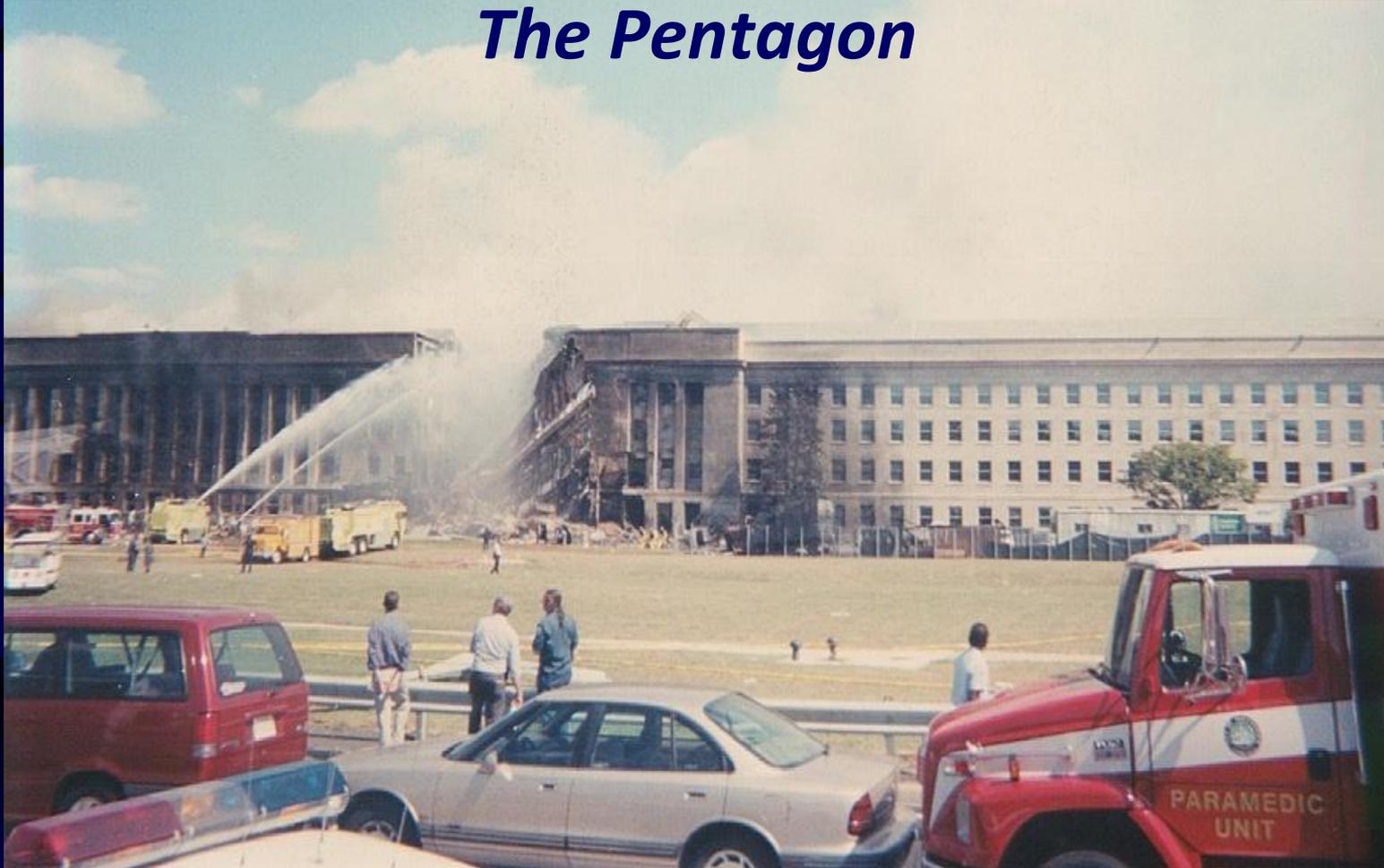




# September 11, 2001



## *The Pentagon*



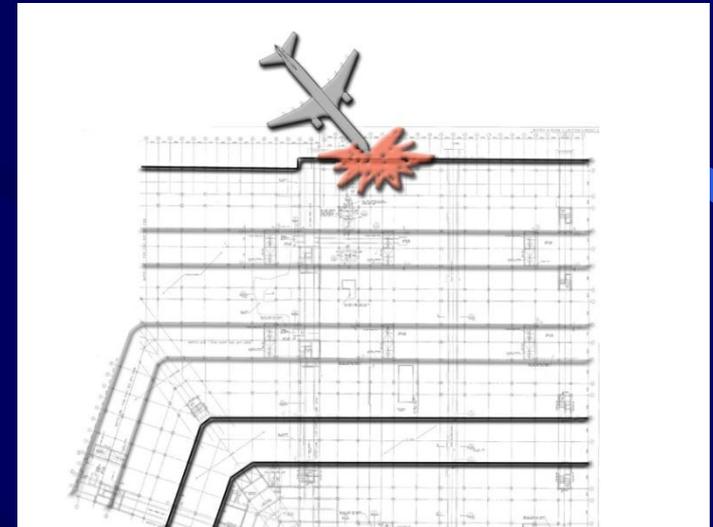
Presented by Leo J. Titus, Jr., P.E.  
October 8, 2011

# OBJECTIVES

**Overview of FEMA US&R  
Response System**



**Review attack and  
general description of damage**



# Discuss US&R mission objectives

- *Reconnaissance*
- *Shoring*
- *Recovery*
- *Monitoring*
- *Demolition*

## Review daily Task Force activities

## Review of Project Phoenix



# FEMA Urban Search and Rescue (US&R) Response System



28 Teams specializing in Urban Search and Rescue in the U.S.

Specialists serve on a team in four major functional elements:

- Search
- Rescue
- Technical
- Medical



# VIRGINIA TASK FORCE ONE (VA-TF1)



- Comprised of civilian and career members
- 70,000+ pounds of tools, equipment and supplies
- Ready for world-wide deployment within 6 hours
- Self-sufficient for 72 hours domestic and 10 days international

**TASK FORCE LDR**  
 RED : TAMMILLOW  
 BLUE : BRINKLEY

**OPERATIONS**  
 RED : ROUSSILLON  
 BLUE : BICKHAM

**MEDICAL UNIT LEADER**  
 RED : ROPPOLO  
 BLUE : HANFLING  
 BLUE : BURKHAMMER

**HAZMAT SPEC.**  
 RED : BRULEY  
 BLUE : IANNELLI

**RED SQUAD 1**  
 OFC WATTS  
 1 DABNEY  
 2 WALMER  
 3 EVANS  
 4 MASON  
 5 REEDY  
 MED MORAVITZ

**RED SQUAD 2**  
 OFC CONRAD  
 1 OBRIEN  
 2 MCGEE  
 3 STRICKLAND  
 4 LUCAS  
 5 WARNER  
 MED MERRITT

**STRUCTURAL SPEC**  
 RED : BEALE / WILLEY  
 BLUE : TITUS

**HEAVY RIGGING**  
 RED : BUNCH, GARY  
 BLUE : SHUGART

**BLUE SQUAD 3**  
 OFC MAYERS  
 1 DAVIS  
 2 TOBALSKE  
 3 MCKINNY  
 4 FEASTER  
 5 LEATHERMAN  
 6 WILLIAMS, CHUCK  
 MED WILLIAMS, JEROME

**BLUE SQUAD 4**  
 OFC ZOLDOS  
 1 PLUNKETT  
 2 VACCHIO  
 3 BERNAZANI  
 4 BEST  
 5 BERTOVICH  
 MED SACRA

**SEARCH TEAM MGR**  
 RED : TEAL / DYER  
 BLUE : REGAN

**TECH SEARCH SPEC**  
 RED : GRIFFIN  
 BLUE : MATSOS

**CANINE SPEC**  
 RED : HOLLEYMAN  
 RED : ARWE  
 RED :  
 BLUE : WINN  
 BLUE : KREITLER  
 BLUE :

**SAFETY**  
 RED : TOLSON  
 BLUE : DIAMANTES

**PLANNING**  
 RED : LUECKE  
 BLUE : GALVEZ

**TECH INFO**  
 RED : TORPEY  
 BLUE : ROATCH

**LOGISTICS CHIEF**  
 RED : POTTER  
 BLUE : BOOTH

**LOGISTICS SPEC**  
 RED : MORRISON  
 RED : CHABEL  
 BLUE : ANDERSON  
 BLUE : BASTIN

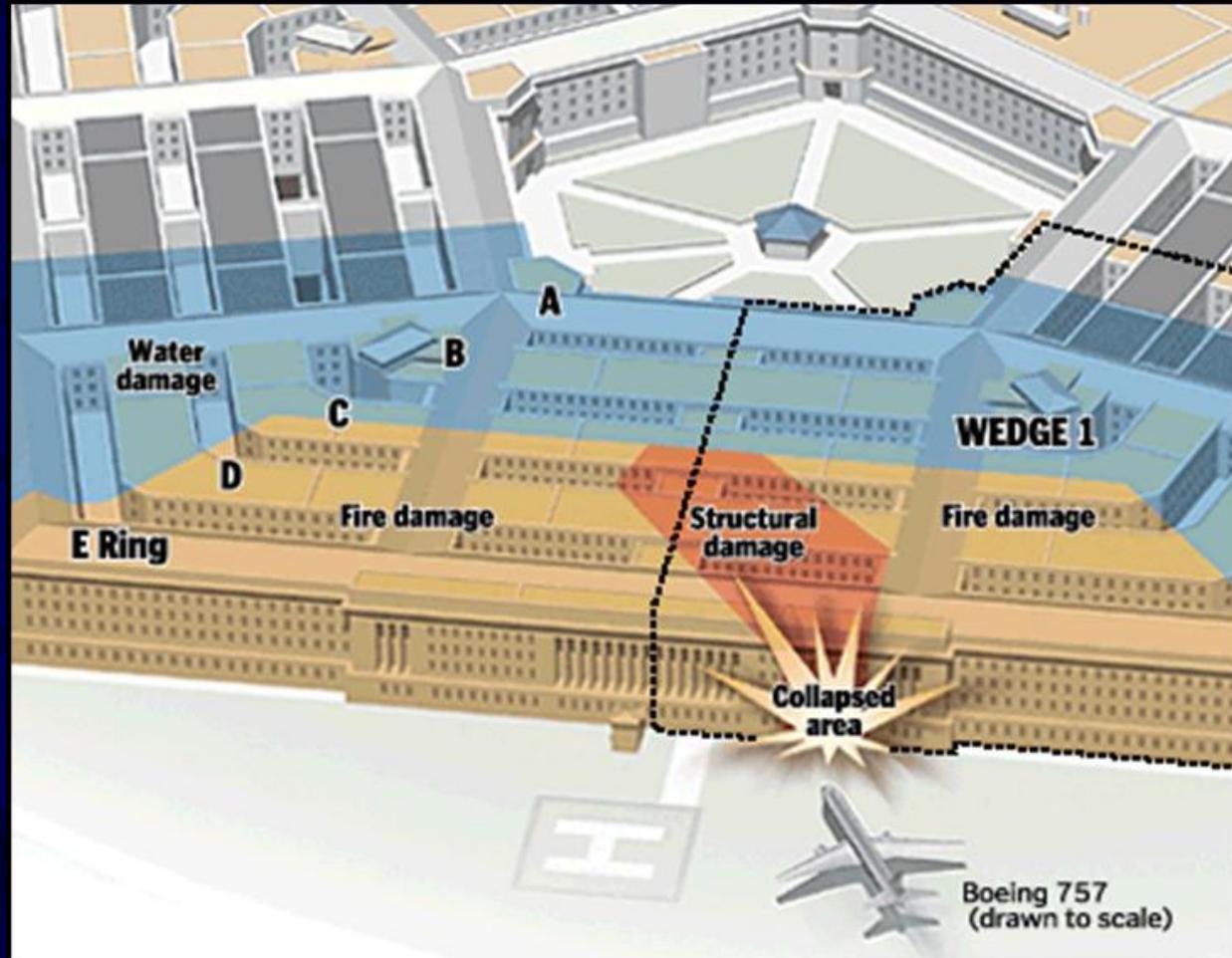
**COMMUNICATIONS**  
 RED : BUNCH, GREG  
 BLUE : SCHMIDT  
 CLOYED

**DRIVERS**  
 TRACTOR : ALLEN  
 SERV 1 : KEELER

**ACTIVATION NAME : PENTAGON INCIDENT**  
 NOTES : (UPDATED 9/13/01 18:40 HRS  
 SLEMP TRANSFERRED TO ARL CO LOGISTICS  
 OTHER PERSONNEL: BARKER, DUBE, DONALDSON, TILLS  
 ALL SHIFTS WORKING 1900-0700

# 9-11... THE ATTACK

- Boeing 757
- 30,000 pounds of fuel
- Recently renovated
- Plane strikes first floor
- Building collapses 19 minutes after impact
- 189 people killed





# FEMA

## SEARCH & RESCUE OPERATIONS

*The Pentagon - September 11th, 2001*

### 4 FEMA Teams on site:

- VA-TF1 (Fairfax Co., VA) 1:00 p.m.
- MD-TF1(Montgomery Co., MD) – 3:00 p.m.
- VA-TF2 (VA Beach) - 8:00 p.m.
- TN-TF1 - Wednesday morning
- Military District of Washington - Army Search & Rescue



# MISSION #1: RECON



## RECON Objectives:

- Search for potential live victims
- Evaluate rescue hazards
- Evaluate Structural Damage



- Significant internal damage on all floors.
- Fire, smoke, heat, debris, water: all obstacles for recon team.
- Floors too hot for canine teams.















# Overview of Structural Damage



# Front view at 1pm, 9/11



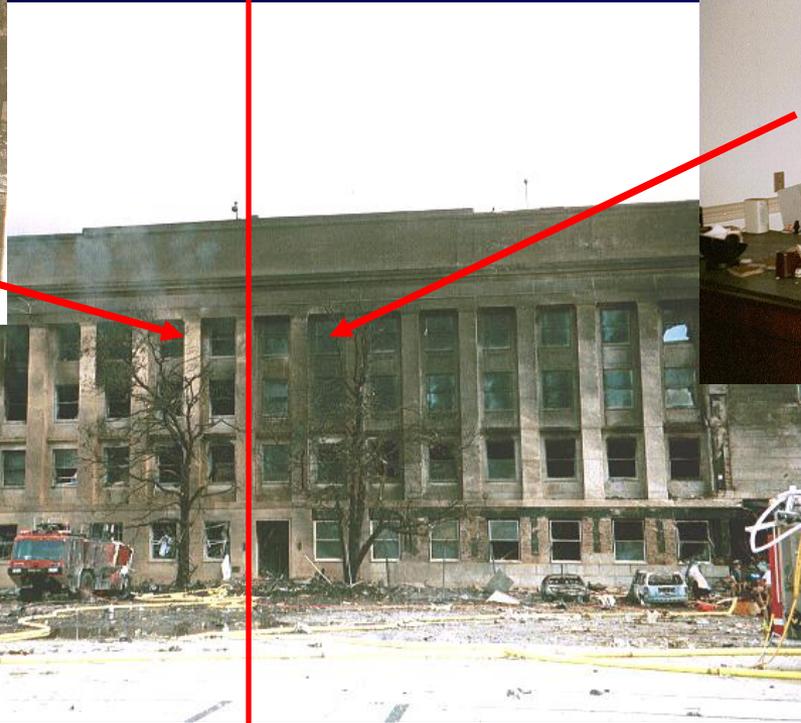
Corridor 5

Wedge 2

Wedge 1

Corridor 4

# Blast Design Benefits



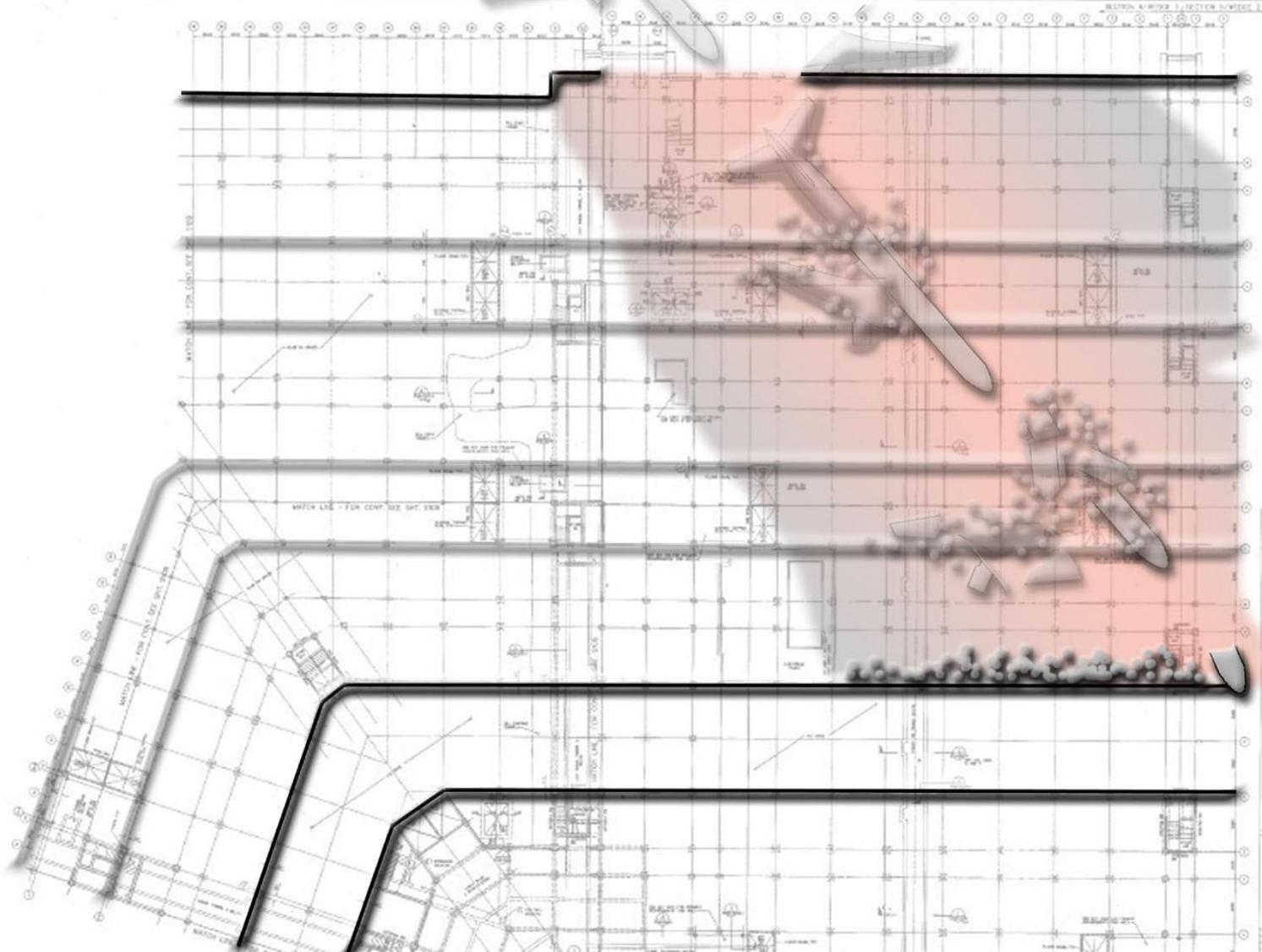
Not Renovated  
Wedge 2

Blast Renovated  
Wedge 1

← Impact  
site



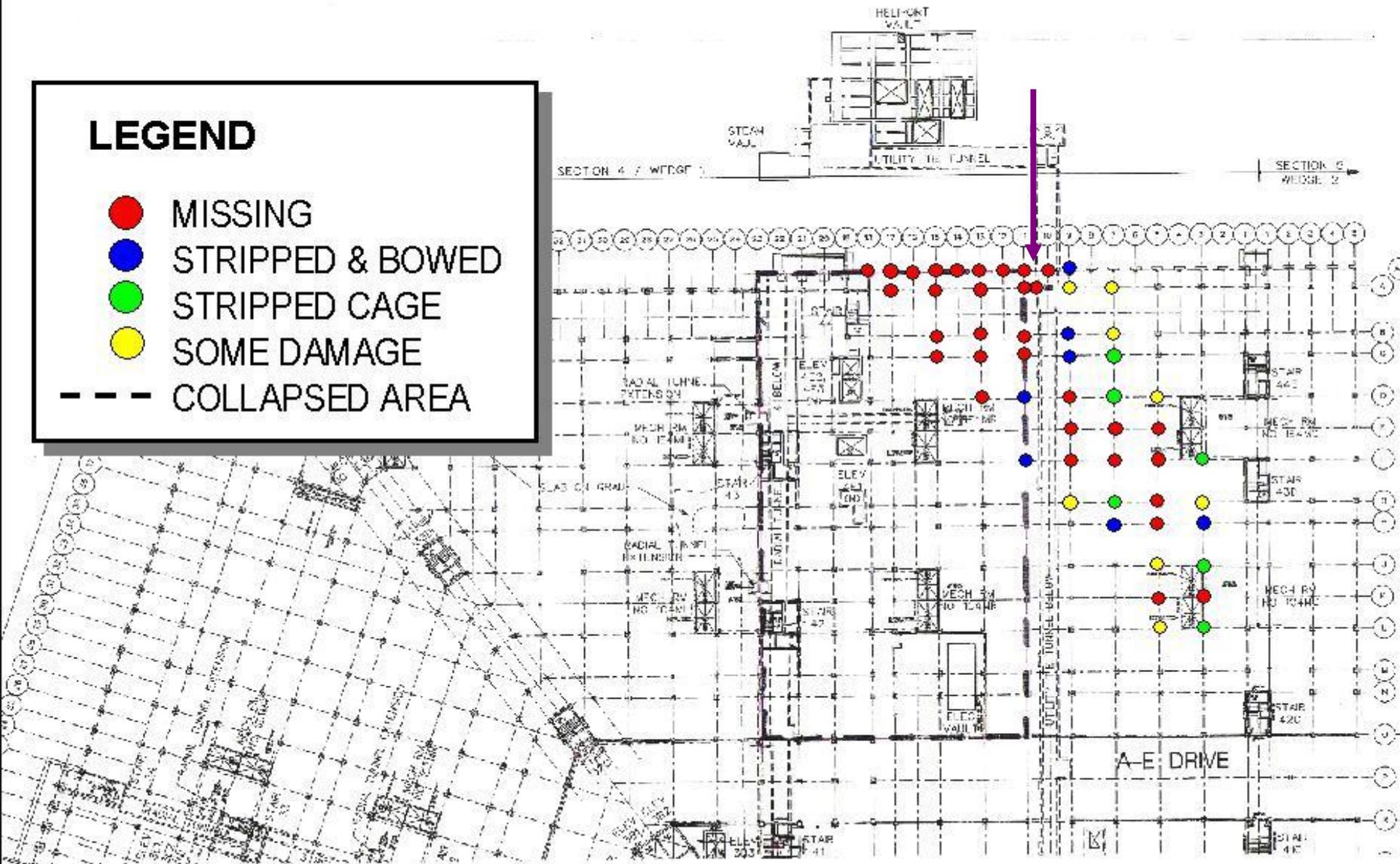
SECTION SURFACE 1 - SECTION SURFACE 2



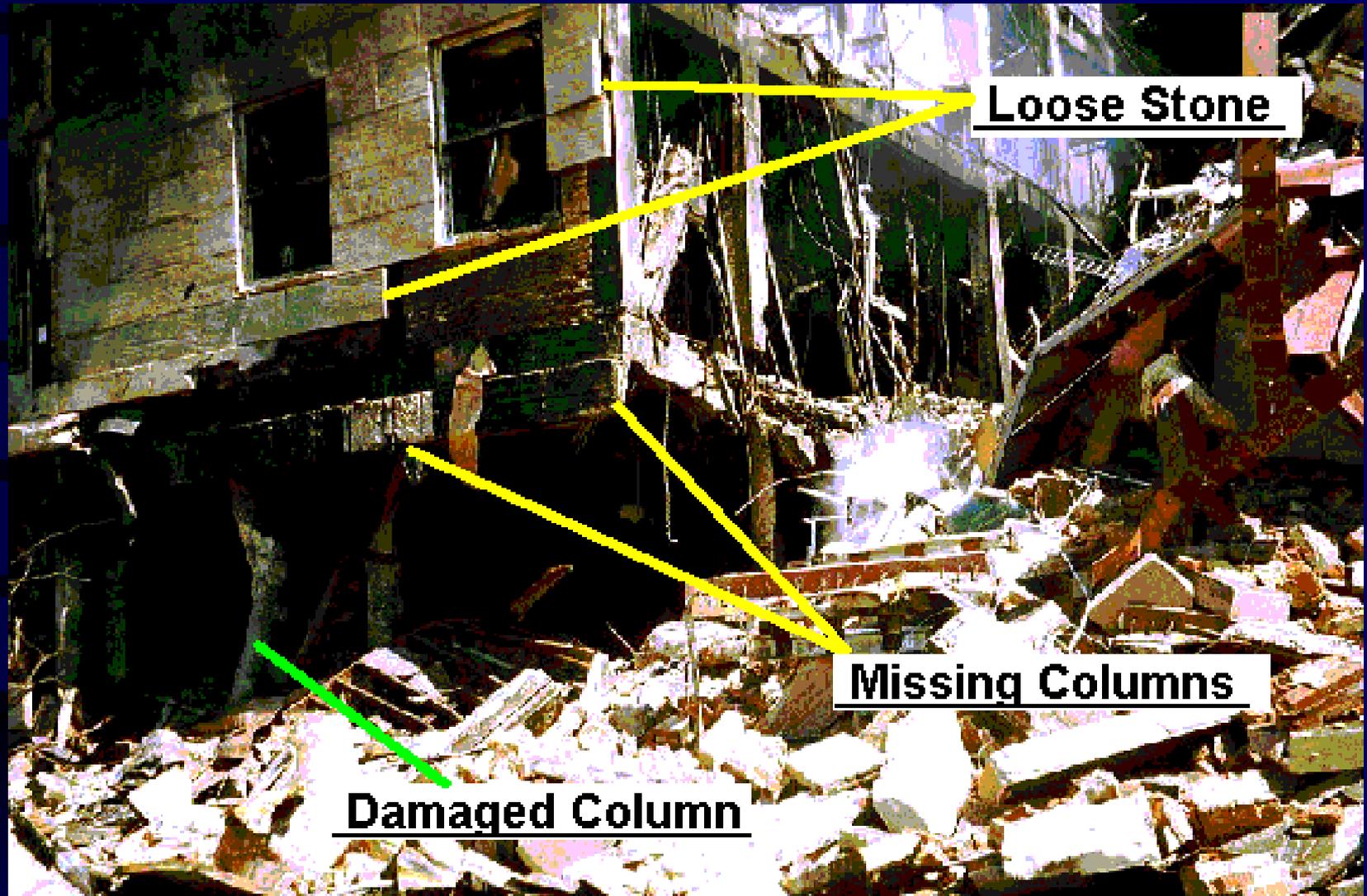
# STRUCTURAL INTEGRITY

## LEGEND

- MISSING
- STRIPPED & BOWED
- STRIPPED CAGE
- SOME DAMAGE
- - - COLLAPSED AREA







Corner of building left of collapse

# MISSION #2: SHORING



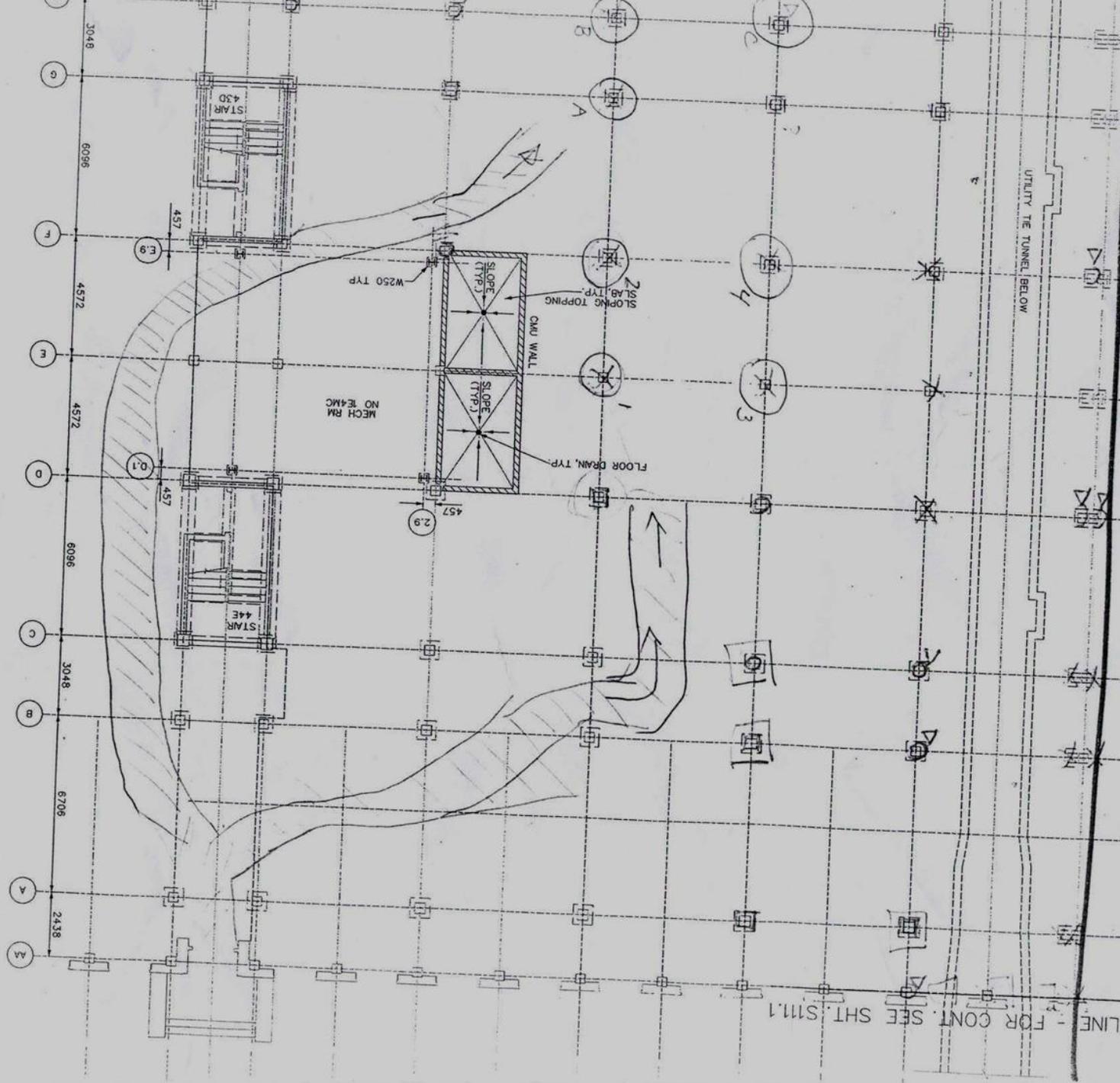
# Logistical Issues Before Shoring Could Begin

- Debris & Hazards
- Lumber
- Victims & Evidence
- Lighting



- VERIFY AND CORRECT BEFORE PROCEEDING WITH CONSTRUCTION. IF DISCREPANCIES ARE FOUND, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING NECESSARY APPROVALS FROM THE ARCHITECT AND ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING NECESSARY APPROVALS FROM THE ARCHITECT AND ENGINEER.
1. PREPARE SHOP DRAWINGS FOR ALL STRUCTURAL STEEL MEMBERS AND CONNECTIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING NECESSARY APPROVALS FROM THE ARCHITECT AND ENGINEER.
  2. REF. EL. = 11798(U.S.G.S.) AND IS TO BE USED FOR ALL ELEVATIONS UNLESS OTHERWISE NOTED.
  3. 1/2" CONC. SLAB ON GRADE EL. = 11798.
  4. NEW SLAB ON GRADE AT ALL AREAS OF DEFORMATION.
  5. THICK, NORMAL WEIGHT CONCRETE SLAB PLATE WITH VAPOR BARRIER OVER 1 1/2" THICK LA. WATER BARRIER ON COMPACTED APPROVED G. NEW SLAB SHALL MATCH TOP OF SURROUND.
  6. SLAB, W-2, ETC. INDICATES WALL PLATES.
  7. STEEL FRAMING TO EXISTING CONCRETE FR. GIRDER, COLUMN, WALL(S).
  8. FOR OTHER INFO, SEE DEMOLITION PLANS THRU SD111.

X Missing  
 O = Stripped  
 Δ = Stripped  
 □ = Same as



LINE - FOR CONT. SEE SH. S111.



Over 42 Columns Required Shoring on the 1st Floor

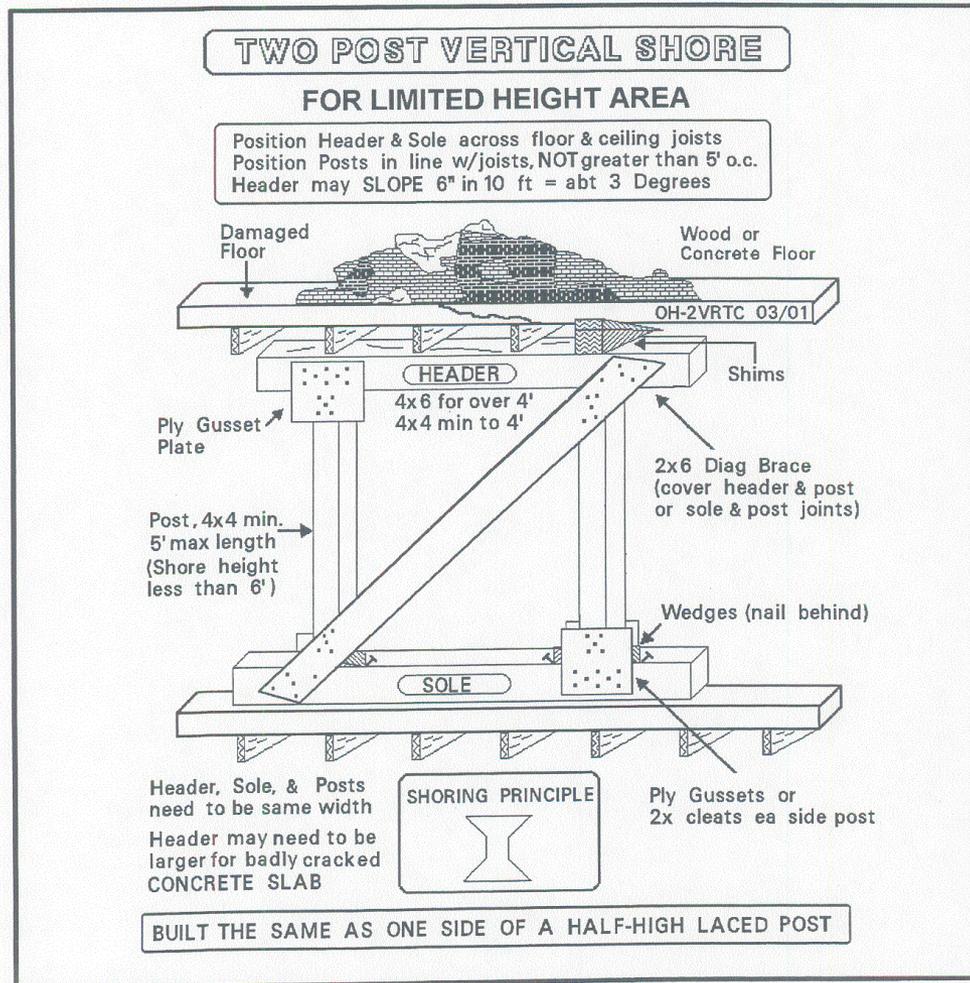
## Three types of shores used:

- Vertical Crib Shores
- Vertical Post Shores
- Raker Shores for lateral support

## SECTION 2.3 US&R SHORING CONSTRUCTION

### TWO POST VERTICAL SHORES

- The Limited Height Area, Two Post Vertical Shore is constructed the same as a Half High, Single Side of a Laced Post Shore
- The Full height Two Post Vertical Shore is constructed the same as the Single Side of a Laced Post Shore





- 3 vertical crib shores used on front corner
- 6"x6" lumber used for cribbing





9 point crib



4 point crib

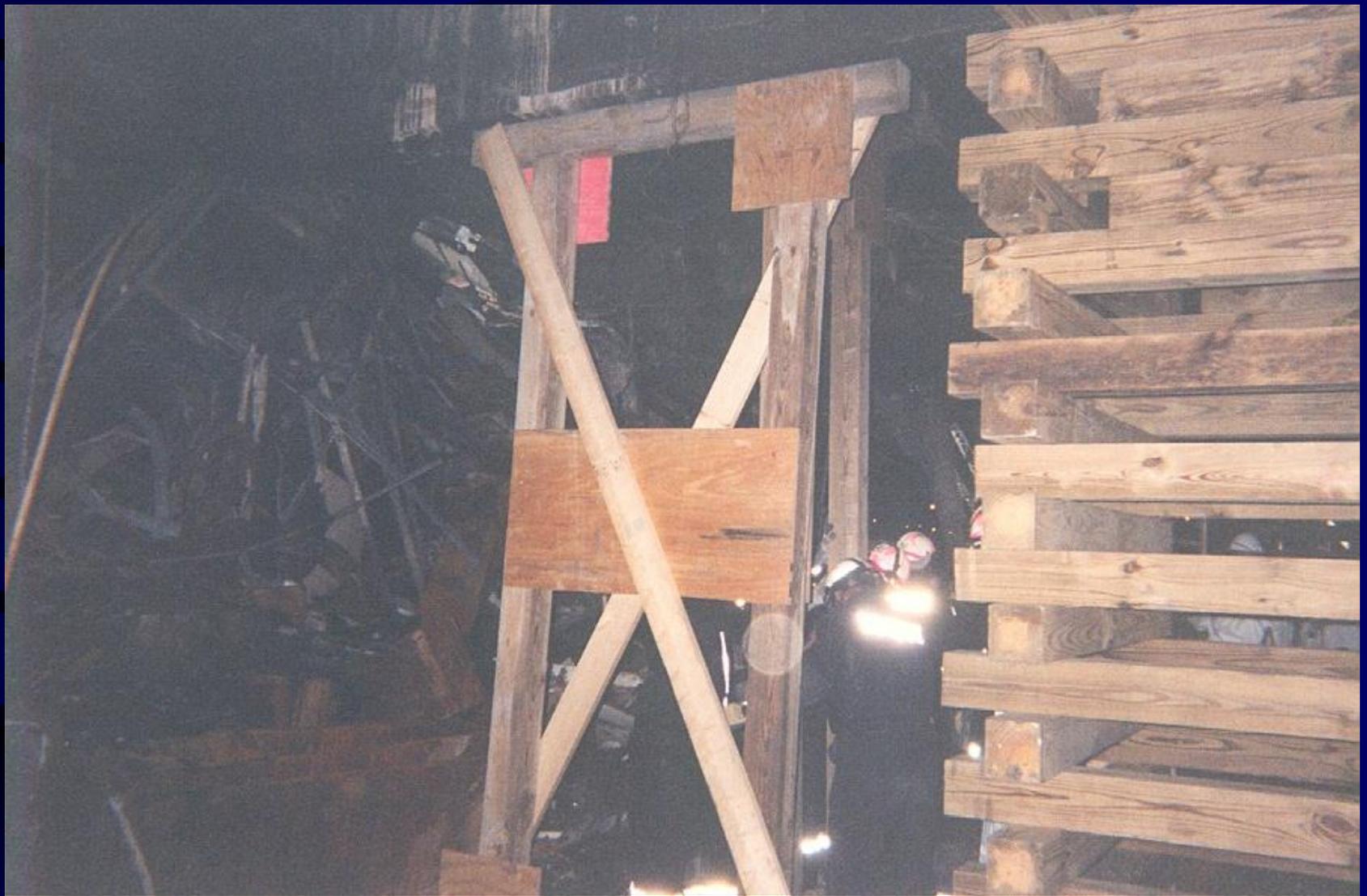


9C

9C

9C





Vertical Shores used to support damaged beams and joists

- Raker Shore constructed for lateral support

- Knocked off “Widowmakers”



# MISSION #3: RECOVERY



## 2nd night: "A&E Drive"

- Plane punched out into alley
- Escorted FBI for body and evidence recovery.







- Canine Teams Search for Victims



# MISSION #4: MONITORING



## Monitoring building movement

2 points monitored all week with transits

- Cantilevered corner
- Hanging concrete parapet



### Equipment Used:

- 3 Transits
- Binoculars
- Air Horn
- Monitoring Log

**Building Stability Monitoring Log**

Page of

Site ID: PENTAGON

Event:

Search Grid:

Team: BLUEDate: 9/11/01Monitoring Station: LEFT SIDE OF COLLAPSEStart time: 22:50

TIME	✓	Notes	TIME	✓	Notes	TIME	✓	Notes
23:00	<input checked="" type="checkbox"/>	No Mov	04:00	<input checked="" type="checkbox"/>	N/C	:00	<input type="checkbox"/>	
23:15	<input checked="" type="checkbox"/>	No Mov	04:15	<input checked="" type="checkbox"/>	N/C	:15	<input type="checkbox"/>	
23:30	<input checked="" type="checkbox"/>	N/C	04:30	<input checked="" type="checkbox"/>	N/C	:30	<input type="checkbox"/>	
⊗ 23:45	<input checked="" type="checkbox"/>	<del>N/C</del> SHORING BEGAN	04:45	<input checked="" type="checkbox"/>	N/C	:45	<input type="checkbox"/>	
00:00	<input checked="" type="checkbox"/>	N/C	05:00	<input checked="" type="checkbox"/>	N/C	:00	<input type="checkbox"/>	
00:15	<input checked="" type="checkbox"/>	N/C	05:15	<input checked="" type="checkbox"/>	N/C	:15	<input type="checkbox"/>	
00:30	<input checked="" type="checkbox"/>	N/C	05:30	<input checked="" type="checkbox"/>	N/C	:30	<input type="checkbox"/>	
00:45	<input checked="" type="checkbox"/>	N/C	05:45	<input checked="" type="checkbox"/>	<del>N/C</del> FINISHED SHORING	:45	<input type="checkbox"/>	
⊗ 01:00	<input checked="" type="checkbox"/>	<del>N/C</del> SHIMMING 1ST CRIB (LEFT)	:00	<input type="checkbox"/>		:00	<input type="checkbox"/>	
01:15	<input checked="" type="checkbox"/>	N/C	:15	<input type="checkbox"/>		:15	<input type="checkbox"/>	
01:30	<input checked="" type="checkbox"/>	N/C	:30	<input type="checkbox"/>		:30	<input type="checkbox"/>	
01:45	<input checked="" type="checkbox"/>	N/C	:45	<input type="checkbox"/>		:45	<input type="checkbox"/>	
02:00	<input checked="" type="checkbox"/>	N/C	:00	<input type="checkbox"/>		:00	<input type="checkbox"/>	
02:15	<input checked="" type="checkbox"/>	N/C	:15	<input type="checkbox"/>		:15	<input type="checkbox"/>	
02:30	<input checked="" type="checkbox"/>	N/C	:30	<input type="checkbox"/>		:30	<input type="checkbox"/>	
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03:30	<input checked="" type="checkbox"/>	N/C	:30	<input type="checkbox"/>		:30	<input type="checkbox"/>	
03:45	<input checked="" type="checkbox"/>	N/C	:45	<input type="checkbox"/>		:45	<input type="checkbox"/>	

CHECK BOX IF NO CHANGE

Field logs were kept to keep records of any building movement.

# Man Basket Operations

- Watching for victims
- Monitoring building movement
- 2 hour shifts



Arlington, VA, September 17, 2001 -- FEMA Urban Search and Rescue workers inspect the Pentagon crash site from a crane.

Photo by Jocelyn Augustino/ **FEMA News Photo**

# 3rd Night FIRE!







# MISSION #5: DEMOLITION



## 4th Day - Demolition Begins

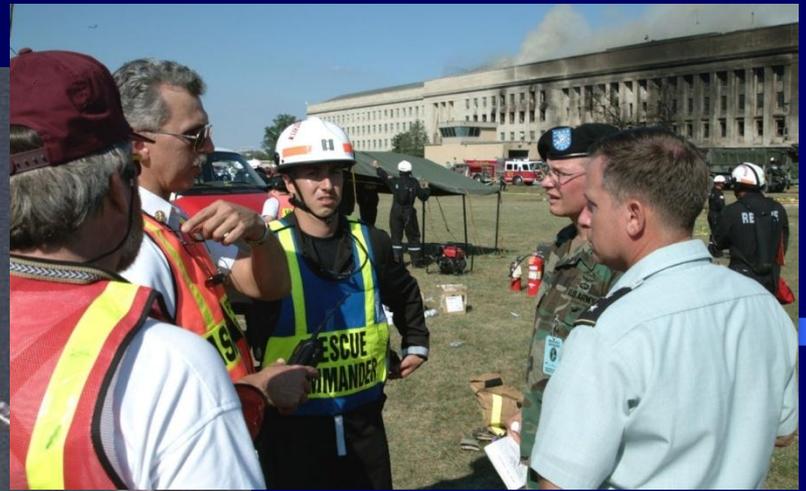


“Pulverizer” used to break up concrete safely.



# OPERATIONS





- VATF-1 & VATF-2: Night Shift 6:00 p.m. to 6:00 a.m.
- MDTF-1 & TNTF-1: Day Shift



## FEMA - IST (Incident Support Team)

Daily transitional meetings 6:30 a.m., 6:30 p.m.



# Other Agencies On Site Involved With Search & Rescue:

- Arlington County Fire Department



- Fairfax County Fire Dept



- US Army



- FBI



- NTSB



- ATF





## Personal Protective Equipment (PPE)

- Flash Gear
- Helmet
- Respirator
- Tyvex
- Boots/Gloves
- Eye Protection



“Decon”

# VATF-1 BOO

(Base Of Operations)









Arriving at  
Anacostia base  
for rehab...

... Sleeping  
quarters in a  
classroom



# FANTASTIC SUPPORT !!

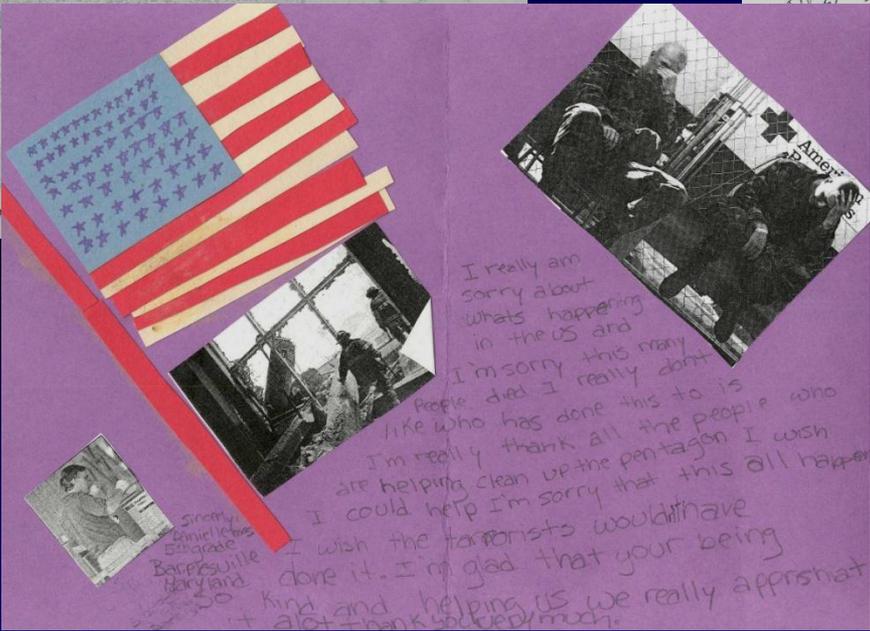
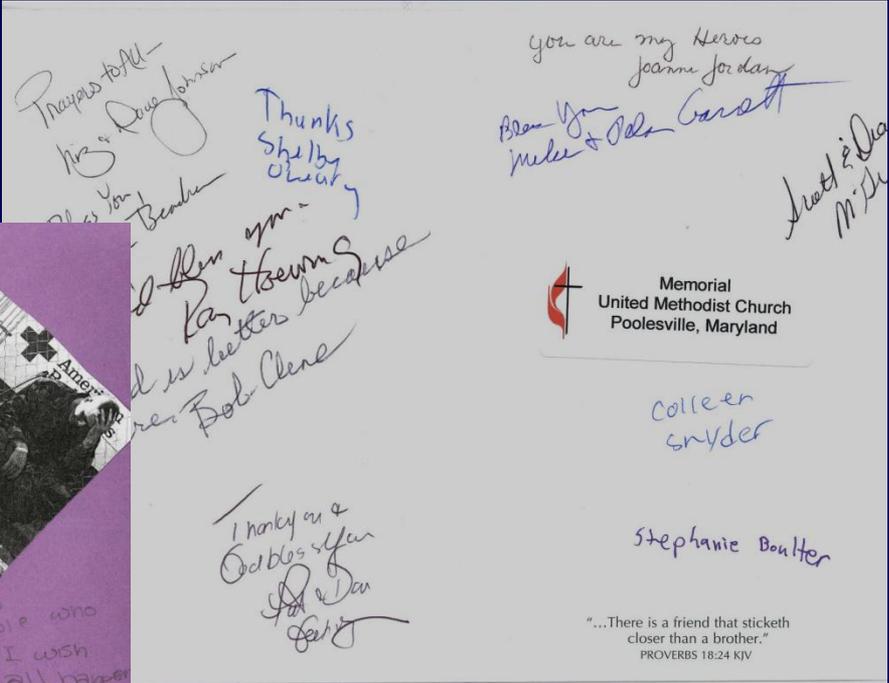
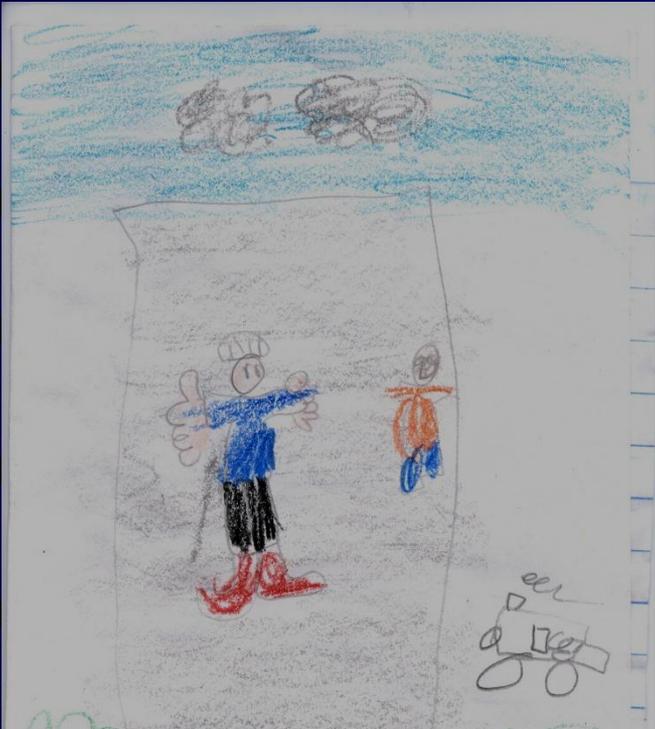
- American Red Cross
- Salvation Army
- Local Contractors & Businesses



- Food
- Clothing
- Services
- Letters/Cards/Flowers



# Support came from children and adults all across the country.





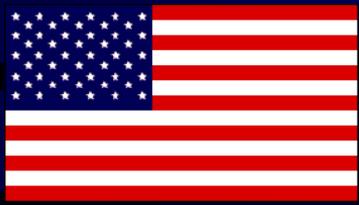
## Special Visitors

- President Bush
- VP Cheney
- Governor Gilmore
- Sec. Defense Rumsfeld
- Congressmen



# VA-TF1 Goodbye - Sept. 18th 2001





# HOMECOMING





- Team and families addressed by several dignitaries.
- Pictures, lunch and HOME!



Cakes full of fun/D1

# FAIRFAX THE Journal

The daily newspaper of Fairfax, Virginia

Vol. 63, No. 219

Wednesday, September 16, 2001

25 cents

## One week later, taking next steps

### Search and recovery scaled back

By CERRIL HOLLY  
Assistant Press

One week after a Boeing 767 jumbo jet slammed into the Pentagon, officials scaled back the search and recovery effort.

An Air Force search team's last mission for the plane's wreckage ended Tuesday.

About 100 civilian search workers head of home to nearby Fairfax County and Montgomery County, Md., as operations on the ground faded from chaotic to routine.

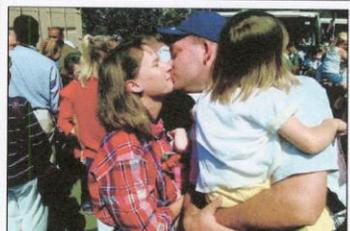
"The area that collapsed is a probably going to be a very rocky thing under there," said Lt. Mark D. Stone of the Fairfax County Police.

The team was sent to search for the plane's wreckage after the crash on Sept. 11.

The team was sent to search for the plane's wreckage after the crash on Sept. 11.

### INSIDE

The latest bit of news from the search and recovery effort at the Pentagon.



Leo Titus is reunited with his wife, Jennifer, and his daughters, Allison and Laura, after spending a week at the Pentagon searching for survivors of the Sept. 11 terrorist attack.

## Staggered airport reopening considered

By SAM HANANEL  
Journal Staff Writer

Delays in Virginia's airports, led by Reagan National, will be staggered over the next week, according to the Federal Aviation Administration.

The FAA said it will allow airports to begin reopening on Sept. 17, but that some airports may not be able to do so until Sept. 18 or 19.

The FAA said it will allow airports to begin reopening on Sept. 17, but that some airports may not be able to do so until Sept. 18 or 19.

## Rescuers return to families

### No survivors found after a week at Pentagon

By CHRISTINE C. IWAN  
Journal Staff Writer

Rescuers who spent a week at the Pentagon searching for survivors of the Sept. 11 terrorist attack returned to their families Tuesday.

The rescue workers, who were sent to the Pentagon to search for survivors, returned to their homes and families after a week of intense work.

The rescue workers, who were sent to the Pentagon to search for survivors, returned to their homes and families after a week of intense work.



Fairfax County Fire and Rescue members are greeted with support Tuesday.

Please see PENTAGON, A7

## Garden provides escape

### Refuge salutes emergency crews

By JASON FORNEY  
Journal Staff Writer

The Williams Walker Clinic is now home to a new garden that provides a peaceful escape for emergency responders.

The garden, located on the clinic's grounds, is a beautiful oasis of flowers and greenery.

The garden, located on the clinic's grounds, is a beautiful oasis of flowers and greenery.



Member Meyer takes time to enjoy the newly installed healing garden and labjects Tuesday in Arlington.

## Woodley Hills Ele to receive nation: Program on character spurs

By ANDREW BLANKLEY  
Journal Staff Writer

Four young men, leaders at Woodley Hills Elementary School in the Mount Vernon Square of Fairfax County, were named as recipients of the National Character Award.

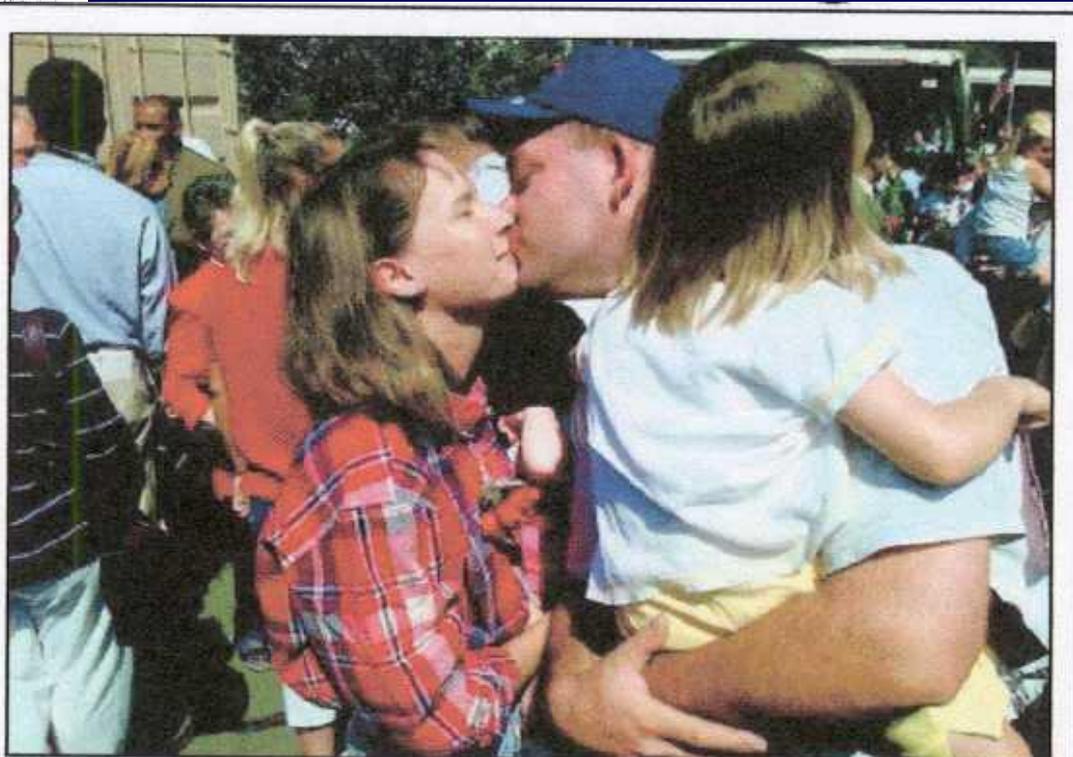
The award is given to students who demonstrate exceptional character and leadership.

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The labjects, established on a building site where the building was destroyed, will be used to honor the memory of the victims of the Sept. 11 terrorist attack.

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Please see GARDEN, A7



Photographs by Jeff Menke/Journal

Leo Titus is reunited with his wife, Jennifer, and his daughters, Allison and Laura, after spending a week at the Pentagon searching for survivors of the Sept. 11 terrorist attack.

**TOMORROW:** Showers possible, highs near 60, lows in the mid-50s.

News	D4	Class Ad	D4	Opinion	A2
Business	C8	Food	D1	Police Beat	A3
Chesapeake	D8	Home	D1	Sports	B1
Classified	C1	Letters	A8	State	C8
Community	A3	Letters	A8	Trends	D3
Continued	D4	Movie	D4	TV Listings	D4

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**THE PHOENIX PROJECT**

**"LET'S ROLL"**



## Sampling Concrete



## Helical Anchor Piles



Stabilize

Analyze

Demolish

Rebuild



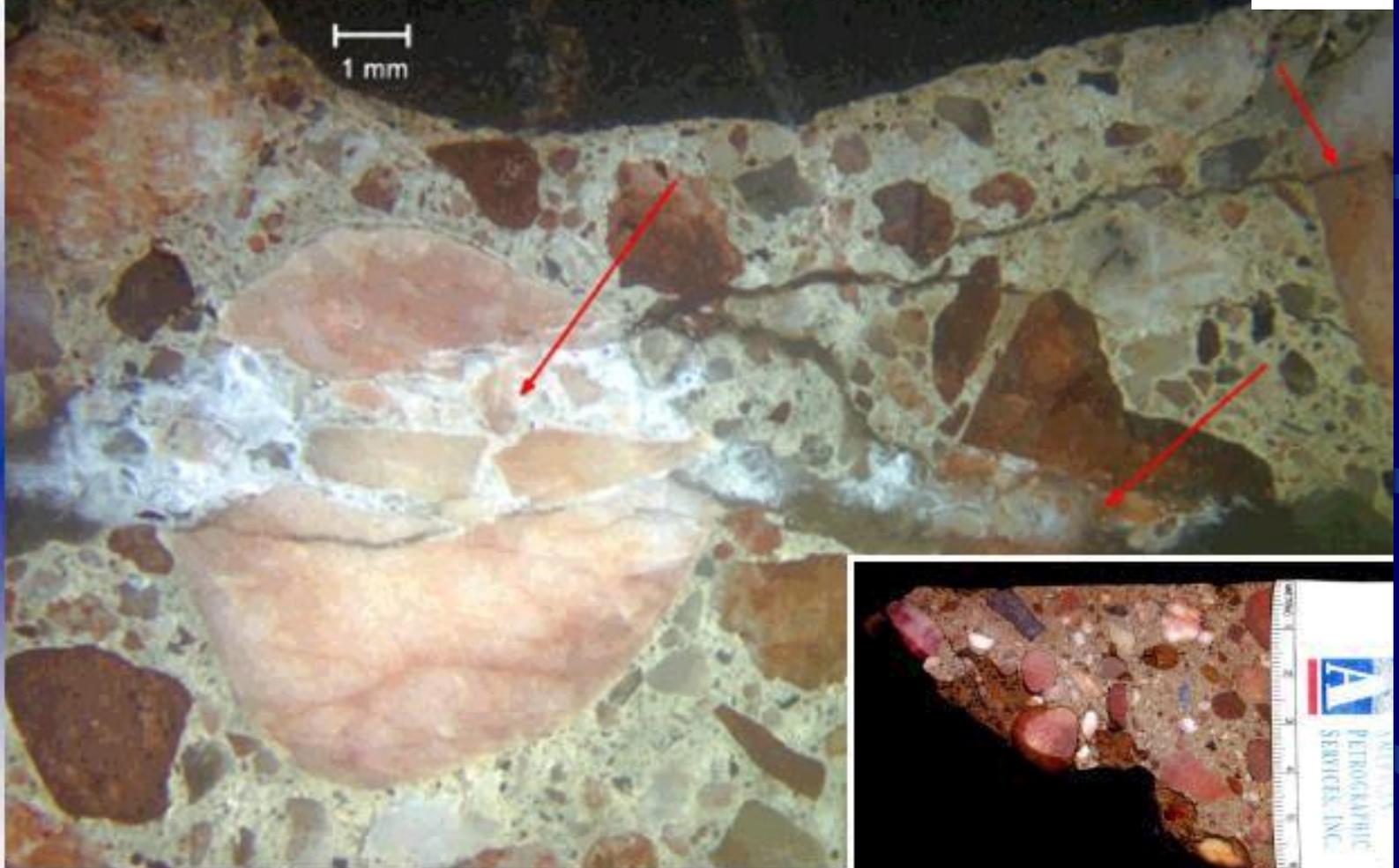
## Pile Load Test in Collapse Area







1 mm



Stabilize  
Analyze  
Demolish  
Rebuild

**Saw-cut cross section of concrete from the support columns showed numerous micro-fractures.**



*September 11th, 2001...*





Photo date: 11/27/01

Stabilize  
Analyze  
Demolish  
Rebuild

**Demolition completed Nov 19, 2001.  
Four weeks ahead of most aggressive schedule.**







KEEP  
OFF  
MEDIAN

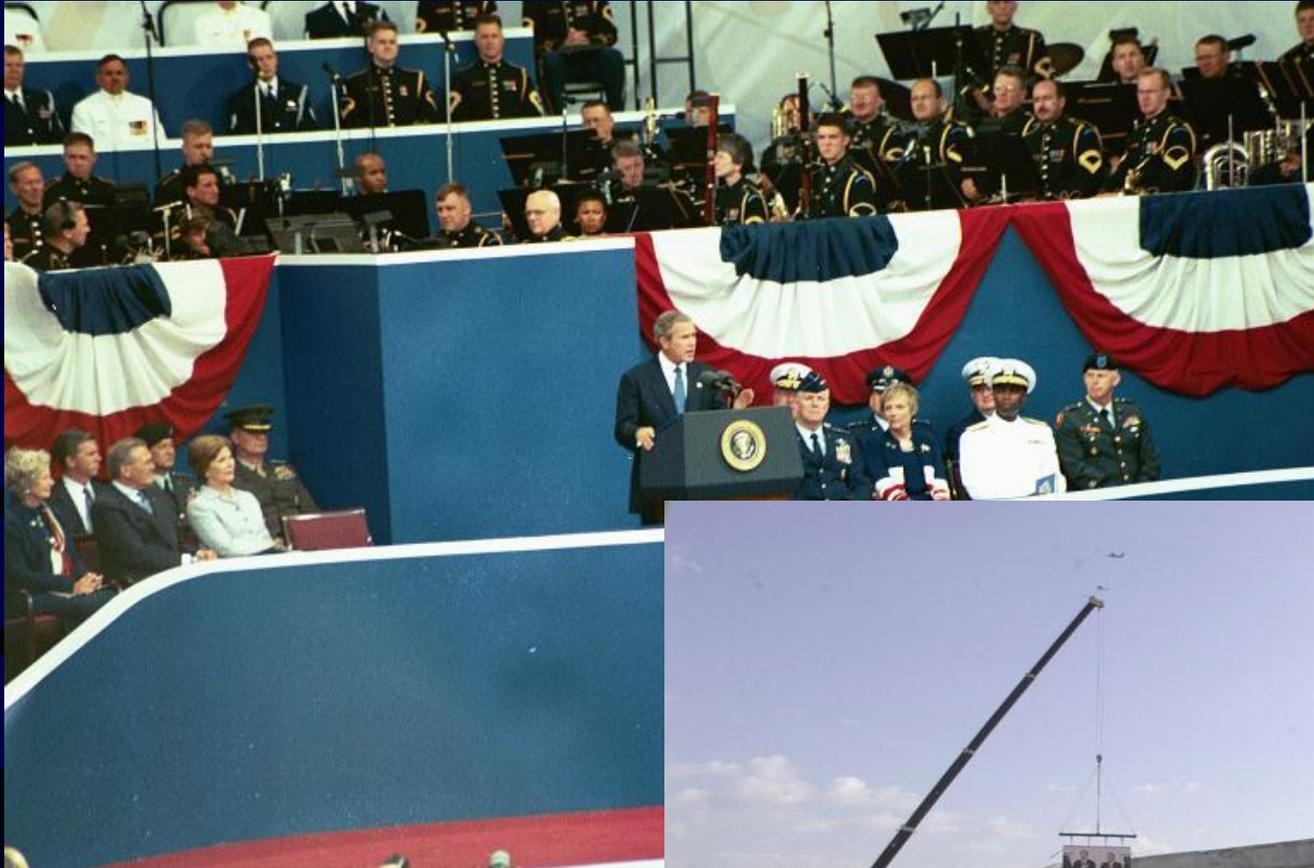


# Topped Out April 5th, 2002!





# September 11, 2002







<http://www.firefightthebook.com>

