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Acronyms in this issue

AASHTO	American Association of State Highway and Transportation Officials	ISU	Iowa State University
CTRE	Center for Transportation Research and Education	LTAP	Local Technical Assistance Program
FHWA	Federal Highway Administration	Iowa DOT	Iowa Department of Transportation
		MUTCD	Manual on Uniform Traffic Control Devices

Enhancing Iowa transit with technology

CTRE IS SUPPORTING the Iowa DOT's Office of Public Transit in developing a statewide plan for implementing intelligent transportation systems (ITS) technologies in public transit. In Iowa, public transit consists primarily of buses that provide either fixed-schedule or on-request services.

Dennis Kroeger, research specialist at CTRE, says, "Transit ITS technologies have the capability of reducing travel times and improving the overall operation of the transportation network. For example, automatic vehicle location systems can increase schedule adherence and reduce passenger waiting time."

A step at a time

As one step toward developing a statewide transit ITS plan, in November 2001 the Iowa DOT held an expo of transit ITS technologies. Transit personnel from across Iowa met vendors of systems for automatic vehicle location, electronic fare collection using pre-paid cards, automatic passenger counts, and computer-aided dispatch and scheduling.

Next steps involve

1. Hiring a contractor to determine transit ITS technology needs and develop a business plan.
2. Developing a comprehensive record of available technologies and a plan for implementing needed and/or new technologies.
3. Implementing the plan.

The Iowa DOT is currently interviewing potential contractors. A contractor will be selected and the project will begin early in 2002.

For more information

For more information about the Iowa transit ITS plan, contact Dennis Kroeger, 515-294-8103, kroeger@iastate.edu, or Kay Thede, Iowa DOT's public transit policy specialist, 515-239-1048, kay.thede@dot.state.ia.us.

For information about other ITS projects in Iowa, visit the Iowa DOT's *OnTrack* website, www.iowaontrack.com. See page 10 of this issue for information about Transit Cooperative Research Program publications for loan from CTRE's library. •

Iowa will host Heartland chapter of ITS America

ITS America, Heartland Chapter Conference
University Park Holiday Inn
West Des Moines
March 26-28, 2002

IN MARCH Iowa will host the third annual conference of the Heartland chapter of ITS America. The chapter includes Iowa, Kansas, Missouri, and Nebraska. ITS policy makers, technicians, and academicians are invited to attend. The event will feature sessions concerning I-235 reconstruction, transit, 511 traveler information successes, incident management strategies, and multimodal information issues.

Watch ITS America's website for registration information: www.itshearland.org. •

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The mission of Iowa's LTAP is to foster a safe, efficient, environmentally sound transportation system by improving the skills and knowledge of local transportation providers through training, technical assistance, and technology transfer, thus improving the quality of life for Iowans.

Iowa's LTAP is housed and administered at Iowa State University's Center for Transportation Research and Education (CTRE):

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Electronic tools for sign management: Are they for you?

SOME OF IOWA'S local transportation agencies use manual, or paper-based, systems for managing information about their traffic control devices. Many agencies, however, have switched to electronic, or computer-based, sign management systems. Would such a switch benefit your agency?

Advantages of computer-based sign management

Manual systems are basically paper records of an agency's sign inventory. Such systems may be adequate for agencies with small inventories. However, electronic systems help agencies with larger inventories manage their signs and other traffic control devices more aggressively and efficiently.

With electronic systems, sign inventory data are stored in a computer database and can be quickly accessed in a variety of ways. Staff responsible for signs can sort the inventory by kind (stop, yield, etc.), location (geographic coordinates and/or address), date purchased/installed/maintained/replaced, material, or other sign characteristics.

This sorting capability allows staff to, for example,

- schedule maintenance/replacement activities based on any of several characteristics, like age of the signs,
- locate and schedule the replacement of signs made of materials that no longer meet MUTCD recommendations,
- generate replacement cost estimates and other electronic reports,
- generate a list of all traffic control devices at a particular intersection or problem location, and
- identify high vandalism locations and trends.

An engineer or technician working with signs in the field can access and update the electronic files using a portable computer, not only saving time and effort

but also ensuring the system is immediately and continuously up-to-date.

Choosing the right software

Good basic sign management system software includes the following features:

- user-friendly interface
- easy data entry, retrieval, and sorting
- ability to import, export, and share data with other management systems and other software (like accounting software)

An effective system also allows an agency to document sign inspection and maintenance activities and provides a means of tracking signs from purchase through maintenance activities and replacement.

Some sign management software can be linked to geographic information systems (GIS) software packages and a base map, allowing users to locate signs efficiently on a map.

Enhanced (and usually more expensive) soft-

ware packages may include features such as photographs of traffic control devices.

The FHWA is encouraging agencies' transition to sign management software by offering a free package: Sign Inventory Management System (SIMS 98), developed by the Technology Transfer Center at the University of New Hampshire.

Getting started

After selecting software, implement your electronic system by

- collecting sign inventory data,
- entering the data into the sign management system, and
- updating data regularly.



SMS continued on page 3

Can't wait for statewide urban design and specification standards?

IN THE NEXT couple of years, Iowa will become the first state to implement statewide urban design and specifications manuals for public infrastructure improvements.

In the meantime, agencies can use central Iowa's *Standard Design and Specification Manuals*, which were developed by 34 central Iowa jurisdictions and will form the framework for the statewide manuals.

Order the central Iowa manuals

The current central Iowa manuals (printed in December 2000) are being maintained by Snyder & Associates and are available for any government entity to purchase and use. A detailed order form is online, www.ctre.iastate.edu/bulletin/urbanspecs.pdf. Or call Brent Bean or Melissa Leopold at Snyder & Associates, Inc., Ankeny, Iowa, 515-964-2020.

What's the progress on statewide standards?

The development effort is anticipated to take two to three years. The following organizations and groups are working together to create and implement statewide manuals:

- city and county engineers
- Iowa DOT
- contractors

SMS continued from page 2

Some data may already exist on a paper inventory, but very likely staff will have to collect additional data. Where no written inventory exists, the price tag for information gathering can run from three to five dollars a sign. Many counties have between 5,000 and 8,000 signs; cities, upwards of 25,000 signs or more.

Collecting data, therefore, can be the most costly part of establishing an electronic sign management system.

Between purchasing software and collecting and entering data into the system, getting an electronic system up and running can be expensive. However, the ability to update data quickly and track and manage the inventory proactively can make the investment worthwhile.

- Iowa chapter of the American Public Works Association
- Statewide Urban Standard Design and Specification Manuals Steering Committee
- CTRE

Steering committee members include engineer representatives of the Iowa DOT, metropolitan planning organizations, transportation management agencies, regional associations of local governments, as well as city and county engineers, contractors, and other stakeholders throughout the state.

In addition to standard designs and specifications, the statewide manuals will include design and construction details unique to specific jurisdictions across the state. They will address considerations like materials availability and soil conditions, which may vary among the six state districts.

CTRE is staffing and coordinating the development of the manuals. District subcommittees will identify design and specification particulars unique to specific jurisdictions for inclusion in the manuals.

For more information

If you have questions about the statewide standards, contact Dale Harrington, associate director for pavements at CTRE, 515-294-8103, pcconc@iastate.edu. •

The ultimate purpose for using electronic sign management systems, of course, is to improve traffic control signage and thereby increase road user convenience, reduce crashes, and limit agency exposure to tort liability. Sign management staff must evaluate the benefit/cost of implementing such a system in their own jurisdiction.

For more information

To find out more about sign management systems, or to obtain a copy of the free FHWA software, contact Tom McDonald, Iowa's Safety Circuit Rider, 515-294-6384, tmcdonal@iastate.edu. Tom can also provide sign management training.

For information about his county's experience with electronic sign management, contact Mark Nahra, Delaware County engineer, 319-927-3505, mark_nahra@hotmail.com. •

LTAP Advisory Board

The people listed below help direct the policies and activities of Iowa's Local Technical Assistance Program (LTAP). Contact any of the advisory committee members to comment, make suggestions, or ask questions about LTAP.

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Center for Transportation
Research and Education

IOWA STATE UNIVERSITY

Recent court cases emphasize ADA compliance

SOME CITIES across the country that haven't yet installed accessible sidewalk curb ramps have been sued for not complying with the Americans with Disabilities Act (ADA) of 1990. In at least two cases, courts found that cities are responsible for installing curb ramps along all streets they resurface, not just where the city is working directly on curbs and sidewalks.

Don't be complaisant about compliance

State and local governments are subject to ADA's Title II: Public Entities—State and Local Governments' Services. Under ADA, every state and local public entity with 50 or more employees has had to develop an ADA compliance transition plan identifying nonconforming facilities and establishing a timeline for making necessary corrections (including installing curb ramps). Corrections were to have been made by January 1995.

Having a compliance plan is not enough; follow-through is critical. An attorney representing wheelchair users in one lawsuit noted that some cities "did something the first couple of years and then they stopped because they thought no one was paying attention."

Jan Thompson, transportation specialist at FHWA, Iowa Division, also emphasizes the importance of implementing ADA compliance plans: "[Agencies] have the responsibility of ensuring that individuals with disabilities are not excluded from services, programs, and activities because facilities are inaccessible."

These tools can help

Two resources can help state and local agencies comply with ADA accessibility requirements:

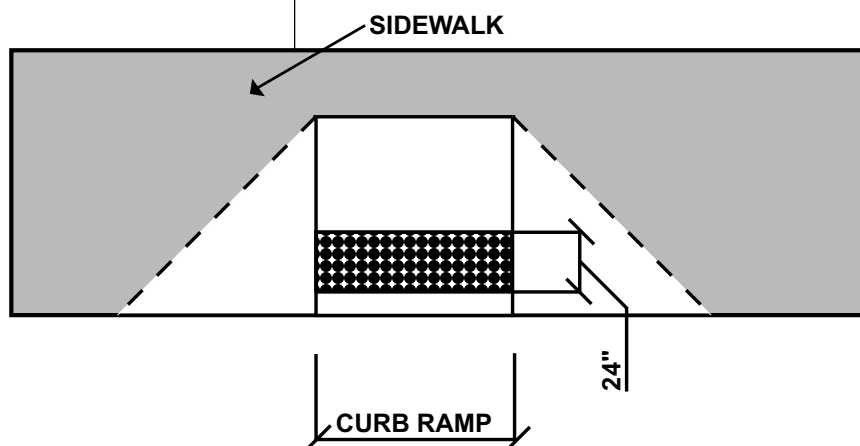
Accessible Rights-of-Way: A Design Guide (U.S. Access Board's Public Right-of-Way Access Advisory Committee, in collaboration with Federal Highway Administration) includes recommendations to help agencies design

- curb ramps
- driveways
- corridors of accessible travel
- detectable warnings
- landings
- crosswalks
- medians and refuge islands
- roundabouts
- signals and wayfinding
- audible signs
- accessible pedestrian signals
- on-street accessible parking
- parking meters
- temporary construction
- pedestrian barricades

The standards included in the design guide are going through a rulemaking process that includes publication in the Federal Register and soliciting public comment. Only after the U.S. Department of Justice and the Department of Transportation issue final rules will the provisions become legally enforceable.

ADA Technical Assistance, a free CD-ROM (U.S. Department of Justice), contains a complete collection of the U.S. Department of Justice's ADA materials: regulations, architectural design standards, and technical assistance publications. It's designed

ADA continued on page 5



Standards recommended in *Accessible Rights-of-Way: A Design Guide*, like this one for detectable warnings on curb ramps, are going through the federal rulemaking process.

Another “better mousetrap”: Quick snow fence roller

THE CITY OF ANKENY erects 8,000 feet (80 rolls) of snow fence each winter. At the end of the season, rolling up the fence manually would take a crew about two weeks.

Joe Hodapp, an equipment operator with the city, developed a much faster method.

Joe built a quick roller using an old 12-volt, electric over hydraulic pump and spinner motor attached to a spindle with a four-inch PVC pipe to hold and roll up the snow fence.

To roll up a length of fence, just slide the end of the fence into a slit in the PVC pipe and activate the pump.

The quick roller definitely saves time. Ankeny now spends one day to roll up its 8,000 feet of fence.

It also rolls the fence into tight rolls, which makes handling and storage easier.

The city has also made an attachment for spools to roll up rope for temporary parking and wire from traffic signal updates.

For more information about the quick snow fence roller, contact Joe Hodapp, 515-965-6481 or 515-964-8482. •



Joe Hodapp, equipment operator with the City of Ankeny, demonstrates the quick snow fence roller, winner of a “Better Mousetrap” award at the Iowa Maintenance Expo in September.

ADA continued from page 4

for use on laptop computers in the field and on computers that lack access to these materials via the Internet. Documents are provided in a variety of formats, including portable document format (.pdf) for downloading and printing.

For more information

Accessible Rights-of-Way: A Design Guide is available through CTRE’s library. Contact Jim Hogan, library coordinator, 515-294-9481, hoganj@iastate.edu. (Ask for P1481.)

The free CD-ROM *ADA Technical Assistance* can be ordered online, www.usdoj.gov/crt/ada/adahom1.htm. Or call the ADA technical assistance line, 800-872-2253.

An article in the February 2001 issue of the *Columbus (Ohio) Dispatch* describing a lawsuit against the City of Columbus is online, <http://libpub.dispatch.com/cgi-bin/documentv1?DBLIST=cd01&DOCNUM=5001>. •

Choosing the right anti-icing chemical

A STRAIGHTFORWARD GUIDE to help agencies select the best anti-icing chemicals for their particular needs is available online at a University of Iowa (UI) website: www.anti-ice-guide.com/. The guide is in downloadable, portable document format (.pdf).

Developed by Wilfrid A. Nixon, professor of civil and environmental engineering at UI, and Anissa D. Williams, graduate research assistant at UI's Institute of Hydraulic Research, *A Guide for Selecting Anti-icing Chemicals* (version 1.0) specifies essential performance properties and suggests ways of grading anti-icing chemicals.

The website is a project of the Hydrosience and Engineering group at UI's Iowa Institute of Hydraulic Research.

Your input will help others

Nixon plans to expand the web site to include

- a database of available liquid anti-icing chemicals,

- software that will help agencies select chemicals according to their needs and priorities, and
- version 2.0 of the guide that will be even more accessible and useful to the transportation community.

Your input will help make these online tools more helpful. Here's how to contribute:

1. Provide feedback about the current version 1.0 of the guide; your comments will affect the content of version 2.0. A "Comment on the Guide" link is available on the website.
2. Submit information about a particular chemical for the database to Nixon, wilfrid-nixon@uiowa.edu. The e-mail link is also available on the website.

For more information

Contact Wilfrid Nixon, 319-335-5166, wilfrid-nixon@uiowa.edu. Or visit www.anti-ice-guide.com/.

National Work Zone Memorial Wall

Dedicated to the memories of those lost in our nation's roadway work zones.

Sponsored by:

American Traffic Safety Services Association (ATSSA)
Eastern Metal/USA-SIGN
National Capital Industries
Reflexite Americas
3M Traffic Control Products Division

Sponsored by:

New York State Police Benevolent Association
Bob's Guardrails
Progressive Insurance
Airport Striping
AAA of Central New York

Sponsored by:

Bob's Guardrails
Progressive Insurance
Airport Striping
AAA of Central New York
Dave's Towing

Sponsored by:

Bob's Guardrails
Progressive Insurance
Airport Striping
AAA of Central New York
Dave's Towing

Work Zone Worker ↑
Motorist ●
Law Enforcement ◊
Emergency Worker ■
Child †

National Work Zone Memorial: Help make it personal

THOUSANDS of Americans—road workers, road users, law enforcement officers, and public safety personnel—have died in work zones, 868 people in 1999 alone. The American Traffic Safety Services Association (ATSSA) is honoring people who have died in work zones, while raising public awareness about work zone dangers.

In April 2002, during National Work Zone Awareness Week, ATSSA's new memorial exhibit will be unveiled in Washington D.C. and begin a journey to several locations across the country.

The exhibit will include

- a memorial wall inscribed with names of people who have died in work zones,
- photographs and memorabilia donated by friends and families of the deceased, and
- educational information about work zone safety.

How to submit names for the memorial

Names will continually be added to the memorial wall. Anyone wishing to submit names of work zone fatalities can find the necessary forms at www.atssa.com/pubinfo/nwz_memorial.htm.

The website also includes an artist's rendition of the memorial (the sponsor panel is shown at left), information about hosting the exhibit, and other information.

For additional information contact James Baron, ATSSA's director of communications, 540-368-1701, jimb@atssa.com.

Main ID Panel
with Sponsor Designation
Panel Size = 48" x 64"

“Making your case” more effectively

’TIS THE SEASON when local agencies regularly present proposals or technical information to city councils, county supervisors, and others. To increase your audience’s understanding of the information and their appreciation for your point of view, take some time to prepare an interesting, customized presentation that incorporates helpful visual elements.

Develop effective presentations using slides, overhead transparencies, or presentation software like MS PowerPoint. Such software can help you organize information, create a visually appealing presentation, and add “pizzazz” to technical material. You can incorporate graphics, charts and graphs, photographs, even sound and animation, to highlight important ideas.

Preparation tips

- Begin and end your presentation with a brief outline of your objectives.
- Use a large typeface—36 points is a good starting place—and only one or two fonts. Arial, Helvetica, Geneva, and Univers are easy to read on a screen.
- Keep content simple and brief, using key words and phrases instead of sentences. Six lines of six words each per slide is a general guideline.
- Use bulleted lists to highlight parallel information.
- Color can be a powerful visual tool, but use it sparingly. Use dark text on a light background, or very light (white or yellow) text on a dark background.
- Whenever possible, substitute pictures, tables, charts, and other visual elements for words. Keep them simple.
- Use photographs generously to help viewers “see” the topic. Photos can be especially effective in showing actual road conditions, sign placement, or safety problems.
- Use humorous illustrations and graphics wisely. Nothing off-color or insensitive, please. (And don’t get into trouble by using copyrighted graphics.)
- Double-check spelling and grammar.
- Generate audience handouts from your slides, transparencies, or software presentation.

Presentation tips

- Use your own computer and/or projection equipment if possible. If not, test your presentation on the equipment at hand before the meeting. Always have a backup plan in case the technology doesn’t work.
- Have an extra projector bulb on hand.
- Speak to your audience, not to the presentation. Use your slides or transparencies as a tool, not a crutch.
- Darken the room enough to see the presentation easily but leave enough light so your audience can comfortably take notes and participate in a discussion.

Tools for getting started

Check out these resources for developing effective presentations:

Powerful Presentations (website): Helps both beginning and veteran speakers by sharing ideas, giving pointers, answering questions, and suggesting resources. Includes articles on all aspects of presenting. www.powerfulpresentations.net

Presentations Magazine (publication, website): Includes tips on designing and making presentations, product reviews, and technology. www.presentations.com/

Presenter’s University (website): Includes tools, templates, and tutorials for PowerPoint presentations. Includes series of articles on content, delivery and visual aids. www.presentersuniversity.com/index.cfm

PowerPoint in the Classroom (website, course): Presents a humorous tutorial on designing PowerPoint presentations, including creating slides, making changes, adding images and charts, adding motion, adding sound, timing and rehearsing; and taking it with you. Tutorial can be used in print format. www.actden.com/pp/index.htm

Sonia Coleman’s PowerPoint Collection (website): Over 140 free PowerPoint templates for download. Also includes PowerPoint tutorials. www.soniacoleman.com/Templates.htm

PowerPoint FAQ (website): Comprehensive source for answers to frequently asked questions. www.rdpslides.com/ppfaq/

Effective presentations “. . . increase your audience’s understanding of the information and their appreciation for your point of view”

Editor’s note: This article is adapted from the October 2001 issue of Inside LTAP, a newsletter of the National Local Technical Assistance Program, and the April 1999 issue of Teaching with Technology, a newsletter of Iowa State University’s Instructional Technology Center. Used with permission.

Addressing employee safety at Iowa's local transportation agencies

Tom McDonald, Safety Circuit Rider

MAINTAINING safe working conditions and providing employee safety training are major responsibilities for local transportation agencies. Despite common safety needs and concerns among local agencies, however, agencies rarely share or coordinate their safety efforts, resources, and challenges.

CTRE is studying how local agencies currently address employee safety responsibilities and assessing agencies' need for assistance in safety-related communication, cooperation, and training.

In addition to discussing safety training programs with representatives of the Iowa Municipal Workers Compensation Association (IMWCA) and the Iowa DOT, CTRE conducted a survey of local governments.

The survey consisted of 10 specific questions ranging from use of safety coordinators, safety-related meeting schedules, training sources, and need for additional assistance.

Two hundred fifty-four surveys were mailed to Iowa counties and cities with populations over 2,000. Approximately 100 surveys, or 40 percent, were returned.

Employee safety survey results

The results of this survey indicate that responding local agencies in Iowa do provide a level of safety training and equipment for employees but need reliable resources and assistance.

Written policies. Approximately 82 percent of responding agencies indicated they had adopted a written safety policy and/or handbook for employees and that regular safety meetings were scheduled, most of those on a monthly basis.

Training topics. Most popular topics for training included blood borne pathogens, confined space, chain saw safety, CPR, first aid, and a variety of other subjects.

Sources of training. Cities and counties in Iowa rely on a variety of organizations and resources for safety training including area councils of governments,

insurance companies, CTRE, and local experts. Over 70 separate sources were cited in the survey responses.

When asked if the agency would take advantage of low-cost safety planning assistance and training materials if available, 88 percent responded positively.

Safety equipment and clothing. Local agencies provide a wide array of personal protective equipment for employees. Hard hats, steel toed footwear, safety glasses, gloves, hearing protection, and reflective vests are the most common. Other safety equipment available for employees in some agencies includes respirators, work apparel, and first aid kits.

Safety coordinators. Approximately 56 percent of responding agencies assign safety coordinator duties to an employee. For only about 29 percent of those coordinators are safety responsibilities a full-time assignment. Most coordinators spend only about 25 percent of their time or less on safety related activities. About 47 percent of responding cities and counties provide specialized training for their safety coordinators.

Over 90 percent replied that their safety coordinator would benefit from attending a conference where issues of common interest could be discussed with peers. Over one half indicated a willingness to serve on an advisory committee to plan such a conference and provide input on specific training needs.

Safety personnel: your input is important!

To further examine where additional support may be most appropriate, CTRE staff will invite local transportation agency staff to serve on an advisory committee to explore the potential benefits of a statewide conference for safety coordinators in cities and counties. The committee will also consider the possibility of establishing a communication network for coordinators.

Anyone interested in serving on an advisory committee or who wants to offer advice on this subject should contact Tom McDonald, 515-294-6384, tmcdonal@iastate.edu.

When asked if the agency would take advantage of low-cost safety planning assistance and training materials if available, 88 percent responded positively.

Signing for curves and hills

Tom McDonald, Safety Circuit Rider

ALTHOUGH IOWA is often considered flat, drivers regularly encounter uneven, rolling terrain on Iowa's roadways. To ensure safe travel for Iowa's drivers, be sure to provide proper advance warning of variations in roadway alignment.

Iowa's manual for traffic control devices (Section C5) and the millennium MUTCD (Chapter 2C) present detailed suggestions and recommendations for signing hills and curves on local roads.

The Iowa manual explains proper use of specific warning signs, from the common curve and turn signs to signing for more complex alignment conditions.

Using supplemental plaques and combination signs

The Iowa manual discusses the use of supplemental plaques, along with several new combination signs and plaques featured in the MUTCD.

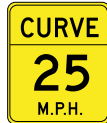
These include the combination Horizontal Alignment/Advisory Speed sign, W1-9, and Curve Speed sign, W13-5. Determining advisory speeds for curves is addressed in Section H1.1, "Advisory Speed Determination," in the Iowa manual.

Using arrow and chevron signs

For higher-volume roads or in other locations of special concern, agencies may wish to install large arrow signs, W1-6, or chevrons, W1-8. These devices can provide additional warning for drivers in locations with potential problems.



W1-9



W13-5



W1-6



W1-8

Drawing on information in handbooks from South Dakota and Kansas, Iowa's manual presents recommendations for locating and installing arrows and chevron alignment signs for maximum effectiveness along curves.

Using warning signs for hills

In addition to horizontal alignment situations, Iowa's manual presents information about selecting warning signs for hills, primarily using guidance from the MUTCD.

When referring to the suggestions on advance warnings for roadway alignment changes in Iowa's guide manual, refer to the tables in Chapter 2C of the new MUTCD to determine proper application, size, and location for these important traffic control devices. •

Editor's note: This article is part of a series about the Iowa Traffic Control Devices and Pavement Markings: A Manual for Cities and Counties. The manual was funded by the Iowa Highway Research Board (TR-441) and supplements the Manual on Uniform Traffic Control Devices (MUTCD).



Bicycle friendly rumble strips

AS YOU PLAN road maintenance and rehabilitation projects for the next construction season, remember the bicyclists in your jurisdiction.

Two new "bicycle friendly" rumble strip patterns have been recommended to AASHTO's Steering Group for Technology Deployment. The patterns are recommended specifically for implementation along nonfreeway facilities.

Developed by Pennsylvania State University, the new configurations provide enough vibration to alert inattentive or drowsy motorists but can be safely traversed by bicyclists.

For more information see AASHTO's High Value Research website, www4.nationalacademies.org/trb/scor/states.nsf. Or contact Michael Bonini, Research Division, Pennsylvania DOT, 717-772-4664, mbonini@dot.state.pa.us. •

Selecting asphalt mixes

THE FHWA and the National Asphalt Pavement Association have published a guide to help agencies select appropriate asphalt mixes.

The *Mix Type Selection Guide* includes information about

- recommended mix types for surface, intermediate, and binder courses
- general recommendations for pavement surface preparation
- recommended sublayer conditions for the placing of different mix types
- suggested materials for dense-graded mixtures, based on the planned layer of construction and traffic levels

- types of pavement drainage
- rehabilitation techniques

For more information

To obtain a copy of the guide, contact the FHWA Report Center, 301-577-0818, report.center@fhwa.dot.gov. Or download an electronic version of the guide (portable document format, or .pdf) from the FHWA Office of Pavement Technology website, www.fhwa.dot.gov/pavement/library.htm#asphalt.

To borrow a copy from CTRE's library, contact Jim Hogan, library coordinator, 515-294-9481, jhogan@iastate.edu. Ask for publication No. P1578. •

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