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**MOUNTAIN VISTA SUBAREA PLAN  
FORT COLLINS, COLORADO**

**TRAFFIC NOISE EVALUATION REPORT**

***Prepared for:***

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## 1. INTRODUCTION

As part of the long-range planning activities by the City of Fort Collins for the Mountain Vista subarea, traffic noise levels that would result from planned major street improvements have been examined. The Mountain Vista subarea (**Figure 1**) is located in northeast Fort Collins, Colorado within Larimer County. Currently, much of the subarea is undeveloped and unimproved. Major new or relocated arterial streets are envisioned within the long-range plan for this subarea.

The purpose of this traffic noise analysis is to assess the future traffic noise levels from the street improvements for compatibility with future developed uses of the adjoining properties within the subarea. The proposed major road improvements include:

- Redesigning the Timberline Road connection to Mountain Vista Drive
- Widening Mountain Vista Drive, Timberline Road and Lemay Avenue
- Completing Vine Drive along a new alignment
- Completing connection of Conifer Street

The following report presents an overall traffic noise analysis that was performed to assess potential traffic noise levels at various distances from these road improvements. Train noise has not been included. This assessment is intended to provide supporting data for decisions regarding land use planning in the subarea.

Generally speaking, residences are a land use more sensitive to (and incompatible with) high traffic noise levels. This is important for the Mountain Vista subarea, given that substantial residential development is planned here. While it is desirable to have residential noise levels as low as possible, real-world experience shows that it is very difficult to achieve low noise levels in developed areas. Often, the access routes to the residential areas are sources of noise that inhibit achievement of low overall noise levels. Often, a balance must be struck between low traffic noise levels and sensible land development.

Figure 1. Mountain Vista Subarea and Noise Measurement Locations



## 2. METHODS

The City of Fort Collins does not have regulations geared specifically toward routine traffic noise from streets. The City does have nuisance noise regulations (Fort Collins Municipal Code Chapter 20), including those for individual motor vehicles. However, the regulations specifically exempt the City for noise from public rights-of-way. Moreover, conforming individual vehicles could cumulatively cause traffic noise concerns. So, the City does not have specific noise regulations by which to evaluate the potential future traffic noise conditions.

Therefore, three related noise criteria that have been developed by others were selected for discussion in this project. These noise criteria are based on either of two noise level metrics: the 1-hour equivalent sound level (Leq), which is the 1-hour “average” sound level; or the day-night level (Ldn), which is the 24-hour “average” sound level with a 10-decibel (dB) penalty for noise between 10 PM and 7 AM. The three selected criteria are described below and the corresponding numeric values are listed in **Table 1**:

- Colorado Department of Transportation’s (CDOT’s) Noise Abatement Criteria, regularly used to assess highway noise
- U.S. Department of Housing and Urban Development (HUD) noise regulation (24 CFR Part 51B), regularly used to assess housing projects applying for federal funding
- U.S. Environmental Protection Agency (EPA) recommended noise levels, identified by EPA as requisite to protect public health and welfare

**Table 1. Residential Noise Limits Included in Analysis**

Agency	Acceptable Residential Noise Level	Type of Sound Level Value
CDOT	< 66 dB	Leq
HUD	≤ 65 dB	Ldn
EPA <sup>a</sup>	≤ 55 dB	Ldn

<sup>a</sup> Recommended noise level, but does not consider technical feasibility or cost

The noise analysis is based on a combination of noise measurements and computer modeling. Noise measurements were made to document conditions along existing corridors comparable to these planned for Mountain Vista. Modeling was performed to predict future traffic noise conditions along the major study area roads.

Two noise measurements were made for the project (**Figure 1**). The first measurement was made in the yard of Peak Community Church at 500 Mathews Street, approximately 27 feet from traffic on Mulberry Street. The second measurement was in Warren Park, at approximately 1201 E. Horsetooth Road and approximately 100 feet from traffic. The measurements began on June 4 and June 24, 2009, respectively.

Each measurement consisted of 24 consecutive 1-hour cumulative measurements with ambient sound levels logged each second. Traffic on adjoining streets was not counted due to the nature of the measurements.

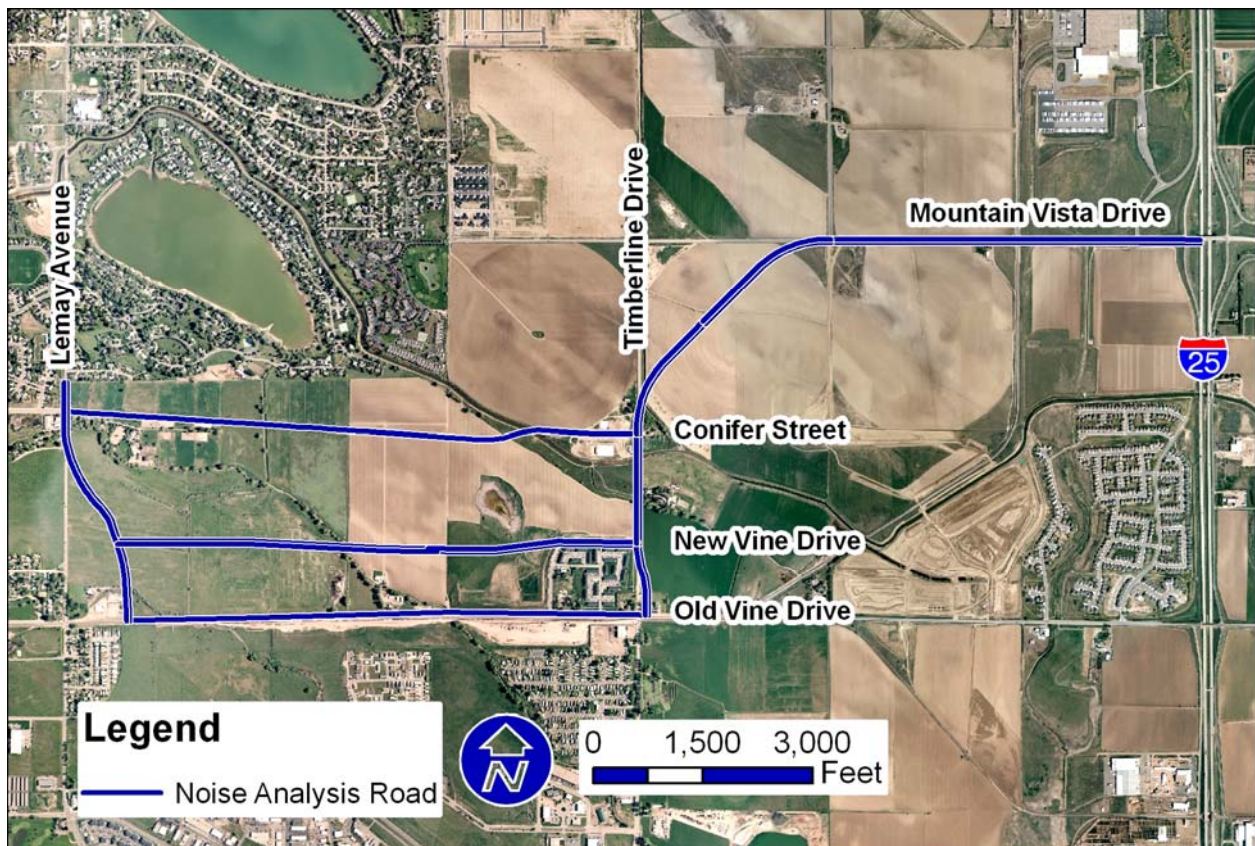
The noise modeling used the Federal Highway Administration’s Traffic Noise Model (TNM) Version 2.5 software to predict Year 2035 traffic noise levels for the major study area roads (**Figure 2**). The streets analyzed included Lemay Avenue, new Vine Drive, old Vine Drive, Conifer Street, Timberline Drive and Mountain Vista Drive. Traffic volumes for 2035 were provided by LSA Associates, Inc. Proposed 2035 street alignments were used. Because the streets have different traffic volumes, each street will have different traffic noise characteristics.

Traffic speed was modeled at 45 MPH for all streets. The vehicle fleet mix proportions were derived from published CDOT traffic count data from Highway 14 (5.1 percent trucks).

The noise model receivers consisted of regularly-spaced points in a line extending away from each of the streets of interest. Traffic noise levels were calculated using the models for each of these receivers. TNM is designed to calculate hourly Leq values, so to obtain Ldn values, standard daily traffic distribution patterns were assumed to create TNM models for peak, off-peak, evening and night traffic hours for each of the streets of interest. The peak hour TNM results were used for comparison to the CDOT noise limit. To produce Ldn values, the four hourly Leq results from the TNM models were mathematically combined for each receiver.

The purpose of the modeling was to generate data to identify the distance from each road of interest to each of the noise levels in **Table 1**. Property within these distances may not be compatible with residences. Therefore, the distances indicate what set back from the streets will be needed for a prospective residential area to meet each of the three traffic noise limits, as a guide for long-term planning decisions. **It is important to note that these results are without any traffic noise mitigation features, such as berms or landscaping, or any development features, such as buildings, setbacks or parking areas.**

**Figure 2. Noise Model Roads of Interest (2035 Alignments)**



### 3. TRAFFIC NOISE RESULTS

The measurement results are summarized in **Table 2**. The data have been arranged sequentially to begin at midnight for convenience.

Sound levels at Location 1 exceeded all three noise limits included in this study (**Table 1**). Sound levels at Location 2 exceeded the CDOT limit (at Hour 1000 only) and the EPA limit, but met the HUD limit. (Note: further investigation indicates that the CDOT limit exceedence may have been due to park activities, not traffic.)

**Table 2. Results from Noise Measurements**

Hour of Measurement	Location 1 Hourly Leq (dBA)	Location 2 Hourly Leq (dBA)
0000	58.4	49.4
0100	55.9	48.6
0200	57.3	49.6
0300	55.6	49.9
0400	56.7	48.3
0500	62.3	53.1
0600	66.4	57.1
0700	67.0	58.7
0800	67.1	61.2
0900	71.2	58.5
1000	66.7	66.4
1100	68.1	64.0
1200	67.7	60.9
1300	67.7	57.1
1400	68.7	57.5
1500	67.8	57.4
1600	67.9	58.0
1700	67.4	57.7
1800	68.9	57.3
1900	67.7	58.5
2000	65.1	57.9
2100	63.8	55.6
2200	63.4	53.9
2300	62.8	52.3
<b>Ldn</b>	<b>69.9</b>	<b>61.2</b>

The modeling results are summarized in **Table 3**. These results show the approximate set back from each street of interest needed to meet the residential traffic noise limits for each of the three agency limits being considered (**Table 1**). Future development plans that comply with these set backs would ensure that the designated land uses (transportation and residences) are compatible with each other in terms of traffic noise without any noise mitigation actions. Note that the distances for the EPA limit are by far the most restrictive, and that the distances for the CDOT and HUD limits are similar. These set back distances are illustrated in **Figure 3**; properties within the shaded areas would be incompatible with residential uses according to the indicated agency noise limits.

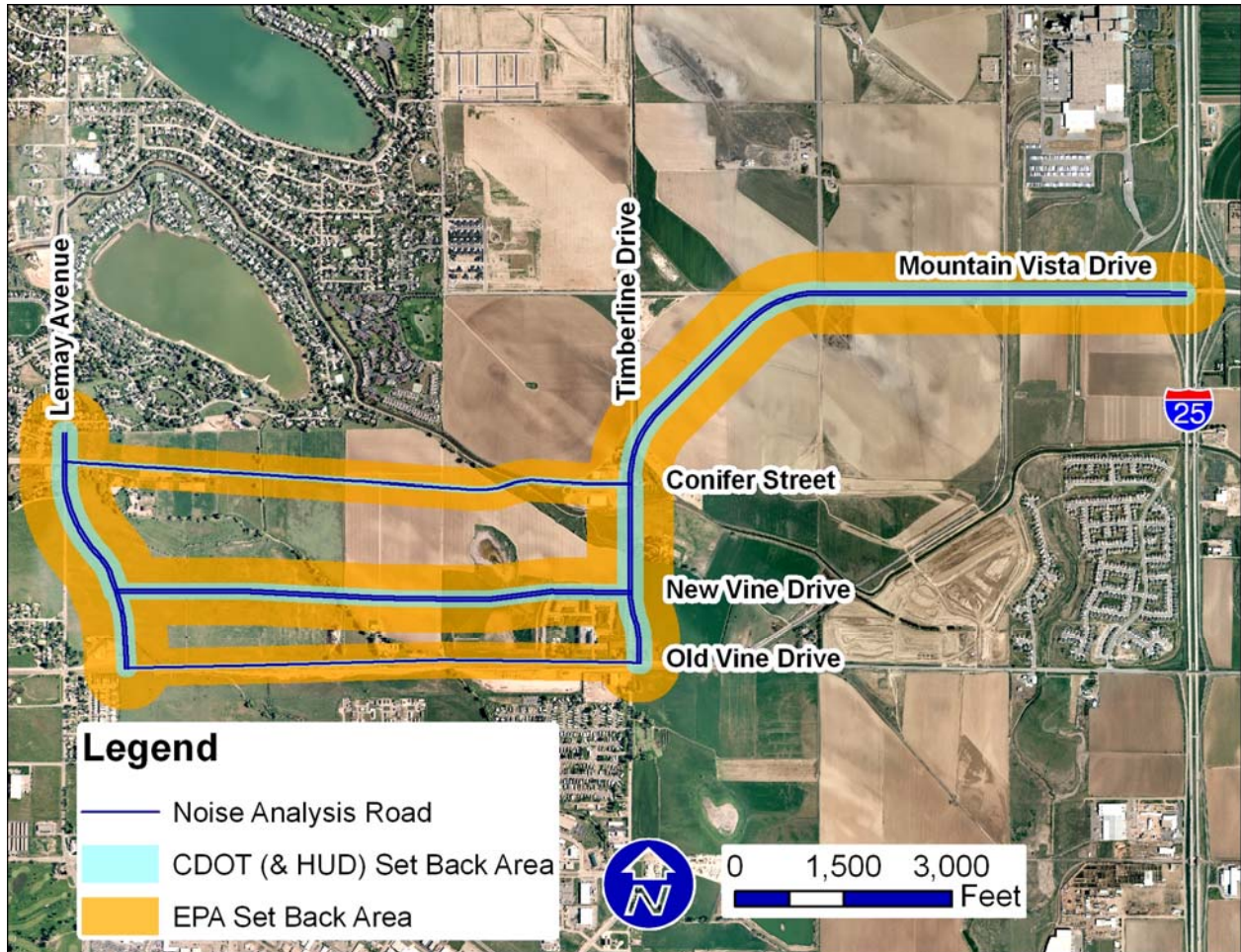
**Table 3. Results from 2035 Noise Models (without Mitigation)**

Street	Distance from Future Edge of Street Pavement to Residential Noise Limit (feet)		
	CDOT	HUD	EPA
Lemay Avenue north of New Vine Drive	160	110	600
Lemay Avenue south of New Vine Drive	120	100	570
Conifer Street	50	55	290
New Vine Drive	95	80	450
Old Vine Drive	35	25	260
Timberline Drive north of New Vine Drive	160	150	580
Timberline Drive south of New Vine Drive	160	150	550
Mountain Vista Drive	140	130	550

Several existing homes may be within these set back zones, which indicate traffic noise may be louder than desirable at these locations when the street improvements have been made. Implementation of these set backs for future development could leave some property unavailable for residential development. This could be offset by placing less noise-sensitive land uses (such as commercial areas or open spaces) next to the major street corridors. Rows of non-noise-sensitive buildings (e.g., commercial buildings) next to the major streets could reduce traffic noise levels at the properties behind these buildings, possibly allowing compatible residential development closer to the major streets.

Another option would be to construct traffic noise mitigation features, such as earth berms, along the major streets where residences are planned. As an example, a 6-foot-tall berm installed next to a major street may reduce traffic noise such that no set back beyond the berm is necessary to meet the CDOT and HUD residential limits (**Table 1**). (Note: this is a general result and will depend on the specific ground topography near the berm and on the ultimate noise level goal.) So there are several options available to manage the traffic noise levels in the subarea to ensure maximum land use compatibility.

Figure 3. Calculated Residential Set Backs for Major Mountain Vista Subarea Roads



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## 4. SUMMARY

A traffic noise analysis was performed for the proposed major road improvements in the Mountain Vista subarea (**Figure 2**). The adjoining properties were examined for 2035 traffic noise levels for comparison to three common residential traffic noise limits (**Table 1**). Without noise mitigation, a set back of at least 100 feet from the major 4-lane arterial streets in the subarea (**Table 3**) may be necessary for future residential land uses to ensure compatibility. With systematic noise mitigation planning, the set back may be reduced or eliminated, which would increase land use planning flexibility in the Mountain Vista subarea.