ENGINEERING, REIMAGINED

US 2/US 81 SKEWED INTERSECTION STUDY

Alternatives Analysis Report

Grand Forks, ND

June 2019

Overcoming Barriers Strengthening Connections

M.P.O. M.P.O. M.P.O.

Grand Forks - East Grand Forks
Metropolitan Planning Organization

Ensuring Opportunities Planning One Community

Table of Contents

Table of Figures

INTRODUCTION

The Existing and Future Conditions Report identified a series of safety and operational deficiencies through the Gateway Drive/US 2 corridor from 20th Street to 3rd Street. These issues, along with feedback from the project's Steering Committee, were the primary drivers of the alternatives development, evaluation, and ranking process discussed in this chapter.

DEVELOPMENT OF ALTERNATIVES

KEY ISSUES

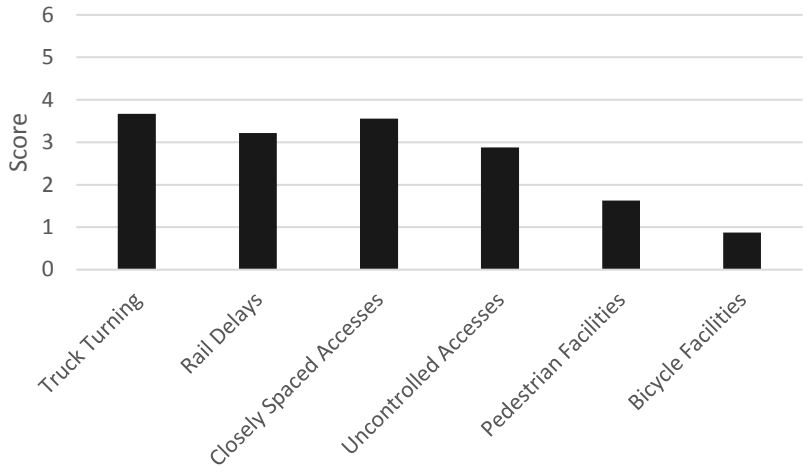
The existing and future conditions analysis identified six key issues that various improvement alternatives are intended to address:

- Truck turning challenges at the skewed intersections at Washington Street and Mill Road/5th Street.
- Rail induced delays and conflicts to vehicles, transit, bicycles, pedestrians, and emergency vehicles.
- Closely spaced traffic signals causing friction, rear-end crashes, and queueing issues.
- Dense access spacing creating safety issues.
- Lack of accessible pedestrian facilities, controlled pedestrian crossings, and desirable facilities.
- Limited bicycle facilities within the study area and an uncontrolled shared use path crossing on Washington Street.

The project's Steering Committee ranked these key issues, as shown in **Figure 1**. The committee ranked each of the six key issues on a scale of one to six, with a higher score indicating a higher priority.

The rankings were used to understand needs along the corridor in order to guide alternative development. Rankings were completed by the attendees of the first steering committee meeting, where representatives from the Forks MPO, NDDOT Grand Forks District, Grand Forks Engineering, Grand Forks Planning, Wilder Elementary School, the North Dakota State Mill and two representatives from a local business were present. This included a representative from all of the different agencies and at-large groups other than FHWA and BNSF and represented just half of the entire steering committee as a whole.

Figure 1 - SRC Prioritized Key Issues



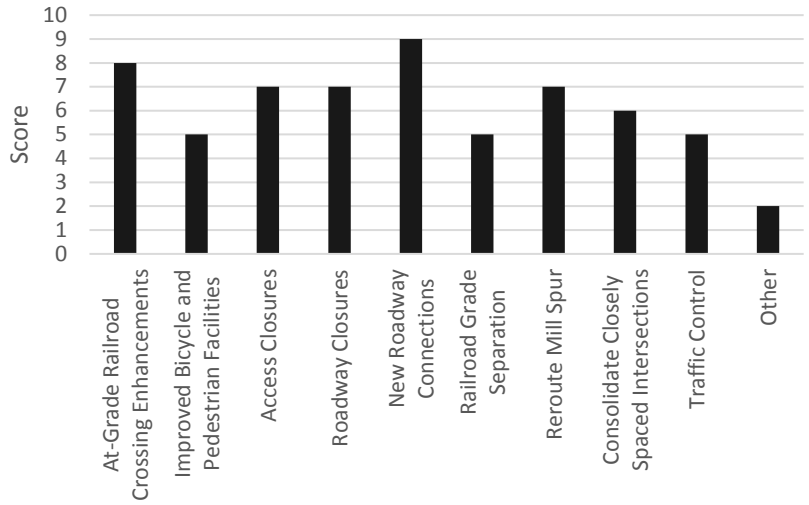
IMPROVEMENT CONSIDERATIONS

There are many strategies that can be considered to address the key issues in the study area:

- At-grade railroad crossing enhancements
- Improved pedestrian facilities and better pedestrian and bicycle connectivity to transit
- Access closures to private businesses
- Roadway closures to private streets
- New roadway connections to reroute skewed movements
- Railroad grade separation
- Reroute the Mill Spur
- Consolidate closely spaced intersections
- Traffic control revisions

The Steering Committee was asked to select from these improvement strategies and provide other strategies that may be worth considering, as shown in **Figure 2**. The higher the number, the more Steering Committee members thought it was an important improvement strategy.

Figure 2 - SRC Prioritized Improvement Strategies



Alternatives Development

To begin the alternatives development process, the steering committee was asked to draw concepts for further alternative analysis. Each concept was incorporated into subsequent alternative analysis. Many concepts were redundant and others incomplete so additional alternatives were also incorporated into this report.

Alternatives Selected for Detailed Analysis

Using Steering Committee feedback and technical analysis from the existing and future conditions analysis, alternatives were developed with three different major themes:

1) No Railroad Changes Alternatives
   - Existing Footprint Improvement Plan
   - New Roadway Connection Improvement Plan
   - Skewed Movement Rerouting Improvement Plan
2) Grade Separation Alternatives
   - Grade Separation Alternative A – US 81/Washington Street and Mill Spur
   - Grade Separation Alternative B – US 81/Washington Street, Mill Spur, and Mill Road/5th Street
3) Railroad Realignment Alternatives
   - Railroad Realignment Alternative A – Roundabout
   - Railroad Realignment Alternative B – Offset T-Intersections

More detailed descriptions and conceptual drawings of each of the alternatives listed above can be found later in this document.

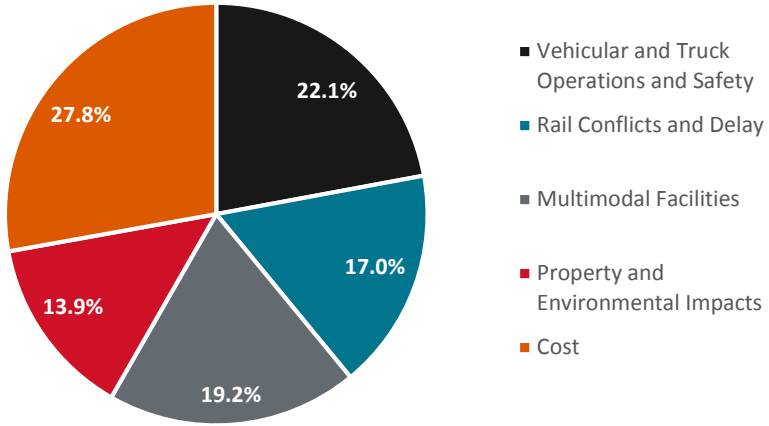
Improvement Priorities

To determine improvement priorities for the US 2/Gateway Drive skewed intersections, the Steering Committee rated the importance of the following elements:

- Vehicular and truck operations and safety
- Rail conflicts and delay
- Multimodal facilities (pedestrian and bicycle facilities)
- Property and environmental impacts
- Cost

The Steering Committee members were given 100 points to assign across the five elements above. The scoring values are shown in Figure 3.

Figure 3 - Improvement Priorities



Evaluation and Ranking of Alternatives

Alternatives were evaluated in terms of each of the elements that were prioritized by the Steering Committee (vehicular and truck operations and safety, rail conflicts and delay, multimodal facilities and safety, property and environmental impacts, cost).

For each of the evaluation elements, a score between zero (○○○○○○○○○○) and ten (●●●●●●●●●●). A score of zero indicates the alternative performs poorly for the given element and a score of ten indicates a significant improvement, or no consequences if the element's condition is already good.

Scores were assigned based on technical data and adjusted where appropriate using engineering judgment. Scores were assigned to alternatives relative to the other alternatives for comparison purposes. Scoring is designed to combine both quantitative and qualitative data, with detailed descriptions related to how alternatives provided in the subsequent discussion in this report.

Alternative scores are not intended to serve as recommendations, rather they are meant to be a metric to help the Study Review Committee and stakeholders better understand how different alternatives address the existing issues at each location.

Scoring Methods

Vehicular and Truck Operations

This criterion considers overall delays, traffic operations, and the number of expected conflicts during normal peak hours. This evaluation also considers issues with truck turning movements and impacts of alternative routing options. Traffic operations are for projected 2045 conditions.

Traffic operations, as well as the number of expected conflicts (i.e. crossing conflict, rear-end conflicts, or lane-change conflict) were estimated using Vissim traffic simulation models.

Rail Conflicts and Delay

This criterion considers overall delays induced during train event scenarios and potential conflicts with and without improved crossing infrastructure. This assumes current train lengths since current expectations are that future unit trains will occur at night, outside of peak traffic conditions that are being studied as part of this project.

Multimodal Facilities and Safety

This criterion considers bicycle and pedestrian safety and comfort. The current MPO Pedestrian and Bicycle Plan was used as a guide, and specific details related to each improvement is discussed for each alternative.

Property and Environmental Impacts

This criterion considers the number of impacted properties, the square footage of impacted areas, and the number of environmental factors that may be impacted.

Cost

This criterion is based on the estimated planning-level construction costs.

Weighted Average Score

A weighted average score considering all categories described above was calculated using the Steering Committee input as the weighting criteria. An example is shown in Table 1.

In this example, the weighted score was calculated as follows:

$$Weighted\ Score = (Vehicular\ and\ Truck\ Operations\ and\ Safety \times Element\ Weight) + (Rail\ Conflicts\ and\ Delay\ Score \times Element\ Weight) + (Multimodal\ Facilities\ and\ Safety\ Score \times Element\ Weight) + (Property\ and\ Environmental\ Impacts \times Element\ Weight) + (Cost \times Element\ Weight)$$

$$Weighted\ Score = (3 \times 0.22) + (1 \times 0.17) + (2 \times 0.19) + (10 \times 0.14) + (10 \times 0.28) = 5.4 \rightarrow \mathbf{5}$$

Table 1 - Sample Alternative Scoring

Scoring Category	Category Weight	Category Score	Weighted Score
Vehicular and Truck Operations and Safety	22	●●●○○○○○○○	●●●●●○○○○○ (5.4)
Rail Conflicts and Delay	17	●○○○○○○○○○	
Multimodal Facilities and Safety	19	●●○○○○○○○○	
Property and Environmental Impacts	14	●●●●●●●●●●	
Cost	28	●●●●●●●●●●	

Note: Colors in the "Category Weight" column are simply intended to visibly compare the weights for each scoring category.

In summary, the higher the score, the better the overall performance based on the weighting. It is impossible to achieve a perfect score of 10/10 because it is impossible to improve traffic operations, safety, etc. without any costs.

ALTERNATIVES WITH NO CHANGES TO THE MILL SPUR

The three alternatives discussed here do not make any changes to the Mill Spur but focus on changes that can be done to the study intersections while maintaining the railroad at-grade crossing.

ALT 1 EXISTING FOOTPRINT IMPROVEMENT PLAN

The existing footprint improvement plan would focus on three primary areas:

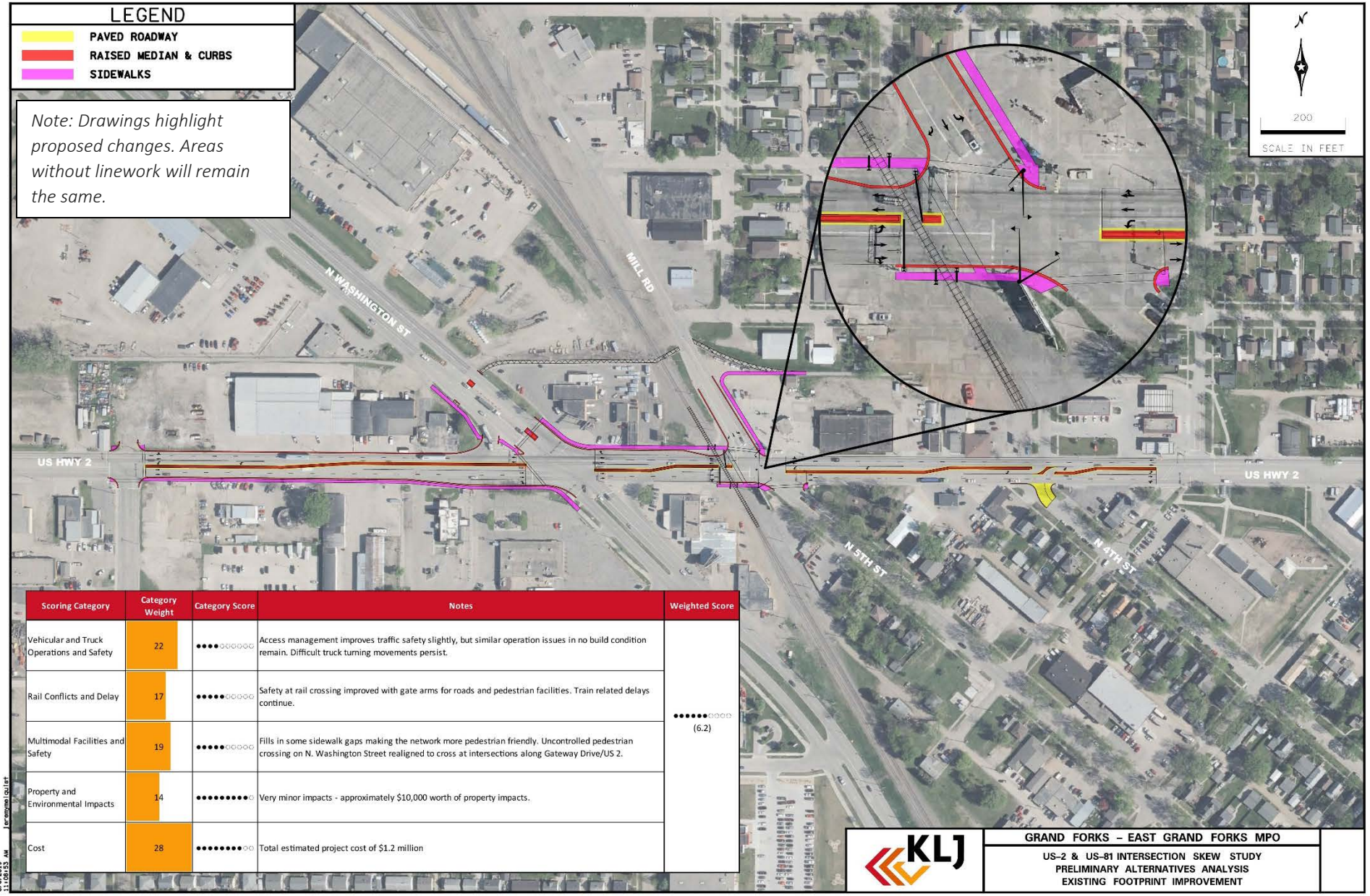
- **At-grade crossing safety** by adding railroad gate arms for the roadway and pedestrian crossings, with active warning systems and a raised median on US 2/Gateway Drive east of the Mill Road/5th Street intersection.
- **Bicycle and pedestrian facilities** by realigning the shared-use path through the skewed intersections to remove the uncontrolled crossing on Washington Street. This improves ADA compliance and crossing safety.
- **Access management** via access consolidation and closure, constructing a raised median west of Washington Street and east of Mill Road/5th Street.

Impacts

- **Vehicular and Truck Operations and Safety:** Intersection delay will not be significantly impacted, however access revisions reducing 14 accesses will reduce crash potential. Note this assumes the signal at US 2/Gateway Drive and 20th Street is maintained even though it is currently unwarranted since access management strategies in the area could draw more traffic to this signal.
- **Rail Conflicts and Delay:** This alternative will improve safety for all users by adding gate arms, warning systems, and a raised median, but will not mitigate railroad-related delays.
- **Multimodal Facilities and Safety:** The existing uncontrolled shared use path crossing across US 81/Washington Street and Mill Road (north of US 2/Gateway Drive) will be relocated to the intersection of US 2/Gateway Drive and US 81/Washington Street and the intersection of US2/Gateway Drive and Mill Road (on the north approach). Signal control will simplify crossing maneuvers.
- **Property and Environmental Impacts:** Very minor impacts - approximately $10,000 worth of property impacts.
- **Cost:** Total estimated project cost of $1.2 million

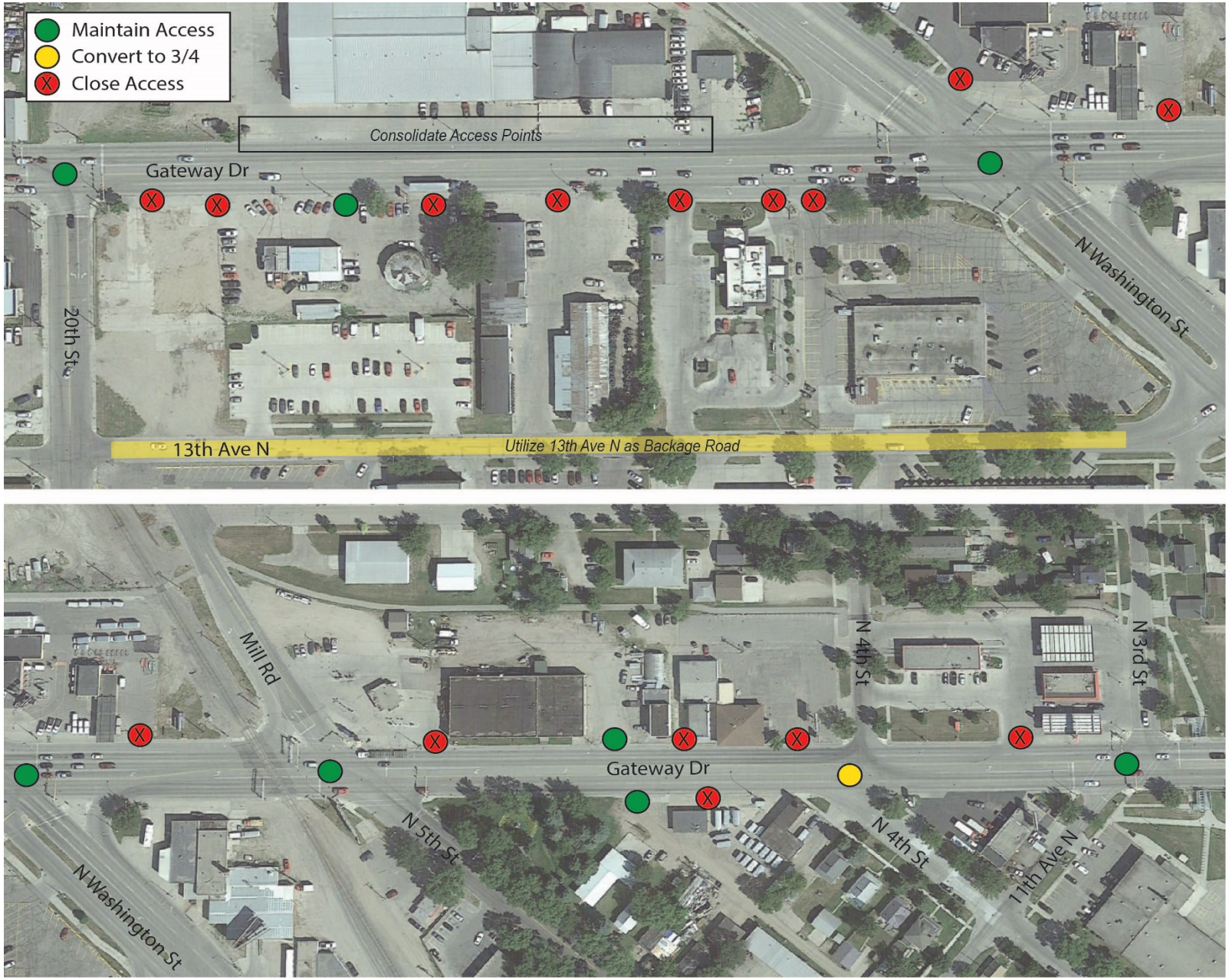
A concept drawing of the Existing Footprint Improvement Plan can be seen in Figure 4. A potential access management concept that can be implemented as part of this (or other) improvements can be seen in Figure 5.

Figure 4 – Alt 1 Existing Footprint Improvement Plan



Scoring Category	Category Weight	Category Score	Notes	Weighted Score
Vehicular and Truck Operations and Safety	22	●●●●○○○○○○	Access management improves traffic safety slightly, but similar operation issues in no build condition remain. Difficult truck turning movements persist.	●●●●●●○○○○ (6.2)
Rail Conflicts and Delay	17	●●●●●○○○○○	Safety at rail crossing improved with gate arms for roads and pedestrian facilities. Train related delays continue.	
Multimodal Facilities and Safety	19	●●●●●○○○○○	Fills in some sidewalk gaps making the network more pedestrian friendly. Uncontrolled pedestrian crossing on N. Washington Street realigned to cross at intersections along Gateway Drive/US 2.	
Property and Environmental Impacts	14	●●●●●●●●●○	Very minor impacts - approximately $10,000 worth of property impacts.	
Cost	28	●●●●●●●●○○	Total estimated project cost of $1.2 million	

Figure 5 – Access Management Concept



ALT 2 NEW ROADWAY CONNECTION IMPROVEMENT PLAN

The new roadway connection improvement plan would create a new roadway connecting the west and north approaches of the intersection of US 2/Gateway Drive and US 81/Washington Street. The junction of this new connection at US 81/Washington Street would be south of the State Mill, aligning between Grand Forks County Correctional and River Cities Speedway. The other junction at US 2/Gateway Drive would be east of Gateway Sportz. Other specifics include:

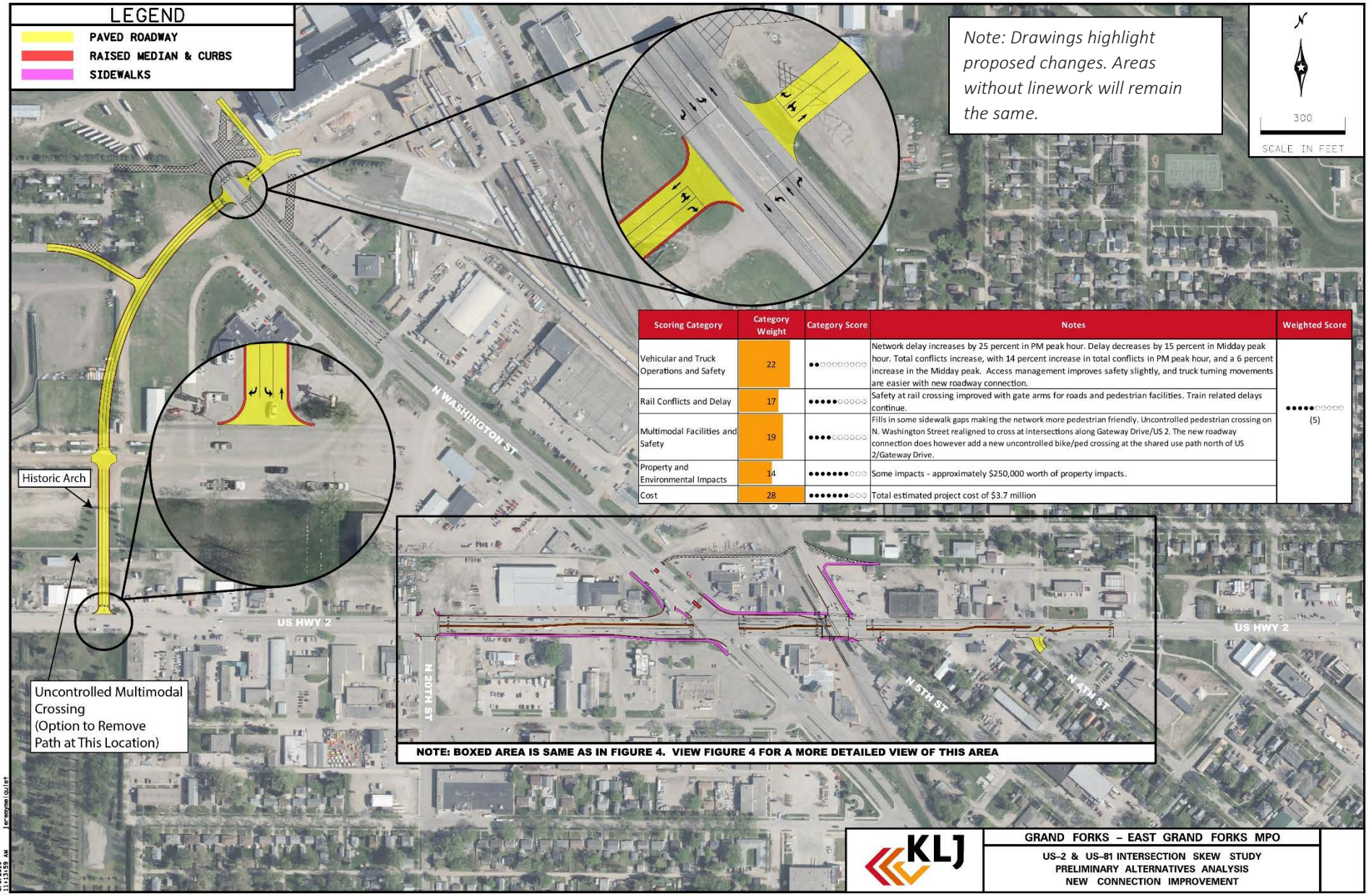
- This new roadway connection is intended to serve eastbound left turns and southbound right turns that currently use the intersection of US 2/Gateway Drive and US 81/Washington Street. Other movements would continue to operate as they currently do.
- The new intersections on US 81/Washington Street and US 2/Gateway Drive are not expected to meet signal warrants.
- This would close the current Valley Park access onto US 81/Washington Street and realign onto the new corridor.
- The multiple accesses from the State Mill would be consolidated into one.
- This alternative would also incorporate the at-grade crossing safety improvements, bicycle and pedestrian facilities, and access management from the Existing Footprint Improvement Plan.

Impacts

- **Vehicular and Truck Operations and Safety:**
  - Network delay is increased by 25 percent in the PM peak hour. Unsignalized left turn movements onto the new connection are expected to operate at LOS E in the PM peak however will provide an unskewed movement. Delays however are expected to decrease by 15 percent in the Midday rail peak hour.
  - Total conflicts are expected to increase by 14 percent in the PM peak and by 6 percent in the Midday rail peak. These increases are mainly attributable to crossing conflicts introduced by uncontrolled left turning movements at the new roadway connection intersections, with a 32 percent increase in crossing conflicts in the PM peak and a 50 percent increase in the Midday rail peak.
- **Rail Conflicts and Delay:** This alternative will improve safety for all users by adding gate arms, warning systems, and a raised median, but will not mitigate railroad-related delays.
- **Multimodal Facilities and Safety:** Existing sidewalk gaps will be filled in with new sidewalks, improving pedestrian accessibility and comfort. The existing uncontrolled shared use path crossing across US 81/Washington Street and Mill Road (north of US 2/Gateway Drive) will be relocated to the intersection of US 2/Gateway Drive and US 81/Washington Street and the intersection of US2/Gateway Drive and Mill Road (on the north approach). Signal control will simplify crossing maneuvers. A potential consequence of this plan is that a new uncontrolled bicycle/pedestrian crossing would be added at the shared use path north of US 2/Gateway Drive if no revisions are made to this path.
- **Property and Environmental Impacts:** Some impacts - approximately $250,000 worth of property impacts, the majority of which are occurring on the new corridor connection points. Note the new roadway connection would cross an existing historical arch entering the fairgrounds. Previous planning efforts have generated similar concepts where no concerns were identified. Impacts to the arch will need to be considered in greater detail during project development.
- **Cost:** Total estimated project cost of $3.7 million

A concept drawing of the New Roadway Connection Improvement Plan can be seen in Figure 6.

Figure 6 – Alt 2 New Roadway Connection Improvement Plan



Scoring Category	Category Weight	Category Score	Notes	Weighted Score
Vehicular and Truck Operations and Safety	22	●●○○○○○○○○	Network delay increases by 25 percent in PM peak hour. Delay decreases by 15 percent in Midday peak hour. Total conflicts increase, with 14 percent increase in total conflicts in PM peak hour, and a 6 percent increase in the Midday peak. Access management improves safety slightly, and truck turning movements are easier with new roadway connection.	●●●●●○○○○○ (5)
Rail Conflicts and Delay	17	●●●●●○○○○○	Safety at rail crossing improved with gate arms for roads and pedestrian facilities. Train related delays continue.	
Multimodal Facilities and Safety	19	●●●●○○○○○○	Fills in some sidewalk gaps making the network more pedestrian friendly. Uncontrolled pedestrian crossing on N. Washington Street realigned to cross at intersections along Gateway Drive/US 2. The new roadway connection does however add a new uncontrolled bike/ped crossing at the shared use path north of US 2/Gateway Drive.	
Property and Environmental Impacts	14	●●●●●●●○○○	Some impacts - approximately $250,000 worth of property impacts.	
Cost	28	●●●●●●●○○○	Total estimated project cost of $3.7 million	

ALT 3 SKEWED MOVEMENT REROUTING IMPROVEMENT PLAN

The Skewed Movement Rerouting Improvement Plan is similar to the New Roadway Connection option above, but would reroute all movements that currently must navigate significant roadway skew. The new connections between US 81/Washington Street and US 2/Gateway Drive will also be smaller with greater use of existing roadways and intersections. Specifics include:

- New connection in northwest quadrant would connect through the Case IH implement dealer property at US 81/Washington Street and connect to US 2/Gateway Drive at 20th Street. Both terminal intersections would be signalized, with warrants expected to be met under 2045 traffic volumes.
- New connection in the southeast quadrant would have a new connection at 11th Avenue to US 81/Washington Street, aligning with 12th Avenue. The intersection of US 81/Washington Street and 11th Avenue would be signalized. This alternative would include adding an additional railroad crossing at this connection point.
    - These new connections would then service the skewed movements at the US 2/Gateway Drive and US 81/Washington Street intersection (northbound right, southbound right, eastbound left, and westbound left).
- At Mill Road/5th Street, the intersection would be realigned, separating the north and south approaches of the intersection, and converting them to ¾ access (no left-turns or through movements from the minor approaches). Each of these two intersections would be under minor approach stop control.
- This alternative would also incorporate the at-grade crossing safety improvements, bicycle and pedestrian facilities, and access management from the existing footprint improvement plan.

Impacts

- Vehicular and Truck Operations and Safety:
    - Network delay decreases by 13 percent in the PM peak hour and by 12 percent in the Midday rail peak hour. At the intersection of US 2/Gateway Drive and US 81/Washington Street, the overall intersection is improved to LOS D in the PM peak (LOS E in no build condition).
        - The improved operations compared to the New Roadway Connection option are due to using the existing signalized intersection at US 2/Gateway Drive and 20th Street as a rerouting intersection. This option would however add a new signal at US 81/Washington Street and 12th Avenue N satisfying unmet existing signal warrants.
        - Queue spillback between Us 81/Washington Street an Mill Road will be reduced, benefitting the corridor operations.
    - Conflicts are expected to increase by 80 percent in the PM peak hour, and increase by 16 percent in the Midday rail peak hour. These increases are mainly attributable to increases in crossing conflicts (158 percent increase in PM peak and 73 percent in Midday rail peak). The increase in crossing conflicts is due to the re-routed left turns being accommodated by protected/permitted left turn phasing at 20th Street and 11th Avenue rather than the existing protected-only phasing at the intersection of US 2/Gateway Drive and US 81/Washington Street.
- Rail Conflicts and Delay: This alternative will improve safety for all users by adding gate arms, warning systems, and a raised median, but will not mitigate railroad-related delays. Reducing queues at US 81/Washington and completely eliminating them at Mill road should mitigate the queueing across the tracks issue.
- Multimodal Facilities and Safety: Existing sidewalk gaps will be filled in with new sidewalks, improving pedestrian accessibility and comfort. and Mill Road (north of US 2/Gateway Drive) will be relocated to the intersection of US 2/Gateway Drive and US 81/Washington Street and the intersection of US2/Gateway Drive and Mill Road (on the north approach). Signal control will simplify crossing maneuvers. One potential consequence of this option is adding traffic to 11th Avenue North past Wilder Elementary, even though this is not the intended route.

- **Property and Environmental Impacts:** Moderate impacts - approximately $790,000 worth of property impacts due to new roadway construction and one building removal
- **Cost:** Total estimated project cost of $8.6 million

A concept drawing of the Skewed Movement Rerouting Improvement Plan can be seen in Figure 7.

Sub-Option: ITS Routing Solution

A sub-option for all the alternatives that make no impacts to the Mill Spur at-grade crossing include an intelligent transportation systems (ITS) routing solution. This solution would implement a variety of technologies to warn drivers of an upcoming train event at the Mill Spur to allow them to select a different route that would add 5 additional minutes in travel time using Demers Avenue. This would help to minimize the impacts to operations and driver delay during train events but could be a net travel time impact. ITS solutions would include:

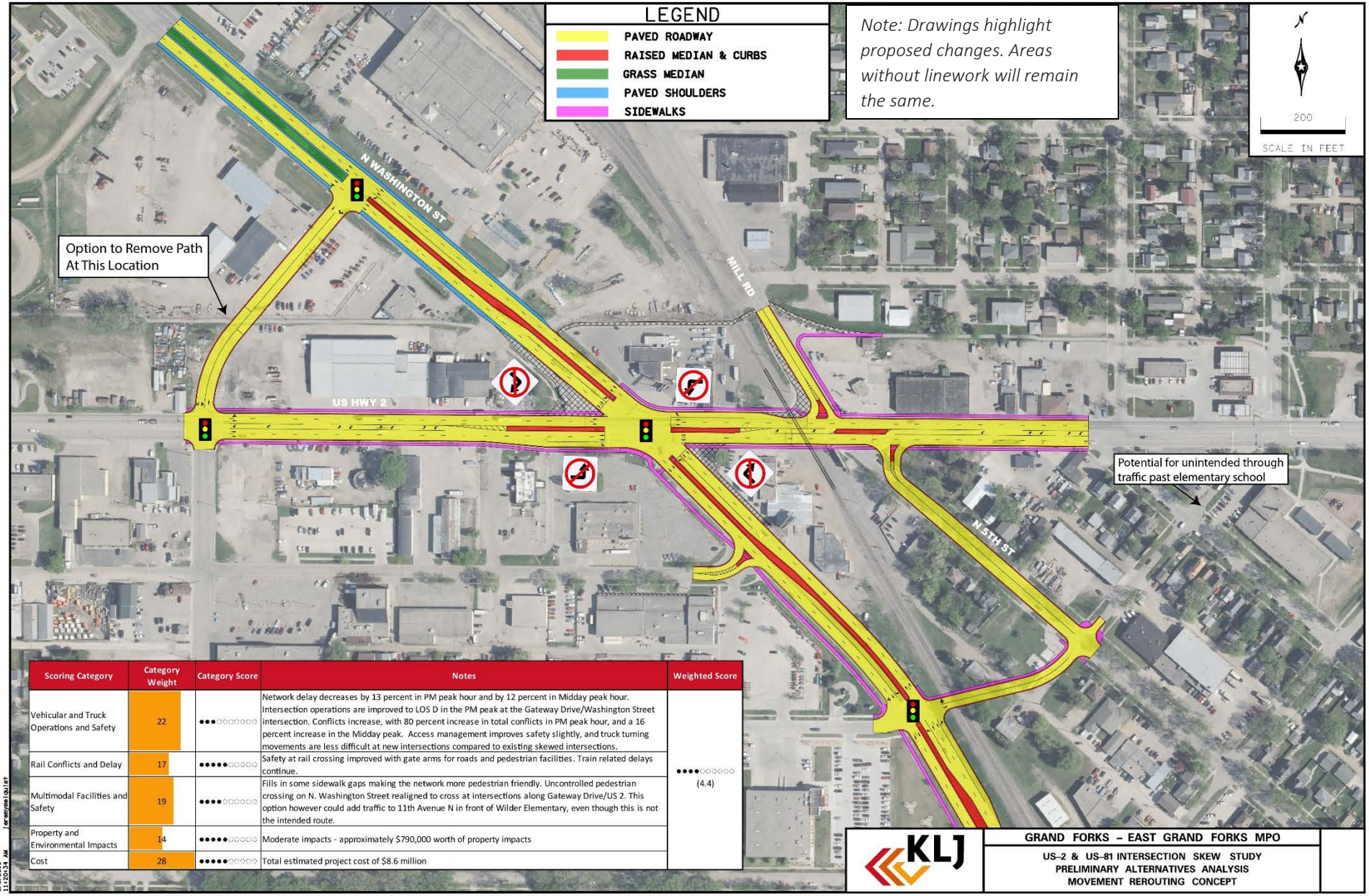
- Dynamic message signs strategically located along Grand Forks and East Grand Forks' most important travel corridors, including US 2/Gateway Drive, west of Columbia Road; US 81/N and east of the Red River. Washington Street north of US 2/Gateway Drive and south of DeMers Avenue/ND 197. These signs can also feed back information to emergency response centers like hospitals and fire departments, allowing for alternate route selections. This information can also be sent out to cell phones with push notifications
- Additional sensors for the railroad crossings, travel time, etc. to improve data collection and information collection.
- Traffic signals that can incorporate data from the new sensors to automatically adjust timing plans to reduce traffic delays.

Note that there are some existing ITS solutions for the neighborhoods to the east of the State Mill, but these do not impact through traffic on the surrounding arterials.

Impacts of Unit Trains

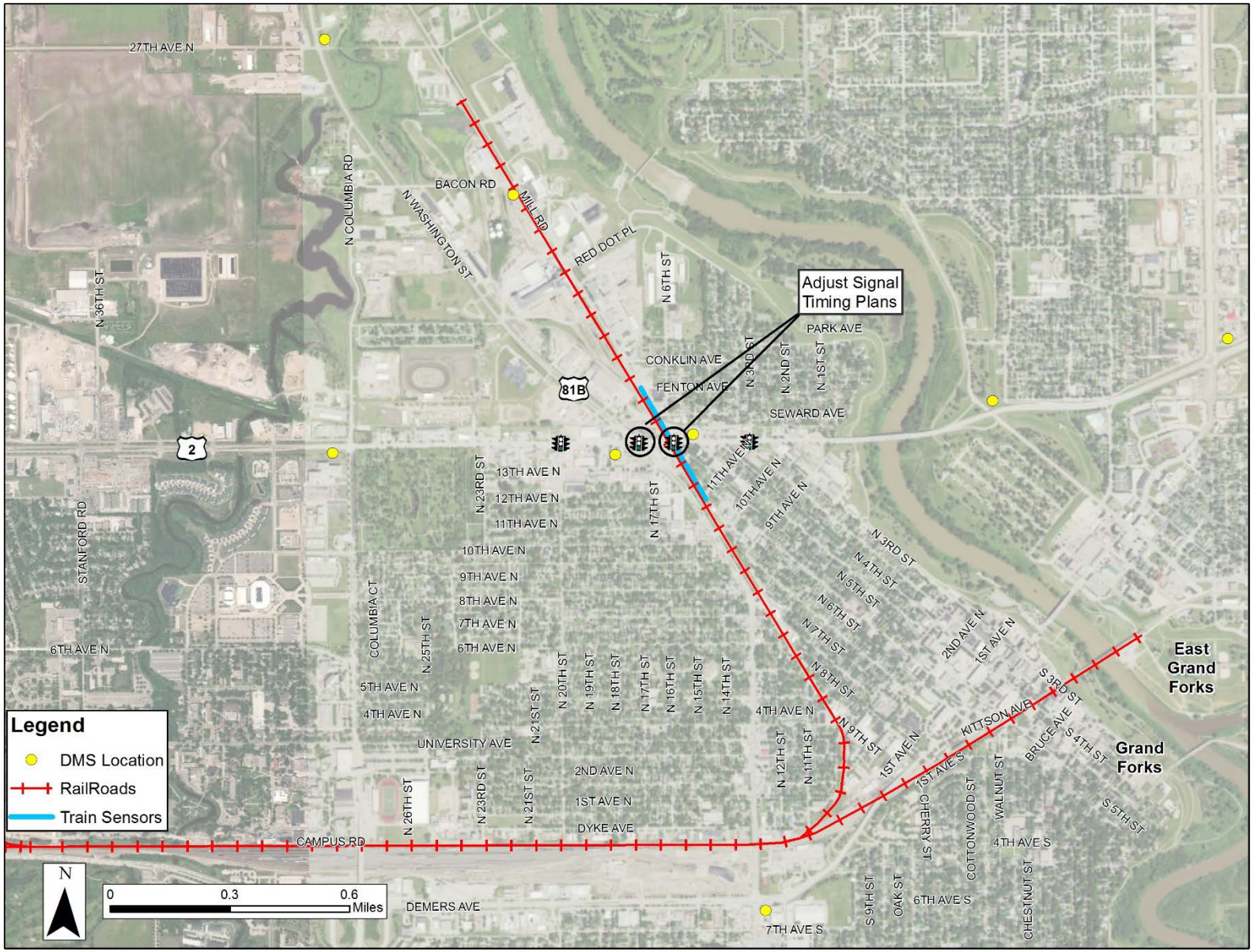
The North Dakota State Mill is planning for unit trains to deliver large loads of grain to their facility up to three times a month, typically occurring during the weekends and evenings. Unit trains are approximately 7,000 feet long, and previous analysis indicated expected delay for one unit train would be between 8.0 and 15.9 minutes. These impacts would be severe at the Gateway Drive/US 2 crossing without a grade separation, even while occurring during off-peak hours. These extended train events would have severe impacts to emergency response time. Including ITS routing and traveler information could help minimize driver delay by allowing for proactive rerouting during these extra-long train events.

Figure 7 – Alt 3 Skewed Movement Rerouting Improvement Plan



Scoring Category	Category Weight	Category Score	Notes	Weighted Score
Vehicular and Truck Operations and Safety	22	●●●○○○○○○○	Network delay decreases by 13 percent in PM peak hour and by 12 percent in Midday peak hour. Intersection operations are improved to LOS D in the PM peak at the Gateway Drive/Washington Street intersection. Conflicts increase, with 80 percent increase in total conflicts in PM peak hour, and a 16 percent increase in the Midday peak. Access management improves safety slightly, and truck turning movements are less difficult at new intersections compared to existing skewed intersections.	●●●●○○○○○○ (4.4)
Rail Conflicts and Delay	17	●●●●●○○○○○	Safety at rail crossing improved with gate arms for roads and pedestrian facilities. Train related delays continue.	
Multimodal Facilities and Safety	19	●●●●○○○○○○	Fills in some sidewalk gaps making the network more pedestrian friendly. Uncontrolled pedestrian crossing on N. Washington Street realigned to cross at intersections along Gateway Drive/US 2. This option however could add traffic to 11th Avenue N in front of Wilder Elementary, even though this is not the intended route.	
Property and Environmental Impacts	14	●●●●●○○○○○	Moderate impacts - approximately $790,000 worth of property impacts	
Cost	28	●●●●●○○○○○	Total estimated project cost of $8.6 million	

Figure 8 – ITS Routing Sub-Option



ALTERNATIVES WITH RAILROAD GRADE SEPARATIONS

The two alternatives discussed here grade separate US 2/Gateway Drive from US 81/Washington Street and the Mill Spur.

ALT 4 GRADE SEPARATION OF US 81/WASHINGTON STREET AND MILL SPUR

This option would grade separate US 2/Gateway Drive above US 81/Washington Street and the Mill Spur. Specifics include:

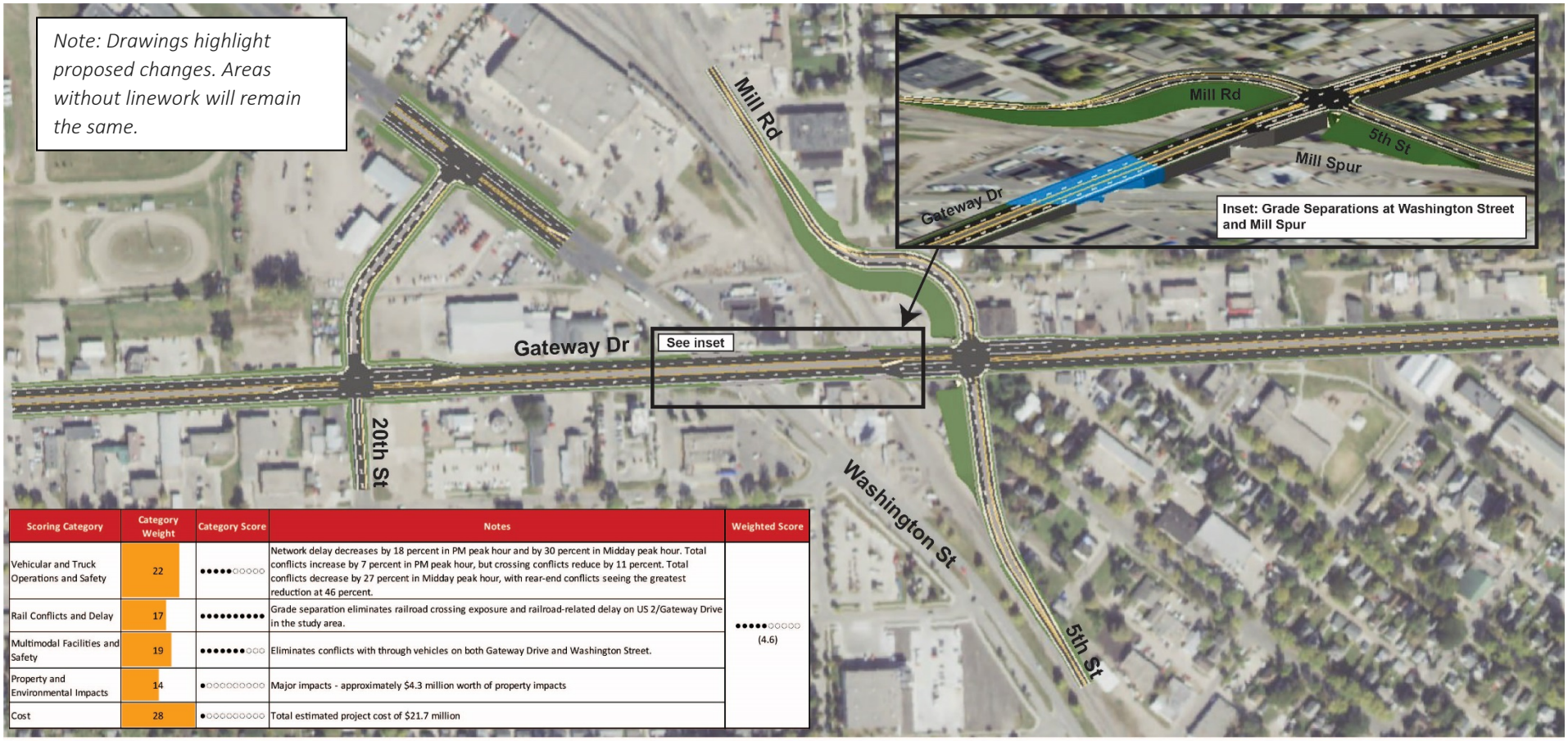
- No direct access between US 2/Gateway Drive and US 81/Washington Street
- Full access intersection at US 2/Gateway Drive and 20th Street, which includes adding a north approach that connects to US 81/Washington Street
- Full access intersection at US 2/Gateway Drive and Mill Road/5th Street blocking business access within 700 feet of the intersection.
- Close intersections of US 2/Gateway Drive at 4th Street and 3rd Street

Impacts

- **Vehicular and Truck Operations and Safety:**
  - Network delay decreases by 18 percent in the PM peak and by 30 percent in the Midday rail peak. The poorest performing intersection is US 2/Gateway Drive and 20th Street, which is expected to operate at LOS D in the PM peak. This option also eliminates the skewed intersections and proximity of the Washington St and Mill Road/5th Street closely spaced intersections.
  - Total conflicts increase by 7 percent in the PM peak, but crossing conflicts are reduced by 11 percent. In the Midday train peak, total conflicts are reduced by 27 percent, with rear-end crashes seeing the greatest reduction at 46 percent.
- **Rail Conflicts and Delay:** The grade separation eliminates railroad crossing exposure and railroad-related delay on US 2/Gateway Drive in the study area.
- **Multimodal Facilities and Safety:** Eliminates conflicts with through vehicles on both US 2/Gateway Drive and US 81/Washington Street
- **Property and Environmental Impacts:** Major impacts - approximately $4.3 million worth of property impacts and two building removals
- **Cost:** Total estimated project cost of $21.7 million

A concept drawing of the Grade Separation of US 81/Washington Street and Mill Spur can be seen in Figure 9.

Figure 9 – Grade Separation of US 81/Washington Street and Mill Spur



Scoring Category	Category Weight	Category Score	Notes	Weighted Score
Vehicular and Truck Operations and Safety	22	●●●●●○○○○○	Network delay decreases by 18 percent in PM peak hour and by 30 percent in Midday peak hour. Total conflicts increase by 7 percent in PM peak hour, but crossing conflicts reduce by 11 percent. Total conflicts decrease by 27 percent in Midday peak hour, with rear-end conflicts seeing the greatest reduction at 46 percent.	●●●●●○○○○○ (4.6)
Rail Conflicts and Delay	17	●●●●●●●●●●	Grade separation eliminates railroad crossing exposure and railroad-related delay on US 2/Gateway Drive in the study area.	
Multimodal Facilities and Safety	19	●●●●●●●○○○	Eliminates conflicts with through vehicles on both Gateway Drive and Washington Street.	
Property and Environmental Impacts	14	●○○○○○○○○○	Major impacts - approximately $4.3 million worth of property impacts	
Cost	28	●○○○○○○○○○	Total estimated project cost of $21.7 million	

Alt 5 Grade Separation of US 81/Washington Street, Mill Spur, and Mill Road/5th Street

This operation would grade separate US 2/Gateway Drive above US 81/Washington Street, the Mill Spur, and Mill Road/5th Street. Specifics include:

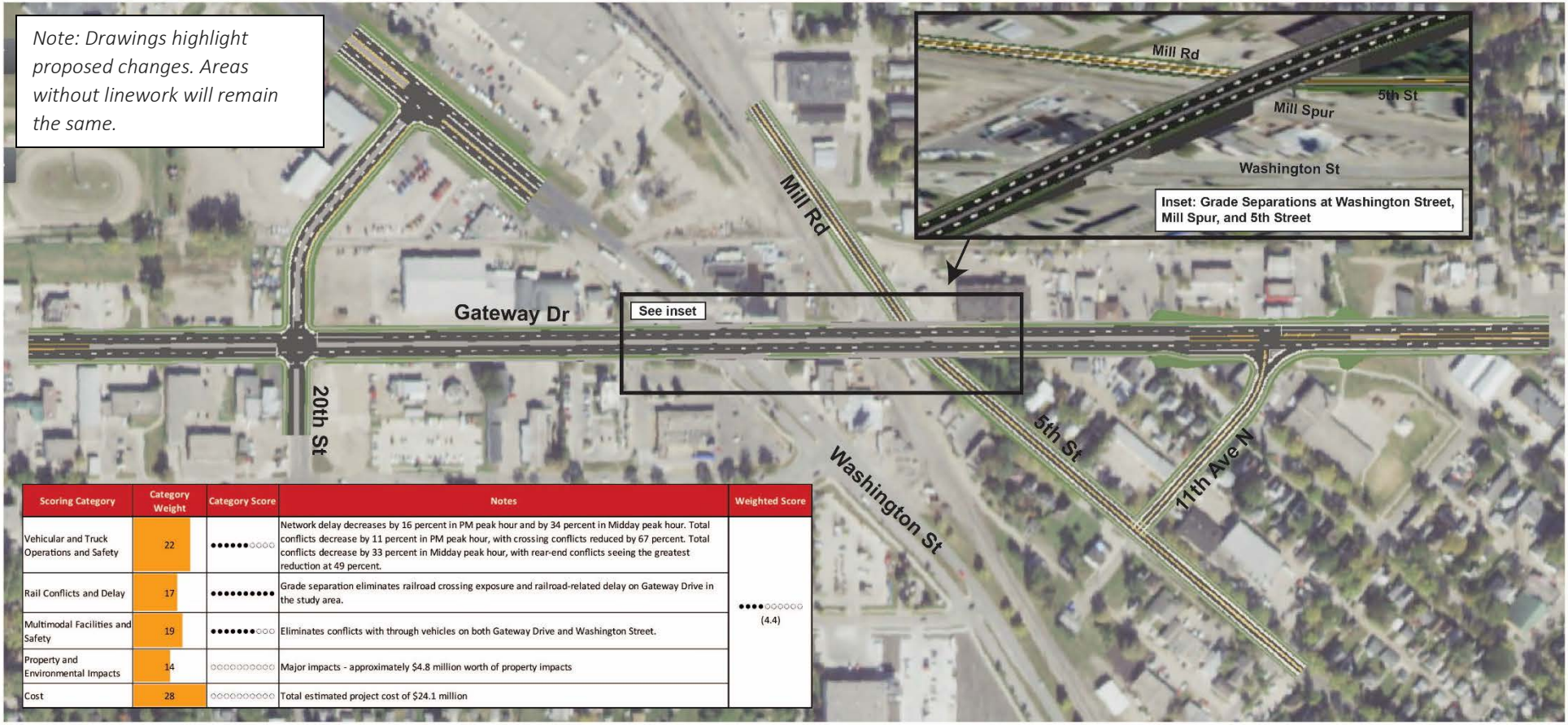
- No direct access between US 2/Gateway Drive and US 81/Washington Street
- No direct access between US 2/Gateway Drive and Mill Road/5th Street
- Full access intersection at US 2/Gateway Drive and 20th Street, which includes adding a north approach that connects to US 81/Washington Street
- Full access intersection at US 2/Gateway Drive and 4th Street with a mini roundabout assumed at 4th Street and Mill Road/5th Street.
- Close intersection of US 2/Gateway Drive and 3rd Street

Impacts

- **Vehicular and Truck Operations and Safety:**
  - Network delay decreases by 16 percent in the PM peak and by 34 percent in the Midday rail peak. The poorest performing intersection is US 2/Gateway Drive and 20th Street, which is expected to operate at LOS D in the PM peak. This option also eliminates the skewed intersections and proximity of the Washington St and Mill Road/5th Street closely spaced intersections.
  - Total conflicts reduce by 11 percent in the PM peak and by 33 percent in the Midday rail peak. The greatest reduction is for crossing conflicts, where they reduce by 67 percent in the PM peak and by 49 percent in the Midday rail peak.
- **Rail Conflicts and Delay:** The grade separation eliminates railroad crossing exposure and railroad-related delay on US 2/Gateway Drive in the study area.
- **Multimodal Facilities and Safety:** Eliminates conflicts with through vehicles on both US 2/Gateway Drive and US 81/Washington Street
- **Property and Environmental Impacts:** Major impacts - approximately $4.8 million worth of property impacts and two building removals
- **Cost**: Total estimated project cost of $24.1 million

A concept drawing of the Grade Separation of US 81/Washington Street, Mill Spur, and 5th Street can be seen in Figure 10.

Figure 10 – Grade Separation of US 81/Washington Street, Mill Spur, and 5th Street



Scoring Category	Category Weight	Category Score	Notes	Weighted Score
Vehicular and Truck Operations and Safety	22	●●●●●●○○○○	Network delay decreases by 16 percent in PM peak hour and by 34 percent in Midday peak hour. Total conflicts decrease by 11 percent in PM peak hour, with crossing conflicts reduced by 67 percent. Total conflicts decrease by 33 percent in Midday peak hour, with rear-end conflicts seeing the greatest reduction at 49 percent.	●●●●○○○○○○ (4.4)
Rail Conflicts and Delay	17	●●●●●●●●●●	Grade separation eliminates railroad crossing exposure and railroad-related delay on Gateway Drive in the study area.	
Multimodal Facilities and Safety	19	●●●●●●●○○○	Eliminates conflicts with through vehicles on both Gateway Drive and Washington Street.	
Property and Environmental Impacts	14	○○○○○○○○○○	Major impacts - approximately $4.8 million worth of property impacts	
Cost	28	○○○○○○○○○○	Total estimated project cost of $24.1 million	

ALTERNATIVES WITH RAILROAD REALIGNMENT

In 2016, the Grand Forks – East Grand Forks MPO studied the Glasston Subdivision railroad crossings. This study discussed the possibilities for the Mill Spur line if the State Mill built a grain unit unloading facility with rail access from the Glasston Subdivision. This facility would make the Mill Spur obsolete, opening other opportunities for the railroad right-of-way. If the Mill Spur was abandoned between 2nd Avenue North and Gateway Drive, a new rail line connecting the Glasston Subdivision and the north end of the Mill Spur (north of Gateway Drive) would be constructed somewhere near 27th Avenue North.

Any of the at-grade solutions could also be applied in this section with obvious benefits from removing the mill spur. The purpose of these alternatives is to leverage the extra space and elimination of railroad crossing conflicts to develop a solution that eliminate the skew turning movements and closely spaced traffic signals which would still be an issue with the railroad line was removed. The two alternatives discussed here would require the realignment of the Mill Spur to the north. It would vacate the Mill Spur right-of-way and eliminate the train-vehicle interactions.

ALT 6 CONSOLIDATE US 81/WASHINGTON STREET AND MILL ROAD/5TH STREET INTO ROUNDABOUT INTERSECTION

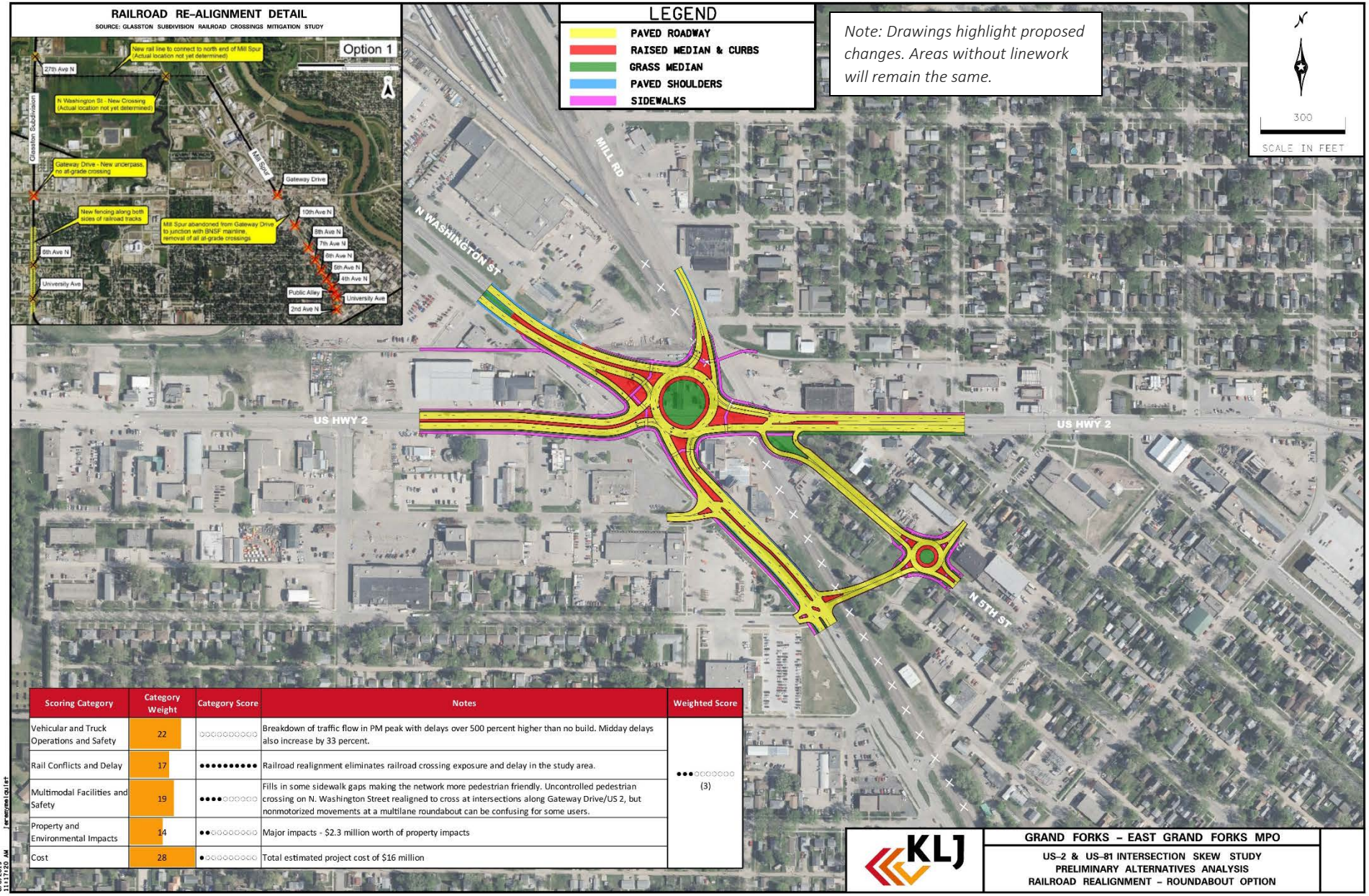
This option would consolidate the US 2/Gateway Drive intersections with US 81/Washington Street and Mill Road/5th Street into one multilane roundabout. A single lane roundabout would also be constructed at 5th Street and 11th Avenue N. The single lane roundabout will have a connection to US 81/Washington Street, south of US 2/Gateway Drive.

Impacts

- **Vehicular and Truck Operations and Safety:** Traffic flow breaks down in PM peak hour, with 500 percent more delay than no-build condition and the multilane roundabout operating at LOS F. This also consolidates Washington Street and Mill Road/5th Street into one intersection. Midday delay also increases by 33 percent, with the roundabout operating at LOS D.
- **Rail Conflicts and Delay:** Railroad realignment eliminates railroad crossing exposure and delay in the study area.
- **Multimodal Facilities and Safety:** Some existing sidewalk gaps will be filled in with new sidewalks, improving pedestrian accessibility and comfort. The existing uncontrolled pedestrian crossing across US 81/Washington Street is realigned to cross at intersections along US 2/Gateway Drive, but nonmotorized movements at a multilane roundabout can be confusing for some users.
- **Property and Environmental Impacts:** Major impacts - $2.3 million worth of property impacts and 6 building removals
- **Cost:** Total estimated project cost of $16 million ($4.4 million of which in railroad realignment costs)

A concept drawing of the Railroad Realignment and Roundabout can be seen in Figure 11.

Figure 11 – Railroad Realignment with Roundabout



Scoring Category	Category Weight	Category Score	Notes	Weighted Score
Vehicular and Truck Operations and Safety	22	○○○○○○○○○○	Breakdown of traffic flow in PM peak with delays over 500 percent higher than no build. Midday delays also increase by 33 percent.	●●●○○○○○○○ (3)
Rail Conflicts and Delay	17	●●●●●●●●●●	Railroad realignment eliminates railroad crossing exposure and delay in the study area.	
Multimodal Facilities and Safety	19	●●●●○○○○○○	Fills in some sidewalk gaps making the network more pedestrian friendly. Uncontrolled pedestrian crossing on N. Washington Street realigned to cross at intersections along Gateway Drive/US 2, but nonmotorized movements at a multilane roundabout can be confusing for some users.	
Property and Environmental Impacts	14	●●○○○○○○○○	Major impacts - $2.3 million worth of property impacts	
Cost	28	●○○○○○○○○○	Total estimated project cost of $16 million	

ALT 7 SEPARATED T-INTERSECTION OF US 81/WASHINGTON STREET APPROACHES

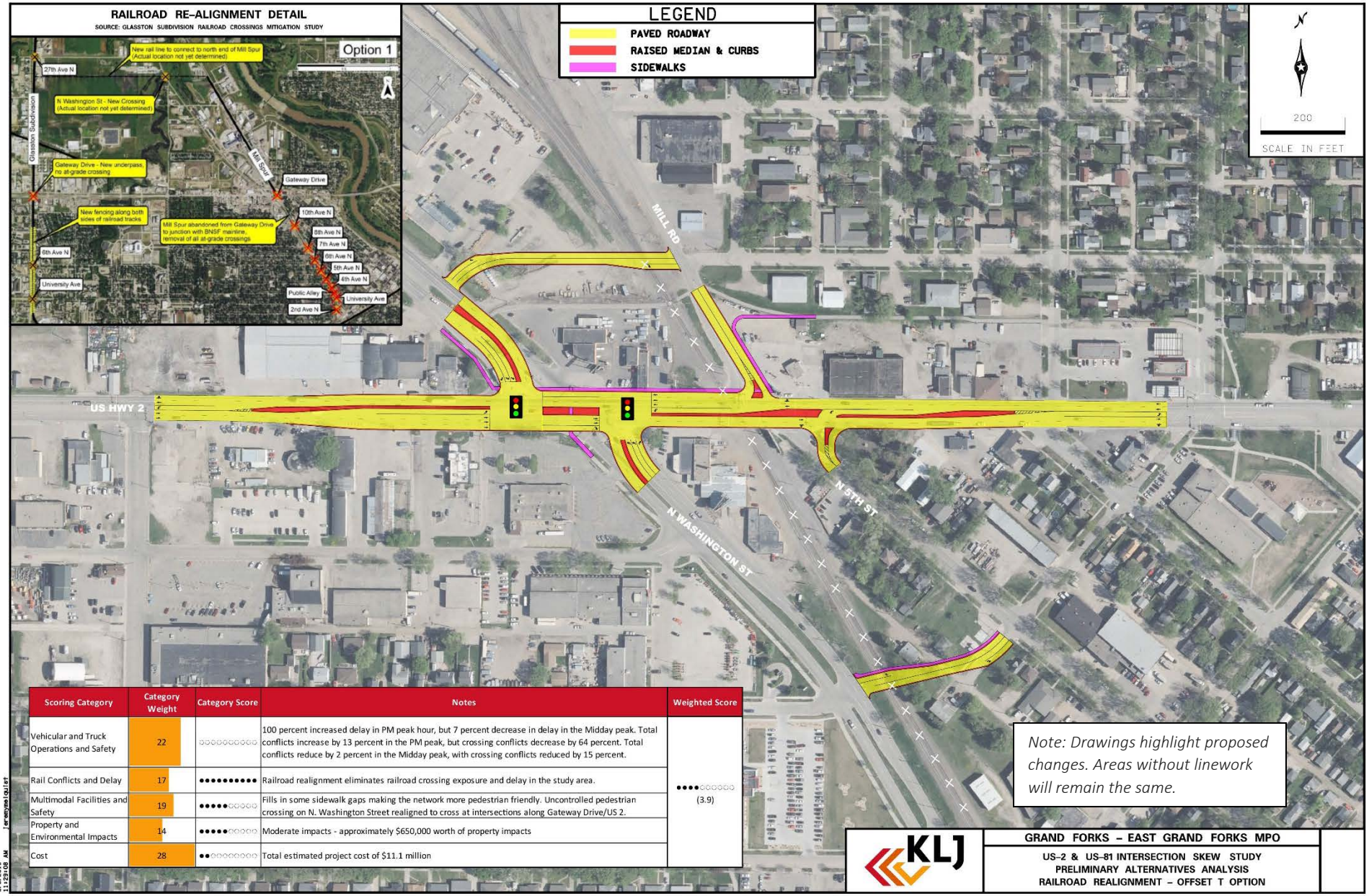
The separated T-intersection of US 81/Washington Street approaches would realign the north and south approaches of US 81/Washington Street into two signalized t-intersections. A similar configuration would be implemented at Mill Road/5th Street, but each of these t-intersections will be ¾ accesses that restrict minor approach left turns.

Impacts

- **Vehicular and Truck Operations and Safety:**
  - Network delay increases by over 200 percent in the PM peak hour, with the US 2/Gateway Drive and US 81/Washington Street separated t-intersection configuration operating at LOS F. This is due to the capacity and phasing constraints need for the NBT and SBT movements on Washington Street being consolidated into a single lane. Network delay decreases by 7 percent in the Midday rail peak.
  - Total conflicts increase by 75 percent in the PM peak. Total conflicts increase by 47 percent in the Midday rail peak, with crossing conflicts reduced by 4 percent.
- **Rail Conflicts and Delay:** Railroad realignment eliminates railroad crossing exposure and delay in the study area.
- **Multimodal Facilities and Safety:** Existing sidewalk gaps will be filled in with new sidewalks, improving pedestrian accessibility and comfort. The existing uncontrolled multimodal crossing across US 81/Washington Street and Mill Road (north of US 2/Gateway Drive) will be relocated to the intersection of US 2/Gateway Drive and US 81/Washington Street (on the north approach). Signal control will simplify crossing maneuvers.
- **Property and Environmental Impacts:** Moderate impacts - approximately $650,000 worth of property impacts
- **Cost:** Total estimated project cost of $11.1 million ($4.4 million of which in railroad realignment costs)

A concept drawing of the Railroad Realignment and Offset T Intersection can be seen in Figure 12.

Figure 12 – Railroad Realignment with Offset T Intersection



Scoring Category	Category Weight	Category Score	Notes	Weighted Score
Vehicular and Truck Operations and Safety	22	○○○○○○○○○○	100 percent increased delay in PM peak hour, but 7 percent decrease in delay in the Midday peak. Total conflicts increase by 13 percent in the PM peak, but crossing conflicts decrease by 64 percent. Total conflicts reduce by 2 percent in the Midday peak, with crossing conflicts reduced by 15 percent.	●●●●○○○○○○ (3.9)
Rail Conflicts and Delay	17	●●●●●●●●●●	Railroad realignment eliminates railroad crossing exposure and delay in the study area.	
Multimodal Facilities and Safety	19	●●●●●○○○○○	Fills in some sidewalk gaps making the network more pedestrian friendly. Uncontrolled pedestrian crossing on N. Washington Street realigned to cross at intersections along Gateway Drive/US 2.	
Property and Environmental Impacts	14	●●●●●○○○○○	Moderate impacts - approximately $650,000 worth of property impacts	
Cost	28	●●○○○○○○○○	Total estimated project cost of $11.1 million	

ALT 8 NEW ROADWAY CONNECTION PLAN (WITH RAILROAD REALIGNMENT)

This option is a modification to Alternative 2 discussed above, but with the inclusion of railroad realignment.

Impacts

- **Vehicular and Truck Operations and Safety:**
  - Network delay is increased by 25 percent in the PM peak hour. Delays however are expected to decrease by 15 percent in the Midday rail peak hour.
  - Total conflicts are expected to increase by 14 percent in the PM peak and by 6 percent in the Midday rail peak.
- **Rail Conflicts and Delay:** Railroad realignment eliminates railroad crossing exposure and delay in the study area.
- **Multimodal Facilities and Safety:** Existing sidewalk gaps will be filled in with new sidewalks, improving pedestrian accessibility and comfort. The existing uncontrolled shared use path crossing across US 81/Washington Street and Mill Road (north of US 2/Gateway Drive) will be relocated to the intersection of US 2/Gateway Drive and US 81/Washington Street and the intersection of US2/Gateway Drive and Mill Road (on the north approach). Signal control will simplify crossing maneuvers.
- **Property and Environmental Impacts:** Some impacts - approximately $250,000 worth of property impacts, the majority of which are occurring on the new corridor connection points.
- **Cost:** Total estimated project cost of $8.1 million

ALT 9 SKEWED MOVEMENT REROUTING PLAN (WITH RAILROAD REALIGNMENT)

This option is a modification to Alternative 3 discussed above, but with the inclusion of railroad realignment.

Impacts

- **Vehicular and Truck Operations and Safety:**
  - Network delay decreases by 13 percent in the PM peak hour and by 12 percent in the Midday rail peak hour. At the intersection of US 2/Gateway Drive and US 81/Washington Street, the overall intersection is improved to LOS D in the PM peak (LOS E in no build condition).
  - Conflicts are expected to increase by 80 percent in the PM peak hour, and increase by 16 percent in the Midday rail peak hour.
- **Rail Conflicts and Delay:** Railroad realignment eliminates railroad crossing exposure and delay in the study area.
- **Multimodal Facilities and Safety:** Existing sidewalk gaps will be filled in with new sidewalks, improving pedestrian accessibility and comfort. and Mill Road (north of US 2/Gateway Drive) will be relocated to the intersection of US 2/Gateway Drive and US 81/Washington Street and the intersection of US2/Gateway Drive and Mill Road (on the north approach). Signal control will simplify crossing maneuvers. One potential consequence of this option is adding traffic to 11th Avenue North past Wilder Elementary, even though this is not the intended route.
- **Property and Environmental Impacts:** Moderate impacts - approximately $790,000 worth of property impacts due to new roadway construction and one building removal
- **Cost:** Total estimated project cost of $13 million

SUMMARY

A summary of the performance of all alternatives across all considered evaluation criteria can be seen in Table 2.

NEXT STEPS

Once the Steering Committee has had an opportunity to review this document and provide feedback and potential refinements to the alternatives, the alternatives will be presented to the public. After public input has been obtained, the recommended alternatives will be identified, and an implementation workshop will be held to determine an implementation plan for improvements.

Table 2 - Summary of Alternatives

Alternative	Scoring Category	Category Weight	Category Score	Weighted Score
No Build	Vehicular and Truck Operations and Safety	22	●●●○○○○○○○	●●●●●○○○○○ (5.4)
	Rail Conflicts and Delay	17	●○○○○○○○○○	
	Multimodal Facilities and Safety	19	●●○○○○○○○○	
	Property and Environmental Impacts	14	●●●●●●●●●●	
	Cost	28	●●●●●●●●●●	
Alternative 1: Existing Footprint Improvement Plan	Vehicular and Truck Operations and Safety	22	●●●●○○○○○○	●●●●●●○○○○ (6.2)
	Rail Conflicts and Delay	17	●●●●●○○○○○	
	Multimodal Facilities and Safety	19	●●●●●○○○○○	
	Property and Environmental Impacts	14	●●●●●●●●●○	
	Cost	28	●●●●●●●●○○	
Alternative 2: New Roadway Connection Improvement Plan	Vehicular and Truck Operations and Safety	22	●●○○○○○○○○	●●●●●○○○○○ (5)
	Rail Conflicts and Delay	17	●●●●●○○○○○	
	Multimodal Facilities and Safety	19	●●●●○○○○○○	
	Property and Environmental Impacts	14	●●●●●●●○○○	
	Cost	28	●●●●●●●○○○	
Alternative 3: Skewed Movement Rerouting Improvement Plan	Vehicular and Truck Operations and Safety	22	●●●○○○○○○○	●●●●○○○○○○ (4.4)
	Rail Conflicts and Delay	17	●●●●●○○○○○	
	Multimodal Facilities and Safety	19	●●●●○○○○○○	
	Property and Environmental Impacts	14	●●●●●○○○○○	
	Cost	28	●●●●●○○○○○	
Alternative 4: Grade Separation of US 81/Washington Street and Mill Spur	Vehicular and Truck Operations and Safety	22	●●●●●○○○○○	●●●●●○○○○○ (4.6)
	Rail Conflicts and Delay	17	●●●●●●●●●●	
	Multimodal Facilities and Safety	19	●●●●●●●○○○	
	Property and Environmental Impacts	14	●○○○○○○○○○	
	Cost	28	●○○○○○○○○○	
Alternative 5: Grade Separation of US 81/Washington Street, Mill Spur, and Mill Road/5th Street	Vehicular and Truck Operations and Safety	22	●●●●●●○○○○	●●●●○○○○○○ (4.4)
	Rail Conflicts and Delay	17	●●●●●●●●●●	
	Multimodal Facilities and Safety	19	●●●●●●●○○○	
	Property and Environmental Impacts	14	○○○○○○○○○○	
	Cost	28	○○○○○○○○○○	
Alternative 6: Railroad Realignment with Roundabout	Vehicular and Truck Operations and Safety	22	○○○○○○○○○○	●●●○○○○○○○ (3)
	Rail Conflicts and Delay	17	●●●●●●●●●●	
	Multimodal Facilities and Safety	19	●●●●○○○○○○	
	Property and Environmental Impacts	14	●●○○○○○○○○	
	Cost	28	●○○○○○○○○○	
Alternative 7: Railroad Realignment with Offset T-Intersection	Vehicular and Truck Operations and Safety	22	○○○○○○○○○○	●●●●○○○○○○ (3.9)
	Rail Conflicts and Delay	17	●●●●●●●●●●	
	Multimodal Facilities and Safety	19	●●●●●○○○○○	
	Property and Environmental Impacts	14	●●●●●○○○○○	
	Cost	28	●●○○○○○○○○	
Alternative 8: Railroad Realignment with New Roadway Connection Plan (Modified Alternative 2)	Vehicular and Truck Operations and Safety	22	●●○○○○○○○○	●●●●●○○○○○ (5.5)
	Rail Conflicts and Delay	17	●●●●●●●●●●	
	Multimodal Facilities and Safety	19	●●●●●○○○○○	
	Property and Environmental Impacts	14	●●●●●●●○○○	
	Cost	28	●●●●●○○○○○	
Alternative 9: Railroad Realignment with Skewed Movement Rerouting Improvement Plan (Modified Alternative 3)	Vehicular and Truck Operations and Safety	22	●●●○○○○○○○	●●●●○○○○○○ (4.4)
	Rail Conflicts and Delay	17	●●●●●●●●●●	
	Multimodal Facilities and Safety	19	●●●●○○○○○○	
	Property and Environmental Impacts	14	●●●●●○○○○○	
	Cost	28	●●○○○○○○○○	