

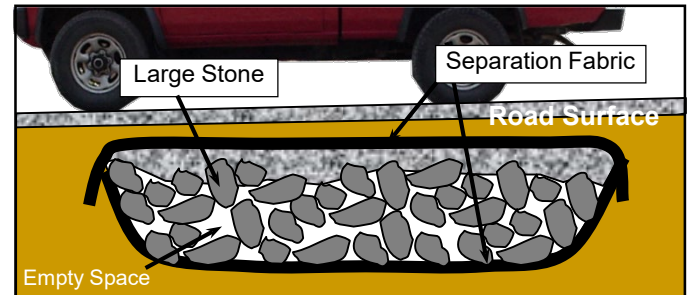
# Technical Bulletin

## French Mattress

**FRENCH MATTRESS** – A structure under a road consisting of clean coarse rock wrapped in geotextile through which water can freely pass. French Mattresses are used in saturated soils, such as in wetlands, to support the roadbed while allowing unrestricted water movement.

### CRITERIA FOR FRENCH MATTRESS USE

- Areas where roadside springs and low gradient road ditches result in road base saturation.
- Areas where springs under the road saturate the road base or come to the surface in the road.
- Areas where the road lays over soils with a high water table, such as wetlands and creek bottoms.



Side view schematic of a French Mattress.

### BENEFITS OF FRENCH MATTRESSES

- Stabilizes the road base in areas where the road is weakened by water saturation.
- Allows for the free movement of water through road base (can be bi-directional).
- Maintains dispersed flows and prevents gully erosion associated with concentrated outlets.
- Can be used in wetland situations where a traditional pipe may lower the wetland water level.
- Requires little or no maintenance and has a long service life.
- Unlike pipes, a French Mattresses effectively reduces damming by beavers.
- Maintains floodplain connectivity through the roadway.
- Effectively insulates the road surface from water under the road, keeping the travel-way high and dry.

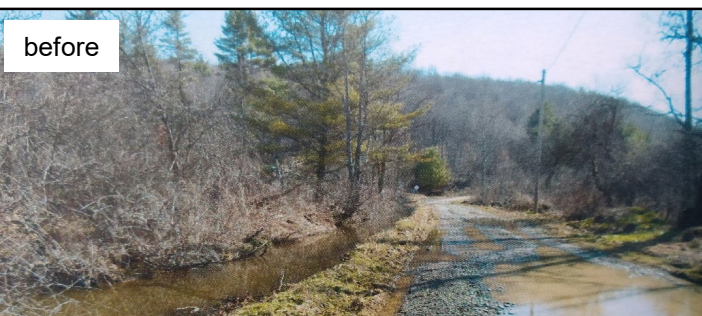
### IMPORTANT MATTRESS CONSIDERATIONS

- Mattresses are not suitable replacements for road drainage pipes, or anywhere concentrated overland flow carries sediment. These flows will clog the mattress over time and are to be handled by drainage pipes..
- Mattress size is flexible. In the examples below the smaller mattress allows roadside springs to bleed through the road base while maintaining road stability. The larger mattress creates a stable foundation for the road through an area of soft wet soils.
- A French Mattress should be covered by a minimum of 12" of compacted fill material.
- In most situations the mattress should be level end to end (with the road alignment).
- A French Mattress should provide unrestricted flow through the road. In wetland situations, the side slope may be flat or minimal. In sloped areas a 1- to 2-percent fall from inlet to outlet will aid drainage.
- The mattress must be free draining at the outlet to avoid ponding water beneath the road.



The small mattress shown during construction was installed to drain a group of small hillside seeps that saturated the roadway. The larger mattress is being constructed to create a free draining and stable road base in a low land stream bottom.





## CONSTRUCTION SEQUENCE

The mattress shown on the left traverses a wide wetland. The numbers refer to picture sequence.

1. Excavate the mattress to desired depth and slope, allowing for min 12 inches of compacted cover over the mattress. Place geotextile fabric in the trench. Allow enough fabric on the ends to overlap the top piece of geotextile in the finished mattress.
2. Place porous AASHTO 1 stone on top of the fabric and spread into a uniform bed of the desired depth.
3. Place a piece of fabric overtop of the installed stone. Be sure to overlap all fabric joints by at least 12 inches. Leave the stone exposed along the road edges.
4. Shape and compact fill overtop of the finished mattress. Establish the desired road surface shape in the fill. Place enough fill to ensure a minimum of 12" of compacted cover once the fill and surface aggregate are installed.

## MATERIALS REQUIRED FOR A FRENCH MATTRESS

- **Geotextile fabric** (Class 1 Non-woven). Separation fabric around the mattress allows water to pass through while blocking fine silt and clay, which would eventually clog the structure.
- **Clean stone**. It is important to use clean stone. Clean stone is relatively uniform in size with no fine material. Typically 3- to 4-inch-diameter stone is used. Smaller stone should be avoided, as it requires lateral confinement to stabilize. Additionally, larger stone will increase the bridging potential and the flow capacity of the mattress.

## EQUIPMENT REQUIRED FOR A FRENCH MATTRESS

- **Excavator/backhoe**: Needed for excavation; helps to spread stone after dumping.
  - **Trucks**: Needed to import clean stone and haul away excavated material.
  - **Hand Tools**: Rakes and shovels to move and level stone.
  - **Grader\***: To establish uniform depth and shape of fill.
  - **Compaction\***: A vibratory roller is needed to compact fill.
- \* *Alternative equipment can be used on smaller mattresses*

**Reminder:** A French Mattress should not be used to handle storm drainage. The sediment load carried in storm flows will eventually clog the mattress.

In the example above a French Mattress is used to convey wetland flows while providing a stable road base.