EVALUATION OF EXPERIMENTAL RAILROAD-HIGHWAY GRADE CROSSINGS IN LOUISIANA

INTERIM REPORT NO. 5

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ABSTRACT

This interim report is prepared to provide a review of the performance evaluation exhibited on twenty-three (23) experimental railroad-highway grade-crossing projects in the state of Louisiana. The railroad crossings were installed during a ten-year period from June, 1970, to April, 1980, under the Federal Highway Administration "Category 2 - Experimental Construction" program.

Of the three major types of crossings evaluated, the performance of rubber panels (Goodyear's Super Cushion, General Tire's Gen-Trac and Structural Rubber Product's SAF & DRI) can be rated as good to excellent, while the performance of Oneida's True Temper linear polyethylene (structural foam) panels can be rated as poor or unsatisfactory. The True Temper crossings deteriorated rapidly, within two to three years after installation, requiring extensive repair and/or replacement. However, during the past two years, two True Temper, T-Core and two Cobra crossings installed in low-traffic, rural roads (ADT 570) have to date performed exceptionally well, without any sign of deterioration.

The precast concrete slab crossing, FAB-RA-CAST, which was installed in 1974 began to fail within six months after installation and had to be removed and replaced in 1977, as per request of its manufacturer In 1979, the crossing experienced complete failure, again, and had to be replaced with a temporary timber-asphalt crossing.

A sectional treated-timber crossing was also included in the study for comparison purposes, and its performance has been rated as good after four years of service.

In April, 1980, Park Rubber Company's Parkco rubber crossing material was experimentally installed on a double-track crossing in Lafayette. This was the first installation of Parkco rubber panels on the state highway system. Performance evaluation of this material will begin as soon as the crossing is opened to vehicular traffic.

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.

ACKNOWLDEGEMENT

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The authors are equally grateful to Mr. Edward M. Wagner, Jr., Head Highway Transport Engineer, for his diligent effort in obtaining and furnishing the authors with the traffic data and other related statistical information required for this project.

Acknowledgement is also given to the following railroad companies for verbally furnishing the authors with statistical data concerning railroads under their jurisdictions:

Arkansas and Louisiana Missouri Railway Company
Illinois Central Gulf Railroad Company
Kansas City Southern Railroad Company
Louisiana and Arkansas Railway Company
Louisiana Southern Railroad Company
Missouri Pacific Railroad Company
Southern Pacific Railroad Company

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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 Units
	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 (cm^2)
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^3)
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 (kg/cm^2)
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

IMPLEMENTATION

The Department has previously developed and implemented a policy, "Railroad-Highway Grade-Crossing Policy". The policy (see Appendix A, page 73) in part, requires the use of rubberized crossing (see Appendix B, page 79) on all new construction where ADT is 1000 vpd or more and the use of treated timber crossing (see Appendix C, page 85) where ADT is less than 1000 vpd. Supplemental Specifications for subbase treatment at railroad-highway grade-crossings can be found in Appendix D, page 91.

BACKGROUND

In view of a past history of highway user dissatisfaction with at-grade railroad-highway crossings, in general, and a lack of uniformity in construction techniques and materials, the Department's New Products Evaluation Committee, in the fall of 1968, initiated a study to evaluate the use and performance of a railroad crossing material manufactured by the Goodyear Tire and Rubber Company of Akron, Ohio. The rubber panels had the trade name Super Cushion and were molded of long-wearing rubber, reinforced with steel. Up to that time, only the full-depth, creosoted timber and the timber-asphalt crossings had been used in Louisiana. The opinion of the Committee was that these timber type crossings were inadequate due to maintenance problems and the inability to maintain smooth crossings. It was the intent of the Committee to determine if the railroad rubber-panel crossing was superior to the conventional timber crossings. Questionnaires were mailed to a number of states and railroad companies to determine their experiences with the rubber-panel crossing. After evaluating the questionnaires and collecting other available data, it was decided to go ahead with Louisiana's first experimental elastomeric railroad-highway grade crossing and begin its evaluation as soon as possible.

The initial field installations of rubber crossings were made on La. 2, in Sterlington, and U.S. 190, in Baton Rouge, during the summer and fall of 1970, respectively. After two (2) years of service, performance evaluation reports on these crossings revealed that the experimental installations were in very good condition. The pads were found to be level with the tracks, crossings were smooth and there were no signs of wearing or tearing.

In 1972, based on the performance of the two rubber-crossing installations, the New Products Evaluation Committee concluded that Goodyear's rubber-panel crossings were superior to conventional timber crossings used in the state of Louisiana. Additionally, the Committee recommended that rubber-panel crossings be required by the Department on all new or reconstructed railroad crossings where the average daily traffic (ADT) count is more than 1500.

The Board of Highways, on September 7, 1972, recognizing the need for a policy decision on the subject of railroad-highway grade crossing and acting under authority vested by Louisiana Revised Statutes 45:841 and 48:382, adopted a "Railroad-Highway Grade-Crossing Policy" to reflect the findings of the Product Evaluation Committee.

During the period 1974 to 1980, twenty-one (21) additional experimental railroad-highway grade crossings of various types and sizes were installed throughout the state of Louisiana. Included were nine (9) Goodyear's Super Cushion; two (2) General Tire's Gen-Trac; two (2) Structural Rubber Products' SAF & DRI; two (2) True Temper, Oneida; two (2) True Temper, T-Core; two (2) Cobra; one (1) precast concrete FAB-RA-CAST; one (1) treated timber and one (1) Park Rubber Company's Parkco.

The Louisiana Department of Transportation and Development, Office of Highways' "Railroad-Highway Grade-Crossing Policy" was revised effective November 1, 1979 (see Appendix A, page 73). 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 crossing where ADT is less than 1000 vpd.

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

PURPOSE

The purpose of this report is to provide performance evaluations on twenty-three (23) experimental railroad-highway grade crossings installed under the Federal Highway Administration "Category 2 - Experimental Construction" program. This report will provide the basis for any future revision to the Department's policy governing railroad-crossing surface materials.

SCOPE

The scope of this report includes the results of periodic inspections of twenty-three (23) experimental railroad-highway grade crossings carried out over a period which spans from one month for the most recent installation to approximately ten years for the oldest. The semi-annual inspections included visual observation and photo-documentation of each one of the experimental installations. Original photographs were used as a reference for later comparisons. This procedure provided an accurate historical record of the construction and installation techniques, as well as an accurate log of aesthetic conditions at the time of inspection. The scope also includes location description, traffic data, railroad and rail movement statistics at each site.

METHOD OF PROCEDURE

Site Selection

The Department, through its office of the Project Control Engineer, selected the location and the type of crossing material to be used at each experimental site and secured the approval of the Federal Highway Administration (FHWA) before any construction could begin.

Materials Evaluated

Three basic categories of railroad-crossing materials were approved for experimental installation:

1. Rubber Panels
   Super Cushion - Goodyear Tire and Rubber Company of Akron, Ohio.
   Gen-Trac - General Tire and Rubber Company of Wabash, Indiana.
   SAF & DRI - Structural Rubber Products Company of Springfield, Illinois.
   Parkco - Park Rubber Company of Lake Zurich, Illinois.
2. Linear Polyethlyene (Structural Foam) Panels
   True Temper - Oneida General Corporation of Ogden, Utah.
   True Temper, T-Core - Railway Appliance Division of True Temper Corporation.
   Cobra Crossing Material - Railroad Friction Products Corporation.
3. Precast Concrete Slabs
   FAB-RA-CAST - Szarka Enterprises, Inc.

One (1) treated-timber crossing was also included in the study for comparison purposes.

Field Installation

Construction of experimental railroad-highway grade crossing at each site was carried out through a contract with the appropriate railway company having jurisdiction over the railroad. The Department's maintenance forces provided detour and necessary signs and barricades. Since 1970, twenty three (23) Category 2 experimental installations have been constructed, the most recent having been completed in April, 1980. Whenever possible, the Department's research personnel were on hand to note installation techniques and construction problems. The general concensus was that it is no more difficult to install high type railroad crossings than the formerly used conventional timber crossings.

Performance Evaluation

Semi-annually, each site was inspected by research personnel to determine the overall physical condition of the crossings including rideability, smoothness characteristics, surface breaks, cracks, wearing and missing parts. Maps were prepared and photographs were taken to document any sign of failure. Original photographs were used as a reference for later comparisons. This documentation provided an accurate historical record of the construction and installation techniques, as well as, an accurate log of aesthetic conditions at the time of inspection. Quality of ride at each crossing was subjectively determined by making several runs at the posted speed limit, using a standard American made automobile. Local inquiries were also made concerning any train derailment or other out-of-the-ordinary incidents.

Statistical data such as highway classification, estimated ADT, posted maximum highway speed, pavement type, number of tracks, classification of tracks, railroad movement in 24 hours, maximum railroad speed and type of rail was acquired for each site and recorded on an inspection report. The general physical condition of each crossing, together with possible causes of any surface failure, was also noted on the same inspection report.

Each inspection report, together with related photographs, was evaluated individually and a rating was assigned. Performance ratings varied from poor to excellent.

The numbered performance evaluations which follow include location description, statistical data, current physical condition and the performance rating assigned to each experimental railroad crossing covered by this research study. The locations of these crossings may be found in Figure 1 and in Table 1.

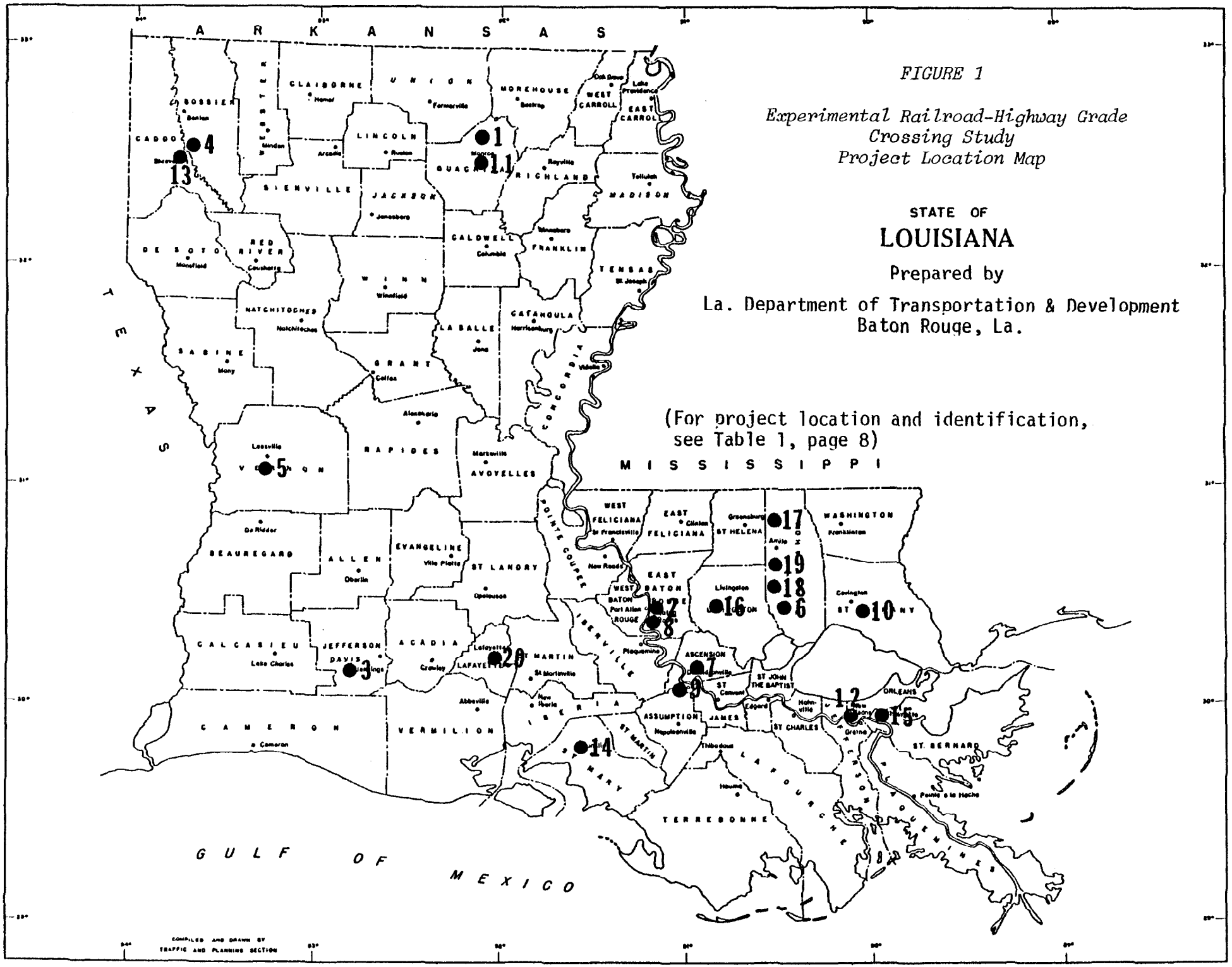


FIGURE 1

Experimental Railroad-Highway Grade Crossing Study
Project Location Map

STATE OF
LOUISIANA

Prepared by

La. Department of Transportation & Development
Baton Rouge, La.

(For project location and identification, see Table 1, page 8)

COMPILED AND DRAWN BY TRAFFIC AND PLANNING SECTION

TABLE 1

Experimental Railroad Highway Grade Crossing Study
Project Location and Identification

Project No.	Map Loc.	Route No.	Parish	Nearest City	Location Description	Subbase Treatment	Crossing Material	Age (Yrs.)
1	1	La 2	Ouachita	Sterlington	La 2 - 0.1 mi. s. of La 553	None	Goodyear	10
2	2	US 190	East Baton Rouge	Baton Rouge	US 190 - 0.5 mi. e. of Miss. Rv. Bridge	None	Goodyear	10
3	3	La 99	Jefferson Davis	Welsh	La 99 - (N. Adams St.) 0.5 mi. s. of I-10	None	Goodyear	3
4	4	La 3105	Bossier	Bossier City	0.1 mi. s. of I-20	None	Goodyear	4
4A*	4	La 3105	Bossier	Bossier City	2.1 mi. s. of I-20	None	Treated Timber	4
5	5	La 10	Vernon	Pickering	La 10 - 0.1 mi. e. of US 171	None	Goodyear	4
6	6	US 190	Tangipahoa	Hammond	0.1 mi. e. of US 51	None	Goodyear	5
7	7	La 44	Ascension	Burnside	La 44 - 0.8 mi. s. of La 22	None	FAB-RA-CAST	2
8	8	La 30	East Baton Rouge	Baton Rouge	La 30 at the Junc. of La 42	8" Sand-Shell	True Temper	4
9	9	La 3089	Ascension	Donaldsonville	0.5 mi. s. of La 18	None	True Temper	2
10A	10	La 59	St. Tammany	Abita Springs	La 59 - 4 mi. n. of I-12	None	SAF & DRI	3
10B	10	La 59	St. Tammany	Abita Springs	La 59 - 1 mi. n. of I-12	None	Gen-Trac	3
11	11	US 165	Ouachita	Monroe	2.7 mi n. of US 80	None	Goodyear	3
12	12	La 49	Jefferson	Kenner	La 49 (Williams Blvd) 0.1 mi. s. of US 61	None	Goodyear	3
13	13	La 3132	Caddo	Shreveport	3132 - 0.5 mi. s. of La 1	None	Goodyear	2
14	14	La 83	St. Mary	Baldwin	La 83 - 0.2 mi. sw of La. 182	None	Goodyear	2
15	15	La 47	St. Bernard	Chalmette	La 47 (Paris Rd) 0.1 mi. s. of La. 46	None	Goodyear	2
16A	16	La 1029	Livingston	Walker	La 1029 (Corbin St) 0.2 mi. n. of US 190	None	True Temper	1

TABLE 1 (CONTINUED)

Experimental Railroad Highway Grade Crossing Study
Project Location and Identification

Project No.	Map Loc.	Route No.	Parish	Nearest City	Location Description	Subbase Treatment	Crossing Material	Age (Yrs.)
16B	16	La 1029	Livingston	Walker	La 1029 (Corbin St.) 0.2 mi. n. of US 190	None	Cobra	1
17A	17	La 1054	Tangipahoa	Greenlaw	La 1054 - 0.2 mi. e. of La 51	None	True Temper	2
17B	17	La 1054	Tangipahoa	Greenlaw	La 1054 - 0.2 mi. e. of La 51	None	Cobra	2
18	18	La 1064	Tangipahoa	Natalbany	La 1064 - 0.6 mi. e. of US 51	4" Asphalt	SAF & DRI	2
19	19	La 1065	Tangipahoa	Independence	La 1065 - 0.1 mi. e. of US 51	4" Asphalt	Gen-Trac	2
20	20	US 90	Lafayette	Lafayette	US 90 (Mudd St.) 0.2 mi. w. of US 167	12" Conc.	Parkco	New

*Not experimental

No. 1
State Project No. 70-07-11(31)
Goodyear Rubber Crossing
La. 2 at Sterlington

This crossing is located on La. 2, about 0.1 mile south of La. 553, at Sterlington, Louisiana. The track at this location is part of an industrial spur which crosses La. 2 at approximately right angles. This single-track crossing was constructed in June, 1970, and it was the first experimental installation of rubber (elastomeric) panels in the state of Louisiana. The rubber panels were a patented product, with the trade name Super Cushion, manufactured by the Goodyear Tire and Rubber Company of Akron, Ohio.

The roadway is 24 feet wide, carries two lanes of opposing traffic with a posted maximum highway speed of 30 mph and an estimated 1979 average daily traffic (ADT) of 4,170, including 10% trucks. A negligent amount of train traffic, less than one train per day, uses the spur line at an estimated railroad speed of 10 mph.

Figures 2a and 2b are photographs showing a Goodyear rubber-panel crossing at Sterlington after approximately six and ten years of service, respectively. The crossing remains in good condition, with only a minimum number of rubber cap plugs missing. These plugs are largely cosmetic in nature and do not add to the structural integrity of the installation. There are also a few loose panels which need to be tightened, and so far only one panel has been replaced. All other panels are in good-to-excellent condition.

Evaluation of this experimental crossing was formally terminated on December, 1979. However, periodic inspection will continue; and if there is any new development, it will be documented and reported in the final report.

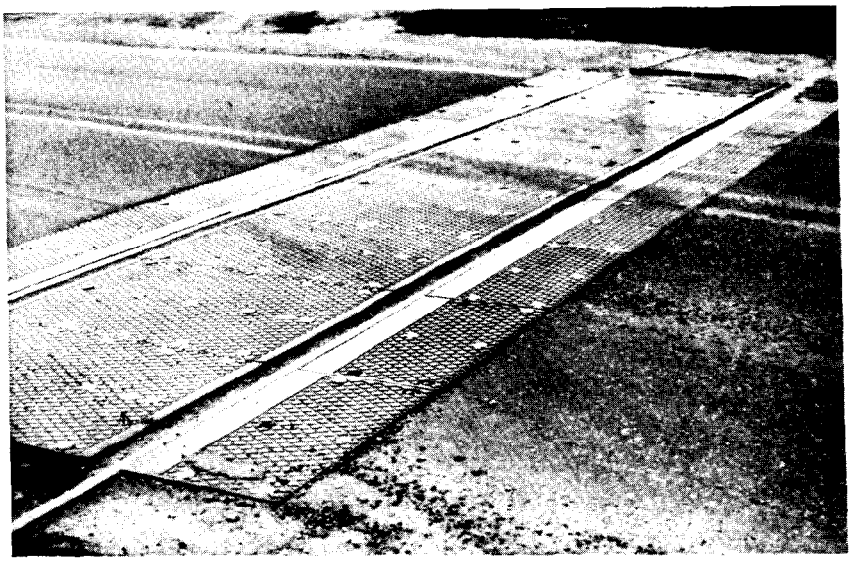


FIGURE 2a

Goodyear rubber crossing at Sterlington after approximately six years of service

FIGURE 2b

Goodyear rubber crossing at Sterlington after approximately 10 years of service

No. 2
State Project No. 7-09-56
Goodyear Rubber Crossing
U.S. 190 at Baton Rouge

This crossing is located on U.S. 190, approximately 0.5 mile east of the Mississippi Bridge, in Baton Rouge, Louisiana. In the subject area, U.S. 190 is a four-lane, divided highway with a posted maximum highway speed of 55 mph and an estimated 1979 ADT of 19,250, including 10% trucks.

This Goodyear rubber-panel crossing was installed on both the east and westbound lanes of U.S. 190 in the fall of 1970. The tracks intersect the roadway at approximately right angles and serve four (4) trains per day at an estimated maximum railroad speed of 20 mph.

The first inspection of this crossing was made about two (2) years after installation, and the overall condition of the crossing was rated as excellent. The panels were found to be level with the tracks and there was no sign of wearing. Test drives at maximum highway speed indicated that the crossing was very smooth.

In March 1973, a train derailment severely damaged the crossing (Figure 3). The installation continued to deteriorate rapidly under the effect of heavy highway traffic until 1977 when partial repair was made by the Louisiana and Arkansas Railroad Company. The repair involved replacement of four of the major "between rail" rubber pads and could by no means be termed a complete rectification of the 1973 derailment damages.

The November, 1979, inspection revealed that many problems associated with the 1973 accident still existed. There were warped pads, loose bolts, uneven panels and some broken welds which caused the overall performance to be rated as only fair (Figure 4). Since the first inspection report had revealed an excellent performance until the

time of the derailment, it can be concluded that the November, 1979, performance rating of "fair" is primarily due to the 1973 derailment damages and also due to subsequent deterioration which was caused by lack of proper and timely repairs to correct those damages.

Evaluation of this experimental crossing was formally terminated on December, 1979. However, periodic inspection will continue; and if there is any new development, it will be documented and reported in the final report.

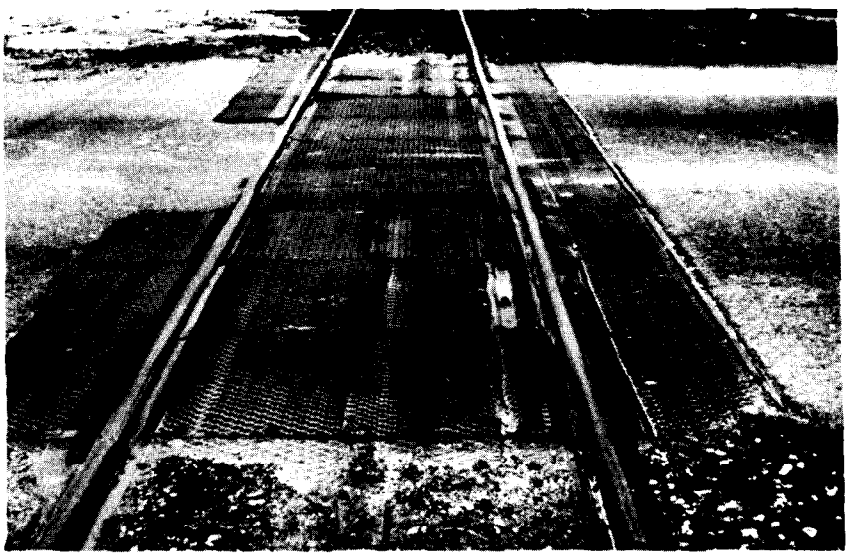


FIGURE 3

1977 view of Goodyear rubber crossing at Baton Rouge showing derailment damage incurred in 1973

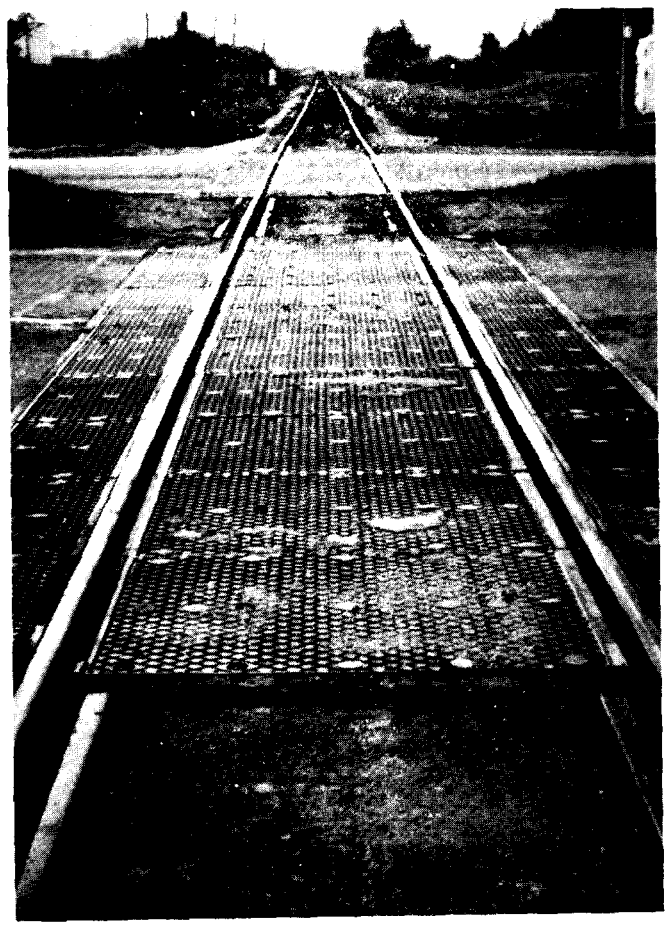


FIGURE 4

Goodyear rubber crossing at Baton Rouge after approximately 12 years of service

(NOTE: 1973 derailment damage was partially repaired in late 1977)

No. 3
State Project No. 198-03-09(31)
Federal-Aid-Project No. S-144-1(001)
Goodyear Rubber Crossing
La. 99 at Welsh

This crossing is located on La. 99 (N. Adam Street), approximately 0.5 mile south of I-10, in Welsh, Louisiana. In the subject area, La. 99 is a four-lane, undivided highway with a posted maximum highway speed of 35 mph and an estimated 1979 ADT of 3600, including 5% trucks.

The Goodyear rubber panel crossing was installed on both the north and southbound lanes of La. 99 in October, 1976. This single track is part of a main line which serves seventeen (17) rail movements per day at an estimated maximum railroad speed of 25 mph.

The most recent inspection, in November, 1979, revealed that the crossing was in excellent overall condition (Figures 5 and 6). However, it should be noted that the relief joints between the field-side rubber panels and the portland cement concrete pavement on either side of the crossing were apparently filled with inferior and uncompacted asphaltic material which had sunk and broken out in several spots creating a bump effect at the crossing. Addition of an asphaltic filler mix to the relief joints should remedy the problem and result in a much smoother ride over the crossing.

Annual inspection and evaluation of this experimental installation will continue.

FIGURE 5

Overall view of Goodyear rubber crossing at Welsh after approximately 3 years of service

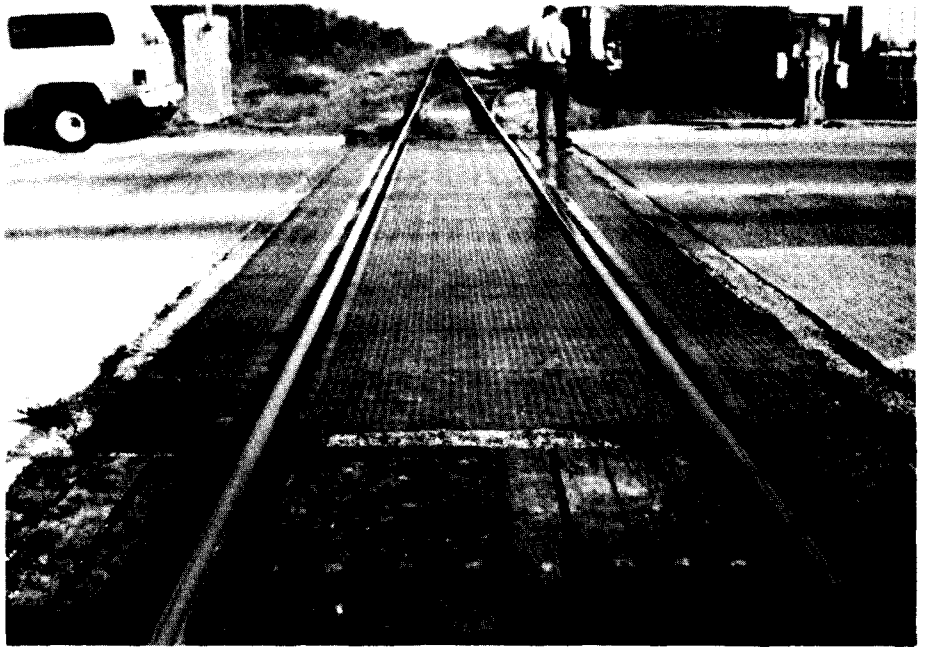


FIGURE 6

Goodyear rubber crossing at Welsh after approximately 3 years of service

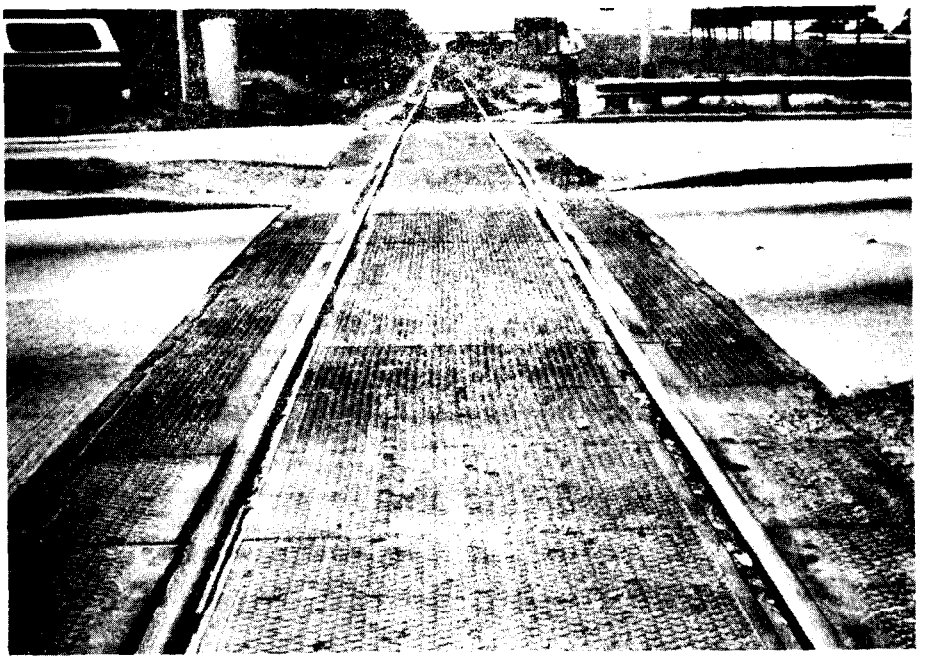
No. 4 and 4a
State Project No. 808-07-06
Federal-Aid Project No. U-19-04(001)
La. 3105 at Bossier City (Goodyear Rubber Crossing - No. 4)
La. 3105 at Bossier City (Sectional Treated Timber Crossing - No. 4a)

These crossings are both located on La. 3105, south of I-20, in Bossier City, Louisiana. Crossing No. 4 is approximately 0.1 mile south of I-20 with an estimated 1979 ADT of 22,210 and 6% trucks. Crossing No. 4a is two (2) miles further south with an estimated 1979 ADT of 16,100, including 6% trucks. In the subject location, La. 3105 is a four-lane, urban street with a posted maximum speed of 35 mph.

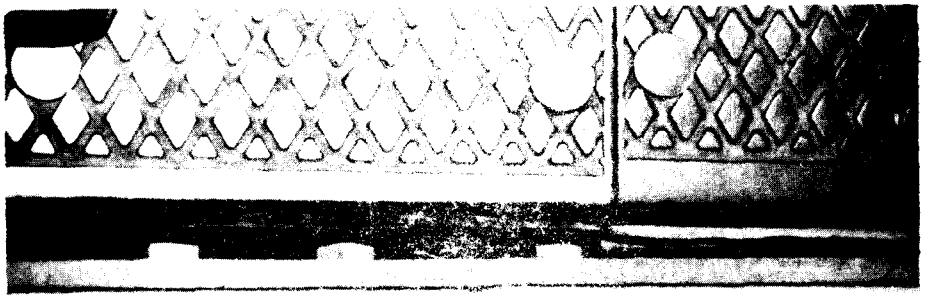
Both crossings were installed in July, 1976. Crossing No. 4 serves nine (9) and crossing No. 4a serves six (6) rail movements per day at an estimated rail speed of 45 mph.

The November, 1979, inspection revealed that both of these crossings were in good physical condition and exhibited good riding qualities after more than three (3) years of service.

At location No. 4 , which utilizes Goodyear rubber panels (Figure 7), the rails had been bolted together without welding at the time of construction. Since then, however, all rails have been welded except for one at the highway median (Figure 8) which continues to cause panel alignment problem. Train movement over this rail allows the joint to pivot, with resulting up and down movements of the adjoining rails. This action loosens the panels and nails and causes misalignment. Welding of the rails in the highway median should, however, remedy the problem. Loose panels should also be tightened as soon as practical.



Overall view of [illegible] crossing at Bossier City after approximately [illegible] years of service



Close up view of Grating [illegible] crossing at Bossier City showing [illegible] the highway median

Crossing No. 4a is a sectional treated timber crossing (Figure 9) which has been included in the study for comparison purposes. It has performed well to date primarily due to a well drained and a well compacted subgrade. There is one loose rail which needs to be tightened.

Annual inspection and evaluation of these two crossings will continue with particular emphasis on comparative durability and riding quality.

FIGURE 9

Overall view of sectional treated timber Crossing at Bossier City after approximately 4 years of service

No. 5

State Project No. 858-03-09

Federal-Aid Project No. EHS-SG-903(1)

Goodyear Rubber Crossing

La. 10 at Pickering

This crossing is located on La. 10, approximately 0.1 mile east of U.S. 171, in Pickering, Louisiana. At this location, La. 10 carries two lanes of opposing traffic at a posted maximum highway speed of 55 mph and an estimated 1979 ADT of 3,850, with 5% trucks. Fort Polk Military Reservation is also located nearby which results in heavy equipment usage of the crossing.

This single-track, rural crossing is part of a main line which serves eight (8) freight trains per day at an estimated rail speed of 35 mph. The crossing utilizes Goodyear rubber panels and was installed in December, 1975. With the exception of slight deterioration of the asphalt filler at the header boards (Figure 10), the crossing has performed very well, and its performance can be rated as good to excellent. Ride quality over the crossing is also very satisfactory.

Annual inspection of this crossing will continue.

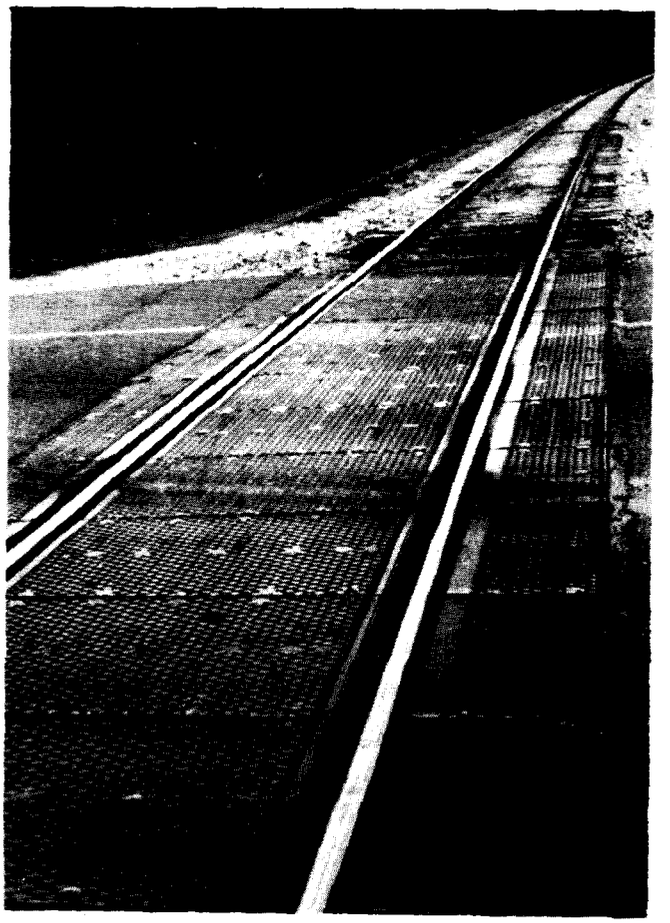


FIGURE 10

Goodyear rubber crossing at Pickering after 4 years of service

No. 6

State Project Nos. 13-08-15 & 13-09-24

Federal-Aid Project Nos. U-18-3(001) & U-18-3(002)

Goodyear Rubber Crossing

U.S. 190 at Hammond

This double-track crossing is located on both east and westbound lanes of U.S. 190, approximately 0.1 mile east of U.S. 51, in Hammond, Louisiana. At this location, U.S. 190 is a four-lane, divided street with a posted maximum speed of 25 mph and an estimated 1979 ADT of 14,850, with 6% trucks.

The tracks at the subject location are part of main lines which serve fifteen (15) rail movements per day at an estimated rail speed of 30 mph. The crossing was constructed in the fall of 1974 using Goodyear rubber panels. With the exception of minor equipment damage to the skid plates, a loose rail and uneven relief joints, the experimental installation remains in good-to-excellent condition and exhibits smooth riding quality for vehicular traffic (Figures 11 and 12).

Evaluation of this experimental crossing was formally terminated on December, 1979, after more than five (5) years of satisfactory service. However, periodic inspection will continue; and if there is any new development, it will be documented and reported in the final report.

FIGURE 11

Double-track Goodyear rubber crossing at Hammond after more than five years of service

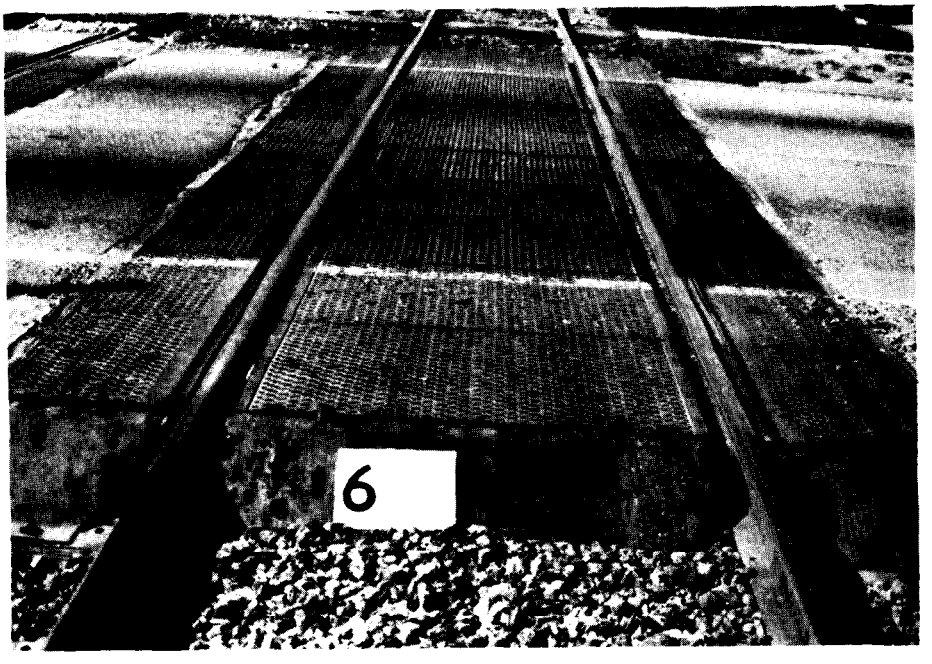


FIGURE 12

After more than five years of service, Goodyear Super Cushion panels remain in good condition at Hammond installation Note the sunken asphaltic filler in the left relief joint.

No. 7

State Project No. 265-01-23

Precast Concrete Crossing FAB-RA-CAST

La. 44 at Burnside

This double-track crossing is located on La. 44, approximately 0.8 mile south of La. 22, in Burnside, Louisiana. At this location, La. 44 is a two-lane, rural road with a posted maximum highway speed of 55 mph and an estimated 1979 ADT of 4,430, with 8% trucks.

The crossings at the subject location are part of a mainline which serves six (6) rail movements per day at an estimated maximum rail speed of 40 mph. Both crossings were constructed in December, 1974, using a new type of prefabricated reinforced-concrete crossing manufactured by Szarka Enterprises, Inc. of Livonia, Michigan, having the trade name FAB-RA-CAST (Figure 13a).

FIGURE 13a

General view of precast concrete crossing FAB-RA-CAST in Burnside

A routine inspection in April, 1975, revealed that the precast slabs were beginning to crack and subside (Figure 13b). One slab was actually broken to the extent that only its internal reinforcing steel was holding the broken prices together (Figure 13c). A followup inspection in July, 1975, showed conditions to be steadily worsening as traffic began to loosen the bolts and brackets which had secured the concrete pads in place. The badly deteriorated slab (Figure 13d) along with other damaged slabs throughout the installation, was eventually removed (Figure 13e) by Illinois Central Gulf Railroad maintenance personnel and replaced with new precast slabs.

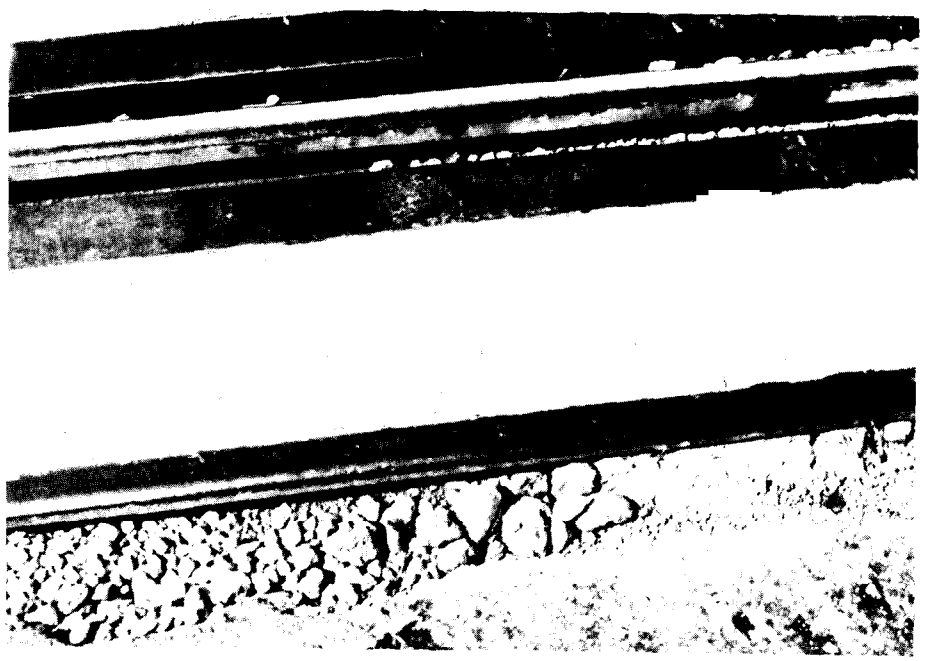


FIGURE 13b

FAB-RA-CAST slabs began cracking and subsiding soon after installation

FIGURE 13c

FAB-RA-CAST slab began deteriorating soon after installation

FIGURE 13d

FAB-RA-CAST slab disintegrated under traffic load

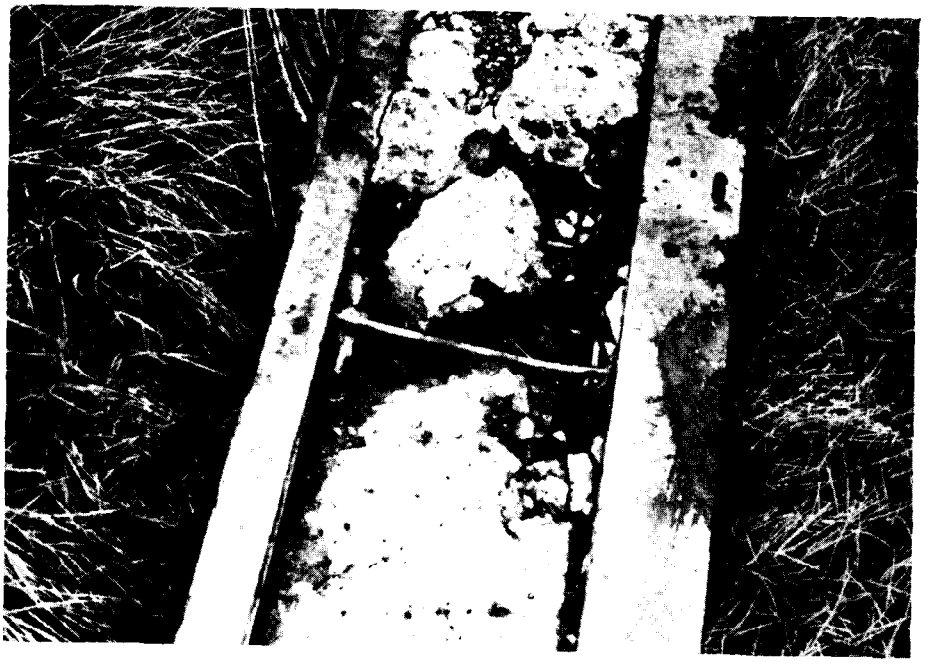


FIGURE 13e

Badly deteriorated FAB-RA-CAST slab has been removed to be replaced by a new panel

These new pads too, began to rapidly deteriorate, as had their predecessors. In addition to fracturing, almost all of the pads exhibited some degree of looseness during the passage of even the lightest vehicle across the tracks. Adjacent slabs started seating themselves in different vertical positions, resulting in a very rough ride and a hazard to motoring public (Figure 13f).

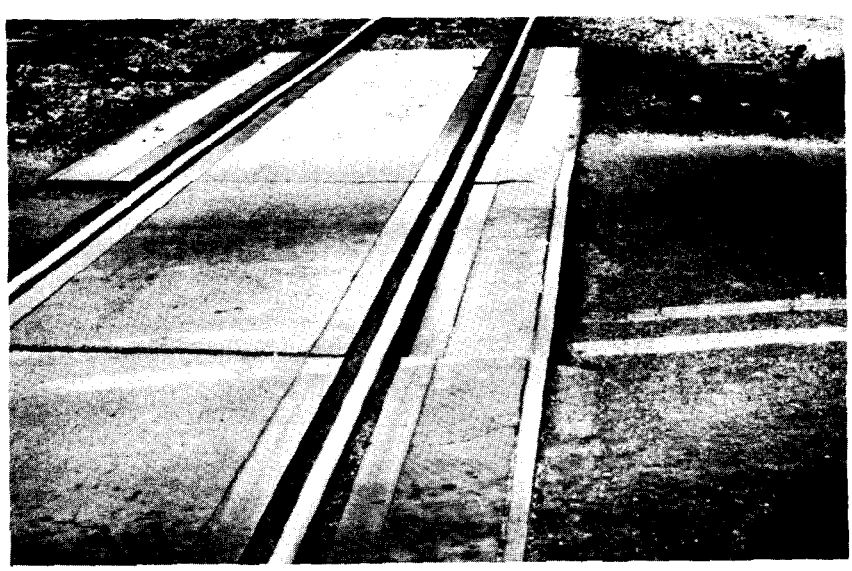


FIGURE 13f

General view of FAB-RA-CAST grade crossing shortly before April, 1977 re-construction

In March, 1976, in order to make the crossings safe, a decision was made to temporarily install treated timbers in place of four of the most troublesome precast slabs while a final decision was being formulated relative to the future disposition of the aforementioned crossings.

In April, 1977, the FAB-RA-CAST manufacturer requested that the Department consider a general overhaul of the crossings and the inclusion of special vibration dampers and insulator pads which were claimed to reduce the loosening of the precast concrete panels under traffic. This request was granted, and a complete removal and rebuilding operation was undertaken in April, 1977, (Figure 13g) and completed in two (2) working days.

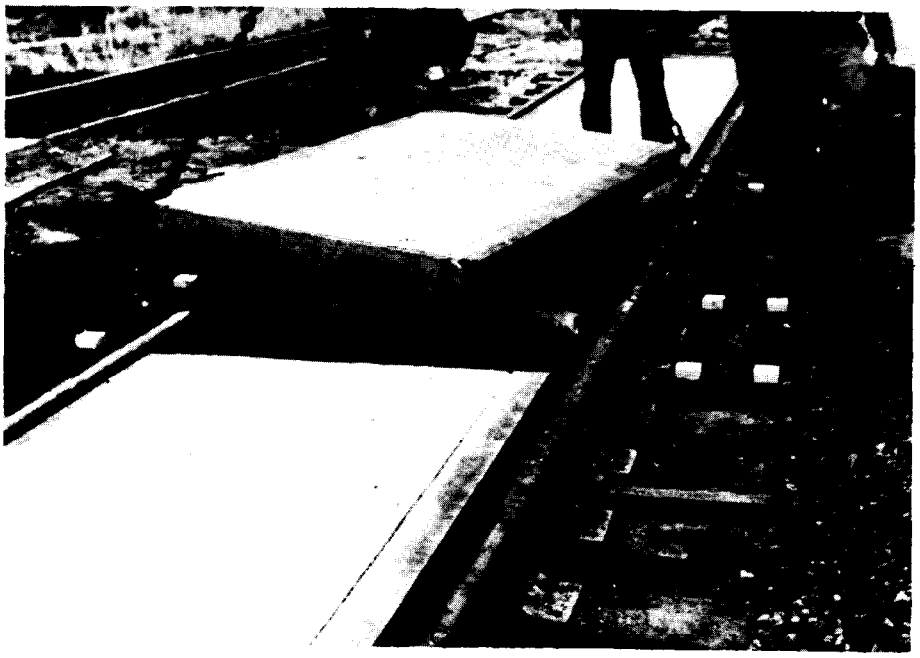


FIGURE 13g

April, 1977, re-construction of Burnside crossing using new FAB-RA-CAST panels with vibration dampers and insulator pads

In June, 1977, two field-side panels had cracked and other pads had begun rocking. By 1979, the crossings had experienced complete failure, again, and they had to be removed and replaced by temporary timber-asphalt crossings (Figure 14). Rubber-panel crossings will be installed at this location in the near future.

Performance evaluations of the above crossings were terminated in December, 1979.

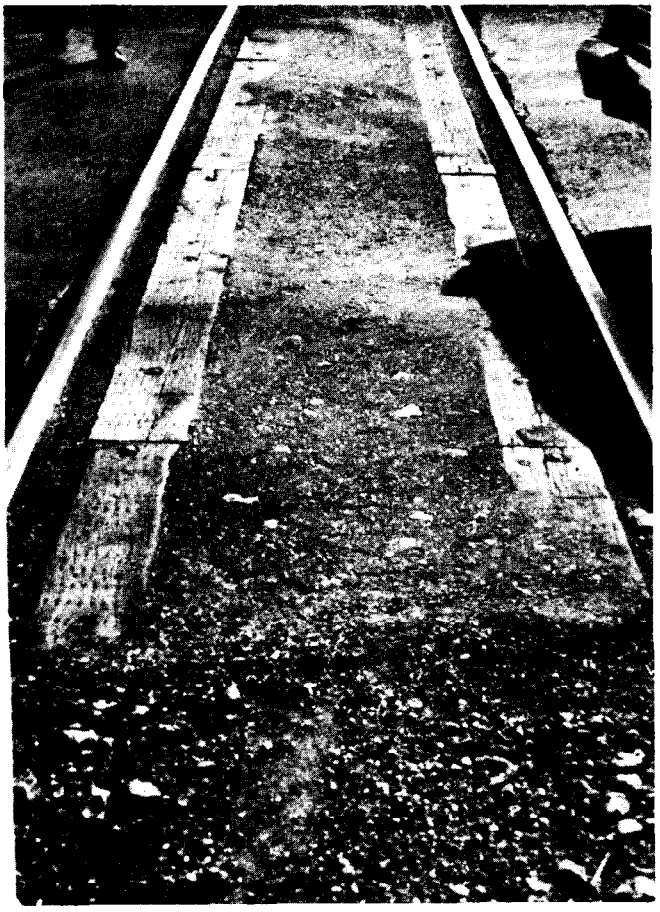


FIGURE 14

1979 view of temporary timber-asphalt crossing at Burnside after FAB-RA-CAST slabs had failed again and required removal and replacement

No. 8

State Project No. 414-01-18

True Temper, High Density Polyethylene Crossing

La. 30 at Baton Rouge

This single track crossing is located on La. 30 (Nicholson Drive), at the Junction of La. 42, near the L.S.U. Campus in Baton Rouge (Figure 15a). At the subject location, La. 30 is an urban road, carrying two lanes of opposing traffic at a posted maximum highway speed of 45 mph with an estimated 1979 ADT of 14,350, including 6% trucks.

FIGURE 15a

General view of True Temper crossing near L.S.U. Campus in Baton Rouge after 4 1/2 years of service (NOTE: In May, 1978 all broken panels were removed and replaced.)

The crossing is 183 feet long and was installed in November, 1975, using linear polyethylene panels (structural foam) manufactured by Oneida General Corporation of Ogden, Utah, and having the trade name True Temper. The track is classified as a spur line and is rarely used.

Periodic inspections of this installation have revealed that the performance of this crossing is at best marginal to poor. Development of surface failures such as cracking, spalling, break-outs, and wavy and out-of-alignment panels have become a common occurance. Several pads have completely failed, and large pieces have broken out under the action of the traffic.

In May, 1978, all broken modules were replaced with new panels, resulting in an improved safety and ride quality. However, the December, 1978, inspection again revealed the appearance of more cracked and broken panels. Also noted was a loose rail near the center of the roadway which rocked under vehicular traffic. The December, 1979, inspection indicated that this experimental crossing was rapidly deteriorating and was in need of immediate maintenance or replacement (Figures 15b and 15c).

As a temporary measure, asphalt mix is being used to patch holes in the crossing (Figure 16).

Periodic inspection and evaluation of this crossing will continue.

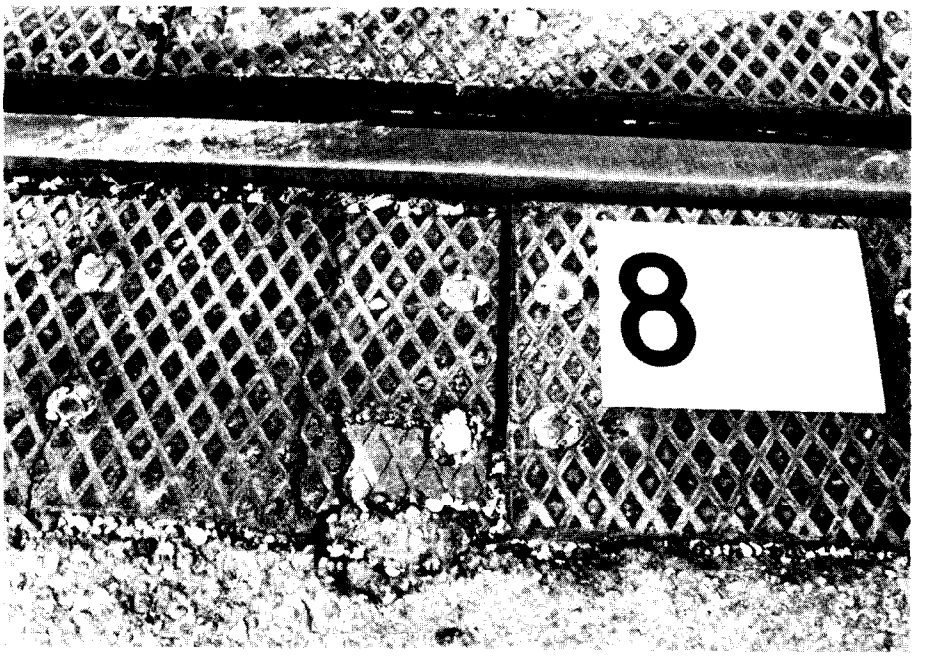


FIGURE 15b

Close up view of True Temper crossing in Baton Rouge showing a cracked polyethylene panel

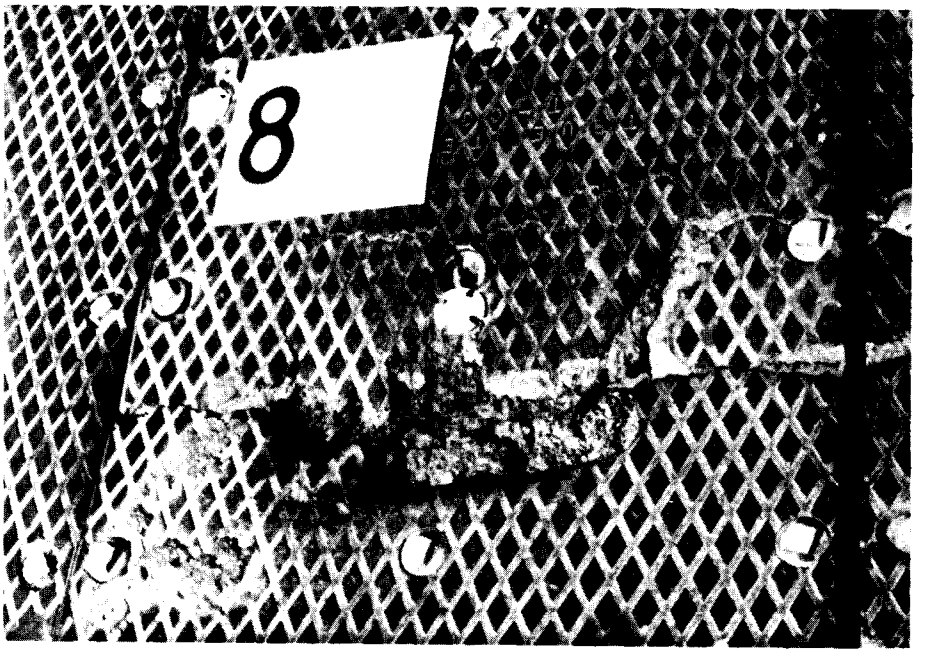


FIGURE 15c

Close up view of True Temper crossing in Baton Rouge showing an extensively damaged panel

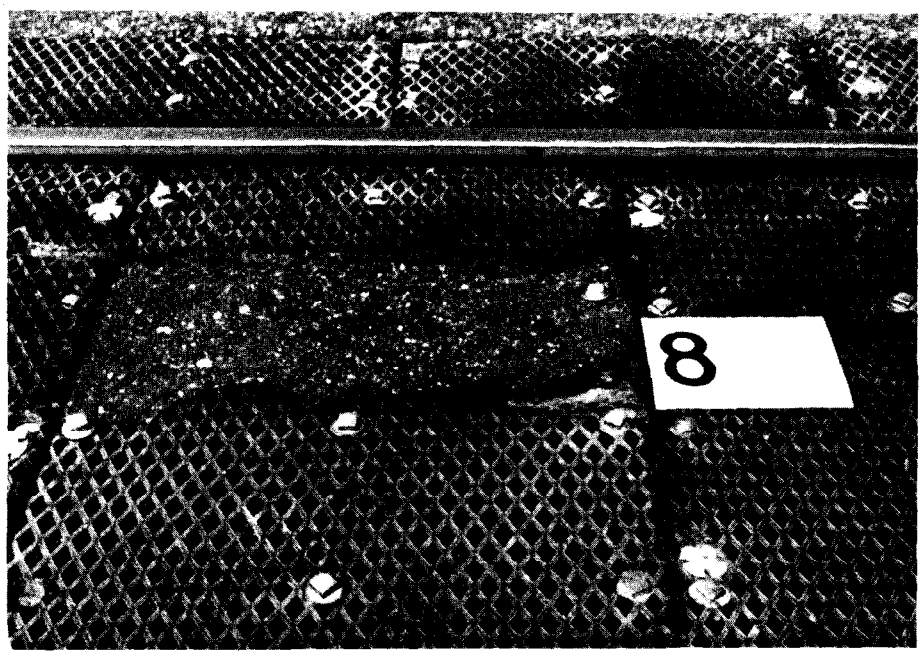


FIGURE 16

Close up view of True Temper crossing in Baton Rouge showing an asphalt filled pot-hole in a broken panel

No. 9

State Project No. 426-01-09

True Temper High Density Polyethylene Crossing

La. 3089 at Donaldsonville

This crossing is located on both the east and the westbound lanes of La. 3089, approximately 0.5 mile south of La. 18, at the site of a spur serving the C. F. Industries plant, near Donaldsonville, Louisiana. At the subject location, La. 3089 is a four-lane, divided rural highway with a posted maximum highway speed of 55 mph and an estimated 1979 ADT of 5,610, including 20% trucks.

The crossing was installed in September, 1976, using linear polyethylene panels (structural foam) manufactured by Oneida General Corporation of Ogden, Utah, and having the trade name True Temper (Figure 17). This spur line serves two (2) rail movements per day at an estimated maximum rail speed of 10 mph.

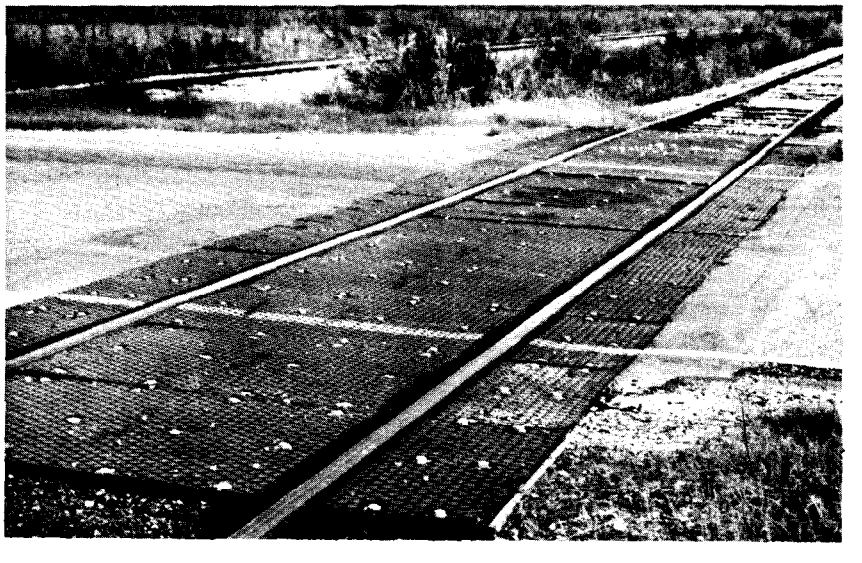


FIGURE 17

December, 1976, photograph showing True Temper, Oneida crossing in Donaldsonville after 3 months of service
Note the cracks which have already developed in the panels.

A routine field inspection in late 1976 revealed that the crossing was beginning to show signs of deterioration. Surface cracking, apparently due to weathering, was beginning to develop in almost all of the cellular polyethylene panels. A small rectangular piece of one of the several badly cracked panels was already broken off and lying in one of the flangeways.

By February, 1977, several badly deteriorated panels had been removed and replaced. Also noted during the February inspection was a loose rail on the eastbound installation and the beginning stages of a general subsidence of the entire crossing.

The July, 1977, inspection revealed that the crossing had steadily worsened. Plywood shims had begun to disintegrate and work themselves out from under the pads. Most of the pads making up the crossing had become loose by this time.

By 1978, the crossing had completely failed, and it was removed and replaced with Goodyear's Super Cushion rubber panels (Figure 18). Inspection and evaluation of this crossing were terminated as of December, 1979, and it is no longer considered experimental.

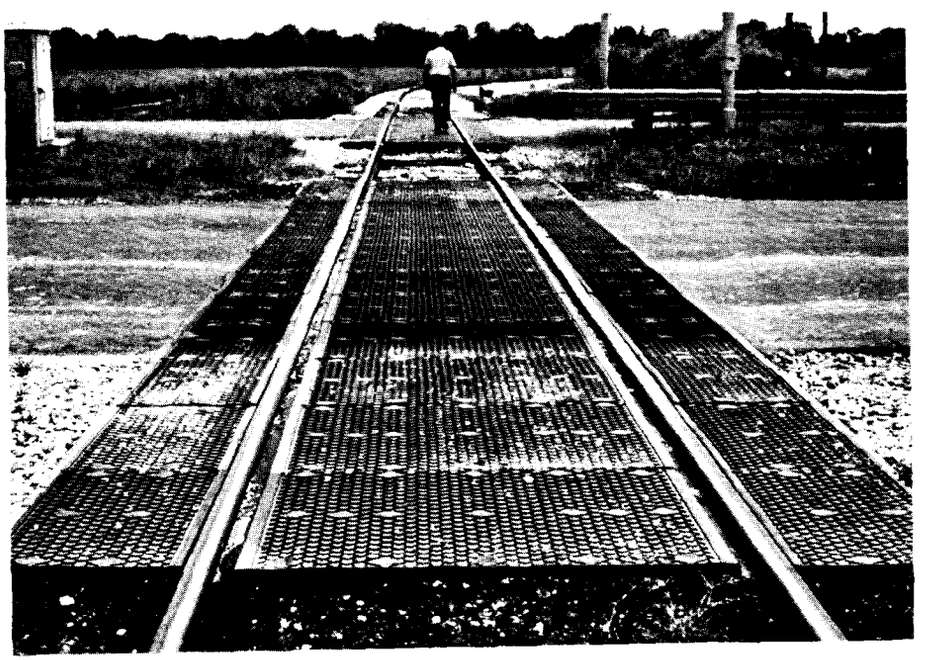


FIGURE 18

December, 1979, photograph showing the Donaldsonville crossing after replacement with Goodyear rubber crossing

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

10A. SAF & DRI Rubber Panel Crossing

This crossing is located on La. 59, approximately four (4) miles north of I-12, in Abita Springs, Louisiana. At this location, La. 59 is classified as an urban street which carries two (2) lanes of opposing traffic at a posted maximum speed of 25 mph with an estimated 1979 ADT of 2,540, including 10% trucks.

This single-track crossing is part of a main line which serves two freight trains per week at an estimated rail speed of 25 mph.

The crossing utilizes SAF & DRI rubber panels manufactured by Structural Rubber Products Company of Springfield, Illinois. The installation was completed on July, 1977, with no major construction problem observed or reported.

After nearly three (3) years of service, the SAF & DRI crossing is in excellent physical condition with excellent rideability (Figure 19).

Annual inspection of the crossing will continue.

FIGURE 19

SAF & DRI rubber crossing at Abita Springs remains in excellent condition after nearly three years of service

10B. GEN-TRAC Rubber Panel Crossing

This crossing is located on La. 59, approximately one (1) mile north of I-12, near Abita Springs, Louisiana. At this location, La. 59 is classified as two-lane, rural road which carries two (2) lanes of opposing traffic at a posted maximum highway speed of 55 mph with an estimated ADT of 2,540, including 10% trucks.

This single track crossing is part of a main line which serves two freight trains per week at an estimated maximum rail speed of 25 mph.

The crossing utilizes Gen-Trac rubber panels manufactured by General Tire and Rubber Company of Wabash, Indiana. The installation was completed in July, 1977, with no major construction problem observed or reported.

After nearly three (3) years of service, the Gen-Trac installation is attractive, smooth riding and exhibits an excellent overall physical condition (Figure 20).

Annual inspection of this crossing will continue.

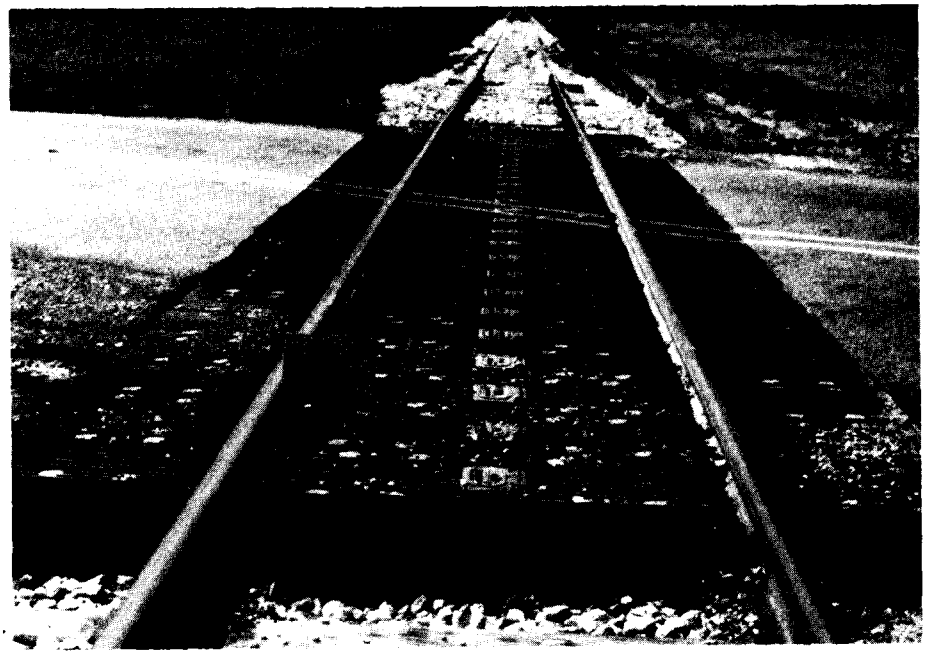


FIGURE 20

Gen-Trac rubber crossing at Abita Springs exhibits excellent overall condition after nearly three years of service

No. 11
State Project No. 16-01-12(31)
Federal-Aid Project No. F-U-02-06(001)
Goodyear Rubber Crossing
U.S. 165 at Monroe

This crossing is located on both the north and southbound lanes of U.S. 165, approximately 2.7 miles north of U.S. 80, in Monroe, Louisiana. At the subject location, U.S. 165 is a four-lane, divided urban street with a wide median and a posted maximum speed of 35 mph. It has an estimated 1979 ADT of 17, 250, which includes 10% trucks. The crossing was completed in May, 1977, and utilizes Goodyear's Super Cushion rubber panels. It crosses U.S. 165 at a very sharp angle with a total length of 738 feet which includes 42 feet for a median cross-over at Loop Road.

This single track serves six (6) rail movements per day at an estimated rail speed of 15 mph.

With the exception of some minor damage to header boards and the asphalt filler (Figures 21 and 22), the crossing remains in good physical condition and exhibits an excellent riding quality.

Annual inspection and evaluation of the crossing will continue.

FIGURE 21

Goodyear rubber crossing installation on the Southbound lanes of U.S. 165 in Monroe

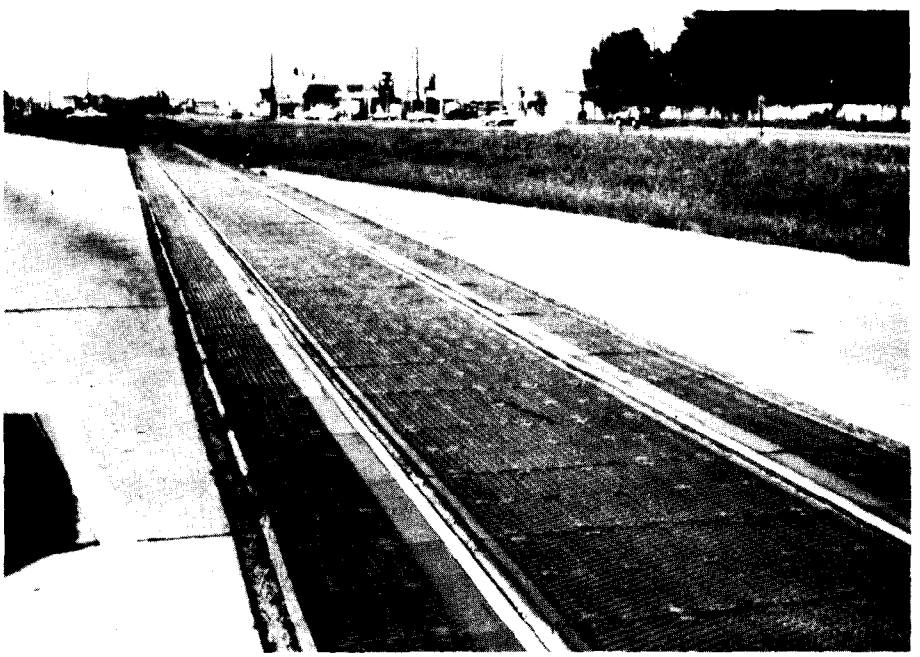


FIGURE 22

Goodyear rubber crossing installation on the Northbound lanes of U.S. 165 in Monroe

No. 12
State Project No. 7-02-51(32)
Federal-Aid Project No. U-15-02(001)
Goodyear Rubber Crossing
La. 49 at Kenner

This triple-track crossing is located on La. 49 (William's Boulevard), approximately 0.1 mile south of U.S. 61 (Airline Highway), in Kenner, Louisiana. At the subject location, La. 49 is a four-lane divided urban street with a posted maximum roadway speed of 40 mph and an estimated 1979 ADT of 12,920, including 12% trucks.

There are three sets of tracks at this crossing (Figure 23). The main and passing lines intersect the street at right angles while the spur line crosses it at an slight curvature. The tracks serve a total of nine (9) freight trains per day at an estimated maximum rail speed of 20 mph.

FIGURE 23

General view of triple track Goodyear rubber crossing at Kenner

The installation was completed in March, 1977, utilizing Goodyear's Super Cushion rubber panels. There were no major construction problems observed or reported. It should be noted that the "saw tooth" pattern on the west end of the spur line (Figure 24) is a result of the use of standard rectangular rubber panels on a set of tracks with slight curvature.

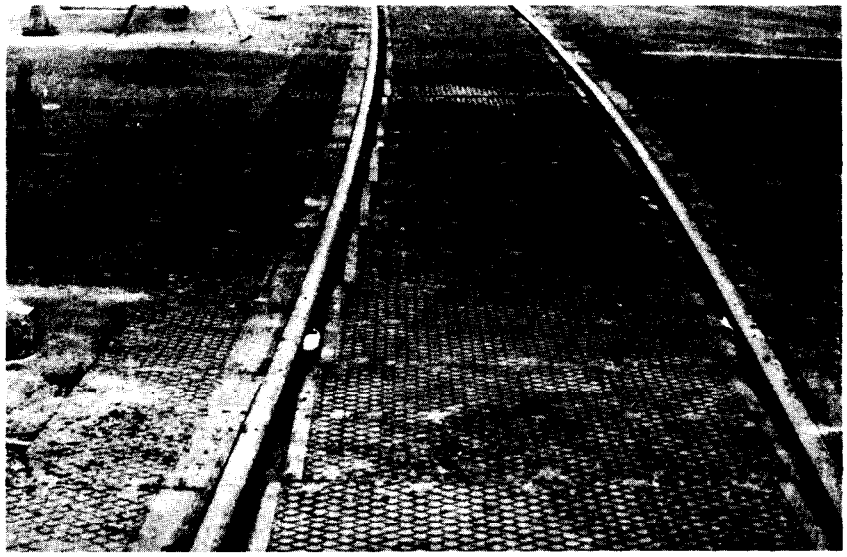


FIGURE 24

Saw tooth pattern on the west end of curving spur line at Kenner produced by the use of standard rectangular Goodyear rubber panels

Our 1979 inspection reveals that there are some loose panels which need to be tightened; otherwise, the crossing exhibits a good riding quality and an overall good physical condition.

Annual inspection and evaluation of the crossing will continue.

No. 13
State Project No. 427-01-05(32)
Federal-Aid Project No. U-62-01(003)
Goodyear Rubber Crossing
La. 3132 at Shreveport

This crossing is located on La. 3132, approximately 0.5 mile south of La. 1, in Shreveport, Louisiana. At the subject location, La. 3132 is a rural, four-lane divided highway with a narrow median and a posted maximum highway speed of 45 mph. The estimated 1979 ADT is 9,400, including 10% trucks.

This single track crossing is 99 feet long, perpendicular to the centerline, and continues through the median of the highway (Figure 25). It was completed in February, 1978, with Goodyear's Super Cushion rubber panels. The tracks on this crossing are part of a main line which serves six (6) freight trains per day at an estimated maximum rail speed of fifty (50) mph.

FIGURE 25

General view of Goodyear rubber crossing at Shreveport after two years of service. The crossing remains in good condition with excellent rideability.

After two years of service, the crossing is in good general physical condition with excellent rideability. The only problem observed was at the header boards and the relief joints between the field-side panels and the approaching concrete pavement (Figure 26). The asphaltic filler material had sunk approximately one (1) inch and broken out in some areas. Rehabilitation of the aforementioned relief joints should remedy the problem.

Periodic inspection and evaluation of this installation will continue.

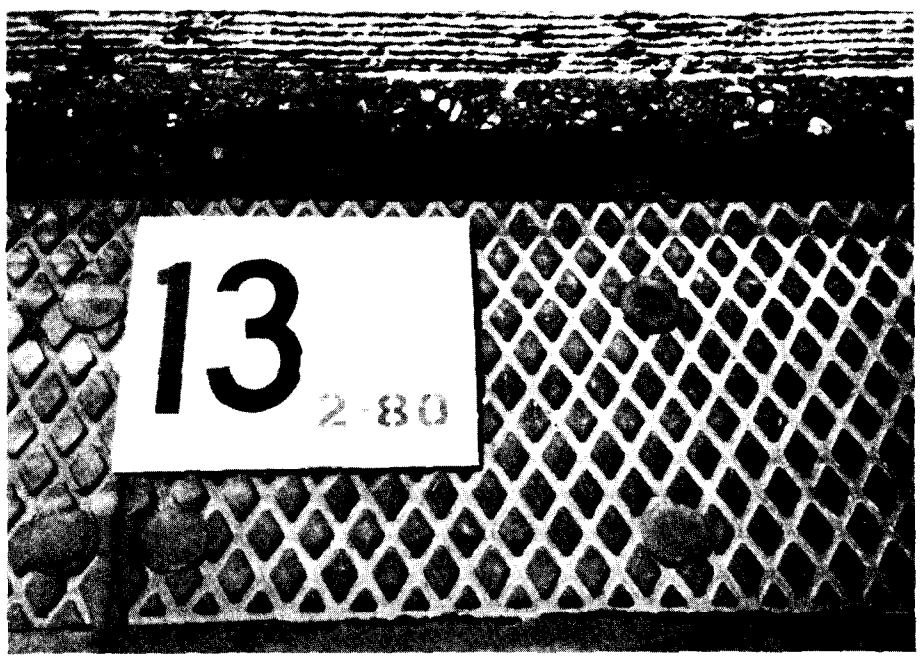


FIGURE 26

Close up view of relief joint at the juncture of field-side rubber panels and the approaching concrete pavement Note the damaged and sunken header board.

No. 14
State Project No. 424-05-27
Federal-Aid Project No. RF-F-01-07(004)
Goodyear Rubber Crossing
La. 83 at Baldwin

This double-track crossing is located on La. 83, approximately 0.2 mile southwest of La. 182, in Baldwin, Louisiana. At this location, La. 83 is a four-lane, divided rural road with a posted maximum highway speed of 55 mph and an estimated 1979 ADT of 1,370, including 7% trucks.

The tracks at the subject location serve a total of twenty (20) rail movements per day, which include one passenger and eleven freight trains. The remaining eight rail movements are for switching purposes. The estimated maximum rail speed is 60 mph for passenger trains and 40 mph for freight trains.

The crossing was completed in June, 1978, using Goodyear's Super Cushion rubber panels for surfacing material. With the exception of minor damage to header boards and the sinking of the asphalt mix in the relief joints at the juncture of field-side panels and the approaching concrete pavement (Figure 27), the crossing remains in good physical condition with excellent rideability (Figure 28), however, there is a loose rail at the crossing which should be tightened as soon as possible.

Annual inspection and evaluation will continue.

FIGURE 27

General view of double-track Goodyear rubber crossing in Baldwin. Note the sunken asphalt filler in the relief joint.

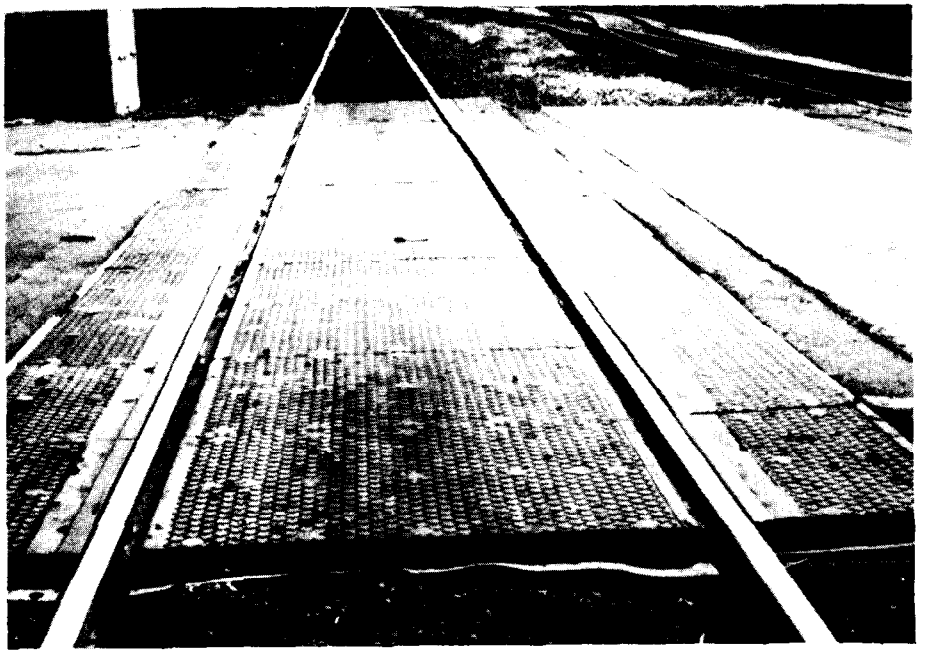


FIGURE 28

Goodyear rubber crossing in Baldwin remains in good condition after nearly two years of service

No. 15

State Project No. 148-01-19

Federal-Aid Project No. UG-59-04(003)

Goodyear Rubber Crossing

La. 47 at Chalmette

This crossing is located on La. 47 (Paris Road), approximately 0.1 mile south of La. 46 in Chalmette, Louisiana. At this location, La. 47 is a four-lane, undivided urban road with a posted maximum highway speed of 35 mph and an estimated 1979 ADT of 3,700, which includes 25% trucks.

There are two (2) sets of tracks at the subject location; the main line serves one (1) freight train per day at an estimated speed of 10 mph, while the spur line is seldom used.

The crossing is 96 feet long at the main line and 138 feet at the spur line. They were both completed in February, 1978, utilizing Goodyear's Super Cushion rubber panels for surfacing material.

After two (2) years of service, the crossing remains in excellent overall physical condition (Figures 29 and 30) and exhibits an excellent riding quality.

Annual inspection and evaluation of this experimental installation will continue.

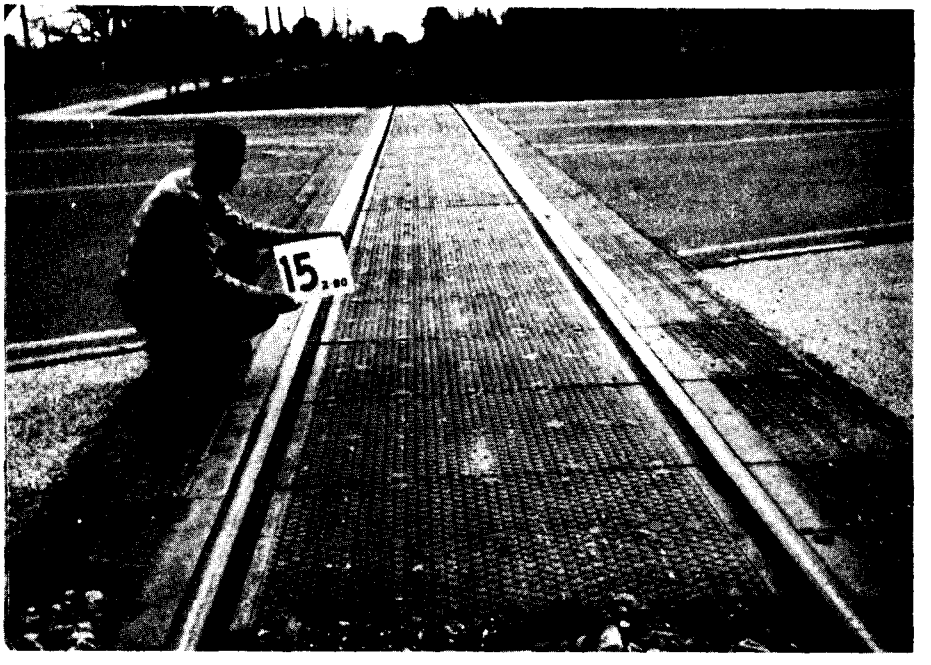


FIGURE 29

Goodyear rubber crossing (main line)
at Chalmette after two years of service

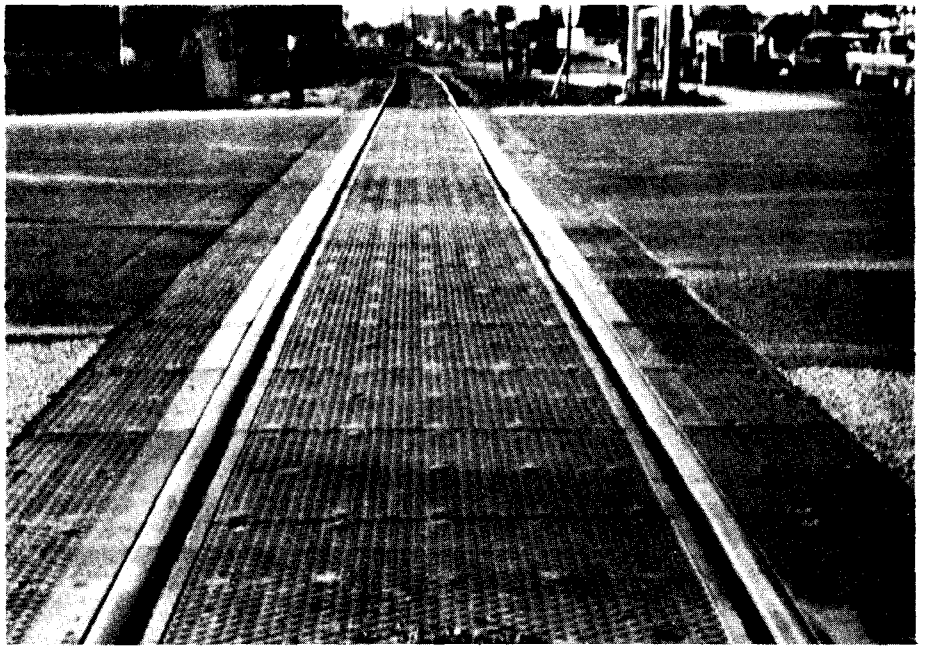


FIGURE 30

Goodyear rubber crossing (main line)
at Chalmette after two years of service

No. 16A and 16B
State Project No. 832-25-02
Federal-Aid Project No. RRO-000-S(002)
La. 1029 at Walker (True Temper, T-Core) Crossing - No. 16A)
La. 1029 at Walker (Cobra) Crossing - No. 16B)

This double-track crossing is located on La. 1029 (Corbin Street), approximately 0.2 mile north of U.S. 190, in Walker, Louiaiana. At this location, La. 1029 is a rural road carrying two lanes of opposing traffic at a posted maximum speed of 40 mph and an estimated 1979 ADT of 570, including 10% trucks.

The tracks at the subject crossing are part of main lines which serve a total of six (6) rail movements per day at an estimated maximum rail speed of 25 mph.

Each crossing is thirty three (33) feet long and was completed in May, 1979, using linear high density polyethylene modules (structural foam) manufactured by Oneida General Corporation of Ogden,Utah. Crossing No. 16A utilizes panels which were distributed by the Railway Appliance Division of True Temper Corporation under the trade name True Temper, T-Core. Panels used on crossing No. 16B were distributed by Railroad Friction Products Corporation under the trade name Cobra Crossing Material (Figure 31).

The November, 1979, inspection revealed minor deterioration of asphaltic filler material adjacent to the T-Core field-side panels (Figure 32). However, no major problems pertaining to crossing surface material were observed.

After one year of service, the performance of the True Temper, T-Core and the Cobra crossings located on this low-traffic, rural road were rated as good and excellent, respectively (Figures 33 and 34). Annual inspection of the crossing will continue.

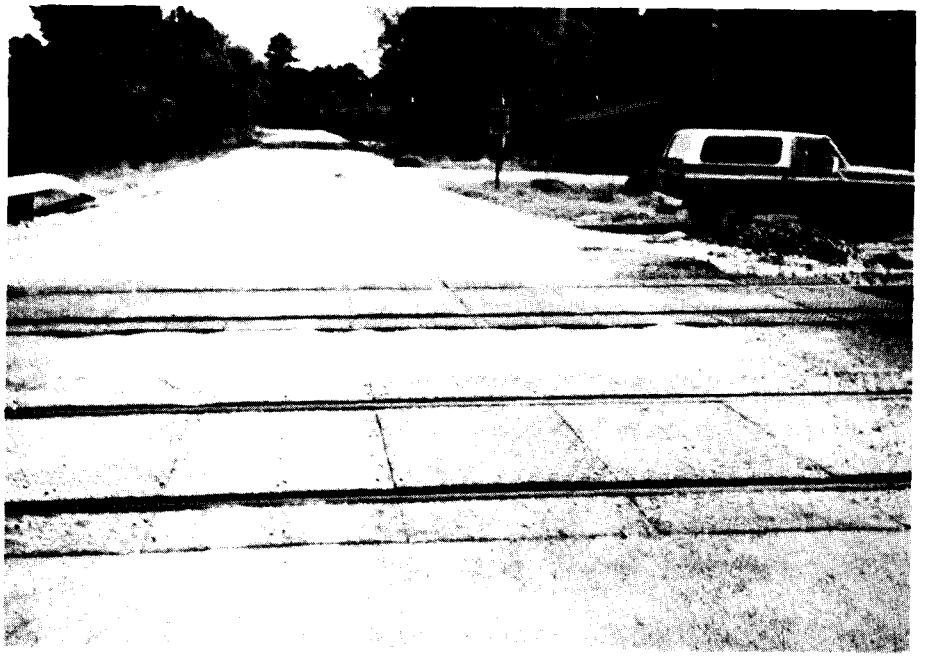


FIGURE 31

True Temper, T-Core crossing (foreground) and Cobra crossing (background) in Walker

FIGURE 32

True Temper, T-Core, crossing in Walker Note the deteriorating asphalt mix adjacent to the field-side panels.

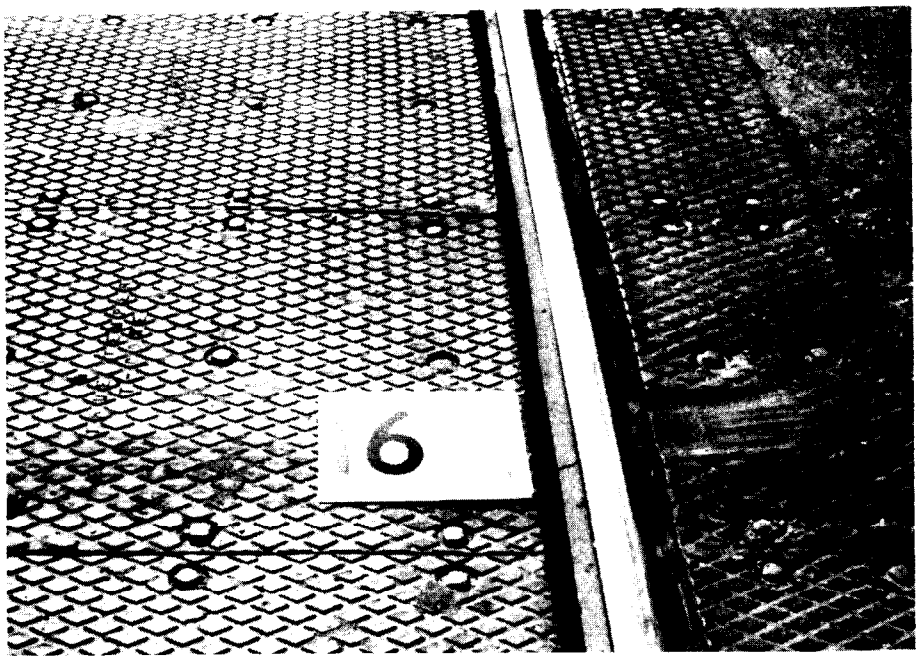


FIGURE 33

Close up view of [illegible] Tamper, T-Core crossing in Walker

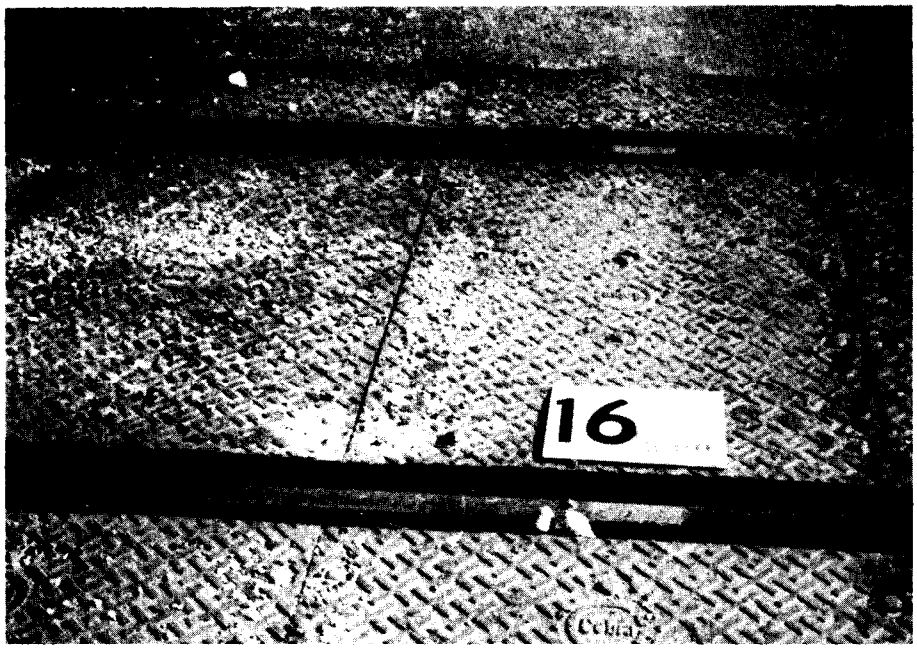


FIGURE 34

Close up view of Cobra crossing in Walker

No. 17A and 17B
State Project No. 853-01-07
Federal-Aid Project No. RRO-000-S(001)
La. 1054 at Greenlaw (True Temper, T-Core Crossing - No. 17A)
La. 1054 at Greenlaw (Cobra Crossing - No. 17B)

This double-track crossing (Figure 35) is located on La. 1054, approximately 0.2 mile east of La. 51, at Greenlaw, Louisiana. At this location, La. 1054 is a rural road carrying two lanes of opposing traffic at a posted maximum speed of 55 mph and an estimated 1979 ADT of 550, including 10% trucks.

FIGURE 35

True Temper, T-Core crossing (foreground) and Cobra crossing (background) in Greenlaw

The tracks at the subject crossing are New Orleans to Chicago main lines which serve a total of twenty (20) rail movements per day, including two (2) passenger trains, twleve (12) freight trains and six (6) switchings. Estimated maximum rail speed at the crossing is 79 mph for passenger trains, 60 mph for freight trains and 25 mph for switching.

Each crossing is thirty-three (33) feet long and was completed in April, 1978, using linear high density polyethylene modules (structural foam) manufactured by Oneida General Corporation of Ogden, Utah. Crossing no. 17A utilizes True Temper, T-Core panels (Figure 36), while crossing no. 17B was constructed with Cobra crossing material (Figure 37).

The November, 1979, inspection revealed some hairline cracks in the T-Core modules (Figure 38), additionally, some panels and skid plates sustained damage caused by dragging railroad equipment. There were also some loose T-Core panels which required tightening. There were no major problems noted at the Cobra crossing site except for minor sinking of the asphalt mix along the flangeways.

After two (2) years of service, the general physical condition and the rideability of both T-Core and Cobra grade crossings located on this low-traffic, rural road were rated as good and excellent, respectively. Periodic evaluation of the crossing will continue.

FIGURE 36

True Temper, T-Core crossing in Greenlaw after two years of service

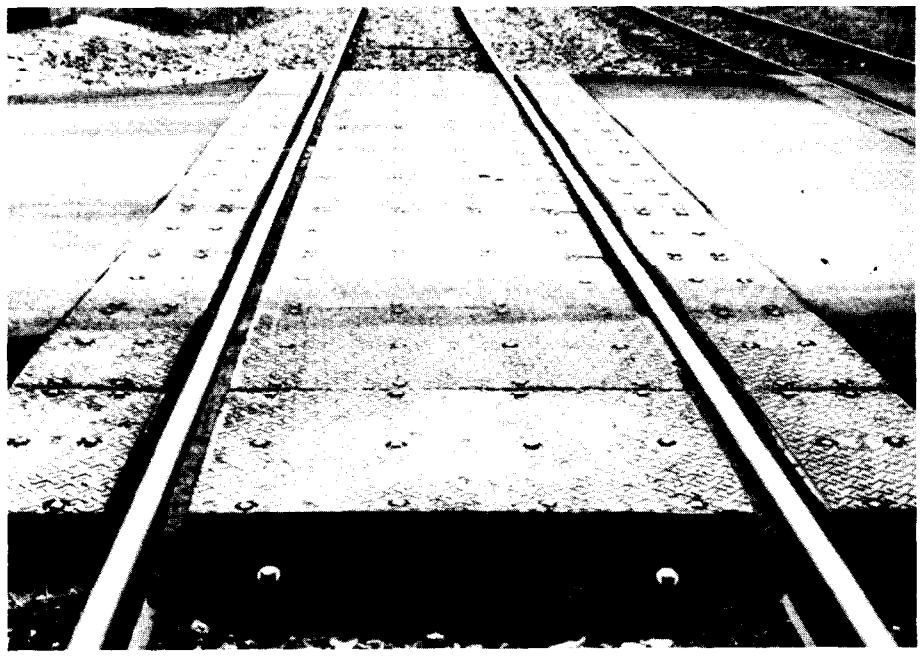


FIGURE 37

Cobra crossing in Greenlaw after two years of service

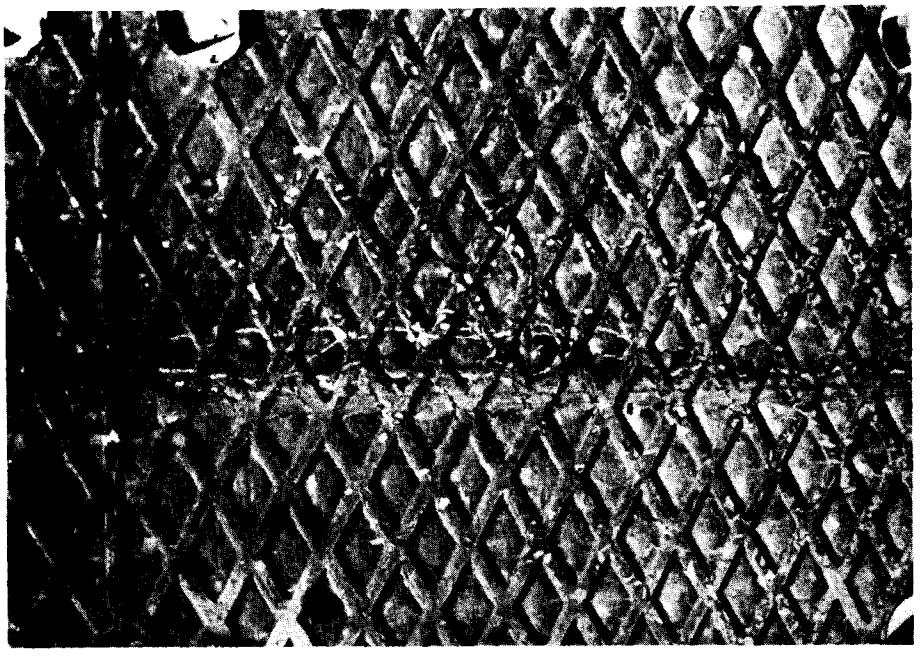


FIGURE 38

Close up view of True Temper, T-Core crossing in Greenlaw showing cracked polyethylene modules

No. 18
State Project No. 853-09-07
Federal-Aid Project No. OSG-0053(003)
SAF & DRI Rubber Crossing
La. 1064 at Natalbany

This triple-track crossing (Figures 39 and 40) is located on La. 1064 approximately 0.6 mile east of U.S. 51, in Natalbany, Louisiana. At this location, La. 1064 is a rural road carrying two lanes of opposing traffic at a posted maximum highway speed of 55 mph and an estimated 1979 ADT of 2,610, including 10% trucks.

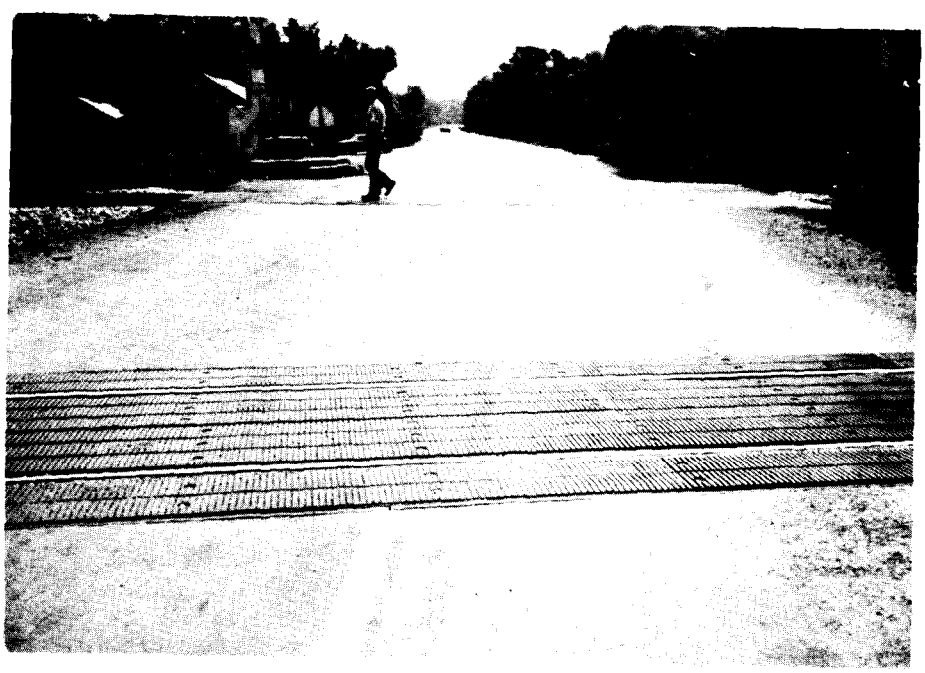


FIGURE 39

General view of SAF & DRI triple-track rubber crossing in Natalbany

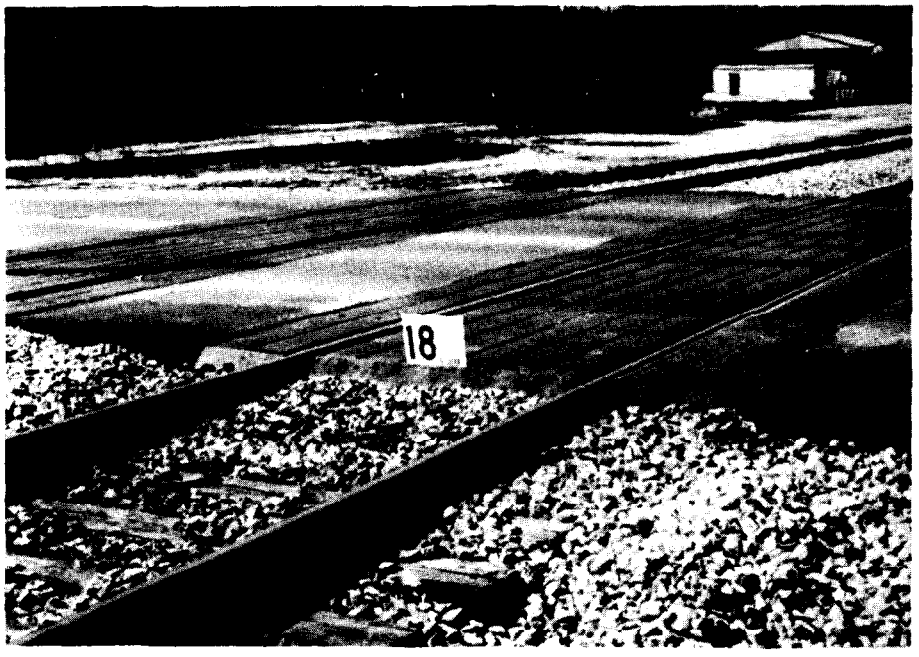


FIGURE 40

SAF & DRI triple-track rubber crossing in Natalbany after one and half years of excellent performance

Of the three sets of tracks, two are main lines and one is a spur line They serve a total of fifteen (15) trains per day: two (2) passenger trains at an estimated maximum rail speed of 79 mph and thirteen (13) freight trains at 60 mph.

Each crossing is thirty-three (33) feet long and was completed in October, 1978, using SAF & DRI rubber panels, manufactured by Structural Rubber Products Company of Springfield, Illinois. There were no problems observed or reported during construction. Since the installation, however, one skid plate and one header board have been slightly damaged (Figure 41). After one and half years of service, the crossing remains in excellent overall physical condition with good riding quality (Figure 42). Inspection and evaluation of the installation will continue.

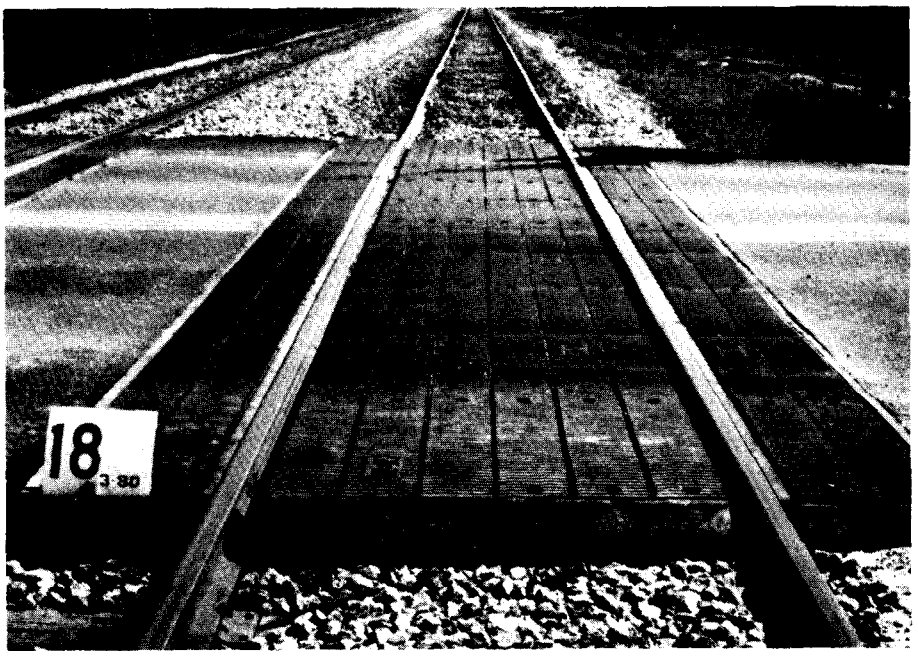


FIGURE 41

Close up view of SAF & DRI rubber crossing in Natalbany

FIGURE 42

SAF & DRI rubber crossing in Natalbany
remains in excellent physical condition after one and half years of service

No. 19
State Project No. 853-33-09
Federal-Aid Project No. OSG-0053(002)
Gen-Trac Rubber Crossing
La. 1065 at Independence

This double-track crossing (Figure 43) is located on La. 1065 (5th Street), approximately 0.1 mile east of U.S. 51, in Independence, Louisiana. At this location, La. 1065 is a rural road carrying two lanes of opposing traffic at a posted maximum speed limit of 30 mph and an estimated 1979 ADT of 1220, including 10% trucks.

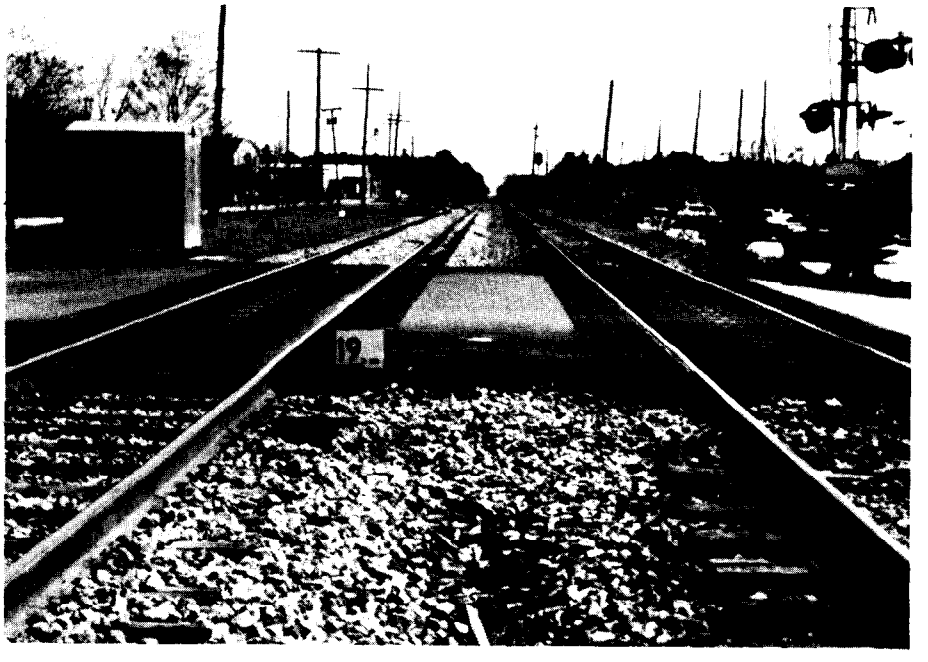


FIGURE 43

Gen-Trac rubber crossing installation in Independence, Louisiana

The tracks at the subject crossing are part of main lines which serve a total of fifteen (15) railroad movements per day, including two (2) passenger trains and thirteen (13) freight trains. Estimated maximum rail speed at the crossing is 79 mph for passenger trains and 60 mph for freight trains.

Each crossing is forty-two (42) feet long and was completed in April, 1978, using steel-reinforced rubber-panel crossing material with the trade name Gen-Trac, manufactured by the General Tire and Rubber Company of Wabash, Indiana.

After two (2) years of service (Figures 44 and 45), the crossing remains in excellent condition with excellent rideability.

FIGURE 44

General view of Gen-Trac installation in Independence

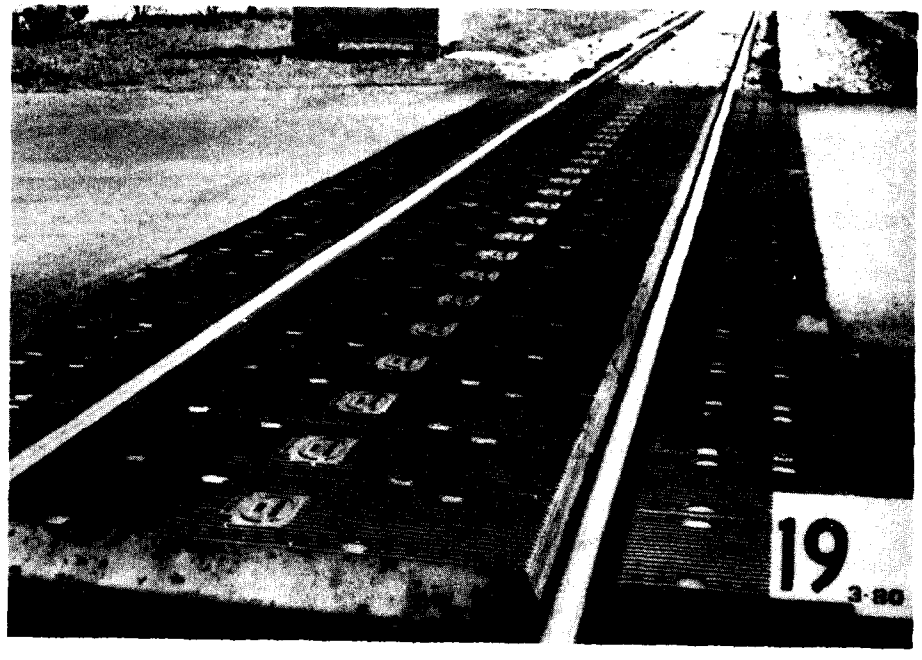


FIGURE 45

After two years of service, Gen-Trac rubber crossing remains in excellent condition in Independence, Louisiana

No. 20
State Project No. 4-32-16
Federal-Aid Project No. RRP-6113(001)
Parkco Rubber Grade Crossing
U.S. 90 at Lafayette

This double-track crossing is located on U.S. 90 (Mudd Street), approximately 0.2 mile 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 1979 ADT of 12,480, including 7% trucks.

The crossing (Figure 46) includes one main and one side line; it serves one (1) passenger and fourteen (14) freight trains per day at an estimated maximum railroad speed of 25 mph.

FIGURE 46

Double-track Parkco rubber crossing under construction in Lafayette

Each crossing in this double-track installation is eighty-four (84) feet long and was completed in March, 1980, using steel reinforced rubber panels with the trade name Parkco (Figure 47), manufactured and distributed by Park Rubber Company of Lake Zurich, Illinois. The Parkco crossing material has the unique features of arched steel reinforcement plate in each panel and the fact that the panels are not individually fastened to the wooden shims or the crossties underneath. Instead, the panels are held together by means of eight (8) post-tensioned steel rods which pass through precast longitudinal channels, two (2) per panel (Figure 48).

FIGURE 47

Close up view of Parkco rubber panel crossing under construction in Lafayette

The installation of the Parkco pads was very quick and simple. There were no major problems encountered during construction except that the wooden shims were not all installed level and, therefore, there were gaps between the bottom of the panels and the top surface of the shims (Figure 49). The problem was brought to the attention of the manufacturer's representative at the site who said that the Parkco system had been designed to act as a bridge, and panels did not have to be in full contact with the individual supporting wooden shims. Also, the creosoted pine header boards adjacent to the field-side panels were slightly damaged by the steel wheel roller during subsequent asphalt patching operation.

FIGURE 48

Parkco rubber crossing installation in Lafayette showing the positioning of a panel on wooden shims.

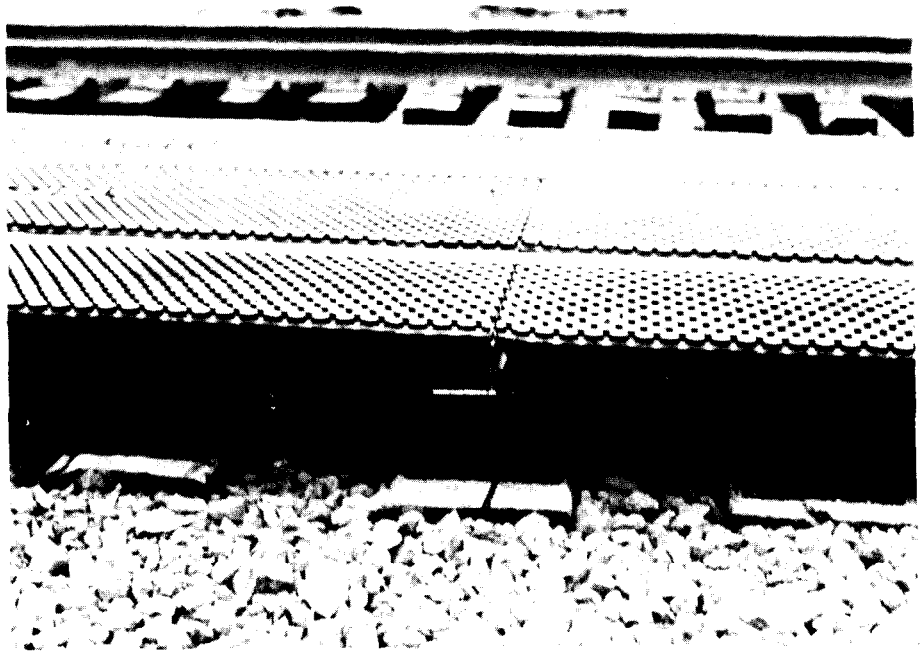


FIGURE 49

Parkco panels sitting on top of wooden shims
Note the gap between the panels and the shims.

It should be noted that the work at this grade crossing included Type B subgrade treatment consisting of excavation and removal of the existing subgrade to the required depth, placement of plastic filter cloth, construction of 12-in. portland cement concrete subbase, installation of two (2) 6-in. perforated pipes to facilitate drainage and placement and compaction of 8-in. ballast, all in accordance with La. DOTD Standard Plan R-M-42 (see Appendix B, page 79) and in accordance with Supplemental Specification for Subbase Treatment at Railroad Highway Grade Crossings dated December, 1979 (see Appendix D, page 91).

As of this writing, the aforementioned experimental railroad crossing (Figure 50) has not been opened to traffic due to construction of another crossing nearby. Performance evaluation will begin as soon as the road has been opened to traffic.

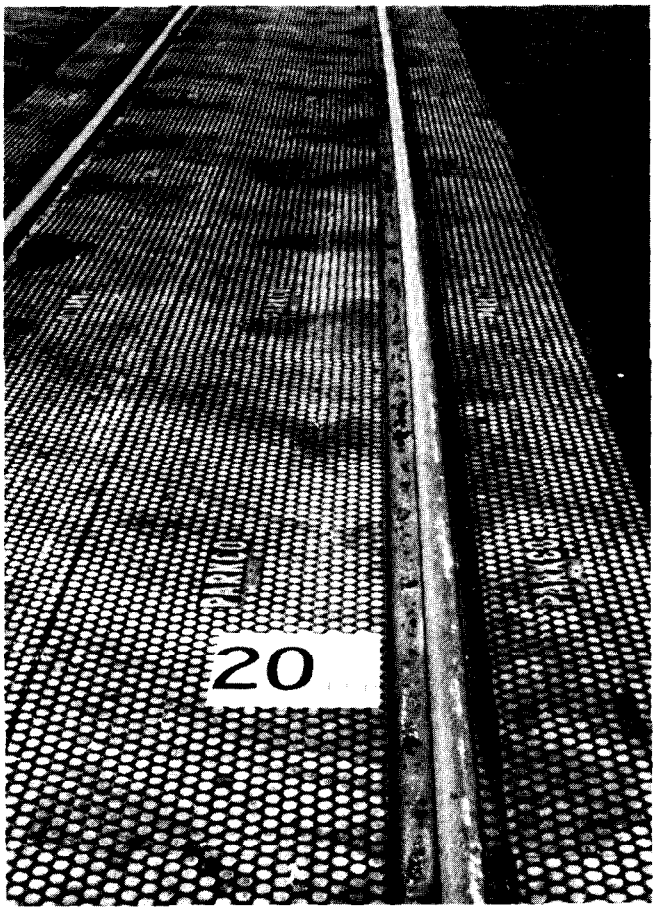


FIGURE 50

Completed Parkco rubber crossing installation in Lafayette before it was opened to vehicular traffic

SUMMARY OF EVALUATIONS

A review of the preceding performance evaluations indicate the following:

1. Performance evaluations of eleven experimental Goodyear Super Cushion rubber-panel crossings, over a period which spans from two years for the most recent installation to approximately ten years for the oldest, indicated good-to-excellent overall performance under varying traffic conditions.

2. Two SAF & DRI and two Gen-Trac experimental railroad-highway grade crossings, installed in low-traffic rural roads (ADT 1220 to 2610) during the years 1977 and 1978, have exhibited excellent rideability and remain in excellent physical condition to date without any signs of deterioration.

3. Oneida's True Temper linear polyethylene (structural foam) panels, installed at two locations during the years 1975 and 1976, deteriorated rapidly within two to three years, requiring extensive repair and/or replacement. However, during the past two years two True Temper, T-Core and two Cobra crossings installed in low-traffic, rural roads (ADT 570) have performed exceptionally well to date without any sign of major problems.

4. The precast concrete slab crossing FAB-RA-CAST which was installed in 1974 began to fail within six months after installation and had to be removed and replaced in 1977, as per request of its manufacturer. In 1979, the crossing experienced complete failure again and had to be removed and replaced with a temporary timber-asphalt crossing.

5. The performance of a sectional treated timber crossing, evaluated for comparison purposes, was rated as good after four years of service. The good performance is thought to be primarily due to a well drained and a well compacted subgrade.

SUMMARY OF EVALUATIONS (CONTINUED)

6. In April, 1980, Parkco rubber-crossing material was experimentally installed on a double-track crossing on U.S. 90 at Lafayette. This was the first installation of this material on the state highway system. Installation was quick, simple and without major problems. Performance evaluation of this crossing will begin as soon as the road is opened to vehicular traffic.

7. Regardless of the type of crossing material used, the header boards and the asphaltic mix used to fill the relief joints between field-side panels and the approaching pavement were, in many instances, damaged, deteriorated and/or sunken causing a bump effect on either side of the crossing.

8. Field observations indicate that regardless of the type of crossing material used, the performance and durability of a grade crossing is directly related to adequate preparation of the track structure including subbase treatment and adequate drainage.

9. The quality of ride and the general physical condition of some of the experimental crossings were adversely affected by loose rails, panels, shims and/or crossties. It was found that bolted rails had become loose and begun rocking and pivoting around the joint, while welded rails remained solid and functional as intended.

10. Observation of installation techniques during construction indicated that it is no more difficult to install high-type railroad grade crossings that it is to construct conventional timber crossings.

RECOMMENDATIONS

1. It is recommended that more attention be directed towards adequate preparation of the track structure including subbase treatment and adequate drainage before installing a new railroad-highway grade crossing surface. Efforts should be made to use Type B subbase treatment on all new or reconstructed crossings if possible (see Appendix D, page 91).

2. It is recommended that more attention be directed towards installation of header boards and construction of relief joints adjacent to the field-side panels. Asphaltic mix used to fill the gaps should be of high quality and should be throughly compacted to keep it from sinking and/or breaking out.

3. It is also recommended that district maintenance forces periodically inspect all crossings, revitalize the relief joints, and add asphaltic filler mix if necessary. Railroad maintenance crews should also check the crossings under their jurisdiction to remedy the problem of loose rails, panels, shims, crossties, etc.

4. Finally, it is recommended that the experimental installation and evaluation of railroad highway grade crossing materials be continued until longer range performance information on various crossing materials is obtained in order to develop alternate crossing requirements.

APPENDIX A

DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT OFFICE OF HIGHWAYS	EDSM NO. II.2.1.2

ENGINEERING DIRECTIVES AND STANDARDS MANUAL

VOLUME	II	DATE	November 1, 1979
CHAPTER	2	SUBJECT	Construction of At-Grade Railroad-Highway Crossings
SECTION	1		
DIRECTIVE	2		

1. BACKGROUND. Louisiana Revised Statute 45:841 provides, among other things, that "The owner. . . of any railroad. . . crossing any public road. . . to construct and maintain a suitable and convenient crossing over such public road. . . in accordance with the standard specifications furnished by the Department of Highways. . .;" also, Louisiana Revised Statute 48:382 provides, among other things, that ". . . the owner of the facility or utility shall provide a means of crossing the highway which, in the opinion of the Chief Engineer, is appropriate and adequate. . .".

   In view of a past history of highway user dissatisfaction in at-grade railroad-highway crossings, in general, and a lack of uniformity in at-grade crossing construction among the railroads, the Department conducted a study of a rubber pad type of at-grade railroad-highway crossing construction. The study culminated in a Highway Research Report "Evaluation of Railroad Rubber Pad Crossings", dated May, 1972.

   The Board of Highways, on September 7, 1972, recognizing the need for a policy decision on the above subject and acting under authority vested by Louisiana Statutes above, adopted a "Railroad-Highway Grade Crossing Policy".

2. POLICY. Therefore, the DOTD, Office of Highways' policy will be as follows:

   (a) The Office of Highways will require use of rubberized crossings of railroads on all new construction where ADT is 1000 vpd or over, and the Department is responsible for all costs. Where ADT is less than 1000 vpd and the crossing is not subject to vehicles stopping on the crossing, full width timber crossings shall be used, except that if the crossing is at an angle of 45 degrees or less, measured from the centerline of the highway, rubberized crossing may be used. If the crossing is subject to vehicles stopping on the crossing, rubberized crossings shall be used.

(b) All permits by railroad companies to cross hard surfaced highways will require rubberized or timber crossings as outlined above.

(c) The Office of Highways will embark on a program of improving existing crossings. The railroad companies will be required to pay the equivalent of their current standard crossing. The Department will pay the difference between the standard crossing and the rubber or timber crossing as outlined above.

(d) Under special conditions and upon approval of the Chief Engineer, concrete crossing may be used in lieu of the rubberized or timber crossings.

(1) Rubber Pad Type Railroad Grade Crossing

(a) The rubber (elastomeric) pad type of railroad grade crossing shall be used under either of the following conditions:

+ When highway ADT is 1000 vpd or over at the railroad highway crossing; or

+ When the crossing is subject to vehicles stopping on the crossing.

(b) The rubber (elastomeric) pad type of railroad grade crossing may be used in lieu of the other approved types of at-grade crossing construction when the railroad-highway crossing is at an angle of 45 degrees or less, measured from the centerline of the highway.

(c) The rubber (elastomeric) pad type of railroad grade crossing shall conform to Standard Plan RM-42 and to specifications therefor, see copy attached.

(d) In specifying rubber (elastomeric) pad railroad grade crossing the requirements under "General Requirements", hereinafter, shall be followed.

(2) Timber Panel Railroad Grade Crossing

(a) The timber panel railroad grade crossing shall be that designated in the Board of Highways' policy as full width timber crossing. Timber panel railroad grade crossing shall be used for all at-grade railroad-highway crossings where the highway ADT is less than 1000 vpd and where the crossing is not subject to vehicles stopping on the crossing.

(b) When the railroad-highway crossing is at an angle of 45 degrees or less, measured from the centerline of the highway, the engineer's discretion shall be used in designating timber panel railroad grade crossing in lieu of rubber pad railroad grade crossing.

(c) The timber panel crossing shall conform to Standard Plan RM-43 and to the specifications therefor, see copy attached.

(d) In specifying timber panel railroad grade crossing the requirements under "General Requirements", hereinafter, shall be followed.

(3) Concrete Railroad Grade Crossing - At the writing of this directive no acceptable standard concrete railroad grade crossing has been designated.

(4) General Requirements

(a) Railroad grade crossing shall extend for the full width of the highway to the edge of surfaced shoulders or a minimum of 3 feet outside the edge of traveled way or back of curbs. (See standard plan.)

(b) When applicable, the railroad grade crossing shall be constructed by the Railroad Company. The bituminous filler and the header shall be the railroad's responsibility; unless highway contract operations include placing of bituminous material, then the Project Engineer will negotiate for placing of bituminous material by the highway contractor against the header board. (See standard plan.)

(c) The edge of pavement and gutter and the crown on either side of the railroad crossing shall be adjusted to fit the grade of the railroad track by use of liberal transition curved surfaces. The height of any curb adjacent to railroad tracks shall be reduced to one (1) inch at a point of 4-feet from the near edge of grade crossing by standard transitions unless otherwise provided on the plans.

(d) Exceptions to this directive must be approved by the Chief Engineer.

3. OTHER ISSUANCES AFFECTED. This directive supersedes EDSM NO. II.2.1.2, dated January 1, 1977. All directives, memoranda or instructions issued heretofore in conflict with this directive are hereby rescinded.

4. EFFECTIVE DATE. This policy will become effective on November 1, 1979.

Dempsey D. White

DEMPSEY D. WHITE
CHIEF ENGINEER

APPENDIX B

LOUISIANA DEPARTMENT OF
TRANSPORTATION AND DEVELOPMENT
SUPPLEMENTAL SPECIFICATIONS

ELASTOMERIC RAILROAD GRADE CROSSING

DESCRIPTION: This work consists of constructing elastomeric railroad grade crossings at the locations shown on the plans, in accordance with plan details, the applicable requirements of the specifications of the American Railway Engineering Association (AREA), the railroad company and the following requirements.

The installer of the railroad grade crossing shall survey the site to insure that all components of the elastomeric assembly unit fit accurately, especially noting special pie-shaped units for curved rail crossing, as may apply.

MATERIALS:

The elastomeric assembly units furnished shall be equal in composition and quality to original samples which have been tested and approved by the Department's Materials Section. The elastomeric assembly consists of elastomeric units, creosote treated timber shims (as may apply), end plates, washers and plugs, steel washers, metal spikes and galvanized lag screws.

The crossing pads shall be of steel reinforced molded elastomer with an acceptable non-skid pattern on the riding surface. A manufacturer's analysis and certification shall be furnished stating the composition of the steel and elastomer used.

The aggregate ballast, track-ties, shims and neader boards, rails, plates and hardware used for construction or reconstruction of the crossing shall meet the requirements of the specifications of the AREA as approved by the railroad company.

CONSTRUCTION REQUIREMENTS: All work performed in the construction or reconstruction of the crossing prior to installation of the elastomeric unit shall be done in strict compliance with AREA standards of construction. The grade crossing subbase treatment shall be in accordance with the Department's Supplemental Specifications therefor. The aggregate ballast materials shall be compacted to such a degree that undue settlement will not occur after completion of the installation. Approved mechanical compaction methods shall be used for compaction.

Grade Elevation of tracks and crossing pads shall be a maximum of 1½" above finished highway grade as based on engineering judgment of soil conditions and condition of ballast in order to provide for subsequent settling under rail and highway traffic. Temporary asphaltic ramps shall be placed for use of highway traffic until settling of tracks and crossing pads have stabilized. The asphaltic ramps shall then be removed to provide a smooth riding surface through the grade crossing.

The elastomeric units shall be installed in accordance with the manufacturer's installation procedures.

The asphaltic filler material shall be standard hot or cold asphaltic mixture that is acceptable to the engineer. The material shall be properly compacted and the finished surface shall be level with the top of the existing pavement surface.

MEASUREMENT AND PAYMENT: When the Elastomeric Railroad Grade Crossing is a construction bid item, measurement and payment will be in accordance with the project special provisions.

APPENDIX C

SUPPLEMENTAL SPECIFICATIONS
TREATED TIMBER RAILROAD GRADE CROSSING

DESCRIPTION: This work shall consist of furnishing and constructing a treated timber railroad grade crossing at the locations shown on the plans in accordance with plan details, the applicable requirements of the specifications of the American Railway Engineering Association (AREA), the railroad company and the following requirements.

The installer of the railroad grade crossing shall survey the site to insure that all components of the sections fit accurately.

MATERIALS: The crossing sections shall be made of a fine-grained hardwood timber of red oak or gum. The gum shall be one of the following, stated in order of preference: (1) black gum, (2) tupelo gum, (3) sweet gum. If shims are used, they shall be of the same material.

All timber shall be treated with creosote or creosote coal-tar preservative in accordance with AREA specifications for the preservative treatment of wood with creosote, Chapter 17.

The aggregate ballast, track ties, shims and header boards, rails, plates and hardware used for the construction or reconstruction of the crossing shall meet the requirements of the specifications of the AREA as approved by the railroad company.

FABRICATION OF SECTIONS: The intermediate sections shall be in lengths which are multiples of the tie spacing used in the track.

The center sections of the crossing shall be of such width that two of them will make up that portion between the running rails, allowing sufficient flangeway opening.

The depth of the section shall be such that the top surface of the crossing will lie in the plane of the tops of the rails with the bottom of the section resting directly on the cross ties.

CONSTRUCTION REQUIREMENTS: All work performed in the construction or reconstruction of the crossing prior to the installation of the sections shall be done in strict compliance with AREA standards of construction. The grade crossing subbase treatment shall be in accordance with the Department's Supplemental Specifications therefor. The aggregate ballast materials shall be compacted to such a degree that undue settlement will not occur after completion of the installation. Approved mechanical compaction methods shall be used for compaction.

Grade Elevation of tracks and crossing pads may be a maximum of 1 1/2" above finished Highway grade as based on engineering judgement of soil conditions and condition of ballast in order to provide for subsequent settling under rail and highway traffic. Temporary asphaltic ramps shall be placed for use of highway traffic until settling of tracks and crossing pads have stabilized. The asphaltic ramps shall then be removed to provide a smooth riding surface through the grade crossing.

The sections shall be installed in accordance with the manufacturer's installation procedures and AREA standards. All bored holes shall be filled with creosote oil before lag screws are placed.

The asphaltic filler material shall be standard hot or cold asphaltic mixture that is acceptable to the engineer. The material shall be properly compacted and the finished surface shall be level with the top of the existing pavement surface.

MEASUREMENT AND PAYMENT. When the Prefabricated Sectional Treated Timber Railroad Grade Crossing is a construction bid item, measurement and payment will be in accordance with the project special provisions.

APPENDIX D

LOUISIANA OFFICE OF HIGHWAYS
SUPPLEMENTAL SPECIFICATIONS

SUBBASE TREATMENT AT RAILROAD-HIGHWAY GRADE CROSSINGS

DESCRIPTION: This work consists of reconstructing the subbase below the track structure in accordance with these specifications, in resonably close conformity with the lines, grades, thicknesses and sections shown on the plans or established by the engineer.

This subbase reconstruction will be designated as either Type A or B.

The Type A subbase treatment is to be specified when (1) subgrade soil survey is not required or (2) when rail traffic cannot be disrupted.

The Type B subbase treatment is to be specified when it has been determined by on-site inspection and/or subgrade soil survey that complete reconstruction of subbase is required.

MATERIALS: Materials shall conform to the following Sections and Subsections of the Standard Specifications:

Asphaltic Concrete Mixtures	501
Portland Cement Concrete for Minor Structures	902
Portland Cement	1001.02
Preforated Bituminous Coated Corrugated Steel Pipe	1007.06
Water	1017.01
Calcium Chloride	1017.02
Lime	1017.03

Filter Cloth: The plastic filter cloth shall conform to Subsection 1017.15 of the Standard Specifications as revised by Supplemental Specifications elsewhere herein, and shall be one of the approved materials on the DOTD Qualified Products List.

GENERAL CONSTRUCTION REQUIREMENTS: These requirements apply to both Type A and Type B subbase treatment.

1. Remove track structure, ties and ballast.
2. Completely reconstruct and finish subbase as specified.
3. Unless otherwise specified, 6" diameter perforated Bituminous Coated Corrugated Steel Pipe (16 gage) or approved equal will be placed in ballast to facilitate drainage out to shoulder backslopes or into subsurface drainage. This will be done in accordance with the plans and as directed by the engineer.
4. Place and compact clean ballast, cross ties, rails and construct grade crossing surface. (This work is to be included under pay item for grade crossing construction as may apply).

TYPE A SUBBASE TREATMENT: The existing subgrade shall be shaped to approximately the same cross slope as that of the roadway and compacted with mechanical tampers to the satisfaction of the engineer. Fill material shall be furnished as required and shall be "Selected Material" in accordance with Subsection 203.06 of the Standard Specifications or as approved by the engineer. After final shaping, plastic filter cloth shall be installed on the subbase prior to placing ballast and perforated drain pipe.

TYPE B SUBBASE TREATMENT: After the ballast has been removed, the existing subgrade material shall be excavated to the required depth and properly disposed of. The subbase shall be constructed with either (1) soil cement, (2) asphaltic concrete, or (3) portland cement concrete with calcium chloride additive in accordance with the plans and the following requirements.

(1) Soil Cement Subbase. The soil for soil cement shall be selected materials classified A-6 or better under test procedure DOTD Designation: TR 423 that will stabilize with cement. The soil materials shall be combined with portland cement and water, mixed, uniformly compacted and shaped by approved methods.

The percentage of cement will be determined in accordance with DOTD Designation: TR 432 prior to mixing. The minimum amount of cement used shall not be less than 8 percent by volume.

Plastic filter cloth shall be placed in the excavation prior to placement of soil cement mixture.

(2) Asphaltic Concrete Subbase. The asphaltic concrete subbase may be constructed of any of the types of asphaltic concrete mixtures, except Type 5B, listed in Section 501. The asphaltic mixture shall be placed, finished and compacted by approved methods to the satisfaction of the engineer.

Plastic filter cloth shall be placed in the excavation prior to placement of asphaltic concrete.

(3) Portland Cement Concrete with Calcium Chloride as an additive for reduced "setting" time. Portland cement concrete to which calcium chloride is added shall be Class A Concrete. Concrete placed and shaped by approved methods shall be reasonably smooth and meet the slope and profile requirements. This subbase mix facilitates rapid consolidation and reopening of tracks to rail traffic in 5-6 hours.

Plastic filter cloth shall be placed in the excavation prior to placement of the concrete.

> NOTE: The calcium chloride is added to the concrete mix with 1 inch slump in the mixer at the crossing site in the amount of 1 lb. calcium chloride per bag of portland cement at temperatures from 70° F and above, or 2 lbs. of calcium chloride per sack of portland cement at air temperatures between 70° F to 40° F. Mechanical vibrators shall be used in working the mix to match the roadway cross slope.

MEASUREMENT: Type A Subbase will be measured by the square yard of actual area which has been compacted and shaped.

Type B Subbase will be measured by the cubic yard (net section) of subbase actually constructed.

Plastic filter cloth and perforated steel pipe will not be measured for separate payment the cost thereof shall be included in the unit cost for subbase treatment.

PAYMENT: The accepted quantity of subbase treatment will be paid for at the contract unit price under:

Item S- , Type A Subbase Treatment, per square yard.
Item S- , Type B Subbase Treatment, per cubic yard.