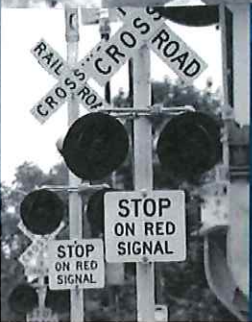




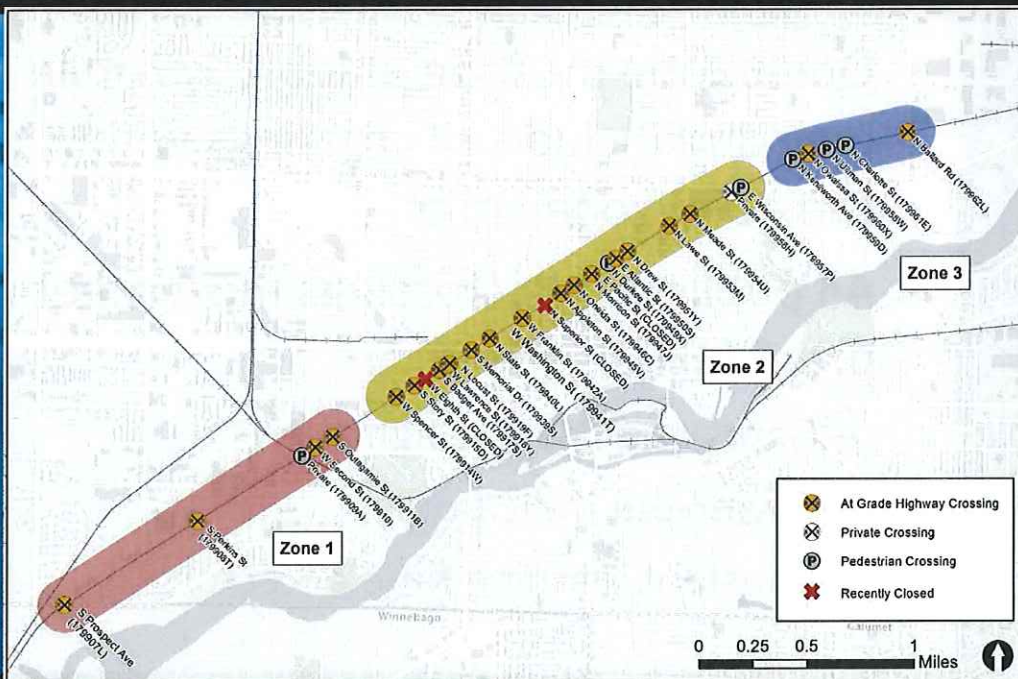
QUIET ZONE PRESENTATION



Appleton, Wisconsin
July 26, 2016



Proposed Quiet Zone Crossings



Train Horn Rule Background

- 1994: Congress mandates Federal regulation of horns at grade crossings with exceptions to allow “quiet zones”
- 1994-2003: FRA solicits input from stakeholders
- 2005: Train Horn Rule goes into effect

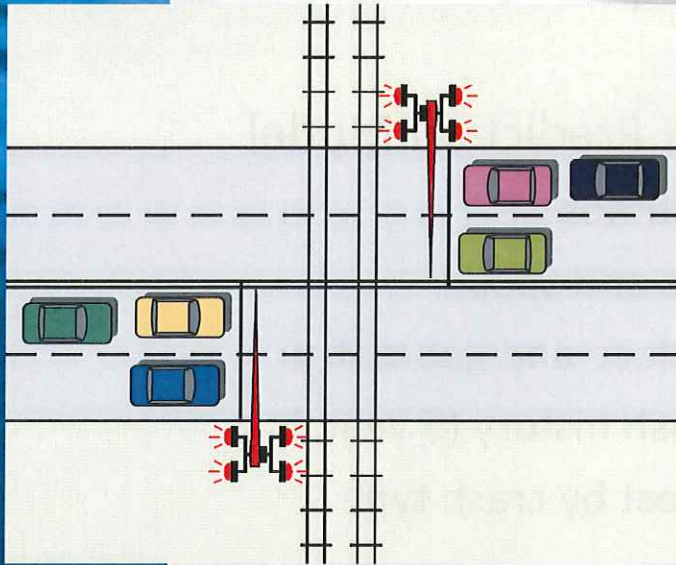
SRF

Minimum Requirements

- Quiet Zone must be at least 1/2-mile long and include all crossings within the quiet zone limits
- All public grade crossings must meet pre-qualifying criteria:
 - Gates and flashing lights
 - Power-out indicators
 - Constant warning time detectors

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Two-Quadrant Vehicle Gates, Warning Lights, Constant Warning Time



- Cost = \$250K
- Required for quiet zone designation
- Railroad controls:
 - installation
 - scheduling
 - requirements
 - cost

SRF

Two-Quadrant Gate Example



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Quiet Zone Risk Levels

- Quiet Zone Implementation based on risk analysis
- DOT Accident Prediction Model
 - Highway volumes
 - Rail volumes and speed
 - Crossing surface and geometry
 - Previous crash history (5 years)
 - Estimated cost by crash type

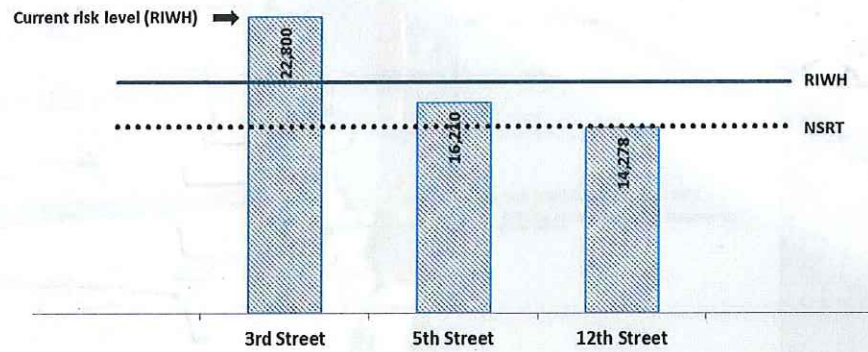
SRF

Quiet Zone Risk Levels

- Quiet Zone Risk Index (**QZRI**)
 - Risk level after crossing improvements and no horn sounding
- Risk Index With Horns (**RIWH**)
 - Existing conditions with horns
- Nationwide Significant Risk Threshold (**NSRT**)
 - National average of risk for all crossings in the U.S.
 - Adjusted annually (Current level = 14,347)

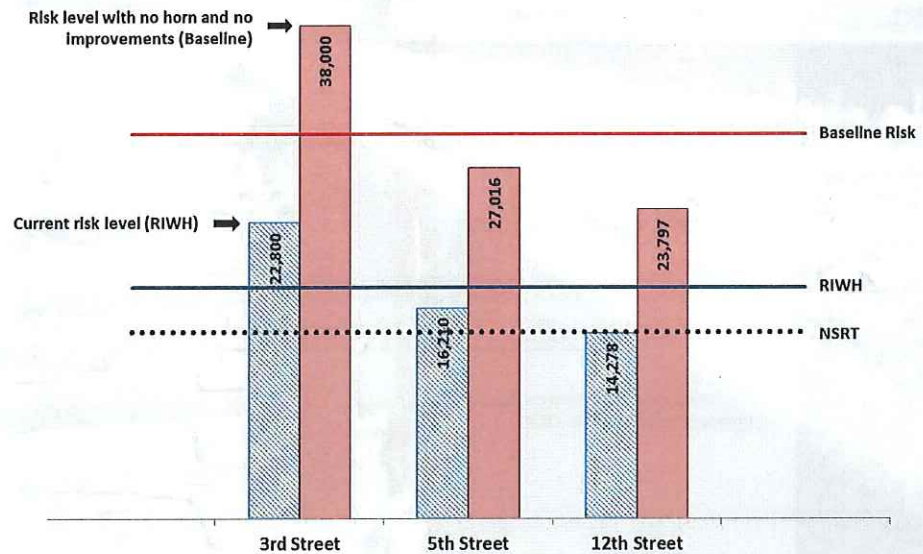
SRF

Quiet Zone Risk Example



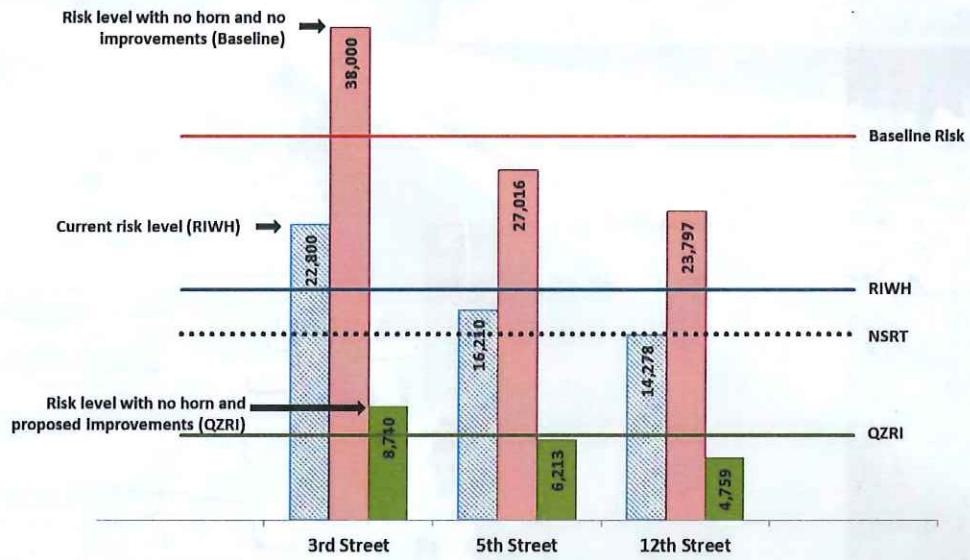
SRF

Quiet Zone Risk Example

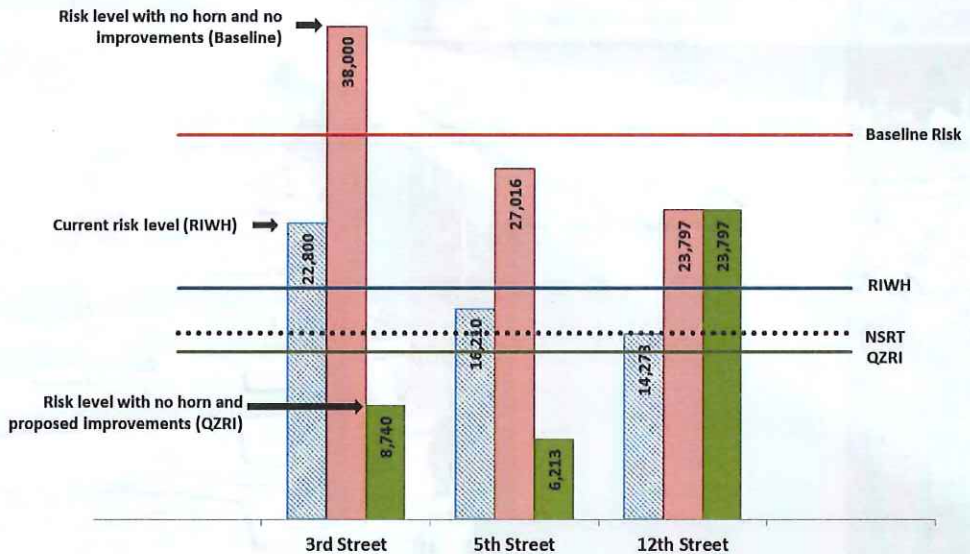


SRF

Quiet Zone Risk Example



Quiet Zone Risk Example

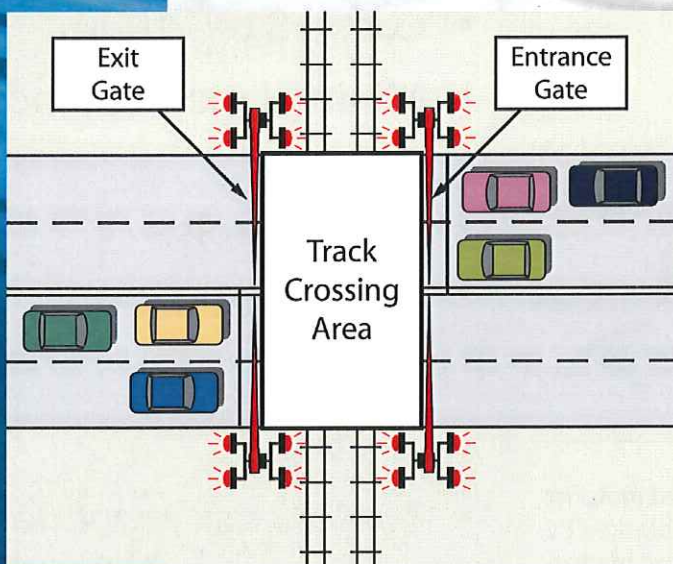


Supplementary Safety Measures (SSMs)

- Four-quadrant vehicle gates
- Medians/channelization devices
- Closure (temporary or permanent)
- One-way street
- Wayside horns

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Four-Quadrant Vehicle Gates



- Cost w/ detection = \$700K
- Railroad agreement
- Maintenance costs = \$7K annually
- Railroad controls:
 - Installation requirements
 - Construction schedule
 - Cost
- No access impacts
- 77-82% risk reduction

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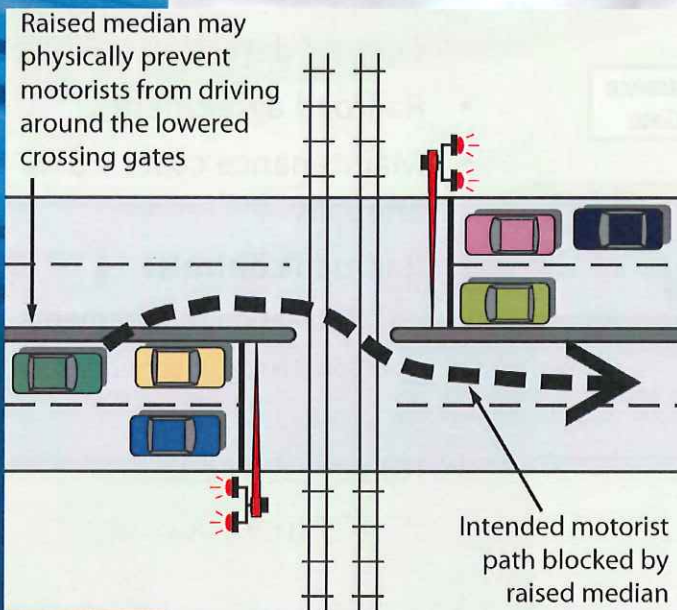
Four-Quadrant Gate Example



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Non-Traversable Medians/ Channelization Devices

Raised median may physically prevent motorists from driving around the lowered crossing gates



Intended motorist path blocked by raised median

- Cost = \$10 - 100K
- Minimal maintenance costs
- City controls:
 - installation
 - scheduling
 - Cost
- 75-80% risk reduction

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Non-Traversable Median Example



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Channelization Device Example



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Channelization Device Example



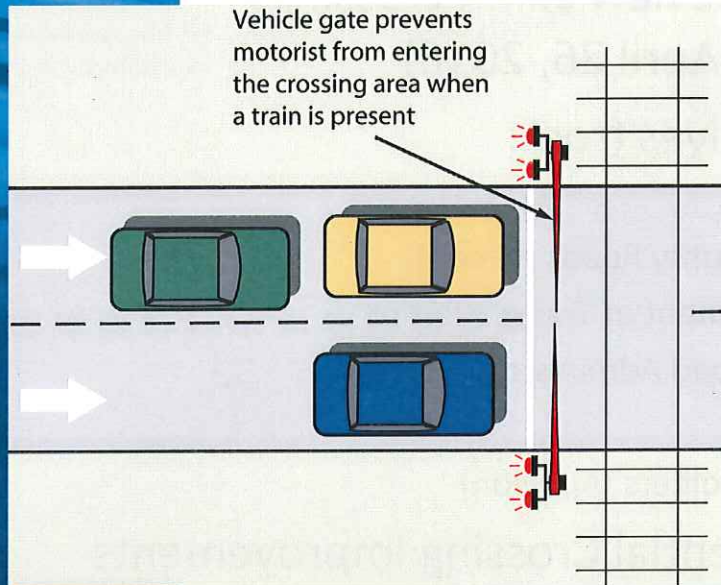
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Crossing Closure



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One-Way Street



- Costs variable
 - Gate relocation?
 - Street conversion?
- Typically done as one-way pairs
- 82% risk reduction

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Wayside Horns



- Cost w/ detection = \$100K
- Annual maintenance costs = \$5K
- Stationary horn sounded in place of train horn
- Railroad installs train detection system – requires RR Agreement
- No access impacts
- Less expensive than four-quadrant gates
- Equal risk to train horn

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Diagnostic Meeting

- Site visit to review all RR crossings (Conducted April 26, 2016)
- Representatives from:
 - City
 - County (if County Roads present)
 - State Department of Transportation
 - Federal Railroad Administration (FRA)
 - Railroad
 - Other Stakeholders (Appvion)
- Identify Potential Crossing Improvements

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Implementation Steps

1. Diagnostic Meeting
2. Determine Necessary Crossing Improvements
3. Notice of Intent
4. Application Required if ASMs are Used
5. Install Crossing Improvements
6. Notice of Establishment

Typical Quiet Zone Project takes 1-2 Years

SRF

Proposed Improvements

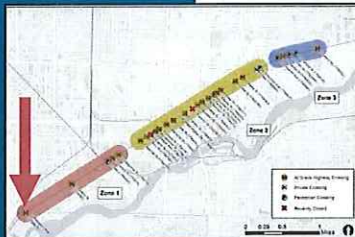
- Medians/Channelized Delineators
 - Commercial/Residential Access Impacts
 - Parking impacts
- Closures
 - 1-2 proposed
- Pedestrian Crossings
 - Durkee, Wisconsin, Kenilworth, Ullman, Charlotte
 - Minor improvements: replace crossbucks, “No Train Horn” signs, flangeway repairs
- Private Crossings
 - CN, Appvion
 - No proposed improvements

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Prospect Avenue

Prospect Avenue

Risk Reduction	0%
Cost	\$100,000 - \$250,000

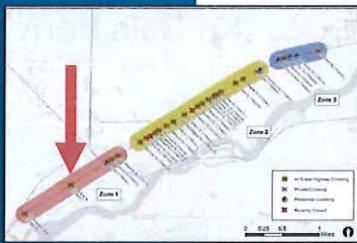


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Perkins Street – Option 1

Perkins Street - Option 1

Risk Reduction	34%
Cost	\$17,840

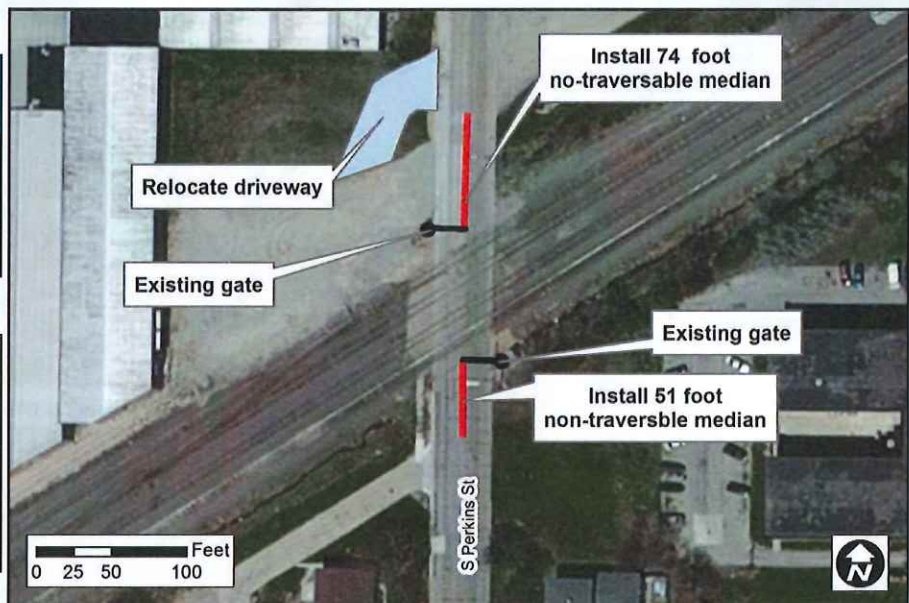
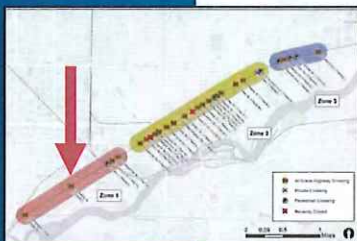


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Perkins Street – Option 2

Perkins Street - Option 2

Risk Reduction	74%
Cost	\$53,750

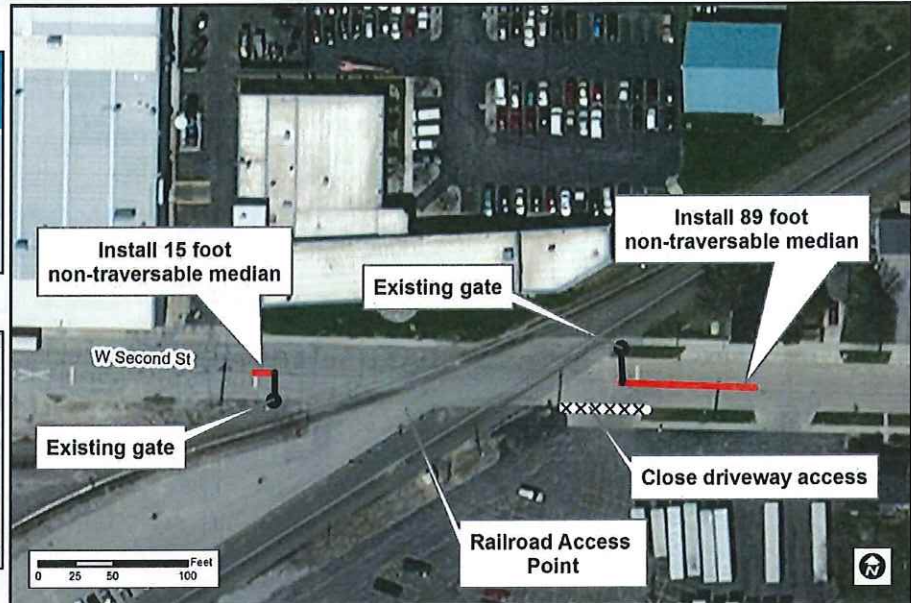
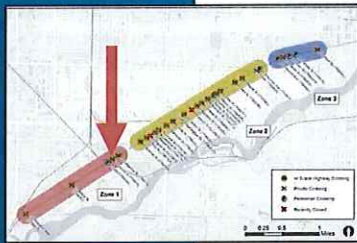


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Second Street

Second Street

Risk Reduction	50%
Cost	\$41,400

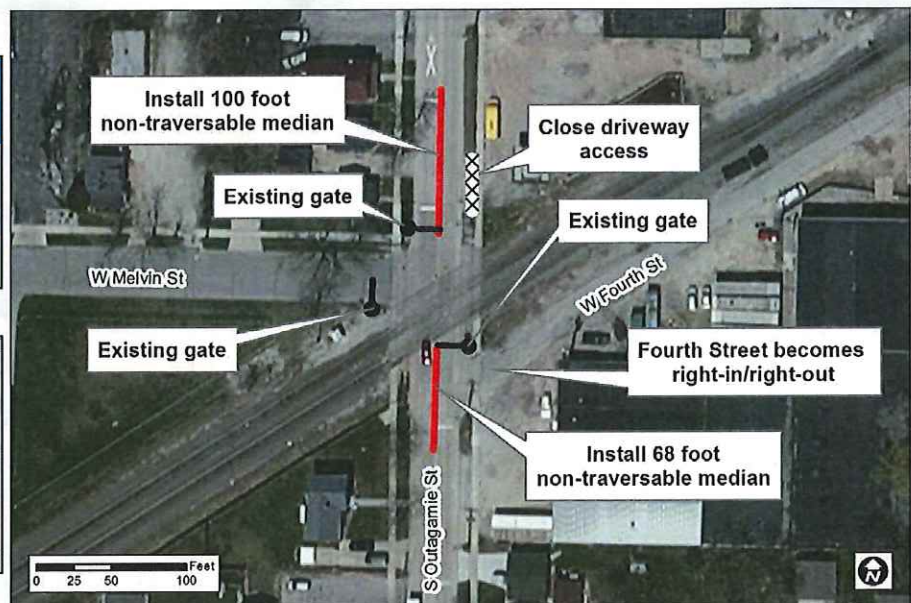
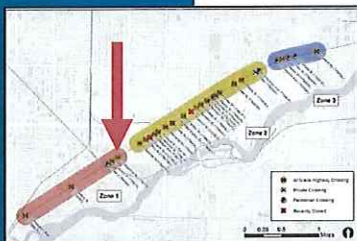


SRF

Outagamie Street – Option 1

Outagamie Street – Option 1

Risk Reduction	80%
Cost	\$63,800

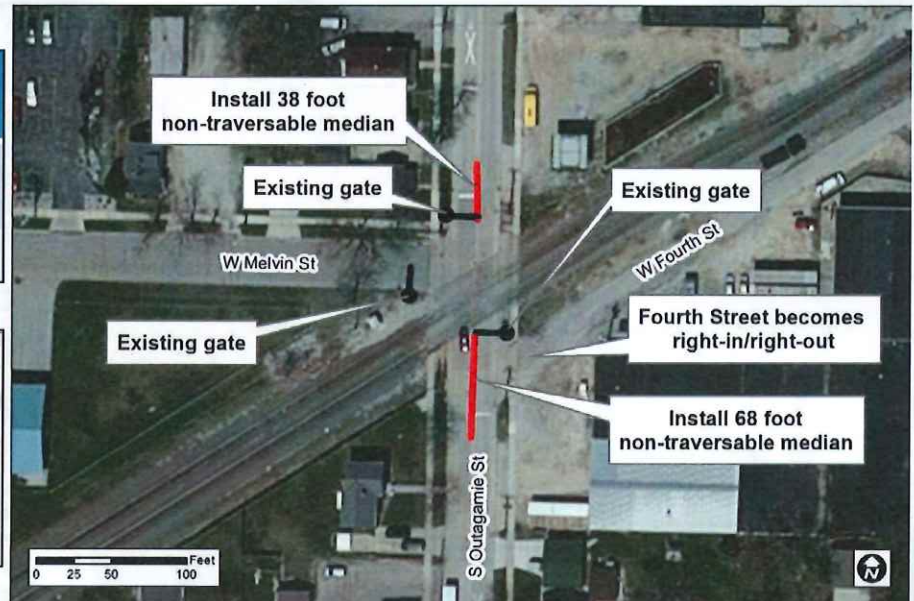
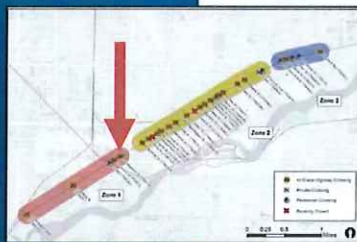


SRF

Outagamie Street – Option 2

Outagamie Street – Option 2

Risk Reduction	53%
Cost	\$30,800

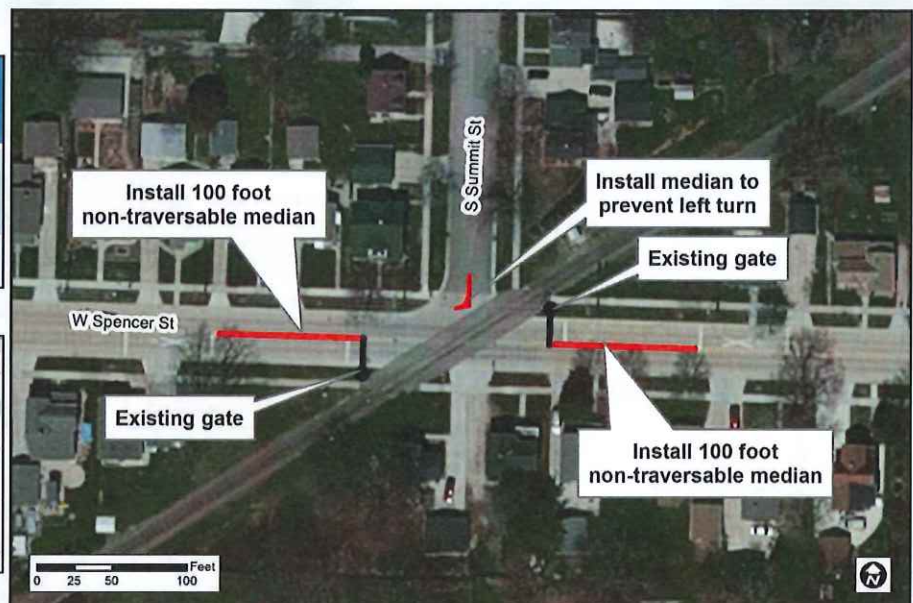
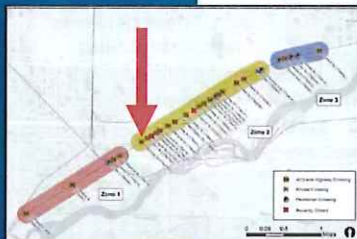


SRF

Spencer Street – Option 1

Spencer Street – Option 1

Risk Reduction	80%
Cost	\$75,000

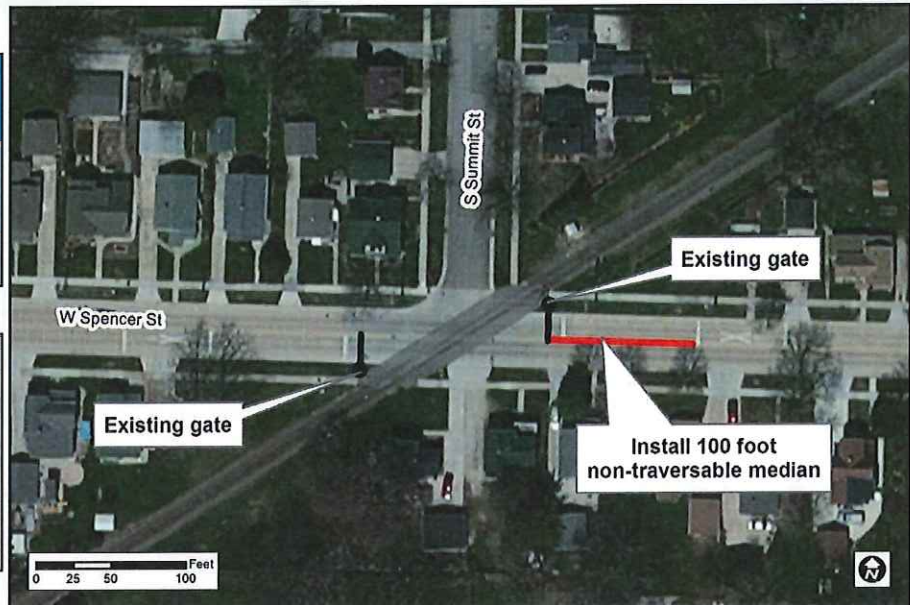
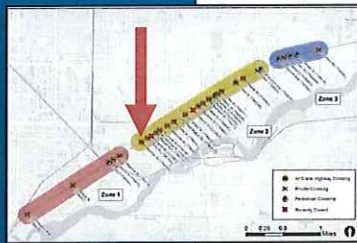


SRF

Spencer Street – Option 2

Spencer Street – Option 2

Risk Reduction	40%
Cost	\$35,000

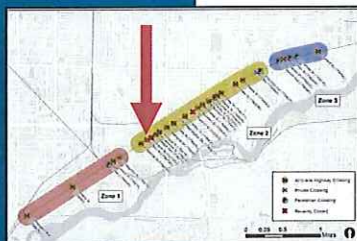


SRF

Story Street – Option 1

Story Street – Option 1

Risk Reduction	53%
Cost	\$29,785

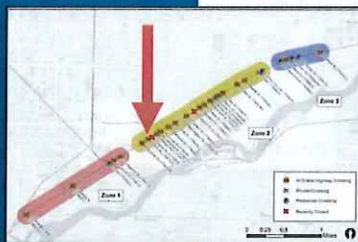


SRF

Story Street – Option 2

Story Street – Option 2

Risk Reduction	59%
Cost	\$53,650

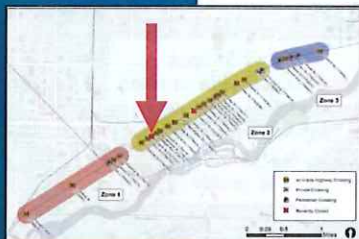


SRF

Eighth Street

Eighth Street

Risk Reduction	100%
Cost	N/A

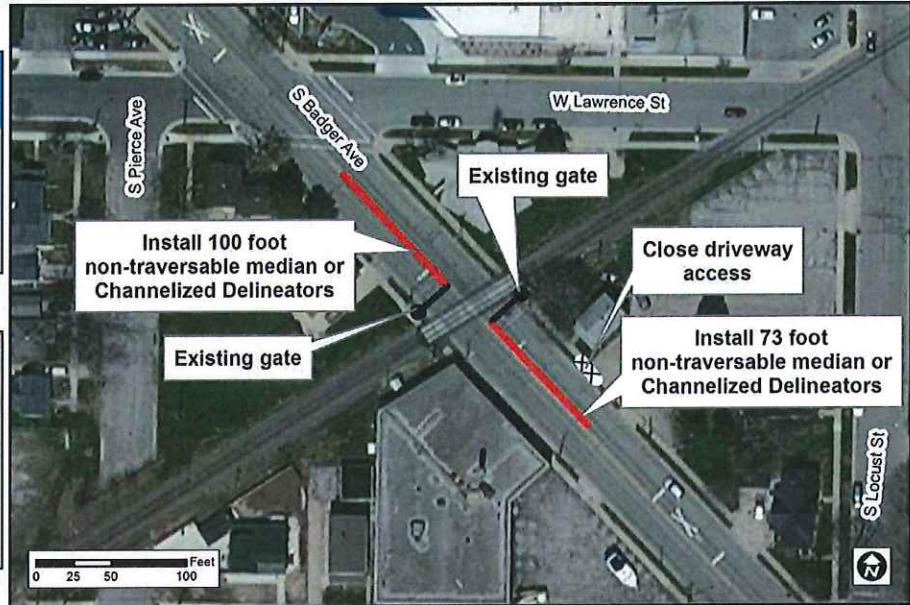
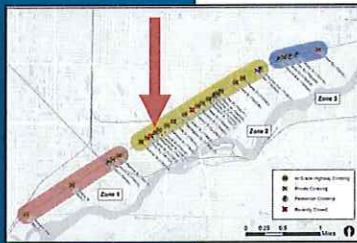


SRF

Badger Avenue

Badger Avenue

Risk Reduction	80%
Cost	\$65,650

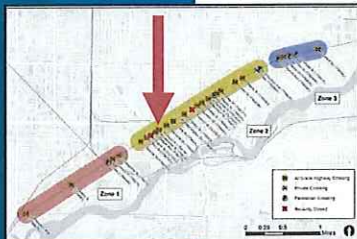


SRF

Lawrence Street – Option 1

Lawrence Street – Option 1

Risk Reduction	100%
Cost	\$0

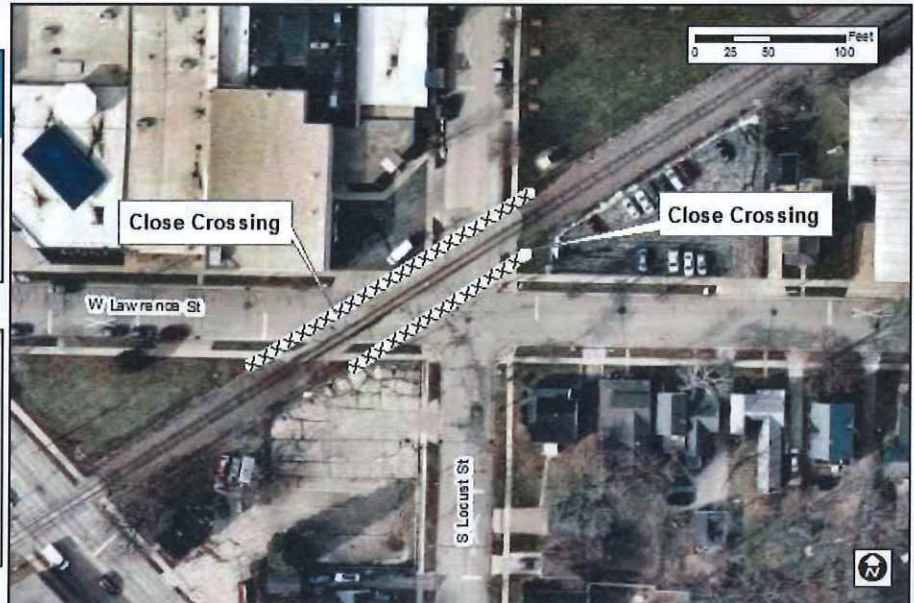
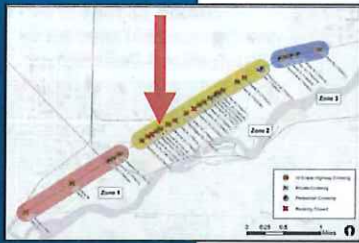


SRF

Lawrence Street – Option 1a

Lawrence Street – Option 1a

Risk Reduction	100%
Cost	\$0

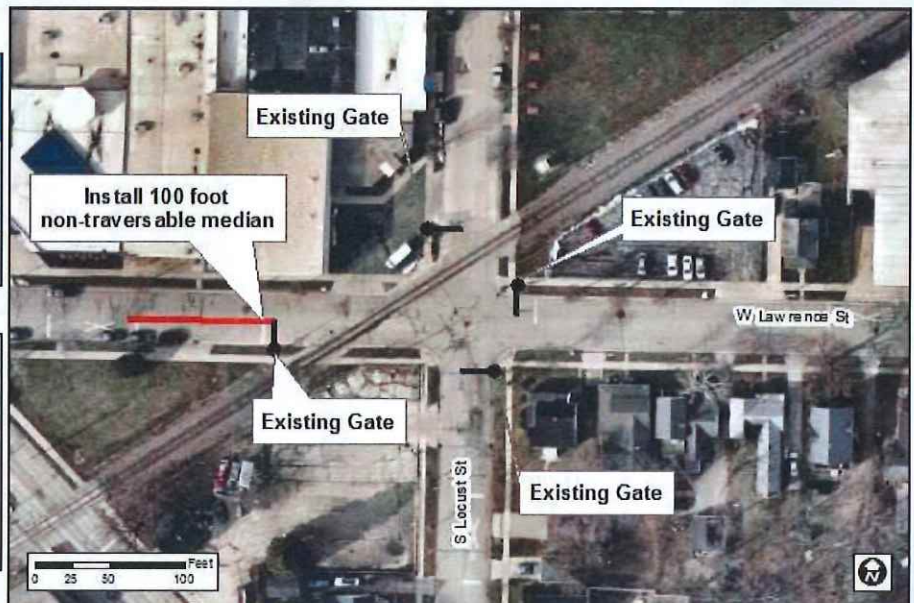


SRF

Lawrence Street – Option 2

Lawrence Street – Option 2

Risk Reduction	40%
Cost	\$35,500

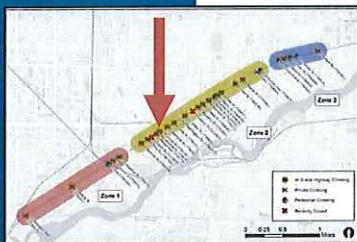


SRF

Locust Street – Option 1

Locust Street – Option 1

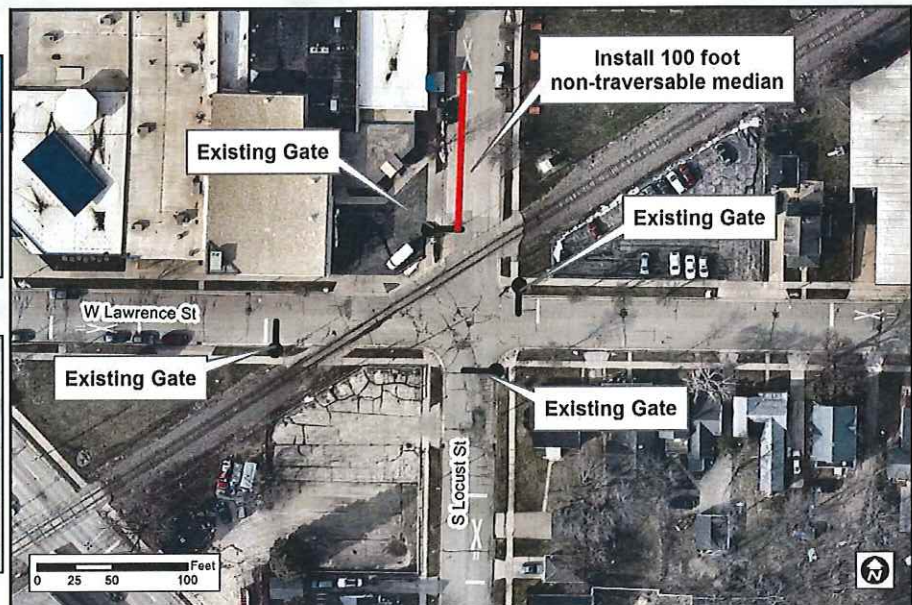
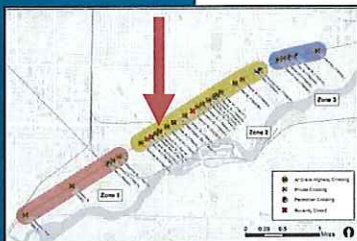
Risk Reduction	100%
Cost	\$0



Locust Street – Option 2

Locust Street – Option 2

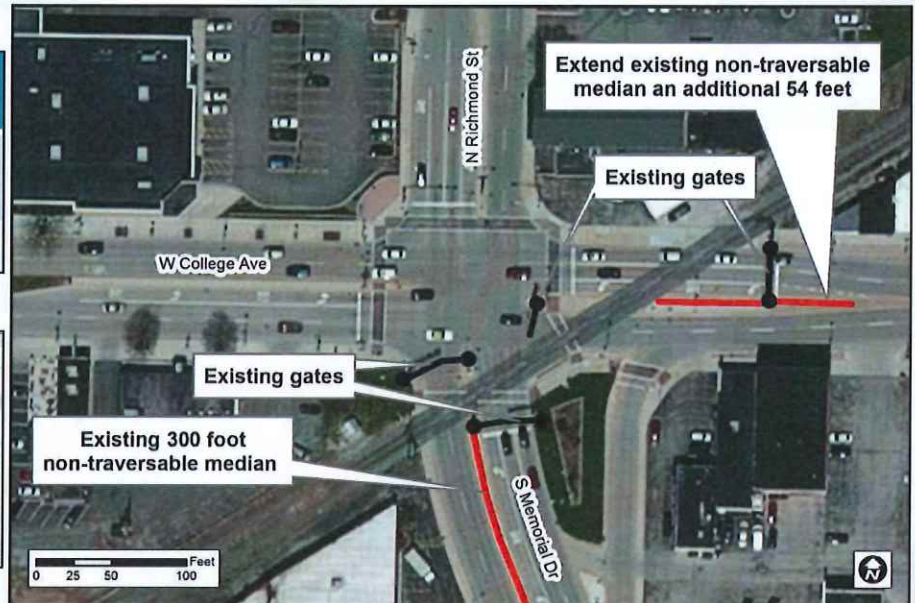
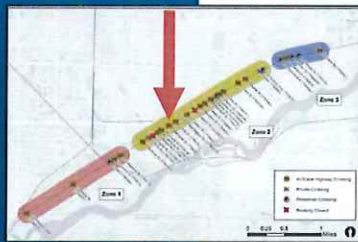
Risk Reduction	40%
Cost	\$35,500



Memorial Drive

Memorial Drive

Risk Reduction	18%
Cost	\$18,900

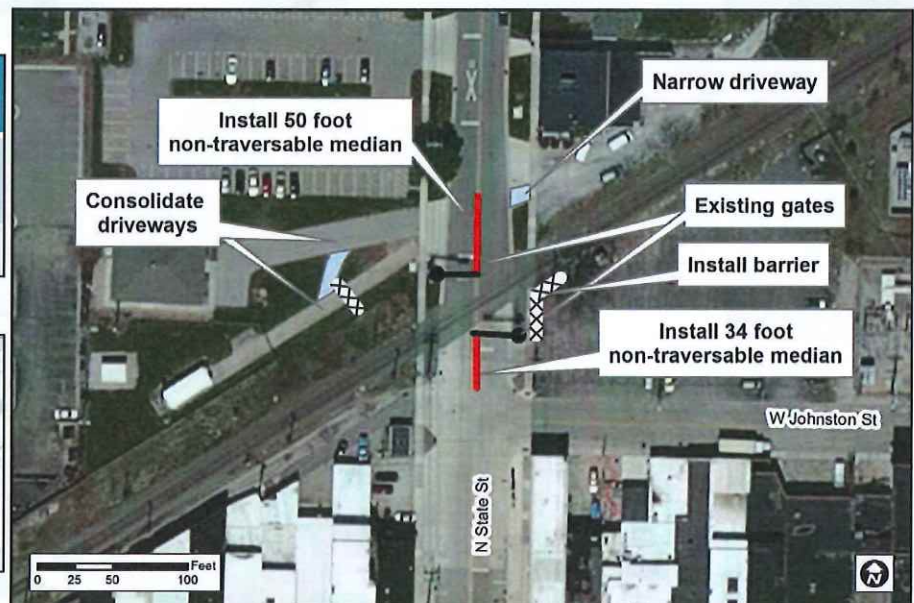
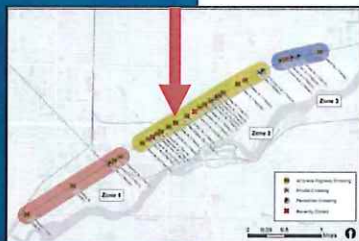


SRF

State Street – Option 1

State Street – Option 1

Risk Reduction	56%
Cost	\$39,400



SRF

State Street – Option 2

State Street – Option 2

Risk Reduction	36%
Cost	\$23,900

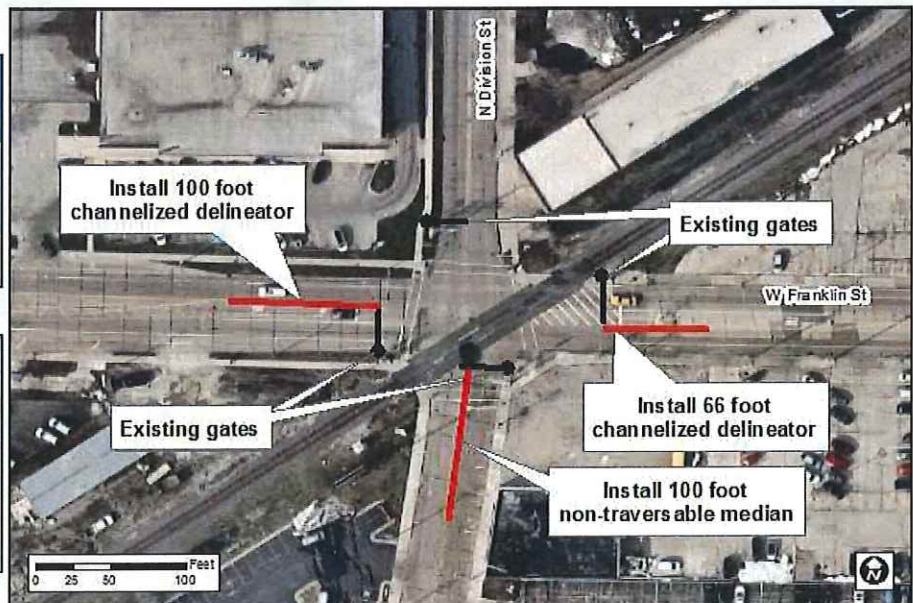


SRF

Franklin Street – Option 1

Franklin Street – Option 1

Risk Reduction	58%
Cost	\$43,300

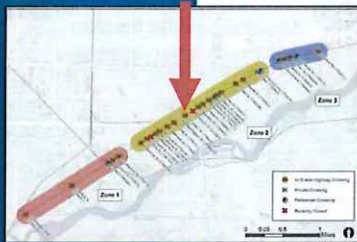


SRF

Franklin Street – Option 2

Franklin Street – Option 2

Risk Reduction	20%
Cost	\$23,100

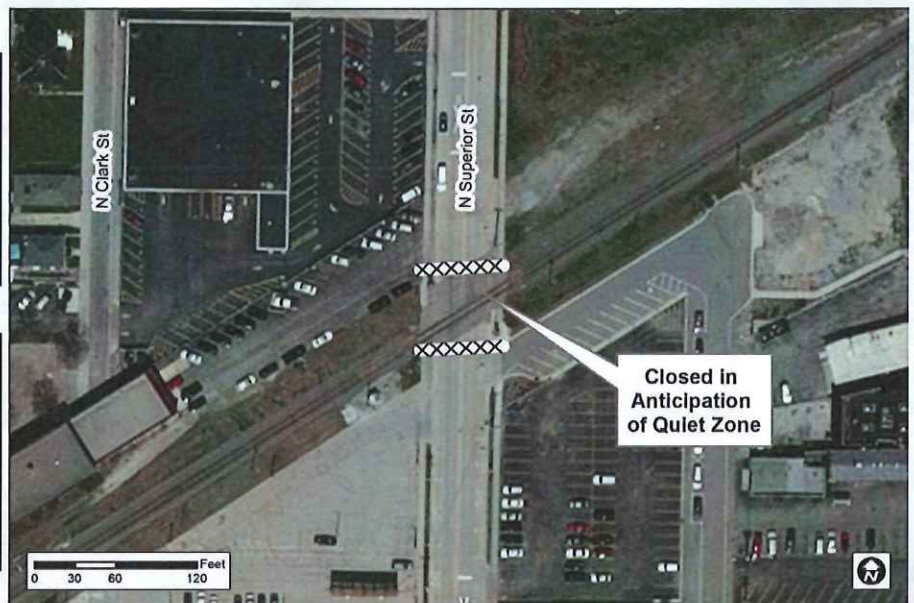


SRF

Superior Street

Franklin Street – Option 2

Risk Reduction	100%
Cost	\$0

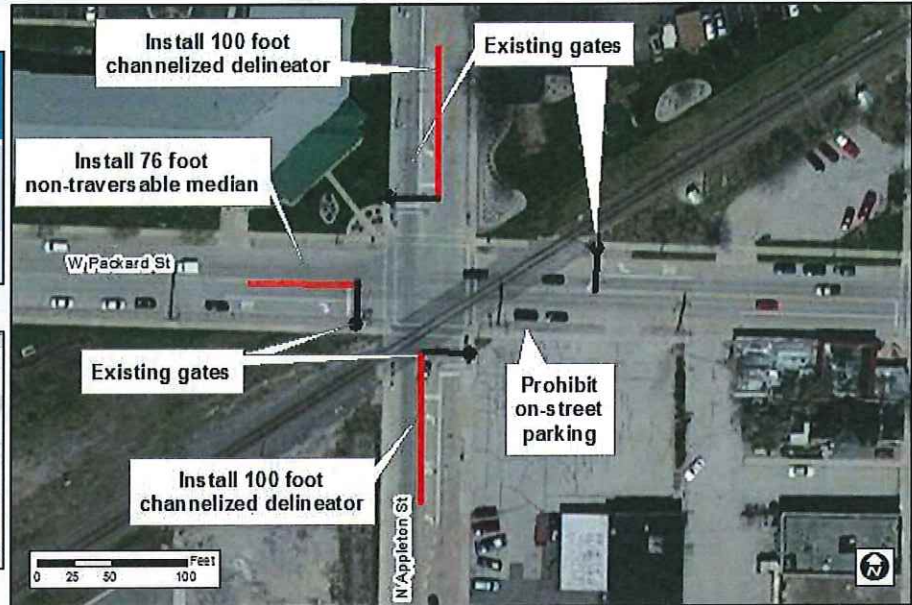
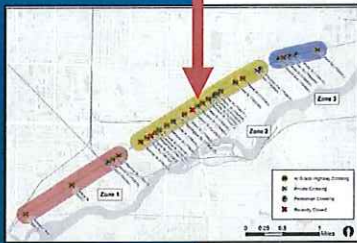


SRF

Appleton Street – Option 1

Appleton Street – Option 1

Risk Reduction	58%
Cost	\$36,600

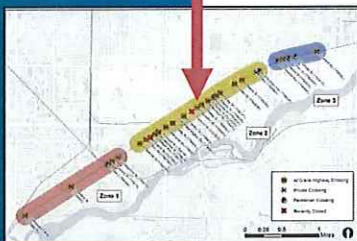


SRF

Appleton Street – Option 2

Appleton Street – Option 2

Risk Reduction	20%
Cost	\$26,600

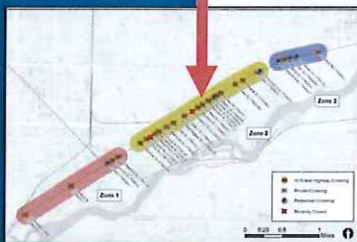


SRF

Oneida Street – Option 1

Oneida Street – Option 1

Risk Reduction	100%
Cost	\$0



Mobility Study has identified Oneida as a problematic closure.

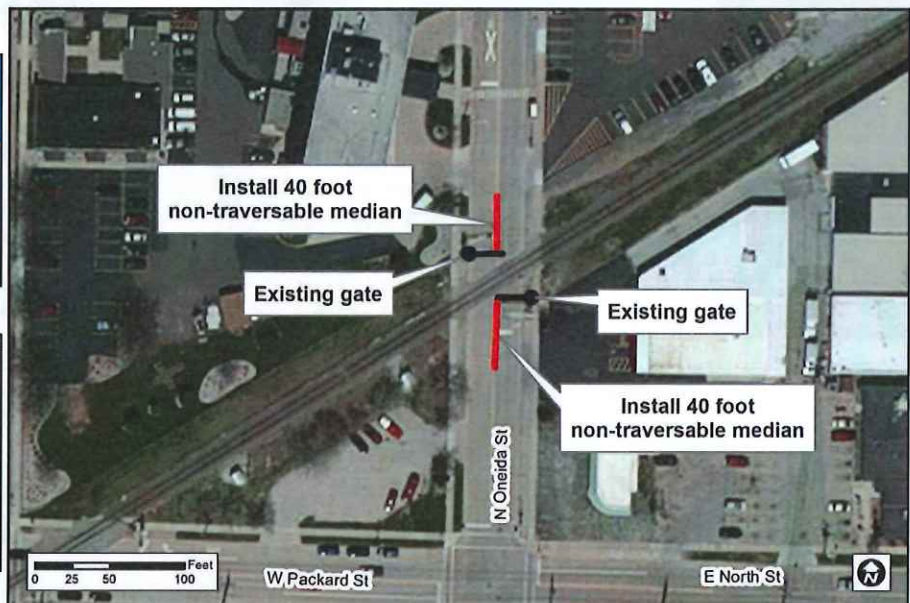
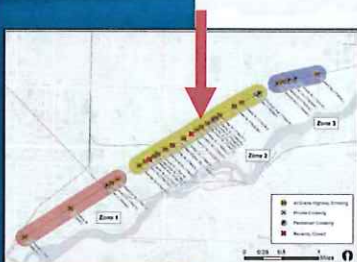


SRF

Oneida Street – Option 2

Oneida Street – Option 2

Risk Reduction	53%
Cost	\$28,000

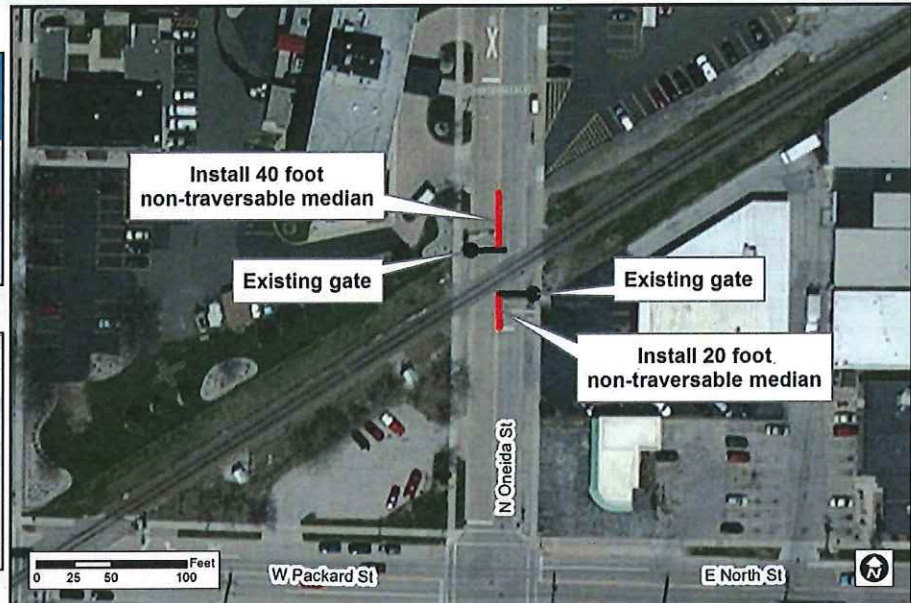
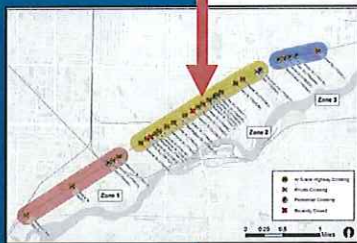


SRF

Oneida Street – Option 3

Oneida Street – Option 3

Risk Reduction	40%
Cost	\$21,000

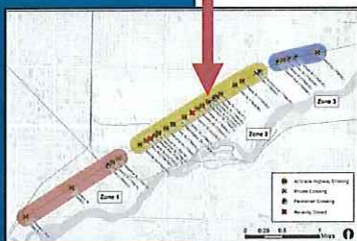


SRF

Morrison Street – Option 1

Morrison Street – Option 1

Risk Reduction	100%
Cost	\$0

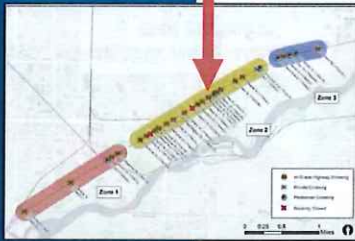


SRF

Morrison Street – Option 2

Morrison Street – Option 2

Risk Reduction	57%
Cost	\$34,750

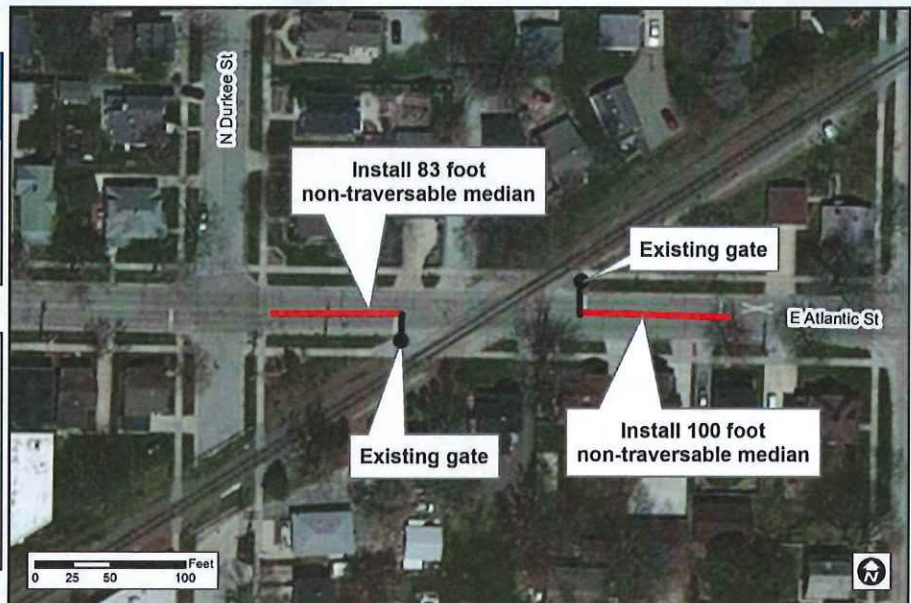
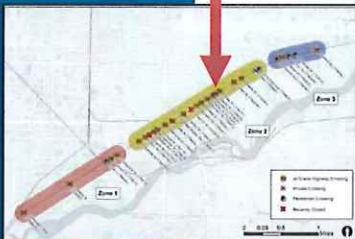


SRF

Atlantic Street – Option 1

Atlantic Street – Option 1

Risk Reduction	80%
Cost	\$64,050

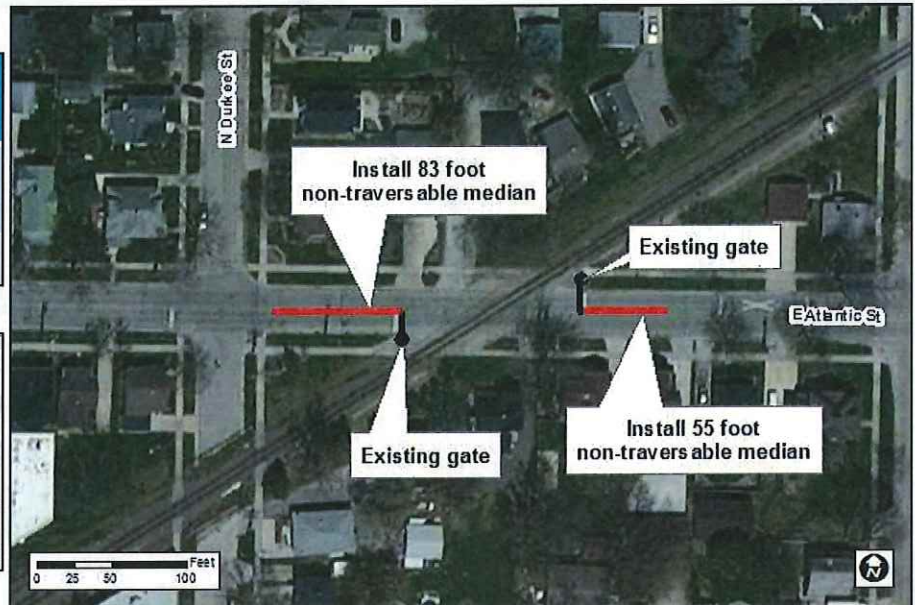
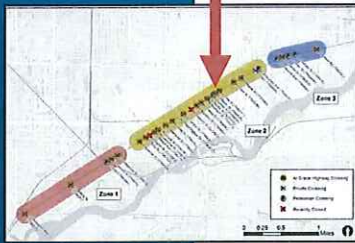


SRF

Atlantic Street – Option 2

Atlantic Street – Option 2

Risk Reduction	62%
Cost	\$48,300

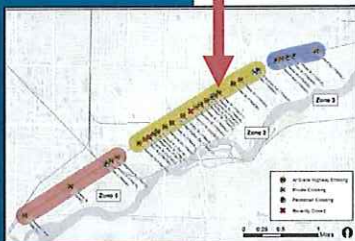


SRF

Drew Street – Option 1

Drew Street – Option 1

Risk Reduction	40%
Cost	\$24,500

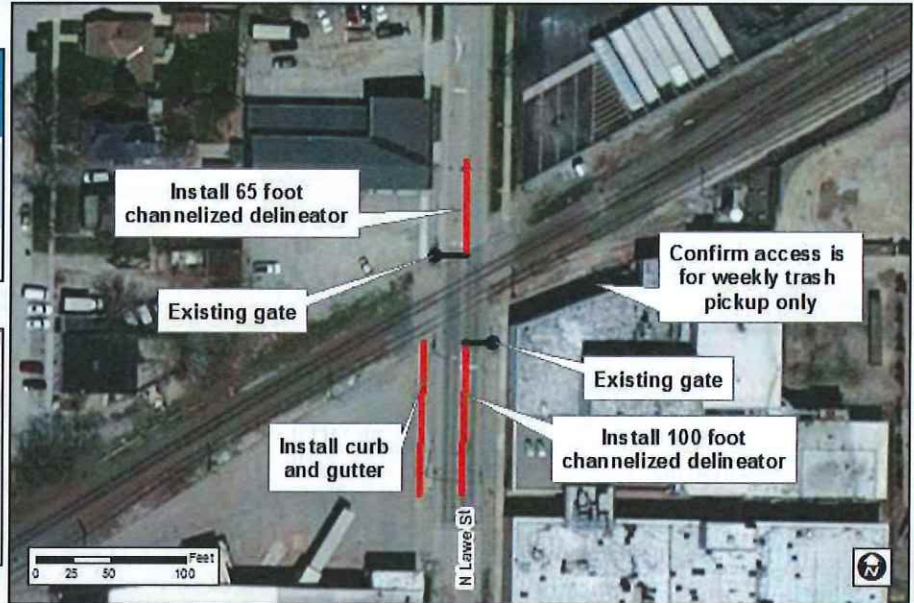
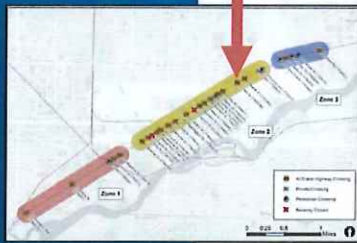


SRF

Lawe Street – Option 1

Lawe Street – Option 1

Risk Reduction	75%
Cost	\$11,750

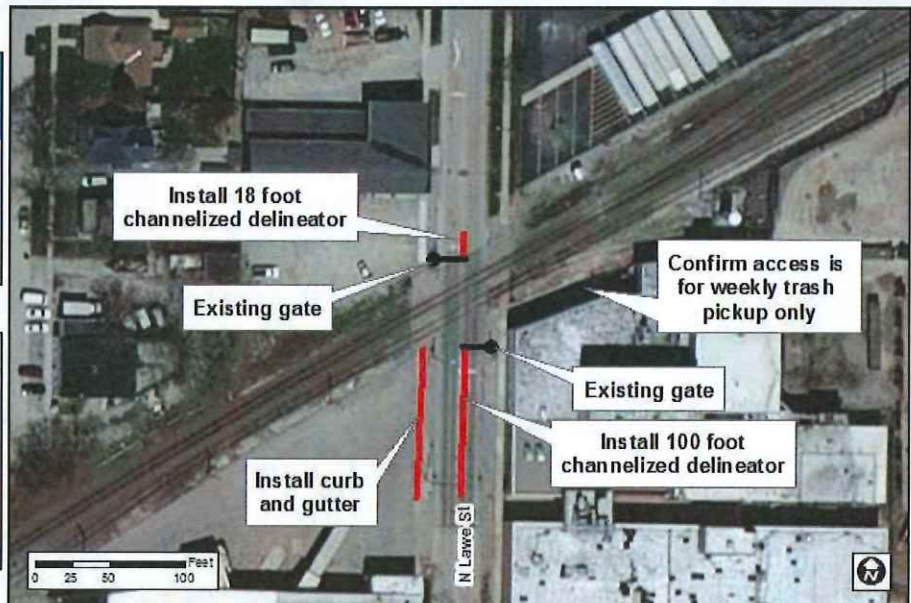
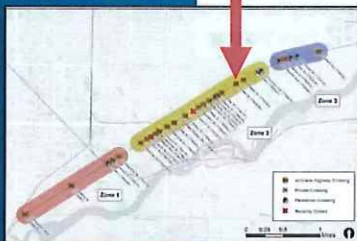


SRF

Lawe Street – Option 2

Lawe Street – Option 2

Risk Reduction	49%
Cost	\$9,400

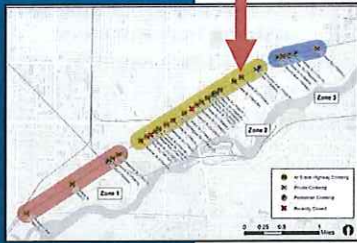


SRF

Meade Street

Meade Street

Risk Reduction	0%
Cost	\$5,000

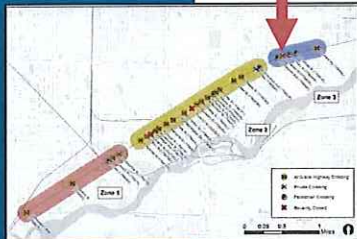


SRF

Owaissa Street

Owaissa Street

Risk Reduction	53%
Cost	\$28,000

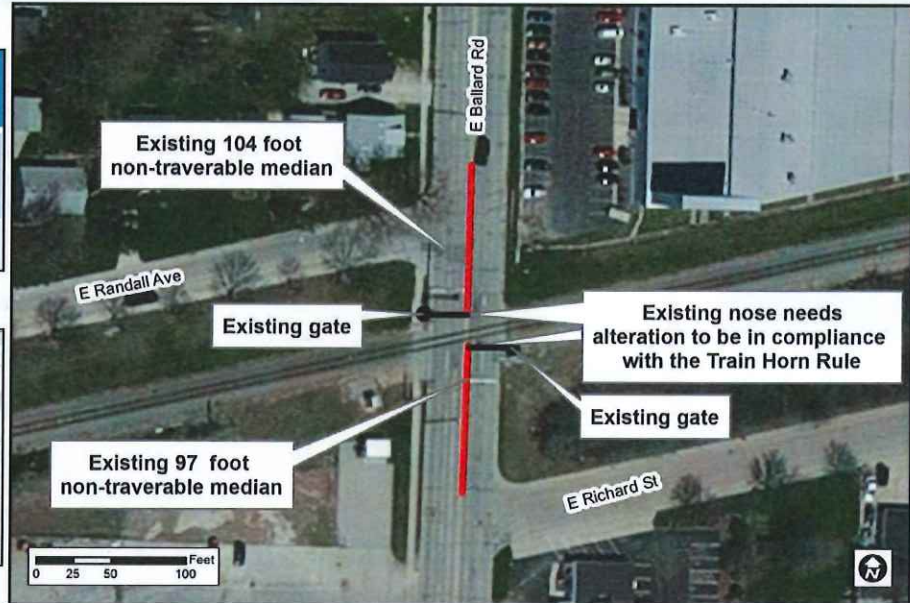
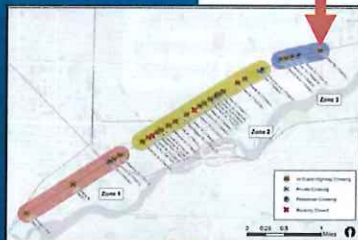


SRF

Ballard Road

Ballard Road

Risk Reduction	80%
Cost	\$5,000



SRF

Scenario 1 – Minimal Impact

Table 1. Scenario 1: Minimal Impact

Crossing Name	Improvement Option	Improvement Summary	Existing Risk Level (RWH)	New Risk Level (QZRI)	Estimated Cost
Prospect Avenue	No Treatment	Upgrade crossing with CWT detection	12,637	21,079	\$100,000
Perkins Street	Option 1	51' median south	5,680	6,253	\$17,850
Second Street	No Treatment	No Treatment	5,170	8,624	\$-
Outagamie Street	Option 1	100' median north, 68' median south, driveway mods	7,137	2,381	\$63,800
Spencer Street	Option 3	100' median east	10,379	10,472	\$35,000
Story Street	Option 1	29' median north, 51' median south (with C&G)	6,254	4,920	\$29,785
Eighth Street	Option 1	Closure	5,888	-	\$-
Badger Avenue	Option 1	100' median north, 73' median south, driveway mods	12,019	4,044	\$65,550
Lawrence Street	Option 2	100' median west	6,232	6,304	\$35,000
Locust Street	Option 1	Closure	6,639	-	\$-
Memorial Drive	Option 1	Existing 100' median south, 54' median east	79,155	86,612	\$18,900
State Street	Option 2	20' median north, 34' median south, barriers	8,224	8,779	\$23,900
Franklin Street	Option 2	100' median south	14,082	19,049	\$23,100
Superior Street	Option 1	Closure	7,330	-	\$-
Appleton Street	Option 2	76' median west	13,157	18,201	\$26,800
Onelda Street	Option 3	40' median north, 20' median south	7,363	7,369	\$21,000
Morrison Street	Option 2	25' median north, 60' median south, alley mods	7,100	5,132	\$34,750
Atlantic Street	Option 1	83' median west, 100' median east	7,529	2,512	\$64,050
Drew Street	Option 1	70' median north	9,675	9,683	\$24,500
Laws Street	No Treatment	No Treatment	10,286	17,156	\$-
Meade Street	No Treatment	Physical Barrier	8,909	14,860	\$5,000
Owassa Street	Option 1	20' median north, 60' median south	10,794	8,402	\$28,000
Ballard Road	Option 1	Existing 104' median north, 97' median south (needs nose reconstruction)	16,739	5,584	\$5,000
Average/Total			12,103	11,627	\$621,785

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Scenario 1a – Exclude Prospect

Table 2. Scenario 1a: Minimal Impact (Excluding Prospect Avenue)

Crossing Name	Improvement Option	Improvement Summary	Existing Risk Level (RWVH)	New Risk Level (QZRI)	Estimated Cost
Perkins Street	Option 1	51' median south	5,680	6,253	\$17,850.00
Second Street	No Treatment	No Treatment	5,170	8,624	\$-
Outagamie Street	No Treatment	No Treatment	7,137	11,904	\$-
Spencer Street	Option 3	100' median east	10,379	10,472	\$35,000.00
Story Street	Option 1	29' median north, 51' median south (with C&G)	6,254	4,920	\$29,785.00
Eighth Street	Option 1	Closure	5,888	-	\$-
Badger Avenue	Option 1	100' median north, 73' median south, driveway mods	12,019	4,044	\$65,550.00
Lawrence Street	Option 2	100' median west	6,232	6,304	\$35,000.00
Locust Street	Option 1	Closure	6,639	-	\$-
Memorial Drive	Option 1	Existing 100' median south, 54' median east	79,155	86,612	\$18,900.00
State Street	Option 2	20' median north, 34' median south, barriers	8,224	8,779	\$23,900.00
Franklin Street	Option 2	100' median south	14,082	19,049	\$23,100.00
Superior Street	Option 1	Closure	7,330	-	\$-
Appleton Street	Option 2	76' median west	13,157	18,201	\$26,600.00
Oneida Street	Option 3	40' median north, 20' median south	7,363	7,369	\$21,000.00
Morrison Street	Option 2	25' median north, 60' median south, alley mods	7,100	5,132	\$34,750.00
Atlantic Street	Option 1	83' median west, 100' median east	7,529	2,512	\$64,050.00
Drew Street	Option 1	70' median north	9,675	9,683	\$24,500.00
Lawe Street	No Treatment	No Treatment	10,286	17,156	\$-
Meade Street	No Treatment	Physical Barrier	8,909	14,860	\$5,000.00
Owalissa Street	Option 1	20' median north, 60' median south	10,794	8,402	\$28,000.00
Ballard Road	Option 1	Existing 104' median north, 97' median south (needs nose reconstruction)	16,739	5,584	\$5,000.00
Average/Total			12,079	11,630	\$457,985

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Scenario 2 – Maximum Safety

Table 3. Scenario 2: Maximum Safety

Crossing Name	Improvement Option	Improvement Summary	Existing Risk Level (RWVH)	New Risk Level (QZRI)	Estimated Cost
Prospect Avenue	No Treatment	Upgrade crossing with CWT detection	12,637	21,079	\$100,000
Perkins Street	Option 2	74' median north, 51' median south, driveway mods	5,680	2,463	\$53,750
Second Street	Option 1	15' median west, 89' median east, driveway mods	5,170	4,312	\$41,400
Outagamie Street	Option 1	100' median north, 68' median south, driveway mods	7,137	2,381	\$63,800
Spencer Street	Option 2	100' median west, 100' median east, one-way entry	10,379	3,491	\$75,000
Story Street	Option 2	29' median north, 100' median south (with C&G), driveway mods	6,254	4,287	\$53,650
Eighth Street	Option 1	Closure	5,888	-	\$-
Badger Avenue	Option 1	100' median north, 73' median south, driveway mods	12,019	4,044	\$65,550
Lawrence Street	Option 1	Closure	6,232	-	\$-
Locust Street	Option 1	Closure	6,639	-	\$-
Memorial Drive	Option 1	Existing 100' median south, 54' median east	79,155	86,612	\$18,900
State Street	Option 1	50' median north, 34' median south, driveway mods, barriers	8,224	6,036	\$39,400
Franklin Street	Option 1	100' channelized delineator west, 100' median south, 66' channelized delineator east	14,082	10,120	\$43,300
Superior Street	Option 1	Closure	7,330	-	\$-
Appleton Street	Option 1	76' median west, 100' channelized delineator south, 100' channelized delineator north	13,157	9,669	\$36,600
Oneida Street	Option 2	40' median north, 40' median south	7,363	5,731	\$28,000
Morrison Street	Option 2	25' median north, 60' median south, alley mods	7,100	5,132	\$34,750
Atlantic Street	Option 1	83' median west, 100' median east	7,529	2,512	\$64,050
Drew Street	Option 1	70' median north	9,675	9,683	\$24,500
Lawe Street	Option 1	65' channelized delineator north, 100' channelized delineator south (with C&G)	10,286	4,289	\$11,750
Meade Street	No Treatment	Physical Barrier	8,909	14,860	\$5,000
Owalissa Street	Option 1	20' median north, 60' median south	10,794	8,402	\$28,000
Ballard Road	Option 1	Existing 104' median north, 97' median south (needs nose reconstruction)	16,739	5,584	\$5,000
Average/Total			12,103	9,160	\$792,400

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Scenario 3 – Phased (Zone 1)

Table 4. Scenario 3: Zone 1

Crossing Name	Improvement Option	Improvement Summary	Existing Risk Level (RIWH)	New Risk Level (QZRI)	Estimated Cost
Prospect Avenue	No Treatment	Upgrade crossing with CWT detection	12,637	21,079	\$100,000
Perkins Street	Option 2	74' median north, 51' median south, driveway mods	5,680	2,463	\$53,750
Second Street	Option 1	15' median west, 89' median east, driveway mods	5,170	4,312	\$41,400
Outagamie Street	Option 1	100' median north, 68' median south, driveway mods	7,137	2,381	\$63,800
Average/Total			7,656	7,559	\$258,950

Table 5. Scenario 3: Zone 1 (Excluding Prospect)

Crossing Name	Improvement Option	Improvement Summary	Existing Risk Level (RIWH)	New Risk Level (QZRI)	Estimated Cost
Perkins Street	Option 1	51' median south	5,680	6,253	\$17,850
Second Street	No Treatment	-	5,170	8,624	\$-
Outagamie Street	Option 1	100' median north, 68' median south, driveway mods	7,137	2,381	\$63,800
Average/Total			5,996	5,753	\$81,650

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Scenario 3 – Phased (Zone 2)

Table 6. Scenario 3: Zone 2

Crossing Name	Improvement Option	Improvement Summary	Existing Risk Level (RIWH)	New Risk Level (QZRI)	Estimated Cost
Spencer Street	Option 3	100' median east	10,379	10,472	\$35,000
Story Street	Option 1	29' median north, 51' median south (with C&G)	6,254	4,920	\$29,785
Eighth Street	Option 1	Closure	5,888	-	\$-
Badger Avenue	Option 1	100' median north, 73' median south, driveway mods	12,019	4,044	\$65,550
Lawrence Street	Option 2	100' median west	6,232	6,304	\$35,000
Locust Street	Option 1	Closure	6,639	-	\$-
Memorial Drive	Option 1	Existing 100' median south, 54' median east	79,155	86,612	\$18,900
State Street	Option 2	20' median north, 34' median south, barriers	8,224	8,779	\$23,900
Franklin Street	Option 2	100' median south	14,082	19,049	\$23,100
Superior Street	Option 1	Closure	7,330	-	\$-
Appleton Street	Option 2	76' median west	13,157	18,201	\$26,600
Oneida Street	Option 3	40' median north, 20' median south	7,363	7,369	\$21,000
Morrison Street	Option 2	25' median north, 60' median south, alley mods	7,100	5,132	\$34,750
Atlantic Street	Option 1	83' median west, 100' median east	7,529	2,512	\$64,050
Drew Street	Option 1	70' median north	9,675	9,683	\$24,500
Lawe Street	No Treatment	No Treatment	10,286	17,156	\$-
Meade Street	No Treatment	Physical Barrier	8,909	14,860	\$5,000
Average/Total			12,954	12,653	\$407,135

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Scenario 3 – Phased (Zone 3)

Table 7. Scenario 3: Zone 3

Crossing Name	Improvement Option	Improvement Summary	Existing Risk Level (RIWH)	New Risk Level (QZRI)	Estimated Cost
Owaissa Street	No Treatment	-	10,794	18,004	\$-
Ballard Road	Option 1	Existing 104' median north, 97' median south (needs nose reconstruction)	16,739	5,584	\$5,000
<i>Average/Total</i>			13,767	11,794	\$5,000

Summary of Scenarios

Scenario	Cost
Scenario 1: Minimal Impact	\$621,785
Scenario 1a: Minimal Impact (Excluding Prospect)	\$457,985
Scenario 2: Maximum Safety	\$792,400
Scenario 3: Phased Implementation	\$493,785 - \$671,085
Zone 1: Prospect to Outagamie	\$258,950
Zone 1a: Perkins to Outagamie (Ex. Prospect)	\$81,650
Zone 2: Spencer to Wisconsin	\$407,135
Zone 3: Kenilworth to Ballard	\$5,000

Quiet Zone Decision Process



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Questions?

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