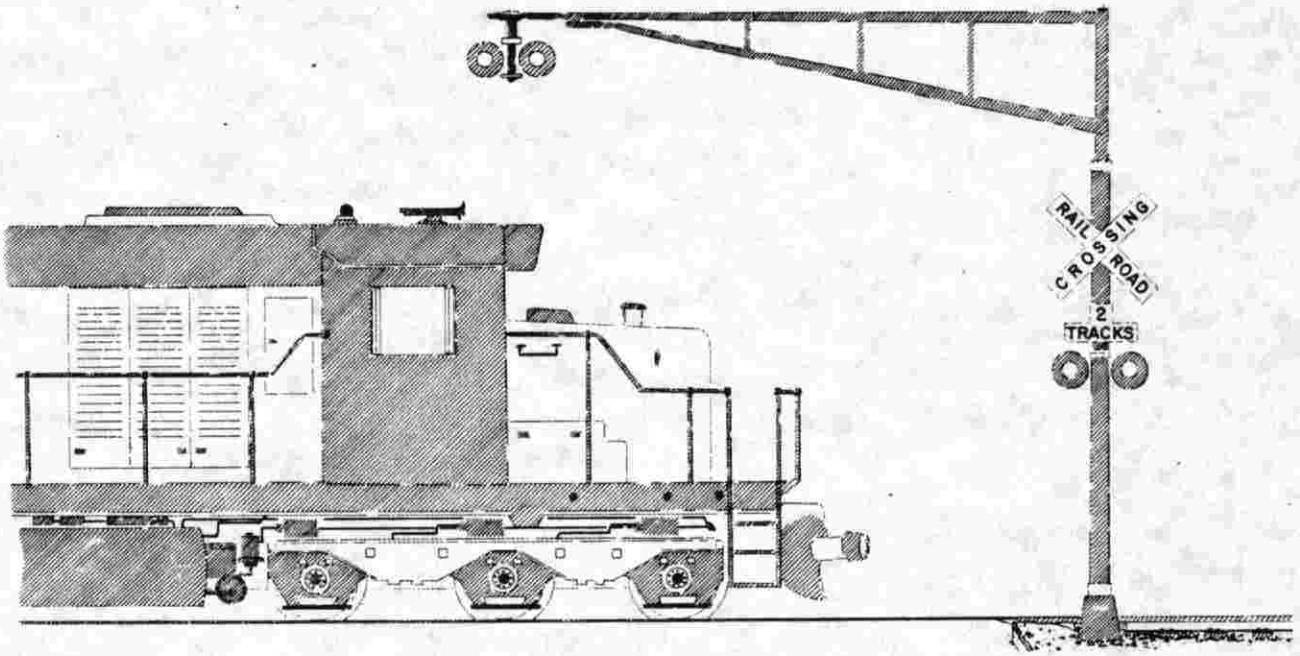
ABERDEEN
RAIL / HIGHWAY GRADE CROSSING
STUDY



SOUTH DAKOTA
DEPARTMENT OF TRANSPORTATION
DIVISION OF PLANNING
PIERRE, S. D. 57501

NOVEMBER 1984

ABERDEEN
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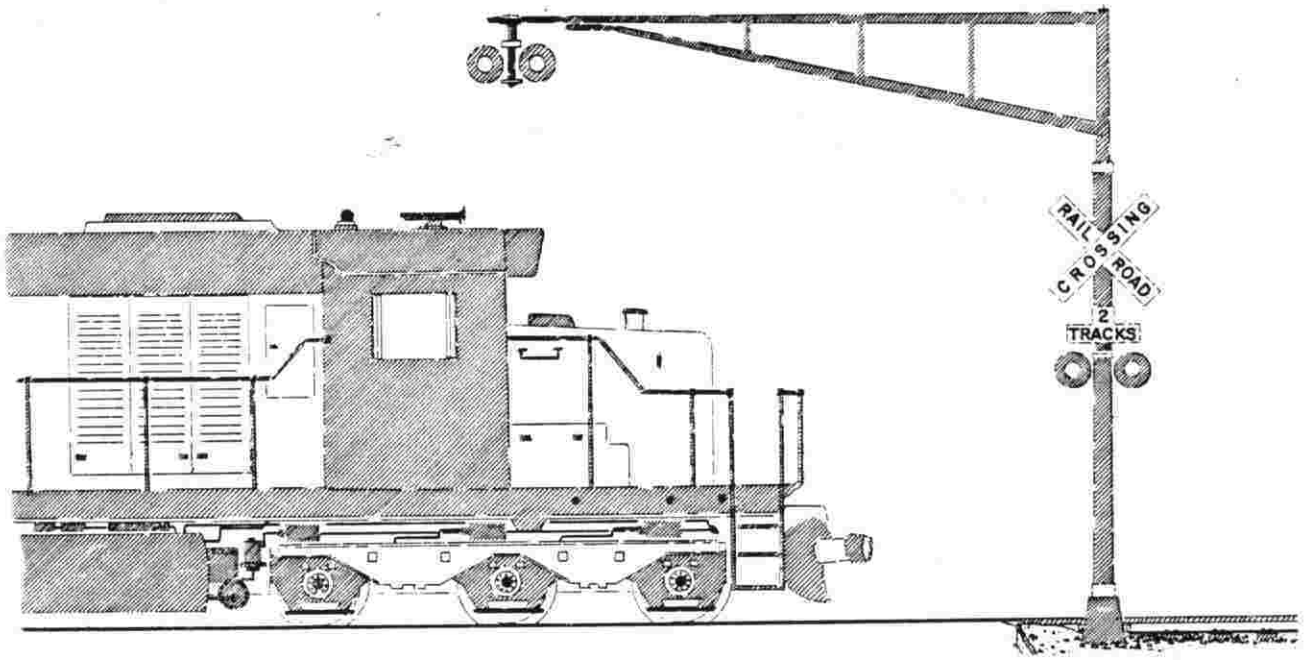

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INTRODUCTION

This document is the culmination of a cooperative effort by the South Dakota Department of Transportation (State) and the City of Aberdeen to identify hazards associated with rail/highway crossings and to seek methods that will minimize the potential for crossing accidents. The Study was initiated because of recent changes in the local rail network and steadily increasing train frequency at certain crossings. Although Aberdeen has not yet experienced a increase in crossing accidents, hazards typically increase as train operations increase.

This Study presents the technical portion of the crossing problem in Aberdeen. As is the case in any hazardous crossing location, the interface between the two systems may be excellent but accidents occur because of the absence of appropriately safe driving habits. Safety and technology must complement each other to minimize hazards.

The South Dakota Safety Council has presented a safety program in Aberdeen to increase driver awareness at crossings and to encourage safe driving techniques. Education of the driving public can significantly improve the value of proper and consistent traffic engineering and warning devices.

Among the several agencies in Aberdeen that provided valuable assistance include the Planning, Engineering, Police, and Fire Departments, bus services, and bulk carriers. Within SDDOT, technical guidance was given by the Division of Engineering, Division of Operations, Office of Local Government Assistance, and the Aberdeen Regional Office.

The following sections describe the technology of grade crossings, a descriptive inventory of crossings in Aberdeen including an accident history, design options to improve crossing safety, and recommendations for implementing this Study.

HISTORICAL PERSPECTIVE

Railroad/highway crossings have always been a hazardous area of surface transportation. As early as 1877, the United States Supreme Court ruled that a road vehicle operator had failed to exercise ordinary care, but that the railroad was bound to give timely warning of the train's approach. The first warning mechanism was a flagman who signalled approaching vehicles. In 1885, train-actuated gates began to be used. The first automatic bell control was used in 1887.

The Federal Road Act of 1916 was the first governmental involvement with crossings on a national scale. This allowed funds to be used for projects to eliminate hazards at grade crossings. Since the railroads were the dominant transportation industry in the early 1900's, most states that received the 50/50 matching funds placed the responsibility for grade separations or traffic control devices at crossings upon the railroads. This procedure for improving crossings remained in effect until the 1930's. The Depression brought about changes in the volumes of railroad and highway traffic over grade crossings and led to new ideas relative to the responsibility for grade crossings.

The National Industrial Recovery Act of 1933 authorized $300 million to the states to pay for the construction costs to eliminate the hazards of highway-railroad grade crossings. The act also provided that the states did not have to provide matching funds, nor were improvements limited to the Federal-Aid highway system.

In the ten year period from Fiscal Year 1935 through Fiscal Year 1944, 3,844 crossings were eliminated, 655 grade separations reconstructed, and traffic control devices were installed at 4,652 crossings. This was the first time such a coordinated attack on the grade crossing problem had been made.

The Federal-Aid Highway Act of 1944 also provided 100% Federal funding to eliminate grade crossing hazards on the Federal-Aid highway system. The Act included a provision that any railroad involved in a project to eliminate hazards at grade crossings, paid for in part or in full with Federal funds, would be liable to the United States for any benefits received. This clause, because of the difficulty in measuring railroad benefits, delayed many grade crossing improvement projects. The clause was finally removed in the Federal Highway Safety Act of 1973.

Under the 1973 Act, the funding formula also changed to a 90% Federal share and 10% State or local share. The Highway Safety Act of 1976 continued the intent of the 1973 Act, while also allowing funds to be used at the state's discretion through the use of a hazard rating formula and diagnostic team review.

The Surface Transportation Act of 1980 increased the funds available nationally for crossing improvements. However, because of revisions in the allocation formula, the crossing funds for South Dakota have actually decreased. South Dakota is receiving $2,085,439 for the grade crossing program in Fiscal Year 1985, according to the Notice of Apportionment issued by the Federal Highway Administration.

GRADE CROSSING TECHNOLOGY

In its simplest terms, a railroad-highway grade crossing is literally the intersection of two transportation systems. This statement defines the needs of the two modes while implying the practical problems of crossing installation and maintenance.

For railroad purposes, the only point of contact of the railcar to the entire trackbed is at the top of the rail. The remainder of the track surface, if in good condition, does not affect the rolling motion of steel wheel on steel track. Ties, ballast, and other basic components of the track surface act together to provide a stable base for supporting the huge loads placed on the rail.

Highway travel requires a different set of criteria for vehicles. One of the foremost needs is a relatively smooth driving surface. In contrast with the small area of contact of a trackbed, a highway must have a wider area of continuous driving surface for the rubber tires and suspension systems of motor vehicles. The subsurface base of a highway, therefore, must be totally covered with a smooth surface of either a bituminous or concrete material. On a relative basis, structural maintenance is more difficult on highways, although generally it does not require major maintenance as often as a railbed at a comparable service level.

At crossings, the railroad, which usually was present prior to the construction of roads, is primarily concerned with maintaining structural stability and clean rail channels for operations. If trains are not inhibited by the crossing structure, the main railroad concern is performing the difficult job of track

maintenance actually underneath the crossing surface. Highways merely require a relatively smooth driving surface with adequate safety precautions.

Here, then, is the concerns of the two modes:

Railroad: Beyond safety, maintaining the strength of the roadbed.

Highway: Providing a relatively smooth, safe driving surface over the track surface.

Types of Surfaces

Several different types of crossing surfaces are commonly used in the United States. Each type offers a driving surface and maintenance schedule generally proportional to the installation cost. Maintenance expenditures tend to decrease as installation costs increase. Whereas funds are limited to improve crossings, priorities must be established according to the volumes of rail and highway traffic that it carries.

The crossing surfaces that are commonly used today include:

- Bituminous material
- Full-depth timber planks
- Prefabricated timber panels
- Precast concrete slabs
- Concrete pavement
- Steel panels
- Polyethylene panels
- Rubber panels
- Epoxy elastomeric material

A bituminous crossing is probably the most common crossing surface at paved street and road locations. Since it involves the same material for construction as the road itself, it is relatively inexpensive. Maintenance can be performed quite rapidly because of the availability of the material.

Full-depth timber planks are another low-cost, low maintenance crossing for lightly travelled roads. They provide excellent strength for highway traffic and good weatherability. Prefabricated sectional timber crossings are similar to planks, except that they are shorter and are connected together to form panels. This crossing has the advantage that the panels can be removed and reinstalled for track maintenance purposes. Both of these crossing types are most common on unpaved roads, especially in rural areas.

Precast concrete slabs have also been used for crossing material. If the roadway is also concrete, this crossing has the advantage of continuity in surface types. Slabs can also vary in size depending upon maintenance needs. Concrete pavement also provides similar continuity in surfacing, but is recommended mainly for locations where vehicle traffic travels roughly parallel to the track, such as wharves and truck transfer locations.

Two crossing types that are not commonly used in South Dakota are steel and polyethylene panels. Preformed steel panels may be removed and reinstalled individually for maintenance purposes. If properly installed, this type of crossing has low maintenance requirements for light density, low speed traffic. Polyethylene panels offer similar advantages and are probably used more often at perpendicular crossings, but earlier models usually didn't last as long as steel or the more recent, higher density polyethylene panels.

Full depth rubber modules and rubber panels are usually the most expensive material to install but have the longest expected life. High traffic areas are excellent locations for these low maintenance crossings. They also offer one of the smoothest driving surfaces for motor vehicles.

The final crossing type is an epoxy elastomeric cast-in-place crossing. It is composed of specially formulated epoxy and scrap rubber tires ground into finely grained particles. Although they are not commonly used in South Dakota due to the the high reconstruction costs necessary for deteriorated crossings, they do offer a smooth driving surface.

The criteria involved in selecting a crossing type involves the following:

- Train speed
- Train frequency
- Vehicular traffic
- Vehicular speed
- Subsurface conditions
- Climatic conditions
- Road approach condition
- Ride
- Cost

GRADE CROSSINGS IN ABERDEEN

As with many other Midwestern cities, Aberdeen is quite closely tied to the rail network that serves local businesses and industries. This relationship had its origin in the 1880's, when the railroads first constructed track into the area. This method of high volume, long distance transportation promoted commercial and industrial development nearby that would use rail service. Grade crossings were assured a part of Aberdeen's future traffic network as business grew.

Vehicular accidents at rail-highway grade crossings paralleled the increased use of the automobile. As car manufacturers refined their product to include total passenger enclosure, heaters, air conditioning, and audio systems, the operator was faced with interior distractions that diverted the driver's attention from the road environment. At the same time, operating speeds increased for highway travel. The time available for decisions on crossing hazards, therefore, decreased automatically for all vehicle operators.

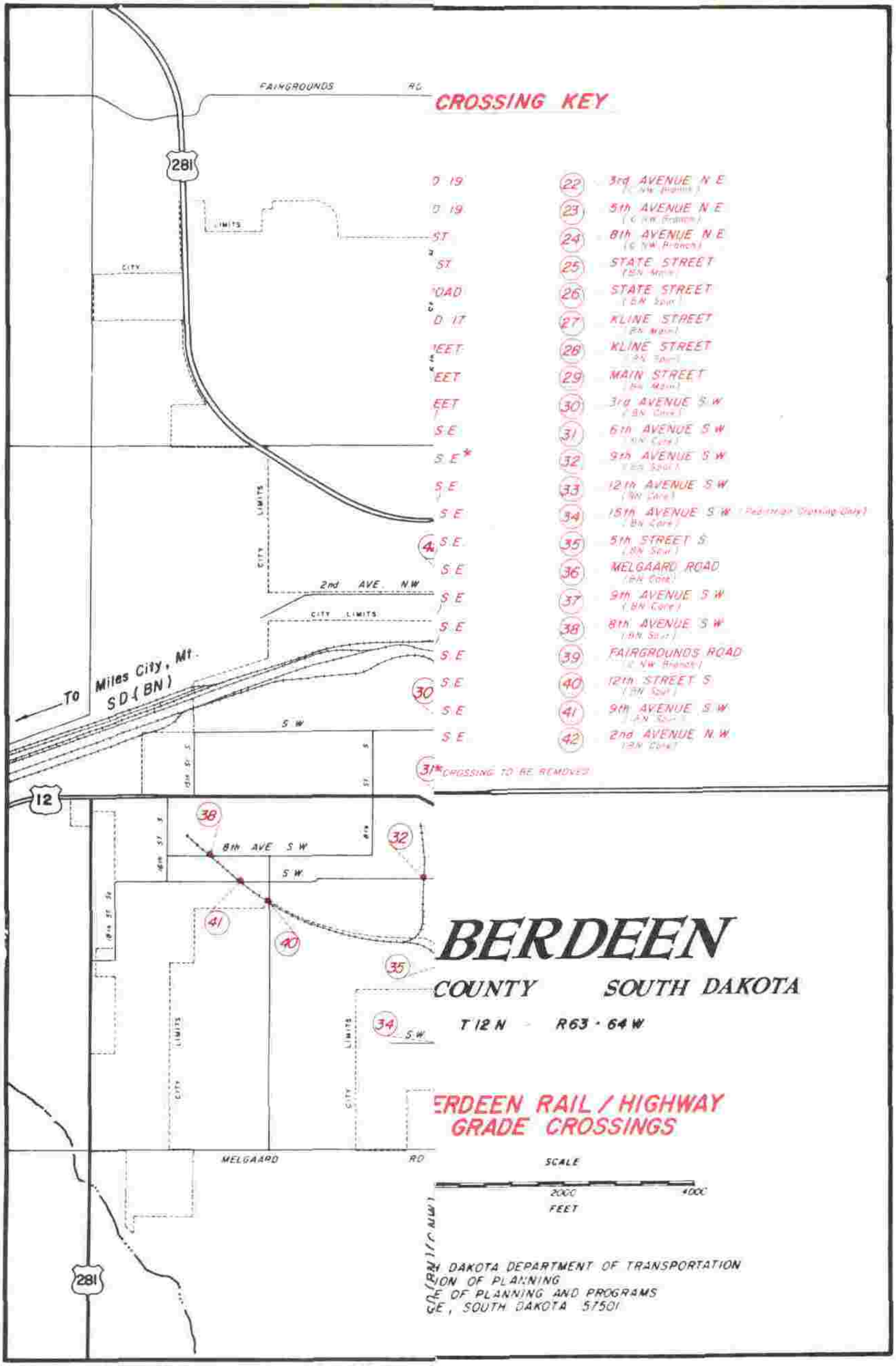
For rail movements, decision times virtually disappeared as loads increased. The hauling capacity of modern railcars generates a large moving force that can only be gradually slowed down. If a loaded train approached a crossing even at a very slow speed, it would be unable to stop for traffic because of its momentum. This further emphasizes the need for appropriate warning systems for highway traffic.

The following figures illustrate the grade crossings in Aberdeen and the accidents associated with them since 1973. The first figure is a map that shows the actual location of crossings in Aberdeen. As many as nine rail corridors have been part of the Aberdeen transportation network. Currently five rail lines remain in service at varying levels of operation.

Due to the Milwaukee Road bankruptcy, three rail segments are now being operated by the Burlington Northern Railroad. Although train movements are not significantly higher yet, the new operating scenario of these lines has the potential for a large increase in trains. The strategic location of the east-west main line and the south line for transcontinental freight movements may encourage an unprecedented volume of rail traffic through Aberdeen. As a result, the risk of crossing accidents increases significantly.

Rail abandonments have discontinued the need for some crossings in Aberdeen. Since several of these crossings still have the materials in place despite the salvage of the line itself, the driving public does not perceive them to be any different than that of operating rail lines. To avoid potential train/vehicle conflicts because of driver confusion over crossing status, all crossing materials on abandoned lines should be promptly removed by the appropriate government agency.

The second figure shows the actual location of crossing accidents in Aberdeen from 1973 to 1983. As this figure indicates, Aberdeen has had only 18 accidents during this time frame, or less than 5% of the statewide total. The crossings with more than one accident include Dakota Street (4), 1st Avenue SE (3), 6th Avenue SE (2), and 6th Avenue SW (2). Dakota Street maintains a high potential for accidents due to traffic increases from street improvements and a possible increase in train volume. While 6th Avenue will maintain a high traffic count since it is a main highway route, accidents should not increase because of the low train frequency. 1st Avenue SE should not experience a significant increase in accidents because of the relatively low and static traffic levels.


CROSSING KEY
22 3rd AVENUE N.E.
23 5th AVENUE N.E.
24 8th AVENUE N.E.
25 STATE STREET
26 STATE STREET
27 KLINE STREET
28 KLINE STREET
29 MAIN STREET
30 3rd AVENUE S.W.
(BN Core)
31 6th AVENUE S.W.
32 9th AVENUE S.W.
33 12th AVENUE S.W.
34 15th AVENUE S.W.
35 5th STREET S.
36 MELGAARD ROAD
37 9th AVENUE S.W.
(BN Core)
38 8th AVENUE S.W.
39 FAIRGROUNDS ROAD
40 12th STREET S.
41 9th AVENUE S.W.
42 2nd AVENUE N.W.
31* CROSSING TO BE REMOVED
BERDEEN
COUNTY SOUTH DAKOTA
T 12 N R63 - 64 W
ERDEEN RAIL / HIGHWAY
GRADE CROSSINGS
SCALE
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4000
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E, SOUTH DAKOTA 57501
FAIRGROUNDS
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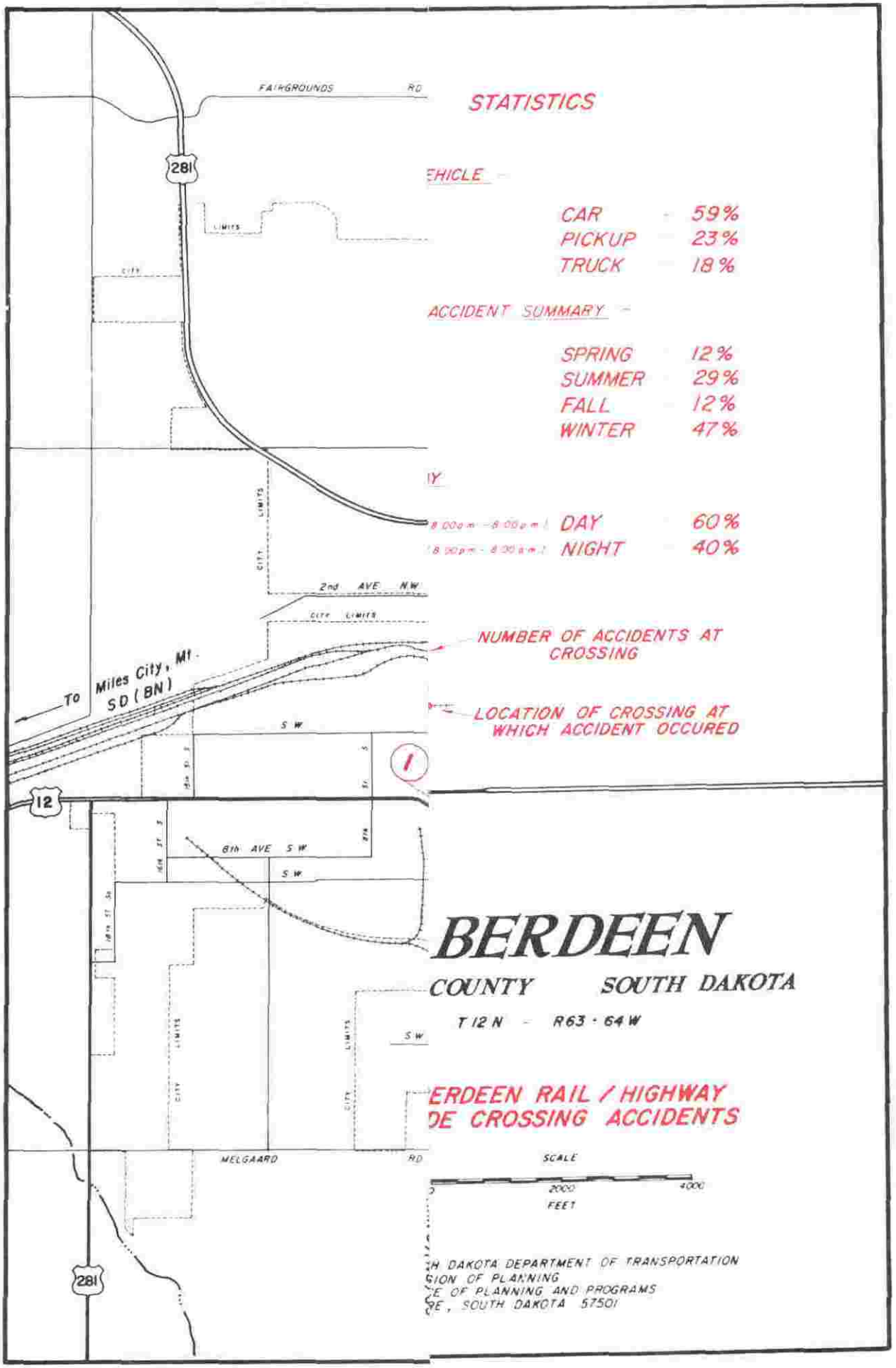
281
12
CITY LIMITS
2nd AVE. N.W.
To Miles City, Mt.
S.D.(BN)
8th AVE S.W.
S.W.
MELGAARD
RD
38
32
41
40
35
34
30
31*


FAIRGROUNDS RD
281
LIMITS
CITY
LIMITS
CITY
2nd AVE NW
CITY LIMITS
To Miles City, Mt.
SD (BN)
S W
12
8th AVE S W
S W
MELGAARD RD
281
STATISTICS
EHICLE
CAR 59%
PICKUP 23%
TRUCK 18%
ACCIDENT SUMMARY
SPRING 12%
SUMMER 29%
FALL 12%
WINTER 47%
IY
DAY 60%
NIGHT 40%
NUMBER OF ACCIDENTS AT CROSSING
LOCATION OF CROSSING AT WHICH ACCIDENT OCCURED
1
BERDEEN
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RE, SOUTH DAKOTA 57501

In Aberdeen, accidents have remained fairly constant, never rising above three accidents per year. An interesting fact is that during the Milwaukee Road reorganization and the resulting realignment of rail service in South Dakota (1980-1983), only two accidents occurred in Aberdeen. While this may not be directly related to the reduced train frequency during the period, greater hazards are now present because of the improved rail service and greater rail freight from the growing economy.

A review of accident statistics since 1973 can assist in determining contributing factors which may increase the hazards of crossings. Statistics that were reviewed include the time of year, time of day, license plate data, and vehicle type.

In some accidents, weather conditions could affect the driver's reactive ability. Of the four seasons, winter (December, January, and February) had 47% of all crossing accidents. Visibility constraints caused by snowfall are significant enough to encourage a review of snow removal practices and winter driving hazards near crossings. Since no individual crossing had more than one wintertime accident, the hazards are not isolated and are general in nature. Advance warning signs and illumination are important to give the motorist the best possible reaction time in adverse driving conditions. Of the remaining seasons, Summer had the second highest percentage of accidents with 29%. Spring and Autumn each accounted for 12%.

Time of the accident does not indicate any conclusive evidence that might relate to the general cause of accidents. During the hours of darkness or twilight, about 40% of the accidents occurred. This may reflect on the lack of illumination, since the majority of vehicular traffic is present during daylight hours.

Since Aberdeen is on a major highway for multi-state travel, possibly the unfamilar surroundings poses problems for visitors. This premise, however, can be dismissed by a survey of license plates on accident vehicles. Brown County cars accounted for all of the vehicles in crossing accidents, with all but two vehicles from the City of Aberdeen.

While all of the accidents involved trains, 59% involved a car as the motor vehicle. Pickup trucks were in 23% of the total accidents, while trucks accounted for 18%.

HAZARD MITIGATION

The goal of this Study is to reduce the risk of grade crossing accidents. The ultimate method to achieve this goal is to eliminate crossings. Where crossings are not present, accidents can not occur. This solution is composed of three alternatives:

a) Abandon the railroad tracks,

b) Block off the street, or

c) Construct grade separations.

The first alternative, railroad abandonment, has already been implemented, to some extent, in Aberdeen. In 1968, the Chicago & North Western Railroad abandoned its track from Stratford to Leola thorugh Aberdeen. The CNW also later abandoned its line from Aberdeen to Mansfield in 1982. The Milwaukee Road abandoned their line to Edgeley, North Dakota in 1980 as part of their bankruptcy proceedings. While these lines will never be returned to an operational status, some signing, signals, and even the actual crossing remain in place. Activities should be immediately initiated to remove crossing materials at these locations:

- 10th Avenue SE (Rubber)
- 11th Avenue SE
- State Street SE
- 12th Street SE
- 15th Street SE
- 17th Street SE
- Melgaard Road
- Fairgrounds Road

Another abandonment proceeding could possibly commence in the near future. The CNW branch line from Aberdeen to Oakes, North Dakota is in ICC Abandonment

Category 1, which means that it is potentially subject to abandonment in the next three years. If efforts to continue operations after an abandonment would be unsuccessful, these crossing materials should also be immediately removed and salvaged, if possible.

The second alternative to eliminate crossings, blocking off the streets where the crossings are located, avoids the conflicting mode of vehicular traffic. Despite the traffic increases that would obviously occur at another location, the safety aspects can be better addressed where no physical detriments exist. Although this may not be physically possible and is rarely an acceptable political solution, two streets with high hazards but low traffic (First Avenue SE and Penn Street) could be candidates for closure as one of the last resorts for traffic safety. Other community and business costs may outweigh the safety benefits, however.

The final alternative, grade separation, is generally not feasible in Aberdeen because of the cost (land acquisition, earthwork, and structure) and competing land uses. One grade separation already exists on the west side of Aberdeen, the US 281 bridge (Fourth Street W). If another location would be proposed for construction of a bridge, it should be on the east side of town and removed from concentrated development. At present, Roosevelt Street is the only route that is compatible with the needs and resources of the community. As train volume on the Main Lines changes in the future, an engineering analysis of this alternative may be necessary. The majority of the crossings will remain necessary within the foreseeable future. To reduce the hazards associated with these crossings, several individual measures are proposed. Each crossing is addressed in detail at the end of this section and suggestions are made that would improve traffic safety.

Crossing improvements that are needed within the Aberdeen community could include the following:

- o Pavement marking
- o Illumination
- o Curb painting
- o Advance warning signs
- o Crossbucks
- o Post-mounted signals
- o Cantilever-mounted signals
- o Crossing surface
- o Removal of obstructions

Generally, the most effective improvement for crossings in Aberdeen is the establishment of a standardized traffic warning system that is consistent with traffic levels and hazard ratings. Traffic engineering techniques must be consistently applied to crossing approaches to provide optimum driver warning and to avoid possible legal implications resulting from accidents. Consistency can be attained by observing the guidelines outlined in the Manual on Uniform Traffic Control Devices. Sections of this Manual pertinent to crossings are listed in Appendix A.

Periodic signing maintenance should be a high priority for the responsible Aberdeen personnel. Activities should be conducted at least annually to maintain the maximum safety value of warning systems. Additional traffic engineering information is available in the FHWA booklet entitled "Railroad-Highway Grade Crossing Handbook", August 1978.

The type of warning used at a crossing is dependent on traffic levels and the hazards that are present. On low traffic, two-lane city streets and rural areas, crossbucks with the proper advance warning signs usually provide adequate identification to the driver. This universally accepted signing should be reflectorized and at the proper location with restrictions placed on parking so as to maximize visual recognition.

Two types of flashing light signals are commonly used at urban crossings in South Dakota: post-mounted and cantilever-supported. Post-mounted signals are placed directly on the support post at the side of the approach. Cantilevered-supported signals are suspended over the driving surface in a manner similar to other highway signals to provide better visibility. These signals are used in high traffic areas, especially high speed, multi-lane approaches where trains are relatively frequent.

Automatic gates could be used in conjunction with signals at locations of extremely high traffic, multiple tracks, and congested, hazardous areas. Most gates must operate under fail-safe conditions; that is, if the device should lose its power source, the gates automatically lower into position. This warning mechanism is quite uncommon in South Dakota and must have adequate justification to be installed. They have been known to cause problems from vandalism and vehicles weaving around the gates themselves.

Besides the warning devices placed in the proximity of the crossing, other mechanisms should be used in advance of the crossing approach. Advance warning signs, standard yellow circular signs with black crossbucks imprinted on them, should be installed 250 feet from the crossing in urban areas, although as low as 100 feet is permissible in the low speed areas.

Pavement markings are necessary where signals or gates are located, or where highway speeds are above 40 miles per hour. In central business districts of urban areas, these markings can be omitted unless a significant hazard exists. The dimensions of the markings should be elongated to compensate for the viewing angle of the motorist.

Optically programmed signals can be used where a multitude of traffic signals could confuse motorists. At a few locations in Aberdeen, traffic lights at intersections are relatively close to the crossing signals. Engineering studies may determine that optically programmed signals, which are designed to limit illumination to a smaller street area and cannot be distinguished from a distance, could avoid the potential for misinterpretation by approaching motorists.

Speed grooves have been used effectively in some areas as a method of alerting the motorist. Longitudinal cuts are made in the pavement that causes a tracking effect on the vehicle. This method passively directs the motorist's attention to an approaching hazard.

The final general aspect of warning devices is illumination. In areas of low train speeds and nighttime operations, standard street lights may assist in lowering hazards. Illumination should be placed so as to not interfere with the visibility of flashing signals.

Other specific warning signs may be erected as the situation warrants. In some cases, an amber flashing light with a sign stating "STOP WHEN FLASHING" can be erected in advance of the crossing. This train-activated signal should not, however, be utilized if it would add to driver confusion from an overabundance of signs and lights.

HAZARD FORMULA

The South Dakota Department of Transportation has established a formula to prioritize crossing improvement projects using federal funds. As the funds are not sufficient to meet current needs, the formula pinpoints the greatest need so that funds are judiciously expended.

The formula reads as follows:

$$\text{Hazard Rating} = (V*T) + (VS*TS/10) + (D*I*N*P) + [(1+A^2)*R*L*F] + (10*H) + (B*C)$$

where

V = Average Vehicular Daily Traffic, in Hundreds
T = Trains Per Day
VS= Vehicular Speed
TS= Train Speed
D = Sight Distance, where sight distance is 2000', D = 1
1500', D = 2
1000', D = 3
500', D = 4
500', D = 5
I = Intersection Angle where angle is 90°, I = 1
45°-90°, I = 3
0°-45°, I = 5
N = Number of tracks in Crossing where number is 1, N = 1
2-3, N = 3
4 or more, N = 5
P = Approach where straight and level, P = 1
hill/curve on one side, P = 3
hill/curve on both sides, P = 5
A2 = Number of accidents squared
R = Ride where ride is good, R = 1
moderate, R = 3
poor, R = 5
L = Local Priority where priority is 15, L = 1
6-15, L = 3
1-5, L = 5
F = Form of Protection where protection is signals, F = 1
crossbucks, F = 5
H = Vehicles carrying hazardous materials crossing per day
B = Bus Crossings per Day
C = Passengers per Bus

An analysis of this formula reveals that the most important factor in the prioritization process is the traffic level of both modes. Logically, this is the correct emphasis in the formula because, despite all safety precautions that

can be taken, frequency of exposure of each mode is the primary risk factor for grade crossings. It is also a major consideration for selection of proper signalization and crossing material.

The remainder of the factors can vary significantly in importance. For South Dakota and Rapid City, however, the number of accidents is the second most important factor. Again, this is a logical result for the formula because it demonstrates actual need in very real terms. Other formula inputs that have a major role for Rapid City crossings include hazardous materials crossings, bus crossings, and vehicular speeds.

The following pages supply the data inventory and the engineering design needs for each crossing in Rapid City. The inventory page lists the items that are utilized in the crossing formula, as well as non-formula items such as the number of driveways and number of accidents in the last two years. Other unique circumstances are discussed under the Miscellaneous heading.

The design needs page provides information concerning the engineering practices that should be provided at that crossing. Options are then discussed concerning alternatives and estimated costs. Accompanying these two pages are photographs showing the crossings from each street approach.

6TH AVENUE SW - Westbound

DATA INVENTORY

Tracks	4	Traffic Lanes	5
Trains/Day	1	Vehicles/Day	26,498
Train Speed	10	Vehicle Speed	27
Bus Crossings/Day (Passengers)	218	Warning Device	Cantilever/Mast Signal
Hazardous Matls. Crossings/Day	36	Crossing Surface	2Rubber,Metal,Asphalt
Driveways Within 200'	3	Crossing Angle	80 degrees
Pavement Markings	Stop lines-east side	Advance Warning Signs	Yes
Accidents - Past Two Years	0	Land Use	Commercial
Accidents - Past Ten Years	2	Approach	Straight, Level
Local Priority	5	Ride	Good

HAZARD RATING	1,488

Miscellaneous: View distance - Less than 500'

6TH AVENUE SW - Eastbound

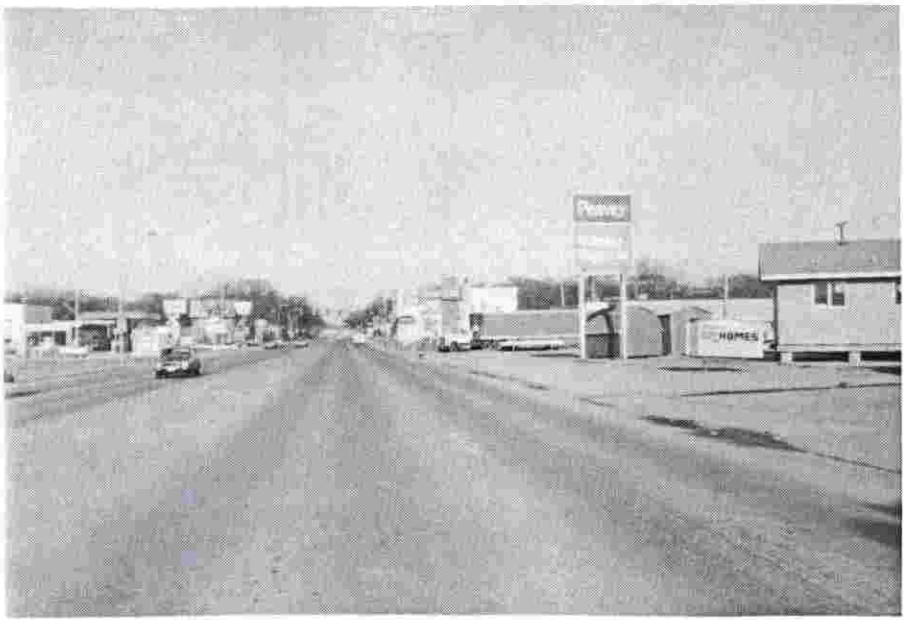
ENGINEERING DESIGN NEEDS

Advance warning device
Unnecessary crossing

DESIGN OPTIONS

Alternative	Estimated Cost
1. Pavement markings	$3,000
2. Track removed for unused crossing	Minor

Recommended Course of Action	Estimated Total Cost
Both alternatives. In addition, increases in rail movements may encourage traffic signal preemption at the nearby intersecion of 6th Avenue and Fifth Street.	$3,000



6TH AVENUE SE (BN SPUR) - Westbound

DATA INVENTORY

Tracks	2	Traffic Lanes	5
Trains/Day	0.5	Vehicles/Day	26,728
Train Speed	10	Vehicle Speed	24
Bus Crossings/Day (Passengers)	320	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	78	Crossing Surface	Asphalt
Driveways Within 200'	5	Crossing Angle	85 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Commercial
Accidents - Past Ten Years	2	Approach	Straight, Level
Local Priority	15	Ride	Moderate

HAZARD RATING	1,339

Miscellaneous: View distance - Less than 500'

6TH AVENUE SE (BN SPUR) - Eastbound

ENGINEERING DESIGN NEEDS

Approach warning devices

DESIGN OPTIONS

Alternative	Estimated Cost
1. Advance warning signs	$40
2. Pavement markings	$1,500

Recommended Course of Action	Estimated Total Cost
Both alternatives. This crossing should share approach warning devices with the C&NW crossing a short distance to the east on 6th Avenue.	$1,540

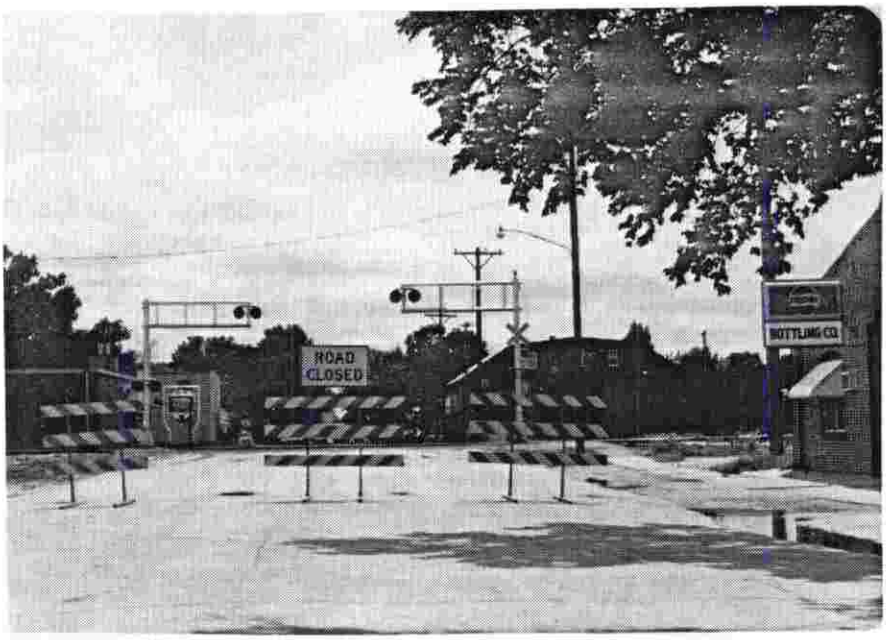
STATE STREET (MAIN LINE) - Northbound

DATA INVENTORY

Tracks	5	Traffic Lanes	2
Trains/Day	12	Vehicles/Day	6,930
Train Speed	10	Vehicle Speed	22
Bus Crossings/Day (Passengers)	89	Warning Device	Cantilever Signals
Hazardous Matls. Crossings/Day	1	Crossing Surface	Asphalt
Driveways Within 200'	4	Crossing Angle	90 degrees
Pavement Markings	No	Advance Warning Signs	Yes
Accidents - Past Two Years	1	Land Use	Commercial
Accidents - Past Ten Years	1	Approach	Straight, Level
Local Priority	2	Ride	Poor

HAZARD RATING	1,006

Miscellaneous: View distance - Less than 500'



STATE STREET (MAIN LINE) - Southbound

ENGINEERING DESIGN NEEDS

Approach warning devices
Sight distance
Crossing surface
Crossing elimination

DESIGN OPTIONS

Alternative	Estimated Cost
1. Advance warning lights	$2,500
2. Pavement markings	$1,500
3. Rubber crossing	$70,000
4. Illumination	$250
5. Remove unnecessary trackage	Minor

Recommended Course of Action	Estimated Total Cost
All alternatives.	$74,250

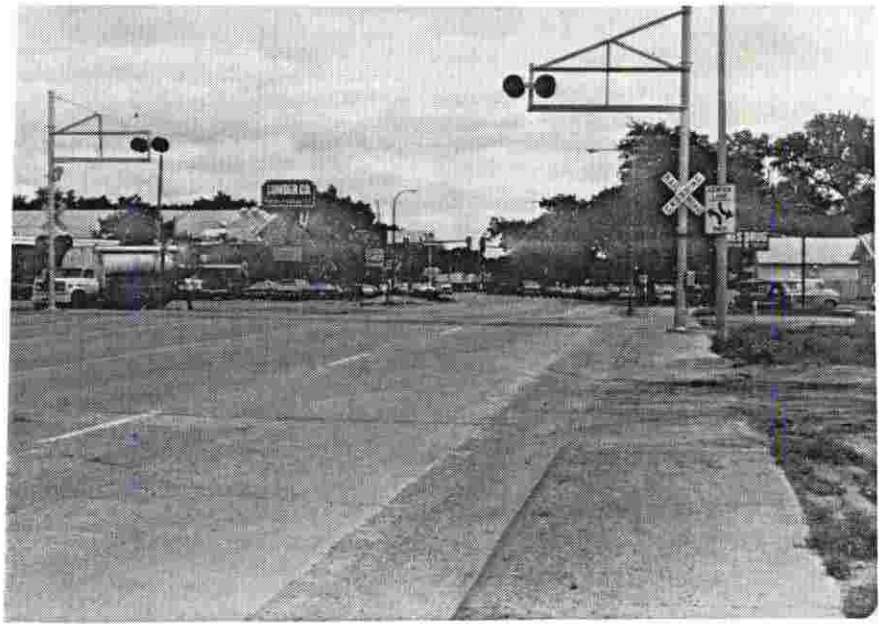
6TH AVENUE SE (CNW BRANCH) - Westbound

DATA INVENTORY

Tracks	2	Traffic Lanes	5
Trains/Day	0.5	Vehicles/Day	26,728
Train Speed	10	Vehicle Speed	24
Bus Crossings/Day (Passengers)	320	Warning Device	Cantilever Signals
Hazardous Matls. Crossings/Day	78	Crossing Surface	Asphalt
Driveways Within 200'	5	Crossing Angle	90 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Commercial
Accidents - Past Ten Years	1	Approach	Curve on East Side, Level
Local Priority	15	Ride	Moderate

HAZARD RATING	954

Miscellaneous: View distance - Less than 500'



6TH AVENUE SE (CNW BRANCH) - Eastbound

ENGINEERING DESIGN NEEDS

Approach warning devices
Unnecessary crossing(s)

DESIGN OPTIONS

Alternative	Estimated Cost
1. Advance warnings	$40
2. Pavement markings	$1,500
3. Remove unnecessary trackage	Minor

Recommended Course of Action	Estimated Total Cost
All alternatives, if track removal is permitted. This crossing should share approach warning devices with the BN crossing a short distance to the west on 6th Avenue.	$1,540

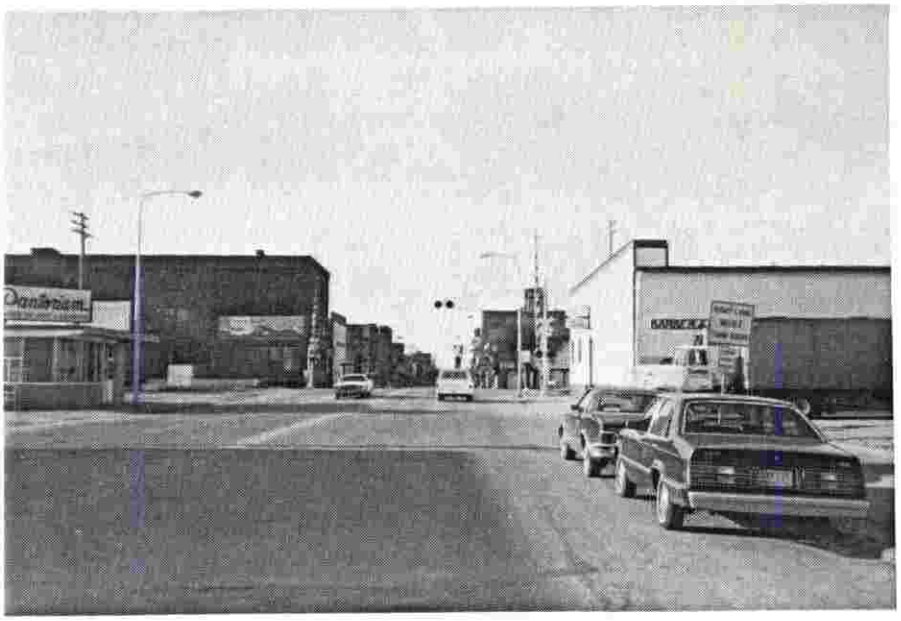
MAIN STREET - Northbound

DATA INVENTORY

Tracks	4	Traffic Lanes	4
Trains/Day	12	Vehicles/Day	6,050
Train Speed	10	Vehicle Speed	20
Bus Crossings/Day (Passengers)	0	Warning Device	Cantilever Signals
Hazardous Matls. Crossings/Day	2	Crossing Surface	Asphalt/Timber Headers
Driveways Within 200'	3	Crossing Angle	90 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Industrial
Accidents - Past Ten Years	1	Approach	Straight, Level
Local Priority	4	Ride	Rough

HAZARD RATING 816

Miscellaneous: View distance - Less than 500'



MAIN STREET - Southbound

ENGINEERING DESIGN NEEDS

Approach warning devices
Sight distance
Traffic area interaction
Crossing surface
Crossing elimination

DESIGN OPTIONS

Alternative	Estimated Cost
1. Advance warning sign on north side	$40
2. Advance warning lights	$2,500
3. Pavement markings on north side	$1,500
4. Speed grooves/rumble strips	$50
5. Improved Illumination	$500
6. New rubber crossing surface	$80,000
7. Remove unnecessary crossings	Minor

Recommended Course of Action	Estimated Total Cost
All Alternatives except #2, which would interfere with existing traffic signals. Two of the crossings will be removed in 1984, and the remaining two will have rubber surfaces installed in 1985, according to the 1985-1989 South Dakota DOT Construction Program.	$82,040

DAKOTA STREET (MAIN LINE) - Northbound

DATA INVENTORY

Tracks	1	Traffic Lanes	3
Trains/Day	12	Vehicles/Day	5,755
Train Speed	10	Vehicle Speed	27
Bus Crossings/Day (Passengers)	10	Warning Device	Cantilever Signals
Hazardous Matls. Crossings/Day	0	Crossing Surface	Rubber
Driveways Within 200'	4	Crossing Angle	90 degrees
Pavement Markings	No	Advance Warning Signs	Yes*
Accidents - Past Two Years	0	Land Use	Commercial
Accidents - Past Ten Years	4	Approach	Straight, Level
Local Priority	1	Ride	Good

HAZARD RATING 789

Miscellaneous: View distance - 1,000'
* This crossing shares advance warning signs with the BN Branch/Dakota Street crossing.

DAKOTA STREET (MAIN LINE) - Southbound

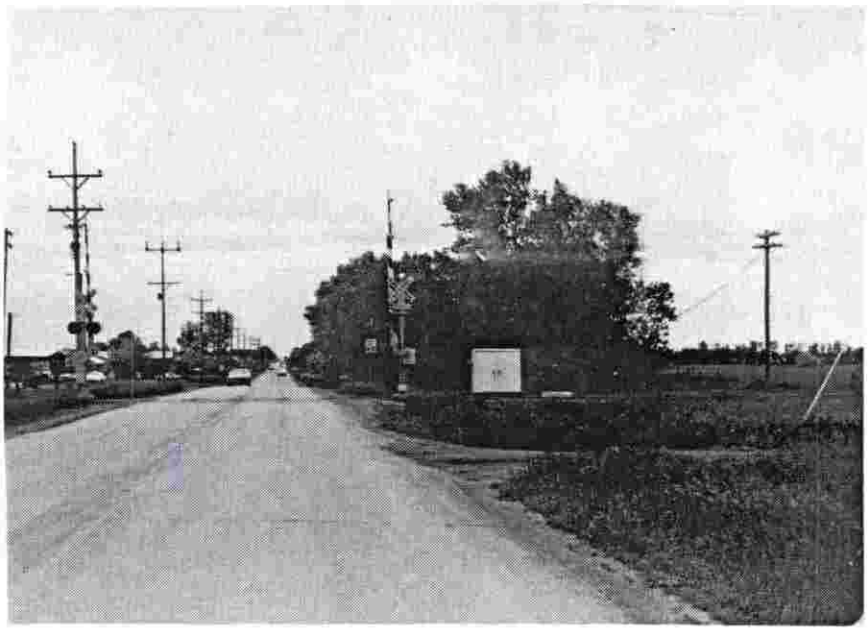
ENGINEERING DESIGN NEEDS

Approach Warning Devices
Traffic area interaction
Sight distance
Warning devices at crossing

DESIGN OPTIONS

Alternative	Estimated Cost
1. Pavement markings	$1,500
2. Curb painting	$50
3. Illumination	$250
4. Gates	$24,000

Recommended Course of Action	Estimated Total Cost
All Alternatives.	$25,800



ROOSEVELT STREET (MAIN LINE) - Northbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	12	Vehicles/Day	5,112
Train Speed	10	Vehicle Speed	32
Bus Crossings/Day (Passengers)	70	Warning Device	Gates/Mast Lights
Hazardous Matls. Crossings/Day	8	Crossing Surface	Asphalt/Timber Headers
Driveways Within 200'	4	Crossing Angle	90 degrees
Pavement Markings	Poor Condition	Advance Warning Signs	Yes
Accidents - Past Two Years	0	Land Use	Residential/Industrial
Accidents - Past Ten Years	1	Approach	Straight, Level
Local Priority	7	Ride	Moderate

HAZARD RATING 783

Miscellaneous: View distance - 1,500'

ROOSEVELT STREET (MAIN LINE) - Southbound

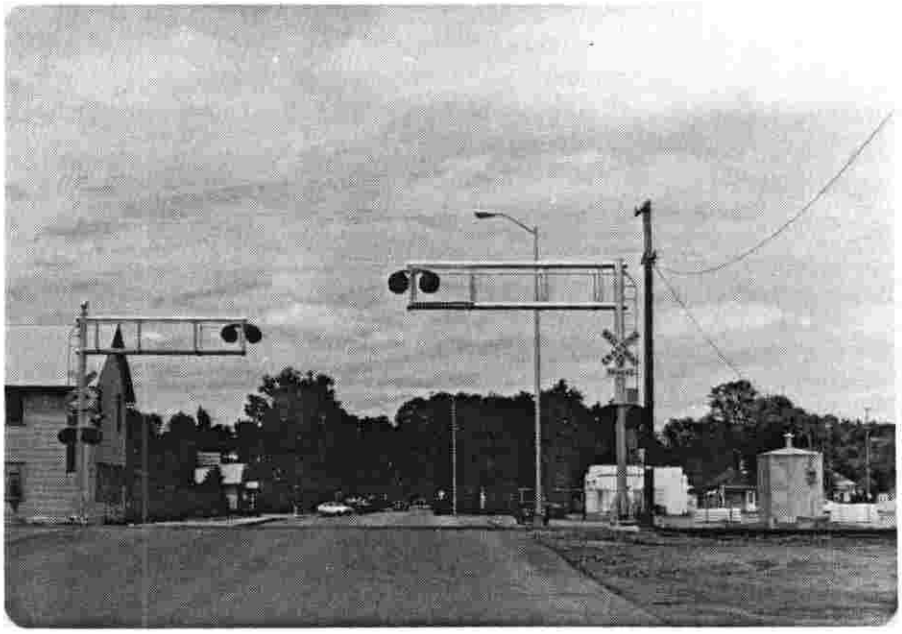
ENGINEERING DESIGN NEEDS

Approach warning device
Crossing surface
Crossing elimination
Sight distance

DESIGN OPTIONS

Alternative	Estimated Cost
1. Pavement markings reconditioned	$1,500
2. Speed grooves/rumble strips	$250
3. Rubber crossing	$70,000
4. Grade separation	$450,000
5. Illumination	$250

Recommended Course of Action	Estimated Total Cost
#1, 2, 3, and 5 or #4. Alternative #3 is a project in the South Dakota Highway Construction Program. Alternative #4 should be implemented only if train traffic warrants the large expenditure.	$72,000 (#4--$450,000)



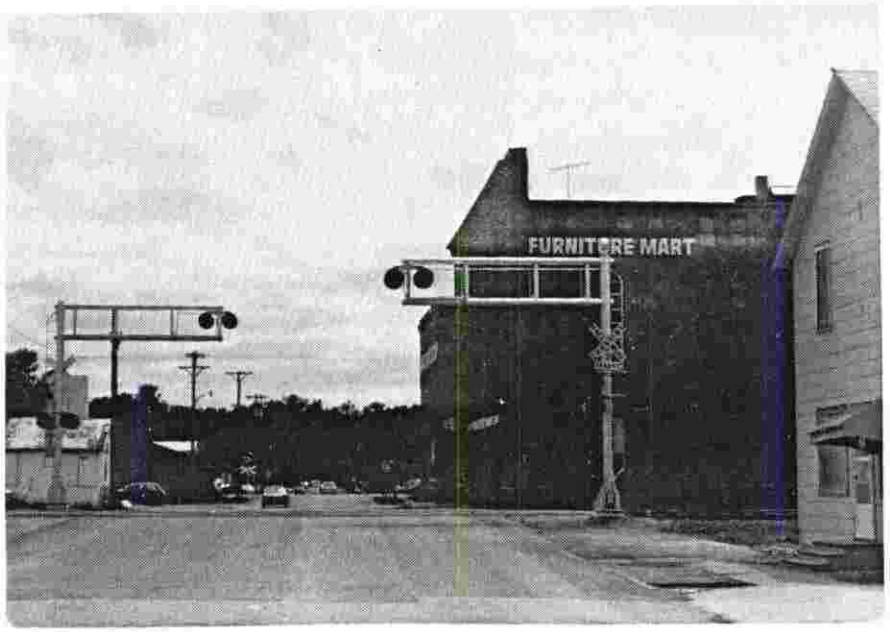
KLINE STREET (MAIN LINE) - Northbound

DATA INVENTORY

Tracks	2	Traffic Lanes	2
Trains/Day	12	Vehicles/Day	4,411
Train Speed	10	Vehicle Speed	23
Bus Crossings/Day (Passengers)	80	Warning Device	Cantilever Signals
Hazardous Matls. Crossings/Day	1	Crossing Surface	Rubber
Driveways Within 200'	7	Crossing Angle	90 degrees
Pavement Markings	No	Advance Warning Signs	Yes
Accidents - Past Two Years	0	Land Use	Commercial
Accidents - Past Ten Years	1	Approach	Straight, Level
Local Priority	3	Ride	Good

HAZARD RATING	639

Miscellaneous: View distance - Less than 500'



KLINE STREET (MAIN LINE) - Southbound

ENGINEERING DESIGN NEEDS

Approach warning devices
Sight distance
Crossing elimination

DESIGN OPTIONS

Alternative	Estimated Cost
1. Pavement marking	$1,500
2. Illumination	$250
3. Remove unnecessary trackage	Minor

Recommended Course of Action	Estimated Total Cost
All Alternatives.	$1,750

8TH AVENUE SE - Westbound

DATA INVENTORY

Tracks	2	Traffic Lanes	2
Trains/Day	0.5	Vehicles/Day	690
Train Speed	10	Vehicle Speed	17
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	40	Crossing Surface	Sectional Timber
Driveways Within 200'	5	Crossing Angle	70 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Residential/Commercial
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Rough

HAZARD RATING 458

Miscellaneous: View distance - Less than 500'

8TH AVENUE SE - Eastbound

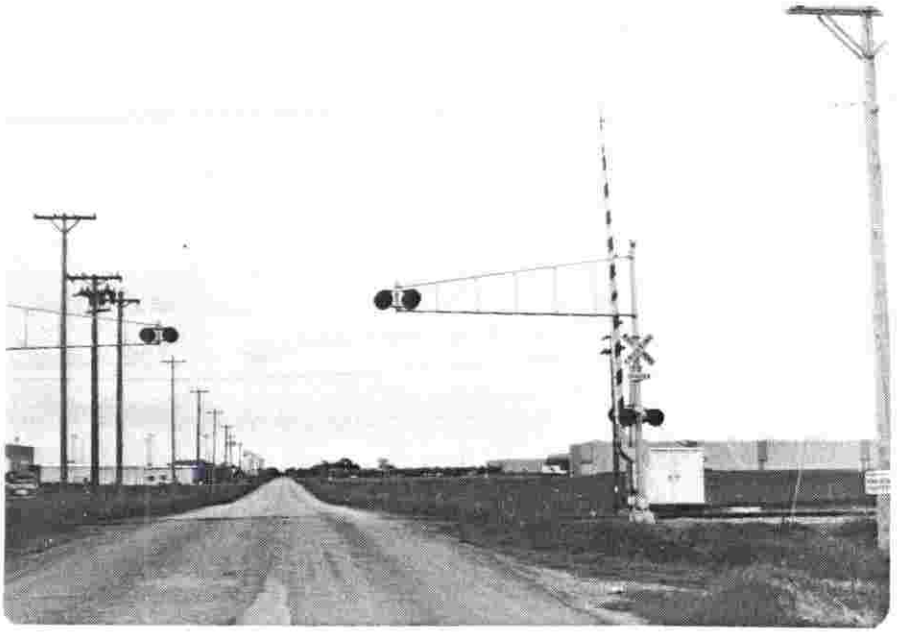
ENGINEERING DESIGN NEEDS

Approach warning devices
Crossing Surface

DESIGN OPTIONS

Alternative	Estimated Cost
1. Advance warning signs	$80
2. Pavement markings	$1,500
3. Crossing maintenance	Minor

Recommended Course of Action	Estimated Total Cost
Alternatives #1 and #3. Pavement markings are not needed at this low traffic location. Crossing maintenance would include assuring that the timber sections are secure and the street approaches are properly aligned.	$1,580



BROWN COUNTY #19 (MAIN LINE) - Northbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	12	Vehicles/Day	2,287
Train Speed	10	Vehicle Speed	37
Bus Crossings/Day (Passengers)	20	Warning Device	Cantilever Lights
Hazardous Matls. Crossings/Day	8	Crossing Surface	Asphalt/Timber Headers
Driveways Within 200'	0	Crossing Angle	90 degrees
Pavement Markings	Poor Condition	Advance Warning Signs	Yes
Accidents - Past Two Years	0	Land Use	Agricultural
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	14	Ride	Rough

HAZARD RATING 405

Miscellaneous: View distance - 2,000'

BROWN COUNTY #19 (MAIN LINE) - Southbound

ENGINEERING DESIGN NEEDS

Crossing surface
Sight distance
Approach warning devices

DESIGN OPTIONS

Alternative	Estimated Cost
1. Rubber crossing	$70,000
2. Illumination	$250
3. Pavement markings reconditioned	$1,500
4. Speed grooves/Rumble strips	$250

Recommended Course of Action	Estimated Total Cost
All alternatives. Alternative #1 is a project in the South Dakota Highway Construction Program.	$72,000

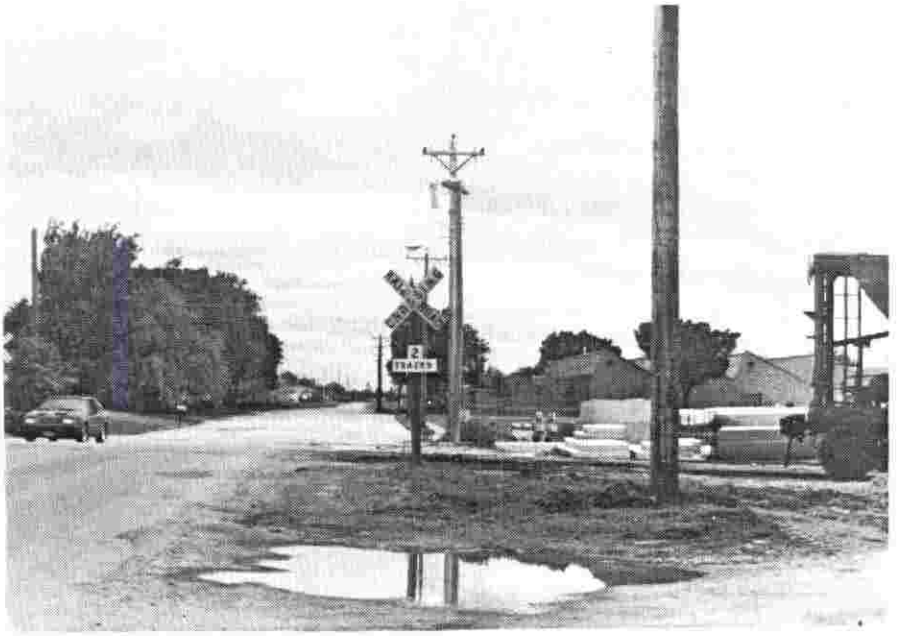
1ST AVENUE SE (CNW BRANCH) - Westbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	0.5	Vehicles/Day	2,221
Train Speed	10	Vehicle Speed	20
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	2	Crossing Angle	70 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Industrial
Accidents - Past Ten Years	3	Approach	Straight, Level
Local Priority	15	Ride	Moderate

HAZARD RATING 279

Miscellaneous: View distance - 500'



1ST AVENUE SE (CNW BRANCH) - Eastbound

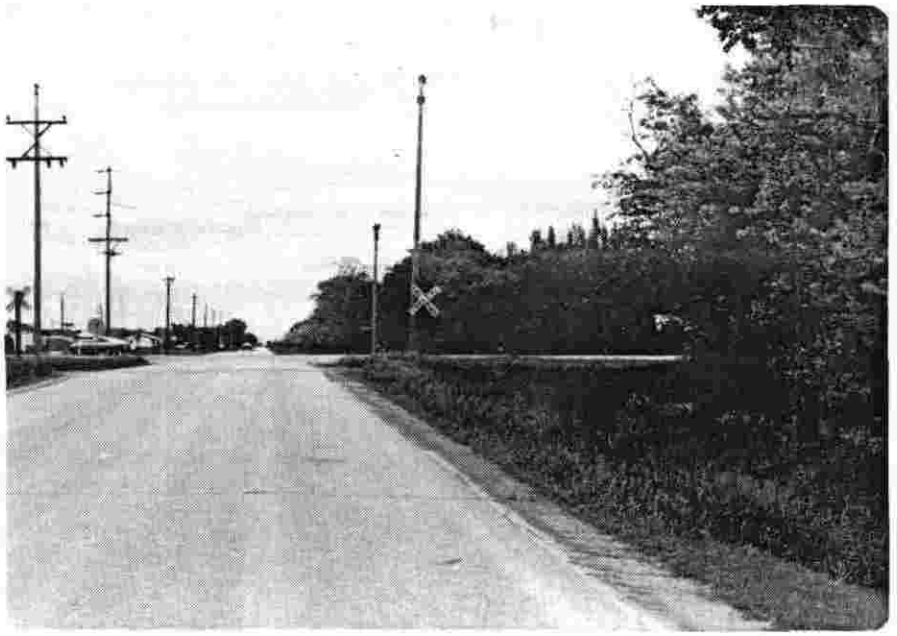
ENGINEERING DESIGN NEEDS

Approach warning devices
Traffic area interaction
Sight distance
Crossing surface

DESIGN OPTIONS

Alternative	Estimated Cost
1. Advance warning signs	$80
2. Pavement markings	$1,500
3. Curb painting	$50
4. Illumination*	$250
5. Rubber crossing	$70,000

Recommended Course of Action	Estimated Total Cost
Alternatives #1, #3, and #5. Alternative #2 is not needed because of low rail traffic and uncertain future. Illumination (#4) previously recommended on Dakota Street should provide adequate lighting for both the crossing and the high traffic street intersection. Alternative #5 is a scheduled project for 1985 in the 1985-1989 South Dakota DOT Construction Program.	$70,130



ROOSEVELT STREET (BN BRANCH) - Northbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	1	Vehicles/Day	5,112
Train Speed	10	Vehicle Speed	32
Bus Crossings/Day (Passengers)	70	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	8	Crossing Surface	Asphalt
Driveways Within 200'	3	Crossing Angle	50 degrees
Pavement Markings	Poor Condition	Advance Warning Signs	Yes
Accidents - Past Two Years	0	Land Use	Agricultural
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Good

HAZARD RATING 221

Miscellaneous: View distance - 1,000'

ROOSEVELT STREET (BN BRANCH) - Southbound

ENGINEERING DESIGN NEEDS

Approach warning devices
Crossing Surface

DESIGN OPTIONS

Alternative	Estimated Cost
1. Pavement markings reconditioned	$1,500
2. Rubber Crossing	$64,000

Recommended Course of Action	Estimated Total Cost
Both Alternatives. Additionally the pavement markings on the south side may be too far away to be effective. Alternative #2 is a scheduled project in the 1985-1989 South Dakota DOT Construction Program.	$65,500

MELGAARD ROAD - Westbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	1	Vehicles/Day	3,577
Train Speed	10	Vehicle Speed	15
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt/Timber Header
Driveways Within 200'	0	Crossing Angle	90 degrees
Pavement Markings	Incomplete, Faded	Advance Warning Signs	Yes
Accidents - Past Two Years	0	Land Use	Residential
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	13	Ride	Good

HAZARD RATING 204

Miscellaneous: View distance - 1,000'

MELGAARD ROAD - Eastbound

ENGINEERING DESIGN NEEDS

Approach Warning Devices
Sight distance

DESIGN OPTIONS

Alternative	Estimated Cost
1. Pavement markings	$1,500
2. Illumination	$250
Recommended Course of Action	**Estimated Total Cost**
Both alternatives	$1,750

BROWN COUNTY #19 (BN BRANCH) - Northbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	1	Vehicles/Day	400
Train Speed	10	Vehicle Speed	37
Bus Crossings/Day (Passengers)	50	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	8	Crossing Surface	Asphalt
Driveways Within 200'	2	Crossing Angle	70 degrees
Pavement Markings	Poor Condition	Advance Warning Signs	Yes
Accidents - Past Two Years	0	Land Use	Agricultural, Recreational
Accidents - Past Ten Years	1	Approach	Straight, Level
Local Priority	15	Ride	Rough

HAZARD RATING 187

Miscellaneous: View distance - 2,000'

BROWN COUNTY #19 (BN BRANCH) - Southbound

ENGINEERING DESIGN NEEDS

Warning Device at Crossing
Approach Warning Devices
Crossing Surface

DESIGN OPTIONS

Alternative	Estimated Cost
1. Crossbucks for northbound traffic	$40
2. Pavement markings reconditioned	$1,500
3. Rubber crossing	$40,000

Recommended Course of Action	Estimated Total Cost
All alternatives. Alternative #3 is a scheduled project in the 1985-1989 South Dakota DOT Construction Program.	$41,540

FAIRGROUNDS ROAD - Westbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	0.5	Vehicles/Day	1,050
Train Speed	10	Vehicle Speed	43
Bus Crossings/Day (Passengers)	147	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	0	Crossing Angle	70 degrees
Pavement Markings	Faded	Advance Warning Signs	Yes
Accidents - Past Two Years	0	Land Use	Agricultural
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Moderate

HAZARD RATING 181

Miscellaneous: View distance - 500'

FAIRGROUNDS ROAD - Eastbound

ENGINEERING DESIGN NEEDS

Approach warning device

DESIGN OPTIONS

Alternative	Estimated Cost
1. Pavement markings restored	$1,500

Recommended Course of Action	Estimated Total Cost
Alternative #1. The segment of rail line that includes this crossing could be abandoned in the near future. If this occurs, track removal is the only appropriate alternative.	$1,500

STATE STREET (BN SPUR) - Northbound

DATA INVENTORY

Tracks	3	Traffic Lanes	2
Trains/Day	0.5	Vehicles/Day	6,930
Train Speed	10	Vehicle Speed	22
Bus Crossings/Day (Passengers)	89	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	1	Crossing Surface	Asphalt
Driveways Within 200'	3	Crossing Angle	80 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Commercial
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	10	Ride	Poor

HAZARD RATING 165

Miscellaneous: View distance - Less than 500'

STATE STREET (BN SPUR) - Southbound

ENGINEERING DESIGN NEEDS

Approach warning devices
Crossing elimination

DESIGN OPTIONS

Alternative	Estimated Cost
1. Advance warning sign to the south	$40
2. Pavement markings	$1,500
3. Remove unnecessary trackage	Minor

Recommended Course of Action	Estimated Total Cost
All Alternatives. Advance warning sign is not needed for southbound traffic due to the proximity to the main line crossing on State Street.	$1,540

KLINE STREET (BN SPUR) - Northbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	0.5	Vehicles/Day	4,411
Train Speed	10	Vehicle Speed	23
Bus Crossings/Day (Passengers)	80	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	1	Crossing Surface	Asphalt
Driveways Within 200'	3	Crossing Angle	90 degrees
Pavement Markings	No	Advance Warning Signs	Yes
Accidents - Past Two Years	0	Land Use	Commercial
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	11	Ride	Moderate

HAZARD RATING 162

Miscellaneous: View distance - Less than 500'

KLINE STREET (BN SPUR) - Southbound

ENGINEERING DESIGN NEEDS

Crossing Elimination

DESIGN OPTIONS

Alternative	Estimated Cost
1. Remove unnecessary trackage	Minor

Recommended Course of Action	Estimated Total Cost
Alternative #1. Approach warning devices are shared with the main line/Kline Street crossing.	Minor

3RD AVENUE SW - Westbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	1	Vehicles/Day	3,652
Train Speed	10	Vehicle Speed	26
Bus Crossings/Day (Passengers)	45	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	1	Crossing Angle	90 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Open Space
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	_	Ride	Good

HAZARD RATING 162

Miscellaneous: View distance - Less than 500'

3RD AVENUE SW - Eastbound

ENGINEERING DESIGN NEEDS

Warning device at crossing
Approach warning devices
Sight distance

DESIGN OPTIONS

Alternative	Estimated Cost
1. Reflectorized crossbucks	$80
2. Pavement markings	$1,500
3. Advance warning signs	$80
4. Improved illumination	$250

Recommended Course of Action	Estimated Total Cost
All alternatives	$1,910

8TH AVENUE NE - Westbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	0.5	Vehicles/Day	5,678
Train Speed	10	Vehicle Speed	28
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	3	Crossing Angle	70 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Residential
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Rough

HAZARD RATING 135

Miscellaneous: View distance - 1,000'

8TH AVENUE NE - Eastbound

ENGINEERING DESIGN NEEDS

Approach warning devices
Traffic area interaction
Sight distance

DESIGN OPTIONS

Alternative	Estimated Cost
1. Advance warning signs	$80
2. Pavement markings	$1,500
3. Curb painting	$50
4. Illumination	$250

Recommended Course of Action	Estimated Total Cost
All alternatives. Despite the low rail traffic and questionable future of this line, a new rubber crossing is currently being installed.	$1,880

3RD AVENUE SE (CNW BRANCH) - Westbound

DATA INVENTORY

Tracks	2	Traffic Lanes	2
Trains/Day	0.5	Vehicles/Day	8,556
Train Speed	10	Vehicle Speed	15
Bus Crossings/Day (Passengers)	25	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	2	Crossing Angle	70 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Industrial
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Good

HAZARD RATING 103

Miscellaneous: View distance - Less than 500'

3RD AVENUE SE (CNW BRANCH) - Eastbound

ENGINEERING DESIGN NEEDS

Approach warning devices
Traffic Area Interaction
Sight Distance

DESIGN OPTIONS

Alternative	Estimated Cost
1. Advance warning signs westbound	$40
2. Pavement markings westbound	$750
3. Crossing/street intersection engineering design study	Minor

Recommended Course of Action	Estimated Total Cost
All alternatives. Advance warning devices should be shared between all 3rd Avenue crossings. Since Dakota Street is a new, high traffic route, an engineering design study for preemptive signals may be necessary to avoid potential conflicts at the Dakota/3rd Avenue intersection caused by train movements.	$790

3RD AVENUE SE (CNW SPUR) - Westbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	0.5	Vehicles/Day	8,556
Train Speed	10	Vehicle Speed	15
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	4	Crossing Angle	80 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Commercial
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Moderate

HAZARD RATING 98

Miscellaneous: View distance - Less than 500'

3RD AVENUE SE (CNW SPUR) - Eastbound

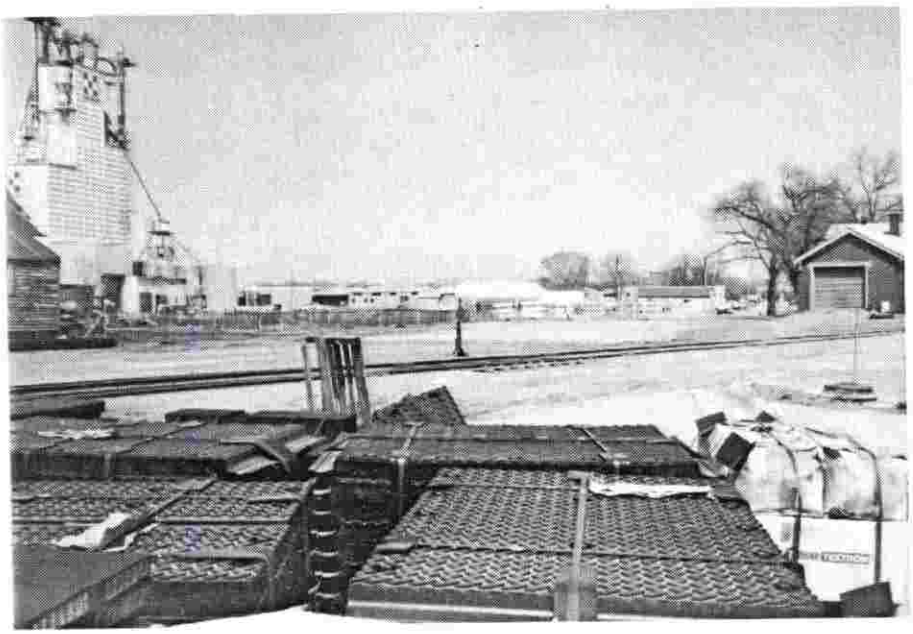
ENGINEERING DESIGN NEEDS

Crossing elimination

DESIGN OPTIONS

Alternative	Estimated Cost
1. Track Removal	Minor

Recommended Course of Action	Estimated Total Cost
Alternative #1, if rail traffic no longer exists on siding.	Minor



DAKOTA STREET (CNW BRANCH)* - Northbound

DATA INVENTORY

Tracks	1	Traffic Lanes	3
Trains/Day	0.5	Vehicles/Day	5,755
Train Speed	10	Vehicle Speed	27
Bus Crossings/Day (Passengers)	10	Warning Device	None
Hazardous Matls. Crossings/Day	0	Crossing Surface	Rubber
Driveways Within 200'	1	Crossing Angle	20 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Commercial
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	9	Ride	Good

HAZARD RATING 93

Miscellaneous: View distance - Less than 500'
*This crossing is under construction.
Signals are to be installed.

DAKOTA STREET (CNW BRANCH) - Southbound

ENGINEERING DESIGN NEEDS

Warning devices at crossings
Approach warning devices
Traffic area interaction
Sight distance

DESIGN OPTIONS

Alternative	Estimated Cost
1. Crossbucks	$80
2. Advance warning signs	$80
3. Pavement markings	$1,500
4. Curb painting	$50
5. Illumination	$250

Recommended Course of Action	Estimated Total Cost
All Alternatives except #3 because of nearby BN crossings, low train traffic, and uncertain future of the rail line.	$460

3RD AVENUE SE (BN SPUR) - Westbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	0.5	Vehicles/Day	8,556
Train Speed	10	Vehicle Speed	15
Bus Crossings/Day (Passengers)	25	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	3	Crossing Angle	70 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Commercial
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Good

HAZARD RATING 88

Miscellaneous: View distance - Less than 500'

3RD AVENUE SE (BN SPUR) - Eastbound

ENGINEERING DESIGN NEEDS

Approach warning devices
Traffic area interaction
Crossing surface

DESIGN OPTIONS

Alternative	Estimated Cost
1. Pavement marking	$1,500
2. Curb painting	$50
3. Rubber crossing	$48,000

Recommended Course of Action	Estimated Total Cost
All alternatives. Pavement markings should be shared between all 3rd Avenue crossings. Alternative #3 is a scheduled project in the 1985-1989 South Dakota DOT Construction Program. Low rail traffic levels may not justify a rubber crossing, but some new crossing material should be installed.	$49,550

FIFTH STREET S. - Northbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	0	Vehicles/Day	2,500
Train Speed	0	Vehicle Speed	25
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	2	Crossing Angle	35 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Industrial
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	6	Ride	Rough

HAZARD RATING 80

Miscellaneous: View distance - Less than 500'

FIFTH STREET S. - Southbound

ENGINEERING DESIGN NEEDS

Advance warning devices

DESIGN OPTIONS

Alternative	Estimated Cost
1. Pavement markings	$1,500
2. Advance warning signs	$80

Recommended Course of Action	Estimated Total Cost
Both alternatives. However, if a rail user does not locate in the warehouse formerly operated by the Farmers Union, this crossing trackage can at least be paved over.	$1,580

BROWN COUNTY #17 - Westbound

DATA INVENTORY

Tracks	1	Traffic Lanes	4
Trains/Day	1	Vehicles/Day	5,554
Train Speed	10	Vehicle Speed	43
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	0	Crossing Angle	40 degrees
Pavement Markings	Poor Condition/West Side	Advance Warning Signs	Yes
Accidents - Past Two Years	0	Land Use	Agricultural
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Good

HAZARD RATING 66

Miscellaneous: View distance - 2,000'

BROWN COUNTY #17 - Eastbound

ENGINEERING DESIGN NEEDS

Advance warning device
Sight distance
Crossing surface

DESIGN OPTIONS

Alternative	Estimated Cost
1. Pavement markings reconditioned on west side	$750
2. Speed grooves/rumble strips	$250
3. Trim trees nearest to crossing in southeast quandrant	Minor
4. Rubber crossing	$40,000

Recommended Course of Action	Estimated Total Cost
Alternatives #1, #3, and #4. Alternative #2 is not necessary because of low rail traffic. Alternative #4 is a scheduled project in the South Dakota DOT Construction Program.	$40,750

2ND AVENUE SE (BN SPUR) - Westbound

DATA INVENTORY

Tracks	2	Traffic Lanes	2
Trains/Day	0.5	Vehicles/Day	1,800
Train Speed	10	Vehicle Speed	18
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	3	Crossing Angle	80 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Industrial
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Rough

HAZARD RATING 64

Miscellaneous: View distance - Less than 500'

2ND AVENUE SE (BN SPUR) - Eastbound

ENGINEERING DESIGN NEEDS

Approach warning devices
Traffic area interaction
Crossing surface

DESIGN OPTIONS

Alternative	Estimated Cost
1. Advance warning signs	$80
2. Pavement markings	$1,500
3. Curb painting	$80
4. Rubber crossing	$40,000

Recommended Course of Action	Estimated Total Cost
Alternatives #1 and #3. Alternatives #2 and 4 are not needed at this low traffic location for both modes.	$160

2ND AVENUE SE (CNW SPUR) - Westbound

DATA INVENTORY

Tracks	2	Traffic Lanes	2
Trains/Day	0.5	Vehicles/Day	1,800
Train Speed	10	Vehicle Speed	18
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Timber Section, Gravel
Driveways Within 200'	0	Crossing Angle	85 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Industrial
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Rough

HAZARD RATING 64

Miscellaneous: View distance - Less than 500'

2ND AVENUE SE (CNW SPUR) - Eastbound

ENGINEERING DESIGN NEEDS

Approach warning devices
Crossing elimination

DESIGN OPTIONS

Alternative	Estimated Cost
1. Advance warning signs	$80
2. Track removal	Minor

Recommended Course of Action	Estimated Total Cost
Either alternative, preferably #2. Although this is a lightly traveled street, advance warning signs are still appropriate if the crossing is not removed.	$80 (Max.)

DAKOTA STREET (BN BRANCH) - Northbound

DATA INVENTORY

Tracks	1	Traffic Lanes	3
Trains/Day	0.5	Vehicles/Day	5,755
Train Speed	10	Vehicle Speed	27
Bus Crossings/Day (Passengers)	10	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Rubber
Driveways Within 200'	5	Crossing Angle	60 degrees
Pavement Markings	No	Advance Warning Signs	Yes*
Accidents - Past Two Years	0	Land Use	Commercial
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	8	Ride	Good

HAZARD RATING 63

Miscellaneous: View distance - 1,000'
*This crossing shares advance warning signs with the Main Line/Dakota Street Crossing.

DAKOTA STREET (BN BRANCH) - Southbound

ENGINEERING DESIGN NEEDS

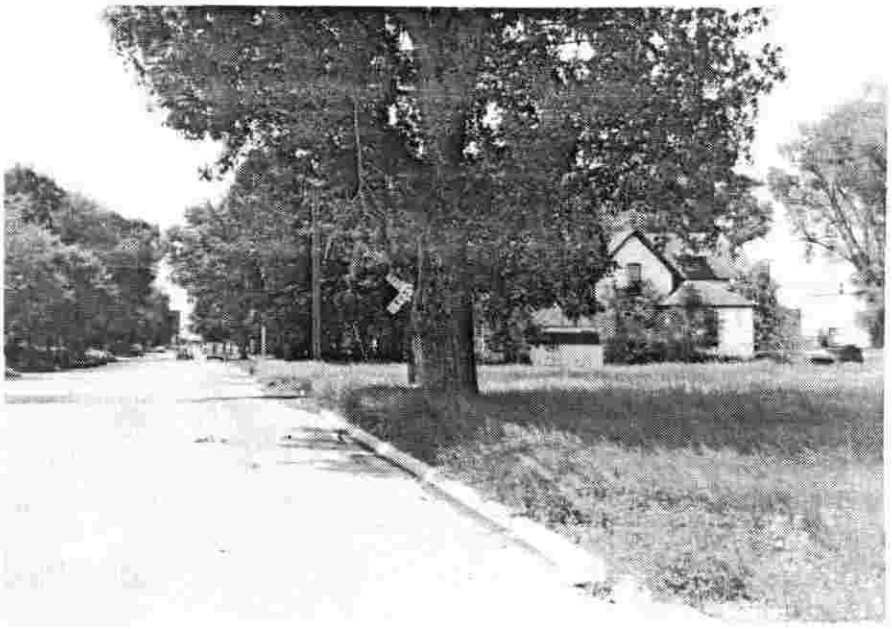
Warning devices at crossing
Approach warning devices
Traffic area interaction

DESIGN OPTIONS

Alternative	Estimated Cost
1. Move crossbuck for southbound lane back to crossing	Minor
2. Pavement markings*	----
3. Curb painting	$50

Recommended Course of Action	Estimated Total Cost
All 3 Alternatives	$50

*Pavement markings should be shared with the Main Line/Dakota Street crossing.



1ST AVENUE SE (BN SPUR) - Westbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	0.5	Vehicles/Day	2,221
Train Speed	10	Vehicle Speed	20
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	3	Crossing Angle	70 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Residential
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Moderate

HAZARD RATING 51

Miscellaneous: View distance - Less than 500'

1ST AVENUE SE (BN SPUR) - Eastbound

ENGINEERING DESIGN NEEDS

Warning devices at crossing
Approach warning devices
Traffic area interaction
Crossing surface

DESIGN OPTIONS

Alternative	Estimated Cost
1. Move westbound crossbuck clear of tree	Minor
2. Advance warning signs	$80
3. Pavement markings	$1,500
4. Curb painting	$50
5. Rubber crossing	$66,000

Recommended Course of Action	Estimated Total Cost
Alternatives #1, 2, and 4. Alternative #3 is not needed because of low train traffic. Although this crossing is relatively lightly used, especially by rail, a rubber crossing (Alternative #5) is scheduled to be installed in 1985, according to the South Dakota DOT Construction Program.	$67,630

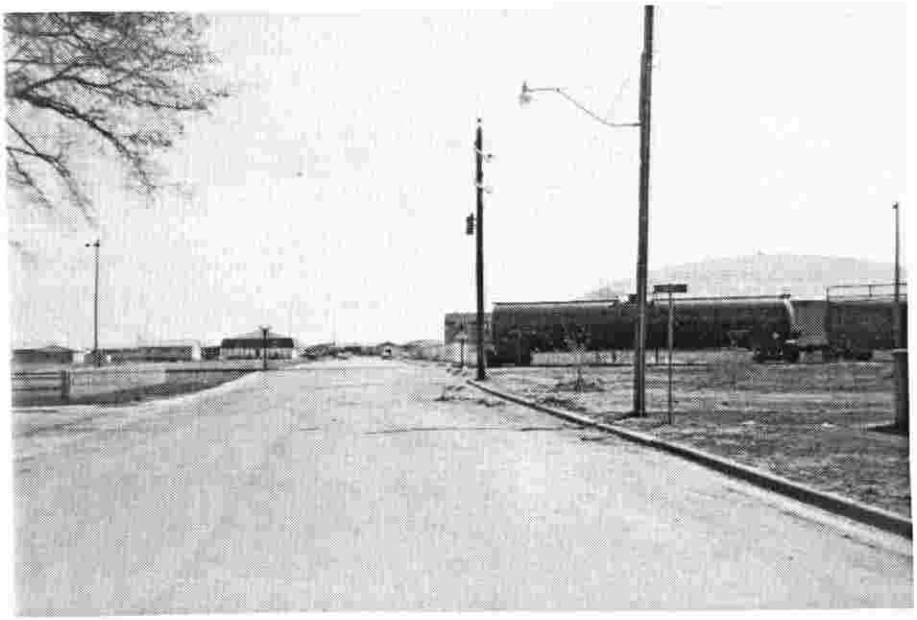
3RD AVENUE NE - Westbound

DATA INVENTORY

Tracks	2	Traffic Lanes	2
Trains/Day	0.5	Vehicles/Day	500
Train Speed	10	Vehicle Speed	16
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Timber Section, Plank
Driveways Within 200'	1	Crossing Angle	70 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Industrial
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Rough

HAZARD RATING 46

Miscellaneous: View distance - 1,000'



3RD AVENUE NE - Eastbound

ENGINEERING DESIGN NEEDS

Approach warning devices
Traffic area interaction

DESIGN OPTIONS

Alternative	Estimated Cost
1. Advance warning signs	$80
2. Pavement markings	$1,500
3. Curb painting	$50

Recommended Course of Action	Estimated Total Cost
Alternative #1 and #3. Pavement markings are not needed at this traffic location.	$130

5TH AVENUE NE - Westbound

DATA INVENTORY

Tracks	2	Traffic Lanes	2
Trains/Day	0.5	Vehicles/Day	500
Train Speed	10	Vehicle Speed	16
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	4	Crossing Angle	70 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Residential
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Rough

HAZARD RATING 46

Miscellaneous: View distance - 1,000'

5TH AVENUE NE - Eastbound

ENGINEERING DESIGN NEEDS

Approach warning devices
Traffic area interaction

DESIGN OPTIONS

Alternative	Estimated Cost
1. Advance warning signs	$80
2. Pavement markings	$1,500
3. Curb painting	$50

Recommended Course of Action	Estimated Total Cost
Alternatives #1 and #3. Pavement markings are not needed at this low traffic location.	$130

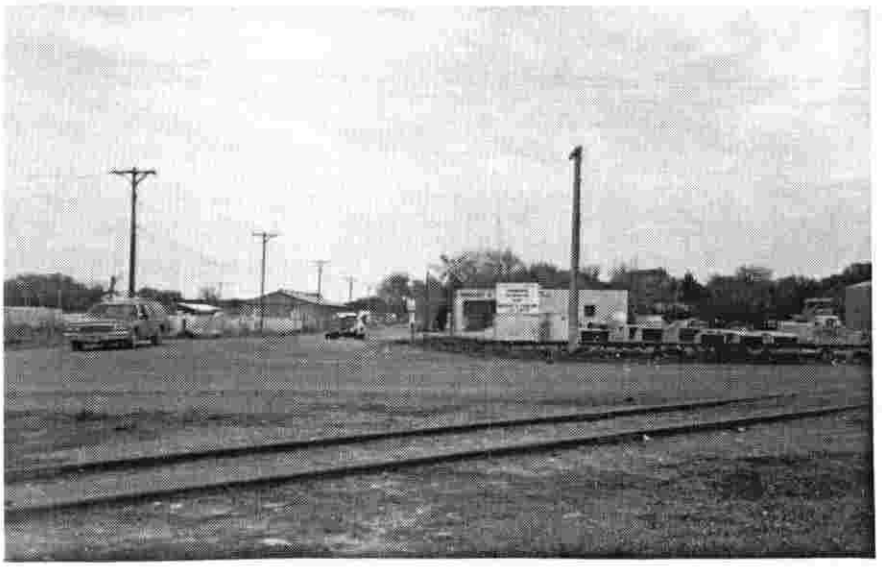
12TH AVENUE SW - Westbound

DATA INVENTORY

Tracks	2	Traffic Lanes	2
Trains/Day	1	Vehicles/Day	1,289
Train Speed	10	Vehicle Speed	15
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	2	Crossing Angle	90 degrees
Pavement Markings	No	Advance Warning Signs	East Side
Accidents - Past Two Years	0	Land Use	Industrial
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Good

HAZARD RATING 43

Miscellaneous: View distance - Less than 500'



12TH AVENUE SW - Eastbound

ENGINEERING DESIGN NEEDS

Sight distance
Advance warning signs

DESIGN OPTIONS

Alternative	Estimated Cost
1. Illumination	$250
2. Pavement markings to the east	$750

Recommended Course of Action	Estimated Total Cost
Both alternatives.	$1,000

9TH AVENUE SE - Westbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	0.5	Vehicles/Day	300
Train Speed	10	Vehicle Speed	20
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	4	Crossing Angle	70 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Residential
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Rough

HAZARD RATING 42

Miscellaneous: View distance - Less than 500'

9TH AVENUE SE - Eastbound

ENGINEERING DESIGN NEEDS

Approach warning devices
Crossing surface

DESIGN OPTIONS

Alternative	Estimated Cost
1. Advance warning signs	$80
2. Pavement markings	$1,500
3. New crossing	$22,000

Recommended Course of Action	Estimated Total Cost
Alternatives #1 and #3. Pavement markings are not needed at this low traffic location. Alternative #3 is a scheduled project in the 1985-1989 South Dakota DOT Construction Program.	$22,080

9TH AVENUE SW (AT GAGE BROS.) - Westbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	0	Vehicles/Day	550
Train Speed	0	Vehicle Speed	13
Bus Crossings/Day (Passengers)	12	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	3	Crossing Angle	90 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Industrial
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Rough

HAZARD RATING 42

Miscellaneous: View distance - Less than 500'

9TH AVENUE SW (AT GAGE BROS.) - Eastbound

ENGINEERING DESIGN NEEDS

Sight distance
Advance warning devices

DESIGN OPTIONS

Alternative	Estimated Cost
1. Illumination	$250
2. Pavement markings to the east	$750

Recommended Course of Action	Estimated Total Cost
Both alternatives. However, if a rail user does not locate in the warehouse formerly operated by the Farmers Union, this crossing trackage can be removed.	$1,000

9TH AVENUE SW (SD CORE) - Westbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	1	Vehicles/Day	550
Train Speed	10	Vehicle Speed	18
Bus Crossings/Day (Passengers)	12	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	3	Crossing Angle	90 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Industrial
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Rough

HAZARD RATING 36

Miscellaneous: View distance - Less than 500'

9TH AVENUE SW (SD CORE) - Eastbound

ENGINEERING DESIGN NEEDS

Sight distance
Advance warning devices

DESIGN OPTIONS

Alternative	Estimated Cost
1. Illumination	$250
2. Pavement markings to the east	$750
3. Advance Warning Sign to the east	$40

Recommended Course of Action	Estimated Total Cost
All alternatives.	$1,040

9TH AVENUE SW (WEST END) - Westbound

DATA INVENTORY

Tracks	2	Traffic Lanes	2
Trains/Day	0	Vehicles/Day	200
Train Speed	0	Vehicle Speed	18
Bus Crossings/Day (Passengers)	0	Warning Device	1 Crossbuck on west side
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	2	Crossing Angle	45 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Residential
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Rough

HAZARD RATING 35

Miscellaneous: View distance - Less than 500'

9TH AVENUE SW (WEST END) - Eastbound

ENGINEERING DESIGN NEEDS

Crossing elimination

DESIGN OPTIONS

Alternative	Estimated Cost
1. Track removal	Minor

Recommended Course of Action	Estimated Total Cost
Alternative #1. Although this crossing was part of the line that served the abandoned Dakota Transfer grain elevator, no shipping is currently present with no prospects for future traffic.	Minor

2ND AVENUE NW - Westbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	0	Vehicles/Day	50
Train Speed	0	Vehicle Speed	15
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbuck on east side
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt on Wood Plank
Driveways Within 200'	3	Crossing Angle	80 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Open Space
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Rough

HAZARD RATING 31

Miscellaneous: View distance -

2ND AVENUE NW - Eastbound

ENGINEERING DESIGN NEEDS

Crossing elimination

DESIGN OPTIONS

Alternative	Estimated Cost
1. Track removal	Minor

Recommended Course of Action

Since this track does not appear to be used for switching operations, the crossing can be removed.

Estimated Total Cost

Minor

8TH AVENUE SW - Westbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	0	Vehicles/Day	500
Train Speed	0	Vehicle Speed	18
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	2	Crossing Angle	45 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Residential
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Rough

HAZARD RATING 30

Miscellaneous: View distance - Less than 500'

8TH AVENUE SW - Eastbound

ENGINEERING DESIGN NEEDS

Crossing elimination

DESIGN OPTIONS

Alternative	Estimated Cost
1. Track Removal	Minor

Recommended Course of Action	Estimated Total Cost
Alternative #1. Although this crossing was part of the line that served the abandoned Dakota Transfer grain elevator, no shipping is currently present with no prospects for future traffic.	Minor

12TH STREET S. - Northbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	0	Vehicles/Day	50
Train Speed	0	Vehicle Speed	12
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Gravel
Driveways Within 200'	4	Crossing Angle	60 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Agricultural
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Rough

HAZARD RATING 29

Miscellaneous: View distance - 500'

12TH STREET - Southbound

ENGINEERING DESIGN NEEDS

Crossing elimination

DESIGN OPTIONS

Alternative	Estimated Cost
1. Track Removal	Minor

Recommended Course of Action	Estimated Total Cost
Alternatives #1. Although this crossing was part of the line that served the abandoned Dakota Transfer grain elevator, no shipping is currently present with no prospects for future traffic.	Minor

1ST AVENUE SE (BN BRANCH) - Westbound

DATA INVENTORY

Tracks	1	Traffic Lanes	2
Trains/Day	0	Vehicles/Day	2,221
Train Speed	0	Vehicle Speed	20
Bus Crossings/Day (Passengers)	0	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Asphalt
Driveways Within 200'	1	Crossing Angle	70 degrees
Pavement Markings	No	Advance Warning Signs	No
Accidents - Past Two Years	0	Land Use	Open Space
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Moderate

HAZARD RATING 27

Miscellaneous: View distance - Less than 500'

1ST AVENUE SE (BN BRANCH) - Eastbound

ENGINEERING DESIGN NEEDS

Crossing elimination

DESIGN OPTIONS

Alternative	Estimated Cost
1. Track removal	Minor

Recommended Course of Action	Estimated Total Cost
Alternative #1 is scheduled for 1984.	Minor

PRIVATE CEMETARY ROAD - Northbound

DATA INVENTORY

Tracks	1	Traffic Lanes	1
Trains/Day	12	Vehicles/Day	10
Train Speed	10	Vehicle Speed	10
Bus Crossings/Day (Passengers)	6	Warning Device	Crossbucks
Hazardous Matls. Crossings/Day	0	Crossing Surface	Wood Plank
Driveways Within 200'	1	Crossing Angle	90 degrees
Pavement Markings	No	Advance Warning Signs	South Side Only
Accidents - Past Two Years	0	Land Use	Institutional
Accidents - Past Ten Years	0	Approach	Straight, Level
Local Priority	15	Ride	Good

HAZARD RATING 7

Miscellaneous: View distance - 2,000'

PRIVATE CEMETARY ROAD - Southbound

ENGINEERING DESIGN NEEDS

DESIGN OPTIONS

Alternative	Estimated Cost
Recommended Course of Action	Estimated Total Cost

This is an infrequently used, slow speed crossing. Stop signs placed at crossing further improves safety. No further improvements are warranted.

15TH AVENUE SW - Westbound

DATA INVENTORY

Tracks	1	Traffic Lanes	—
Trains/Day	1	Vehicles/Day	—
Train Speed	10	Vehicle Speed	—
Bus Crossings/Day (Passengers)	—	Warning Device	—
Hazardous Matls. Crossings/Day	—	Crossing Surface	—
Driveways Within 200'	—	Crossing Angle	—
Pavement Markings	—	Advance Warning Signs	—
Accidents - Past Two Years	—	Land Use	—
Accidents - Past Ten Years	—	Approach	—
Local Priority	15	Ride	—

HAZARD RATING NA

Miscellaneous: View distance - Less than 500'. Pedestrian crossing only.

15TH AVENUE SW - Eastbound

ENGINEERING DESIGN NEEDS

Pedestrian crossing--no design criteria

DESIGN OPTIONS

Alternative	Estimated Cost
Recommended Course of Action	Estimated Total Cost

ABERDEEN RAIL/HIGHWAY CROSSINGS: HAZARD RATING

LOCATION	INVENTORY/ NEEDS PAGE	DAILY CROSSINGS	VEHICLE SPEED	TRAINS PER DAY	TRAIN SPEED	TRACKS	RAILROAD COMPANY	WARNING SYSTEM	ACCIDENTS TWO YEARS	ACCIDENTS TEN YEARS
6TH AVENUE SW	20/21	26,498	27	1	10	4	BN (CORE)	5	0	2
6TH AVENUE SE (W)	22/23	26,728	24	0.5	10	2	BN SPUR	5	0	2
STATE STREET	24/25	6,930	22	12	10	5	BN MAIN	1	1	1
6TH AVENUE SE (E)	26/27	26,728	24	0.5	10	2	CNW BRANCH	1	0	1
MAIN STREET	28/29	6,050	20	12	10	4	BN MAIN	1	0	1
DAKOTA STREET	30/31	5,755	27	12	10	1	BN MAIN	1	0	4
ROOSEVELT STREET (S)	32/33	5,112	32	12	10	1	BN MAIN	1	0	1
KLINE STREET	34/35	4,411	23	12	10	2	BN MAIN	1	0	1
8TH AVENUE SE	36/37	690	17	0.5	10	2	CNW/BN	5	0	0
BROWN COUNTY #19	38/39	2,287	37	12	10	1	BN MAIN	1	0	1
1ST AVENUE SE (E)	40/41	2,221	20	0.5	10	2	CNW BRANCH	5	0	3
ROOSEVELT STREET (N)	42/43	5,112	32	1	10	1	BN BRANCH	5	0	0
MELGAARD ROAD	44/45	3,577	15	1	10	1	BN (CORE)	5	0	0
BROWN COUNTY #19	46/47	400	37	1	10	1	BN BRANCH	5	0	1
FAIRGROUNDS ROAD	48/49	1,050	43	0.5	10	1	CNW BRANCH	5	0	0
STATE STREET	50/51	6,930	22	0.5	10	3	BN SPUR	5	0	0
KLINE STREET	52/53	4,411	23	0.5	10	1	BN SPUR	5	0	0
3RD AVENUE SW	54/55	3,652	24	1	10	1	BN (CORE)	5	0	0
8TH AVENUE NE	56/57	5,678	28	0.5	10	1	CNW BRANCH	5	0	0
3RD AVENUE SE (E)	58/59	8,556	12	0.5	10	2	CNW BRANCH	5	0	0
3RD AVENUE SE	60/61	8,556	15	0.5	10	1	CNW BRANCH	5	0	0
DAKOTA STREET (NEW)	62/63	8,556	27	0.5	10	1	CNW BRANCH	5	0	0
3RD AVENUE SE (W)	64/65	8,556	15	0.5	10	1	BN SPUR	5	0	0
5TH STREET S.	66/67	2,500	25	0	0	1	BN SPUR	5	0	0
BROWN COUNTY #17	68/69	5,554	43	1	10	1	BN BRANCH	5	0	0
2ND AVENUE SE (E)	70/71	1,800	18	0.5	10	2	CNW BRANCH	5	0	0

ABERDEEN RAIL/HIGHWAY CROSSINGS: HAZARD RATING

LOCATION	VIEW	ANGLE	APPROACH	RIDE	BUS XING PER DAY	BUS RIDERS	FUEL XING PER DAY	LOCAL PRIORITY	HAZARD RATING
6TH AVENUE SW	5	1	1	5	13	218	36	5	1,488
6TH AVENUE SE (W)	5	3	1	3	10	320	78	1	1,339
STATE STREET	5	1	1	5	7	89	1	5	1,006
6TH AVENUE SE (E)	5	1	3	3	1	4	78	1	954
MAIN STREET	5	1	1	5	0	0	2	5	816
DAKOTA STREET	3	1	1	1	1	10	0	5	789
ROOSEVELT STREET (S)	2	1	1	3	3	70	8	3	783
KLINE STREET	5	1	1	1	3	80	1	5	639
8TH AVENUE SE	5	3	1	5	0	0	40	1	458
BROWN COUNTY #19	1	1	1	5	1	20	8	3	405
1ST AVENUE SE (E)	3	3	1	5	0	0	0	1	279
ROOSEVELT STREET (N)	3	5	1	1	3	70	8	1	221
MELGAARD ROAD	3	1	1	5	2	30	6	3	204
BROWN COUNTY #19	1	3	1	5	2	50	8	1	187
FAIRGROUNDS ROAD	4	1	1	5	5	147	0	1	181
STATE STREET	5	3	1	5	0	0	1	3	165
KLINE STREET	5	1	1	3	3	80	1	3	162
3RD AVENUE SW	5	1	1	5	5	45	0	3	162
8TH AVENUE NE	3	3	1	5	1	23	0	3	135
3RD AVENUE SE (E)	5	3	1	1	1	25	0	1	103
3RD AVENUE SE	5	3	1	3	1	25	0	1	98
DAKOTA STREET (NEW)	5	5	1	1	1	10	0	3	93
3RD AVENUE SE (W)	5	3	1	1	1	25	0	1	88
5TH STREET S.	5	1	1	5	0	0	0	3	80
BROWN COUNTY #17	1	5	1	1	0	0	0	1	66
2ND AVENUE SE (E)	5	3	1	5	0	0	0	1	64

ABERDEEN RAIL/HIGHWAY CROSSINGS: HAZARD RATING

LOCATION	INVENTORY/ NEEDS PAGE	DAILY CROSSINGS	VEHICLE SPEED	TRAINS PER DAY	TRAIN SPEED	TRACKS	RAILROAD COMPANY	WARNING SYSTEM	ACCIDENTS TWO YEARS	ACCIDENTS TEN YEARS
2ND AVENUE SE (W)	72/73	1,800	18	0.5	10	2	BN SPUR	5	0	0
DAKOTA STREET	74/75	5,755	27	0.5	10	1	BN BRANCH	5	0	0
1ST AVENUE SE (W)	76/77	2,221	20	0.5	10	1	BN BRANCH	5	0	0
3RD AVENUE NE	78/79	500	16	0.5	10	2	CNW BRANCH	5	0	0
5TH AVENUE NE	80/81	500	16	0.5	10	2	CNW BRANCH	5	0	0
12TH AVENUE SW	82/83	1,289	15	1	0	1	BN (CORE)	5	0	0
9TH AVENUE SW (AT GAGE BROS.)	84/85	550	13	0	0	1	BN SPUR	5	0	0
9TH AVENUE SE	86/87	300	20	0.5	10	1	CNW/BN	5	0	0
9TH AVENUE SW (CORE)	88/89	635	18	1	10	1	BN (CORE)	5	0	0
9TH AVENUE SW (WEST END)	90/91	200	18	0	0	2	BN SPUR	5	0	0
2ND AVENUE NW	92/93	50	15	1	10	1	BN (CORE)	5	0	0
8TH AVENUE SW	94/95	500	18	0	0	1	BN SPUR	5	0	0
12TH STREET S.	96/97	50	12	0	0	1	BN SPUR	5	0	0
1ST AVENUE SE	98/99	2,221	20	0	0	1	BN SPUR	5	0	0
PRIVATE CEMETARY	100/101	10	10	12	10	1	BN MAIN	5	0	0
15TH AVENUE SW	102/103	NO VEHICLES		1	10	1	BN (CORE)	5	0	0

ABERDEEN RAIL/HIGHWAY CROSSINGS: HAZARD RATING

LOCATION	VIEW	ANGLE	APPROACH	RIDE	BUS XING PER DAY	BUS RIDERS	FUEL XING PER DAY	LOCAL PRIORITY	HAZARD RATING
2ND AVENUE SE (W)	5	3	1	5	0	0	0	1	64
DAKOTA STREET	3	3	1	1	1	10	0	3	63
1ST AVENUE SE (W)	5	3	1	5	0	0	0	1	51
3RD AVENUE NE	3	3	1	5	0	0	0	1	46
5TH AVENUE NE	3	3	1	5	0	0	0	1	46
12TH AVENUE SW	5	1	1	5	0	0	0	1	43
9TH AVENUE SW (AT GAGE BROS.)	5	1	1	5	2	12	0	1	42
9TH AVENUE SE	5	3	1	5	0	0	0	1	42
9TH AVENUE SW (CORE)	5	1	1	5	0	0	0	1	36
9TH AVENUE SW (WEST END)	5	1	1	5	0	0	0	1	35
2ND AVENUE NW	5	1	1	5	0	0	0	1	31
8TH AVENUE SW	5	1	1	5	0	0	0	1	30
12TH STREET S.	4	1	1	5	0	0	0	1	29
1ST AVENUE SE	4	3	1	3	0	0	0	1	27
PRIVATE CEMETARY	1	1	1	1	0	0	0	1	7
15TH AVENUE SW	PEDESTRIAN CROSSING ONLY -- NO DATA				0	0	0	1	NA

CONCLUSIONS

Railroad crossings have always been, and will continue to be, a significant safety concern for the City of Aberdeen, the State of South Dakota, and the railroads. Although crossing accidents have not been a frequent occurrence in the last ten years, the increase in rail traffic over specific crossings does contribute to higher risks in the future.

In order to lower the potential for serious crossing accidents, a three-part program is recommended. The program segments complement each other and are necessary to reduce crossing hazards as much as possible. The benefit of the program is reduced if one of the segments is not present.

The program is composed of the following parts:

- Education
- Enforcement
- Engineering

Education deals with informing and updating the general public on proper driving techniques, the status of crossing and street projects, and precautions to avoid accidents. The South Dakota Safety Council, in cooperation with the Burlington Northern Railroad, is addressing this concern with the "Operation Lifesaver" project. Operation Lifesaver is an effort supported by the Railroad to supply safety information via schools, public meetings, and the media. This program effectively addresses the large potential for extensive property damage and injury to vehicular passengers. The community should treat this program as an initiative to continue the education process directed at individual crossings.

Enforcement, the second segment of the crossing safety program, is a logical continuation of the education segment. Assuming that speed limits and traffic ordinances exist, meaningful penalties should be enforced for failure to observe crossing regulations. Since trains move on a scheduled basis several times each day, opportunities are present where patrol cars can halt vehicles that run flashing lights or violate other traffic ordinances. The railroads may cooperate in this regard by informing enforcement personnel when train movements will be occurring. An effort can also be made to inform the public of the enforcement of applicable traffic ordinances through newspapers and broadcast media advertisements.

Finally, traffic engineering, the major substance of this report, should provide properly designed, commonly accepted warning devices in accordance with the Manual on Uniform Traffic Control Devices (MUTCD). Signals, signs, pavement markings, and curb markings may be required for some crossings. In addition, the surrounding environment can and does influence traffic engineering. Some locations in Aberdeen may inhibit driver recognition of hazards due to nearby buildings or other obstructions. While traffic control devices must meet minimum design specifications, zoning ordinances for construction and renovation activities near crossings should be also developed and enforced.

In all cases, proper signing at crossings is a necessary safety installation. In areas where signals are desirable, standards also apply for their installation. Advance warning signs should be installed in all locations except where distances are not great enough to permit their effective use. Pavement markings are highly desirable on high traffic thoroughfares and crossings with a significant accident history or potential. Curb painting should prohibit parking near crossings where accidents could be directly caused by parking in the train's path or indirectly caused by obscuring the view of the crossing area.

Design engineering of the actual crossing is another phase of engineering that complements the traffic engineering functions. The crossing must be able to support the traffic potential for both the street and the track in a way that provides smooth travel for many years. Design and construction must be properly conducted to avoid expensive renewal efforts in later years. The crossing material (asphalt, rubber, steel, or timber) can vary significantly in cost. Therefore higher quality crossings must be justified by high traffic volume or high hazard locations.

As federal funding for crossings is limited (slightly more than $2 million for South Dakota currently) all needs cannot be met statewide. However, if Aberdeen desired to fund several small projects independently of the federal funds, the State can provide technical assistance for design purposes.

The priority and recommendations for crossings reflect the analysis conducted on all Aberdeen crossings. Traffic levels, speeds, number of tracks, number of bus and hazardous materials crossings, and local priority are just a few of the factors that were considered. The following list examines the highest ranked crossings.

Crossings	Reason
1. 6th Avenue SW	Traffic, busses, and fuel
2. 6th Avenue SE (W)	Traffic, busses, and fuel
3. State Street (BN Main)	Train volume and local priority
4. 6th Avenue SE (E)	Traffic, busses, and fuel
5. Main Street	Train volume and local priority
6. Dakota Street (BN Main)	Accidents and train volume
7. Roosevelt Street (BN Main)	Train volume

With the work now in progress and planned in the near future, Aberdeen will have an extensive reduction in the number of crossings. The removal of several unused crossings will enhance vehicular ride and street maintenance programs while eliminating the potential for accidents. Aberdeen is approaching the minimum number of necessary crossings. As this goal is being attained, active crossings will be upgraded and maintained, as necessary.

Local emphasis should also be supplied in the area of traffic regulation enforcement. Public driving habits may require an incentive based on traffic fines. Although this mechanism will not reduce accidents any more than the other portions of this program, an awareness of the hazards involved with unsafe driving habits at crossings will become ingrained in the public's mind through the penalty of traffic fines.

As with many other government programs, projects and solutions to problems rely on communication and cooperation. The railroads, the City, the State, and the public should establish a cooperative effort, since each party has their own knowledge and priorities. The State, as the funding agency for crossing improvements, has an urgent need to know and understand the specific local issues. The railroad should be aware of community and state priorities so that operations will recognize safety hazards. The community must use its influence to educate the driving public and to enforce traffic regulations so that the main reason for accidents, poor driving habits, can be improved. The public can supply valuable additional information concerning crossing priorities. Crossing safety requires a continuing cooperative effort to minimize the hazards which could potentially contribute to accidents.

APPENDIX A

Part VIII. TRAFFIC CONTROL SYSTEMS FOR RAILROAD — HIGHWAY GRADE CROSSINGS

A. GENERAL

8A-1 Functions

Traffic control systems for railroad-highway grade crossings include all signs, signals, markings, and illumination devices and their supports along highways approaching and at railroad crossings at grade. The function of these systems is to permit safe and efficient operation of rail and highway traffic over crossings. Traffic control devices shall be consistent with the design and application of the standards contained herein. For the purpose of installation, operation, and maintenance of devices constituting traffic control systems at railroad-highway grade crossings, it is recognized that any crossing of a public road and a railroad is situated on right-of-way available for the use of both highway traffic and railroad traffic on their respective roadways and tracks.

With due regard for safety and for the integrity of operations by highway and railroad users, the highway agency and the railroad company are entitled to jointly occupy the right-of-way in the conduct of their assigned duties. This requires joint responsibility in the traffic control function between the public agency and the railroad. The determination of need and selection of devices at a grade crossing is made by the public agency with jurisdictional authority. Subject to such determination and selection, the design, installation and operation shall be in accordance with the national standards contained herein.

8A-2 Use of Standard Devices

The grade crossing traffic control devices, systems, and practices described herein are intended for use both in new installations and at locations where general replacement of present apparatus is made, consistent with Federal and State laws and regulations. To stimulate effective reaction of vehicle operators and pedestrians, these devices, systems, and practices utilize the five basic considerations: design, placement, operation, maintenance, and uniformity employed generally for traffic control devices and described fully in section 1A-2.

8A-3 Uniform Provisions

All signs used in grade crossing traffic control systems shall be reflectorized to show the same shape and color to an approaching motorist

both by day and by night. Reflectorization may be by one of the methods described in section 2A-18.

Normally, where the distance between tracks, measured along the highway, exceeds 100 feet, additional signs or other appropriate traffic control devices should be used.

No sign or signal shall be located in the center of an undivided roadway except in an island with barrier curbs installed in accordance with the general requirements of Part V with minimum clearance of 2 feet from the face of each curb.

Where it is practical, equipment housing should provide a lateral clearance of 30 feet from the roadway. Adequate clearance should also be provided from tracks in order to reduce the obstruction to motorists sight distance and to reduce the possibility of damage to the housed equipment.

8A-4 Crossing Closure

Any highway grade crossing for which there is not a demonstrated need should be closed.

8A-5 Traffic Controls During Construction and Maintenance

Traffic controls for street and highway construction and maintenance operations are discussed in Part VI of this manual. Similar traffic control methods should be used where highway traffic is affected by construction and maintenance at grade crossings.

Public and private agencies should meet to plan appropriate detours and necessary signing, marking, and flagging requirements for successful operations during the closing. Pertinent considerations include length of time for crossing to be closed, type of traffic affected, time of day, materials and techniques of repair. Inconvenience, delay, and accident potential to affected traffic should be minimized to the extent practical. Prior notice should be extended to affected public or private agencies before blockage or infringement on the free movement of vehicles or trains.

Construction or maintenance techniques should not extensively prolong the closing of the crossing. The width and riding quality of the roadway surface at a grade crossing should, as a minimum, be restored to correspond with the approaches to the crossing.

B. SIGNS AND MARKINGS

8B-1 Purpose

Passive traffic control systems, consisting of signs, pavement markings, and grade crossing illumination, identify and direct attention to the location of a grade crossing, to permit vehicle operators and pedestrians to take appropriate action.

Where a railroad track has been abandoned or its use discontinued, all related traffic control devices shall be removed, and the tracks should be removed or covered.

8B-2 Railroad Crossing (Crossbuck) Sign (R15-1, 2)

The railroad crossing sign, commonly identified as the "crossbuck" sign, as a minimum shall be white reflectorized sheeting or equal, with the words RAILROAD CROSSING in black lettering. As a minimum, one crossbuck sign shall be used on each roadway approach to every grade crossing, alone or in combination with other traffic control devices. If there are two or more tracks between the signs, the number of tracks shall be indicated on an auxiliary sign of inverted T shape mounted below the crossbuck in the manner and at the heights indicated in figure 8-1 except that use of this auxiliary sign is optional at crossings with automatic gates.

Where physically feasible and visible to approaching traffic the crossbuck sign shall be installed on the right hand side of the roadway on each approach to the crossing. Where an engineering study finds restricted sight distance or unfavorable road geometry, crossbuck signs shall be placed back to back or otherwise located so that two faces are displayed to each approach.

Crossbuck signs should be located with respect to the roadway pavement or shoulder in accordance with the criteria in sections 2A-21 through 2A-27 and figures 2-1 and 2-2 (pages 2A-9 and 2A-10) and should be located with respect to the nearest track in accordance with signal locations in figure 8-7, (page 8C-6). The normal lateral clearances (sec. 2A-24), 6 feet from the edge of the highway shoulder or 12 feet from the edge of the traveled way in rural areas and 2 feet from the face of the curb in urban areas will usually be attainable. Where unusual conditions demand, variations determined by good judgment should provide the best possible combination of view and safety clearances attainable, occasionally utilizing a location on the left-hand side of the roadway.

Appropriate details of R15-1 and R15-2 are available in the Standard Highway Signs Booklet.*

* Available from Federal Highway Administration (HTO-20) Washington, D.C. 20590

R15–1
48" x 9"
(drilled for 90-degree mounting)

R15–2
9" x 9"
27" x 9"

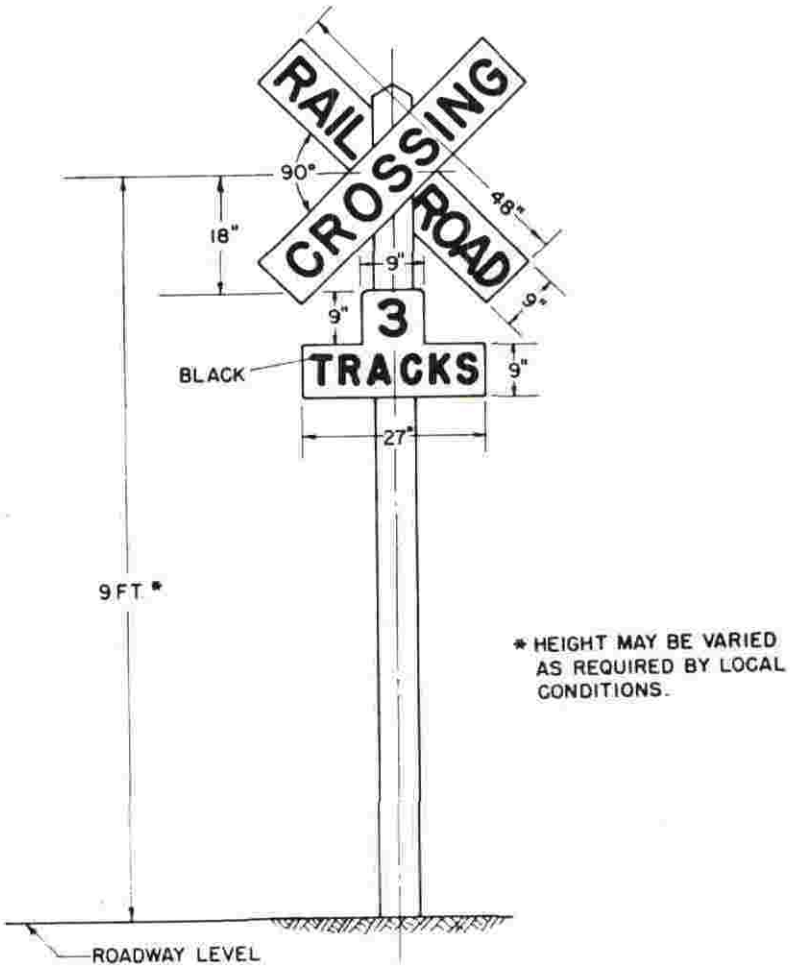


Figure 8-1. Railroad-highway crossing (crossbuck) sign.

8B-3 Railroad Advance Warning Sign (W10-1)

A Railroad Advance Warning sign shall be used on each roadway in advance of every grade crossing, with the following exceptions: (1.) on low volume, low speed roadway crossing minor spurs or other tracks which are infrequently used and which are flagged by train crews; (2.) in the business districts of large cities where active grade crossing traffic control devices are in use; (3.) or where physical conditions do not permit even a partially effective display of the sign. On divided highways it is desirable to erect an additional sign on the left side of the roadway.

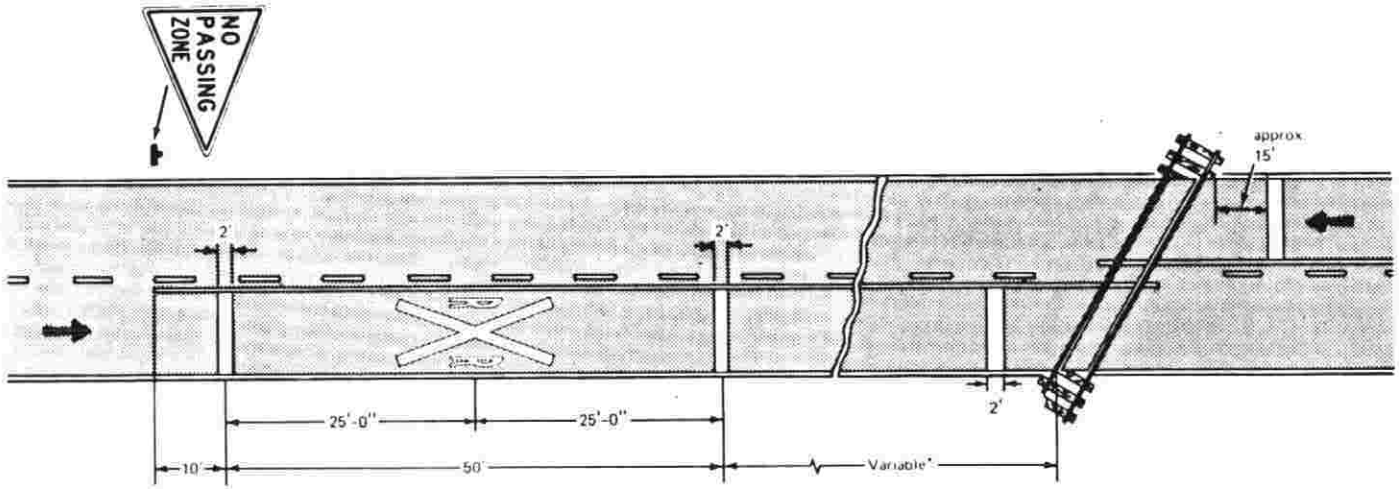
Placement of the sign shall be in accordance with section 2C-3 and sections 2A-21 to 2A-27, normally 750 feet or more in advance of the crossing in rural areas and 250 feet in advance of the crossing in urban areas except that in a residential or business district, where low speeds are prevalent, the sign may be placed a minimum distance of 100 feet from the crossing. If there is a street intersection within 100 feet an additional sign or signs may be placed to warn traffic approaching the crossing from each intersected street. Lateral clearance of the advance warning signs are determined by the same criteria as for the crossbuck sign.

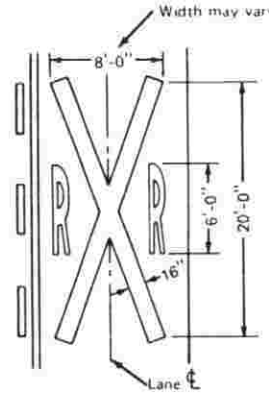
W10-1
36" Diameter

8B-4 Pavement Markings

Pavement markings in advance of a grade crossing shall consist of an X, the letters RR, a no passing marking (2-lane roads), and certain transverse lines. Identical markings shall be placed in each approach lane on all paved approaches to grade crossings where grade crossing signals or automatic gates are located, and at all other grade crossings where the prevailing speed of highway traffic is 40 mph or greater.

The markings shall also be placed at crossings where engineering studies indicate there is a significant potential conflict between vehicles and trains. At minor crossings or in urban areas, these markings may be omitted if engineering study indicates that other devices installed provide suitable control.





*The distance from the railroad crossing marking to the nearest track will vary according to the approach speed and the sight distance of the vehicular traffic approaching, but probably should be not less than 50 feet.

A three lane roadway should be marked with a centerline for two lane approach operation on the approach to a crossing.

On multi-lane roads the transverse bands should extend across all approach lanes, and individual RXR symbols should be used in each approach lane.

Refer to Standard Alphabet for Highway Signs and Markings for RXR symbols details.

Figure 8-2. Typical pavement markings at railroad-highway grade crossings.

The design of railroad crossing pavement markings shall be essentially as illustrated in figure 8-2. The symbols and letters are elongated to allow for the low angle at which they are viewed. All markings shall be reflectorized white except for the no-passing markings which shall be reflectorized yellow.

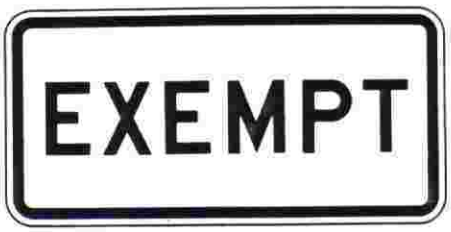
8B-5 Illumination at Grade Crossings

At grade crossings where a substantial amount of railroad operation is conducted at night, particularly where train speeds are low, where crossings are blocked for long periods, or accident history indicates that motorists experience difficulty in seeing trains or control devices during the hours of darkness, illumination at and adjacent to the crossing may be installed to supplement other traffic control devices where an engineering analysis determines that better visibility of the train is needed. Regardless of the presence of other control devices, illumination will aid the motorist in observing the presence of railroad cars on a crossing where the gradient of the vehicular approaches is such that the headlights of an oncoming vehicle shine under or over the cars.

Recommended types and location of luminaires for grade crossing illumination are contained in the AASHTO Lighting Guide* and the American National Standard Practice for Roadway Lighting, RP8.** In any event, luminaires shall be so located and light therefrom so directed as to not interfere with aspects of the railroad signal system and not interfere with the field of view of members of the locomotive crew.

8B-6 Exempt Crossing Signs (R15-3, W10-1a)

When authorized by law or regulation a supplemental sign (R15-3) bearing the word EXEMPT may be used below the Crossbuck and Track signs at the crossing, and supplemental sign (W10-1a) may be used below the Railroad Advance Warning sign. These supplemental signs are to inform drivers of vehicles carrying passengers for hire, school buses carrying children, or vehicles carrying flammable or hazardous materials that a stop is not required at certain designated grade crossings, except when a train, locomotive, or other railroad equipment is approaching or occupying the crossing or the driver's view of the sign is blocked.



R15-3 White background
W10-1a Yellow background

* Available from the American Association of State Highway and Transportation Officials, Washington, D.C.
** Available from the Illuminating Engineering Society, New York, N.Y. 10017