TOWN BOARD WORK SESSION
May 20, 2013 – 6:00 P.M.
301 Walnut Street, Windsor, CO 80550

The Town of Windsor will make reasonable accommodations for access to Town services, programs, and activities and will make special communication arrangements for persons with disabilities. Please call (970) 674-2400 by noon on the Thursday prior to the meeting to make arrangements.

GOAL of this Work Session is to have the Town Board receive information on topics of Town business from the Town Manager, Town Attorney and Town staff in order to exchange ideas and opinions regarding these topics.

Members of the public in attendance who have a question related to an agenda item are requested to allow the Town Board to discuss the topic and then be recognized by the Mayor prior to asking their question.

AGENDA

6:00 p.m. 1. Train Quiet Zone study update – K. Arnold

6:45 p.m. 2. Cemetery Master Plan – W. Willis

7:15 p.m. 3. Museum Landscape Plan – C. Knight

7:45 p.m. 4. Future Meetings Agenda

FELSBURG HOLT & ULLEVIG
connecting and enhancing communities

EXECUTIVE SUMMARY

May 14, 2013

Background: The following information is provided as an Addendum to the Windsor Highway-Rail Crossing Safety Study, dated August 2008, completed for the Town of Windsor. The original study evaluated the need for safety improvements at crossings within Windsor's Growth Management Area, which included some crossings under the jurisdiction of the County or State. The Study also provided recommendations for additional crossing improvements for Quiet Zone establishment at crossings within the Town's jurisdiction, which are those within the Town's corporate limits.

Purpose: The focus of this addendum is to review crossing improvements that have been completed since the original Study, and reassess infrastructure needs at the Town's crossings for Quiet Zone establishment. Updated concept costs were completed for standard Supplemental Safety Measure (SSM) installations as defined by the Federal Railroad Administration (FRA). Other options for Quiet Zone establishment, other than standard SSM treatments, were also evaluated.

Results: The table on the following page lists the crossings within the Town's corporate limits along with the SSM installation and associated cost for a permanent Quiet Zone. Crossings outside the Town's limits can also be pursued for Quiet Zone establishment by the respective road authority, either County or State. Recommendations for Quiet Zone improvements at crossings not within the Town's jurisdiction are not provided herein, but can be generated if requested.

Changes from the 2008 Study: Within the 2008 Study, some safety improvements were necessary in combination with Quiet Zone treatments in order to complete a standard SSM treatment. Additionally, the SSM of 4-Quadrant gates was not considered. For cost effectiveness at the time, installation of Wayside Horns was assumed where the crossing geometry would not allow for another solution. Wayside Horns are a lower decibel, stationary horn that still provides sound to warn of an approaching train. The table provided in this summary includes consideration of 4-Quadrant gates to completely silence the horn at crossings where other solutions were not viable. This results in a higher cost due to additional railroad infrastructure.

Safety Improvements: Safety improvements including railroad crossing warning devices, were completed at the Main Street crossing of the Great Western Railway (GWR) line. No other safety improvements identified in the 2008 Study were completed.

Corridor Crossing Evaluation for Risk Index: The Main Street corridor (including 1st, 5th, 6th, and 7th) was also evaluated using referenced material found in the FRA Final Rule to calculate the Risk Index. The resulting Risk Index is below the Nationwide Significant Risk Threshold (NSRT), and could be part of an application to the FRA for consideration of Quiet Zone establishment through an Alternative Safety Measure (ASM) application. Costs would be for the application paperwork.

Petition/Waiver Considerations: Petitions for modifications to the Final Rule for crossings of Short Line railroads or to return to discretionary horn sounding at night could be considered. The Town could also consider requesting a waiver from standard SSM installation of some equipment at crossings with sidings/industry tracks with lower speed operations, to reduce costs.

Quiet Zone SSM Treatment Cost through Town: Total cost for SSM treatments at crossings through the main part of town, including Crossroads, Eastman Park, SH 257 Angle, Garden Drive, SH 257 Spur, SH 257 (former Ballpark), 1st, Main, 5th, 6th, and 7th is estimated at $2,225,000. Note that Crossroads Boulevard is Quiet Zone compliant today and would require no additional infrastructure.

6300 South Syracuse Way, Suite 600 Centennial, CO 80111 tel 303.721.1440 fax 303.721.0832
www.fhueng.com info@fhueng.com

Crossing	Existing Railroad Devices	Automatic Gates & Lights	Constant Warning Time	Raised Medians	Bungalow	4-Quad Gates	Cost Estimate
Estimated Unit Cost		$100,000	$50,000	Varies	$50,000	$240,000	
GWR Main Line							
WCR 15	Crossbucks		X		X	X	$340,000
Crossroads Blvd	Gates, Flashers, Bells, CWT circuitry						$0
Eastman Park Dr	Crossbucks		X		X	X	$340,000
SH 257 Angle	Gates, Flashers, Bells		X	X			$130,000
Garden Dr [4]	Crossbucks	X	X	X[1]	X		$275,000
SH 257 Spur [4]	Flashers, Bells, Cantilevers	X	X	X[1]			$200,000
GWR Greeley Line							
WCR 15 & WCR 70	Crossbucks		X		X	X	$340,000
7th Street [3]	Flashers, Bells	X	X	X[1]	X		$230,000
6th Street [3]	Crossbucks		X		X	X	$340,000
5th Street [3]	Crossbucks		X		X	X	$340,000
Main Street [3]	Gates, flashers, Bells, CWT circuitry, cantilevers			X			$30,000
1st Street [3]	Crossbucks		X		X	X	$340,000
SH 257 (former Ballpark)	Flashers, Bells		X		X	X	$340,000
WCR 66	Crossbucks		X		X	X	$340,000

Total (SSM Treatments at every crossing)	$3,540,000
[2]Total (Crossings with 4-Quad Gates replaced with Wayside Horns)	$3,420,000
[5]Total (Crossroads Blvd thru SH 257 Spur & 1st thru 7th only)	$2,225,000

NOTES:
[1] Raised median options at these crossings assume modification of adjacent accesses within 60 feet of the gate arm.
[2] Each crossing treated with 4-Quadrant gates could instead be treated with Wayside Horns. Wayside Horns result in a savings of $15,000 per crossing. However, these crossings would not truly be silent, as the wayside horns would still sound in place of the locomotive horn.
[3] Crossings at 1st Street through 7th Street along the Greeley line are within ¼ mile of each other and would need to be pursued for Quiet Zone establishment as a corridor.
[4] Crossings at Garden Drive and the SH 257 Spur are within ¼ mile and would need to be pursued for Quiet Zone establishment together.
[5] Costs are associated with full SSM Treatments at the majority of crossings through the main part of town including: Crossroads, Eastman Park, SH 257 Angle, Garden Drive, SH 257 Spur, SH 257 (former Ballpark), 1st, Main, 5th, 6th, and 7th.

WINDSOR HIGHWAY-RAIL SAFETY STUDY

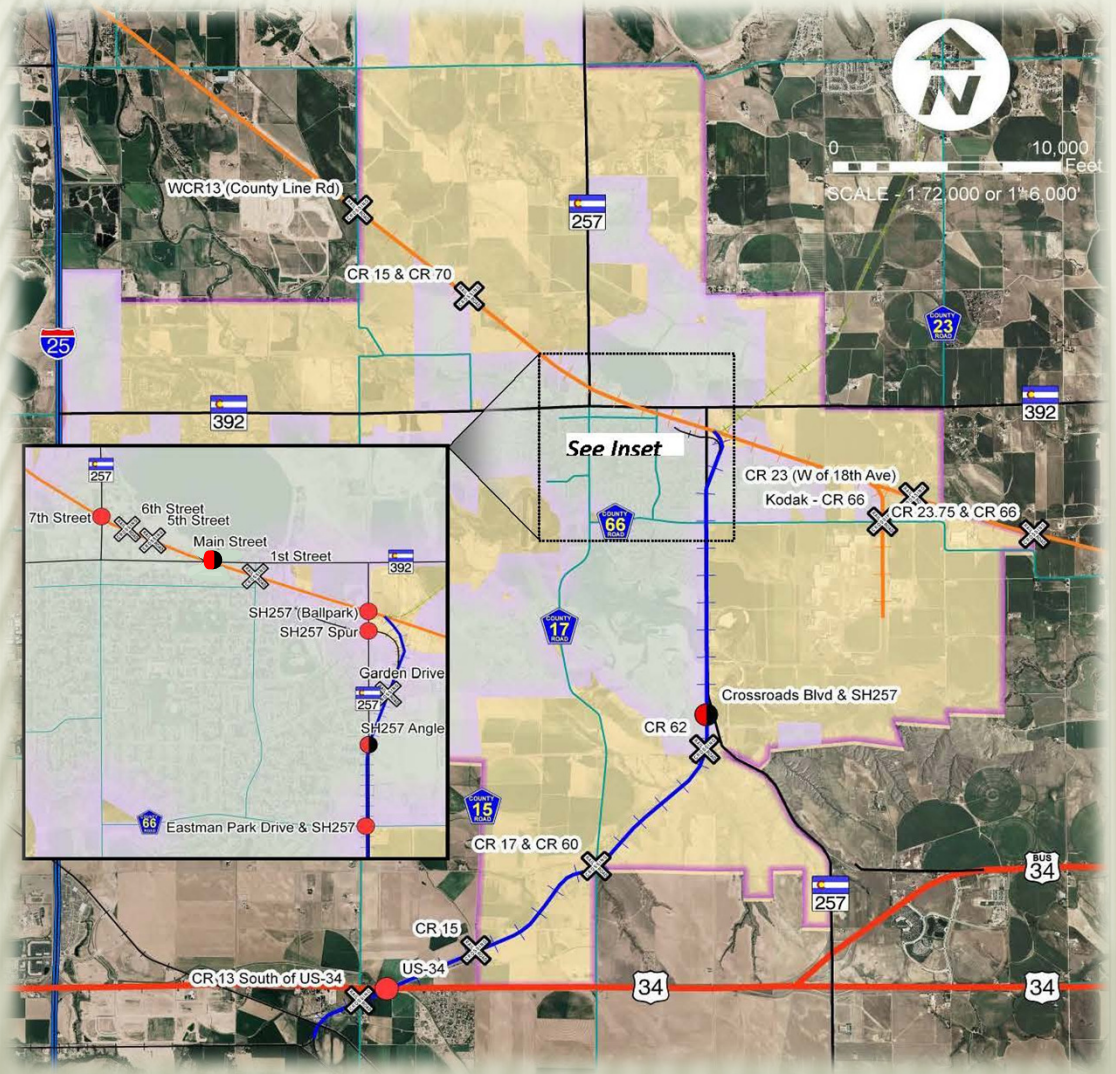
ADDENDUM REPORT

MAY 20, 2013

SUMMARY

- Background:
  - Highway-Rail Safety Study completed in August 2008 evaluated safety at crossings within Windsor's Growth Management Area
  - 2008 Study also assessed Quiet Zone needs at crossings within the Town's limits
- Purpose of this Effort:
  - Update the status of any improvements at the crossings
  - Identify improvements needed at the Town's crossings for Quiet Zone Compliance
  - Update concept costs for full Supplemental Safety Measure (SSM) installations
  - Evaluate other options for pursuit of Quiet Zones

CROSSINGS EVALUATED



Legend

- Flashing Lights & Gates
- Flashing Lights
- Crossbucks Only
- Railroads
- Greeley Line
- Main Line
- Abandoned
- Windsor Municipal Limits
- Interstate
- U.S.
- State
- County Roads
- Windsor Growth Mngt Area

CROSSING IMPROVEMENT UPDATES

- Main Street received upgraded crossing warning devices
- SH 257 Spur, Eastman Park Drive and Great Western Drive received new crossing material
- Great Western Drive, 5th Street and 6th Street received new cross bucks
- No other safety improvements were completed

QUIET ZONE COMPLIANCE ASSESSMENT

- Town's crossings were evaluated for treatment with Supplemental Safety Measure (SSM) options

Raised Medians with Approach Gates

Wayside Horns

4-Quadrant Gates

SSM OPTIONS AND COSTS

Crossing	Existing Railroad Devices	Automatic Gates & Lights	Constant Warning Time	Raised Medians	Bungalow	4-Quad Gates	Cost Estimate
Estimated Unit Cost		$100,000	$50,000	Varies	$50,000	$240,000	
GWR Main Line							
WCR 15	Crossbucks		X		X	X	$340,000
Crossroads Blvd	Gates, Flashers, Bells, CWT circuitry						$0
Eastman Park Dr	Crossbucks		X		X	X	$340,000
SH 257 Angle	Gates, Flashers, Bells		X	X			$130,000
Garden Dr [4]	Crossbucks	X	X	X[1]	X		$275,000
SH 257 Spur [4]	Flashers, Bells, Cantilevers	X	X	X[1]			$200,000
GWR Greeley Line							
WCR 15 & WCR 70	Crossbucks		X		X	X	$340,000
7th Street [3]	Flashers, Bells	X	X	X[1]	X		$230,000
6th Street [3]	Crossbucks		X		X	X	$340,000
5th Street [3]	Crossbucks		X		X	X	$340,000
Main Street [3]	Gates, flashers, Bells, CWT circuitry, cantilevers			X			$30,000
1st Street [3]	Crossbucks		X		X	X	$340,000
SH 257 (former Ballpark)	Flashers, Bells		X		X	X	$340,000
WCR 66	Crossbucks		X		X	X	$340,000

Total (SSM Treatments at every crossing)	$3,540,000
[2]Total (Crossings with 4-Quad Gates replaced with Wayside Horns)	$3,420,000
[5]Total (Crossroads Blvd thru SH 257 Spur & 1st thru 7th only)	$2,225,000

NOTES:

[1] Raised medians require adjacent access modifications.

[2] 4-Quad gates could be replaced with Wayside Horns for lower cost.

[3] Crossings are within ¼ mile and need to be treated as a corridor.

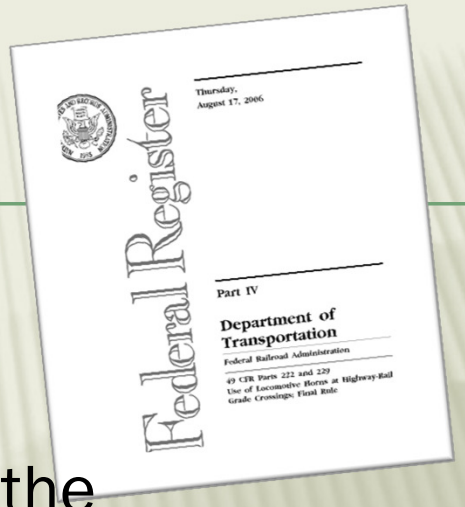
[4] Crossings are within ¼ mile and need to be treated as a corridor.

[5] Costs are for full SSM Treatments.

OTHER OPTIONS

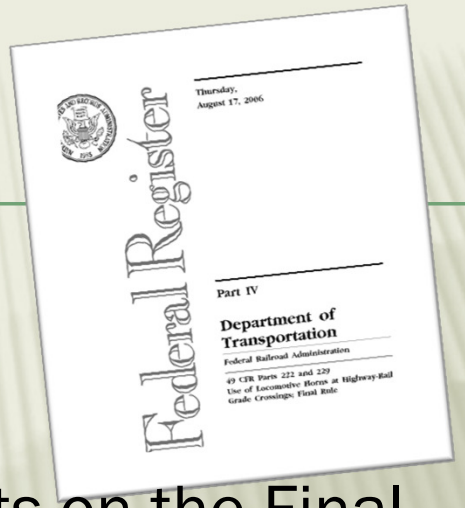
- Evaluation of Corridor Risk Index for 1st Street through 7th Street with existing treatments
  - Procedure completed according to reference material provided in the FRA Final Rule
  - Calculated Risk Index falls below the Nationwide Significant Risk Threshold (NSRT)
  - This procedure and resulting Risk Index could be provided to the FRA for consideration as a base condition prior to Quiet Zone establishment
  - Minimal up front infrastructure cost
  - Timeline to FRA decision – 9 to 12 months

OTHER OPTIONS



- Petitions/Waivers
  - Consult with Great Western Railway and the American Short Line & Regional Railroad Association
  - Determine if any modifications to the requirements of the Final Rule should be considered by FRA
  - Compile petition or waiver request for submittal to FRA
  - Process includes notification in the Federal Register, opportunity for public comment, hearing (if needed) and a decision

OTHER OPTIONS



- Propose an Amendment
  - Can be done when FRA solicits comments on the Final Rule through a Notice of Proposed Rulemaking
  - Involves a comment period, evaluation, possible Interim Rules and typically a Final Amended Rule
  - Possible Amendments could include:
    - Discretionary horn-sounding at night in urban/residential areas
    - Modified requirements for Short Line Railroad tracks or branch line/industry spur tracks with low speed operations

CONCLUSIONS

- Quiet Zone establishment can be pursued in several ways:
  - Standard SSM treatments at every public crossing
    - more up front infrastructure cost
    - shorter notification process with FRA
    - results in permanent Quiet Zone
  - Alternative Safety Measure (ASM) application
    - can include non-engineered solutions
    - less up front infrastructure cost
    - longer process with FRA
    - approval, if granted, will include long term monitoring and reporting
  - Corridor Risk Index Calculation Methodology
    - proposal involves submittal of methodology and results to FRA for consideration prior to a formal Quiet Zone pursuit
    - no up front cost
    - longer process with FRA
    - approval, if granted, will include long term monitoring and reporting

FELSBURG HOLT & ULLEVIG
connecting and enhancing communities

May 14, 2013

REPORT ADDENDUM

The following information is provided as an Addendum to the Windsor Highway-Rail Crossing Safety Study, dated August 2008, completed for the Town of Windsor. The original study evaluated the need for safety improvements at crossings within Windsor's Growth Management Area (Exhibit A), and provided recommendations for additional crossing improvements for Quiet Zone establishment at crossings within the Town's corporate limits.

Windsor Highway-Rail Crossing Safety Study

The original study evaluated 21 railroad crossings for existing and future traffic demands, existing crossing warning devices and compliance with advance warning signing/striping as recommended by the Manual on Uniform Traffic Control Devices. Base recommendations for safety improvements were provided. In addition to the base recommendations, crossings within the Town's limits were also reviewed for Quiet Zone compliance. Any additional infrastructure needed, beyond that recommended for safety improvements, was identified and concept level costs provided for the Town's consideration.

Purpose of this Addendum

The focus of this addendum is to review crossing improvements that have been completed since the original Study, and reassess infrastructure needs at the Town's crossings for Quiet Zone establishment. Updated concept costs were completed for standard Supplemental Safety Measure (SSM) installations. The results of the reassessment are provided in Figures 1, 2 and 3 at the end of the text portion of this document.

Since the 2008 Study, several other communities have pursued Quiet Zone establishment. Some have found that the standard SSM installation is not viable within their community, due to urban environments and closely spaced infrastructure or roadways. This has resulted in the research into other portions of the Federal Railroad Administration's *Final Rule on Use of Locomotive Horns at Highway-Rail Grade Crossings (Final Rule)*, last amended August 17, 2006, for other options that may be more viable.

For the Town of Windsor, the option to treat each crossing with standard SSM installations still exists. However, there are also other actions that the Town may wish to consider that may assist in the pursuit of Quiet Zones, such as the following:

A. Discussion with FRA regarding Quiet Zone establishment and possible compliance variations/waivers for Short Line Railroads, such as Great Western Railway (GWR)
B. Calculation of the Quiet Zone Risk Index and Assessment of the Existing Conditions Risk Index for the Corridor across Main Street (1st St. thru 7th St.)
C. Proposing an Amendment to the Final Rule to return to discretionary horn sounding during nighttime hours in urban areas

The following sections discuss in more detail each of the possible actions listed above, and identify information or calculations relevant to railroad crossings through Windsor. Following the discussion are updated tables reflecting current crossing conditions at the crossings, differences in field conditions from the Federal Railroad Administration Crossing Inventory Forms, and updated concept costs for standard SSM installations at crossings within the Town's limits.

A. Discussion with FRA regarding Quiet Zone establishment and possible compliance variations/waivers for Short Line Railroads, such as Great Western Railway (GWR)

The FRA Final Rule does not differentiate between Class I railroads and Short Line railroads. Because of this, there is no differentiation in the requirements for Quiet Zone establishment, even though the number and type of trains, speed of trains and track usage can vary greatly. This may be a worthwhile avenue to explore in the event the FRA solicits comments on the Final Rule.

Currently, the term 'waiver' is defined within the Final Environmental Impact Statement (FEIS) for the Interim Final Rule for the Use of Locomotive Horns at Highway-Rail Grade Crossings as: *A temporary or permanent modification of some or all of the requirements of the final rule as they apply to a specific party under a specific set of facts. Waiver does not refer to the process of establishing quiet zones or approval of quiet zones in accordance with the provisions of the rule.*

The FEIS indicates that 'a regulation or specific section of a regulation, while appropriate for the general regulated community, may be inappropriate when applied to a specific entity.' It goes on to say – 'An extension of time to comply with a regulatory provision may be needed, or technological advancements may result in a portion of a regulation being inappropriate in a certain situation. FRA may grant a waiver from its regulations in such instances.'

In Summary, the waiver process is as follows:

- A petition for a waiver is received by FRA;
- A notice of the waiver request is published in the *Federal Register*;
- An opportunity for public comment is provided; and
- An opportunity for a hearing is afforded the petitioning or other interested party.

In researching the FRA website for examples of successful waivers, two scenarios exist: 1) waivers have been granted for not installing Constant Warning Time (CWT) circuitry where it is not practical (i.e., industry/siding tracks that are infrequently used and at low speeds); and 2) a waiver has been granted for eliminating the non-traversable curb on one side of a median, such that vehicles stopped on the tracks could drive onto the median in the event of an approaching train.

The Town of Windsor could talk with the GWR and the American Short Line & Regional Railroad Association (ASLRRA) about possible modifications to the Final Rule that could be considered for Short Line railroads. The Town could then provide a petition to the FRA outlining modifications to the Final Rule that should be implemented for Short Line railroads, along with supporting documentation, which would be published in the Federal Register allowing a period of time for public comment, and a hearing opportunity. Other communities that are home to Short Line railroads may wish to comment on the petition, or be a party to the petition to support Windsor's effort.

B. Calculation of the Quiet Zone Risk Index and Assessment of the Existing Conditions Risk Index for the Corridor across Main Street (1st St. thru 7th St.)

The FRA Final Rule does provide alternatives to installing SSMs at every public road crossing within a proposed Quiet Zone. One possible alternative involves calculating the risk index along a proposed corridor, with the crossing warning devices present today. The existing condition risk index is then compared to the Nationwide Significant Risk Threshold (NSRT), which represents the average risk at public highway-rail crossings nationwide that have flashing lights and gates, and at which locomotive horns are sounded. If the risk of the proposed Quiet Zone corridor is higher than the NSRT, additional safety measures must be implemented in an attempt to bring the risk number down below the nationwide threshold. This is a trial and error process in which, for example, 4-quadrant gates might be added at 2 of the crossings in a corridor, and the risk with those added features is calculated. The resulting risk number is again compared to the NSRT, and if it is still higher than the NSRT, more SSMs must be added, and so on until the calculated risk along the proposed Quiet Zone corridor is below the NSRT.

The downside of this option is that over time, as public highway-rail grade crossings nationwide become safer, and the NSRT continues to drop, eventually the calculated risk for the proposed Quiet Zone may exceed the NSRT. At this point the community would need to reassess the Quiet Zone risk index and add additional treatments until the risk index is once again below the NSRT.

Risk Index Calculator through Main Street in Windsor

The FRA Quiet Zone Risk Calculator program was used to assess the crossings along the Great Western Railway corridor through Main Street in Windsor. There are several adjacent crossings to Main Street that are within ¼ mile, and would need to be assessed with Main Street for Quiet Zone establishment along this corridor. The crossings in this corridor include: 1st Street, Main Street, 5th Street, 6th Street and 7th Street. The calculation worksheet from the FRA website is included in Exhibit B.

The Risk Calculator is an FRA software program that allows the user to add SSM treatments and calculate the resulting risk index at a given crossing or group of crossings. This program is not equipped to analyze passive crossings or crossings with proposed Alternative Safety Measure (ASM) installations. Therefore, in order for the software to function, a base condition must be created that assumes one of the warning device options is already present at all of the crossings within the corridor. For the purposes of this Risk Calculator run, it is assumed that railroad gates are present at all of the crossings (even though, in reality, gates are only present at Main Street). Note that the resulting Risk Index will reflect the level of risk if the Town should decide to have railroad gates installed at the remaining four crossings. Following are the results of this calculation:

Crossing Conditions	Description	Quiet Zone Risk Index	Nationwide Significant Risk Threshold (NSRT)
Assumes that railroad gates are in place at all five crossings (1st, Main, 5th, 6th and 7th)	In reality, only Main Street has railroad gates. 7th Street has flashers. 1st, 5th, and 6th, are passive crossings (cross bucks and maybe stop or yield signs) with no active warning devices.	7247 (below NSRT)	13,722

NOTES:

1. The "gates" installation assumes the typical railroad gate which includes flashers, cross bucks and bells.
2. The installation of "gates" is not a fully compliant SSM installation, and would be considered an Alternative Safety Measure (ASM) installation, unless medians could be installed (minimum 60 feet) and no commercial accesses or adjacent parallel roadways exist within 60 feet of the crossings on each approach.
3. Vehicular traffic data at each crossing has a substantial affect on the risk index at each crossing. The lower the traffic, the lower the calculated risk.

Alternative Safety Measure (ASM) Spreadsheet Calculations

There are references provided in the Final Rule that allow for an assessment of risk reduction credit for existing crossing warning devices that do not currently meet the requirements of standard SSM treatments. This spreadsheet calculation essentially assesses the crossings in their current condition. The resulting Risk Index is not automatically considered approved by the FRA, but rather must be provided to the FRA with supporting methodology for FRA consideration. If the FRA approved this base Risk Index for the corridor in its current condition, the Risk Index is then compared to the NSRT, and various treatments are added, if needed, until the index falls below the NSRT.

The procedure recommended by the FRA Final Rule for assessing risk in non-SSM scenarios is the *Rail-Highway Crossing Resource Allocation Procedure: User's Guide, Third Edition, August 1987.* To summarize the methodology of this procedure, the vehicular and train data for each crossing is inserted into calculations which predict the probability of a non-fatal accident and a fatal accident at each crossing, which then produces a unit-less Risk Index number for each crossing. The average of the indices at all of the crossings within the proposed Quiet Zone corridor produces the corridor Risk Index, which is compared to the NSRT. If the corridor Risk Index is lower than the NSRT, the corridor can be proposed to the FRA for a Quiet Zone based on these calculations.

This procedure was completed for the corridor crossing Main Street, including 1st Street, 5th Street, 6th Street and 7th Street, using data from FRA Inventory Reports. The calculations were also completed using the traffic data from the 2008 Study, including 2008 traffic numbers and projected 2030 traffic numbers. The spreadsheets for these calculations are provided in Exhibit C. The resulting corridor Risk Index for each of the scenarios is as follows:

Source of Data	Risk Index	Comparison to NSRT (NSRT = 13,772)
FRA Inventory Report	8,004	Less than NSRT
2008 Study (2008 Traffic)	9,536	Less than NSRT
2008 Study (2030 Traffic)	11,067	Less than NSRT

This calculation takes into consideration number of trains, train speed, vehicle traffic and number of accidents in the prior 10-year period at each crossing in the evaluated corridor. The fact that all three of these risk index results fall below the current NSRT may give further support to the idea that Short Line railroads operate differently than characteristic Class I railroads.

It should be noted that there is risk to the Town in proceeding with this proposal to FRA. If, for example, this corridor is approved by the FRA for Quiet Zone establishment, the passive

crossings at 1st, 5th and 6th, would receive no additional treatment, *and* approaching trains would no longer sound their horns. If the typical motorist behavior at these crossings is not to stop and look for trains, but rather to proceed at the speed limit, the lack of train horn may have catastrophic consequences. At a minimum, the Town should consider the installation of stop signs at passive crossings within a proposed Quiet Zone to force vehicles to stop and look for approaching trains, if the train horns are successfully silenced at the passive crossings.

C. Proposing an Amendment to the Final Rule to return to discretionary horn sounding during nighttime hours in urban areas

Periodically, the FRA will provide notification in the Federal Register inviting comment with regard to specific activities or rules. The 'rulemaking' process can lead to the issuance of a new rule, an amendment to an existing rule, or the repeal of an existing rule. It would be through this process that the Town could propose an amendment to the Final Rule with regard to nighttime horn use in urban areas.

The Final Rule standardized the pattern and decibel level of locomotive horns at public at-grade crossings nationwide for consistency for both locomotive engineers and vehicle drivers when approaching an at-grade crossing. This removed the option for locomotive engineers to use discretion at crossings in instances when no vehicles are present, such as at night, or in rural areas. As a result, train horn noise has been more noticeable to residents and businesses; and particularly in urban or residential areas, nighttime horn sounding has become a regular disturbance to formerly quiet areas during overnight hours.

There are several steps in this process including a Notice of Proposed Rulemaking (NPRM), a comment period, evaluations (such as environmental or economic), possibly interim rules, and in most cases a Final Rule is issued.

The Federal Docket Management System is available to the public and is the complete, official record of rulemakings, guidance documents, adjudicatory actions, peer reviews, data quality and other documents. This government-wide, on-line database includes the US Department of Transportation's (DOT) public docket.

The rulemaking docket is the file in which DOT places all of the rulemaking documents it issues (e.g., the NPRM, hearing notices, extensions of comment periods, and final rules), supporting documents that it prepares (e.g., economic and environmental analyses), studies that it relies on that are not readily available to the public, all public comments related to the rulemaking (e.g., comments that may be received in anticipation of the rulemaking, comments received during the comment period, and late-filed comments), and other related documents. The DOT also prepares and places in the docket, summaries of any substantive, public, oral communications (sometimes referred to as "ex parte" contacts) that concern a rulemaking that the FRA/DOT may receive.

We have heard that the FRA may publish a Notice of Proposed Rulemaking within the next 18 months regarding the Train Horn Rule that would be appropriate for comment regarding an amendment to the rule.

Study Update Information

A field review of the crossings was conducted on March 7, 2013 to observe any changes in the crossing elements that may have occurred after August 2008. This information was compared to the original study crossing conditions and also compared to information provided in the Federal Railroad Administration Crossing Inventory Reports. Those findings are provided in **Figure 1**.

Following the field review, the current conditions at each crossing were assessed for Quiet Zone compliance, and to determine which crossings are within ¼ mile of an adjacent crossing and would need to be treated as a corridor. These findings are shown in **Figure 2**.

Following evaluation of Quiet Zone compliance, costs were reassessed (from the 2008 Study) for standard SSM installations at crossings within the Town's corporate limits. The updated concept costs are provided in **Figure 3**. It should be noted that the Crossroads Boulevard crossing is Quiet Zone compliant currently, and would only require the notification procedure to the FRA to create the Quiet Zone.

Attachments

Exhibit A

Growth Management Area Crossing Exhibit

Exhibit B

Quiet Zone Calculator Results Spreadsheet

Exhibit C

Alternative Safety Measure Risk Calculation Spreadsheet (FRA Data used)

Alternative Safety Measure Risk Calculation Spreadsheet (2008 Study-2008 Traffic Data used)

Alternative Safety Measure Risk Calculation Spreadsheet (2008 Study-2030 Projected Traffic Data used)

Figure 1. Existing Crossing Conditions

Crossing	DOT#	M.P.	Train/Vehicle Data (FRA)			Existing Warning Devices (FRA Rpt)						Max. Speed (mph)	Tracks (FRA Rpt)		Field Review March 2013 Existing Conditions	FRA Report Corrections Needed
			Total Trains Per Day	ADT	Date of FRA Rpt	Crossbucks	Gates	Flashers	Bells	Circuitry	Hwy Traffic Signals		Main	Other		
GWR Main Line																
WCR 13 South of US Hwy 34	849369H	24.01	2	99	1-Jan-11	2	0	0	0	DC/AFO	0	35	1	0	No changes noted from FRA Rpt data	NO
US Hwy 34	849370C	24.30	2	36000	1-Jan-11	2	0	0	0	DC/AFO	4	35	1	0	No changes noted from FRA Rpt data	NO
WCR 15	849373X	25.07	2	99	1-Jan-11	2	0	0	0	DC/AFO	0	35	1	0	No changes noted from FRA Rpt data	NO
WCR 17 & WCR 60	849379N	26.36	2	4100	1-Jan-11	2	0	0	0	DC/AFO	0	35	1	0	No changes noted from FRA Rpt data	NO
WCR 62	849381P	27.74	2	99	1-Jan-11	2	0	0	0	DC/AFO	0	35	1	0	No changes to crossing; road is paved on west approach outside of RR ROW	YES
Crossroads Blvd	871991C	28.46	2	20	1-Jul-96	2	0	0	2	None	0	35	1	0	Crossing has gates, flashers, xbucks, bells, CWT, advance warning signs/paint installed ~2006	YES
Eastman Park Drive	871917X	29.71	2	7400	1-Jan-11	2	0	0	0	DC/AFO	2	35	1	0	New concrete surfacing installed	YES
SH 257 Angle	871919L	30.05	2	15525	1-Jan-11	2	2	4	1	None	0	35	1	0	No changes noted from FRA Rpt data	YES
Garden Drive Noted as Private;	871921M	30.48	0	99	1-Jan-11	2	0	0	0	None	0	0	0	0	2 tracks cross; 1-main; 1-other(industry)	YES
SH 257 Spur	871920F	30.53	1	15525	1-Jan-11	2	0	5	1	None	0	35	0	1-siding	2 merging tracks; OH cantilevers with flashers on each approach; crossing material upgraded to concrete	YES
GWR Greeley Line																
WCR 13 south of LCR 36	244886X	83.85	4	99	3-Jan-11	2	0	0	0	DC/AFO	0	20	1	0	No changes noted from FRA Rpt data	NO
WCR 15 & WCR 70	244889T	85.06	2	2300	3-Jan-11	2	0	0	0	DC/AFO	0	20	1	0	No changes noted from FRA Rpt data	NO
7th Street	244892B	86.33	4	11270	3-Jan-11	4	0	4	1	DC/AFO	0	20	1	1-industry	Crossing has only 1 track across the roadway; not 2 tracks	YES
6th Street	244893H	86.43	4	99	3-Jan-11	2	0	0	0	DC/AFO	0	20	1	2-industry	Crossing has only 1 track across the roadway; not 3 tracks	YES
5th Street	244894P	86.54	4	99	3-Jan-11	2	0	0	0	DC/AFO	0	20	1	2-industry	Crossing has only 1 track across the roadway; not 3 tracks	YES
Main Street	244895W	86.77	6	11000	3-Jan-11	4	0	0	0	DC/AFO	0	20	1	1-unknown	Crossing has gates, flashers(9 sets), xbucks, bells, OH cantilevers on each approach. Circuitry unknown-no PUC	YES
1st Street	244897K	86.94	4	99	3-Jan-11	2	0	0	0	DC/AFO	0	20	1	0	No changes noted from FRA Rpt data	NO
SH 257 (former ballpark)	244898S	87.37	4	9100	3-Jan-11	2	0	4	1	DC/AFO	0	20	1	0	No changes noted from FRA Rpt data	NO
WCR 66 Noted as Private;	849382W	27.96	0	0	11-May-81	0	0	0	0	None	0	0	0	0	Crossing has xbucks and 1 track across	YES
WCR 23 Listed as CR 21.8	245106Y	89.21	4	100	3-Aug-97	2	0	0	0	DC/AFO	0	20	1	0	Crossing has Yield signs and new concrete crossing surface	YES
WCR 23.75 & WCR 66	245108M	90.26	2	99	3-Jan-11	2	0	0	0	DC/AFO	0	20	1	0	No changes noted from FRA Rpt data	NO

Highlighted data from FRA Inventory Reports has changed or was incorrect.

Figure 2. Crossing Quiet Zone Assessment

Crossing	DOT#	M.P.	Dist. To Nearest Xing	Existing Warning Devices (FRA Rpt)						Total Train-Vehicle Accidents (5 years) (FRA Rpt)	Field Review March 2013 Existing Conditions	QZ (SSM) Compliant today?
				Crossbucks	Gates	Flashers	Bells	Circuitry	Hwy Traffic Signals			
GWR Main Line												
WCR 13 South of US Hwy 34	849369H	24.01	0.29	2	0	0	0	DC/AFO	0	0	No changes noted from FRA Rpt data	NO
US Hwy 34	849370C	24.30	0.29	2	0	0	0	DC/AFO	4	0	No changes noted from FRA Rpt data	NO
WCR 15	849373X	25.07	0.77	2	0	0	0	DC/AFO	0	0	No changes noted from FRA Rpt data	NO
WCR 17 & WCR 60	849379N	26.36	1.29	2	0	0	0	DC/AFO	0	0	No changes noted from FRA Rpt data	NO
WCR 62	849381P	27.74	0.72	2	0	0	0	DC/AFO	0	0	No changes to crossing; road is paved on west approach outside of RR ROW	NO
Crossroads Blvd	871991C	28.46	0.72	2	0	0	2	None	0	0	Crossing has gates, flashers, xbucks, bells, CWT, advance warning signs/paint installed ~2006	YES
Eastman Park Drive	871917X	29.71	0.34	2	0	0	0	DC/AFO	2	0	New concrete surfacing installed	NO
SH 257 Angle	871919L	30.05	0.34	2	2	4	1	None	0	0	No changes noted from FRA Rpt data	NO, needs medians and CWT circuitry
Garden Drive Noted as Private 2 STOP signs	871921M	30.48	0.05	2	0	0	0	None	0	0	2 tracks cross; 1-main; 1-other(industry	NO
SH 257 Spur	871920F	30.53	0.05	2	0	5	1	None	0	0	2 merging tracks; OH cantilevers with flashers on each approach; crossing material upgraded to concrete	NO
GWR Greeley Line												
WCR 13 south of LCR 36	244886X	83.85	1.21	2	0	0	0	DC/AFO	0	0	No changes noted from FRA Rpt data	NO
WCR 15 & WCR 70	244889T	85.06	1.21	2	0	0	0	DC/AFO	0	0	No changes noted from FRA Rpt data	NO
7th Street	244892B	86.33	0.10	4	0	4	1	DC/AFO	0	0	Crossing has only 1 track across the roadway; not 2 tracks	NO
6th Street	244893H	86.43	0.10	2	0	0	0	DC/AFO	0	0	Crossing has only 1 track across the roadway; not 3 tracks	NO
5th Street	244894P	86.54	0.11	2	0	0	0	DC/AFO	0	0	Crossing has only 1 track across the roadway; not 3 tracks	NO
Main Street	244895W	86.77	0.23	4	0	0	0	DC/AFO	0	0	Crossing has gates, flashers(9 sets), xbucks, bells, OH cantilevers on each approach. Circuitry is CWT.	NO, 1st and 5th are within 1/4 mi; need to part of a corridor
1st Street	244897K	86.94	0.17	2	0	0	0	DC/AFO	0	0	No changes noted from FRA Rpt data	NO
SH 257 (former ballpark)	244898S	87.37	0.43	2	0	4	1	DC/AFO	0	0	No changes noted from FRA Rpt data	NO
WCR 66 Noted as Private no signs	849382W	27.96	0.22	0	0	0	0	None	0	0	Crossing has xbucks and 1 track across	NO
WCR 23 Listed as CR 21.8 in FRA Rpt	245106Y	89.21	1.05	2	0	0	0	DC/AFO	0	1	Crossing has Yield signs and new concrete crossing surface	NO
WCR 23.75 & WCR 66	245108M	90.26	1.05	2	0	0	0	DC/AFO	0	0	No changes noted from FRA Rpt data	NO

Highlighted data from FRA Inventory Reports has changed or was incorrect.

Crossings closer than 1/4 mile from next nearest crossing.

Figure 3. Concept Costs

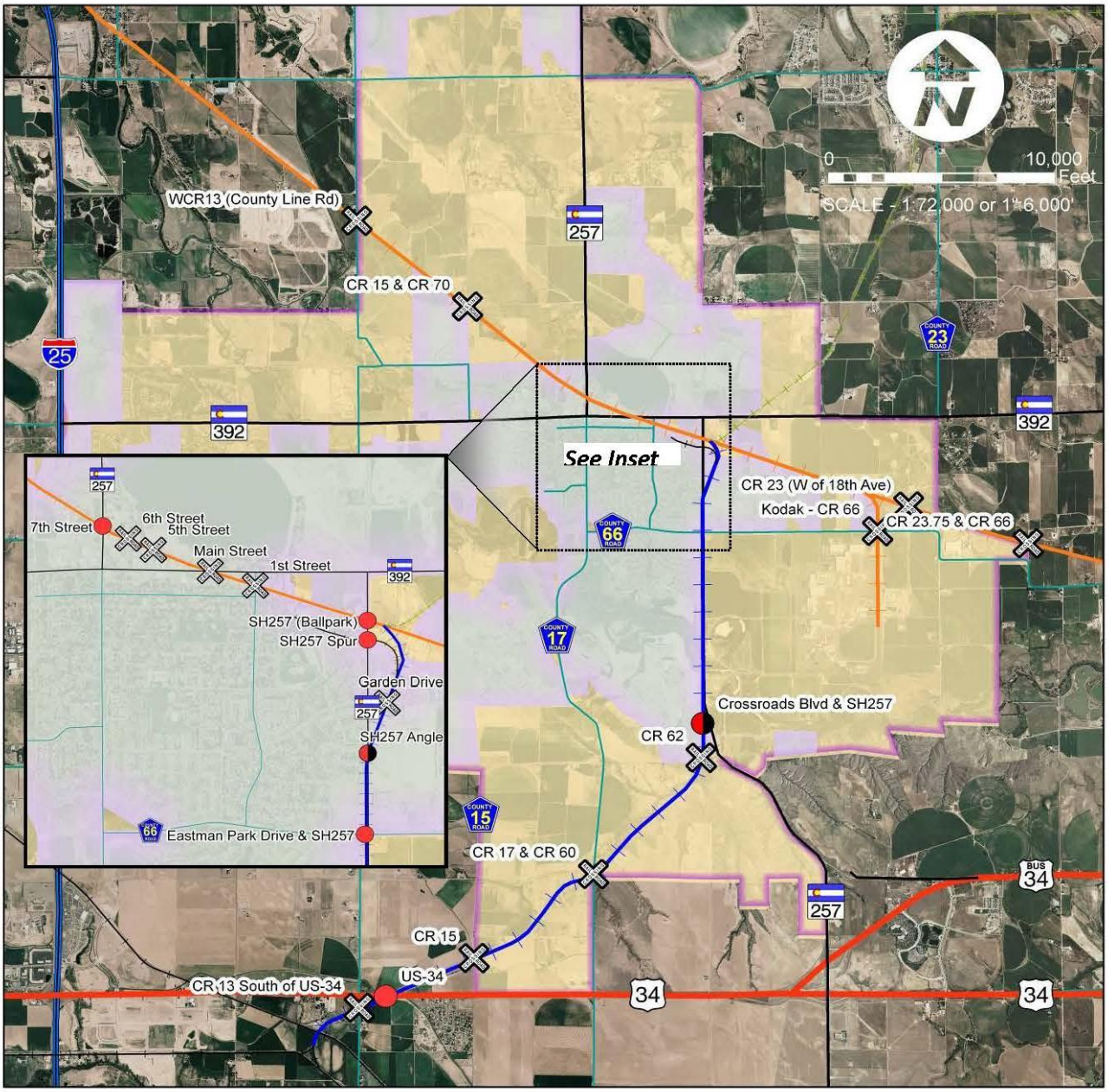
STREET	RR CIRCUITRY	GATES/ LIGHTS	CROSSING SURFACE	SSM Alternatives: RAISED MEDIANS	ONE-WAY STREET	4-QUAD GATES	WAYSIDE HORNS	CLOSURE	Concept Level Costs by Option (1): CWT Circuitry /New Bungalow	Upgraded Circuitry	Raised Medians	One-way Street	Approach Gates/ Flashers/ Bells	4-Quad Gates	Wayside Horns	Opinion of Construc-tion Cost
GWR Main Line																
WCR 17 & WCR 60	DC/AFO	NO	asphalt				X		$100,000				$145,000		$80,000	$325,000
						X			$100,000					$240,000		$340,000
Crossroads Blvd	CWT	YES	conc	**HAS GATES, FLASHERS, BELLS, RAISED MEDIANS AND CWT CIRCUITRY. CROSSING IS QZ COMPLIANT.												$0
Eastman Park Dr.	DC/AFO	NO	conc				X		$100,000				$145,000		$80,000	$325,000
						X			$100,000					$240,000		$340,000
SH 257 Angle	?	YES	conc	X					$100,000		$30,000					$130,000
							X		$100,000						$80,000	$180,000
Garden Drive	NONE	NO	conc & asphalt	X					$100,000		$30,000		$145,000			$275,000
						X			$100,000					$240,000		$340,000
SH 257 Spur	NONE	LIGHTS	conc	X					$50,000		$50,000		$100,000			$200,000
*could be excluded from the Quiet Zone if infrequently used						X			$100,000					$240,000		$340,000
GWR Greeley Line																
WCR 15 & WCR 70	DC/AFO	NO	asphalt				X		$100,000				$145,000		$80,000	$325,000
						X			$100,000					$240,000		$340,000
7th Street	DC/AFO	LIGHTS	conc	X					$100,000		$30,000		$100,000			$230,000
*could also consider a modified SSM installation to include the north median (< req'd						X			$100,000					$240,000		$340,000
6th Street	DC/AFO	NO	asphalt				X		$100,000				$145,000		$80,000	$325,000
						X			$100,000					$240,000		$340,000
5th Street	DC/AFO	YES	conc				X		$100,000				$145,000		$80,000	$325,000
						X			$100,000					$240,000		$340,000
Main Street	CWT	YES	conc	X							$30,000					$30,000
						X								$240,000		$240,000
1st Street	DC/AFO	YES	conc				X		$100,000				$145,000		$80,000	$325,000
						X			$100,000					$240,000		$340,000
SH 257 (former ballpark)	DC/AFO	LIGHTS	conc				X		$100,000				$145,000		$80,000	$325,000
						X			$100,000					$240,000		$340,000
WCR 66	NONE	NO	conc				X		$100,000				$145,000		$80,000	$325,000
						X			$100,000					$240,000		$340,000

(1) COSTS ARE BASED ON GWR COSTS FOR CROSSROADS BOULEVARD WITH 3% PER YEAR INCREASE.

Cost Range:	Low	High
GWR Main Line	$1,255,000	$1,540,000
GWR Greeley Line	$2,210,000	$2,620,000
Both Corridors-Total	$3,465,000	$4,160,000

Total (SSM Treatments at every crossing):	$3,585,000
Total (Crossings with 4-Quad Gates replaced with Wayside Horns:	$3,465,000
Total (Crossroads thru SH 257 Spur & 1st thru 7th Only):	$2,225,000

Exhibit A
Growth Management Area Crossing Exhibit



Legend

- Flashing Lights & Gates
- Flashing Lights
- Crossbucks Only
- Railroads
- Greeley Line
- Main Line
- Abandoned
- Windsor Municipal Limits
- Interstate
- U.S.
- State
- County Roads
- Windsor Growth Mngt Area

Exhibit B
Quiet Zone Calculator Results Spreadsheet

Cancel | Change Scenario: FHU W-CO T_39695 | Continue

Create New Zone
Manage Existing Zones
Log Off

Crossing	Street	Traffic	Warning Device	Pre-SSM	SSM	Risk	
244892B	**7TH SO BIRCH**	**11270**	**Gates**	0	0	17,396.93	MODIFY
244893H	**6TH NO ASH**	**99**	**Gates**	0	0	1,947.40	MODIFY
244894P	**5TH NO ASH**	**99**	**Gates**	0	0	1,947.40	MODIFY
244895W	**MAIN AT 3RD**	**11000**	**Gates**	0	0	12,993.55	MODIFY
244897K	**1ST SO MAIN**	**99**	**Gates**	0	0	1,947.40	MODIFY

Step by Step Instructions:

Step 1: To specify New Warning Device (For Pre-Rule Quiet Zone Only) and/or SSM, click the MODIFY Button

Step 2: Select proposed warning device or SSM. Then click the UPDATE button.To generate a spreadsheet of the values on this page, click on ASM button—This spreadsheet can then be used for ASM calculations.

Step 3: Repeat Step (2) until the SELECT button is shown at the bottom right side of this page. Note that the SELECT button is shown ONLY when the Quiet Zone Risk Index falls below the NSRT or the Risk Index with Horn.

Step 4: To save the scenario and continue, click the SELECT button

* Only Public At Grade Crossings are listed.

Click for Supplementary Safety Measures [SSM]

Click for ASM spreadsheet: ASM * Note:The use of ASMs requires an application to and approval from the FRA.

Summary	
Proposed Quiet Zone:	FHU W-CO TEST QZ-1
Type:	New 24-hour QZ
Scenario:	FHU W-CO T_39695
Estimated Total Cost:	$0.00
Nationwide Significant Risk Threshold:	13722 .00
Risk Index with Horns:	4344.45
Quiet Zone Risk Index:	**7246.54**

Select

Exhibit C (following this sheet)

Alternative Safety Measure Risk Calculation Spreadsheet (FRA Data used)

Alternative Safety Measure Risk Calculation Spreadsheet (2008 Study-2008 Traffic Data used)

Alternative Safety Measure Risk Calculation Spreadsheet (2008 Study-2030 Projected Traffic Data used)

Town of Windsor, CO

Generated by: SJSA

SSM & ASM Alternative Improvements- GWR Corridor
Assessment of Risk for Existing Corridor thru Main Street

(Traffic Data is taken from FRA Inventory Reports)

4/17/2013

									Railroad Equipment						Traffic Equipment			Quiet Zone Treatment Elements	
STREET	DOT #	M.P.	MIN. DIST BTWN XINGS (mi.)	MIN. DIST BTWN XINGS (ft.)	MAX TIME TABLE SPEED	DAY THRU TRAINS	SWITCH TRAINS	TOTAL TRAINS	RR CIRCUITRY	GATES/ LIGHTS	LIGHTS	# FLASHING LIGHT PAIRS	BELLS	CROSSING SURFACE	INTERSECTION TRAFFIC CONTROL	NO. HIGH WAY LANES	TRAFFIC VOLUME	SSMs	Engineering ASMs ?
7th Street	244892B	86.33	0.10	528	20	2	2	4	DC/AFO	NO	YES	4	YES	conc	N/A	2	11,270		Flashing Light Pairs, Raised Medians
6th Street	244893H	86.43	0.10	528	20	2	2	4	DC/AFO	NO	NO	0	NO	asphalt	N/A	2	99		
5th Street	244894P	86.54	0.11	581	20	2	2	4	DC/AFO	NO	NO	0	NO	conc	N/A	2	99		
Main Street	244895W	86.77	0.23	1214	20	2	2	4	CWT?	YES	YES	9	YES	conc	N/A	4	11,000	CWT(assumed), Flashing Light Pairs, Gates	
1st Street	244897K	86.94	0.17	898	20	2	2	4	DC/AFO	NO	NO	0	NO	asphalt	N/A	2	99		

Comments:

1. Within these calculations, I don't know if credit is given for passive crossings that have cross bucks and also stop or yield signs.
2. The Resource Allocation procedure, page 11, discusses factors based on different categories of passive crossings, and flashing lights (only) crossings. The passive crossing categories include Class 3 (stop signs) and Class 4 (cross bucks). The Flashing Lights category includes Class 6 (Highway signals, wig-wags or bells). However, I don't know if all of these classes of conditions were considered in the resulting factors, or if there is an additional factor to be included for crossings that have any of these additional warning devices.

(Traffic Data is taken from FRA Inventory Reports)

Rail-Highway Crossing Resource Allocation Procedure: User's Guide, Third Edition, August 1987 Calculations

Crossing Characterization Factor									General Accident Prediction Formula						Probability of Fatal Accident					
Crossing Category	Formula Constant, K	Eqn. 1 Exposure Index Factor, EI	Eqn. 2 Day Thru Trains Factor, DT	Eqn. 3 Max. Timetable Speed Factor, MS	Eqn. 4 Main Tracks Factor, MT	Eqn. 5 Highway Paved Factor, HP	Eqn. 6 Highway Lanes Factor, HL	Eqn. 7 Crossing Characteristic Factor, a	Accidents in last 10 years, N	No. of years, T	Accidents per year, N / T	Formula Weighting Factor, To	Accident Prediction, B	Final Accident Prediction, A	Constant, KF	Max Timetable Speed Factor, MS	Day Thru Trains Factor, TT	Switch Trains per Day Factor, TS	Urban or Rural Factor, UR	Probability of Fatal Accident, P(FA|A)
Flashing Lights	0.0003351	157.73	1.31	1.00	1.21	1.00	1.20	0.1008	0	10	0	6.63	0.040	0.0279	440.9	0.050	0.909	1.101	1.616	0.0272
Passive Crossing	0.0006938	16.59	1.53	1.17	1.00	1.00	1.00	0.0206	0	10	0	14.17	0.012	0.0099	440.9	0.050	0.909	1.101	1.616	0.0272
Passive Crossing	0.0006938	16.59	1.53	1.17	1.00	1.00	1.00	0.0206	0	10	0	14.17	0.012	0.0099	440.9	0.050	0.909	1.101	1.616	0.0272
Gates/Flashers	0.0005745	37.30	1.53	1.00	1.16	1.00	1.53	0.0585	0	10	0	9.22	0.028	0.0188	440.9	0.050	0.909	1.101	1.616	0.0272
Passive Crossing	0.0006938	16.59	1.53	1.17	1.00	1.00	1.00	0.0206	0	10	0	14.17	0.012	0.0099	440.9	0.050	0.909	1.101	1.616	0.0272
Passive Crossing	0.0006938	16.59	1.53	1.17	1.00	1.00	1.00	0.0206	0	10	0	14.17	0.012	0.0099	440.9	0.050	0.909	1.101	1.616	0.0272

Crossing Characteristic Factor Equations:

Eqn. 1:
Passive: ((c x t + 0.2)/0.2)^0.37
Flashing Lights: ((c x t + 0.2)/0.2)^0.4106
Gates: ((c x t + 0.2)/0.2)^0.2942
c = no. hwy vehicles per day
t = no. trains per day

Eqn. 2:
Passive: ((d + 0.2)/0.2)^0.178
Flashing Lights: ((d + 0.2)/0.2)^0.1131
Gates: ((d + 0.2)/0.2)^0.1781
d = no. thru trains during daylight

Eqn. 3
Passive: e^0.0077ms
Flashing Lights: 1.0
Gates: 1.0
ms = max. timetable speed

Eqn. 4:
Passive: 1.0
Flashing Lights: e^0.1917mt
Gates: e^0.1512mt
mt = no. main tracks

Eqn. 5
Passive: e^-0.5966(hp-1)
Flashing Lights: 1.0
Gates: 1.0
hp = hwy paved? Yes=1; No=2

Eqn. 6:
Passive: 1.0
Flashing Lights: e^0.1826(h1-1)
Gates: e^0.1420(h1-1)
h1 = no. hwy lanes

Eqn. 7:
a = K x EI x DT x MS x MT x HP x HL

General Accident Prediction Formula:

$$B = \frac{To}{To + T} * (a) + \frac{T}{To + T} * (N / T)$$

where:
A = final where accident prediction, accidents per year per crossing
** A = 0.8239 * B for Passive crossings
** A = 0.6935 * B for Flashing Lights
** A = 0.6714 * B for Gates

a = Initial unnormalized accident prediction from basic formula

N / T = accidents per year; N=number of observed accidents in T years
To = formular weighting factor = 1.0 / (0.05 + a)

**FRA's Rail-Highway Crossing Accident/Incident and Inventory Bulletin was checked for adjustments to normalizing constants for passive crossings, flashing light crossings and gated crossing (in formula for A) and are reflected in this calculation. Most current Bulletin found reflects adjustments dated 1992.

(Traffic Data is taken from FRA Inventory Reports)

Probability of Casualty Accident							FRA Final Rule Risk Index Calculation (Final Rule Appendix D, Pg. 47664)								Corridor Risk Index Calculations		
Constant, KC	Max Timetable Speed Factor, MS	Number of Tracks Factor, TK	Urban or Rural Factor, UR	Probability of Casualty Accident, P(CA|A)	Predicted Fatal Accidents per year, FA	Predicted Casualty Accidents per year, CA	Predicted Collissions PC (= A)	P(FC|C) (= P(FA|A))	Predicted Cost of Fatalities	Predicted Collissions PC (= A)	P(CC|C) - P(FC|C)	Predicted Cost of Injuries	Risk Index (with Max. Speed 20 MPH)	Risk Index from QZRI Calculator (SSM treatment)	Existing Risk Index of Corridor today (1ST-7TH)	Existing Risk Index of Corridor today W QZRI @ MAIN	
4.481	0.358	1.122	1.527	0.2669	0.001	0.007	0.0279	0.0272	2685	0.0279	0.2397	10372	13057		7170	8004	Both calculations of the Quiet Zone Risk Index are below the current Nationwide Significant Risk Threshold of 13, 772.
4.481	0.358	1.122	1.527	0.2669	0.000	0.003	0.0099	0.0272	957	0.0099	0.2397	3698	4656				
4.481	0.358	1.122	1.527	0.2669	0.000	0.003	0.0099	0.0272	957	0.0099	0.2397	3698	4656				
4.481	0.358	1.122	1.527	0.2669	0.001	0.005	0.0188	0.0272	1815	0.0188	0.2397	7010	8825	12994			
4.481	0.358	1.122	1.527	0.2669	0.000	0.003	0.0099	0.0272	957	0.0099	0.2397	3698	4656				

Probability of a Fatal Accident given an accident occurs:

P(FA|A) = 1 / (1 + KF * MS * TT * TS * UR)

P(FA|A) = probability of a fatal accident, given an accident

KF =	formula constant (440.9)		
MS =	factor for maximum timetable speed =	ms^-0.9981	ms=max timetable speed
TT =	factor for thru trains per day =	(tt + 1)^-0.0872	tt=thru trains per day
TS =	factor for switch trains per day =	(ts + 1)^0.0872	ts=switch trains per day
UR =	factor for urban or rural crossing =	e^0.357ur	ur: urban=1.344; rural=1.0

Probability of a Casualty Accident given an accident occurs:

P(CA|A) = 1 / (1 + KC * MS * TK * UR)

P(CA|A) = probability of a casualty accident, given an accident

KC =	formula constant (4.481)		
MS =	factor for maximum timetable speed	ms^-0.343	ms=max timetable speed
TK =	factor for number of tracks	e^0.1153tk	tk=total number of tracks
UR =	factor for urban or rural crossing	e^0.296ur	ur: urban=1.429; rural=1.0

Risk Index Formula:

Risk Index = Integer Sum of the Predicted Cost of Fatalities and the Predicted Cost of Injuries

Predicted Cost of Fatalities = PC * P(FC|C) * Avg. No.of fatalities in fatal collisions * $3 million

PC = A (Predicted accidents per year)

Avg. No. of fatalities in fatal collisions = 1.1825 (from FRA Final Rule, Pg 47664, Risk Index, Part e)

Predicted Cost of Casualties = PC * (P(CC|C)) - P(FC|C)) * Avg. No. of injuries in injury collisions * $1,167,000

PC = A (Predicted accidents per year)

Avg. No. of injuries in injury collisions = 1.3303 (from FRA Final Rule, Pg 47664, Risk Index, Part e)

Predicted Fatal Accidents:

FA = P(FA|A) * A

FA = predicted fatal accidents per year

P(FA|A) = predicted fatal accident probability from eqn above

A = predicted accidents per year ("A" from prev. calc.)

Predicted Casualty Accidents:

CA = P(CA|A) * A

CA = predicted casualty accidents per year

P(CA|A)= predicted casualty accident probability from eqn. above

A = predicted accidents per year ("A" from prev. calc.)

Town of Windsor, CO

Generated by: SJSA

SSM & ASM Alternative Improvements- GWR Corridor
Assessment of Risk for Existing Corridor thru Main Street

(Traffic Data is taken from 2008 Study. Traffic volumes are for 2008.)

4/17/2013

									Railroad Equipment						Traffic Equipment			Quiet Zone Treatment Elements	
STREET	DOT #	M.P.	MIN. DIST BTWN XINGS (mi.)	MIN. DIST BTWN XINGS (ft.)	MAX TIME TABLE SPEED	DAY THRU TRAINS	SWITCH TRAINS	TOTAL TRAINS	RR CIRCUITRY	GATES/ LIGHTS	LIGHTS	# FLASHING LIGHT PAIRS	BELLS	CROSSING SURFACE	INTERSECTION TRAFFIC CONTROL	NO. HIGH WAY LANES	TRAFFIC VOLUME	SSMs	Engineering ASMs ?
7th Street	244892B	86.33	0.10	528	20	2	2	4	DC/AFO	NO	YES	4	YES	conc	N/A	2	6,542		Flashing Light Pairs, Raised Medians
6th Street	244893H	86.43	0.10	528	20	2	2	4	DC/AFO	NO	NO	0	NO	asphalt	N/A	2	540		
5th Street	244894P	86.54	0.11	581	20	2	2	4	DC/AFO	NO	NO	0	NO	conc	N/A	2	109		
Main Street	244895W	86.77	0.23	1214	20	2	2	4	CWT?	YES	YES	9	YES	conc	N/A	4	5,602	CWT(assumed), Flashing Light Pairs, Gates	
1st Street	244897K	86.94	0.17	898	20	2	2	4	DC/AFO	NO	NO	0	NO	asphalt	N/A	2	1,561		

Comments:

1. Within these calculations, I don't know if credit is given for passive crossings that have cross bucks and also stop or yield signs.
2. The Resource Allocation procedure, page 11, discusses factors based on different categories of passive crossings, and flashing lights (only) crossings. The passive crossing categories include Class 3 (stop signs) and Class 4 (cross bucks). The Flashing Lights category includes Class 6 (Highway signals, wig-wags or bells). However, I don't know if all of these classes of conditions were considered in the resulting factors, or if there is an additional factor to be included for crossings that have any of these additional warning devices.

(Traffic Data is taken from 2008 Study. Traffic volumes are for 2008.)

Rail-Highway Crossing Resource Allocation Procedure: User's Guide, Third Edition, August 1987 Calculations

Crossing Characterization Factor									General Accident Prediction Formula						Probability of Fatal Accident					
Crossing Category	Formula Constant, K	Eqn. 1 Exposure Index Factor, EI	Eqn. 2 Day Thru Trains Factor, DT	Eqn. 3 Max. Timetable Speed Factor, MS	Eqn. 4 Main Tracks Factor, MT	Eqn. 5 Highway Paved Factor, HP	Eqn. 6 Highway Lanes Factor, HL	Eqn. 7 Crossing Characteristic Factor, a	Accidents in last 10 years, N	No. of years, T	Accidents per year, N / T	Formula Weighting Factor, To	Accident Prediction, B	Final Accident Prediction, A	Constant, KF	Max Timetable Speed Factor, MS	Day Thru Trains Factor, TT	Switch Trains per Day Factor, TS	Urban or Rural Factor, UR	Probability of Fatal Accident, P(FA|A)
Flashing Lights	0.0003351	126.16	1.31	1.00	1.21	1.00	1.20	0.0806	0	10	0	7.66	0.035	0.0242	440.9	0.050	0.909	1.101	1.616	0.0272
Passive Crossing	0.0006938	31.07	1.53	1.17	1.00	1.00	1.00	0.0385	0	10	0	11.29	0.020	0.0168	440.9	0.050	0.909	1.101	1.616	0.0272
Passive Crossing	0.0006938	17.19	1.53	1.17	1.00	1.00	1.00	0.0213	0	10	0	14.02	0.012	0.0103	440.9	0.050	0.909	1.101	1.616	0.0272
Gates/Flashers	0.0005745	30.59	1.53	1.00	1.16	1.00	1.53	0.0480	0	10	0	10.21	0.024	0.0163	440.9	0.050	0.909	1.101	1.616	0.0272
Passive Crossing	0.0006938	46.02	1.53	1.17	1.00	1.00	1.00	0.0571	0	10	0	9.34	0.028	0.0227	440.9	0.050	0.909	1.101	1.616	0.0272

Crossing Characteristic Factor Equations:

Eqn. 1:
Passive: ((c x t + 0.2)/0.2)^0.37
Flashing Lights: ((c x t + 0.2)/0.2)^0.4106
Gates: ((c x t + 0.2)/0.2)^0.2942
c = no. hwy vehicles per day
t = no. trains per day

Eqn. 2:
Passive: ((d + 0.2)/0.2)^0.178
Flashing Lights: ((d + 0.2)/0.2)^0.1131
Gates: ((d + 0.2)/0.2)^0.1781
d = no. thru trains during daylight

Eqn. 3
Passive: e^0.0077ms
Flashing Lights: 1.0
Gates: 1.0
ms = max. timetable speed

Eqn. 4:
Passive: 1.0
Flashing Lights: e^0.1917mt
Gates: e^0.1512mt
mt = no. main tracks

Eqn. 5
Passive: e^-0.5966(hp-1)
Flashing Lights: 1.0
Gates: 1.0
hp = hwy paved? Yes=1; No=2

Eqn. 6:
Passive: 1.0
Flashing Lights: e^0.1826(h1-1)
Gates: e^0.1420(h1-1)
h1 = no. hwy lanes

Eqn. 7:
a = K x EI x DT x MS x MT x HP x HL

General Accident Prediction Formula:

$$B = \frac{To}{To + T} * (a) + \frac{T}{To + T} * (N / T)$$

where:
A = final where accident prediction, accidents per year per crossing
** A = 0.8239 * B for Passive crossings
** A = 0.6935 * B for Flashing Lights
** A = 0.6714 * B for Gates

a = Initial unnormalized accident prediction from basic formula

N / T = accidents per year; N=number of observed accidents in T years
To = formular weighting factor = 1.0 / (0.05 + a)

**FRA's Rail-Highway Crossing Accident/Incident and Inventory Bulletin was checked for adjustments to normalizing constants for passive crossings, flashing light crossings and gated crossing (in formula for A) and are reflected in this calculation. Most current Bulletin found reflects adjustments dated 1992.

(Traffic Data is taken from 2008 Study. Traffic volumes are for 2008.)

Probability of Casualty Accident							FRA Final Rule Risk Index Calculation (Final Rule Appendix D, Pg. 47664)								Corridor Risk Index Calculations		
Constant, KC	Max Timetable Speed Factor, MS	Number of Tracks Factor, TK	Urban or Rural Factor, UR	Probability of Casualty Accident, P(CA|A)	Predicted Fatal Accidents per year, FA	Predicted Casualty Accidents per year, CA	Predicted Collissions PC (= A)	P(FC|C) (= P(FA|A))	Predicted Cost of Fatalities	Predicted Collissions PC (= A)	P(CC|C) - P(FC|C)	Predicted Cost of Injuries	Risk Index (with Max. Speed 20 MPH)	Risk Index from QZRI Calculator (SSM treatment)	Existing Risk Index of Corridor today (1ST-7TH)	Existing Risk Index of Corridor today W QZRI @ MAIN	
4.481	0.358	1.122	1.527	0.2669	0.001	0.006	0.0242	0.0272	2336	0.0242	0.2397	9022	11357		8462	9536	Both calculations of the Quiet Zone Risk Index are below the current Nationwide Significant Risk Threshold of 13, 772.
4.481	0.358	1.122	1.527	0.2669	0.000	0.004	0.0168	0.0272	1622	0.0168	0.2397	6267	7889				
4.481	0.358	1.122	1.527	0.2669	0.000	0.003	0.0103	0.0272	988	0.0103	0.2397	3816	4803				
4.481	0.358	1.122	1.527	0.2669	0.000	0.004	0.0163	0.0272	1567	0.0163	0.2397	6054	7621	12994			
4.481	0.358	1.122	1.527	0.2669	0.001	0.006	0.0227	0.0272	2188	0.0227	0.2397	8450	10638				

Probability of a Fatal Accident given an accident occurs:

P(FA|A) = 1 / (1 + KF * MS * TT * TS * UR)

P(FA|A) = probability of a fatal accident, given an accident

KF =	formula constant (440.9)		
MS =	factor for maximum timetable speed =	ms^-0.9981	ms=max timetable speed
TT =	factor for thru trains per day =	(tt + 1)^-0.0872	tt=thru trains per day
TS =	factor for switch trains per day =	(ts + 1)^0.0872	ts=switch trains per day
UR =	factor for urban or rural crossing =	e^0.357ur	ur: urban=1.344; rural=1.0

Probability of a Casualty Accident given an accident occurs:

P(CA|A) = 1 / (1 + KC * MS * TK * UR)

P(CA|A) = probability of a casualty accident, given an accident

KC =	formula constant (4.481)		
MS =	factor for maximum timetable speed	ms^-0.343	ms=max timetable speed
TK =	factor for number of tracks	e^0.1153tk	tk=total number of tracks
UR =	factor for urban or rural crossing	e^0.296ur	ur: urban=1.429; rural=1.0

Risk Index Formula:

Risk Index = Integer Sum of the Predicted Cost of Fatalities and the Predicted Cost of Injuries

Predicted Cost of Fatalities = PC * P(FC|C) * Avg. No.of fatalities in fatal collisions * $3 million

PC = A (Predicted accidents per year)

Avg. No. of fatalities in fatal collisions = 1.1825 (from FRA Final Rule, Pg 47664, Risk Index, Part e)

Predicted Cost of Casualties = PC * (P(CC|C)) - P(FC|C)) * Avg. No. of injuries in injury collisions * $1,167,000

PC = A (Predicted accidents per year)

Avg. No. of injuries in injury collisions = 1.3303 (from FRA Final Rule, Pg 47664, Risk Index, Part e)

Predicted Fatal Accidents:

FA = P(FA|A) * A

FA = predicted fatal accidents per year

P(FA|A) = predicted fatal accident probability from eqn above

A = predicted accidents per year ("A" from prev. calc.)

Predicted Casualty Accidents:

CA = P(CA|A) * A

CA = predicted casualty accidents per year

P(CA|A)= predicted casualty accident probability from eqn. above

A = predicted accidents per year ("A" from prev. calc.)

Town of Windsor, CO

Generated by: SJSA

SSM & ASM Alternative Improvements- GWR Corridor
Assessment of Risk for Existing Corridor thru Main Street

(Traffic Data is taken from 2008 Study. Traffic volumes are projected for 2030.)

4/17/2013

									Railroad Equipment						Traffic Equipment			Quiet Zone Treatment Elements	
STREET	DOT #	M.P.	MIN. DIST BTWN XINGS (mi.)	MIN. DIST BTWN XINGS (ft.)	MAX TIME TABLE SPEED	DAY THRU TRAINS	SWITCH TRAINS	TOTAL TRAINS	RR CIRCUITRY	GATES/ LIGHTS	LIGHTS	# FLASHING LIGHT PAIRS	BELLS	CROSSING SURFACE	INTERSECTION TRAFFIC CONTROL	NO. HIGH WAY LANES	TRAFFIC VOLUME	SSMs	Engineering ASMs ?
7th Street	244892B	86.33	0.10	528	20	2	2	4	DC/AFO	NO	YES	4	YES	conc	N/A	2	7,900		Flashing Light Pairs, Raised Medians
6th Street	244893H	86.43	0.10	528	20	2	2	4	DC/AFO	NO	NO	0	NO	asphalt	N/A	2	1,410		
5th Street	244894P	86.54	0.11	581	20	2	2	4	DC/AFO	NO	NO	0	NO	conc	N/A	2	280		
Main Street	244895W	86.77	0.23	1214	20	2	2	4	CWT?	YES	YES	9	YES	conc	N/A	4	16,000	CWT(assumed), Flashing Light Pairs, Gates	
1st Street	244897K	86.94	0.17	898	20	2	2	4	DC/AFO	NO	NO	0	NO	asphalt	N/A	2	4,080		

Comments:

1. Within these calculations, I don't know if credit is given for passive crossings that have cross bucks and also stop or yield signs.
2. The Resource Allocation procedure, page 11, discusses factors based on different categories of passive crossings, and flashing lights (only) crossings. The passive crossing categories include Class 3 (stop signs) and Class 4 (cross bucks). The Flashing Lights category includes Class 6 (Highway signals, wig-wags or bells). However, I don't know if all of these classes of conditions were considered in the resulting factors, or if there is an additional factor to be included for crossings that have any of these additional warning devices.

(Traffic Data is taken from 2008 Study. Traffic volumes are projected for 2030.)

Rail-Highway Crossing Resource Allocation Procedure: User's Guide, Third Edition, August 1987 Calculations

Crossing Characterization Factor									General Accident Prediction Formula						Probability of Fatal Accident					
Crossing Category	Formula Constant, K	Eqn. 1 Exposure Index Factor, EI	Eqn. 2 Day Thru Trains Factor, DT	Eqn. 3 Max. Timetable Speed Factor, MS	Eqn. 4 Main Tracks Factor, MT	Eqn. 5 Highway Paved Factor, HP	Eqn. 6 Highway Lanes Factor, HL	Eqn. 7 Crossing Characteristic Factor, a	Accidents in last 10 years, N	No. of years, T	Accidents per year, N / T	Formula Weighting Factor, To	Accident Prediction, B	Final Accident Prediction, A	Constant, KF	Max Timetable Speed Factor, MS	Day Thru Trains Factor, TT	Switch Trains per Day Factor, TS	Urban or Rural Factor, UR	Probability of Fatal Accident, P(FA|A)
Flashing Lights	0.0003351	136.32	1.31	1.00	1.21	1.00	1.20	0.0871	0	10	0	7.29	0.037	0.0255	440.9	0.050	0.909	1.101	1.616	0.0272
Passive Crossing	0.0006938	44.32	1.53	1.17	1.00	1.00	1.00	0.0550	0	10	0	9.53	0.027	0.0221	440.9	0.050	0.909	1.101	1.616	0.0272
Passive Crossing	0.0006938	24.37	1.53	1.17	1.00	1.00	1.00	0.0302	0	10	0	12.47	0.017	0.0138	440.9	0.050	0.909	1.101	1.616	0.0272
Gates/Flashers	0.0005745	41.65	1.53	1.00	1.16	1.00	1.53	0.0653	0	10	0	8.67	0.030	0.0204	440.9	0.050	0.909	1.101	1.616	0.0272
Passive Crossing	0.0006938	65.66	1.53	1.17	1.00	1.00	1.00	0.0814	0	10	0	7.61	0.035	0.0290	440.9	0.050	0.909	1.101	1.616	0.0272

Crossing Characteristic Factor Equations:

Eqn. 1:
Passive: ((c x t + 0.2)/0.2)^0.37
Flashing Lights: ((c x t + 0.2)/0.2)^0.4106
Gates: ((c x t + 0.2)/0.2)^0.2942
c = no. hwy vehicles per day
t = no. trains per day

Eqn. 2:
Passive: ((d + 0.2)/0.2)^0.178
Flashing Lights: ((d + 0.2)/0.2)^0.1131
Gates: ((d + 0.2)/0.2)^0.1781
d = no. thru trains during daylight

Eqn. 3
Passive: e^0.0077ms
Flashing Lights: 1.0
Gates: 1.0
ms = max. timetable speed

Eqn. 4:
Passive: 1.0
Flashing Lights: e^0.1917mt
Gates: e^0.1512mt
mt = no. main tracks

Eqn. 5
Passive: e^-0.5966(hp-1)
Flashing Lights: 1.0
Gates: 1.0
hp = hwy paved? Yes=1; No=2

Eqn. 6:
Passive: 1.0
Flashing Lights: e^0.1826(h1-1)
Gates: e^0.1420(h1-1)
h1 = no. hwy lanes

Eqn. 7:
a = K x EI x DT x MS x MT x HP x HL

General Accident Prediction Formula:

$$B = \frac{To}{To + T} * (a) + \frac{T}{To + T} * (N / T)$$

where:
A = final where accident prediction, accidents per year per crossing
** A = 0.8239 * B for Passive crossings
** A = 0.6935 * B for Flashing Lights
** A = 0.6714 * B for Gates

a = Initial unnormalized accident prediction from basic formula

N / T = accidents per year; N=number of observed accidents in T years
To = formular weighting factor = 1.0 / (0.05 + a)

**FRA's Rail-Highway Crossing Accident/Incident and Inventory Bulletin was checked for adjustments to normalizing constants for passive crossings, flashing light crossings and gated crossing (in formula for A) and are reflected in this calculation. Most current Bulletin found reflects adjustments dated 1992.

(Traffic Data is taken from 2008 Study. Traffic volumes are projected for 2030.)

Probability of Casualty Accident							FRA Final Rule Risk Index Calculation (Final Rule Appendix D, Pg. 47664)								Corridor Risk Index Calculations		
Constant, KC	Max Timetable Speed Factor, MS	Number of Tracks Factor, TK	Urban or Rural Factor, UR	Probability of Casualty Accident, P(CA|A)	Predicted Fatal Accidents per year, FA	Predicted Casualty Accidents per year, CA	Predicted Collissions PC (= A)	P(FC|C) (= P(FA|A))	Predicted Cost of Fatalities	Predicted Collissions PC (= A)	P(CC|C) - P(FC|C)	Predicted Cost of Injuries	Risk Index (with Max. Speed 20 MPH)	Risk Index from QZRI Calculator (SSM treatment)	Existing Risk Index of Corridor today (1ST-7TH)	Existing Risk Index of Corridor today W QZRI @ MAIN	
4.481	0.358	1.122	1.527	0.2669	0.001	0.007	0.0255	0.0272	2455	0.0255	0.2397	9481	11936		10377	11067	Both calculations of the Quiet Zone Risk Index are below the current Nationwide Significant Risk Threshold of 13, 772.
4.481	0.358	1.122	1.527	0.2669	0.001	0.006	0.0221	0.0272	2129	0.0221	0.2397	8222	10351				
4.481	0.358	1.122	1.527	0.2669	0.000	0.004	0.0138	0.0272	1331	0.0138	0.2397	5142	6473				
4.481	0.358	1.122	1.527	0.2669	0.001	0.005	0.0204	0.0272	1962	0.0204	0.2397	7580	9542	12994			
4.481	0.358	1.122	1.527	0.2669	0.001	0.008	0.0290	0.0272	2793	0.0290	0.2397	10788	13581				

Probability of a Fatal Accident given an accident occurs:

P(FA|A) = 1 / (1 + KF * MS * TT * TS * UR)

P(FA|A) = probability of a fatal accident, given an accident

KF =	formula constant (440.9)		
MS =	factor for maximum timetable speed =	ms^-0.9981	ms=max timetable speed
TT =	factor for thru trains per day =	(tt + 1)^-0.0872	tt=thru trains per day
TS =	factor for switch trains per day =	(ts + 1)^0.0872	ts=switch trains per day
UR =	factor for urban or rural crossing =	e^0.357ur	ur: urban=1.344; rural=1.0

Probability of a Casualty Accident given an accident occurs:

P(CA|A) = 1 / (1 + KC * MS * TK * UR)

P(CA|A) = probability of a casualty accident, given an accident

KC =	formula constant (4.481)		
MS =	factor for maximum timetable speed	ms^-0.343	ms=max timetable speed
TK =	factor for number of tracks	e^0.1153tk	tk=total number of tracks
UR =	factor for urban or rural crossing	e^0.296ur	ur: urban=1.429; rural=1.0

Risk Index Formula:

Risk Index = Integer Sum of the Predicted Cost of Fatalities and the Predicted Cost of Injuries

Predicted Cost of Fatalities = PC * P(FC|C) * Avg. No.of fatalities in fatal collisions * $3 million

PC = A (Predicted accidents per year)

Avg. No. of fatalities in fatal collisions = 1.1825 (from FRA Final Rule, Pg 47664, Risk Index, Part e)

Predicted Cost of Casualties = PC * (P(CC|C)) - P(FC|C)) * Avg. No. of injuries in injury collisions * $1,167,000

PC = A (Predicted accidents per year)

Avg. No. of injuries in injury collisions = 1.3303 (from FRA Final Rule, Pg 47664, Risk Index, Part e)

Predicted Fatal Accidents:

FA = P(FA|A) * A

FA = predicted fatal accidents per year

P(FA|A) = predicted fatal accident probability from eqn above

A = predicted accidents per year ("A" from prev. calc.)

Predicted Casualty Accidents:

CA = P(CA|A) * A

CA = predicted casualty accidents per year

P(CA|A)= predicted casualty accident probability from eqn. above

A = predicted accidents per year ("A" from prev. calc.)

M E M O R A N D U M

Date: May 20, 2013
To: Town Board
From: Wade Willis, Parks and Open Space Manager
Re: Lakeview Cemetery Master Plan Concept
Item #: 2.a.

Background / Discussion:

In 2009, Lakeview Cemetery underwent a brief master planning process through DOLA and CSU graduate students. The process identified some alternatives and additional uses of the land. In March 2013, staff selected Robert Peccia and Associates (RPA) to render landscape master planning services for the Lakeview Cemetery Master Plan Update, as additional land has been acquired and some components of the 2009 master plan did not reflect existing site constraints or feasibility.

Using the 2009 master plan as a base RPA is evaluating: proposed sexton facility, maintenance building alternatives, site circulation, western 4 acre parcel, site access, current trends and regional competitiveness. RPA will also be responsible for providing design drawings for the main entry sign located at the corner of 392 and 257, the replacement entry gates damaged in 2008, and an irrigation system to replace the current antiquated system. RPA is also in the process of completing a report relative to a comparison of all cemeteries within a 25 mile radius to compare costs, services offered, financial sustainability, and amenities available. Their scope also includes evaluating the feasibility of developing master plan components and evaluating the potential for cost recovery of the improvements.

RPA has prepared conceptual master plans for consideration based on submitted comments from the website and town staff for your consideration this evening. Staff would request Town Board provide feedback about the concepts or components of concepts that they like or would like to see as a part of one of the main entries into Windsor. What type of feel should Lakeview Cemetery portray, formal, park like, a place for quiet contemplation, a destination, a place to relax, exercise, or learn?

This plan has also been presented to PReCAB (05/07/13), as well as Historic Preservation Commission (05/08/13) and Planning Commission (05/15/13) as an informational item. Additional input has been solicited through a website developed by RPA to provide information about the process to the public and acquire feedback. http://www.rpa-hln.com/LakeviewCemetery . PReCAB will see it for final review and approval on 06/04/13 and Town Board will see it again for final approval on 06/10/13.

Financial impact:

N/A

Relationship to Strategic Plan:

N/A

Recommendation:

For review and comment. Formal board action will take place at a future meeting.

Attachments:

b. Master Plan Concepts

Lakeview Cemetery Master Plan
WINDSOR, COLORADO

CONTEXT

TOWN OF WINDSOR
RPA

Fort Logan - Three Sided Enclosure: All Windows

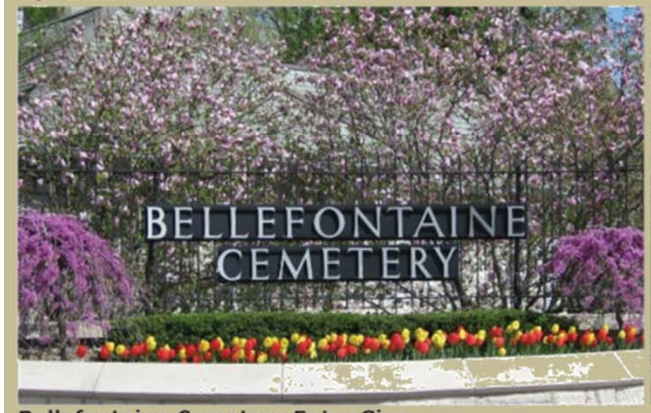
Missouri Veterans Committal Building

Open Air Committal Shelter

Open Air Committal Shelter

Three Sided Enclosure: Rear Stone Facade

Interior of Enclosed Committal Shelter



Bellefontaine Cemetery Entry Sign

Lakeview Cemetery - Broomfield

Example of Wrought-Iron Gate

Lakeview Cemetery
Master Plan
WINDSOR, COLORADO

CONCEPTS

TOWN OF WINDSOR

RPA

Memorial Wall with Random Columbarium Niches

Memorial Garden Wall for In-Ground Interments

Shared Bench Memorial

Shared Cenotaph in Ground Cover

Shared Memory Tree

Columbaria Along Path

Shared Wall Memorial

Cremation Rock Garden with Bronze Plaques

Cremation Rock Garden with Core-Drilled Interment Niche

Columbarium Wall

Memorial Gathering Space and Cenotaph Panels

Communal Memorial + Ossuary

Undulating Memorial Wall

Lakeview Cemetery Master Plan
WINDSOR, COLORADO

CONCEPTS

TOWN OF WINDSOR
RPA

Memorial Pavers in Turf

Reflective Plaza

Walled Garden Estates

Designed Views

Artistic Paving Pattern

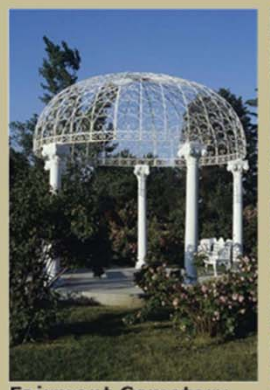
Reflective Water Feature

Timeless Stone Walls

Memorial Garden with Plantings

Rose Trellis - Memorial Garden

Memorial Rose Garden



Fairmont Cemetery
Rose Pavilion

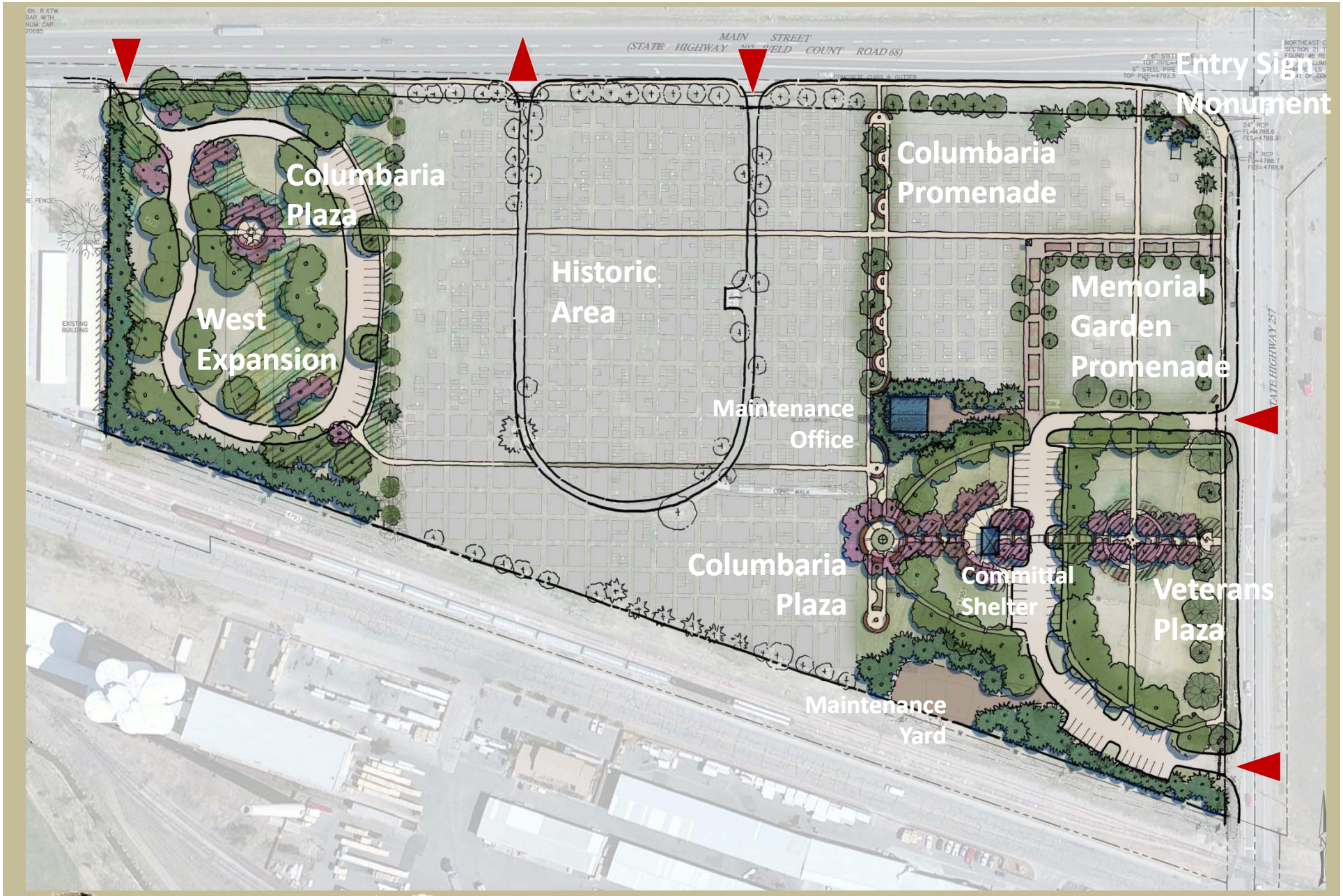
Rose Border

Lakeview Cemetery
Master Plan
WINDSOR, COLORADO

CONCEPTS

TOWN OF WINDSOR

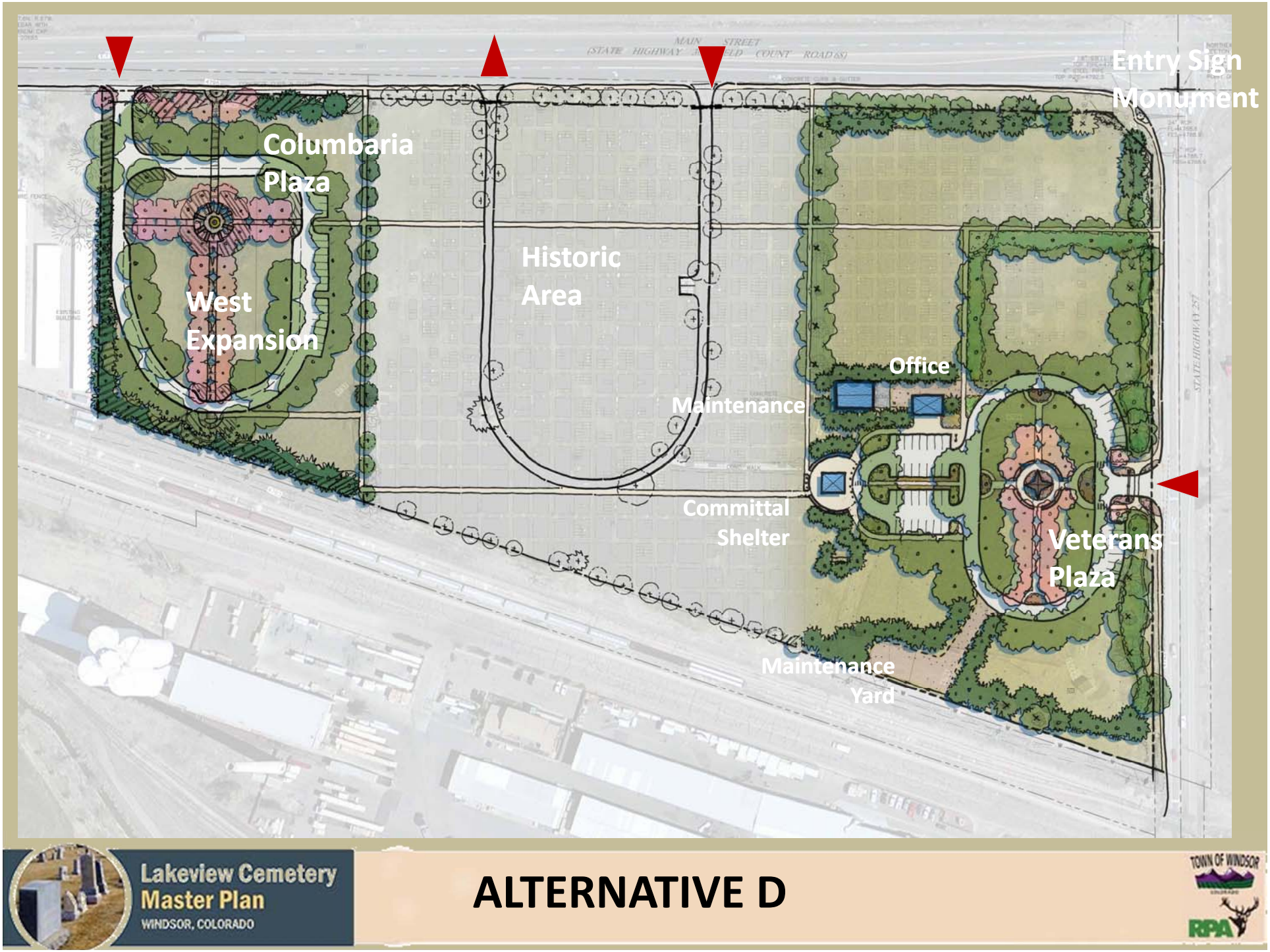
RPA



Lakeview Cemetery Master Plan
WINDSOR, COLORADO

ALTERNATIVE B

TOWN OF WINDSOR
RPA



Lakeview Cemetery
Master Plan
WINDSOR, COLORADO

ALTERNATIVE D

TOWN OF WINDSOR
RPA

Lakeview Cemetery
Master Plan
WINDSOR, COLORADO

ALTERNATIVE E

TOWN OF WINDSOR
RPA

M E M O R A N D U M

Date: May 20, 2013
To: Parks, Recreation & Culture Advisory Board
From: Carrie Knight, Art & Heritage Manager
Re: Museum Interpretive Landscape Concept
Item #: 3.a.

Background / Discussion:

In Spring 2008, museum staff worked with CSU students on the development of an interpretive landscape plan specific to the Town of Windsor Museum at Boardwalk. A preliminary plan was approved in March 2008. The following May, the tornado caused significant damage to the museum buildings at Boardwalk Park requiring staff to take a step back and devote energies to their restoration.

Between 2008 and 2012, museum staff had the ability to re-evaluate goals for the site, identify programming opportunities, and address maintenance concerns. This evaluative process revealed that use of the site had evolved over time and would, with all probability, continue to do so into the future. It was determined that significant modifications would be required to accommodate these considerations.

In March 2013, museum staff selected Robert Peccia and Associates (RPA) to render landscape master planning services for its interpretive site at Boardwalk Park. For future reference, the term "interpretive" refers to the landscape's capacity to support the "telling" of cultural and historic narratives important to the site. Department staff has consulted with RPA to ensure that the following components of an interpretive landscape plan receive due attention; a.) Orientation and Access, b.) Programmatic Space/Amenities, c.) Physical Appearance. RPA has prepared a presentation for your consideration highlighting key concepts. They will proceed based upon your recommendation and/or comments with a final plan for your future consideration.

This plan has also been presented to PReCAB (05/07/13), as well as Historic Preservation Commission (05/08/13) and Planning Commission (05/15/13) as an informational item. Additional public input has been solicited through the Town of Windsor website and Community Voice. PReCAB will see it for final review and approval on 06/04/13 and Town Board will see it again for final approval on 06/10/13.

Financial impact:

N/A

Relationship to Strategic Plan:

N/A

Recommendation:

For review and comment. Formal board action will take place at a future meeting.

Attachments:

b. Preferred Museum Landscape Concept

1. Clarified entry sequence and orientation node
2. Three gathering nodes for museum tours
3. Additional nodes/ outdoor program spaces
4. Beet – hands on interpretive sculpture
5. Spatial enclosure, access and ADA improvements:
   a. Winter Santa workshop circulation
   b. Social paths
   c. Summer kitchen plaza
   d. Farm equipment
   e. Visibility and connection to restrooms
   f. Activation of spaces (west of Depot and west of summer kitchen)

PREFERRED MUSEUM LANDSCAPE CONCEPT

FUTURE TOWN BOARD MEETINGS

Work Sessions & Regular Meetings will be held in the Board Chambers unless otherwise noted.

May 27, 2013	Memorial Day – Meetings cancelled
June 3, 2013 6:00 p.m. – First floor conference room	Town Board Work Session 25 mph speed limit discussion
June 10, 2013 5:30 p.m. - First floor conference room	Board/Manager/Attorney Monthly Meeting
June 10, 2013 7:00 p.m.	Town Board Meeting
June 17, 2013 6:00 p.m.	Town Board Work Session 2012 Audit Report Presentation Economic Development update
June 24, 2013 6:00 p.m.	Town Board Work Session
June 24, 2013 7:00 p.m.	Town Board Meeting
July 1, 2013 6:00 p.m.	Town Board Work Session
July 8, 2013 5:30 p.m. - First floor conference room	Board/Manager/Attorney Monthly Meeting
July 8, 2013 6:00 p.m.	Town Board Meeting Kern Board Meeting
July 15, 2013 6:00 p.m.	Town Board Work Session
July 22, 2013 6:00 p.m.	Town Board Work Session
July 22, 2013 7:00 p.m.	Town Board Meeting
July 29, 2013	Fifth Monday

Additional Events

June 18-21, 2013	CML Annual Conference

Future Work Session Topics

N/A