Turfs exposed to vehicular traffic are subject to wear injury and compaction stress. The severity of turfgrass injury in heavily trafficked conditions depends upon the traffic type and intensity, turfgrass species or cultivar used, environmental conditions, and the cultural practices employed. Turf managers should select wear and compaction tolerant grasses and employ cultural practices that enhance the ability of turfs to grow under these conditions. In addition to these aspects, physical factors that protect the turfgrass plant from wear and compaction injury may also be used to help turf persist in heavily trafficked areas.

Paver complexes (i.e. concrete, brick, and plastic materials) have been designed as physical support systems for turf growing in areas such as parking lots, fire lanes, and golf car paths, where traffic stress may be a problem. Paver complexes are designed to allow the turfgrass plant to grow in void areas while the crown or growing point of the plant are protected from traffic injury by placement below the paver surface or by waffle-like protrusions on the paver surface.

One of these turfgrass-paver complexes was tested at the University of Nebraska Turfgrass Research Facility located at Mead, Nebraska. The paver complex was tested to determine its influence on turfgrass establishment, quality, wear tolerance, and recuperative potential. Information of this nature is needed to help turf managers better understand the advantages and disadvantages of using such a system in heavily trafficked areas.

Six turfgrass species were included in this study: (1) Manhattan perennial ryegrass, (2) Merion Kentucky bluegrass, (3) Kentucky 31 tall fescue, (4) Dawson creeping red fescue, (5) Highlight chewings fescue, and (6) Fairway crested wheat-grass. These species were selected because they were commonly used in Nebraska and they covered a range of wear tolerant and intolerant species. The grasses were established in two areas, one with the paver system and an adjacent area planted in soil (Sharpsburg silty-clay loam). Once the turfs were established, they were mowed weekly at 3.0 inches; watered to prevent drought stress; and fertilized with three pounds of nitrogen (45-0-0) per 1,000 sq. ft. per growing season.

Some of the relative effects of the grass-paver complex on establishment, winter survival, and turf quality are indicated in Table 1. The grass-paver complex adversely affected turf quality for Manhattan and Merion but enhanced the quality rating for Fairway crested wheatgrass. The reduced turf quality rating for Merion was primarily due to its slow establishment rate in the paver complex compared to that in the non-paver area. Merion and Fairway established more slowly in the paver complex than the soil area; while Manhattan, Kentucky 31, Dawson and Highlight established equally as well in either area.

Winter survival of susceptible grasses was adversely affected by the grass-paver complex during the seedling year. The six species were established in September, 1976. During the following winter, snow cover was lacking and temperatures were ex-
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tremely low. As a result, Manhattan perennial rye-
grass and Kentucky 31 tall fescue were injured by
direct low temperature injury in both the paver
and non-paver areas, but injury was greatest in the
grass-paver complex. Turf managers should be
aware of this as a potential problem. Selecting cold
tolerant species and cultivars and avoiding late fall
plantings should help minimize potential problems
from low temperature and desiccation injury.

Wear treatments were applied, using an 18-
horsepower Cushman truckster. Each turf was sub-
jected to 600 trips with the truckster over a four
hour period. Subsequent wear injury and
recuperative rates were evaluated (Table 2). Wear
injury from the 600 trips was quite severe, particu-
larly on grasses such as chewings fescue and
crested wheatgrass which are wear intolerant
species. The grass-paver complex improved tur-
growth wear tolerance and recuperative potential for
all the turfgrasses except for Merion Kentucky
bluegrass. The paver system was most beneficial in
helping grasses that were very susceptible to wear
injury (i.e. Fairway crested wheatgrass, chewings
fescue, and creeping red fescue), but it was even
beneficial to those that were fairly wear tolerant.
Loss in turfgrass quality (density and uniformity)
associated with the paver complex was offset by its
improvement in turfgrass wear tolerance and
recuperative rate.

Turfgrass-paver complexes can play a beneficial
role in maintaining turfgrasses that are exposed to
intense traffic, particularly in areas like overflow
parking, driveways, cartpaths, walkways, and
firelanes. Placement of paver systems, regardless
of type or construction, is extremely important. The
paver must be situated so that the crown of the tur-
growth plant is protected from injury. If the paver
system is improperly placed, its purpose is
defeated and no improvement in wear tolerance or
recuperative rate will be obtained.

Turfgrass-paver complexes are not without
management difficulties. Thatch accumulation and
its removal could be a problem. Turf managers
should select turfgrasses that have a minimum
thatching tendency and use cultural practices that
reduce thatch accumulation. Snow removal on
paver complexes with surface protrusions can be a
problem; however, float devices for the snowplow
blade minimize the problem. Oil and gas spills can
be a problem in parking areas, and repair of
damaged areas may be necessary. Increased soil
temperatures were thought to be a problem in
paver complexes. However, in this study no differ-
ences were noted in soil temperatures beneath
turfs growing in the paver and non-paver areas. Mowing was not a problem in either area and turfs
used similar amounts of water.

<table>
<thead>
<tr>
<th>Turfgrass Species</th>
<th>Rate of Establish-</th>
<th>Percent Ground</th>
<th>Winter Survival</th>
<th>Turf Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manhattan perennial ryegrass</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Merion Kentucky bluegrass</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Kentucky 31 tall fescue</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Dawson creeping red fescue</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Highlight chewings fescue</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fairway crested wheatgrass</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>+</td>
</tr>
</tbody>
</table>

1Ratings based on + = better than, - = poorer than, and 0 = no different than turfs in the non-paved area.

<table>
<thead>
<tr>
<th>Turfgrass Species</th>
<th>Wear Tolerance</th>
<th>Recuperative Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manhattan perennial ryegrass</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>Merion Kentucky bluegrass</td>
<td>0</td>
<td>+</td>
</tr>
<tr>
<td>Kentucky 31 tall fescue</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Dawson creeping red fescue</td>
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<td>+</td>
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</tr>
</tbody>
</table>

1Ratings based on + = better than, - = poorer than, and 0 = no different than turfs in the non-paved area.