Chapter 16 Sign Maintenance, Repairs, Recycling and Disposal

16.1 Maintenance Objective

Plan, schedule, and perform maintenance with the objective of keeping signs, posters, and other traffic control devices clean, legible, functional, and properly positioned to facilitate safe use and enjoyment of National Forest System lands and to provide a favorable Forest Service image.

Signs should be replaced when:

- They are damaged.
- Their poor condition has an effect on safety of the traveling public.
- Their appearance reflects poorly on the agency.
- They no longer meet applicable standards.

16.2 Condition Surveys

Condition surveys should be performed to determine the condition and effectiveness of all traffic control devices, signs, and posters. Inspect retroreflectorized devices at night as well as during the day. As part of the condition survey, include evaluations of:

- Legibility.
- Retroreflectivity.
- Overall condition of device and supports.
- Placement.
- Visibility.
- Encroachment of vegetation.
- Continued sign need.
- Other identified conditions.

Develop and use field inspection checklists to guide the inspection process and document findings.

Promote a high level of awareness among field personnel to encourage them to recognize missing, improper, incorrectly placed, damaged, or deteriorated devices, and to report these to the person responsible for signing.

Develop and use field inspection checklists to guide the inspection process and document findings. Checklists also may be used to update the sign inventory (See Chapter 2 and FSH 7709.11). As a minimum, the checklist shall document the following:

- Route number
- Sign number
- Date and time of inspection
- Inspection findings
- Actions taken
- Name of inspector

Photos of the sign also are an excellent method of providing documentation and for ordering replacements for missing signs.

16.2.1 Retroreflectivity Inspections

Retroreflective signs lose their ability to reflect light as they age and when they are subjected to vandalism or other physical damage. The orientation of a sign also affects the rate of deterioration. Sign faces subject to direct sunlight for much of the day will deteriorate sooner than sign faces that rarely receive direct sunlight.

Use one or more of the methods described below to perform retroreflective inspections to ensure minimum retroreflective levels required by Federal standards (refer to Section 3.3.2) are being met:

1. Drive the road at night, with the headlights on low beams, and note any signs with obviously deficient retroreflectivity. Older drivers are better suited for this task as they require greater levels of luminance from retroreflective signs to rate the sign as acceptable.
   Also use this procedure for night inspections of other traffic control devices, such as pavement striping, barricades, and traffic cones.
2. Shine a beam spotlight (1,000,000 candlepower or greater) on signs during daylight or use a mirror to reflect sunlight on the sign face. With a little practice, signs that are losing their retroreflectivity can be detected.
3. To check signs with questionable retroreflectivity at night using a simple visual comparison, obtain a piece of sheeting that exhibits an acceptable minimum level of retroreflectivity and compare it with the retroreflectivity of the existing sign by:
   - Affixing a piece of sheeting (an approximately 8- by 10–inch piece of sheeting of the same color and having the chosen minimum level of retroreflectivity) to the face of the sign with masking tape.
   - Step back about 30 feet. Hold a flashlight about 2 inches from your eyes and shine it at the sign. Do not use vehicle headlights.
   - If the piece of sheeting is brighter than the sign, the sign should be replaced within a year.
   - If the sign is brighter than the piece of sheeting, the sign may not have to be replaced for a number of years.
   - If the sign and the piece of sheeting appear of equal brightness, the sign may have 1 or 2 years of useful life left.

     In the daylight, this method may be used with a bright spotlight beam or a mirror reflecting the sun.
4. Use a retroreflectometer to measure the sign's retroreflectivity in the field. Because this equipment is costly and the process is time consuming, it should be limited to signs identified through other inspection techniques as having questionable retroreflectivity.
5. Procure retroreflectivity inspections. If a unit has a high number of retroreflective signs, consider contracting to have the measurements recorded by a qualified contractor.

16.2.2 Inspection Documentation

Document all inspection findings as they are completed. Report retroreflectivity findings in three categories:

- Signs needing immediate replacement or repair
- Signs that should be replaced within 3 years
- Signs that have adequate retroreflectivity

16.3 Maintenance Plan Development

Develop maintenance plans based on:

- Results of condition and retroreflectivity surveys.
- Review and analysis of vehicle accident records in which signing or lack of signing was a factor.
- Review and analyze road users' complaints, suggestions, or comments.

Determine whether the sign should be repaired or replaced. Often it is less expensive to replace a badly damaged or illegible sign than to attempt extensive repairs. Compare repair cost vs. likely extended sign life with new sign cost and service life when making decisions.

Replace nonstandard signs based on safety, priorities, and available resources.

The sign maintenance plan may be implemented separately or as part of the annual road maintenance plan. See Chapter 2 of this Guidebook and the *Transportation System Maintenance Handbook* (FSH 7709.58).

16.4 Sign Maintenance

Perform maintenance on a regular and systematic basis to as necessary and practical with the objective of keeping signs and other traffic control devices clean and functional. Use only those materials (paints, stains, sheeting, edge tape, and hardware) that comply with the applicable specifications for the sign or traffic control device being refurbished. Evaluate the maintained product against the standards for materials and workmanship established by the original manufacturing or construction specifications.

- Check and replace top edge tape on a routine basis.
- Clear small trees, brush, and other vegetation that may obscure signs. Ensure that fences or other objects do not obscure signs. Relocate signs if obstructions cannot be eliminated.
- Clean signs obscured by dust, bituminous materials, road film, mud, fungus, and vandalism to restore legibility and retroreflectivity.
- If there is a history of repeat vandalism, consider ordering replacement signs with a clear protective overlay sheeting over the entire face of the sign. Various companies make clear, pressure-sensitive sheeting, with brand names such as Vandal Guard. This sheeting resists spray paint and other forms of vandalism. See Chapter 14.

16.4.1 Maintenance Performance

Use the following procedures for cleaning signs:

Dust, road film, mud. Flush sign surface with clean water to remove loose dirt, or scrub sign face with a soft brush, rag, or sponge using a mild nonabrasive detergent or other suitable cleaner. Scrub from the top down. Avoid abrading the surface or damaging the interior structure of the high-intensity sheeting with unnecessary scrubbing. Keep a steady stream of water flowing on the sign face to wash away dirt. Rinse the entire sign face with clean water.

Avoid abrading the surface or damaging the interior structure of the high-intensity sheeting with unnecessary scrubbing.

Tar, oil, diesel fuel, bituminous material. Use a mild solvent such as mineral spirits. Then wash the surface with mild detergent and water and rinse with clean water.

Pollen and fungus. Wash the surface with a 3- to 5-percent sodium hypochlorite solution, such as a commercial brand of bleach, followed by detergent and water. Rinse with clean water.

Lipstick and crayon. Use a mild solvent such as mineral spirits to remove the material. Follow with detergent and water and clean water rinse.

Spray Paint. It may be possible to remove paint sprayed onto a reflective sheeting sign face by using a commercial paint remover designed for this purpose. The type of paint, length of exposure, and type of remover may affect the life of the sheeting. Consider ordering a clear overlay sheeting on future signs in locations subjected to this type of vandalism.

Paint ball gun damage. The impact damage from paint ball guns often appears much less severe during daylight than at night. This is especially true on high-intensity and diamond-grade sheeting because the interior prism structure of the sheeting is easily damaged. The impacted area on damaged signs will appear as a “black blob” on the otherwise retroreflective sign when viewed at night with headlights. If sheeting is damaged, it will need to be repaired or replaced.

Other severe contamination. Soiling that cannot be removed by traditional methods may be removed by scrubbing with a very fine steel wool or plastic kitchen scour. However, if this scrubbing is not done carefully, it may destroy all or part of the sign’s retroreflectivity. Heavy scrubbing can also damage the reflective geometry of high-intensity or diamond-grade sheeting.

If special cleaning procedures have been used, signs may need to be inspected at night to determine if the cleaned area has lost too much of its retroreflectivity. Replace those signs with insufficient retroreflectivity.

16.4.2 Retroreflective Sign Repairs

Minor damage may be repaired in the field without removing the sign from its support. Repair of major damage normally requires that the work be performed in a sign shop. Extensive repairs can easily cost more than a new sign and often do not increase sign life significantly. Some repairs may be made so the sign is operational until a replacement can be ordered and installed.

It may not be necessary to repair each bullet hole or puncture in a sign.

It may not be necessary to repair each bullet hole or puncture in a sign, especially if the sign was shot from the front side. Bullet damage is usually much more evident in the face of signs with an aluminum substrate than with signs constructed on a fiberglass or plywood substrates (sign board). When a bullet hole does not damage the message or symbol and does not, by itself, create a sloppy signing image for the Forest Service, maintenance may not be needed.

Where repairs are needed, follow the steps for the specific type of substrate.

16.4.2a Aluminum Substrate Signs

Bent signs. Straighten bent aluminum sign substrates with a hammer and flat automotive body dolly. If the reflective background or legend has been scraped or damaged, remove any additional sheeting damaged during straightening.

Bullet holes or punctures. Patch the bullet hole or puncture on both sides with a heavy aluminum foil tape using a squeegee to apply firm pressure. Do this on both sides of the sign. On large holes, start placing the foil at the bottom of the hole, overlapping each strip in a shingle fashion to the top of the hole.

If the back of the sign has been painted, use an aerosol can of enamel paint (color to match back of sign board), lightly spray the aluminum tape covering the holes on the sign back.

16.4.2b High-Density Overlay Plywood Substrate Signs

The following procedures are recommended for repair of bullet holes and other damage to high-density overlay (HDO) plywood or fiberglass substrates:

- Remove all loose substrate material on both sides of the sign and all damaged sheeting.
- Fill holes with wood filler or auto body filler such as Bondo®, smooth with a putty knife, and sand smooth.
- Wipe area with clean cloth or with denatured alcohol.
- On larger repairs it may be desirable to reinforce holes with fiberglass mesh before applying the auto body filler.
- Use a squeegee to smooth the repair area. If the repair is still not flush with the sign, file or rasp the repair before it sets hard, then sand the repair smooth once it sets hard.

16.4.2c Retroreflective Background Sheeting Repairs

If the reflective background has been scraped or damaged, proceed as follows once the substrate for the sign has been repaired.

- Remove all background sheeting and legend from an area slightly larger than the area that has been damaged.
- Clean exposed surface with a mild detergent and rinse with clean water or with denatured alcohol and wipe with a clean cloth.
- Apply matching pressure-sensitive reflective background sheeting, extending it at least $^1/_2$ inch beyond the damaged area.

16.4.2d Retroreflective Characters and Border Repairs

The message (legend, characters, and border) can be reapplied using die-cut, pressure-sensitive, prespaced letters, borders, and symbols. Replacing more than one or two letters and symbols on the original background sheeting of a sign is more difficult. Consider ordering an entire line of a sign's message and symbols preapplied to strip of matching pressure-sensitive sheeting from a sign company. Specify the exact letter height and length of the replacement message.

At best, sign life can be extended for a few years using these methods.

This technique can also be used to change a line of text that is no longer appropriate in an otherwise functional sign. Apply the replacement characters as follows:

- Properly position the entire replacement message on the sign and tape it to the sign with masking tape or top application tape across the entire top edge of the replacement message. The tape holds the replacement message in the proper alignment on the sign so the backing paper on the pressure-sensitive sheeting can be removed.
- Hinge the replacement message up using the tape to form a hinge so the backing paper can be removed.
- Once the backing paper is removed from the pressure-sensitive adhesive, slowly lower the replacement message with the pressure-sensitive adhesive and use a squeegee to iron out the repair and remove air bubbles.

- If air bubbles persist, use a pushpin to pierce the bubbles and then again squeegee out the air.

If the sign is subjected to snow burial and the replacement sheeting extends to the top edge of sign, place a 2-inch strip of clear-top application tape over the top edge. If the sign repair sheeting is at midpoint in the sign, it is still beneficial to apply a strip of clear-top application tape entirely across the top edge of the replacement characters. The clear tape protects the sheeting and provides protection to the characters from peeling if the sign is subject to snow burial.

At best, sign life can be extended for a few years using these methods. For heavily damaged signs, these methods can provide a usable sign until a replacement can be ordered and installed.

16.4.3 Routed Wood Sign Repairs

The following procedures are recommended for either natural woods or medium density overlay (MDO) plywood signs.

- Scrape off loose paint with a wire brush. Dress all bullet holes and damaged wood with a knife.
- Fill all cracks, holes, and imperfections with wood or auto body filler. Use a putty knife to smooth filler as much as possible.
- Sand sign edges, back, and face. Do not sand into the surface overlay on MDO substrate signs.
- Remove all loose paint, dust, and other foreign materials.
- Route the affected letters and symbols back into the sign using a template.

16.4.3a Maintenance of Routed Fiberglass Substrate Signs

The colors in wood-grained fiberglass signs are imbedded in a gelcoat and should not require repainting. Dirt, paint or graffiti often can be removed using a pressure washer or a solvent such as acetone. Periodic cleaning by wiping of the sign will remove dust and pollens. If the face appears to be oxidizing, the sign can be waxed with automotive polish containing a UV protection to restore the original appearance.

16.4.3b Repair of Routed Fiberglass Substrate Signs

Most damage to routed fiberglass signs can be repaired.

Most damage to routed fiberglass signs can be repaired. Bullet holes can usually be repaired/filled on site. Contact the manufacturer for advice on major repairs and for color-matched putty repair kits. The repair putty requires a catalyst available from an automotive paint supply. Follow manufacturer directions for mixing the putty with the catalyst. Typically, 4 to 6 ounces of putty is poured into a small cup and is mixed with 4 to 5 drops of catalyst. (The higher the air temperature, the faster the catalyst will set—usually 5 to 15 minutes.

It is best to fill holes from the back of the sign after covering the front of the hole with masking tape. Press the putty from the back of the sign with a stick or putty knife until the tape on the front of the sign starts to bulge. Smooth out the surfaces of the sign before the putty sets. The general area around the spot of repair can be cleaned up with solvents (acetone) if needed.

In the case of a name change or when damage to the sign is extensive, such as from a vehicle impact or shotgun damage, the sign can be sent to the manufacturer for repairs and, in most cases, can be repaired for about half the cost of a new sign.

16.4.3c Painting Routed Signs

If the repairs are extensive, make the following repairs with the sign removed from the mounting and lying flat.

- Apply a primer coat first and then apply two coats of paint to the sign message using a short fiber roller. Hint: Instead of cleaning the roller, wrap the roller in tin foil between coats to prevent it from drying. For extended periods of storage, place the paint roller wrapped in tin foil in a deep freeze to preserve the roller between uses.
- Let paint dry thoroughly between coats.
- Apply two coats of paint to the background area.
- Work paint thoroughly into all corners of letters and numbers if the sign remains mounted. If the sign has been removed and is lying flat, paint for the letters can be flowed into the letters using a high-quality squeeze bottle, such as one used in a hair salon.
- Touch up letters if background paint contaminated the message.

16.4.3d Staining Natural Wood Signs

- Handpaint the message area, keeping paint off the sign face.
- Apply two coats of stain to the background area.

All painting and staining operations shall be in accordance with the specific requirements of the appropriate manufacturing specifications (Chapter 14).

16.4.3e Other Sign Materials

For other sign substrate materials not covered above, consult with the material manufacturer or provider for specific maintenance procedures.

16.4.4 Supports and Hardware

As necessary, repair or replace damaged or deteriorated sign supports and associated mounting hardware.

16.5 Pavement Markings

Maintain pavement markings to preserve uniformity in design, position, and application.

Renew striping and other pavement markings when legibility has decreased and they are no longer effective.

Renew striping and other pavement markings when legibility has decreased and they are no longer effective. Follow the recommended application practice of the material manufacturer, the pavement marking machine manufacturer, and current Forest Service specifications.

Remove temporary traffic stripes or lane lines when they are no longer applicable. Also remove pavement stripes that are no longer appropriate for current traffic flow. Methods available for stripe removal include chemical paint removers, sand blasting, high-pressure water jet, grinding, and high temperature burning. Regardless of the method used, all evidence of existing striping must be removed and the pavement surface restored to a condition similar to the adjacent roadway surface.

Do not paint over pavement markings with black paint or bituminous materials as these smooth materials reflect light when wet and still appear to be a pavement marking. In addition, the cover paint will eventually wear away and the original lines will reappear.

16.6 Record Keeping

Record all maintenance accomplishments. Identify by individual sign the date, specific work performed, and any additional work needed. Accurate records showing the type and frequency of maintenance performed aid in determining service life and future budget needs. They also are extremely important as evidence in tort claim situations.

16.7 Recycling

Signs that are damaged, no longer serviceable, or do not meet current standards should either be recycled or disposed of. If the substrate of the sign is still in good condition or is repairable, it may be refaced and used in a new sign. Large signs may be made into several smaller signs. Aluminum signs also may be used for various small metal projects such as mounting brackets.

16.7.1 Recycling Retroreflective Signs

Signs with retroreflective sheeting can be refaced with a new sheet of retroreflective material after the substrate has been repaired and the old sheeting stripped. Aluminum substrates that are not bent or shot can be planed to remove the sheeting and refaced with a new sheet of retroreflective sheeting. Bent signs may be straightened and resurfaced.

16.7.2 Recycling Routed Wood Signs

Routed wood signs with unneeded messages or holes and blemishes can often be repaired. Large holes in MDO plywood and natural lumber can be filled with fiberglass epoxy material such as Bondo®. Split, warped, and unusable natural boards can be sawed out and reglued with new boards, or the face can be planed and sanded to remove the old message and a new message routed. A new message can sometimes be routed on an unused back face. It is also possible to reface a sign with a new routed fiberglass sign glued or bolted over the old sign.

Routed wood signs with unneeded messages or holes and blemishes can often be repaired.

16.8 Disposal

Follow the procedures in FSH 6409.31, “Sale, Abandonment or Destruction of Personal Property,” to dispose of signs.

When signs have no use or sales value and cannot be donated, they should be destroyed provided:

- The sign has no commercial value either as an item or as scrap.
- The cost of handling, care, and preparation of the signs would be greater than the expected sale proceeds.

When signs are to be disposed, destroy them so they are no longer usable as a sign and remove all government identification.

Aluminum signs should be cut, rolled, or bent and taken to a recycling center.

Large wood and fiberglass signs should be cut into smaller sizes to facilitate handling.

16.8.1 Documentation of Disposal

Disposal of individual signs with an acquisition cost over $500 should be documented on an AD-112 “Report of Unserviceable Lost or Damaged Property.” Items under $500 may be destroyed without an AD-112, although a signed statement of accomplishment action should be retained.