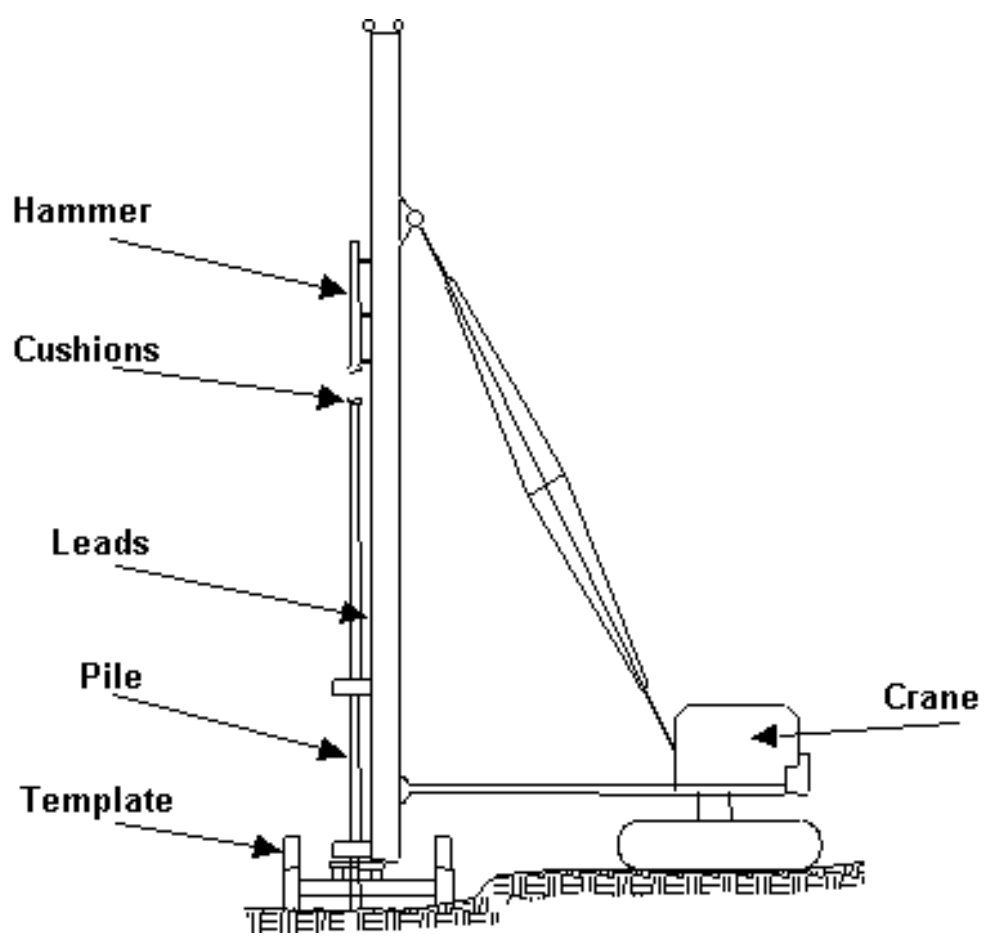


**Pile Driving System Components Checklist**

As a pile driving inspector, it is important that you know and recognize the various components of the pile driving system. In many cases, it is part of your responsibility to verify that the proper equipment is on site, that it operates properly, and that it is not damaged.

Below is a diagram, as well as a checklist, of the components that make up the pile driving system.

Note that some specifications described in the following content may not be the same as the specifications followed by your agency. Always check with your State agency's standards and specifications when using these guidelines.



## Sections

- Hammer
- Cushions
- Leads
- Pile
- Template
- Crane

## Hammer

- There are a variety of pile driving hammers for the contractor to choose from
- Each variety has its own inherent advantages and disadvantages, and the contractor's selection is often dependent upon the project needs and what they have available or can readily get economically
- Hammers advance piles with two different techniques:
  - Impact – Advance the pile through “hitting” it with a ram
  - Vibration – Advance the pile through vibration
- The most common hammers in use are:
  - Open end diesel
  - Close end diesel
  - Air/steam hammers
  - Hydraulic hammers
  - Vibratory hammers

## Cushions

- Used to protect both the hammer and the pile
- Hammer cushions:
  - Are constructed of man-made materials that are heat resistant, durable, and absorb a certain amount of shock

— Are located between the point of the ram or anvil and the pile cap

**❑ Pile cushions:**

— Are placed between the pile top and the pile cap on concrete piles and not used on steel piles or timber piles

— Consist of plywood

— Are generally replaced for each pile or as directed by the engineer

— Are located between the top of the pile and the bottom of the pile cap

**❑ Common cushion materials are aluminum, micarta, and polymer, which are in the form of disks**

**Leads**

**❑ Leads are used to align the pile and hammer during driving**

**❑ There are numerous different lead designs**

— Box leads have been the most commonly used

**❑ Lead systems include three main types:**

— Swinging leads – The leads are suspended from the boom by the cable and are not attached to the boom. A template is required when swinging leads are used to maintain the pile in proper position and alignment.

— Semi-fixed leads – If the leads are attached to the boom at the top, then they are not attached at the bottom. If they are attached at the bottom, then they are not attached at the top. A template is required when semi-fixed leads are used to maintain the hammer and pile in proper position and alignment.

— Fixed leads – The leads are attached at the top of the boom and to the crane at the bottom with a brace. A template is not required when fixed leads are used to maintain the hammer and pile in proper position and alignment.

## Pile

- There are a variety of pile types used in construction**
- Generally, the designer selects the type of pile to be used for the foundation system based upon several factors:**
  - The loads the foundation system must carry
  - The type of structure being built
  - The geologic conditions found on the site
  - Special design needs
  - Specifications or standards relating to construction
- Two basic systems:**
  - Displacement piles – Piles that actually displace the material they are driven into
  - Low (non) displacement piles – Piles that displace very little of the material they are driven into
- Pile foundations develop their load carrying capacity in two ways:**
  - End-bearing
  - Friction
- Designers rely on a combination of both to support the pile**
- Common piles used on State DOT projects include:**
  - Prestressed square concrete piles (most common)
  - Steel piles
  - Cylinder piles
  - Timber piles

### Template

- Templates are required when driving piles with swinging leads or with semi-fixed leads.
- The templates are to be fixed in place and rigid enough to support the pile. Flimsy wood templates are not considered adequate. Do not use floating templates (attached to a barge).
- For piles on land, locate the template within 5 feet [1.5 m] of cutoff or within 5 feet [1.5 m] of ground line, whichever is less. For piles in water, locate the template within 5 feet [1.5 m] of cutoff or within 5 feet [1.5 m] of the waterline, whichever is less.
- Where practical, place the template so that the pile can be driven to cut-off elevation before removing the template.

### Crane

- It is not the responsibility of the inspector to inspect the crane. The crane and leads should be the ones indicated in the Pile Installation Plan submitted by the contractor.
- The crane must be large enough to handle the leads, hammer, and the pile. Cranes are usually rated based on their lifting capacity.