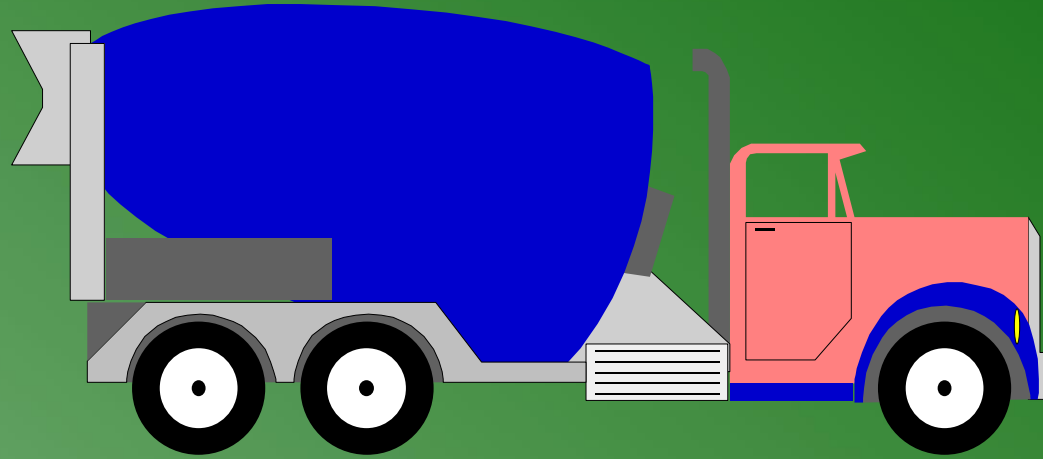


# Subpart Q



## Concrete & Masonry Construction

# Subpart Q - Concrete & Masonry Construction (1926.700 - 706)

## Reinforcing steel - Guarding

701(b)



292

## Masonry walls - Bracing

706(b)



23

## Masonry construction - Limited access zone

706(a)(1)



17



# Concrete and Masonry

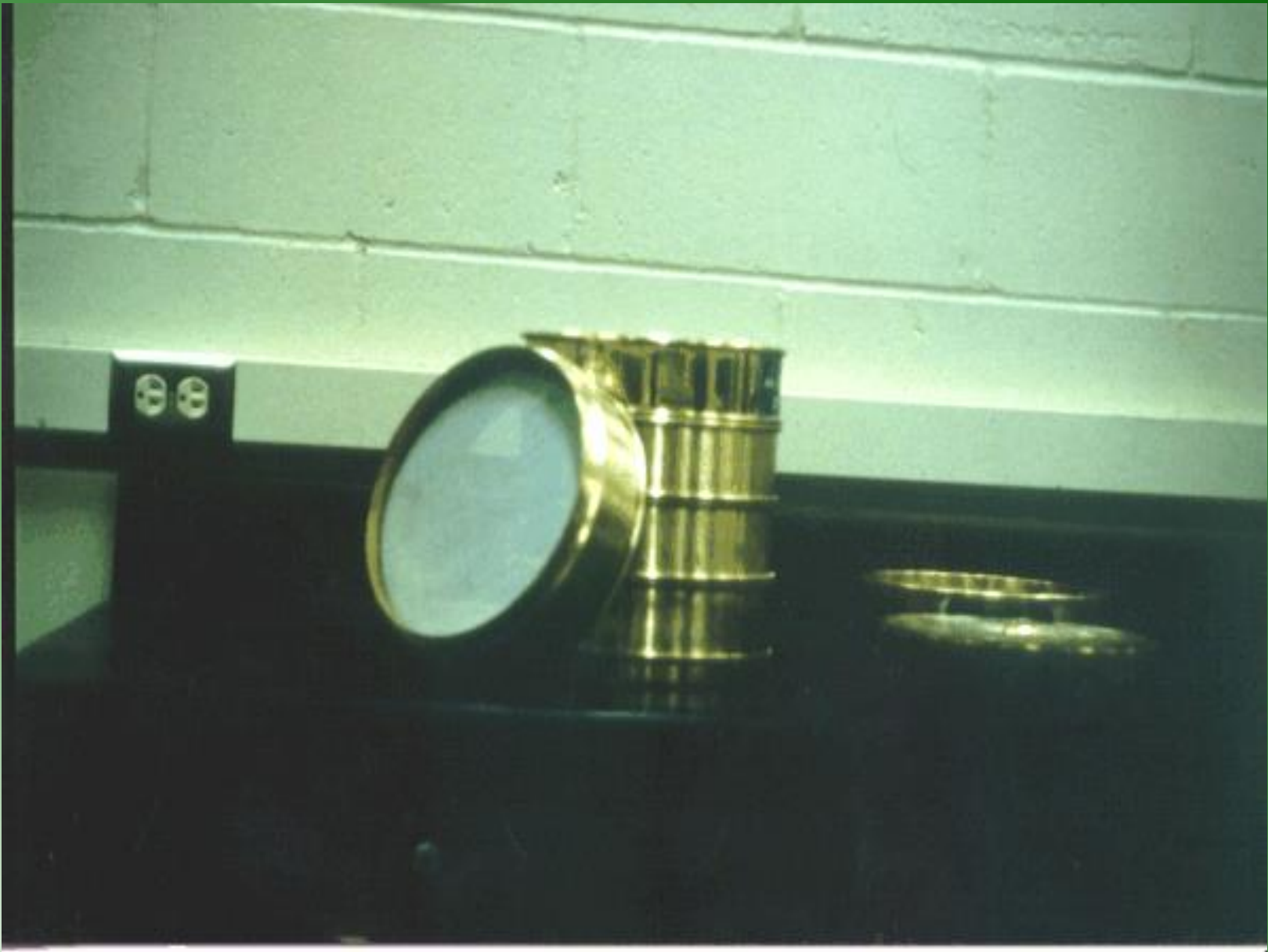
- Revisions to standard during the 1990's
- Standard expands/toughens protection against wall collapse
  - Revised bracing requirements
  - Requires limited access zones





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Revisions include additional methods for testing concrete





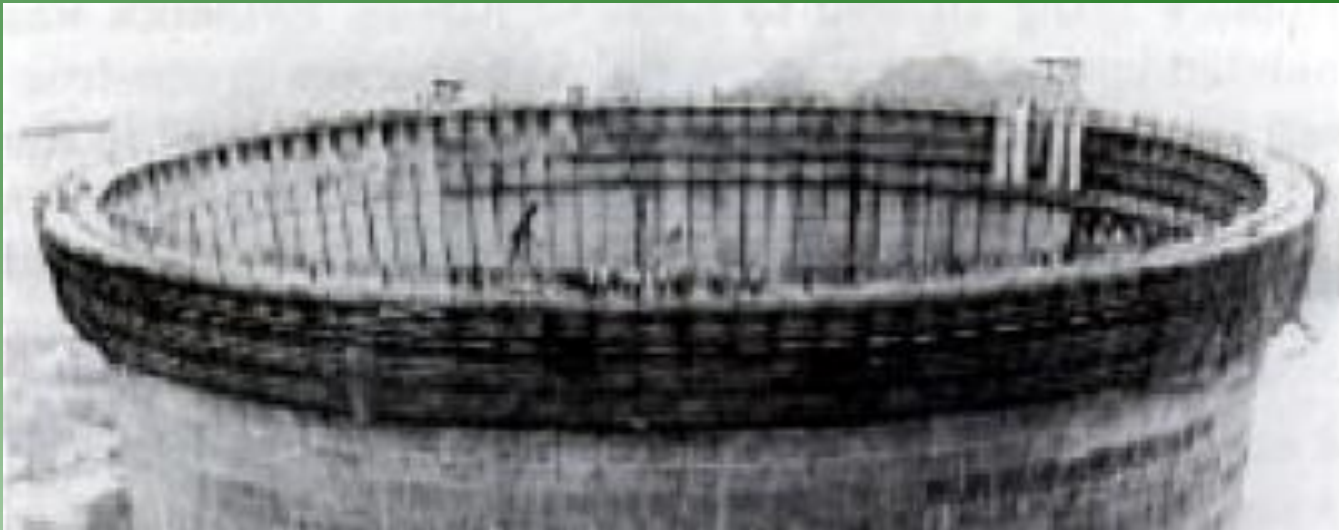




# Cooling Tower

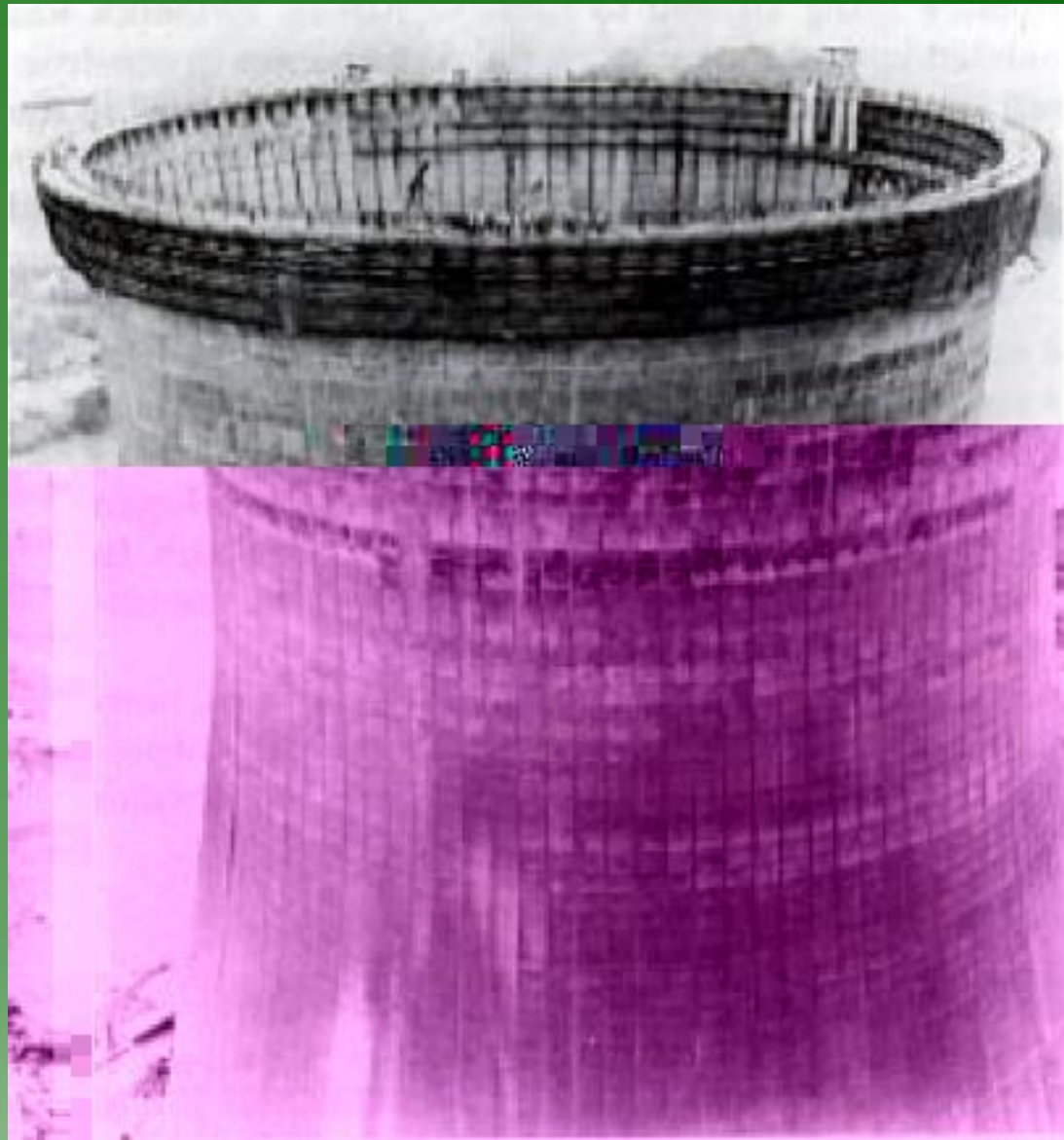
## St. Mary's West Virginia 1978

- 51 killed
- 170 feet above ground
- Entire form peeled away from newly placed concrete





**What the St. Mary's  
West Virginia  
tower would have  
looked like if it had  
been completed.**





Jump forms atop the St. Mary's structure tore loose, pulling work platforms and concrete down inside the tower.

Wreckage 168 feet below the top of the St. Mary's tower being picked apart by investigators looking for clues. The state of West Virginia objected to the site being cleaned before it could make its own full investigation.





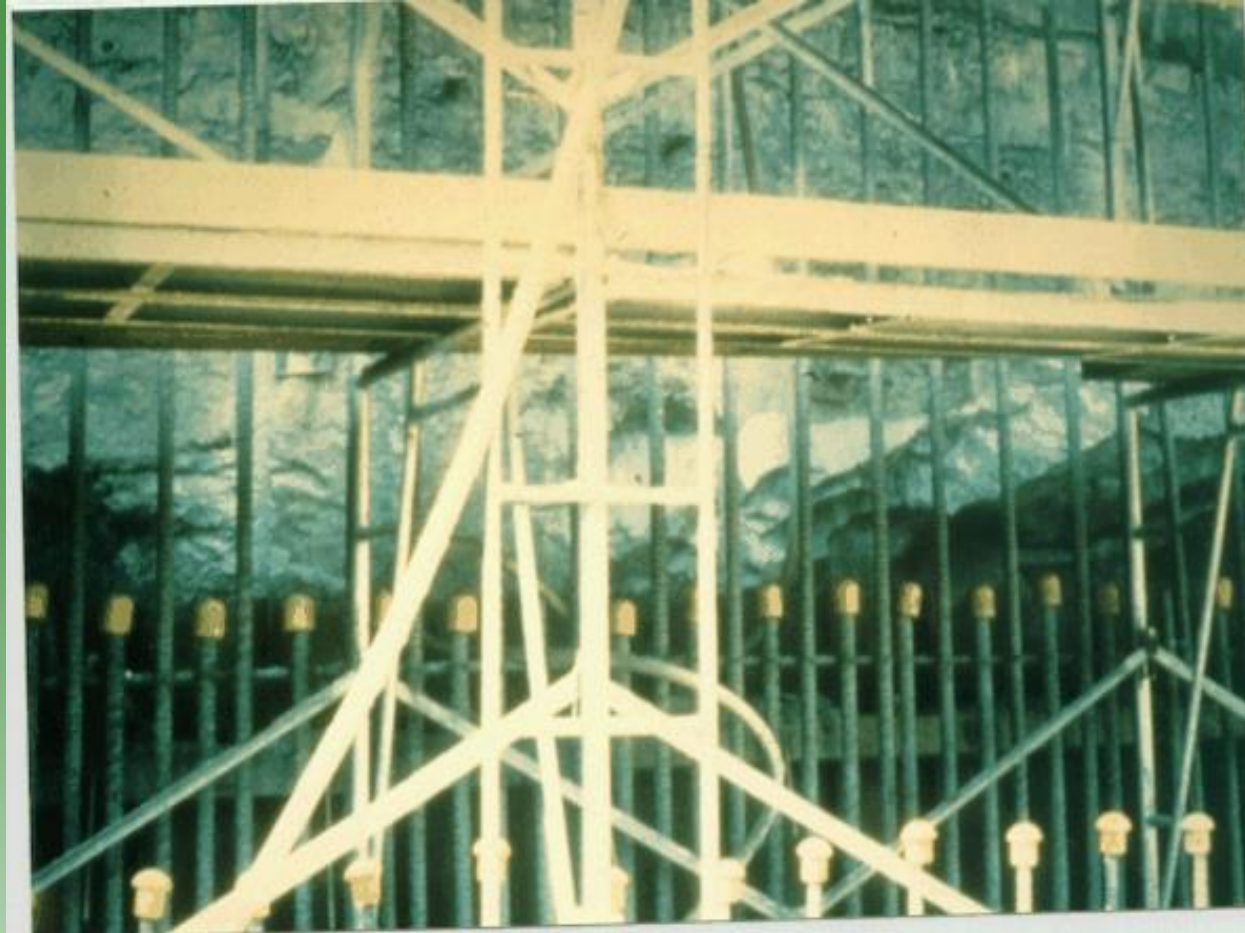
# General Requirements 1926.701

- No construction loads placed on concrete structure unless:
  - Employer determines safe to do so
  - Person qualified in industrial design
  - Structure capable of supporting loads



# Concrete and Masonry

- All rebar must be capped











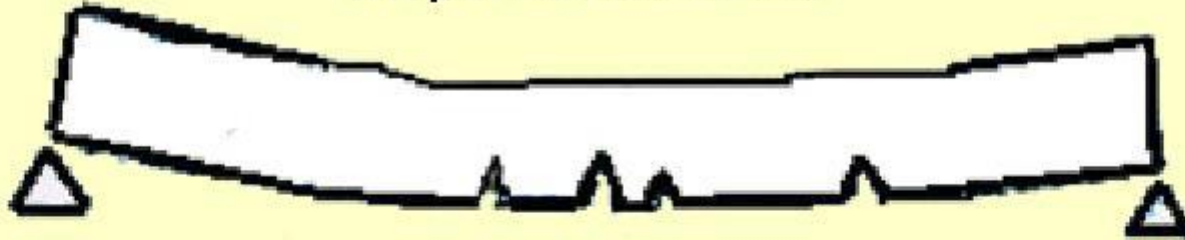
# Post-tensioning operations

- No employee except those essential to operations permitted behind the jack during tensioning operations
- Signs and barriers erected to limit employee access to area during operations

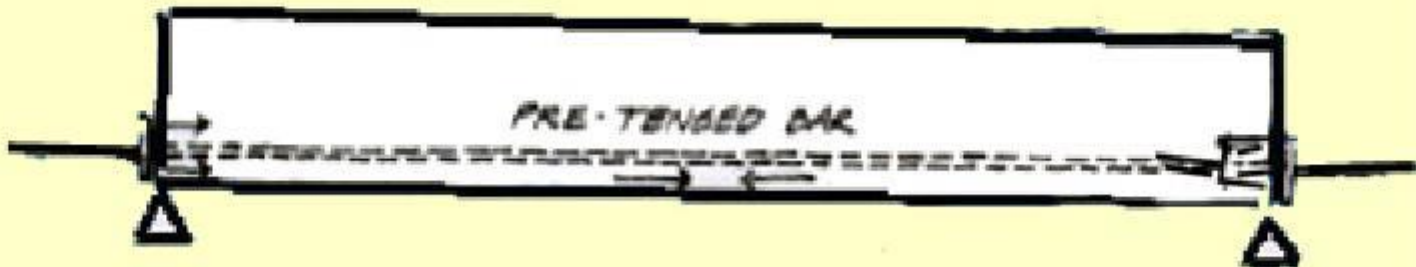




Un pre-stressed slab



Prestressed slab - unloaded



Prestressed slab - loaded



# Concrete Bucket



**No employee is ever permitted to ride concrete buckets**

# Working under loads



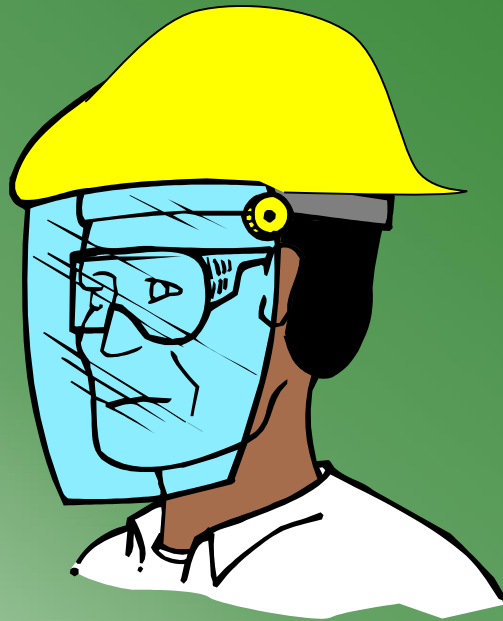
- No employee shall work under concrete bucket while:
  - Bucket is being raised
  - Bucket is being lowered
  - To the extent practical... route buckets so no employees or the fewest number are exposed

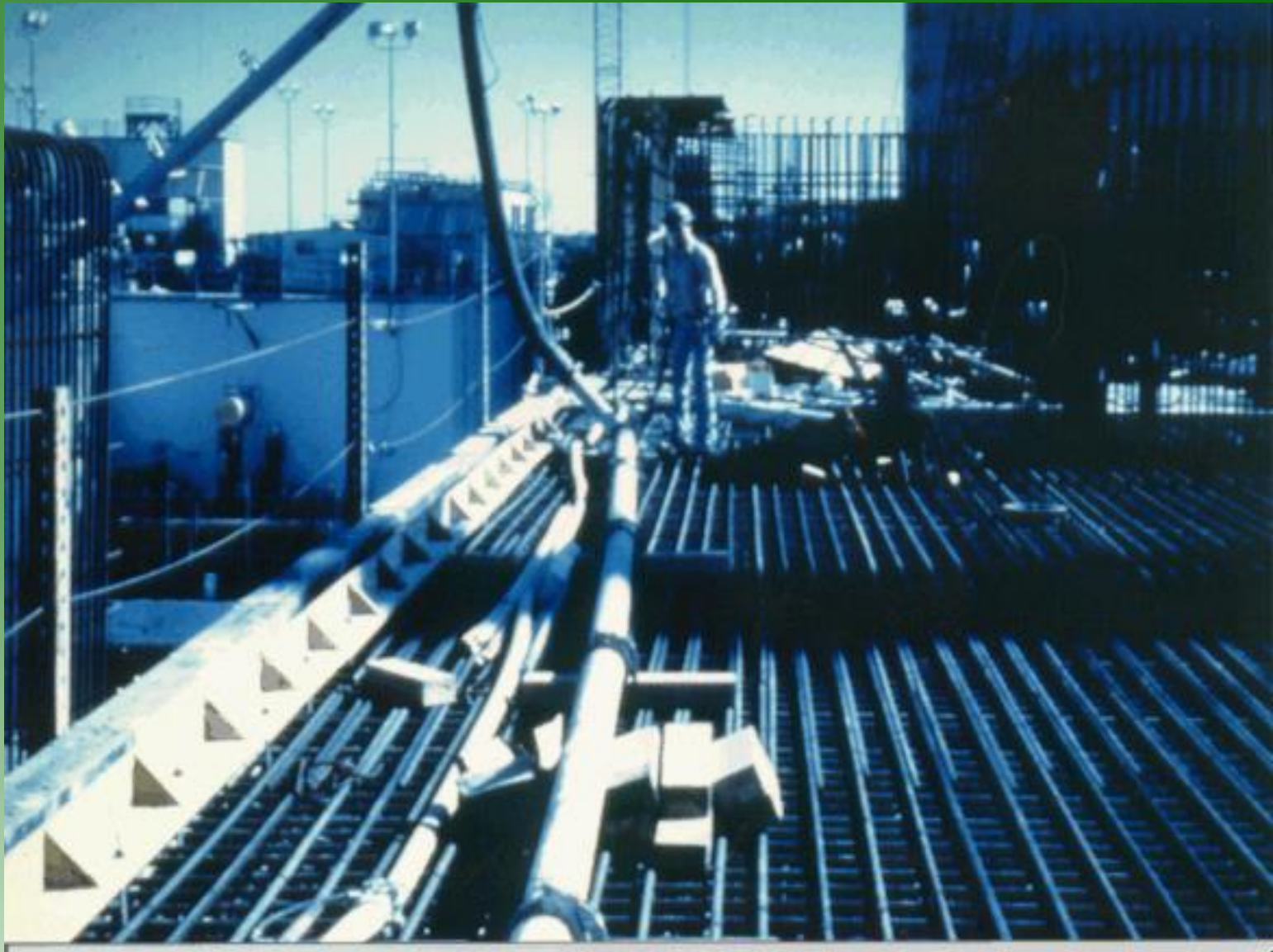




# Personal Protective Equipment

- If pneumatic hose is used to pump cement sand and water mixture
- Employees must wear protective head and face equipment







# Bulk cement storage



- Storage bins and silos:
- Conical or tapered bottoms
- Locked and tagged before entering
- Concrete Mixers: Loading skip 1yd<sup>3</sup> or larger:
  - Mechanical device to clear material
  - Guardrails on each side of the skip

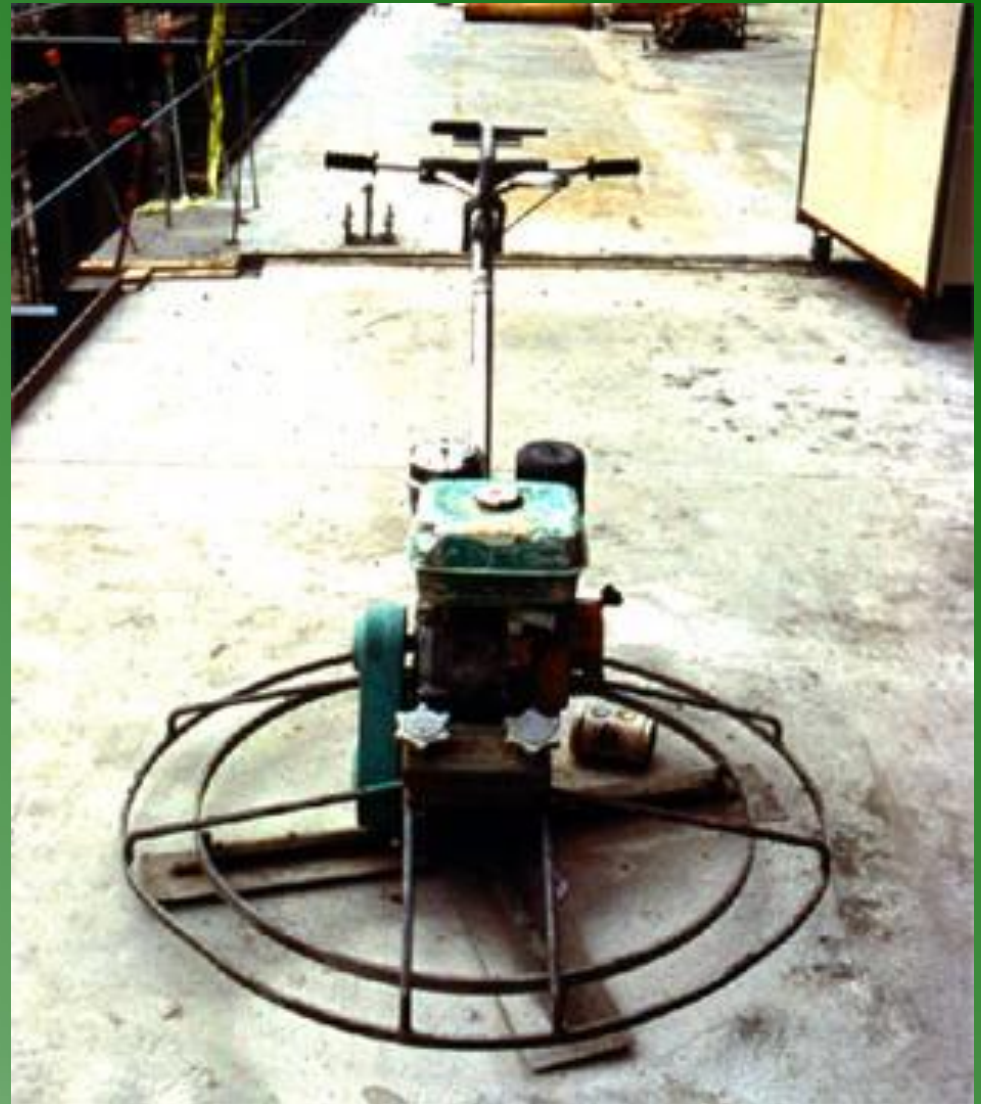
# Concrete pumping systems

- Provided with pipe supports designed for 100% overload
- Compressed air hoses on pumping systems:
  - Positive fail-safe joint connectors
  - Prevent separation of sections while pressurized



# Power concrete trowels

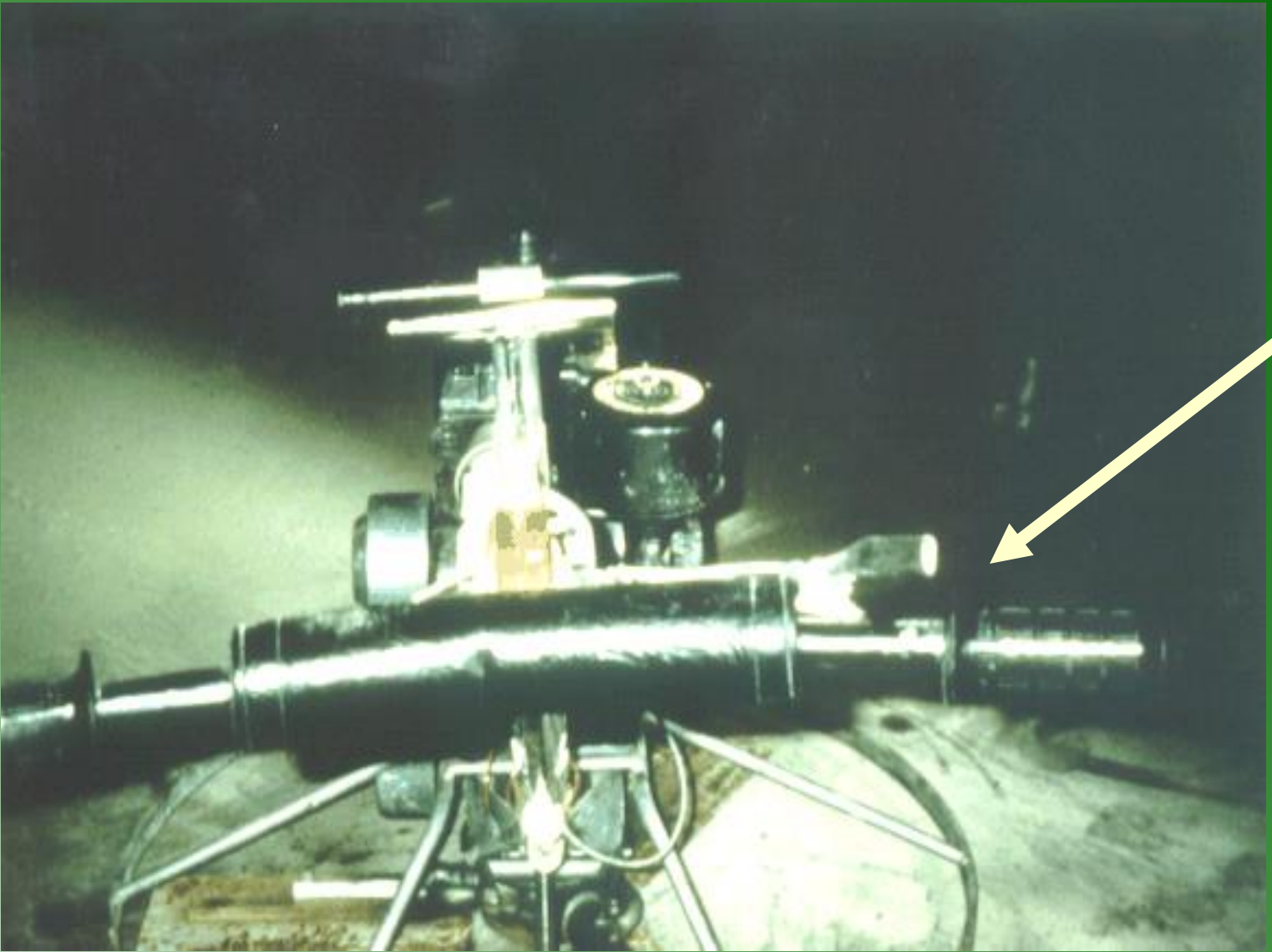
- Stop automatically when hand(s) are released from control















**Concrete buggy handles may not extend beyond the wheels on either side of the buggy**





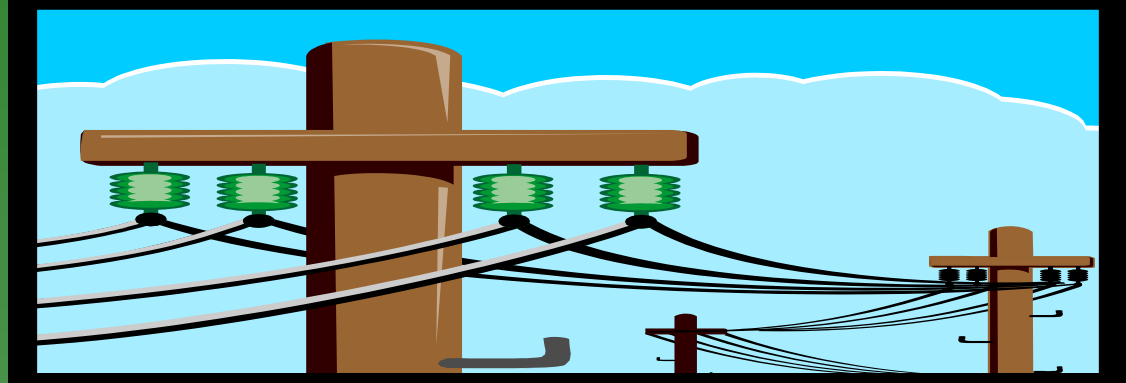
Safety device required to prevent premature or accidental dumping



- Tremies: secured with wire rope (or similar) in addition to regular couplings or connections

# Bull floats

- If handles could contact electrical conductors they must be of the non-conductive type





**Guarded with semi-circular enclosure  
over blade**

**Enclosure must provide for retaining  
flying blade fragments**



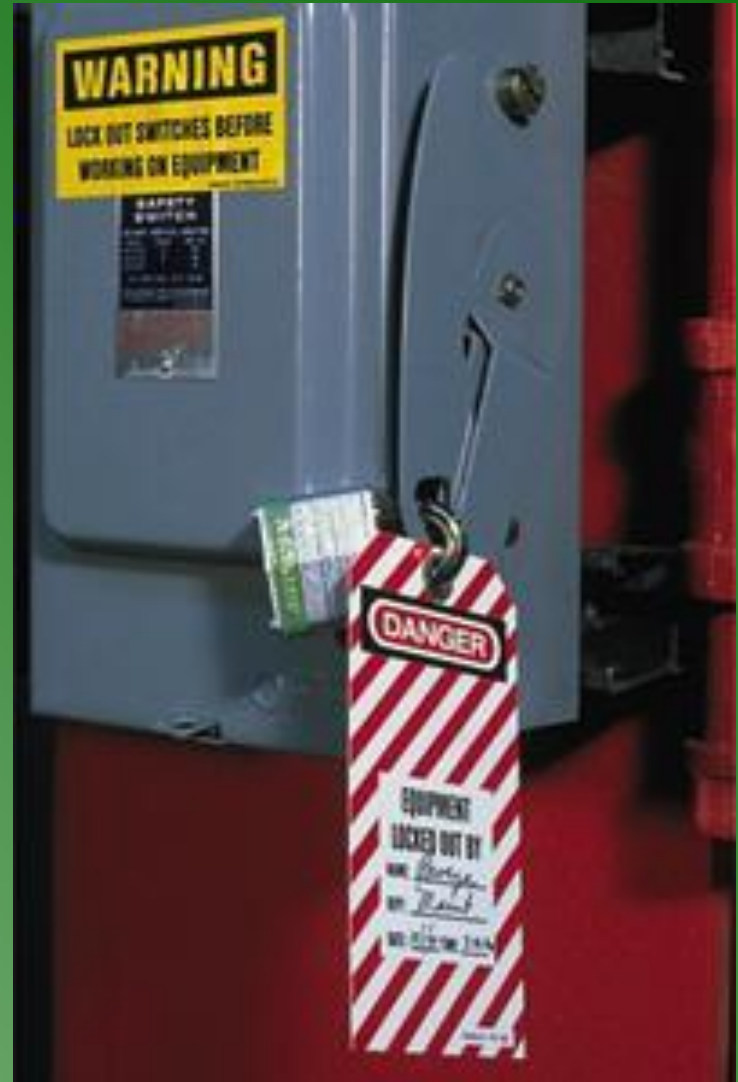






# Lockout/Tagout Procedures

- No repair or maintenance on equipment where inadvertent operation of the equipment could occur and cause injury unless hazardous energy sources have been locked out and tagged





# Cast-in-Place Concrete

- Cast in place concrete
  - Must be capable of supporting, without failure:
    - vertical loads
    - lateral loads
    - Use ANSI A10.9-1983
  - Drawings and plans
    - Must be on job site
    - Must include all revisions







# Shoring and reshoring

- Shoring inspected prior to erection for
- Conformance with formwork drawings
- Damaged shoring equipment not used
- Shoring damaged after erection immediately reinforced



# Shoring and reshoring

- Sills sound, rigid, and capable of carrying the maximum intended load
- Base plates, shore heads, adjustment screws in firm contact w/ form and foundation





# Tiered single post shores

- Designed & inspected by qualified engineer
- Vertically aligned
- Spliced to prevent misalignment
- Braced in 2 mutually perpendicular directions at splice
- Each tier diagonally braced in same 2 dir.
- No raising of shores after concrete poured





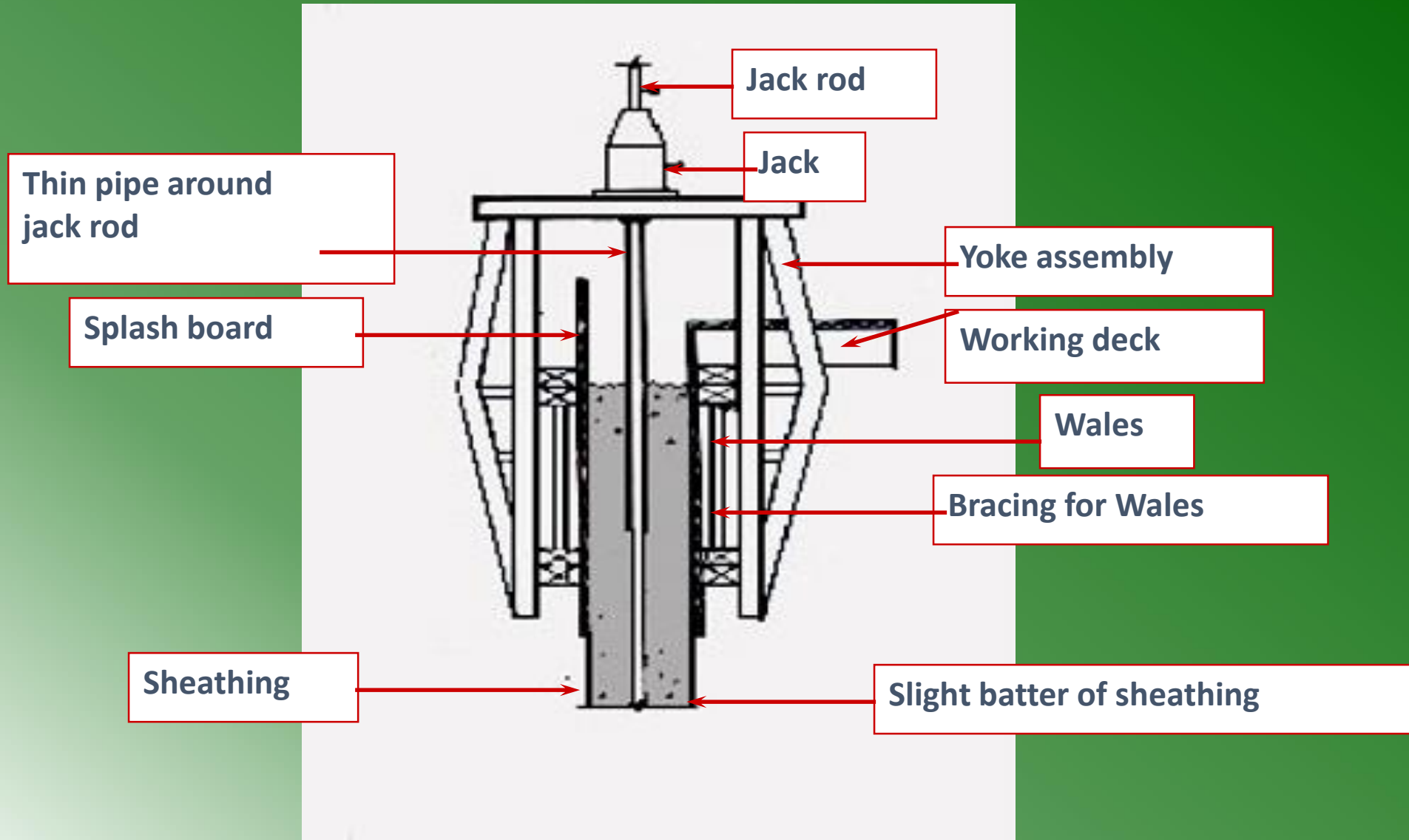
# Vertical slip forms



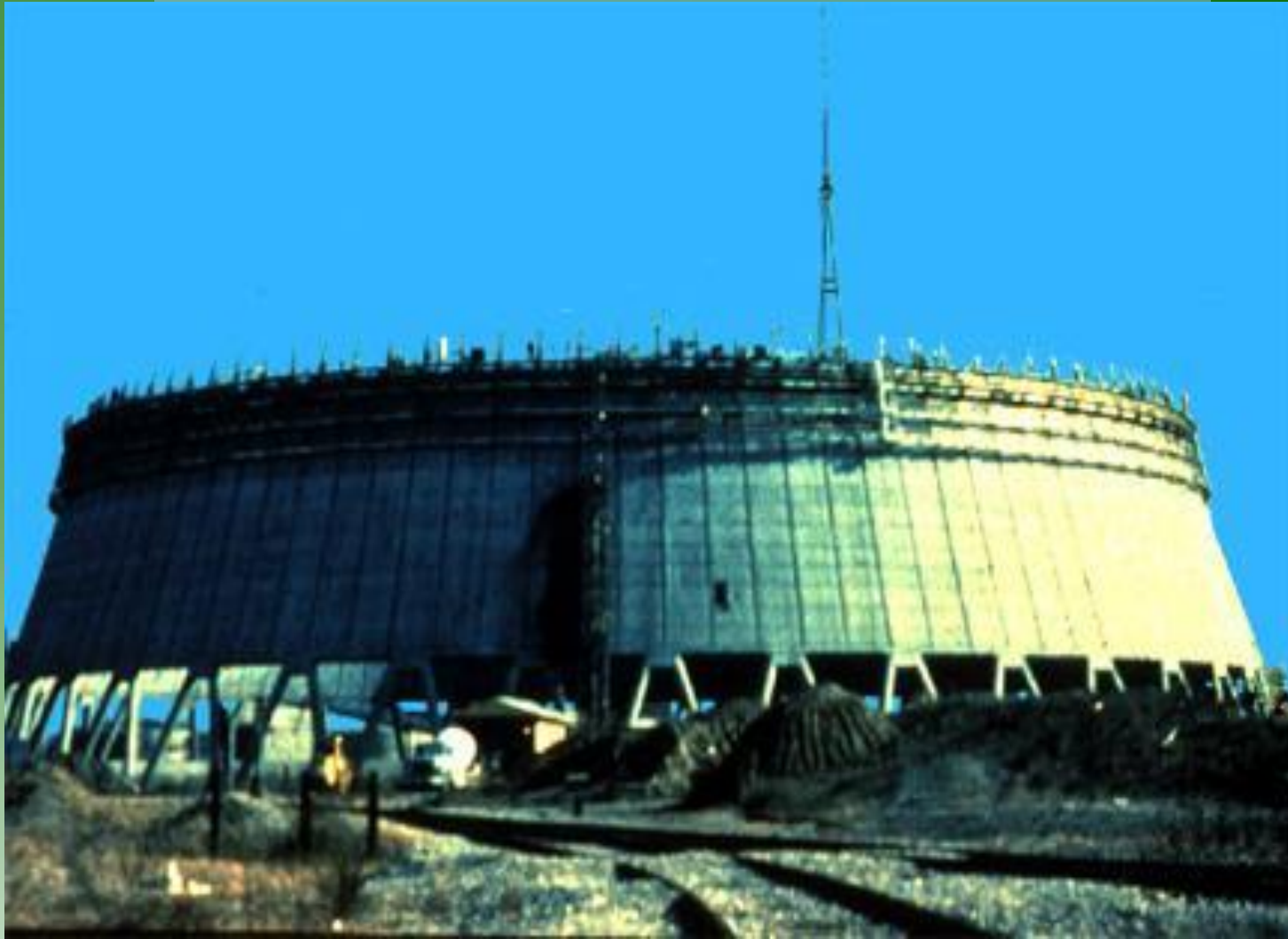
- Rods or pipes on which jacks climb:
  - Designed for that purpose
  - No excessive distortion during jacking
  - Provided with scaffolds where employees are required to pass



## 1926.703(c) Vertical slip forms



# Vertical slip-form operation



# Reinforcing Steel

- For walls, piers, columns, & other vertical structure shall be supported to prevent overturning or collapse
- Employers take measures to prevent wire mesh from recoiling





# Removal of formwork



- Forms and shores (Except those used for slabs on grade & slip forms):
  - Not removed until employer determines concrete has gained sufficient strength to support its weight and superimposed loads

# Flying forms



# Precast concrete

- Tilt-up walls supported to prevent overturning & collapse
- Lifting inserts capable of supporting 2X the intended load
- Lifting inserts in other than tilt-up members 4X the intended load
- Lifting Hardware... 5X intended load
- Only erectors under members being lifted





# Lift-slab operations

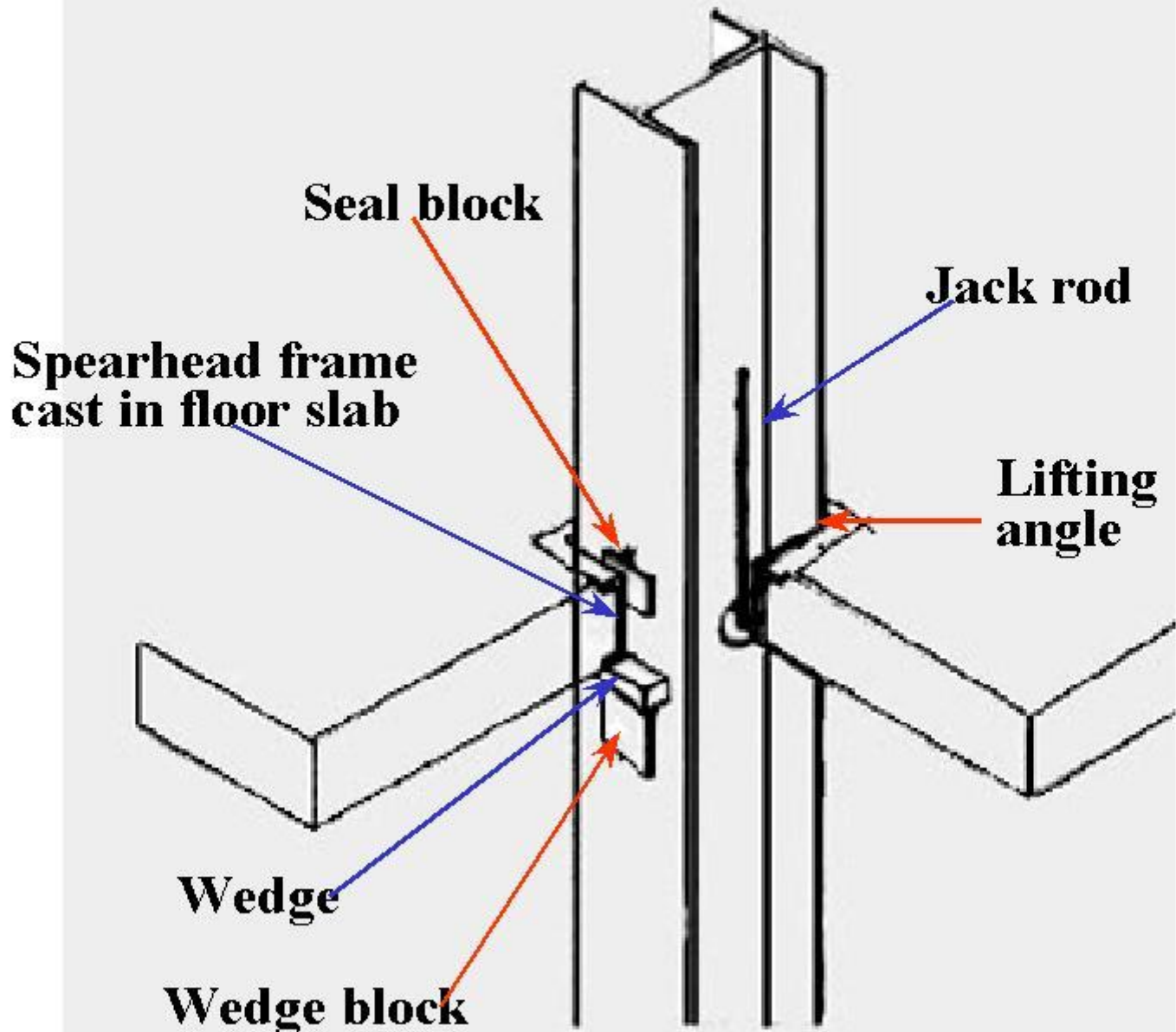
- Designed and planned by registered P.E. w/ experience in lift-slab construction
  - Employer must implement P.E.'s design
  - Plans include instructions, sketches & method of erection
  - Design ensures lateral stability of the building/structure during construction



# Lift-slab operations

- Jacks designed so they will not lift, or continue to lift if loaded beyond their rated capacity
- Jacks synchronized so that all points are within 1/2 inch of being level











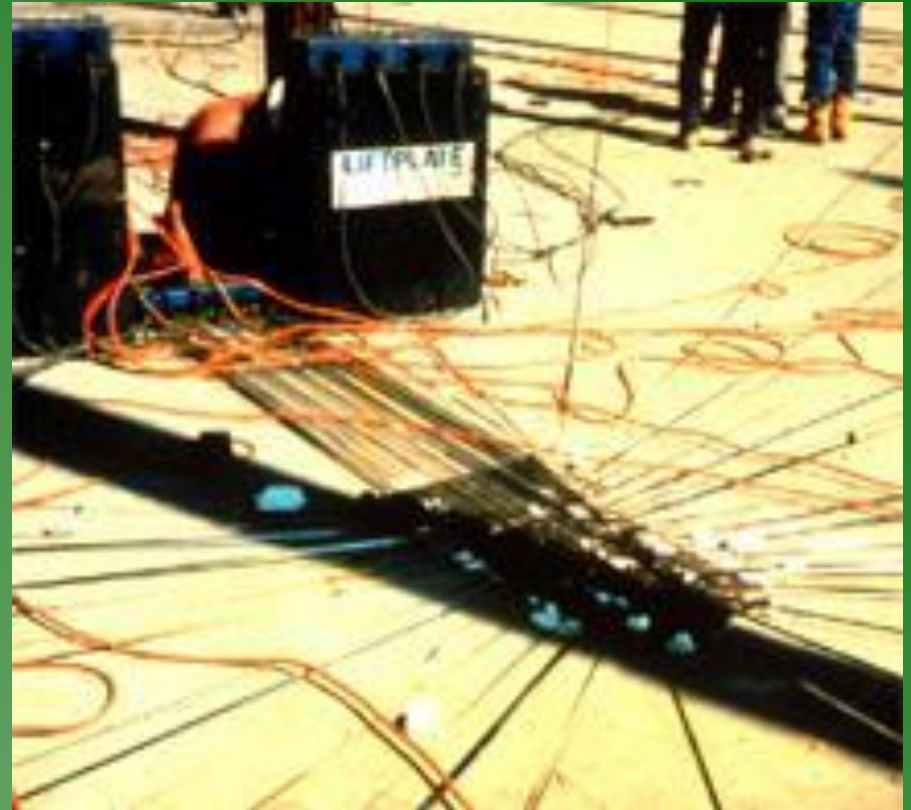
# Jack lifting unit







**Manual lifting controls shall be centrally located**



# CFR 1926.706 Masonry construction.





# Limited Access Zone

- Shall be established whenever a masonry wall is being constructed
- Prior to start of construction
- Equal to height of wall plus four feet
- Entire length of wall
- Opposite scaffold side
- Only masons allowed



# Limited Access Zone



- L.A.Z. shall remain in place until wall is supported
- If wall is over eight feet tall it must be braced unless adequately supported
- Bracing must remain until permanent support structures are in place

**Build Safely...**

***Build SAFETY!!!***