

The University of Rhode Island Porous Asphalt Parking Lots

NEMO U 5 – Middletown, CT

October 17, 2006

**Lorraine Joubert and Lisa DeProspero Philo
University of Rhode Island Cooperative Extension
Nonpoint Education for Municipal Officials**

*In partnership with the RI HEALTH
Source Water Assessment Program*



Today's Topics



**About the URI Porous Pavement
Parking Lots**

Water Quality Monitoring Results

Maintenance Requirements

University of Rhode Island, Kingston

Two Porous Asphalt Parking Lots

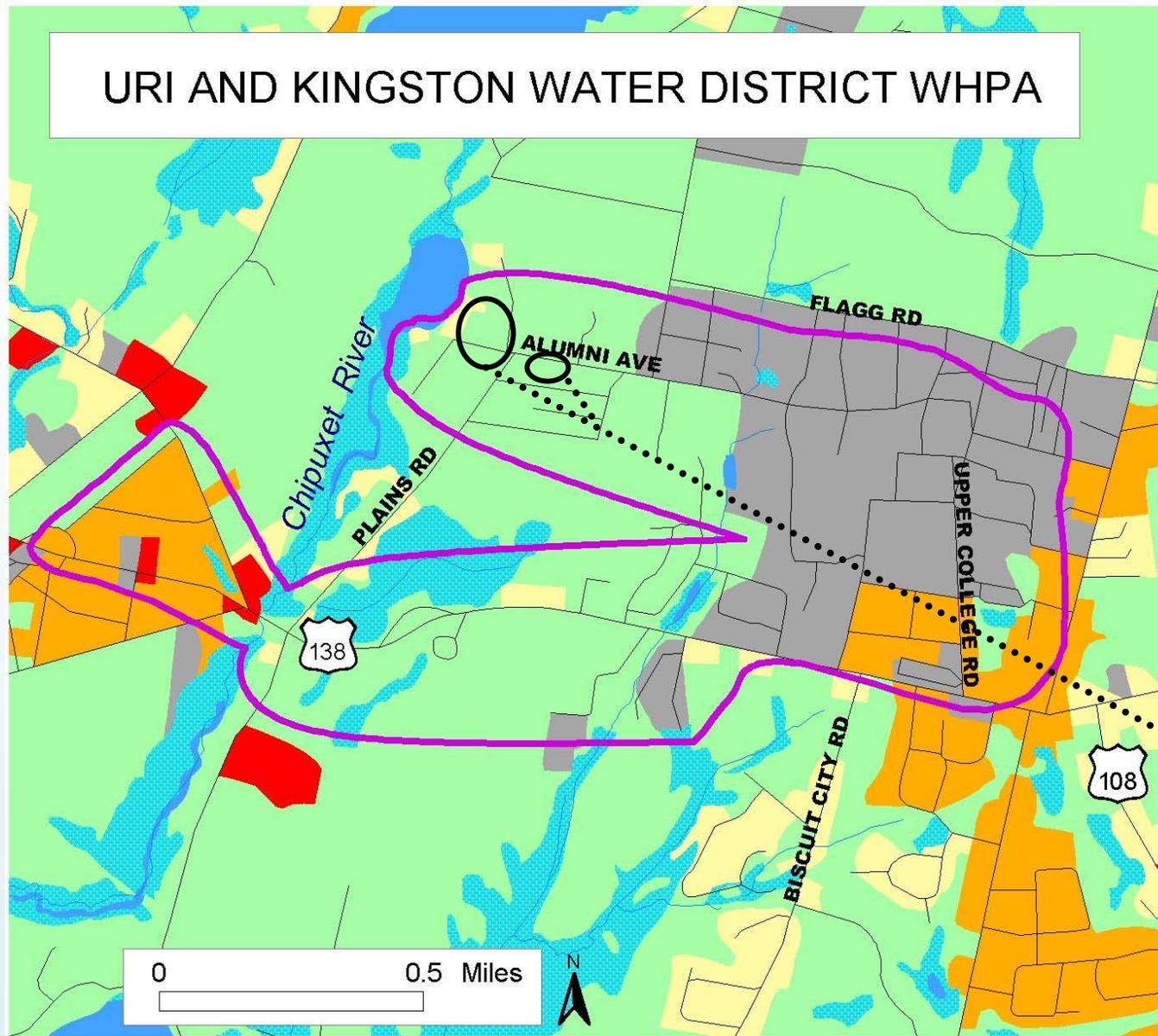


Built Fall 2002 & 2003.

**Full use since Fall 2004
with student and
event parking.**

- **800 vehicle lot at
Plains Road (Ryan
Center) 5.5 acres**
- **200 vehicle lot W.
Alumni Ave (Dairy
barn) 1.5 acres.**

Factors in Selecting Alternative Pavement



RI NEMO
source water
assessment
estimated
wellhead area
40% impervious

Need to reduce
runoff, maintain
groundwater
recharge.

Cheaper than
parking garage.

Porous
Pavement
Parking Lots

Practical Benefits



- Cost comparable by avoiding closed drainage system, topsoil use.
- Space savings by eliminating surface stormwater treatment
- Winter snow and ice usually melt and drain more easily
- Improvement of wet pavement skid resistance
- Pedestrians and motorists do not have to contend with large puddles

A Note About Costs



- Typical porous pavement averages \$2,200 to \$2,750 per parking space.

Site preparation is critical!

Remove silt and replace with crushed rock

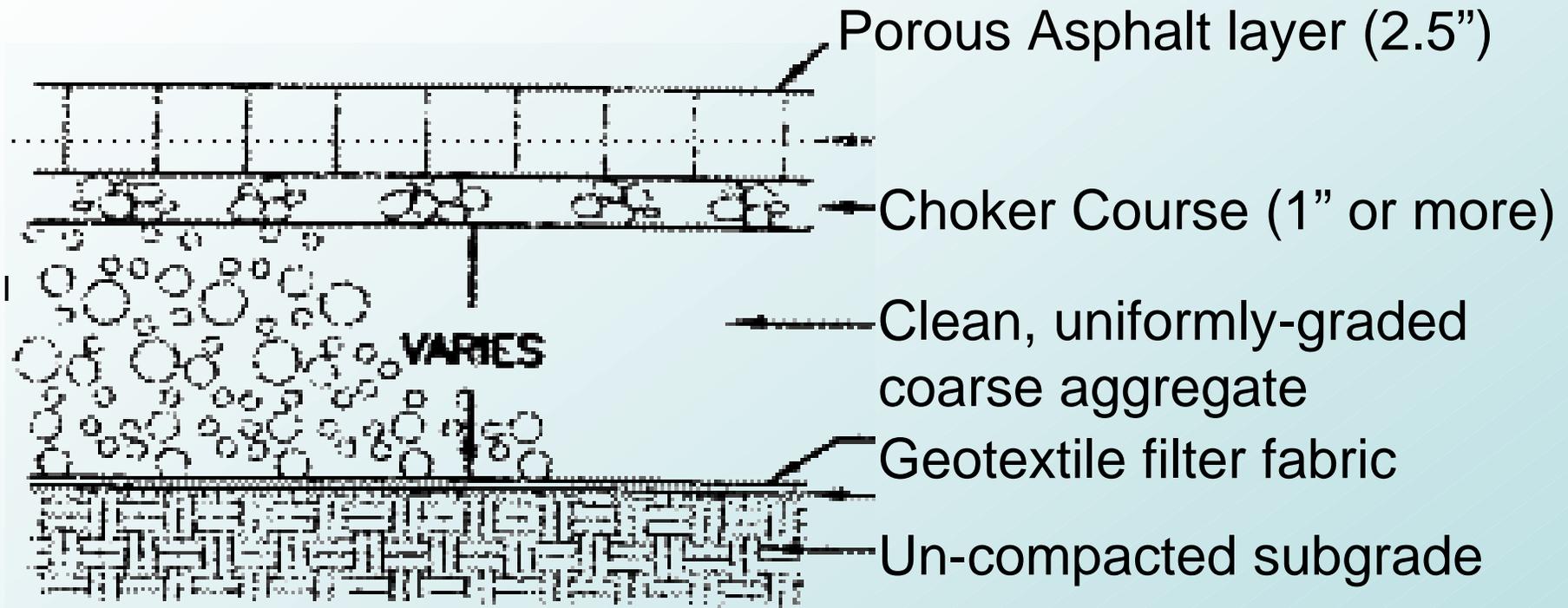


Crushed Rock Provides:

- Stability to asphalt
- Proper drainage
- Large storage area for infiltrating water



Porous Pavement Design Cross Section





Island Features

- Serve as bioinfiltration areas
- Provide secondary infiltration route during intense rainfall and in case of surface clogging
- 6" risers with clean-out and overflow grates

Does it work?

Compare!



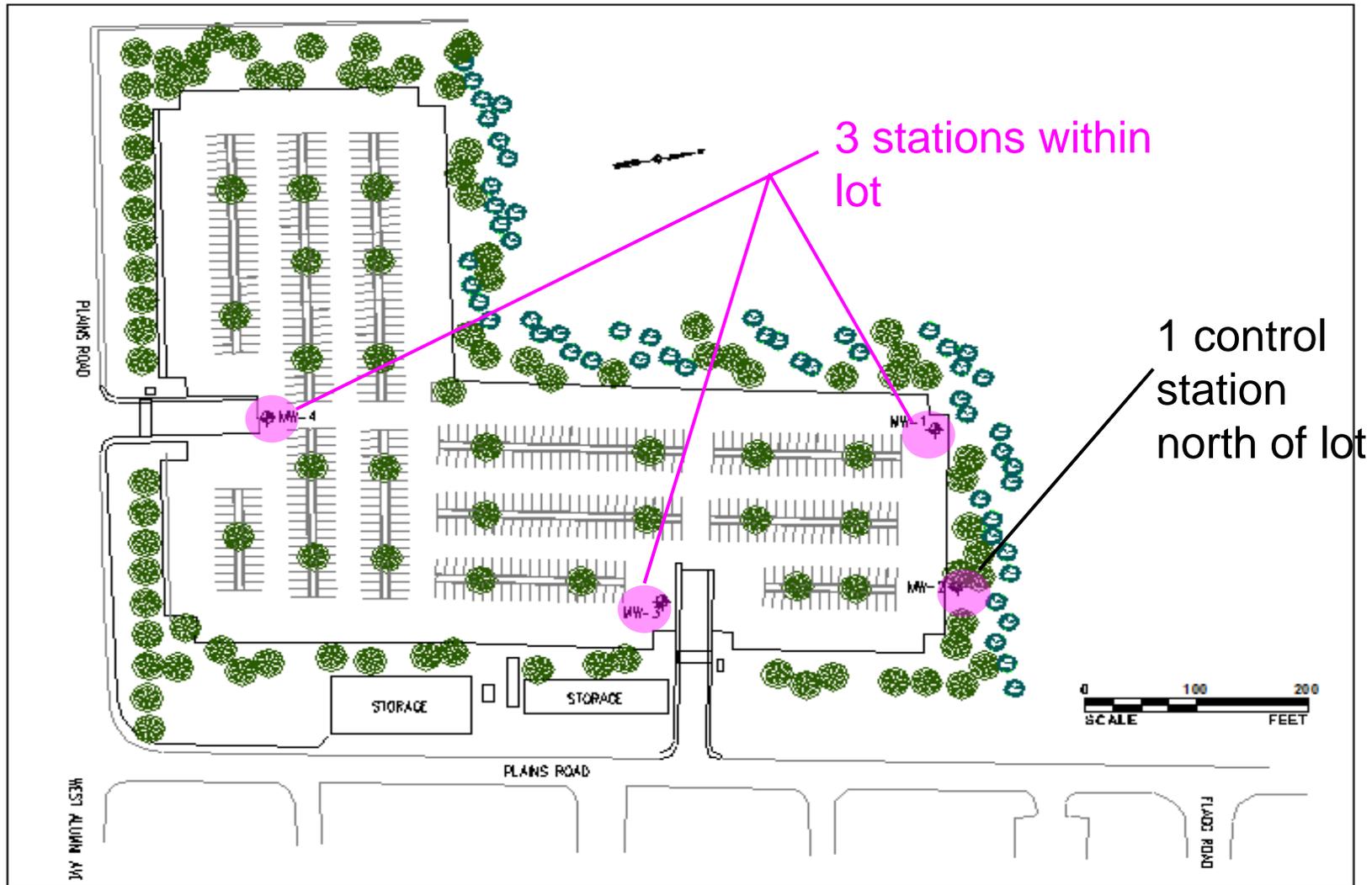
Today's Topics

**About the URI Porous Pavement
Parking Lots**

 **Water Quality Monitoring Results**

Maintenance Requirements

Four Monitoring Locations for Stormwater Infiltrate



Stormwater Infiltrate Monitoring Results

None Detected:	Low Level	Higher Levels
Bacteria BOD Lead	PAH Zinc and copper 90% retention	Winter Chlorides Spring Nitrates & Phosphorus

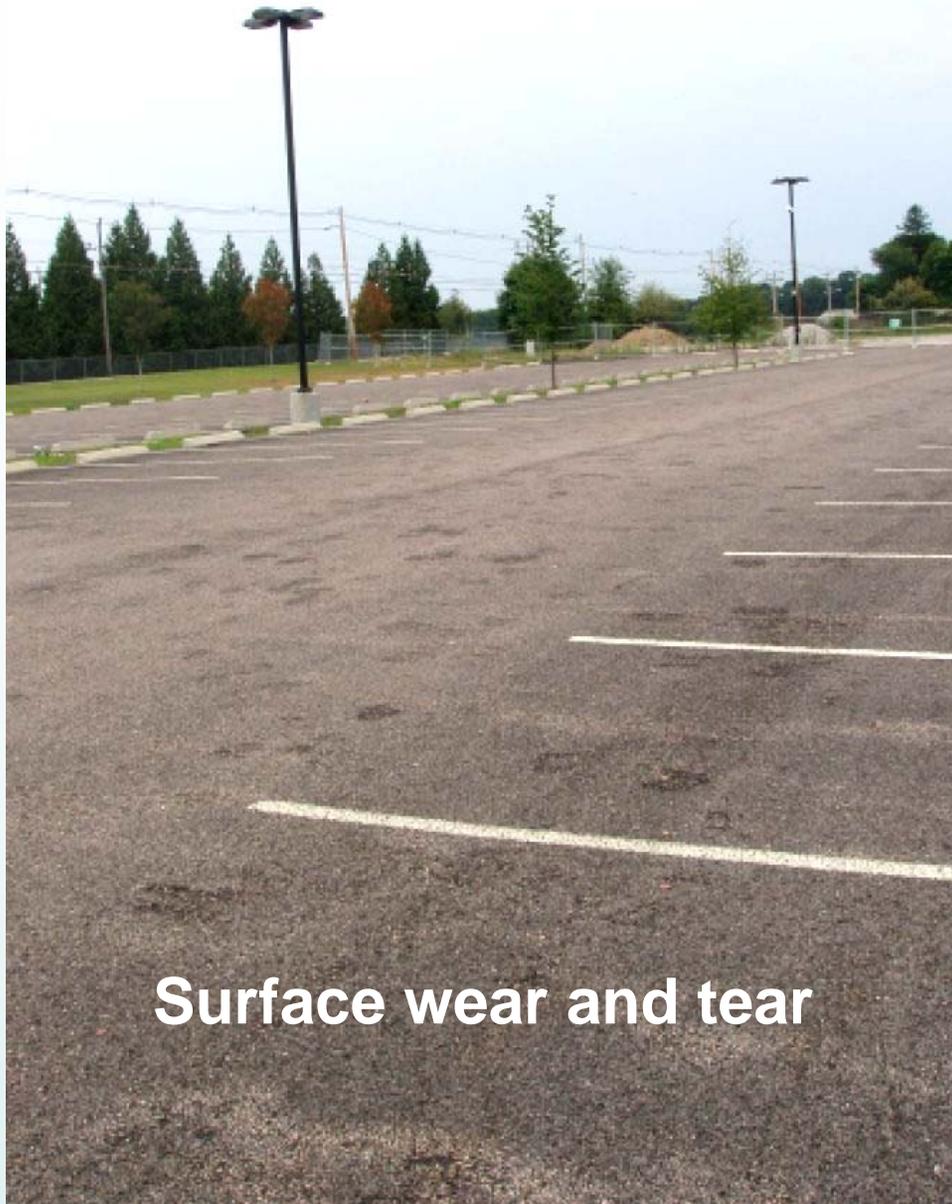
Issues With Monitoring Results

☁ Contaminants might not have migrated to sample port depth

☁ Main problem – geotextile fabric prohibiting infiltration resulting in:

- Channeling along fabric to seams, with preferential infiltration.
- Lack of samples,
- Reduced pollutant retention.

General Performance



In some areas:
Fine sand clogging asphalt



Additional Observations

- Snow stockpiled in corner of lot reduced infiltration due to sands
- Wheel stops moved by plow
- Meadow grasses planted in bioinfiltration areas were high maintenance and eventually mowed
- Some signs of surface clogging in new lot.



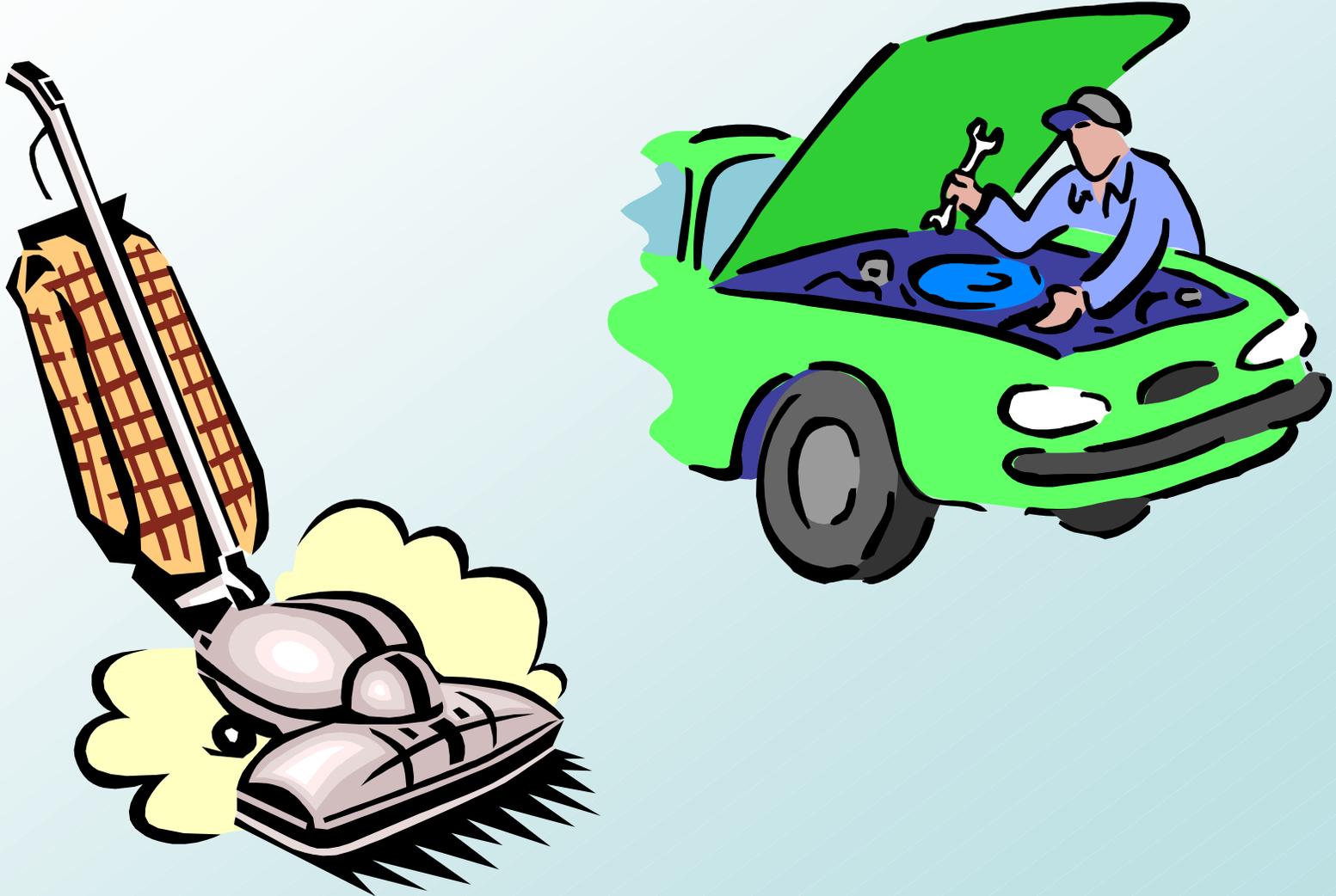
Today's Topics

**About the URI Porous Pavement
Parking Lots**

Water Quality Monitoring Results

 **Maintenance Requirements**

Preventing Clogging



Preventing Clogging

- Vacuum pavement 2 times/year with commercial unit. Do not use brush/wash or compressed air units.
- Maintain planted areas near pavement to avoid bare soil or washouts.
- Mow vegetated islands at least annually. Do not cut to a height less than 4 inches. Remove litter.
- Immediately clean any soil or mulch deposited on pavement.
- Where possible, avoid wind-blown silt from nearby agricultural fields and construction sites.
- Clean inlets draining to subsurface twice/year.

Winter Maintenance



Winter Maintenance

- No sanding.
- No sodium chloride allowed due to wellhead. Use magnesium chloride.
- Raise plow blade 1" higher than normal.
- Do not stockpile snow on pavement.

As recommended by Cahill Associates, environmental engineering firm

Design Changes with New Lot



- Fewer, wider infiltration islands
- Curb cuts for water entry to island bioinfiltration areas
- Mowed grass, not meadow grasses for islands
- Fewer wheel stops, where possible

Additional Recommendations

- Hire contractor with specialized expertise in permeable pavements for design and field inspection.

- Test asphalt mix at time of delivery.

- Verify maintenance plan is followed and modify as needed.

- Investigate use of more permeable geotextile fabric.

- Consider retaining some silt below crushed rock bed or augmenting coarse subsoil for improved pollutant attenuation.

- Consider using rumble strips at entries to lots to help remove sediment and debris from entering cars.

- Investigate use of updated asphalt mixture that uses the polymer Styrene-Butadiene-Styrene.

If you'd like more info...

Go to: www.uri.edu/ce/wq/

Click on: URI Nonpoint Education for Municipal Officials / Publications

Lorraine Joubert

ljoubert@uri.edu

Tel: 401-874-2138

Lisa DeProspero Philo

lphilo@uri.edu

Tel: 401-874-5687

