TR-120841

City of Vancouver • P.O. Box 1995 • Vancouver, WA 98668-1995
www.cityofvancouver.us

June 1, 2012

Associate Administrator for Safety
Federal Railroad Administration
Office of Safety, RRS-23
1200 New Jersey Ave, MS 25
Washington, DC 20590

Subject: **Proposed Quiet Zone: East Vancouver Quiet Zone**
A) Notice of Intent to Establish a Railroad Quiet Zone Under 49 CFR 222.43
B) Public Authority Application to the FRA Under 49 CFR 222.39 (b)

A) Notice of Intent to Establish a Railroad Quiet Zone Under 49 CFR 222.43

This letter and the attachments are a Notice of Intent for the creation of a quiet zone. As required under 49 CFR 222.43, the following information is provided to you and other parties.

All public highway-rail grade crossings to be included within the proposed quiet zone are:

Crossing ID	Street Name
090093S	SE 164th Ave
090092K	SE 147th Ave
090090W	SE 139th Ave

A private highway-rail crossing to be included within the proposed quiet zone are:

090091D	Private crossing in the vicinity of SE 144th Ave/Evergreen Highway intersection.

The quiet zone is proposed to restrict the routine sounding of locomotive horns 24-hours a day.

The City of Vancouver's plan to implement a quiet zone at each crossing is as follows:

SE 164th Ave: Install 100 feet of non-traversable median curb 100 feet long on each side of the existing crossing gates. This will require minor widening of the roadway. The railroad crossing currently consists of automatic gates, flashing lights, power-out-indicator and constant warning time circuitry. See Attachment 1, Figure 1.

SE 147th Ave: Install a mountable median with channelization devices on each side of the existing crossing gates. The median length is measured from the gate arm to the nose of the median. The south side median is 41 feet in length. The north side is 16 feet in length. The railroad crossing currently consists of automatic gates, flashing lights, power-out-indicator and constant warning time circuitry. See Attachment 1, Figure 2.

SE 139th Ave: Install a mountable median with channelization devices on each side of the existing crossing gates. The median length is measured from the gate arm to the nose of the median. The south side median is 56 feet in length. The north side is 16 feet in length. The railroad crossing currently consists of automatic gates, flashing lights, power-out-indicator and constant warning time circuitry. See Attachment 1, Figure 3.

Private crossing in the vicinity of SE 144th Ave intersection with Evergreen Highway: Install enhanced STOP sign with LED lights. Remove sight obstructions on the south side of the tracks. See Attachment 1, Figure 4

Name and title of person who will act as point of contact during the quiet zone development process:

City of Vancouver, WA - Point of Contact:
Brian Carlson, PE
Director of Public Works
PO Box 1995
Vancouver WA 98668-1995
360-487-7131
brian.carlson@cityofvancouver.us

See Attachment 2 for the list of each party receiving this notification.

ACTION REQUIRED
Please consider this notice as the beginning date of the required 60-day comment period in the Quiet Zone process. The 60-day comment period for this Quiet Zone will end on July 31, 2012, or when written comments or a "no comment" statement is received from each recipient of this notice.

B) Public Authority Application to the FRA Under CFR 222.39 (b)

The City of Vancouver requests the Associate Administrator of the FRA to approve this quiet zone with the use of an Alternative Safety Measure. The City of Vancouver provides the following required information in compliance with Section 222.39 (b) (1):

I. Accurate, complete and current Grade Crossing Inventory Forms (Attachment 3). This form reflects the crossings as of March 1, 2012.

II. The present safety measures at the grade crossing:
The public railroad crossing at SE 164th Ave (DOT # 090093S) currently consists of automatic gates, flashing lights, and constant warning time circuitry.
The public railroad crossing at SE 147th Ave (DOT # 090092K) currently consists of automatic gates, flashing lights, and constant warning time circuitry.
The public railroad crossing at SE 139th Ave (DOT # 090090W) currently consists of automatic gates, flashing lights, and constant warning time circuitry.
The railroad crossing at the private crossing near the intersection of Evergreen Highway and SE 144th Ave intersection (DOT # 090091D) has STOP sign controls on each side of the crossing and the crossbuck signs.

III. Diagnostic Team Review. A Diagnostic Team Review was convened on several dates, including March 5, 2007 and most recently on January 25, 2010. A synopsis of the Diagnostic Team Review is included in the memo dated March 14, 2012 in Attachment 4.

IV. Detailed information on safety improvements implemented at the crossings.
The City of Vancouver proposes to install the following SSM and engineering ASM improvements at the following crossings:

At the railroad crossing at SE 164th Ave (DOT # 090093S), install 100 feet long barrier median on each side of the crossing to qualify as a SSM.

At the railroad crossing at SE 147th Ave (DOT # 090092K), install 16 feet long mountable median with traffic channelization devices on the north side of the crossing and 41 feet of mountable median with traffic channelization devices on the south side of the crossing to qualify as an engineering SSM.

At the railroad crossing at SE 139th Ave (DOT # 090090W), install 16 feet of mountable median with traffic channelization devices on the north side of the crossing and 47 feet of mountable median with traffic channelization devices on the south side of the crossing to qualify as an engineering SSM.

At the railroad crossing at the private crossing near the intersection of Evergreen Highway and SE 144th Ave intersection (DOT # 090091D), install enhanced stop signs with flashing red LED lights along the edge of the sign. Remove sight obstructions on the south side of the track.

The improvements at this crossing are a condition of a Waiver granted by FRA on April 12, 2011 (Docket: FRA-2010-0170).

Other auto traffic safety improvements are also proposed to be installed as part of the implementation of the quiet zone and are outlined in the memo in Attachment 4.

V. Commitment to implement. The City of Vancouver is committed to implement all proposed SSM, ASM (Engineering SSM) and traffic safety improvements as described above and in memo in Attachment 4.

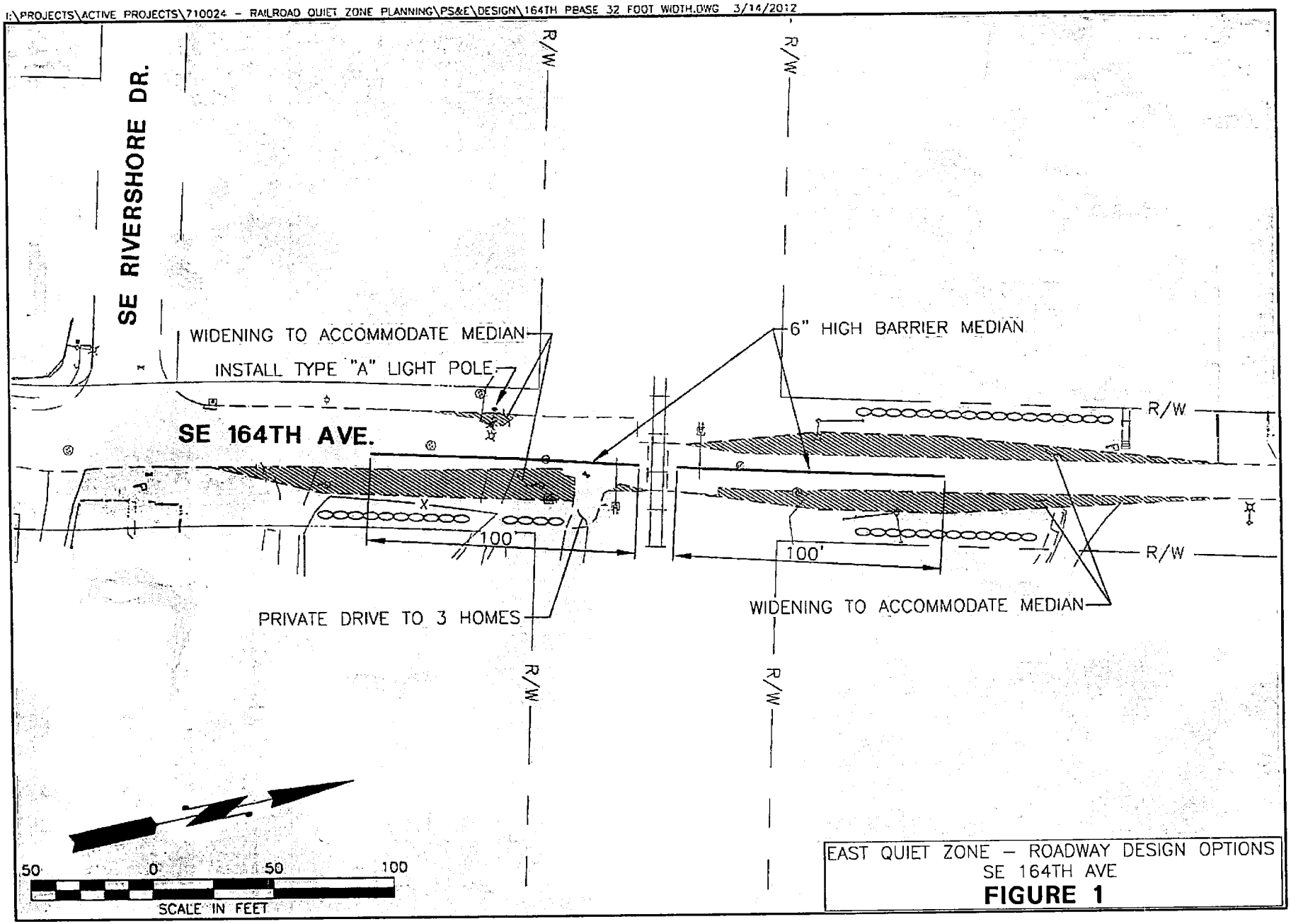
VI. Demonstrate with data the proposed measure will be below RIWH.
The proposed ASM median at SE 147th Ave and SE 139th Ave are less than 60 feet on each side of the crossings. The Quiet Zone Calculator shown in Attachment 5 indicates the Risk Index with Horns (RIWH) is **27,695.67** and Attachment 6 indicates that the Quiet Zone Risk Index (QZRI) is **25,175.56**. Therefore the QZRI is less than the RIWH, and this corridor qualifies as a quiet zone.

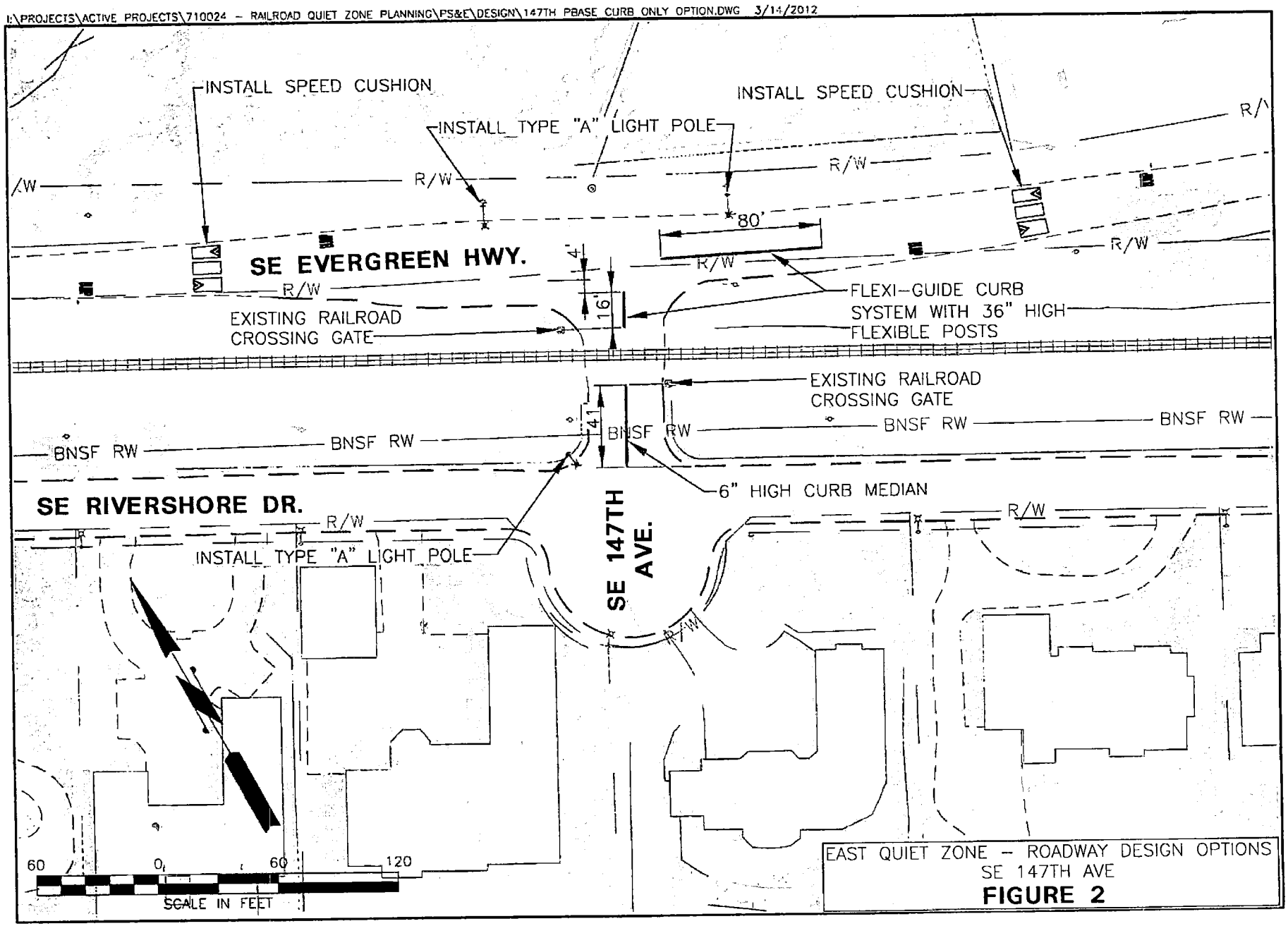
See Attachment 5 for the RIWH calculation.
See Attachment 6 for the ASM Spreadsheet Output and QZRI calculation.

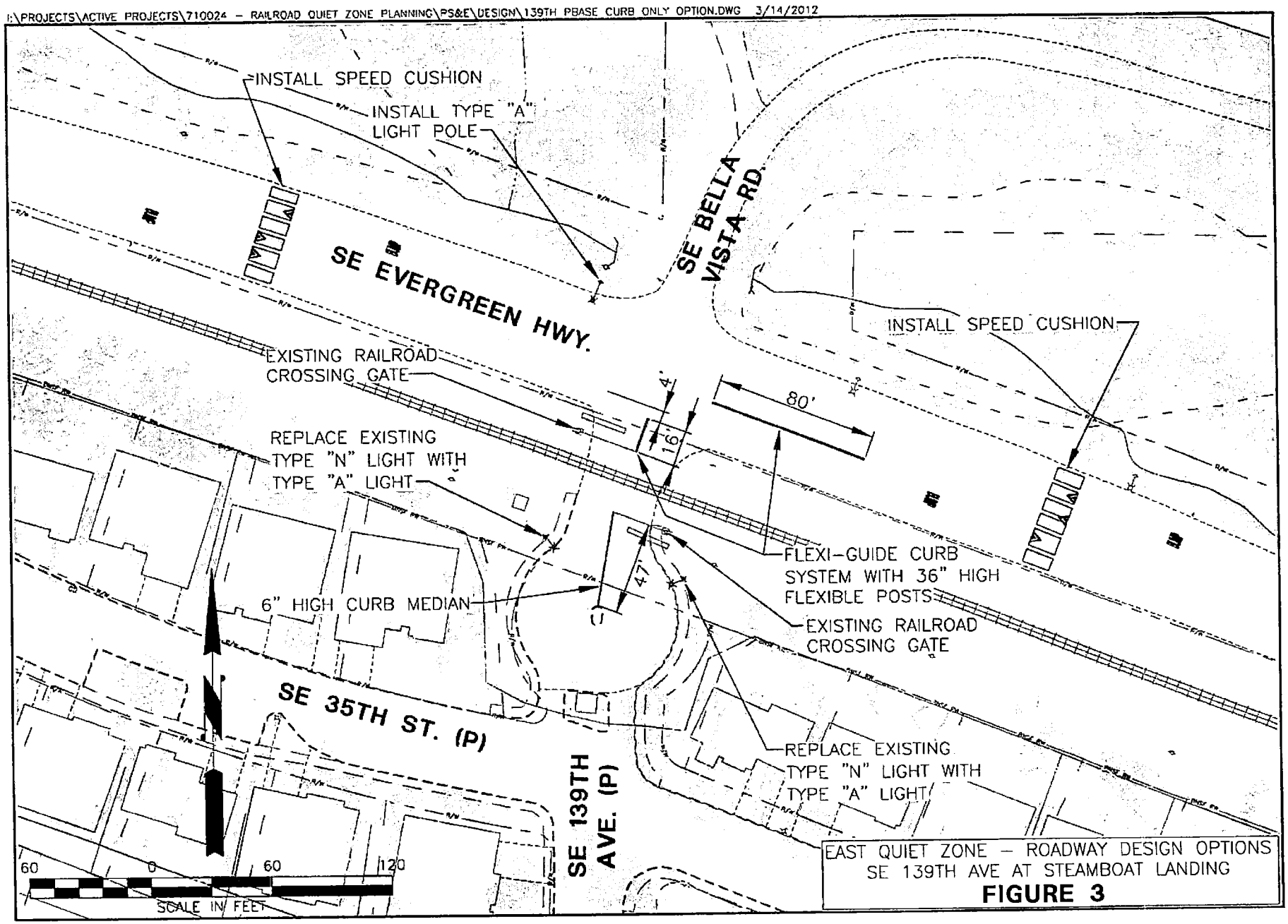
Respectfully submitted,

Brain Carlson, PE
Director of Public Works
City of Vancouver, WA

Attachment 1
Figure 1 – SE 164th Ave Crossing
Figure 2 – SE 147th Ave Crossing
Figure 3 – SE 139th Ave Crossing
Figure 4 – Private Crossing near SE 144th Ave/Evergreen Highway intersection

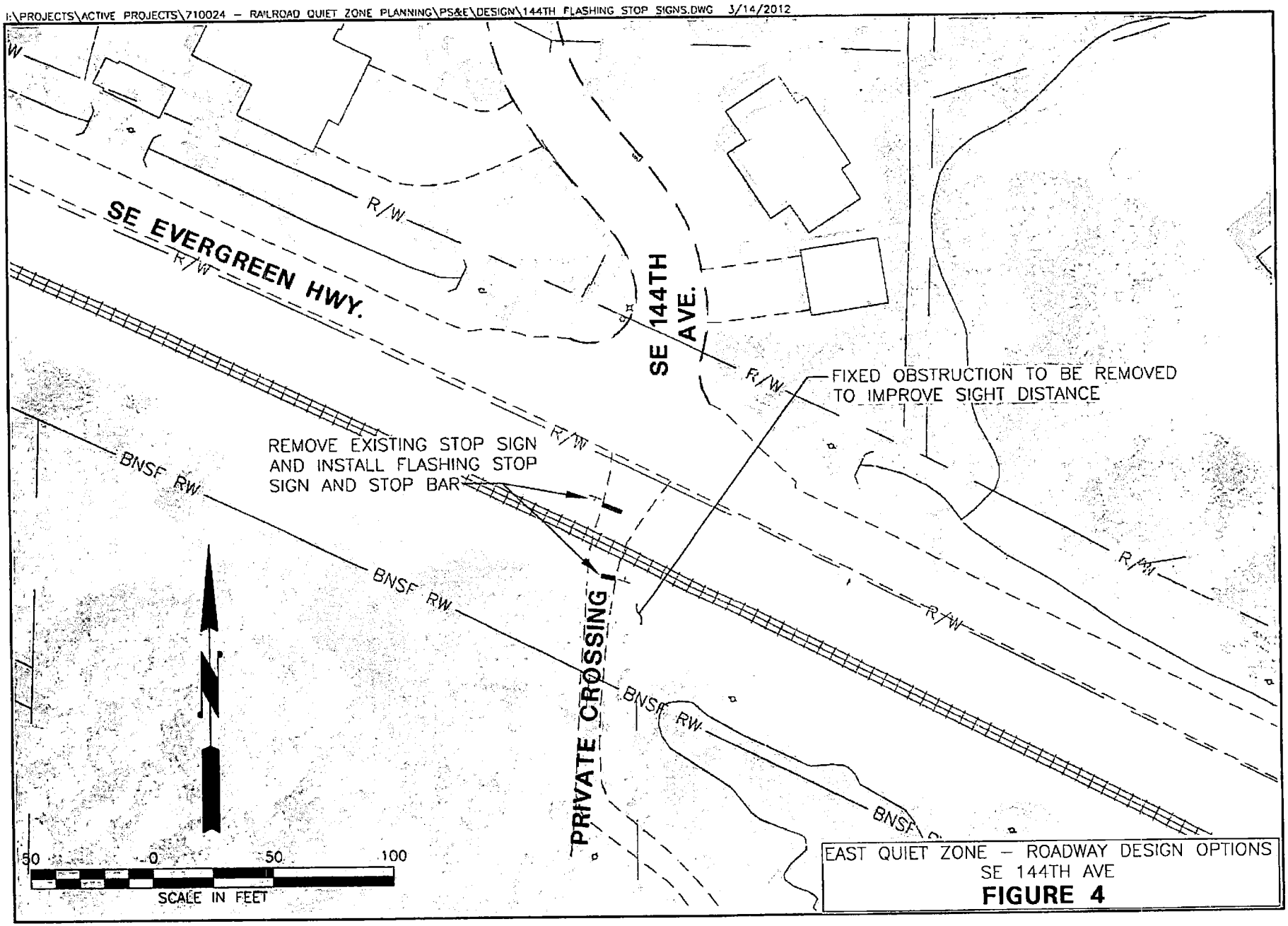

I:\PROJECTS\ACTIVE PROJECTS\710024 - RAILROAD QUIET ZONE PLANNING\PS&E\DESIGN\164TH PHASE 32 FOOT WIDTH.DWG 3/14/2012
SE RIVERSHORE DR.
SE 164TH AVE.
R/W
R/W
WIDENING TO ACCOMMODATE MEDIAN
INSTALL TYPE "A" LIGHT POLE
6" HIGH BARRIER MEDIAN
R/W
100'
100'
R/W
PRIVATE DRIVE TO 3 HOMES
WIDENING TO ACCOMMODATE MEDIAN
R/W
R/W
50 0 50 100
SCALE IN FEET
EAST QUIET ZONE – ROADWAY DESIGN OPTIONS
SE 164TH AVE
FIGURE 1


I:\PROJECTS\ACTIVE PROJECTS\710024 - RAILROAD QUIET ZONE PLANNING\PS&E\DESIGN\147TH PBASE CURB ONLY OPTION.DWG 3/14/2012
INSTALL SPEED CUSHION
INSTALL TYPE "A" LIGHT POLE
INSTALL SPEED CUSHION
R/W
80'
SE EVERGREEN HWY.
4'
16'
FLEXI-GUIDE CURB SYSTEM WITH 36" HIGH FLEXIBLE POSTS
EXISTING RAILROAD CROSSING GATE
EXISTING RAILROAD CROSSING GATE
41'
BNSF RW
6" HIGH CURB MEDIAN
SE RIVERSHORE DR.
SE 147TH AVE.
INSTALL TYPE "A" LIGHT POLE
60
0
60
120
SCALE IN FEET
EAST QUIET ZONE - ROADWAY DESIGN OPTIONS
SE 147TH AVE
FIGURE 2



EAST QUIET ZONE – ROADWAY DESIGN OPTIONS
SE 139TH AVE AT STEAMBOAT LANDING

FIGURE 3


I:\PROJECTS\ACTIVE PROJECTS\710024 - RAILROAD QUIET ZONE PLANNING\PS&E\DESIGN\144TH FLASHING STOP SIGNS.DWG 3/14/2012
SE EVERGREEN HWY.
R/W
SE 144TH AVE.
FIXED OBSTRUCTION TO BE REMOVED TO IMPROVE SIGHT DISTANCE
REMOVE EXISTING STOP SIGN AND INSTALL FLASHING STOP SIGN AND STOP BAR
BNSF RW
PRIVATE CROSSING
50 0 50 100
SCALE IN FEET
EAST QUIET ZONE – ROADWAY DESIGN OPTIONS
SE 144TH AVE
FIGURE 4

Attachment 2
Notice for Intent to Establish a Railroad Quiet Zone Written Notice Recipients

1. Railroads operating over the grade crossings:

John Shurson
Assistant Director of Public Projects
BNSF Railway
740 E. Carnegie Dr
San Bernardino, CA 92408

Richard Wagner
Manager of Public Projects
BNSF Railway
2454 Occidental Ave South, Suite 1A
Seattle, WA 98134-1451

Kurt Laird
Amtrak Senior Safety Coordinator
1875 South Holgate St
Seattle, WA 98134

2. State agency responsible for highway and road safety, and State agency responsible for grade crossing safety:

Ahmer Nizam
Railroad Specialist
Washington DOT
PO Box 47329
Olympia, WA 98504-7329

Katherine Hunter
Transportation Compliance Manager
Washington Utilities and Transportation Commission
1300 S. Evergreen Park Dr. SW
PO Box 47250
Olympia, WA 98504-7250

3. Federal Railroad Administration

Associate Administrator for Safety
Federal Railroad Administration
Office of Safety, RRS-23
1200 New Jersey Ave, MS 25
Washington, DC 20590

Christine Adams
Regional Manager for Grade Crossing Safety
Federal Railroad Administration
PO Box 2744
Vancouver, WA 98668

4. Property owners of Private crossing (DOT #090091D) near the intersection of SE 144th Ave/Evergreen Hwy

Joseph Leas and Juianne Ament-Leas
14209 SE Evergreen Highway
Vancouver, WA 98683

Mary A Kellogg, Trustee
14301 SE Evergreen Highway
Vancouver, WA 98683

Ralph and Mary Jacob
14317 SE Evergreen Highway
Vancouver, WA, 98683

Kathy Marshack
PO Box 873429
Vancouver, WA 98687

David and Martha Lindsay
14411 SE Rivershore Dr
Vancouver, WA 98683

Attachment 3
Current Grade Crossing Inventory Forms

U.S. DOT - CROSSING INVENTORY INFORMATION
AS OF 3/19/2012

Crossing No.: *090093S* Update Reason: ~~*Changed Crossing*~~ Effective Begin-Date of Record: ~~*07/29/11*~~ 03/1/12
Railroad: *BNSF BNSF Rwy Co. [BNSF]* CHANGE IN EXISTING DATA End-Date of Record:
Initiating Agency *Railroad* Type and Position: *Public At Grade*

Part I Location and Classification of Crossing

Division:	*NORTHWEST*	State:	*WA*
Subdivision:	*FALLBRIDGE*	County:	*CLARK*
Branch or Line Name:	*PORTLND-WISHRAM*	City:	*In VANCOUVER*
Railroad Milepost:	*0019.38*	Street or Road Name:	*SE 164TH AVE*
RailRoad I.D. No.:	*0047*	Highway Type & No.:	*CO30030*
Nearest RR Timetable Stn:	*FISHER*	HSR Corridor ID:	
Parent Railroad:		County Map Ref. No.:	*6-1B*
Crossing Owner:		Latitude:	*45.5886733*
ENS Sign Installed:		Longitude:	*-122.5042501*
Passenger Service:	*AMTRAK*	Lat/Long Source:	*Actual*
Avg Passenger Train Count:	*2*	Quiet Zone:	*No*
Adjacent Crossing with Separate Number:			

Private Crossing Information:

Category: Public Access: *Unknown*

Specify Signs: Specify Signals:

ST/RR A ST/RR B ST/RR C ST/RR D

Railroad Use:

State Use:

Narrative:

Emergency Contact: *(800)832-5452* Railroad Contact: *(913)551-4540* State Contact: *(360)664-1262*

Part II Railroad Information

Number of Daily Train Movements:

Total Trains: ~~*34*~~ 64 Total Switching: *0* Less Than One Movement Per Day: *No*

Day Thru: ~~*17*~~ 32

Typical Speed Range Over Crossing: From *1* to *70* mph Maximum Time Table Speed: *70*

Type and Number of Tracks: Main: *1* Other *0* Specify:

Does Another RR Operate a Separate Track at Crossing? *No*

Does Another RR Operate Over Your Track at Crossing? *Yes: ATK*

U.S. DOT - CROSSING INVENTORY INFORMATION
Continued

Crossing *090093S*

Effective Begin-Date of Record: *07/29/11*
End-Date of Record:

Part III: Traffic Control Device Information

Signs:

Crossbucks:	*2*	Highway Stop Signs:	*0*
Advanced Warning:	*Yes*	Hump Crossing Sign:	
Pavement Markings:	*No Markings*	Other Signs: *0* *0*	Specify:

Train Activated Devices:

Gates:	*2*	4 Quad or Full Barrier:	
Mast Mounted FL:	*2*	Total Number FL Pairs:	*0*
Cantilevered FL (Over):	*0*	Cantilevered FL (Not over):	*0*
Other Flashing Lights:	*0*	Specify Other Flashing Lights:	
Highway Traffic Signals:	*0*	Wigwags: *0*	Bells: *1*
Other Train Activated Warning Devices:		Special Warning Devices Not Train Activated:	
Channelization:		Type of Train Detection:	*Constant Warning Time*
Track Equipped with Train Signals?	*Yes*	Traffic Light Interconnection/Preemption:	

Part IV: Physical Characteristics

Type of Development:	~~*Open Space*~~ RESIDENTIAL	Smallest Crossing Angle:	*60 to 90 Degrees*
Number of Traffic Lanes Crossing Railroad:	*2*	Are Truck Pullout Lanes Present?	*No*
Is Highway Paved?	*Yes*		
Crossing Surface:	*Concrete*	If Other:	
Nearby Intersecting Highway?	*201 to 500 feet*	Is it Signalized?	
Does Track Run Down a Street?	*No*	Is Crossing Illuminated?	
Is Commercial Power Available?	*Yes*		

Part V: Highway Information

Highway System:	*Non-Federal-aid*	Functional Classification of Road at Crossing:	URBAN ~~*Rural*~~ *Local*
Is Crossing on State Highway System:	*No*		
Annual Average Daily Traffic (AADT):	~~*000500*~~ 300	AADT Year:	~~*2011*~~ 2012
Estimated Percent Trucks:	*1*	Avg. No of School Buses per Day:	*0*
Posted Highway Speed:	*25*		

U.S. DOT - CROSSING INVENTORY INFORMATION
AS OF 3/19/2012

Crossing No.: *090092K* Update Reason: *Changed Crossing* Effective Begin-Date of Record: *07/29/11*

Railroad: *BNSF BNSF Rwy Co. [BNSF]* End-Date of Record:

Initiating Agency *State* Type and Positiion: *Public At Grade*

Part I Location and Classification of Crossing

Division:	*NORTHWEST*	State:	*WA*
Subdivision:	*FALLBRIDGE*	County:	*CLARK*
Branch or Line Name:	*PORTLND-WISHRAM*	City:	*In VANCOUVER*
Railroad Milepost:	*0018.52*	Street or Road Name:	*SE 147TH AVENUE*
RailRoad I.D. No.:	*0047*	Highway Type & No.:	
Nearest RR Timetable Stn:	*FISHER*	HSR Corridor ID:	
Parent Railroad:		County Map Ref. No.:	*6-1B*
Crossing Owner:		Latitude:	*45.5930120*
ENS Sign Installed:		Longitude:	*-122.5207657*
Passenger Service:	*AMTRAK*	Lat/Long Source:	*Actual*
Avg Passenger Train Count:	*2*	Quiet Zone:	*No*
Adjacent Crossing with Separate Number:			

Private Crossing Information:

Category: Public Access: *Unknown*

Specify Signs: Specify Signals:

ST/RR A ST/RR B ST/RR C ST/RR D

Railroad Use:

State Use:

Narrative:

Emergency Contact: *(800)832-5452* Railroad Contact: *(913)551-4540* State Contact: *(360)664-1262*

Part II Railroad Information

Number of Daily Train Movements:

Total Trains: ~~34~~ 4 Total Switching: *0* Less Than One Movement Per Day: *No*

Day Thru: ~~17~~ 3 2

Typical Speed Range Over Crossing: From *1* to *70* mph Maximum Time Table Speed: *70*

Type and Number of Tracks: Main: *1* Other *0* Specify:

Does Another RR Operate a Separate Track at Crossing? *No*

Does Another RR Operate Over Your Track at Crossing? *Yes: ATK*

U.S. DOT - CROSSING INVENTORY INFORMATION
Continued

Crossing ***090092K***

Effective Begin-Date of Record: ***07/29/11***
End-Date of Record:

Part III: Traffic Control Device Information

Signs:

Crossbucks:	***2***	Highway Stop Signs:	***0***
Advanced Warning:	***Yes***	Hump Crossing Sign:	
Pavement Markings:	***No Markings***	Other Signs: ***0*** Specify:	
		0	

Train Activated Devices:

Gates:	***2***	4 Quad or Full Barrier:	
Mast Mounted FL:	***2***	Total Number FL Pairs:	***0***
Cantilevered FL (Over):	***0***	Cantilevered FL (Not over):	***0***
Other Flashing Lights:	***0***	Specify Other Flashing Lights:	
Highway Traffic Signals:	***0***	Wigwags: ***0*** Bells:	***1***
Other Train Activated Warning Devices:		Special Warning Devices Not Train Activated:	
Channelization:	***None***	Type of Train Detection:	***Constant Warning Time***
Track Equipped with Train Signals?	***Yes***	Traffic Light Interconnection/Preemption:	

Part IV: Physical Characteristics

Type of Development:	~~***Commercial***~~ RESIDENTIAL	Smallest Crossing Angle:	***60 to 90 Degrees***
Number of Traffic Lanes Crossing Railroad:	***2***	Are Truck Pullout Lanes Present?	***No***
Is Highway Paved?	***Yes***		
Crossing Surface:	***Concrete***	If Other:	
Nearby Intersecting Highway?	***Less than 75 feet***	Is it Signalized?	
Does Track Run Down a Street?	***No***	Is Crossing Illuminated?	
Is Commercial Power Available?	***Yes***		

Part V: Highway Information

Highway System:	***Non-Federal-aid***	Functional Classification of Road at Crossing:	***Urban Local***
Is Crossing on State Highway System:	***No***		
Annual Average Daily Traffic (AADT):	~~***000600***~~ 300	AADT Year:	~~***2011***~~ 2012
Estimated Percent Trucks:	***01***	Avg. No of School Buses per Day:	***0***
Posted Highway Speed:	***25***		

U.S. DOT - CROSSING INVENTORY INFORMATION
AS OF 3/19/2012

Crossing No.: ***090091D*** Update Reason: ***Changed Crossing*** Effective Begin-Date of Record: ~~***08/17/06***~~ 3/1/12

Railroad: ***BNSF BNSF Rwy Co. [BNSF]*** CHANGE END-DATE End-Date of Record:

Initiating Agency ***Railroad*** Type and Position: ***Private At Grade***

Part I Location and Classification of Crossing

Division:	*NORTHWEST*	State:	*WA*
Subdivision:	*FALLBRIDGE*	County:	*CLARK*
Branch or Line Name:	*PORTLND-WISHRAM*	City:	~~*Near CAMAS*~~ IN VANCOUVER
Railroad Milepost:	*0018.32*	Street or Road Name:	*FARM RD.XING*
RailRoad I.D. No.:	*0047*	Highway Type & No.:	
Nearest RR Timetable Stn:	*FISHER*	HSR Corridor ID:	
Parent Railroad:		County Map Ref. No.:	*6-1B*
Crossing Owner:		Latitude:	*45.5942475*
ENS Sign Installed:		Longitude:	*-122.5242520*
Passenger Service:	*AMTRAK*	Lat/Long Source:	*Actual*
Avg Passenger Train Count:	*0*	Quiet Zone:	*No*
Adjacent Crossing with Separate Number:			

Private Crossing Information:

Category: ~~*Farm*~~ RESIDENTIAL Public Access: NO

~~*No signs or signals*~~ Specify Signs: CROSSBUCKS Specify Signals:

	ST/RR A	ST/RR B	ST/RR C	ST/RR D
Railroad Use:				
State Use:				

Narrative:

Emergency Contact: ***(800)832-5452*** Railroad Contact: ***(913)551-4540*** State Contact: ***(360)664-1262***

Part II Railroad Information

Number of Daily Train Movements: Less Than One Movement Per Day: ***No***

Total Trains: ~~*41*~~ 64 Total Switching: *0* Day Thru: ~~*21*~~ 32

Typical Speed Range Over Crossing: From *0* to *70* mph Maximum Time Table Speed: *70*

Type and Number of Tracks: Main: *1* Other *0* Specify:

Does Another RR Operate a Separate Track at Crossing? ***No***

Does Another RR Operate Over Your Track at Crossing? ***Yes: ATK***

U.S. DOT - CROSSING INVENTORY INFORMATION
Continued

Crossing *090091D*

Effective Begin-Date of Record: *08/17/06*
End-Date of Record:

Part III: Traffic Control Device Information

Signs:

Crossbucks: 0
Advanced Warning: 0
Pavement Markings: NONE

Highway Stop Signs: 0
Hump Crossing Sign: NONE
Other Signs: 0 Specify:
0

Train Activated Devices:

Gates: 0
Mast Mounted FL: 0
Cantilevered FL (Over): 0
Other Flashing Lights: 0
Highway Traffic Signals: 0
Other Train Activated Warning Devices:
Channelization:
Track Equipped with Train Signals?

4 Quad or Full Barrier:
Total Number FL Pairs: 0
Cantilevered FL (Not over): 0
Specify Other Flashing Lights:
Wigwags: 0 Bells: 0
Special Warning Devices Not Train Activated:
Type of Train Detection: None
Traffic Light Interconnection/Preemption:

Part IV: Physical Characteristics

Type of Development: RESIDENTIAL
Number of Traffic Lanes Crossing Railroad:
Is Highway Paved? YES
Crossing Surface: Concrete
Nearby Intersecting Highway? LESS THAN 25'
Does Track Run Down a Street? NO
Is Commercial Power Available? YES

Smallest Crossing Angle: 60-90 DEGREES
Are Truck Pullout Lanes Present? NO
If Other:
Is it Signalized? NO
Is Crossing Illuminated? NO

Part V: Highway Information

Highway System:
Is Crossing on State Highway System:
Annual Average Daily Traffic (AADT): 33
Estimated Percent Trucks:
Posted Highway Speed: 0

Functional Classification of Road at Crossing: RURAL
AADT Year: 1988 2012
Avg. No of School Buses per Day: 0

U.S. DOT - CROSSING INVENTORY INFORMATION
AS OF 3/19/2012

Crossing No.: *090090W* Update Reason: ***Changed Crossing*** Effective Begin-Date of Record: ~~*07/29/11*~~ 3/19/12
Railroad: ***BNSF BNSF Rwy Co. [BNSF]*** End-Date of Record:
Initiating Agency ***Railroad*** Type and Positiion: ***Public At Grade***

Part I Location and Classification of Crossing

Division:	***NORTHWEST***	State:	***WA***
Subdivision:	***FALLBRIDGE***	County:	***CLARK***
Branch or Line Name:	***PORTLND-WISHRAM***	City:	***In VANCOUVER***
Railroad Milepost:	***0018.07***	Street or Road Name:	***SE 139TH STREET***
RailRoad I.D. No.:	***0047***	Highway Type & No.:	
Nearest RR Timetable Stn:	***FISHER***	HSR Corridor ID:	
Parent Railroad:		County Map Ref. No.:	***6-1B***
Crossing Owner:		Latitude:	***45.5956683***
ENS Sign Installed:		Longitude:	***-122.5292611***
Passenger Service:	***AMTRAK***	Lat/Long Source:	***Actual***
Avg Passenger Train Count:	***2***	Quiet Zone:	***No***
Adjacent Crossing with Separate Number:			

Private Crossing Information:

Category: Public Access: ***Unknown***

Specify Signs: Specify Signals:

ST/RR A ST/RR B ST/RR C ST/RR D

Railroad Use:

State Use:

Narrative:

Emergency Contact: ***(800)832-5452*** Railroad Contact: ***(913)551-4540*** State Contact: ***(360)664-1262***

Part II Railroad Information

Number of Daily Train Movements:

Total Trains: ~~*34*~~ 32 Total Switching: ***0*** Less Than One Movement Per Day: ***No***

Day Thru: ~~*17*~~ 32

Typical Speed Range Over Crossing: From ***1*** to ***70*** mph Maximum Time Table Speed: ***70***

Type and Number of Tracks: Main: ***1*** Other ***0*** Specify:

Does Another RR Operate a Separate Track at Crossing? ***No***

Does Another RR Operate Over Your Track at Crossing? ***Yes: ATK***

U.S. DOT - CROSSING INVENTORY INFORMATION
Continued

Crossing *090090W*

Effective Begin-Date of Record: *07/29/11*
End-Date of Record:

Part III: Traffic Control Device Information

Signs:

Crossbucks:	*2*	Highway Stop Signs:	*0*
Advanced Warning:	*No*	Hump Crossing Sign:	
Pavement Markings:	*No Markings*	Other Signs: *0* *0*	Specify:

Train Activated Devices:

Gates:	*2*	4 Quad or Full Barrier:	*No*
Mast Mounted FL:	*2*	Total Number FL Pairs:	*0*
Cantilevered FL (Over):	*2*	Cantilevered FL (Not over):	*0*
Other Flashing Lights:	*0*	Specify Other Flashing Lights:	
Highway Traffic Signals:	*0*	Wigwags: *0*	Bells: *1*
Other Train Activated Warning Devices:		Special Warning Devices Not Train Activated:	
Channelization:	*None*	Type of Train Detection:	*Constant Warning Time*
Track Equipped with Train Signals?	*No*	Traffic Light Interconnection/Preemption:	

Part IV: Physical Characteristics

Type of Development:	*Residential*	Smallest Crossing Angle:	*60 to 90 Degrees*
Number of Traffic Lanes Crossing Railroad:	*2*	Are Truck Pullout Lanes Present?	*No*
Is Highway Paved?	*Yes*		
Crossing Surface:	*Concrete*	If Other:	
Nearby Intersecting Highway?	*Less than 75 feet*	Is it Signalized?	*No*
Does Track Run Down a Street?	*No*	Is Crossing Illuminated?	
Is Commercial Power Available?	*No*		

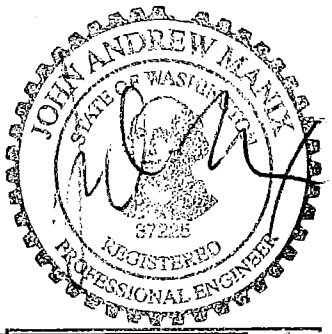
Part V: Highway Information

Highway System:	*Non-Federal-aid*	Functional Classification of Road at Crossing:	URBAN LOCAL *Rural Minor Arterial*
Is Crossing on State Highway System:	*No*		
Annual Average Daily Traffic (AADT):	*001200* 1250	AADT Year:	*2011* 2012
Estimated Percent Trucks:	*01*	Avg. No of School Buses per Day:	*0*
Posted Highway Speed:	*25*		

Attachment 4
ASM Recommendation Memo Date May 31, 2012

John Manix PE, PTOE – Safe, Livable and Sustainable Transportation

Memorandum



To: Matt Ransom, Brian Carlson, and Dan Swenson

From: John Manix PE, PTOE

Date: May 31, 2012

Re: East Vancouver Quiet Zone – Final Recommendation

EXP. 12/23/13

RECOMMENDATION:

Implement the East Vancouver Quiet Zone which includes the following crossing and quiet zone improvements:

- Public grade crossing at SE 164th Ave, DOT #090093S, with a Supplement Safety Measure per Figure 1.
- Public grade crossing at SE 147th Ave, DOT #090092K, with an Alternative Safety Measure per Figure 2.
- Public grade crossing at SE 139th Ave, DOT #090090W, with an Alternative Safety Measure per Figure 3.
- Private grade crossing near SE 144th Ave, DOT #090091D, with Federal Railroad Administration required upgrades as required by waiver approval per Figure 4.
- Include traffic calming, street lighting and other traffic safety improvements as shown in Figures 1 through 4.

Next steps to implement the proposed quiet zone include:

- Submit a Notice of Intent and related Quite Zone applications for Alternative Safety Measure improvements as required by Federal Railroad Regulations (FRA).
- Finalize engineering of SSM and ASM improvements

The purpose of this memo is to document traffic engineering and related safety improvements for the proposed Alternative Safety Measure (ASM) improvement recommendations.

PROJECT BACKGROUND:

The *Use of Locomotive Horns at Highway-Rail Grade Crossings; Final Rule (Train Horn Rule)* was adopted by the Federal Railroad Administration (FRA) in 2005. The City of Vancouver started to research the pending Train Horn Rule and began exploratory work on the proposed quiet zone in 2004. The initial research and subsequent 2005 city recommendations were based on, at the time, the city's understanding of how the Rule might be applied and in response to requests from the community to address train horn noise after the *Draft Train Horn Rule* was published.

Several Diagnostic Review team assessments were completed and the city hired a third party consultant to also review and make recommendations for each crossing. The recommendation of the Diagnostic Team originally proposed a 4-quad gate system as a Supplemental Safety Measure (SSM) to qualify for a quiet zone. This alternative was supported by the Diagnostic Team that included staff representing the Federal Railroad Administration (FRA), Burlington Northern Santa Fe Railroad (BNSF), Washington Utility and Transportation Commission and City of Vancouver. Installation of 4-quad gate system was the preferred alternative based on the following:

- The low cost SSM alternative (60-100' long medians) was not feasible due to roadway constraints. At the SE 139th Ave and SE 147th Ave crossings, roadways parallel to the tracks are very close whereby a median long enough to qualify as an SSM cannot be installed. At the SE 164th Ave crossing, the roadway is too narrow to install a median without roadway widening.
- The proposed 4-quad gates have a very high effectiveness rating as a safe alternative to train horns. Without prior experience with quiet zones, the consensus of the Diagnostic Team was to recommend the quad gate SSM alternative.
- The proposed 4-quad gates maintained full access to all abutting properties. During the diagnostic team discussions the city was told that roadway closure is always BNSF's preferred alternative because it is the safest. However it was determined that loss of access for the public was not acceptable in this case.
- A preliminary financing plan was developed utilizing the Local Improvement District model and it appeared that the cost of 4-quad gate systems could be spread over enough homes and the benefit would be so high that the community would find the project cost acceptable.

The formation of the proposed quiet zone and establishment of the LID assessment has strong public support in the community with over 400 homes within range of the horn noise. The negative impact of the noise was verified through a professionally prepared sound study. Public support was verified, in writing, by a majority of the residents willing to contribute financially to the quiet zone project.

As the City gained more experience with the Train Horn Rule it determined that exploration of Alternative Safety Measure (ASM) treatments at the public street crossings was a prudent and allowable alternative to the 4-quad gate (SSM) treatment.

The City contracted with Railroad Controls Limited to prepare an independent analysis which looked for lower cost alternatives to the 4-quad gate system. That report provided lower cost alternatives which included a combination of one-way circulation through two of the crossings and use of way-side horns associated with the third crossing. These alternatives were deemed not workable by both the citizen committee due to the significant out of direction travel for many residents associated with one-way streets that use the crossings, and the objection of noise associated with the way-side horns.

- Wayside Horns demonstrations:

Way-side horns were given thorough consideration. Two demonstrations of way-side horns were completed and attended by committee members representing affected neighborhoods. A sound

consultant also prepared exhibits that modeled the sound contours of the way-side horns vs. train horns. These diagrams showed a dramatic reduction in the area impacted by the train horn noise. This option was appealing because it works within the geometric constraints and existing BNSF crossing gate equipment, does not restrict access, is supported by BNSF and can be installed and maintained by the City. It does have one significant complication, the LID funding benefit zone would need to be modified. In addition, the homes in very close proximity to the grade crossing would not receive substantial noise reduction benefit from the way-side horns.

- Private Crossing:

During FRA's review of the city's initial submission of a Notice of Intent, the "status" of the private crossing at approximately SE 144th Avenue was raised. This very low volume private crossing, typically, would not need to be addressed based on the *Train Horn Rule.* However, due to a business providing counseling services out of one of the three homes using the crossing, it was deemed by the FRA as a 'private crossing with public access.' A Diagnostic Team Meeting was convened and there was no consensus as to the preferred course of action or improvement. Careful consideration was given to closing the private crossing, but after exhaustive research into right-of-way access rights across adjacent properties, none could be confirmed. The City submitted a waiver to FRA requesting that this private crossing not be treated as 'private crossing with public access.' The request was approved with conditions that required certain safety enhancements at the private crossing.

ENGINEERING ALTERNATIVE SAFETY MEASURES

City of Vancouver project staff now recommends the engineering study of Alternative Safety Measure (ASM) as an alternative to the 4-quad gate Supplemental Safety Measure (SSM) systems at SE 139th Avenue and SE 147th Avenue. An SSM improvement is planned for SE 164th Avenue. The remainder of this memorandum documents recommendations for ASM to form the quiet zone and safety enhancements that should be installed in conjunction with the proposed ASM improvements.

ASM- Background:

The *Train Horn Rule* documents several ASMs that can be classified under: non-engineering alternatives to the SSMs. Non-engineering ASMs are associated with enforcement and education/awareness and are seldom used. Engineering ASMs are typically modified SSMs. A popular Engineering ASM is the use of short medians with crossing gates. A quiet zone with a median that is 60 to 100 feet long qualifies as a SSM, assuming the gates are up to current standards and no significant driveways are within 60 feet of the crossing gates. If a median is proposed shorter than 60 feet on each side of the crossing gates, it would then be considered an Engineering ASM.

In the case of this quiet zone, medians cannot be constructed 60-100 feet long without conflicting Evergreen Highway on the north side and other roadways on the south side of the tracks at two of the three crossings. The primary design consideration with the ASM is to determine how long the medians must be to be as considered safe or safer than the current use of train horns. The question is answered by comparing the Risk Index with Horns (RIWH) and the Quiet Zone Risk Index (QZRI) for the proposed ASM. Under the current conditions, the number and speed of trains, the volume of traffic crossing the tracks, number of collisions in the past and a few other variables are used to calculate the risk at the crossing associated with train horns. Depending on the SSM or ASM, a QZRI must be calculated using the same variables to verify it will have a lower risk. The *Train Horn Rule* does not provide explicit calculations of QZRI for ASMs, only SSMs. Therefore the agency must propose a method to calculate the effectiveness of an ASM and submit an application requesting approval of the quiet zone. This is an additional step in the quiet zone approval process that is not required with quiet zones only using SSMs. The *Train Horn Rules* also recommends that the agency

request that FRA review the effectiveness calculation methodology prior to formal submittal of the quiet zone application.

ASM - Effectiveness

In order to enhance effectiveness, the City of Vancouver initially evaluated changing the horizontal alignment of Evergreen Highway to maximize the length of the median proposed for the ASM. The proposed re-alignment required additional right-of-way, wetland mitigation and would be very expensive to construct.

After several discussions and meetings with FRA staff, the City of Vancouver proposed an Engineering ASM to install short medians on both sides of two public street crossings. These Engineering ASMs would work in conjunction with the existing dual gate system at each location. The effectiveness rating of the proposed short median will be based on the percentage of the effectiveness rating of a full length median that qualifies as an SSM. For example, if a full length median has an SSM effectiveness rating of 0.75, then a median only half the full length would have an effectiveness rating of 50% of the SSM effectiveness or ½ X 0.75 = 0.375.

The effectiveness rating calculation was submitted to FRA for their input with supportive feedback received. A draft of the attached table was submitted for comments to FRA and the approach was approved in concept. See Table 2 for more details on the calculation of the effectiveness of the quiet zone using an ASM. Once the effectiveness of the ASM is approved through the formal application process with FRA, the QZRI can be calculated and compared to the RIWH. If the QZRI was less than the RIWH, it qualifies for a quiet zone.

The most important finding from the establishment of a method to calculate the effectiveness of the ASM median was that no changes to the horizontal alignment were required of Evergreen Highway. The QZRI calculations show that the current design with a 16 foot long median north of the tracks at SE 139th Ave and 148th Ave has a lower risk than the RIWH.

Having the QZRI less than the RIWH qualifies as a quiet zone, eliminates the requirement of annual review and eliminates the likelihood that the quiet zone could be terminated in the future.

SUPPLEMENTAL SAFETY MEASURES AT 164TH AVE

ASMs are proposed for the SE 139th Ave and SE 147th Ave crossing. and at SE 164th Ave, the roadway allows for the construction of a barrier median (median over 6" high) that qualifies as an SSM. The existing roadway is very narrow; less than 20 feet wide is some sections. After an engineering assessment, the existing recommendation is to install a vertical 6 inch high, non mountable median in the center of the roadway and widen the edges to allow a minimum auto, pedestrian and bicycle travel way. Sidewalks were considered as part of the project and the design will place the retaining walls with room for future installation.

There is one driveway close to the tracks on the south side of 164th Ave. This is a possible issue because driveways are not typically allowed due to concerns they will generate traffic that will drive around the medians. This driveway only serves three homes and the *Train Horn Rule* allows driveway that serve four homes or less. The adjacent property owners will need to be notified of proposed plans that will result in driveway access changes affecting them. Left hand turns in and out will be restricted. It is recommended that they be contacted as the preliminary engineering plans are being prepared.

SAFETY ENHANCEMENTS TO THE ASM

Based on further engineering review, several enhancements are recommended to improve the effectiveness and reduce risks related to traffic, pedestrians and bicyclists conflicts. The following safety enhancements are proposed at the crossings:

- Use mountable medians as apposed to a 6-inch curb median at the intersections with ASMs. Shorten the median between the tracks and Evergreen Highway to provide a 4 foot gap between the travel lanes on Evergreen and the end of the median.
- Install street lights within the vicinity of the crossings to meet minimum lighting standards.
- Install speed cushions on the Evergreen Highway approaches to reduce the entry speed of vehicles at each intersection.
- Install a mountable median on Evergreen Highway between the westbound left turn lane and the eastbound through lane to channelize the turning movement traffic.

The following details provide a summary of traffic safety review:

Median Type and Length

To accommodate pedestrians walking on the south side of Evergreen Highway, the City proposed a 4 foot gap in the proposed median north of the tracks. This would be in line with any future walking trails planned for Evergreen Highway and would meet the intent of the Americans with Disability Act (ADA) requirements. We learned from FRA staff that no breaks in the median would be allowed. The design was modified by shortening the median to allow room between the travel lanes on Evergreen Highway and the end of the median. This also allows room for pedestrian and bicyclists traveling along the south side of Evergreen Highway to maneuver around the proposed median outside the travel lanes.

Even with the end of the median a minimum of 4 feet from the perpendicular travel lane on Evergreen Highway, additional work was necessary to minimize risk to traffic that may hit the proposed perpendicular median segment at full speed. To address the risk of damage to motor vehicles, a mountable median is recommended as a substitute for the barrier median (6" high curb median). Figure 5 shows an example comparing of the two median types. The curbing with the tubular cones is a mountable median that is referred to by the *Train Horn Rule* as a 'traffic channelizing device.' It is only 4" high and has been approved for use with a quiet zone in Washougal, WA. The concrete curb in the picture is approximately 6" high and is a barrier because it is assumed will stop a vehicle from driving over it. Although the barrier medians have a slightly higher effectiveness rating as an SSM, they also pose a significant risk of causing injuries if they are hit. The proposed mountable medians shown in the Figure 5 have proven very effective in discouraging traffic from crossing over them and if hit it is much less likely to cause an injury or damage to a vehicle. The vertical wands also act as a delineator of the travel way and a visual alert to traffic which may be affected during low visibility or light conditions.

Street Lights and Low Light Visibility

With the implementation of the proposed quiet zone, staff has concluded that street lights should be brought up to current standards. It is important to provide roadway users a clear view of the medians, pedestrians and bicyclists. The lights may also provide train engineers with a better view of possible conflicts at the crossing.

A field assessment found that the current street light configuration does not meet current lighting standards and therefore additional lights should be installed in conjunction with the project. A photometric evaluation to verify the placement of the lights and light wattage should be completed with the project final engineering design. Additionally, the vertical mountable medians at the crossings adjacent to and along Evergreen Highway should include a vertical – flexible – wand with reflector materials to provide additional visual notification to motorists regarding median location.

pedestrians and bicyclists. The lights may also provide train engineers with a better view of possible conflicts at the crossing.

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Traffic Speeds and Turning Movements

Traffic counts and speed data was collected along Evergreen Highway and the side streets proposed for the ASM/SSM improvements. Review of the data finds that entry speeds into the location where the medians will be installed needs to be reduced in order to minimize risks associated with vehicle/pedestrian/bicycle conflicts vehicles striking the medians and to ensure turning movements speeds are managed to promote safe turning through the intersections.

Installing a mountable median on Evergreen Highway between the westbound left turn lane and the eastbound through lane will significantly improve the effectiveness of the median in preventing driving around the crossing gate. The use of medians as an ASM assumes that drivers will be trapped by the median from driving around the gates. Installing medians on Evergreen Highway will prevent westbound traffic from turning left early going southbound through the northbound lane to go around the gates. Turning right is not a problem because it requires a sharp right turn and is a difficult maneuver to make to go around both the median and the gate, especially at SE 147th Ave because of the right turn lane. This is not the case for westbound traffic without the center median. By starting the left turn 50 feet east of the intersection, the vehicle can easily maneuver around the median and the crossing gates as a high speed train approaches.

With the installation of the medians, the clearance between fixed objects, pedestrians, bicyclists and queued vehicles is very constrained. A single passenger vehicle queued at the crossing gate will have room to get out of the way but it's rear-end will be on the edge of the eastbound lanes. Currently, eastbound traffic can pass by a vehicle queued by crossing into the opposing traffic lane. This will not be feasible if the median is installed on Evergreen Highway. This is a serious safety concern at the current 85th percentile speed of traffic on Evergreen Highway at 49 MPH. See Table 1 for count and speed survey data collected February 12, 2012.

Table 1 – Traffic Count and Speed Survey Data

Location	Direction of Travel	Volume (Average Daily Traffic)*	Speed (85th percentile)**
Evergreen Hwy at SE 139th Ave	Eastbound	797 VPD	49 MPH
	Westbound	803 VPD	49 MPH
Evergreen Hwy at SE 147th Ave	Eastbound	810 VPD	49 MPH
	Westbound	808 VPD	51 MPH
SE 139th St just south of RXR tracks	Northbound	688 VPD	***
	Southbound	569 VPD	***
SE 147th Ave just south of RXR tracks	Northbound	161 VPD	***
	Southbound	140 VPD	***
SE 164th Ave north of RXR tracks	Northbound	151 VPD	27 MPH
	Southbound	156 VPD	26 MPH

*Average number of vehicle per day
**The speed that 85% of vehicle travel at or below.
*** No speed data collected at these locations due to confined geometry and lack of need for vehicle speeds.

Pedestrian and bicycle safety is also a concern that can be addressed with traffic calming. The current plan directs pedestrians and bikes closer to the travel lane than they would normally travel without the median. Again, if an eastbound vehicle was passing a pedestrian or bicyclist under current conditions, it can meander into the opposing lane to provide a buffer between the vehicle and the pedestrian or bicycle. But with a median installed in the center of Evergreen Highway, the eastbound traffic will be held in their lane and will pass very close to pedestrian or bicyclist. Slowing traffic to about 25-30 MPH will significantly reduce risk of collisions associated with the proposed medians.

Roadway improvements that are intended to slow down traffic are often referred to as "traffic calming" and they can take many forms. A few that were considered included:

- Center medians that force traffic to slow by deflecting the path of the vehicle. They are commonly used at modern roundabouts and are not controversial but very expensive due to roadway widening and material costs.
- Speed humps can take several forms including:
    - Modern speed humps that are not to be confused with the parking lot speed bumps that have not proven safe for public roadways. Speed humps are safe, effective, low cost but controversial due to ride discomfort and increase in emergency response time.

- Speed tables – a wider version of the modern speed hump that was originally intended for arterials and to have less impact on emergency vehicles and other large trucks. They are often used in conjunction with a crosswalk and referred to as "raised crosswalk". They are less controversial than the modern speed hump but they still have a significant impact on emergency vehicles.

- Speed cushions – a slotted speed hump that allows wide wheel based vehicles such as fire trucks and buses to traverse them with minor impact. The Fire Department considers speed cushions the preferred traffic calming alternative. They cost the same as speed humps and are a lot less controversial with the public. In 2005 staff prepared a post card survey of hundreds of residents living in the vicinity of traffic calming and received no significant negative comments regarding speed cushions.

Installing speed cushions are recommended to slow traffic and reduce the risk that the proposed quiet zone improvements will result in a serious collision.

PRIVATE CROSSING IMPROVEMENTS

The approval of the City's waiver to classify the private crossing as 'private without public crossing access' at the 144th Ave intersection with Evergreen Highway, DOT #090091D; FRA conditioned the City to include the following improvements:

- Remove or relocate the fixed object vertical monument which exists on the south side of the track. Removal or relocation is recommended to increase sight distances at the crossing.

- Installation of an enhanced stop sign at the approaches / stop bar at the crossing. A flashing LED enhanced stop sign was recommended as an option.

CONCLUSION

The current quiet zone proposal of using ASMs is estimated to be safer than the current use of train horns to protect the public. The method of estimating the ASM effectiveness was reviewed by FRA staff and endorsed. The QZRI is estimated to be lower than the RIWH using the methodology endorsed by FRA.

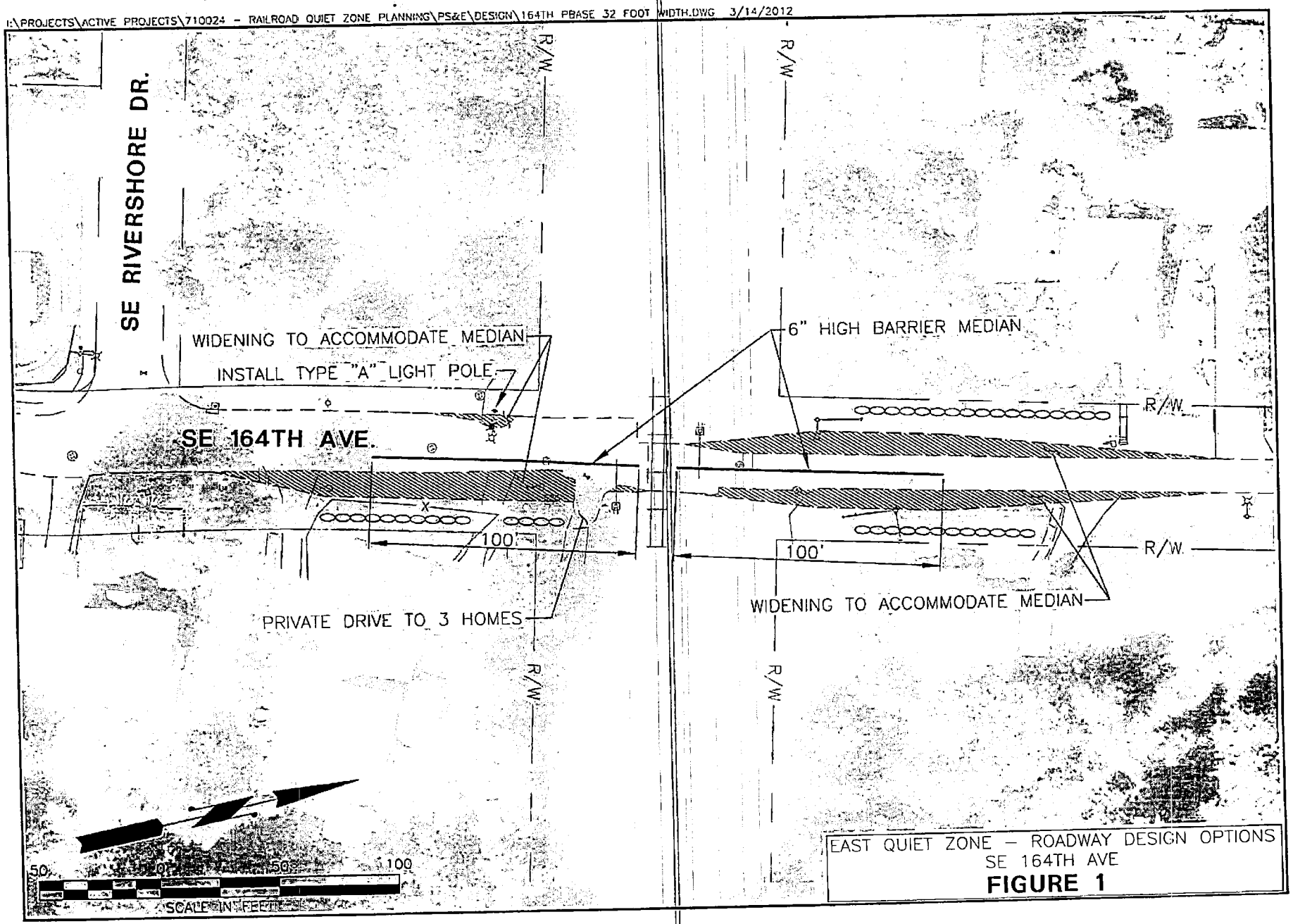
To ensure the proposed quiet zone does not compromise traffic safety in the vicinity of the intersection with ASMs installed to form a quiet zone, the findings of this engineering study recommends several traffic safety improvements that reduce risk to the travel way and serve to increase the likelihood of compliance with the design of the ASM. The proposed enhancements include:

- adding street lights to meet city minimum standards at the public street crossings,

- constructing speed cushions to reduce the entry speed of traffic approaching and turning through the intersections,

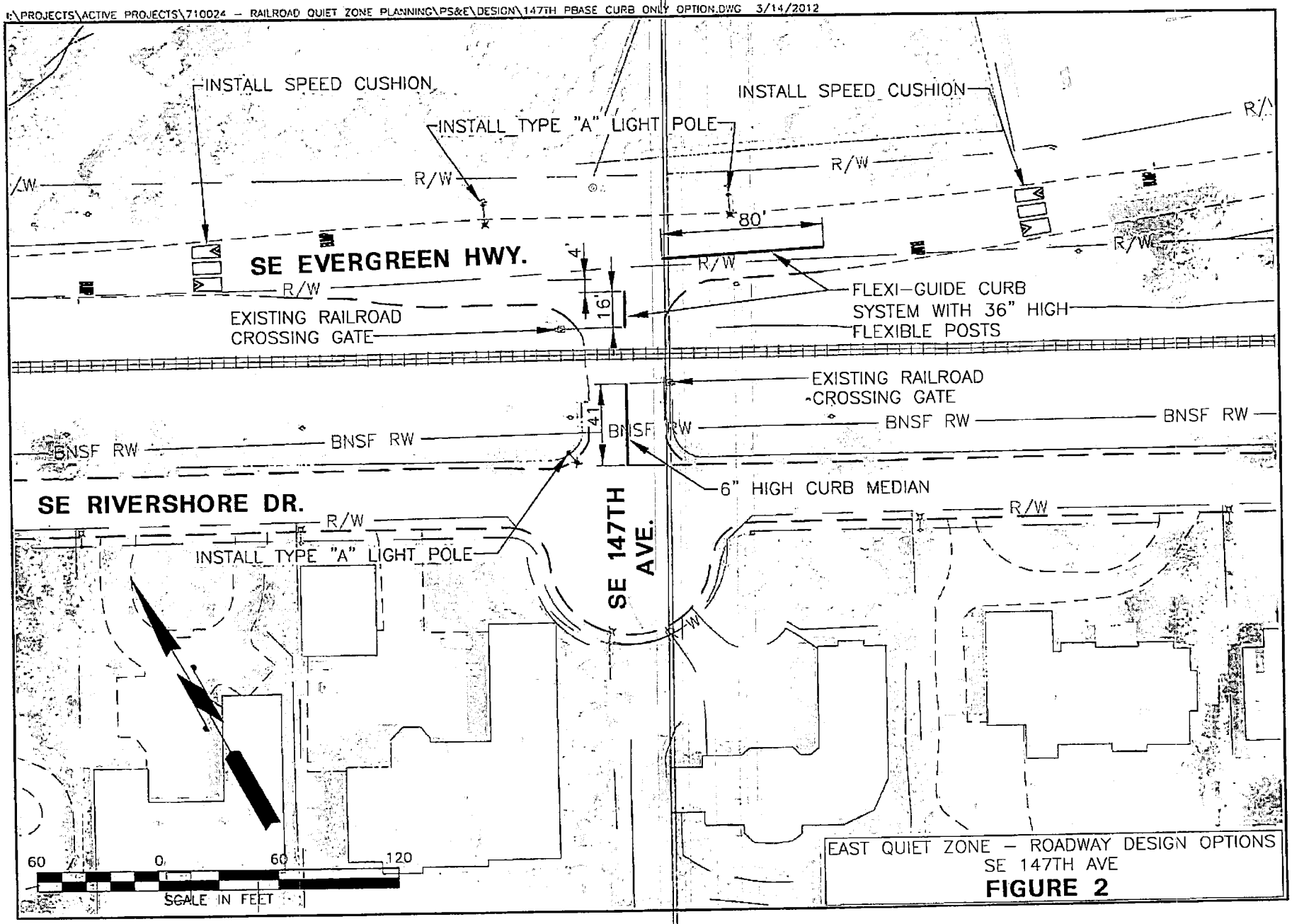
- shortening the median on the north side of tracts to provide room for parallel pedestrian and bicyclist traffic and comply with access under ADA rules,

- Installation of mountable medians to minimize risk the addition of perpendicular fixed objects for the travel lanes most adjacent to Evergreen Highway



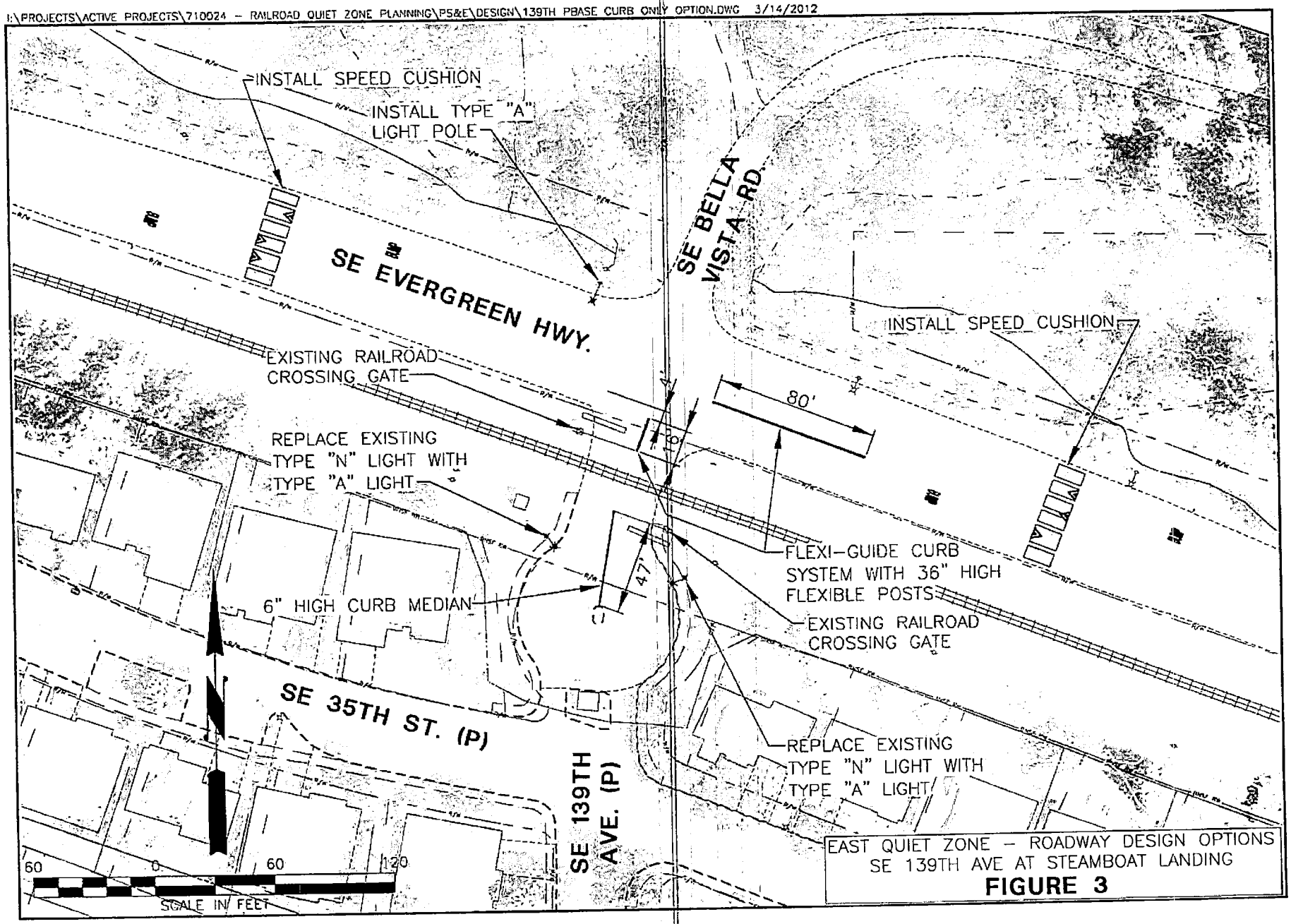
EAST QUIET ZONE – ROADWAY DESIGN OPTIONS
SE 164TH AVE

FIGURE 1



EAST QUIET ZONE – ROADWAY DESIGN OPTIONS
SE 147TH AVE

FIGURE 2



EAST QUIET ZONE – ROADWAY DESIGN OPTIONS
SE 139TH AVE AT STEAMBOAT LANDING

FIGURE 3

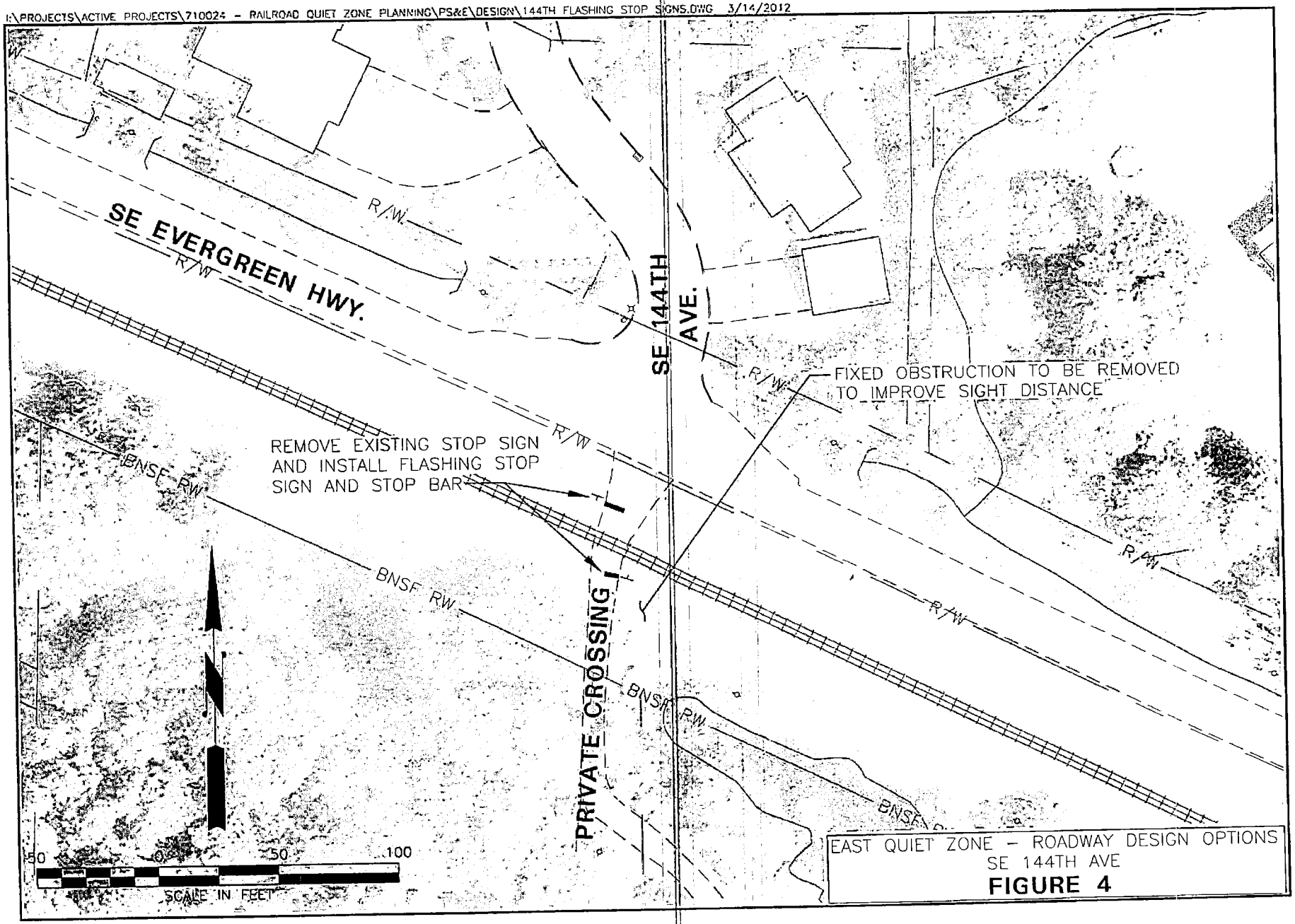
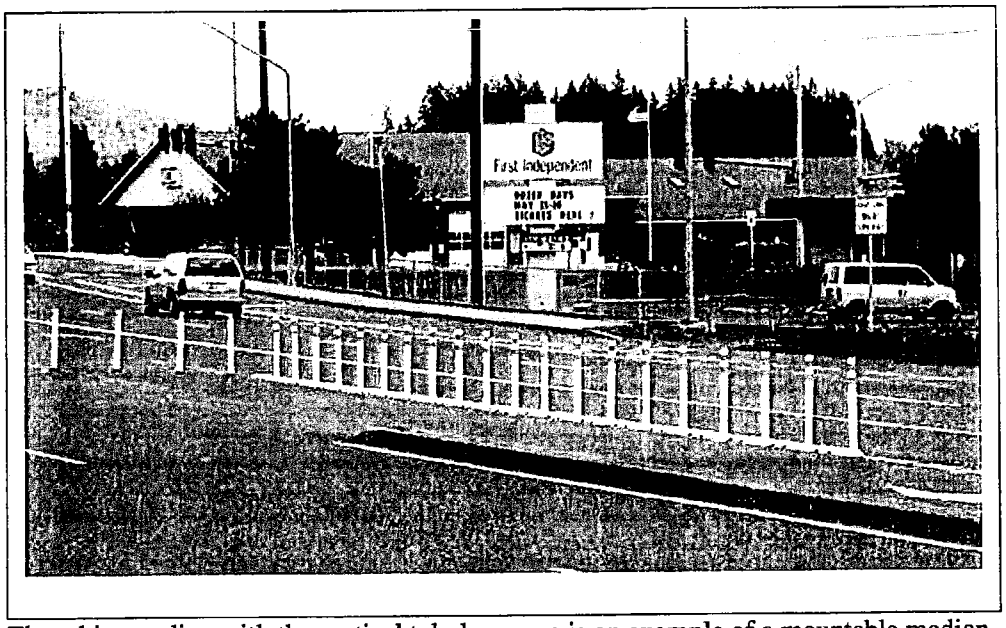
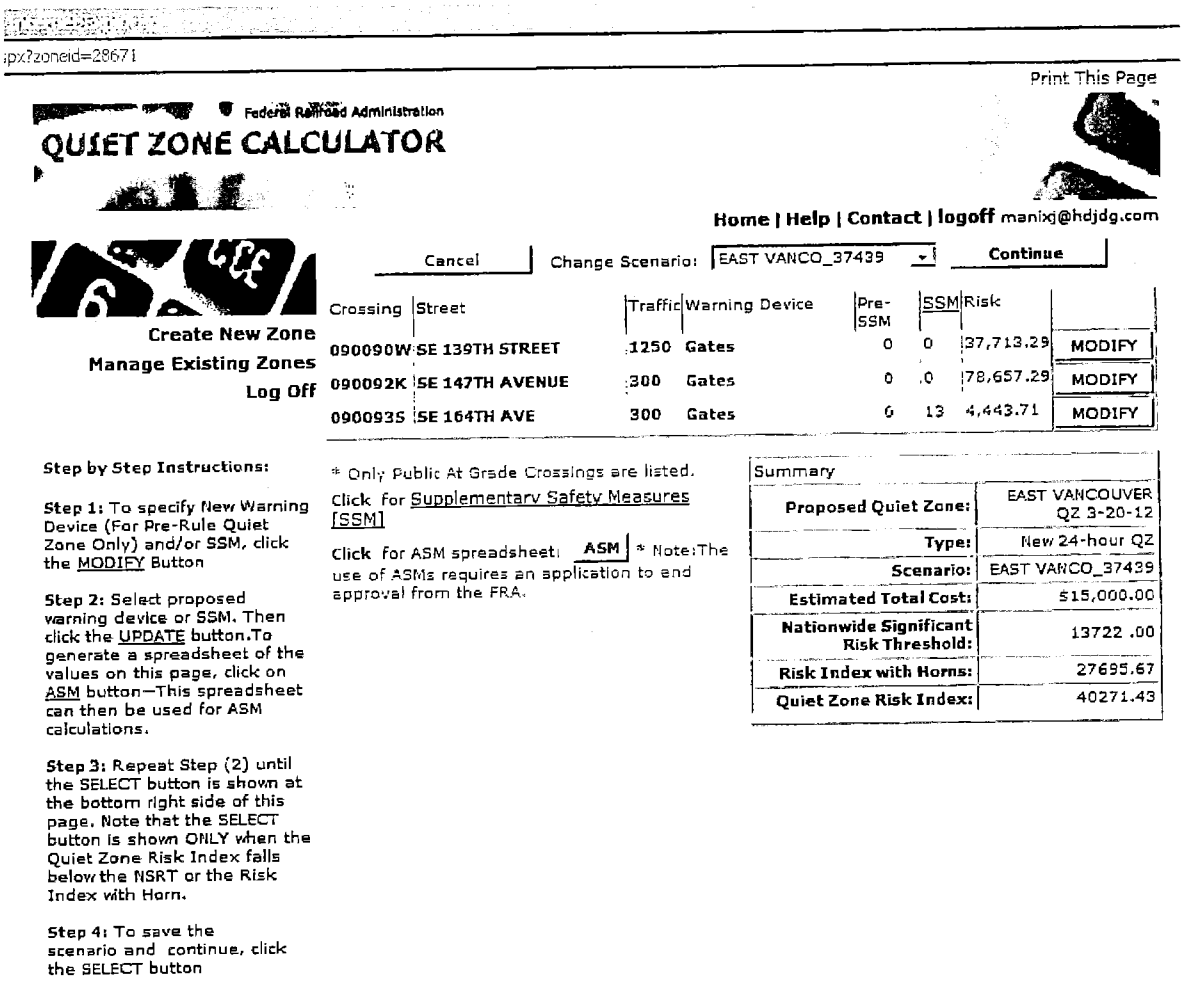

I:\PROJECTS\ACTIVE PROJECTS\710024 - RAILROAD QUIET ZONE PLANNING\PS&E\DESIGN\144TH FLASHING STOP SIGNS.DWG 3/14/2012
SE EVERGREEN HWY.
R/W
SE 144TH AVE.
PRIVATE CROSSING
BNSF RW
FIXED OBSTRUCTION TO BE REMOVED TO IMPROVE SIGHT DISTANCE
REMOVE EXISTING STOP SIGN AND INSTALL FLASHING STOP SIGN AND STOP BAR
50 0 50 100
SCALE IN FEET
EAST QUIET ZONE – ROADWAY DESIGN OPTIONS
SE 144TH AVE
FIGURE 4

Figure 5 – Mountable verse Barrier Medians



The white median with the vertical tubular cones is an example of a mountable median
The concrete curb that is approximately 6" high is an example of a barrier median.

Attachment 5
Quiet Zone Calculator



Quiet zone calculator results with Non-Traversable Curb Medians (barrier medians) SSM at SE 164th Ave Crossing but ASM improvements.

Risk Index with Horns (RIWH) = 27695.67

Attachment 6
ASM Spreadsheet Output and Quiet Zone Risk Index Calculation

FRA Quiet Zone Risk Indices

ZoneID	ScenarioID	Crossing	Street	Warning Device	SSM	PreSSM	RiskIndex	ASM Effectiveness Rate	QZRI	Notes
27424	36118	090090W	SE 139TH STREET	Gates	0	0	37713.29	0.45	20742.31	1
27424	36118	090092K	SE 147TH AVENUE	Gates	0	0	78657.29	0.36	50340.67	2
27424	36118	090093S	SE 164TH AVE	Gates	13	0	4443.71		4443.71	3
Average Quiet Zone Risk Index for the 3 crossings must be lower than the RIWH or the NSRT to qualify for a QZ									**25175.56**	4
Risk Index with Horns from Quiet Zone Calculator									27695.67	5
National Significant Risk Threshold from Quiet Zone Calculator									13722.00	6

Notes

1 - ASM Effectiveness Rating= 0.75/2*16/60+0.75/2*56/60= 0.45
0.75 = Effectiveness for an median SSM of full length for mountable median with reflectorized traffic channelizers
16 =length of median on north side of tracks
56=length of median on south side of tracks
60 = full length median for SSM on each side of tracks

2 - ASM Effectiveness Rating= 0.75/2*16/60+0.75/2*41/60= 0.36
0.75 = Effectiveness for an median SSM of full length for mountable median
16 =length of median on north side of tracks
41=length of median on south side of tracks
60 = full length median for SSM on each side of tracks

3 - SSM calculation from QZ calculator for 100 foot long medians on both sides of tracks, effectiveness rating = 0.80

4 - The average QZRI for entire quiet zone = the sum of the QZRI for each of the 3 crossings/3 (number of crossings)

5 - Risk Index with Horns calculated by the QZ calculator

6 - National Significant Risk Threshold calculated by QZ calculator.

QZRI = 25,175.56 which is less than the RIWH = 27695.67, therefore the proposed East Vancouver Quiet Zone qualifies.