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Arizona Corporation Commission (ACC)  
Procedural Order  
Notice of Errata

Re: ACC Applicant Docket NO. RR-02635B-09-0075 for Existing Rail Crossing  
Changes, DOT #'s 025099J & 025129Y

To whom it may concern,

It was brought to my attention that one of the attachments to the application had some missing pages. The attachment is "Quiet Zone/Wayside Horn Update December 2006" report which addressed the various safety measures recommended by the quiet zone diagnostic team on May 2, 2006. Please note that since the report does contain several options for each crossing there is a significant amount of information in the report that does not pertain to the final design. The Arizona Corporation Commission and BNSF were supplied this report as part of the diagnostic team review during the Federal Railroad Administrations quiet zone process.

Please do not hesitate to call or Email me at 928-226-4844 or [rwhitaker@flagstaffaz.gov](mailto:rwhitaker@flagstaffaz.gov).

Thank You,

*Randy Whitaker*

Randy Whitaker  
Senior Project Manager  
City of Flagstaff

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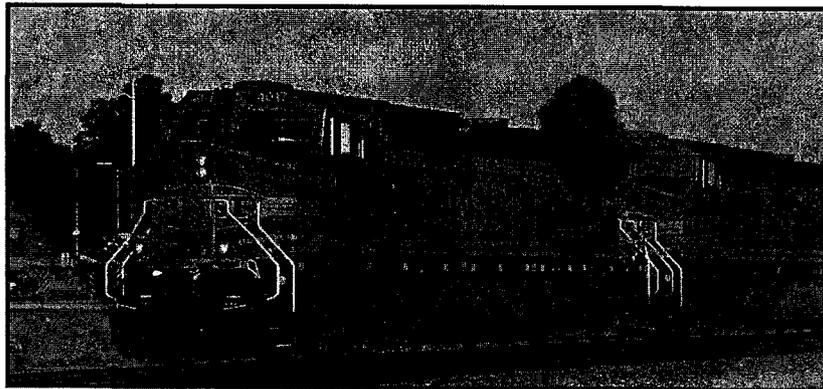
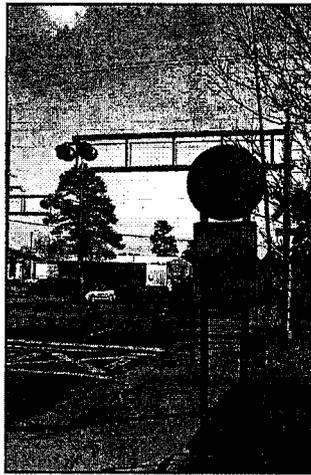
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*City of Flagstaff*  
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## **Quiet Zone/Wayside Horn Update December 2006**



**Revision 1-22-07**

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<b>Beaver Street Quiet Zone W/Pedestrian Barriers</b>	<b>(Exhibit QZPB-1)</b>
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<b>Fanning Drive W/Wayside Horns</b>	<b>(Exhibit W-5)</b>
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<b>Pedestrian Barrier</b>	<b>(Exhibit PB)</b>

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# 1.0 INTRODUCTION

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## 1.1 HISTORY

In 2004, the City of Flagstaff contracted with Gannet Fleming to assist in the development of a Quiet Zone for the five highway-rail crossings within the city (Beaver Street, San Francisco Street, Enterprise Road, Steves Boulevard and Fanning Drive).

The intent had originally planned to have a Diagnostic Team, as required by Federal Railroad Administration (FRA), dispatched to the proposed Quiet Zone site to observe and record the existing conditions of the five crossings. The information acquired would then be used in completing and submitting the Crossing Inventory forms along with developing recommendations to be used as safety needs for each crossing for the qualification of the Quiet Zone.

However at that time, due to ruling situation of FRA Final Ruling and the intent of the BNSF to take a wait and see of what the Final Rule would mandate, the Diagnostic Team was reorganized into a Site Investigation Team. The Site Investigation Team gathered information to update and submit the Crossing Inventory forms along with setting a general direction for the Diagnostic Team once the Final Rule was placed into affect.

In July 2005 Staff gave a presentation to Council to verify the direction of the Quiet Zone project. In January 2006 a Design Agreement was entered into with the engineering firm of Gannett Fleming. Throughout the design period, the question of cost savings and options were considered. The use of wayside horns was discussed in regards to cost and effectiveness. Staff determined that a prudent action would be to have a demonstration of the wayside horns including a public survey.

On May 2, 2006 Railroad Controls, a wayside horn vendor, conducted a demonstration at each of the five railroad at-grade crossings within the Flagstaff City limits. The demonstration did confirm the data in the manufacturer's literature and their claim that the wayside horn is an effective noise reduction option.

A public survey process was included as part of the demonstration. Eighty-Nine percent of the returned survey indicated that the wayside horn was an acceptable alternative to a train horn. The "not acceptable" surveys concerns were that the wayside horns could not be heard inside a car, over loud background noise or other miscellaneous general safety concerns.

As mandated by FRA and prior to the implementation of the Quiet Zone, a Diagnostic Team comprised of a group of qualified or specially-trained individuals assembled to make objective judgments about the physical and/or operating conditions at the highway-rail crossings must be dispatched to assess and make recommendations for each crossing.

Based on the previous findings, it was agreed upon that the Diagnostic Team's review would address the following:

Each Crossing was looked at under two options:

1. Use of wayside horns.
2. Creation of a Quiet Zone.

**Wayside Horns:** The use of wayside horns does not create a Quiet Zone as the sounding of the locomotive horns is mimicked by the wayside horns. However the decibel levels and positioning of the horns allows for a more controlled displacement of noise. The use of wayside horns would be considered more as a Noise Reduction Zone than a Quiet Zone.

Wayside horns have been classified by the FHWA as a traffic control device for inclusion in the Manual on Uniform Traffic Control Devices (MUTCD).

**Quiet Zone:** The placement of a Quiet Zone within the five railroad at-grade crossings would require the use of Supplementary Safety Measures (SSM) in order for the five railroad at-grade crossings to qualify. The approved SSM's include:

- Temporary Closure of a Public Highway-Rail Grade Crossing.
- Permanent Closure of a Public Highway-Rail Grade Crossing.
- Grade Separation of a Public Highway-Rail Grade Crossing.
- Four-Quadrant Gates upgraded from Two-Quadrant gates, No Vehicle Presence Detection.
- Four-Quadrant Gates with Vehicle Presence Detection.
- Two-Quadrant Gates, with medians of at least 60 feet, with or without Presence Detection.
- Non-traversable Curb Medians with or without Channelization Devices.
- One Way Streets with gates.

Wayside horns can be used in a Quiet Zone area but are not considered a SSM. They are considered a one-for-one substitute for the train horns but are not considered in the Risk Index calculated for the Quiet Zone.

### **Closing Statement**

On May 2, 2006, the Diagnostic Team met to review and develop recommendations. It was the intent of the Diagnostic Team to develop the best available options in order for the City of Flagstaff to decide the direction they would like to take this project to final design. Conclusions of this study can be found in Section 6.0.

## 1.2 DIAGNOSTIC TEAM

### Attendance:

Kurt Anderson, Railroad Controls

Barry Gondron, Gannett Fleming

Chris Watson, Arizona Corporation Commission

Stu Seubert, City of Flagstaff (part time)

Randy Whitaker, City of Flagstaff

Debbie Jo Maust, City of Flagstaff

Gerry Craig, City of Flagstaff (part time)

Megan McIntyre, BNSF

Tom Chilcoat, BNSF

Note: FRA representatives could not attend due to financial situation.

### General discussion:

- **Direction**

The Diagnostic Team was instructed to review the five railroad at-grade crossings under the two options described above. 1 - Wayside horn option; 2 - Quiet Zone option.

- **Pedestrian Safety**

Within the review of each crossing and option it was further instructed that pedestrian safety would play a prime roll. Supplementary Safety Measures indicated in the quiet zone ruling have no correlation with pedestrian accidents or safety. They address vehicles only. The Diagnostic Team was instructed to consider mitigation factors for pedestrian safety at each crossing. It was brought up that the MUTCD (Part 10 - Traffic Controls for Highway-Light Rail Transit Grade Crossing) section addresses the use of pedestrian barrier installations for light rail transit crossings and that these could possibly be used and modified to address pedestrian safety concerns at Beaver Street and San Francisco Street situations.

- **Wayside horn maintenance recommendations**

Discussions with Railroad Controls Limited indicated it was in the best interest for the city to supply their own maintenance for the wayside horns. Citing financial consideration and response time as the primary factor for this recommendation. Installations of the wayside horns include operating and maintenance technical training for the City's traffic signal or electrical supervisor.

- **Cost**

No costs are to be considered during Diagnostic Team recommendations.

### 1.3 LIABILITY

No one with BNSF, Corporation Commission, or the FRA has indicated there is any quantified liability comparison between the Risk Index of a crossing, pedestrian safety and wayside horns.

### 1.4 PROCESS

General process for:

- **Signing direct agreement with BNSF for wayside horn use.**

The BNSF currently has in possession agreements for installation of wayside horns. The city would be required to execute these agreements at minimum administrative costs. An 11-month schedule is anticipated at this time for implementation. Unless other wise noted the duration for the schedule starts when the City chooses the desired safety equipment.

- **Creating Quiet Zone without BNSF ordering and installing four-quadrant gates.**

Agreements would be required for installation of Safety measures placed on existing BNSF right of way for the activation of the quiet zone. The cost would vary from minimum administration cost to improvement easements with yearly fees depending on the option chosen per crossing. A 19-month schedule is anticipated at this time for implementation.

- **Creating Quiet Zone with BNSF ordering and installing four-quadrant gates.**

Construction and maintenance agreements would be required for the installation of the additional gates. At present BNSF has not identified what these would include as not many agreements of this type has been implemented. A 29-month schedule is anticipated at this time for implementation.

- **Creating Quite Zone - Notice of Intent.**

The City must provide a Notice of Intent to create a Quiet Zone. This notification must be sent via certified mail, return receipt request, to all railroads operating over the crossings in the proposed Quiet Zone, to the State Agency responsible for roadway safety and the agency responsible for grade crossing safety (Arizona Corporation Commission). The purpose of this Notice of Intent is to provide an opportunity for the railroads and State agency to provide comments and recommendations to the public authority as it plans the Quiet Zone. The railroad and State agency will have 60 days to provide these comments to the public authority.

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## **2.0 DIAGNOSTIC TEAM'S ANALYSIS AND RECOMMENDATIONS**

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Each Crossing was looked at under two options:

1. Use of wayside horns.
2. Creation of a Quiet Zone.

In either case the use of signage indicating the changed condition will be needed.

Conceptual cost and schedule for each crossing is provided in the Appendix to this report.

### **2.1 BEAVER STREET**

#### **2.1.1 Wayside Horns (Exhibit W-1)**

- Place a horn at the northwest and south/west corner of the crossing. One horn facing north and one facing south.
- Fencing going along BNSF right-of-way to channel people to the crossing in front of the horn.
- ADA sidewalk treatment.
- Place "No Train Horn" signs.

#### **2.1.2 Quiet Zone with Pedestrian Barrier (Exhibit QZPB-1)**

- Fencing along BNSF right-of-way to channel people to crossing.
- Pedestrian barriers at Beaver Street on south side of crossing to channel people to one location where signage is located. Signage would indicate that there are no horns and second train may be coming. This in theory would function as a +staging area much as at theme parks (Exhibit PB).
- Relocate or redesign driveways adjacent to crossing on south side.
- ADA sidewalk treatment.
- Place "No Train Horn" signs.

#### **2.1.3 Quiet Zone with 4-Quad Gates (Exhibit QZ-1)**

- Fencing along BNSF right-of-way to channel people to crossing.
- Install Four Quadrant Gates with vehicle detection between gates.
- ADA sidewalk treatment.
- Place "No Train Horn" signs.

## **2.2 SAN FRANCISCO STREET**

Options are the same as Beaver Street except north and south treatments are reversed.

### **2.2.1 Wayside Horns (Exhibit W-2)**

- Place a horn at the north/west and south/east corners of the crossing. One horn facing north and one facing south.
- Fencing going along BNSF right-of-way to channel people to the crossing in front of the horn.
- A third horn will be added facing the Amtrak area.
- ADA sidewalk treatment.
- Place "No Train Horn" signs.

### **2.2.2 Quiet Zone with Pedestrian Barriers (Exhibit QZPB-2)**

- Fencing along BNSF right-of-way to channel people to crossing.
- Pedestrian barriers at San Francisco Street on north side of crossing to channel people to one location where signage is located. Signage would indicate that there are no horns and second train may be coming. This in theory would function as a staging area much as at theme parks (Exhibit PB).
- Driveway for Amtrak will not be closed but improvement will be made to emphasis that only left turns are allowed.
- Add larger left turn arrow on Amtrak drive.
- Add left turn sign across from Amtrak drive.
- ADA sidewalk treatment.
- Place "No Train Horn" signs.

### **2.2.3 Quiet Zone with 4-Quad Gates (Exhibit QZ-2)**

- Fencing along BNSF right-of-way to channel people to crossing.
- Install Four Quadrant Gates with vehicle detection between gates.
- Add larger left turn arrow on Amtrak drive.
- Add left turn sign across from Amtrak drive.
- ADA sidewalk treatment.
- Place "No Train Horn" signs.

## **2.3 ENTERPRISE ROAD**

### **2.3.1 Wayside Horns (Exhibit W-3)**

- Horns will be placed at the northwest and southeast corners of crossings. In addition two horns will be placed on an existing light pole in the south median with one horn facing north and another facing south.
- ADA sidewalk treatment.
- Place "No Train Horn" signs.

### **2.3.2 Quiet Zone with Reflective Paddles (Exhibit QZ-3)**

- The existing median will be submitted to the FRA as an alternative safety measure (ASM). The median would qualify as a standard safety measure but the north median is shorter than the standard. Reflective paddles will be used to limit access and mark median.
- ADA sidewalk treatment.
- Place "No Train Horn" signs.

## **2.4 STEVES BLVD.**

### **2.4.1 Wayside Horns (Exhibit W-4)**

- Horns will be placed at the northwest and southeast corners of crossings.
- ADA sidewalk treatment.
- Place "No Train Horn" signs.

### **2.4.2 Quiet Zone with 4-Quad Gates (Exhibit QZ-4)**

- Four Quadrant Gates installed.
- Close Driveways at BNSF ROW.
- ADA sidewalk treatment.
- Place "No Train Horn" signs.

## **2.5 FANNING DRIVE**

### **2.5.1 Wayside Horns (Exhibit W-5)**

- Horns will be placed at the northwest and southeast corners of crossings.
- ADA sidewalk treatment.
- Place "No Train Horn" signs.

### **2.5.2 Quiet Zone with 4-Quad Gates (Exhibit QZ-5)**

- Four Quadrant Gates installed.
- Close Driveways at BNSF ROW.
- ADA sidewalk treatment.
- Place "No Train Horn" signs.

### 3.0 SCENARIOS FOR COMBINATION OF CROSSING PROTECTION

The following is a combination scenario, with associated conceptual cost, for the implementation of wayside horns or locomotive (true) quiet zone. The Diagnostic Team's recommendation was the basis of Scenario A and B. Additional scenarios were developed to take advantage of as many options possible for decision making.

SCENARIO RECAP TABLE		
Scenario	Duration Decision to Completion	Conceptual Cost
A	11 months	\$990,150.
B	29 months	\$2,409,250.
C	29 months	\$3,881,250.
D	19 months	\$885,500.
E	29 months	\$2,386,250.

**Scenario A Recommendation by the diagnostic team for use of wayside horns.**

- Install wayside horns at all locations.

**Scenario B Recommendation by diagnostic team to create a Quiet Zone.**

- Install pedestrian barriers at Beaver and San Francisco.
- Median used as Alternative Safety Measure at Enterprise.
- Install Four-Quadrant Gates at Steves and Fanning.

**Scenario C Creates a Quiet Zone using Four-Quadrant gates at Beaver and San Francisco in-lieu of pedestrian barriers.**

- Install Four-Quadrant Gates at Beaver and San Francisco.
- Median used as Alternative Safety Measure at Enterprise.
- Install Four-Quadrant Gates at Steves and Fanning.

**Scenario D Creates a Quiet Zone with wayside horns at Steves and Fanning for cost savings.**

- Install pedestrian barriers at Beaver and San Francisco.
- Median used as Alternative Safety Measure at Enterprise.
- Install wayside Horns at Steves and Fanning.

**Scenario E Creates a quiet zone with wayside horns at Steves and Fanning with Four-Quadrant gates at Beaver and San Francisco.**

- Install Four-Quadrant Gates at Beaver and San Francisco.
- Median used as Alternative Safety Measure at Enterprise.
- Install wayside Horns at Steves and Fanning.

### 3.1 SCENARIO A

**Scenario A - Recommendation by the Diagnostic Team for use of wayside horns:  
Install wayside horns at all locations.**

<b>Wayside Horns (Exhibits W-1, 2, 3, 4, 5):</b>	
City Staff	56,000
Design	88,000
BNSF Agreement (est.)	50,000
City of Flagstaff Construction	
-Beaver	157,000
-San Francisco	135,000
-Enterprise	145,000
-Steves	115,000
-Fanning	115,000
<b>SUBTOTAL</b>	<b>\$861,000.</b>
Contingency 15%	\$129,150.
<b>TOTAL COST</b>	<b>\$990,150.</b>
<b>Advantages:</b>	
-Simplest and quickest implementation.	
-Audible warning second train is coming.	
-Cost (Installation and yearly maintenance).	
-BNSF already has a standard agreement.	
-BNSF has experience with use of wayside horns.	
-Considered by FRA and BNSF as acceptable and equivalent for train horns.	
<b>Disadvantages:</b>	
-Presence of wayside horn noise.	
-No physical barrier for vehicles going wrong direction on one-way streets.	
<b>Schedule:</b>	
	<u>Months</u>
Design	4
Agreements	2
Material	2
Construction	3
<b>TOTAL</b>	<b>11</b>

### 3.2 SCENARIO B

**Scenario B – Recommendation by diagnostic team to create a true quiet zone.**

Pedestrian barriers at Beaver and San Francisco; Median used as Alternative Safety Measure at Enterprise; Four-Quadrant Gates at Steves and Fanning.

**Quiet Zone (Exhibits QZPB-1, 2 & QZ-3, 4, 5):**

City Staff	100,000
Design	110,000
BNSF Agreement (est.)	50,000
City of Flagstaff Construction	
-Beaver	105,000
-San Francisco	85,000
-Enterprise	115,000
-Steves	295,000
-Fanning	295,000
BNSF Construction	
-Beaver	-0-
-San Francisco	-0-
-Enterprise	-0-
-Steves	382,500
-Fanning	557,500
<b>SUBTOTAL</b>	<b>\$2,095,000.</b>
Contingency 15%	\$314,250
<b>TOTAL COST</b>	<b>\$2,409,250.</b>

**Advantages:**

- Eliminates all horn noise at all locations
- Less costly than Scenario C

**Disadvantages:**

- Does not provide wrong way vehicle protection as Scenario C for Beaver & San Francisco
- Cost (Installation and yearly maintenance)
- No audible warning of first train other than bell chimes at gate crossing.
- No audible warning of second train.
- Longest implementation period.

**Schedule:**

**Months**

Design	6
FRA Agreement	2
BNSF Agreement	6
Material	9
Construction	6
<b>TOTAL</b>	<b>29</b>

### 3.3 SCENARIO C

**Scenario C - Creates a true quiet zone using Four-Quadrant gates at Beaver and San Francisco in-lieu of Pedestrian barriers.**

Four-Quadrant Gates at Beaver and San Francisco; Median used as Alternative Safety Measure at Enterprise; Four-Quadrant Gates at Steves and Fanning.

<b>Quiet Zone (Exhibits QZ-1, 2, 3, 4, 5):</b>	
City Staff	100,000
Design	110,000
BNSF Agreement (est.)	50,000
City of Flagstaff Construction	
-Beaver	255,000
-San Francisco	255,000
-Enterprise	115,000
-Steves	295,000
-Fanning	295,000
BNSF Construction	
-Beaver	557,500
-San Francisco	402,500
-Enterprise	-0-
-Steves	382,500
-Fanning	557,500
<b>SUBTOTAL</b>	<b>\$3,375,000.</b>
Contingency 15%	\$506,250
<b>TOTAL COST</b>	<b>\$3,881,250.</b>
<b>Advantages:</b>	
-Eliminates all horn noise at all locations	
-Provides wrong way vehicle protection at one-way streets	
<b>Disadvantages:</b>	
-Cost (Installation and yearly maintenance)	
-Construction and installation time	
-No audible warning of first train other than bell chimes at gate crossing.	
-No audible warning of second train.	
-Longest implementation period.	
<b>Schedule:</b>	<b>Months</b>
Design	6
FRA Agreement	2
BNSF Agreement	6
Material	9
Construction	6
<b>TOTAL</b>	<b>29</b>

### 3.4 SCENARIO D

**Scenario D - Creates a quiet zone with wayside horns at Steves and Fanning for cost savings.**

Pedestrian barriers at Beaver and San Francisco; Median used as Alternative Safety Measure at Enterprise; Wayside Horns at Steves and Fanning.

<b>Quiet Zone/Wayside Horns (Exhibits QZPB-1, 2, QZ-3, W-4, 5):</b>	
City Staff	75,000
Design	110,000
BNSF Agreement (est.)	50,000
City of Flagstaff Construction	
-Beaver	105,000
-San Francisco	85,000
-Enterprise	115,000
-Steves	115,000
-Fanning	115,000
BNSF Construction	
-Beaver	-0-
-San Francisco	-0-
-Enterprise	-0-
-Steves	-0-
-Fanning	-0-
<b>SUBTOTAL</b>	<b>\$770,000</b>
Contingency 15%	\$115,500
<b>TOTAL COST</b>	<b>\$885,500</b>
<b>Advantages:</b>	
-Less costly than Scenario B & C (Installation and yearly maintenance)	
<b>Disadvantages:</b>	
-Does not provide wrong way vehicle protection (4-quad)	
-No audible warning of first train other than bell chimes at Beaver and San Francisco Streets.	
-No audible warning of second train at Beaver and San Francisco Streets.	
<b>Schedule:</b>	<b>Months</b>
Design	6
FRA Agreement	3
BNSF Agreement	4
Material	2
Construction	4
<b>TOTAL</b>	<b>19</b>

### 3.5 SCENARIO E

Scenario E - Creates a quiet zone with wayside horns at Steves and Fanning with Four-Quadrant gates at Beaver and San Francisco for added vehicle safety on the one-way streets.

Four-Quadrant Gates at Beaver and San Francisco; Median used as Alternative Safety Measure at Enterprise; Wayside Horns at Steves and Fanning.

<b>Quiet Zone/Wayside Horns (Exhibits QZ-1, 2, 3 &amp; W-4, 5):</b>	
City Staff	100,000
Design	110,000
BNSF Agreement (est.)	50,000
City of Flagstaff Construction	
-Beaver	255,000
-San Francisco	255,000
-Enterprise	115,000
-Steves	115,000
-Fanning	115,000
BNSF Construction	
-Beaver	557,500
-San Francisco	402,500
-Steves	-0-
-Fanning	-0-
<b>SUBTOTAL</b>	<b>\$2,075,000.</b>
Contingency 15%	\$311,550
<b>TOTAL COST</b>	<b>\$2,386,250.</b>
<b>Advantages:</b>	
-Less costly than Scenario B & C (Installation and yearly maintenance).	
-Protects one way vehicle travel from wrong way movement.	
<b>Disadvantages:</b>	
-No full vehicle protection at Steves & Fanning.	
-No audible warning of first train other than bell chimes at Beaver and San Francisco Streets.	
-No audible warning of second train at Beaver and San Francisco Streets.	
-Longest implementation period.	
<b>Schedule:</b>	<b>Months</b>
Design	6
FRA Agreement	2
BNSF Agreement	6
Material	9
Construction	6
<b>TOTAL</b>	<b>29</b>

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## 4.0 YEARLY MAINTENANCE FEES

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### **Wayside Horns:**

Railroad Controls or City could maintain the horns.

Railroad Controls – To be negotiated

City Staff – Averages \$500-\$800 per year per crossing

### **Loop Detectors (required for four-quadrant gates):**

City Staff has to maintain the loops under a Construction and Maintenance agreement with BNSF.

City of Flagstaff – Minimal as cost will be included within routine roadway signal maintenance.

### **Four-Quadrant Gates:**

BNSF yearly maintenance fee – \$5,000 - \$10,000 (each crossing)

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## 5.0 GENERAL SCHEDULES

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From Date Scenario is Chosen:

Wayside horns only	11 months
Quiet Zone without four-quadrant gates	19 months
Quiet Zone with four-quadrant gate	29 months

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## 6.0 CONCLUSION

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### Staff/ Designer Conclusions:

- With the completion of the Diagnostic Team's investigation this concludes the study and analysis phase of this project, as mandated by FRA.
- City staff has taken the Diagnostic Team's recommendation and have come up with 5 scenario's to mitigate the potential safety concerns for the implementation of the Noise Mitigation or Quiet Zone project.
- The next recommended step is for the city to decide on which scenario they feel would best serve the general public and proceed toward final design and implementation.
- It is Gannett Fleming's opinion that the implementation of the wayside horns would best serve this project based on the conditions observed.

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# APPENDIX

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## CONCEPTUAL COST AND SCHEDULE

### BEAVER STREET

#### Beaver Street Wayside Horns (Exhibit W-1)

##### Cost (Staff, Agreement and Maintenance Costs not included):

Fencing (@400 feet):	10,000
Horns (2 poles, 2 horns):	72,000
Remote Indicator	25,000
BNSF Connection:	5,000
Sidewalk Treatment:	40,000
Misc. signage/stripping	5,000
<b>TOTAL</b>	<b>\$157,000.</b>

<u>Schedule:</u>	<u>Months</u>
Design	4
Agreements	2
Material	2
Construction	3
<b>TOTAL</b>	<b>11</b>

#### Beaver Street Quiet Zone with Pedestrian Barriers (Exhibit QZPB-1)

##### Cost (Staff, Agreement and Maintenance Costs not included):

Fencing BNSF ROW:	10,000
Pedestrian Barriers Beaver:	20,000
Driveway Improvements:	30,000
Sidewalk Treatment:	40,000
Misc. signage/stripping	5,000
<b>TOTAL</b>	<b>\$105,000.</b>

<u>Schedule:</u>	<u>Months</u>
Design	6
FRA Agreement	3
BNSF Agreement	4
Material	2
Construction	4
<b>TOTAL</b>	<b>19</b>

## BEAVER STREET

**Beaver Street Quiet Zone with 4-Quad Gates (Exhibit QZ-1)**  
**Cost: (Staff, Agreement and Maintenance Costs not included):**

Fencing	10,000
Gates (upgrade to 4-quad)	382,500
Remote Crossing signal	175,000
Loops	200,000
Sidewalk Treatment:	40,000
Misc. signage/stripping	5,000
<b>TOTAL</b>	<b>\$812,500.</b>

<u>Schedule:</u>	<u>Months</u>
Design	6
FRA Agreement	2
BNSF Agreement	6
Material	9
Construction	6
<b>TOTAL</b>	<b>29</b>

## SAN FRANCISCO STREET

**San Francisco Street Wayside Horns (Exhibit W-2)**  
**Cost (Staff, Agreement and Maintenance Costs not included):**

Fencing (@400 feet):	10,000
Horns (2 poles, 3 horns):	75,000
BNSF Connection:	5,000
Sidewalk Treatment:	40,000
Misc. signage/stripping	5,000
<b>TOTAL</b>	<b>\$135,000.</b>

<u>Schedule:</u>	<u>Months</u>
Design	4
Agreements	2
Material	2
Construction	3
<b>TOTAL</b>	<b>11</b>

## SAN FRANCISCO STREET

### San Francisco Street Quiet Zone with Pedestrian Barriers (Exhibit QZPB-2)

#### Cost (Staff, Agreement and Maintenance Costs not included):

Fencing BNSF ROW:	10,000
Pedestrian Barriers San Francisco:	20,000
Driveway Improvements:	10,000
Sidewalk Treatment:	40,000
Misc. signage/striping	<u>5,000</u>
<b>TOTAL</b>	<b>\$85,000.</b>

<u>Schedule:</u>	<u>Months</u>
Design	6
FRA Agreement	3
BNSF Agreement	4
Material	2
Construction	4
<b>TOTAL</b>	<b>19</b>

### San Francisco Street Quiet Zone (Exhibit QZ-2)

#### Cost: (Staff, Agreement and Maintenance Costs not included):

Fencing	10,000
Gates (upgrade to 4-quad)	382,500
Possible axial cable to Beaver St.	20,000
Loops	200,000
Sidewalk Treatment:	40,000
Misc. signage/striping	<u>5,000</u>
<b>TOTAL</b>	<b>\$657,500.</b>

<u>Schedule:</u>	<u>Months</u>
Design	6
FRA Agreement	2
BNSF Agreement	6
Material	9
Construction	6
<b>TOTAL</b>	<b>29</b>

## ENTERPRISE ROAD

### Enterprise Road Wayside Horns (Exhibit W-3)

#### Cost (Staff, Agreement and Maintenance Costs not included):

Horns (2 poles, 4 horns):	95,000
BNSF Connection:	5,000
Sidewalk Treatment:	40,000
Misc. signage/striping	5,000
<b>TOTAL</b>	<b>\$145,000.</b>

#### Schedule:                      Months

Design	4
Agreements	2
Material	2
Construction	3
<b>TOTAL</b>	<b>11</b>

### Enterprise Road Quiet Zone with Reflective Paddles (Exhibit QZ-3)

#### Cost (Staff, Agreement and Maintenance Costs not included):

Reflective paddle:	70,000
Sidewalk Treatment:	40,000
Misc. signage/striping	5,000
<b>TOTAL</b>	<b>\$115,000.</b>

#### Schedule:                      Months

Design	4
Agreements	2
Material	2
Construction	3
<b>TOTAL</b>	<b>11</b>

## STEVES BLVD.

<b>Steves Blvd. Wayside Horns (Exhibit W-4)</b>	
<b>Cost (Staff, Agreement and Maintenance Costs not included):</b>	
Horns (2 poles, 2 horns):	65,000
BNSF Connection:	5,000
Sidewalk Treatment:	40,000
Misc. signage/striping	5,000
<b>TOTAL</b>	<b>\$115,000.</b>

<b>Schedule:</b>	<b>Months</b>
Design	4
Agreements	2
Material	2
Construction	3
<b>TOTAL</b>	<b>11</b>

<b>Steves Blvd. Quiet Zone with 4-Quad Gates (Exhibit QZ-4)</b>	
<b>Cost: (Staff, Agreement and Maintenance Costs not included):</b>	
Gates (upgrade to 4-quad)	382,500
Loops	200,000
Driveway closures	50,000
Sidewalk Treatment	40,000
Misc. signage/striping	5,000
<b>TOTAL</b>	<b>\$677,500.</b>

<b>Schedule:</b>	<b>Months</b>
Design	6
FRA Agreement	2
BNSF Agreement	6
Material	9
Construction	6
<b>TOTAL</b>	<b>29</b>

## FANNING DRIVE

Scenarios cost and schedule same as Steves Blvd.

<b>Fanning Drive Wayside Horns (Exhibit W-5)</b>	
<b><u>Cost (Staff, Agreement and Maintenance Costs not included):</u></b>	
Horns (2 poles, 2 horns):	65,000
BNSF Connection:	5,000
Sidewalk Treatment:	40,000
Misc. signage/striping	5,000
<b>TOTAL</b>	<b>\$115,000.</b>
<b><u>Schedule:</u></b>	
	<b><u>Months</u></b>
Design	4
Agreements	2
Material	2
Construction	3
<b>TOTAL</b>	<b>11</b>

<b>Fanning Drive Quiet Zone with 4-Quad Gates (Exhibit QZ-5)</b>	
<b><u>Cost: (Staff, Agreement and Maintenance Costs not included):</u></b>	
Gates (upgrade to 4-quad)	382,500
Remote Crossing signal	175,000
Loops	200,000
Driveway closures	50,000
Sidewalk Treatment	40,000
Misc. signage/striping	5,000
<b>TOTAL</b>	<b>\$852,500.</b>
<b><u>Schedule:</u></b>	
	<b><u>Months</u></b>
Design	6
FRA Agreement	2
BNSF Agreement	6
Material	9
Construction	6
<b>TOTAL</b>	<b>29</b>