



Project Manager:
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City of Worthington, Minnesota



Quiet Zone Feasibility Study

April 26, 2010
Project No. 14542.000

TKDA

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Background

The Federal Railroad Administration (FRA) published the Final Rule on the Use of Locomotive Horns at Highway-Rail Grade Crossings (Train Horn Rule) in the Federal Register on April 27, 2005. The rule became effective June 24, 2005 and was amended on August 17, 2006. The Rule requires railroads to sound horns at all public grade crossings in the United States.

Recognizing that some communities have quiet zones in place, the FRA provided a process in the Train Horn Rule to maintain existing quiet zones and establish new quiet zones. Communities such as the City of Worthington are able to establish a new quiet zone using a defined process approved by the FRA.

The City of Worthington has expressed interest in establishing a quiet zone within the city limits. The City has identified two public grade crossings to be included in this study. These crossings are 12th Street (DOT #185743L, MP 177.55) and Flower Lane (DOT #187026V, MP 178.76). These crossings are located in the City of Worthington on Union Pacific's (UP's) Worthington Subdivision.

Final Train Horn Requirements

The Train Horn Rule specifically addresses design elements such as the type of warning devices, type of circuitry and type of power indicators for new quiet zones. The Train Horn Rule requires the following elements at all new quiet zones:

- **Active warning devices featuring a minimum of flasher, lights and gates.** 12th Street (DOT #185743L, MP 177.55) already has active warning devices consisting of flashing lights and gates. Currently, Flower Lane (DOT #187026V, MP 178.76) does not meet this requirement. Flower Lane has active warning devices consisting of only flashing lights. Prior to establishing a quiet zone, the warning devices at Flower Lane will have to be upgraded to meet the minimum requirements.
- **Constant Warning Time (CWT) circuits where practical.** CWT is a type of train detection that adjusts the start of the warning sequence based on the speed of an approaching train. The benefit for CWT is that the signals always operate for the same amount of time, regardless of the train's speed. Currently, CWT is not installed at either crossing in the proposed quiet zone. Flower Lane and 12th Street will have to be upgraded to include CWT prior to establishing a quiet zone.
- **Power-Out Indicators on Signal Cabins.** The power out indicator is a signal that indicates to the railroad and/or emergency personnel that there is power at the crossing. A power-out indicator is typically a light attached to the side of the signal cabin. When commercial power to the signal cabin is not available the power-out indicator will not be lit. Power-out indicators are standard on Union Pacific Railroad Company signal cabins. This requirement is met at 12th Street and will be met when new signals are installed at Flower Lane.

- **Minimum Length Requirement.** The Train Horn Rule requires that new quiet zones are a minimum of a half-mile in length. The proposed quiet zone meets this requirement.

Quiet Zone Scenarios

In addition to the minimum quiet zone requirements listed above, the risk of the quiet zone must also meet certain requirements as outlined in the Train Horn Rule. The FRA has defined a process to calculate the risk of a proposed quiet zone. There are a number of factors used to calculate the risk of a zone. These factors can include train volumes and speeds, highway vehicle volumes, and crash history within the zone. The total risk is determined by calculating the risk at each crossing within the zone and then determining an average risk for the entire zone. Essentially, it must be shown that the lack of a train horn does not present a significant risk, or that the significant risk has been compensated for by other means, i.e. Supplementary Safety Measure (SSM) or Alternative Safety Measure (ASM) improvements. SSM's are standard safety improvements that have been evaluated by the FRA to determine their risk reduction factor. These improvements include; medians, wayside horns, permanent closure, four-quadrant gates, etc. An ASM is any safety improvement that has not already been evaluated by the FRA. An ASM would have to be evaluated by the FRA to determine if it is an acceptable substitute for the train horn and what the risk reduction factor is. A quiet zone can qualify in two ways. The first way is to show that the future risk or Quiet Zone Risk Index (QZRI) calculated without the horns is lower than the current risk or Risk Index With Horns (RIWH). This can be achieved through various safety improvements (SSM's or ASM's) within the zone. The second way is for the QZRI to be lower than the Nationwide Significant Risk Threshold (NSRT). The NSRT is a measure of risk, calculated on a nationwide basis, which reflects the average level of risk to the motoring public at public crossings with flashing lights and gates and at which horns are sounded. The FRA periodically updates the NSRT and this value will trend downward as the safety of crossings is increased.

Shown below are the various scenarios the City may pursue to establish this quiet zone. TKDA ran the risk analysis for each scenario shown below. Conceptual costs for each improvement at each crossing are shown below. The Risk Analysis Calculator results are also shown in the following figures.

- **Scenario 1 – No SSM Improvements.** This scenario shows the quiet zone will qualify without any SSM improvements as the QZRI is less than the NSRT. The risk was calculated assuming each crossing conforms to the minimum requirements for a quiet zone as established in the Train Horn Rule. As such, Flower Lane would have to be upgraded to include flashing lights, gates and CWT. 12th Street would also have to be upgraded to include CWT. Conceptual cost estimate for these improvements could be approximately \$450,000 for 12th Street and \$285,000 for Flower Lane.
- **Scenario 2 – Permanent Closure of Flower Lane (DOT #187026V, MP 178.76).** This scenario shows the quiet zone will qualify with the permanent closure to the Flower Lane crossing as the QZRI is less than the NSRT. The risk was calculated assuming each crossing conforms to the minimum requirements for a quiet zone as established in the Train Horn Rule. 12th Street would have to be upgraded to include CWT. UP is eager to

reduce the number of grade crossings on their system. As such, UP may be willing to provide a monetary incentive to the City in exchange for the crossing closure. However, actual compensation for the closure would need to be negotiated between the City and UP. Scenario 2 will likely be the most cost effective way for the City to achieve the quiet zone. Conceptual cost estimate for these improvements could be approximately \$450,000 for 12th Street.

- **Scenario 3 – Mountable Medians at 12th Street.** This scenario shows the quiet zone will qualify by installing mountable medians at 12th Street and minimum requirements (gates) at Flower Lane. The risk was calculated assuming each crossing conforms to the minimum requirements for a quiet zone as established in the Train Horn Rule. Per the Train Horn Rule, any commercial access points within 60 feet of the gate arms at 12th Street will need to be closed or relocated for the medians to qualify as an SSM and receive the full risk reduction credit. Partial risk reduction credit may be given for shorter medians. At 12th Street there are multiple access points within 60 feet of the gate arm. Should the City decide to install medians, these commercial access points will have to be closed or shorter medians may be used at a reduced risk reduction rate. The risk was calculated assuming full length medians are to be installed. Under this scenario the quiet zone qualifies as the QZRI is less than the RIWH. Conceptual cost estimate for these improvements could be approximately \$450,000 for 12th Street and \$285,000 for Flower Lane.
- **Scenario 4 – 12th Street Standalone QZ -** The City may also consider implementing a standalone quiet zone that includes only the 12th Street crossing. 12th Street alone can qualify as quiet zone assuming the minimum requirements are met (including adding CWT at 12th Street) and it satisfies the risk requirements. This quiet zone can currently qualify with only the minimum requirements satisfied. However, it is only by a small margin. Any increase in collisions, train traffic or vehicle traffic will likely cause the quiet zone to no longer qualify. Due to the nearby intersecting roads with 12th Street, traffic queue lengths should be considered at this crossing. Conceptual cost estimate for these improvements could be approximately \$450,000 for 12th Street.

Worthington, MN – Scenario 1 Analysis

Minimum QZ Requirements

Crossing	Street	Traffic	Warning Device	Pre-SSM	SSM	Risk	
185743L	12TH ST	1750	Gates	0	0	18,187.22	<input type="button" value="MODIFY"/>
187026V	FLOWER LANE	1000	Gates	0	0	10,250.46	<input type="button" value="MODIFY"/>

RIWH < QZRI < NSRT

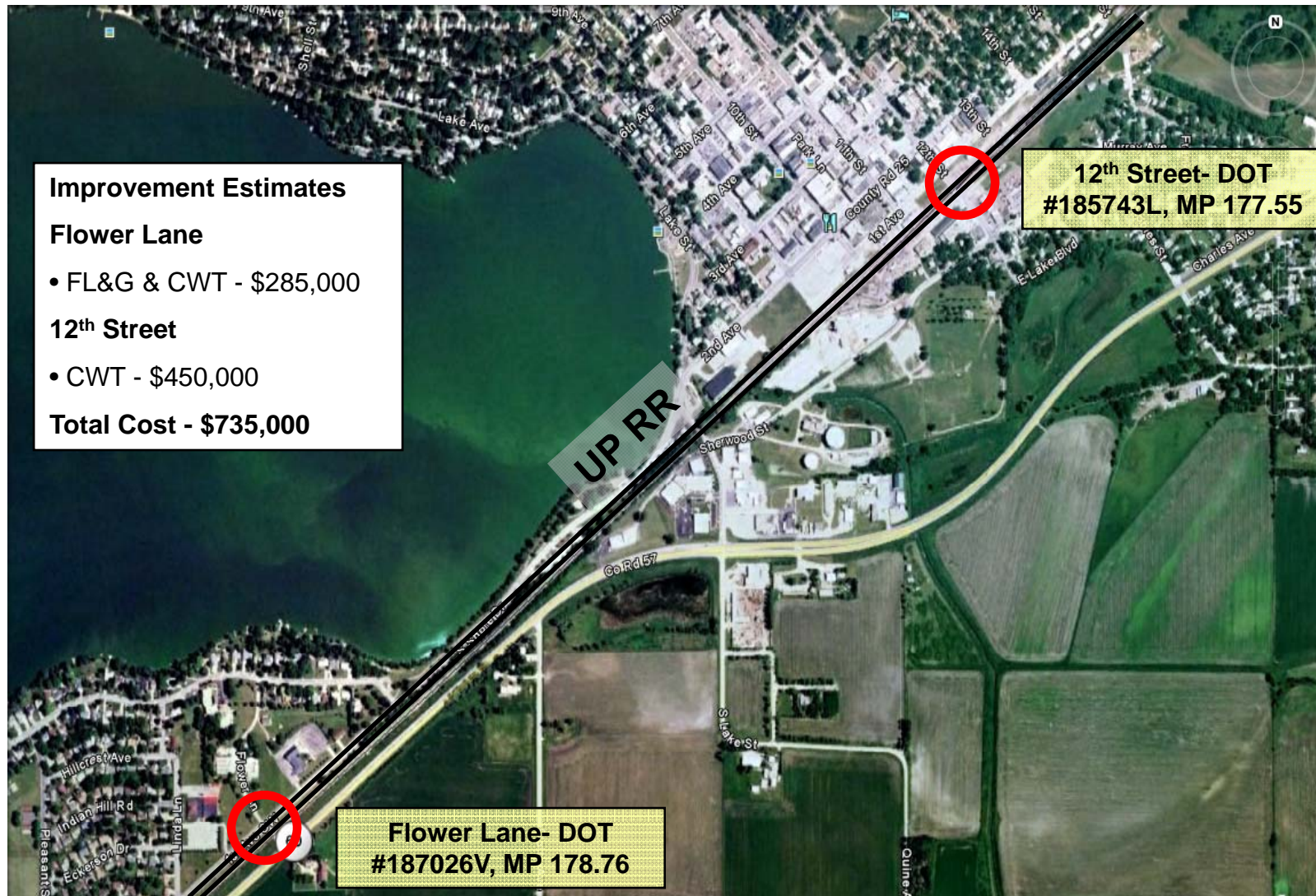
Quiet Zone currently qualifies without any SSM improvements.

Note (only when applicable):

However, all crossings within a quiet zone must be equipped with flashing lights and gates. Such warning devices must also be equipped with constant warning time, where reasonably practical. Flower Lane would have to be upgraded to include gates and both crossings would require constant warning time.

Summary	
Proposed Quiet Zone:	WORHTINGTONFINAL
Type:	New 24-hour QZ
Scenario:	WORHTINGTO_31350
Estimated Total Cost:	\$0.00
Nationwide Significant Risk Threshold:	18775 .00
Risk Index with Horns:	8524.48
Quiet Zone Risk Index:	14218.84

Worthington, MN – Scenario 1 Analysis Site Layout



This scenario includes upgrading Flower Lane with FL&G and CWT at both Flower Lane and 12th Street.

Worthington, MN – Scenario 2 Analysis

Close Flower Lane

Crossing	Street	Traffic	Warning Device	Pre-SSM	SSM	Risk	
185743L	12TH ST	1750	Gates	0	0	18,187.22	<input type="button" value="MODIFY"/>
187026V	FLOWER LANE	0	CLOSED(SSM 2)	0	2	0	Closed

RIWH < QZRI < NSRT

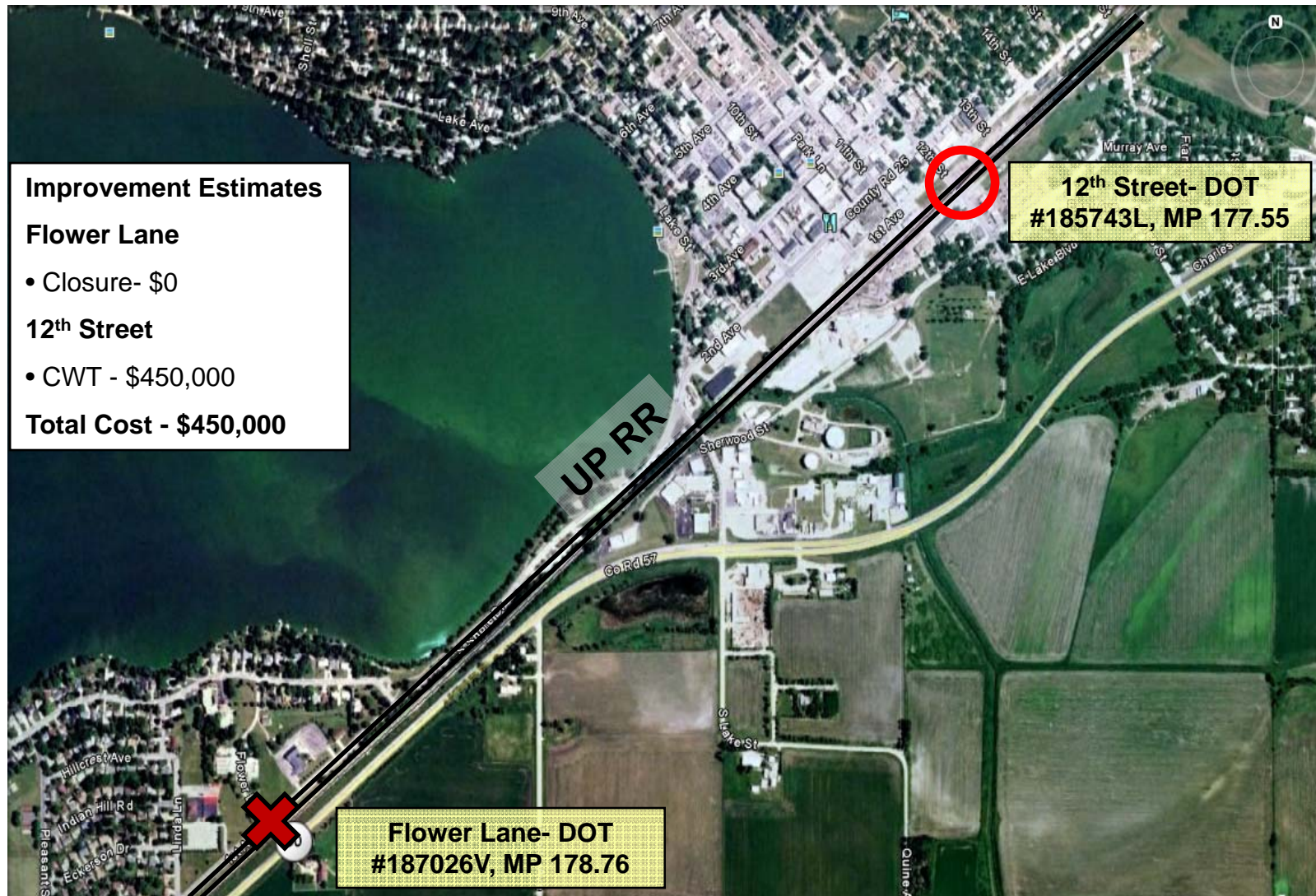
Quiet Zone will qualify with a permanent closure to Flower Lane.

Note (only when applicable):

Per the Train Horn Rule, 12th Street will have to be upgraded to include constant warning time.

Summary	
Proposed Quiet Zone:	WorthingtonFinal
Type:	New 24-hour QZ
Scenario:	WORHTINGTO_31350
Estimated Total Cost:	\$5,000.00
Nationwide Significant Risk Threshold:	18775 .00
Risk Index with Horns:	8524.48
Quiet Zone Risk Index:	9093.61

Worthington, MN – Scenario 2 Analysis Site Layout



This scenario includes the closure of Flower Lane and CWT at 12th Street.

Worthington, MN – Scenario 3 Analysis

Mountable Medians at 12th Street

Crossing	Street	Traffic	Warning Device	Pre-SSM	SSM	Risk	
185743L	12TH ST	1750	Gates	0	12	4,546.80	<input type="button" value="MODIFY"/>
187026V	FLOWER LANE	1000	Gates	0	0	10,250.46	<input type="button" value="MODIFY"/>

QZRI < RIWH < NSRT

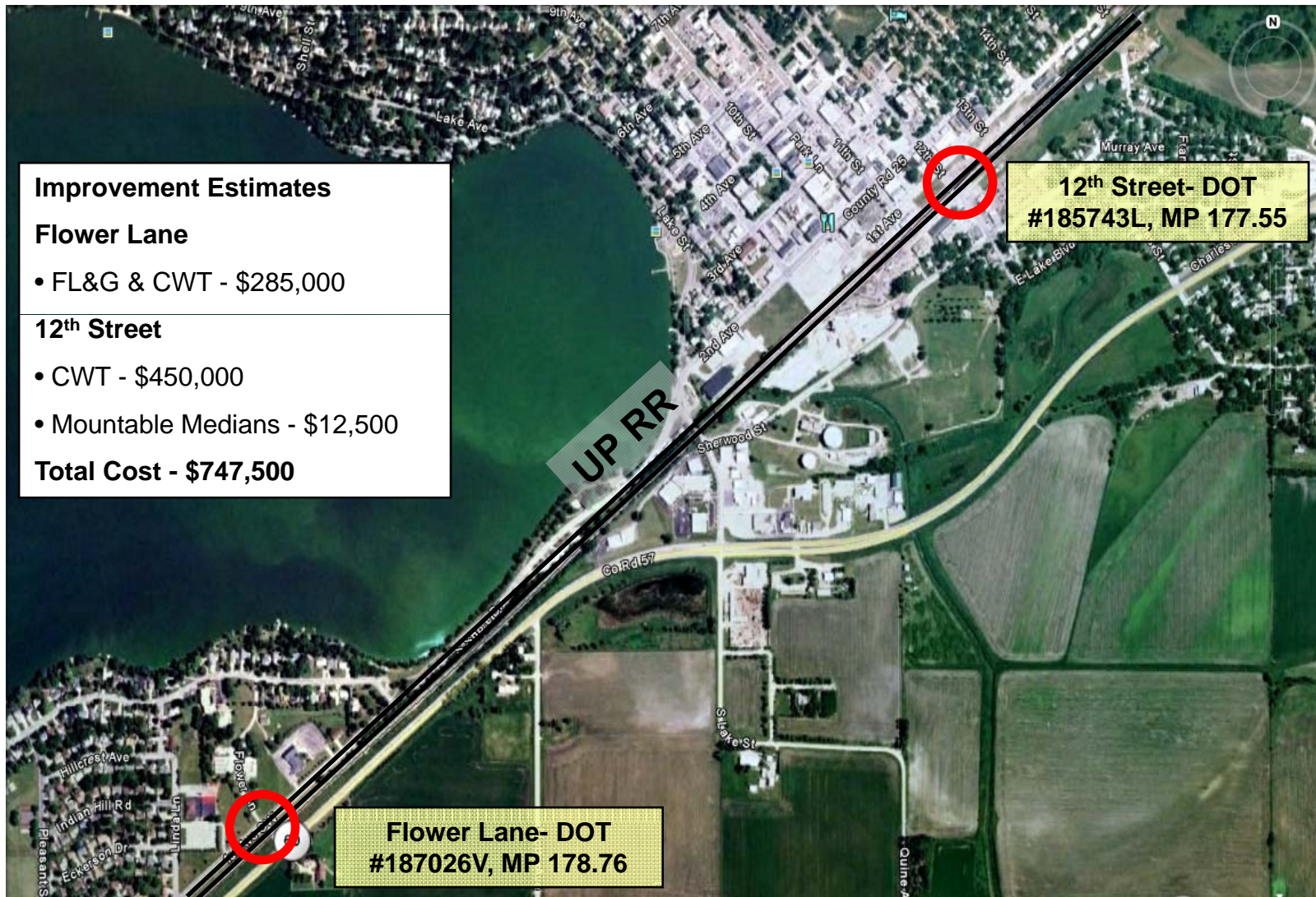
Quiet Zone will qualify with mountable medians at 12th Street.

Note (only when applicable):

Per the Train Horn Rule, Flower Lane will have to be upgraded to include flashing lights and gates and both crossings will have to be upgraded to include constant warning time.

Summary	
Proposed Quiet Zone:	WorthingtonFinal
Type:	New 24-hour QZ
Scenario:	Worthingto_31353
Estimated Total Cost:	\$13,000.00
Nationwide Significant Risk Threshold:	18775 .00
Risk Index with Horns:	8524.48
Quiet Zone Risk Index:	7398.63

Worthington, MN – Scenario 3 Analysis Site Layout



This scenario includes upgrading Flower Lane with FL&G, 12th street with mountable medians and CWT time at both Flower Lane and 12th Street.

Worthington, MN – Scenario 4 Analysis

12th Street Only – Minimum Requirements

Crossing	Street	Traffic	Warning Device	Pre-SSM	SSM	Risk	
185743L	12TH ST	1750	Gates	0	0	18,187.22	<input type="button" value="MODIFY"/>

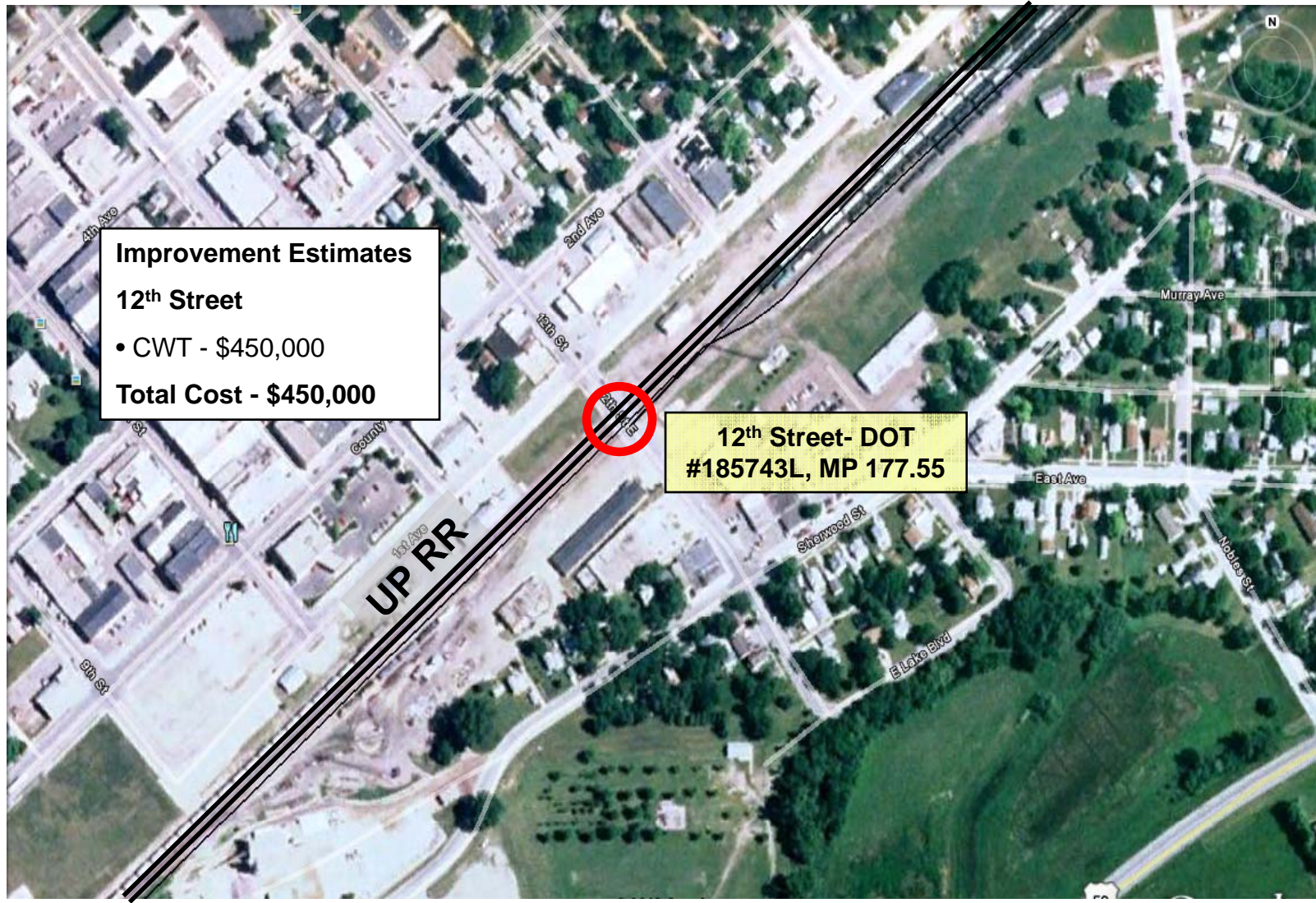
RIWH < QZRI < NSRT

Note (only when applicable):

Per the Train Horn Rule, 12th Street will have to be upgraded to include constant warning time.

Summary	
Proposed Quiet Zone:	12th
Type:	New 24-hour QZ
Scenario:	12TH_31730
Estimated Total Cost:	\$0.00
Nationwide Significant Risk Threshold:	18775 .00
Risk Index with Horns:	10903.61
Quiet Zone Risk Index:	18187.22

Worthington, MN – Scenario 4 Analysis Site Layout



This scenario is for a standalone QZ at 12th Street. Flower Lane is not part of this QZ.
12th Street must be upgraded to include CWT.

Conceptual Cost Improvement Estimates

Shown below are conceptual cost estimates for the various improvements to be considered at each crossing.

- Flower Lane
 - Upgrade to CWT, Flashing Lights and Gates - \$285,000 (required to establish quiet zone through crossing.)
 - Mountable Medians - \$10,000 - \$15,000
 - Concrete Medians - \$20,000 - \$25,000
 - Four-Quadrant Gates - \$400,000 - \$500,000
 - Permanent Closure - \$0 (UP will remove crossing surface and block access. UP may also include an incentive to close, but this would have to be negotiated.)
- 12th Street
 - CWT Circuitry Upgrades - \$450,000 (The proximity of 12th Street to the adjacent rail yard can greatly affect the cost of installing CWT at this location. A full diagnostic meeting and site review of this location with UP forces would be required for a more accurate estimate. Required to establish quiet zone through crossing.)
 - Mountable Medians - \$10,000 - \$15,000
 - Concrete Medians - \$20,000 - \$25,000
 - Four-Quadrant Gates - \$400,000 - \$500,000

Summary and Next Steps

Currently, the risk of this zone is relatively low when compared to the NSRT. This quiet zone can currently qualify without any SSM improvements. Any additional SSM improvements will lower the QZRI even further. By installing SSM improvements the City can increase the likelihood the quiet zone will continue to conform to the Train Horn Rule in the future without any additional improvements. Should the City decide to pursue this quiet zone, all active crossings within the zone will have to meet the minimum requirements as outlined in the Train Horn Rule. These requirements include installing flashing lights, gates and constant warning time at each crossing. However, if the Flower Lane crossing were to be closed as part of this quiet zone the City would not have to pay to upgrade the warning devices at this crossing.

If the City decides to pursue this quiet zone the FRA has a defined process the City would have to follow to establish the quiet zone. The process consists of a series of Notices to the FRA, any railroads that operate in the zone and any public agency with jurisdiction in the zone indicating the City's intention to establish a quiet zone. Initially, the City must file a Notice of Intent (NOI). In the NOI, the City must provide a brief explanation of the City's tentative plans for implementing improvements within the quiet zone. Upon submitting the NOI, the railroad and the FRA have the opportunity to comment on the proposed plan. After receiving comments from all applicable parties or after 60 days from the submission of the NOI, the City may file a Notice of Establishment (NOE). The NOE must specifically reference the regulatory provision that provides basis for the quiet zone establishment. The City must also prove the quiet zone and improvements do indeed meet the risk requirements to establish the zone. Once again, the applicable agencies will have the opportunity to comment on the NOE. If any deficiencies are found in the Notices the City may be required to resubmit the notice before the quiet zone can go into effect. Depending on how the City intends to establish the quiet zone, other information and/or notices may be required to establish the zone.

TKDA has a long history with significant experience in implementing the quiet zone process; we have assisted many communities in establishing quiet zones. We also review quiet zone notices for the railroad. Because of this TKDA is familiar with all aspects of the quiet zone process. Should the City decide to move forward in establishing this quiet zone, TKDA is available to assist the City throughout the process.

CITY OF WORTHINGTON, MINNESOTA

FLOWER LANE

DOT #187026V, MP 178.76



Looking Southeast, Northwest of the Crossing



Looking Northwest, Southeast of the Crossing



Looking Southwest, Northeast of the Crossing



Looking Northeast, Southwest of the Crossing

CITY OF WORTHINGTON, MINNESOTA

FLOWER LANE

DOT #187026V, MP 178.76



Looking Southwest - First Avenue



Looking Northeast, First Avenue



Looking Southwest, Highway 60



Looking Northeast, Highway 60

CITY OF WORTHINGTON, MINNESOTA

12TH STREET

DOT #185743L, MP 177.55



Looking Northwest– Southeast of Crossing



Looking Southeast, Northwest of the Crossing



Looking Northeast, South of Crossing



Looking Southwest, North of Crossing

CITY OF WORTHINGTON, MINNESOTA

12TH STREET

DOT #185743L, MP 177.55



Private Access—South of crossing



Commercial Access—South of Crossing



Commercial Access—South of Crossing



Sidewalk—Southwest side of 12th Street

CITY OF WORTHINGTON, MINNESOTA

12TH STREET

DOT #185743L, MP 177.55



Looking Northwest—From First Avenue



Looking Northwest—View From Crossing



Commercial Access—North of Crossing



UP Yard Access—North of Crossing

City of Worthington, Minnesota
Quiet Zone Feasibility Study
January 20, 2010

Road Name	DOT Number	Milepost	Quiet Zone Status	Lanes	Sidewalks	Tracks	Existing Safety Measures	Warning Devices ^(2,3)	Approximate Roadway Width	Approximate Distance to Access or Intersection (Measured from Warning Device Gate Arm) ⁽¹⁾
Flower Lane	187026V	178.76	No Quiet Zone	2	Snowmobile Trail	1	None	North - CFL South - CFL	25 ft	North - 53 ft to First Avenue South - 81 ft to US 59
12th Street	185743L	177.55	No Quiet Zone	2	SW side of 12th Street	2	None	North - FL&G South - FL&G	38 ft	North - 95 ft to First Ave. South - 72 ft to Commercial Access

Notes:

1. Along 12th Street, there are multiple access points. Depending on their classification and proximity to the crossing, some may have to be relocated or closed.
2. CFL = Cantilever, flashing lights
3. FL&G = Flashing light and gates

City of Worthington
Quiet Zone Assistance - Inventory Comparison
City, State **Worthington, MN**
Subdivision **Worthington**
MP Begin **177.30**
MP End **179.01**
Review Date **January 26, 2010**

	DOT	Roadname	MP	Proposed Improvement	Improvement Type (SSM or ASM)	FRA Inventory				UP Inventory		Notes
						Trains	Max Track Speed (mph)	AADT	AADT Year	Trains	Max Track Speed (mph)	
Worthington Sub	187026V	Flower Lane	178.76			5	40	1000	2007	5	49	1 track
	185743L	12th Street	177.55			6	30	1750	2007	11	49	2 tracks

Notes:

1. UP inventory information provided by Richard Ellison of UP.
2. AADT values are relatively new, but new counts may be required if they are no longer accurate.