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FINAL REPORT

LEXAN GATE ARM

EXPERIMENTAL PROJECT

IA - 86 - 09

Rail & Water Div.

10-27-1987

## INNOVATE CROSSING GATE ARM

### I. INTRODUCTION

Innovative Rail Ltd. of Cedar Rapids, Iowa produced a new rail/highway crossing gate arm that shows promise in two areas:

- a. Minimizing arm breakage, and
- b. Added target value to motorists.

The new gate was demonstrated to the Chicago and North Western Transportation Company, and that railroad has requested its use at two crossings on an "experimental basis" to determine if its installation provides relief in those areas.

On April 18, 1986, the Department observed a test of the material under field conditions with the Transportation Company. The gate received four mid-center strikes at 5 MPH by a company truck while in the lowered position, and showed no damage. In a fifth mid-center strike at 15 MPH, the gate was visibly damaged at the connection to its raising mechanism, but continued to function though at a 5-10 degree drop. Several pictures of the gate and its saddle mechanism are shown in Appendix A of this report.

Innovative Rail established distributorships in the United States and Canada, and has since gone out of business.

## II. LAB TEST BY DEPARTMENT OF TRANSPORTATION

The gate was constructed of "delta" shaped extruded red translucent Lexan material about 4.7" on the bottom and 9.1" on the side. The material in the gate is GE polycarbonate (Lexan) 6816 grade 153. A 12" sample was submitted to the DOT for inspection and testing.

Red and white high intensity sheeting from 3M covers the Lexan material to form the 45 degree red and white stripes required by the Manual on Uniform Traffic Control Devices for Streets and Highways. The void in the sheeting allows the internally mounted light source to show the fixed and blinking lights required of gates. The portion of the gate visible to the motorist is almost twice the area of the currently used gate. A copy of the Test Report from the DOT is shown as Appendix B of this report.

## III. FIELD TRIALS

The new gate arm was installed by the Transportation Company at one location in Iowa, and was slated to be installed at another location, but Innovative Rail went out of business just before the Lexan arm was to be delivered to the transportation company. This location was on primary road U.S. 30 in Missouri Valley, Iowa.

Location 2 is on Edgewood Road in Cedar Rapids, Iowa. The FRA crossing number is 190-532-A. The Edgewood Road crossing is a three track crossing with gate signals north and south of the tracks. The crossing is located in southwest Cedar Rapids, Iowa. The highway is a two-lane 24 foot wide

pavement with about 4 foot shoulders. The AADT is 2,620 with 16% trucks, 24 trains per day cross at typical speeds in Cedar Rapids, Iowa. The Lexan gate arm was struck by an unknown vehicle shortly after it was installed causing the gate arm to fold in the middle, and the Lexan gate arm was subsequently removed, and a regular gate arm was installed.

No Federal funding was utilized in this experimental project.

#### IV. PERMANENCE TEST

The transportation company was required to measure the performance of the new gate arm mechanism in accord with the work plan for a Lexan railroad signal gate arm. A copy of the work plan is attached to the report and labeled Appendix C. The report requires a three-year study with an annual report submitted for each crossing location to the Rail and Water Division. Additionally, the transportation company was required to file a written report to the Rail and Water Division every time the gate arm mechanism is replaced at either test location. Since this Lexan gate arm was in place such a short time and never replaced, we have waived the above formal report requirement by the North Western in lieu of the attached letter from the North Western labeled Exhibit "D".

#### V. CONCLUSION

Since the Lexan gate arm is not being manufactured anymore and seemed to bend in the middle when struck by a vehicle rendering the Lexan gate arm in a useless condition, we can only conclude that the Lexan arm isn't

practical for every day use in its present design. The Lexan gate arm was worth investigating, but it evidently needs further development to be a useful product in the signal industry. Should the company start developing the Lexan gate arm again, the Rail and Water Division would consider looking at the product again. This experimental project is hereby terminated. A copy of this report will be submitted to the FHWA and to the Transportation Company.

RDB/bjg

attachments

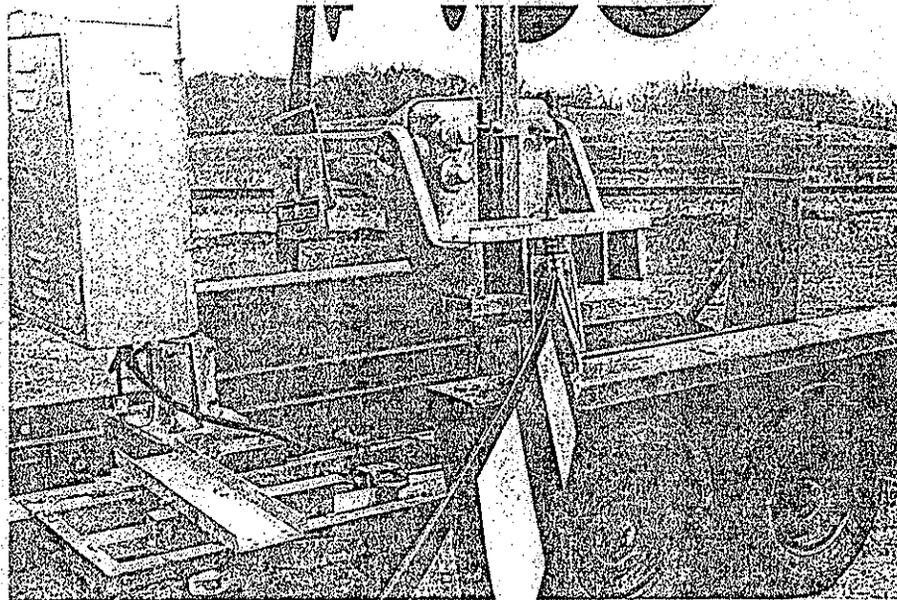
cc: FHWA

CNW

INNOVATIVE CROSSING GATE ARM



Lexan Gate Arm at 4/18/86 CNW Demonstration



Lexan Gate Arm showing attachments



INNOVATIVE GATE ARM  
Iowa Department of Transportation

MATERIALS DEPARTMENT

TEST REPORT - MISCELLANEOUS MATERIALS  
AMES LABORATORY

Phys. Misc. Test  
B. Miner  
M. Sheeler  
V. Marks  
Ray Callahan

Material Plastic RR Gate Arm Laboratory No. AR6-194

Intended Use \_\_\_\_\_

County \_\_\_\_\_ Proj. No. Dept Info.

Producer General Electric Contractor \_\_\_\_\_

Source \_\_\_\_\_

Unit of Material Material is GE Polycarbonate (Lexan) 6816 Grade 153

Sampled by \_\_\_\_\_ Sender's No. \_\_\_\_\_

Date Sampled 7-14-86 Date Rec'd 7-15-86 Date Reported 8-25-86

QUV, 250 Hrs.	Passes
Brittleness @ -20°F	Passes
Resistance to salt	Passes
Shattering resistance	Passes

*cc Jack Lattrell*

DISPOSITION:

Signed

*Mary J. Sheeler*  
Testing Engineer

## Work Plan for Lexan Railroad Signal Gate Arms

### INTRODUCTION

This work plan relates to an innovative gate arm mechanism on a signal warning system. The gate arm is constructed of "delta" shaped extruded red translucent Lexan material 4.7" on the bottom and 9.1" on the sides. The material used is GE Polycarbonate (Lexan) 6816 Grade 153. Crash tests have been conducted on the Lexan gate arm with satisfactory results. The Lexan gate arm is advertised as unbreakable and not supposed to cause damage to vehicles. The Lexan gate arm will be tested at two Chicago and North Western Transportation Company (CNW) crossing locations located on U.S. Highway 30 in Missouri Valley, Iowa and Edgewood Road in Cedar Rapids, Iowa.

### OBJECTIVE

The objective of this work plan is to evaluate the performance, maintenance requirements, and cost effectiveness of the Lexan gate arm.

### CONSTRUCTION

The construction operation shall be documented. All problems and difficulties shall be noted. The construction effort and time shall be compared to the installation of a regular gate arm.

### PERFORMANCE

The Lexan gate arms shall be inspected twice monthly during the CNW's routine signal maintenance inspection.

Records shall be kept for each crossing location on the required maintenance, parts replacement and the estimated number of times the gate arm has been struck.

A determination shall be made based on maintenance reports of whether the Lexan gate arm is superior to the regular gate arm.

The cost effectiveness of the Lexan gate arm shall be determined in comparison to the cost effectiveness of a regular gate arm. This determination will be based on original costs and maintenance costs.

### REPORTS

A three year study will be required on the Lexan gate arm with an annual report submitted for each crossing location to the Rail and Water Division. A written report shall be sent to the Rail and Water Division every time a Lexan gate arm is replaced at either test location.

Boone, Iowa  
October 20, 1987

 Richard Brown  
Iowa Department of Transportation  
Ames, Iowa

The experimental Lexan Gate the C&NW Transportation Company installed at Edgewood Road in Cedar Rapids, Iowa was struck by an unknown vehicle. The blow caused the Lexan Gate to fold in the middle from which it did not recover.

The Lexan Gates were never installed at Highway 30 Missouri Valley, Iowa account Innovative Rail Ltd. went out of business and did not deliver the gates.

J. W. Dirks  
Manager of Signals

cc: T. J. Crubaugh

EXHIBIT "D"