

Minnesota Highway Department Research and Standards Division Maintenance Standards

Maintenance Quality Standards for Traffic Services Operations

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PREFACE

Quality standards for maintenance operations have been developed to promote statewide uniformity in maintaining the Interstate and trunk highway system. The standards prescribe levels of service for the maintenance of roadway surfaces and shoulders, roadsides, drainage facilities and structures, snow and ice control and traffic services operations.

The levels of service should be interpreted as Highway Department policy for maintenance operations. However, it is expected that the area maintenance engineer will continue to exercise his judgment to cover those situations that warrant more or less maintenance than indicated by the standards. While variations in local conditions must be allowed for, it should be understood that deviations from a standard must, insofar as possible, be consistent with the intent of the standard.

Changes in the standards will be considered by the Maintenance Standards Advisory Committee and shall be consistent with available resources.



QUALITY STANDARDS TRAFFIC SERVICES

GENERAL

Traffic services facilities include all highway signs, traffic lines and markings, guard rail, dust control, lighting, traffic signals, and detours. Each of these facilities has a definite function to perform in the regulation and safe and efficient movement of traffic. In order to function most effectively and retain their authority, traffic control facilities must be well maintained.



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QUALITY STANDARD TRAFFIC SERVICES OPERATION 31 SIGNING

Highway signs are erected to convey specific messages to the traveling public. They are classified as follows:

- Regulatory signs advise the highway user of traffic laws or regulations that apply at a given place or on a given highway.
- 2. Warning signs call attention to conditions or locations which are potentially hazardous to traffic operations.
- Guide signs given direction and information such as route numbers, destinations and distances.

Highway signing should be executed jointly under the direction of the traffic and maintenance engineers. The district traffic engineer will provide Traffic Control Orders and layouts for all new sign installations and make any revisions which may be required. The area maintenance engineer is responsible for the installation of signs as called for in Traffic Control Orders and layouts provided by the district traffic engineer. He is also responsible for the maintenance of all signs after they have been installed. This responsibility should be delegated to the signmen, sub-area foremen and maintenance men.

The following is a list of the responsibilities of the maintenance men:

- 1. Signs should be kept in proper position and legible at all times.
- Damaged signs should be replaced with new signs. Signmen should be notified if assistance is required.

3. Signs with bullet holes should be replaced only if the message is

distorted or it is felt that the sign will not provide the service for which it was intended.

- 4. Signs defaced with paint should be reported to the signmen as soon as possible. These can occasionally be restored with certain kinds of paint remover.
- 5. Signs should be checked for missing or loose bolts; not only those used to hold the sign but also those used to splice the posts.
- 6. Signs should be checked for damage and legibility as soon as possible after a snow storm or when slushy conditions have prevailed, and cleaned if necessary.
- Any vegetation that may interfere with the visibility of signs should be removed.
- 8. All sign lighting outages or malfunctions should be reported to the district traffic office.
- 9. When posts are installed in areas of highway lighting, location of the buried power cable should be determined prior to installation to insure that the cable will not be severed.

The following is a list of the responsibilities of the signmen:

- 1. Signs should be installed as called for in Traffic Control Orders and signing layouts furnished by the district traffic engineer.
- 2. Signs should be positioned as nearly as practicable in compliance with the location and height called for in the Manual on Uniform Traffic Control Devices. NOTE: To avoid specular glare, signs should be turned outward approximately 3° from a plane perpendicular to the traffic lane.



- 3. When posts are installed in areas of highway lighting, location of the buried power cable should be determined prior to installation to insure that the cable will not be severed.
- Records should be kept that will show how many new or reconditioned signs and posts were used and where they were installed. Reference may be made to mile posts, or control sections.

The following applies to sign fabrication:

- Sign blanks should be cleaned with a non-oil base cleaner or thinner before sheeting is applied.
- 2. Sheeting applied to the sign blanks should provide a wrinkle-free and bubble-free sign surface. The joints of the sign sheeting on the sign face should be carefully lapped or butted to eliminate the possibility of an open joint or an area of weakness on the sign face. The sign sheeting should be selected to provide a sign of uniform color.
- 3. The sign face should be cleaned to provide a clean and dry surface and the letters should be cut to form a neat and uniform message in accordance with layouts in the Standard Signs Manual, 5-992.
- The completed sign should have a protective coating applied uniformly to the sign face.

The following applies to periodic sign replacement:

1. The periodic sign replacement program is based on a sign life expectancy of approximately 5 years. As a result, each maintenance area should be divided into 5 sign replacement divisions. The boundaries should be such that there is approximately the same number of signs in each division.



Depending upon the geographic layout of the maintenance area, the general division should be controlled either by area or by route. By establishing a rotation program, all highway signs in each division should be replaced approximately every 5 years.

- 2. Prior to each year's replacement program, the district traffic office should review each roadway scheduled for replacement that year. At this time, any additional signing, relocation of signing, or removal of needless signing can be incorporated into that year's program.
- 3. The replacement program includes the use of the latest standards for sign design, dimensioning, mounting, and roadway location.
- 4. As each new sign is installed, the mounting should be checked for deterioration. Bent or excessively rusted posts should be replaced with new or reconditioned posts.
- 5. Signs that have recently been replaced on the roads scheduled for replacement may be left as is, provided that they are still in a like new condition and conform to 3 and 4, above.



QUALITY STANDARD TRAFFIC SERVICES OPERATION 32 TRAFFIC LINES AND MARKINGS

Traffic lines and markings are traffic control devices in the form of symbols, words and patterns painted or otherwise delineated on the pavement and curbs to regulate and direct traffic.

Traffic lines and markings should be placed in accordance with the current Manual on Uniform Traffic Control Devices for Streets and Highways of the State of Minnesota. Striping or marking for any condition not specifically detailed in the Manual should be placed in a manner as directed by the District Traffic Engineer.

Pavement markings should generally be applied when the pavement temperature is 50°F. or above, and when the pavement is dry. On heavily traveled urban highways, or where new construction is completed late in the fall, it will be necessary to disregard this temperature requirement in the interest of safety to the traveling public. All roadways should be swept with a single pass of a power broom, if needed, prior to painting.

Each maintenance area or district should establish priority schedules for striping, giving preference to hazardous or unusual locations, and to the more heavily traveled routes. Centerline striping should generally be given priority over edge striping.

The work program should be planned to avoid striping on routes during periods of high traffic concentration resulting from fairs, athletic events, celebrations, or daily peak volumes.

Coordination of pavement markings with other maintenance operations such as crack filling, joint sealing, seal coating and shoulder repair, and with construction scheduling, is also necessary.



Operation 32 Traffic Lines and Markings Page 2

Pavement stripes and markings should be placed on all newly constructed bituminous surfaces or seal coated surfaces, which are open to traffic, as soon as the surface has cured sufficiently. On plant mixed bituminous surfaces and on plant mixed seal coats, the maximum time elapsed should be 48 hours. Many variations exist in the cure time for seal coats due to materials used, traffic volumes and weather conditions; however, traffic safety must be given considerable priority. Generally, satisfactory striping can be obtained 10 days after completion of the seal coat.

All newly constructed roadways from which traffic has been diverted should be completely striped and marked before traffic is routed thereon.

All surfaced temporary bypasses should be properly striped and marked before traffic is routed thereon.

The following table should be used as a guide to determine frequency and rate of application for the various pavement marking operations:

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OPERATION GROUP 32 - Traffic Lines & Markings

Frequency 1/

Application Rate 2/

Operation	Routes 0-1000ADT	Routes 1000-5000ADT	Routes Over 5000ADT	
Skip Stripe Centerline	Every 2 years	Ever y Year	Yearly or renew when 50% gone	15 mils thick Approx. 6.5 gal/mile
Skip Stripe and Hazard Centerline	Every 2 years	Every Year	Yearly or renew when 50% gone	15 mils thick
Double Yellow Stripe	Every 2 years	Every Year	Yearly or renew when 50% gone	15 mils thick Approx. 30 gal/mile both stripes
Edge Stripe	3 years	3 years	Yearly	10 mils thick Approx. 10 gal/mile each edge
Curb Paint	2 years	Yearly	Yearly	Complete coverage
Stripe Turn Lanes and Gores	Every 3 years	Yearly	Yearly	15 mils thick
Air Patrol Markers	Every 2 years 3/	Yearly 3/	Yearly	Complete coverage
Pavement Messages	Every 2 years	Yearly, or renew when 50% gone	Yearly, or renew when 50% gone	Complete coverage

1/ Minimum. Unusual conditions may require more frequent application
2/ values shown are for the MHD Standard Traffic Paint
3/ Markers placed on surfaced shoulders rather than on the traveled roadway may require renewing at less frequent

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QUALITY STANDARD TRAFFIC SERVICES OPERATION 33 GUARD RAIL 6/2/71

Guard rail and guide posts shall include all barriers normally installed parallel to the roadway. Guard rail serves to keep vehicles from leaving the roadway at hazardous locations, to prevent cross-median accidents, and to reduce the severity of collisions with fixed objects. Guide posts serve as a means of delineating the roadway edges.

It is the responsibility of the maintenance crews to maintain all existing guard rail and guide posts and to replace with new type installations when required.

DUMMY (GUIDE) POSTS

- A. The standard two lb. metal post with a standard reflectorized white delineator should be used for this purpose on all roads where their use may be required in accordance with established standard locations.
- B. Existing wooden or other type guide posts are to be replaced with the appropriate metal post and reflector as the occasion demands.
- C. Guide posts of all types should not be field painted.
- D. Inspections of guide posts should be made during routine patrols by maintenance personnel and timely repairs made when necessary. Maintenance and repair work may consist of washing reflectors, replacing damaged or deteriorated posts and reflectors, and repairing bent posts.

GUARD RAIL

A. Posts should be of wood or metal and spaced in accordance with established standards.



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B. Wood posts should be treated with preservative in accordance with State specifications. Broken or rotted posts should be replaced immediately.
Posts loosened by accidents should be thoroughly tamped in place in vertical position.

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- C. Broken cable and fittings and damaged plate beam sections should be repaired or replaced immediately.
- D. Cable tension and post alignment should be checked and corrected if required each fall and spring.
- E. No painting or refinishing of any type guard rail should be accomplished in the field. Rusted or deteriorated sections should be removed and replaced in kind with new or refinished material.
- F. Ineffective delineation material should be replaced routinely by field maintenance crews.



QUALITY STANDARD TRAFFIC SERVICES OPERATION 34 DUST CONTROL

Dust control on gravel roads and/or shoulders is required for traffic safety and convenience as well as the conservation of gravel material. This is usually accomplished through the application of calcium chloride in either dry or liquid form.

Application of calcium chloride for dust control on gravel shoulders should be restricted to residential or commercial areas.

Application of calcium chloride for dust control purposes on gravel roadways should be restricted to (1) residential or commercial areas, (2) spot coverage 250 feet either side of farm homes, and (3) other roadways where average daily traffic exceeds 200 vehicles per day.

Calcium chloride should be applied after the road beds have become stabilized following the spring break-up period. Normally two applications per season will be required; however, engineering judgment may indicate one application is sufficient.

The dry application rates for the first treatment should be 1.0 pound per square yard Type 1 regular, or 0.8 pound per square yard Type 2 concentrated calcium chloride in flake or pellet form.

If used in liquid form, a 34 percent calcium chloride solution should be applied at the rate of 0.2 gallon per square yard of Type 1 regular, or 0.16 gallon per square yard of Type 2 concentrated calcium chloride for the first treatment. The second treatment should be made before the first treatment has become totally ineffective. This usually occurs in August, depending on the rainfall during the intervening period.

The second treatment should be applied at the rate of 50 percent of the first treatment.

QUALITY STANDARD TRAFFIC SERVICES OPERATION 35 LIGHTING

Highway and sign illumination is provided to improve driver visibility and to promote safer and more efficient use of the highway facilities. Malfunctioning lighting is not only a hazard, but also reduces the effectiveness of the adjacent lights in the system.

The maintenance and repair of all lighting fixtures is the responsibility of the Fort Snelling Electrical Services Shop, or others, except those items listed below which should be performed by maintenance area personnel:

- The maintenance forces in each maintenance area should provide emergency removal service for damaged or knocked down light standards. If necessary, the damaged lighting standard, pole and miscellaneous debris should be hauled to a salvage area.
- 2. In some areas, scheduled maintenance area night patrols should provide bi-monthly surveillance for highway lighting and sign illumination systems and defective lights should be reported to the district traffic office. The report should be in writing and should include the pole number and the date the outage was reported. The district traffic office should then fill out the Lighting Maintenance Record to insure prompt repair of the outage.
- 3. At all times, <u>ALL</u> maintenance personnel should be alert to any lighting defects or damage, and such deficiencies should be reported to the district traffic office. In most cases, a radioed report should be sufficient, and if possible, should include the pole number of the reported light or sign.



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QUALITY STANDARD TRAFFIC SERVICES OPERATION 36 TRAFFIC SIGNALS

Highway traffic signals include all power operated control devices by which traffic is warned or directed to take some specific action. Their purpose is the orderly assignment of right-of-way to the various traffic movements. It is essential that such signals be operated and maintained by the agency having jurisdiction over them.

At all times, <u>all</u> maintenance personnel should be alert to any traffic signal malfunctions or damages, and such deficiencies should be reported as soon as possible to the district traffic office. Improperly operating traffic signals may be a serious traffic hazard.

The maintenance of all highway traffic signals is the responsibility of State personnel from the Fort Snelling Electrical Services Shop, or others, except those items listed below, which may be performed by maintenance area personnel:

- The responsibility for relamping, cleaning and painting of signals will vary between districts. Where this function is performed by maintenance personnel, the following standards should apply:
 - a. Group relamping should be done on a planned schedule based on rated bulb life, but not to exceed an interval of one year. At the time the bulbs are changed, all reflectors, lenses, and heads should be given a thorough cleaning.



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> b. Traffic signal standards and control cabinets should be repainted at least once every five years, or more often if necessary. The following paints should be used:

> > Aluminum #3528 for mast arms and controller cabinets Dark green #3552 for pedestal and mast arm pole bases Yellow #3572 for pedestal shafts, mast arm poles, and guard posts

Dull black for visors, louvers and doors

When painting control cabinets, care should be taken to prevent excess paint from filling the locking mechanisms.

2. Signals and flashers suspended on span wires should be checked for height at least once a year, preferably in the spring. The bottom of the signal heads should be a minimum of 16 feet above the centerline of the roadway.



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QUALITY STANDARD TRAFFIC SERVICES OPERATION 38 DETOUR

A detour is defined as a temporary route over one or more highways to carry traffic while construction or maintenance work is performed on the trunk highway for which the detour was established.

Where a trunk highway is not available as a detour, county, township, or municipal roads or streets may be used in which case the State assumes full responsibility for maintenance. A bypass is distinguished from a detour in that it is contained in the right of way of the trunk highway which it serves.

When the State is maintaining a detour, all work essential to the maintenance of that detour should be performed during the time that the temporary trunk highway order is in effect. Work essential to the carrying of traffic over a detour may be performed after its official designation has been made. All maintenance work performed should conform with the Quality Standards written for each operation.

In some cases, local authorities may prefer to maintain the detour. A maintenance agreement is then written which permits the maintenance by local authority and relieves the State of the responsibility.

