CINTEC AMERICA Inc

Blast Protection & Mitigation

1. Blast Mitigation

2. Envelope Protection

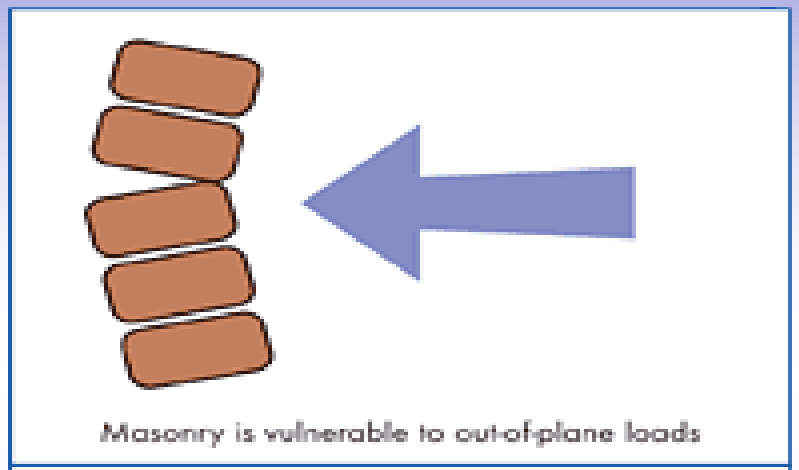
3. Window Protection

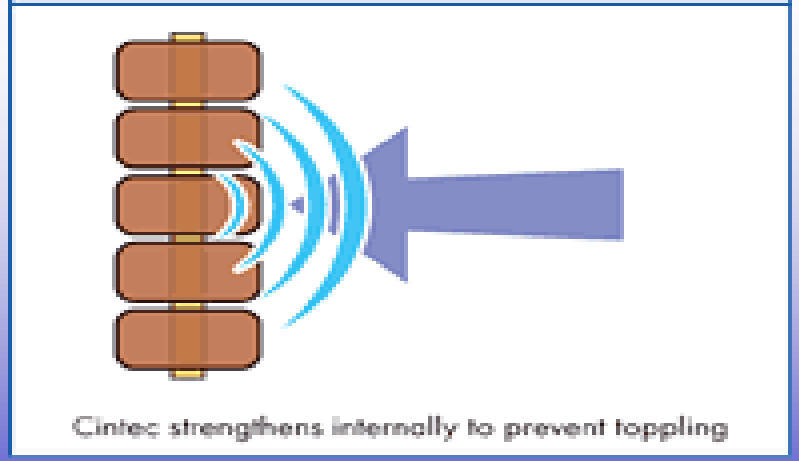
4. Door Enforcement

Load Plane

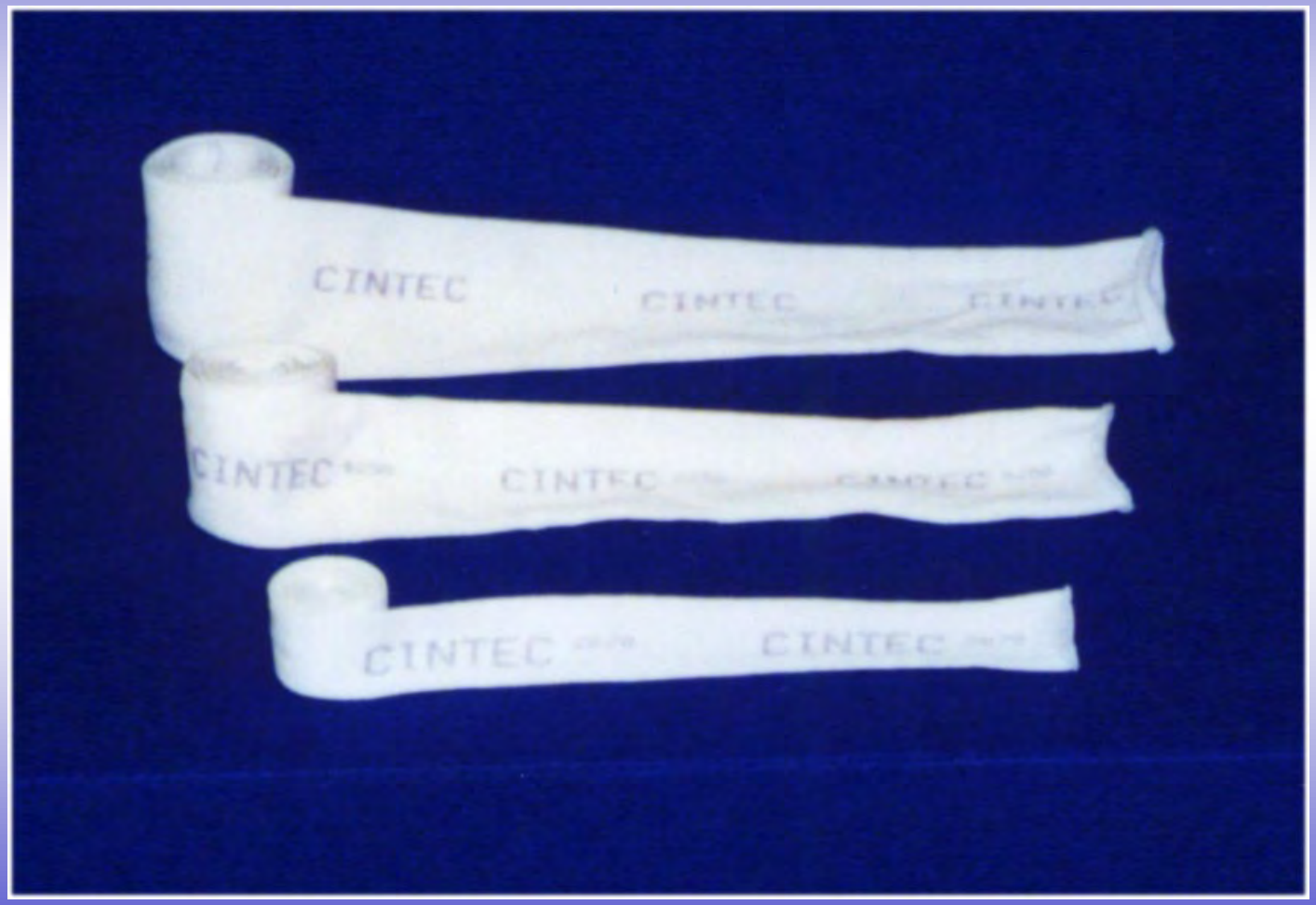
Out-Of-Plane-Load

Strengthen-Plane





The Sock



Bar

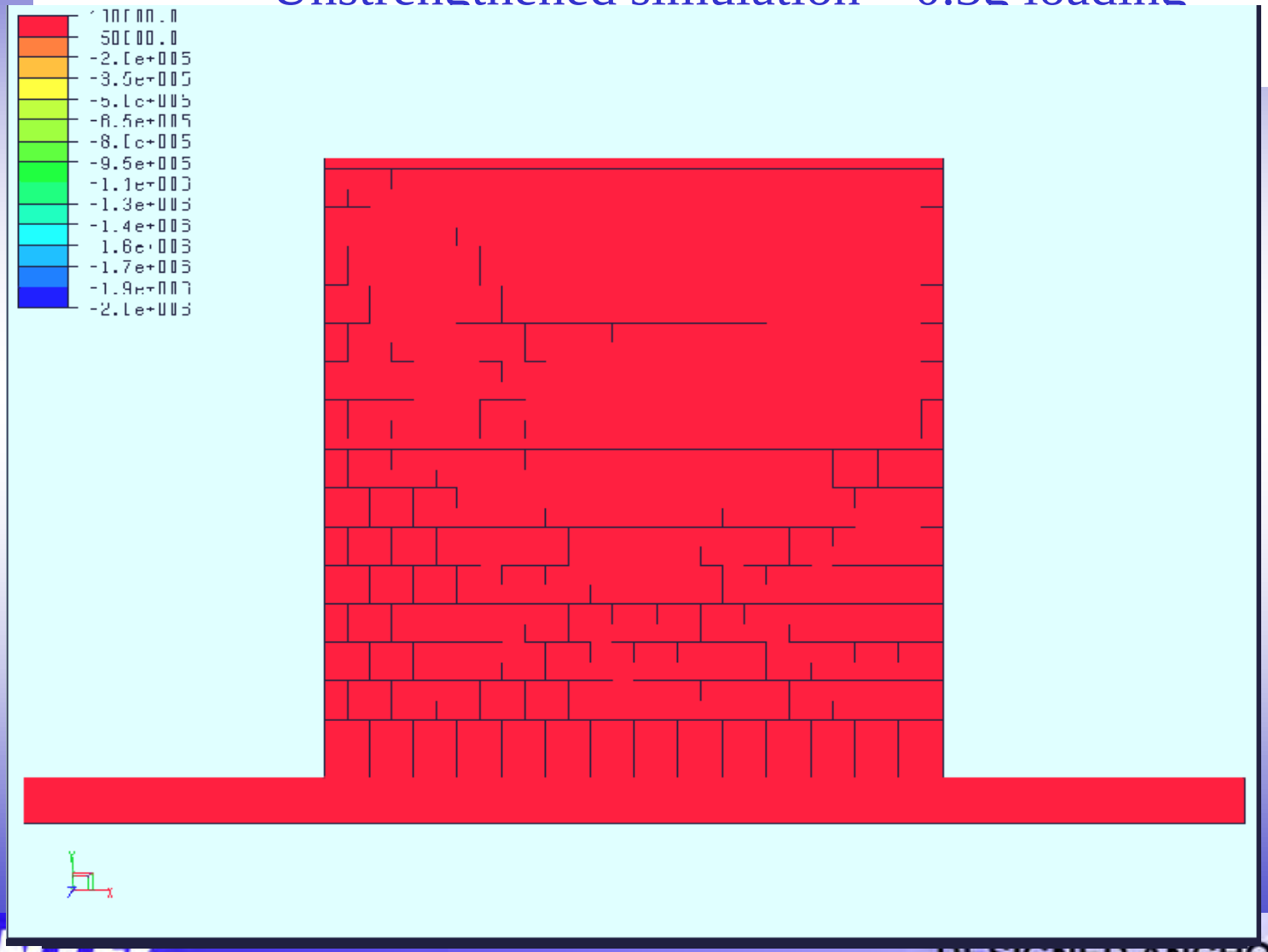
The Grout

Cintec Anchor System

- Structural Analysis & Testing
- Drilling
- Anchor Assembly and Insertion
- Inflation
- Government Agencies

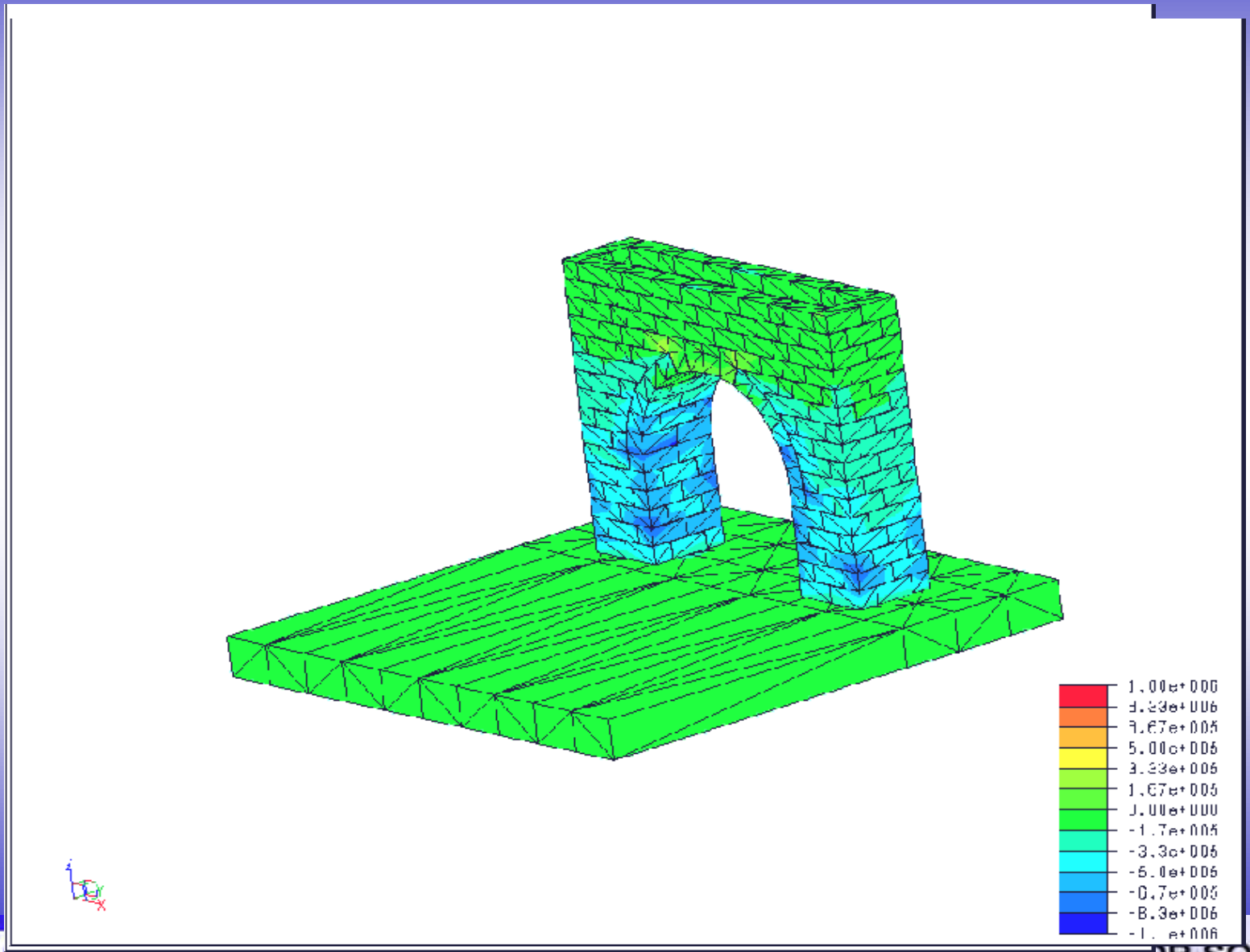
Analysis

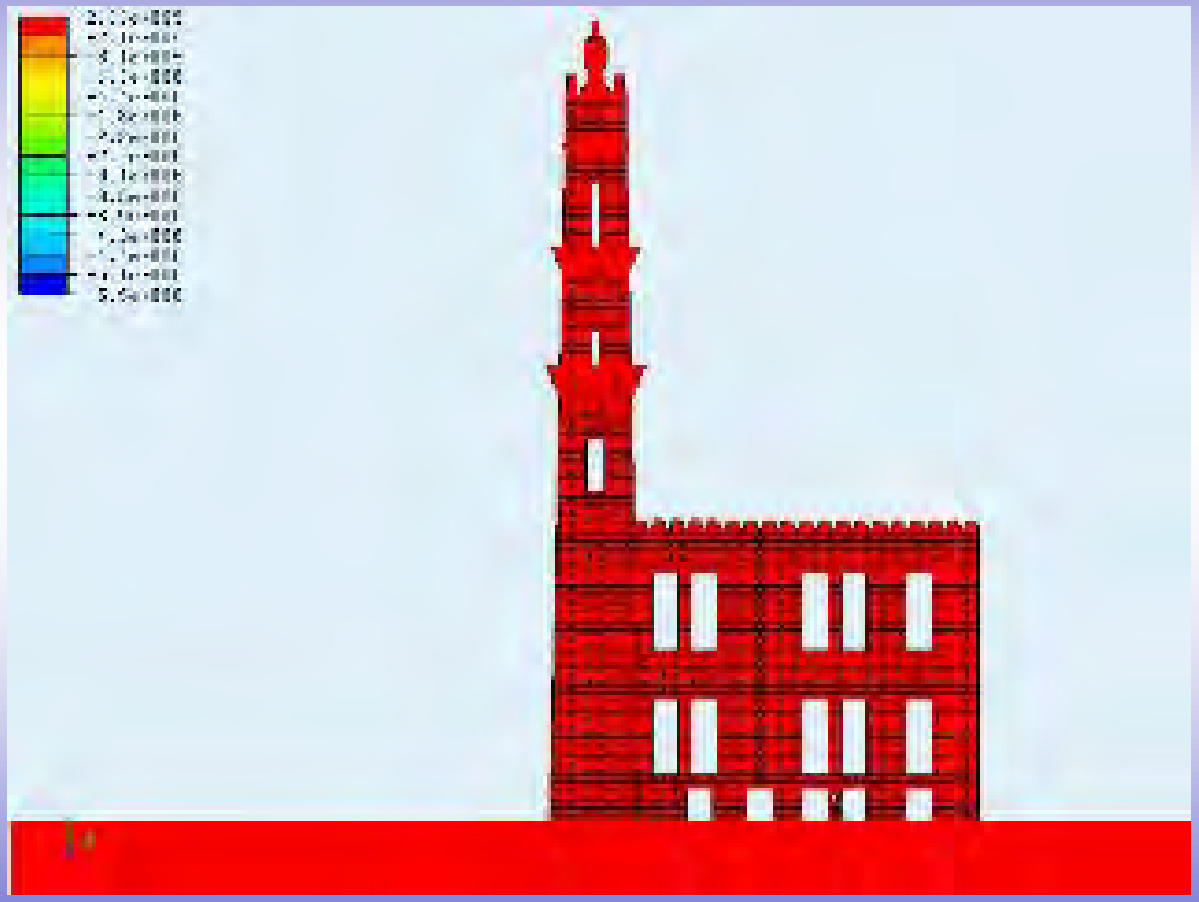
Unstrengthened simulation – 0.3g loading



Principal compressive stresses in N/m^2

3D Discrete Element analysis





121 Army Hospital - Seoul

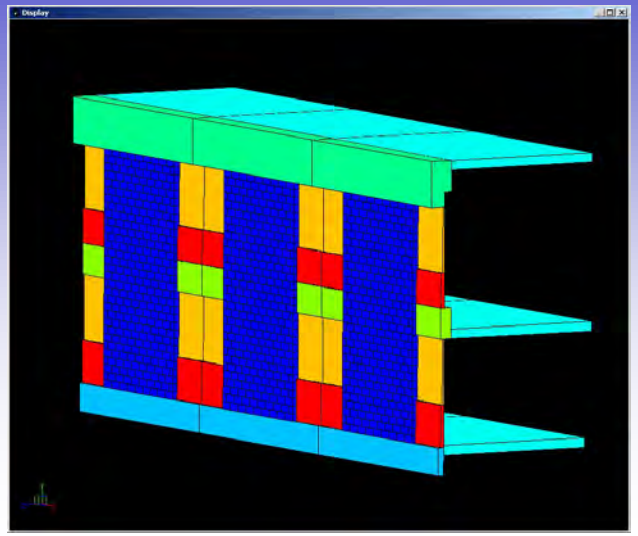


Figure A5.6 Elfen Model Prediction for an Unreinforced Bed Wing Wall Pier Subjected to a Blast Load of 250lbs TNT at 50 ft.

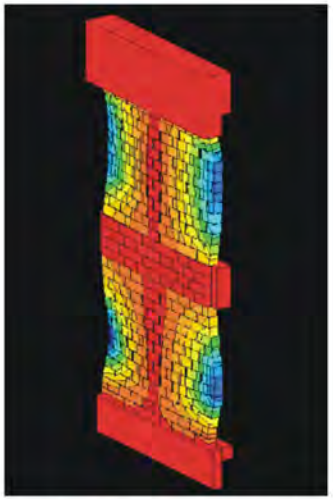
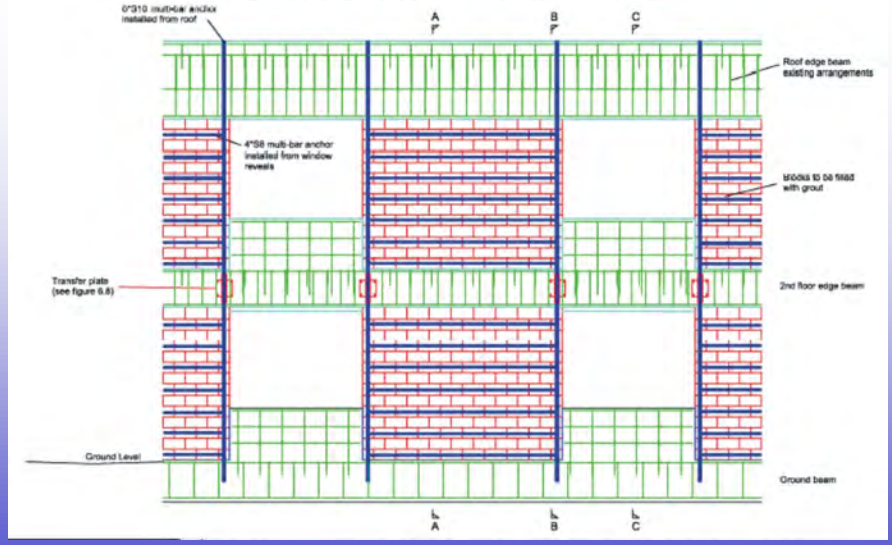
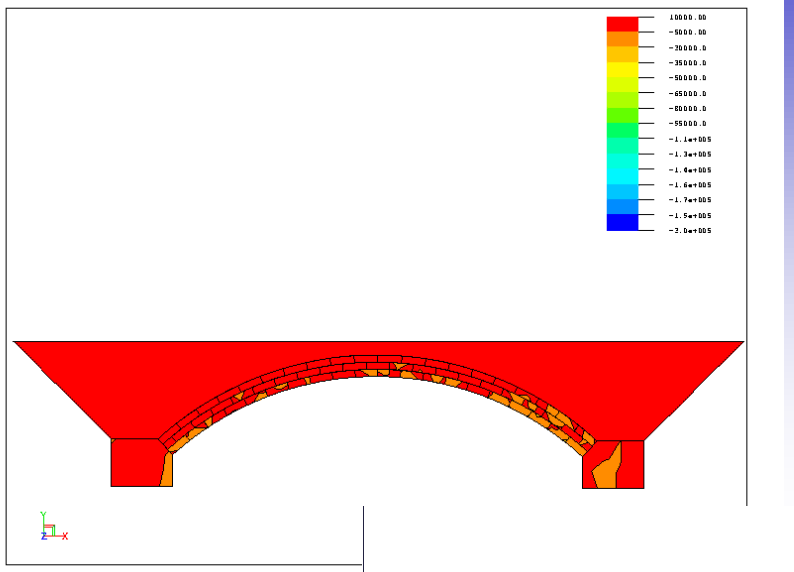


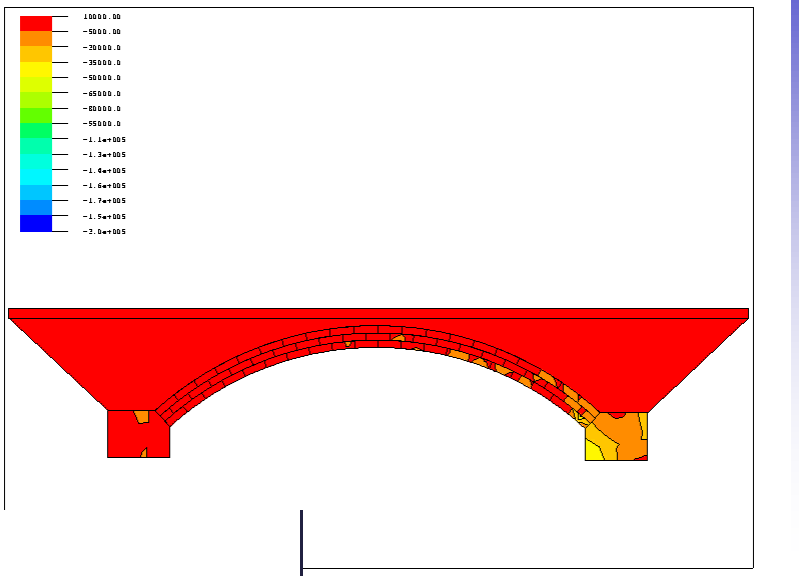
Figure A5.7 Elfen model prediction for a reinforced bed wing wall pier subjected to a blast load of 250lbs TNT at 50 ft.

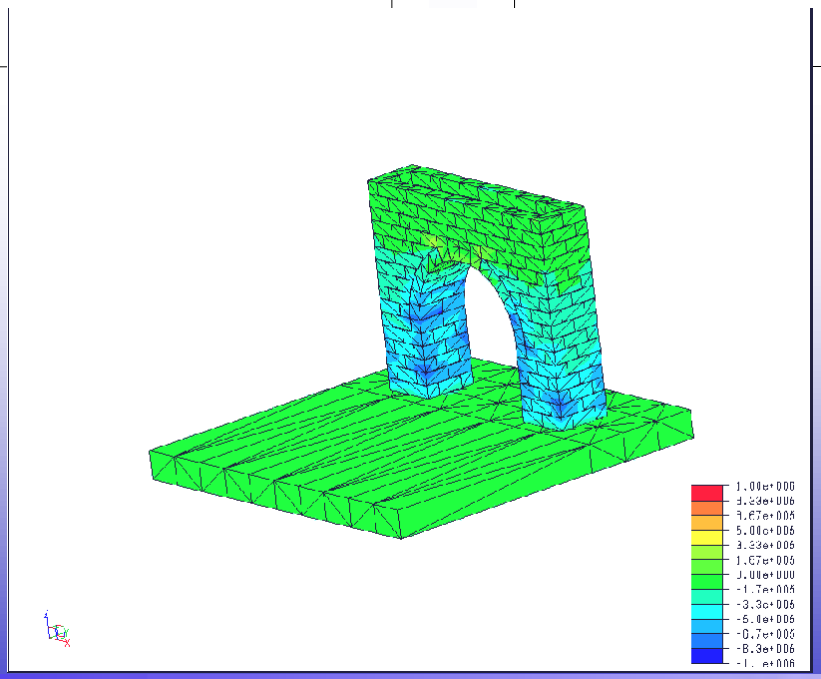


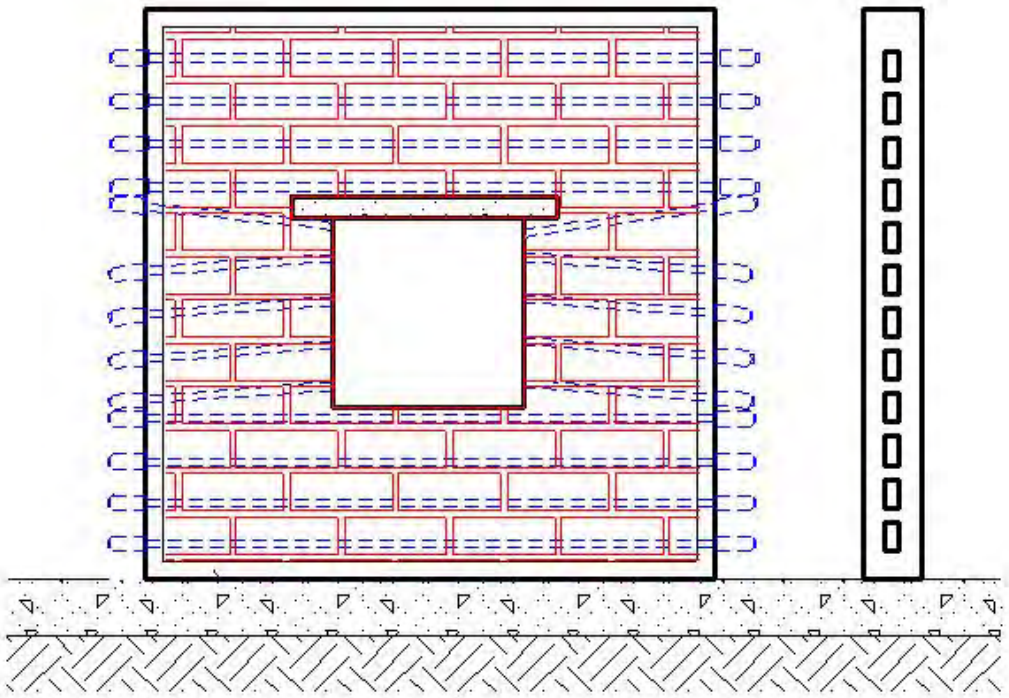
121 Army Hospital - Seoul

Discrete Element Analysis









Reinforced Wall with Window

- Charge weight - 200kg (440lbs) TNT equivalent
- Plain wall @ 12.5m (41ft)
- Wall with window @ 15m (49ft)

Large Charge Hollow Block Wall Test

Concrete Masonry
Block Wall Test
5 June 2001
CINTEC
DESIGNED ANCHOR SOLUTIONS

Concrete Masonry
Block Wall & Window
Test
6 June 2001
CINTEC
DESIGNED ANCHOR SOLUTIONS

Powerframe Window Analysis

(car bomb – 550lbs TNT @ 110ft)

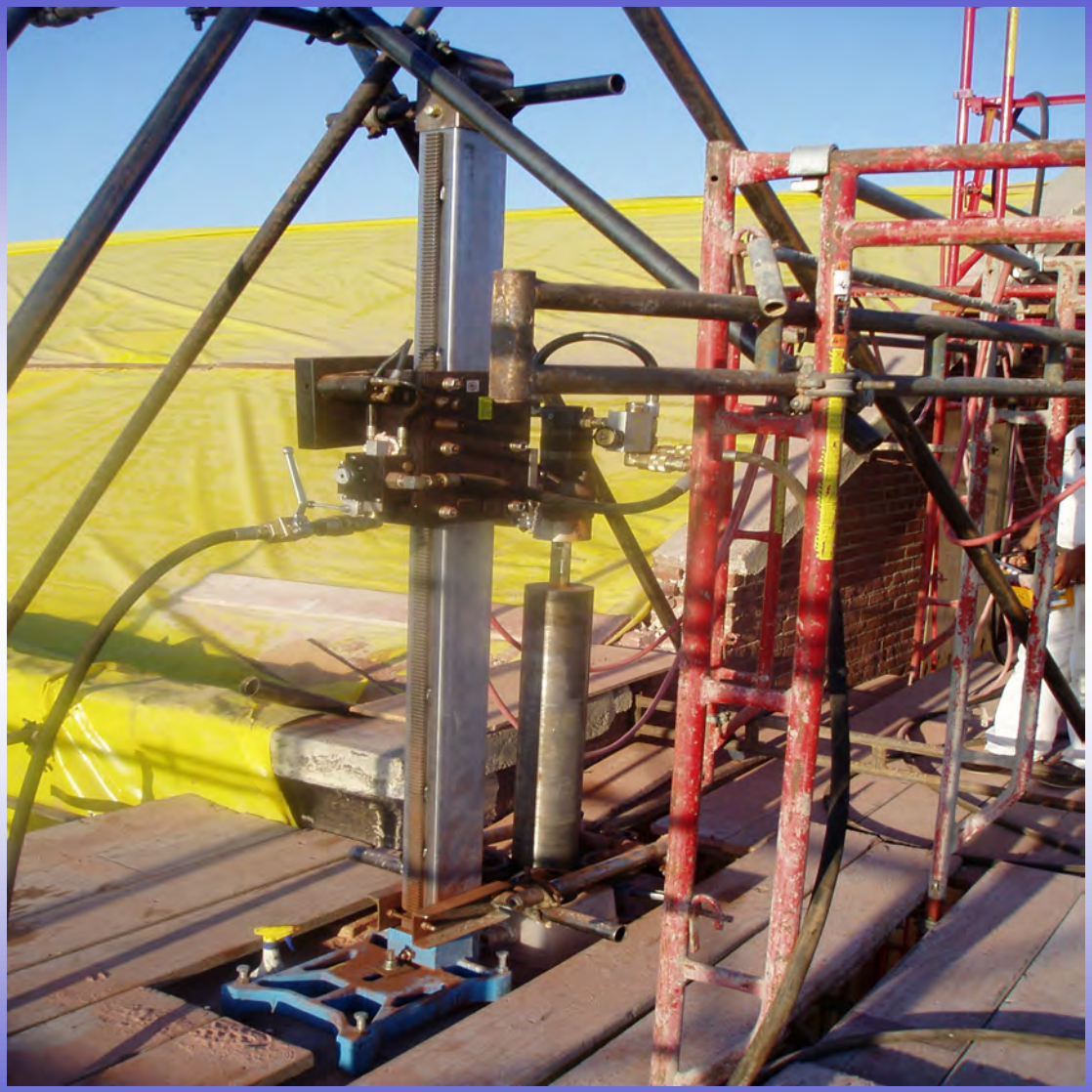
(p_r = 12.6psi; i_r = 106psi-ms)

Before

After

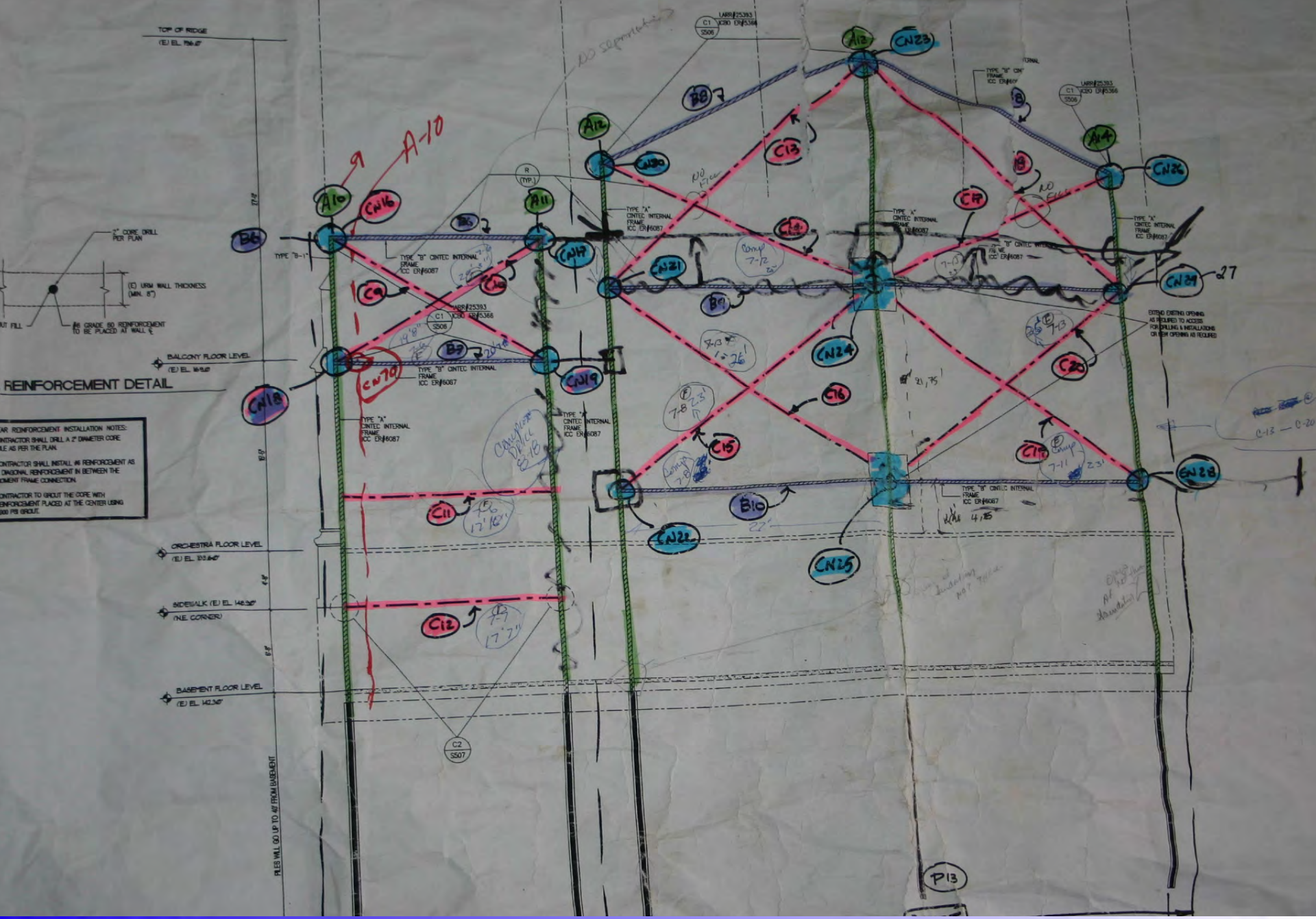
ANCHOR DRILLING

Precision Diamond Core Drilling



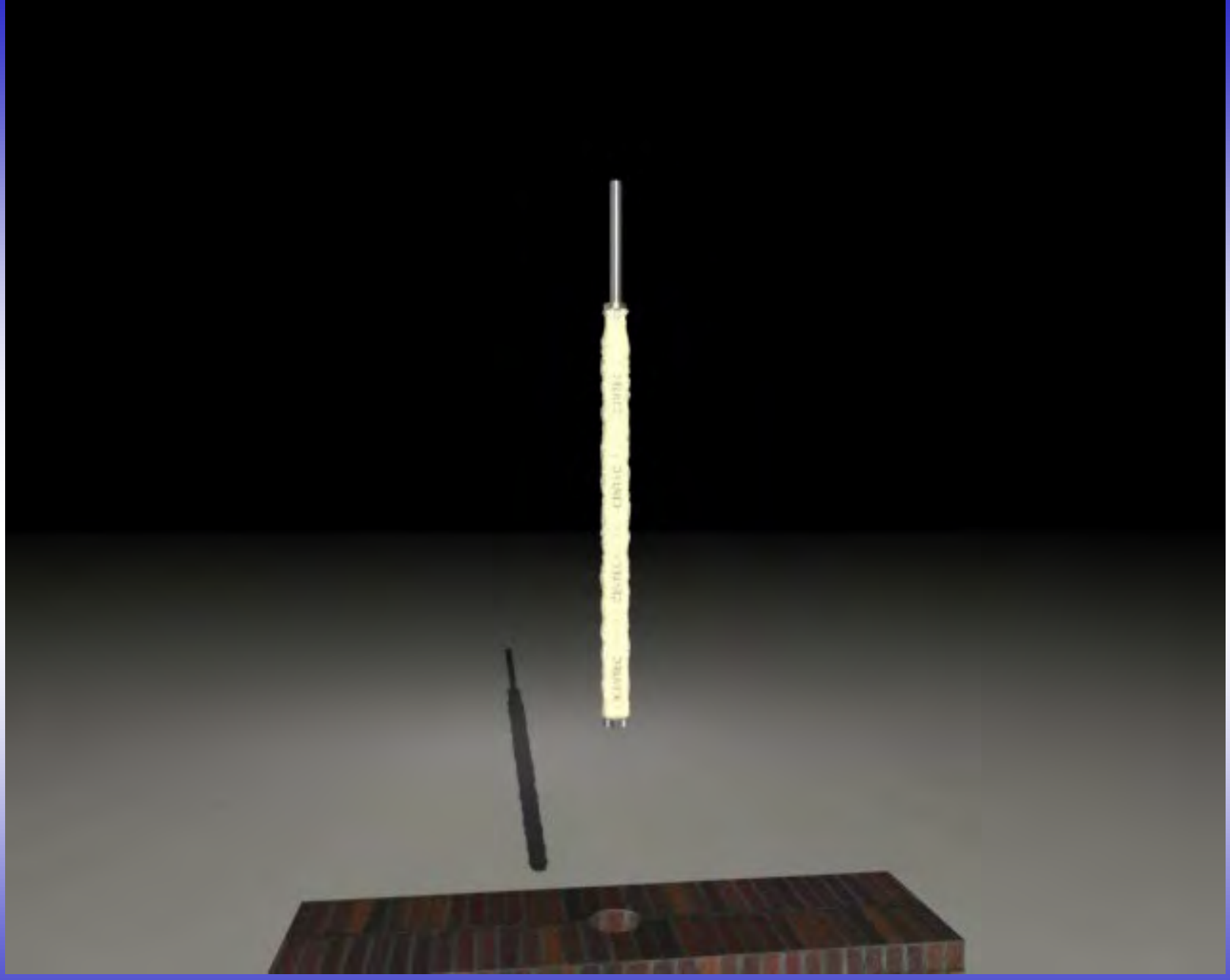
MECO

4”x4”x70ft


REINFORCEMENT DETAIL
TOP OF RIDGE
(E) EL. 196.67'
2" CORE DRILL PER PLAN
(E) URM WALL THICKNESS (MIN. 8")
#6 GRADE 60 REINFORCEMENT TO BE PLACED AT WALL ℄
BALCONY FLOOR LEVEL
(E) EL. 169.58'
ORCHESTRA FLOOR LEVEL
(E) EL. 153.67'
SIDEWALK (E) EL. 146.38'
(NE. CORNER)
BASEMENT FLOOR LEVEL
(E) EL. 142.36'
TYPE "B-1"
TYPE "B" CINTEC INTERNAL FRAME ICC ER#6087
TYPE "A" CINTEC INTERNAL FRAME ICC ER#6087
A10
A11
A12
A14
A-10
CN16
CN17
CN18
CN19
CN20
CN21
CN22
CN23
CN24
CN25
CN26
CN27
CN28
CN30
CN31
B6
B7
B8
B9
B10
C9
C11
C12
C13
C15
C16
C17
C18
C20
P13
C1 S506
C2 S507
EXTEND EXISTING OPENING AS REQUIRED TO ACCESS FOR DRILLING & INSTALLATIONS OR NEW OPENING AS REQUIRED
FILES WILL GO UP TO 40' FROM BASEMENT
CINTEC
DESIGNED ANCHOR SOLUTIONS

Anchor Inserted in guide sleeve

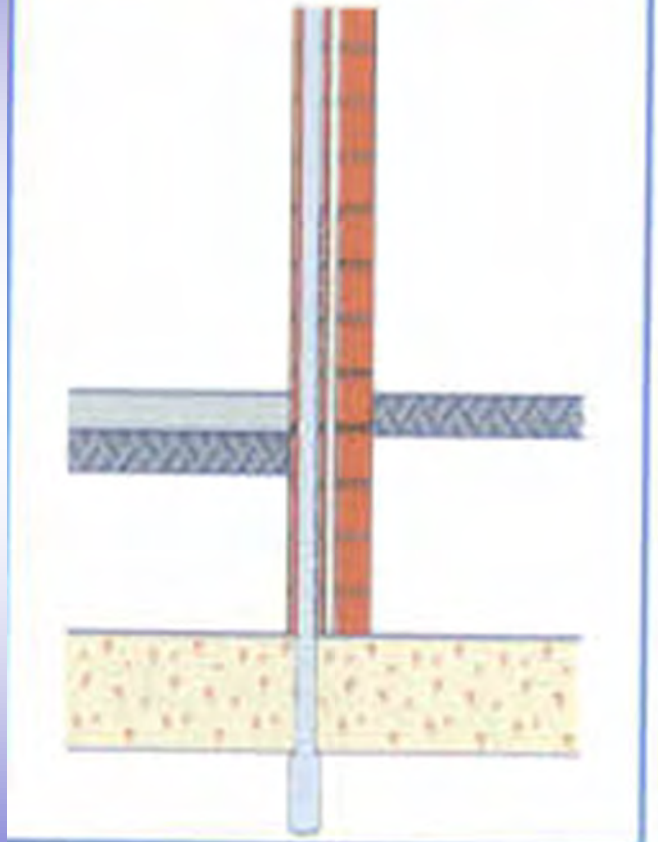
High Volume Pump Unit



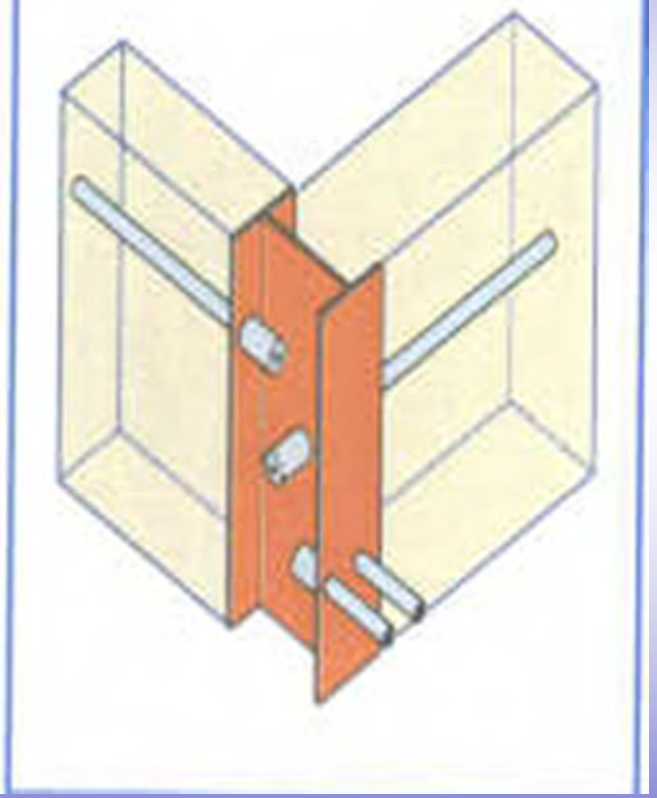
ROLL
ROLL

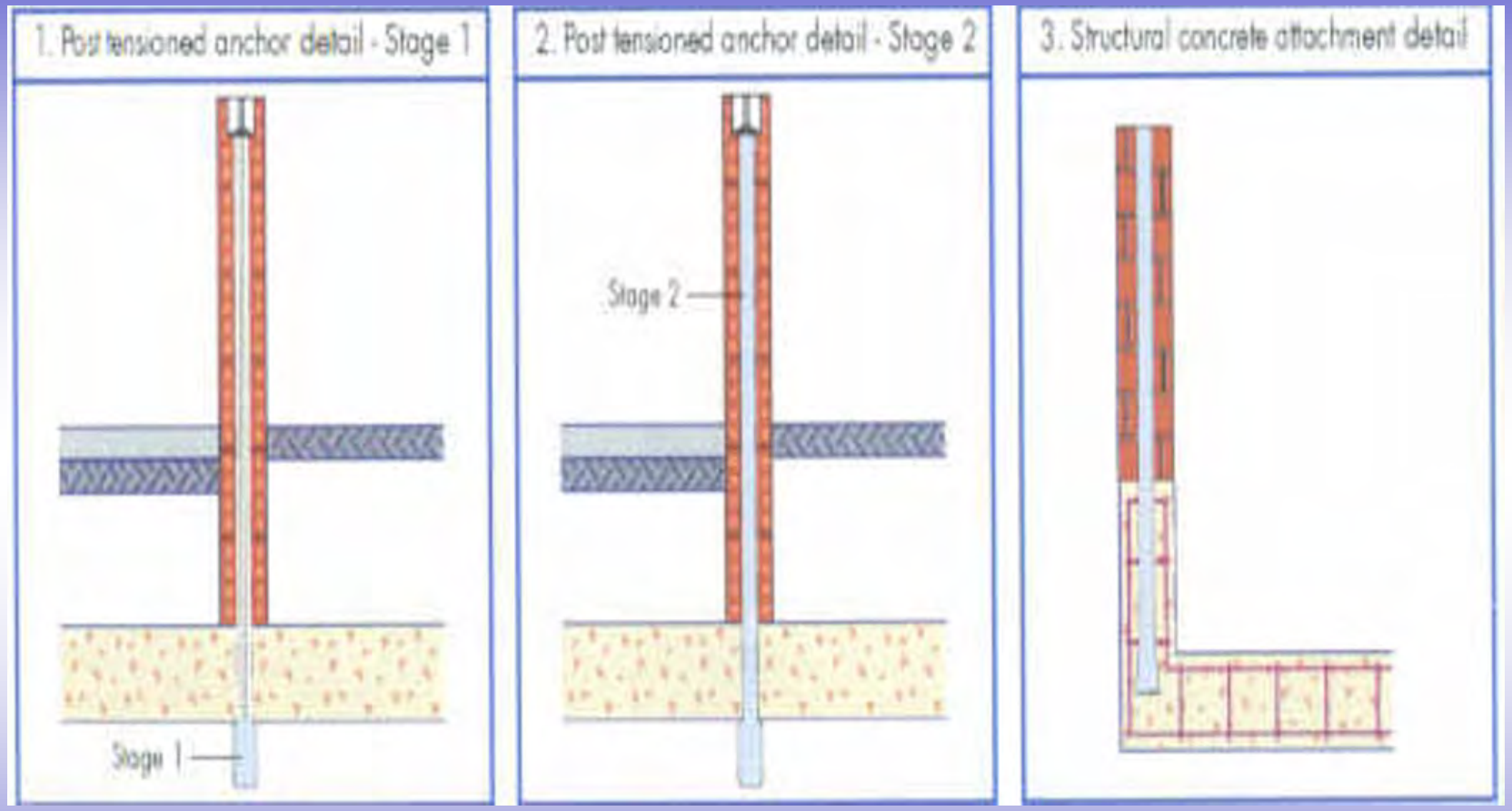
African American Unity Center Los Angeles, CA

6. Foundation anchorage detail

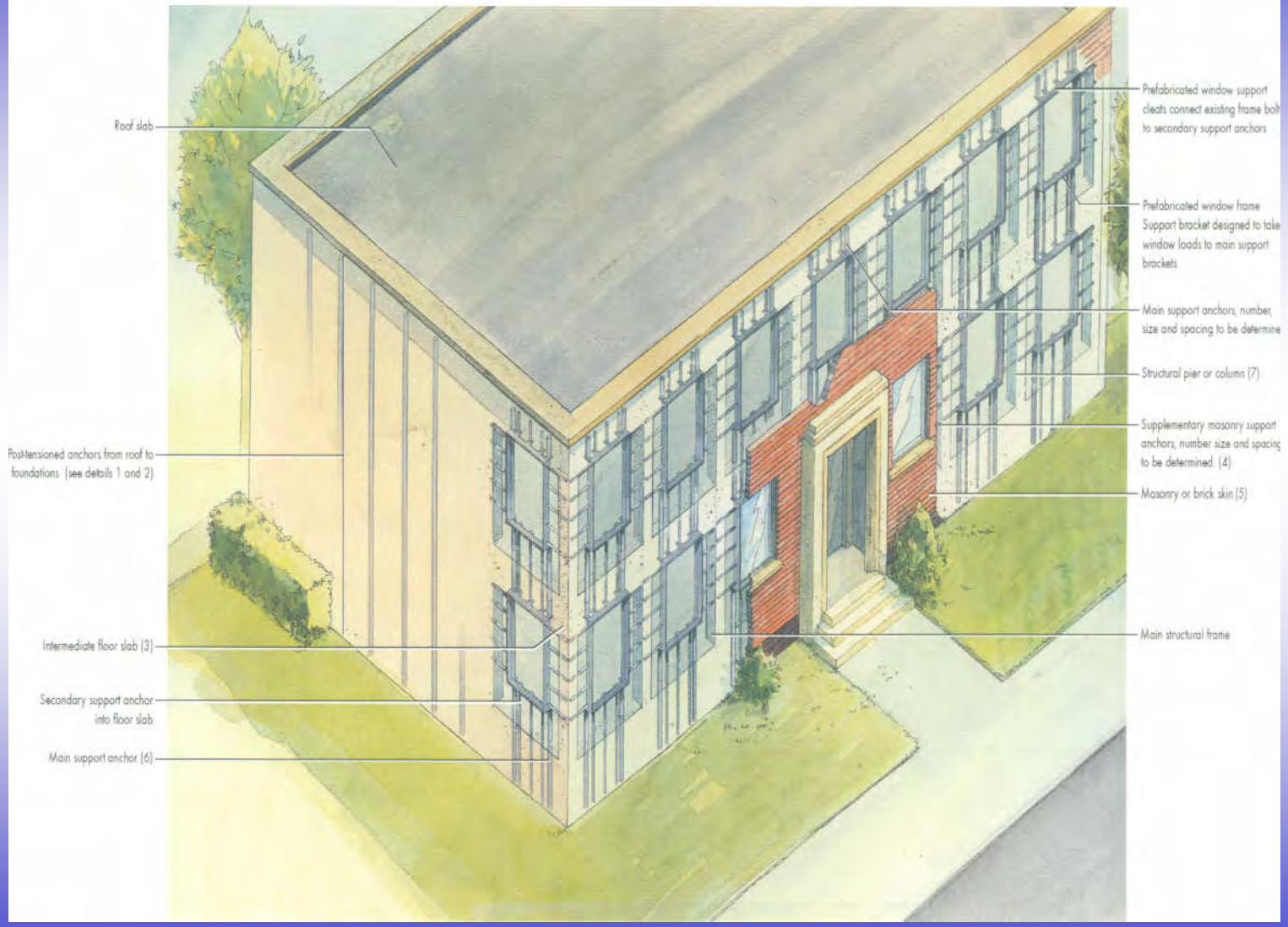


7. Structural steel attachment detail

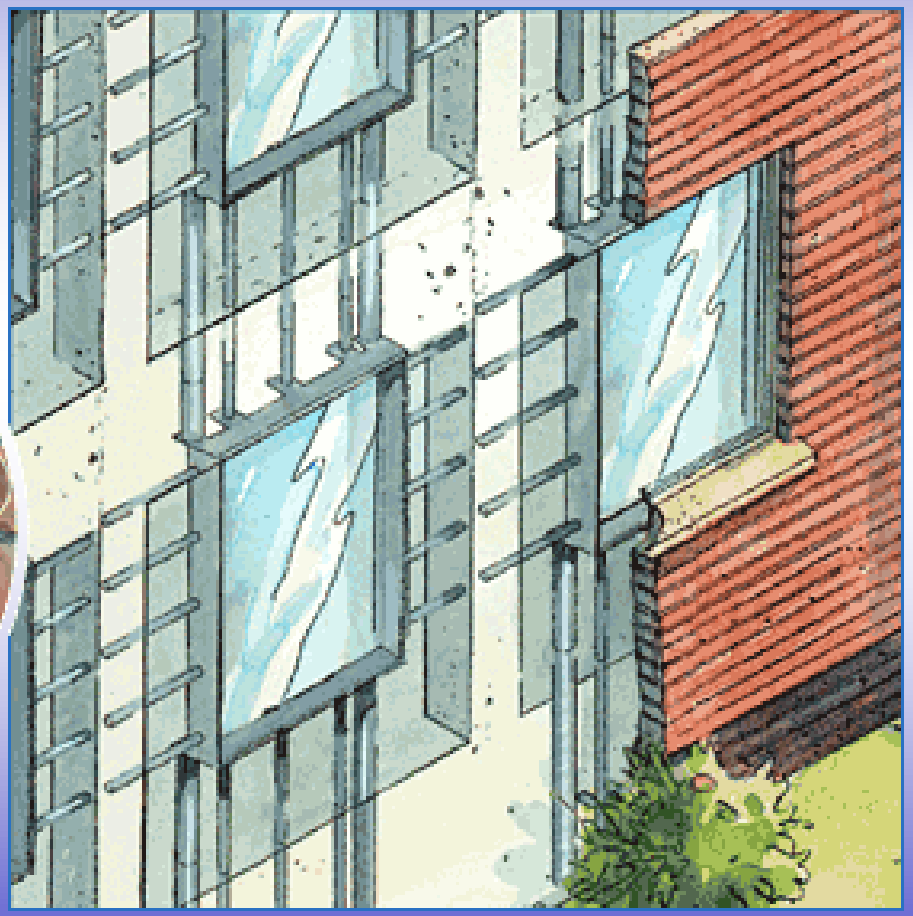



1. Post tensioned anchor detail - Stage 1
Stage 1
2. Post tensioned anchor detail - Stage 2
Stage 2
3. Structural concrete attachment detail

Design of CINTEC Retrofit Systems and Products



Post-tensioned retrofitted masonry support anchors increase vertical stress in wall



Retrofitted Masonry

- Reinforced masonry stronger than conventional brickwork
- Blast protection to existing structures
- Installation is simple and cost effective
- Protects the whole façade – combines blast proof windows with reinforced masonry
- Blast loads on windows carried into surrounding walls
- Neither visually nor physically intrusive
- Helps prevent disproportionate collapse

US Government Agencies

USACOE	GSA
https://pdc.usace.army.mil	www.gsa.gov Search Blast protection

Our Services

Take advantage of some of the services the PDC offers:

Planning
Project scoping and criteria development using risk and threat analysis

Engineering Surveys
Protective system recommendations, structural damage surveys and force protection assessments at fixed facilities and forward deployed sites

Design Services
Review, consultation or preparation of facility drawings and specifications

Construction Support
On-site inspections and review of contract specifications and contractor submittals

Publications
Writing, editing, updating and revising protective design manuals and other publications, reports and regulations

Training
Short courses that provide the tools to protect people and other critical assets against a wide range of threats - *for design professionals, master planners, force protection officers and security professionals*

Points of Contact

For more information, contact the Protective Design Center or visit
http://pdc.nwo.usace.army.mil

U.S. Army Corps of Engineers
Protective Design Center
12565 West Center Road
Omaha, Nebraska 68144-3869
Dan Sommer; 402-221-3151

Hardened Structures Design
Patrick Lindsey; 402-221-3177
Bruce Walton; 402-221-4923

Weapons Effects and Explosives Safety
Tim Knight; 402-221-3176

Chemical, Biological, and Radiological Protection
Rich Heiden; 402-221-4925

Security Engineering and Other Training
Dan Kurmel; 402-221-3073
Katherine Barnett; 402-221-4919

Security Fencing and Vehicle Barriers
Jim Eaton; 402-221-3153

Threat and Vulnerability Assessments/ Site Surveys
Dan Kurmel; 402-221-3073
Tom Schuberth; 402-221-3062

AT Standards and Coordination with Others
Curt Betts; 402-221-3817

Analysis/Design of Structures
Ed Conrath; 402-221-3152
Dale Nebuda; 402-221-4914

Explosive Safety
Huntsville Engineering and Support Center
Bill Zehrt; 256-895-1829

Center of Expertise

Protective Design Center

Hardened Structures - *The exterior wall of the Pentagon, designed to resist a large vehicle bomb remained standing for 30 minutes after a plane crashed into the structure September 11, 2001.*

Force protection, hardened structures, weapons protection and more.

US Army Corps of Engineers ®
Respected·Responsive·Reliable

CINTEC
DESIGNED ANCHOR SOLUTIONS

Mission

The mission of the Protective Design Center (PDC) is to provide engineering services to protect designated assets against criminal, terrorist and military weapons effects.

Mission Areas

The corps designated the PDC a center of expertise in 1985. The center maintains state-of-the-art technical expertise in protective design and specializes in:

- Physical Security and Antiterrorism
- Conventional Weapons Resistant Design
- Nuclear Weapons Resistant Design
- Chemical and Biological Protection
- Electromagnetic Compatibility
- Explosives Safety
- Support to the Troops

Blower Door Test - *Leakage rate testing for facility collective protection against chemical/biological threats.*

What we do

The PDC uses a proven security engineering approach to develop protective design criteria as well as to devise and implement protective design strategies such as:

- Evaluating research, testing and product development related to protective design.
- Maintaining corps criteria documents and computer programs related to protective design.
- Coordinating with the private sector in areas of protective design.
- Reviewing programming documents for protective design applications.
- Providing protective design technical support to the corps.
- Providing security engineering/ force protection technical support.
- Providing security engineering/ force protection policy support.

For hardened structures, the PDC formulates analytical design methods, develops related computer programs, conducts studies and monitors laboratory research related to weapons effects and facility response.

The center also provides technical support to non-Department of Defense (DoD) agencies and foreign governments when coordinated with, and authorized by, the U.S. Army Corps of Engineers.

Force Protection - *The PDC protects designated assets against criminal, terrorist and military weapons threats.*

Improving capabilities

The knowledgeable and dedicated professional PDC staff is continually developing better security engineering standards. The staff is sensitive to project cost issues and work with research agencies to improve the hardness capabilities of standard construction systems through low-cost hardening solutions.

The corps works within the DoD community to establish research needs, product testing, event analysis and technology transfer. Testing includes small-scale and full-scale testing of structural systems, which is transferred into meaningful design criteria and computer simulation software.

Training others

The PDC offers training at various locations around the world covering:

- Security Engineering
- Minimum Antiterrorism (AT) Construction Standards
- Blast Analysis/Design
- Windows and Doors in Blast Environment

Mobile training teams are available upon request.

- 2003 Facilities Standards (P100) 8.7 Structural Engineering

- **Protection Levels**. The entire building structure or portions of the structure will be assigned a protection level according to the facility-specific risk assessment. Protection levels for ballistics and forced entry are described in *New Construction* in this section. The following are definitions of damage to the structure and exterior wall systems from the bomb threat for each protection level:
- **Low and Medium/Low Level Protection - Major damage.** The facility or protected space will sustain a high level of damage without progressive collapse. Casualties will occur and assets will be damaged. Building components, including structural members, will require replacement, or the building may be completely unrepairable, requiring demolition and replacement**.**
- **Medium Level Protection - Moderate damage, repairable.** The facility or protected space will sustain a significant degree of damage, but the structure should be reusable. Some casualties may occur and assets may be damaged. Building elements other than major structural members may require replacement.
- **Higher Level Protection - Minor damage, repairable**. The facility or protected space may globally sustain minor damage with some local significant damage possible. Occupants may incur some injury, and assets may receive minor damage.

Stanshiels Abbey

Labour Party Conference – Blackpool 2002

The Bomb Bin can be placed over suspect explosive device

The air is then replaced by water to create a heavy and stable blast protection