Noise Technical Report

State Highway 82 / Entrance to Aspen
Environmental Reevaluation

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Colorado Department of Transportation, Region 3

and

Federal Highway Administration, Colorado Division

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1.0 Affected Environment

This report provides a reevaluation of the noise analysis presented in the 1997 State Highway 82/Entrance to Aspen Final Environmental Impact Study (FEIS) for the Preferred Alternative selected in the Record of Decision (ROD) issued in August 1998.

The study corridor defined for noise and vibration at the time of publication of the FEIS and ROD was the State Highway 82 corridor from approximately the Buttermilk Ski Area to Rubey Park.

1.1 Methodology

At the time of the FEIS and ROD, the affected environment was characterized in terms of land use according to FHWA and CDOT established guidelines defining Noise Abatement Criteria (NAC) for maximum acceptable traffic noise levels. The purpose of the assessment done in 1997 was to compare the noise levels at sensitive noise receptors (called "receivers" in the FEIS) to established criteria and, where potential impacts were identified, to estimate if effective noise mitigation can be provided. For the reevaluation, current land uses along the Preferred Alternative's alignment were compared to the land uses in 1997. New sensitive receivers were identified according to the FHWA and CDOT guidelines. The locations of the noise receivers identified in the FEIS were compared to the locations of the new sensitive receivers (residences) to estimate potential noise impacts to the new receivers, because these receivers are in close proximity to receivers identified in the FEIS within the commercial core of Aspen.

1.2 Regulatory Overview

Since the FEIS was published in 1997, 23 CFR Part 772 – Procedure for Abatement of Highway Traffic Noise and Construction Noise has been updated. Updated sections that would apply to implementation of the Preferred Alternative include the following:

- In April, 2004, FHWA released the Federal Highway Administration Traffic Noise Model (FHWA TNM) Version 2.5, to make both acoustical and user improvements to the FHWA Highway Traffic Noise Prediction Model contained in FHWA-RD-77-108 model. Stamina 2.0 Noise Modeling Program was the most current version in 1997. The FHWA TNM has been required for use in all new traffic noise analyses for Federal-aid highway projects that begin after October 14, 2004. Existing noise at each 1997 receiver was determined by field measurements or with the STAMINA 2.0 computer model, which was based on the FHWA method for predicting noise generated by constant speed traffic at that time.

- The updated definition of Type I Projects (one of the project types that require noise analysis) under 23 CFR 772is as follows:

> A Type I project is a project that consists of a proposed Federal or Federal-aid highway project for the construction of a highway on a new location or the physical alteration of an existing highway which significantly changes either the horizontal or vertical alignment or increases the number of through traffic lanes.

Pursuant to requirements set forth by the FHWA, CDOT Noise Analysis and Abatement Guidelines provide the procedural and technical requirements for the evaluation of highway project traffic noise and consideration of noise mitigation alternatives where noise impacts are identified. *Colorado Department of Transportation Noise Analysis and Abatement Guidelines* issued December 1, 2002, supersede the February 1, 1995 guidelines that were in effect during the preparation of the FEIS and ROD. The FHWA Type I Projects definition, as above, was adopted by CDOT.

The CDOT Noise Abatement Criteria (NAC), which are based on FHWA Noise Abatement Criteria (23 CFR 772) have not changed since the publication of the FEIS. FHWA's maximum allowable noise level is 67 decibels (dBA) for residential/recreational areas, and 72 dBA for commercial areas. Colorado defines a noise impact as being 1 dBA below the noise abatement criterion, and mitigation must be evaluation for receivers at or above 66 dBA for residential/recreational areas and 71 dBA for commercial areas. An increase of 10 or more dBA from the existing noise level is also considered an impact for which mitigation must be evaluated.

The CDOT Noise Analysis and Abatement Guidelines address noise impact assessments done after a project ROD is issued, such as in the case with the Entrance to Aspen. Section 2.5 of the Guidelines, Project Timing, states that, "Each state highway agency is required to identify when the public is officially notified of the adoption of a location of a proposed highway project. CDOT, within the scope of these guidelines, defines the "date of public knowledge" as the date in which the final environmental project document (Categorical Exclusion, Finding of No Significant Impact, or Record of Decision) is approved. After this date, CDOT will be responsible for analyzing changes in traffic noise impacts, but will not be required to provide noise abatement for new development which occurs adjacent to the proposed highway project. Decisions concerning such noise abatement are left to the local government agencies and private developers." Therefore, this reevaluation identifies new development that will potentially be affected by the Preferred Alternative, but does not recommend mitigation in addition to that identified in the ROD.[1]

Pitkin County Chapter 6.36 Noise Abatement was updated in 1999. The 1999 updates to section 6.36.090 related to noise created by categories of motor vehicles, and includes the distance from the center of the

[1] As described in Section 1.3, all new noise receivers (residential units) identified in this reevaluation are within the commercial core and are proximate to numerous other receivers identified in the FEIS and ROD. Therefore, although the Guidelines do not require that impacts to new receivers be mitigated after the issuance of a Record of Decision, implementation of the mitigation outlined in the 1998 ROD would by default also benefit these new receivers because of their proximity to other receivers where mitigation will be implemented.

lane of travel at which noise is to be measured (50 feet). Construction noise is also regulated by Pitkin County and City of Aspen ordinances.

1.3 Description of the Existing Condition

Roadway noise is the dominant source of noise in the study area. Existing and projected noise levels at sensitive receivers are identified in the FEIS for the Modified Direct Alignment (which is the alignment of the Preferred Alternative selected in the 1998 ROD). The FEIS states that current (1997) noise levels along the Modified Direct Alignment are generally below 60 dBA outside of the city core, and levels further into the City of Aspen are generally below 64 dBA (FEIS, page V-46). For this reevaluation, existing noise levels along the study corridor are assumed to be approximately the same today as those reported in the FEIS, because traffic levels have been maintained within the corridor at virtually the same level as 1993-1994.[2] Therefore, the only part of the study corridor addressed in this reevaluation is the area in which new sensitive receivers have been constructed since publication of the ROD.

New housing units (sensitive receivers) have been constructed within the corridor of the Preferred Alternative since the 1998 ROD. A total of 26 new residences have been built within approximately 100 feet of the project since 1998.

- Twelve multiple-family dwelling units, built in 2000, are located on the southeast corner of North 7th Street and West Main Street (719 West Main Street). As a result, twelve more households would be added to those identified as affected by the project by the 1997 FEIS (Christenson 2006a).
- Two new condominium buildings located within 100 feet of the project are part of the Bavarian Inn development. They are addressed 102–108 North 8th Street and 814–822 West Main Street, and were constructed in 2003 and sold in 2004. These deed-restricted buildings contain a total of 12 units (Christenson 2006b). As a result, twelve more households would be added to those identified as affected by the project by the 1997 FEIS.
- Two other new residences are located within 100 feet of the project. These townhouses were built in 2004 and are located at 101 South 7th Street and 103 South 7th Street. They are not deed-restricted, and no relocations or displacements are anticipated.

All new sensitive receivers in the study corridor built since the 1998 ROD are between approximately 7th Street and 8th Street, in close proximity to other residential units that were identified as sensitive receivers in the FEIS. Table 1-1 shows the existing noise levels measured in 1997 in this area of the study corridor, and the approximate location of new sensitive receivers in relation to them. The locations of the 1997 receivers and the new receivers are shown in Figure 1-1.

[2] See Traffic Characteristics and Safety Technical Report, and System Management Technical Report, State Highway 82/Entrance to Aspen (FHWA and CDOT, November 2006a and 2006b, respectively) for more detail.

Table 1-1
Existing Noise Levels (1997) in Proximity to New Sensitive Receivers (2006)

1997 Receivers (see Figure 1-1)	**1997 Noise Level (dBA)**	**New Sensitive Receivers in Proximity to 1997 Receivers** (see Figure 1-1)
17	60.5	A = 102–108 N. 8th Street (4-unit building) B = 814–822 W. Main Street (8-unit building)
20	62.0	C = 101 S. 7th Street (townhouse) D = 103 S. 7th Street (townhouse)
23	61.0	E = 719 W. Main (12-unit building)

Source: FEIS (CDOT 1997) and *Noise Impacts Report (*CDOT 1995)

Two components of the Preferred Alternative have been constructed since the publication of the FEIS and ROD: (1) Owl Creek Road and West Buttermilk Road have been relocated to create a new, signalized intersection with State Highway 82 near the Buttermilk Ski Area; and (2) the roundabout at the Maroon Creek Road intersection has been completed.

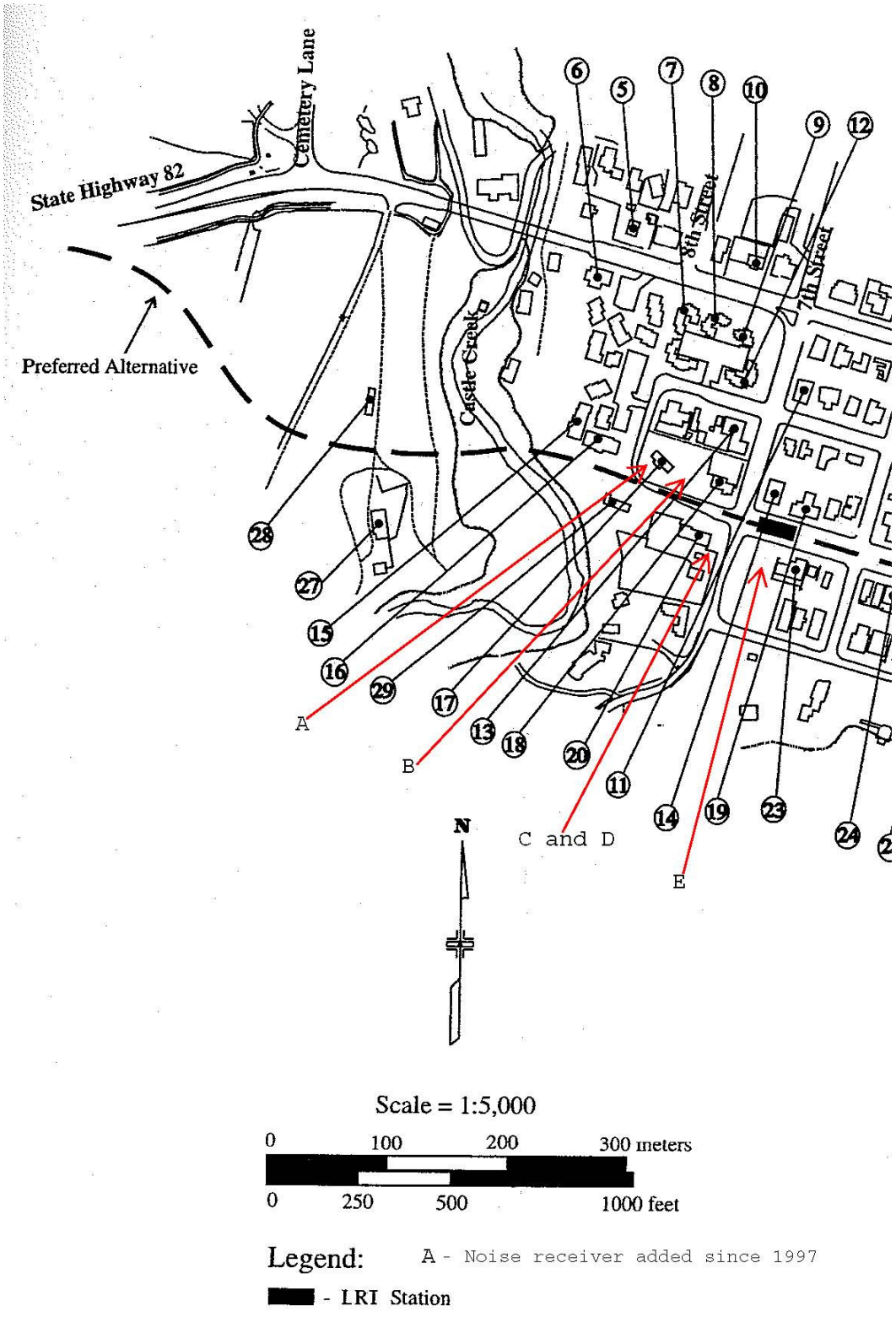
In addition, the Maroon Creek Bridge Replacement Project is currently under construction, scheduled for completion by spring of 2008. This project is being constructed as a bridge replacement without any increase in roadway capacity. However, it will accommodate the Entrance to Aspen Preferred Alternative in the future by removing the center median and re-striping for two general-purpose lanes and two exclusive bus lanes (see the Introduction to the Technical Report Volume for more detail).

The intersection of Truscott Drive and State Highway 82 was completed in 2001. While this intersection is not part of the Entrance to Aspen Project, its configuration accommodates the alignment for the east approach to the Maroon Creek Bridge Replacement Project.

A transportation easement across the Marolt-Thomas Open Space was conveyed from the City of Aspen to CDOT in August of 2002, as part of land exchange and mitigation agreements between CDOT and the City of Aspen and Pitkin County. (Refer to Appendix A and B in the 1998 Record of Decision for details of the open space conveyance agreements and mitigation commitments.)

None of the actions to date described above are in the area of new sensitive receivers within the study area, so project activities to date have had no effect on the noise analysis done for this reevaluation.

Figure 1-1 State Highway 82 Entrance to Aspen Noise Receivers



2.0 Environmental Consequences

2.1 Methodology

Residential units constructed within the study corridor since the 1998 ROD are all within the city core and in close proximity to other residential units assessed in the FEIS. Therefore, the locations of the new receivers were compared to the locations of receivers potentially affected by noise from the proposed project as reported in the *Noise Impacts Report* (August 1995), the FEIS (1997), and the ROD (1998). The new units were assigned the same impact levels as proximate receivers identified in the FEIS.

2.2 Preferred Alternative

The noise analysis done for the EIS was based on noise generated from three sources: highway/transit vehicles, the proposed LRT, and proposed transit stations. The noise model used to forecast noise impacts accounted for all of these, particularly where more than one source would be present. Model inputs include vehicle speeds, traffic volume, LRT frequency, distance between receivers and vehicles, vehicle type, station location, and existing noise barriers such as fences. LRT warning horns contribute substantially to noise level projections in some areas, generally adding between 1 and 3 dBA depending on existing noise levels and proximity to sensitive receivers (CDOT 1995).

Noise levels for the first phase of the Preferred Alternative selected in the ROD (the exclusive bus lane phase) were projected to be lower than those with the LRT system in place (CDOT 1995), due in part to the warning horn noise associated with the LRT. This assumption remains valid, and noise levels in the bus phase may be even lower in the future with the integration into the bus fleet of new, hybrid buses. These vehicles operate approximately ten times more quietly than traditional buses (Kenyon, 2006). Approximately 10 percent of the existing (2006) bus fleet consists of hybrid buses, and additional vehicles have been ordered.

Table 2-1 shows the estimated noise levels from the Preferred Alternative at the new sensitive receivers in the study corridor, based on the LRT system in place, with and without LRT warning horns being used. As described above in Section 2.1, the new receivers were assigned the noise levels of the closest receiver evaluated in the FEIS. As shown in the table, existing noise levels along the Preferred Alternative's alignment are below 67 dBA in the area of the new receivers. Noise levels would exceed the NAC for all of the new receivers, but would be reduced to below the NAC with mitigation outlined in the FEIS and ROD. As stated in Section 1.2, mitigation is not required for development constructed after the ROD; however, because the new receivers are located directly proximate to original receivers where mitigation was required, these new receivers will benefit from the mitigation described in the FEIS and ROD for the receivers in this area (see Section 3.0 for mitigation measures).

Table 2-1
Existing (1997) and Projected Noise Levels at New Sensitive Receivers along Preferred Alternative Alignment

1997 Receivers (see Figure 1-1)	**Existing (1997) Noise (dBA)**	**2030* Noise with LRT: with horn (without horn)**	**2030* Noise with LRT with mitigation**	**New sensitive receivers in vicinity of 1997 receivers** (see Figure 1-1)
17	60.5	69 (62)	62	A = 102¯108 N. 8th Street (4-unit building B = 814–822 W. Main Street (8-unit building)
20	62.0	68 (68)	62	C = 101 S. 7th Street (townhouse) D = 103 S. 7th Street (townhouse)
23	61.0	70 (68)	63	E = 719 W. Main (12 unit building)

**Source*: FEIS (CDOT 1997) and *Noise Impacts Report (*CDOT 1995). See text below for explanation of 2015 and 2030 projections.

The projected noise levels in the FEIS were for the year 2015. These same noise levels are shown in Table 2-1 for the year 2030, because the updated traffic projections done for this Reevaluation show that traffic levels in 2030 will be slightly below those previously projected (in the FEIS) for 2015. This is largely due to traffic management (TM) measures implemented by the City of Aspen to reduce traffic volumes in the downtown area, as well as the limited capacity of the roadway to accommodate additional vehicles. See *Traffic Characteristics and Safety* and *System Management* Technical Reports for more detail (FHWA and CDOT, 2007a and 2007b, respectively).

Construction noise from any future construction associated with the Preferred Alternative must comply with Aspen and Pitkin County ordinances pertaining to construction noise. These requirements are outlined in Section 3.0 as mitigation for construction impacts.

2.0 Summary of Impacts and Mitigation

Impacts are summarized below in Table 4-1 as identified in both the FEIS and this reevaluation. Mitigation measures listed in the table are those from the 1998 ROD, and would be implemented for the Preferred Alternative selected in the ROD. Regarding LRT warning horn noise, the ROD states that, "This may be mitigated by using a quieter horn, or replacing the horn with flashing lights." (ROD, page 35 of 37). Transit warning systems continue to evolve (e.g., a number of communities have established "quiet zones", and research continues on balancing noise with safety). Therefore, during final design of the LRT system in the future, it is expected that additional options for reducing warning horn noise may be available for consideration.

Table 3-1
Summary of Impacts and Mitigation Measures

Topic	FEIS Impact	Reevaluation Impact	Mitigation Measures
Noise	**Construction** Construction noise will vary depending on the activities involved. The noise is anticipated to exceed 90 dBA for short durations in some instances.	26 new residential units have been constructed in the corridor.	Restrict noisy construction to the daylight hours. Require an appropriate/good condition muffler on all equipment.
	Operations and Maintenance Residences and businesses in the downtown area will be impacted by noise when the LRT warning horn is used.		Use a quieter LRT warning horn, or replace the horn with flashing lights. A noise barrier has been modeled in the vicinity of the east landing of Castle Creek Bridge to the intersection of 7th Street and Main. During final design, a noise analysis will be conducted. Any form of noise barrier will be approved by area residents or business owners prior to construction.
	Noise impacts of the Preferred Alternative will affect the recreational qualities of the Marolt-Thomas Property and the Holden Smelting Complex.		A cut-and-cover tunnel and berms will be at the Marolt-Thomas Property. Some remaining noise impacts are likely to remain, however, they will not interfere to a significant degree with the qualities that make the resources valuable.

3.0 Agency Coordination

The Roaring Fork Transportation Authority (RFTA) provided information on the hybrid buses being added to its fleet, and their noise levels relative to traditional buses.

4.0 References

Christensen, Cindy, 2006a. Aspen/Pitkin County Housing Authority, Cindy Christensen, Operations Manager, personal communication—telephone calls from Terri Morrell, August 1, 2006.

_____, 2006b. Aspen/Pitkin County Housing Authority, Cindy Christensen, Operations Manager, personal communication—telephone calls from Terri Morrell, October 27, 2006.

City of Aspen, Maximum Noise Level by Zone District. No date. Web page http://www.aspenpitkin.com/depts/44/noise.cfm, accessed October 24, 2006.

_____. City of Aspen Municipal Code, Title 18 Noise Abatement. No date. http://www.aspenpitkin.com/pdfs/depts/44/noiseordinance18_04_010.pdf, accessed October 24, 2006.

_____. 2006. City of Aspen and Pitkin County-GIS and Mapping, GISMO Address Search Tool, www.aspenpitkin.com/depts/46/gismoinstruct.cfm, http://205.107.51.230/website/parcels/MapFrame.htm, accessed October 26, 1006.

Colorado Department of Transportation (CDOT). 1995. *State Highway 82 Entrance to Aspen Draft Environmental Impact Statement Technical Reports*, Project STA 082A-008, August 1995. [*Noise Impacts Report*, August, 1995, Centennial Engineering, Inc.]

_____. 1997. *State Highway 82 Entrance to Aspen Final Environmental Impact Statement and Section 4(f) Evaluation Volume 1* (FEIS), Project STA 082A-008, August 1997.

_____. 1998. *State Highway 82 Entrance to Aspen Record of Decision (ROD),* Project STA 082A-008, August 1998.

_____. 2002, Noise Analysis and Abatement Guidelines, December 1, 2002.

Federal Highway Administration (FHWA) and CDOT. November 2006a. Traffic Characteristics and Safety Technical Report, State Highway 82/Entrance to Aspen Environmental Reevaluation.

_____. November 2006b. System Management Technical Report, State Highway 82/Entrance to Aspen Environmental Reevaluation.

Kenyon, Kristin. 2006. Personal communication between K. Kenyon at Roaring Fork Transportation Authority (RFTA) and Lucy Bowen of HDR Engineering, July 11, 2006.

National Archives and Records Administration. No date. Electronic Code of Federal Regulations, Title 23 Highways, Part 772-Procedures for Abatement of Highway Traffic Noise and Construction Noise [47 FR 29654, July 8, 1982; 47 FR 33956, Aug. 5, 1982, as amended at 61 FR 45321, Aug. 29, 1996; 70 FR 16710, Apr. 1, 2005], http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=3ecfd4573812ca81876f356518723d9b&rgn=div5&view=text&node=23:1.0.1.8.43&idno=23, accessed October 24, 2006.

Pitkin County. No date. Pitkin County Code Title 6 Health and Safety, Chapter 6.36 Noise Abatement, http://www.aspenpitkin.com/pdfs/depts/12/county-noise-ord.pdf, accessed October 24, 2006.

_____. 2006. Pitkin County Assessor/Treasurer, Property Search database. www.pitkinassessor.org/assessor/ParcelMultipleResults.asp, accessed October 25, 2006.

5.0 List of Preparers

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