

# Focus on Research

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"Focus on Research updates engineers and technicians on items of interest upcoming in active TxDOT research projects."

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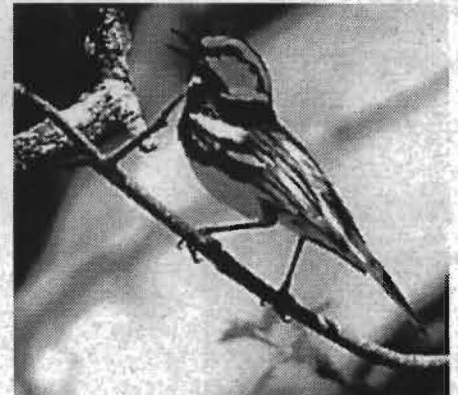
## Research Area Titles

- Area A: "Administrative Policy"
- Area 1: "Planning, Economics, Environment, and Transit"
- Area 2: "Materials, Construction, Maintenance, and Pavement Design"
- Area 3: "Traffic Operations, Geometric Design, and Right-of-Way"
- Area 4: "Structural Design"

## Golden-Cheeked Warbler Behavior Focus of TTI Environmental Study

The Golden-Cheeked Warbler (GCW), a Texas songbird found in the juniper-oak woodlands of the Edwards Plateau and Llano Uplift, is a federally listed endangered species. Although environmentalists know its breeding range to lie entirely within Texas, they are less certain about the bird's specific feeding habits, largely because of its rarity. Thus scientists cannot assess precisely the impact of habitat loss on the warbler's food base. Moreover, many field personnel are unable to recognize either the warbler's song or how such vocal behavior relates to the bird's nesting cycles, and so do not know if TxDOT activities in the area are disruptive to GCW habitats.

In Study 7-1983, *Avian Predators, Available Food Species, and Vocalization of the Golden-Cheeked Warbler in Travis County, Texas*, researchers will record, using high quality digital audio equipment, several hours of the warbler's breeding-season song. In this way, they intend to document the relationship between the phases of the nesting cycle and the vocal behavior of the GCW. To complement this effort, the study



team will record other Edwards Plateau birds whose songs might be mistaken for those of the GCW. Researchers will use the facilities of the Center for Bioacoustics to carry out these objectives.

In addition to providing a better understanding of GCW vocal behavior, the findings of this research will benefit wildlife managers, government agencies, and others concerned with protecting endangered resources. For TxDOT, the study will provide an important training tool for personnel working with this endangered species; and for future investigations, the study will provide useful baseline information on the effects of noise on GCWs.

To implement the study findings, the research team will submit to the department five high quality compact discs (CDs) to be used for training incoming field personnel assigned to GCW areas. Using these discs, TxDOT personnel will learn to recognize the warblers, their nesting cycles, and when TxDOT activities may pose a threat. The project runs from May 1993 through August 1995.

Area 1 — PD: Cal Newnam, AUS  
Researcher: Dr. Keith Arnold, TTI



Research and  
Technology Transfer  
Office, in cooperation  
with the FHWA

## New Long-Range Research Plans Under Development

Mr. Michael Murphy, P.E., of the Design Division presented a framework for long-range planning to the Research Advisory Committee 2 at the spring 1994 meeting. Although his example was specifically for pavement research, this framework is to be used as a model for long-range planning in all the other research areas. The purpose of such planning is to:

- identify anticipated needs of the department;
- guide the submission of problem statements;
- establish a set of clearly defined short-, intermediate-, and long-range research goals based on these needs (short-term  $\approx$  2 years, intermediate  $\approx$  2 to 5 years, and long-range  $\approx$  5 to 10 years);
- provide for the most efficient and effective use of TxDOT and university resources to accomplish the goals;
- monitor all goal-related research projects to
  - understand the consequences and alternatives if planned

research is delayed or not implemented

- to aid in identifying specific projects that may be terminated due to insufficient progress;
  - evaluate past, present, and proposed research projects to determine if this research meets current goals and objectives;
  - define relationships that may exist between various research projects to reveal possible
    - shared benefits
    - possible duplication of effort (past or present)
    - the best sequence for scheduling needed research
    - if a multi-agency or pooled fund study is needed;
  - establish consistency among the various projects for data collection formats, software documentation, long-term monitoring of experimental sections and research results and other factors that affect implementation; and
  - ensure maximum implementation of research results.
- Each long-range plan developed

by a Research Advisory Committee will be managed by a subcommittee, chaired by a member of the Advisory Committee, and made up of three to five people having both interest in the plan and expertise in the subject. A technical advisory committee comprised of 20 to 30 TxDOT, FHWA, and university personnel will be convened as needed to develop or modify long-range plans under the guidance of a plan's subcommittee.

Along with pavements, the Research Advisory Committee 2 selected three more candidate topics for long-range plan development — construction, maintenance, and materials. They also selected possible subcommittee chairmen to spearhead the individual long-range research plans. Details of how TxDOT will approve and carry forward the long-range plans or specifics on the long-range plan for pavement research are available from the Research and Technology Transfer Office. Call Mr. Rick Norwood at (512) 465-7406.

## Research Study Seeks to Reduce TxDOT Right-of-Way Costs

The need to purchase extensive additional right-of-way can significantly drive up the total cost of highway improvements. Often, the agency needs only a part of an abutting property, leaving behind a number of small, irregular "remainder tracts." Left with such unmarketable property, landowners can sustain considerable damages. In other instances, such remainder property may increase significantly in value.

Determining the extent of enhancements or damages to remainder property often presents a problem to real estate appraisers — a problem that can lead to a greater number of properties having to be acquired through condemnation proceedings. TxDOT right-of-way personnel estimate that the agency could reduce right-of-way procurement costs by approximately 5 percent, or \$7 million, per year by offsetting some right-

of-way payments to landowners due to enhancement to their remaining land.

Research Study 0-1390, *Determination and Evaluation of Remainder Characteristics Which Significantly Affect Right-of-Way Costs*, will assess remainder properties created in later years (e.g., 1984-1987) to determine the amount of damages or enhancements that accrue as a result of differing remainder characteristics. The researchers will also determine how changing laws affect right-of-way procurement costs (remainders created during 1984-1987 now have a 5-to-8 year history to evaluate change in value). Also, the study team will compare results from this study with the analyses of about 350 remainder cases conducted in the 1950s and 1960s.

The general objective of this study is to identify remainder characteristics that significantly affect right-of-

way costs. Specifically, the project will (1) determine remainder property, access, and location characteristics that affect right-of-way costs; and (2) determine the effects of the 1984-87 right-of-way evaluation law on right-of-way costs.

The study findings are expected to reduce right-of-way costs by allowing TxDOT to monitor the appraisals of remainder tracts and by suggesting ways to avoid creating remainder properties that contribute to right-of-way costs. Also, the department can use the findings to support recommended changes in state right-of-way acquisition laws that could significantly reduce right-of-way costs. This project runs from September 1993 through August 1994.

**Area 3 — PD: Jerry Loven, P.E., PAR Researchers: Dr. J. L. Buffington, M. Wildenthal, and M. Chui, TTI**

## R&D Committee Approves 18 New Studies for FY '95

**B**elow is a list of the approved research proposals for FY 95. More detailed information on these proposals, when they become studies, will be available in future *Focus on Research* issues.

### Research Advisory Area A

0-1446 (TTI & TSU) *Potential of Telecommuting for Travel Demand Management* (Research Advisory Area A — Priority 2)

### Research Advisory Area 1

0-1449 (TTI & TX A&M International) *Guidelines for Bicycle and Pedestrian Facilities* (Research Advisory Area 1 — Priority 3)

0-1451 (TTI & UTEP) *Multimodal System Planning Evaluation for Peak Period Operation* (Research Advisory Area 1 — Priority 4)

0-1478 (TTI) *Implementation of Transportation Planning Methods* (Research Advisory Area 1 — Priority 2)

### Research Advisory Area 2

0-1454 (TTI & Prairie View A&M) *72-Hour Urban Highway Intersection Replacement* (Research Advisory Area 2 — Priority 1)

0-1455 (UTEP) *Evaluation for Environmental Conditioning System (ECS) for Predicting Moisture Damage Susceptibility of HMAC* (Research Advisory Area 2 — Priority 2)

0-1456 (UTEP) *Evaluation and Guidelines for Drainable Bases* (Research Advisory Area 2 — Priority 3)

0-1458 (TTI) *Recycled Materials in Roadside Safety Devices* (Research Advisory Area 2 — Priority 6)

0-1459 (TECH) *Use of Pavement Skid History as the Basis for TXDOT Skid Reduction Program* (Research Advisory Area 2 — Priority 8)

0-1463 (Prairie View A&M) *Recycled Tire Rubber in Concrete Pavements* (Research Advisory Area 2 — Priority 11)

### Research Advisory Area 3

0-1464 (UTA) *Fiberoptic Applications for Traffic Signal and Roadway Illumination* (Research Advisory Area 3 — Priority 1)

0-1466 (TECH) *Guidelines Rumble for Strip Use* (Research Advisory Area 3 — Priority 4)

0-1467 (TTI) *Highway Operations*

*Research and Implementation* (Research Advisory Area 3 — Priority 6)

0-1468 (CTR & UTA) *Integrated Arterial Freeway Operation Control Strategies for IVHS Advanced Traffic Management Systems* (Research Advisory Area 3 — Priority 9)

0-1469 (TTI & Prairie View A&M) *Enhanced Traffic Control Devices & Railroad Operations for Highway Railroad Grade Crossings* (Research Advisory Area 3 — Priority 11)

0-1477 (TTI) *Automated Real-*

*Time Signal Phasing and Use of PASSER IV Traffic Control Model* (Research Advisory Area 3 — Priority 3)

### Research Advisory Area 4

0-1471 (CTR) *Effective Noise Barrier Solutions for TxDOT* (Research Advisory Area 4 — Priority 3)

0-1472 (TTI & TX A&M Kingsville) *Tightening Procedures for Large-Diameter Anchor Bolts* (Research Advisory Area 4 — Priority 4)

## Better Use of Texas Frontage Roads Investigated in TTI Study 0-1393

**T**he current *Highway Capacity Manual* (HCM) includes techniques for estimating both capacity and level of service on freeways and urban arterials. Unfortunately, such techniques cannot be applied directly to freeway frontage roads, where features from both freeways and arterials are often present. Even when planners expect weaving to dominate frontage road operations, they are still unable to determine frontage road capacity or level of service because of the speed assumptions contained in the HCM freeway weaving analysis.

Present research efforts in this area have also failed to provide estimation guidelines. A recent Transportation Research Board document (*Transportation Research Circular 371*, June 1991), which outlined research needs in highway capacity analyses, neglected to include frontage road capacity and level of service analyses among its research topics — probably since most states have not incorporated frontage roads into their urban freeway system to

the extent that Texas has. Thus TxDOT, because of the state's unique highway system, requires techniques to enable engineers to adequately design frontage roads for expected volumes, to predict operating conditions under a range of flows, and to select alternatives in solving operational problems.

In Research Project 0-1393, *Determination of Capacity and Level of Service on Freeway Frontage Roads*, the researchers will develop techniques for analyzing expected or existing operations on frontage roads. Given that TxDOT has scheduled reconstruction for many of the urban freeways in Texas, the agency will no doubt benefit by having frontage road designs standardized. Overall, the research findings will assist TxDOT in its efforts to make better use of frontage roads. This project runs from September 1993 through August 1996.

*Area 3 — PD: Wayne Dennis, P.E., CMD  
Researchers: Drs. Kay Fitzpatrick, P.E., and Tom Urbanik, P.E., TTI*

## Prairie View A&M Studies Recycled Tire Rubber Uses

**P**avement research indicates that the addition of tire rubber to asphalt concrete mixtures can improve pavement performance. Now, researchers are increasingly optimistic that the addition of scrap-tire rubber to rigid concrete mixtures will improve that concrete's pavement performance as well. In addition, such practice offers an environmental dividend in that it provides yet another means of recycling waste tires.

The addition of scrap-tire rubber to the concrete mix may improve the performance of rigid concrete pavements by increasing the pavement's flexibility and strength. (Strength gains are possible because, unlike the crumb rubber used in asphalt mixes, the scrap rubber to be used will contain steel fibers from belted tires.) Other possible benefits include

improved skid and crack resistance. If study results are encouraging, the researchers will propose expanded testing and field trials. This project starts in September 1994 and will end in August 1995.

*Area 2 — PD: Tomas Saenz, P.E., MAT  
Researcher: Dr. Zaher Khatib, Prairie View A&M*

**The addition of scrap-tire rubber to the concrete mix may improve the performance of rigid concrete pavements...**

Research Study 0-1463, *Recycled Tire Rubber in Concrete Pavements*, will evaluate, through laboratory testing, the potential of concrete mixes having differing percentages of scrap-tire rubber used as a replacement for coarse aggregate. The study will show the variation of concrete mix strength (both flexural and compressive) from 100 percent coarse aggregate to 100 percent scrap-tire rubber.

## Research Seeks To Improve State's Current Noise-Barrier Technology

**L**ike most agencies across the country, TxDOT recognizes the need for more effective noise-barrier technology. Present noise-barrier technology used by the agency — wooden fences and concrete walls or panels — can have disadvantages in terms of acoustic performance, durability, cost, and appearance. Thus the objectives of Research Study 0-1471, *Effective Noise-Barrier Solutions for TxDOT*, are to:

- document and evaluate current TxDOT designs against functional performance criteria (Phase 1);
- investigate how new materials, concepts, designs, and practices from other states and countries could improve present noise-barrier technology and pro-

vide a better understanding of acoustical modeling (Phase 2); and

- implement improvements with a design procedure and design guide (Phase 3).

The study results will assist TxDOT in improving acoustical properties, life-cycle costs, and aesthetics of TxDOT noise barriers. The study will also produce a statewide specification and standard sheets for noise-attenuation systems. This project runs from September 1994 through August 1997.

*Area 4 — PD: John Chase, P.E., FTW  
Researchers: Dr. Richard Klingner, P.E., Michael McNerney, P.E., and Dr. Ilene Busch-Vishniac, CTR*

### Focus on Research

The purpose of **Focus on Research** is to update engineers and technicians on items of interest in active upcoming projects. The contents of the various articles do not necessarily reflect the official views of the FHWA or TxDOT.

Contact Kathleen M. Jones (512) 465-7947, Research and Technology Transfer Office, P.O. Box 5051, Austin, TX 78763-5051, for more detailed information.



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