中国的地下长城

Strategic Implications of China's Underground Great Wall

Dr. Phillip A. Karber

26 September 2011
China’s Underground Great Wall

Strategic Implications of China’s Underground Great Wall

Dr. Phillip A. Karber

with assistance from Tim Brown, Wes Cross, J.M LaGray and the students of seminars: Arms Control & Multipolarity and #457 Asian Arms Control Prospects #569

11 September 2011
Forward

In 2008 the Director of the Defense Threat Reduction Agency asked the Threat Reduction Advisory Committee Science & Technology Panel to join with the DTRA Nuclear Deterrence Panel to address improvements needed in detection, monitoring and verification related to future arms control.

Following the May 2008 Sichuan earthquake, the Chinese media became more open about the PLA’s decades long effort to protect their nuclear missile forces through tunneling. I commissioned S&T panel member Dr. Phillip A. Karber to conduct an “open source” study of what the PRC called their “Underground Great Wall.”

Dr. Karber was the right person for this assignment given his four decades experience: with the Congressional Joint Committee on Atomic Energy; as director of the National Security Council net assessment project 186; strategy advisor to Secretary of Defense Weinberger; and bipartisan reputation in advising the Congress on security/arms control issues. He served on the Four Power Asian Security Committee (appointed by Secretary Carlucci), had aviation experience in China, as well as heads Georgetown University’s Asian Arms Control Project with a pool of trained student researchers willing to comb through thousands of pages of military writings and hundreds of hours of Chinese television coverage.

In the middle of the Karber project – on 11 December 2009 – the People’s Liberation Army officially announced their “Underground Great Wall” project and publicly claimed that it involved 3,000 miles of tunnels for the concealment of nuclear weapons. The Georgetown team has assembled hundreds of pages of documentation and a 45 minute video compendium of tunnel coverage shown on Chinese television. Their evidence suggests a massive and modern effort that includes mobile ICBMs in new complexes. This report summarizes the implications of the PLA missile underground.

The surprising scope of the effort combined with the asymmetrical nature of the approach underscores the importance of the Karber effort in looking at the questions of strategic culture behind it: Why did the Chinese make this kind of effort? How would it function operationally? What are the implications for our own forward deployed force survivability, allied security guarantees and arms control strategy?

The DTRA TRAC panels have since been superseded by other on-going efforts, but the Karber Report shows that we need to give China’s evolving nuclear posture more attention, that they have not only have taken an approach to nuclear force survivability that is quite different than our own experience, but that further stabilization and reduction of major nuclear power inventories will not succeed without bringing the PRC into a posture of negotiated constraint.

Dr. Joseph V. Braddock
Chair, DTRA S&T Committee
(2005-2009)
China’s Underground Great Wall

CONTENTS

Appendix 1  Sichuan earthquake Tunnel exposure
Appendix 2  Twenty-five Hundred Years of Cave Defense
Appendix 3  Civil Defense Tunneling
Appendix 4  Patterns of Early Nuclear, Naval & Air Base Tunneling
Appendix 5  2nd Artillery Underground Great Wall
 Phase I: 1985-1995 – Liquid Rocket “roll-out”
 Phase II: 1996-2010 – Solid Fuel SRBM/IRBM “enhanced mobility”
 Phase III: 2011-?? – Tunnel Based Road/Rail Mobile MIRVed ICBM
Appendix 6  Operational Concept: Hide, Surge, Strike, Move, Hide
Appendix 7  Breakout & Instability
 Uncertainties and the Problems of Monitoring & Verification
 PLA Deterrence Theory – Minimum vs. War Fighting
 Issues for Arms Control

Video:  2nd Artillery Comes Out of the Cave
Volumes  2nd Artillery Translated Article Collection
Implications of American Entropy:

China’s Strategic Rocket Force

“Underground Great Wall”

• Lessons Unlearned – during the Cold War we missed 50% of the Soviet stockpile, i.e. 20,000 warheads were not accounted for and presumed not to exist;

• Missed Significance -- while the US has tracked PRC tunnel construction for years, the scope, magnitude and strategic rational behind the “Underground Great Wall” has been under appreciated;

• Missed Trends – the Chinese buildup of their Theater-Strategic Rocket Force has not been the focus a comprehensive all source analysis that includes technology, deployment, operational concepts, readiness, logistics, training as well as protective deception, dispersal and underground deployment;

• Missing Warheads – public estimates of Chinese nuclear warheads range from 300 to 400, PRC data in 1995 gave the figure at 2350, and if the doubling of tunneling since then is reflected in the size of the protected force, our public numbers could be easily off by a factor of 10.

• Missing Assessment – we have not thought through what all this means for US forces deployed in the region, let alone the impact of a “surprise” roll-out in the middle of a regional crisis of a much large ICBM force than estimated.
二炮导弹地理：掩体、阵地遍布全国山川
SECOND ARTILLERY MISSILE GEOGRAPHY
Bunkers, Mountains and Rivers All Over the Country Positions
The Challenge

Historically the PRC has been EXTREMELY tight lipped about their nuclear forces.

A Radical Shift in State Behavior that is NOT associated with apparent external or internal stimuli raises three serious questions:

- Is it Real?
- Why did they do it?
- What does it Portend for Future behavior?

The Opportunity

Over the last eight years there has been an exponential increase in Chinese discussion of Second Artillery:

- Major Books – *Science of 2nd Arty Campaigns, Glorious Era of 2nd Arty*
- Journal Articles – actually say something about:
  -- Problems in training, logistics, maintenance, leadership initiative, Party meddling;
  -- Emerging capabilities in mobility, space based RSI, accuracy and lethality;
  -- Experimenting with innovative Joint Command and Theater Campaign Concepts.
- **TV coverage** – Prime Time Series, weekly news coverage
- **An explosion of Internet based information and military blogging.**

This offers the potential of looking for insight in non-traditional sources.
2\textsuperscript{nd} Artillery Underground Great Wall
Referenced in Chinese Military Literature

![Chart showing the annual number of articles referencing "Underground Great Wall" from 1995 to 2010. The number of articles increases significantly in 2009 and 2010.]
Internet Flows both Ways: IP-1011

Administrators and censors have trouble keep up with explosion in traffic;
Backdoors are left open – particularly in less sophisticated regional sites –
  String character searches particularly useful
False sense of security about lack of Western access to the language --
  Second Artillery created the digital code that makes Chinese machine readable
Military bloggers like to share “cool” stuff and exchange critical comments on it;
Unique trove but massive overload of treasure and trash --
  Need focus and anvil to test it against.
Project IP-1011: Chinese OCR Experiment

Hard Copy or Internet in Mandarin → Digitized Scanning up to 100 pp per hour → Output PDF file → Searchable, Distributable, Storable Electronic Media

MDGB Machine Translation & Editing → Chinese OCR Reading Software
An Experiment

A Radical Shift in Behavior from Minimizing to Highlighting?
-- Is it Real? Why did they o it? What does it Portend?

History: A Deep Culture of Strategic Concealment
II. Implications: Operational Warfighting
III. Implications: Force Design
IV. Implications: Strategic Deterrence & Theater Dissuasion
V. Uncertainties: What should be expected in the Next Phase?
警告!!!  WARNING!!!

This is NOT an Intelligence Product:
-- NO classified material on this topic consulted;
-- NO correlation or correction by others;
-- NO claim of accuracy or truth.

This is a Georgetown University study of Chinese Strategic Culture & American Arms Control Entropy:
-- DTRA S&T panel tasking but no-government funding;
-- utilizing original and only open source material;
-- generating heuristic hypotheses to be tested.
"Bathtub of Ignorance"*

"This is not an indictment of our intelligence system.... The flaw, instead, is in our decision-making process. Our system reacts positively only when confronted with hard evidence -- a photograph of fielded equipment -- and negatively to an intelligence community 'bathtub' projection. No one in Washington is willing to make a decision until shown a picture of a fielded system incorporating new technology; then there will be all sorts of doomsday and 'how could this have happened reactions.'"

“Bathtub of Ignorance”*

"This is not an indictment of our intelligence system.... The flaw, instead, is in our decision-making process. Our system reacts positively only when confronted with hard evidence -- a photograph of fielded equipment -- and negatively to an intelligence community 'bathtub' projection. No one in Washington is willing to make a decision until shown a picture of a fielded system incorporating new technology; then there will be all sorts of doomsday and 'how could this have happened' reactions."

STUDY #1

Sichuan earthquake Tunnel exposure
2008 Sichuan Earthquake exposes Tunnels

- Co-location of 2008 earthquake epicenter and underground nuclear “armory;”¹
- Earthquake “volcano” split mountain spewing manmade concrete blocs;²
- Reports that PLA’s largest underground nuclear weapons cache collapsed;³
- Government concern over “radiation” leakage;⁴
- Large scale military reaction with 137,000 troops dispatched to quake area – including 2nd Artillery engineer division⁵ and 2,700 radiation technicians;⁶
- Post –quake scientific controversy whether event was “triggered” by human action;⁷
- Closure of epicenter to reporters and press suppression.⁸

Chinese Nuclear Facilities in Proximity to 2008 Earthquake

Major Nuclear Facilities in Quake Zone

"Core’ since the sixties of last century, the number of tunnels in Sichuan needing repair? Difficult to count."

Mianyang: Science and Technology City of Sculpture "Spring Thunder" a symbol of a nuclear explosion.

“大地震销毁中国军队最大兵库 [Earthquake Destroyed the Chinese Army's Largest Armory],” 大纪元, iop cit.
"Guangyuan
Sichuan 2008 Aftershock

Earthquake close to major PLA nuclear tunnel complex

Nuclear experts said that closer to the epicenter of the earthquake, in rugged hills a two-hour drive west of Mianyang, China runs a highly secretive center that houses a prompt-burst reactor. It mimics the rush of speeding subatomic particles that an exploding atom bomb spews out in its first microseconds. North in an even more rugged and inaccessible region, nuclear experts said, China maintains a hidden complex of large tunnels in the side of a mountain where it stores nuclear arms. “It’s very close to the epicenter,” said one specialist, who spoke on the condition of anonymity because, to the best of his knowledge, the exact location of the secret complex had never been publicly disclosed.¹

Larger Crater near Epicenter associated with Underground Explosion

According to a CNS report on May 31, titled "Suspicious Epicenter of the Epicenter Was Found," on May 23, a medical team, consisting of paramedics from the People’s Liberation Army (PLA) hospitals and psychologists from Beijing, found onsite a one-kilometer (0.62 mile) wide and two kilometers (1.24 mile) long valley on a hill close to the epicenter. The long ravine was found to have been covered with concrete debris 10-20 inches thick at its bottom as if large cement blocks were tossed about randomly surrounding the immediate area.
A team member said, “Where did those concrete blocks come from?” Since there were no large buildings nearby, everybody was curiously talking about it but could not find an answer. A local resident…. saw a huge hole form at the top of the mountain. Many things were pushed out of this hole like toothpaste being squeezed out. "Was it magma?" somebody asked. “No, those were concrete blocks,” said He. “The eruption lasted about three minutes,” he added.
Earthquakes may sometimes result in a volcanic eruption, but no concrete eruption has ever been recorded, said an expert. Based on the CNS report, several experts have suggested the eruption could have been caused by a huge explosion beneath the mountain, which shattered the concrete cover of the underground facilities and pushed them to the surface. The thickness of the concrete blocks pushed to the surface seemed to match the cover layer used in China’s underground military bases.²

² “大地震销毁中国军队最大兵库 [Earthquake Destroyed the Chinese Army’s Largest Armory],” 大纪元, iop cit.
Claims of “Volcanic like eruption” near Yingxiu

四川山区有很多军工厂、武器库及核设施基地，军方知情人士透露，这次地震引发武器弹药库爆炸，给军队带来灾难性的重创。图为地震山区爆炸后的情形。当地村民说：大山好像被切开了肚子——这能量太大了。

“大地震销毁中国军队最大兵库 [Earthquake destroyed the Chinese army’s largest Arsenal],” op cit. Caption: “Mountains in Sichuan, many military factories, arsenals and nuclear facilities, bases, military informed sources, the earthquake triggered weapons and ammunition depot explosion, a devastating hit to the military. The picture shows the situation after the explosion earthquake mountain. Local villagers said: the mountain seems to its stomach cut open with the greatest energy.
Sichuan 2008 Aftershock

Suppression of Reports of Damage to Nuclear Facilities

May 18, 2008, acting chairman of China Democracy Party Guo Quan released the "China Democracy Party as soon as possible to urge the Chinese government issued the security of nuclear facilities in Sichuan, the report." He cited in this report a series of Sichuan Province experimental research facilities and nuclear power projects after the earthquake casualties of these units, and asked the CPC and the immediate surrounding areas throughout Sichuan, all nuclear facilities in Sichuan, radiation detection and early release of nuclear facility safety reports. However, the third day after the publication of the report, Guo Quan was arrested. Police said no charges Guo Quan, but must be detained for 10 days, 10 days do processing.¹

Major Loss to China’s Nuclear Arsenal?

July 4, 2008,... according to high-level Chinese military source secretly disclosed that in the earthquake the Chinese Army’s largest arsenal of weapons was completely destroyed, for the Chinese army this was a catastrophic hit. Sources said that the earthquake triggered weapons and ammunition mountain chain explosion, a large supply of nuclear weapons which the PRC had stored for decades was completely destroyed; in addition some new nuclear warheads, weapons test site and nuclear facilities, have been destroyed. This event, the highest military secret, set off vibrations at Zhongnanhai [Communist headquarters in Beijing].²

Radiological Leakage into Underground Water Supply

"North River below the original nuclear storage places ... Result of underground nuclear leaks, now has a serious threat to groundwater and Sichuan, Chongqing, hundreds of millions of people safe."³

² 2008年5月18日，中國新民黨代主席郭泉發表了「中國新民黨敦促中共政府盡快發布四川核設施的安全報告」。他在該報告中列舉了四川境內的一系列核動力工程實驗研究設施及地震後這些單位的人員傷亡情況，並要求中共立即對四川全境及周邊地區所有核設施進行輻射檢測及盡快發布四川核設施的安全報告。但在該報告發表後的第三天，郭泉被拘捕。警方稱，郭泉沒有罪名，但必須拘留10天，10天後再做處理。Ibid.
³ 2008年7月4日，據中共軍方高層知情人士秘密透露，在汶川地震中中國軍隊最大的武器庫被完全銷毀，給中共軍隊帶來災難性的重創。消息稱，地震引發山區武器彈藥庫連鎖爆炸，中共幾十年經營的最大的兵器補給庫被完全銷毀，還包括新武器試驗基地及部分核設施、核彈頭都遭到摧毀。此事件作為最高軍事秘密，震動中央南海。Ibid.
⁴ 2009年3月16日署名內幕人士本著良心、道德向博訊網「驚天大爆料」： 「北川下方是原來的核彈貯藏地 ... 造成地下核洩露，現已經嚴重威脅到川渝地下水和億萬人民的安爭。」Ibid.
2008 Earthquake Military Containment

Medical team of specialists enter crater area near Yingziu

100 paratroopers jump into mountain epicenter for “security”

Chemical defense troop of the Chinese Army deployed to Chenjiaba, Beichuan County, area of reported ground water radiological contamination

Location of Earthquake & Reconstruction Projects

Military Deployments to Earthquake Zone

2008 May 18: Vice Minister of the General Staff for Operations Ma Jian news conference showed the deployment of military relief force to the earthquake area.

Accidents Happen
and can be revealing

Given Second Artillery’s high degree of reliance on the nation’s rail and highway system for its nuclear deterrent, a failure in the transport network is cause for concern. One example of a rail failure that potentially affected warhead logistics occurred during the May 12, 2008 Sichuan earthquake. A train hauling hazardous materials derailed and ignited inside a tunnel in Qinling Mountains in the vicinity of a primary 22 Base warhead rail transfer point. Rail operations on the Baoji-Chengdu line were shut down for 12 days. The Hongling Command Cell commander responded and arrived on the scene in just over two hours.¹

Baoji-Chengdu Rail Accident 2008²

“12 tankers, part of a 40-car freight train trapped in the No 109 tunnel by landslides following last week’s earthquake....” Xin Dingding, “Final Gas Tankers Cleared from Tunnel,” China.com, (2008.05.21) at <http://english.china.com/sh_cn/news/china/11020307/20080521/14858076.html> accessed 5 May 2010]. “Li Chunhong, a military officer assigned to the Baoji-Chengdu clearance operation, said there is a slim chance the tunnel could reopen at the end of next week if weather permits. Previously, poisonous gas emitted from the fire and the dangers posed by the gasoline had prevented firefighters from entering the tunnel, he said to the 21st Century Business Herald. When the army team arrived the day after the earthquake, the temperature at both of the tunnel’s exits had reached 160 C, he said. Fearing an explosion, local officials helped evacuate more than 900 farmers living in two nearby towns to a safer place 6 km away.”
Earthquake buried train on the Baoji-Chengdu Railway

UPPER LEFT: The locomotive was successfully buried out of the tunnel;
UPPER RIGHT: Fire brigade uninterrupted cooling water to the southern end of the tunnel;
LEFT: Fatigue and sleep in the battle space of the fire brigade.

Sichuan Seismic Record 12 May 2008, Richter scale = 7.9 shows
No Nuclear Detonation before, during or after Earthquake

STUDY #2

2,500 Years of Cave Defense
**STUDY 1: Twenty-five Hundred Years of Cave Defense**

- China’s military culture has long valued defensive tunneling and underground fortification – such as the “cliff roads” of the late Warring States period (c.259-210BC) and the “Terracotta Warriors” of Qin Shi Huang’s tomb (c.259-210BC);
- Seven times in the history of China the phrase “Underground Great Wall” has been used in the context of military defense;
- The most recent application of the term -- “mysterious underground Great Wall” -- was secretly applied to the effort to build secure basing for the strategic nuclear rocket force in the 1980s; first ambiguously referenced in print in the mid-90s, and officially enshrined as a “national project” involving 3,000 miles of tunnels on 11 Dec. 2009.
Earliest Middle Kingdom Tunneling

“Cliff Roads” of the late Warring State Period (circa 475-221BC)

Chinese contribution was the provision of roads in precipitous regions by the use of cliff-face gallery roads. The four most famous were in Shaanxi Province, and work on the most notorious of these – the Shaanxi to Sichuan cliff road – began in the Warring States period in 475-221BC.

Modern example (circa 1972): 1,200m Guoliang Tunnel, Taihang Mountains, Huixian County

Underground Guardians of the Emperor
Qin Shi Huang’s 兵马俑 Terracotta Tunnel Warriors (circa 259-210BC)

700,000 workers spent 36 years constructing the necropolis with nearly 1,000 meters of tunnels and over 8,000 figures.

地下长城 – “Underground Great Wall”
is an Established Defensive Concept in Chinese History

Six times in the history of China the phrase “Underground Great Wall” has been used in the context of military defense:

• 安徽地下长城，天下无二 -- Bozhou underground military defensive tunnel system built by Cao Cao – politician, general and literati -- (circa 155-220AD):
• 宋地下长城 – Song Dynasty “underground Great Wall” linear defensive positions (circa 960-1279);
• 广西地下长城 -- Ping Kong Ling underground Great Wall was built in 1889, under Adm. Su Yuanchun supervision by the Guangxi Border Guards Service (circa late 1800s);
• 朝鲜战争地下长城 -- Korean War tunnel complex built north of the 42nd parallel (circa 1952-53);
• 河北地下长城 -- Hebei Great Wall Underground civil defense complex in Beijing and other northern cities fearing Soviet attack (1969-1975);
• 神秘的“地下长城” – “Mysterious ‘Underground Great Wall’” for protection of 2nd Artillery missile units:
  Phase 1 – 1985-1995
  Phase 2 – 1998-2009
  Phase 3 -- 2010-??

Underground Great Wall -- 安徽地下长城，天下无二  
(circa 155-220)

Lying in the old city of Bozhou, it is an underground military defensive tunnel built by Cao Cao (155-220), a famous politician, militarist and literati, in his hometown. It underwent repeated expansion in the Song and Yuan dynasties. About 3-8 meters below the surface of the downtown area, the tunnel extends some 10 km, it is a military tunnel with the longest history, most complicated structure, largest scale and complete facilities ever discovered in China. Therefore, it is renowned as the Underground Great Wall.

The whole tunnel is crisscrossed with complicated and subtle arrangements, with multilevel distribution and complex construction. The tunnel takes the shape of a “T” when it turns. The two parallel lanes are spaced 2-3.5 meters apart, and there are square holes for passing on a message on the wall between them.

Along the deep and zigzagging tunnel, some military and supporting facilities were built, including foxholes, obstacle walls, stumbling boards, traps, vent holes, holes for passing on a message and niches for torches. The cultural relics of the Han, Tang and Song dynasties unearthed in the tunnel include pills, soldier’s swords, lamps, copper mirrors, pottery, porcelain and ink-stones left behind from several dynasties. These are all of great importance for researching China’s ancient military buildings and tactics and the military thought of Cao Cao.

Tunnel Warfare from the Northern Song Dynasty

Song Dynasty Military Tunnel Discovery

During the Song Dynasty (916-1125), in the years between 960 and 1127, this area was a battlefield between the states Song and Liao. Liao occupied part of the Song state, and the Song built a military defense line, which was expanded during a 200 year long period of war. The ancient structure was completely forgotten until 1948. A great flood happening in Yongqing village, Hebei province, was about to destroy the whole village, when it was stopped with a thunderous noise. The course of the flood was changed, the water level sank, as the water was flowing into an underground passage. In 1951 an underground cave some 150m² in size was discovered, after a house 2.5km from Yongqing had caved in. Dozens of small doors in this cavern were opening to a passageway each. Ancient war passages were found, spreading throughout Yongqing County, covering an area of some 300 square kilometers. The underground bulwark is of enormous size, 90km of tunnels which cover an area 65km from east to west, and 25km from north to south, which is an area of 1,600m². Most of it is a long tunnel along the border, similar to the Great Wall, that is why it is called Underground Great Wall It consists of a wide range of military facilities, camouflaged exits, covers, and locking gates. A frontier pass between the rivaling states was fortified by an underground fortress. But it also has living necessities, with ventilation holes, and lamp stands integrated into the walls. There were brick beds, with some basic comfort, as they could be heated during winter.

Underground Great Wall -- 宋地下长城 -- as Defense Position

In ancient Chinese history it is recorded that The Northern Song Dynasty (960-1127 AD) battled for 200 years with the Liao and Jin Dynasties, which at the time were ruled by minority races from China’s Northern Territories, the Khitan and Jurchens respectively. The Northern China Plain was an endless flat ground, with no mountains or rivers that could be used to help defend against the northerners.

Upon further investigation, experts found that ancient war passages were spread throughout Yongqing County in an area covering approximately 300 square kilometers. Who Built the Ancient War Passages and When? Experts discovered that the Yongqing ancient war passages were widespread. They were in fact a large-scale construction used to house troops during times of war. The structures of the caves were complicated and complete, possessing military facilities such as camouflaged exits, covers, and locking gates.

Underground Great Wall -- 宋地下长城 -- as National Redoubt

The creation and maintenance of such a massive underground network required a great number of these bricks. It is believed that these ancient war passages were constructed as part of a large nation-wide project created and overseen at a national level by the governing authorities of the time. The Passages Spread Over 1,600 Square Kilometers.

Experts have dug out similar war passages in Yongqing, Xiong county, and Bazhou. The ancient war passages are about 65 kilometers from east to west, 25 kilometers from north to south, which extend through 1,600 square kilometers. When the border between the Song Dynasty and the Liao Dynasty went as far west as Rongcheng county and Xushui county, it is thought that many ancient war passages existed in that area. How far the ancient war passages extended eastwards from Yongqing is still unknown.

Hiding Soldiers in the Ancient War Passages to Defend the Country: Amidst many legends about the underground network, one states that the ancient war passages were built by General Yang and his family; a family that produced three great generals over three generations. Another legend suggests that General Yang Liulang used the underground passageways to defend the border. At the time (960-1127 AD), soldiers of the Liao Dynasty strictly guarded the lands north of Yongqing County. It is said that Yang Liulang built the passages to hide his soldiers underground so they could quickly defend against attacks launched by the Liao soldiers. Experts point out that the underground passages may have been used as base for launching attacks during wars fought in ancient China. As a means of defense throughout the years, people have built great walls in mountainous areas and water fields near rivers and lakes to block cavalries. However, in the open plains, where it is difficult to use the terrain as a means of defense, the tunnels would have allowed soldiers to travel unseen below the earth. The ancient war passages have become famous for the advantages they provide whether the troops are attacking or defending, and they have been named the "underground Great Wall."

广西地下长城 – “Underground Great Wall of Guangxi”

Ping Kong Ling “underground Great Wall” was built in 1889 by the late Admiral Su Yuanchun supervision of the Guangxi Guangxi Border Guards Service built during the military defense system, it is based on the cross-border river - flat terrain and the river environment, the construction of a north-south peace Kong cobbles two batteries, each country Krupp cannons An Youde each one, the number of small cannon door.

In 1921 artillery from Taiwan was moved to Nanning, by Guangxi warlord Lu Rongting to create the “Zhenning Battery).” Between north and south the grand battery was connected by an underground passage, and crossed the river through the length of more than 1000 meters – became known as the “underground Great Wall.”

February 1950, the PLA Army 45th division in the Ping Gang area cut off the Kuomintang 19th and 197th divisions, with 6715 troops. After two days and nights fighting in the Guangxi fortress, the PLA wiped out the remnants of the KMT forces. This is the war of liberation in southern Guangxi, the last battle known to history Ping'erguan The campaign battle.

“地下长城 [Underground Great Wall],” op cit.
Beijing Tunnels from the War of Japanese Aggression

Monument to Tunnel Warriors

Firing Port

Famous Art Depicting Defense of the Tunnels
Tunnels from the War of Japanese Aggression

“Film "Tunnel Warfare" has been hailed as a red classic films, as a commemoration of the 65th anniversary of the victory of the Chinese People's Anti-Japanese War as a tribute to the "Tunnel Warfare" tunnel warfare site in Hebei Province....”

“TV version of the "Tunnel Warfare" film uses the "three-stage" structure. The original single-port, dual port hiding hole, the development of interlinked to every household, every village connected, the tunnel dug under the devils strongholds and fortified towers....”

“...the TV drama ‘Tunnel Warfare’ will be limited to the original high-Jinjiazhuang of tunnel warfare and the neighboring villages, rivers and lakes, reed marshes, urban guerrilla warfare within the enemy’s positions - mine warfare, mahjong warfare, ambush warfare, sabotage, war, siege warfare tactics....”


"in the tunnel connecting Chairman Mao's childhood home to the rest of Shaoshan village.,” blog (no date), at <http://chinadan.com/index.html> [accessed 7 Mar. 2010].
Mao’s Utilization of Caves during the Revolution

Yan'an, in northwestern China's Shaanxi Province, was the headquarters of the Communist Party of China from 1935-1948, serving as the endpoint of the Long March and as a military base against the Japanese.

LEFT: CCP Headquarters complex and Mao’s command center;
ABOVE: Mao working in his cave office;
RIGHT: making a speech to cadres during his 13 years dwelling in Yan’an’s caves.

Korea War “地下长城”
“Underground Great Wall”

Volunteers Logistics depot carry forward the revolutionary spirit of hard struggle, mountains building a database, storage material.

志愿军战士不畏艰苦，一定要筑成“地下长城”

Volunteer soldiers despite the difficulties, we must build into the “underground Great Wall.”

Volunteers making radio broadcasts to enemy troops.

Korea War Stalemate: “Underground Great Wall”

Volunteer soldiers in the trenches in the cupola on the self-constructed self-built tools for tunnel.

Linking up through the tunnel, the soldiers “join forces.”
Ibid.

Night attack out of the position.

June 13, 1952 Palace Dai Lixi Hill battle, relying on volunteers Jun 12 trenches and fight the enemy repeatedly, kill and wound the enemy more than 2,000 people, smash the enemy’s attack
Korea War: Underground Great Wall

Volunteer soldiers in the trenches enjoy bath.

Ma Liang Shan volunteer unit fighting in the infantry, artillery, armored joint command post.

Squad attack.

Tunnel briefing & oath before battle.

To carry out training activities in the tunnel.

Ibid.
Korean War era Tunneling

“In view of the Battle of the Korean War a Major lessons learned In the 20th century, China's national defense project began 60 years of underground fortress building.”

Korean War era Tunneling

“During the Korean War, the Chinese People's Volunteers and the Korean People's Army Air Force created an Air Force joint operations command structure. Under the Sino-Korean Combined Forces Command, the headquarters was set up by the Chinese People's Volunteers and the dual leadership of the PLA Air Force.”

Command Tunnel for the Joint Command, December 1950

Underground Culture

“An estimated 40 million people in northern China still live in cave homes known as yaodongs.”

**STUDY #3**

**Cold War Civil Defense Tunneling**

- 3rd Line Construction -- Relocation & Hardening of Industry: 1964-1979
- Beijing Civil Defense Shelter Complex
- Project 131: CMC National Command Bunker
- Project 816: Reserve Weapons Production Complex
- Project 7381 at Harbin: Urban Defense for Nuclear War
- Modern Shanghai’s Underground
- Military Rail & Road Tunneling
- Related Issues
PRC Civil Defense

The Chinese have taken some initial steps to provide protection against the immediate effects of a large-scale nuclear attack. They apparently feel that their civil defense has enhanced civilian morale as well as their ability to survive an air or missile attack.

In contrast to the West’s, China’s civil defense measures have taken on a new and larger strategic dimension. The extensive construction of shelters and underground tunneling serves two purposes. They are seen as offering some protection of personnel during bombing and as providing locations from which to fight an invader in the ground defense of a city.

China’s shelter and tunnel program is one of the most extensive in the world, though its effectiveness remains untested. Since 1969, the massive effort to build more and better protection has resulted in the construction of a maze of shelters and tunnels under most, if not all, large and medium-sized cities.... [T]he nature and quality of these underground installations vary from city to city....

“Third-Line Defense”
Relocation & Hardening of Industry: 1964-1979

3rd Line Construction in the 1960s
Millions of Peasant Man-hours of Labor

### Massive Impact of “TLD” Relocation of Industry: 1964-1979

- From 1965 to 1979, 125 large-scale enterprises (producing cars, light and heavy machinery, mechanical equipment, rolling mills, etc.) were completed;
- From 1969 it included Underground location of Nuclear Reactors, Warhead Storage, Command Center, Urban population civil defense (northern cities) and bunkers for DF-1 and DF-2 missile storage but cost of the latter NOT included in TLD budget;
- 8,000 km of railroad tracks and 250,000 km of roads were constructed to support TLD projects.
- TLD seen as source of enormous economic drain and was cancelled in the post-Mao development policy.

<table>
<thead>
<tr>
<th>Year/Period</th>
<th>Overall budget for capital investment in billion yuan RMB</th>
<th>Budget for TLD in billion yuan RMB</th>
<th>TLD share in % of overall capital investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>17.000</td>
<td>7.813</td>
<td>45.96</td>
</tr>
<tr>
<td>1966–1970 (3rd FYP)</td>
<td>97.603</td>
<td>48.243</td>
<td>49.43</td>
</tr>
<tr>
<td>1976–1980 (5th FYP)</td>
<td>246.786</td>
<td>69.100</td>
<td>28.00</td>
</tr>
<tr>
<td>1965–1980 (Total)</td>
<td>537.784</td>
<td>184.356</td>
<td>34.28</td>
</tr>
</tbody>
</table>

3rd Line Defense Production Underground

Video screen shots from: “地下长城” (Beijing, PRC: Civil Defense Film, 2000), [accessed 1 Mar. 2010].
3\textsuperscript{rd} Line Construction in the 1960s

Most Projects involved extensive Tunneling

\textbf{Distribution of Dispersed and Tunneled Facilities}

\begin{itemize}
\item 011 Base: Anshun. Fighter and trainer aircraft production base.
\item 012 Base: Hanzhong. Into a fighter production base is expected in 1975, the central decision developed by Xi'an Aircraft Design shipped eight aircraft from the 012 bases continue to develop the base into a transport aircraft manufacturing base. Tong Hui Machinery Factory in 1979, Jinsong Machinery Plant and the 012 aircraft design by the separation of the establishment of a separate Shaanxi Aircraft Manufacturing Company, 012 Aviation parts production base into base. In 1980, eight transport aircraft in production.
\item 013 bases (Hunan aviation): Zhangjijie - Changsha. Jurisdiction of several aviation parts plant (mainly Xiang Ling Machinery Factory Factory 3028) and Zhangjijie Vocational and Technical College aviation industry, aviation and the third and Design Institute.
\item 014 Base (Missile Institute of China): Luoyang. 158 South Peak plant moved to the company from Hanzhong, specializes in manufacturing air to air missiles.
\end{itemize}

Chongqing Rail Line
3rd Line Tunnel Construction

Impact of Civilian Tunneling:
- Built between 1970-1978;
- Line length of 897 km;
- Total of 716 bridges;
- 405 tunnels;
- Sixty “student” construction companies with 18,500 high school and 25,800 junior high school students to participating
- Within a three year period 141 students killed in construction accidents.
Bridge and tunnel length equaled 45% of total line length over the Chengdu-Kunming line.

3rd Line Construction in the 1960s

Most Projects involved extensive Tunneling

Distribution of Dispersed and Tunneled Facilities (cont.)

• 061 Base (South space) Zunyi. Anti-aircraft missile base, sub-two homes built aircraft.
• 063 Base (Aerospace four homes): Xi’an.
• 064 bases (into 062 base): Florida.
• 066 Base (Sanjiang Space): Yuan’an - Xiaogan. Cruise Missile base (red bird). Construction of Hospitals minutes flight.
• 081 Base (Kawakita E): Guangyuan. The original 0821 headquarters, built in 1965, the production base for the fire control radar.
• 082 Base: eastern suburbs of Chengdu, the electronics industry base.
• 083 Base (Zhenhua Electronics): Duyun.
• 541 Factory: Tank manufacturing base, authorities Wencan Township, the plant located in Xinjiang County, Yicheng and Yuanqu.

“大三线建设：——宏伟深远的超级战略工程,” op cit.
3rd Line Construction in the 1960s
Most Projects involved extensive Tunneling

Third Front Construction of Major Achievements
- China steam (Shiyan City, Hubei Province)
- China’s second-largest automotive group
- Oilfield (Qianjiang City, Hubei Province)
- Changqing Oilfield (Shaanxi Province) China's third-largest oil field
- Jiuquan Iron and Steel Group (Gansu Jiuquan)
- Northwest aluminum plants (Lanzhou)
- Panzhihua Iron and Steel Group (Sichuan Panzhihua)
- China's fifth largest Steel Group
- Coal base in the Helan Mountains (Shizuishan City)
- Jiuquan Space Launch Center (Gansu Jiuquan) China's largest space launch site
- Xichang Space Launch Center (Sichuan Xichang)
- Jinchuan Nonferrous Metals Company (Jinchang)
- Jialing Motorcycle Group (Chongqing) the world's largest motorcycle maker
- Liupanshui coal industry base (Liupanshui)

3rd Line Construction in the 1960s

Most Projects involved extensive Tunneling

Third Front Construction of Major Achievements (cont.)

Deyang Second Heavy Machinery Plant (Sichuan Deyang) Large machinery manufacturer

Luoyang Glass Factory (Luoyang, Henan Province)

Dongfang Steam Turbine Works,

Dongfang Electrical Machinery Factory

Dongfang Boiler Works

Chengdu-Kunming Railway (Chengdu - Kunming) Total length of 1091 km

Hunan-Guizhou railway 772 km (Zhuzhou - you may be) Total length of 905 km

Xiangyu Railway (Xiangfan - Chongqing) Total length of 1,411 km

Qinghai-Tibet Railway a (Xining - Nanshan mouth) full 814 kilometers

Luijiaxia Hydropower Station The total installed capacity of 1,225,000 kilowatts, generating capacity of 5.7 billion degrees of Danjiangkou Hydropower

Asia's largest artificial freshwater lake Hydroelectric (Hubei Yichang city) The total installed capacity of 2,715,000 kilowatts, generating capacity of 16.1 billion degrees in Southwest China

Research Institute of China

Nuclear Power Institute of Physics

“大三线建设: ——宏伟深远的超级战略工程,” op cit.
3rd Line Construction in the 1960s

Most Projects involved extensive Tunneling

“大三线建设: ——宏伟深远的超级战略工程,” op cit.
DEFENSE RELATED EXAMPLE 1: Beijing Underground City

“The Secret Tunnels of the Capital”

Mao Tse Tung (1969)

A relic from the Cold War Era and the 1960s tensions between China and the Soviet Union. Once a secret air-raid shelter network expected to protect 40% of the Beijing Public inside underground Tunnels from a devastating nuclear attack, it fell into disuse after the late 1970s.

During the Days of the Cultural Revolution 400,000 Beijing Chinese were mobilized to dig these underground tunnels that run for miles and miles under Beijing.

After the Cultural Revolution and with the advent of modernity in China, it was soon forgotten by most Beijingers and remained a site virtually unknown to the City’s Citizens until at least the year 2000AD. Since it has become a modest tourist attraction.... Beijing Underground city can be found in the Chongwen District.¹

Beijing’s Underground City
30 km in length

“We shall never forget the ancient city of Beijing, an underground city of definite proportions has already begun to emerge. There are factories, stores, guesthouses, restaurants, hospitals, schools, theaters, reading-rooms, a roller skating rink, a grain and oil warehouse, and a mushroom cultivation farm. These underground production and service facilities cover a total area of 850,000 square meters and makes use of more than 1,000 anti-air raid structures.”

Current Activity:
• Entertainment: 4 main public restaurants, 2 underground theaters, and a roller skating rink.
• Hotels: “In the last few years, the number of underground hotels has climbed to 100, with a total of more than 10,000 beds. This number is roughly equivalent to the half of the total offered at guest houses in the Beijing Municipality.”
• Retail and leased storage: “The stores underneath the Xidan shopping area north of Chang’ an Hotel take up an area of over 5,000 square meters. Of this, some 4,000 square meters are used for storage, the rest for business. Ventilation equipment maintains a constant 27 ˚C environment, with relative humidity never above 78 percent.”

Public Access:
• Public tours operated between 2000-2009:
  “There are roughly 90 entrances to the complex, all of which are hidden in shops along Qianmen's main streets. A fluorescent wall map reveals the routing of the entire tunnel system. You can visit a section of the tunnels and ... you’ll pass chambers labeled their original function (cinema, hospital, arsenal etc) as well as flood-proof gates. You can also make out signposts to major landmarks accessed by the tunnels (Tiananmen Sq, the Forbidden City), but these routes are inaccessible.”
• Since June 2009, however, other than commercial locations listed above, all tour entrances currently closed.

Dark Side:
• Much of the complex not maintained – flooded, filled with trash, and boarded up.

“The Secret Tunnels of the Capital” under construction

Mao personally reviewing plans for Underground City

400,000 civilians participated in construction

400,000 civilians participated in construction

Part of interior lined with the old city walls of Beijing

Video screen shots from: “地下长城” (Beijing, PRC: Civil Defense Film, 2000), [accessed 1 Mar. 2010].
“The Secret Tunnels of the Capital” as a cultural achievement

“The Secret Tunnels of the Capital” upon completion

Active hospital in underground city

Storage compartments & narrow-gauge rail transport

Heavy blast/anti-radiation doors on underground hospital

VIP drive-thru galleries

Video screen shots from: “地下长城” (Beijing, PRC: Civil Defense Film, 2000), [accessed 1 Mar. 2010].
Beijing Underground City
Decline thru Lack of Use
Beijing Underground City

Beijing Underground City
The Dark Side

DEFENSE RELATED EXAMPLE 2: Central Committee Command Complex

Project 131

- CONTEXT: A deteriorating relationship with the USSR after the “Zhenbao Island military clash back in the 60s after the war when the Soviet Union deployed on the border 1 million troops eyeing China. Anticipating a War of Aggression against China, its top authorities recognized an urgent need to prepare for an it and decided to build an anti-nuclear war underground headquarters in the central hinterland.”
- Leadership orders the construction of a nuclear war command center constructed as a series of underground bunkers for the senior political elite and the PLA command and control organs;
- Under the direct command of General Huang Yongsheng, Central Political Bureau member and PLA Chief of Staff, who picked the location for leadership hideout near his home town of Gaoqiao Town, Xianning City, Hubei Province;
- Top Secret program started 1969 January 31
- 1-31, thus named 131; construction: 1969-1971
- Stopped before completed, investment = 1.3 billion.

Project 131
Mao’s Above Ground Villa

- Leadership orders the construction of a nuclear war command center constructed as a series of underground bunkers for the senior political elite and the PLA command and control organs;
- “Surrounded by verdant mountains and forests, the location is hard to see, even from low-altitude reconnaissance aircraft, is indeed a good place for the construction of hard to find military facilities.”

LEFT: Entrance to tunnel complexes

RIGHT: Mao’s bedroom

Project 131 Mao’s Command Center

Mao: “Burrow deep, store grain, never seek hegemony.”
Lin Biao: "If the North is lost, we must build an impregnable position in the south with an underground headquarters."

- In addition to the extensive tunneling, the plans included “an airport, railway, highway, and other ancillary works.”
- With the fall of Lin Piao, the “131” underground construction was not yet fully completed and came to a rash end.” Visiting the complex which is now open to Chinese tourists (but not foreigners) a reporter noted the large scale of the operational headquarters and extensive facilities designed specifically for Chairman Mao, where once the war broke out, he “will be here, strategizing Chief of the three armed forces, commanding the war against aggression.”
"131"地下军事城堡简介

“131”工程（又名“地下军事城堡”）是1969年1月31日由当时的军委参谋长黄永胜上将根据中央军委指示签署命令，亲自选址后始建的地下军事城堡。主体建筑由地面58层的四合院和地下456米的地下通道及其全长128米的高倍变焦等设施构成。地下军事城堡总建筑面积43288平方米，内设各种不同规格用途的房间98间，其中包括一号首长（毛泽东）住房、二号首长（林彪）同室、专机指挥室、总参谋长（黄永胜）同室、安全指挥室、机电设备房、发电配电房、生活服务区等，共有进出洞口四个，均设有防爆、防弹、防冲击波的大钢门，还设有蓄水池、仓库、餐厅、

“131”地下军事城堡导游图

"探秘湖北“131”工程：毛泽东与江青卧室什么样 [Quest Hubei "131" project: What kind of Mao Zedong and Jiang Qing bedroom]," 晓慧的博客, (2011.08.03), at <http://zhanghui552.blog.163.com/blog/static/807152162011730172285/> [accessed 1 Sept. 2011; translated by IP-1011].
Project 131
Underground Bunker

Ibid.
Project 131
Underground Bunker

Ibid.
DEFENSE RELATED EXAMPLE 3: Nuclear Reactor

Project 816: Reserve Weapons Production Complex

Known as "the world's largest artificial cave," the Chongqing Fuling 816 military cave for the first time to open as tourist attractions. The project started in 1967, to conduct pre-drilled holes by the Corps of Engineers, The Ins and Outs of human 60 000 people share the 1984 lockout, in April 2002 to decrypt.

816 military cave is located in the streets of Fuling District, Bai Tao. In 1966, Zhou Enlai, China approved the construction of a second nuclear material industrial base for Third-Line construction -- atomic reactors and chemical post-treatment works, that is, to provide nuclear bomb underground nuclear plant materials, are classified as top secret level military secrets.

816 military tunnel for body total construction area of 104,000 square meters, plant hole depth of 400 meters. Cave at the top of the best cover 200 meters thick, the core parts of plant cover layer thickness of 150 meters.

Entrances = 19, corridors = 21 km in total length.

April 24, the tourists visited the reactor hall. Nuclear reactors, also known as atomic reactors or reactor, is equipped to achieve large-scale nuclear fuel fission chain reaction can be controlled device. The hall and down a total of nine layers, up to 79.6 meters, the equivalent of 20 multi-storey building height, size of a standard football field is almost the same.

Nuclear reactors, "bottom" well preserved. According to reports, bottom diameter of 78 cm of the 2001 holes, for nuclear materials, nuclear energy exchange. As the production here has not stopped, there is no radiation.

9 floors in the main control room, are placed at the most advanced computer body, the computer console is on the four drops of a diameter of about 2m in the control panel, the holes were filled with hundreds of nuclear material rod is inserted into the these holes, but never really used in the production.

Project 816 Mountain

“Declassified Chinese Underground Nuclear Facility Open to Public,” Youtube, (2010.04.22) at OSC.
Project 816 Underground Nuclear Reactor

“816工程参观照片,” op cit.
Project 816 Underground Nuclear Reactor

Early construction

Control Room under repair

Press tour of facility

Project 816 Underground Nuclear Reactor

“816工程参观照片,” op cit.
Project 816 Underground Reactor Core


Project 816 Underground Reactor Control Panels
Project 816 Underground Reactor Core
Project 816 Schematic

(entrances = 19, corridors = 21 km)

The region marked in yellow is the area open to the public
DEFENSE RELATED EXAMPLE  4: Urban Defense for Nuclear War

7381 Project at Harbin

- CONTEXT: “After the “Zhenbao Island incident, under the guidance of the people the entire Party concluded that Harbin air defense system, an important position ‘must be prepared to fight’ placed the city’s.”
- “From 1970 to 1980, Harbin civil air defense construction mobilized the masses and concentrated on building a permanent masked fortifications, mobile evacuation roads and groups fortifications. This included ten new roads of 376,631 square meters ... and protection for thousands of families in the underground tunnel network.”
- “In 1973, taking into account Harbin as an important strategic position it was recognized that the original construction of the small trunk size tunneling was small, poor quality, and can not meet the evacuation of staff and operational mobility needs of the situation....”
- “…decided to build underground evacuation tunnels through the city, connecting mountains and the ‘5 can be’ large motorized roads project.”
- “…on August 1, 1973 (73-8-1) by the provincial approval, the name ‘7381’ project.”
- “After six years of continuous construction of the building to complete the project – depth of 21 meters by 6 meters wide and 7.3 m of reinforced concrete structures -- trunk engineering 111.8 thousand square meters, trunk length of 9.5 kilometers.”
- “‘7381’ project to participate in the construction of 68 units, the average daily number of people involved in the construction of the 1.5 million people, with a total investment volume of more than 720 million working man-days to build area of 11 thousand square meters.”

2 The “5 can be” projects were designated to be able to: [1] prevent [war], [2] fight, [3] be mobile, [4] able to live, and [5] can produce.”
7381 Project at Harbin (cont.)

- “After six years of continuous construction of the building to complete the project – depth of 21 meters by 6 meters wide and 7.3 m of reinforced concrete structures -- trunk engineering 111.8 thousand square meters, trunk length of 9.5 kilometers.”
- "7381" project entirely of reinforced concrete structure, the entire project consumed 12,501 tons steel, 20,549 cubic meters of wood, 100,000 tons of cement, sand and 247,000 cubic meters, all kinds of stone 400 thousand cubic meters, a total investment of 53.08 million yuan (not including labor costs and sporadic tool costs), the average cost of 404 yuan per square meter.

Ibid.
7381 Project at Harbin (cont.)
The “New” 7381 Project
Subway Reconstruction using 10km of original tunnels

Modern Shanghai’s Underground

Shanghai has constructed a massive underground bunker complex capable of sheltering 200,000 people from a nuclear attack, a local newspaper reported. The million-square-foot complex connects to shopping centers, office buildings, apartment buildings and the subway system via miles of tunnels, the Shanghai Morning Post said in an exclusive report. The newspaper said the complex has water, electricity, lighting, ventilation and protective doors, and can support life for as long as two weeks.¹

Shanghai’s Civil Defense Office announced completion of the city’s largest subterranean bunker:
-- 90,000 square meters;
-- Accommodate 200,000 citizens;
-- Protection from nuclear radiation, poisonous gas releases, or terrorist blasts.
-- 15 tunnels, each 4,000 meters, link more than 10 trading centers, office buildings, and residential buildings throughout city.
-- Complex equipped with its own power supply, ventilation, and power storage capability, which is able to ensure a daily underground supply for 1–2 weeks.
-- Shelter is connected to railway and world’s largest subway.²

¹ “When I was a kid in Shanghai, I used to play in those underground bunkers.... They are called Fang Kong Dong, or anti-air holes...Also, in my elementary school, we converted part of the underground bunker into a sports complex where my school’s rifle team used to practice.” European Bunkers blog, op cit.
Repairing & Reconstructing Civil Defense Tunnels

# PRC Subway Development

China’s cost of subways = $100 million per mile versus $2.4 billion per mile in New York

<table>
<thead>
<tr>
<th>12 Operating Subways</th>
<th>15 Under Construction</th>
<th>13 Planned Subways</th>
</tr>
</thead>
<tbody>
<tr>
<td>-- Anshan</td>
<td>-- Chengdu</td>
<td>-- Changzhou Metro</td>
</tr>
<tr>
<td>-- Beijing</td>
<td>-- Harbin</td>
<td>-- Datong Metro</td>
</tr>
<tr>
<td>-- Changchun</td>
<td>-- Hangzhou</td>
<td>-- Dongguan Metro</td>
</tr>
<tr>
<td>-- Dalin</td>
<td>-- Hefei</td>
<td>-- Fuzhou Metro</td>
</tr>
<tr>
<td>-- Guangzhou</td>
<td>-- Kunming</td>
<td>-- Guiyang Metro</td>
</tr>
<tr>
<td>-- Hong Kong</td>
<td>-- Lanzhou</td>
<td>-- Jiaxing Metro</td>
</tr>
<tr>
<td>-- Nanjing</td>
<td>-- Macao</td>
<td>-- Lanzhou Metro</td>
</tr>
<tr>
<td>-- Shanghai</td>
<td>-- Nanchang</td>
<td>-- Nanning Metro</td>
</tr>
<tr>
<td>-- Shenyang</td>
<td>-- Qingdao</td>
<td>-- Quanzhou Metro</td>
</tr>
<tr>
<td>-- Shenzhen</td>
<td>-- Suzhou</td>
<td>-- Shijiazhuang Metro</td>
</tr>
<tr>
<td>-- Tianjin</td>
<td>-- Uruuqui</td>
<td>-- Taiyuan Metro</td>
</tr>
<tr>
<td>-- Wuhan</td>
<td>-- Weihai</td>
<td>-- Xiamen Metro</td>
</tr>
<tr>
<td></td>
<td>-- Xi’an</td>
<td>-- Xuzhou Metro</td>
</tr>
<tr>
<td></td>
<td>-- Zhengzhou</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-- Zibo</td>
<td></td>
</tr>
</tbody>
</table>

Growth of PRC Rail & Roads and associated Tunnels

Nuclear Storage & Rail Tunneling

Situated deep in the Qinling [秦岭] mountain range about 140 kilometers west of the historical city of Xian, an independent organization known as the 22 Base is responsible for storing and managing most of the Second Artillery’s nuclear warhead stockpile.

Taibai Mountain is the highest peak in China, east of its three western-most provinces of Tibet, Qinghai, and Xinjiang. Taibai Mountain reaches 3767 meters (12,358 feet) in height and is formed of large granite rock. Perhaps to facilitate logistics, the PLA Rail Corps initiated construction of a rail line connecting Baoji and Chengdu annuclear production facilities near Mianyang in the 1960s. The Baoji-Chengdu line was considered a major feat, not only because it was China’s first electric rail, but due to tunnels that sliced through mountains south of Baoji. Of most significance was a 2.3 kilometer tunnel passing through Qinling Mountain and a series of spiral tunnels just southwest of Baoji.

Although the Taibai nuclear warhead facility has existed for 40 years, Second Artillery engineering units have been engaged in a national engineering project in the Qinling Mountain region between Taibai and western foothills adjacent to Tianshui city (Gansu Province) over the last 10 to 15 years.

China’s tunneling technology since then has advanced significantly, with completion of an 18.5 kilometer tunnel cut through the eastern edge of the Qinling Mountains south of Xian.

Quote from: Stokes, China’s Nuclear Warhead Storage and Handling System, op cit: pp. 3, 8, 14-15; map from the International Tunnelling and Underground Space Association (ITA).
China Rail Tunneling

There are more than 5,300 railway tunnels with a total length of 2,500 km.

Railway tunnels, each longer than 5 km, as of 1999

<table>
<thead>
<tr>
<th>Tunnel Name</th>
<th>Length</th>
<th>Railway Name</th>
<th>Completion Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qinling Tunnel</td>
<td>18,457 m</td>
<td>Xi'an - Ankang</td>
<td>1999</td>
</tr>
<tr>
<td>Dayaoshan Tunnel</td>
<td>14,294 m</td>
<td>Beijing - Guangzhou</td>
<td>1987</td>
</tr>
<tr>
<td>Changliangshan Tunnel</td>
<td>12,780 m</td>
<td>Suozhou - Huanghuagang</td>
<td>2000</td>
</tr>
<tr>
<td>Mihualing Tunnel</td>
<td>9,383 m</td>
<td>Nanning - Kunming</td>
<td>1996</td>
</tr>
<tr>
<td>Jundushan Tunnel</td>
<td>8,460 m</td>
<td>Datong - Qinhuangdao</td>
<td>1987</td>
</tr>
<tr>
<td>Yuntaishan Tunnel</td>
<td>8,145 m</td>
<td>Houma - Yueshan</td>
<td>1991</td>
</tr>
<tr>
<td>Fenshuiguan Tunnel</td>
<td>7,228 m</td>
<td>Hengnan</td>
<td>1997</td>
</tr>
<tr>
<td>Yimaling Tunnel</td>
<td>7,032 m</td>
<td>Beijing - Yuanping</td>
<td>1969</td>
</tr>
<tr>
<td>Sipujian Tunnel</td>
<td>6,407 m</td>
<td>Suozhou - Huanghuagang</td>
<td>Under construction</td>
</tr>
<tr>
<td>Shamilala Tunnel</td>
<td>6,383 m</td>
<td>Chengdu - Kunming</td>
<td>1966</td>
</tr>
<tr>
<td>Bapanling Tunnel</td>
<td>5,340 m</td>
<td>Xitian</td>
<td>1993</td>
</tr>
<tr>
<td>Pingxingguan Tunnel</td>
<td>6,188 m</td>
<td>Beijing - Yuanping</td>
<td>1971</td>
</tr>
<tr>
<td>Guancunba Tunnel</td>
<td>6,187 m</td>
<td>Chengdu - Kunming</td>
<td>1966</td>
</tr>
<tr>
<td>Kuixian Tunnel</td>
<td>6,152 m</td>
<td>Nanjiang</td>
<td>1978</td>
</tr>
<tr>
<td>Nanling Tunnel</td>
<td>6,061 m</td>
<td>Beijing - Guangzhou</td>
<td>1987</td>
</tr>
<tr>
<td>Hongqi Tunnel</td>
<td>5,848 m</td>
<td>Beijing - Tongliao</td>
<td>1975</td>
</tr>
<tr>
<td>Pengmoshan Tunnel</td>
<td>5,592 m</td>
<td>Jiaozuo - Liuzhou</td>
<td>1973</td>
</tr>
<tr>
<td>Dabashan Tunnel</td>
<td>5,334 m</td>
<td>Xiangfan - Chongqing</td>
<td>1973</td>
</tr>
<tr>
<td>Liupanshan Tunnel</td>
<td>5,240 m</td>
<td>Baoji - Zhongwei</td>
<td>1994</td>
</tr>
<tr>
<td>Wudangshan Tunnel</td>
<td>5,226 m</td>
<td>Xiangfan - Chongqing</td>
<td>1973</td>
</tr>
<tr>
<td>Pingguan Tunnel</td>
<td>5,140 m</td>
<td>Panxi</td>
<td>1970</td>
</tr>
<tr>
<td>Baijawan Tunnel</td>
<td>5,058 m</td>
<td>Datong - Qinhuangdao</td>
<td>1986</td>
</tr>
</tbody>
</table>

Qingling Tunnel
Baoji-Chengdu Rail Line

Stages of PRC Tunneling Technology

Rail Tunneling Examples: 1955-2000

<table>
<thead>
<tr>
<th>STAGES</th>
<th>TIMES</th>
<th>SYMBOLIC PROJECT</th>
<th>LENGTH (km)</th>
<th>CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>50s</td>
<td>Qinling T. (on Bacji-Chengdu Railway)</td>
<td>2</td>
<td>Use pneumatic rock drills and track type mine cars</td>
</tr>
<tr>
<td>II</td>
<td>60s</td>
<td>Guancunba T. Shanadada T.</td>
<td>6</td>
<td>Partial-face excavation Series of light machines used</td>
</tr>
<tr>
<td>III</td>
<td>80s</td>
<td>Dayaoshan T.</td>
<td>14</td>
<td>NATM Unified mechanization Heavy-duty machinery Full-face excavation</td>
</tr>
<tr>
<td>IV</td>
<td>90s</td>
<td>Qinling T. (on Xi’an-Anyang Railway)</td>
<td>18</td>
<td>TBM</td>
</tr>
</tbody>
</table>

TBM = Tunnel Boring Machine
NATM = New Austrian Tunnel Method

“National 863 Project”

Chinese Government investment “年国家 863项目” program acquires world class tunneling technology and supports domestic enterprise development of domestic underground expertise.

“With a new round of subway construction in Chinese cities, and other tunnel construction boom the vigorous development of shield tunneling machines play a major task of the special machinery to become the focus of domestic construction equipment.”

China Rail Tunneling Advances

Dayaoshan Rail Tunnel Complex introducing the New Austrian Tunneling Method (NATM)

Since the 1960s, NATM, a new tunneling concept or philosophy from Europe, has been accepted by Chinese tunneling engineers both in its spirit and for the term itself. NATM has become a popular topic in some symposiums or colloquiums on tunneling and underground works held in China. Quite a lot of tunnels under difficult geological conditions and in weak rock have been successfully constructed by NATM.

Qinghai-Tibet Railway Tunnel = total length of 65.3 kilometers

Modern PLA Tunnel Construction
嘎隆拉隧道 Galong La tunnel
Medog highway, Tibet

“Cutting Edge” Tunneling

After more than four years’ construction, Xiamen Xiang’an Undersea Tunnel, the first undersea tunnel in Chinese mainland, was dug through on Oct. 5, 2009, marking a milestone in China’s tunnel construction technology between Xiamen Island and Xiamen in southeast China’s Fujian province. The project, which adopted the undersea blasting and undermining methods traversing the eastern sea of Xiamen, has a total length of 8.695 km with the tunnel length amounting to 5.95 km and 70 meters below the sea level at its deepest section.

The Chongming River Crossing comprises two 15.3 meters diameter TBM tunnels, making it the largest tunnel in the world, connected by eight cross passages. Each tunnel is approximately 7.5 kilometers long and linked to a 1.5 kilometers approach road. The tunnel will be a double-deckered. The upper part will be a three lane road, while the lower part will house the utilities and a light railway. An innovative ground freezing technique will be used for cross passage construction. Cast iron lining segments will replace the 650 millimeters thick concrete at the junction between the bored tunnel and cross passage.

Related Tunneling Efforts

2007 Ning Xia Dafeng Coal Mine 5kt Blast

20 December 2007: “Ning Xia Dafeng Coal Mine Blasting Chamber.” Total investment: 50 million yuan+; Project period: 2006 – 2007. 5,500 tons of explosives equal small nuclear weapons, explosive power equivalent to 1 / 4 the Hiroshima atomic bomb, The world's largest blasting in 17 years = 14 million tons of coal brought to light the world's rare, for the first time for the civil air defense engineering seismic data to provide blast resistant.”

Carlyle Group’s failed attempt to acquire Xuaona Heavy Equipment Manufacturer

“In 2008, Washington-based private-equity firm Carlyle Group L.P. abandoned a plan to acquire a controlling stake in Xugong Group because it failed to receive approval from the Chinese government. Carlyle had planned to buy a ... 85% stake in the firm.”

What ever the real reason for the failed deal, it is not irrelevant that the Xuaona Corporation produces most of the excavators used in the Underground Great Wall Project.
Civilian Underground Infrastructure & Technology
Part of National Policy and Major Military Asset

- There is more civilian tunneling going on in China than everywhere else in the world combined.
- China is becoming the leading buyer and applier of tunneling technology.
- A “New Century” Strategy:
  - From Emergency Response to Long Range: Construction of a New Underground "Great Wall;"
  - From "Single" to "Multi-Function": Integration of Protective Engineering;
  - From "Scattered" to "Networked": "Networking" of Command Systems;
  - From Closed to Open: Increased Benefits of Integrating Peacetime and Wartime Functions;
  - From "Rule of Man" to "Rule of Law": Regulation Becoming More Scientific;
  - From Underground to the Surface: Marriage of "Two Defenses" Builds a Protective Barrier;
  - Looking to Tomorrow from Today: "Digging Deep Tunnels" Never Out of Date.

- Crossover between Civil Defense tunneling and Military underground technology development and force deployment.

STUDY #4

*Military Underground Deployment*

- Nuclear Facilities
- Army (PLA) Tunneling
- Naval (PLAN) Tunneling
- Air Force (PLAAF) Tunneling
Lop Nur Nuclear Test Site
and Tunnel Warhead Storage (circa 1962-current)

“The first storage tunnel reportedly was completed in 1964, the same year as China’s first nuclear test, and subordinated to the National Defense Science Commission in 1965. Declassified U.S. intelligence community reporting from 1971 indicates that a central storage facility for warheads was located ‘in a ridge about 12nm from the Koko Nor weapons fabrication complex’.”

Current Lop Nur Nuclear Testing & Warhead Storage

Right: Close-ups of entrances to five horizontal tunnels at the Lop Nur test site in the Xinjiang province. Centered at 41°42′01″N, 88°21′58″E, the satellite image reveals various levels of activities at all five entrances. Trucks are visible at four of the five tunnel entrances, particularly the eastern ... and one entrance is covered with a roof.

Left: This satellite image taken in 2005 shows what appears to be the most active horizontal tunnel at the Lop Nur test site. Several 20-foot (6-meter) trucks are visible amongst the buildings. What appears to be the dumping area for rock

Tunnel Complex at Nuclear Test Site

EXAMPLE  4: Early Missile Facility?

Lin Piao’s Project 6501
“中国地下长城”
“Underground Great Wall of China’ internal layout of China's Underground Nuclear Second Strike Capability Insurance”

Lin Piao’s Project 6501

PLA’s largest known man-made tunnel

- started by Lin Piao in 1965
- underground railroad link with four tracks
- 7 years under construction
- 17 kilometers of tunnels
- 3 layers
- main gallery = 12 x 12 meters
- 25 large rooms
- 18 large circular tanks (for liquid fuel storage?)
- 17 ventilation shafts
- abandoned in 1973

Mysterious “Underground Great Wall of China”

Lin Piao’s Project 6501

“Hailed as the ‘underground Great Wall of China’.

From the information currently available, 6501 Project name comes from the Central Military Commission file No. 1965, is currently the largest known man-made military use of the cave. Cave complex. There are 25 rooms, with, 17 ventilation shaft, length of over 17,000 meters, a large hole designed to pass trains, hole for truck traffic. There are 18 circular cement floor, put the original 18 large tanks. 6501 project ... hailed as the "underground Great Wall of China."

You can walk through the train from four trucks to enter the parallel, the width of 12 meters, 12 meters high in the cave, but anti-Zhong Hunan Linxiang town "6501" main hole.

Since 1965 it has a very subtle state in the construction of 8 years. Early 1973, suddenly abandoned, still no one understood its function, role and reason are abandoned. Now, the local government has here and 3 km away Taolin Lead-Zinc "artificial desert" development as tourist spot.

Linxiang the northern gate of Hunan, is under the jurisdiction of Yueyang, from Wuhan, Changsha, respectively 154 km and 161 km, 107 State Road side shop in Linxiang City, Beijing-Zhuhai Expressway Linxiang mouth down, 5 minutes up urban area, one called "Chang" crossed the river in the city. 6501 Engineering Linxiang city about 15 kilometers away from.

Black hole gauze cover nearly half a hole, as the project has so far not fully decrypted. From the information currently available, 6501 works from the Central Military Commission in 1965 named the first document, is currently the largest known military use of man-made caves. It is the upper, middle and lower layers. The entire mountain has been hollowed out, connected up and down, hole connected to those early hole, such as break maze, large scale rarely seen in the outside world.

Huge granite structure was hollowed out mountain, made of reinforced concrete up and down three, cold and humid, the temperature about 18 degrees Celsius year round. Surprisingly, the 6501 project in addition to 17 kilometers of artificial caves, but also the distribution of the 25 rooms of various sizes hall, large room to hundreds of square meters, and 17 large high-wide missile-shaped cave.

“国内最大人造军事洞穴 林彪的6501工程,” op cit.
Project 6501

ABOVE: Secure entrance to the valley;
RIGHT: Tunnel guard tower; BELOW: Main road.

“中国最大人造军事洞穴：林彪签发6501秘密工程,” op cit.
Project 6501
Total = 10 Entrances for Rail and Trucks.


RIGHT: Main entrance;
LEFT: Other exits.
Project 6501
Total = 10 Entrances for Rail and Trucks.

LEFT: Rail line from Linxiang City; RIGHT: Railroad Entrance (tracks removed).

Lin Piao’s Secret Project 6501

“中国最大人造军事洞穴：林彪签发6501秘密工程,” op cit.
Lin Piao’s Secret Project 6501

Project 6501

Described as Missile Bay

One of eighteen 80 meter high “Silos”

Silo for tank storage of Liquid Fuel?

“中国最大人造军事洞穴：林彪签发6501秘密工程,” op cit.
Project 6501

“中国最大人造军事洞穴：林彪签发6501秘密工程,” op cit.
Uncompleted parts of Project 6501

“中国最大人造军事洞穴：林彪签发6501秘密工程,” op cit; and “神秘的6501工程-中国最大军事烂尾工程 [Mysterious 6501 project - China’s largest military unfinished projects ],” Baidu, (2008.01.31), at <http://hi.baidu.com/e5259/blog/item/a99541f3691f1ecf0b46e012.html > [accessed 1 Sept. 2011; translated by IP-1011].
Uncompleted parts of Project 6501

Army Tunneling
PLA deployment of Army units in underground complex
Late 1960s/early 1970s

Video screen shots from: “地下长城” (Beijing, PRC: Civil Defense Film, 2000), [accessed 1 Mar. 2010].
Late 1960s PLA Created Series of Large

Chinese Mounded Defensive Position

This is the most elaborately developed of the defensive positions located north of the missile range at Shuang-ch'ing-tzu. The mounds of the North China Plain have a similar design but are less heavily fortified.
PLA “Logistic storage tunnels”
后勤某屯装坑道

Built in reaction to threat of Soviet nuclear preemption

PLA Coastal Defense Regiment
Modern retractable artillery bunker in island tunnel complex

Tunneling for Coastal Defense (circa 1955-1975)
example of White Island

Fortification of Coastal positions began in the 1950s;
Dec. 1967 Zhou Enlai personally gave order for “nuclear hardening;”
10 years of construction, 5,000 workers;
High risk – “almost every meter excavation, the sacrifice of a soldier or civilian... 30 killed and hundreds injured...”
500 meter entrance hall, then opens up into underground naval base 27 meters high by 70 meters wide, exit tunnel;
10 lateral tunnels 500 meters long;
30,000 square meters inside;
Included “missile reserve bank” and “missile handling storage;”
Can hold and repair more than 20 boats up to 2,140 tons;
Sealed and self-contained storage for 1000 tons oil, 300 tons fresh water, and 140 blocks of barracks.

White Island Coastal Defense

“珠海白沥岛(图),” op cit.
Coastal Fortifications

Coastal Fortifications
Coastal Fortifications

White Island Coastal Defense

Jianggezhuang Sub Base

Jianggezhuang Sub Base
1970s to Present

Tailings used as fill

Coffer dam

Tunnel dig

Dock and base

Tunnel entrance

Residual drill, exit

Underground Sub Base
(probably Jianggezhuang – home of all Han-class Type-091)

Submarine Launched Ballistic Missiles
stored and maintained underground with reloads for Subs

JL-1

JL-2

Photo from: “JL-2 (CSS-NX-4 SLBM Jin Class SSBN Nuclear Deterrent Missile System,” General Bouma blog, (20
Yulin Underground Sub Base
Hainan Island

“The tunnel is one of 10 such submarine tunnels China has built to avoid detection and attack for its submarine forces.”

“Is there a Nuclear Weapons Storage Site on Hainan Island?”

“Where does China store nuclear warheads for its ballistic missile submarines? The naval base near Jutin on Hainan Island has extensive underground facilities. An alternative to the base itself could potentially be a facility elsewhere on the island, such as Foluo Air Base where construction of an underground facility began five years before the first SSBN arrived at Hainan. Or are the weapons stored on the mainland?”

PLAAF Underground Hanger Construction
(circa 1960s)
PLAAF Mountain Hanger
Former Shahe Airbase

PLAAF “Model of Air Force station”
空军场站模型

Example of Tunnel Based Aircraft Shelter

**Chifeng Air Base**  
**Inner Mongolia**

China’s first nuclear hardened underground aircraft hanger  
(1969)

Lijiao Air Base  
(Gansu Province)

Standard airbase pattern but with hardened shelter or tunnel entrance backed into earth (entry way to underground complex?) at end of a tree lined country road 1.2km from base. Hard to find except for fighter parked outside.
Zhangye Southeast Air Base
(Gansu Province)

Dual off-set runways

Overlapping center aprons

Underground aircraft storage in side of mountain with hardened face and heavy blast doors; but no apparent back door

Qingshui Air Base
(Gansu Province)

Recent air base construction with nearly identical dual Pass-thru shelters at West and East ends of Qingshui Air Base. Each shelter complex has nearby hardstand and loop access. Note relative size of fighter.

Qingshui Air Base (cont.)

Recently constructed two identical 600ft Pass-thru shelters at Qingshui Air Base with blast doors and overhead cover. Note bulldozer tracks adding earth cover and relative size of fighter.
**Urumqi South Air Base** (Xinjiang AR)

Main operating base

3km long public access paved road for aircraft movement

Town & industrial center

West-end tunnel complex with hardened doors for aircraft access

Paved “road to nowhere:” coming out of East-end tunnel.

**Urumqi South Air Base (cont.)**

Unique combination of West entrance for aircraft and East entrance for test and maintenance facilities with paved “road to nowhere.” Presumably the two facilities are linked by one of the longest airbase tunnels in the PLAAF at over 8,000ft in length.
**Tianshui Air Base**
*(Gansu Province)*

Pass-thru covered hardened shelter 500ft long, with blast doors; located in an industrial area, across major highway at end of a tree lined street 1,000ft from runaway.

**Wuwei Air Base follows Zhangye Model**
(under construction, date unknown)

Yinchuan Air Base
Ningxia AR
(built circa 1980s)
Variety of Tunnels &
Underground Complexes

Facilities with Hillside Tunnels

Warhead Storage Bunkers

Underground Aircraft Hanger Complex

Main Base

Yinchuan Air Base

Schematic of Chinese Designed Underground Airbase
similar to Yinchuan Air Base

PAF Base near the Pakistan navy Base Gwadar: construction of this complex has begun in 1980 with the help of China and it is reported that it cannot be damaged during an earthquake.

Yiwu Air Base
Jinan MR
Tunnel Complex Design
similar to Yinchuan model

Feidong Air Base
(Abhui Province)
Anqing Air Base
(Anhui Province)
Main Base for H-6 Bombers

Anqing Air Base (cont.)

Ibid.
Other Tunneling coverage for Anqing Air Base -- H-6 Bombers

30.35 N  117.02 E

“Fighter” sized Tunnels

Blast Door Design
Examples of Large Underground Hangers

Ibid.
Underground Air Base Hanger Interior Design

Nuclear capable IL-28 in large hanger at *Guangzhou*

Jiang Zemin CMC inspection

*Guangzhou* underground hanger

Underground Air Base Hanger Interior Design

Comparative entrance sizes for PLA underground hangars, scaled from imagery. Some fighter base entrances are as narrow as 12 metres, while some “Badger-sized” base entrances may be as wide as 40 metres. There are eight known 35 - 40 metre wide “Badger-sized” hangars, one of which is decommissioned, fourteen known 22 metre wide “Beagle-sized” hangars, and seventeen known 12 to 14 metre wide “MiG-sized” hangars.

Significant increases in internal storage capacity and supporting capabilities such as materiel storage and personnel accommodation can be achieved by using complex rather than simple internal topologies.

New Emphasis on Hardened Individual Shelters?
(circa 2010)

Prototype model of H-14 shown with latest aircraft shelter with blast doors.

STUDY #5

2nd Artillery Underground "Great Wall"
President Hu inspects the Second Artillery Force
performance of “Song of Dong Feng” – *Eastward Wind*

Chinese President Hu Jintao inspected the headquarters of the Second Artillery Force of the Chinese People’s Liberation Army (PLA) on Wednesday to mark the 40th anniversary of the founding of the country’s strategic troops.

In his speech, Hu pledged to step up military reforms, *intensify preparations for the military struggle, and strengthen the overall building of the Second Artillery Force*....

Noting that the Second Artillery Force shoulders a glorious mission and important duties in the new century and the new period, Hu said the Party Central Committee and the CMC have attached great importance to and pinned high hopes on the development of the Second Artillery Force.....

Hu and other military leaders watched an art performance entitled “Song of Dong Feng (*Eastward Wind*), which tells about the 40-year experience of the Second Artillery Force in an artistic way.

During his stay, the president, who is also general secretary of the Communist Party of China (CPC) Central Committee and chairman of the Central Military Commission (CMC), had a meeting with senior officers of the Second Artillery Force, with the company of its commander Jing Zhiyuan and commissar Peng Xiaofeng.

Second Artillery Underground 1964-2010

• From earliest deployment, use of caves and tunnels was a common theme;
• The name “Second Artillery” was a form of concealment and disinformation;
• PLA Strategic Nuclear focus from late 60s to early 90s was on the USSR;
• Survivability of STRATEGIC missiles – driven by nature of liquid fuel – deployed:
  – Few number of fixed hardened sites – not “active” with fuel/warhead loaded;
  – Hidden cave or tunnel “nests” for assembly and roll-out to pre-surveyed launch sites.
• Survivability of TACTICAL missiles by dispersal and redundancy:
  – Use of mobility and emphasis on multiple reload trailers per fire unit.
• 1st “Underground Great Wall” built in NE and on coast between 1985-1995;
• Introduction of solid fuel has led to major build-up in active launch units as well as multiple re-fires for “dual capability” with DF-11, DF-15 and DF-21;
• Introduce employment concept of “the surge” for deterrence and warfighting;
• 2nd “Underground Great Wall” supposed to be between 1995-2005 but delayed;
• Intense construction in NW, SE, Tibet for completion of 2nd UGW by 2009 for DF-21/DF-31;
**Tunnel Digging as National Strategic Culture**

**天嘯  Heaven’s Roar**

- 2008 Joint Second Artillery Dept. of Television Arts Centre prime-time “epic” series  
  *Brilliant reproduction of 40-year history of the Second Artillery to mark the 87 anniversary of the founding of the CPC. Second Artillery Corps, the full name "The PLA Second Artillery Force," approved by Chairman Mao, Premier Zhou named. Many people think it is just an ordinary force, in fact it is a secret form of China’s strategic missile forces.*

- Shown nation wide on CCTV-3 with high ratings
- 24 programs @ 43min = 17.2 hours
- Extremely accurate dramatization of the non-fictional early history of the 2nd Artillery: **Tīān Xiào**
- 1st active DF-2 Surface-to-Surface Missile Regiment
- Deployment to Gobi Desert
- Storage location in deep ravines
- Engineer Battalion digging primitive horizontal tunnel construction with deadly cave-ins  
  *Few years, they have no powerful modern construction machinery, but with blood and sweat – loss of life patriotism, strong military dreams, heroism, sacrifice, -- they hollowed out, and get through the tens of kilometers of the cave, as the well built missile nests.*

- Failure of initial missile tests
- Relives successful missile delivered nuclear detonation = 18kt
- Live testing incorporated into CMC CPX against the Soviets

Early Trailer Deployment
Training for Tunnel Roll-out

Early examples of towed “Rollout”

Early Silo Deployment

1980s Silo Deployment

我们会伸出无情的铁拳
Handling & Diagnostic in Facilities

Diagnostics & Mating Re-entry Vehicle on DF-31 ICBM

Late 1980s Bunkers
Modernization of Bunker Command & Control

"央视曝光解放军二炮部队地下战略核导弹发射井," op cit.
Missiles in Underground Storage

Tunnels
1985-1995
“Surge” from Underground as National Strategic Culture

导弹旅长 Missle Brigade

- 2002 Joint Second Artillery Dept. of Television Arts Centre prime-time “epic” series
- Shown nation wide on CCTV with high ratings
- 18 programs @ 45min = 13.5 hours
- Accurate dramatization of 2nd Artillery: Tiān Xiǎo
- Shows mixed Brigades with DF-2, DF-3, DF-4 and DF-5
- Deployment in “The East” (adjacent to Yangtze River)
- Storage location in sides of mountains with many winding narrow access roads
- Follows Missile Brigade Commander through system modernization
- Shows Military District underground command center as built up on a natural cave
- Shows 2nd and 3rd generation tunnels
- Relives 1995-1996 naval crisis over the Taiwan Straits
- Live testing incorporated into CMC CPX against US Fleet with DF-21s tracking American carriers.

Command Cave

1分钟准备 1分钟准备
1990s Tunnels
Fathers of the Underground

M.Gen. Qiucheng Long

Lt.Gen. Zhang Xiang

[Report by Ding Haiming, Wei Cunren, and He Zhong]:“万里天疆绘就中国弹道 —— 追记我军战略导弹作战运用专家第二炮 兵装备研究院原研究员邱 成龙 [Miles-day Xinjiang draw on China’s trajectory - In Memory of the Army's Strategic Missile experts in the use of equipment, the Second Artillery Institute of the original researcher Qiucheng Long],” Jiefangjun Bao Online [Beijing, in Mandarin], (2010.05.17): p. 1, at [OSC summary CPP20100525088001: “JFJB on Late PLA Missile Expert Qiu Chenglong (Part 1);” full translation by IP-1011].


2nd Artillery Tunneling
2005

18 separate national TV programs; 15 minutes of edited coverage.

04 Dec 2004 Emergency report -- “tunneling work ran into a group of ‘dragon [stalacite] caves’.”

05 Feb 2005 Large scale landslide at underground 2nd Arty construction site;
09 Feb Engr. Regt. tunneling in minus 30 degree Centigrade;
13 Feb Unit works near Longtan Power Plant;
13 Mar 2nd Arty representative complains to Beijing that troops in isolated “frontline construction.... described cultural and recreational activities in the unit as monotonous.
17 Mar Following a cave-in at a construction site of 2nd Arty engineering regiment under the Commander “immediately rushed to the site to organize contingency measures: ‘The first step is to remove hazards. Then spray concrete, set up props, section by section, and pour concrete. Then we strengthen steel support. Then we will pass muster‘.”
18 Mar “Four news” – methodology, technology, XXXXX, YYYYYY -- training course for 2nd Arty Engr unit; visit the Xiaolangdi and Three Gorges dams to learn construction techniques
28 Mar 2nd Arty Engr. Unit “has invested several tens of millions of yuan to set up five new mechanized operation lines” and “new-model rock-drilling machine ... can complete a three-meter-deep roof bolt in five minutes, compared to more than one hour in the past.

06 Apr  Rock surface fragmented and collapsed at 2nd Arty underground construction site;
18 Apr  Soldier afraid of tunnels but now “unfazed as he leads hazardous construction work;”
02 Jul   Expensive drilling trolley spare parts produced by Regt. locally to save money;
03 Jul   Award for “iron man” in tunneling projects to soldier working since 1981;
08 Jul   Engr. Regt. has “accident free” national defense construction mission for past 17 years;
21 Aug   Engr. Regt. assigned new defense construction mission in early April;
25 Aug   Exhibition of technological accomplishments of 2nd Arty Corp Engr. units – all tunnel related;
13 Sep   Mobile S&T service team comes to aid unit with cave-in due to “water percolation in rocks;
18 Sep   2nd Arty Engr. Regt. – “narrow, stuffy work sites with temp exceeding 50 degrees Celsius....”
2 Oct    2nd Arty Engr. Regt. – “cadres” front line troops for holiday rest.
16 separate national TV programs; 19 minutes of edited coverage.

02 Feb  2\textsuperscript{nd} Arty Engineer Reg. working on tunneling thru holidays;
11 Feb  Innovation in development of steel membrane tunnel coating machine;
21 Mar  New approach to preventing “cave-ins” over two year period;

2nd Artillery Tunneling: 2006 (cont.)

07 Apr  CMC award to 2nd Arty Cmd Academy Professor – linking program of training + tunneling for 10 yrs;

08 Apr  CMC cited 2nd Arty Cmd Academy Professor who made major technical innovations -- visits tunnel site, inspect ventilation + air conditioning;

20 Apr  Award for 2nd Arty Engr Reg Cmdr for 100% construction acceptance at completion of tunnel project;

26 Apr  Explosives in tunneling – concern over enlisted troop morale – psychological program initiated to address troop fears;
<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>07 May</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Arty Engr Reg. develops optimum drilling techniques for linear + curvilinear tunneling – 10 fold increase in efficiency;</td>
</tr>
<tr>
<td>29 Jun</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Arty Engr unit “known as ‘nest builders’ for missiles,” makes innovations in video monitored safety + earth moving;</td>
</tr>
<tr>
<td>02 Jul</td>
<td>Communist Party Committee oath taking for troops of “the Magic Swords of the Orient” unit in high mountain location on 3,600m plateau;</td>
</tr>
<tr>
<td>12 Jul</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Arty Engr unit specialists in air duct work necessary for humidity control and air conditioning “at locations storing missiles;”</td>
</tr>
</tbody>
</table>
2nd Artillery Tunneling: 2006 (cont.)

07 May, CCTV-7

12 Jul, CCTV-7
2\textsuperscript{nd} Artillery Tunneling: 2006 (cont.)

11 Sep
“TSP advance geological forecasting technology” surveys material 100m ahead of drilling to prevent “cave-ins.”

06 Oct
No fall holiday for 2\textsuperscript{nd} Arty Engr construction project “\textbf{entering a crucial stage};”

31 Oct
Use of the phrase – “ascending/descending translational protective containment for \textit{underground railway};”

27 Nov
Expert response team created to respond to tunneling problems at “\textit{a dozen ... units in remote areas};”

04 Dec
2\textsuperscript{nd} Engr Bn working in “\textbf{small cave depot};” also utilization of advanced “\textbf{New Austrian Tunneling system}.”
01 Feb  3rd Bn, 2nd Arty Engineer Reg. “garrisoned in a cold northwestern region, recently received a ... ‘company-delivery’ [wu xia lian] contingent.... To help them solve practical problems, so as to elevate their self-building capability;”

"..."
2nd Artillery Tunneling: 2007 (cont.)

03 Feb  An IT-based command center established within a Second Artillery unit, “that cost millions of yuan to build,; was put into operation in late January -- center will be used to **direct the construction work of national defense-related projects.**

04 Feb  2nd Arty Eng. Regt. “working on a plateau” continues underground construction thru winter; coping with problems of “pitting, water seepage, and cracking” in the **high-altitude frigid zone;**”

07 Feb  Rotation of 2nd Arty Eng. Regt. technical personnel (relieved by Party cadres);

08 Feb  8th Co., 2nd Arty Eng. Regt. completes a **3 year project** in the “harsh” Gobi Desert;

09 Feb  Projection movies shown to troops digging underground in Gobi Desert;

21 Feb  Underground 2nd Arty unit “in order to **race against the time** ... working overtime;”
2nd Artillery Tunneling: 2007 (cont.)

06 Mar  Pt. 1: Plateau-based “poor rock quality in the tunnel is creating problems for blasting;” Regt. Cmdr. “on a plateau in the northwest” since 2004; Regt. “over the past few years.... responsible for “17 national defense projects;”

07 Mar  Pt. 2: Cmdr is a specialist in digging through difficult terrain and has published 16 papers on “Smooth-Surface Blasting for Tunneling;”

13 Mar  “The tunnel in which the 3d Battalion of the regiment works is a very tough environment.”

27 Mar  Party committee mobile office (comprising committee members and technical experts) formed to help solve problems encountered by the grassroots servicemen and prevent the occurrence of construction-related accidents.
2\textsuperscript{nd} Artillery Tunneling: 2007 (cont.)

01 May 2 construction records set in history of 2\textsuperscript{nd} Arty Corps:
-- \textbf{Daily tunneling footage of 17.5 meters} by a single tunneler in a cave depot;
-- \textbf{Monthly ferroconcrete usage of over 10,000 cubic meters}.

09 May “Report on the safety assurance measures adopted by a Second Artillery regiment at its construction site;” concern with \textbf{“checking and redressing any lurking perils;}”

13 May “To actively change the work style of its command and staff cadres, the authorities of a Second Artillery regiment have, since the beginning of May, required the regiment's command and staff cadres to go to the construction sites of the key national defense projects it has undertaken.... One such project was entering the critical stage of concreting.”
2007: “Engineering Regiment Updates Second Artillery Project Methods”*

After the peak of the latest round of national defense construction, an unidentified engineering regiment famous for bravely going all out also underwent challenge. In mission after mission, with time limits repeatedly moved up and quality standards constantly raised, the regimental party committee adjusted thoughts and ideas to advance with the times, adjusted team building to satisfy the need for development, and sought the best avenue for improving the overall combat strength of the armed forces. After several years of exploration, the regiment has gotten into the fast lane of comprehensive development under the guidance of the scientific development concept.

**Installing "Clock Hands" in the Brain**

As the pattern of battalions fighting on their own, companies fighting on their own, and even squads fighting on their own has emerged, projects involving tunnels, revetments, and installation and repair have become bigger in scale. At the same time, inconsistencies, such as a lack of main battle equipment and pressing deadlines for handing over completed projects, were preventing projects from fully "blooming." But in deploying the work force organically, having more people was in fact leading to holdups in work....

The regiment received instructions to urgently dig out a shelter several hundred meters long. "Forward command" transferred experts in machinery operation, maintenance, and demolition to form a small digging fendui [squad to battalion-size unit], and it concentrated superior forces to roll out operations. For 76 days, 56 "mountain moving warriors" fought bravely to satisfactorily complete the mission, setting a Second Artillery speed record for an underground facility.

The "green light" was given all the way to bring the following to the troops: Manpower support comes from the construction company; responsibility for equipment support is handed over to the mechanized company; technical support is provided by the mapping platoon and the technical groups; logistics support allows for the management of the supply of materials at battalion headquarters.

**The Party Is Not Behind the Times**

Presently, **the EYB automated command center**, which the regiment invested in and designed and built on its own, is undergoing extensive trials for the first time in the engineering corps' informatization building. After the automated command center is completed, the situations at the locations of the tunneling operations, the mechanized equipment site, and the detonator and explosives storehouses will conveniently appear on the screen....

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>08 Jul</td>
<td>Operational underground “<strong>EYB Automated Command Center</strong>” -- application of IT has greatly enhanced the quality and efficiency of their construction work;”</td>
</tr>
<tr>
<td>10 Aug</td>
<td>Concern of smoke and dust in tunnels; innovative “roller shutter” automated self-sealing “<strong>Gate of Health</strong>” development by 2nd Arty Eng. Regt.</td>
</tr>
<tr>
<td>24 Aug</td>
<td>New “engineering vehicle designed by” Eng. Regt; “holders of dozens of Second Artillery records, including <strong>monthly tunneling footage and daily revetment</strong>;”</td>
</tr>
<tr>
<td>12 Sep</td>
<td>Unit based cost savings initiatives for recycling of expensive drill bits;</td>
</tr>
<tr>
<td>17 Sep</td>
<td>Profile of Cmdr, 3rd Co., 2nd Arty, participated in <strong>5 “key national defense construction projects”</strong> over last three years, awarded the title of &quot;Vanguard Company in National Defense Project Construction&quot; after “most serious cave-in recently.”</td>
</tr>
</tbody>
</table>
03 Nov 2nd Arty Engr. Regt. “setting a new record of tunneling footage in soft, weak, and precarious rock area.” Interview with Political Commissar, Lt. Col. Huang Jinpo: “We must, under the guidance of the 17th CPC National Congress spirit, adhere to the scientific development concept and accomplish our defense construction tasks to high standards, with a sense of urgency that time and tide waits for no man.”
2008: “Second Artillery Achieves Remarkable Results in Site Construction”*

From the Conference on Second Artillery Site [zhen di] Engineering Construction Work that concluded yesterday, the reporters learned the following:

...its achievements were spoken highly of by the [Central] Military Commission and [the PLA] Headquarters. Second Artillery Deputy Commander Zhang Yuting attended and addressed the conference and Deputy Chief of Staff Wang Zhimin summed up last year's work and outlined plans for this year. Liu Huanmin, deputy director of the Logistics Department of the Second Artillery Corps, presided over the conference.

The tasks involved in last year's site [zhen di] engineering construction were *unprecedentedly weighty*, the project *deadlines were unprecedentedly tight*, and the required standards were higher than ever.... At the project construction front, the vast numbers of [Second Artillery] officers and men tackled key problems, overcame difficulties.... while the wartime project support capability of its troops has been formed in an all-round way.

The achievement of success relies on the firm conviction of our vast numbers of officers and men who took part in the site [zhen di] engineering construction, their collective wisdom, and united efforts.

...they had ensured the satisfactory progress of their projects and broken many of the Second Artillery's records for underground construction.... They had successively introduced many pieces of capital construction equipment of the world's most advanced level and vigorously improved and innovated their construction technologies. In so doing, they had resolved several dozen challenging problems related to long-distance ventilation and smoke discharge, cave-depot construction in areas with unfavorable geological conditions, and roughening of concrete surface. As a result, the quality of a number of site [zhen di] construction processes, including tunneling, covering, and installation, had reached the highest standard in the [Second Artillery's] history of site [zhen di] construction.

Deputy Commander Zhang pointed out in his address: Units at all levels must.... [w]ith a combat-ready posture and determination to meet the requirement to win wars, all units must get a good grasp of the demands of the situation, resolutely *uphold their actual-combat standards*, and push forward, in a down-to-earth manner, their site [zhen di] engineering construction and *preparations for wartime project support*.... They must focus their attention on the general prospect of our overall national building and the long-term development of our Second Artillery Corps, and vigorously create a favorable atmosphere charged with the desire to work hard, to economize, and to realize benefits, so that money can be put to the best use.

21 Mar  Tunnel construction site with temperature below minus 10 Celsius “referred to by experts as the most dangerous and most ‘unnerving’ project in the history of the Second Artillery Corps’ underground works.”

23 Mar  In temperatures below minus 20 degrees Celsius, the “officers and men are using a self-developed insulated mixing station to perform concrete coating.” Other inventions by this tunneling unit include mobile power switchboard and composite ventilation system.
25 Mar  “Iron 8th Company, 2nd Arty, in underground area where “landsides were very common,” used new technology and new processes to overcome the difficulties in the tunneling operation caused by poor geological conditions and the project was completed on time.”

4 Oct “Racing against time to ensure that their projects can be completed before winter sets in, the soldiers are working over 11 hours a day in the tunnels where temperature runs up to over 40 degrees Celsius.”

11 Oct “The tunnel in which the 3d Battalion of the regiment works is a very tough environment.”

7 Dec Party committee mobile office (comprising committee members and technical experts) formed to help solve problems encountered by the grassroots servicemen and prevent the occurrence of construction-related accidents.
Qinghai-Tibet Railway Tunnel

= total length of 65.3 kilometers
Military Highway Construction in Tibet

Military Highway Construction in Tibet

“Building the First Missile Site in Tibet"

In 2007, Colonel Zheng's regiment was tasked to build the first strategic missile site in Tibet. Without providing much information about the new strategic missile site, the documentary mentions that the missile site is located in a mountainous area at an altitude of over 4,000 meters.

Tibet’s harsh environment and scarcity of oxygen at a high altitude posed a major challenge to the missile site project. In light of the situation, Colonel Zheng first built a well-equipped work camp, an oxygen generation station and a water purification station. Oxygen was piped down to the project's work sites deep into a mountain.

In April 2007, the missile site project started and had continued for 200 days till it was completed. The planned missile site was carved out of a hill through layers of perennial frozen soils. The project utilized an array of modern tunnel boring machines. The smoothing blasting techniques were successfully applied, which eventually sped up the entire project.

The documentary indicates that upon the completion of the project, the engineering regiment quickly pulled out, thus allowing immediate missile deployment operations.

PRC Television Reports of Missile Buildup Opposite India

Rail movement of Missile Units

Dual-capable DF-21 IRBM

Missile Deployment in Tibet

Dual-capable DF-11 IRBM

2nd Arty FTX vs. India

Deployment of 2\textsuperscript{nd} Artillery Missiles to Tibet
Photos of Tunnel Construction in Tibet

November 15, 2010, the Chinese official media have reported major Lanzhou Military Region Corps of Engineers is the roof of the world steel soldiers, the news suggested to China from the year 2004 a total of seven years in the western Qinghai-Tibet Plateau altitude of 4,500 meters above the plateau into absolute Ji defense projects.

Construction Troops in Front of what appears to be DF-31 type slanted Tunnel Portal as at Kunming

24 Jan National defense project “is in critical stage” with 2nd Arty Engr. Regt. dealing with dangerous cave-ins.
Dep.Reg.Cmdr: “This working face is a clay intercalation. If it is not promptly buttressed, it may cave in at any moment. That is why we cannot afford to stop.”

2⁶ Artillery Tunneling: 2009 (cont.)

26 Jan  Wives bring “jiaozi” [dumplings] to tunnel for troops to celebrate New Years while working;
2nd Artillery Tunneling: 2009 (cont.)

30 Jan  Engr. Regt. 2nd Arty – “some of the construction sites require that work be done in one stretch.... officers and men are staying in their respective posts during the festive season.”

Political Commissar of 2nd Arty Engr. Regt., Wang Baoguo (lower left, red hat), “has been working in tunnels for over three decades.”

22 Mar  Tunnel troops using “a new type of portable oxygen respirator tailor-made for this unit's drill carriage operators, for the first time, to effectively protect themselves from dust pollution.”

25 Apr  Underground “Engineering Installation Regiment” solves “bottleneck problems.” “Recently, a core sampler [lower right] that had been improved by the soldiers of this regiment was applied at the surveying points for multiple missile sites. This was the 28th innovation outcome of the regiment since the introduction of the "Golden Idea" award.
2\textsuperscript{nd} Artillery Tunneling: 2009

22 May  Profile of Commander of 2\textsuperscript{nd} Arty “Engineering Installation Regiment” at completion of defense project -- with discussion of critical importance of “quality” construction and help of civilian rebuilding (in addition to military duties) in post-earthquake areas:

\textit{During the 100-day earthquake relief operations of last year, Zhang led his entire regiment to rebuild infrastructure and help solve the problems facing over 200,000 victims in their daily life at 18 temporary settlements.}

\textit{Early this year, when a national defense project was completed, the amount of steel used was over four metric tons less than originally planned.}

\textit{Shortly after the Spring Festival this year, the engineering regiment received an urgent assignment.... During a spot check, [the Engr. Regimental Commander] ... noticed a crack on an expansion screw. He immediately instructed the operators to double-check all the screws in the same batch one by one. Over 50 similar problems were exposed, whereupon ... [the Engr. Regimental Commander] ordered comprehensive reworking.}

7 Nov  “In the strategic missile force, there is another unit that has never taken part in the launch of any missile or even seen a missile. This is the engineering unit of the Second Artillery Corps, made up of an engineering headquarters and an engineering technology general unit. They are also known as nest builders for missiles. Their hard work and quiet dedication have created these modern "underground Great Walls" running through the bowels of tall mountains.”

“Second Artillery Corps Tunneling Activities in 2007,” (12 Feb. 2008); FBS2008021273136
24 Jan  National defense project “is in critical stage.” 2\textsuperscript{nd} Arty Engr. Regt. Dealing with dangerous cave-ins; Wang Baoguo, political commissar of 2\textsuperscript{nd} Arty Engr. Regt. (lower right, red hat), “has been working in tunnels for over three decades.”

22 May  Profile of Commander of 2\textsuperscript{nd} Arty “Engineering Installation Regiment” at completion of defense project -- with discussion of critical importance of “quality” construction and help of civilian rebuilding (in addition to military duties) in post-earthquake areas:

7 Nov  “In the strategic missile force, there is another unit that has never taken part in the launch of any missile or even seen a missile. This is the engineering unit of the Second Artillery Corps, made up of an engineering headquarters and an engineering technology general unit. They are also known as nest builders for missiles. Their hard work and quiet dedication have created these modern "underground Great Walls" running through the bowels of tall mountains.”
All photos from “PLA’s Second Artillery Corps to Create a Mysterious ‘Underground Great Wall,’” of 13 Dec. 2009, op cit.
1989 & 2009
21 Oct  [Wang Hailong, battalion commander of an engineering unit, SAC] In the past, to support such a section, it used to take 15 people working three days. Now, with our independently developed buttress vehicle, the job can be done by eight people in one day.

11 Mar  [Wang Liping, political commissar, Engineering Design Academy, Second Artillery Corps] During the period of the 11th Five-Year Program, we took part in the underground railway air defense shelter projects in Beijing, Nanjing, Shenyang, Dalian, and Changchun. A large number of advanced technologies and outstanding designs were applied.

27 Oct  Today, Gong Xiaobin and the team led by him performed a repeat survey of a national defense project of the Second Artillery Corps and **tendered a report containing the data of more than 100 locations.** The engineering team checked the data and found them error-free.

“DVD/Web Product of PRC Military Activites in Oct 10,” (FEA20110124013666; Washington, DC: Open Source Center, 4-30 Oct.); and

“Video: PRC PLA, PAPF Take Part in Key Projects During 11th Five-Year Program,” (CPP20110505048001, Washington DC: Open Source Center, 1 March 11)
2nd Artillery Tunneling: 2010 (cont.)

15 May    The report says that the remote-controlled tunneling machine has a robotic arm that can turn 360 degrees and can be remotely controlled from within a 200-meter radius. The machine can bore a 25-meter-deep hole at one time, the report says. Workers can use this machine on hazardous terrain, the report says.

“DVD/Web Product of PRC Military Activities in Feb 11,” (FEA20110420017024; Open Source Center, Washington DC: 02-27 Feb 11)
Not all Tunnels are built by the PLA

Contract Construction of Underground Defenses

Not all Tunnels are built the PLA

Contract Construction of Underground Defenses

South Korean Newspaper

“China Builds Underground ‘Great Wall’ Against Nuke Attack”

The Chinese Army is believed to have built an underground "Great Wall" that stretches for more than 5,000 km in the Hebei region of northern China. Citing the People's Liberation Army's official newsletter, the Ta Kung Pao daily of Hong Kong on Saturday said China's strategic missile squadron, the Second Artillery Division, built a massive underground tunnel to conceal nuclear weapons, including the Dongfeng 5 intercontinental ballistic missile with a range of 13,000 km.

Since 1995, the Second Artillery Division has mobilized tens of thousands of soldiers to build a network of tunnels stretching for more than 5,000 km below the mountain regions of Hebei, China's state-run CCTV reported. "A missile base has been built hundreds of meters underground and can withstand several nuclear attacks," CCTV said. "People refer to the network of tunnels connecting to the missile base as the 'Underground Great Wall.'"

"The early version of China's mid- to long-range missiles had all been deployed above ground and were vulnerable to detection by spy satellites and attacks by interceptor missiles. That prompted the Chinese military to move all of their missiles hundreds of meters underground." As a result, the squadrons of the PLA deployed there are completely undetectable because they are based in subterranean bunkers and move around beneath the surface.

The purpose of the secretly constructed underground Great Wall is to give China a second chance after a nuclear attack, military experts said. The main objective of the Second Artillery Division is to be able to launch a counterattack against enemy targets after escaping the first volley of attacks.

The Ta Kung Pao daily reported that it was unprecedented for the PLA's newsletter to reveal classified information about the tunnels and that this demonstrates Beijing's confidence in its military power.

Similar coverage in Japan, Taiwan, Russia and Pakistan, but not the U.S..

Future Issues

- Supporting an Operational Underground
  - Logistics
  - Maintenance
  - Training
  - Mobilization/Field Sustainability

- Surging Larger, Longer-Range Missiles
  - Can Underground ICBMs be Survivable & Credible?

- Strategic Concept for Political Impact
  - Intra-war Deterrence and Escalation Dominance
  - Regional Dissuasion
  - Arms Control without Verification
Centralized Maintenance

“PLA Second Artillery Brigade Conducts Year-End Assessment Exercise,” Military Report, CCTV-7 [Beijing, WMV in Mandarin 32 sec], (2009.11.29) at [translated by OSC CPM20100129017079, accessed 3 June 2010].
Automated Logistics

“Second Artillery Corps Logistics Department Improves Fast-Track Comprehensive Support Capability,” CCTV-7 [Beijing, WMV: 1 min 15 sec in Mandarin], (2009.11.27) at [OSC CPM20100129017042: “PLA Second Artillery Unit Conducts Comprehensive Logistics Support Exercise;” accessed 1 June 2010].
Missile Deployment
Areas of Reported Tunneling Stages

DF-31A ICBM Complex NW of Nanyang
Tunnel Complex NW of Nanyang

Concrete Garage (+ Portal?)

Secondary Entrance

Tall Angled Portals

TEL Turnaround

Reported DF-31A ICBM Deployment in Valley NW of Nanyang

33°11′47.42″N
112°18′37.23″E
DF-31A ICBM
Nanyang Tunnel Complex
DF-31A facility 813th Brigade at Nanyang

Tunnel Complex & 6 Firing Positions 15-20 km to NW

Rail loading area typical for loading Intercontinental Missile Train

“PLA's Second Artillery Corps to Create a Mysterious ‘Underground Great Wall’”

“Recently, sponsored by the People’s Liberation Army, ‘China National Defense News’, revealed the Second Artillery missile forces to build an underground cavern situation…. Analysts said that the Chinese media dared to publish these … called “Underground Great Wall” of the strategic facilities … showed that the Chinese system of its nuclear operations with unprecedented confidence and courage.”

13 Dec. 2009

Chinese photo of “DF-31 Underground Deployment”

**Kunming ICBM Tunnel Complex**

24°33′01.73″N 102°35′10.54″E

Valley Tunnel Complex south of Kunming

LOWER VALLEY

Tunnel Portals
Rail Line
HQ and Maintenance
Access Gate to Valley

UPPER VALLEY

Security Road
Command Center?
Construction Camp
Tunnel Portals

Photos from Google Earth 3D
Valley of Tunnels
24°33′01.73″N 102°35′10.54″E

2 Door Tunnel Portals = 32
3 Door Tunnel Portals = 4

Two Door Tunnel Portals (total = 32 positions)
3 Door Tunnel Portals (total = 4 positions)
DF-31A ICBM Animation
Deployment from Underground & Salvo Launch

2008
Winter
Tunnel
Construction

2009
Summer
Interior
Outfitting
Kunming Underground Complex

Lat: 24°32′19.56″N
Lon: 102°34′47.49″E
Kunming Underground Complex

Lat: 24°32’19.56”N
Lon: 102°34’47.49”E
Tunnel Tailings?

Enough fill to come from an 8x10 meter tunnel, 10 km long.

Construction Camp

Command Center?

Security Road

Upper Valley
The Missing Underground Railroad

Road Map (not including blue) vs Satellite (not including red)
STUDY #6

“Enhanced Mobility” & Crisis Stability
“The Surge”
Deployment from Underground
“The Surge” as Operational Deployment
Coercive Potential but Heightened Vulnerability and Questionable Sustainability
Surge Deployment
Helicopter Security associated with Nuclear Deployment
DF-21 use of Highway Tunnels during “pulse”
Enhanced Mobility during Crisis Deployment
Practice of Salvo Launches
CHINA'S 2ND ARTILLERY

- Started in late 1950s with Mao’s need for “2 bombs & a satellite”
- Break with Soviets over “Peaceful Coexistence”
- 1959 – Khrushchev withdrawal -- last National Parade for 25 years
- 1st Atomic Bomb Test in 1964
- 2nd Artillery founded in 1966 – named for “deception”
- 1st Hydrogen Bomb Test in 1967
- Soviet threat of preemption in 1969
- Disruption of 3rd line construction and “Cultural Revolution”
- Proponent of “No First Use” doctrine
- 1st ICBM shown in 1984 National Parade
- Slow missile development and low key deployment
- Digitized Chinese language – introduced Internet
- PRC lead in experimentation with Cyber & Space Warfare
- Late 1990s “dual capable” Nuclear/Conventional IRBM emphasis
- Announce 3,000 miles of Tunnel for Missiles and Warheads
# PRC Underground Development
## 1950-2010

<table>
<thead>
<tr>
<th>Civil Defense:</th>
<th>2nd Artillery</th>
<th>Nuclear Weapons</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1950</strong></td>
<td>-- People’s Air Defense works ’50</td>
<td>-- People’s Air Defense works ’50</td>
</tr>
<tr>
<td></td>
<td>-- 1st Civil Defense Conf. ’53</td>
<td>-- 1st Civil Defense Conf. ’53</td>
</tr>
<tr>
<td><strong>1955</strong></td>
<td>-- Coastal fortifications &amp; tunneling</td>
<td>-- Coastal fortifications &amp; tunneling</td>
</tr>
<tr>
<td></td>
<td>-- Lin Bao – fear attack on coast ‘62</td>
<td>-- Lin Bao – fear attack on coast ‘62</td>
</tr>
<tr>
<td><strong>1965</strong></td>
<td>-- “Third Line Defense” dispersal ’64</td>
<td>-- “Third Line Defense” dispersal ’64</td>
</tr>
<tr>
<td><strong>1970</strong></td>
<td>-- Fear of Soviet preemption ‘69</td>
<td>-- Fear of Soviet preemption ‘69</td>
</tr>
<tr>
<td><strong>1975</strong></td>
<td>-- 2nd Civil Defense Conf. ’71</td>
<td>-- 2nd Civil Defense Conf. ’71</td>
</tr>
<tr>
<td><strong>1980</strong></td>
<td>-- 3rd Civil Defense Conf. ’78</td>
<td>-- 3rd Civil Defense Conf. ’78</td>
</tr>
<tr>
<td><strong>1985</strong></td>
<td>-- abandon expensive projects</td>
<td>-- abandon expensive projects</td>
</tr>
<tr>
<td></td>
<td>-- focus on military hardening</td>
<td>-- focus on military hardening</td>
</tr>
<tr>
<td><strong>1990</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1995</strong></td>
<td>-- People’s Air Defense Law ‘96</td>
<td>-- NDSC controls storage ‘65</td>
</tr>
<tr>
<td></td>
<td>-- Civil-Military integration</td>
<td>-- 1st Thermonuclear test</td>
</tr>
<tr>
<td><strong>2000</strong></td>
<td>-- 4th Civil Defense Conf. ’00</td>
<td>-- Warheads moved Taibai “69</td>
</tr>
<tr>
<td><strong>2005</strong></td>
<td>-- mention of “indestructible</td>
<td>-- Site selection for test &amp; storage ‘58</td>
</tr>
<tr>
<td></td>
<td>‘Underground Great Wall””</td>
<td>-- 1st Atomic test + tunnel ‘64</td>
</tr>
<tr>
<td><strong>2010</strong></td>
<td>-- Urban renew/subway defense</td>
<td>-- Warhead control 2nd Arty ’79</td>
</tr>
<tr>
<td></td>
<td>-- “Stimulus” investment in subway/rail</td>
<td></td>
</tr>
</tbody>
</table>
2nd Artillery Manpower
1966-2010

Manpower

Percentage of PLA
2\textsuperscript{nd} Artillery Strategic Directions
2\textsuperscript{nd} Artillery Missiles by Range
Quantity of Launchers: 1966-2009

Data derived from the annual \textit{Military Balance} reports (London, UK: International Institute for Strategic Studies, 1960-2010).
Tactical Ballistic Missile Systems
Quantity of Launchers: 1966-2009

Tactical Dual-Capable: DF-11 & DF-15
Quantitative and Qualitative Emphasis of Last Decade
Tactical SRBM exiting Tunnels
Tactical TELs in New Tunnels

Tactical TELs in New Tunnels
2nd Artillery Tactical Training Exercise in Tunnel

Dongfeng-15 Tactical Missile reload in Storage

PLA “Model of the Second Artillery firing positions”
二炮发射阵地模型

Example of Tunnel Based Rail Deployed Tactical Missile

- Stationed in underground facility
- Unit deployed on special train
- With supporting equipment
- DF-11/DF-15/DF-21 TELs on flat car or “special transport car”
- Normally fired from ground positions but also discussion of launch from “special transport car” from pre-surveyed siding

Illustration from: “防护工程的中外比较和战略思考 [Protection Project at Home and Abroad and Strategic Thinking],” ShowChina, [2009.03.06], at <http://translate.google.com/translate?hl=en&sl=zh-CN&u=http://www.showchina.org/zgjbqkxl/zlwhyjszc/200903/t274665.htm&ei=MzspTeTXEY-u8Ab97s22AQ&sa=X&oi=translate&ct=result&resnum=1&ved=0CBQ7gEwAA&prev=/search%3Fq%3Dhttp://www.showchina.org/zgjbqkxl/zlwhyjszc/200903/t274665.htm%26hl%3Den%26client%3Dsafari%26rls%3Den%26prmd%3Ddivns> [accessed 10 Dec. 2010; translated by IP-1011].
Theater Missiles
Quantity of Launchers: 1966-2009

Early 2nd Artillery Timeline
Missile Development, Organization & Tunneling

Creation of 2nd Artillery

1st Missile Bn

Initial Tunneling

Theater Nuclear Missiles

DF-2

DF-3

DF-21*

DF-21C/D*

DH-10*

* = Dual Capable
DF-3 Tunnels in Dalian Peninsula

Possible UGF entrances

Possible Underground Facility

DF-3 Firing Circle

Unclassified Google Earth imagery courtesy of Tim Brown, (1 April 2009).
Interior Mating of DF-2 Components on Rails
DF-3 Tunnel Interiors shown on Chinese TV
Modern DF-21 Deployment in Tunnels

The logical assumption is that the vast network of UGFs located near the missile garrisons and launch sites are used to protect, store, and transfer these items. Storing warheads and missiles in UGFs allows TELs to be loaded and armed under protected cover, and away from the prying eyes of intelligence satellites...

Theater Missile Tunnels in the West

Two variants of the DF-21C (DF-25?) MRBM

The fuzzy photo above was released in Nov. 2006 on the Chinese Internet claiming to show the DF-25. The 2007 photo on the right shows the same DF-21C TEL and missile booster with different warheads – believed to be nuclear (rear) and conventional (fore).
DF-21 TEL being Reloaded in Operational Facility
Vulnerability of 2\textsuperscript{nd} Arty Transport

Large quantity of DF-21s moved by rail
DF-21 on the Move
Tunnel Concealment combined with Emphasis on Mobility

“To Frighten the West”
西方惊惧

Continental Missiles
Quantity of Launchers: 1978-2009

Continental Nuclear Missiles

DF-4
- Range =
- Liquid Fuel
- Slow Preparation
- Accuracy Degraded by Movement

Concrete Sheds in Berms & Shallow Tunnels
DF-31
Tripolarization = Targeting Europe

Articles in People’s Daily referencing “multipolarization”

DF-31 Continental Ballistic Missile too short for US, too long for Russia

DF-5 ICBM shown in Silo launch and tunnel storage

DF-5 Underground Silo

The image above depicts a DF-5 (CSS-4) ICBM silo located in southern China near Huitong. Chinese ICBM silos are very difficult to identify. As seen in the image above, they are allowed to become overgrown with vegetation and may actually be camouflaged. This is part of a denial and deception effort intended to mask their locations from overhead imaging sensors. Using effective concealment efforts can make targeting these strategic assets very difficult if the sites are effectively hidden. As shown here, however, these concealed missile sites can still be located if an observer is aware of their layout and cognizant of the relevant features that need to be identified.

ICBM Warhead and 3rd Stage -- Mating with 1st/2nd Stages

Photo shows 2nd Artillery diagnostic test facility and procedure for coupling stages. Note use of track and rail mounted carriages typical of tunnel deployment.

“Declaration of War signals”
CCTV exposure of DF-31A intercontinental ballistic missiles

Text claims DF-31A ICBM deployment in Shaoyang and Hunan provinces

Animation of DF-31A ICBM Deployment from Tunnel to pre-surveyed firing position

DF-31/41 ICBM Train
“CCTV intercontinental nuclear missile train appeared!”

Text suggests that rail-mounting of ICBMs is related to this new line and tunnel construction.

Is there a Road Mobile DF-41?
SS-25 with Chinese Characteristics
Heavy road-mobile MIRV ICBM?

Photos taken in China: 2007

If it exists – where is it?
2006 Television Shot
Is there a Rail Mobile ICBM?

“Rocket arrives at launch facility”

“Our Country Arms Factory with a Railway Container Train of Cars that Actually Hide the Second Artillery Important Secret!”

A Chinese SS-24?

“This train car is no longer applicable in peacetime, but how do I find his car roof to be demolished, then it is specialized equipment like arms, but rather a disguised Second Artillery Corps train! Our units used to transport arms seem ordinary trains!”
China's Dong Feng Missile Train

洲际核导弹列车亮相央视
Intercontinental Nuclear Missile Train appeared CCTV

ICBM Rail Transport/Launcher
不吃人的狼top81
“Second Artillery bomb train appeared on CCTV, China's Military began a Showdown”

STUDY #7

Underground “Great Wall” Implications for Deterrence & Arms Control
Nuclear Warheads are Not Amenable to National Means of Verification

During the Cold War the U.S. Missed 20,000 Soviet Nuclear Weapons

How Small is China’s Nuclear Arsenal?

Tunnel Expansion
Stages of Underground Development

Phase I

Phase II

Phase III

Between 1995-2010 the announced length of 2nd Arty tunnels doubled from 2,500km to 5,000km.
Reported Nuclear Capable Missile Increases
including “Dual” Tactical Systems
and deployment of new ICBM

Chinese Statements of Nuclear Warhead
(Average Annual Production for a given decade)

- 200 per year
- 140-150 per year
- 110-120 per year

Is “No Nuclear Growth” Plausible?
there be as many as 3,000 nuclear warheads

“Absence of Evidence is not Evidence of Absence”
Carl Sagan

SAC Development

<table>
<thead>
<tr>
<th>Warheads</th>
<th>Tunnel Kilometers</th>
</tr>
</thead>
<tbody>
<tr>
<td>3000</td>
<td>5000</td>
</tr>
</tbody>
</table>


Nuclear Warhead Growth?
Tunnel Growth
Missile Growth
Nuclear Warhead No Growth?
Hypothesized Chinese Deterrent Criteria
based on rare comments

• Hold opponents values hostage;
• Target 300 American cities;
• Believable capacity to kill 200,000,000 Americans;
• Reduce Vulnerability -- they can’t target what they can’t see -- hide and move;
• Reduce cost of “high ready” systems with mobilization;
• Discussion of 2nd and 3rd Strategic Strikes, with implied:
  – Stored reserve;
  – Reloads;
  – Multiple launch positions.
• Demonstrate enhanced capability during a crisis.

What would it take?
PRC Counter-Value Strike Against US Cities: 2000

**Impact**
- Megaton warheads
- 20 urban areas
- High altitude fallout west to east
Counter-Value Strike Against US Cities with MIRV
Collateral Destruction of US Electrical Grid with City Attack

- 230,000 volts
- 345,000 volts
- 500,000 volts
- 765,000 volts
- High-voltage direct current
Value Distribution of US Agriculture

Residual Radiation Coverage of US Agriculture

Assumptions: Counter-Value City Attack
average kiloton yield = 200KT airburst
average megaton yield = 2MT airburst
POL Pumping Stations and Pipelines
Major Breaks in Distribution
National Highway System
Major Breaks in Highway System
National Rail Net
National Rail Net Traffic
Major Breaks in Railway System
Impact of Chinese Counter-value Attack

• Impact on Population
  – 50,000,000 are likely to be direct casualties (immediate deaths and severely injured requiring medical attention to survive);
  – A similar number (+/-50%) will suffer radiation sickness ranging from debilitating to life-shortening;
  – At least 2/3 of the nations 7,569 hospitals will be destroyed or inoperable and half the physicians/surgeons and other healthcare professionals themselves casualties.

• Impact on Electrical Generation
  – The national electrical grid will be broken in over 200 major areas and at least 1/3 of the generation capacity destroyed;
  – The lack of electricity for food sustentation, water pumping, transportation and fossil fuel production and distribution will mean that virtually all surviving population in urban areas and towns will begin starving within a week of the attack;
  – For at least 2 years following the attack, lack of electricity will impact 80% of American households.

• Impact on Agricultural Production
  – At least 40% of the national food producing agricultural land will be exposed to significant residual radiation;
  – Farming productivity will drop to less than 25% due to lack of water pumping, equipment fuel, feed, seed, fertilizer and manpower; slaughter of feed stock in the first six months of national famine will take decade to replace;
  – Starvation will be a reality for at least 100,000,000 Americans surviving the initial attack.

BOTTOM LINE: 200 million lost, and surviving Americans will be living in the dark, on a subsistence diet, with a life style and life expectancy equivalent to the dark ages.
Strategic Arms Control Implications of a Large Chinese Nuclear Force

- **Post START II**
  - A larger than estimated Chinese strategic nuclear force raises grave questions about US national security:
    - US nuclear force levels needed?
    - US nuclear force reliability/capabilities/effectiveness?
    - US extended deterrent for Asian Allies and as non-proliferation incentive?
    - Self-deterred by threat of “unacceptable damage” to American population?
    - Constraints on US Prompt Global Strike capabilities
      - China is developing a strong conventional ballistic missile force
    - Constraints on US missile defenses
      - China is developing its own national missile defense

- **Potential future US-China strategic nuclear arms control issues**
  - History of highly successful Chinese secrecy and deception
  - Dual capable tactical/theater ballistic missile systems – US constrained by INF Treaty
  - 4th generation nuclear weapons not covered by current treaties
  - US capabilities to verify, in light of Chinese Underground Great Wall effort to reduce effectiveness of US national technical means
机动展开 “Mobile Expansion”
Deployment from Underground in a Crisis

“... during peacetime only small quantities of units will be allocated in pre-determined operational areas for emergency use, and the main operational units will be allocated in areas outside the operational areas that are transportation accessible. Prior to war, only missile units that bear the mission of conducting fire assault and small quantities of support units (or elements) will be allocated in the concealed tunnels within the operational areas, while the remaining units will be positioned in concealed areas that are far from the theater, thereby reducing the overall exposed forces. During the war is when forward mobile expansion is conducted at the appropriate time.”

Top Cover Helicopter Security = Nuclear Warhead Deployment?
## Chinese *DETERRENCE* Terminology

### KEY WORDS

<table>
<thead>
<tr>
<th>English</th>
<th>Chinese</th>
<th>Pinyin</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dominate</td>
<td>威 wěi</td>
<td>might, prestige</td>
<td></td>
</tr>
<tr>
<td>Afraid</td>
<td>懦 shè</td>
<td>cower, scared, fearful</td>
<td></td>
</tr>
<tr>
<td>Shake</td>
<td>震 zhèn</td>
<td>quake, symbol of thunder</td>
<td></td>
</tr>
<tr>
<td>Force</td>
<td>逼 bī</td>
<td>make someone do something</td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td>力 lì</td>
<td>strength, influence</td>
<td></td>
</tr>
<tr>
<td>Capability</td>
<td>量 liàng</td>
<td>capacity, quantity, amount</td>
<td></td>
</tr>
<tr>
<td>Nuclear</td>
<td>核 hé</td>
<td>atom</td>
<td></td>
</tr>
</tbody>
</table>

### KEY CONSTRUCTS

<table>
<thead>
<tr>
<th>English</th>
<th>Chinese</th>
<th>Pinyin</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deterrence</td>
<td>威慑 wēishè</td>
<td></td>
<td>dominate thru fear, cower by force</td>
</tr>
<tr>
<td>Intimidate</td>
<td>震慑 zhènshè</td>
<td></td>
<td>to be in awe, shake/tremor,</td>
</tr>
<tr>
<td>Compellence</td>
<td>威逼 wēibī</td>
<td></td>
<td>threaten, coerce</td>
</tr>
<tr>
<td>Deterrent</td>
<td>威慑力量 wēishèlìliàng</td>
<td></td>
<td>dominating power capability</td>
</tr>
<tr>
<td>Nuclear Deterrence</td>
<td>核威慑 hěwēishè</td>
<td></td>
<td>nuclear domination thru fear</td>
</tr>
<tr>
<td>Nuclear Deterrent</td>
<td>核威慑力量 hěwēishèlìliàng</td>
<td></td>
<td>nuclear dominating power capability</td>
</tr>
</tbody>
</table>
PRC View of Deterrence is neither Minimal nor Passive

Warfighting and deterrence are two major basic functions of the armed forces. What is termed deterrence is the military conduct of a state or a political group in displaying force or showing determination to use force to compel the enemy to submit to one’s volition and to refrain from taking hostile actions or escalating the hostility.

Strategic deterrence and strategic operations are dialectically unified. Strategic operations secure the strategic objective through direct engagement with the enemy on the battlefield, with a view to winning the war or to curbing the war by war, which the objective of strategic deterrence is to contain the outbreak of war or to limit the scope and the escalation of war, with a view to curbing the war, and its strategic objective is attained by non-fighting means or fighting a small war. Strategic deterrence and strategic operations are interacted, and their objectives are for attaining one’s strategic objectives by frustrating the enemy’s attempts.

With regard to the Second Artillery conventional missile strike campaign, it will be carried out under nuclear deterrence conditions. Despite the fact that future wars primarily will be conventional local wars, in the global community, those that have nuclear weapons are primarily nations with strong militaries, and have not promised no first use of nuclear weapons; moreover local wars that erupt in the near future will implement nuclear deterrence many times. The Second Artillery must successfully handle preparations for nuclear strike and nuclear deterrence, and must be rooted in nuclear conditions or operations under nuclear deterrence conditions. Missile deterrence operations are the operational activities to contain enemy strategic intentions or major military risky operations through the specific use of forces and firepower from the Second Artillery conventional missile campaign large formation in order to demonstrate firm will and formidable actual strength against the enemy side’s implementation of containment.

Missile deterrent operations are permeated with stratagem qualities and artistry. Their essence lies in the ingenious selection of targets, ingenious choice of timing opportunities, ingenious use of forces and firepower, and the ingenious application of operational methods. The campaign commander and the command organ must fully anticipate all the situations that might emerge during the campaign, while formulating multiple deterrence operational methods and advance plans. When implementing the missile deterrence operation, one should flexibly employ deterrence operational methods based on the strategic intentions of the higher-level authorities and the dynamic state of the enemy side and make every effort to achieve the goals of deterrence.
Chinese Nuclear Capable
Tactical & Theater Missile Systems

“Once everything is stored underground, and given that China tends to decouple warheads from the missiles, it will be next to impossible to quantify China's entire nuclear arsenal. Not only would 5,000km of storage allow for a greatly expanded arsenal, but transport capabilities within the tunnel could allow for the launch of nuclear weapons from a number of locations along the tunnel.... Any substantial increase in its arsenal would mean that Beijing's limited deterrent is (or could become) far greater than what we have come to expect. If this were to materialize, the entire strategic balance in Asia would be shaken and would inevitably force the US, the sole security guarantor in the region, to reassess how it calculates the risks and costs of intervention, such as during a crisis....”*

Strategic Parity & Theater Escalation Dominance

“... no one wants to escalate the conflicts but everyone is eager to restrain the other.”

China’s “Underground Great Wall”

Strategic Implications

- It is real – actual size unknown but strong evidence that it is the largest nuclear underground complex ever constructed by anyone;
- At least half (1,500 miles) constructed in the last 15 years to accommodate solid-fuel missiles;
- It involves hiding ICBMs as well as Tactical and Theater TELS;
- We do NOT know what they are hiding in the Tunnels but evidence suggests much larger nuclear warhead & missile reload inventory;
- Underground Great Wall appears to be associated with introduction of MIRV ICBM and Strategic Trains;
- Continued Theater SRBM/IRBM expansion designed to “Deter the Deterrer,” if not reversed -- will threaten US-Russian INF Treaty;
- Failure to get China’s forces constrained via negotiation will produce major challenge to US counter-proliferation Nuclear Umbrella in Asia.
End of the Tunnel or a New Opening?