Utility Pole Safety

A Project for
The Alabama Department of Transportation

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16. Abstract

Federal regulations indicate that highway agencies should work with utility companies to treat utility facilities that are found likely to cause injury to motorists. Between 1994 and 1998, Alabama ranked 14th among the 50 states in total utility pole fatalities and 13th in utility pole fatalities per 100 billion vehicle miles traveled. This research project studied the contribution that a reduction in utility pole crashes could make to the overall transportation safety effort in Alabama and examined methods for the Alabama Department of Transportation (ALDOT) to accomplish such reductions.

Utility pole crashes constituted only 1.0% of crashes on state-controlled roads, so a large reduction in pole crashes will play only a small role in meeting overall roadway safety goals. Fatal utility pole crashes in Alabama are relatively random events and do not occur in easily treated clusters, so there is no quick, inexpensive method of treating that problem. There is strong competition for safety funds in Alabama, with Hazard Elimination Safety (HES) funds used as the principle source. The research showed that most utility pole crash sites in Alabama could not compete effectively for HES funds. A review of nearby states with utility pole safety programs showed that they addressed utility pole safety principally during state highway agency construction projects. Considering the low impact an independent utility pole safety program would have on overall roadway safety and the strong competition for safety funds, the researchers endorse achieving pole remediation through inclusion in active ALDOT construction projects or through sites that can be positively identified through the normal cost:benefit studies used for safety projects.

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Executive Summary

The Alabama Department of Transportation (ALDOT), the Alabama Department of Public Safety (DPS), and the Alabama Department of Economic and Community Affairs (ADECA) adopted a goal in 1999 of reducing roadway crashes, injuries, and deaths by 20% over the next 10 years. This research project studied the contribution that a reduction in utility pole crashes could make to that effort and examined methods of accomplishing such reductions.

Between 1994 and 1998, Alabama ranked 14th among the 50 states in total utility pole fatalities and 13th in utility pole fatalities per 100 billion vehicle mile traveled. Even at these levels, utility pole crashes constituted only 1.0% of crashes on state-controlled roads. A large reduction in pole crashes will play only a small role in meeting the overall roadway safety goal, considering ALDOT roads constitute only approximately 10,900 miles of the 94,309 total miles of roads in the state. Fatal utility pole crashes in Alabama are relatively random events and do not occur in easily-treated clusters, so there is no quick, inexpensive method of treating the problem.

A review of nearby states with utility pole safety programs showed that they addressed utility pole safety principally during state highway agency construction projects. Existing utility pole placements are reviewed during project design, and relocation/remediation is treated as part of the overall project. The remediation cost is borne principally by the utility companies, which usually have no information concerning pole crashes unless the pole requires replacement.

There is strong competition for safety funds in Alabama, with Hazard Elimination Safety (HES) funds used as the principle source. Only $2.9M of HES funds was available in 2001, and the research showed that most utility pole crash sites in Alabama could not compete effectively for HES funds with traditional types of projects. Two factors reduce the attractiveness of pole safety projects:

- Lack of precise crash records limits the ability to match crashes to specific poles, so simple, inexpensive treatments to a single pole may not be a realistic solution to these crashes.
- In urban areas, site complexity is increased by the variety of poles and pole owners present, as well as by the difficulty of relocating poles due to nearby buildings, signs, etc.

Federal regulations indicate ALDOT should work with utility companies to treat utility facilities that are found likely to cause injury to motorists. Major utility companies contacted during this study demonstrated willingness to work with ALDOT to improve utility pole safety. Considering the low impact an independent utility pole safety

program would have on overall roadway safety, the difficulty in defining precise project boundaries, and the strong competition for safety funds, the researchers endorse achieving pole remediation through inclusion in active ALDOT construction projects or at sites that can be positively identified through the normal cost:benefit studies used for safety projects. Section Five of this report outlines how ALDOT can comply with federal regulations through a public/private partnership that addresses utility pole sites identified as part of the ALDOT's yearly crash analysis study and evaluation. Part of the program would include a renewed emphasis on two of ALDOT's current policies:

- Encouraging utility companies during the permitting process to install facilities well back from intersections and away from the outside of horizontal curves
- Evaluating major projects as well as 3R/4R projects for safety treatments of existing utility poles.

Section 1
Introduction

Between 1994 and 1998, there were 150 deaths in Alabama resulting from vehicle impacts with utility poles. That statistic placed Alabama 13th among the 50 states in the number of such deaths per 100 billion vehicle mile traveled (Federal Highway Administration, 2000). Federal regulations state that "When the transportation department determines that existing utility facilities are likely to be associated with injury or accident to the highway user …. the transportation department shall initiate or cause to be initiated in consultation with the affected utilities, corrective measures to provide for a safer traffic environment." [23 CFR 645.209(k)]. As yet, Alabama has no comprehensive plan for such corrective measures.

The overall objective of the project was to contribute to the State of Alabama's program to reduce crashes, injuries, and deaths by 20% in the next 10 years, a goal adopted in 1999 by the Alabama Department of Transportation (ALDOT), the Alabama Department of Public Safety (DPS), and the Alabama Department of Economic and Community Affairs (ADECA). To do so, the project performed a variety of tasks related to utility pole safety:

- Identified the magnitude of the utility pole safety problem through the use of the CARE® computer program, an analytical tool designed for crash analysis and countermeasure development (CARE).
- Performed field investigations of a sample of utility pole crash sites.
- Investigated utility pole safety programs used in other states.
- Investigated the possibility of using Hazard Elimination (HES) or Optional Safety funds for pole remediation.
- Developed a sample utility pole safety policy for ALDOT.

The study was limited to roads in Alabama under the jurisdiction of ALDOT. Local roads were not addressed, but recommendations for utility pole safety included herein may be transportable to local governments.

Section 2
Background

This section of the report describes two important background elements of the study. First, general statistics concerning utility pole crashes in Alabama were gathered with the CARE® computerized crash data system. Second, descriptions of utility pole safety programs used in other state transportation agencies were gathered through personal communications with coordinators of those programs.

Alabama Crash Statistics

CARE® examined data concerning utility pole crashes in Alabama for the 5-year period 1996-2000 (the most recent data available.) In that period, there were 3,364 total utility pole related crashes and 327,720 other types of crashes on state-controlled roads in Alabama. Thus, only 1.0 percent of crashes on state-controlled roads were related to utility poles. In that same period, there were 2,951 total fatalities on state controlled roads, of which 70 (2.4%) were utility pole related. Table 2-1 presents further statistics comparing utility pole crashes with non-utility pole crashes in Alabama.

Table 2-1. Utility Pole Crashes vs. All Other Crashes (State Routes, 1996-2000)

	Pole Related		Non-Pole Related	
	Frequency	%	Frequency	%
Rural	1,243	37.0	99,071	30.2
Urban	2,121	63.0	228,649	69.8
State Route	1,924	57.2	150,489	45.9
U.S. Route	1,232	36.6	123,668	37.7
Interstate*	208	6.2	53,563	16.3
Segment	3,147	93.5	288,469	88.0
Intersection	217	6.5	39,251	12.0
PDO	1,906	56.7	243,592	74.3
Injury	1,388	41.3	81,247	24.8
Fatal	70	2.1	2,881	0.9

*Facilities are typically breakaway light supports

Several interesting conclusions concerning utility pole and non-utility pole crashes on state-controlled roads may be drawn from the table:

- Utility pole crashes take place more frequently on rural roads (37.0% to 30.2%).
- Utility pole crashes take place less frequently at intersections (6.5% to 12.0%).

- Utility pole crashes are more likely to be fatal (2.1% to 0.9%). This is to be expected, as utility pole crashes are more severe than most other types of crashes.

Utility pole crashes on state routes were also compared to utility pole crashes on non-state routes using CARE® for 1996-2000 data. The state system comprises approximately 10,900 miles of road, while non-state roads comprise 83,400 miles. The state system carries more than three times the vehicle-miles of travel compared to non-system roads. The results of the CARE® runs, shown in Table 2-2, reveal interesting differences:

- There were 3,364 utility pole crashes on state-controlled routes and 8,677 utility pole crashes on non-state routes (258% as many).
- There were 70 utility pole fatal crashes on state-controlled routes and 98 fatal crashes on non-state routes (140% as many).
- Fatal crashes were 2.1% of state route utility pole crashes but only 1.1% of non-state route utility pole crashes. This difference probably reflects the higher speeds on state-controlled roads, which are mostly rural, high-speed facilities.

Table 2-2. Utility Pole Crashes on State Routes vs. Non-State Routes (1996-2000)

	State Routes		Non-State Routes	
	Frequency	%	Frequency	%
Rural	1,243	37.0	3,097	35.6
Urban	2,121	63.0	5,580	64.4
Segment	3,147	93.5	8,147	94.1
Intersection	217	6.5	512	5.9
PDO	1,906	56.7	5,102	58.9
Injury	1,388	41.3	3,459	40.0
Fatal	70	2.1	98	1.1

The CARE® system was also used to investigate possible concentrations of fatal pole crashes from 1996 to 2000 to determine if they were "random" events or if they were clustered on certain poles or pole lines:

- Mile-posted roads were searched in 5-mile increments to discover if more than one fatality had occurred in any 5-mile section.
- All road segments (non-mile-posted road stretches of variable length) were searched to discover if more than one fatality had occurred in any segment.
- All intersections were searched to discover if more than one fatality had occurred at any intersections.

The results showed that no state-controlled intersection in Alabama sustained more than one utility pole-related fatality in the past five years. No road segment sustained more than one utility pole-related fatality in the past five years. Only one five-mile section of road sustained more than one utility pole-related fatality in the past five years: State Road 217 from milepost 5 to 10 in rural Mobile County had sustained two such fatalities. The two fatalities were 3.6 miles apart, so the two fatal crashes were not closely related.

Thus, it appears that fatal utility pole crashes in Alabama are somewhat random occurrences. This situation might exist because ALDOT routinely discourages pole placement in medians, intersections, and on the outsides of curves.

Other States' Utility Pole Programs

Several states have initiated or plan to initiate utility pole safety programs. A memo to FHWA Division Administrators dated October 25, 2000 from Mr. Dwight A. Horne, FHWA Director of Program Administration, listed several such programs. The researchers for this project contacted six of those states to learn about the programs:

- Florida
- Georgia
- New York
- North Carolina
- Maryland
- Pennsylvania

The Maryland and North Carolina programs are only in the planning stages. Pennsylvania has completed negotiations with utility companies but has not yet begun relocating poles. Florida, Georgia, and New York all have active programs. Table 2-3 gives a brief summary of the some significant features of their systems. In general, the utility pole safety programs affect only state-controlled roads; local roads are outside the program scope. In general, utility companies pay for the relocations unless the utility had a compensable interest (ownership or an easement) in the land from which it is asked to move. Pennsylvania's plan is the exception, because the state anticipates paying an average of 50% of the undergrounding/relocation/shielding costs of utility pole relocations. Other states are largely limited to moving poles during highway construction projects, but Pennsylvania plans to target poles/pole lines with significant crashes whether or not they are part of a highway construction project.

Table 2-3. State Utility Pole Safety Program Highlights

State	Roads Affected	Pays Relocation	Typical Relocation Sites
FL	State-controlled	Utilities	DOT construction projects
GA	State-controlled	Utilities	DOT construction projects
NY	State-controlled	Utilities	Started with individual sites; now has evolved into mostly coordinating pole line relocations with DOT projects
PA	State-controlled	DOT/Utilities	Plans to target individual sites

New York

New York started its utility pole safety program in 1982 after experiencing 8,000 utility pole crashes, over 100 deaths, and approximately 6,600 injuries in one year. The key to its program is a tabulation of utility pole crashes during a seven-year period along each

0.1-mile road increment. Increments with more than five crashes or at least one death plus another crash in seven years were put on a "bad actor" list. The list started with 567 eligible increments. (These numbers represent a significantly higher pole crash rate than that found in Alabama -- see Section Three of this report.)

Two conditions signal use of the "bad actor" list:

- When a highway construction project is being planned; and
- When a utility company asks Department of Transportation (DOT) permit reviewers permission to replace an existing pole line.

Either condition prompts a study to determine if a utility facility should be moved.

Florida

Florida's program is activated when a DOT construction project is being designed. Crash histories are checked for poles on construction (not just resurfacing) projects, and then an on-site inspection is performed to determine if poles are in the clear zone or Florida's "control zone," defined as six feet behind the curb for $\leq$ 35 mile per hour (mph) speed zones and eight feet behind the curb for >35 mph speed zones. If existing poles are inside these areas and if benefit:cost calculations exceed 2:1, the pole or poles are placed on the "move" list. If a pole is in a restricted zone but has no place else to be moved and has no significant crash history, the utility company can file a "request for variance" form, which is frequently granted.

Florida is also putting emphasis on rebuilding pole lines that adhere to the new criteria. Utility companies are asking their crews to always replace individual poles a foot or two *farther* from the road instead of closer to it. However, as one Florida DOT employee stated, "…first priority is to move poles out of control zones with highway projects."

Georgia

The goal of Georgia's award-winning "Clear Roadside Program" is to relocate all pole facilities currently in the clear zone on all U.S. and State routes in Georgia in the next 30 years. The plan includes relocating approximately 250 poles per year. The plan arose from talks in the Georgia Utilities Coordinating Committee. To win utility company approval, Georgia softened its rules on pole attachments. (Utilities can now attach to existing poles in the clear zone for which they would have previously been denied a permit, as long as the poles have no accident history.)

Georgia checks three-mile-long, state-controlled road sections to obtain suitable remediation sites. A Georgia DOT employee described how pole relocation sites are chosen in Georgia in a presentation at the 2000 Annual Meeting of the Transportation Research Board. Total utility pole crashes are tabulated for the past three years for each three-mile section of road. During that year, the top 20 sites in Georgia averaged 21 crashes in three years, significantly higher than the site with the highest number of crashes in Alabama (see Section Three of this report.)

Poles and pole lines that do not meet requirements are subject to relocation. Georgia's curbed roadway requirements are the same as Florida's: six foot minimum for roads with $\leq$ 35 mph speed limit and eight foot minimum for roads with > 35 mph speed limits. The *desired* minimum setback is12 feet in all curbed conditions. All of Georgia's "worst offenders" to date were in the Atlanta metro area, concentrated on roadways with curb and gutter.

Pennsylvania

Pennsylvania's program is not yet in place but will differ from the other programs cited. Pennsylvania's program will not concentrate on highway construction projects; instead it will relocate utility poles in "hit pole clusters" defined as three crashes within 0.5 miles over a five-year period. Poles will be moved only when a substantial gain – five feet or more – is achievable. Though no poles have yet been relocated, plans call for sharing 50% of the cost for undergrounding, 50% for relocations from existing right-of-way to private right-of-way, 0% for relocations from within right-of-way to edge of existing right-of-way, and other percentages for other situations.

Section Three
Field Work

The research team identified and visited approximately 28 potential utility pole relocation sites to determine the extent of the utility pole crash problem in Alabama and the opportunity to decrease the number of pole hits.

Computer Searches

The CARE® computerized crash information system was used to select sites on state-controlled routes that might be suitable for remediation projects. An initial decision was made to consider total crashes, rather than crash severity, as the parameter upon which to select sites. Computer searches were performed to identify sites with the following properties:

- For intersections: identify all intersections with two or more crashes in four years (1996-1999), the most recent data available at the time of the search.
- For segments: identify all segments with three or more crashes in four years (1996-1999)
- For mile-posted roads: identify all segments with more than two crashes in three years (1997-1999) in five-mile increments. (The three-year time period is inconsistent with the other searches. The research team suggests that future work involve searches with consistent time periods.)

The search yielded nine intersections with three or more crashes in the four-year period. (The highest number of crashes was seven in the four-year period). An additional 25 intersections had two crashes in the period, but these sites were excluded from further consideration in this study due to their large number and low rate of crashes.

The search yielded nine segments with four or more crashes in the four-year period. (The highest number of crashes was eight in the four-year period.) An additional 17 segments had three crashes in the period, but these sites were excluded from further consideration.

The search yielded 126 five-mile-long sites with the minimum of two crashes in three years. (The highest number of crashes was 17 in the three-year period, although 75% of the sites had only 2 or 3 total crashes.) A severity method was used to evaluate the large number of sites to determine which should be selected for further study. All crashes were converted to equivalent property damage only (PDO) crashes using the following relationships:

- 1 fatal crash = 10 PDO crashes
- 1 injury crash = 3 PDO crashes

The method yielded 19 sites with PDO equivalents of 10 or higher, ensuring that each fatal crash site was represented, along with sites with multiple-injury and PDO crashes.

Of these sites, 11 of 37 were found to be on Interstate highways. Longitudinal utility facilities are not allowed on Alabama Interstate roads, so an initial visit was made to three of the Interstate sites to determine the type of utility facilities involved in the crashes. The crashes were found to have taken place on breakaway highway luminaire supports, which are approved safety treatments and are not the subject of this research. On the assumption that almost all utility pole crashes on Interstates are associated with breakaway luminaire supports, the 11 sites were removed from the list of potential sites, leaving 26 sites. One additional site could not be located during field visits; the mileposts listed in the computer output were beyond those found in the field. That left 25 sites to be visited as listed in Table 3-1.

Table 3-1. List of Sites Selected for Initial Investigation

Division	County	City	Link	Location	Crashes
Segments					
4	Lee	Lee Rural	S-1	MP 122.7 to MP 127.7	5
1	Madison	Madison Rural	S-1	MP 350.1 to MP 355.1	10
1	Madison	Madison Rural	S-1	MP 356.1 to MP 361.1	4
9	Escambia	Escambia Rural	S-3	MP 76.8 to MP 81.8	3
5	Tuscaloosa	Tuscaloosa Rural	S-6	MP 61.2 to MP 66.2	3
6	Dallas	Dallas Rural	S-8	MP 88.1 to MP 93.1	17
8	Monroe	Monroe Rural	S-21	MP 22.9 to MP 27.9	2
5	Chilton	Chilton Rural	S-22	MP 52.7 to MP 57.7	5
1	Cherokee	Cherokee Rural	S-25	MP 245.8 to MP 250.8	4
2	Lawrence	Lawrence Rural	S-33	MP 32.4 to MP 37.4	2
9	Mobile	Mobile Rural	S-42	MP 13.8 to MP 18.8	6
8	Washington	Washington Rural	S-56	MP 9.2 to MP 14.2	2
3	Jefferson	Jefferson Rural	S-75	MP 3.1 to MP 8.1	10
1	DeKalb	DeKalb Rural	S-75	MP 66 to MP 71	5
1	Limestone	Limestone Rural	S-99	MP 2.5 to MP 7.5	3
1	Marshall	Boaz	S-168	Node 244 to Node 289	6
5	Jefferson	Birmingham	S-5	Between 30th Ct. and Eufaula Ave.	4
2	Marion	Gu-Win	S-118	Node 9 to Node 10	4
Intersections					
2	Marion	Guin	S-171	Node 165	3
2	Marion	Guin	S-118	Node 251	3
5	Tuscaloosa	Tuscaloosa	S-215	AL 215 at Crescent Rd.	3
3	Jefferson	Homewood	S-149	Node 180	3
9	Mobile	Prichard	S-17	Clark Ave. W. at Viaduct St.	3
4	Calhoun	Piedmont	S-74	Node 72	3
5	Tuscaloosa	Tuscaloosa	S-6	37th St. at AL 6 & McFarland Blvd.	3

Site Visits and Results

Graduate and undergraduate students from the University of Alabama (UA) performed field visits to the 25 sites listed in Table 3-1. They took with them copies of all accident

report forms for the sites during the analysis period. They completed a Utility Pole Accident Site Report Form including photographs of the utility pole for each site. An example of the form is given in Figure 3-1.

Figure 3-1 has two parts: a data page and a photographs page. The top portion of the data page lists the type of crash site and how to find it, as well as information concerning the type of facility and the general character of the roadway. The middle section describes the type of utility facility and its owner. The lower portion of the data page lists the number and severity of accidents, along with a paragraph at the bottom of the page outlining the comments of the field visit team. Figure 3-1 describes a visit to US 80 in Selma, Alabama from milepost 88 to 93 where poles in the median have been involved in a substantial number of utility pole crashes along that section of highway. The last paragraph indicates that investigators found that some of the poles were removed before the site visit.

The second page of Figure 3-1 shows five photographs of the area. The median poles are shown in the top right and middle left photos. They are poles owned by the Alabama Power Co., but the only service they support is lighting paid for by the City of Selma. The remaining photographs show that the majority of poles outside the travel lanes are spaced well back from the highway. The bottom photo shows an intersection situation that became familiar to the survey team: signal supports and luminaire support poles closer to the roadway than other utility poles.

The survey team made two particular observations:

- Accident report forms filled out by law enforcement officials usually did not provide precise locations of the poles that were hit. For example, rather than describe the crash location at milepost 5.36, the report might state that the location was milepost 5. Additionally, diagrams might contain no reference to nearby streets or other landmarks, so the exact location of the pole could not be determined. Thus, crashes often could not be associated with individual poles. This issue could be addressed by providing local law enforcement with global positioning system equipment.
- At urban intersections, luminaire supports and traffic signal supports frequently were the closest poles to the roadway.

Advisory Committee Meeting

The research team met with its Advisory Committee composed of ALDOT Safety Section, ALDOT Utilities Section and FHWA Division personnel, along with utilities consultant Mr. Ted Williams of General Design, Inc. The group examined and discussed a number of Utility Pole Accident Site Report Forms.

Utility Pole Accident Site Report Form From Dallas County

****

Accident Site: Intersection / Road Segment / *Mile posted Road*
Intersection of roads: *NA*
State Road No.: U.S. Equivalent: *U.S. 80*
Milepost No. *88-93*
Road: Rural / *Urban*
Road: *Tangent / Curved*
Road near intersection of: *AL 41*
Road Width: *4 Lane divided*
Does road have a paved shoulder? *NO*
Does road have the edge striped? *YES*
Does road have a curb and gutter? *NO*
Condition of road: *Good*
Speed Limit: *55*
Is utility pole on the outside of a curve? *NO*
Is utility pole on the inside of a curve? *NO*
Are there other obstructions near road? *NO*
What are they? *None*
Distance of pole from the road: *Poles range from 9' to 11' from the roadway in the median and 25' to 50' from the roadway along each side.*

****

Utility Pole Owner / Identification:
DOT:
Telephone Co.: *Bellsouth*
Power Co.: *APCO*
Utility pole no.:
Size and Class: *5-40*
Condition of pole: *Good*
Guy Wires (direction, number etc.): *Varies*

****

Accident Site Statistics:
No. Of PDO accidents in period ('96-'99): *14*
No. Of Injury accidents in period ('96-'99): *9*
No. Of Fatal accidents in period ('96-'99): *0*

Recommendations: *There are several poles at this site that need to be moved from the median. Poles range from 9' to 11' from the roadway in the median and 25' to 50' from the roadway along each side. 16 of the accidents were with poles in the median that only provide light. From milepost 89.5-91.6 poles recently have been removed from the median.*

Figure 3-1. Example Site Visit Report Form (Part 1 of 2)

DALLAS COUNTY U.S. 80 MP 88-92

Eastbound shots showing poles in median and along roadway.

Eastbound shots show ing poles in median and along roadway.

Shot showing pole at intersection of US80&AL41

Figure 3-1. Example Site Visit Report Form (Part 2 of 2)

Based on the field team reports and the photographic evidence, the group made the following observations:

- Several urban sites included poles where there is little chance to relocate the pole.
- Several of the rural sites included poles that were already 25 to 50 feet from the road.
- Several of the sites had ancillary devices, or were connected to nearby high cost devices, that would make the poles expensive to relocate.
- Several poles were probably owned by municipalities (usually lighting and traffic signal supports) rather than traditional utility companies.

The Advisory Committee desired to know how many utility pole crashes could be prevented yearly if all the 25 sites in Table 3-1 were treated. Those sites represent the "low hanging fruit," the sites where treatment would provide the greatest return. Table 3-1 lists 116 total crashes for the 25 sites, accumulated over three and four year periods. Not all sites appeared to need remediation, and not all poles along five-mile-long stretches of road would be relocated, leaving opportunities for continued utility pole crashes. With those situations in mind, the Advisory Committee estimated that 50% of yearly pole crashes could be prevented by remediation. Those values led to the following approximation:

$$(116 \text{ crashes}/3 \text{ years}) \times 0.5 = 20 \text{ crashes per year prevented} \qquad (3\text{-}1)$$

Twenty crashes prevented per year is approximately 0.015% of the 135,000 crashes taking place in Alabama each year. The question arose regarding the cost effectiveness of initiating a safety program which would have so little impact on the overall highway crash problem in Alabama. Accordingly, the Advisory Group asked the research team to investigate several of the sites that appeared most in need of treatment to determine if those sites could successfully compete for funds in established programs such as the Hazard Elimination (HES) program.

Alabama Power Investigations

The research group met October 1, 2001 with Mr. Mark Edwards, a Power Delivery Specialist with Alabama Power Co. and with consultant Mr. Ted Williams. Mr. Edwards and Mr. Williams possessed the capability to assess and estimate costs for remediation efforts at utility pole crash sites. During the meeting, five sites listed in Table 3-1 were chosen for follow-up site visits. Alabama Power personnel and Mr. Williams investigated and, where appropriate, produced cost estimates to remediate the five sites:

- US 80 in Dallas County
- AL 33 in Lawrence County
- AL 75 in Centerpoint in Jefferson County
- The intersection of AL 168 and Snead Street (US 431) in Boaz in Marshall County
- The intersection of US 43 and Co. Road 21 in Marion County

US 80

The site at US 80 in Dallas County is the same site previously shown in Figure 3-1. It had been identified as one of the sites most likely to qualify for HES funding. Luminaire supports in the median at that location were involved in 5 PDO and 2 injury crashes in three years. (Other poles in that line had been involved in further crashes, but those poles had been relocated recently.) Alabama Power representatives evaluated the site and prepared a cost estimate for remediation. The estimate involved removing the poles in the median and replacing them with 140 poles and lighting on both sides of US 80 for $247,600.

Research team members used the computerized Candidate Analysis Site Evaluation Form (CASE Form) from the CARE® system to evaluate the cost:benefit ratio for the proposed improvements. The completed form for the US 80 site is shown in Figure 3-2. The user enters identifying information, the number, severity, and time frame for past crashes, the project cost, and the estimated percent crash reduction. The computer completes the cost:benefit ratio for the site based on figures supplied by the FHWA. For the US 80 site, the ratio was 0.349.

To determine if the site might fare well in competition with other candidates for HES funds, it was compared to the successful 2001 HES projects. The top 15 of 41 2001 HES projects are shown in Table 3-2. They exhibit cost:benefit ratios of less than 0.01. (The other 26 selected projects are similar, with 85% of them having cost:benefit ratios under 0.10 However, the three lowest-ranked projects have values between 0.2 and 0.6.) The value of 0.349 indicates that US 80 would probably have a difficult time competing for HES funding. The US 80 site is a typical situation where utility treatment should be included in an ALDOT construction project.

AL 33

The site on AL 33 from milepost 32 to 35 involved one fatal and two PDO crashes spread over 2.5 miles. None of the crashes involved the same pole. Mr. Ted Williams inspected the site and found the poles were approximately 10-12 feet from the traveled way. Mr. Williams suspected from the tree trimming pattern and other evidence that the poles were already very near the ROW line. ALDOT was asked to provide the ROW width in the area, and they reported it as 50 feet. Assuming 12-foot wide lanes, only about 12 feet remains for ROW on each side, indicating that the poles are already as close as the ROW line as possible.

Potential remediation techniques include undergrounding, or buying private ROW and relocating the lines farther from the road. Both conditions were judged too costly, and the site was eliminated from further consideration.

Candidate Analvsis Site Evaluation Form

(CASE Form)

Reference Number: 1

Funding: Sect 152, ON-System _____ Sect 152 OFF-System _____

System - Urban: Federal X State _____ County _____ Municipal _____

System - Rural: Federal _____ State _____ County _____

Location: _____ System Code _____

Description County City

Link: US 80 (4b) From: MP 88 to MP 89.5

Node/Milepost Node/Milepost

Time Period of Accident History: 4 Years (6) Date of Investigation: 12/01/01

Investigators: Alabama Power Employees

Roadway Environment Causes of Accidents	(9) Total Number of Accidents	(10) Number of Fatal Accidents	(11) Number of Injury Accidents	(12) Number of P.D.O Accidents
Poles in median (10 feet from travel lanes)	7	0	2	5
	0			
	0			
	0			

Total Number of Roadway Environment Causes 1

Description of Alternative Safety Treatments	(14) Initial Cost	(15) Life in Years	(16) Maint. Cost Per Year	(17) % Accident Rate Reduction For Roadway Environment Causes 8a	8b	8c	8d
Move light poles to sides of US 80 (25 ft from road)	$247,600.00	30		42.00%			

Total Number of Safety Treatments 1

Cost Benefit Analvsis

Reference Number: 1

	Cost	Benefit	Maintenance Cost	C/B Ratio	Total Cost	C/B Ratio
Move light poles to sides of US 80 (25 ft from	$247,600.00	$709,786.94	$0.00	0.3488	$247,600.00	0.3488
	$0.00	$0.00	$0.00	0.0000	$0.00	0.0000
	$0.00	$0.00	$0.00	0.0000	$0.00	0.0000

Figure 3-2. Cost:Benefit Calculation Form

Table 3-2 – Sample of Approved HES Sites FY 2001

Div.	County	City	Location	Safety Treatment	Cost	C/B Ratio
4	Calhoun	Rural	US-431@AL-204	Advance warning signs	$1,000	0.0009
5	Tusc.	Tusc.	15th St. at 10th Ave.	Modify Signal	$1,000	0.0015
5	Tusc.	Tusc.	15th St. at Hackberry Lane	Modify Signal	$1,000	0.0018
3	Blount	Rural	AL 79@AL 160	Channelize drives	$10,000	0.0023
3	Shelby	Rural	AL-25@Chemical Lime Plant	Add warning signs	$1,000	0.0033
5	Tusc.	Tusc.	AL-215@10th Ave/35th St.	Change signal operations	$16,000	0.0053
4	Lee	Auburn	Glenn Ave. from Gay to Burton	Warning signs	$1,000	0.0064
4	Lee	Opelika	US-431@Lee Co. Rd. 248	Rumble strips	$3,000	0.0065
4	Calhoun	Anniston	Noble St.@19th St.	Retime sig./Side St. detection	$2,500	0.0067
4	Calhoun	Rural	US-431@Old Gadsden Hwy.	Strobe and warning signs	$4,000	0.007
3	Walker	G'springs	AL-269@Tutwiler Rd. & Adkins Rd.	Warning flashers	$10,000	0.0077
1	Morgan	Rural	SR-36 (MP 24.5 to 25)	Add 12 "No Parking" signs	$2,500	0.0078
4	Lee	Opelika	US-431@Lee Co. Rd. 379	Luminaires and rumble strips	$10,000	0.0094
3	Shelby	Pelham	Valleydale Rd.@US-31	Warning signs	$3,000	0.0098
8	Monroe	Rural	AL-21@AL-136	Upgrade entrance/widen	$200,000	0.0115

US 43 and Co. Rd. 21

Three total PDO pole crashes occurred on one power pole and one luminaire support at this intersection. The poles appeared to have been set appropriately originally but were now close to the intersection due to road widening. Alabama Power estimated relocation costs for the two poles as $23,000. The computerized CASE Form was used to calculate a cost:benefit ratio of 2.6. Due to the high cost:benefit ratio, the site was eliminated from further consideration. However, this is the type of site that could be treated during an ALDOT construction project.

Remaining Sites

The two remaining sites were in urban areas. The first was on AL 75 from mileposts three to six in Centerpoint. Utility poles had been involved in seven PDO and six injury crashes there during the review period. The Alabama Power review group encountered the same difficulties as the earlier site investigation group:

- There were many poles in the area serving power, communications, lighting, signal support, etc. These poles were owned by different groups, making coordination difficult.
- Crashes could not usually be attributed to individual poles due to the inaccuracy of crash reports.
- Many poles could not be moved farther from the road without interfering with businesses, signs, or other objects

- Undergrounding would be difficult due to ALDOT restrictions concerning crossing under their facilities.

As described above, the site was extremely complicated, adequate information was not available to make decisions, and the cost of relocating all the utility facilities would be very high. The site was dropped from further consideration.

The intersection of AL 168 and US 431 in Boaz in Marshall County involved three PDO crashes and one injury crash on four different poles. (Table 3-1 indicates six total crashes, but Mr. Williams' investigation found that the other two crashes were remote enough from the main site as to be unrelated.) The intersection is a complicated, six-approach intersection with a variety of different pole types present. Individual crashes could not usually be attributed to individual poles, so sufficient information to select individual poles for relocation was unavailable. Due to the complexity of the site and the high treatment cost, it was also dropped from further consideration.

Final Lists

After the Alabama Power investigations and subsequent cost:benefit calculations, only one site can be forwarded for possible consideration as an HES site: US 80 from mileposts 88 to 89.5.

The research group reviewed again the list of sites in Table 3-1 to identify those sites that might be good candidates for treatment. The review eliminated sites considered too complicated for treatment (most of the urban sites), sites with pole lines already 25 to 50 feet from the road, and sites with pole lines already at the ROW line. The result is Table 3-3, a list of sites that could be considered for remediation during future construction projects. The list is short, containing only three milepost and two intersection sites. Almost all the milepost sites were eliminated because the poles at those sites were generally 25 to 50 feet from the traveled way. This result indicates that significant numbers of vehicles do impact poles that are placed outside the clear zone.

The two intersections remain because they both contain poles in medians and appear eligible for treatment. The shortness of the list highlights the frustrating nature of pole treatment in urban areas.

Table 3-3. Sites for Consideration During ALDOT Construction

Division	County	City	Link	Location	Crashes
Segment					
6	Dallas	Dallas Rural	S-8	MP 88.1 to MP 93.1	17
5	Chilton	Chilton Rural	S-22	MP 52.7 to MP 57.7	5
1	Limestone	Limestone Rural	S-99	MP 2.5 to MP 7.5	3
Intersection					
5	Tuscaloosa	Tuscaloosa	S-215	AL 215 at Crescent Rd.	3
4	Calhoun	Piedmont	S-74	Node 72	3

Section Four
Conclusions

ALDOT, DPS, and ADECA agreed in 1999 to the goal of reducing roadway crashes, injuries, and deaths by 20% over the next 10 years. This research project studied the contribution that a reduction in utility pole crashes could make to the effort and examined methods of accomplishing such reductions.

Utility pole crashes constitute only 1.0% of crashes on state-controlled roads, so reducing a large percentage of pole crashes will have only a minor impact on the overall roadway safety goal. Fatal utility pole crashes appear to be relatively isolated events and do not occur in easily-treated clusters. No state-controlled intersection and no state-controlled road segment had more than one fatal utility pole crash during the most recent five-year period. Only one five-mile-long section of mileposted road on the state system had more than one utility pole fatality in the last five years, and those crashes took place 3.6 miles apart.

Nearby states with utility pole safety programs address utility pole safety principally during DOT construction projects. Existing utility pole placements are studied during project design, and relocation/remediation is treated as part of the overall project. Georgia and Florida treat several hundred poles per year using this method, and the utility companies bear most of the cost.

Relatively few funds are available to support an independent utility pole safety program. Hazard Elimination (HES) and Optional Safety funds are the principle sources of safety funds. This project analyzed five utility pole sites judged best able to compete against traditional projects for HES funds. The lowest cost:benefit ratio obtained was 0.349, which was higher than more than 90% of the funded projects on the most recent HES project list. Thus, this source of funds alone does not appear capable of supporting a new utility pole safety program. Two principle reasons stand out for the relatively high cost:benefit ratio for pole safety projects:

- In rural and urban areas, lack of precise crash records means crashes frequently cannot be attributed to individual poles, so it is not possible to conduct a program of simple, inexpensive treatments to single poles.
- In urban areas, traffic signal poles and highway lighting poles increase site complexity. In addition, in many urban areas, there may be no place to relocate poles due to nearby buildings, signs, vehicle entrances, etc.

Federal regulations indicate ALDOT should work with utility companies to treat utility facilities that are found likely to cause injury to motorists. Major utility companies contacted during this study demonstrated willingness to work with ALDOT to improve utility pole safety. Considering the low impact an independent utility pole safety program would have on overall roadway safety, the difficulty in defining precise project boundaries, and the strong competition for safety funds, the researchers endorse limiting pole remediation projects to active DOT construction projects or to any sites that can be positively identified through the normal cost:benefit studies used for safety projects. Section 4 of this report outlines how ALDOT can comply with federal regulations through a public/private partnership that addresses utility pole sites identified as part of the ALDOT's yearly crash analysis study and evaluation. Part of the program would include a renewed emphasis on two of ALDOT's current policies:

- Encouraging utility companies during the permitting process to install facilities well back from intersections and away from the outside of horizontal curves
- Evaluating major projects as well as 3R/4R projects for safety treatments of existing utility poles.

Section Five
Recommendations

The research group drafted a recommended Utility Pole Safety Policy for potential use by Alabama DOT. That draft policy follows.

ALDOT desires to provide a reasonable clear zone (clear recovery area) along the roadside to increase safety, improve traffic conditions, and enhance the aesthetic quality of highways in Alabama by designing, constructing, and maintaining highway roadsides as wide, flat and rounded as practical and as free as practical from natural or man made objects such as trees, drainage structures, non-yielding sign supports, highway lighting structures, utility poles, and other ground mounted structures. ALDOT encourages and works with utility companies through the permitting process to provide clear zones in the planning, design, installation, and maintenance of new and existing facilities.

All new utility installations fall under the guidance set out in Paragraph 2.7 CLEAR ZONE of the ALDOT Utility Manual.

Crash analysis studies have revealed that many existing utility poles are in locations that have been the site of vehicle crashes that have resulted in personal injury, property damage only, and fatalities. It is realized that many of these utility poles were placed prior to the adoption of current clear zone criteria and were placed in appropriate locations when originally designed and placed. However, in order to help mitigate the damages and injuries that have occurred repeatedly at some locations and to comply with the safety goals set out by ALDOT, the following policy applies:

1) Utility pole crash analysis studies should be performed periodically as part of the yearly crash analysis study and evaluation. The analysis should be based on frequency of crashes and give due regard to crash history, crash potential, safety cost effectiveness, and other pertinent factors as appropriate for determining the appropriate method for clear zone determinations on existing facilities.

2) Any site that reflects a fatality plus one or more additional crashes, two or more personal injury crashes, or four or more total crashes in the last three years associated with a utility pole (or one mile of utility pole line) should be visited in the field by ALDOT to evaluate the possible cause of said incidents and, if proper, to determine the owner or owners of the poles, if any, in question.

3) If a specific site, intersection, or segment is found worthy of further investigation, the pole owner and all pole users should be notified of the situation, and

appropriate ALDOT and utility personnel should visit the site to determine the feasibility of relocating the poles.

4) If there is an ALDOT project that will affect the site in question, and if the project is scheduled for letting within two years from the date of the visit, then any feasible remediation should be incorporated into that project.

ALDOT and utility personnel will review and evaluate the site (giving due consideration to sound engineering practices, standards, and budgetary constraints) to determine if the remediation plan is cost beneficial. If Hazard Elimination Safety funds are proposed for the remediation, the information will be submitted to the Multimodal Transportation Bureau for review and analysis to develop a cost:benefit evaluation.

Section Six
References

CARE, the Critical Analysis Reporting Environment, http://care.cs.ua.edu

Federal Highway Administration, Memorandum from D.A. Horne, Director, Office of Program Administration to J.D. Wilkerson, Alabama Division Administrator, 8/25/00.