

FIGURE 3.1
EXISTING RR CROSSINGS
IN MOORHEAD
 DOWNTOWN MOORHEAD
 RAILROAD GRADE SEPARATION
 FEASIBILITY STUDY



Fatal Flaw Decision Matrix


Fatal Flaws	Fatal Flaw Description	4 th Street	5 th Street	6 th Street	8 th Street	10 th Street	11 th Street	14 th Street
Lack of Continuity	Does the street corridor provide continuity from the North to South part of the City?	No See Note (1)	No See Note (1)	N/A Since Crossing has been closed	See Note (3)	N/A Since Crossing has been closed	Yes	See Note (3)
Vehicle-Train Exposures	Does the crossing meet the minimum 300,000 daily train-vehicle crash exposures?	No	No	No	Yes	No	Yes	Yes
Significant Site Constraints	Can a grade separation be constructed without significant impacts to buildings, property, or other infrastructure?	No See Note (2)	No See Note (2)	No See Note (2)	Yes	N/A Since Crossing will be closed	Yes	Yes
Planned Crossing Closures	Is the crossing scheduled to remain open in the future?	Yes	Yes	No - Crossing was closed during Quiet Zone project	Yes	No - Crossing was closed during Quiet Zone project	Yes	Yes
Evaluation Result		Crossing Location Eliminated	Crossing Location Eliminated	Crossing Location Eliminated	Crossing Location Requires Additional Analysis	Crossing Location Eliminated	Crossing Location Requires Additional Analysis	Crossing Location Requires Additional Analysis

- (1). Street does not connect directly to 1st Avenue North, nor does it provide any connection to the street network on the north side of town.
- (2). A grade separation at 4th, 5th, or 6th Street would impact the Moorhead Center Mall & City Hall buildings and/or parking.
- (3). 8th Street does not connect to any through streets north of 1st Avenue North. 14th Street does not extend through north Moorhead (becomes a local residential street).

Prepared by Ulteig Engineers, Inc

Legend

- Fatal Flaw - crossing location does not meet criterion
- Crossing location meets criterion, but with concerns noted
- Crossing location meets criterion

FIGURE 3.2 FATAL FLAW DECISION MATRIX	
DOWNTOWN MOORHEAD RAILROAD GRADE SEPARATION FEASIBILITY STUDY	

Crossing Location Comparison Matrix

		8 th Street Crossing				11 th Street Crossing				14 th Street Crossing	
Screening Criteria	Screening Criteria Description	Grade Separation at Prosper & KO Line		Separate KO Line Only (At-grade Crossing at Prosper Sub Stays)		Grade Separation at Prosper & KO Line		Separate KO Line Only (At-grade Crossing at Prosper Sub Stays)		Grade Separation at Prosper & KO Line	
		Sub-Category Rating (2)		Sub-Category Rating (2)		Sub-Category Rating (2)		Sub-Category Rating (2)		Sub-Category Rating (2)	
Property Impacts											
• Potential Business Relocation	The number and type of business properties impacted by the construction of the grade separation	●○○○○	Potential Impacts to 14 Commercial Properties	●○○○○	Potential Impacts to 13 Commercial Properties	●○○○○	Potential Impacts to 11 Commercial Properties	●●●○○	Potential Impacts to 6 Commercial Properties	●○○○○	Potential Impacts to 13 Commercial Properties
• Potential Residential Relocation	The number of residential properties impacted by the construction of the grade separation	●●●●●	No residential property will be directly impacted	●●●●●	No residential property will be directly impacted	●●●●●	No residential property will be directly impacted	●●●●●	No residential property will be directly impacted	●●●●●	No residential property will be directly impacted
	Category Ranking (1)		1		2		4		5		3
Safety											
• Crash History (1974-2006 data)	Fatalities / Injuries / Property Damage	●●●●●	2 Fatalities, 6 Injuries, 15 accidents (\$7000) reported	●●○○○	0 Fatalities, 2 injuries, 6 accidents (\$4000) reported	●●●●○	1 Fatalities, 2 Injuries, 4 accidents (\$6,500) reported	●○○○○	0 Fatalities, 0 injuries, 4 Accidents (\$1,750) reported	●●●○○	3 accidents reported with property damage (no cost info)
	Category Ranking		5		2		4		1		3
Emergency Vehicle Access											
• Unrestricted Access & Optimized Routes	Unrestricted access across RR Tracks & best route for emergency vehicles	●●●○○	Emergency vehicles will have unrestricted access from Main Ave. to 1st Ave. N (Higher Traffic Volumes on 8th Street between 1st Ave N & Main Ave)	●○○○○	Emergency vehicles will only have unrestricted access from Main Ave. to Center Ave. (Higher traffic volumes on 8th Street between 1st Ave N & Main Ave)	●●●●○	Emergency vehicles will have unrestricted access from Main Ave. to 1st Ave. N. The fire station is also in close proximity to 11th St. Corridor	●●○○○	Emergency vehicles will only have unrestricted access from Main Ave. to Center Ave.	●●●●○	Emergency vehicles will have unrestricted access from Main Ave. to 1st Ave. N (Lack of North-South Continuity on 14th Ave)
	Category Ranking		3		1		5		2		4
Traffic Capacity/Mobility											
• Traffic Volumes / Continuity / Proximity to Downtown Area	The corridor's ability to provide adequate mobility and capacity for vehicles	●●●●○	- 2005 ADT = 7300 VPD between Main & 1st Ave N - 8th Street not a thru Street - Poor Continuity - Closest to downtown core area	●○○○○		●●●●○	- 2005 ADT = 4400 VPD between Main & 1st Ave N - 11th St is the only thru Street to North Moorhead - Closer to downtown core area	●●○○○	Vehicles would still have to cross Prosper Xing with this option	●●●○○	- 2005 ADT = 3900 VPD - 14th Street Goes through to 15th Ave North only - Furthest from downtown core area
	Category Ranking		4		1		5		2		3
Page Subtotal			13		6		18		10		13

- (1). Comparative screening assessments range from 1 - (Least Favorable) to 5 - (Most Favorable).
 (2). Comparative screening assessments range from ●○○○○ (Least Beneficial) to ●●●●● (Most Beneficial).

FIGURE 3.3 CROSSING LOCATION COMPARISON MATRIX (1 OF 2)	
DOWNTOWN MOORHEAD RAILROAD GRADE SEPARATION FEASIBILITY STUDY	

Crossing Location Comparison Matrix

		8 th Street Crossing				11 th Street Crossing				14 th Street Crossing	
Screening Criteria	Screening Criteria Description	Grade Separation at Prosper & KO Line		Separate KO Line Only (At-grade Crossing at Prosper Sub Stays)		Grade Separation at & KO Line Prosper		Separate KO Line Only (At-grade Crossing at Prosper Sub Stays)		Grade Separation at Prosper & KO Line	
		Sub-Category Rating (2)		Sub-Category Rating (2)		Sub-Category Rating (2)		Sub-Category Rating (2)		Sub-Category Rating (2)	
■ Constructability & Design											
• Grade Separation	Ease of grade separation construction	●○○○○	A grade separation on the Prosper line will be difficult to construct due to its close proximity to 1st Ave N	●○○○○	A grade separation can be constructed, Center Ave (TH 10) would have to be lowered	●○○○○	Center Ave (TH 10) will have to be lowered to match underpass or separated from 11th St with continuous tunnel	●●●●●	1st Avenue North would not have to be lowered for only one Grade Separation of KO line	●●●●●	A grade separation on the Prosper line will be difficult to construct due to its close proximity to Center Avenue
• Utilities	Impacts of grade separation to storm sewer, sanitary sewer, & water	●○○○○	- High impact to existing utilities and services to adjacent properties during construction - No good location for on-site retention pond	●○○○○	- Moderate impact to existing utilities and services to adjacent properties during construction - No good location for on-site retention pond	●○○○○	- Moderate impact to existing utilities and services to adjacent properties during construction - Location available for on-site retention pond - Potential upgrade of storm sewer back to river is longer	●●●●●	- Low to moderate impact to existing utilities and services to adjacent properties during construction - Location available for on-site retention pond - Potential upgrade of storm sewer back to river is longer	●●●●●	- Low impact to existing utilities and services to adjacent properties during construction - Location available for on-site retention pond - Potential upgrade of storm sewer back to river is longest
• Intersecting Streets	How are Main Ave, Center Ave or 1st Ave N affected?	●○○○○	Alignment of 1st Ave N would be affected by grade separation at Prosper Line.	●●●●●	Impacts to Grades at Intersections with Main & 1st Avenue North (Deeper Cut will impact adjacent properties)	●●●●●	Deep Cut at Main & 1st Avenue North	●●●●●	Deep Cut at Main Ave only	●●○○○	- Connection to Center Avenue requires longer/taller retaining walls - Temp. impacts to 11th St during shoofly const.
Category Ranking (1)			1		2		4		5		3
■ Environmental Impacts		Cultural Resources, Ecological Impacts, Socio-Economic Impacts, Environmental Justice, Hazardous Materials, Noise Quality, Air Quality will all require analysis as part of an EA or EIS. This Feasibility Study will not include in-depth environmental impacts.									
• Cultural Resources	Properties determined to be potential historic/architectural significant sites		Old Fairmount Bldg (NE corner of 8th Street & 1st Avenue North)								
Category Ranking			N/A		N/A		N/A		N/A		N/A
■ Cost or Economics											
• ROW Costs	Preliminary Land Appraisal Costs & Acres or SF of land needed	●○○○○	\$6.0 - \$7.5 million	●○○○○	No detailed cost developed, but will cost less than separating both KO and Prosper	●●●○○	\$3.0 - \$4.0 million	●●●●●	No detailed cost developed, but will cost less than separating both KO and Prosper	●●●○○	\$3.0 - 4.0 million
• Construction, Eng., and Admin Costs	Estimated (non-detailed Costs)	●○○○○	\$32.5 - \$39.5 million	●●●●●	No detailed cost developed, but will cost less than separating both KO and Prosper	●●●○○	\$27.0 - \$33.0 million	●●●●●	No detailed cost developed, but will cost less than separating both KO and Prosper	●●○○○	\$29.5 - \$36.0 million
Category Ranking			1		2		4		5		3
■ Railroad Issues											
• Shoofly Construction	Ease of shoofly construction and track alignment	●○○○○	Significant impact to 6 buildings, parking & 1st Ave N	●○○○○	Significant impacts to at least 5 buildings & private parking	●●●○○	Potential impact to 2 buildings and private parking for KO Line	●●●●●	Only one shoofly needed - minimum to no impacts to buildings	●●○○○	Shooflys for both lines are extremely difficult to construct and operate due to proximity of switches/turnouts just to the east of 14th St
• Train-Vehicle Exposures	Amount of reduction of train-vehicle crash exposures	●●●●●	Train-vehicle crash exposures will be eliminated (761,100)	●○○○○	Train-vehicle crash exposures will be significantly reduced (251,100 remain at Prosper Line)	●●●○○	Train-vehicle crash exposures will be eliminated (555,200)	●●○○○	Train-vehicle crash exposures will be significantly reduced (145,700 exposures remain at Prosper Line)	●●○○○	Train-vehicle crash exposures will be eliminated (363,500)
Category Ranking			3		1		5		2		4
Page Subtotal			5		5		13		12		10
Overall Ranking			18		11		31		22		23

- (1). Comparative screening assessments range from 1 - (Least Favorable) to 5 - (Most Favorable).
 (2). Comparative screening assessments range from ●○○○○ (Least Beneficial) to ●●●●● (Most Beneficial).

FIGURE 3.4 CROSSING LOCATION COMPARISON MATRIX (2 OF 2)	
DOWNTOWN MOORHEAD RAILROAD GRADE SEPARATION FEASIBILITY STUDY	



CROSSING ISSUES:

- VEHICLE/PEDESTRIAN SAFETY
- LOCAL TRAFFIC MOBILITY AND DELAY

EMERGENCY RESPONSE VEHICLES - ACCESS AND MOBILITY ISSUES

PROPERTY AND ACCESS IMPACTS

PROPERTY AND ACCESS IMPACTS

PROPERTY AND ACCESS IMPACTS

PROPERTY AND ACCESS IMPACTS

PROPERTY AND ACCESS IMPACTS

ENVIRONMENTAL ISSUES:

- POTENTIAL FOR HAZARDOUS MATERIALS
- HISTORIC PROPERTIES

UTILITY IMPACTS:

- IMPACTS TO SANITARY SEWER & WATERMAIN
- STORM SEWER MAY NEED TO BE REPLACED ALL THE WAY WEST TO RIVER.

RR CONSOLIDATION ISSUES:

- WOULD ELIMINATE PROSPER LINE
- WOULD AFFECT PROPERTY IMPACTS AND COST FOR GRADE SEPARATION

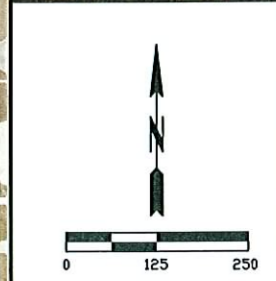


FIGURE 5.1
ISSUES MAP
 DOWNTOWN MOORHEAD
 RAILROAD GRADE SEPARATION
 FEASIBILITY STUDY



CONCEPT #1 ISSUES

- FULL ACCESS PROVIDED BETWEEN CENTER AND 11TH
- TH 10TH 75 RE-ROUTED TO CONTINUE ALONG MAIN TO 11TH, THEN GO UP TO CENTER AVE.
- HIGH NUMBER OF ACCESS CLOSURES ON 11TH, CENTER, 1ST AVE N
- UTILITY IMPACTS
- IMPACTS TO FIRE STATION ACCESS ON 1ST AVE N WILL HAVE TO BE ADDRESSED
- APPROX. 11 POTENTIAL PROPERTY ACQUISITIONS
- POTENTIAL HAZARDOUS MATERIAL ISSUES
- DUAL LEFT TURN LANES MAY BE REQUIRED FOR EB MAIN TO NB 11TH, AND WB 1ST/WB CENTER TO SB 11TH

2ND AVE N

2ND AVE N

1ST AVE N

1ST AVE N

CENTER AVE (US 10 & US 75)

CENTER AVE (US 10 & US 75)

MAIN AVE

MAIN AVE

2ND AVE S

2ND AVE S

8TH ST

10TH ST

11TH ST

14TH ST

10TH ST CROSSINGS WERE CLOSED DURING QUIET ZONE PROJECT

ACE & BAL
U-SAVE
NORTHSIDE SERVICE
MOORHEAD AUTO CENTRE

BERNIES WINES & LIQUORS
FIRE STATION
MOORHEAD AUTO CENTRE

SIMON WAREHOUSE
B&B BOYS
REGENCY
REGENCY
REGENCY

BNSF PROSPER SUBDIVISION RR
PERMANENT RR BRIDGE

1001 ON CENTER
VACANT

HOLLAND'S LANDSCAPE & GARDEN
BNSF KO SUBDIVISION RR
PERMANENT RR BRIDGE

MOORHEAD CREDIT UNION
DON'S CAR WASH
PREMIERE VIDEO

REARDO OFFICE EQUIPMENT
REARDO OFFICE EQUIPMENT
RENT ALL

HORNBAACHERS

MIDTOWN AT MAIN SHOPPING CENTER
HARMON AUTO GLASS

LEGEND

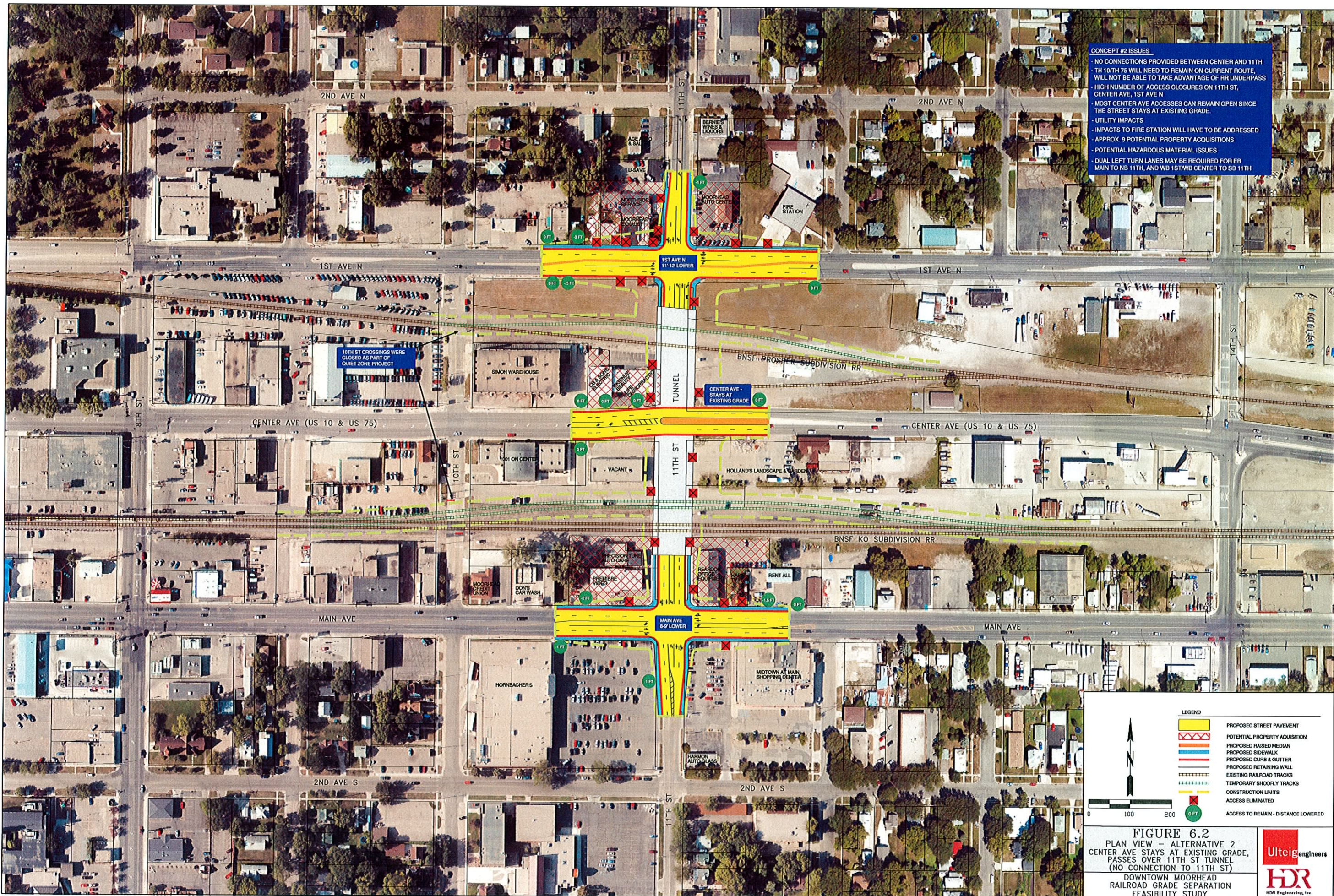
- PROPOSED STREET PAVEMENT
- POTENTIAL PROPERTY ACQUISITION
- PROPOSED RAISED MEDIAN
- PROPOSED SIDEWALK
- PROPOSED CURB & GUTTER
- PROPOSED RETAINING WALL
- EXISTING RAILROAD TRACKS
- TEMPORARY SHOOFLY TRACKS
- CONSTRUCTION LIMITS
- ACCESS ELIMINATED
- ACCESS TO REMAIN - DISTANCE LOWERED

0 100 200

0 FT

FIGURE 6.1
PLAN VIEW - ALTERNATIVE 1
CENTER AVE LOWERED TO MEET 11TH ST AT-GRADE
DOWNTOWN MOORHEAD
RAILROAD GRADE SEPARATION
FEASIBILITY STUDY





CONCEPT #2 ISSUES

- NO CONNECTIONS PROVIDED BETWEEN CENTER AND 11TH ST
- TH 10TH 75 WILL NEED TO REMAIN ON CURRENT ROUTE, WILL NOT BE ABLE TO TAKE ADVANTAGE OF RR UNDERPASS
- HIGH NUMBER OF ACCESS CLOSURES ON 11TH ST, CENTER AVE, 1ST AVE N
- MOST CENTER AVE ACCESSES CAN REMAIN OPEN SINCE THE STREET STAYS AT EXISTING GRADE.
- UTILITY IMPACTS
- IMPACTS TO FIRE STATION WILL HAVE TO BE ADDRESSED
- APPROX. 9 POTENTIAL PROPERTY ACQUISITIONS
- POTENTIAL HAZARDOUS MATERIAL ISSUES
- DUAL LEFT TURN LANES MAY BE REQUIRED FOR EB MAIN TO NB 11TH, AND WB 1ST/WB CENTER TO SB 11TH

10TH ST CROSSINGS WERE CLOSED AS PART OF QUIET ZONE PROJECT

CENTER AVE STAYS AT EXISTING GRADE

11TH ST TUNNEL

MAIN AVE 8-9' LOWER

LEGEND

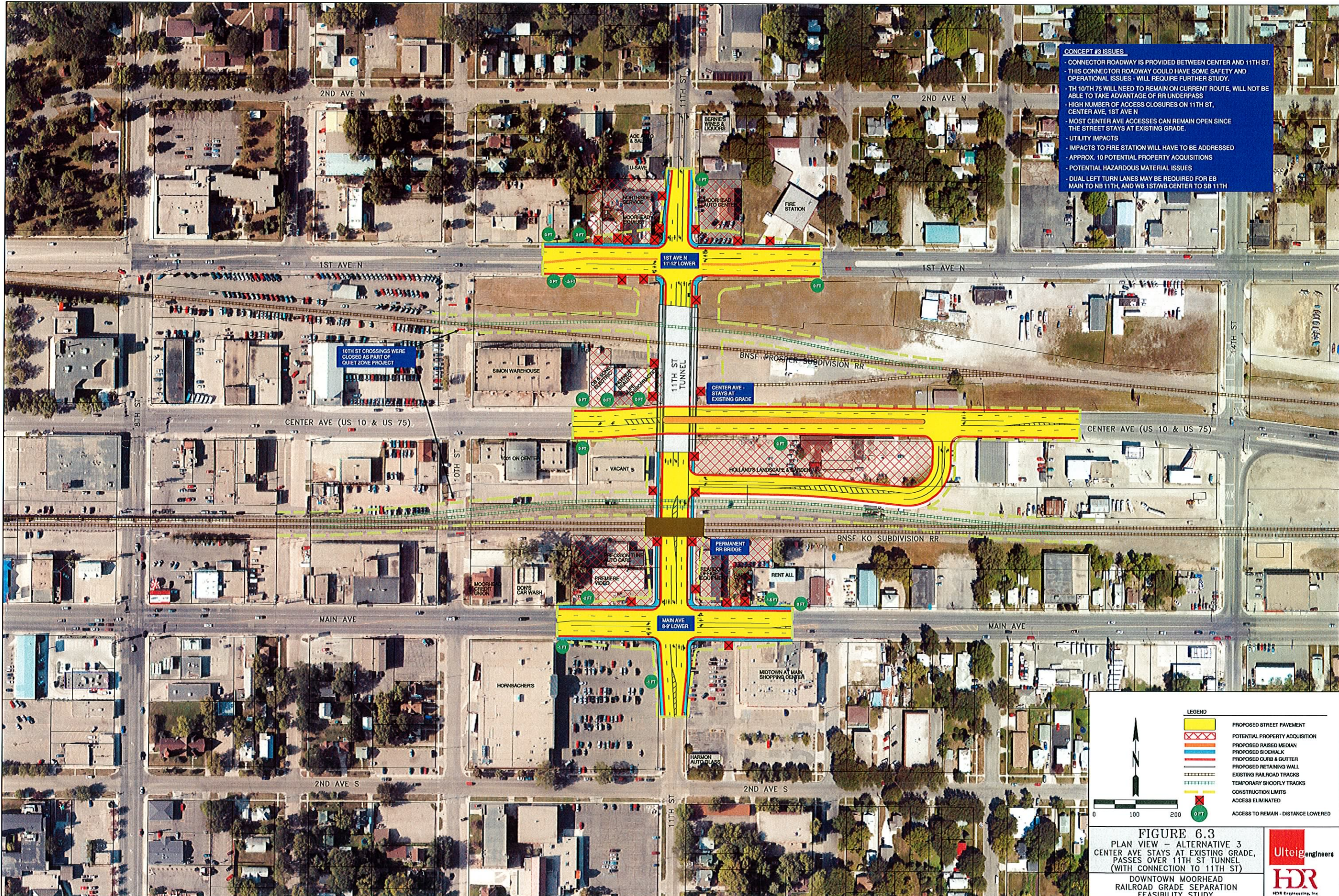
- PROPOSED STREET PAVEMENT
- POTENTIAL PROPERTY ACQUISITION
- PROPOSED RAISED MEDIAN
- PROPOSED SIDEWALK
- PROPOSED CURB & GUTTER
- PROPOSED RETAINING WALL
- EXISTING RAILROAD TRACKS
- TEMPORARY SHOOFLY TRACKS
- CONSTRUCTION LIMITS
- ACCESS ELIMINATED
- ACCESS TO REMAIN - DISTANCE LOWERED

0 100 200 0 FT

FIGURE 6.2
 PLAN VIEW - ALTERNATIVE 2
 CENTER AVE STAYS AT EXISTING GRADE,
 PASSES OVER 11TH ST TUNNEL
 (NO CONNECTION TO 11TH ST)



DOWNTOWN MOORHEAD
 RAILROAD GRADE SEPARATION
 FEASIBILITY STUDY



CONCEPT #3 ISSUES

- CONNECTOR ROADWAY IS PROVIDED BETWEEN CENTER AND 11TH ST.
- THIS CONNECTOR ROADWAY COULD HAVE SOME SAFETY AND OPERATIONAL ISSUES - WILL REQUIRE FURTHER STUDY.
- TH 10TH 75 WILL NEED TO REMAIN ON CURRENT ROUTE, WILL NOT BE ABLE TO TAKE ADVANTAGE OF RR UNDERPASS
- HIGH NUMBER OF ACCESS CLOSURES ON 11TH ST, CENTER AVE, 1ST AVE N
- MOST CENTER AVE ACCESSES CAN REMAIN OPEN SINCE THE STREET STAYS AT EXISTING GRADE.
- UTILITY IMPACTS
- IMPACTS TO FIRE STATION WILL HAVE TO BE ADDRESSED
- APPROX. 10 POTENTIAL PROPERTY ACQUISITIONS
- POTENTIAL HAZARDOUS MATERIAL ISSUES
- DUAL LEFT TURN LANES MAY BE REQUIRED FOR EB MAIN TO NB 11TH, AND WB 1ST/WB CENTER TO SB 11TH

10TH ST CROSSINGS WERE CLOSED AS PART OF QUIET ZONE PROJECT

CENTER AVE - STAYS AT EXISTING GRADE

PERMANENT RR BRIDGE

MAIN AVE 8-9' LOWER

- LEGEND**
- PROPOSED STREET PAVEMENT
 - POTENTIAL PROPERTY ACQUISITION
 - PROPOSED RAISED MEDIAN
 - PROPOSED SIDEWALK
 - PROPOSED CURB & GUTTER
 - PROPOSED RETAINING WALL
 - EXISTING RAILROAD TRACKS
 - TEMPORARY SHOOFLY TRACKS
 - CONSTRUCTION LIMITS
 - ACCESS ELIMINATED
 - ACCESS TO REMAIN - DISTANCE LOWERED

FIGURE 6.3
 PLAN VIEW - ALTERNATIVE 3
 CENTER AVE STAYS AT EXISTING GRADE,
 PASSES OVER 11TH ST TUNNEL
 (WITH CONNECTION TO 11TH ST)





14TH ST ISSUES

- FULL ACCESS PROVIDED BETWEEN CENTER AND 14TH
- TH 10TH 75 RE-ROUTED TO CONTINUE ALONG MAIN TO 14TH, THEN GO UP TO CENTER AVE
- HIGH NUMBER OF ACCESS CLOSURES ON 14TH, MAIN AVE, 1ST AVE N
- UTILITY IMPACTS
- APPROX. 13 POTENTIAL PROPERTY ACQUISITIONS
- POTENTIAL HAZARDOUS MATERIAL ISSUES
- DUAL LEFT TURN LANES MAY BE REQUIRED FOR EB MAIN TO NB 14TH, AND WB 1ST/WB CENTER TO SB 14TH
- SHOOFLY FOR KO AND PROSPER LINES CONFLICT WITH EXISTING BNSF CROSSOVERS AND TURNOUTS

LEGEND

- PROPOSED STREET PAVEMENT
- POTENTIAL PROPERTY ACQUISITION
- PROPOSED RAISED MEDIAN
- PROPOSED SIDEWALK
- PROPOSED CURB & GUTTER
- PROPOSED RETAINING WALL
- EXISTING RAILROAD TRACKS
- TEMPORARY SHOOFLY TRACKS
- TEMPORARY AT-GRADE CROSSING CONSTRUCTION LIMITS
- ACCESS ELIMINATED
- ACCESS TO REMAIN - DISTANCE LOWERED

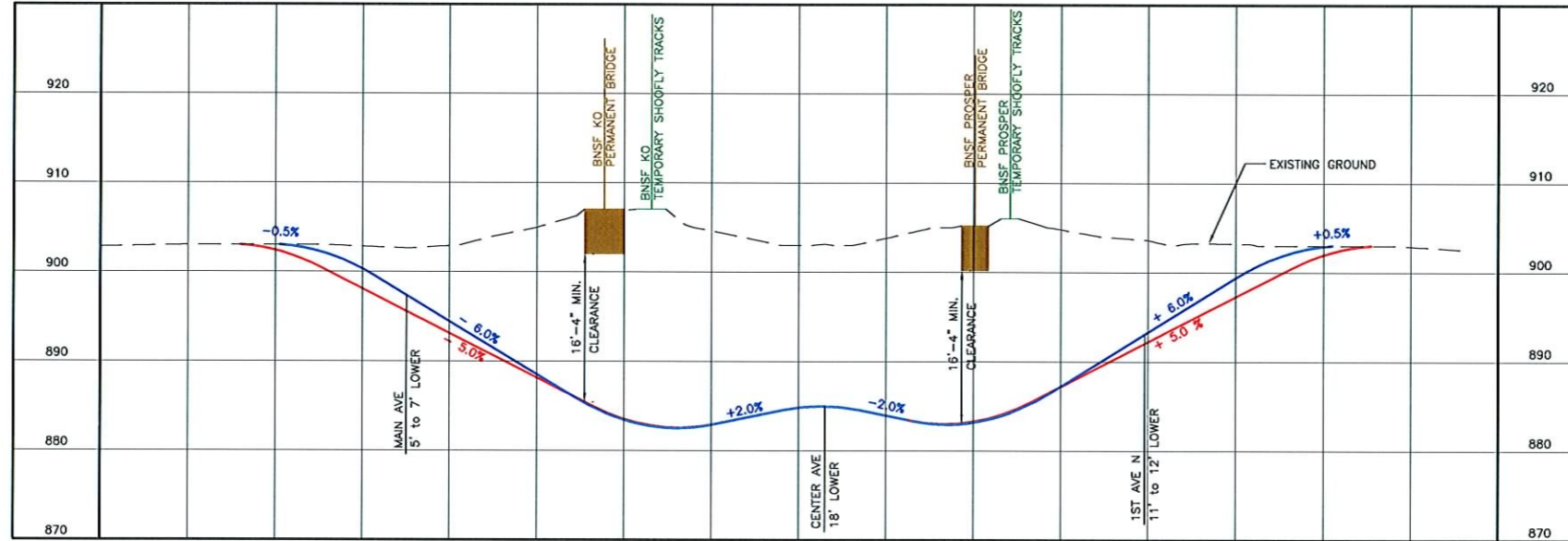
0 100 200

FIGURE 6.4
 PLAN VIEW - 14TH ST LAYOUT
 CENTER AVE LOWERED TO MEET 14TH ST AT-GRADE
 DOWNTOWN MOORHEAD
 RAILROAD GRADE SEPARATION
 FEASIBILITY STUDY

Ulteigengineers
 HDR

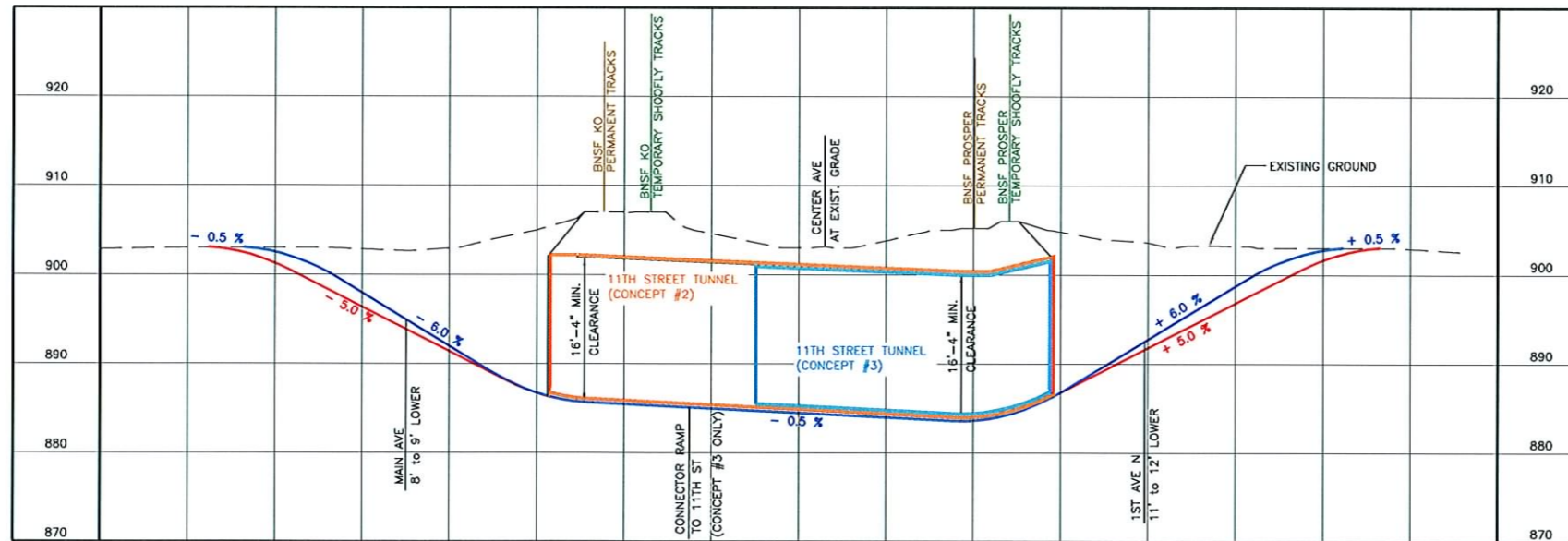
11TH STREET PROFILE ALTERNATIVE #1

CENTER AVE LOWERED TO MEET 11TH STREET AT-GRADE



11TH STREET PROFILE ALTERNATIVE #2 & #3

CENTER AVE REMAINS AT EXISTING GRADE, PASSES OVER 11TH ST TUNNEL



LEGEND:
— PROPOSED 11TH ST PROFILE - 6% MAX. GRADE
— PROPOSED 11TH ST PROFILE - 5% MAX. GRADE

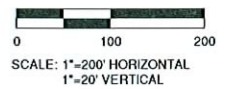
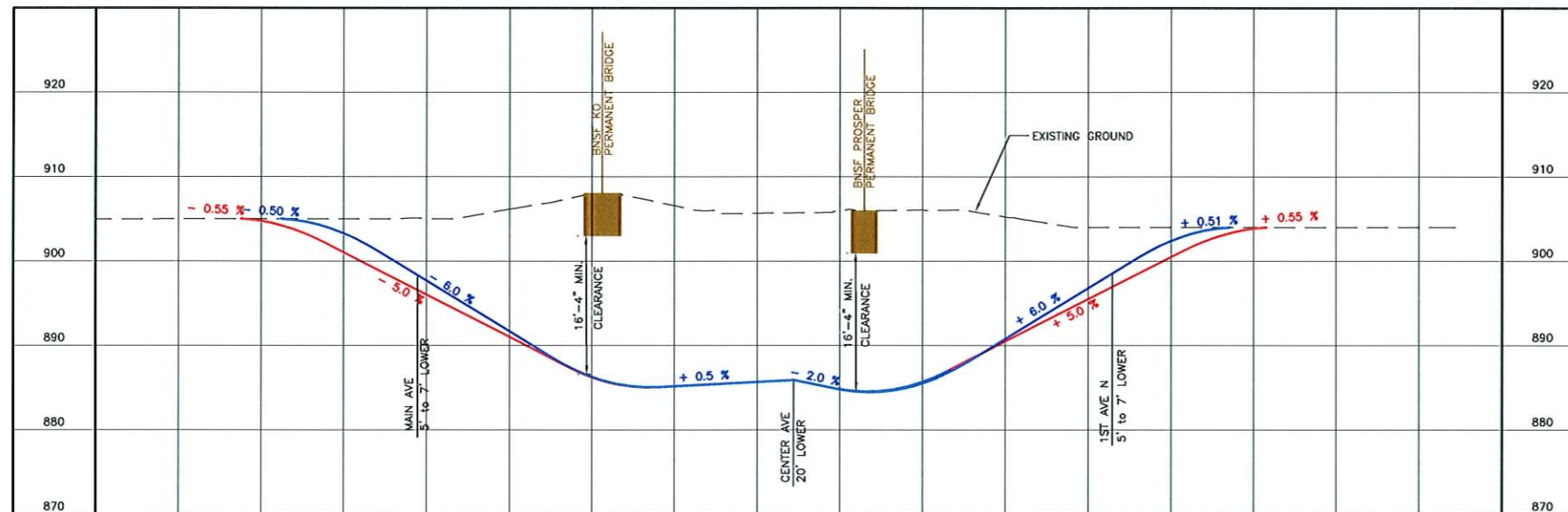


FIGURE 6.5 PROFILES - 11TH STREET CONCEPTS	
DOWNTOWN MOORHEAD RAILROAD GRADE SEPARATION FEASIBILITY STUDY	

14TH STREET PROFILE

CENTER AVE LOWERED TO MEET 14TH STREET AT-GRADE



LEGEND:
— PROPOSED 14TH ST PROFILE - 6% MAX. GRADE
— PROPOSED 14TH ST PROFILE - 5% MAX. GRADE

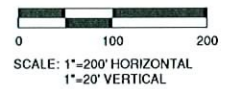


FIGURE 6.6 PROFILES - 14TH STREET CONCEPT	
DOWNTOWN MOORHEAD RAILROAD GRADE SEPARATION FEASIBILITY STUDY	