AHC-TC10: MATTING BEST MANAGEMENT PRACTICES (BMP's)

Minimize the Transport of Invasive Species

Many harmful invasive species clearly impair biological diversity by causing population declines, species extinctions, shifts in predator–prey dynamics, shifts in species niches, changes in habitat, and reductions in ecosystem complexity.

Devastating invasions of plants, insects, aquatic invertebrates, pathogens, and other organisms have changed ecosystems and permanently diminished the biological diversity associated with them. Examples of these in the United States and its territories include: melaleuca (a wetlands tree), gypsy moth, spruce bark beetle, zebra mussel, larch canker, chestnut blight, and the asian longhorned beetle.

Limiting the introduction of foreign species is among the most important BMPs for preserving local ecologies. Generally speaking, there are two major objectives:

- **Minimize the introduction of foreign species through supply chain management.**
  Local ecosystems exist in an established balance. Introducing new plant or animals into the local ecosystems can create imbalances and destruction. Use BMP's to ensure that materials placed in direct contact with the local ecology are "clean".

- **Minimize the transport of forest pests from site to site.**
  Transport of forest pests within geographical ecosystems can be harmful. Use BMP's to minimize the transport of forest pest on equipment and tools.

Invasive species including insects, aquatic invertebrates, pathogens, and other organisms can be brought into sensitive forest environments on equipment and tools. One of the single largest avenues for invasive species is mats used for temporary roads and stream crossings. The following BMPs will help minimize or eliminate the possibility that invasive species will be transported into local environments.

BMP's

1. **Verify that mats are "clean" and free of foreign pests and organisms.** Mats constructed from local resources (check with state forestry official regarding wood quarantines) may be acceptable sources to prevent introduction of invasive species. Mats that are constructed from materials sourced outside of the local environment may contain harmful invasive species and should be verified to meet all local, state, and federal quarantines on the transport of unprocessed raw wood as well as the guidelines detailed in the International Standard for Phytosanitary Measures No 15.
2. **Clean equipment and tools when mobilizing from one job to the next.** Pressure-washing equipment to remove soil, plants, and insects prior to moving to a new site minimizes the possibility of transporting foreign organism to a new ecosystem. The use of a rotary power-broom on mats may also be effective in clearing debris that can transport invasive species. Visual inspection of mats and equipment prior to mobilization on a new site should be conducted to ensure that no plants, soil or insects are present.

MAT ROADS

This section contains BMPs for the use of a group of products routinely referred to as "Mats". A mat has traditionally been a series of wooden components (timbers, logs, billets) that are bolted together to form a large rectangular mat. Mats are be used to support equipment on loose soil or in bridging applications. Mats can also be made of synthetic materials such as plastic or rubber. The design, materials, specifications, and use of these roads vary widely, but they are all referred to as "mat roads" in this section.

The construction and use of mat roads can sometimes cause significant water quality problems. Mat road construction may alter the flow of water over and through the ground. Mat roads are intended to disperse vehicle loads and reduce the exposure of soil. Mat Roads should be designed in such a way as to reduce the total impact to the existing ground conditions. All of these factors pose risks to the quality of nearby water-bodies if the mat roads are not constructed properly.

Well planned and built roads make sense both economically, and environmentally.

Mat Road BMPs:
• extend the seasons that access can be gained to work areas,
• reduce soil impact and water quality run-off issues,
• enable equipment to haul heavier loads,
• lower equipment maintenance costs,
• reduce travel and construction time, and
• protect water quality during operations
• reduce impact on "sensitive receptors and resources" such as recreation areas, agricultural land, pipeline crossings, historical interest sites, driveways, etc

PLAN AHEAD

MAT ROADS

1. **Determine the size and type of road needed.** Mat roads are used to reduce the impact to the existing surface conditions. The scope of work and size of equipment should be determined to best determine the quantity and size of mats required for the job.
2. **Determine mats handling requirements.** Large jobs may require considerable quantities of mats which will require intermittent rallying (unloading and loading) points as well as the appropriate equipment to expedite truck traffic, off road transport and handling. Mat roads are temporary in nature and logistical considerations for removal should be considered.
3. **Know legal requirements and pertinent regulations.** Are local, state or federal permits required and how will invasive species issues associated with the mats be handled.

LOCATING AND LAYING OUT MAT ROADS

1. **Careful study of terrain and access points should be taken.** Topographical maps, aerial photos, local road maps, and site visits should be considered when determining access routes and rallying points. Size of equipment and quantity of mats needs to be estimated to effectively assess access routes.
2. **Design the mat road access route to minimize existing environment impact.** Consideration for shortest routes, fewest wetlands crossings, and high well drained ground should be taken when choosing the route
3. **Single lane traffic minimizes environmental impact.** In general a single lane with periodic turnouts for passing traffic will minimize overall impact to existing surface conditions. Width of road can often be critical to load disbursement so a standard rule that narrower is always better may not be true.
4. **Professional advise can be used to help make decisions.** Geotechnical and civil engineering services can be useful when estimating soil conditions and equipment impact.

CONSTRUCTION TIMING

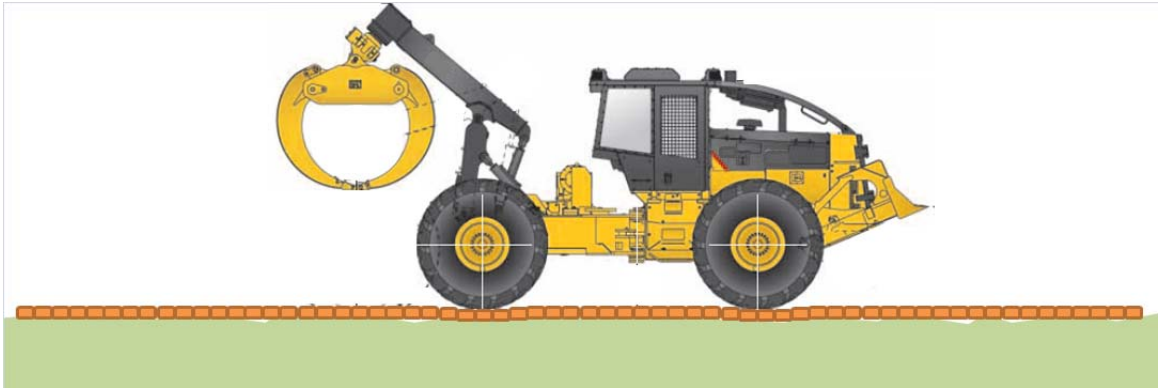
1. **Whenever possible construct roads during dry periods or when the ground is frozen**
2. **Avoid work during heavy rains and/or wet periods**
3. **Plan how and when roads built during the winter will be stabilized**

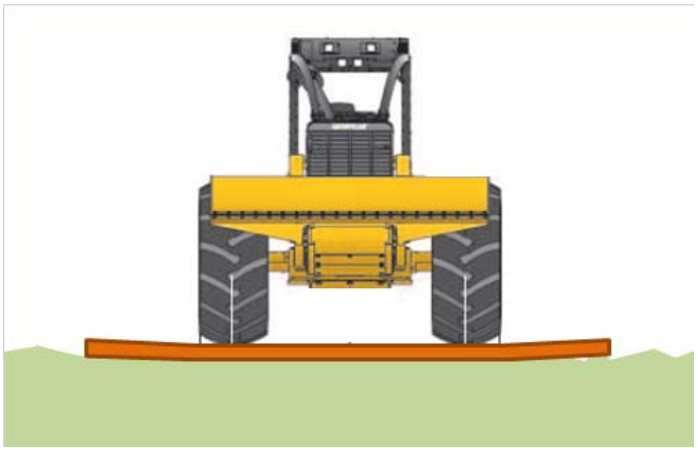
CONSTRUCTION TECHNIQUES

1. **Different terrain conditions will require different construction techniques and equipment to reduce surface impact.** The type of mats that should be used for a well drained agricultural field will be different than the mats used in a wetlands area that has inconsistent formations of rocks and stumps. General construction techniques can be applied to help decide which mat is correct for the condition.
2. **Filling lowland areas with multiple layers of mats should be avoided.** In general filling a stream crossing, lowland, or marshy area with multiple layers of mats to obtain access is an uneconomical and high environmental impact technique. Selecting a mat that distributes the equipment load over a larger area or a mat that bridges the wetlands area is a more appropriate technique.
3. **Selecting a mat that is too large can be as harmful as selecting a mat that is too small.** Once a properly constructed mat road is installed very little impact to the original ground condition should be experienced. For this reason the mat road construction phase presents the greatest potential for surface impact. The heavier the mats the heavy the equipment necessary to handle the mats. The combination of the mats and equipment can create ground pressure conditions that can cause damage to the existing surface conditions. In addition increased handling requirements associated with delivery, unloading and loading can increase job costs.
4. **Matting fundamentals can help guide construction techniques.** The BMP's for mat road construction shown below are basic principles that can help guide infield decisions. Often it is inefficient to consult with professional engineering support to determine exact lowest impact matting technique. It is important to ensure that in elevated applications that the mat chosen is sufficient to support the maximum anticipated load and professional advice should be requested.

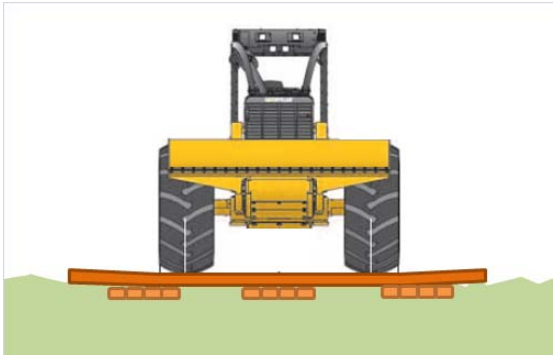
BMP Mat Road Basic Principles

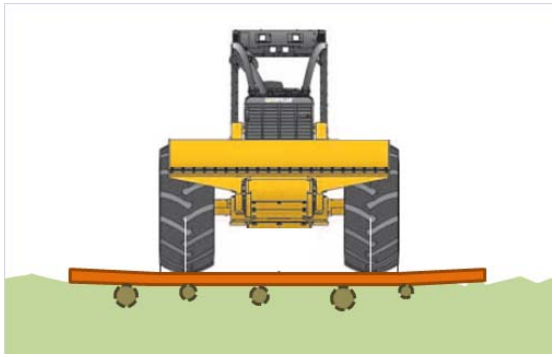
1. On Grade Mat Road. On soil conditions that are sufficiently level to drive across and do not contain large obstacles such as rocks or stumps it is appropriate to lay mats directly on the existing surface. Mats distribute load along the length of the mat and should be laid perpendicular to equipment travel to best distribute load when laid in an on grade application. A wider road will distribute load better than a narrow one, but this should be balanced against the total width of impact created in sensitive areas. Areas where mats are creating greater than a 4" depression should be reviewed for the correct choice of mat.



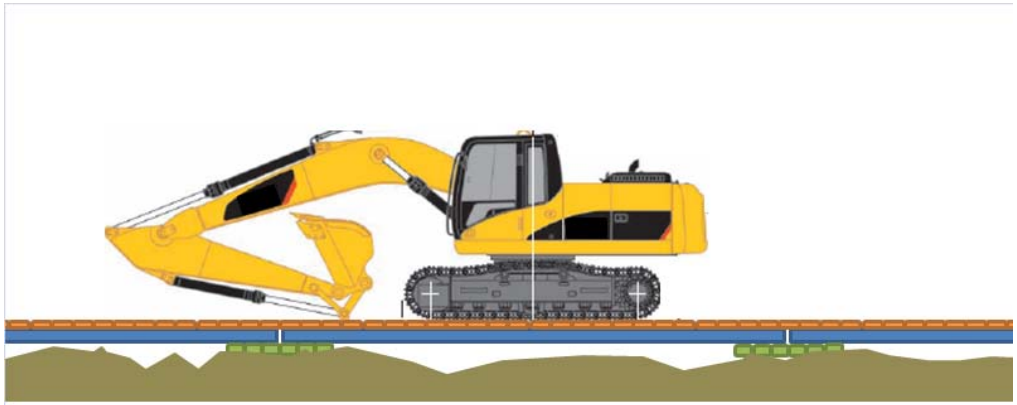


2. On Grade Stringer-Deck Mat Road. Very poor soil conditions in which a 200lb person would sink to their shins in the existing surface generally require greater distribution to maintain a mat road under continuous use. If an on grade mat road is laid with these soil conditions after a period of continuous use the mats will begin to pound or roll creating a road surface unsuitable for traffic. When these conditions exist a double layer of mats is recommended. Generally the mats are laid at a 90 degree orientation from layer to layer, one being parallel to traffic and the other perpendicular. Either direction can be laid first since the load distribution is generally sufficient with either method. Available native resources such as logs or branches can be laid as the first layer if the local regulatory agency approves. Surface conditions should still be relatively clear of obstacles for this method. If there is too much roll to the terrain to lay one layer parallel to traffic, a double layer both being perpendicular to traffic can be utilized.





3. Elevated Stringer-Deck Mat Road. Under severe terrain conditions where numerous obstacles are present such as exposed rocks, stumps, and uneven terrain an elevated mat road should be considered. An elevated mat road can also be used when it is necessary to accommodate uninterrupted water flow. This approach is generally more expensive than the on grade mat road techniques, but results in lower impact to the existing surface, and reduces wear and tear on equipment. Total ground impact is reduced by approximately 75% while resulting in a negligible increase to the maximum ground pressure on the existing surface.



MAINTENANCE

1. **Mat roads need to be inspected daily while they are in use.** Continuous traffic can cause mats to shift which can create damage to the existing surface as well as create a safety issue. Mats need to be adjusted periodically to ensure an efficient road. Areas of the road where mats exhibit greater than a 4” depression into the existing surface should be reevaluated for the proper matting choice or construction technique.

MAT REMOVAL AND CLOSE OUT

1. **Proper removal of a mat road can leave the existing surface in a near original condition.** Care should be taken to remove as much of the mat road while working on the mat road as possible, working in a backwards fashion. When all work is complete all matting material should be removed from the site unless it was borrowed material that was original to the area.
2. **Ensure that water flow is uninhibited in areas where the mat road was elevated.** Mats can shift while in use impairing the flow of water in an area where the mats were elevated to allow for water flow. It is important to check that original water flow is returned.