

# Pearl Parkway/Valmont Road

## Railroad Quiet Zone Conceptual Implementation Analysis Report



City of Boulder

December 2013

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## Purpose

The purpose of this document is to summarize the recommendations for possible future implementation of a Quiet Zone at Pearl Parkway and Valmont Road. As part of the railroad coordination scope for the proposed improvements at Pearl Parkway (30<sup>th</sup> Street to Foothills Parkway), the City of Boulder and Tsiouvaras Simmons Holderness (TSH) requested HDR to produce this technical report documenting the decision making process and the final recommended alternative concepts to implement a Quiet Zone at these two railroad crossings. The alternatives presented herein were developed in conjunction with the other proposed improvements along Pearl Parkway, which will be described later in this report. The preliminary alternatives were reviewed at the diagnostic meeting, held on Thursday, July 25, 2013, from 8:00 am to 11:00 am, with representatives from the City of Boulder, the Burlington Northern Santa Fe (BNSF) Railway, the Colorado Public Utilities Commission (PUC) and the Federal Railroad Administration (FRA), after which a preferred alternative for each crossing was identified. These preferred alternatives were refined and are presented in this report.

## Project Background

In 2007, the City of Boulder adopted an area plan (Transit Village Area Plan, or TVAP) for “Boulder Junction,” allowing for re-zoning and redevelopment of a large parcel of industrial and other land uses, bordered by Valmont Road, Pearl Parkway/Boulder Slough, 30<sup>th</sup> Street and Foothills Parkway. Phase I of this area plan redevelopment includes the 160-acre area between 30<sup>th</sup> Street and the BNSF railroad. The City of Boulder has planned roadway improvements along Pearl Parkway near the BNSF railroad crossing and there are active and future private property developments on each side of Pearl Parkway adjacent to this crossing. One of the developments (3100 Pearl Apartments) is under construction along the south side of Pearl, consisting of a 317-unit apartment complex. An RTD-owned parcel (Depot Square) on the north side of Pearl Parkway is also under construction and includes a bus transfer facility, parking garage, 71 apartment units and a 140-room hotel. In addition, the future RTD Northwest Commuter Rail Line is proposed to run parallel to BNSF with a station and additional transit-oriented development near the future rail station, which is proposed north of Depot Square and Goose Creek, between Pearl Parkway and Valmont Road.

Due to the current and proposed developments, the City has the foresight to review the necessary requirements for a Quiet Zone, should this improvement be considered for implementation in the future. This report presents the concept of a Quiet Zone, FRA policies for a Quiet Zone and preliminary-level cost estimates for the preliminary and preferred alternatives introduced in this report.

## Existing Conditions

**Railroad.** The existing track is owned and operated by the BNSF. This is part of the Colorado Division, Front Range Subdivision that runs from the BNSF 31<sup>st</sup> Yard in Denver, Colorado to Wendover, Wyoming. Currently, approximately eight trains a day pass through the Pearl Parkway and Valmont Road crossings with a maximum speed of 20 miles per hour.

**Pearl Parkway.** Pearl Parkway is an existing four-lane, east-west major arterial that crosses the BNSF tracks at a skewed angle where the tracks curve. An existing raised landscape median separates

eastbound and westbound traffic on both sides of the at-grade crossing with the BNSF tracks, extending approximately 400' west and running continuously east of this crossing to Frontier Avenue.

Improvements are currently planned for Pearl Parkway, with construction having begun when this report was written. Although changes will occur to the existing crossing configuration due to the phasing of the construction along Pearl Parkway, the final configurations will only move the existing signal gates on the northeast and southwest quadrants. The signal gates will be relocated approximately four feet closer to the centerline of roadway to accommodate the new location of curb and gutter. Existing center median-mounted flashers will remain. Also, a new multi-use path will be located on the north side of Pearl Parkway, and there is an existing multi-use path on the south side. A relocation of the existing bungalow (from NW to NE quadrant), upgrades to various railroad signal control systems, and roadway infrastructure improvements are also being completed in conjunction with the current Pearl Parkway project. That project is estimated to be complete at the end of 2014.

Per the FRA crossing inventory, the Pearl Parkway crossing has the following information: National Inventory Crossing ID No. 244815B, BNSF milepost 27.83 (existing gates, median-mounted flashers, bells, DC/AFO circuitry).

**Valmont Road.** Valmont Road is an existing four-lane, east-west major arterial that crosses the BNSF tracks at a skewed angle. It is approximately 2000 feet (0.39 miles) north of Pearl Parkway. Existing raised landscape medians are located east and west of the tracks for approximately 50 feet and 35 feet, respectively, and then are striped. The west approach is striped for a dedicated left-turn lane south into a business access. The east approach is striped double yellow, leading to left-turn lanes at the intersections with Wilderness Place (signalized) and Center Green Drive (unsignalized). There are existing signal gates on the northeast and southwest quadrants as well as center median-mounted flashers. Existing detached sidewalks are located on the north and south sides of the street for pedestrian/bicycle traffic.

Per the FRA crossing inventory, the Valmont Road crossing has the following information: National Inventory Crossing ID No. 244818W, BNSF milepost 31.45 (existing gates, median-mounted flashers, bells, DC/AFO circuitry).



Pearl Parkway, looking west



Valmont Road, looking east

## Quiet Zone Background

The establishment of a Quiet Zone is described by the FRA final ruling, 49CFR, parts 222 and 229. The Rule, which took effect in June 2005, was amended on August 17, 2006. The Rule is known as the “Train Horn Rule” and requires that the railroads under Federal Law sound their horn 15-20 seconds prior to arriving at the public at-grade crossings or a point beginning ¼ mile in advance of the crossing and continuing until the locomotive is in the crossing. By establishing a Quiet Zone, the City would obtain an exception to the Train Horn Rule. Generally, a Quiet Zone is a minimum of ½ mile in length and contains one or more crossings. Due to the close proximity of Pearl and Valmont, 2000 feet or .39 miles, practical considerations dictate that both crossings would be jointly converted to quiet crossings and part of a Quiet Zone to succeed in limiting the train horn sound in this overall proximity.

In order to obtain the exception, the City must establish Supplemental Safety Measures (SSMs) or other measures that would replace the use of the train horn and are approved under the Train Horn Rule. This means providing physical barriers and/or other protective measures to prevent motorists from entering an at-grade crossing when trains approach. By adding necessary SSMs, a Quiet Zone is established and locomotives are not required to sound their horn while approaching and crossing an at-grade crossing. However, it remains the locomotive crew’s decision to sound a train horn whenever the crew perceives a situation that requires it—such as a pedestrian on the track or railroad roadway workers working on the track. Typical SSMs in a Quiet Zone include:

**Four-quadrant gate system (4-quad gates).** A 4-quad gate prevents motorists from entering the rail crossing from any travel lane, even if the motorist tries to proceed around gates by using the oncoming travel lane. A typical 4-quad gate system includes safety measures to provide an escape route if a motorist is in the crossing when the crossing signals activate. This photo is a typical 4-quad gate installation.



**Two-quadrant gate (2-quad gate) system plus median barrier.** A conventional 2-quad gate system can be coupled with the installation of a raised median barrier (or non-traversable barrier) down the centerline of the road, for a minimum length of 100 feet each side of the crossing, to physically prevent motorists from entering the rail crossing by proceeding down an oncoming lane; it is permissible to reduce this median length to 60’ if there is a driveway within 100’ of the gate arm. This design will qualify as an SSM, but the median barrier can only be installed if it does not hamper access to and from the roadway to be protected. A mountable barrier (6” or less) can also be used in this scenario, but is not as effective as a non-traversable median barrier.

**Crossing Closure.** The most effective SSM is to close the at-grade roadway-rail crossing. This eliminates the crossing conflict between motorists and trains. Closures can be permanent in nature or temporary (for example, a crossing could be closed nightly at 10:00 pm).

Diagrams depicting additional SSMs can be found on **FIGURE 1**. These diagrams include graphical depictions of each SSM, an effectiveness rating for each and further discussion of effectiveness ratings. In addition to SSMs, Alternative Safety Measures (ASMs) are also a possibility. However, as these are not

“standard,” the ASMs require an added level of inspection, review and approval before a Quiet Zone can be initiated.

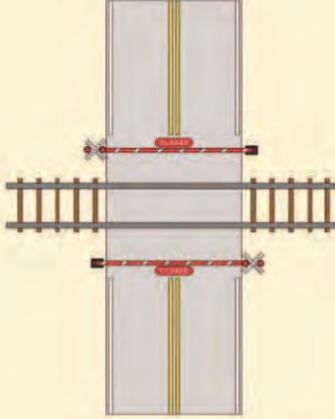
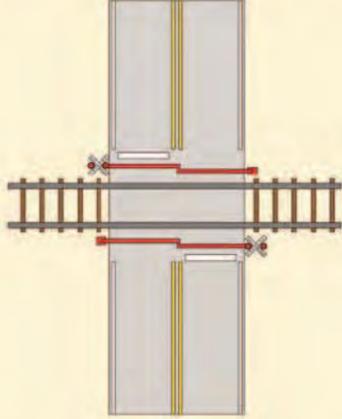
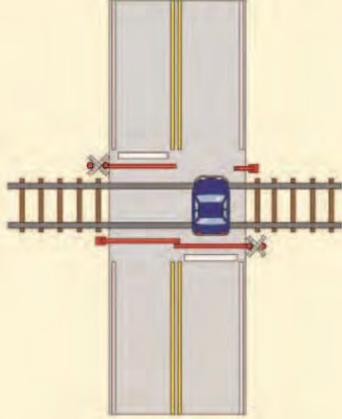
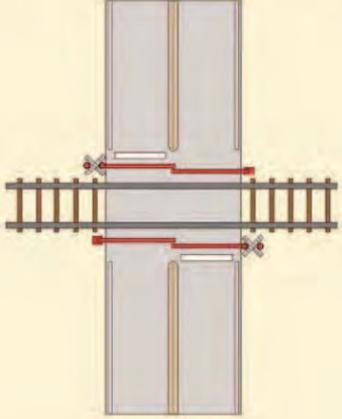
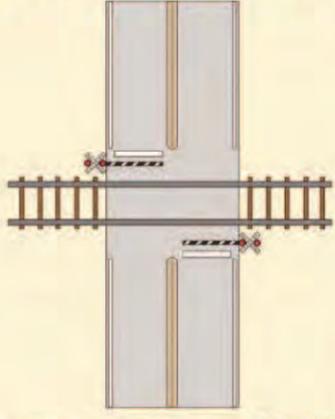
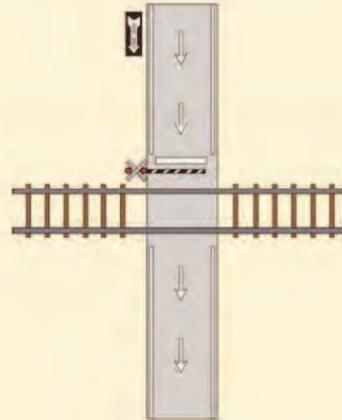
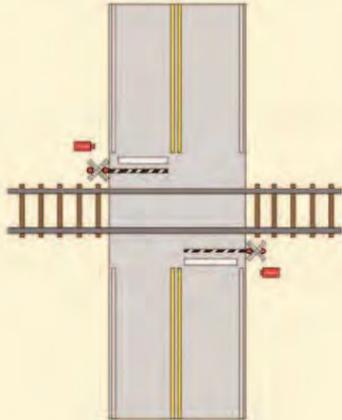
In addition to SSMs and ASMs, the FRA allows other propriety safety products designed to diminish train horn noise. For example, the Automated Horn System (AHS) permanently places a horn on a post adjacent to crossing devices. This stationary horn replaces the need for a train-mounted horn to be sounded up to ¼ mile in advance of the crossing. A second example is directional crossing bells. Newer electronic bells can be directionalized to target roadway travel lanes as opposed to broadcasting equally in all directions. Furthermore, the bells only need to sound as the crossing arm gates move up and down; the bells can be silenced while the crossing arms are in the down position.

The above SSMs and ASMs described are for vehicle traffic only. In addition to these SSMs, there are also SSMs for pedestrian/bicycle facilities, including signage, pavement markings, gates, z-crossings, etc. If a Quiet Zone is implemented, pedestrians will also need to be deterred from crossing the tracks while a train is approaching and passing through the at-grade crossing. New additional advanced warning signs and sidewalk/multi-use path markings are planned for all existing and proposed sidewalk and multi-use path crossings of the railroad at Pearl Parkway and at Valmont Road. MUTCD Part 8 includes recommendations for railroad protective measures for pedestrian/bicycle facilities. The existing and proposed configurations of Valmont Road and of the Pearl Parkway sidewalk/multi-use path crossings of the railroad are within acceptable setbacks from the primary roadway signal facilities, therefore no additional protective measures are necessary specific to the pedestrian/bicycle facilities at Pearl Parkway.

FIGURE 1. SUPPLEMENTAL SAFETY MEASURES

# Supplemental Safety Measures



<p><b>Temporary Closure</b></p>  <p>Effectiveness Rating - <b>1.00</b></p>	<p><b>Four Quadrant Gate System - No Vehicle Presence Detection</b></p>  <p>Effectiveness Rating - <b>0.82</b></p>	<p><b>Four Quadrant Gate System - With Vehicle Presence Detection</b></p>  <p>Effectiveness Rating - <b>0.77</b></p>	<p><b>Four Quadrant Gate System - With Medians of at Least 60 feet</b></p>  <p>Effectiveness Rating - <b>0.92</b></p>
<p><b>Gates with Medians or Channelization Devices - Mountable Curbs / Barrier Curbs</b></p>  <p>Effectiveness Rating - <b>0.75</b> <i>Mountable</i>              Effectiveness Rating - <b>0.80</b> <i>Barrier</i></p>	<p><b>One Way Street with Gates</b></p>  <p>Effectiveness Rating - <b>0.82</b></p>	<p><b>Photo Enforcement*</b></p>  <p>Effectiveness Rating - <b>0.78</b></p>	<p><b>Effectiveness Ratings:</b>              Effectiveness ratings reflect the percentage by which a Supplemental Safety Measure (SSM) has been determined by the FRA to reduce the probability of a collision at an at-grade public highway rail crossing. An SSM with an effectiveness rating of 0.82 reduces the probability of a collision by 82%. The effectiveness rating of a locomotive horn is estimated to be 0.38. Therefore SSMs must have an effectiveness rating of at least 0.38 in order to compensate for silencing locomotive horns.</p> <p>* Public Awareness efforts are critical to the success of this SSM. The public must be informed that horns are not being sounded and that violation of crossing laws will result in fines and penalties.</p> <p>Note: Drawings Not To Scale</p>

## Quiet Zone Process

When the City of Boulder is ready to implement a Quiet Zone, the FRA ruling will guide the process. One of the first tasks is to involve all of the affected jurisdictions. For these crossings, that would include the City of Boulder, the FRA, the BNSF and the PUC. This task was initiated on Thursday, July 25, 2013 when the diagnostic meeting was held with these agencies in attendance. The next step is to confirm the necessary railroad signal and roadway upgrades, design and install these railroad signal and roadway infrastructure upgrades at each crossing being considered for the Quiet Zone. Following completion of these improvements, verify the accuracy of the implemented conditions and adequacy of the current warning treatments and other railroad signal infrastructure. The final step is to update the FRA National Inventory of crossings for this location. This must be done six months before the Quiet Zone is implemented.

There are a few ways after the above steps are completed to establish a Quiet Zone:

1. The first uses the FRA Quiet Zone Calculator to determine if the Quiet Zone Risk Index (QZRI) is less than or equal to the Nationwide Significant Risk Threshold (NSRT). If this is found to be true at Pearl Parkway and Valmont Road, the City would install the required signage at each crossing, notify the affected parties, install the Constant Warning Time (CWT) circuitry, update the crossing inventory and silence the horns. Establishment of the Quiet Zone on this basis is subject to annual review as the NSRT changes. In addition, updates, including those to the USDOT Grade Crossing Inventory Form, must be submitted to FRA every 2 ½ to 3 years.
2. If the QZRI is more than the NSRT per the FRA Quiet Zone Calculator, installation of SSMs or ASMs will be needed. It should be noted that the use of ASMs must be approved in advance by the FRA. Once the SSMs or ASMs are implemented, the same steps above are used—installation of signs, notification of the affected parties, install the Constant Warning Time (CWT) circuitry and other necessary signal upgrades, update of the crossing inventory and silencing of the horns. Updates to the USDOT Grade Crossing Inventory Form are required every 4-½ to 5 years.
3. The last option applies when not every crossing has an SSM added (for instance, if SSMs were added only to Pearl Parkway and not to Valmont Road or vice versa). The Quiet Zone Calculator would be used to determine if the QZRI is less than the level of risk that would exist if the train horns were still to sound. If the QZRI is less than or equal to the Risk Index with Horns (RIWH), then the Quiet Zone can be established and will follow the first option above without SSMs or ASMs installed. The time frame for updating the Inventory Forms (2 ½ to 3 years) as well as the annual FRA review is also the same.

## Initial Quiet Zone Alternatives

**Pearl Parkway.** Four initial alternatives were reviewed to convert Pearl Parkway to a Quiet Zone. Exhibits depicting these alternatives, including description and cost estimates, can be found later in this report. It was determined that all of the alternatives would require that the BNSF upgrade the existing circuitry and possibly the existing hardware. The BNSF will complete much of this signal upgrade work in conjunction with the current Pearl Parkway project. Prior to the diagnostic meeting, possible additional protective measures to be considered for the existing (south side) and proposed (north side) multi-use

path crossings had not been determined. One of the outcomes of the diagnostic meeting was that additional protective measures at these multi-use path crossings would not be required, but should be reassessed in the future with implementation of RTD Northwest Commuter Rail. As part of the Pearl Parkway improvements, the medians will be updated with non-traversable barriers. Exhibits depicting these alternatives can be found in Figures 2-5 and the alternatives are described below.

**Pearl Parkway Alternative 1**—Use of existing medians and existing signal gates and center median-mounted flashers to establish the Quiet Zone. The existing medians are over 100 feet long; 100' is the minimum length that is required to be considered an SSM.

**Pearl Parkway Alternative 2**—Addition of an exit gate at the proposed RTD parking garage access entrance on the northwest corner in addition to the use of existing medians as an SSM.

**Pearl Parkway Alternative 3**—Addition of exit gates (in the northwest and southeast quadrants) in addition to the use of existing medians as an SSM.

**Pearl Parkway Alternative 4**—Similar to Alternative 3, but with the addition of the RTD Northwest Commuter Rail Line 25' west of the existing BNSF track. This would also include addition of exit gates in the northwest and southeast quadrants, relocation of the existing gate on the southwest quadrant, relocate the affected center median-mounted flasher, median updates to the west side of the crossing, and use of the existing median on the east as an SSM.

**Valmont Road.** Three initial alternatives were reviewed to convert Valmont Road to a Quiet Zone. It was determined that all of the alternatives would require that the BNSF upgrade the existing circuitry and possibly the existing hardware as well. There aren't any current plans for any railroad signal or roadway infrastructure upgrades at this location. Prior to the diagnostic meeting, the possible additional protective measures to be considered for the pedestrian crossings had not been determined. One of the outcomes of the diagnostic meeting was that added protective measures at these pedestrian crossings would not be required. Exhibits depicting these alternatives can be found in Figures 6-8 and the alternatives are described below.

**Valmont Road Alternative 1**— Use of existing signal gates and center median-mounted flashers, and median upgrades to establish the Quiet Zone. Extension of the existing raised medians to a minimum of 100' on each side of the crossing, and raising the curb height to 6", which would convert the existing median to a non-traversable barrier median, would prevent vehicular traffic from bypassing the lowered crossing gates. Although the proposed extension of the medians exceeds minimum requirements, it was determined desirable due to the location of existing intersections and entrances onto Valmont Road. The extension of the medians and raising the curb would require relocating the existing business access on the southwest quadrant approximately 70' west to align with 34<sup>th</sup> Street, or leave the access in its current location and restrict the access to right-in/right-out.

**Valmont Road Alternative 2**—This alternative would keep the existing roadway and medians in tact. The upgrade would include only the addition of exit gates as an SSM in the northwest and southeast

quadrants to supplement the existing signal gates and center median-mounted flashers that would remain.

**Valmont Road Alternative 3**—Similar to Alternative 2, but with the addition of the RTD Northwest Commuter Rail Line 25’ west of the existing BNSF track. This would also include addition of exit gates as an SSM in the northwest and southeast quadrants, relocation of the existing gate on the southwest quadrant, relocate the affected center median-mounted flasher, median updates to the west side of the crossing, and use of the existing median on the east as an SSM.

The above alternatives for the Pearl Parkway and Valmont Road crossings would prevent vehicular traffic from entering the grade crossing while occupied by a train. Additional infrastructure for pedestrian and bicycle traffic were not included because pedestrian/bicycle facilities are within the MUTCD separation limits from the roadway for the current railroad crossing devices. However, it should be noted as stated above that FRA, BNSF and PUC may want additional safety measures considered in the future to address pedestrian/bicycle traffic in conjunction with future RTD Northwest Commuter Rail.

### Summary of Conceptual Cost Estimates for Initial Alternatives

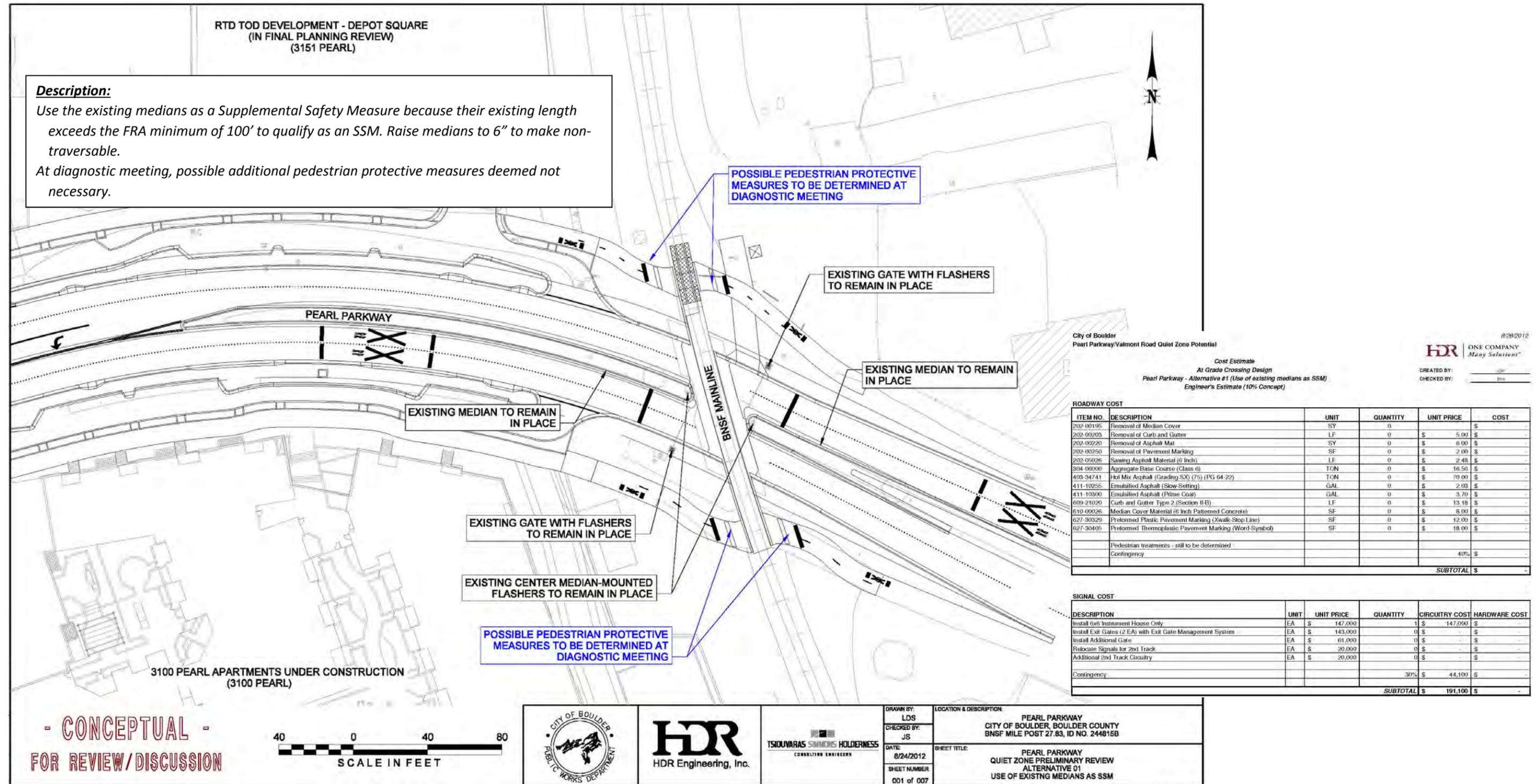
Table 1 summarizes the estimated costs for each alternative to convert the crossings to a Quiet Zone. A detailed breakdown of each conceptual cost estimate can be found in the figures depicting each alternative.

Alternative	TABLE 1. CONCEPTUAL COST ESTIMATES FOR INITIAL ALTERNATIVES				
	Roadway Improvements	Signal Circuitry	Signal Hardware	Contingency (40%)	Total Costs
Pearl Alt 1	\$0	\$147,000	\$0	\$44,000	\$191,000
Pearl Alt 2	\$0	\$147,000	\$61,000	\$62,400	\$270,400
Pearl Alt 3	\$0	\$147,000	\$204,000	\$105,300	\$456,300
Pearl Alt 4	\$41,435	\$167,000	\$224,000	\$133,874	\$566,309
Valmont Alt 1	\$45,532	\$147,000	\$0	\$62,313	\$254,845
Valmont Alt 2	\$0	\$147,000	\$143,000	\$87,000	\$377,000
Valmont Alt 3	\$4,251	\$167,000	\$164,000	\$101,000	\$436,251

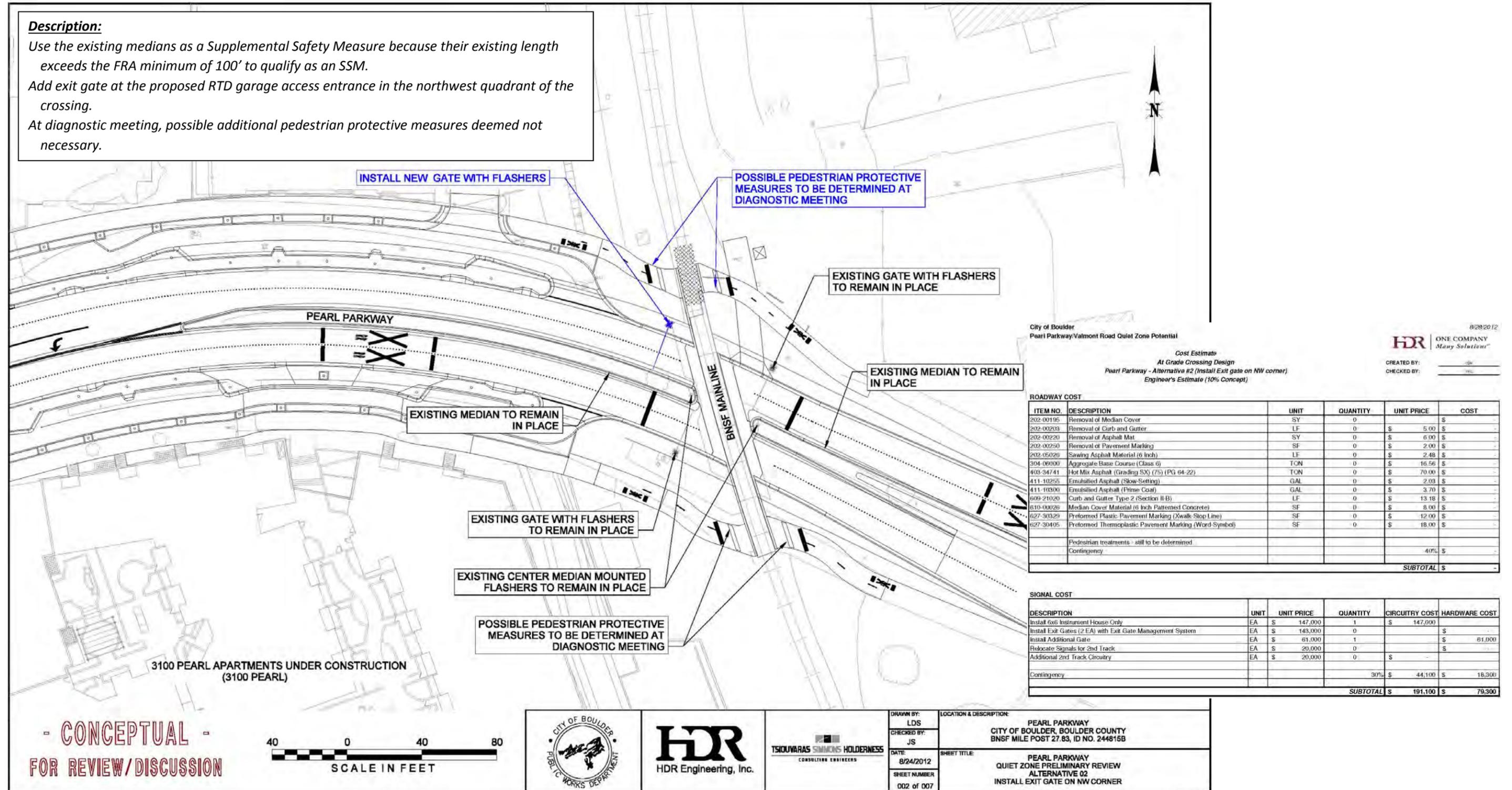
### Initial Alternatives Presentation

Each initial alternative for the Pearl Parkway and Valmont Road crossings are shown on Figure 2 through Figure 8. Each page presents one alternative, complete with the plan view, detailed description and detailed conceptual cost estimate.

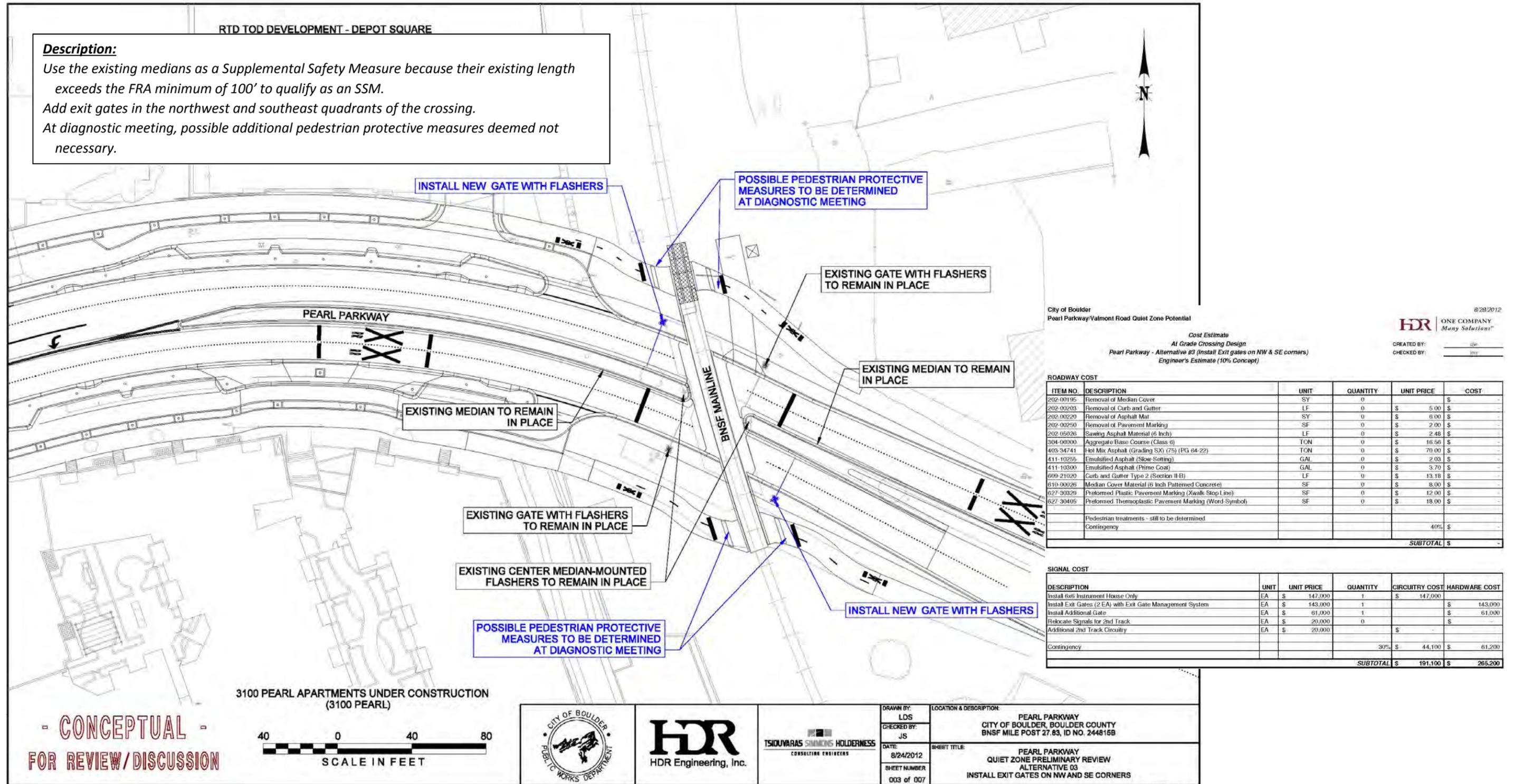
FIGURE 2. PEARL PARKWAY ALTERNATIVE 1



**FIGURE 3. PEARL PARKWAY ALTERNATIVE 2**



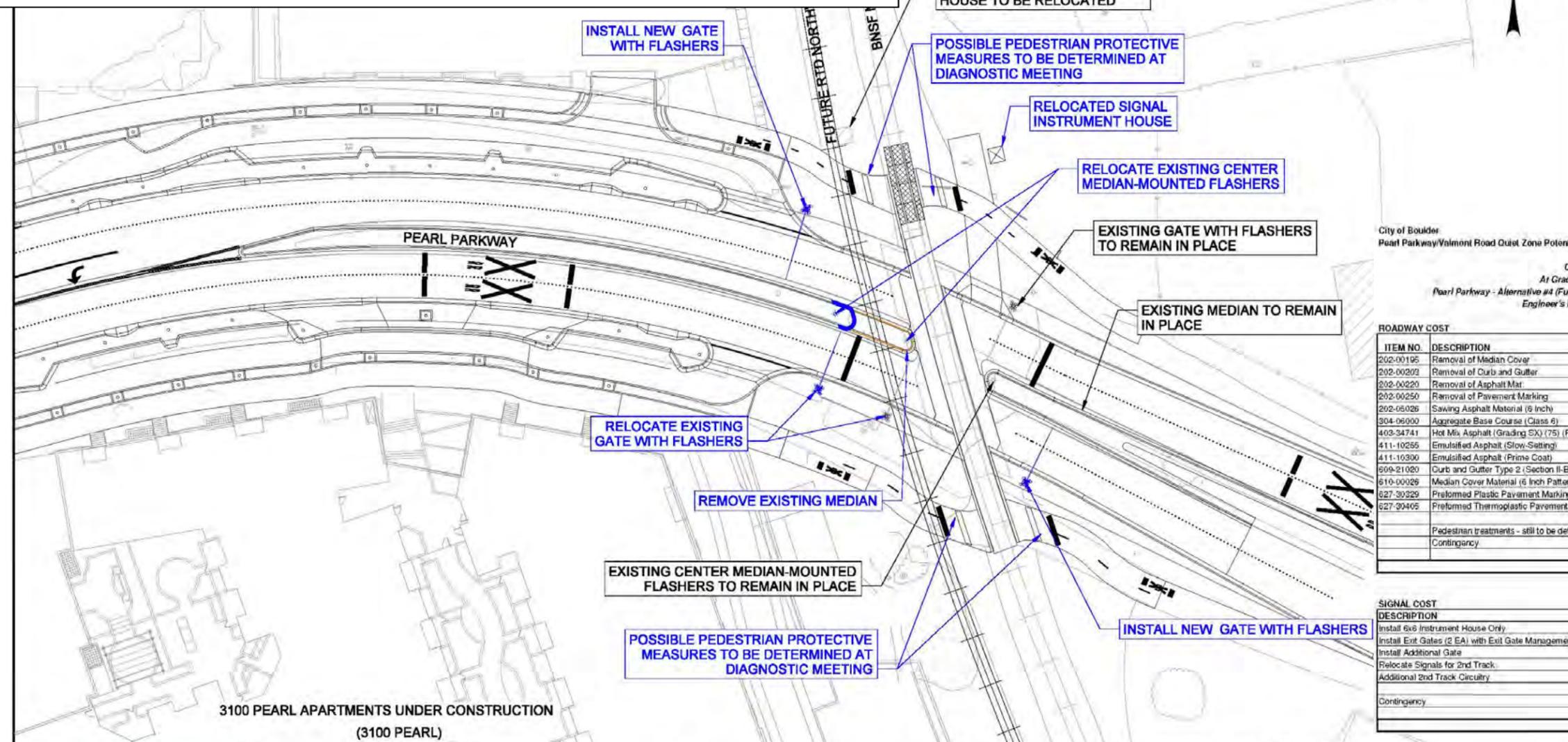
**FIGURE 4. PEARL PARKWAY ALTERNATIVE 3**



**FIGURE 5. PEARL PARKWAY ALTERNATIVE 4**

**Description:**

Use the existing medians as a Supplemental Safety Measure because their existing length exceeds the FRA minimum of 100' to qualify as an SSM.  
Add exit gates in the northwest and southeast quadrants of the crossing.  
Relocate existing gate in the southwest quadrant and center median-mounted flasher to accommodate NW Rail.  
Possible additional pedestrian protective measures to be assessed as part of future RTD NW Rail.



City of Boulder  
Pearl Parkway/Valmont Road Quiet Zone Potential  
8/28/2012  
HDR ONE COMPANY  
Many Solutions  
CREATED BY: [Signature]  
CHECKED BY: [Signature]

Cost Estimate  
At Grade Crossing Design  
Pearl Parkway - Alternative #4 (Future RTD line; Install Exit gates on NW & SE corners)  
Engineer's Estimate (10% Concept)

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
202-00195	Removal of Median Cover	SY	124.4		
202-00202	Removal of Curb and Gutter	LF	604	\$ 5.00	\$ 3,020
202-00220	Removal of Asphalt Mat	SY	479	\$ 6.00	\$ 2,868
202-00250	Removal of Pavement Marking	SF	380.26	\$ 2.00	\$ 761
202-05026	Sawing Asphalt Material (8 Inch)	LF	194	\$ 2.48	\$ 481
304-06000	Aggregate Base Course (Class 6)	TON	293	\$ 16.58	\$ 3,853
403-34741	Hot Mix Asphalt (Grading SX) (75) (PG 64-22)	TON	214	\$ 70.00	\$ 15,007
411-10255	Emulsified Asphalt (Slow-Setting)	GAL	78	\$ 2.03	\$ 158
411-10300	Emulsified Asphalt (Prime Coat)	GAL	234	\$ 3.70	\$ 865
609-21020	Curb and Gutter Type 2 (Section II-B)	LF	488	\$ 13.18	\$ 6,422
610-00026	Median Cover Material (6 Inch Patterned Concrete)	SF	243	\$ 8.00	\$ 1,948
627-30329	Preformed Plastic Pavement Marking (Xwalk-Stop Line)	SF	135	\$ 12.00	\$ 1,620
627-30405	Preformed Thermoplastic Pavement Marking (Word-Symbol)	SF	245.26	\$ 18.00	\$ 4,415
	Pedestrian treatments - still to be determined				
	Contingency			40%	\$ 16,574
					<b>TOTAL \$ 58,009</b>

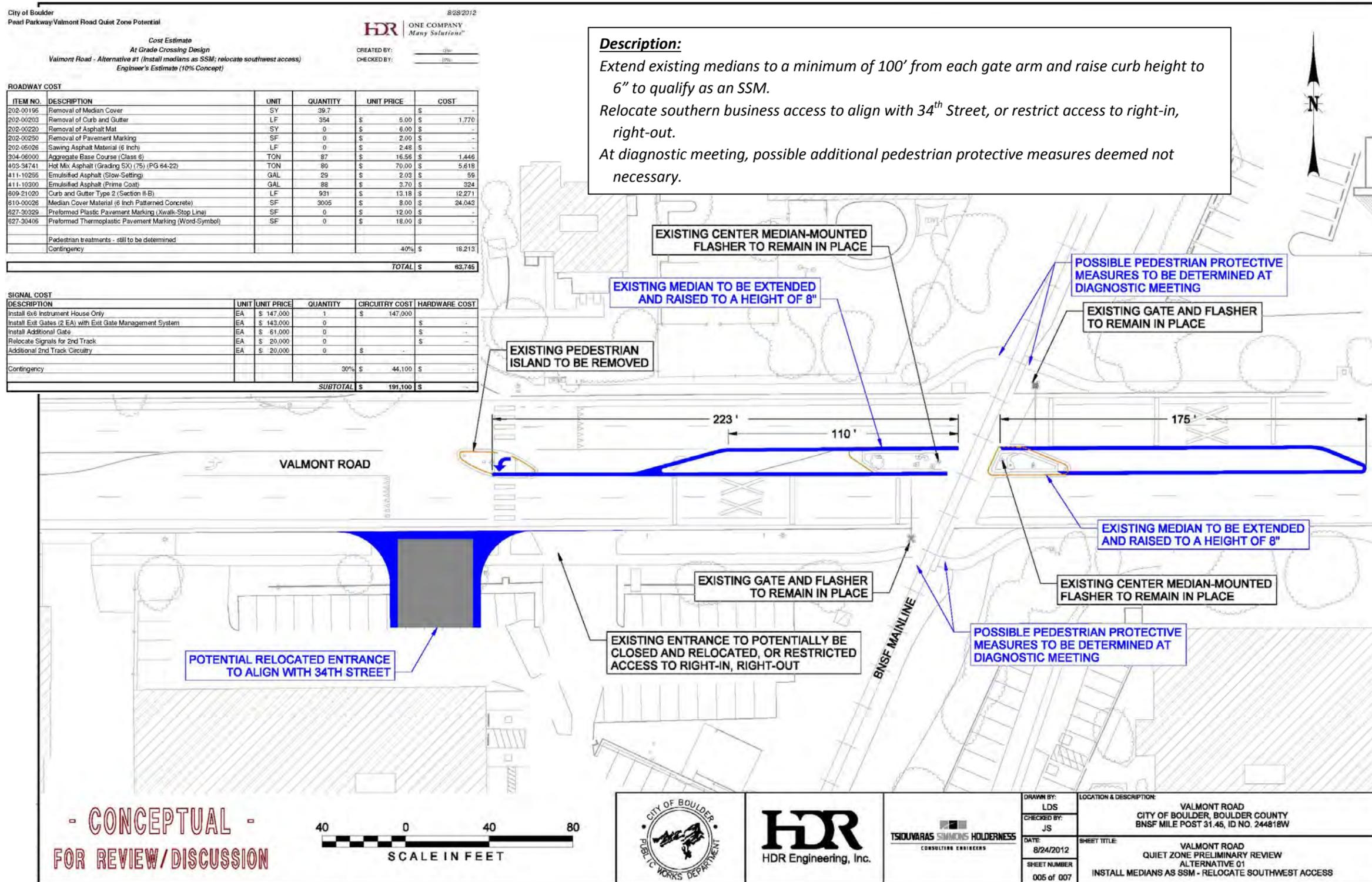
DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	CIRCUITRY COST	HARDWARE COST
Install 6x6 Instrument House Only	EA	\$ 147,000	1	\$ 147,000	
Install Exit Gates (2 EA) with Exit Gate Management System	EA	\$ 143,000	1		\$ 143,000
Install Additional Gate	EA	\$ 61,000	1		\$ 61,000
Relocate Signals for 2nd Track	EA	\$ 20,000	1		\$ 20,000
Additional 2nd Track Circuitry	EA	\$ 20,000	1	\$ 20,000	
Contingency			30%	\$ 50,100	\$ 67,200
					<b>SUBTOTAL \$ 217,100 \$ 291,200</b>

- CONCEPTUAL -  
FOR REVIEW/DISCUSSION

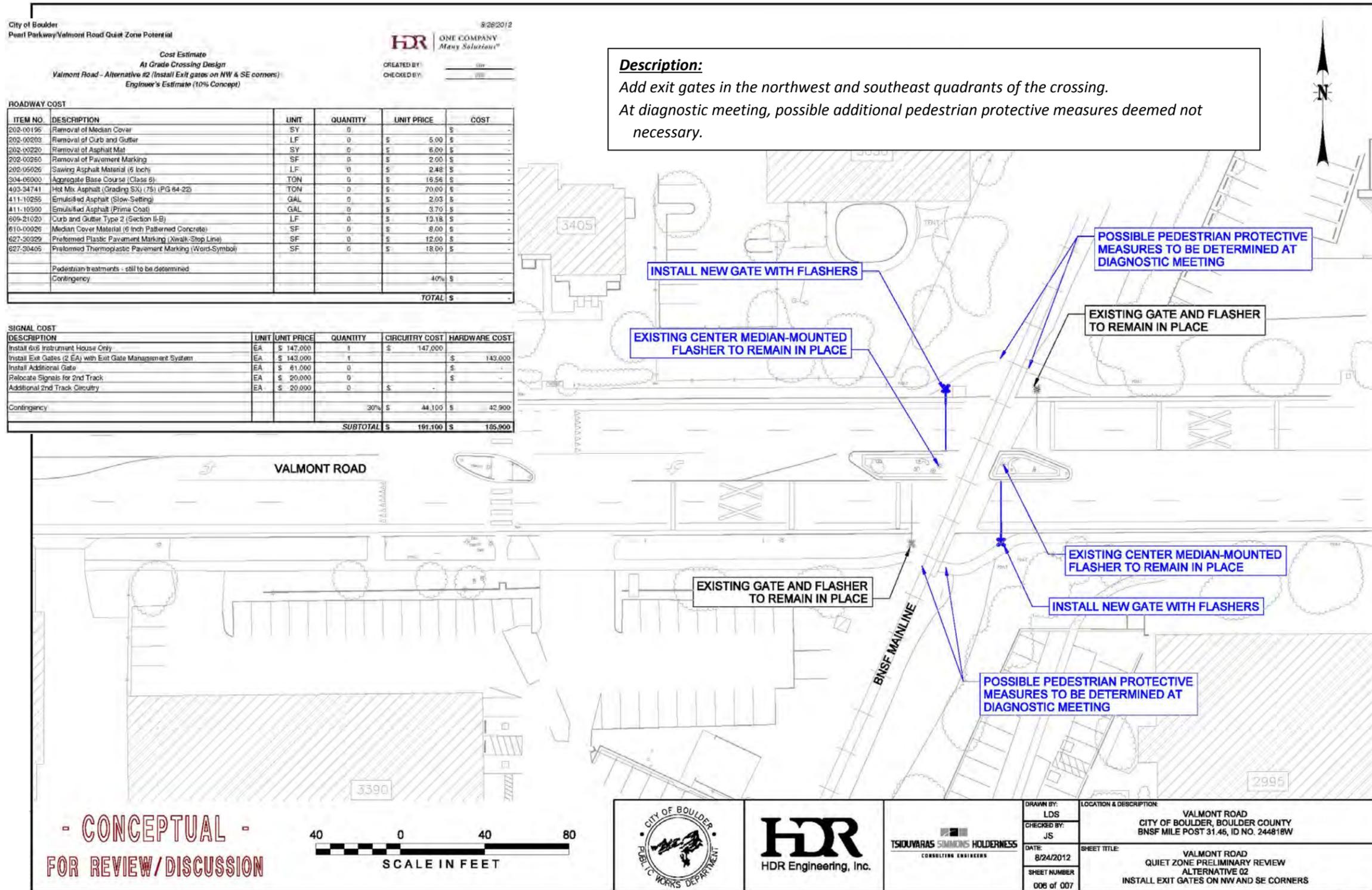


			DRAWN BY: LDS CHECKED BY: JS	LOCATION & DESCRIPTION: PEARL PARKWAY CITY OF BOULDER, BOULDER COUNTY BNSF MILE POST 27.83, ID NO. 244815B
			DATE: 8/24/2012 SHEET NUMBER: 003 of 007	SHEET TITLE: PEARL PARKWAY QUIET ZONE PRELIMINARY REVIEW ALTERNATIVE 04 FUTURE RTD LINE - INSTALL EXIT GATES ON NW & SE CORNERS

**FIGURE 6. VALMONT ROAD ALTERNATIVE 1**



**FIGURE 7. VALMONT ROAD ALTERNATIVE 2**



City of Boulder  
 Pearl Parkway/Valmont Road Quiet Zone Potential  
 8/28/2012  
**HDR** ONE COMPANY  
 Many Solutions™  
 Cost Estimate  
 At Grade Crossing Design  
 Valmont Road - Alternative #2 (Install Exit gates on NW & SE corners)  
 Engineer's Estimate (10% Concept)  
 CREATED BY: [Signature]  
 CHECKED BY: [Signature]

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	COST
202-00195	Removal of Median Cover	SY	0		\$ -
202-00203	Removal of Curb and Gutter	LF	0	\$ 5.00	\$ -
202-00220	Removal of Asphalt Mat	SY	0	\$ 6.00	\$ -
202-00250	Removal of Pavement Marking	SF	0	\$ 2.00	\$ -
202-05025	Sawing Asphalt Material (6 Inch)	LF	0	\$ 2.48	\$ -
304-05000	Aggregate Base Course (Class 6)	TON	0	\$ 16.56	\$ -
403-34741	Hot Mix Asphalt (Grading SX) (75) (PG 64-22)	TON	0	\$ 70.00	\$ -
411-10255	Emulsified Asphalt (Slow-Setting)	GAL	0	\$ 2.93	\$ -
411-10390	Emulsified Asphalt (Prima Coat)	GAL	0	\$ 3.70	\$ -
609-21020	Curb and Gutter Type 2 (Section II-B)	LF	0	\$ 13.18	\$ -
610-00026	Median Cover Material (6 Inch Patterned Concrete)	SF	0	\$ 8.00	\$ -
627-30329	Pretformed Plastic Pavement Marking (Walk-Stop Line)	SF	0	\$ 12.00	\$ -
627-30405	Pretformed Thermoplastic Pavement Marking (Word-Symbol)	SF	0	\$ 18.00	\$ -
Pedestrian treatments - still to be determined					
Contingency					40%
<b>TOTAL \$</b>					

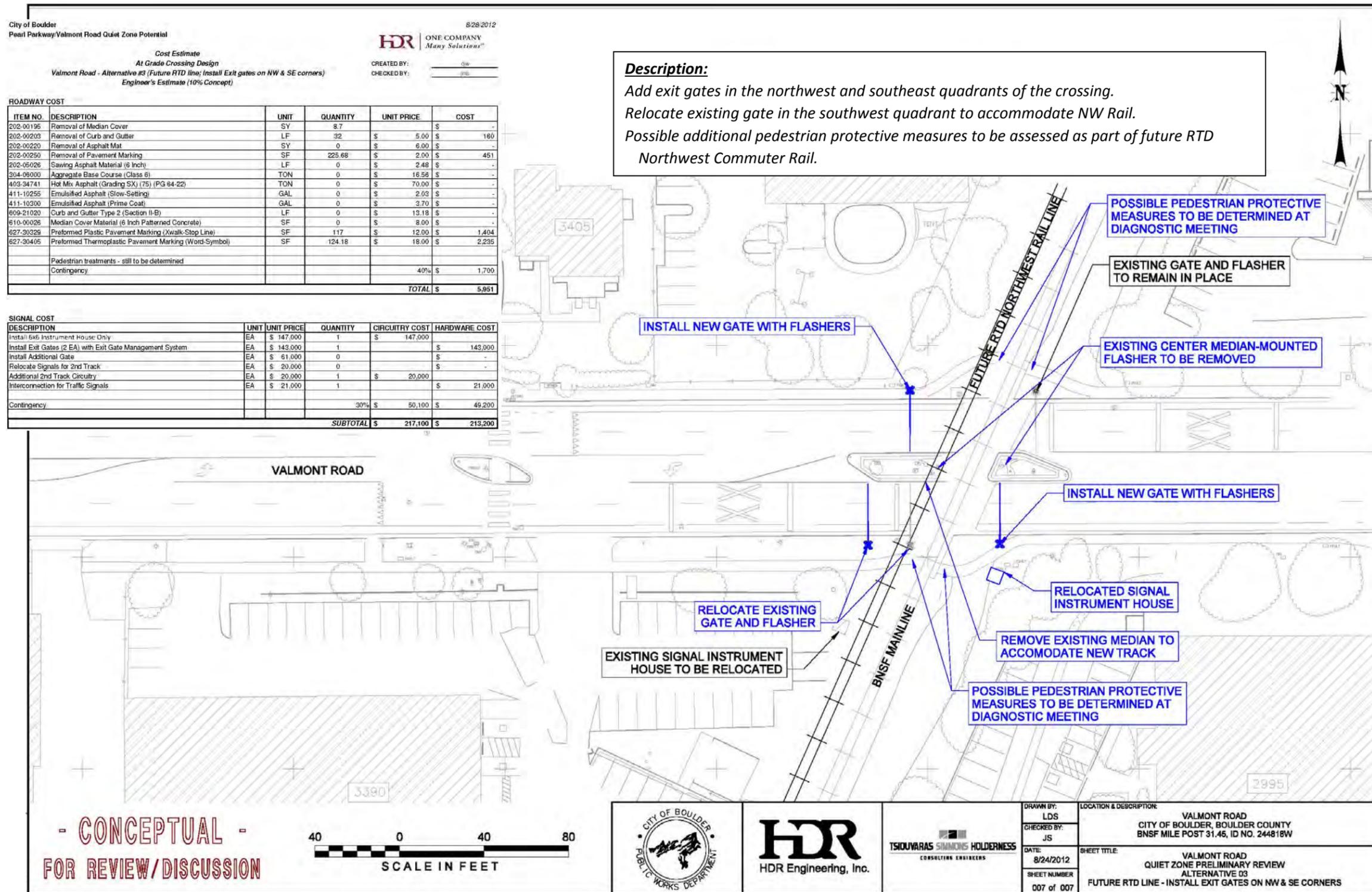
DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	CIRCUITRY COST	HARDWARE COST
Install Exit Instrument House Only	EA	\$ 147,000	1	\$ 147,000	
Install Exit Gates (2 EA) with Exit Gate Management System	EA	\$ 143,000	1		\$ 143,000
Install Additional Gate	EA	\$ 61,000	0		\$ -
Relocate Signals for 2nd Track	EA	\$ 20,000	0		\$ -
Additional 2nd Track Circuitry	EA	\$ 20,000	0		\$ -
Contingency			30%	\$ 44,100	\$ 42,900
<b>SUBTOTAL \$</b>				<b>\$ 191,100</b>	<b>\$ 185,900</b>

- CONCEPTUAL -  
 FOR REVIEW/DISCUSSION



			DRAWN BY: LDS	LOCATION & DESCRIPTION: VALMONT ROAD CITY OF BOULDER, BOULDER COUNTY BNSF MILE POST 31.45, ID NO. 244818W
			CHECKED BY: JS	
			DATE: 8/24/2012	SHEET TITLE: VALMONT ROAD QUIET ZONE PRELIMINARY REVIEW ALTERNATIVE 02 INSTALL EXIT GATES ON NW AND SE CORNERS
			SHEET NUMBER: 006 of 007	

**FIGURE 8. VALMONT ROAD ALTERNATIVE 3**



## Recommended Alternative Concepts

After the initial alternatives were developed, a diagnostic meeting was held to review these alternatives and a preferred alternative was selected for each crossing. The diagnostic meeting was held on Thursday, July 25, 2013 with representatives from the City of Boulder, the FRA, the BNSF and the PUC in attendance. See Appendix B for meeting minutes and the sign-in sheet from this meeting. Those preferred alternatives have been refined and are presented below.

**Pearl Parkway.** The recommendation from the diagnostic meeting for Pearl Parkway is Alternative 3, which includes 4-quadrant gates, upgrading the existing circuitry and possibly the existing hardware, and the need to upgrade the median curb to non-traversable curb. In conjunction with the current Pearl Parkway project, BNSF will complete most of the signal circuitry and conduit, and some of the hardware work required for Quiet Zone implementation. The existing and proposed multi-use paths along both sides of Pearl Parkway follow Manual of Uniform Traffic Control Devices (MUTCD) recommendations for signing and striping and are within applicable proximity zones to the roadway crossing of the BNSF track, so it was determined that additional protective measures at these multi-use path crossings would not be required. The preferred alternative for Pearl Parkway presented on Figure 9.

It's worth noting that the roadway improvements and most of the railroad signal improvements shown in this exhibit will be completed by the time that possible future Quiet Zone improvements would be implemented as part of the current Pearl Parkway (30<sup>th</sup>-Foothills Parkway) Multi-Way Boulevard and Multi-Use Path projects. The railroad signal improvements that will be made include a new 8'x10' bungalow in the northeast quadrant of the crossing, a constant warning time controller, conduit for current gates and future exit gates, and accommodations for a possible future preemption interconnect with City traffic signals on Pearl Parkway at Junction Place and at 30<sup>th</sup> Street. Possible implementation of the future QZ will require only those improvements shown in blue, which include the addition of the new exit gates and flashers on the roadway exit side in each direction of travel, associated wiring and control systems for those gates, loop detection between the gates, and possible traffic signal pre-emption installations.

In the event that RTD constructs the Northwest (NW) Commuter Rail through Boulder, roadway improvements/modifications and other railroad gate improvements/modifications will be required. Exhibits that depict how the proposed NW Commuter Rail tracks could interact with the recommended railroad improvements and other infrastructure improvements being made to the roadway footprint can be found in the previous section of this report in Figure 5. This exhibit depicts the NW Commuter Rail alignment along the west side of the existing tracks (per most current RTD/BNSF sponsored designs), which, if implemented in this manner, would require installation of exit gates in the northwest and southeast quadrants and relocation of the existing gate in the southwest quadrant and the center median-mounted flasher on the west side of the crossing. It should be noted that the addition of NW Commuter Rail was not discussed during the diagnostic meeting, except with respect to possible future pedestrian protective measures. The exhibit assumes that the same treatments at the crossing will be necessary with the additional track to the west. However, a diagnostic meeting will need to be held once

design of NW Commuter Rail has begun to determine the acceptability of the treatment by the involved parties.

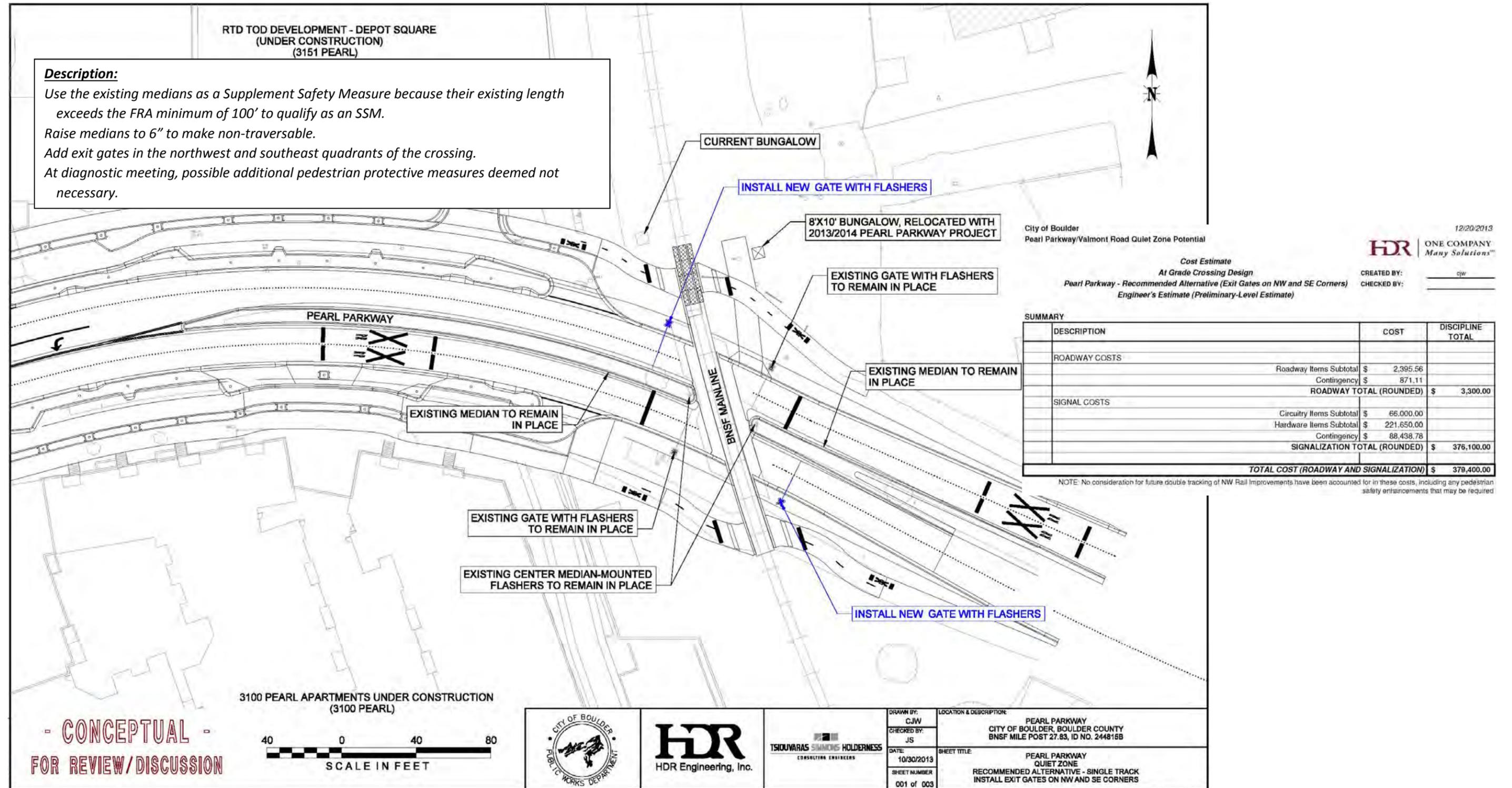
**Valmont Road.** The recommendation from the diagnostic meeting for Valmont Road is similar to Alternative 1, which includes extending the median on the west side by at least 60’ from the approach gate arm and extending the median on the east side to at least 100’ from the approach gate arm, and raising these curbs to a height of 6” to make non-traversable. However, that alternative recommended moving the private driveway to line up with 34th Street to the north to provide the minimum 100’ median, or restricting this existing access to right-in/right-out. The preferred alternative will leave the access as is until such time that the site redevelops. In the meantime, the proposed median treatment will meet the 60’ minimum to serve as an SSM. Similar to Pearl Parkway, additional protective measures for pedestrians were not deemed necessary to qualify as a Quiet Zone. Accommodations for traffic signal preemption at the existing signalized intersection at Wilderness Place and the future signalized intersection at 34<sup>th</sup> Street (as identified in the TVAP Transportation Connections Plan) may be required. The preferred alternative for Valmont Road is presented on Figure 10.

The estimated costs of the preferred Pearl Parkway and Valmont Road alternatives are summarized in Table 2, with a more detailed cost provided with Figures 9 and 10 on the preceding pages.

Crossing	<b>TABLE 2. CONCEPTUAL COST ESTIMATES FOR THE PREFERRED PEARL PARKWAY AND VALMONT ROAD ALTERNATIVES</b>				
	Roadway Improvements	Signal Circuitry	Signal Hardware	Contingency (40%)	Total Costs
Pearl Parkway Preferred Alt	\$3,300	\$66,000	\$221,650	\$88,450	\$379,400
Valmont Road Preferred Alt	\$107,000	\$231,000	\$276,650	\$100,450	\$715,100

Values in this table have been rounded

**FIGURE 9. PEARL PARKWAY PREFERRED ALTERNATIVE**





**Appendix A.**  
**Meeting Minutes and Sign-In Sheet—Diagnostic Meeting**  
**(July 25, 2013)**

## Appendix B. Detailed Cost Estimates