

French Mattress: A structure under a road consisting of clean coarse rock wrapped in geotextile fabric through which water can pass freely. French mattresses are used in extremely wet areas, such as wetlands, to support the roadbed while allowing unrestricted water movement.

Criteria for French Mattress Use

- Areas where concentrated outlet flow through a pipe is undesirable, impractical, or regulated.
- Low-lying areas near streams or wetlands where installing cross drains would be difficult due to lack of grade or vegetation.
- Areas where the road acts as a dam by cutting off the natural flow of subsurface water.
- Areas with a high water table.

Benefits of French mattresses

- Stabilizes the road base in areas where the road is weakened by water saturation.
- Allows for bi-directional free flow of water through road base.
- Maintains dispersed flows and prevents gully erosion above or below the structure.
- Can be used in wetland situations where a traditional pipe may lower the wetland water level.
- Requires no maintenance and has a long service life.
- Unlike pipes, French Mattresses are extremely difficult for beavers to plug.
- Maintains natural vegetative communities and habitat by connecting floodplains.

Important mattress considerations

- Mattresses are **NOT** stream or road drainage pipe replacements. Mattresses should **NOT** be used for concentrated overland flow, such as small stream channels or storm water from ditches. These flows naturally carry sediment, which will clog the mattress over time.
- Mattress size is very flexible. In the example below, three small mattresses were used to drain several springs and seeps. In the example on the back, a large mattress was used to allow wetland flow through during high flows. The width, depth, and size of stone used will all affect the flow capacity of the mattress.
- The finished mattress should be covered by at least 8 inches of compacted fill material.
- French mattresses should be installed to match the slope of the land. In wetland situations, this slope may be minimal. In sloped areas (as pictured below), a 1- to 2-percent slope should be used to aid drainage.

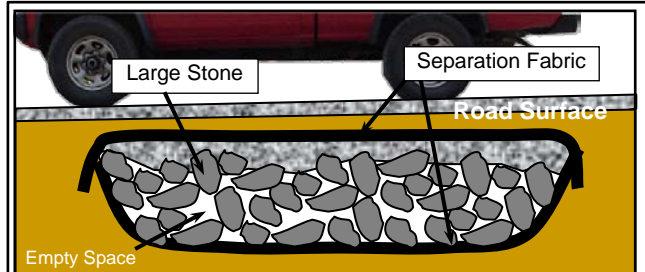


Photo 1. Graphical side view of the mattress components.



Photo 2. Small mattresses installed to drain several springs and seep.



Photo 3. Large mattresses allow wetland flow.



Figures 1-4. French mattress construction sequence.

Reminder: A French mattress should never be used to replace a standard stream pipe or road drainage crosspipe. The frequent flows and sediment load from these sources will eventually clog the mattress.

Construction Sequence

This is a large mattress using large stone to accommodate a wide wetland.

1. Excavate the mattress to desired depth, allowing for a minimum 8 inches of cover over the mattress. Place geotextile fabric in the trench, leaving enough fabric on the sides to overlap on the top of the finished mattress (Figure 1).
2. Place porous stone on top of the fabric and spread out into a uniform bed (Figure 2).
3. Wrap ends of fabric over top of structure. Place a piece of fabric on the top if existing fabric does not completely cover mattress. Overlap all fabric joints by at least 12 inches (Figure 3).
4. Compact fill over top of finished mattress (Figure 4).

Materials required for a French mattress:

- **Geotextile fabric (Class 2 woven):** The fabric around the mattress allows water to pass through while blocking fine silt and clay, which would eventually clog the structure. In situations where water flowing into the mattress may contain sediment (farm fields, etc.), the ends of the mattress should also be wrapped in fabric.
- **Clean Stone:** Use clean stone. Clean stone is relatively uniform in size with no fine material. Typically 3- to 4-inch-diameter stone is used. Larger stones will increase the flow capacity of the mattress.

Equipment required for a French mattress

- **Excavator/backhoe:** Needed to excavate trench; helps to spread stone after dumping.
- **Trucks:** Needed to import clean stone (rock) and haul away excavated material.
- **Hand Tools:** Rakes and shovels to move and level stone.
- **Compaction:** A tamper or vibratory plate can compact fill over small mattresses. A roller is needed for larger mattresses.



Photo 4. This roadway cuts across a floodplain wetland. A 300 foot long French mattress was used to provide relief for wetland flows while providing a stable road base and preventing beavers from damming the nearby stream pipe.