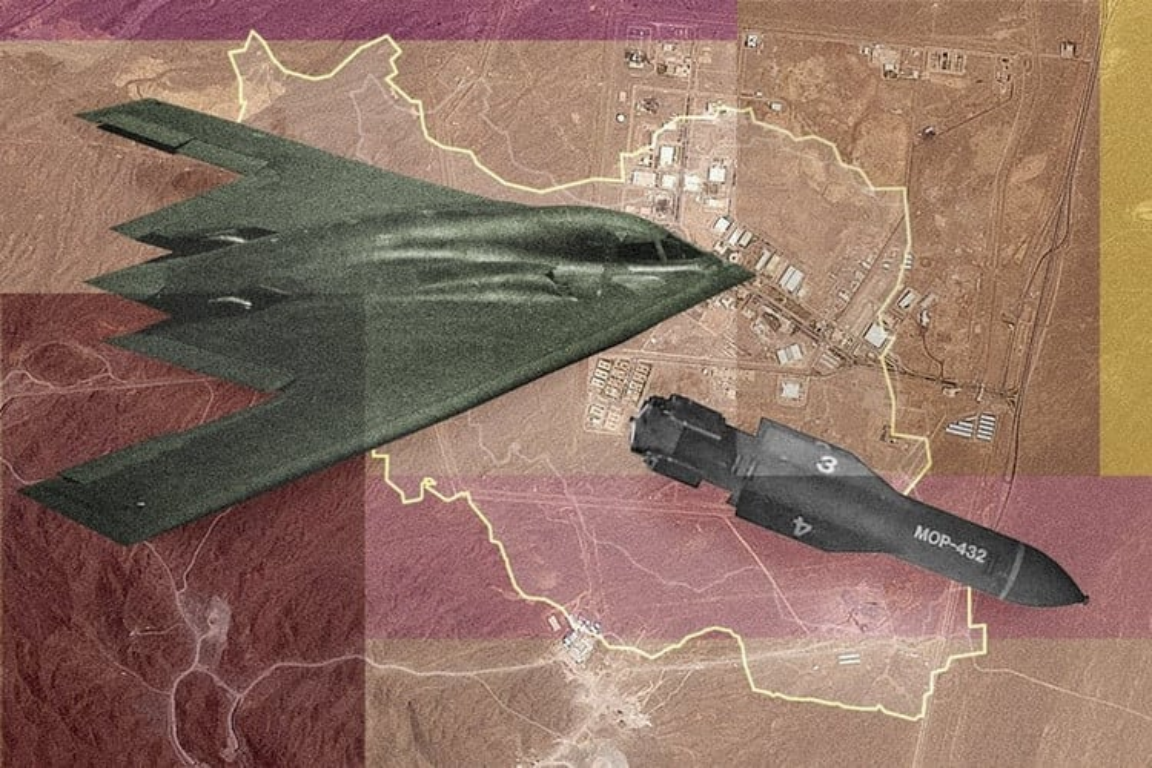
E.A.U.

OMÁN

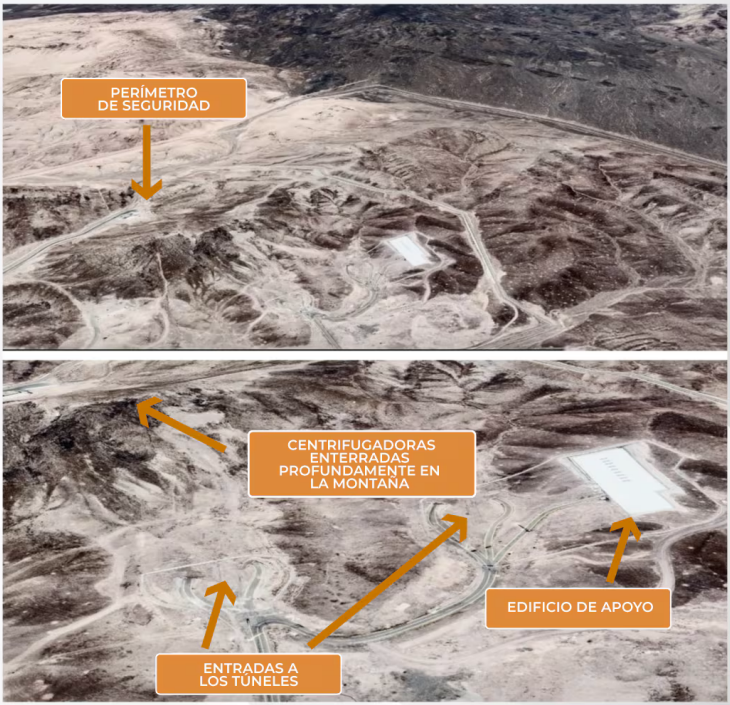


Misil de Ataque Terrestre Tomahawk (TLAM)

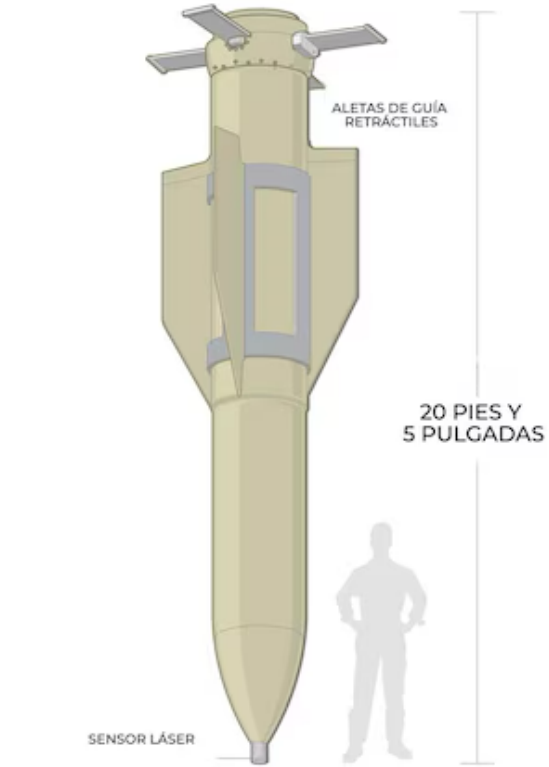
Fuentes: Reuters, NYT, AP


МОР-432

ASÍ ES FORDOW, LA INSTALACIÓN DE ENRIQUECIMIENTO DE URANIO DE IRÁN



POTENTE ATAQUE PARA OBJETIVOS A GRAN PROFUNDIDAD

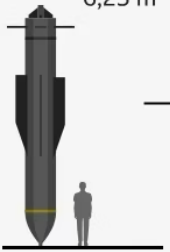


Con **13.668 kg (30.000 libras)**, la bomba **GBU-57 "Massive Ordenance Penetrator" (MOP)** es tan pesada que solo puede ser transportada por el bombardero furtivo B-2 Spirit.

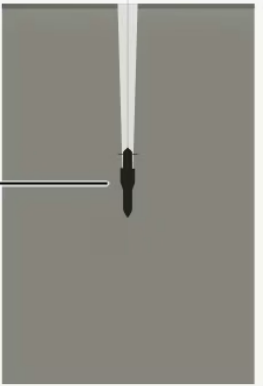
Cómo podría funcionar un ataque contra búnkeres

Arma diseñada para penetrar objetivos enterrados a gran profundidad, como el complejo de enriquecimiento de combustible de Fordo

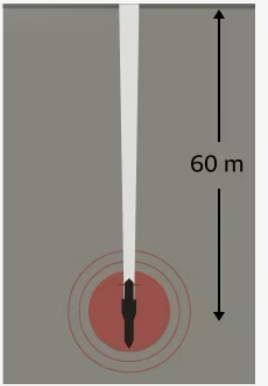
El **GBU-57** pesa 13.600 kg



(1) El misil penetra a gran profundidad bajo tierra



(2) Explota a profundidades de hasta 60 m*



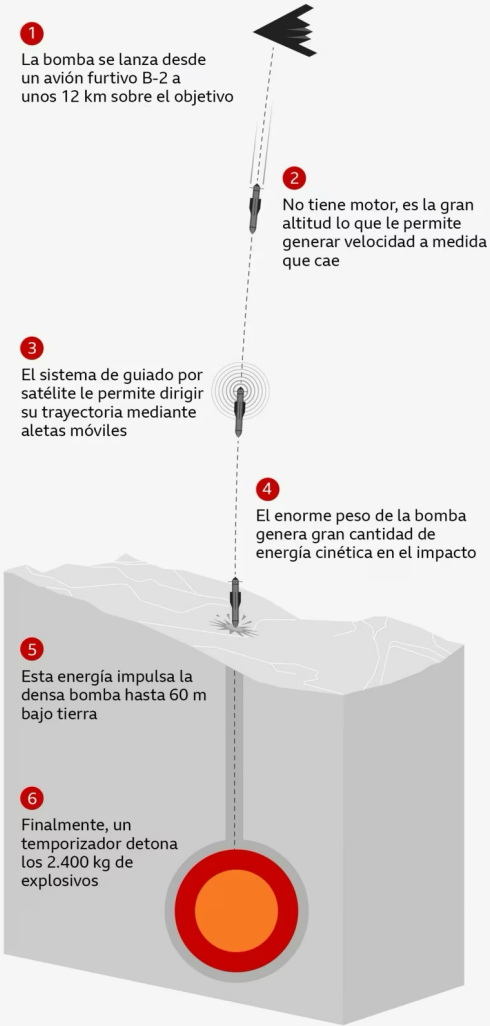
*Profundidad si el material es hormigón

Fuente: Collective Awareness to UXO

BBC

Cómo funciona la “bomba destructora de búnkeres”

La bomba GBU-57 es un Penetrador Masivo de Municiones



Fuente: Janes

BBC

EL ARMA 'SECRETA' DE EU

Un avión estratégico y una bomba rompe-búnker es el plan para atacar el complejo nuclear de Fordo en Irán.

BOMBARDERO B-2

B-2 SPIRIT

Tripulación: Dos

Longitud: 21 m

Envergadura: 52.4 m

Carga: 23,000 kg de bombas

MOP GBU-57

Sistema GPS para mayor precisión.

Carcasa

Aleación de ferro-cobalto para sobrevivir al impacto. Tiene un peso de 13.6 toneladas.

1 Penetrador de Artillería Masiva (MOP, por sus siglas en ingles) o rompe-búnker.

15.2 km (aprox.)

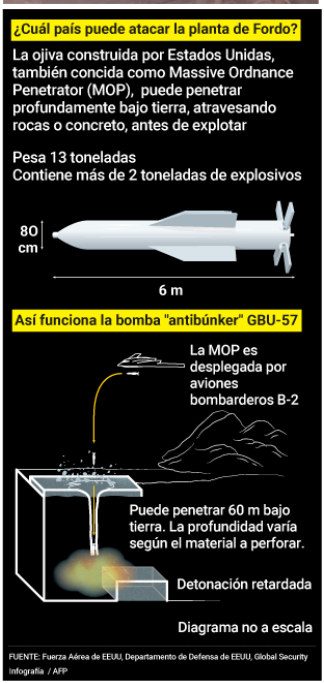
2 El detonador activa la ojiva de 2,423 kg cuando ha dejado de moverse.

6 m

El sitio nuclear de Fordo

Planta de enriquecimiento de uranio de alto nivel, con capacidad para unas 3.000 centrifugadoras, según Teherán

Entradas de túneles/Datos cartográficos: Jaxa



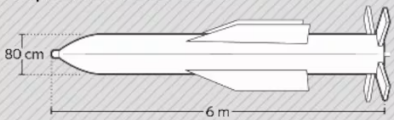
Bombardeos

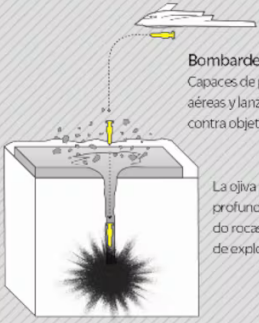
El presidente Donald Trump aseguró el sábado que el ejército estadounidense llevó a cabo un "ataque muy exitoso" contra tres instalaciones nucleares de Irán

Principales instalaciones nucleares

● DESTRUIDAS EN EL ATAQUE

Dispositivo antibúnker GBU-57

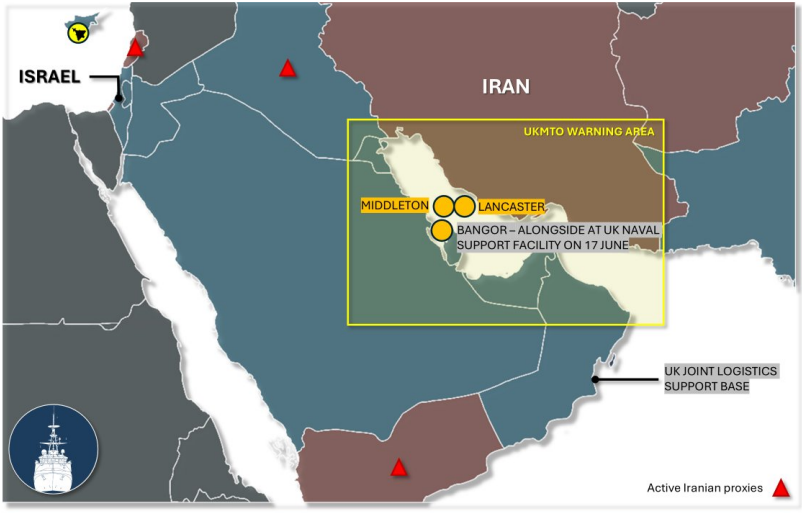




Bombarderos B-2
Capaces de penetrar defensas aéreas y lanzar ataques precisos contra objetivos fortificados.

La ojiva puede penetrar profundamente, atravesando rocas o concreto, antes de explotar.

Nota: Fox News indicó que además se lanzaron 30 misiles Tomahawk desde submarinos estadounidenses en los ataques a las instalaciones de Natanz e Isfahán. Fuentes: Fuerza Aérea de EU, Departamento de Defensa de EU, Global Security, Organismo Internacional de la Energía Atómica.



SITUATION IN THE

MIDDLE EAST

22.06.2025

IN-THEATRE

OPERATION KIPION

Bangor returned to operational status. (Src: Navy Lookout)

DEPLOYMENT-READY

UK WATERS

Anson last spotted off Gibraltar 16th June.

**Exact readiness level unclear. Potentially could deploy.*

UK CARRIER STRIKE GROUP

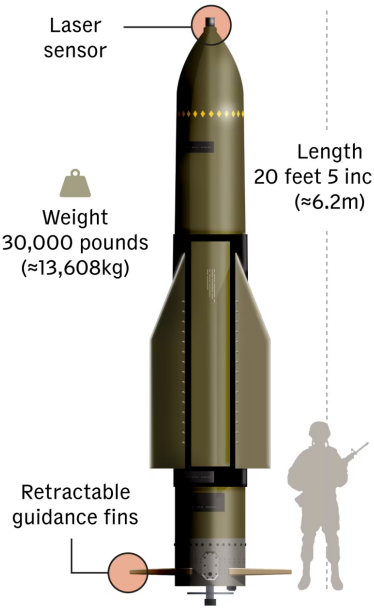
Entire CSG is unlikely to be retasked. Possible an element of the group (likely-Dauntless) will detach and bolster Operation Kipion, to ensure flow of commercial vessels.

RAF AKROTIRI

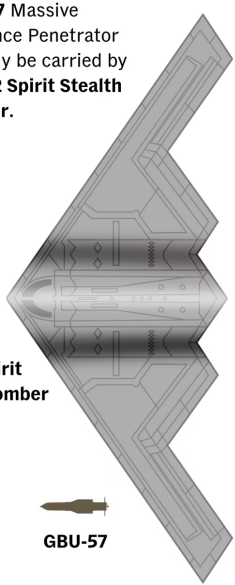
Map colours denote nations of strategic interest. Shading not indicative of actual control. Created by @UKForcesTracker. Not for uncredited use.

A look at the US' bunker-buster bomb

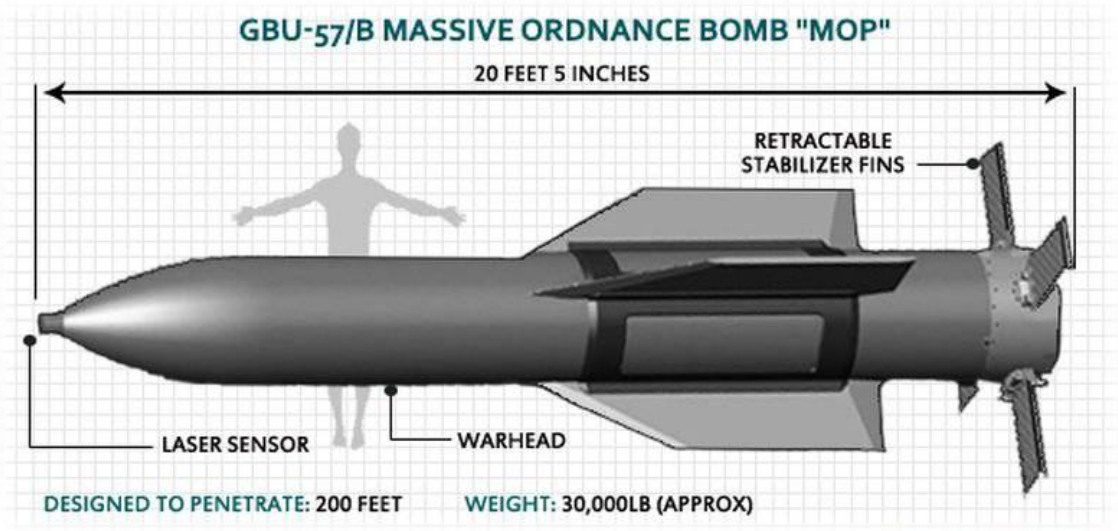
Officially known as the **GBU-57** Massive Ordnance Penetrator, the bomb is designed to target deeply buried and fortified facilities, including bunkers and tunnels.



GBU-57 Massive Ordnance Penetrator can only be carried by the **B-2 Spirit Stealth Bomber.**



Graphic: Rafa Estrada **Source:** US Department of Defense


GBU-57/B MASSIVE ORDNANCE BOMB "MOP"
20 FEET 5 INCHES
RETRACTABLE
STABILIZER FINS
LASER SENSOR
WARHEAD
DESIGNED TO PENETRATE: 200 FEET
WEIGHT: 30,000LB (APPROX)
RICHARDCYOUNG.COM

Massive bunker-busting bomb

GPS-guided penetrating weapon for hard and deeply buried targets

Massive Ordnance Penetrator

Length	6 m
Total weight	13,608 kg
Warhead	2,700 kg

McDonnell Douglas Corporation won a **US$51.9-million** contract to to enable B-2 aircraft to carry the bomb

GBU-28 bomb compared

(Currently used in Iraq)

Metres

6

8

Penetrates 6 m concrete, over 30 m earth

30

40

60

MOP can reach up to 60 m in 5,000 psi* reinforced concrete

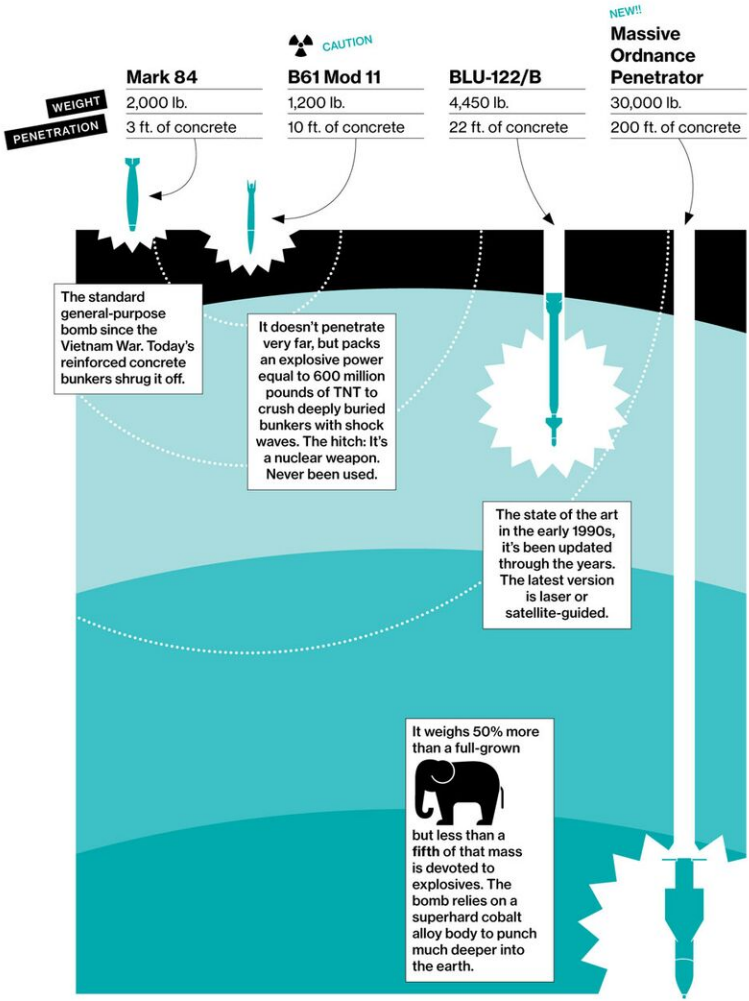
Can reach 8 m in 10,000 psi reinforced concrete

Can reach 40 m through moderate hard rock

*psi - pounds per square inch

AFP 081009

Source: GlobalSecurity


NEW!!
Massive Ordnance Penetrator
CAUTION
B61 Mod 11
BLU-122/B
Mark 84
WEIGHT
PENETRATION
30,000 lb.
200 ft. of concrete
1,200 lb.
10 ft. of concrete
4,450 lb.
22 ft. of concrete
2,000 lb.
3 ft. of concrete
The standard general-purpose bomb since the Vietnam War. Today's reinforced concrete bunkers shrug it off.
It doesn't penetrate very far, but packs an explosive power equal to 600 million pounds of TNT to crush deeply buried bunkers with shock waves. The hitch: It's a nuclear weapon. Never been used.
The state of the art in the early 1990s, it's been updated through the years. The latest version is laser or satellite-guided.
It weighs 50% more than a full-grown
but less than a fifth of that mass is devoted to explosives. The bomb relies on a superhard cobalt alloy body to punch much deeper into the earth.

NOWHERE TO HIDE

What would the U.S. use to take out Iran's nuclear facilities if it decided a military strike was needed? Almost certainly the Massive Ordnance Penetrator (MOP) GBU-57A/B — the most powerful "bunker buster" in existence: a 13,000 kilogram weapon - developed in parallel with Iran's underground Fordow Nuclear Fuel Enrichment Plant - that can smash through 20 metres of reinforced concrete before exploding.

THE LIKELY ROUTE

In 2010, the United States shipped a number of bunker busting munitions to its Diego Garcia base in the Indian ocean. Both B-52 and B-2 bombers could fly to attack Fordow from there. They would be refuelled enroute by tankers from bases in the Middle East.

Even the new MOP may not be enough to damage the deepest recesses of the plant so, it's likely multiple missiles would be used on the same impact point to increase penetration depth further.

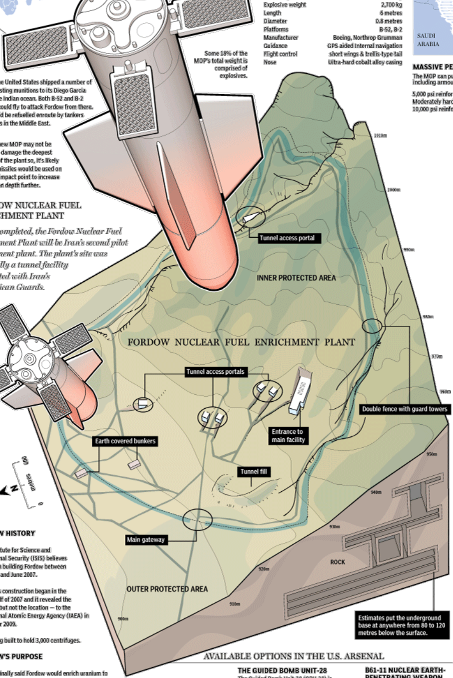
FORDOW NUCLEAR FUEL ENRICHMENT PLANT

When completed, the Fordow Nuclear Fuel Enrichment Plant will be Iran's second pilot enrichment plant. The plant's site was originally a tunnel facility associated with Iran's Republican Guards.

THE MASSIVE ORDNANCE PENETRATOR

Total weight	13,600 kg
Explosive weight	2,700 kg
Length	6 metres
Diameter	0.8 metres
Platforms	B-52, B-2
Manufacturer	Boeing, Northrop Grumman
Guidance	GPS aided Internal navigation
Flight control	short wings & trellis-type tail
Nose	Ultra-hard cobalt alloy casing

Some 18% of the MOP's total weight is comprised of explosives.

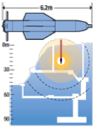


IRAN NUCLEAR LOCATIONS

MASSIVE PENETRATION

The MOP can punch through almost anything, including armoured steel and reinforced concrete

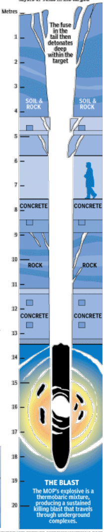
5,000 psi reinforced concrete	18 metres
Moderately hard rock	12 metres
10,000 psi reinforced concrete	2.5 metres



MASSIVE DETONATION

The MOP uses a Hard Target Smart Fuze that enables it to detonate at a desired point inside buried or reinforced concrete targets, such as underground bunkers and command centers.

Detonation occurs after a sensor tells the fuse that the weapon has passed through a pre-programmed number of layers or voids in the target.



THE BLAST
The MOP's explosive is a thermobaric mixture, producing a sustained killing blast that travels through underground complexes.

FORDOW HISTORY

- The Institute for Science and International Security (ISIS) believes Iran began building Fordow between June 2006 and June 2007.
- Iran says construction began in the second half of 2007 and it revealed the facility — but not the location — to the International Atomic Energy Agency (IAEA) in September 2009.
- It is being built to hold 3,000 centrifuges.

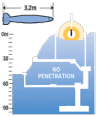
FORDOW'S PURPOSE

- Iran originally said Fordow would enrich uranium to 3.5% (required for nuclear power), then said it was for research and development. It later announced it would enrich uranium up to 20%.
- David Albright, Paul Brannan and Christina Walrond in an analysis for ISIS said, "Iran's decision to build a relatively small enrichment facility without informing the IAEA suggested that Fordow was intended to be used to quickly and securely make highly enriched uranium for nuclear weapons."
- The Iranian Revolution Document Center, a pro-government Iranian research institute, suggests Fordow's strategic purpose is to deter an attack on Natanz. "If Fordow is invulnerable and could alone carry a weapons program forward, the value of attacking Natanz is greatly diminished," suggest analysts with the Federation of American Scientists.
- The IAEA has also raised the possibility that Iran has several secret nuclear facility locations, but only Fordow has been discovered. Iran denies this.

AVAILABLE OPTIONS IN THE U.S. ARSENAL

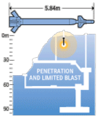
MARK 84 GENERAL PURPOSE BOMB

The Mark 84 is a general-purpose bomb that entered service during the Vietnam War. It is capable of forming a crater 15.2 metres wide and 11 metres deep and causes lethal damage to a radius of 350 metres.



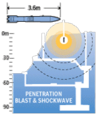
THE GUIDED BOMB UNIT-28

The Guided Bomb Unit-28 (GBU-28) is capable of penetrating 30 metres of soil/rock or six metres of concrete, and was developed for penetrating Iraqi command centres located deep underground. The GBU-28 is a laser-guided conventional munition: The operator illuminates a target with a laser designator and then the munition guides to that spot.



B61-11 NUCLEAR EARTH-PENETRATING WEAPON

The B61-11 can penetrate only a couple of metres into dry earth, but unlike the GBU-28 it's nuclear shockwave can destroy structures well below the surface. However, the after effects - both political and environmental - make use of this weapon very unlikely.



SOURCES: FEDERATION OF AMERICAN SCIENTISTS, INSTITUTE FOR SCIENCE AND INTERNATIONAL SECURITY, NUCLEAR THREAT INITIATIVE, INTERNATIONAL ATOMIC ENERGY AGENCY & GLOBALSECURITY.ORG

MIKE FAILLE AND RICHARD JOHNSON / NATIONAL POST

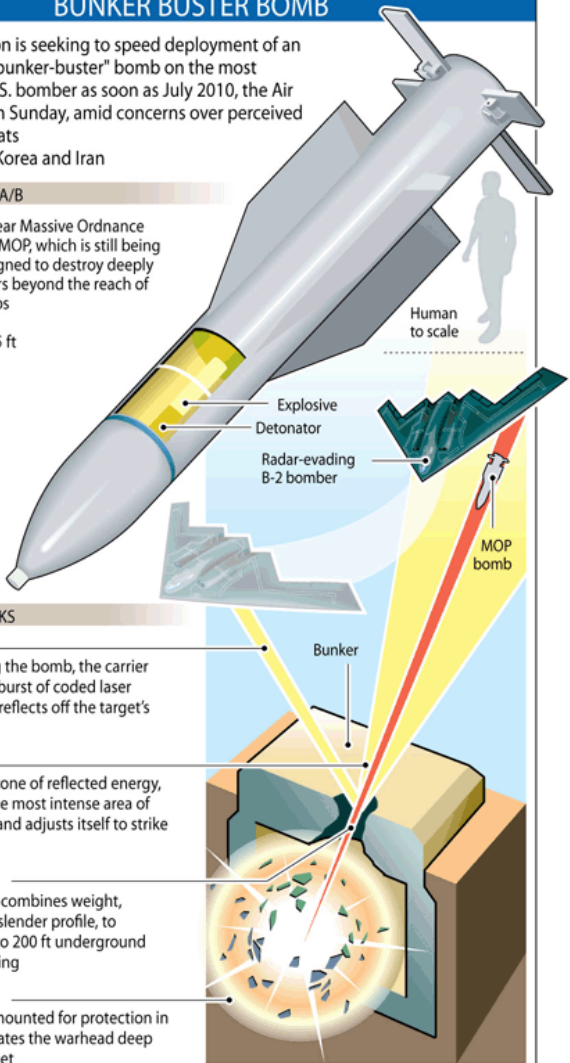
BUNKER BUSTER BOMB

The Pentagon is seeking to speed deployment of an ultra-large "bunker-buster" bomb on the most advanced U.S. bomber as soon as July 2010, the Air Force said on Sunday, amid concerns over perceived nuclear threats from North Korea and Iran

MOP GBU-57A/B

The non-nuclear Massive Ordnance Penetrator or MOP, which is still being tested, is designed to destroy deeply buried bunkers beyond the reach of existing bombs

- Length 20.5 ft
- Diameter 31.5 in
- Weight 30,000 lb
- Explosive load 5,300 lb



HOW IT WORKS

Targeting
After releasing the bomb, the carrier aircraft fires a burst of coded laser energy which reflects off the target's surface

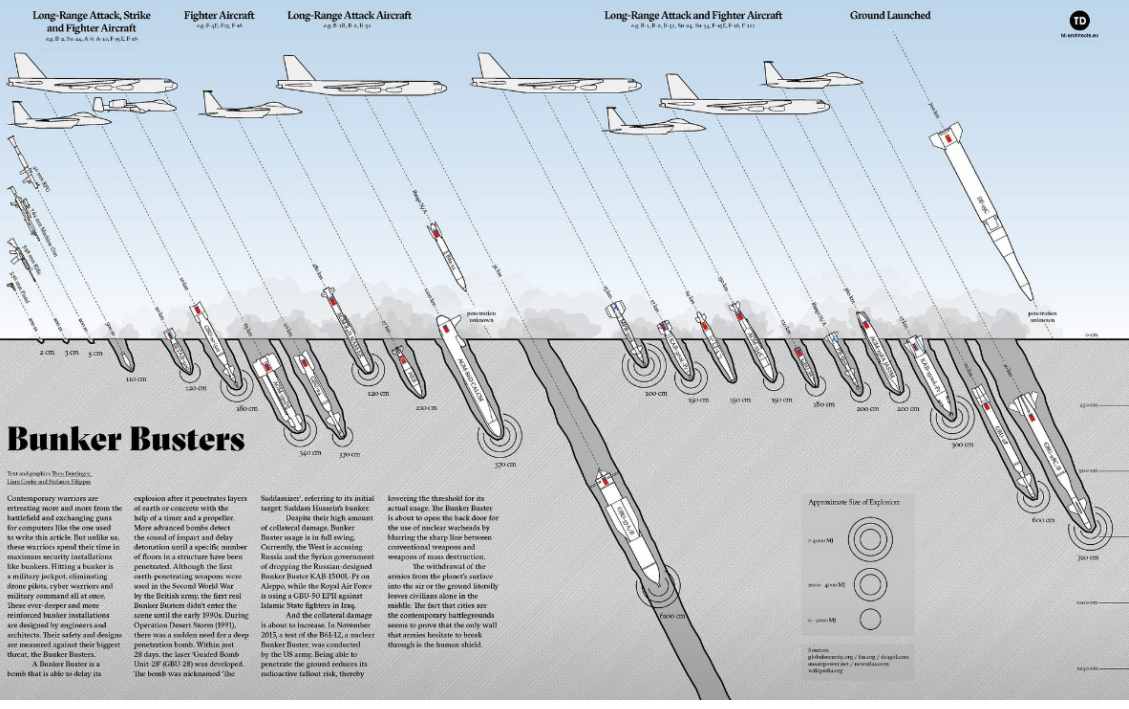
Guidance
Bomb enters cone of reflected energy, seeking out the most intense area of laser 'sparkle', and adjusts itself to strike the mark

Penetration
Bunker Buster combines weight, hardness and slender profile, to penetrate up to 200 ft underground before exploding

Detonation
A delay fuse, mounted for protection in the tail, detonates the warhead deep inside the target

Sources: Jane's Defence Weekly, Bright Star World Aircraft Information File, U.S. Air Force

REUTERS



Bunker Busters

Text and graphics: Thyy Dominguez, Liam Cooke and Stefanos Filippou

Contemporary warriors are retreating more and more from the battlefield and exchanging guns for computers like the one used to write this article. But unlike us, these warriors spend their time in maximum security installations like bunkers. Hitting a bunker is a military jackpot, eliminating drone pilots, cyber warriors and military command all at once. These ever-deeper and more reinforced bunker installations are designed by engineers and architects. Their safety and designs are measured against their biggest threat, the Bunker Busters.

A Bunker Buster is a bomb that is able to delay its explosion after it penetrates layers of earth or concrete with the help of a timer and a propeller. More advanced bombs detect the sound of impact and delay detonation until a specific number of floors in a structure have been penetrated. Although the first earth-penetrating weapons were used in the Second World War by the British army, the first real Bunker Busters didn't enter the scene until the early 1990s. During Operation Desert Storm (1991), there was a sudden need for a deep penetration bomb. Within just 28 days, the laser 'Guided Bomb Unit-28' (GBU-28) was developed. The bomb was nicknamed 'The Saddamizer', referring to its initial target: Saddam Hussein's bunker.

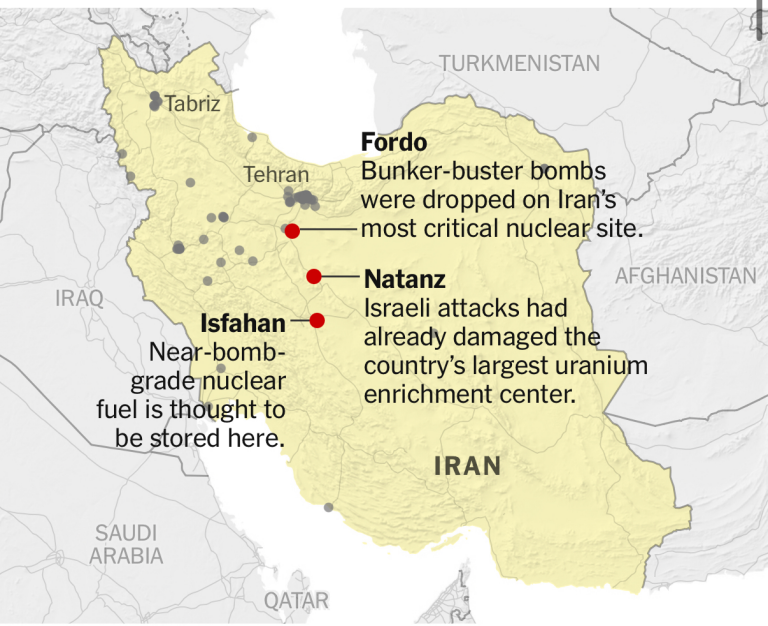
Despite their high amount of collateral damage, Bunker Buster usage is in full swing. Currently, the West is accusing Russia and the Syrian government of dropping the Russian-designed Bunker Buster KAB-1500L-Pr on Aleppo, while the Royal Air Force is using a GBU-50 EPII against Islamic State fighters in Iraq.

And the collateral damage is about to increase. In November 2015, a test of the B61-12, a nuclear Bunker Buster, was conducted by the US army. Being able to penetrate the ground reduces its radioactive fallout risk, thereby lowering the threshold for its actual usage. The Bunker Buster is about to open the back door for the use of nuclear warheads by blurring the sharp line between conventional weapons and weapons of mass destruction.

The withdrawal of the armies from the plane's surface into the air or the ground litterally leaves civilians alone in the middle. The fact that cities are the contemporary battlegrounds seems to prove that the only wall that armies hesitate to break through is the human shield.

Where the U.S. attacked Iran

American strikes Israeli strikes since June 13

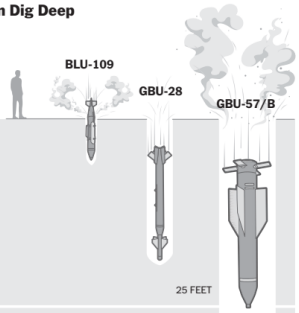


Sources: New York Times analysis of satellite imagery from Airbus, Maxar Technologies and Planet Labs; local news reports; and verified social photos and videos. • Note: Map shows confirmed locations of strikes and is not comprehensive. • The New York Times

The Middle East

A Heavy Bomb That Can Dig Deep

The U.S. Air Force began designing the **GBU-57/B**, also called a bunker buster, in 2004 specifically to attack nuclear facilities deep beneath mountains.



Other American bunker busters, like the **BLU-109** and the **GBU-28**, aren't able to penetrate the thick layers of soil, rock and concrete protecting Fordo.

25 FEET

The GBU-57/B can only penetrate about **25 feet in high-strength concrete** before detonation, but it can travel much farther through less resistant materials.

Iran has been developing new concrete technologies at its research facilities and universities for years. It is unclear what combinations of concrete surrounds the facility.

50 FEET

The maximum allowed height of a New York City **residential bulding** without an elevator (four stories)

The height of the **Washington Square Arch** in Manhattan

The maximum penetration depth depends on the types of underground material the bomb encounters.

100 FEET

Over **5,000 pounds of explosives** are detonated by a specialized fuse that can be programmed to fire at different depths.

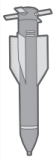
The height of a **12-story building**

130 feet

It can reach a maximum depth of around **130 feet in moderately hard rock.**

The height of the **Statue of Liberty**, without the platform

The distance to the **deepest subway station** in New York City (the 191st Street station on the 1 line)



197 FEET

The GBU-57/B can penetrate about **200 feet** through concrete often used for **building foundations.**

The Fordo enrichment facility is another estimated **60 to 90 feet** farther down.

The height of a **22-story building**

One bomb wouldn't be enough to reach the enrichment facility. Only multiple waves of attacks could reach that depth.

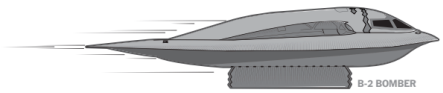
250 FEET

The estimated **shallowest** possible depth of the facility

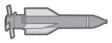
Some estimates put the facility **30 feet deeper or more.**

Sources: Congressional Research Service (bomb capabilities); Center for Strategic and International Studies, Institute for Science and International Security (minimum depth of facility) THE NEW YORK TIMES

Only the United States has the **bomber**...



...and the **bomb**...



... that might be capable of destroying **Fordo**, Iran's underground nuclear enrichment facility.

Israel Gets Needed Help From U.S. To Take Out Key Underground Target

This article is by ***Samuel Granados, Junho Lee, Jeremy White*** *and* ***Leanne Abraham.***

Iran built its most critical nuclear enrichment facility, Fordo, deep inside a mountain to shield it from attacks.

But the United States has a bomb that experts think could probably reach the subterranean site. On Saturday night, President Trump announced a "very successful attack" on Fordo and two other nuclear sites, but it was unclear what weapons were used.

Nuclear facilities at Natanz and Isfahan, which were already damaged in earlier Israeli strikes, were hit again on Saturday by the United States, according to Mr. Trump.

Only the U.S. military has the 30,000-pound GBU-57, or Massive Ordnance Penetrator, that may be able to destroy Fordo, and it is the only armed force with aircraft that can carry out a mission with it.

The U.S. military had concluded that one bomb alone would not destroy the Fordo facility. To destroy the site, an attack would have to come in waves, with bombers releasing one after another down the same hole.

Technically, military and geological experts say, it should be doable.

There is a lot that is not known about the facility, said Heather Williams, the director of the Project on Nuclear Issues at the Center for Strategic and International Studies. "There could be some additional tunnels or facilities that are buried even more deep into the mountain," she said.

Adding even more uncertainty, Rafael Grossi, the director general of the International Atomic Energy Agency, who has visited the facility, said last week that it was half a mile underground. But he may have been speaking in general terms, and most estimates put it 260 to 360 feet below the surface of the mountain.

The size and weight of the GBU-57 — 20 feet long and 30,000 pounds — mean that only the American B-2 Spirit stealth bomber can carry it on missions. Though Israel has fighter jets, it has not developed heavy bombers capable of carrying the explosive.

Fordo is in a hilly area 60 miles south of Tehran and 15 miles away from Qom, a city of 1.4 million people. Iran built the centrifuge facility, which is critical to its uranium enrichment operations, in the 2000s knowing it needed to bury it deep to protect it from attack.

Nuclear experts have warned against any attack on nuclear facilities, but the radiation dispersal risk of striking Fordo appears to be limited.

"The uranium hexafluoride gas that is fed into the centrifuges is poisonous but is heavier than air," said Mark Fitzpatrick, a nuclear expert at the International Institute for Strategic Studies. "Given that Fordo is below ground, any gas that escaped due to a bombing raid would mostly be contained within the plant, even if it's directly hit with bunker busters."

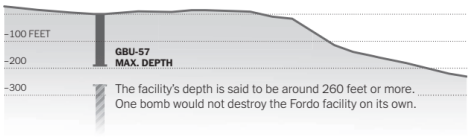
In recent years, Fordo has become Iran's main enrichment facility. "They have the most effective centrifuges there," said Scott Roecker, a vice president at the Nuclear Threat Initiative, a nonprofit organization dedicated to reducing the spread of nuclear weapons.

GBU-57/B is the specific iteration of the bomb believed to be capable of reaching Fordo. We use GBU-57 to refer to the same bomb in this article.

Additional work by Marco Hernandez.

Cross Section of the Mountain Ridge That Encases Fordo

The peak of the mountain is 3,150 feet above sea level.

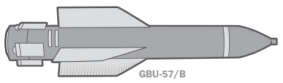


Sources: Congressional Research Service (bomb capabilities); Center for Strategic and International Studies, Institute for Science and International Security (minimum depth of facility) THE NEW YORK TIMES

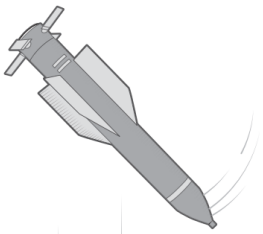
The Bomber and the Bomb

The B-2 plane can operate at up to 50,000 feet, which is 10,000 feet higher than the maximum for typical commercial airliners. As the bomber approaches its target at about 500 miles per hour, a door at the belly opens to drop the bomb.

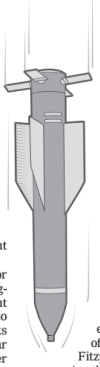
The GBU-57 weighs as much as a school bus. The bomb has never been used in combat — only tested.



After the bomb is deployed, it **uses GPS** to reach the target. This allows it to navigate with high precision so that multiple weapons can hit the same spot.



The bomb hits the ground with near-supersonic velocity. Upon impact, the rounded head gradually distributes the initial crushing force through its steel casing, allowing it to reach the target intact.



Sources: Defense Science Board Task Force (bomb capabilities); Whiteman Air Force Base (aircraft capabilities) THE NEW YORK TIMES

"And they can be arranged in different ways in order to speed up the process."

Recent estimates by the Institute for Science and International Security suggest that Iran could convert its current stock of 60 percent enriched uranium into weapons-grade uranium in three weeks at Fordo, enough to produce nine nuclear weapons. It is unknown, though, whether Iran has the weaponization capabilities needed to do so.

In March 2023, the International Atomic Energy Agency reported that it had discovered some uranium that had been enriched to 83.7 percent purity at Fordo — close to the 90 percent enrichment level necessary for nuclear weapons.

Experts say there are other options for trying to destroy Fordo. Israel could carry out sustained airstrikes with alternative bunker busters.

"They are smaller, but given that Israel has air superiority over the region now, they could offensively conduct longer-term strikes on Fordo to try to destroy it," Ms. Williams said.

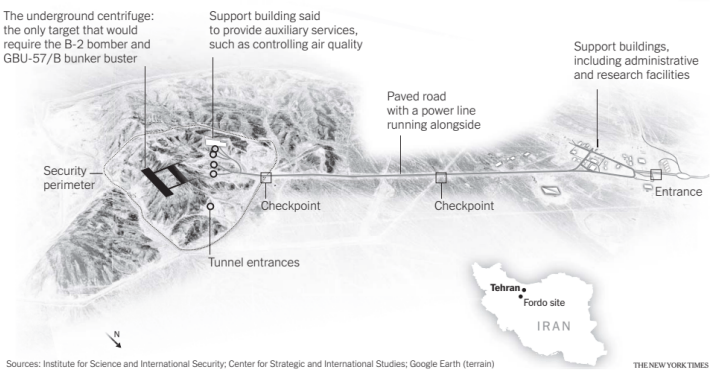
The Israeli military could also hobble the Fordo plant for at least a few months by bombing the air vents, collapsing the egress tunnels and cutting off the electrical supply, Mr. Fitzpatrick said.

Another option is sabotage, which Israel has used in the past against Iran's nuclear program.

Still, history suggests that an effort to build a nuclear weapon is rarely stopped by military force alone. The attacks on Iran's program could make the country even more determined to pursue its quest for nuclear arms.

"I don't believe you can completely dismantle the nuclear program through military means," Mr. Roecker said. "I think you need to negotiate a deal, with transparency and monitoring and verification, in order to fully address a nuclear program. It is the most effective way to repurpose that facility."

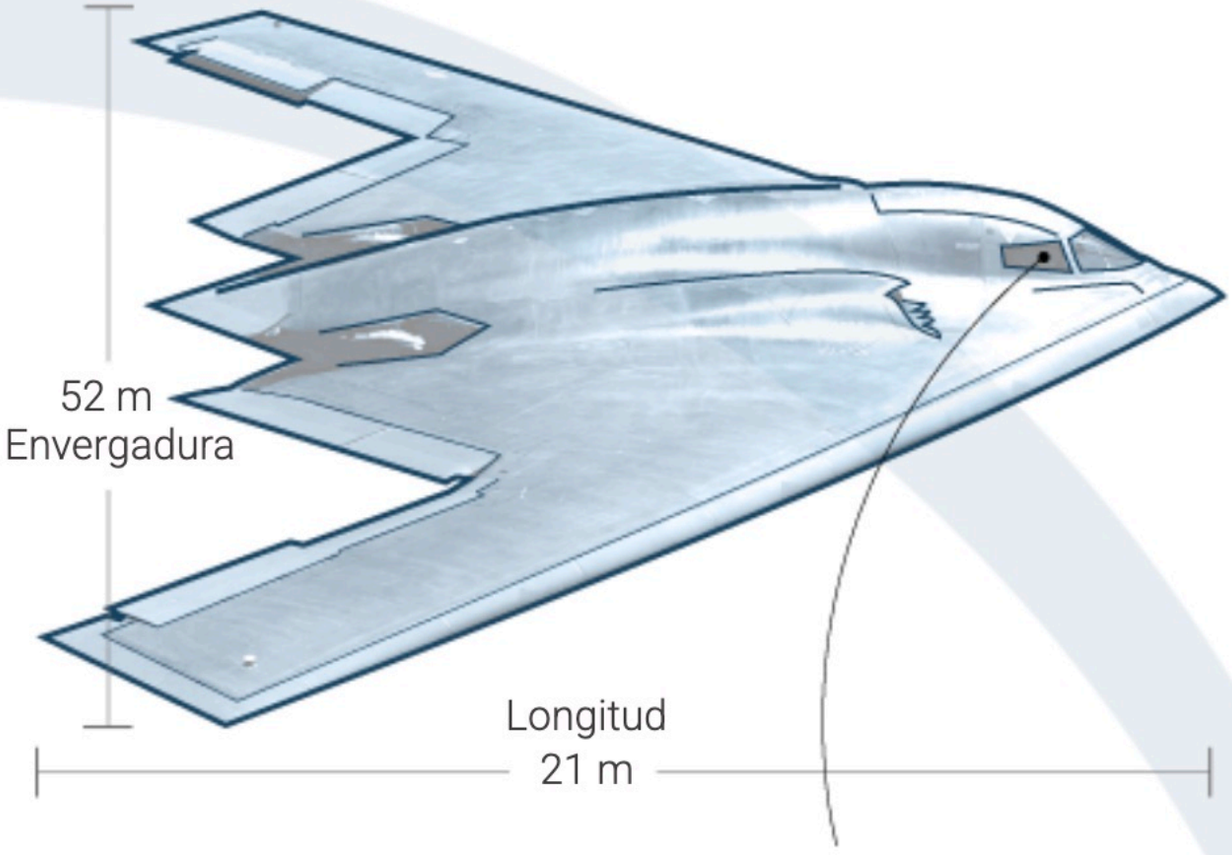
Possible Targets at the Fordo Fuel Enrichment Plant



Sources: Institute for Science and International Security; Center for Strategic and International Studies; Google Earth (terrain) THE NEW YORK TIMES

El ataque aéreo sobre Fordow: cómo Estados Unidos ha alcanzado la instalación nuclear subterránea de Irán

Solo un bombardero B-2 puede transportar hasta dos GBU-57, una bomba de 13,6 toneladas diseñada para perforar decenas de metros de hormigón y roca. Este es el recorrido de su lanzamiento hasta impactar en el complejo de Fordow



Carga máxima

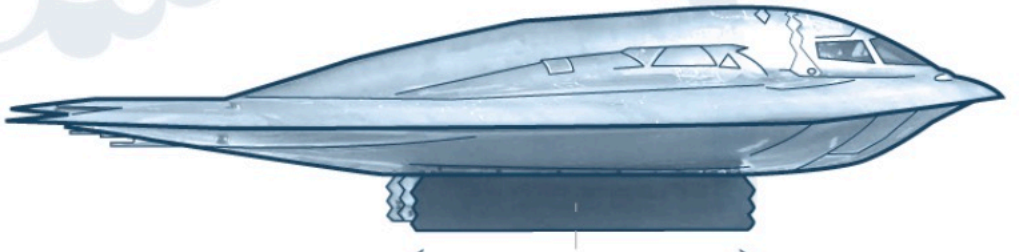
80 bombas JDAM
16 bombas B-83
2 bombas GBU-57

Tripulación

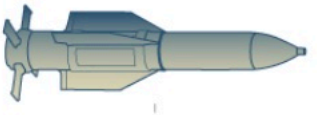
2 personas

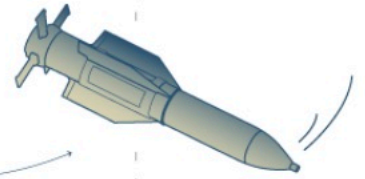
El B-2: un avión furtivo y letal

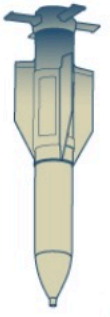
El bombardero estratégico B-2 Spirit es el único avión de la Fuerza Aérea de EE. UU. capaz de transportar la GBU-57.



Es capaz de penetrar defensas aéreas sofisticadas sin ser detectado. Gracias a su diseño furtivo, tiene una firma de radar de solo 0,1 m^2, lo que le permite eludir las defensas aéreas más sofisticadas.





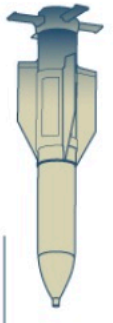


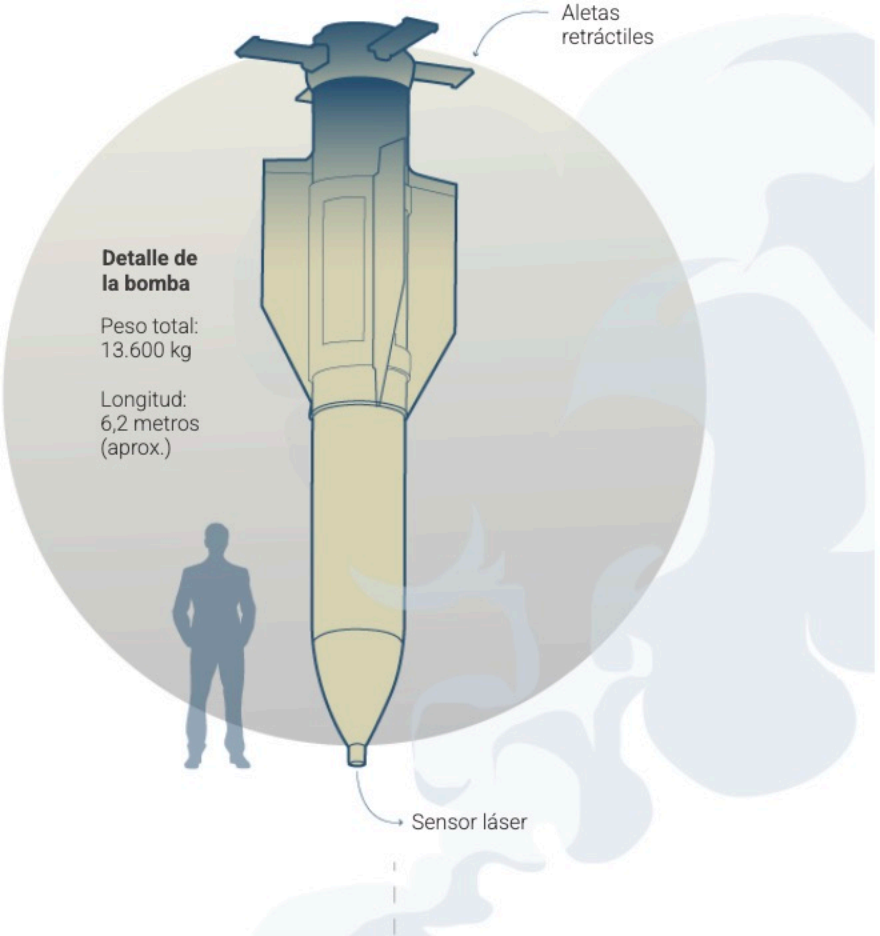
Una bomba para romper montañas

La GBU-57/B es una bomba de 13,6 toneladas diseñada específicamente para destruir instalaciones subterráneas. Tiene una carga explosiva de 2.300 kilogramos.

Puede atravesar hasta 60 metros de material o 40 metros de roca de dureza media.

La bomba puede programarse para detonar a distintas profundidades.




Aletas retráctiles
Detalle de la bomba
Peso total: 13.600 kg
Longitud: 6,2 metros (aprox.)
Sensor láser

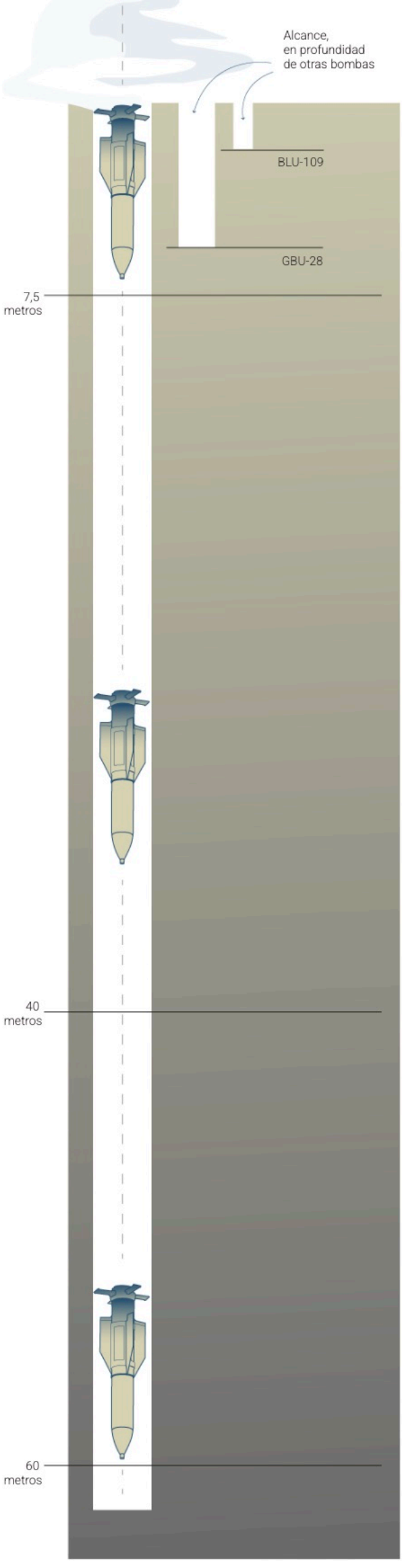
Fordow: el objetivo

Fordow está excavado en el interior de una montaña, a unos 100 km. al sur de Teherán.

La central nuclear, profundamente enterrada (entre 80 y 110 metros bajo tierra), alberga centrifugadoras que permiten enriquecer uranio.

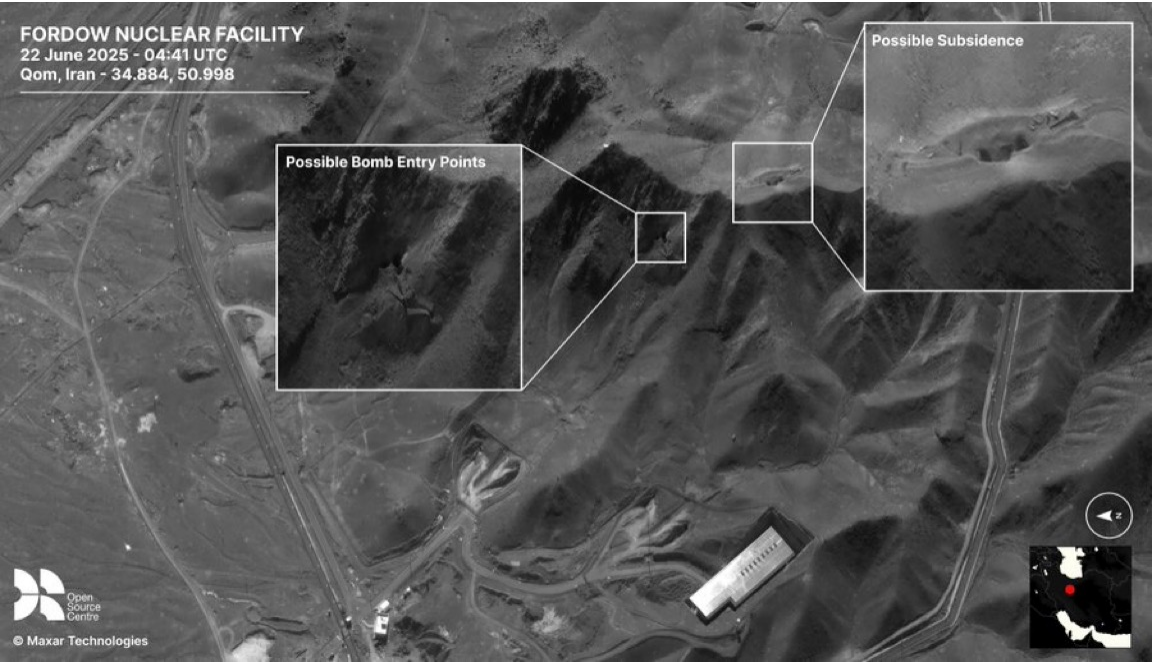
Se cree que la instalación de enriquecimiento de Fordow está de 18 a 27 metros más abajo. Equivale a un edificio de unas 22 plantas.

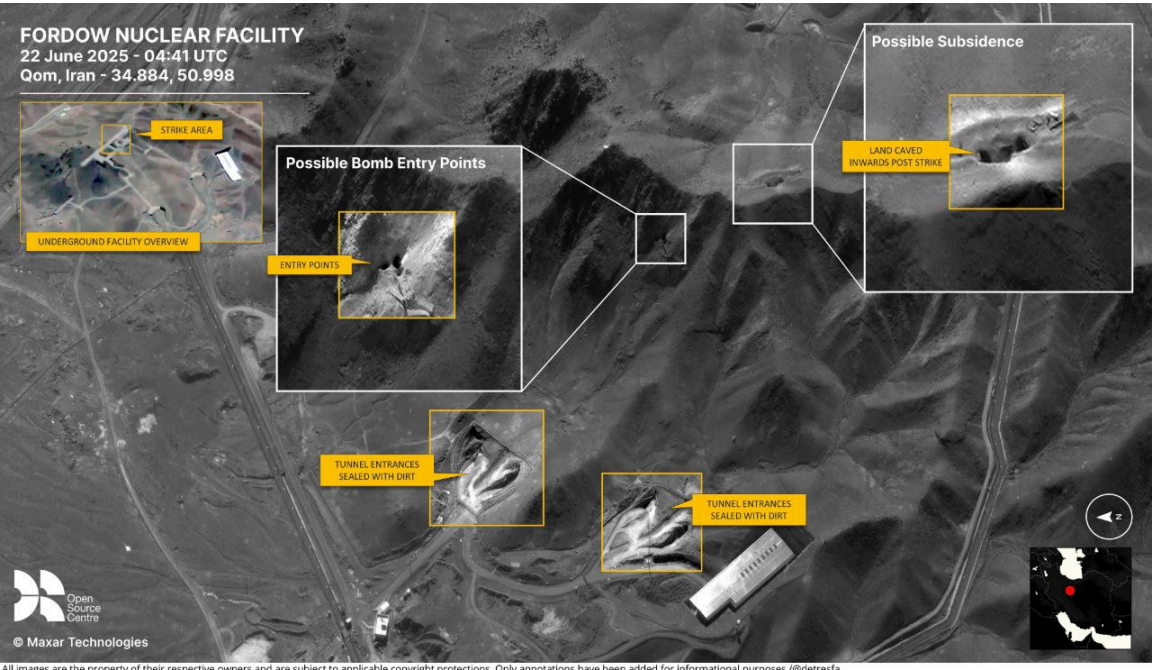
Una sola bomba no bastaría para alcanzar la instalación de enriquecimiento.



INTERNACIONAL

EL ANTES Y DESPUÉS DE LOS ATAQUES A LA PLANTA NUCLEAR SUBTERRÁNEA EN FORDOW


FORDOW NUCLEAR FACILITY
22 June 2025 - 04:41 UTC
Qom, Iran - 34.884, 50.998
Possible Bomb Entry Points
Possible Subsidence
Open Source Centre
© Maxar Technologies




MAXAR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FORDOW NUCLEAR FACILITY
21 June 2025 - 07:39 UTC
Qom, Iran - 34.884, 50.998

BEFORE

AFTER

FORDOW NUCLEAR FACILITY
22 June 2025 - 04:41 UTC
Qom, Iran - 34.884, 50.998

Open Source Centre

FORDOW NUCLEAR FACILITY

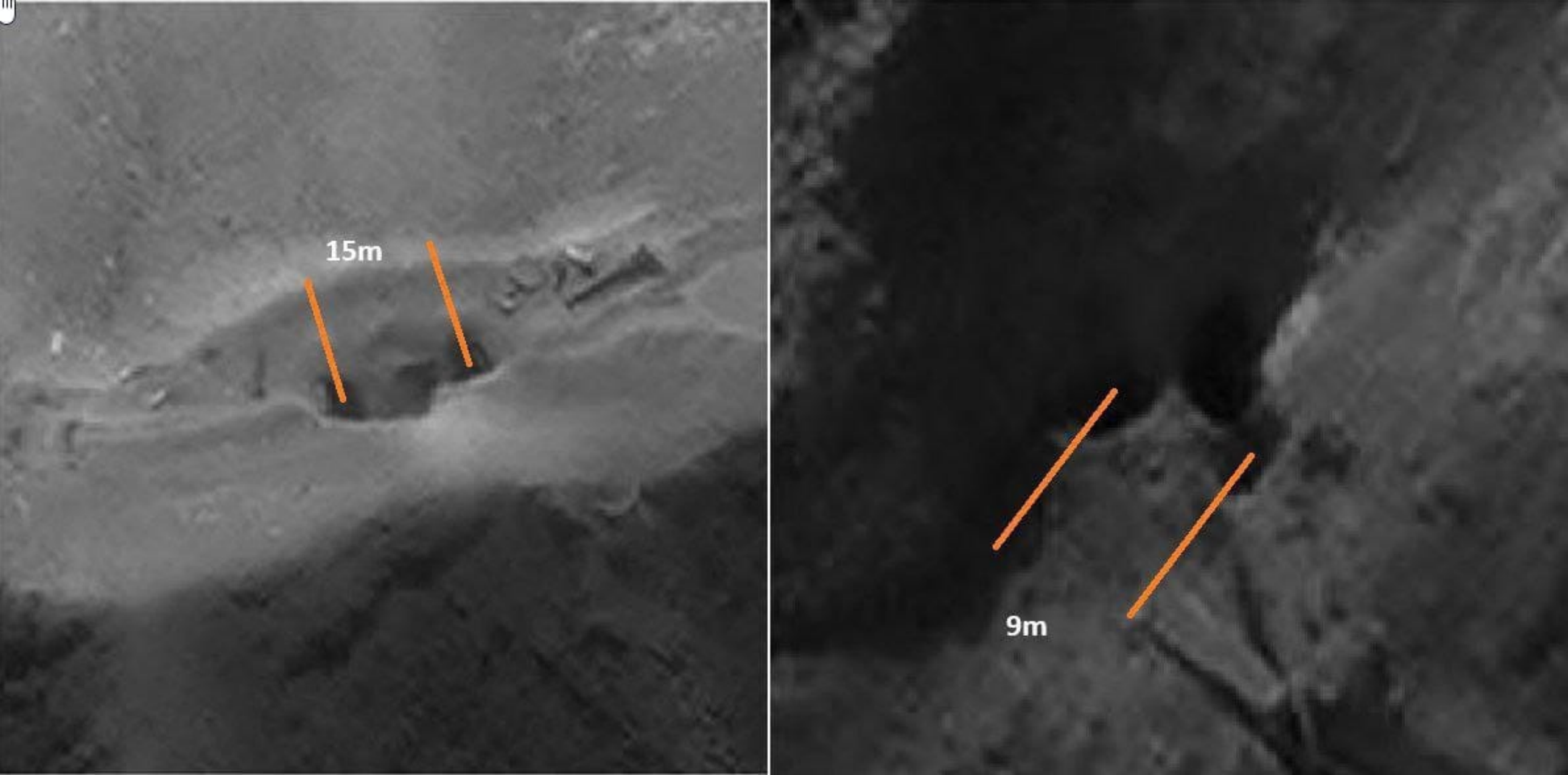
22 June 2025 - 04:41 UTC

Qom, Iran - 34.884, 50.998

Possible Bomb Entry Points

Possible Subsidence

Open Source Centre


15m
9m