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TION OF EXPERIMENTAL RAILROAD-HIGHWAY
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G. BOKUN AND ALFRED F. MOORE

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terim report was prepared to provide a review of the performance ty railroad-highway grade crossings installed experimentally in na between 1970 and 1983. They were constructed of rubber, high- polyethylene (HDPE) or pre-cast concrete panels that were ed under the Federal Highway Administration's (FHWA) Experimental ction - Category II Program. Performance evaluations were ed semi-annually to determine the durability of the proprietary s, ridability characteristics of the approach pavement and surface, effectiveness of the drainage, track structure and boards. In addition to gathering statistical rail and traffic esearch personnel were present to observe and document the tion process. Based on the findings of these performance ons, Department policy and specifications are reviewed and on a continuous basis.

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ABSTRACT

This interim report was prepared to provide a review of the performance of thirty railroad-highway grade crossings installed experimentally in Louisiana between 1970 and 1983. They were constructed of rubber, high-density polyethylene (HDPE) or pre-cast concrete panels that were installed under the Federal Highway Administration's (FHWA) Experimental Construction - Category II Program. Performance evaluations were conducted semi-annually to determine the durability of the proprietary features, ridability characteristics of the approach pavement and crossing surface, effectiveness of the drainage, track structure and header boards. In addition to gathering statistical rail and traffic data, research personnel were present to observe and document the installation process. Based on the findings of these performance evaluations, Department policy and specifications are reviewed and updated on a continuous basis.

METRIC CONVERSION CHART

To convert U.S. Units to Metric Units (S.I.), the following conversion factors should be noted:

Multiply U.S. Units	By	To Obtain Metric Uni
	LENGTH	
inches (in.)	2.5400	centimeters (cm.)
feet (ft.)	0.3048	meters (m.)
yards (yd.)	0.9144	meters (m.)
miles (mi.)	1.6090	kilometers (km.)
	AREA	
square inches (in^2)	6.4516	square centimeters (c
square feet (ft^2)	0.0929	square meters (m^2)
square yards (yd^2)	0.8361	square meters (m^2)
	VOLUME	
cubic inches (in^3)	16.3872	cubic centimeters (cm
cubic feet (ft^3)	0.0283	cubic meters (m^3)
cubic feet (ft^3)	28.3162	liters (l.)
cubic yards (yd^3)	0.7646	cubic meters (m^3)
fluid ounces (fl. oz.)	29.57	milliliters (ml.)
gallons (gal.)	3.7853	liters (l.)
	MASS (WEIGHT)	
pounds (lb.)	0.4536	kilograms (kg.)
ounces (oz.)	28.3500	grams (g.)
	PRESSURE	
pounds per square inch (p.s.i.)	0.07030	kilograms per square centimeters
pounds per square inch (p.s.i.)	0.006894	mega pascal (MPa)
	DENSITY	
pounds per cubic yard (lb/yd^3)	0.5933	kilograms per cubic meter (kg/m^3)
bags of cement per cubic yard (cement bags/yd^3)	55.7600	kilograms per cubic meter (kg/m^3)
	TEMPERATURE	
degrees fahrenheit (°F.)	5/9 (°F.-32)	degrees celsius (°C.) or centigrade

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INTRODUCTION

In the fall of 1968, due to recurring instances of user dissatisfaction with at-grade railroad-highway crossings the Louisiana Department of Transportation and Development (LA DOTD) embarked on a comprehensive program to evaluate its policies, procedures, and materials used in conjunction with at-grade railroad-highway crossings. This was accomplished by coordinating efforts of the Department's New Products Evaluation Committee and the Research and Development Section. In the ensuing years, thirty crossings were installed under the Federal Highway Administration (FHWA) Experimental Construction-Category II program. These consisted of all the popular materials and name brands and incorporated the latest construction techniques available at the time. In conjunction with this, three crossings subsequently failed completely and they were removed and replaced with types then current on the Department's Qualified Products List (QPL). Performance evaluations conducted at these locations are reflected in the most recent LA DOTD's "Railroad-Highway Grade-Crossing Policy" dated November 1, 1979 (See Appendix, page 81).

Of the three major types of crossings under evaluation, the general overall performance of rubber panels (Goodyear's Super Cushion, General Tire's Gen-Trac, Park Rubber's PARKCO and Structural Rubber's SAF & DRI - Model C and S) is considered satisfactory. The only exception is the Gen-Trac panels, which are poor, owing to the tendency of the narrow (18-inch) panels to loosen-up, rock, lose alignment and provide a harsh ride. Otherwise, the use of rubber for railroad-highway crossings has been well established. Problems which have been noted are generally limited to individual design or poor construction techniques rather than the durability of the materials. A pour-in-place type of rubber crossing (FEL-PRO's Track-Span) was evaluated which consists of ground rubber tires blended on-site into a two-component epoxy. Generally used in proximity of switches or odd track configurations, this type of crossing is also performing well. With the exception of some minor shrinkage cracks, the major drawbacks are its cost and the inability to remove it for subseq track repairs.

By comparison, however, four installations of high-density polye (HDPE) or structural foam panels have proven to be unsuitable for departmental use. These crossings (True Temper T-Core and RR Fri Products Cobra) began showing signs of distress within six months installation. Those installed in moderate ADT (5,610 - 15,640 vp areas or with high truck volume experienced complete failure with two years and have been replaced. The remaining crossings, insta in low ADT (865 vpd) rural areas, have exhibited similar failures four years and are scheduled to be replaced shortly.

The third material category, pre-cast concrete panels (Szarka Ente prise's FAB-RA-CAST and DOW-MAC Concrete's DOW-MAC), were also evaluated. Installed in 1974, the FAB-RA-CAST panels experienced failure within six months of installation. Repeated attempts to rehabilitate the crossing, including installation of all new panel still failed to retard the rapid deterioration of the pre-cast con panels, which were replaced with conventional rubber-panels in 197 A more recently developed pre-cast panel DOW-MAC, has been install and is performing well after one year.

Although not experimental, a fourth type of crossing material to be evaluated was sectional-treated timber. This was prompted by the ever-increasing costs of installing polymeric crossings, in an atte to verify the Department's policy with regards to use of this mater (i.e., where traffic volume is 1000 vpd or less). Six installatio with relatively low (250 - 1,693 vpd) traffic volume are serviceabl after two to six years of service. Although not as smooth as polym types, the only signs of distress are normal shrinkage cracks associated with timber.

In conjunction with this study, emphasis was placed on developing a alternative to the wooden header boards, a weakness common to all crossings. Twelve random sites were designated for experimental installation of various patented rubber, polymeric or metal-type header board replacements. Although nine have been installed to date, it is too early to speculate on the effectiveness of the various types at this time.

The Louisiana Department of Transportation and Development's "Railroad-Highway Grade Crossing Policy" was revised effective November 1, 1979. The policy, in part, requires the use of rubberized crossings on all new construction where ADT is 1000 vpd or more and the use of treated-timber crossings where ADT is less than 1000 vpd.

More experimental railroad-highway grade crossing installations are planned for the near future. The new systems, together with the existing crossings, will be inspected annually and the findings reported periodically.

SCOPE

This report provides the results of comprehensive performance eva
ations conducted on thirty railroad-highway grade crossings insta
in Louisiana between 1970 and 1983 under FHWA's Experimental Cons
Category II program. These performance evaluations include perio
visual observation, photo-documentation, statistical traffic data
(both rail and highway), Mays Ridemeter characteristics and locati
descriptions. Whenever possible, research personnel were present
during installation to observe and document the construction proce

These evalutions provide the Department with the information neces
to maintain its "Qualified Products List" (QPL) and "Railroad-High
Grade Crossing Policy" with the latest state-of-the art technology
available.

METHODOLOGY

Site Selection

Each experimental at-grade railroad-highway crossing site was determined by the Department's office of the Project Control Engineer and approved by the FHWA for installation under its Experimental Construction - Category II program. The "Project Notices" indicate specific subbase treatment, type of experimental panels, weight of rails, drainage requirements, etc. More recent installations reflected improvements gained from earlier experiences resulting in refinement of Department policies and procedures to its current state-of-the-art.

Materials Evaluated

Materials installed for evaluation consisted of four basic categories:

1. Rubber panels
2. Linear Polyethylene (Structural Foam) Panels
3. Pre-cast Concrete Slabs
4. Sectional Treated Timber (Not Experimental)

All major manufacturers were represented in the thirty experimental crossings installed between 1970 and 1982 in Louisiana (See Table 1, page 92). Specifics were detailed in each individual performance evaluation. Sectional Treated-Timber crossings were examined collectively for performance comparison purposes only (See Table 2, page 95).

More recent developments have evolved to include a treatise on rubber or polymeric header boards (See Table 3, page 96), designed to replace or eliminate the use of conventional treated-timber headers. This evolution was no doubt prompted by the rapid deterioration of the former and difficulties experienced in maintenance, repair and replacement.

Field Installation

Construction was implemented by appropriate railway maintenance c or independent contractors indicated on the Project Notice under auspices of a Departmental Project Engineer. The Department's di maintenance crews generally provided or augmented necessary detou barricades and signing in accordance with the LA MUTCD. Whenever possible the Department's research personnel were present through construction to document installation techniques and procedures. has proven invaluable, when coordinated with subsequent performan evaluations, in making timely revisions to the Department's "Rail Highway Grade-Crossing Policy."

Performance Evaluations

Comprehensive, periodic performance evaluations were conducted by Department's research personnel approximately semi-annually to do the experimental features suitability for inclusion on its "Quali Products List" (QPL). These evaluations include subjective and o (i.e., Mays Ridemeter) ridability characteristics, panel integrit deterioration, rail and traffic ADT, header board and approach pa conditions. Normal evaluation periods were accelerated where sig abnormal (i.e., excessive cracking or loss of broken panels) wear premature failure were prevalent. This generally resulted in sub quent removal and retrofitting of entire crossings with materials current on the QPL.

Each crossing was assigned a sequentially numbered project identi number for quick reference. This number, in addition to specific location description and statistical data, is depicted in Table 1 Figure 1, page 8 , portrays the respective geographic location of crossing within Louisiana.

Following these extracts are the latest individual performance evaluations conducted on-site by research personnel. Emphasis is placed on dominant features reflected due to construction techniques, poor drainage, approach pavement or traffic conditions, failure of the proprietary experimental materials, etc.

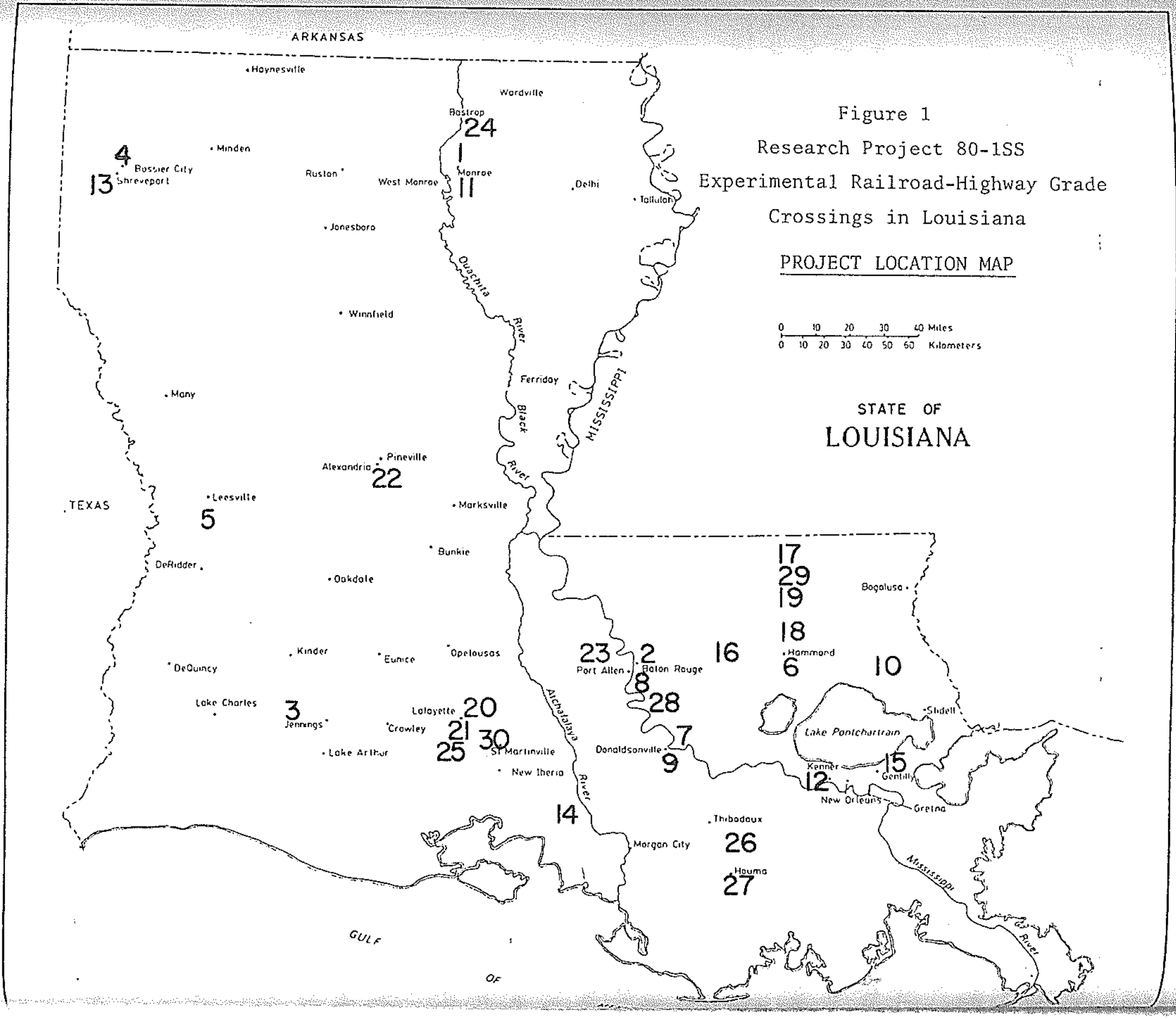


Figure 1

Research Project 80-1SS

Experimental Railroad-Highway Grade

Crossings in Louisiana

PROJECT LOCATION MAP

No. 1 through No. 6

Goodyear Super Cushion Rubber Panel Crossings

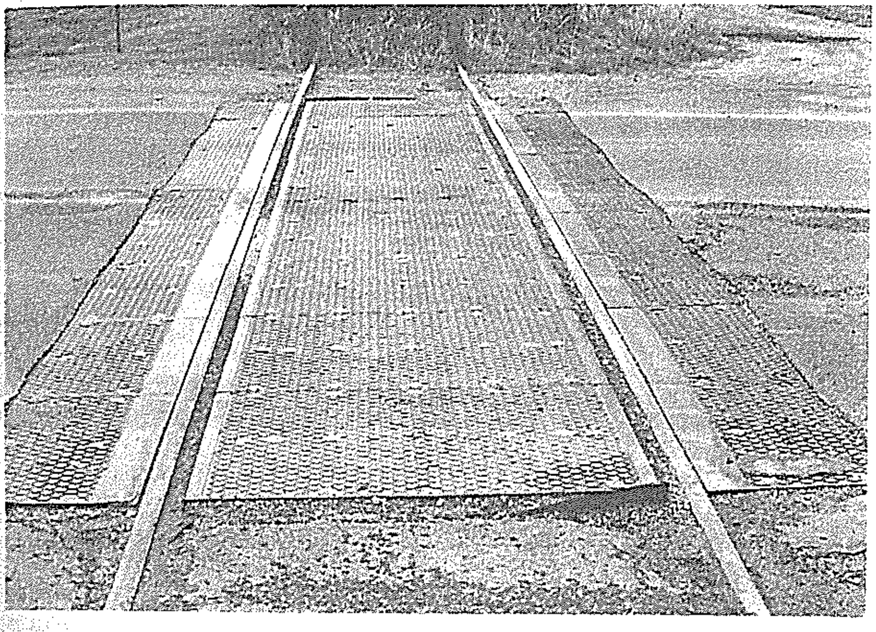


Figure 2

A typical Goodyear Super Cushion rubber panel crossing thirteen years after installation.

The above crossing (Figure 2) is typical of the condition of Goodyear Super Cushion rubber panel crossings installed experimentally throughout Louisiana since 1970. Periodic performance evaluations of these crossings were formally terminated after six to thirteen years of satisfactory overall performance of the proprietary feature, the Goodyear Super Cushion rubber panels. The overall subjective ratings of "Fair" to "Good" can be attributed to the lack of subbase treatment, poor drainage, damage sustained by train derailments (No. 2 and 5) and the rapid deterioration of the wooden header boards (Figure 3). Performance evaluations of these crossings contributed to refinements of Louisiana's "Railroad-Highway Grade Crossing Policy."

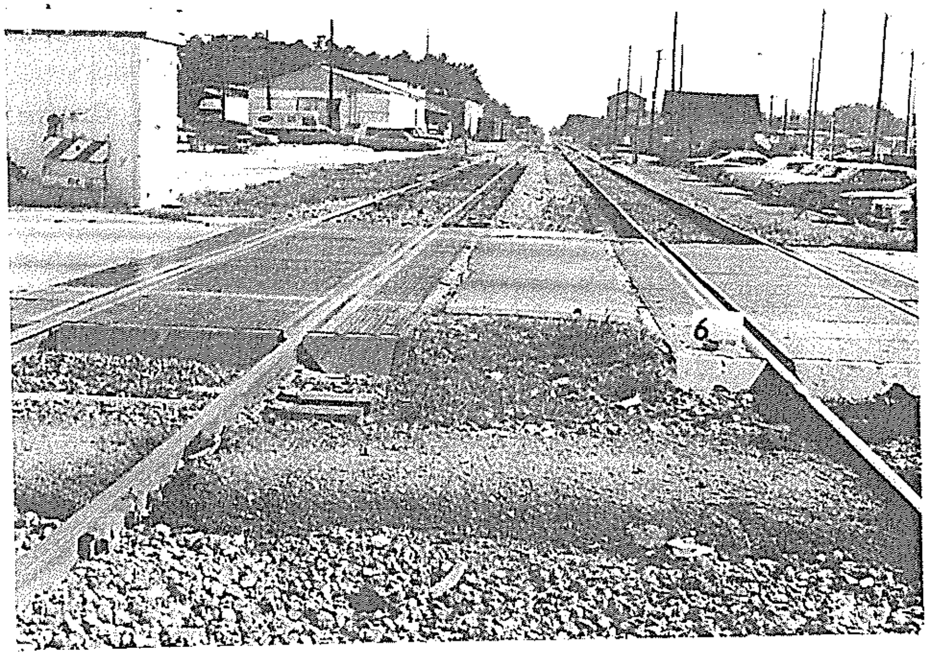


Figure 3

Deterioration of wooden header boards at the pavement relief juncture.

The Goodyear Super Cushion rubber panels were one of the first to be included on the Qualified Products List (QPL) and are now enjoyi widespread use throughout Louisiana by the Department, railway companies and independent industries. Properly installed, they provid a smooth, durable and aesthetically pleasing railroad-highway grade crossing. More detailed evaluations are available in Louisiana Hig way Research Report No. 140 "Evaluation of Experimental Railroad-Highway Grade Crossings in Louisiana - Interim Report No. 5", April 1980.

No. 7

State Project No. 265-01-23

FAB-RA-CAST Pre-cast Concrete Crossing

La. 44 at Burnside

As detailed in Research Report No. 140, performance evaluations were formally discontinued on this prefabricated reinforced-concrete crossing (proprietary name FAB-RA-CAST, manufactured by Szarka Enterprises, Inc., of Livonia, Michigan) in 1979 after their complete failure on several occasions. Initially installed in December 1974, the pre-cast concrete panels began cracking and subsiding almost immediately (Figure 4).

Figure 4

Preliminary cracking of the field-side pre-cast concrete panels three months after initial installation in 1974.

Within six months, little more than the steel reinforcement remai (Figure 5) and Illinois Central Gulf maintenance crews replaced all the panels. In March 1976, these too were removed because of similar failures, creating a very hazardous condition to the moto public. Temporary treated timbers provided interim protection of the crossing pending future disposition.

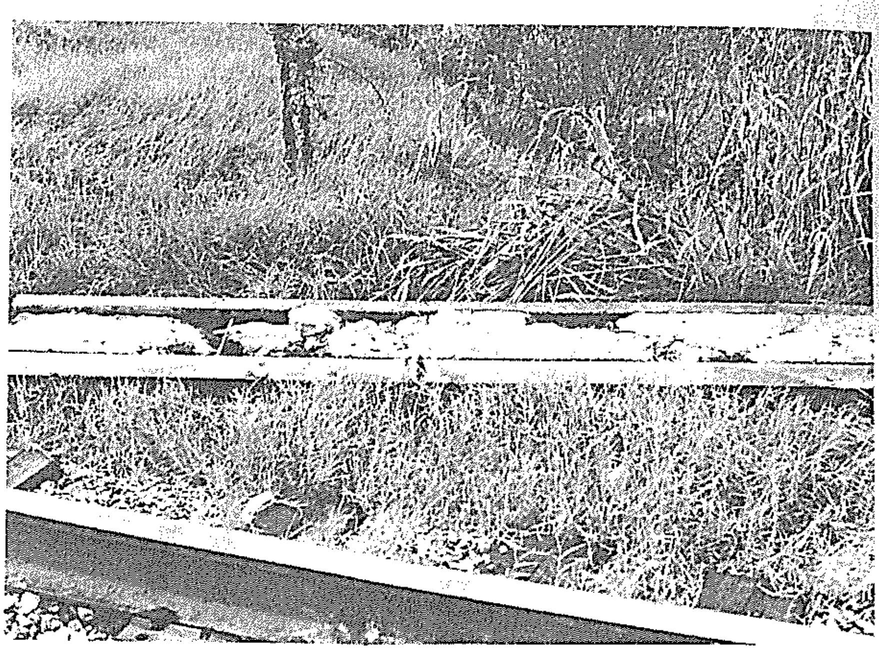


Figure 5

Condition of the aforementioned fieldside panel only six months after installation.

In April 1977, the manufacturer was permitted to retrofit the enti crossing with new FAB-RA-CAST panels using special vibration damper and insulator pads. Within two months, field-side panels were cra ing and rocking was obvious. In 1979, after another complete failure, the entire crossing was removed and replaced with conventional rubber panels then on the Qualified Products List (QPL). T crossing is no longer in our experimental category.

No. 8

State Project No. 414-01-18

True Temper T-Core - High-Density Polyethylene Crossing

La. 30 (Nicholson Drive) at Baton Rouge

This single spur track services the LSU Campus on La. 30 (Nicholson Drive) at the Junction of La. 42. The track crosses this two-lane urban road at a sharp angle (Figure 6), and is rarely used by rail traffic. The estimated 1981 ADT of 19,610 with 6% trucks, was not considered to be the primary cause of the rapid deterioration and subsequent failure of the proprietary feature True Temper high-density polyethylene (structural foam) panels manufactured by Oneida General Corporation of Ogden, Utah.

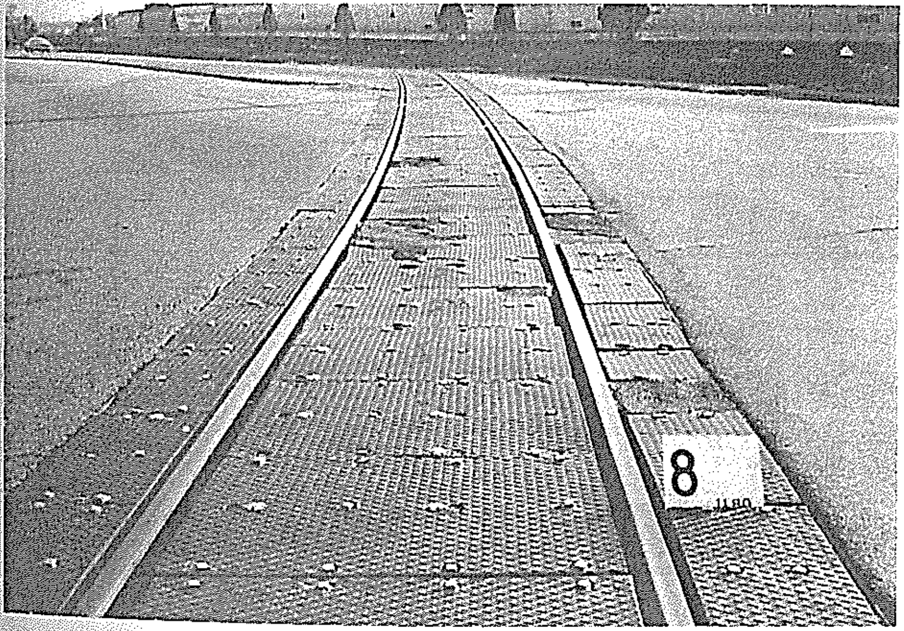


Figure 6

Sharp angle of crossing and temporary asphalt patches only two and one-half years after complete reconstruction in May 1978.

Originally installed without benefit of subbase preparation or ren tion of the rail structure in November 1975, the True Temper po ethylene panels began showing signs of failure almost immediately. This was evidenced by early surface failures in the form of crazi or cracking of panels, eventually resulting in large portions brea ing off completely. This necessitated temporary patching with asp (Figure 7) to minimize the hazardous condition to the motoring public. Rocking and panel looseness were common and resulted in p panel alignment thus contributing to a very harsh ride. By late 1 the majority of the crossing was patched with asphalt where large chunks (one to three square feet) of panels had broken off, especi in proximity of the wheel paths.

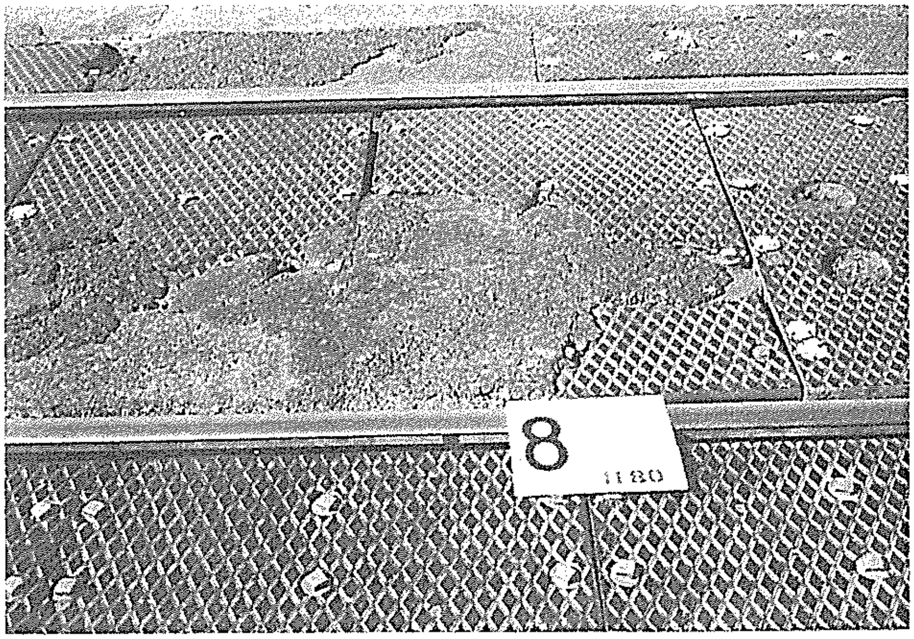


Figure 7

Accumulation of built-up asphalt patches necessitated by the rapid deterioration of the high-density polyethylene panels.

May 1978, the entire crossing was removed and a shallow subbase eight inches of sand-shell was prepared. While some new ties were stalled, most were re-used, some installed on their side, and the same ils reattached. All new True Temper panels were installed at that time.

wever, by December 1978, cracked and broken panels were already in idence. As with the initial installation, deterioration was rapid d asphalt was used extensively as an interim safety measure. Even is proved to be fruitless and ineffective as the built-up asphalt sintegrated rapidly and "popped out" frequently leaving large, tremely hazardous potholes (Figures 8 and 9).

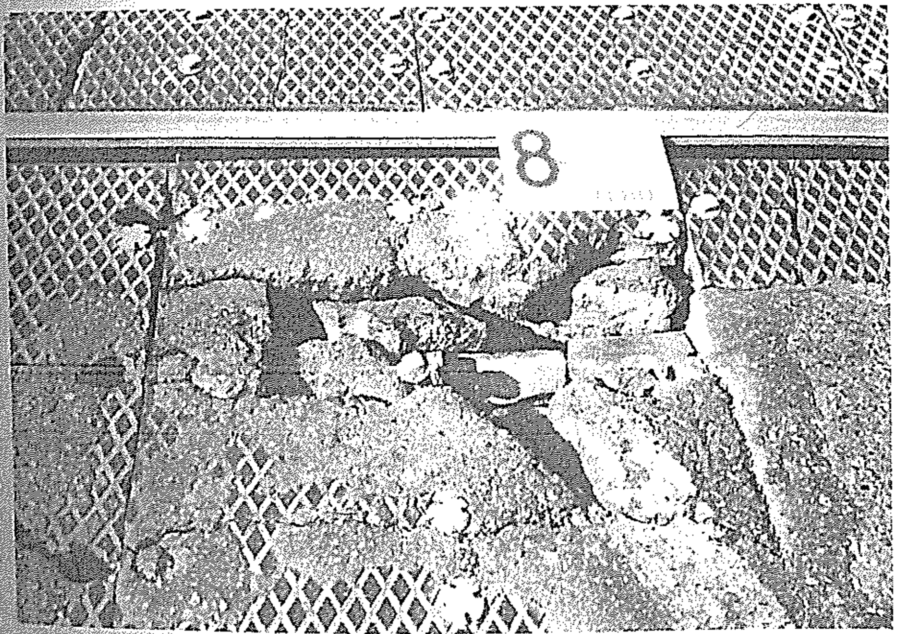


Figure 8

Interim safety precautions in proximity of the vehicular wheelpaths has been largely ineffective.

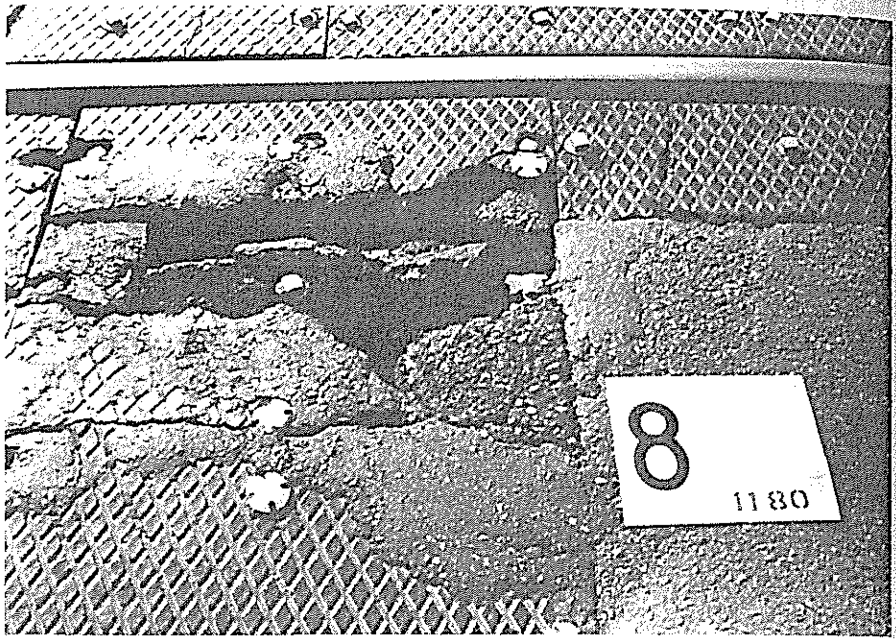


Figure 9

View of rapid disintegration of asphalt patches.

Evaluation of this crossing was terminated in August 1981, with removal of the experimental propriety feature, True Temper high-density polyethylene panels.

By comparison, the replacement conventional rubber panel crossing encompassed the latest state-of-the-art in railroad-highway grade crossing technology.

In accordance with LA DOTD Standard Plan No. RM-42 "Elastomeric (Rubber Type) Railroad Grade Crossing" Specifications (Appendix) this location provided opportunity for a model installation. This began with complete removal and disposition of the failed crossing (Figures 10 and 11) and thorough excavation varying from 18 to 24 inches below the proposed final grade (Figure 12).

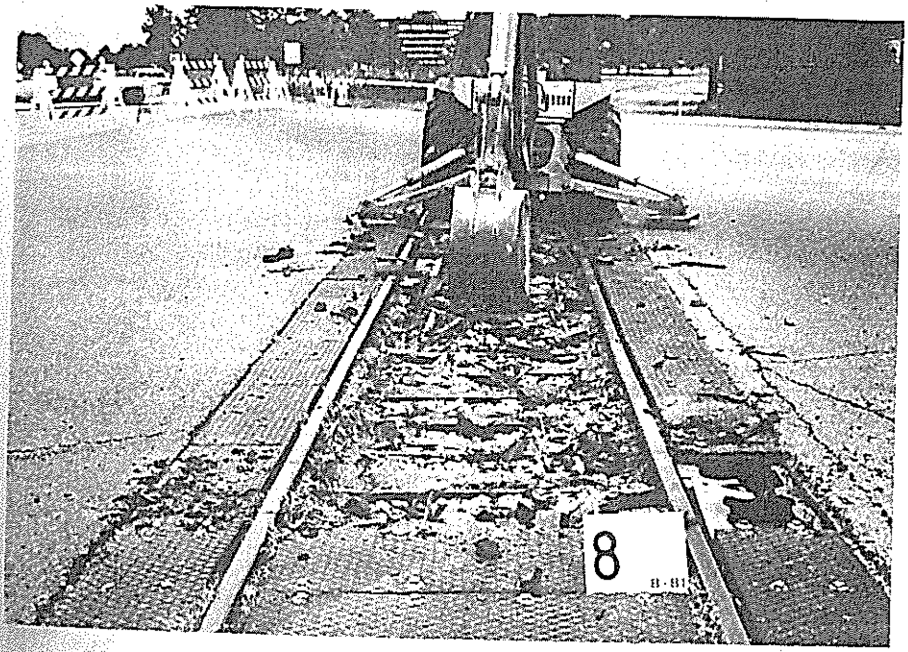


Figure 10

Backhoe being used to remove the old crossing prior to complete reconstruction.

Figure 11

View of the failed structural foam panels just prior to disposition.

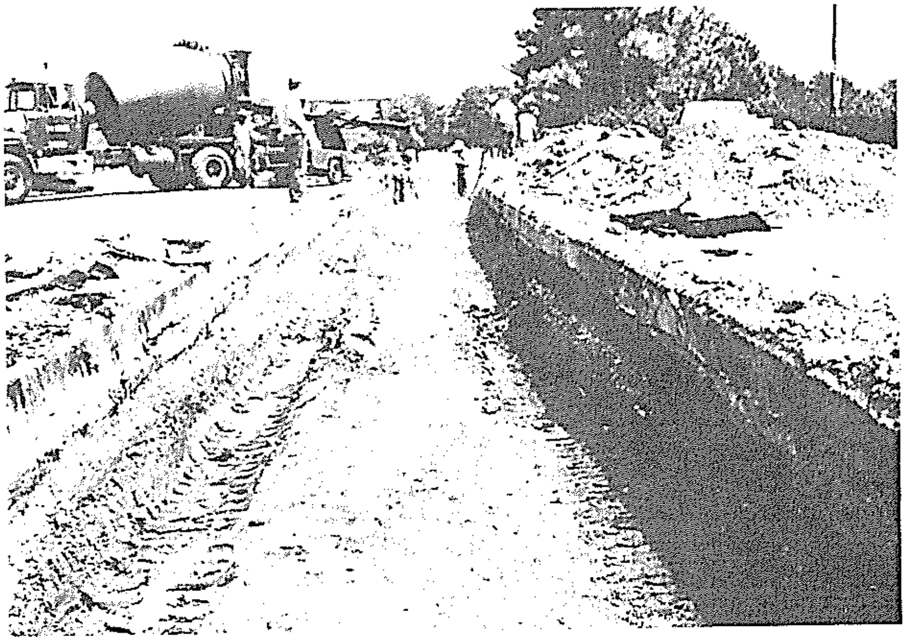


Figure 12

View of completed excavation of the previously cited crossing. Deep tread marks in the soft, underlying soils reveal a condition not uncommon to Louisiana construction crews.

is was followed by pouring portland cement concrete with calcium loride additive to a depth of 12 in. with a 6 in. in 100 ft drop wards the low side to provide for adequate drainage (Figure 13). is additive permits work to progress with minimal disruption whereas nventional methods would require a seven to fourteen day delay nding acceptance through normal compressive strength criteria for C cylinders.

Figure 13

Pouring the PCC base with calcium chloride additive to accelerate the "set" and permit construction to continue with minimal delay.

Within 24 hours, engineering grade fabric filter cloth lined the excavation and encapsulated fresh, coarse ballast to form french drains on either side (Figure 14).

Figure 14

Encapsulating fresh, coarse ballast in engineering grade filter cloth to create french drains.

Fresh ballast was spread over these to provide an additional six to eight inches before placing all new creosoted ties in place.

Voids between the ties were filled with fresh ballast after fitting them with new tie pads, double tie plates (re-usable), new 119 lb rails and achieving approximate final alignment (Figure 15). After arduous and thorough vibration with vibratory hammers (Figure 16), the rail was raised to final grade plus one-half inch as the ballas was compacted. All rails were then double-spiked on each side and panel installation initiated.

The railway roadbed, thus prepared, posed no problem at all with installation of a competitive rubber panel then on the QPL (Figure After over eighteen months, this crossing has not shown the slight inclination towards subsidence, panel looseness or rocking.

Figure 17

Completing the reconstruction process with the installation of a conventional rubber panel currently on the Qualified Products List (QPL).

To researchers, this would seem to indicate that the most critical aspect of proper railroad-highway crossing installation begins with proper subbase preparation.

This crossing is not considered experimental construction and is not scheduled for further evaluation.

No. 9

State Project No. 426-01-09

True Temper T-Core - High-Density Polyethylene

La. 3089 at Donaldsville

At the subject location, La. 3089 is a four-lane, divided rural highway with an estimated 1979 ADT of 5610 with 20% trucks. The True Temper T-Core high-density polyethylene (HDP or structural foam) panels were installed in September 1976, on an industrial spur hosting two rail movements per day. After this installation failed in a manner similar to Experimental Crossing No. 8, but at an accelerated rate due to the high truck volume, it was replaced during 1978 with a Goodyear Super Cushion rubber panel crossing (Figure 18).

Figure 18

Typical truck traffic that contributed to the rapid failure of the True Temper T-Core HDP panels within two years.

As with No. 8, no subbase preparation was implemented during inst
tion. This could be noted by the general looseness of the rails
minor subsidence within three months of installation which no dou
contributed to the rocking of the panels. It could not, however,
the cause of the myriad crazing, cracking and breaking of the cel
polyethylene panels themselves. Evaluation and inspection of this
crossing was terminated in early 1978 after the complete failure
removal of the installation.

No. 10A and 10B
State Project No. 281-03-08
Federal-Aid Project No. RRP - 646-1(001)
SAF & DRI (Model S) Rubber Panel Crossing - No. 10A
Gen-Trac Rubber Panel Crossing - No. 10B
La. 59 at Abita Springs

This project covers the installation of two experimental rubber crossings on La. 59 between I-12 and Abita Springs, La. Both were installed in July 1977, with freshly compacted ballast, new ties, double tie-plates with pads and new 112 lb rails. This two-lane, undivided rural/urban highway has an estimated 1982 ADT of 3180 with 10% trucks. The main line of these crossings has two freight trains per week at an estimated rail speed of 25 mph. The roadbed is well established with excellent drainage at both of these at-grade crossings.

Experimental Crossing No. 10A is of rubber-covered, rectangular steel box-beam construction manufactured by Structural Rubber Products Company of Springfield, Illinois. The eighty-inch long panels, proprietary name SAF & DRI (Model S), are in excellent condition after nearly six years of service (Figure 19). With the exception of the badly deteriorated wooden header boards, there are no signs of movement, rocking or panel looseness common to crossings utilizing the shorter (generally 36 in.) panels spanning fewer ties.

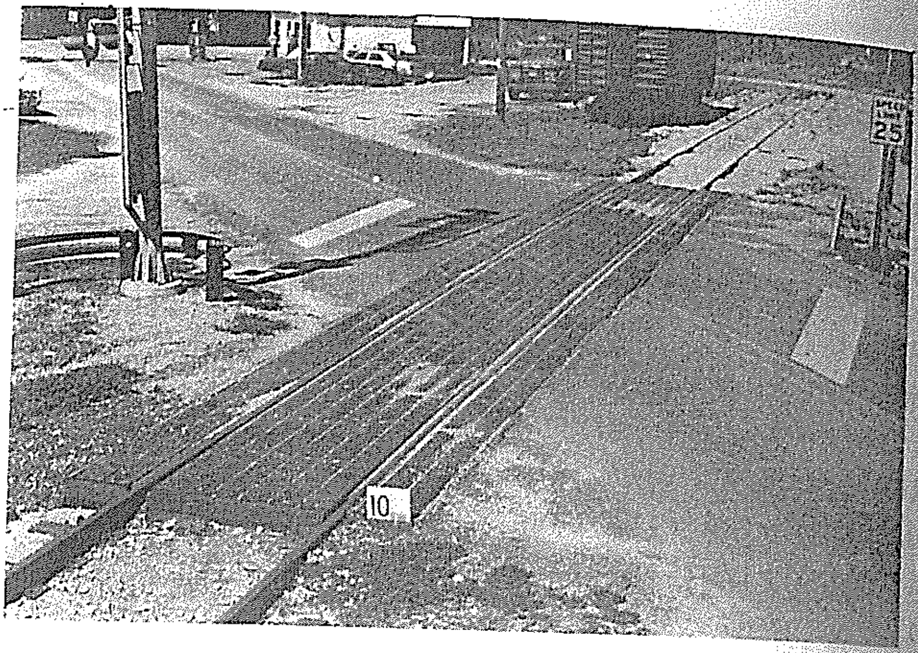


Figure 19

SAF & DRI (Model S) rubber panel crossing at Abita Springs after five years of excellent performance.

Presently on the Qualified Products List (QPL), it is met with fa by the Department and almost all major railroad companies. Proper installed, the SAF & DRI rubber panels provide a very substantial, aesthetically pleasing, smooth and very durable railroad-highway grade crossing.

Formal evaluation and inspection of this crossing was terminated i July 1982 after five years of excellent overall performance.

Experimental Crossing No. 10B is also located on La. 59 and carries the same traffic and rail volume. This crossing utilizes Gen-Trac rubber panels manufactured by General Tire and Rubber Company of Wabash, Indiana (Figure 20). Although the narrow 18 inch rubber panels have exhibited some rocking and have a tendency to loosen-up at some locations, this crossing exhibits excellent overall characteristics with respect to ridability and smoothness. It is presently on the Qualified Products List (QPL) because of the performance exhibited at this crossing.

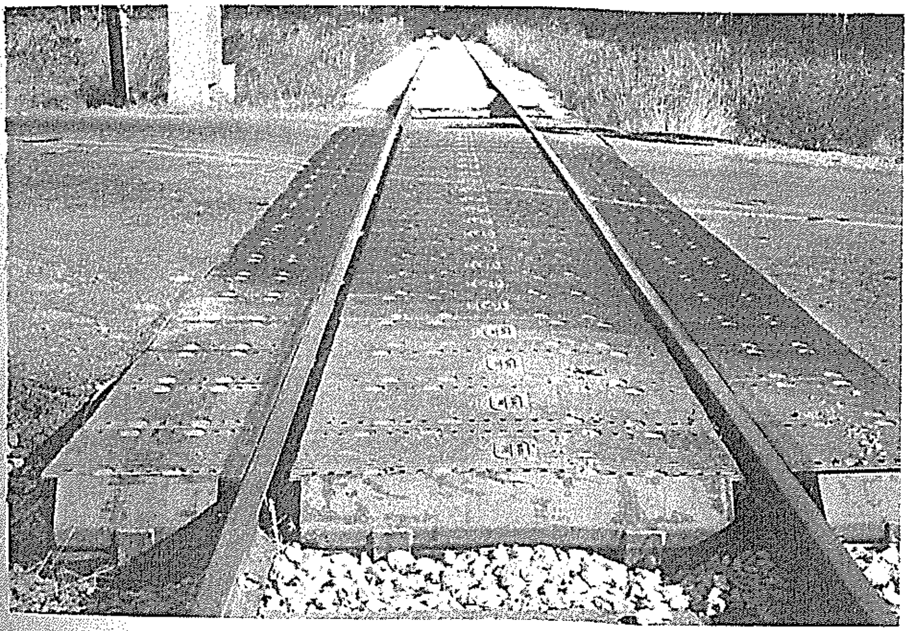


Figure 20

Gen-Trac rubber panel crossing on La. 59 south of Abita Springs after five years of excellent performance.

Formal evaluation and inspection of this crossing was terminated in July 1982.

No. 11 through 15

Goodyear Super Cushion Rubber Panel Crossings

Formal periodic evaluations of these crossings were terminated in early 1983 after five years of satisfactory overall performance. Situated randomly throughout Louisiana (Figure 21), these crossing all feature the proprietary product, Goodyear Super Cushion rubbe panels. Table 1 describes historical performance evaluation and statistical data, while more detailed individual summaries are included in Louisiana Highway Research Report No. 140 "Evaluation of Experimental Railroad-Highway Grade Crossings in Louisiana - Interim Report No. 5," April 1980.

In brief, as with Experimental Crossings No. 1 through 6, these crossings received no special subbase treatment. Unlike No. 1-6, however, these all traverse PCC highways instead of HMAC. Additio all are true at-grade crossings, providing little disruption to tr flow.

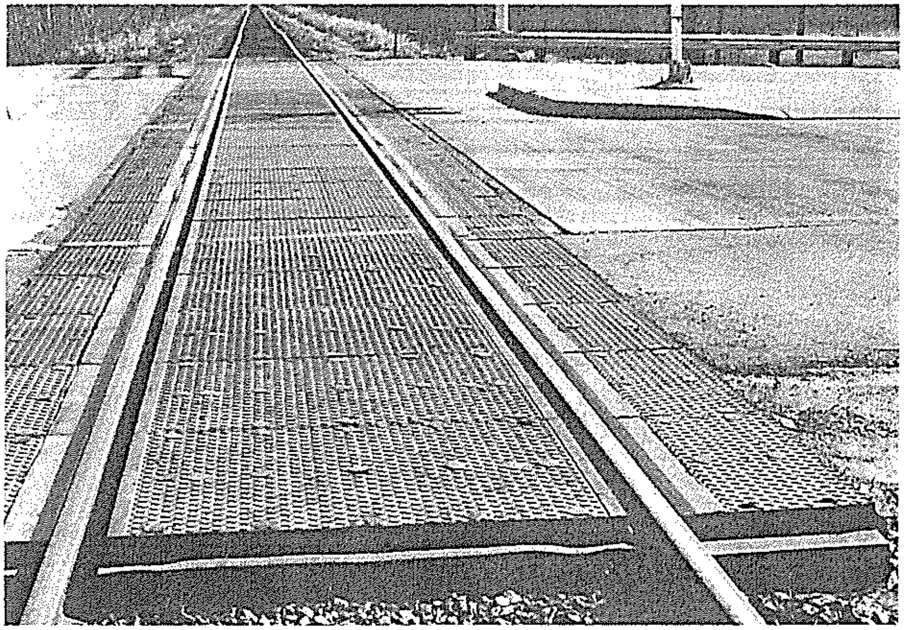


Figure 21

Typical Goodyear Super Cushion traversing PCC highway dipicting true at-grade crossing.

With exception to the normal deterioration of the wooden header boards and HMAC filler at the pavement juncture (Figure 22), these Goodyear Super Cushion rubber panels are providing a very adequate and stable crossing after over five years of varying rail, vehicular ADT and geographic locations. Presently on the Qualified Products List (QPL) Louisiana will continue to encourage competitive bidding and subsequent installation of Goodyear Super Cushion rubber panels for any of its future rail crossing needs.

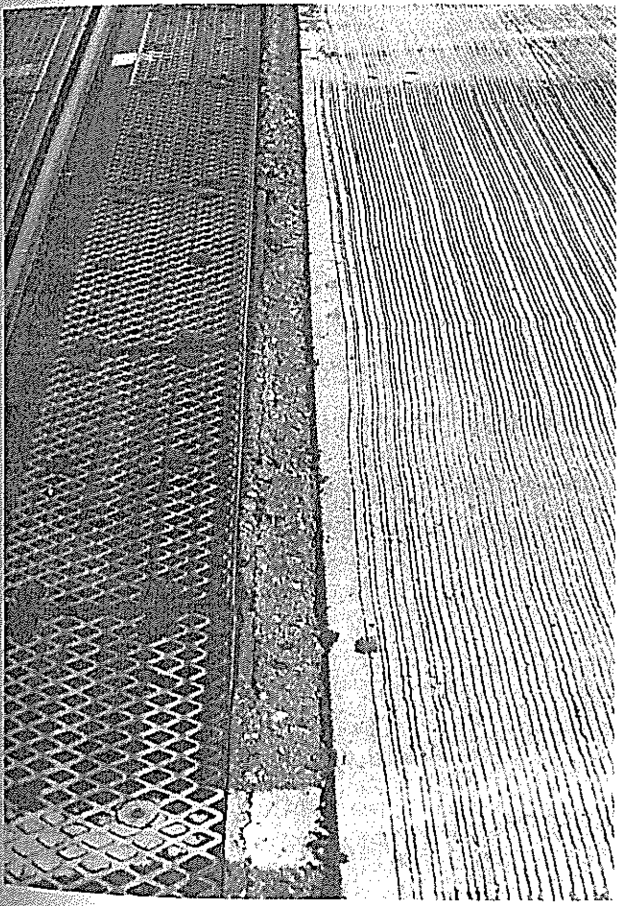


Figure 22

Note the deterioration of the HMAC at the pavement juncture. With this exception, these Goodyear Super Cushion rubber panel crossings are performing well after five years.

Formal performance evaluations of these crossings were discontinued in early 1983.

No. 16A and 16B
State Project No. 832-25-02
Federal-Aid Project No. RRO-000-S(002)
True Temper T-Core - High-Density Polyethylene - No. 16A
Railroad Friction Products Cobra - HD Polyethylene - No. 16B
La. 1029 (Corbin Street) at Walker

This double-track crossing is located on La. 1029 (Corbin Street), approximately 0.2 miles north of US 190, in Walker, Louisiana. At this location, La. 1029 is a two-lane, undivided asphalt rural road with a posted maximum speed of 40 mph and an estimated 1982 ADT of 865 with 10% trucks. The two main lines of this crossing serve six freight-rail movements per day at an estimated rail speed of 25 mph.

Completed in May 1979, each of these thirty-three foot long crossings utilize linear high-density polyethylene (structural foam panels as the proprietary experimental feature. Crossing No. 16A, True Temper T-Core panels, are distributed by the Railway Appliance Division of the True Temper Corporation of Cleveland, Ohio. Crossi No. 16B utilizes Cobra panels distributed by Railroad Friction Products Corporation of Wilmerding, Pennsylvania. Crossing No. 16A only four years after installation, is rapidly experiencing failure such as those cited for Number 8 and 9, which prompted their remova and replacement with conventional rubber types. Panels are getting very loose and large chunks are beginning to break and pop out, especially in the proximity of the wheelpaths (Figure 23).

Also, while the approach pavement is severely rutted (Figure 24), and the pavement juncture is deteriorating rapidly, only the relatively low traffic volume can be attributed to retarding more rapid failure.

Figure 23

Large chunk of True Temper T-Core HDP panel broken off in wheelpath.

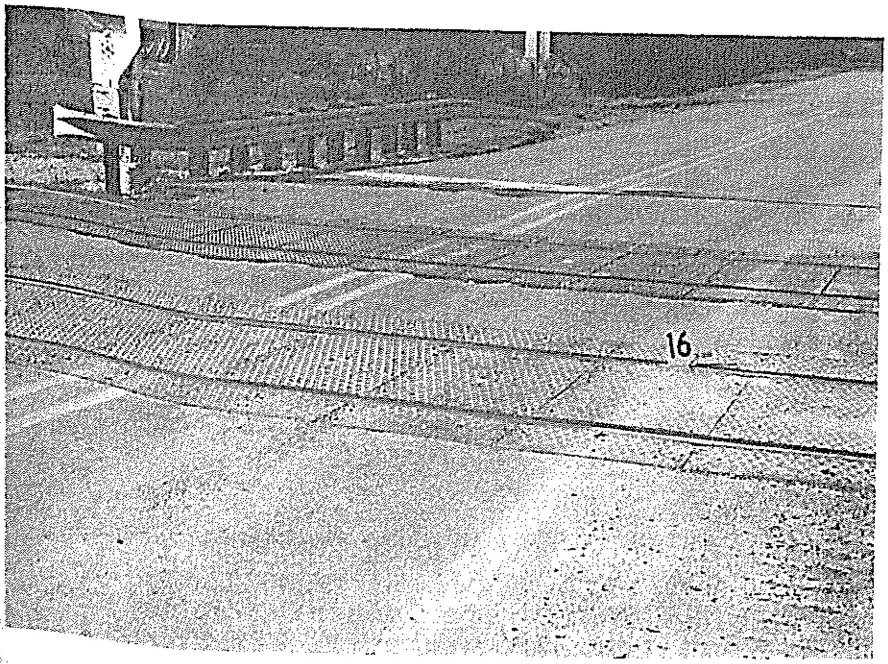


Figure 24

Severe rutting and deterioration of asphalt approach pavement.

Panels that are not broken are beginning to experience cracking th is spreading rapidly. Temporary asphalt patches are the only inte measure that will be utilized pending final disposition of this cr ing's proprietory feature which is performing only marginally.

By comparison, Crossing No. 16B (Figure 25), also of structural foam composition, proprietary name Cobra, is performing satisfacto While it is beginning to show signs of crazing and some cracking on the panel surfaces and some are loose, it is still structurally sound (Figure 26).

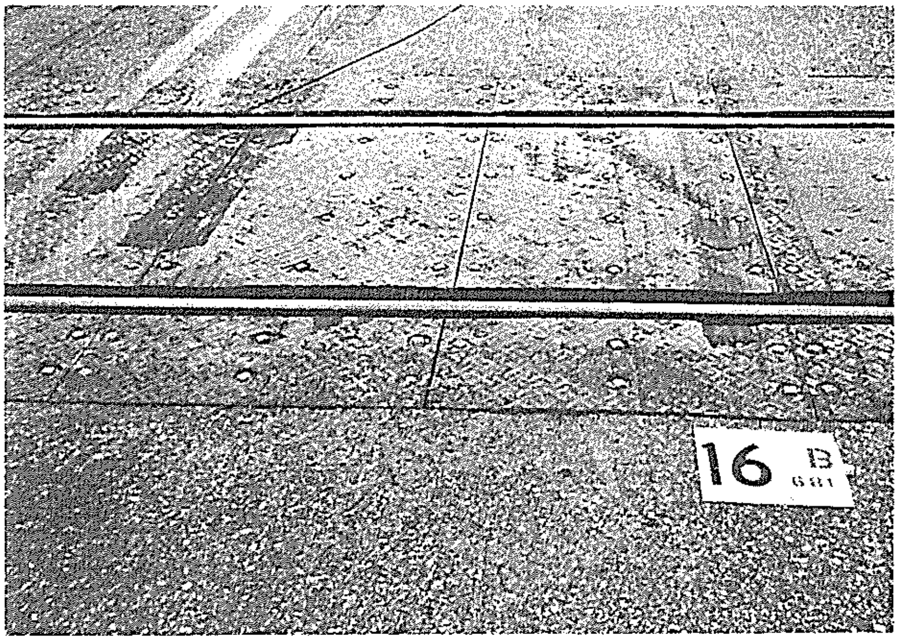


Figure 25

Cobra HDP panels are loosening up and exhibit some crazing, but are still structurally sound.

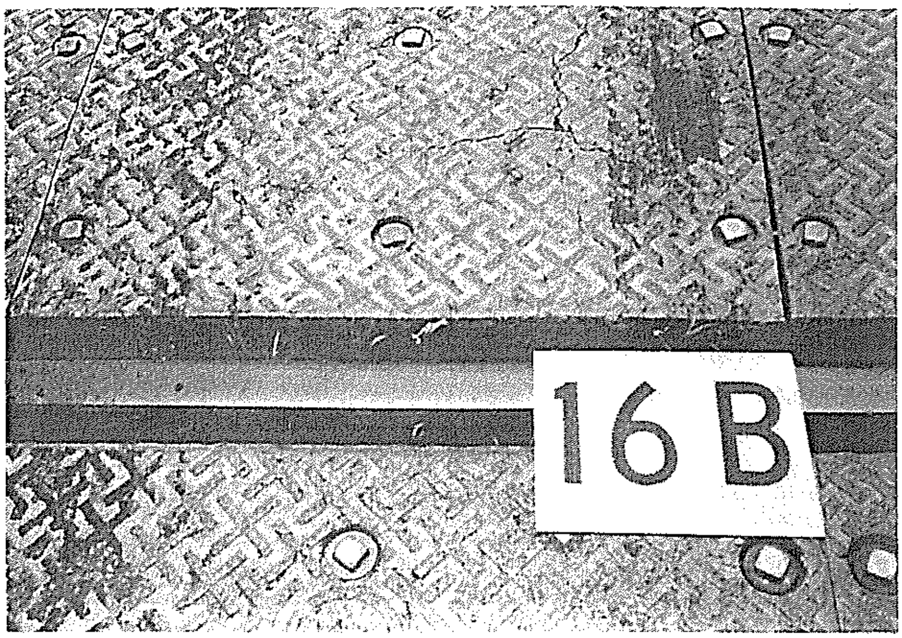


Figure 26

Signs of distress in Cobra HDP panels.

This should not, however, be misconstrued to indicate that these characteristics are acceptable for a crossing only four years old. They are unique only to these high-density polyethylene (structural foam) types and do not occur in conventional rubber panels of any origin. This would seem to indicate that this material is not well suited to the rigors and abuse afforded by traffic and rail movements associated with railroad-highway grade crossings. This theory can be reinforced by noting the relatively insignificant ADT figures in comparison with other crossings of similar construction utilizing different materials.

Evaluations of these crossings, scheduled to terminate in May 1984, will continue until final Departmental disposition has been established. There are no provisions to allow inclusion on the Qualified Products List (QPL) or permit further installations pending this determination. At present, researchers conclude that the overall performance of these crossings can be considered only poor to marginal.

No. 17A and 17B
State Project No. 853-01-07
Federal-Aid Project No. RRO-000-S(001)
True-Temper T-Core - High-Density Polyethylene - No. 17A
Railroad Friction Products Cobra - HD Polyethylene - No. 17B
La. 1054 at Greenlaw

This double-track crossing is located on La. 1054 approximately 0.2 miles east of La. 51, at Greenlaw, Louisiana. At this locati La. 1054 is a two-lane, undivided asphalt rural road with a poste maximum speed of 55 mph and an estimated 1982 ADT of 930 with 10% trucks. The two main lines of this crossing host the New Orleans Chicago traffic with twenty rail movements per day. These consist of two passenger, twelve freight and six switching exercises per day with maximum estimated rail speeds of 79 mph, 60 mph and 25 mp respectively.

Installed in April 1978, specifics regarding these two experimenta crossings are exactly as cited in No. 16A and 16B. Likewise, the comments are also parallel, with the exception of more advanced deterioration on these crossings because of their earlier installation date. Frequent patching is performed with HMAC filler to reduce the traffic hazard to the motoring public created when larg pieces break off and pop out (Figure 27). The Cobra crossing, No. 17B, is still intact, similar to No. 16B, but is showing advan crazing, looseness and exhibits signs of warping of the panels. (Figures 28 and 29).

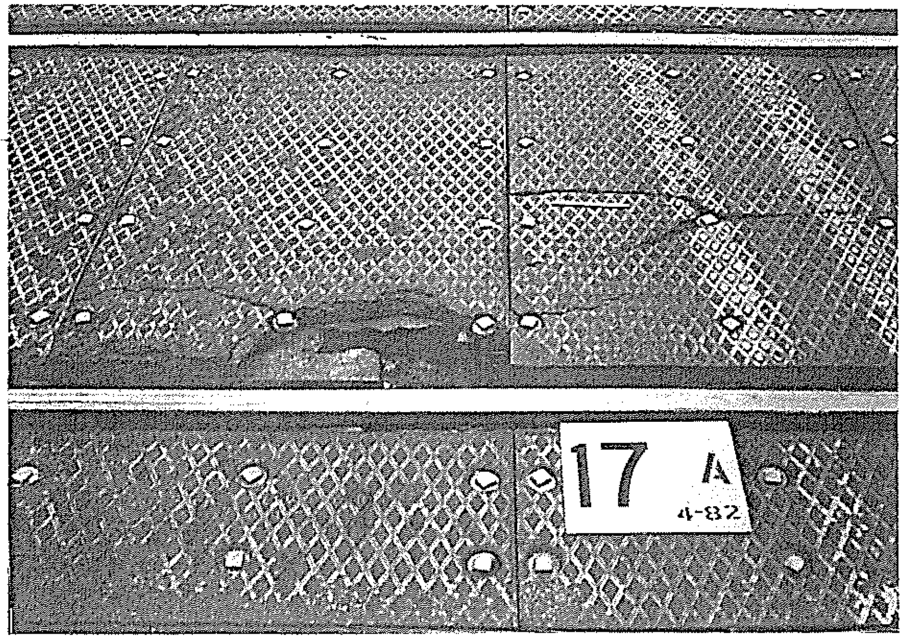


Figure 27

True Temper T-Core polyethylene panels after five years of low traffic volume.

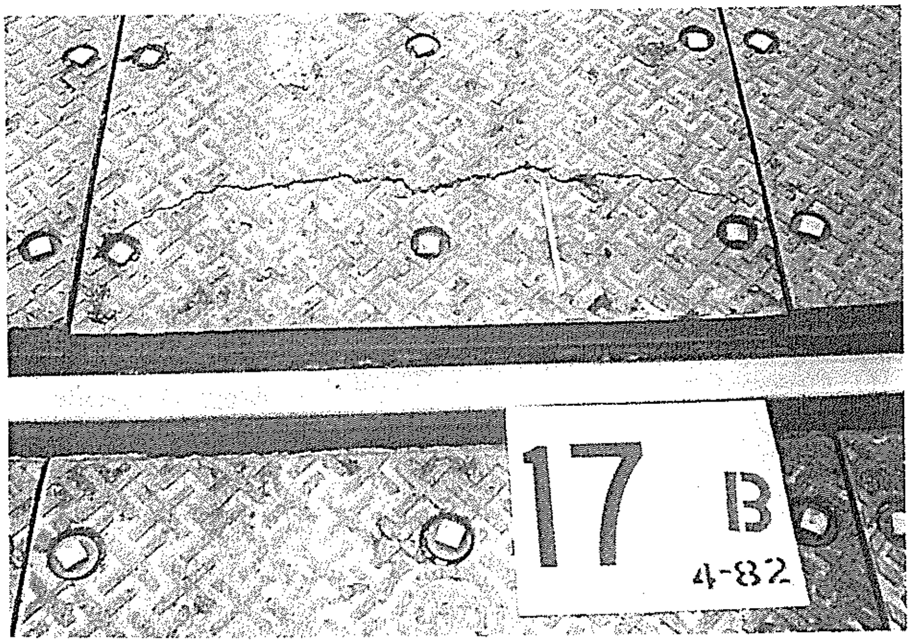


Figure 28

Cobra structural foam (HDP) panel displaying similar signs of distress.

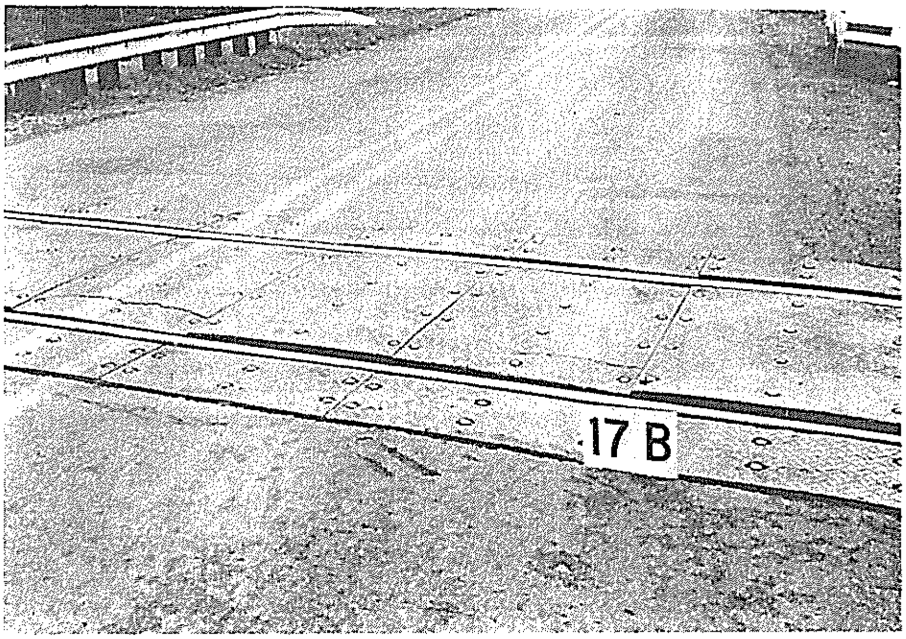


Figure 29

Overall view of Cobra crossing showing warpage and cracking.

Performance evaluations of these crossings, scheduled to terminate five years after installation in April 1983, will continue. Researc estimate that the overall performance of these crossings can be considered only poor to marginal. Evaluations of these crossings wi continue until final Departmental disposition can be established.

No. 18

State Project No. 853-09-07

Federal-Aid Project No. OSG-0053(003)

SAF & DRI (Model S) Rubber Panel Crossing

La. 1064 at Natalbany

This triple-track crossing (Figure 30) is located on La. 1064 approximately 0.6 miles east of U.S. 51 at Natalbany, La. At this location, La. 1064 is a two-lane, undivided asphalt rural highway with a posted maximum speed of 55 mph. It has an estimated 1982 ADT of 3600 with 10% trucks and hosts fifteen rail movements per day. These include two passenger trains at an estimated rail speed of 79 mph and thirteen freight trains at 60 mph. The third track is a spur line serving a small local commercial enterprise and is used infrequently.

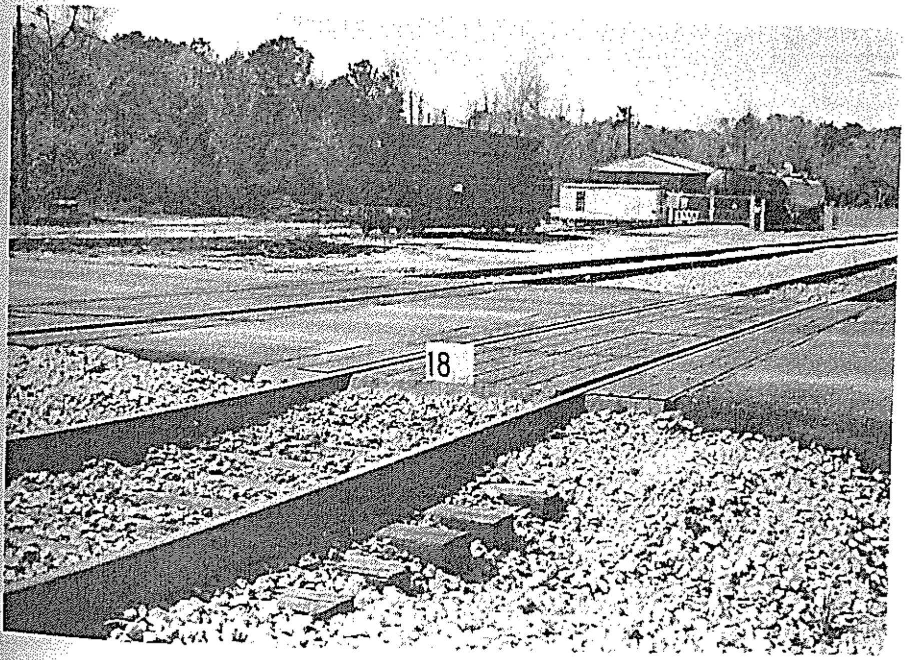


Figure 30

SAF & DRI crossing at Natalbany

Completed in October 1978, the proprietary feature of each of these thirty-three foot long crossings is the SAF & DRI (Model S) rubber panel manufactured by the Structural Rubber Products Company of Springfield, Illinois. After four and one-half years, the rubber panels are in excellent condition and show no signs of deterioration. By comparison, however, the asphalt approach pavement is experiencin rutting and severe spalling which is apparent at the pavement junctu This was accelerated by the rapid deterioration of the wooden header boards (Figure 31).

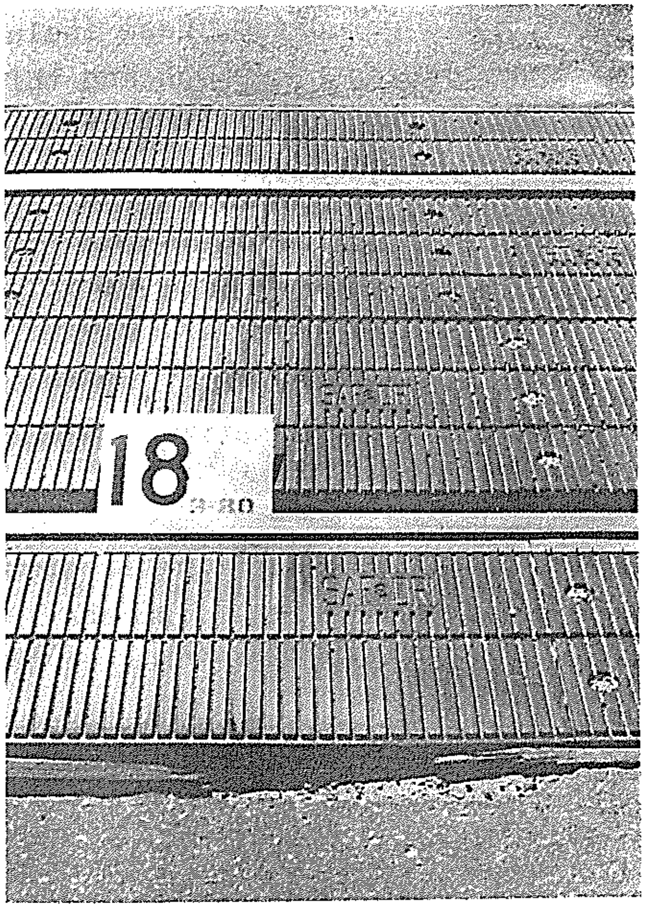


Figure 31

Deterioration of wooden header boards and spalling of asphalt.

While these conditions provide for a somewhat harsh ride through the crossing proper, they do not detract from the overall satisfactory performance of the proprietary feature.

Evaluation of this crossing will terminate in October 1983, after five years of periodic annual investigations.

No. 19

State Project No. 853-33-09
Federal-Aid Project No. OSG-0053(002)

Gen-Trac Rubber Panel Crossing
La. 1065 at Independence

This double-track crossing is located on La. 1065 (5th Street) at the junction of U.S. 51 in Independence, Louisiana. At this location, La. 1065 is a two-lane, undivided city street with a posted maximum speed limit of 30 mph. It has an estimated 1982 ADT of 1,960 with 10% trucks. There are fifteen rail movements per day on these main lines which serve two passenger and thirteen freight trains per day at an estimated rail speed of 79 and 60 mph, respectively.

Figure 32

Gen-Trac Rubber Panel Crossing at Independence after five years of satisfactory performance.

At this location, the well-established roadbed provides an excelle subbase for this slightly elevated crossing. While this abrupt ele tion provides a somewhat harsh ride, it provides excellent stabili for the proprietary experimental feature, Gen-Trac rubber panels. Installed in April 1978, each of these forty-two foot long crossin are the product of the General Tire and Rubber Company of Wabash, Indiana.

Performance evaluations of these crossings were terminated after fi years of satisfactory performance. While these narrow (18 in.) rub panels have been noted to exhibit premature loosening or rocking at some locations, the excellent subbase at this site can be cited as major contributory factor in eliminating this condition. Being ful depth rubber panels, Gen-Trac crossings do not require conventional header boards. There is no evidence of failure at the pavement jun which lends support to this design feature. This crossing continues perform in a very satisfactory manner after five years of evaluatio

No. 20

State Project No. 4-32-16

Federal-Aid Project No. RRP-6113(001)

PARKCO Rubber Panel Crossing

U.S. 90 at Lafayette

This double-track crossing is located on U.S. 90 (Mudd St.), approximately 0.2 miles west of U.S. 167, in Lafayette, Louisiana. At this location, U.S. 90 is a four-lane, undivided urban street with a posted maximum speed of 35 mph and an estimated 1982 ADT of 11,150 with 7% trucks. The crossing consists of one main and one side line, serving one passenger and fourteen freight trains per day at an estimated maximum rail speed of 25 mph.

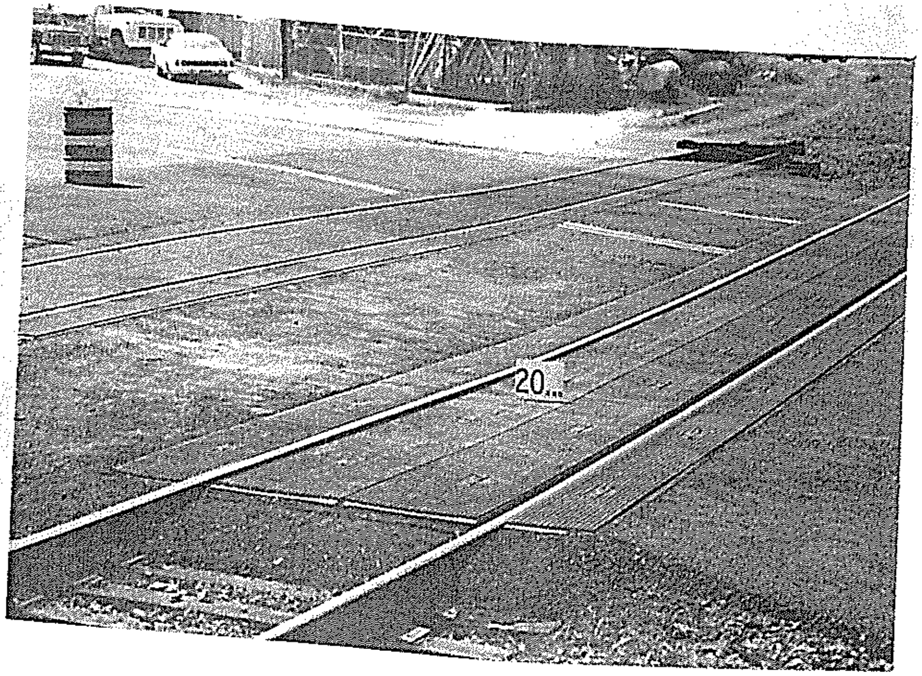


Figure 33

PARKCO rubber panel crossing at Lafayette shortly after installation.

Completed in March 1980, each of these eighty-four foot long crossings feature steel reinforced rubber panels manufactured by the Park Rubber Company of Lake Zurich, Illinois and designated PARKCO. The unique features of these seventy-two inch long rubber panels are the arched steel plate reinforcement, cast in longitudinally, and the method of securing the panels to the crossi Utilizing conventional shims, the rubber panels are popped into place and interlocked by built-in tongue-and groove construction. Since the heaviest component is only 300 pounds, this is readily handled by two people. After all the panels are in place, held temporarily with stabilizer clips (Figure 34), 5/8 in. threaded steel cables are inserted longitudinally through channels cast into the panels.

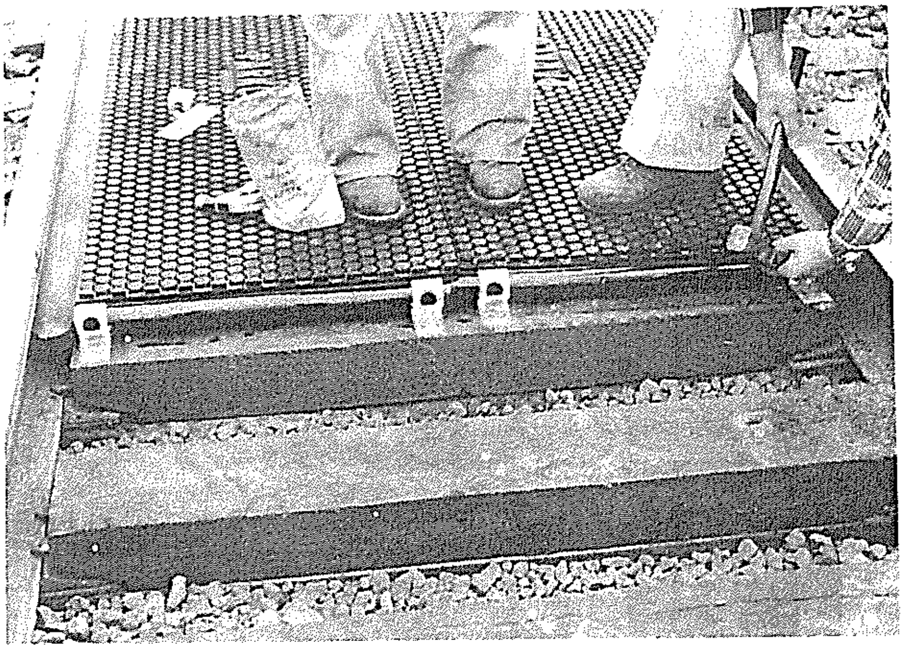


Figure 34

Interlocked rubber panels held in place with stabilizer clips. Holes permit access for steel cables to be inserted longitudinally.

These cables are then post-tensioned with wrenches to steel plates affixed at either end (Figure 35). This cable suspension system eliminates the need for conventional steel drive pins, prevents spike killing the ties and is readily removed and reinstalled with a minimum of manpower and equipment.

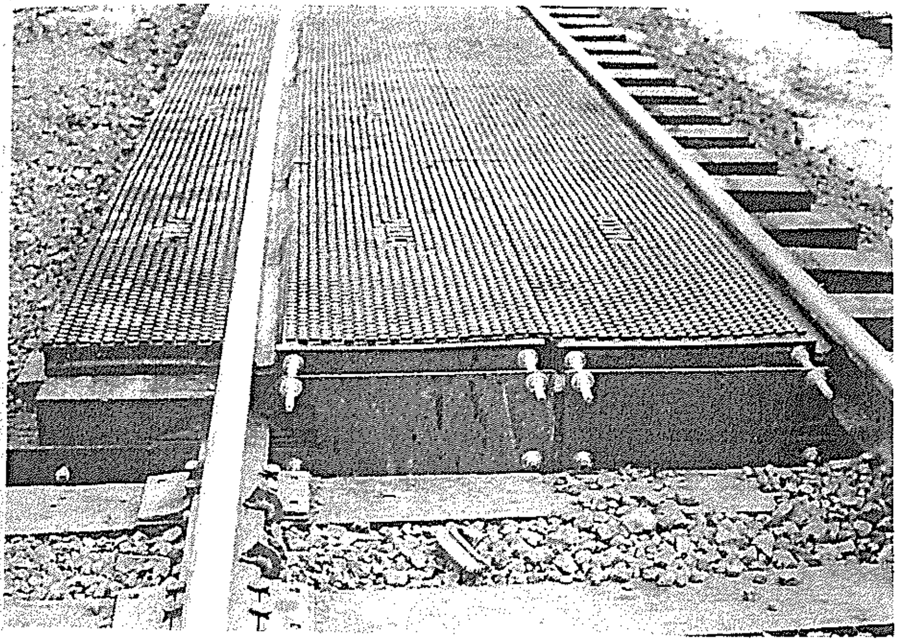


Figure 35

Post tensioned steel cables affixed to steel end plates.

This was noted in 1982 when a broken weld, which prompted partial removal to correct, was repaired readily within a few hours without incident.

After over three years, this crossing is in excellent condition. Evaluation of this crossing will continue as scheduled.

No. 21A and 21B
State Project 4-32-17
Federal-Aid Project RRP-6113(002)
Gen-Trac Rubber Panel Crossing-No. 21A
Track-Span Rubberized Epoxy Crossing-No. 21B
U.S. 90 at Lafayette

At the subject location, U.S. 90 (Mudd Street) is a four-lane, divided asphalt city street with a 1982 estimated ADT of 11 with 7% trucks and a posted speed limit of 35 mph. This has one branch and one storage track with two rail movements per day at five mph. Joined with a switch at the southern end, they traverse U.S. 90 at diverse angles (Figure 36).

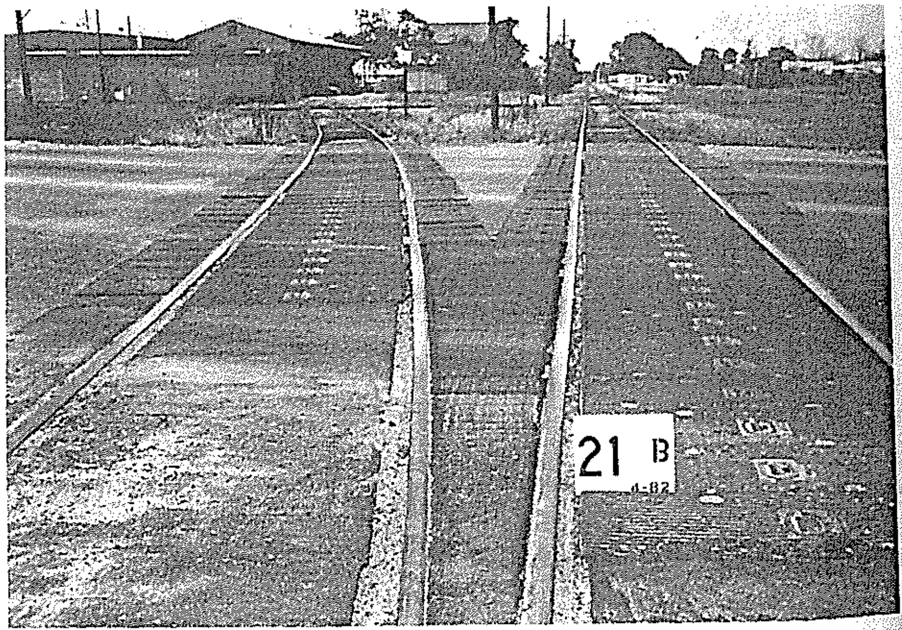


Figure 36

Gen-Trac Rubber Panel Crossing at Lafayette two years after installation.

Installed in April 1980, the majority of these tracks are Gen-Trac rubber panels, a proprietary feature of the General Tire and Rubber Company of Wabash, Indiana. In proximity of the switch, or "frog", however, an experimental rubberized epoxy material, marketed by Fel-Pro, Incorporated of Skokie, Illinois under the brand-name of Track Span was poured to fill the irregular "vee" configuration (Figure 37).

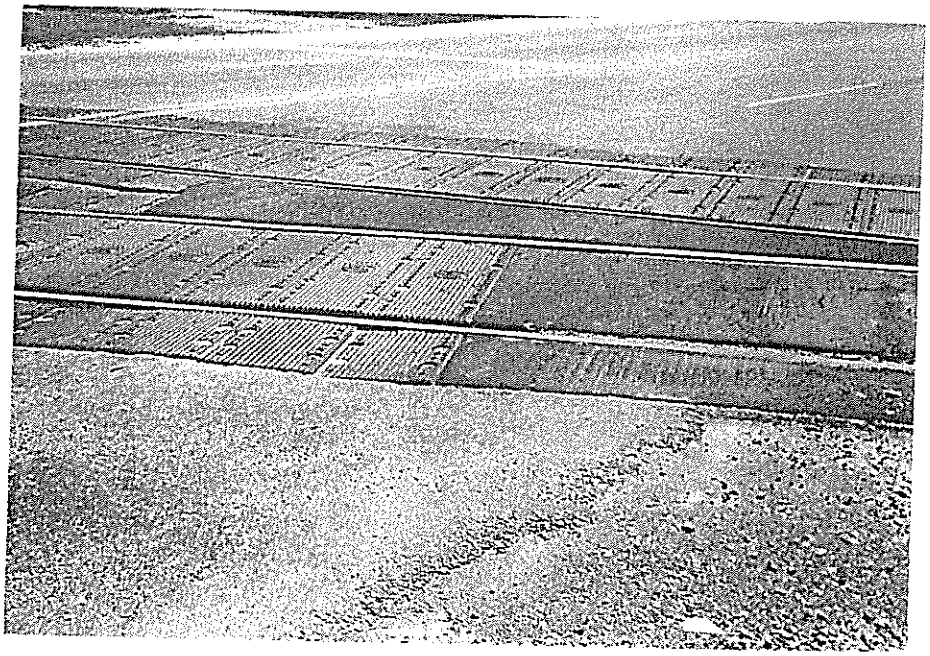


Figure 37

Track Span rubberized epoxy material in proximity of switch.

This material is composed of a base course of coarsely-ground rubber tires and a two-component epoxy mixed in conventional mortar mixers. This pourable combination was then dumped between the rails and switch mechanisms and tamped with wax-coated tampers to reduce voids.

This was completed to within two inches of final grade to allow for applications of the wearing course. The wearing course is co posed of a much finer rubber and epoxy that was smoothed with tro and resembled asphalt when finished. Within twenty minutes, a resilient mass was formed which was impenetrable and watertight. Final set was accomplished within twenty-four hours. With the ex tion of some linear shrinkage and one reflection crack (Figure 38) this material is still very durable and resilient after three year

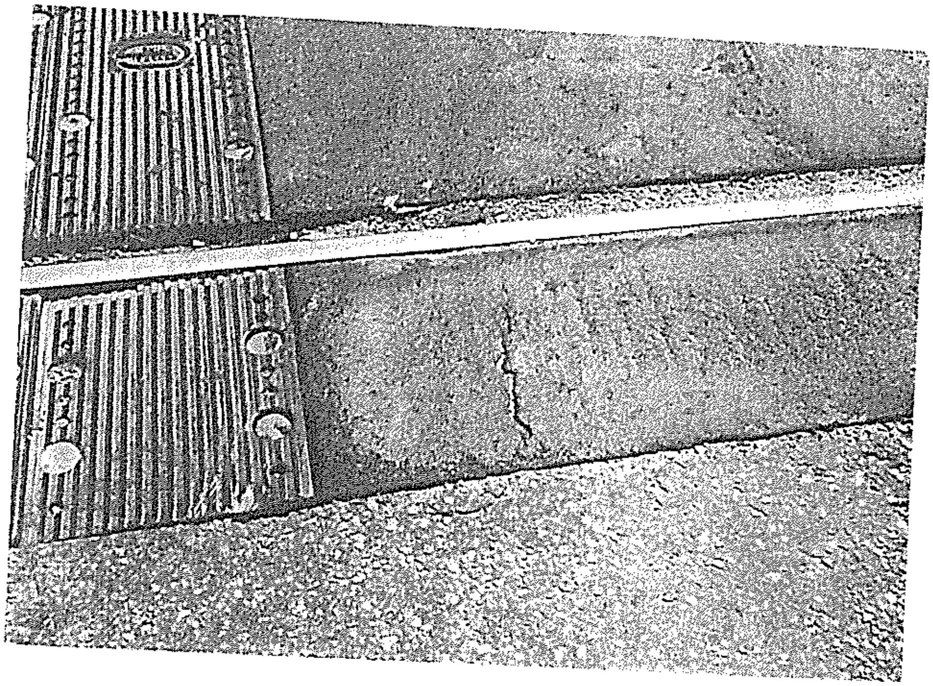


Figure 38

Linear shrinkage and reflection crack in proximity of the wheel path.

By comparison, the Gen-Trac rubber panels, installed on the parall portions of the switch, are exhibiting rocking, looseness, and misalignment problems throughout the crossing. Researchers surmis that the narrow (18 in.) panels, situated at a 72° offset with the roadway, are reflecting the movement of the ties (Figure 39).

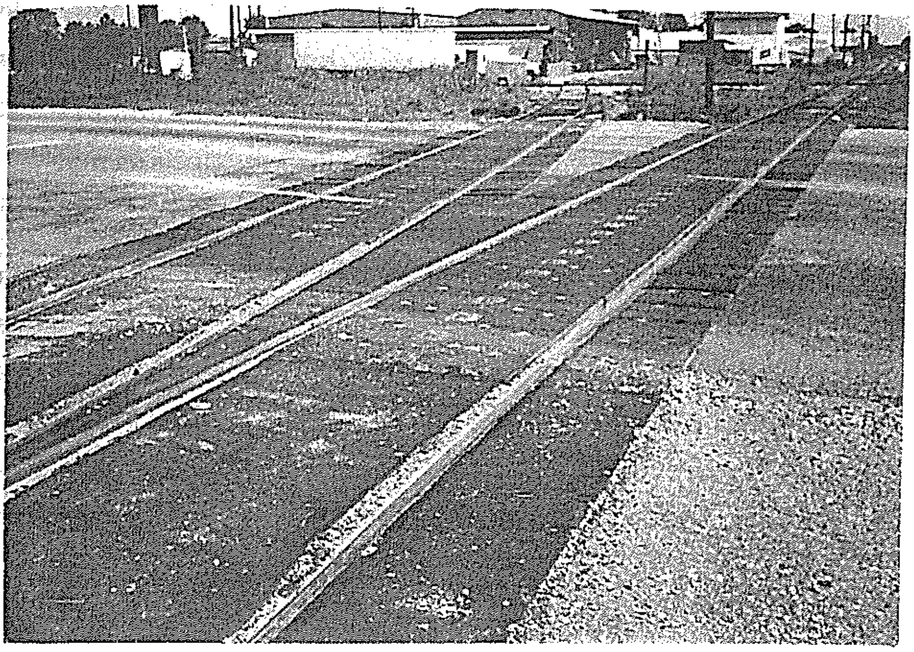


Figure 39

Panel misalignment of the narrow (18 inch) Gen-Trac rubber panels.

This condition is not prevalent in other brands (that vary from thirty-six to eighty inches) because they span three to five ties and equalize out any tie movement. Where any panel subsidence has been noticed, it is barely discernable because of the extra length.

These conditions were pointed out to the railway maintenance personnel and attempts to tighten the drive pins failed to correct the situation. Apparently, the rocking under traffic loads has "spike killed" the ties, making it difficult to tighten the loose panels or correct the misalignment. Three years after installation, this crossing, although not experimental (as Gen-Trac rubber panels are currently on the Qualified Products List), can be rated only as "Fair" to "Good" overall. Performance evaluations of this crossing will continue and further corrective measures sought out and implemented if feasible.

No. 22

State Project No. 52-08-28
Federal-Aid Project No. RRP-34-03(002)
Track-Span Rubberized Epoxy Crossing
La. 1 at Alexandria

This crossing is located on La. 1 (Main Street) in Alexandria, Louisiana, approximately 0.1 miles south of the Red River bridge (Figure 40). This two-lane, undivided one-way city street is trav by the junction of Southern Pacific's main line with a spur line o local industry. During 1982, the average ADT was 16,930 with 10% trucks. There are approximately two switching rail movements per day at about 5 mph.

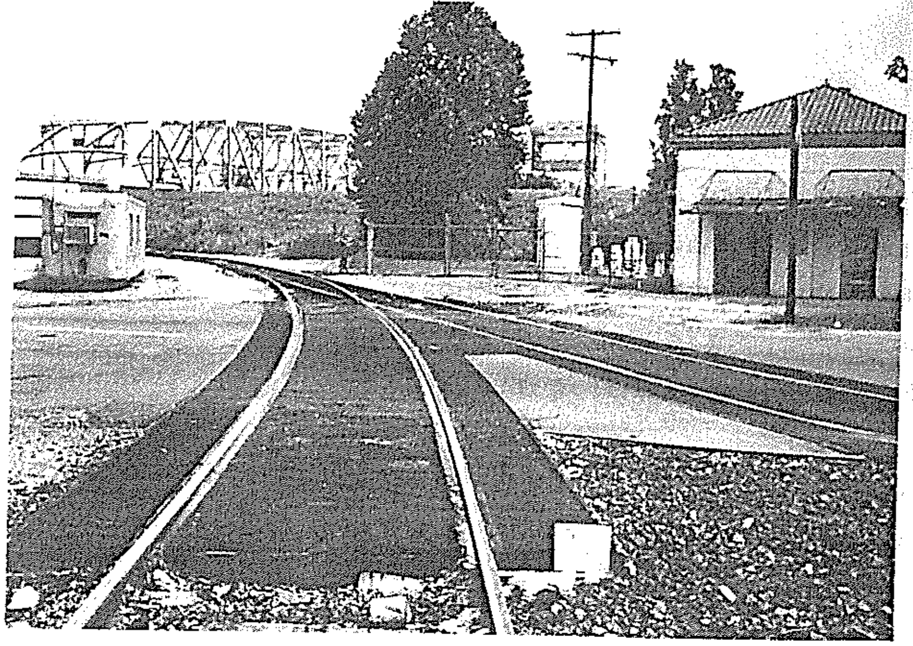


Figure 40

Fel-Pro Track-Span rubberized epoxy crossing at Alexandria shortly after installation in December 1980.

Due to the "vee" configuration of this switch, conventional rubber panels would be inappropriate. Because of this, the entire crossing is composed of Fel-Pro Track-Span (Figure 41) rubberized, cast-in-place, epoxy material cited previously in Crossing No. 21B. Constructed between September and December 1980, installation was complicated by many delays due to labor, weather, material shortages, etc. Low temperatures in December retarded the set of the rubberized epoxy mixture and contributed to difficulty in smoothing the finer rubber wearing course (Figure 42).

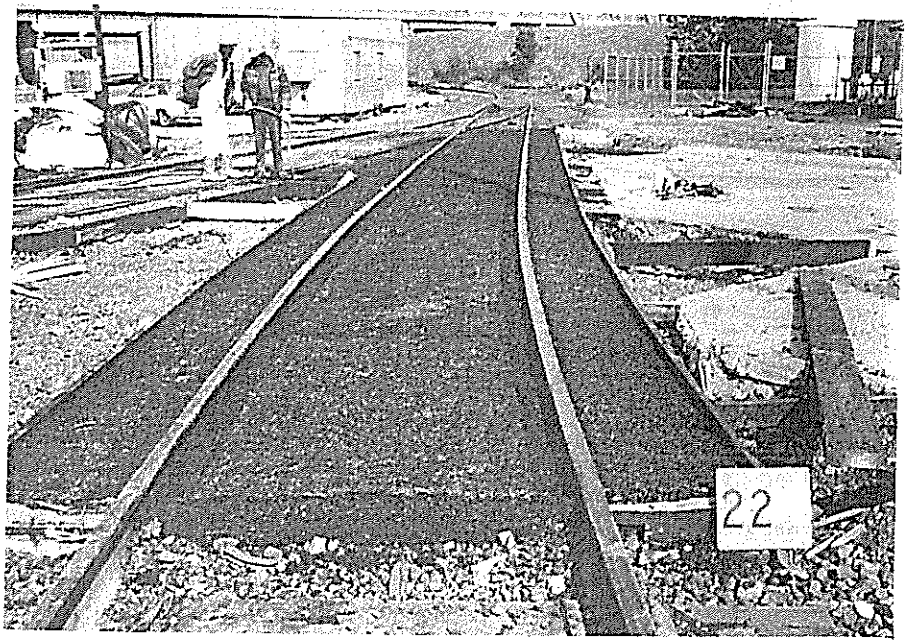


Figure 41

Coarse rubber base course after pouring and tamping to within two inches of final grade.

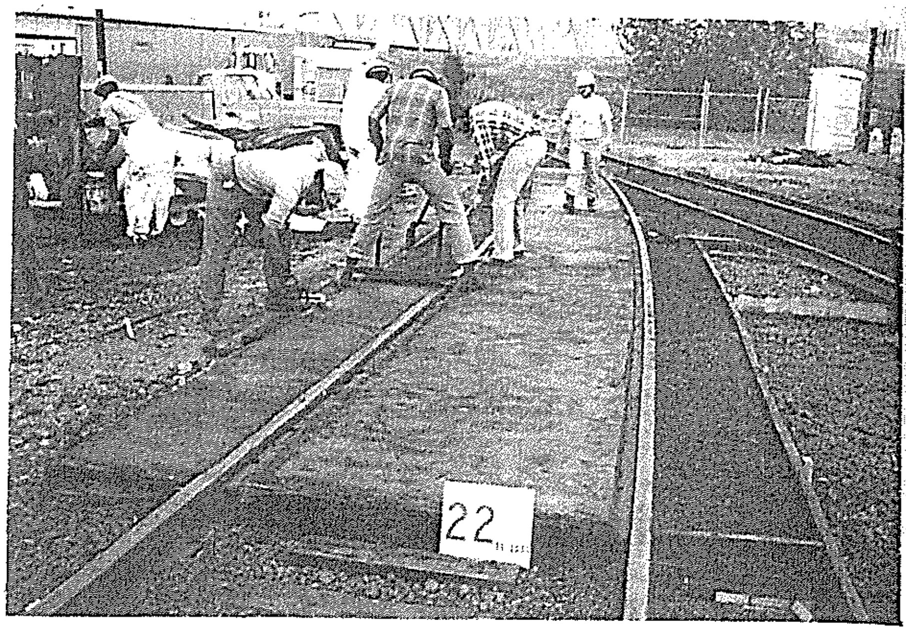


Figure 42

Application of fine rubber wearing course was difficult to smooth because of low temperatures.

This resulted in a rougher than normal surface texture, providi a slightly harsher ride. Open to traffic a little more than tw years, the only defects noted are some minor shrinkage cracking no doubt, to the lack of expansion joints in this 63 foot long Overall performance of this crossing is "Marginal" to "Fair" ow its rough ride.

Performance evaluations of this crossing will continue as sched

No. 23

State Project No. 227-01-04(31)

PARKCO Rubber Panel Crossing

La. 413 at Erwinville

The above captioned project is situated on a two-lane, undivided rural/urban asphalt highway in Erwinville, La. This relatively small (35 foot) crossing serves four freight rail movements per day at an estimated rail speed of 50 mph and 1,230 vpd with 7% trucks.

As with Crossing No. 20, discussed previously, the experimental feature of this crossing is the PARKCO rubber panels (Figure 43) with the unique cable suspension system for securing them to the crossing.

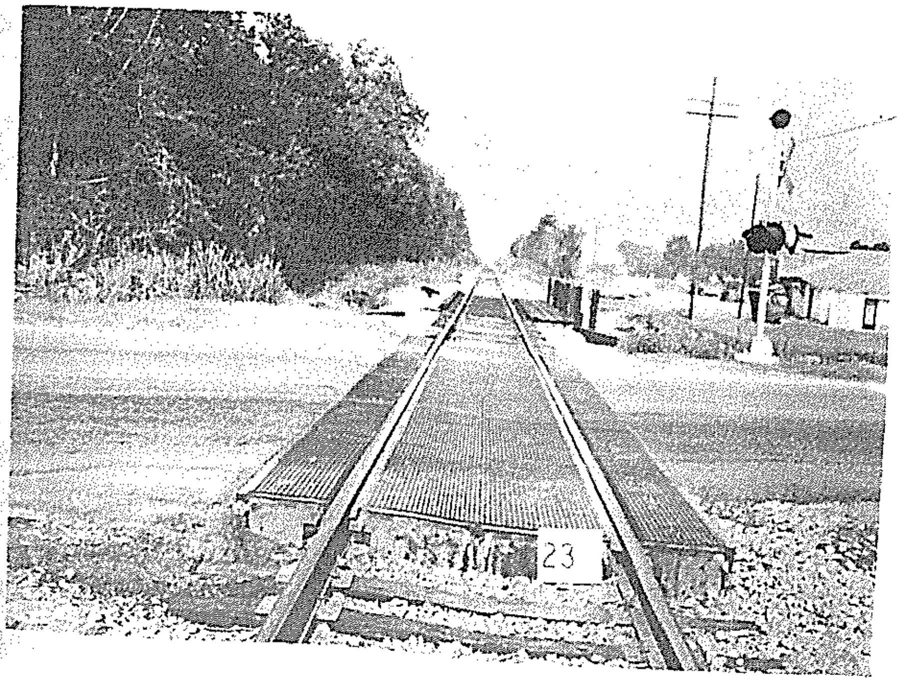


Figure 43
PARKCO rubber panel crossing at Erwinville three years after installation.

Installed in October 1980, this crossing received 18 inches of HMAC to provide for subbase stability. After almost three years, crossing is in excellent condition. While the relatively low tr condition could attribute to this, the approach pavement tie-in one of the best of all the crossings under evaluation (Figure 44

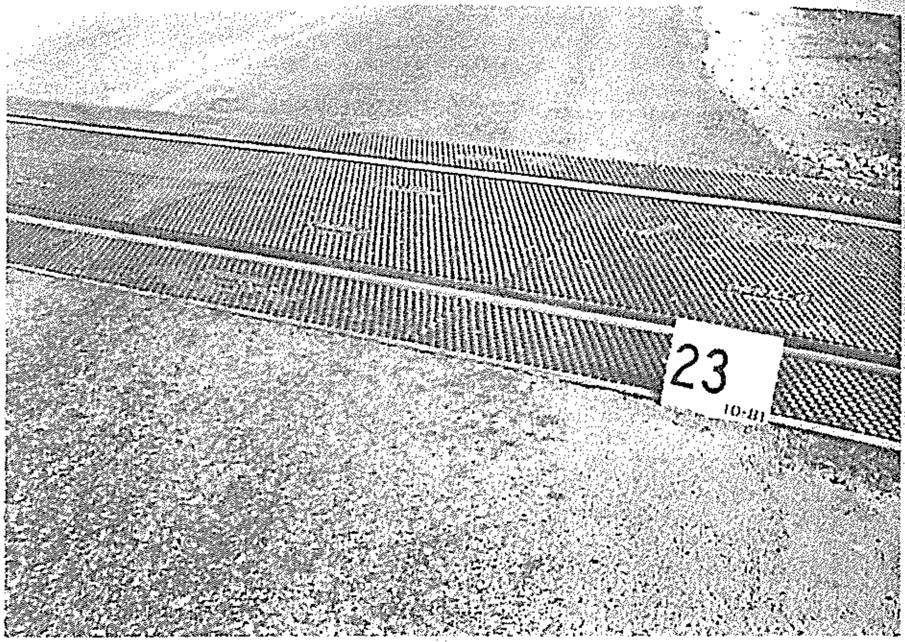


Figure 44
Smooth approach pavement tie-in.

This was accomplished by application of a 35 foot taper being constructed at the time of installation. After allowing a month fo "wearing-in," this taper was refurbished and extended to approximat 50 feet on either side. Generally, this second lift is not added for one-and-one-half to two years in most situations, after ruttin and subsidence have contributed to a very harsh ride through the crossing proper.

Annual evaluation of this crossing will continue until 1986, unless the overall condition of the crossing begins showing signs of exces wear or premature deterioration. The 1982 evaluation indicates it in excellent overall condition after over three years.

No. 24A, 24B and 24C

State Project No. 16-04-09
Federal-Aid Project No. RRS - 02-08(011)
La. 165 at East Jefferson Street (PARKCO Crossing-No. 24A)
La. 165 at East Madison Street (PARKCO Crossing-No. 24B)
La. 165 at East Jefferson Street (Track-Span Crossing No. 24C)
at Bastrop

The above captioned projects are located on two two-lane, one-way city streets in Bastrop, Louisiana (Figure 45) with a posted maximum speed of 40 mph. The estimated 1982 ADT at this location is 12,750 vpd with 6% trucks. Serving the Arkansas and Louisiana, Missouri (A & LM) Railroad, there are four freight trains per day at an estimated 10 mph rail speed. Crossing No. 24C is a spur line serving International Paper Company and handles four switching rail movements per day at an estimated rail speed of 4 mph.

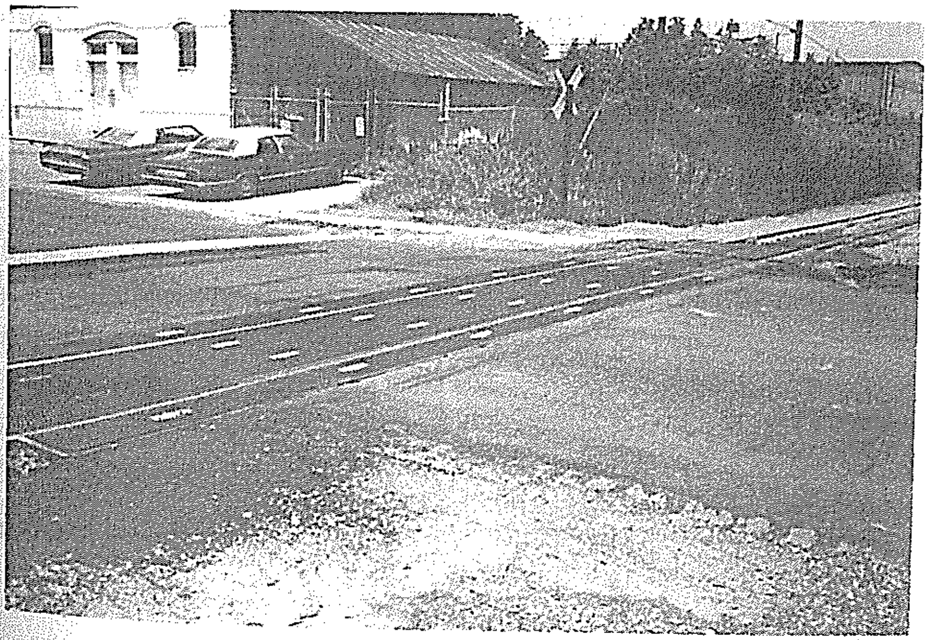


Figure 45
PARKCO rubber panel crossing at Bastrop shortly after installation.

Experimental Crossing No. 24A, installed in January 1981 and No. installed in September 1981, are both PARKCO rubber panel crossing manufactured by The Park Rubber Company of Lake Zurich, Illinois. These rubber panels feature a unique method of installation in the they do not utilize the conventional steel drive pins to affix the to the crossing. Rather, they incorporate the use of steel cables inserted longitudinally through the panels that are post-tensioned either end. This system provides for rapid installation with a mi mum of equipment and manpower. Additionally, it can be readily re to permit inspection or repairs to the rail structure, a feature n practical with the conventional drive pin types. They would requ re-installation of the pins in previously drilled holes, in turn, possibly contributing to unusual or premature loosening because of spike killing the ties.

By comparison, crossing No. 24C (Figure 46) a spur line serving In national Paper Company, is a rubberized epoxy material, proprietary name Track-Span, manufactured by Fel-Pro, Inc., of Skokie, Illinoi

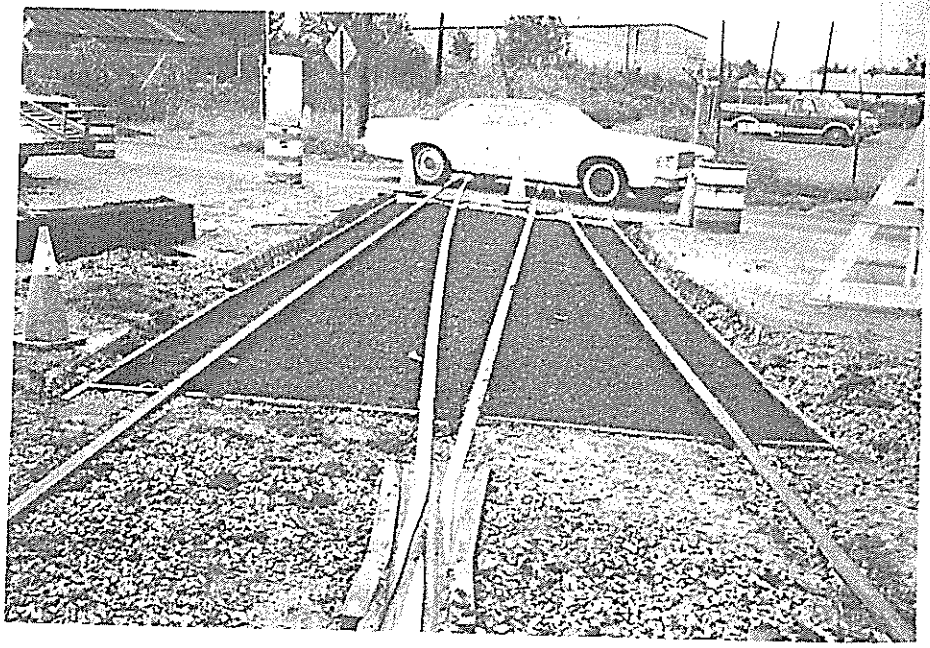


Figure 46
Track-Span rubberized epoxy crossing under construction in late 1981.

This product is a pourable mixture which conforms to the unique configurations of the switches or "frog", where the use of conventional panels would be prohibited. Manufactured of coarsely-ground rubber tires and two-component epoxy, it is poured in place after being combined in conventional mortar mixers. A wearing course of finer rubber is troweled to final grade to provide a durable riding surface. While this system can be adapted to suit any unique track configuration, one of its inherent drawbacks is the impossibility of performing any subsequent track work without complete removal of the crossing material. Although Louisiana has had no experience with it, this process could prove to be a very expensive undertaking because of the monolithic structure of the material and the fact that the material would have to be replaced as it is not reusable. It is, however, the only alternative to using hot mix asphaltic cement (HMAC) which is readily available, but tends to "migrate" and deteriorates rapidly, providing a very harsh ride.

In summation, Experimental Crossing No. 24A and 24B are identical with the exception of installation dates. Although the project notice specified only Type A Subbase Treatment (Appendix), the Project Engineer elected to install four inches of HMAC to help eliminate any future problems with regards to subbase failure. After placing engineering grade plastic filter cloth, new ballast, ties and rails, construction was completed in accordance with the latest specifications (Appendix). Crossing No. 24C was also treated accordingly.

After almost two years, both types of crossing materials are performing in a very satisfactory manner with the exception of the asphalt approach pavement and the wooden header boards. The approach is exhibiting minor rutting and subsidence, while the wooden header boards are splintering and deteriorating rapidly. While this provides for a somewhat harsh ride, preventitive maintenance would remedy this without disrupting the crossing proper.

No. 25

State Project 80-02-20
Federal-Aid Project No. RRS-33-02(004)
SAF & DRI Model C Rubber Panel Crossing
U.S. 167 (Johnston Street) at Lafayette

At the subject location, U.S. 167 (Johnston Street) is a four-la undivided asphalt city street with a 1982 ADT of 23,000 with 7% trucks and a posted maximum speed of 40 mph. There are fourteen freight and two passenger trains per day at an estimated maximum rail speed of 25 mph. There are two tracks at this location, a m line with conventional Goodyear Super Cushion rubber panels and a side line with this experimental proprietary feature, SAF & DRI Mo rubber panels with rubber header boards (Figure 47).

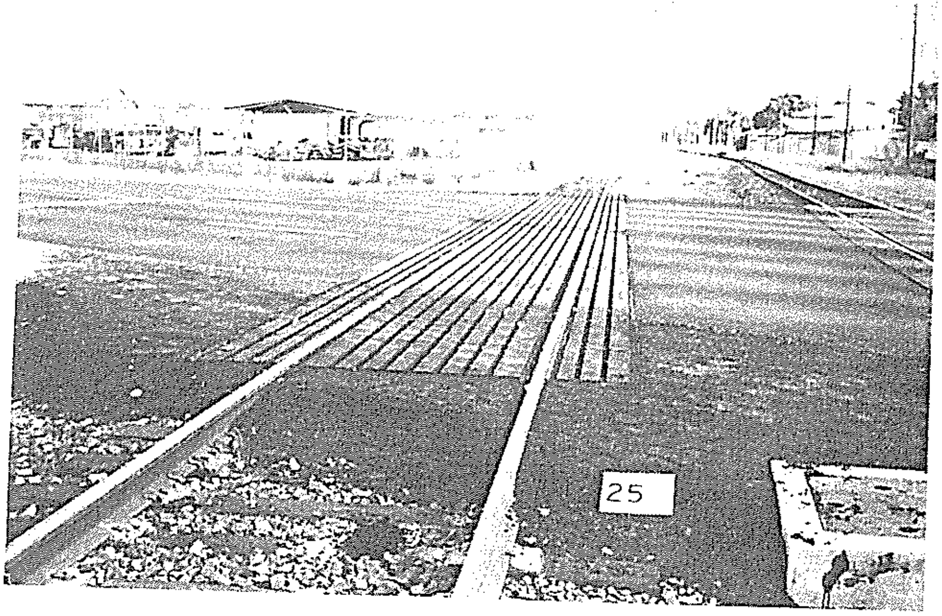
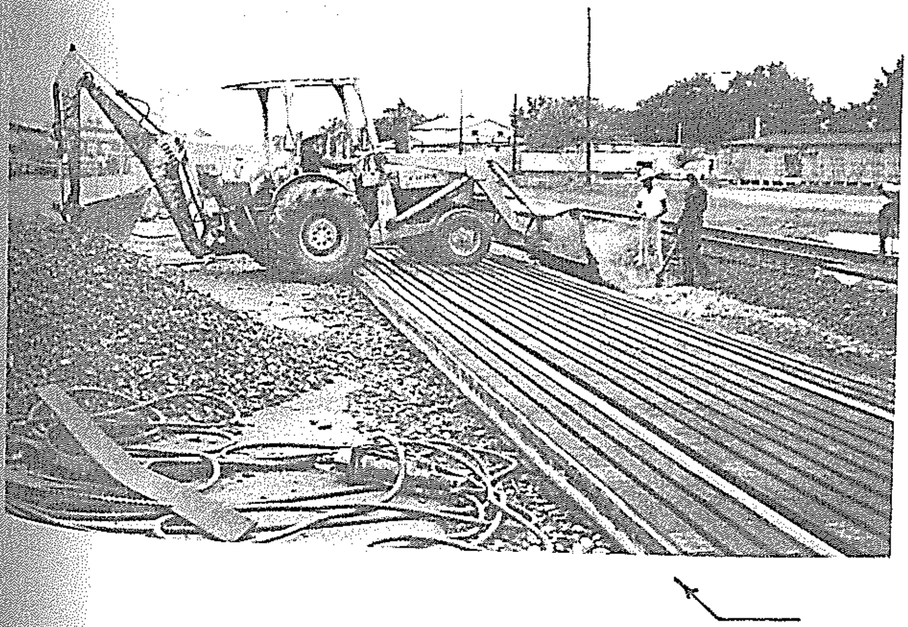


Figure 47
SAF & DRI Model C rubber panel crossing at Lafayette shortly after installation in 1982.

Completed in April 1982, this site marks the first installation of SAF & DRI Model C rubber panels in Louisiana. This crossing was renovated using Type B subbase treatment with 12 inches of portland cement concrete without calcium chloride additive (Appendix). Additionally, an experimental rubber "bulb foot" header board, also manufactured by the Structural Rubber Products Company of Springfield, Illinois, was installed for evaluation.

This is significant, in that after thirteen years of evaluating railroad crossings, the common denominator is always the rapid deterioration of the wooden header boards. This, in turn, permits the asphalt juncture material to recede or settle between the tie ends, causing premature rutting and subjecting the exposed rubber panels to unnecessary abuse. The one inch thick rubber header boards, (Figure 48) with a unique "bulb foot" (Detail "A") to anchor it in place with the asphalt filler material, should preclude this condition.



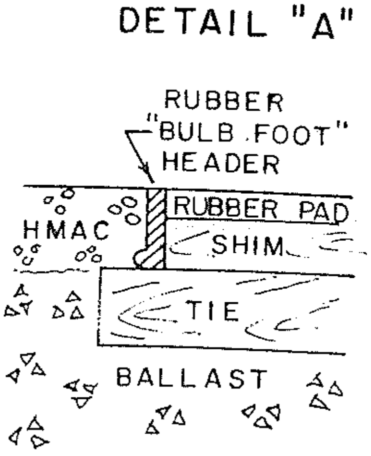


Figure 48

Rubber header board with unique "bulb foot" used to anchor it in place.

The Model C rubber panels, (unlike Model S using rectangular box beams filled with concrete) are heavy steel ribbed panels with unique interlocing tabs. Cast in dense rubber, these tabs subst tially reduce the number of drive pins required and retard the tendency of the panels to rock under traffic loads. The ribbed panels permit casting in deep longitudinal channels providing for excellent drainage. The heavily serrated surface should provide excellent skid resistance even when wet. Drainage is provided for this at-grade crossing by tying-in with the city sewer system usi 8 inch rigid perforated PVC pipe wrapped in filter cloth. Additi the sloped concrete subbase acts like a huge french drain. Witho the filter cloth, the fresh ballast would eventually become clogg up with fine material and be rendered useless.

One year after installation, this crossing is in excellent conditi with only some minor separation of the header board being noted. This separation appears to be caused by the manner in which the he boards are affixed to the shims with spikes below the riding surfa allowing small rocks to become embedded and wedged between the pan and header board near the top or riding surface (Figure 49).

Figure 49
Small rocks wedged in header board.

No. 26
State Project No. 5-07-45
Federal Aid Project No. RRP-0005(069)
SAF & DRI Model C Rubber Panel Crossing
La. 3199 at Raceland

At the subject location, La. 3199 is a two-lane, undivided city street with a posted maximum speed of 35 mph. The 1982 ADT is 4180 with 13% trucks. This single branchline track handles two freight rail movements per day at approximately 10 mph.

Installed in January 1983, this crossing features SAF & DRI Model C rubber panels cited previously. Being new, this at-grade crossing was properly installed and exhibits excellent overall ridability characteristics (Figure 50).

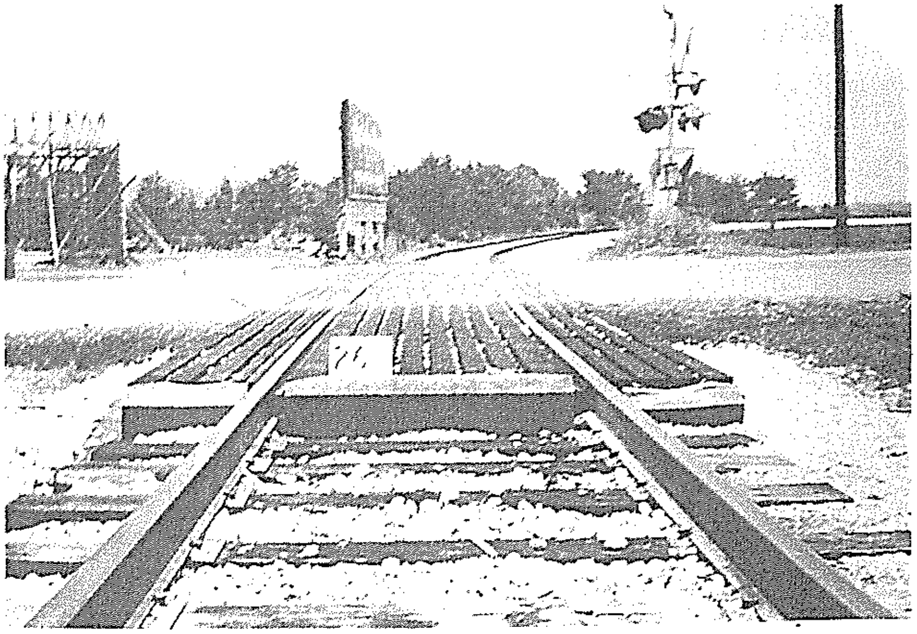


Figure 50
SAF & DRI Model C at Raceland showing poor condition of field-side skid plates.

As the previous figure depicted, the metal skid plates on either end are sustaining repeated damage from dragging rail equipment. Additionally, the exposed ends reveal the cord-reinforced rubber header boards separated from the shims (Figure 51).

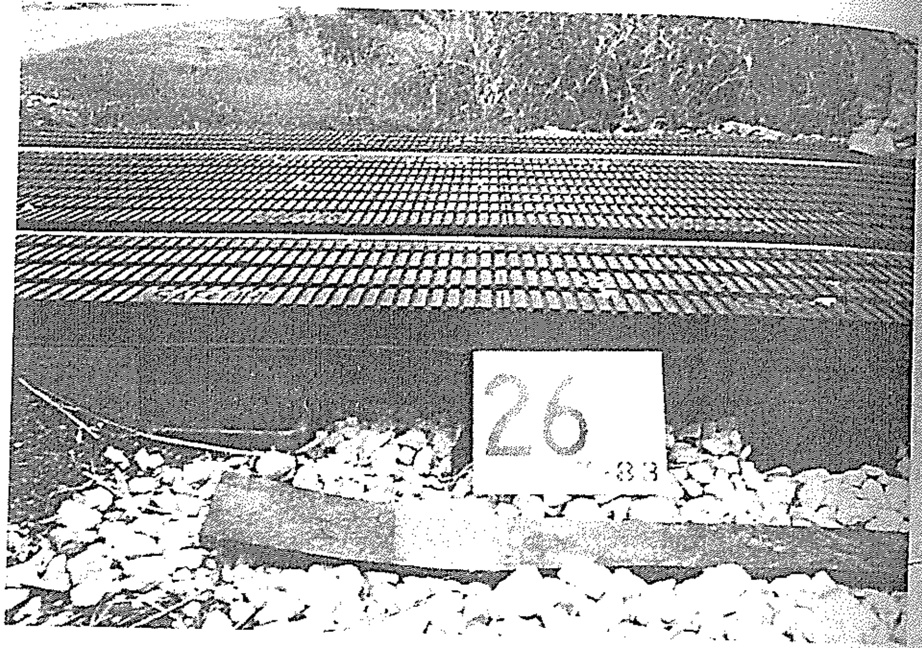


Figure 51
Split shims and rubber header board separation.

The exposed portion of the crossing shows that many of the shims are split. Since researchers were not on hand during construction they can only speculate that this condition was due to poor installation or to ties rocking under rail traffic. Researchers concluded that it is too early to render a performance evaluation as there has been insufficient time for appraisal. This crossing will be included with other experimental sites and evaluated as scheduled.

No. 27

State Project No. 246-01-39(31)

SAF & DRI Model C Rubber Panel Crossing

La. 57 (Ashland Extension) at Houma

At the subject location, La. 57 (Ashland Extension) is a four-lane, undivided city street in Houma, Louisiana. The estimated 1982 ADT is 9510 with 4% trucks at this single track crossing that hosts four rail movements per day at an estimated 35 mph. This main line also affords the opportunity to evaluate the performance of an experimental elastomeric header board.

Installed in March 1982, this sixty-six foot crossing is composed of the proprietary feature SAF & DRI Model C rubber panels manufactured by Structural Rubber Products Company of Springfield, Illinois. In addition to these newly designed 36 inch long panels, described previously in Crossing No. 26, there is a rigid polymeric header board (Figure 52).

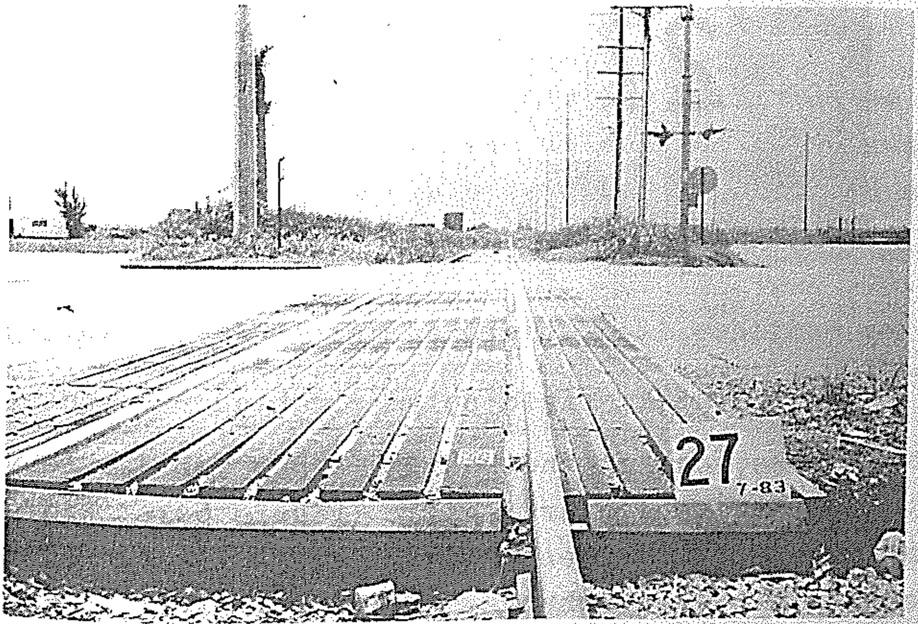


Figure 52

SAF & DRI Model C Crossing in Houma.

Although relatively new, having been installed only a year ago, the rubber panels are performing in an excellent manner. Exception must be taken, however, with the header boards. It seems that these one and one-half inch thick, eight inch deep rigid header boards are unsuitable because of this rigidity or perhaps brittlesness. During construction, it was impossible to penetrate the dense mass in order to affix the header boards to the ties or shims. Consequently, they were set in place and restrained only by the wedging action of the asphalt juncture filler material (Figure 53).

Figure 53

Thick, rigid polymeric header boards

Within six months, one of the boards popped out due to vibration caused by rail and vehicular traffic (Figure 54). Rigidity or brittlesness is also apparently responsible for the further breaking of the panels into large chunks. While the remaining boards are performing their intended function, researchers conclude that the polymeric material is too dense and brittle to absorb the abuse of traffic.

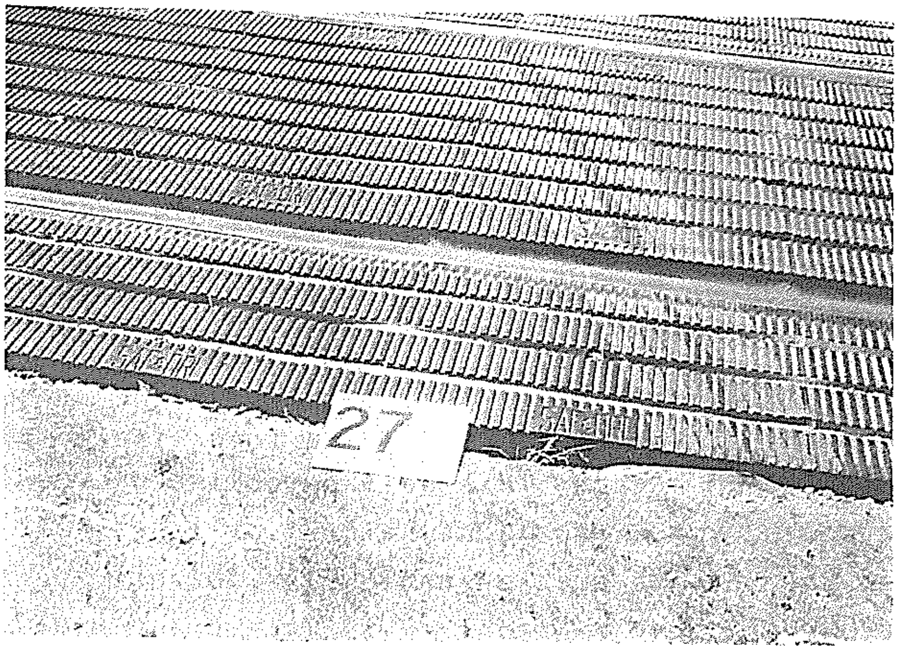


Figure 54

Gap in pavement created when the rigid polymeric header board popped out.

Research also dictates that it is imperative to affix the header boards to the crossing in some fashion, even if only as a precautionary safety measure. Several of the broken pieces could have caused serious damage to vehicles or pedestrians if airborne.

Performance evaluations of this crossing will continue as scheduled with special emphasis being placed on the condition/performance of the remaining header boards.

No. 28

State Project No. 264-01-08(31)

PARKCO Rubber Panel Crossing

La. 74 at St. Gabriel

At the subject location, La. 74 is a two-lane, undivided city street at the junction of La. 30 in St. Gabriel, Louisiana. The estimated 1982 ADT is 2920 with 6% trucks. There are approximately eleven fre rail movements per day at 40 mph rail speed. The crossing received Type A subbase treatment (Appendix) on this single main line track. This was proposed because this well-established crossing is slightly elevated and provides excellent natural drainage. It would be unwarranted to excavate such a stable base further to incorporate a concrete or HMAC subbase as required in Type B subbase specifications.

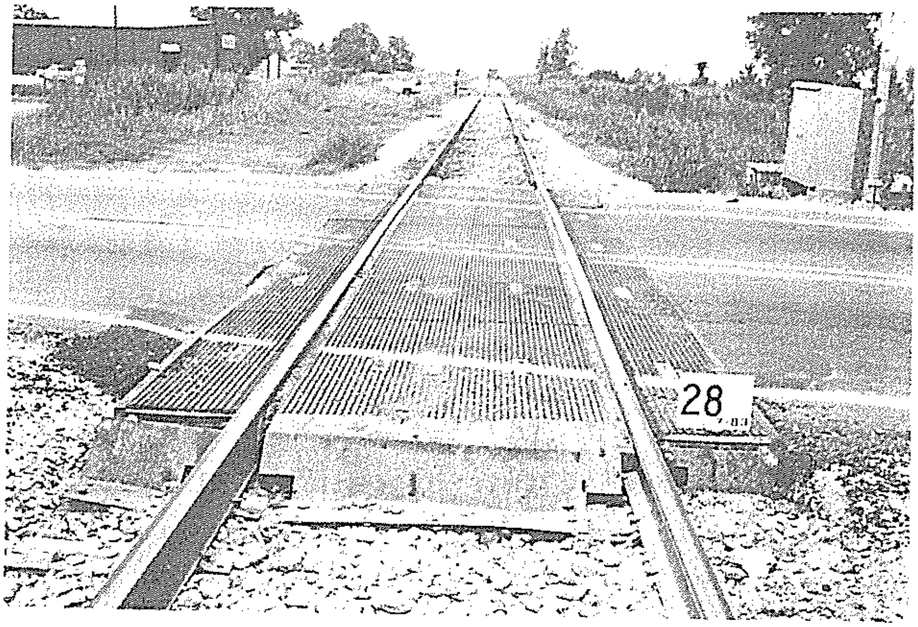


Figure 55

PARKCO rubber panel crossing at St. Gabriel. Note poor condition of missing and battered steel skid plates caused by dragging rail equipment.

The proprietary feature of this thirty foot crossing installed in August 1982 is the latest design of PARKCO rubber panel construction (Figure 55). Cited previously, the recent changes are mostly cosmetic in nature. They include white rubber for the PARKCO name brand embossed in the center of each panel, reduction in height of the two rows of rubber "buttons" nearest the rail on the field side panels (which would eventually be abraded off by the train wheels anyhow) and high-tensile strength steel header board bolts molded in. These bolts replace the earlier practice of using common threaded steel rod pieces, which fatigued easily and broke off almost immediately. The bolt head now provides a base for securely welding it to the steel reinforcing prior to encapsulating in molded rubber.

After "seating in" for two months, La. 74 was reconstructed with a new HMAC overlay which included an excellent approach tie-in. In spite of the slightly elevated track structure, this made for a very smooth crossing. This crossing is relatively new but is exhibiting excellent ridability and performance. Evaluation of this crossing will continue as scheduled.

No. 29

State Project No. 415-03-14
Federal Aid Project No. RRS-437-2(001)
DOW-MAC Pre-cast Concrete Crossing
La. 40 at Independence

Installed in August 1982, this triple-track crossing is located on La. 40 at the junction of La. 51 in Independence, Louisiana. At this location, La. 40 is a two-lane, undivided asphalt city street with 2,070 vpd and 10% trucks. There are fifteen rail movements per day on these main lines which serve two passenger and thirteen freight trains at an estimated rail speed of 79 and 60 m respectively. This site is the only experimental pre-cast concret crossing in Louisiana at this time (Figure 56).

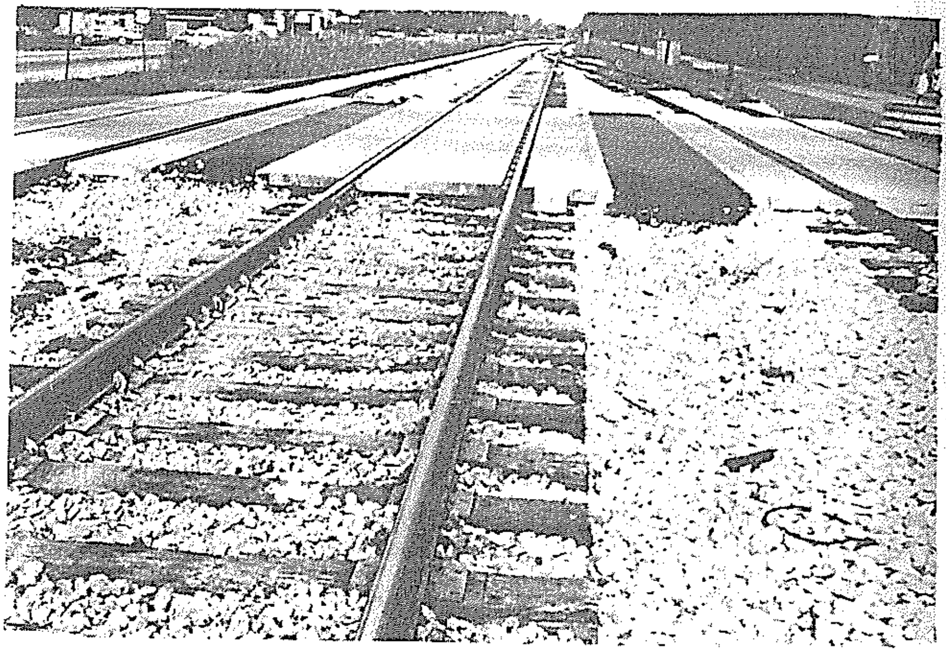


Figure 56

DOW-MAC Pre-cast Concrete Crossings shortly after installation at Independence, Louisiana.

The proprietary feature of these crossings are DOW-MAC pre-cast concrete panels manufactured by DOW-MAC Concrete Company of Norcros, Georgia.

Shortly after installation, researchers noted the end panels tending to "walk-out" (Figure 57).

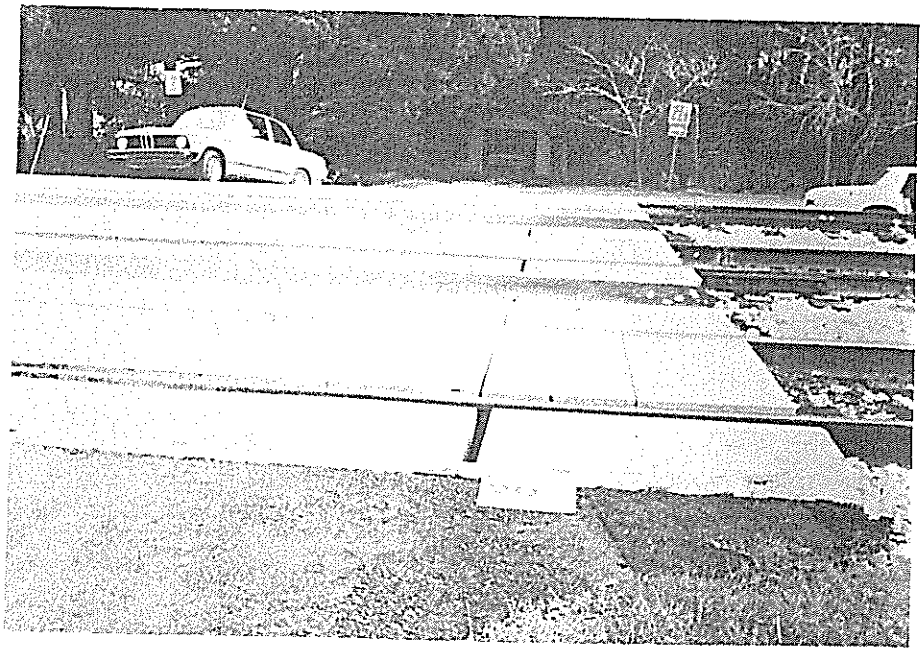


Figure 57

End panels tending to "walk-out."

They concluded that this condition was due to the fact that only rubber wedges are utilized to affix the pre-cast panels in place. Vehicular and rail traffic vibrations were cited as the primary cause of this condition. Immediate corrective measures were taken by jacking panels back into original position and restraining them with HMAC bolsters at each end (Figure 58).

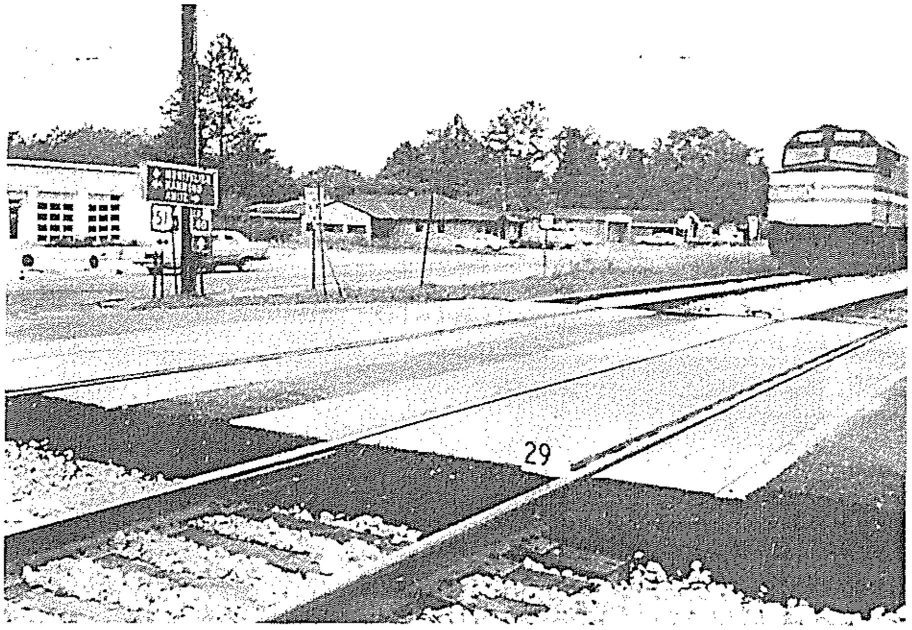


Figure 58

HMAC bolsters added to restrain the panels that are otherwise affixed only with rubber wedges.

This interim measure has proven very satisfactory and these crossings are in excellent overall condition after one year. Evaluation of these crossings will continue as scheduled.

No. 30

State Project No. 828-21-08

Federal Aid Project No. RRP-0005(067)

SAF & DRI Model C Rubber Panel Crossing

La. 731 Spur at Broussard

At this location, La. 731 Spur (Avenue A) is a two-lane undivided asphalt city street in Broussard, Louisiana with 3299 vpd and 4% trucks (Figure 59). This single, mainline track accommodates two passenger and fourteen freight trains per day at an estimated maximum rail speed of 25 mph.

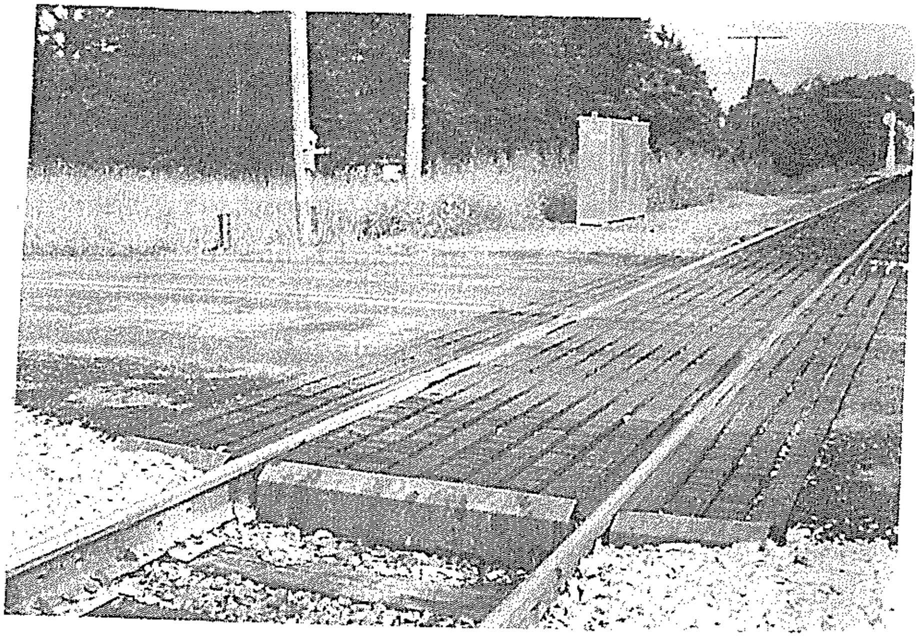


Figure 59

SAF & DRI Model C rubber panel crossing
at Broussard shortly after installation.

Installed in early 1983, this relatively new crossing is in excellent condition and has a very smooth approach tie-in. The slightly elevated crossing is very well drained on this well-established mainline roadbed.

Being new, it is too early to render a performance evaluation on thi crossing at this time. It will be included with the other experimental proprietary features and evaluated as scheduled.

CONCLUSIONS

A review of performance evaluations indicates that:

1. Regardless of the crossing material utilized, the single, most important factor to be addressed is proper subbase and track structure rehabilitation, as well as proper panel installation in accordance with the individual manufacturers's railroad-highway grade crossing performance.

2. Goodyear Super Cushion rubber panel crossings, installed between 1970 and 1978, provide a smooth durable and aesthetically pleasing railroad-highway grade crossing. A somewhat harsh ride at some crossings was attributed to the lack of proper subbase treatment, physical damage due to train derailments and rapid deterioration of the wooden header boards and approach pavements. These conclusions were derived from twenty-four crossings situated throughout Louisiana at eleven single or multi-track locations.

3. Two Structural Rubber Products SAF & DRI (Model S) and two General Rubber Company Gen-Trac rubber panel crossings installed in 1977 and 1978 are in excellent overall condition after five years. This can be attributed in part to the relatively low-traffic volume rural roads (1982 ADT of 1960 to 3600 with 10% trucks) with well-established track roadbeds with good drainage.

4. Five installations utilizing True Temper Corporations T-Core linear polyethylene (structural foam) modules have exhibited rapid deterioration. Minor cracking or crazing of panels were readily visible within a year of construction in spite of relatively low ADT (>1000 vpd). This was followed by large chunks of panels (i.e., 2-3 square feet) breaking off, requiring extensive repair/or replacement. Three have failed and have been replaced, while the remaining two are in very poor condition and failing rapidly.

   At the two remaining sites, Railroad Friction Products Corporations Cobra linear polyethylene panels were installed simultaneously for evaluation. Of a design similar to T-Core, they are apparently of much denser composition. While there is some slight panel warpage and minor crazing in evidence, the panels remain intact and with only minor cracking in evidence. It was concluded that these are signs of early failure and these crossings will continue to be evaluated as scheduled.

5. A unique, longitudinal arched-steel reinforced rubber panel, marketed by Park Rubber Company under the trade name of PARKCO, is one of the most recent additions to Louisiana's Qualified Products List (QPL). First installed in 1980, there are now four PARKCO crossings which utilize post-tensioned steel cables instead of drive pins to affix them to the track structure. Even though interlocked with substantial tongue-and groove joints, these panels are easily installed and/or removed. This non-destructive method of attachment permits rapid and timely repairs to the track structure with a minimum of equipment and manpower.

6. Three installations, encompassing switch or "frog" mechanisms, where conventional rubberized panels would be inappropriate, utilize cast-in-place epoxy-rubber components marketed under the trade name of Track-Span by FEL-PRO, Inc. This pourable mixture of epoxy resins and ground-up rubber tires conform to the awkard configurations of the switch. The major drawback is the inability to remove or repair it for subsequent track work. It is, however, the only permissible alternative to asphalt, which is more economical but requires frequent refurbishings. With this exception, and very minor linear shrinkage where expansion joints are not incorporated, the Track-Span is performing in a satisfactory manner.

7. Four recent additions are SAF & DRI Model C rubber panel crossings. Being relatively new, performance evaluations on these crossings will be withheld until sufficient time has elapsed to render an opinion. They are, however, performing exceptionally well as of this writing.

8. A pre-cast concrete crossing, DOW-MAC, installed in August 1982, is performing well after one year. However, Louisiana's only experience with this type of material was during 1974-77 with the installation of a FAB-RA-CAST crossing which experienced complete failure and was subsequently replaced with a conventional rubber type. This crossing will be monitored closely for any indication of similar failures and reported fully in the next report.

RECOMMENDATIONS

1. It is recommended that attention be directed towards adequate subbase preparation prior to installation of any high-type railroad-highway grade crossing. Researchers have found this to be the single, most important factor towards sustained, adequate performance of any crossing. Wherever practical, efforts should be made to incorporate Type B (Appendix) subbase treatment on all new or reconstructed crossings with emphasis being directed towards providing adequate drainage.

2. It is recommended that efforts continue to develop an alternative to the use of wooden header boards. A deficiency common to all types of crossings, the rapid deterioration of the wooden header boards, prompted the Department to install several different alternative types of header boards experimentally for evaluation. These include various types of rubber, polymeric or metal and will be addressed in depth in the next report, after sufficient time has elapsed to render a decision as to the effectiveness of each type. This, in conjunction with constructuion of the pavement relief joint and tie-in, is directly responsible for the quality of ridability through any railroad-highway grade crossing.

3. Due to the ever-increasing costs of installing high-type railroad-highway grade crossings, the Department also selected six sectional-treated timber crossings to be monitored in an attempt to re-evaluate its policy relative to the use of timber for railroad-highway grade crossing applications. Sufficient time will have elapsed to render individual performance evaluations and recommendations in the next report.

4. It is recommended that district maintenance forces schedule and conduct periodic inspections of all railroad-highway grade crossings and take prompt corrective action where necessary. If the crossing was properly installed, this will generally be

limited to revitalizing the pavement relief joint or refurbishing the asphaltic approach tie-in. They should promptly report any deficiences such as loose or broken rails, crossties, panels, shims, etc. to the proponent railroad company for corrective measures.

5. Finally, it is recommended that research continue in order to assure that only materials and construction techniques of the highest order are utilized to insure high quality railroad-highway grade crossing performance.