Piling Inspection

Objectives

- Recognize pile types 6-05
- The submittals necessary 6-05
- The resources available-HQ construction
- Different types of hammers
- Your duties as an inspector

Types of Piles

- Cast in Place Concrete
  - Most common
  - Steel casings
  - Sealed with pile tips
  - Driven to bearing
  - Cut off to elevation
  - Reinforcing steel installed
  - Concrete placed
  - Splices allowed

H-Piles

- Most commonly used as falsework
- Also used for tie-back walls
- Difference between I-beam and H-pile
- Pile tips used
- Driven to bearing
- Cut to elevation

WSDOT

Wood Piling

- Must check diameter
- Strapping or banding
- Used as falsework
- Used for existing wood structures
- Splicing not allowed
- Not used by the state anymore, as permanent, for new structures

Precast Concrete Piles

- Generally used in the marine environment
- Steel tips
- Driving with single acting drop hammers
- Especially vulnerable to damage
- Usually driven to known elevation
- Can be cut
- Splicing not allowed

Casings

- Verify approval of equipment and piling
- Verify the dimensions of the piling
- Drive a test pile
- Verify piles will be long enough for conditions
- Cover casings after driving

Welding or Splicing

- Approval must be received
  - Need and method
- Not closer than ten feet apart
- No spiral steel allowed

Pile Tips or Shoes

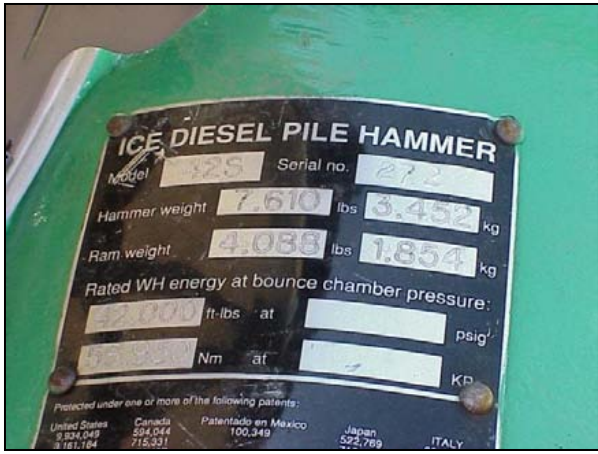
- Listed in QPL
- Must keep casings water tight
- Prevent distortion of pile
- Receive mill test reports

Driving Equipment

- Submittals 15 days before use
- Single acting diesel
- Closed ended diesel
- Single acting air
- Double acting air
- Hydraulic
- Vibratory

Driving Equipment

- Certified hammer weight submitted
- Weight stamped on hammer
- Minimum 3000lbs
  - <50 ft and not more than 60 tons
- Minimum 4000lbs
  - >50 ft @ 60 to 90 tons
- Vibratory hammers allowed
  - Last two feet driven by drop hammer

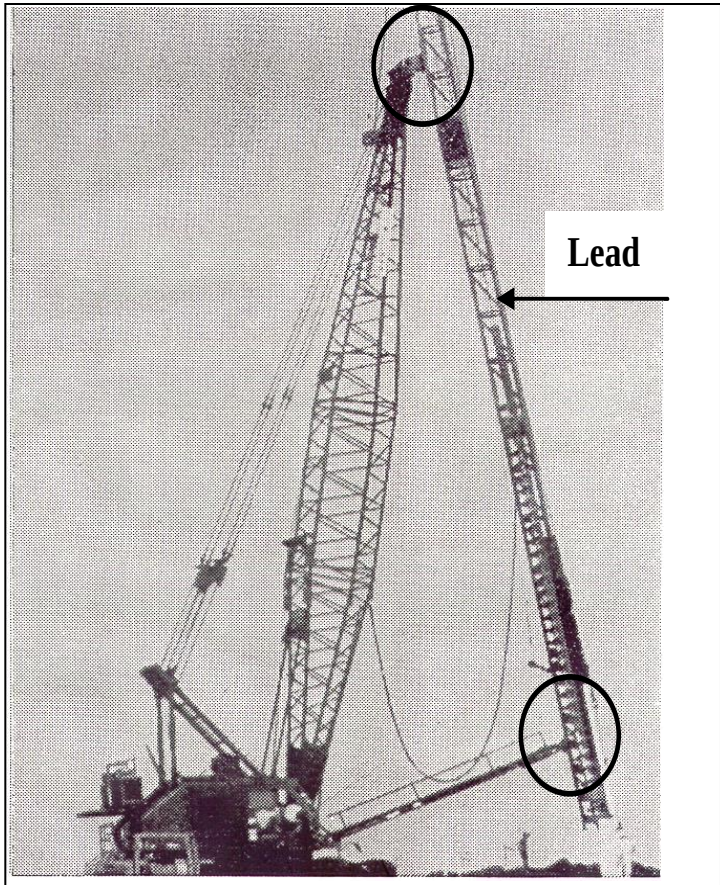


Understanding the Equipment

- Do you have manufacturers recommendations?
- Do you know what the equipment can do?
- Is the hammer marked for height?
- Can it penetrate without damage?
- Are you using an air hammer?

Leads

- Fixed Leads
  - Attached at the top and bottom of boom
- Semi Fixed
  - Attached only at the bottom
- Swinging
  - Suspended by a cable



Placing Concrete

- Ensure approved mix design
- Place with 5’ long tremie or conduit
- Vibrate the top 10’ and at least 5’ below original ground when in an embankment
- Ensure reinforcing steel is installed at the proper elevation and angle allowing for footing steel

General Information

- Impact hammer
  - Heavy weight raised and dropped on pile
- Major distinction between hammers
  - How it's raised and how it impacts the pile
- Transferred energy is only 25 to 50%
- Pile is hoisted and placed in leads
- Pile is placed in position for driving
- Leads and pile are plumbed

General Information

- Pile driving criteria;
  - Minimum depth (Minimum tip elevation)
  - Minimum number of blows to achieve capacity
  - Maximum blows to avoid damage
  - All equipment information

Pile Heave

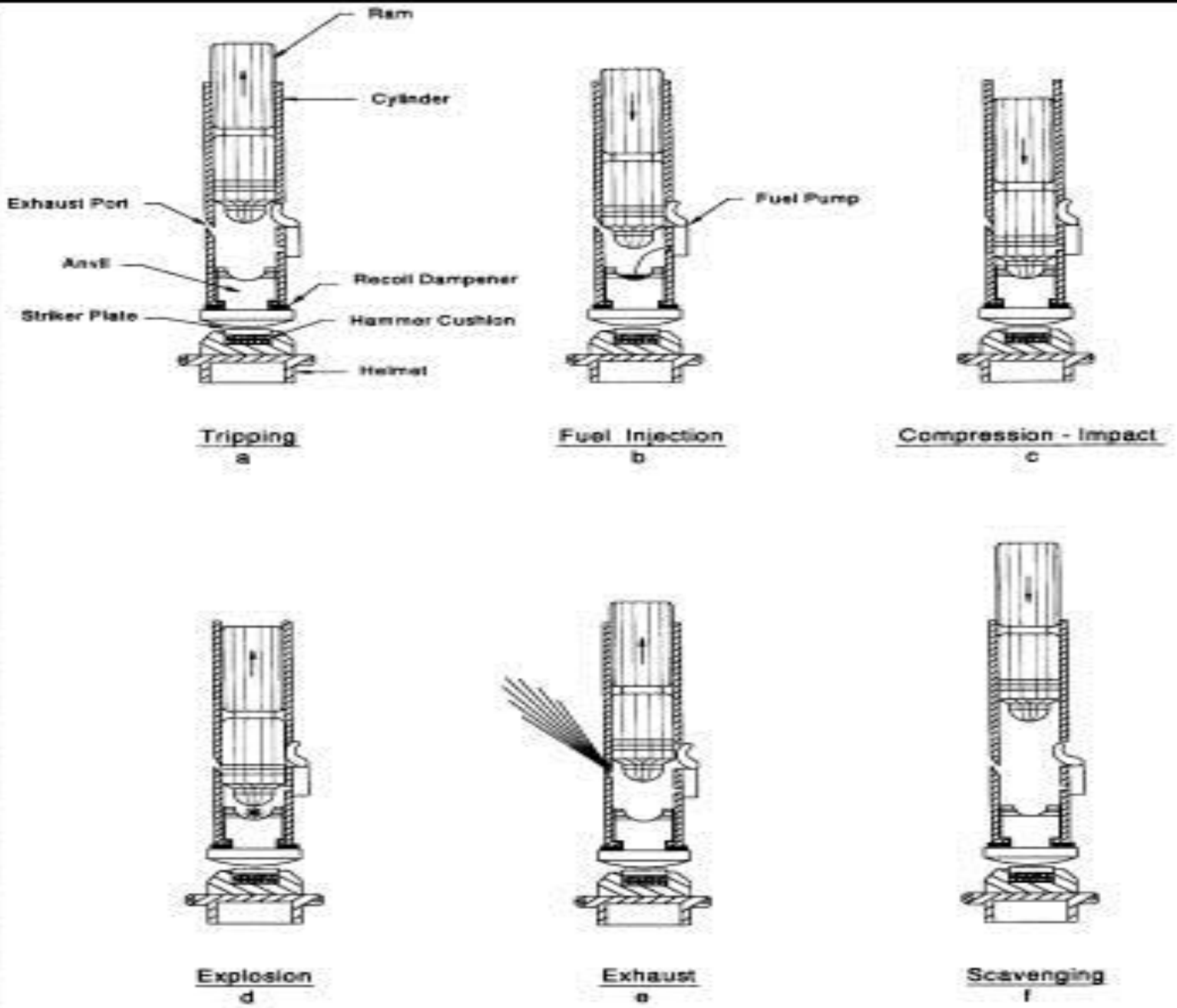
- Displacement of soil from pile penetration
- Generally happens in clay soils
- Displaces piles that have been driven
- Can be very costly when having to re-drive
- Good reason not to cut piles until all are driven

Soil Heave

- Significant movement of soils
  - Caused by displacement during driving
  - If suspected before driving-settlement indicators
  - Check and photo all structures in the area
  - May install wick drains or auger piles if serious
  - Over excavating footing can help
  - Contact the bridge construction office

Hammer Types

- Single acting diesel
- Double acting diesel
- Single acting hydraulic
- Single and double acting air or steam



Single Acting Diesel Hammer

Inspectors Duties

- As always, verify approvals
- Necessary tools-Safety, Calc, book, PDA
- Locate a sight for test pile, if not in footing
  - Be sure to get locates
- Verify driving test pile 15% over
  - 15 blows per foot last 4" = refusal
- Verify length to order
  - Ask questions or think, in water, on land, for falsework or permanent

Inspectors Duties

- Verify and Record
  - Type of piles
  - Thickness, diameter and length
  - Any special devices, saximeter / PDA
  - Equipment including weight of hammer
  - Verify location and review plans and specials
  - Record any circumstances that apply

This is your chance to ask questions!