US 6/Wadsworth

Environmental Assessment

Noise Assessment and Mitigation Meeting Summary Report

CDOT Project STU #0062-019 (15215)
CH2M HILL Project No. 358660

June 2008

CH2MHILL

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Contents

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Acronyms and Abbreviations

CDOT	Colorado Department of Transportation
DRCOG	Denver Regional Council of Governments
EA	Environmental Assessment
EIS	Environmental Impact Statement
FHWA	Federal Highway Administration
NEPA	National Environmental Policy Act

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1.0 Introduction

The Colorado Department of Transportation (CDOT) and Federal Highway Administration (FHWA) are conducting an Environmental Assessment (EA) to study transportation improvements at the interchange of US 6 (also designated as 6th Avenue) and Wadsworth Boulevard (also designated as Colorado State Highway 121), including improvements along Wadsworth Boulevard from approximately 4th Avenue to 14th Avenue in Lakewood, Colorado. The EA was initiated in April 2007, and public scoping, which included an Open House and numerous small group meetings, was conducted between May and August 2007. A second Open House was held on February 12, 2008 to present information gathered from the Level 1 screening of design concepts, and a third Open House was held on April 29, 2008 and May 21, 2008 to present the Level 2 screening of design concepts for the US 6 interchange and Wadsworth Boulevard; the Preferred Alternative; and the preliminary estimates of environmental, transportation, and property impacts. Since presenting the Preferred Alternative, CDOT has:

- Conducted noise analysis on existing and future noise levels, and
- Considered locations for the proposed and reconstructed noise barriers.

CDOT held the Noise Assessment and Mitigation Meeting on Wednesday, June 4, 2008 to present information developed since the Open House #3.

This Noise Assessment and Mitigation Meeting Summary Report summarizes the notification methods and comments received at the meeting conducted in support of the US 6/Wadsworth Boulevard EA.

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2.0 Notification of Noise Assessment Meeting

Multiple methods of communication were used to notify the public of the Noise Assessment and Mitigation Meeting: advertisements in local newspapers; flyers distributed; and postcards mailed. This section describes the meeting notification and outreach process in greater detail.

2.1 Newspaper Advertisements

An advertisement announcing the Noise Assessment and Mitigation Meeting ran in the *Lakewood Sentinel* weekly newspaper on May 29, 2008. See Appendix A for a copy of the advertisement.

2.2 Flyers

A public notice flyer was developed and distributed at the May 21, 2008 Open House #3 to advertise the Noise Assessment and Mitigation Meeting. See Appendix A for a copy of the flyer.

2.3 Postcards

On May 26, 2008, postcards were mailed to the project mailing list advertising the Noise Assessment and Mitigation Meeting. The mailing list consisted of 1733 property and business owners within the geographic boundaries of 3rd Avenue to 9th Avenue and Garrison Street to Saulsbury Street, as well as other members of the public who requested to be included on the project mailing list. See Appendix A for a copy of the postcard.

2.4 Other Notification Media

The meeting was advertised on the project Web site at www.US6Wadsworth.com, which is linked to the main CDOT website.

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3.0 Noise Assessment and Mitigation Meeting

This section summarizes the venue for the Noise Assessment and Mitigation Meeting and presents the meeting format and materials used for exhibits and handouts to the public.

3.1 Location and Attendance

The Noise Assessment and Mitigation Meeting was held at the Lakewood Cultural Center Community Room in Lakewood, Colorado, on Wednesday, June 4, 2008, from 4:00 to 7:00 p.m. The meeting was attended by members of the public, City of Lakewood staff, CDOT representatives, local business owners, property owners, and members of the Lakewood City Council and Planning Commission. Approximately 64 people, not including CDOT, the consultant, or Lakewood staff, attended the meeting. Appendix B includes a copy of the meeting roster, listing the attendees at the Noise Assessment and Mitigation Meeting. Public comments are summarized in Section 4.0 of this report.

3.2 Meeting Format and Content

The Noise Assessment and Mitigation Meeting was conducted in a mixed open house and presentation format. For the Open House portion of the meeting, information stations were set up to cover the following topics:

- project purpose and need, and study schedule;
- noise information; and,
- reference materials and handouts.

CDOT and consultant staff were available at the stations and talked with meeting participants about the information provided. A Powerpoint presentation was given at 6:00 p.m. Appendix C includes a copy of the Noise Assessment and Mitigation meeting presentation.

Both written and verbal comments were received by staff during the open house portion of the meeting, and a comment box was provided to collect comment forms. Meeting minutes are provided in Appendix D. A Spanish translator was available, but no Spanish-only speakers were present at the meeting. An unsupervised children's area was available, and one family took advantage of this service.

3.3 Display Boards and Handouts

Display boards used at the Noise Assessment and Mitigation Meeting provided information on the project purpose and need and schedule; CDOT's noise analysis procedure; existing and future noise conditions; proposed locations for noise barriers; and noise barrier aesthetics. Display boards illustrated the following topics (see Appendix E for illustrations):

- Project purpose and need
- Key milestones schedule
- Sound pressure levels by decibel
- CDOT noise analysis flow chart
- Noise level contours and measurement locations
- Proposed locations of noise barriers
- Noise mitigation approach
- Noise mitigation effectiveness
- Noise barrier aesthetics

Handouts were available to provide more detailed information on some aspects of the project (see Appendix F). Handouts provided information on the following topics:

- Agenda
- Project purpose and need
- Environmental Assessment process
- Noise information
- Noise frequently asked questions
- US 6/Wadsworth frequently asked questions
- CDOT brochure: *Establishing Realistic Speed Limit*
- CDOT brochure: *Highway Traffic Noise: Assessment and Abatement*
- CDOT brochure: *Highway Traffic Noise: Effect of Pavement Types*
- Noise Assessment and Mitigation Meeting comment form

4.0 Noise Assessment Meeting Comments

Members of the public provided comments through discussions with project staff during the meeting and through written comment forms submitted during and after the meeting. The sections below summarize the comments received at the meeting. Comments received verbally by project staff during the Noise Assessment and Mitigation Meeting are detailed in Section 4.1 below. Written comments are summarized in Section 4.2 below and included in their entirety in Appendix G.

4.1 Summary of Verbal Comments

The topics receiving the most comments at the Noise Assessment and Mitigation Meeting were noise levels and frontage road changes. Other topics of interest included vehicle access, sight visibility, and maintenance and aesthetics.

Noise Walls

- Most meeting attendees were strongly in favor of noise walls along US 6 between Wadsworth Boulevard and Garrison Street.
- There is concern that the noise barriers will negatively affect air quality for the homeowners adjacent to the highway by concentrating pollution.
- There is a desire to construct walls where graffiti is easily removed.
- Several property owners fear that the walls will simply reflect the noise farther back into the neighborhoods if the walls are not absorptive.
- The length and height of the sound walls might limit sight distance along the frontage road, especially at on-ramps.
- There is concern that the proposed noise barriers will block business visibility from US 6.
- How far back were noise levels measured? Despite being farther away from the highway, residences that are elevated from the highway experience high noise levels.
- Several residents commented that noise levels increased when noise walls were constructed. There is concern that the proposed walls will worsen noise levels once constructed.
- Is it possible to measure before and after noise levels when the noise walls are constructed?

- Shadows from the sound walls on the north side of US 6 will create ice patches during the winter.
- Because US 6 is elevated at Garrison Street, one resident would like the sound walls to extend farther west than proposed to block visibility to US 6.
- The City of Lakewood wants to be involved in the discussion about the proposed sound barrier along the northeast quadrant's frontage road because of aesthetics. Lakewood also noted that noise barriers are permitted only along US 6 and US 285 in the City.

Frontage Road

- Headlights intruding into homes along the proposed frontage road will not be welcomed.
- There is concern about cut-through traffic on Vance Street and Broadview once the frontage road is constructed.
- Two-way traffic is a good idea for frontage road.
- The frontage road needs to be sloped well so that when ice melts in the winter, it drains properly.
- There is concern about truck traffic being able to negotiate tight curves along the northeast quadrant frontage road.
- There are several questions about where property owners will have access to a public street once the frontage road is constructed.
- Perhaps a wider sidewalk could be constructed closer to the frontage road in the northeast quadrant.

Vehicular Movements

- Several comments have been made asking to install a light at the intersection of Highland Drive and Wadsworth Boulevard so that vehicles exiting the neighborhood from the east can make a left turn onto Wadsworth.
- When US 6 is backed up traveling eastbound, vehicles illegally exit the highway via the Carr Street on-ramp. A resident asked that CDOT install a longer barrier between US 6 and the frontage road to restrict this movement.

Miscellaneous

- Have rising gas prices been considered when making traffic projections?
- Trucks and motorcycles generate extremely loud noise levels from the highway.

- Where will the CDOT plows put the snow from US 6, as it is currently plowed onto the frontage road? Snow is then plowed from the frontage road onto residents' driveways, left for them to clear, and CDOT plows often hit mailboxes when clearing snow.
- Has CDOT considered implementing tire regulations that could lessen the noise levels?
- Where will the ditch on the southern side of US 6 be relocated when the frontage road is constructed? Would the relocation of the ditch make accessing properties more difficult?
- How much do alternatives cost? What percentage of funding is federal versus state?
- Are emergency services being consulted about the design concepts?

4.2 Summary of Written Comments

Approximately 12 comment forms were completed and returned during or after the Noise Assessment and Mitigation Meeting. These written comments were entered into the comment database, which records all individual public comments received during the course of the study. The completed forms are compiled in Appendix G.

The comment form asked the following questions:

1. Do you support the construction of noise walls along US 6 as part of improvements to the US 6 and Wadsworth Boulevard interchange- yes or no? Comments?
2. Do you have any comments about the aesthetics/appearance of noise walls along US 6?
3. Please provide any additional comments.

Exhibit 1 documents the responses to Question 1.

EXHIBIT 1
Noise Assessment and Mitigation Meeting Comment Form Question 1 Responses – noise wall preference

Question	"Yes" Responses	"No" Responses	No Answer
1. Do you support the construction of noise walls along US 6 as part of improvements to the US 6 and Wadsworth Boulevard interchange?	9	2	1

Source: CH2M HILL, 2008.

The responses that disagreed with constructing noise barriers cited the following reasons for disagreement:

- The commercial enterprise depended upon exposure from US 6, and the proposed noise barriers would block that view.
- On the south side of US 6, there is already a problem of snow and ice build-up after every snow storm.

- The sound walls make the sound louder because they reflect sound, especially to properties elevated higher than US 6.

Additional comments provided in response to questions focused on the construction and aesthetics of the noise walls. Other topics of interest included safety and drainage.

Noise Barriers

- More absorptive and less reflective materials should be used for the sound walls.
- Long term maintenance, including graffiti removal, and aesthetics should be considered.
- Noise walls should extend farther west than currently proposed over the Garrison overpass.
- A business owner does not want the sound walls because they will block visibility to US 6 that benefits the business.
- Use shrubbery to help block the noise.
- Driving down US 6 adjacent to the existing noise walls is like driving through a tunnel and is an ugly view.

Vehicle Movements

- A light should be added at the intersection of Highland with Wadsworth in order to make a left turn onto southbound Wadsworth.
- Vehicles exit the Carr Street on-ramp illegally when US 6 is congested with traffic.

Miscellaneous

- Snow removal will be an issue when the sound walls are constructed on the south side of US 6.
- Motorcycles continue to generate high noise levels on US 6.
- If the timing for construction overlaps with the RTD Light Rail construction, it will be a nightmare for people trying to travel north-south.
- Return the speed limit to 55 miles per hour, as this is a residential neighborhood.

APPENDIX A

Notices and Advertisements

US 6/WADSWORTH NOISE MEETING

WHEN:

Wednesday, June 4, 2008 from 4:00 to 7:00 p.m.
Open house with informational presentation at 6:00 p.m.

WHERE:

Lakewood Cultural Center
470 South Allison Parkway
Lakewood, Colorado

WHY:

The Colorado Department of Transportation is studying potential transportation improvements to the US 6/Wadsworth interchange and to Wadsworth from 4th to 14th Avenues. Members of the public are invited to the upcoming meeting to learn about measured noise levels, proposed noise mitigation, and the CDOT noiseanalysis process.

Children's activity area available (unsupervised).
Traducción al español estará disponible durante la reunión.

US 6/Wadsworth

Environmental Assessment

For more information:
visit www.US6Wadsworth.com

DOT
DEPARTMENT OF TRANSPORTATION

CDOT is studying potential transportation improvements to the US 6 and Wadsworth Boulevard interchange and to Wadsworth Boulevard between approximately 4th Avenue and 14th Avenue. The study is an Environmental Assessment. No construction project or budget has been identified at this time.

Join the Colorado Department of Transportation (CDOT) at a public meeting to discuss noise information related to the US 6/Wadsworth Boulevard study. Members of the public are invited to the meeting to learn about measured noise levels, proposed noise mitigation, and the CDOT noise analysis process.

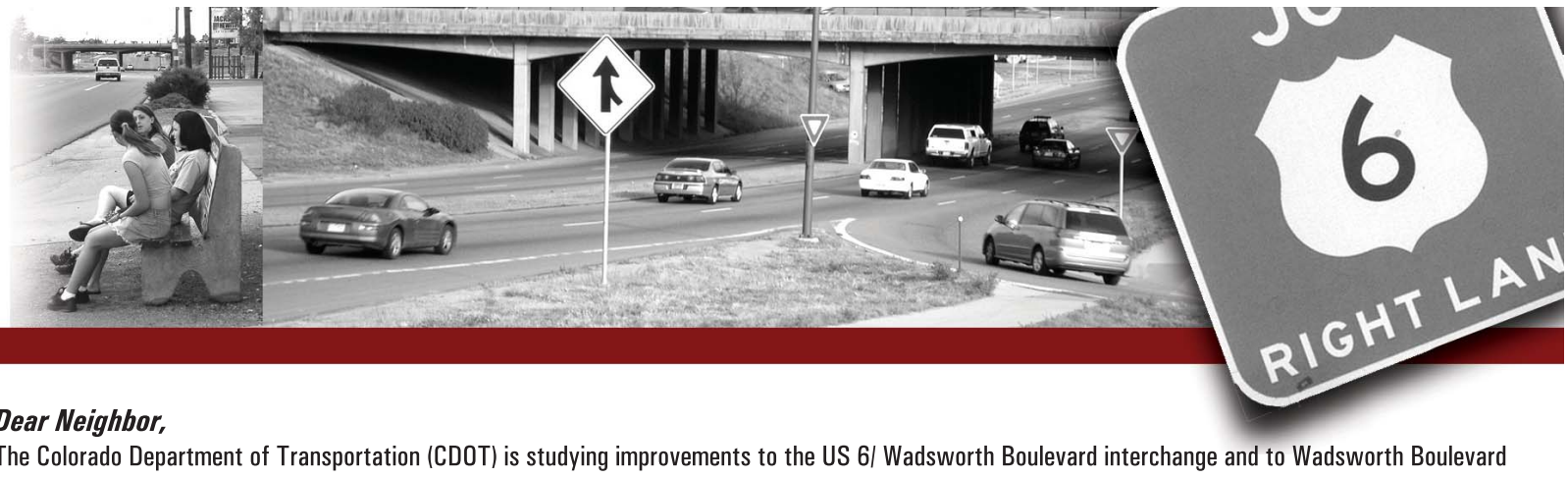
US 6/Wadsworth Noise Meeting

Wednesday, June 4, 2008
Open house 4:00 to 7:00 pm
Informational presentation at 6:00 p.m.
Lakewood Cultural Center
470 S. Allison Parkway, Lakewood
Children's activity area available (unsupervised)

For more information, visit www.US6Wadsworth.com, or call Colleen Kirby Roberts at 303-573-5385 x205.

Traducción al español estará disponible durante la reunión. Para información en español sobre la próxima reunión pública, de la evaluación ambiental de US 6 y Wadsworth, por favor contactar a Claudio Vera al 720-286-0226, claudio.vera@ch2m.com.

DOT
DEPARTMENT OF TRANSPORTATION



Dear Neighbor,

The Colorado Department of Transportation (CDOT) is studying improvements to the US 6/ Wadsworth Boulevard interchange and to Wadsworth Boulevard from 4th to 14th Avenues in Lakewood, Colorado. As part of the study, CDOT has evaluated noise conditions along US 6, determined that noise mitigation is feasible and reasonable, and included sound barriers (noise walls) in the proposed improvements for the interchange. Specifically, CDOT proposes to reconstruct a portion of the existing sound barriers along US 6 east of Wadsworth Boulevard, and construct new sound barriers along a portion of US 6 west of Wadsworth Boulevard.

We invite you to a public meeting to learn about measured noise levels, proposed noise mitigation, and the CDOT noise analysis process:

US 6/Wadsworth Noise Meeting
Wednesday, June 4, 2008
4:00 to 7:00 p.m., with an informational presentation at 6:00 p.m.
Lakewood Cultural Center Community Room
470 South Allison Parkway, Lakewood, Colorado

For additional information about proposed improvements and study progress to date, please visit our project website at www.US6Wadsworth.com, or contact Colleen Kirby Roberts, public involvement manager, at 303-573-5385, ext. 205.

Para información en español acerca de las condiciones de ruido o acerca del próximo mitin sobre el tema de ruido por favor contacte a Claudo Vera al 720-286-0226.

US 6/Wadsworth Environmental Assessment

US 6 and Wadsworth EA
c/o Colleen Kirby Roberts
CH2M HILL
535 16th Street, Ste. 800
Denver, CO 80202

DOT
DEPARTMENT OF TRANSPORTATION

www.US6Wadsworth.com

Noise Meeting Summary Report

APPENDIX B

Noise Meeting Roster

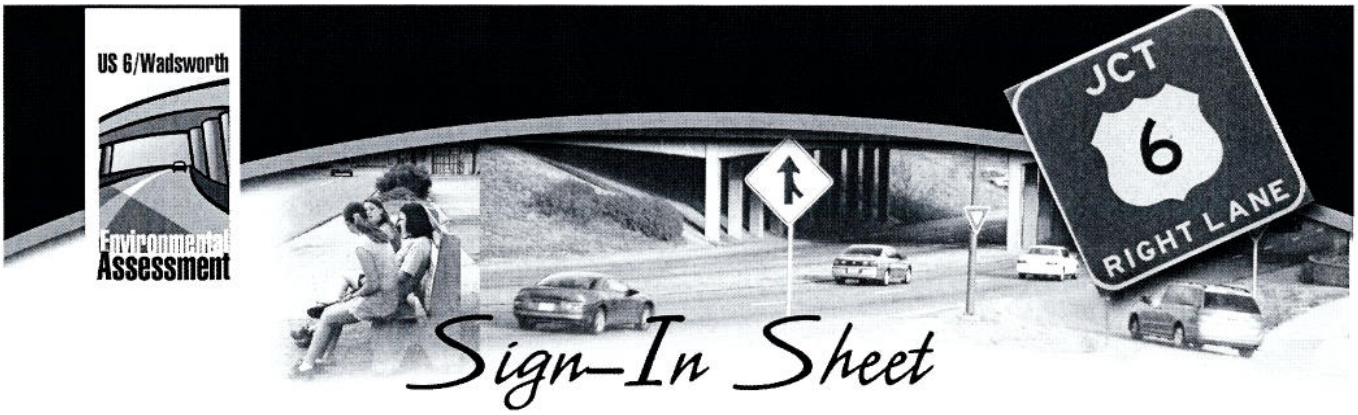
Sign-In Sheet

Meeting: Noise Information Meeting Date: June 4, 2008

Location: City of Lakewood Cultural Center, Lakewood.

Check here to be added to the project mailing list

Name	Address	Email	
Robert N Graham Sr	[redacted]		☒
Scot Kersgard			☒
DANA + JANET WRIGHT			☐
Mike Seal			☒
Carol + Joan Saindon			☐
GEORGE KUCLANES OLYMPIA INTER.			☐
Doug Anderson			☐
Rich Vincent			☐
Kevin + BRENDA SABO			☐
RIC + KAZUKO WEIDNER			☐
Rich Urbanowski			☑ On.
Muriel Saylor			☐
Mark Leaviff			☐



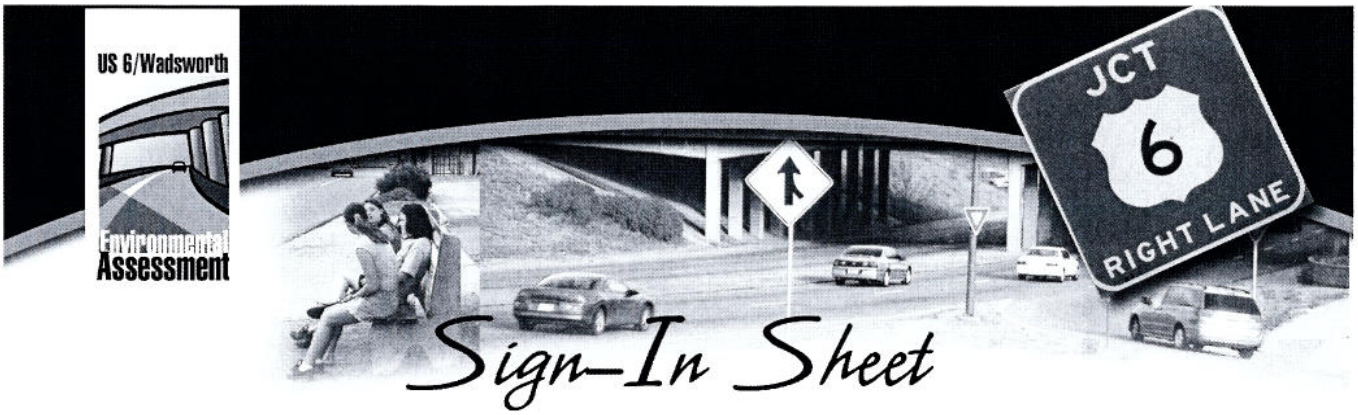
Sign-In Sheet

Meeting: Noise Information Meeting Date: June 4, 2008

Location: City of Lakewood Cultural Center, Lakewood .

Check here to be added to the project mailing list

Name	Address	Email	
Chas Tatman	[redacted]		☐
Karla Unland			☐
Joyce Wooster			☒
MARYANN PANARELLA			☒
David Baskett			☐
Michael Turner			☐
Rosa Fitzgerald			☑
Carl Sjögren			☒
STEVE DAVIS			☐
Chris Hristoforou			☐
DENNIS PFITZER			☒
Fran Yehle			☐
Charlay Able			☐



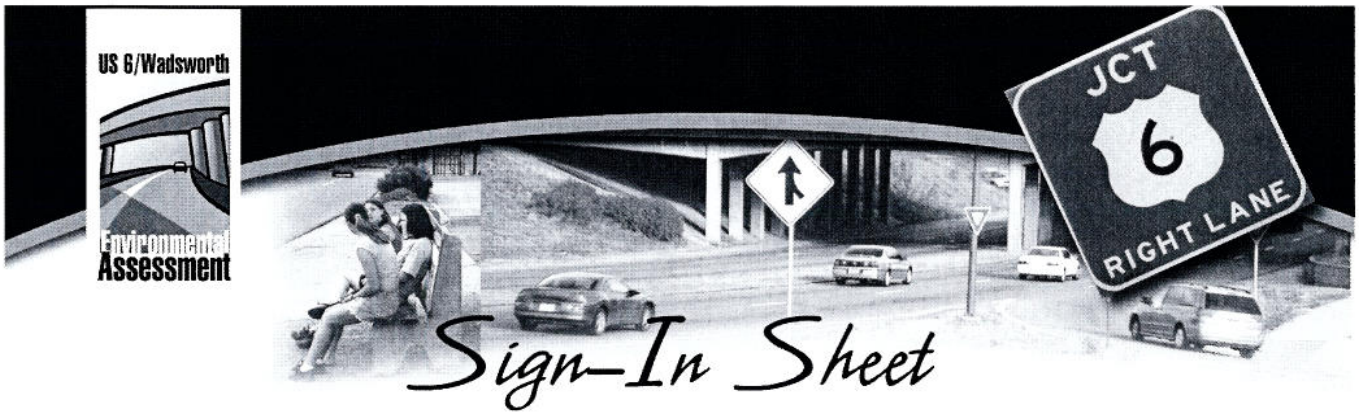
Sign-In Sheet

Meeting: Noise Information Meeting Date: June 4, 2008

Location: City of Lakewood Cultural Center, Lakewood.

Check here to be added to the project mailing list

Name	Address	Email	
Lynn Ayers	[redacted]		☒
Frank Lambert			☐
Susan Lambert			☐
Debbie Koop			☐
Jim & Sandy Ste			☑
Ray Schoch			☐
James Doll			☒
Richard McKinley			☐
Rossi Bray			☐
Jill Meyer			☐
Paul Welte			☑
Eric White			☐
John Lattimer			☒



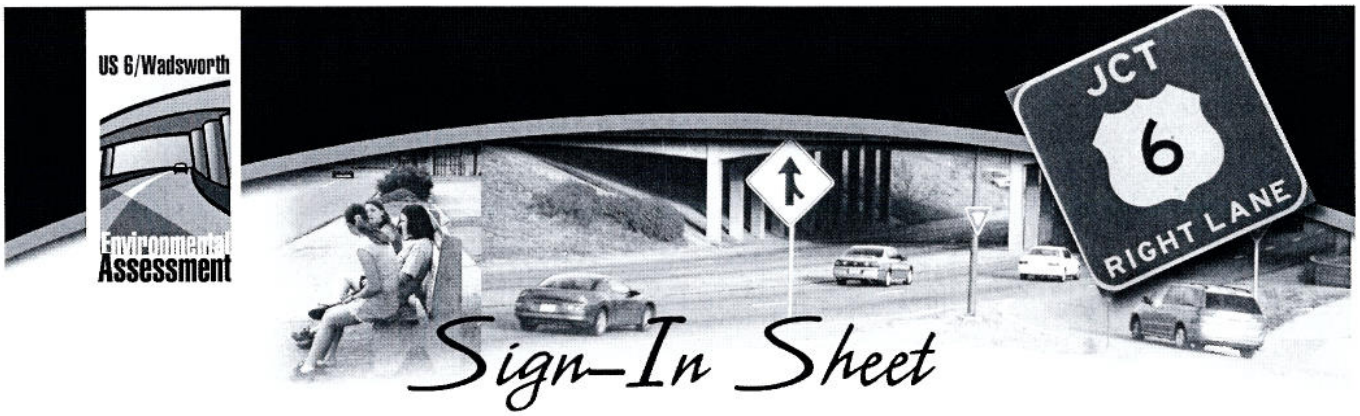
Sign-In Sheet

Meeting: Noise Information Meeting Date: June 4, 2008

Location: City of Lakewood Cultural Center, Lakewood.

Check here to be added to the project mailing list

Name	Address	Email	
Adrian J. Lewis	[redacted]		☒
Sue King			☐
Esther Feldman			☐
JAMES KNOLL			☐
Bob Cerny			☐
Marlo Pelffo			☐
ANSAR			☐
LYLE GALLIVAN			☐
PAUL EMSBO			☐
Kim Bernall			☐
Peter Koclanes			☐
Dorothy Hancock			☐
[illegible]			☒



Sign-In Sheet

Meeting: Noise Information Meeting Date: June 4, 2008

Location: City of Lakewood Cultural Center, Lakewood.

Check here to be added to the project mailing list

Name	Address	Email	
Julie Kronenberger	[redacted]		☑
Jean Reinhart			☒
Daryl Carmeon			☑
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			☐
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			☐
			☐
			☐

Sign-In Sheet

Meeting: Noise Information Meeting Date: June 4, 2008

Location: City of Lakewood Cultural Center, Lakewood.

Check here to be added to the project mailing list

Name	Address	Email	
RONALD GAROFALO	[redacted]		☐
Kathy Schmidt			☐
Sara Fawn Nagy			☐
Pam Vigil			☐
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Noise Meeting Summary Report

APPENDIX C

Noise Meeting Presentation

US 6 and Wadsworth Boulevard Environmental Assessment Noise Assessment and Mitigation

June 4, 2008
Lakewood Cultural Center, Lakewood

Welcome

The mission of the Colorado Department of Transportation (CDOT) is to provide the best multi modal transportation system for Colorado that most effectively moves people, goods, and information.

Agenda

- **Overview of the US 6 and Wadsworth EA**
- **Preferred Alternative**
- **CDOT Noise Policy**
- **Existing and Future (2035) Noise Levels**
- **Noise Reduction Measures**
- **Questions and Comments**

Meeting Format

- **Presentation**
- **Display boards**
- **Reference materials**
- **Tonight's goals**
  - Provide information about proposed improvements
  - Provide information about CDOT's noise policies and noise studies conducted for this project
  - Provide information about noise mitigation
  - Answer questions and collect input on alternatives and proposed noise mitigation

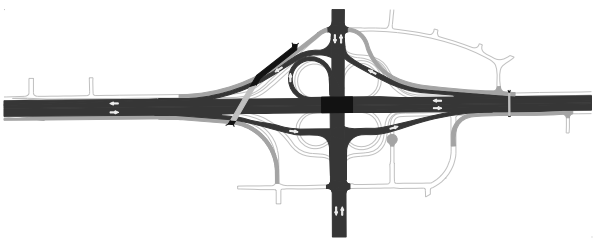
Project Purpose

Improve traffic flow and safety, accommodate high traffic volumes, and increase multi modal travel options and connections at the US 6 and Wadsworth Boulevard interchange and along Wadsworth Boulevard between 4th Avenue and 14th Avenue.

NEPA Process Progress

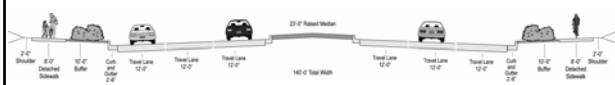
- **Scoping (Completed)**
- **Purpose and Need (Completed)**
- **Develop and Evaluate Alternatives (Completed)**
  - Level One Screening of Design Concepts (February 2008)
  - Level Two Evaluation (March 2008)
  - Preferred Alternative (April 2008)
- **Identify Impacts (April to August 2008)**
- **Determine Mitigation (April to August 2008)**
- **EA Document (August to December 2008)**
- **Final Decision (December 2008)**

Interchange Preferred Alternative Tight Diamond with Loop



Wadsworth Boulevard

- **Six travel lanes**
- **Raised median**
- **Detached sidewalks**



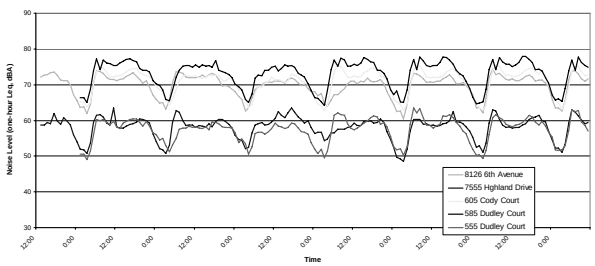
CDOT Noise Policy

- **Noise mitigation is only considered for new or expanded roadways (not for existing roads where traffic has increased or changed over time or where no expansion is being proposed)**
- **Determine existing and future noise levels**
- **If noise levels exceed CDOT's noise threshold of 66 dBA or increase by 10dBA, noise mitigation is warranted**
- **If noise mitigation is feasible and reasonable, it is included in the project design**

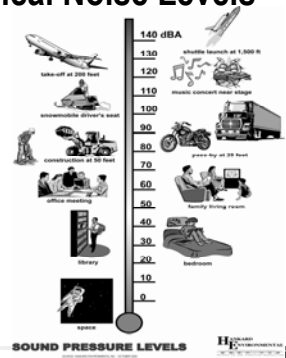
Measured Existing Noise Levels

- **Measured noise levels for one week at five locations**
  - Three locations had direct line of sight to US 6
  - One location was three houses back from US 6
  - One location was along Wadsworth

Existing Noise Levels



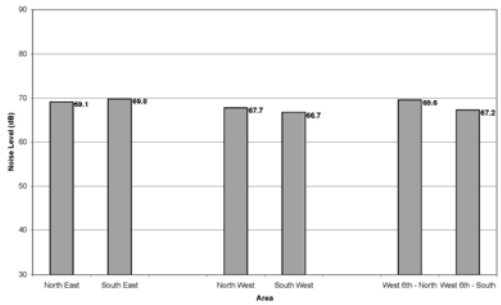
Typical Noise Levels



Predict Future Noise Levels

- **Use FHWA's Traffic Noise Model (TMN) to predict future noise levels with and without the project**
- **Model takes into account**
  - Location of roadways and residences
  - Terrain
  - Elevation
  - Traffic volumes and speeds
  - Existing and proposed barriers
- **Model validated using field measurements**

Future Noise Levels (no noise walls)



Noise "Impact"

- **CDOT's Noise Abatement Criteria for residences is 66 dBA**
- **Noise levels are greater than 66 dBA in this project area**
- **Therefore this project qualifies for a noise abatement analysis**

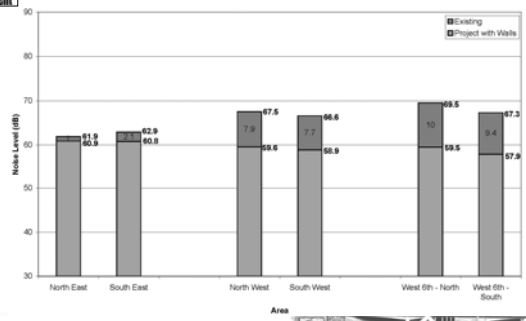
Range of Noise Control Measures

- **Variety of measures considered**
  - Shift road away from residences (not feasible)
  - Partially bury roadway (not feasible)
  - Construct natural barriers (earthen berms) (not feasible)
  - Soundproofing (not allowed by policy or effective for outdoor areas)
  - Speed (minimal noise benefit and difficult to enforce)
- **Quiet pavement could be considered in final design**
  - Primary consideration for pavement type is cost and effectiveness of maintenance
- **Noise walls determined to be appropriate control measure**

Proposed Noise Walls

- **East of interchange**
  - Re-build and extend westward the existing 15-foot-high walls on both sides of US 6
  - Extend walls/berms along frontage road in northeast quadrant
- **West of Interchange**
  - Construct new 15-foot-high walls along both sides of US 6 from Wadsworth Boulevard to Garrison Street
- **On bridge**
  - Construct 4-foot-high concrete barriers
  - Higher bridge walls considered but would create safety, maintenance, and construction issues
- **Wadsworth**
  - No walls proposed due to need for multiple access points and lack of affected residential receptors

Noise Level Reductions



Noise Mitigation Summary

- **12,700 linear feet of noise walls proposed**
- **Cost estimated at $4.8 million ($30 per square foot)**
- **Noise walls will provide noticeable noise reduction for 330 residences (receptors)**
  - The first row of homes adjacent to US 6 would experience an average noise reduction of 11 decibels
  - The average noise reduction for second row receptors is 9 decibels
  - Third row receptors would experience an average noise reduction of 7 decibels
  - Benefits are measurable out to the seventh row in some cases
  - Homes 1,000 feet or farther from US 6 would generally not experience change in noise conditions from noise walls

Questions and Comments

- **Talk with staff**
- **Fill out a comment sheet**
- **Visit the project website**

www.US6Wadsworth.com

APPENDIX D

Noise Meeting Minutes

US 6/Wadsworth

Environmental Assessment
Including Improvements from 4th to 14th Avenues

Purpose:	**Noise Assessment and Mitigation Meeting- present noise analysis on existing and future noise levels and locations for the proposed and reconstructed noise barriers**		
Day:	**Wednesday**	Date:	**June 4, 2008, 4:00 p.m. – 7:00 p.m.**

Location:	**Lakewood Cultural Center, 470 S. Allison Parkway, Lakewood**

Participants:

Attendee	Representing
See meeting roster in *US 6/Wadsworth Environmental Assessment Noise Assessment and Mitigation Meeting Summary Report*	Individuals interested in the project.
Aaron Swafford	CH2M HILL
Allen Albers	City of Lakewood
Alexis Moore	City of Lakewood
Cecilia Lazo	CH2M HILL
Colleen Kirby Roberts	CH2M HILL
David Singer	CDOT R6
Fawn Friend	CH2M HILL
Kirk Webb	CDOT R6
Mandy Whorton	CH2M HILL
Mike Hankard	Hankard Environmental
Randy Furst	CDOT R6
Seyed Kalantar	CDOT R6
Tim Eversoll	CH2M HILL
Vanessa Henderson	CDOT EPB
Zeke Lynch	CH2M HILL

Discussion Items

The purpose of this meeting was to present the noise analysis on existing and future noise levels, and to show locations for the proposed and reconstructed noise barriers.

Approximately 64 people, not including CDOT, the consultant, or Lakewood staff, attended the meeting. Sign-in sheets for this meeting are included in the *US 6/Wadsworth Environmental Assessment Noise Assessment and Mitigation Meeting Summary Report.*

The meeting was an open house format from 4:00 p.m. – 7:00 p.m., supplemented by a formal presentation given at 6:00 p.m. A Spanish translator was available, but no Spanish-only speakers were present at the meeting. An unsupervised children's area was available, and one family took advantage of this service.

For the Open House portion of the meeting, three information stations were set up to cover the following topics: project purpose and need, and study schedule; noise information; and, reference materials and handouts. CDOT and consultant staff were available at the stations and talked with meeting participants about the information provided. At each of the stations, displays boards were used to illustrate aspects of the projects. Reduced sized copies of the display boards are included in the *US 6/Wadsworth Environmental Assessment Noise Assessment and Mitigation Meeting Summary Report.*

For the formal presentation, Randy Furst, CDOT Region 6 Resident Engineer, introduced the project and the participants and provided an overview of CDOT's mission and goals for the Environmental Assessment. Mandy Whorton, CH2M HILL Environmental Manager, presented information about the EA process and information about the alternatives development and screening process. Kirk Webb, CDOT Region 6 Environmental Manager and noise specialist, presented information on CDOT's Noise Policy. Mike Hankard, Hankard Environmental noise consultant, presented information about the noise analysis of existing and future noise levels, the range of noise control measures considered, and the locations of the proposed noise walls.

A copy of all written comments received is available in the *US 6/Wadsworth Environmental Assessment Noise Assessment and Mitigation Meeting Summary Report.* The verbal comments received are presented below, categorized by topic.

Noise Walls

- Most meeting attendees were strongly in favor of noise walls along US 6 between Wadsworth Boulevard and Garrison Street.
- There is concern that the noise barriers will negatively affect air quality for the homeowners adjacent to the highway by concentrating pollution.
- There is a desire to construct walls where graffiti is easily removed.
- Several property owners fear that the walls will simply reflect the noise farther back into the neighborhoods if the walls are not absorptive.
- The length and height of the sound walls might limit sight distance along the frontage road, especially at on-ramps.
- The proposed noise barriers will block business visibility from US 6.
- How far back were noise levels measured? Despite being farther away from the highway, residences that are elevated from the highway experience high noise levels.
- Several residents commented that noise levels increased when noise walls were constructed. There is concern that the proposed walls will worsen noise levels once constructed.
- Is it possible to measure before and after noise levels when the noise walls are constructed?

- Shadows from the sound walls on the north side of US 6 will create ice patches during the winter.
- Because US 6 is elevated at Garrison Street, one resident would like the sound walls to extend farther west than proposed to block visibility to US 6.
- The City of Lakewood wants to be involved in the discussion about the proposed sound barrier along the northeast quadrant's frontage road because of aesthetics. Lakewood also noted that noise barriers are permitted only along US 6 and US 285 in the City.

Frontage Road

- Headlights intruding into homes along the proposed frontage road will not be welcomed.
- There is concern about cut-through traffic on Vance Street and Broadview once the frontage road is constructed.
- Two-way traffic is a good idea for frontage road.
- The frontage road needs to be sloped well so that when ice melts in the winter, it drains properly.
- There is concern about truck traffic being able to negotiate tight curves along the northeast quadrant frontage road.
- There are several questions about where property owners will have access to a public street once the frontage road is constructed.
- Perhaps a wider sidewalk could be constructed closer to the frontage road in the northeast quadrant.

Access and Traffic Issues

- Several comments have been made asking to install a light at the intersection of Highland Avenue and Wadsworth Boulevard so that vehicles exiting the neighborhood from the east can make a left turn onto Wadsworth.
- When US 6 is backed up traveling eastbound, vehicles illegally exit the highway via the Carr Street on-ramp. A resident asked that CDOT install a longer barrier between US 6 and the frontage road to restrict this movement.

Miscellaneous

- Have rising gas prices been considered when making traffic projections?
- Trucks and motorcycles generate extremely loud noise levels from the highway.
- Where will the CDOT plows put the snow from US 6, as it is currently plowed onto the frontage road? Snow is then plowed from the frontage road onto residents' driveways, left for them to clear, and CDOT plows often hit mailboxes when clearing snow.
- Has CDOT considered implementing tire regulations that could lessen the noise levels?

- Where will the ditch on the southern side of US 6 be relocated when the frontage road is constructed? Would the relocation of the ditch make accessing properties more difficult?
- How much do alternatives cost? What percentage of funding is federal versus state?
- Are emergency services being consulted about the design concepts?

APPENDIX E

Noise Meeting Display Boards

Project Purpose and Need

Purpose

Improve traffic flow and safety, accommodate high traffic volumes, and increase multi-modal travel options and connections at the US 6 and Wadsworth interchange and along Wadsworth Boulevard between 4th Avenue and 14th Avenue.

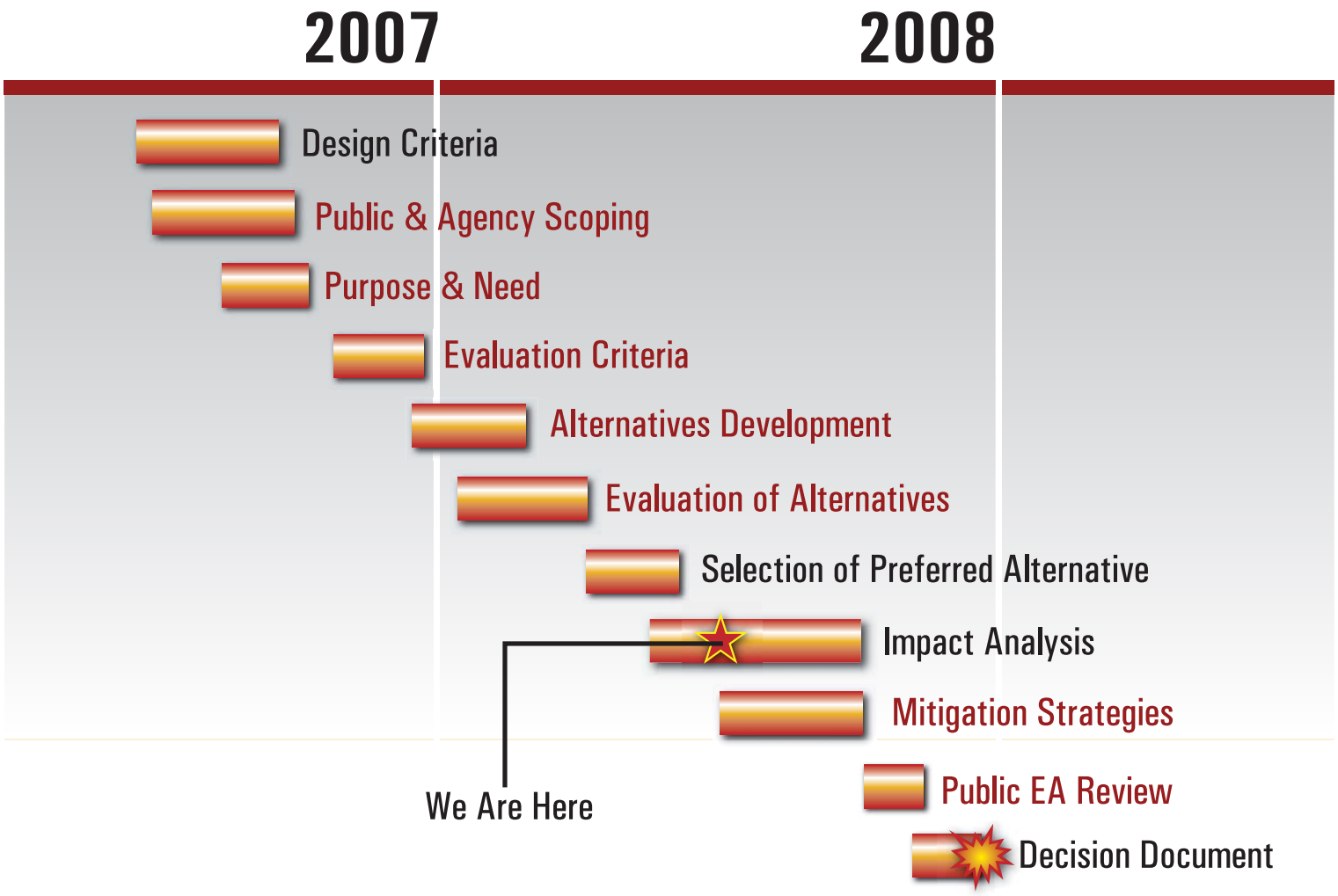
Needs

- Improve safety for motorists, pedestrians, and bicyclists
- Correct design deficiencies that contribute to safety concerns and operational inefficiencies
- Increase infrastructure capacity to meet current and future traffic volumes
- Support multi-modal connections

US 6/Wadsworth Environmental Assessment

DOT DEPARTMENT OF TRANSPORTATION

Key Decision Milestones



US 6/Wadsworth Environmental Assessment

DOT DEPARTMENT OF TRANSPORTATION

Sound Pressure Levels

take-off at 200 feet

snowmobile driver's seat

construction at 50 feet

office meeting

library

space

140 dBA

130

120

110

100

90

80

70

60

50

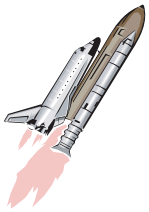
40

30

20

10

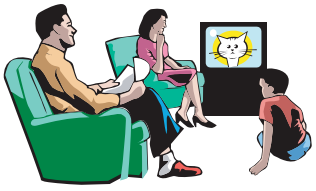
0



shuttle launch at 1,500 ft

music concert near stage

pass-by at 25 feet

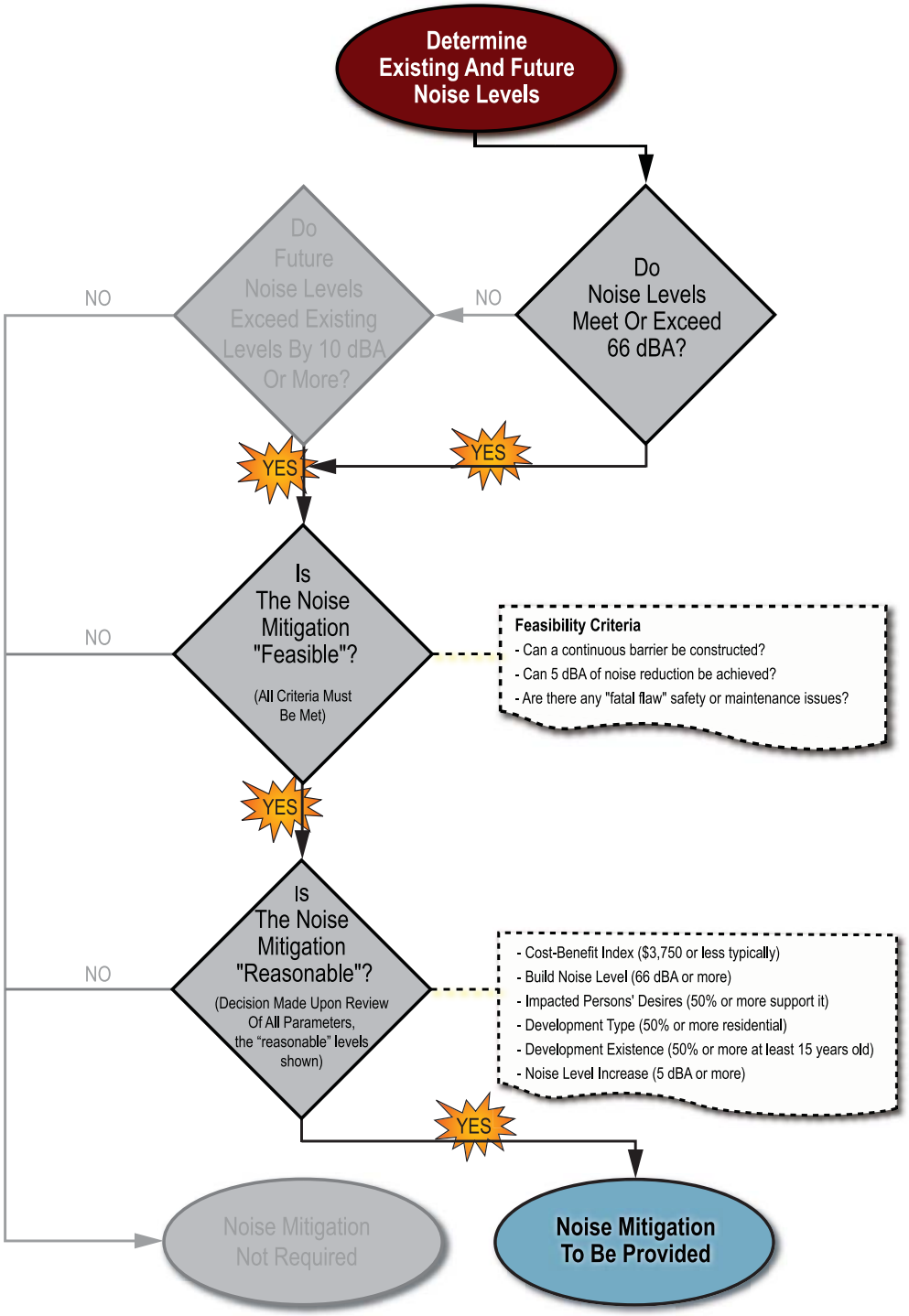


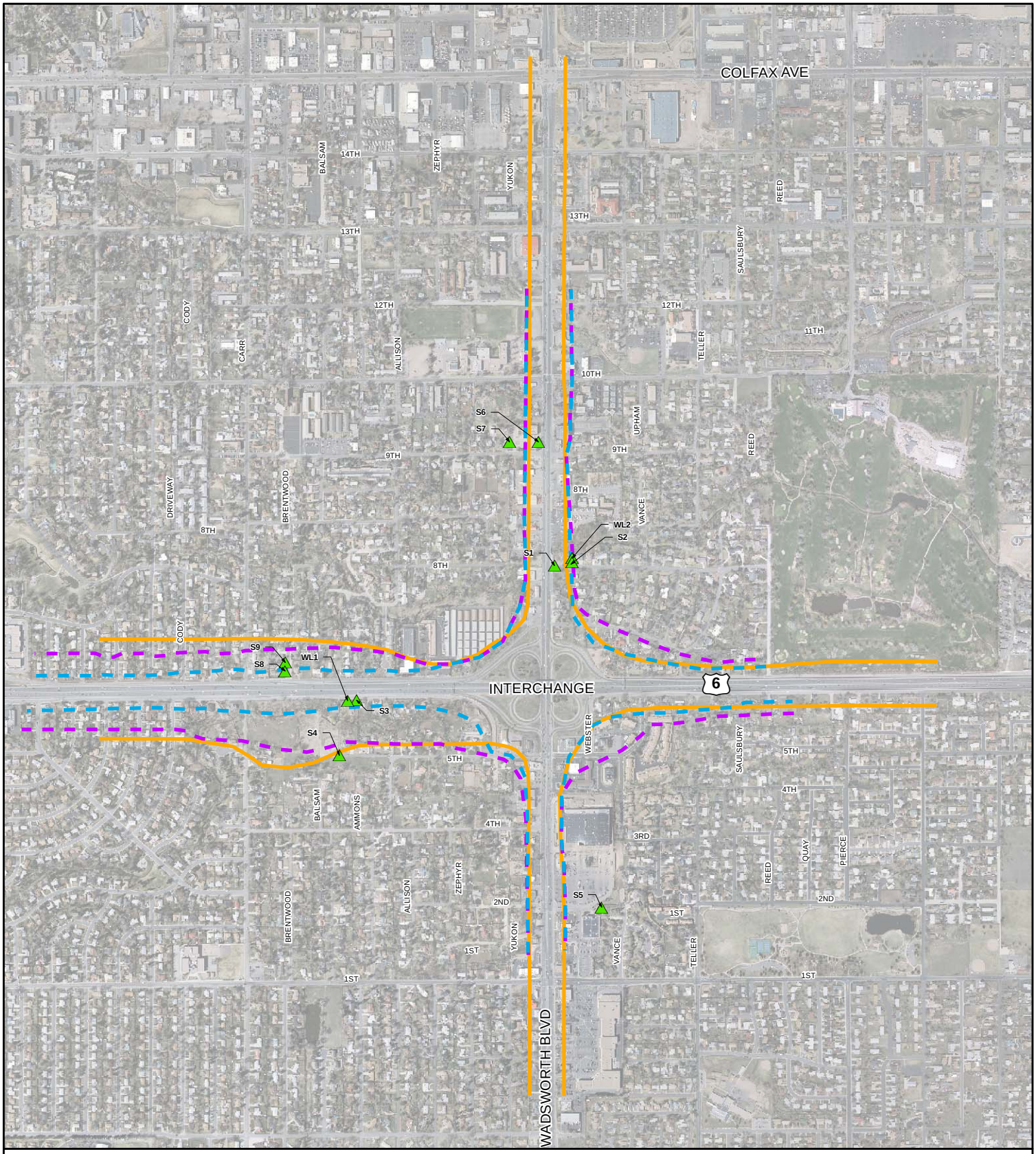
family living room

bedroom

CDOT Noise Analysis Procedure

Cdot Noise Analysis And Abatement Guidelines - December 1, 2002





Legend

- Noise Measurement Locations
- Design Year (2035) 66 dBA Noise Contours (with proposed noise walls)
- Design Year (2035) 66 dBA Noise Contours (without proposed noise walls)
- Existing (2007) 66 dBA Noise Contours

US 6 and WADSWORTH ENVIRONMENTAL ASSESSMENT

Noise Level Contours

SOURCE:
TNM, Hankard Environmental Inc

MAP CREATED: 05-28-08

0 250 500 1,000 1,500 Feet

N

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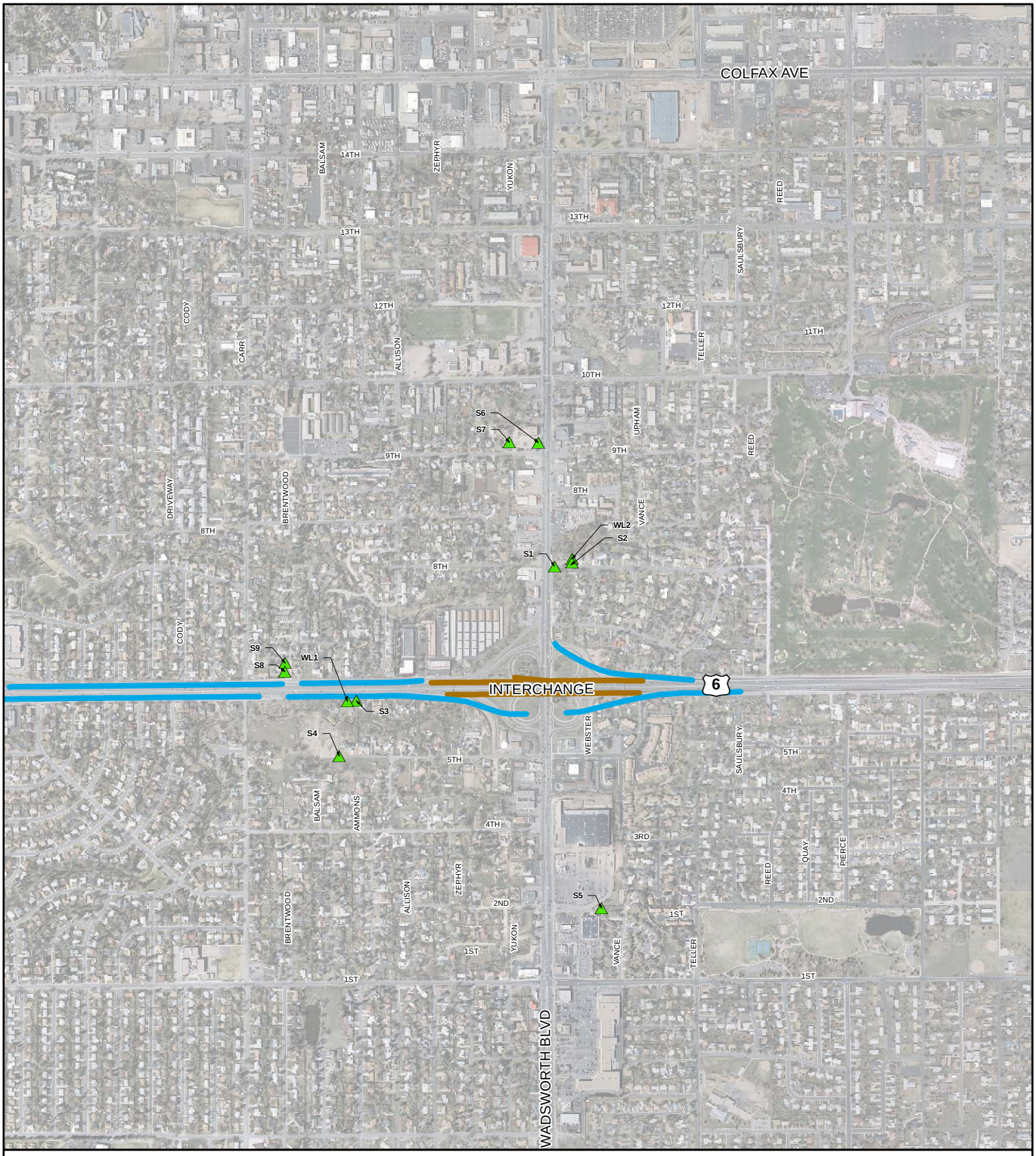

Legend

- Noise Measurement Locations
- Proposed 15 Foot Noise Barrier
- Proposed 4 Foot Noise Barrier

US 6 and WADSWORTH ENVIRONMENTAL ASSESSMENT

Proposed Noise Barriers

SOURCE:
TNM, Hankard Environmental Inc

MAP CREATED: 05-28-08

0 250 500 1,000 1,500 Feet

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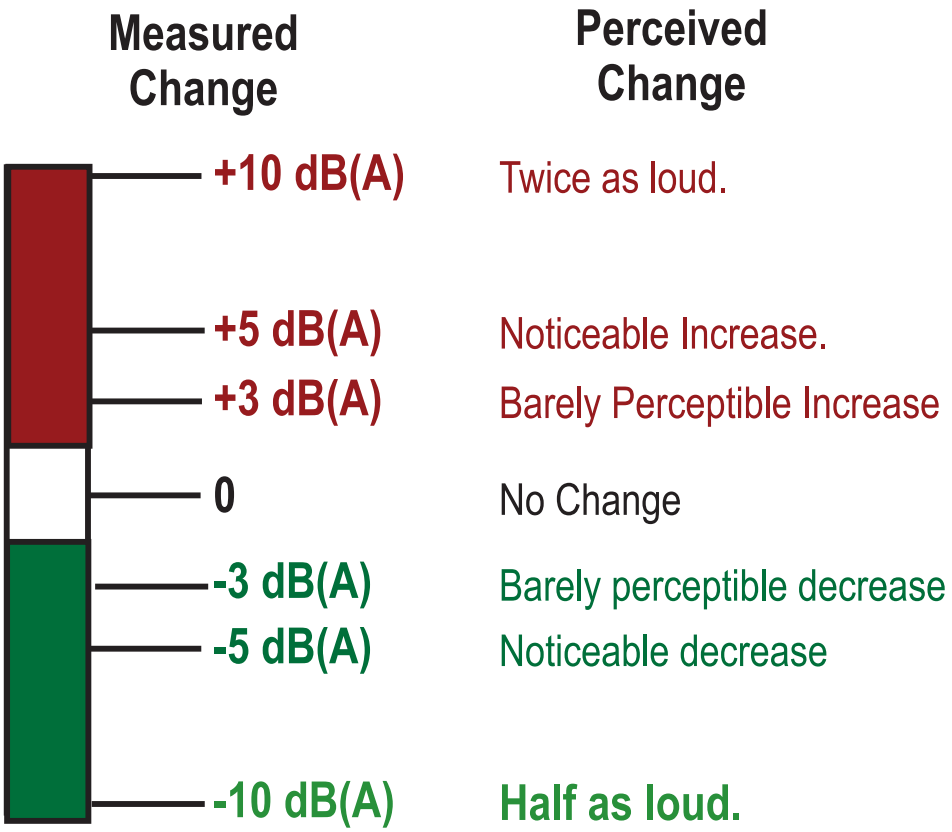
Noise Mitigation

- CDOT is proposing to construct 11,000 feet of new noise walls and reconstruct 1,700 feet of existing noise walls.
- Proposed walls would be 15 feet high, which is the same height as walls to the east of Wadsworth.
- Walls are typically concrete masonry or concrete panels. CDOT will seek input to the aesthetics.
- The average cost of the walls is estimated to be $4.8 million (at $30 per square foot).
- Noise walls are included as part of the basic design package.
- Noise walls could be constructed early in the overall construction to help mitigate construction noise.

Noise Mitigation Effectiveness

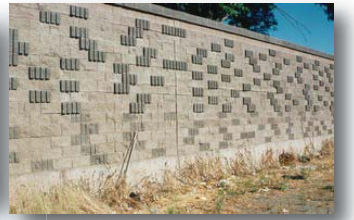
- Noise walls will provide noticeable noise reduction for 330 residences (receptors).

- Typical noise reduction for residences is as follows:
  - The first row of homes adjacent to US 6 would experience an average noise reduction of 11 decibels.
  - The average noise reduction for second row receptors is 9 decibels.
  - Third row receptors would experience an average noise reduction of 7 decibels.
  - Homes 1,000 feet or farther from US 6 would not experience any change in noise conditions from noise walls.



Noise Wall Aesthetics

Standard Architectural Treatments

- Considers elements such as texture, shape, color, and patterns.

Landscaping


- Integrates noise barrier with surroundings, supplements existing vegetation, and provides new vegetation.

Vertical Stepping/Sloping of Panels


- May create a more visually interesting design and facilitate landscaping treatments.

Alignment Changes


- Addresses changes in topography and shifts in alignment.

Horizontal/Vertical Caps


- Provides visual interest and smooths a barrier's profile.

Source: FHWA Highway Noise Barrier Design Handbook, 2000.

Barrier End Treatments


- Creates aesthetically pleasing treatments at the ends of noise barrier systems.

APPENDIX F

Noise Meeting Handouts

Welcome to the US 6 and Wadsworth Boulevard Environmental Assessment Public Noise Meeting

Wednesday, June 4, 2008
Lakewood Cultural Center, Lakewood, Colorado

Tonight's Purpose

The purpose of tonight's meeting is to provide information about

- Measured noise levels along US 6,
- Noise mitigation that would be provided as part of proposed design improvements to the US 6/Wadsworth Boulevard interchange, and
- The CDOT noise analysis process.

Display boards provide information about existing and future noise levels in the study area, proposed locations of new and reconstructed noise walls, benefits of noise mitigation, noise wall aesthetics, and the CDOT noise analysis procedure. Handouts are available with information about the noise analysis and proposed mitigation, and general project information.

Tonight's Agenda

4:00 p.m. to 7:00 p.m. – Sign-In and Public Open House

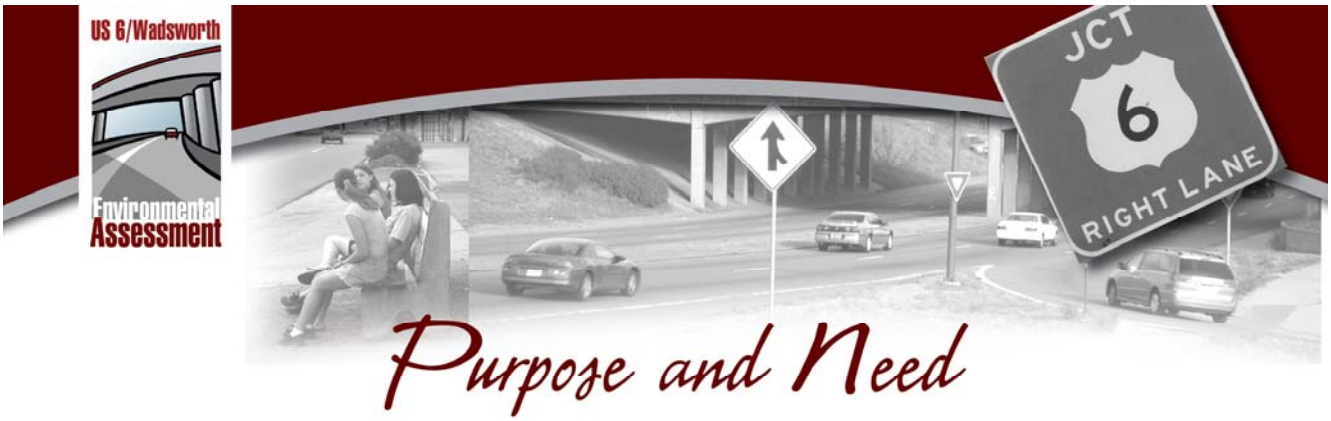
Please view display boards and talk with staff about the study and noise information. We encourage you to talk with staff about the proposed noise mitigation, ask questions, and share your comments.

6:00 p.m. – Informational Presentation

An informational presentation will be held in the Community Room. Please take a seat to listen to information about the noise analysis and proposed noise mitigation. The presentation will last approximately 30 minutes.

Ways to Provide Input

- Talk to one of the project team members at the display boards.
- Fill out a Noise Meeting Comment Form and place it in a comment box (available at the Reference Materials and Sign-In tables) on your way out.
- Mail your Comment Form to: US 6 / Wadsworth EA, c/o Colleen Kirby Roberts, CH2M HILL, 535 16th Street, Suite 800, Denver, CO, 80202.
- Submit comments via the project website at www.US6Wadsworth.com.



The project purpose and need identifies the transportation problems and other needs that the project is intended to address. It is defined through information gathered during scoping meetings and data collection activities.

Purpose of the Proposed Action

The purpose of the US 6 and Wadsworth Boulevard project is to improve traffic flow and safety, accommodate high traffic volumes, and increase multi-modal travel options and connections at the US 6 and Wadsworth Boulevard interchange and along Wadsworth Boulevard between 4th Avenue and 14th Avenue.

The project area includes US 6 (also designated as 6th Avenue) and Wadsworth Boulevard (also designated as State Highway 121). The east-west limits along US 6 are from the eastern interchange ramps with Wadsworth Boulevard west to Garrison Street. On Wadsworth Boulevard, the project limits are 4th Avenue to 14th Avenue. This area is a vital regional hub of the western Denver metropolitan area and the heart of the City of Lakewood.

The Colorado Department of Transportation (CDOT), Federal Highway Administration (FHWA), City of Lakewood (City), area residents, businesses, and commuters have prioritized making improvements to fix the transportation problems in the project area through previous planning efforts. CDOT's goal is to identify a proposed action that meets transportation needs, is compatible with local and regional plans, avoids or minimizes environmental harm, and can be implemented within cost constraints.

Need for the Proposed Action

The existing design and configuration of the interchange and roadway within the project limits have not kept pace with traffic and multi-modal travel demands. Improvements are needed to:

- Improve safety for motorists, pedestrians, and bicyclists
- Correct design deficiencies that contribute to safety concerns and operational inefficiencies
- Increase infrastructure capacity to meet current and future traffic volumes
- Support multi-modal connections

For federally-funded transportation projects, the National Environmental Policy Act (NEPA) requires that the environmental impacts of the proposed action be analyzed. This type of study is required before federal funds can be committed to the project. The Federal Highway Administration (FHWA) is the lead federal agency on the US 6 and Wadsworth Boulevard Interchange Environmental Assessment.

Essential Elements of NEPA:

- **Public & Agency Scoping**
- **Purpose & Need**
- **Alternatives Development**
- **Assess Impacts**
- **Determine Mitigation**
- **Prepare Environmental Assessment**
- **Public & Agency Review**
- **Decision Document**

Public & Agency Scoping: This is a public process used to identify environmental issues that need to be studied and to help define the purpose and need for the project.

Purpose & Need: The project purpose and need identifies the transportation problems and other needs that the project is intended to address. It is defined through information gathered during scoping meetings and data collection activities.

Alternatives Development: A range of alternatives will be developed for the design of the US 6 and Wadsworth Boulevard interchange and Wadsworth Boulevard from approximately 4th Avenue to 14th Avenue. A “No Action” Alternative – which would not provide any transportation improvements – will also be considered. The range of alternatives will then be screened to eliminate alternatives that aren’t reasonable, feasible, or that don’t meet the project purpose and need.

Assess Impacts: Transportation, social, and environmental impacts of the remaining alternatives are studied and documented in the Environmental Assessment.

Determine Mitigation: Mitigation measures are developed to avoid or minimize adverse impacts.

Prepare Environmental Assessment: Once impacts are analyzed and mitigation measures are identified, the Environmental Assessment is written and published for review by the public and agencies.

Public & Agency Review: The project team takes comments from the public and agencies during the review period. A public hearing is held to present the information and take formal comments on the document.

Decision Document: After receiving public and agency comments on the Environmental Assessment, FHWA issues a decision document. This document records the decision made by FHWA on the project and, if a construction project is identified, commits to mitigation of impacts.

CDOT follows FHWA regulations and guidelines, and the *CDOT Noise Analysis and Abatement Guidelines* for assessing traffic-related noise. These guidelines establish "noise abatement criteria," that is, noise level standards above which noise-reducing actions should be considered. These standards are used for determining the noise impacts of a project as well as assessing potential mitigation for impacted areas. Noise abatement criteria vary depending on the activity that occurs on a property. The noise abatement criteria for different activity categories are shown in the table below.

CDOT noise abatement criteria are expressed in A-weighted decibels (dBA). An A-weighted decibel is a unit of measure corresponding to the way the human ear perceives the magnitude of sounds at different frequencies.

According to CDOT guidelines, a traffic noise impact at a location occurs when (1) predicted noise levels at that location exceed the noise abatement criteria, shown in the table below or (2) predicted noise levels exceed the current noise level by 10 dBA or more (even though the predicted levels may not exceed noise abatement criteria). This definition reflects the FHWA position that traffic noise impacts can occur under either of two separate conditions: (1) when noise levels are unacceptably high (absolute level); or (2) when a proposed highway project will substantially increase the existing noise environment (substantial increase).

CDOT's guidelines state that noise mitigation should be considered for any property, typically called a receptor in noise studies, where traffic noise impacts will occur according to the criteria explained above. Information about mitigation measures is provided on the back of this page.

CDOT Traffic Noise Abatement Criteria

Activity Category	L_{eq} [(1)] (dBA)	Description of Activity Category
A	56 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	66 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	71 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	51 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

[(1)] Road noise changes from moment to moment, but one can describe the noise energy over time in terms of its "equivalent level" (abbreviated L_{eq}). The L_{eq} is a single level that has the same sound energy as the fluctuating level over a stated time period. The L_{eq} used for the noise abatement criteria is the hourly A-weighted equivalent level for the "noisiest hour" of the day in the design year.

(Continued on back of sheet)

To be included in a project, a proposed noise mitigation measure must first be found to be feasible. A summary of the feasibility criteria is as follows:

- The proposed mitigation measure must be predicted to achieve at least 5 dBA of noise reduction at front row receptors (that is, the row of properties closest to the road).
- The proposed mitigation measure must not create any “fatal flaw” safety or maintenance issues such as reduced sight distances, shadowing of ice-prone areas, interference with snow/debris removal, or crash hazards.
- If the mitigation measure is to be a barrier, such as a wall, it must be possible to construct it in a continuous manner. Gaps in noise barriers, e.g. for driveways, significantly degrade their performance.

If a mitigation measure is found to be feasible, it is then analyzed for its “reasonableness.” A summary of the reasonableness criteria is as follows:

- The cost/benefit index of the proposed measure should not exceed $4,000 per dB of reduction per benefited receptor.
- The predicted design year noise levels should equal or exceed the Noise Abatement Criteria shown in the table on the front of this sheet.
- At least 50% of the affected properties should approve of the proposed measure.
- Land use in the affected area should be at least 50% Category B (refer to the Noise Abatement Criteria table on the front of this sheet).

Noise walls were determined to be a feasible mitigation measure for the US 6 and Wadsworth project. As such CDOT is proposing to construct 11,000 feet of new noise walls and reconstruct 1,700 feet of existing noise barriers. The total cost of the walls is estimated to be $4.8 million (at $30 per square foot). Fifteen-foot tall noise walls are proposed east and west of the US 6/Wadsworth interchange. Four-foot tall concrete barriers are proposed on the bridge. Noise walls will provide noticeable noise reduction at 330 residences (receptors). Typical noise reduction for residences is as follows:

- The first row of homes adjacent to US 6 would experience an average noise reduction of 11 decibels.
- The average noise reduction for second row receptors is 9 decibels.
- Third row receptors would experience an average noise reduction of 7 decibels.
- Homes 1,000 feet or farther from US 6 would not experience any change in noise conditions from noise walls.

Q-1: How is noise measured?

A-1: Noise, usually defined as unwanted or unacceptable sound, is measured in terms of decibels. A decibel is a unit of measurement that quantifies the sound pressure differences in the air that we perceive as sound (or noise) on a scale ranging from zero decibels on up. Zero decibels is the threshold of human hearing, 40 to 50 decibels is normal for a peaceful neighborhood, 70 to 80 decibels is the level adjacent to a busy urban street or 50 feet from a major freeway, and 120 to 140 decibels is a typical level at which sound is painful. For highway traffic noise studies, noise levels are quantified in terms of the equivalent sound level, or Leq. The Leq is essentially the average noise level over period of time, usually one hour.

Q-2: How are noise level changes perceived?

A-2: Studies have shown that changes in noise levels of 3 decibels or less are not normally detectable by the average human ear. An increase of 5 decibels is generally readily noticeable by anyone, and a 10-decibel increase is usually felt to be "twice as loud" as before.

Q-3: How do changes in traffic or roadway geometry affect noise levels?

A-3: Due to the nature of the decibel scale, a doubling of traffic will result in a 3-decibel increase in noise levels, which in and of itself would not normally be a perceivable noise increase. Traffic would need to increase at least three times to result in a readily perceivable (5 decibel) increase in noise. Using the same reasoning, if a highway is moved half as close to existing homes as it is now (i.e., from 200 to 100 feet), the noise levels will increase by 3 decibels. Conversely, if a highway is moved double the distance from existing homes, the noise levels will decrease by 3 decibels. Noise level increases due to highway projects are usually due to a combination of increased traffic and changes in the roadway alignment.

Q-4: When is a noise analysis required?

A-4: A noise analysis is required for a proposed CDOT project if that project consists of:

- A new highway built on a new location, or
- An existing highway that is significantly altered by substantially changing the horizontal or vertical characteristics of the road, or
- The number of through traffic lanes being increased. Minor projects, such as normal roadway resurfacings (without adding new lanes), do not require a noise analysis.

Q-5: Is a noise analysis required when the speed limit of a highway is changed?

A-5: No. Under the current regulations, a speed limit increase does not qualify as a project in which a noise analysis is required. CDOT does not have legal enforcement authority on the highways and cannot enforce lower speeds; enforcement of the traffic laws are the responsibility of local law enforcement.

Q-6: Does CDOT analyze noise levels on existing highways?

A-6: In the absence of a major highway project as described above, CDOT does not perform noise studies or mitigate noise for existing highways.

Q-7: What constitutes a traffic noise impact?

A-7: A "noise sensitive receiver" (defined as homes, parks, schools, businesses, etc.) is considered impacted by noise if either future noise levels (generally a 20 year projection) approach or exceed the CDOT Noise Abatement Criteria, or if there is a substantial increase in future noise levels over existing noise levels from a proposed CDOT project as described above. These are the noise levels experienced at the commonly used exterior portions of a property on the lowest or ground level for each home or individual unit. For residences, schools, and parks, impact is defined when the Leq is 66 decibels or higher, and for businesses and other commercial properties the impact Leq value is 71 decibels. A substantial increase impact occurs when there is a projected 10-decibel increase over existing noise levels. Impacts such as these require mitigation consideration and analysis, which will result in the construction of noise barriers if they are determined to be feasible and reasonable.

Q-8: How was the selection of the noise levels in the Noise Abatement Criteria determined?

A-8: CDOT's selection of the noise abatement criteria levels were based on guidance from FHWA, and is consistent with the criteria used by all state DOT's. FHWA used numerous approaches in establishing the noise abatement criteria were considered, to include hearing impairment, annoyance, sleep interference, and speech communication interference. The main challenge in establishing the criteria was to balance noise levels which are desirable with those that are achievable. As a result, speech impairment was usefully applied as being the condition that best met that balance.

Q-9: Does EPA have standards which apply to highway noise?

A-9: Not at this time. EPA does have recommended noise levels which are considered goals, but did not recommend those levels as strict standards applicable to highway projects due to factors including but not limited to cost, engineering feasibility, and geographical characteristics.

Q-10: What does CDOT consider "feasible and reasonable"?

A-10: A noise barrier must be both feasible and reasonable if it is to be constructed with a highway project. Feasibility and reasonableness are determined by criteria that are quantifiable but flexible, and judgments for special and/or unusual circumstances are made on a case-by-case basis. As a result, noise mitigation is not automatically provided where noise impacts have been identified. A barrier is feasible if it can be constructed without major engineering or safety issues and provide a substantial noise reduction to the adjacent receivers. Reasonableness deals with whether or not the barrier can be constructed in a cost-effective manner, the percentage of residential-type development, overall noise levels and noise level increases, and the desires of the community.

Q-11: What is a "substantial noise reduction"?

A-11: A noise barrier must provide at least a readily perceptible decrease in noise levels to adjacent receivers to be effective. This is defined as a noise decrease of at least 5 decibels. As noise level changes of 3 decibels or less are not generally perceivable, it is not prudent to construct a noise barrier that gives only a 1 or 2 decibel benefit to adjacent properties.

Q-12: What types of noise barriers are constructed?

A-12: Noise barriers are commonly constructed as walls, earthen berms, or a combination of the two. Walls are most common, and are usually constructed out of dense materials such as concrete or masonry block. Earth berms are a natural alternative to walls, but require much more land to construct. Walls can be constructed on top of berms in order to raise the overall height of the barrier.

Q-13: How do noise barriers work?

A-13: Noise barriers reduce noise by blocking the direct travel of sound waves from a source (such as a highway) to adjacent homes or businesses, forcing the waves over the top or around the barrier. The barrier must be high enough and long enough to block the view (line of sight) of the highway. This is the phenomenon that allows a noise barrier to provide a perceivable noise reduction. Noise barriers do very little good for homes on a hillside overlooking a road or for buildings which rise above a barrier. Openings or gaps in barriers for driveway connections or street intersections reduce barrier effectiveness. Noise barriers are most effective for the first one or two rows of homes at distances up to 200 to 300 feet from the barrier. As noise levels decrease with distance, there is a point away from the highway at which noise barriers are no longer effective. It is important to note that barriers are not designed to eliminate or block all noise.

Q-14: Are noise barriers built to protect locations on the upper floors of homes?

A-14: Noise barriers may, under certain geographic conditions, be able to be designed to protect upper levels of multi-family structures, where each unit is a separate residence. For single-family homes, the primary consideration is the outdoor, ground-floor areas of human activity. Barriers built for the second floor would have to be tall enough to provide a substantial noise reduction for those areas, which in most cases would require very high walls that would not be feasible or reasonable.

Q-15: How are noise reflections from buildings and barrier walls considered?

A-15: Highway traffic noise levels are not substantially increased by construction of a noise barrier or the presence of a building on the opposite side of a highway from sensitive properties. This is because the theoretical maximum noise increase from a source is limited to 3 decibels, which corresponds to a doubling of the source. In practice, not all of the sound energy is reflected back to the receiver. Some of the sound is diffracted over the barrier, some is reflected to points other than the affected property, some is scattered and/or absorbed by ground coverings and other terrain, and some is blocked by the presence of other vehicles on the highway. The overall noise increase is normally limited to 1-2 decibels at the most. In general, this is not a perceptible increase, but the character of the noise may seem to change, which is what is usually noticed.

In the case of parallel barriers, however, studies have shown that if two walls are constructed very close together, there is a potential for multiple reflections that may perceptibly increase noise levels. Generally, this is not normally a problem for barriers greater than 200 feet apart or where the width-to-height ratio is more than 10:1 (barriers 10 feet high should be at least 100 feet apart).

Q-16: Will planting vegetation help reduce noise levels?

A-16: Vegetation is only effective for reducing noise levels if it is at least 100-200 feet deep, high enough that it cannot be seen over, and dense enough that it cannot be seen through. It is not feasible to plant enough vegetation along a highway to achieve this type of reduction, although planting trees or shrubs can provide aesthetic benefit and visual screening.

Q-17: Can anything be done about "Jake Brake" use?

A-17: Colorado state law now requires that any vehicle equipped with engine compression brake devices (commonly referred to as "Jake Brakes") be equipped with proper mufflers. Failure to do so will result in a $500 fine. The enforcement of this law is the responsibility of the local authorities.

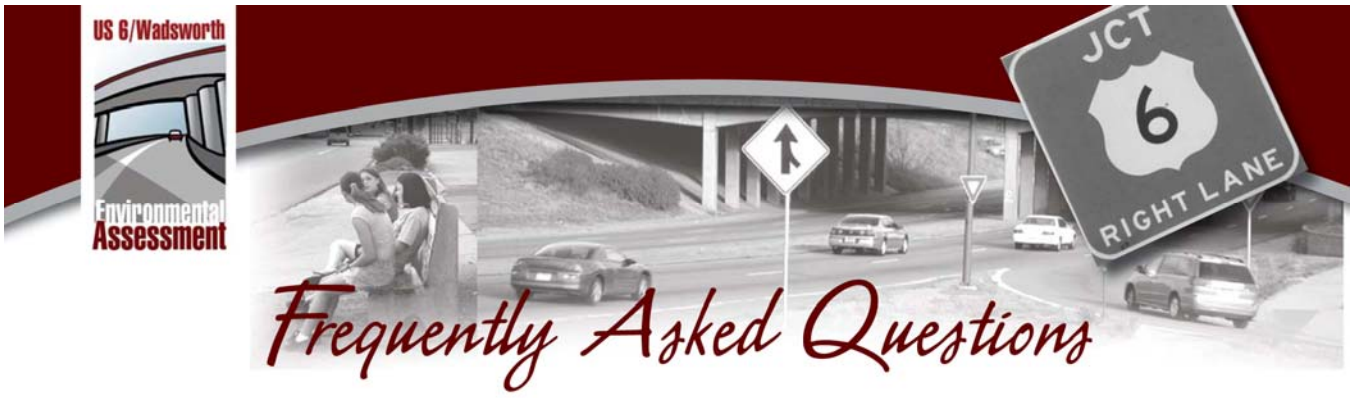
CDOT has not restricted the use of these devices for safety reasons. However, CDOT has assisted local entities with this issue by installing "Engine Brake Mufflers Required" signs along selected highways.

Q-18: What is the effect of pavement type on noise levels?

A-18: Research regarding pavement influence on noise levels has been an ongoing process. In general, the use of certain types of asphalt pavements or texturing of concrete pavements can give an initial noise reduction benefit to properties 200 to 300 feet from the highway. Over a long period of time, however, it is not known if these benefits continue to be realized. As a result, pavement type, in and of itself, cannot be considered as an alternative to conventional noise mitigation measures at this time. CDOT's present policy for pavement type selection is made based on a life-cycle cost analysis, which at this time does not consider noise as a primary factor.

Typical Noise Levels

Noise Source	Noise Level (DBA)
Commercial Jet	110-120
Shouting at 5 feet	95-105
Heavy Truck/Motorcycle at 25 feet	85-95
Freeway Traffic at 50 feet	70-80
Conversational Speech at 5 feet	55-65
Quiet Neighborhood	45-55
Living Room	35-45
Remote Outdoor Location (no wind)	20-30
Threshold of Hearing	0



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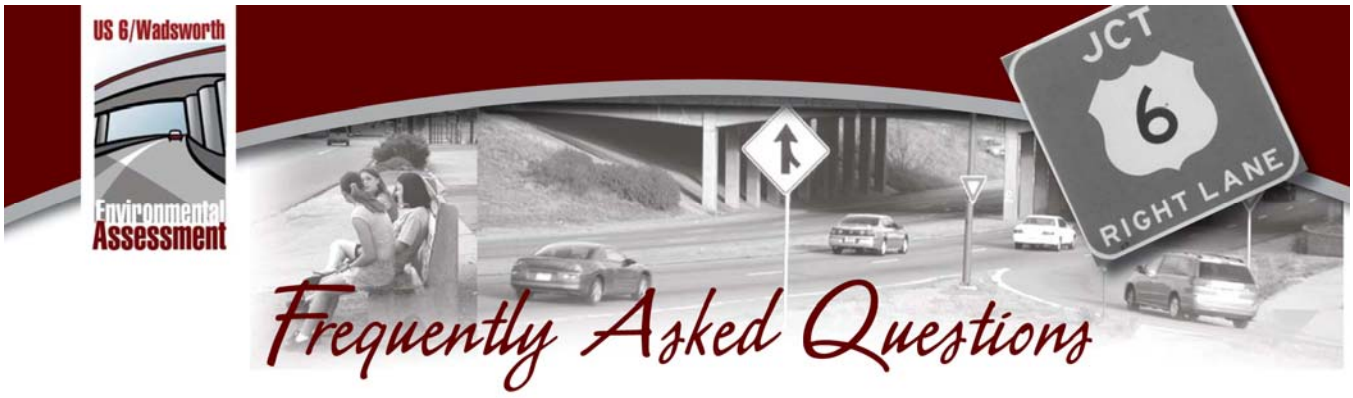


Q-1: Why is CDOT conducting this study?

A-1: Transportation improvements in the study area have been identified as a high priority for CDOT, the City of Lakewood, and area residents, businesses, and commuters. Roadway improvements in the region's West Corridor have been identified in Lakewood's Comprehensive Plan, the Denver Regional Council of Government's (DRCOG's) Regional Transportation Plan, and the 1997 West Corridor Major Investment Study prepared by the Regional Transportation District (RTD). Improvements in the West Corridor, including improvements to the US 6 and Wadsworth interchange, were identified as one of the set of 28 high-priority projects across the state that, in 1996, CDOT committed to completing over the next approximately 25 years. In 1999, Colorado voters approved bonding on CDOT's 28 high-priority projects against future gas tax revenues to complete the projects on an accelerated schedule. CDOT has completed nearly half of the projects of its Strategic Transportation Investment Program, also known as the 7th Pot Program. The US 6 and Wadsworth improvements have been identified as one of the roadway projects needed for the West Corridor, and as such, improvements could be eligible for priority funding.

Q-2: What is an Environmental Assessment (EA)?

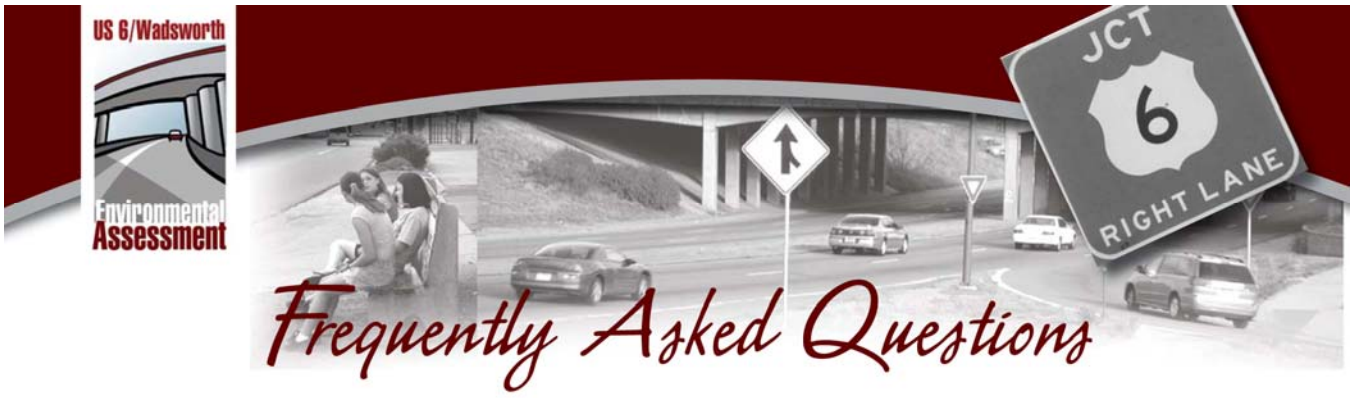
A-2: An EA is a document that describes the effects that a federal action would have on the environment. It also describes the impacts of alternatives to the Proposed Actions and identifies ways to avoid, minimize, or mitigate adverse impacts. The National Environmental Policy Act (NEPA), signed into law on January 1, 1970, established a national policy to protect the environment. Federal agencies are required to integrate the NEPA process into other planning processes to ensure that planning and decisions consider environmental values. Regulations for implementing NEPA established by the President's Council on Environmental Quality (CEQ) require that federal agencies document their consideration of environmental values and provide opportunity for public involvement. The potential for both beneficial and adverse impacts must be considered. EAs are normally prepared for those Proposed Actions whose environmental impacts are unknown. An EA will result in either a Finding of No Significant Impact (FONSI) or a finding of significant impact and a Notice of Intent to prepare an Environmental Impact Statement (EIS) to further study these impacts.

Q-3: Why does this project require an EA?

A-3: An EA is required because the proposed implementation of transportation improvements to US 6 and Wadsworth Boulevard is likely to have environmental impacts, and the extent of these impacts is unknown.

Q-4: How long will the study take?

A-4: The study was initiated in spring 2007 and will is anticipated to be completed in December 2008. If a construction project is identified at the end of the study, the project would then proceed into final design and construction. Final design typically takes 6 to 12 months to complete, and construction typically takes one to two years. The US 6 / Wadsworth study has been identified by CDOT and the Federal Highway Administration (FHWA) as a pilot NEPA streamlining project. It is also a priority project for CDOT and the City of Lakewood. The study is following an accelerated schedule due to the streamlining efforts.



Q-5: What is the role of the public in this study?

A-5: The public has been involved in developing the scope of the study and providing input on the development and screening of preliminary design concepts and identification of a preferred alternative for the interchange and Wadsworth Boulevard.

The public is also involved in developing and selecting mitigation measures used to avoid or minimize impacts of the alternative(s), including the proposed noise walls discussed at tonight's noise meeting. The public will then be able to review the EA document and provide formal comments at a public hearing. FHWA will consider these comments when writing its decision document on the project.

Q-6: What is the role of the City of Lakewood in the study?

A-6: The City of Lakewood is a partnering agency on the study. The City is working with CDOT and FHWA to provide a vision for improvements and necessary information and coordination among city departments and staff.

Q-7: How does CDOT's project relate to Lakewood's Station Area Plan and rezoning for the West Corridor Light Rail Station?

A-7: CDOT has reviewed Lakewood's Station Area Plan to determine whether proposed improvements on Wadsworth Boulevard would conflict with the Plan. Implementation of the Station Area Plan, however, is beyond the scope of this study. The City of Lakewood is a partner with CDOT on the EA.

Q-8: What is the role of RTD and the West Corridor project in the study?

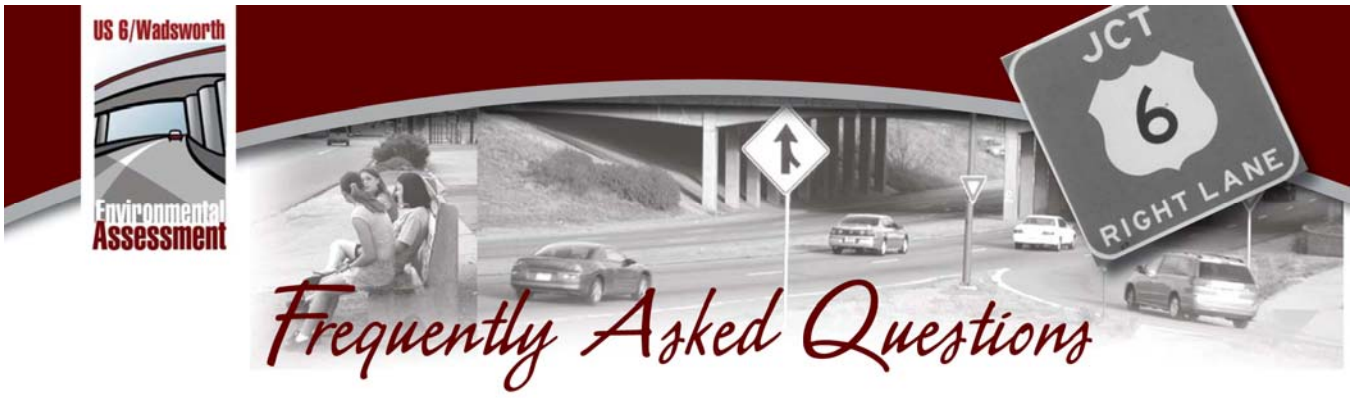
A-8: RTD is a cooperating agency on the study. RTD has jurisdiction over the West Corridor light rail line and station, which are located in the US 6 / Wadsworth study area. RTD is working with CDOT and FHWA to provide necessary information on the West Corridor project and coordinate between the West Corridor and US 6 / Wadsworth projects.

Q-9: Is CDOT involved in the property acquisitions for the West Corridor (east side of Wadsworth between 13th and 14th Avenues)?

A-9: No. The property acquisitions currently occurring along Wadsworth Boulevard between 13th and 14th Avenues are not related to the US 6 / Wadsworth EA.

Q-10: Will this study take into account traffic impacts of the light rail station and increased development along the light rail line?

A-10: The study is using DRCOG's approved 2035 travel forecasting model to determine future corridor traffic conditions, as required by NEPA. The DRCOG model incorporates the entire RTD FasTracks program as well as the most current land use forecasts surrounding the Wadsworth Boulevard corridor and the proposed West Corridor Light Rail Transit station. To date, a number of planning efforts have been completed to evaluate the implementation of light rail transit, the transit station, and the potential for changes in land use surrounding the station such as transit-oriented development (TOD). These planning efforts are described below.

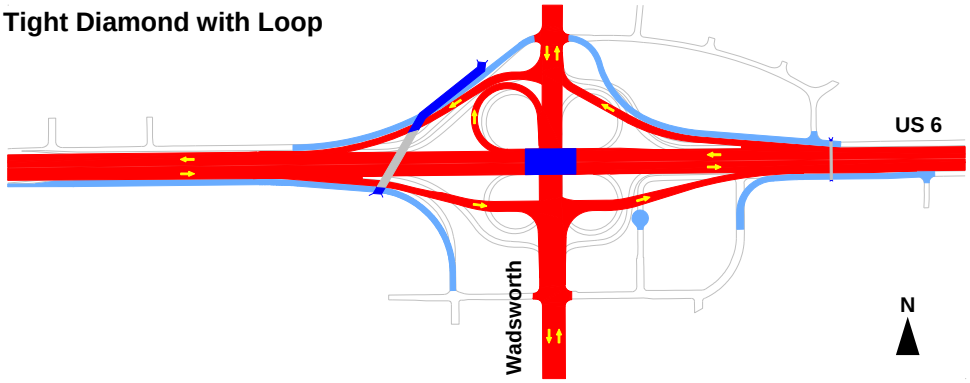


Title	Agency	Date	Status
West Corridor Major Investment Study	RTD	1997	Adopted
Final West Corridor Environmental Impact Statement	RTD	2003	Completed
Wadsworth Boulevard Station Area Plan	City of Lakewood	2006	Adopted
Article 22: Mixed Use Zone District Zoning Ordinance	City of Lakewood	2007	Adopted
Wadsworth Boulevard Station Area Implementation Plan	City of Lakewood	2007	Adopted
West Corridor Supplemental Environmental Assessment	RTD	2007	Completed

Q-11: What are the options for improvements?

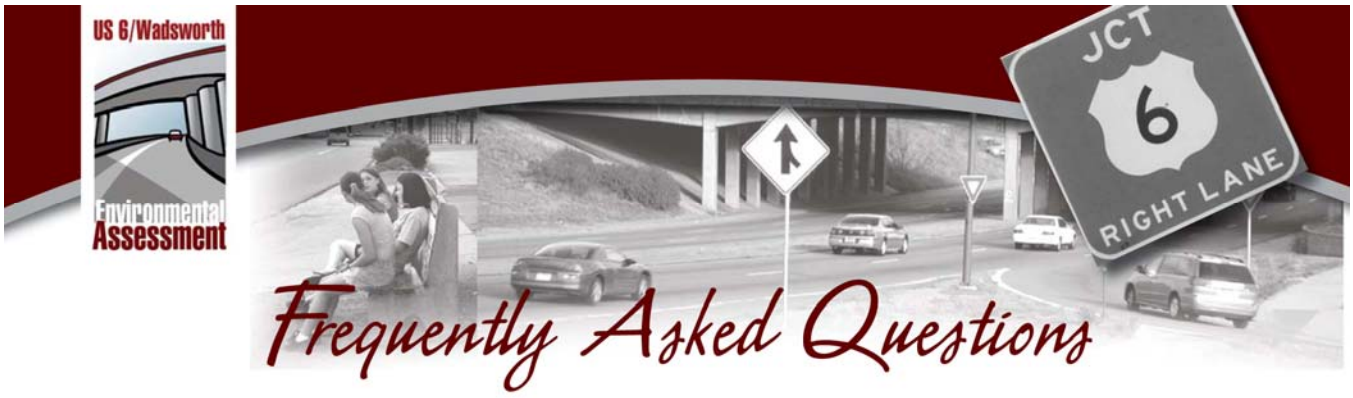
A-11: A Preferred Alternative has been identified for the US 6 and Wadsworth interchange and for Wadsworth Boulevard between 4th and 14th Avenues. CDOT has identified the Tight Diamond with Loop as the proposed configuration for the interchange. The interchange will have standard entrance and exit ramps similar to the interchange at US 6 and Indiana Street, but a new loop will be constructed in the northwest quadrant of the interchange to accommodate traffic moving from westbound US 6 to southbound Wadsworth Boulevard in the evening rush hour. This is the highest volume traffic movement at the interchange, and the loop will allow this traffic to exit US 6 onto Wadsworth Boulevard without turning left at a traffic signal.

Tight Diamond with Loop



CDOT has identified six travel lanes with a raised median and sidewalks as the proposed design for Wadsworth Boulevard between 4th and 14th Avenues. The basic elements of the design are shown below.

Wadsworth Boulevard Typical Section



Q-12: Will the project change traffic operations on the frontage roads?

A-12: Traffic operations on frontage roads north of US 6 would be changed as part of the proposed interchange improvements. Traffic operations on frontage roads south of US 6 would remain the same, although the frontage roads would be reconstructed in the vicinity of the interchange.

Northeast of the interchange, the current design concept proposes a new two-way frontage road connection to Wadsworth in the approximate location of the existing Highland Drive intersection. Highland Drive and Broadview could both be accessed from the frontage road. Cars would be able to turn right to and from northbound Wadsworth and the new frontage road. Cars would be able to turn left onto the new frontage road from southbound Wadsworth.

Northwest of the interchange, the current design concept proposes a new two-way frontage road connection to Wadsworth across from the existing Highland Drive intersection. Cars would be able to turn right to and from southbound Wadsworth and the new frontage road. Cars would be able to turn left onto the new frontage road from northbound Wadsworth. The frontage road would change to a one-way westbound road just west of the existing 6th Avenue Business Center.

Q-13: Who makes the final decision about project improvements?

A-13: FHWA and CDOT will evaluate the environmental impacts of reconstruction of Wadsworth Boulevard and the interchange and determine which, if any, option should be funded.

Q-14: How will my property be affected? Are you going to acquire my property?

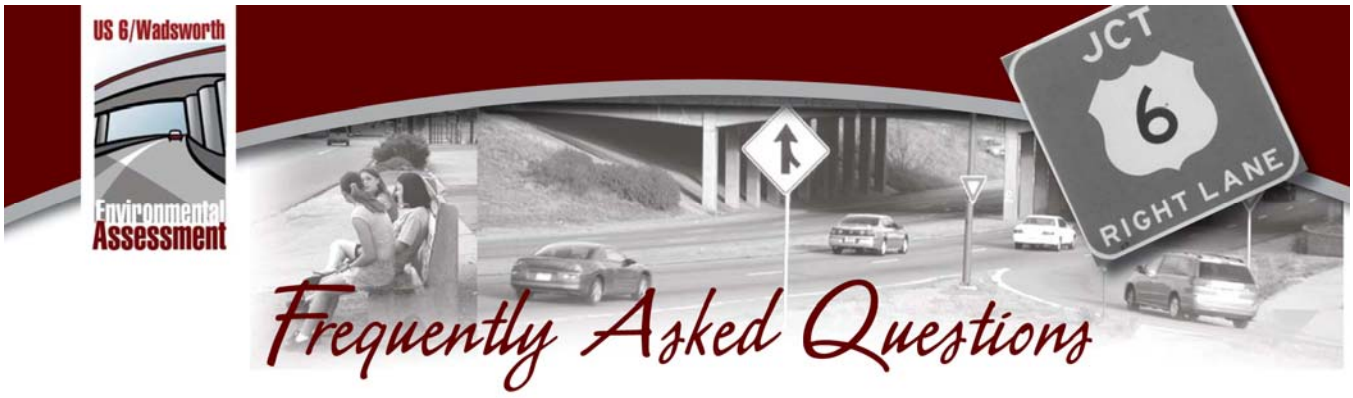
A-14: Preliminary estimates of property impacts have been developed for the Preferred Alternative. Maps of the preliminary estimates can be viewed at the project website, www.US6Wadsworth.com. The maps are located on the Study Documents page in the list of Open House #3 Display Boards: Tight Diamond with Loop – Preferred Alternative, and Wadsworth Boulevard – Preferred Alternative.

Estimates are considered preliminary because they do not take into account a) additional property impacts that may occur from noise walls or water quality treatment features, or b) impacts that may be lessened due to mitigation efforts such as retaining walls, shifts in alignment, or reconfiguration of frontage roads.

In the coming months, CDOT will individually evaluate each potential property acquisition to determine if the acquisitions can be minimized or avoided. If your property is one identified as a potential acquisition, we will contact you and provide the opportunity to schedule a meeting to discuss mitigation options. If you have additional questions about property impacts or the right-of-way acquisition process, please contact Colleen Kirby Roberts, CH2M HILL public involvement manager, at 303-573-5385, ext. 205.

Q-15: Will the project construct noise walls along 6th Avenue west of Wadsworth?

A-15: If a project is recommended for construction, noise mitigation will be provided for locations where highway noise is higher than acceptable thresholds (66 dBA), and where analysis shows that it is



reasonable and feasible to do so. Currently, analysis shows that new noise walls would be provided on both sides of US 6 between Wadsworth Boulevard and Garrison Street. Additionally, any existing noise walls that are demolished to allow for interchange reconstruction will be replaced to continue to provide appropriate noise mitigation.

Q-16: How will the project affect traffic in neighborhoods?

A-16: Specific impacts to neighborhood traffic have not been assessed at this stage of the study. When the alternatives for the interchange and Wadsworth Boulevard are evaluated in detail in the EA, the impacts to neighborhood traffic will be studied, along with transportation, social, and environmental impacts.

Q-17: When will the project be constructed?

A-17: The EA must be completed before CDOT can apply for federal funding to construct a project. A typical schedule would include 18 to 24 months for completion of an EA, 6 to 12 months for final design, and one to two years for construction. Because the project is a high priority, construction could start as early as 2010.

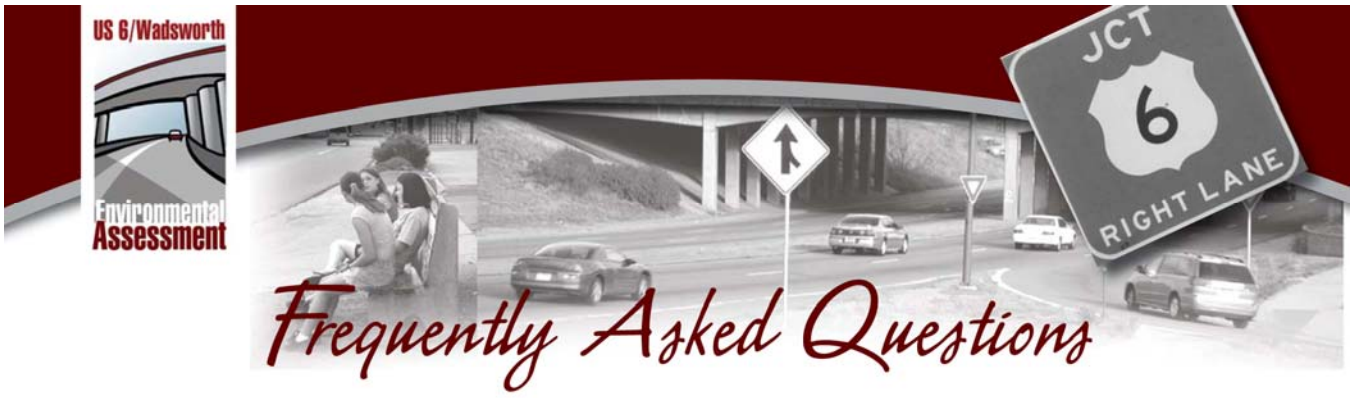
Q-18: Will the project be constructed at the same time as other major construction projects in the area?

A-18: If a construction project is identified, the construction timing will be coordinated with other major construction projects in the area. CDOT will work closely with other entities to coordinate construction schedules to minimize disruptions to area residents, businesses, and commuters to the greatest extent possible.

Q-19: What is quiet pavement, and are you considering using it for US 6 and/or Wadsworth Boulevard improvements?

A-19: At this point, the two main factors that influence CDOT's selection of pavement types are safety and durability. The selection of either asphalt or concrete pavement is based on a life-cycle cost analysis, which includes the cost of initially constructing the pavement and the future inflation-adjusted costs for maintaining the pavement over its useful life. Noise, while not a major factor in this analysis, can be used as one of several secondary factors in cases where the life cycle analysis indicates little to no pavement preference. CDOT is currently conducting a long-term research study to measure the noise effects of the age and type of pavements (both concrete and asphalt) used on Colorado's highways. This research project should provide insight into types of pavements and surface treatments that have potential for providing long-term noise benefits.

Stone Matrix Asphalt (SMA) is a gap-graded asphalt that maximizes rutting resistance and durability with a stable stone-on-stone skeleton held together by a mixture of asphalt, filler, and stabilizing agents. Typically, SMA is used on higher traffic roadways like freeways and expressways. A project using SMA was recently (2006) completed on US 6 between Simms and Indiana Avenues. While the evidence that SMA is quieter over the long term is mainly anecdotal, response to SMA, including in the project area, has been positive.



Although FHWA has supported studies and several pilot programs to evaluate the effect of pavement types on roadway noise (including the research being conducted presently in Colorado), pavement type in and of itself is not recognized as a noise mitigation measure. The most effective and commonly used measures of mitigating highway noise are noise barriers (walls or earthen berms), which will be evaluated for this project.

Q-20: Why did CDOT raise the speed limit on US 6 from 55 mph to 65 mph? Will you consider as part of this study reducing the speed limit back to 55 mph?

A-20: In 2000, CDOT conducted an investigation of speed limits on US 6 between Sheridan and I-70. This study concluded that appropriate limits for US 6 were 55 mph east of Sheridan and 65 mph west of Sheridan. In 2001, a follow-up investigation was completed after the new signs were posted, and the prevailing speed was found to be the same as before the signs went up.

Prevailing speeds are an important factor in setting speed limits and one of the considerations in the speed investigations conducted for US 6. These studies found that the prevailing speed (in the 85th percentile) along US 6 supports a speed limit of 65 mph west of Sheridan.

Traffic investigations have shown that most people will drive at a speed that they perceive is safe with the given roadway conditions and will ignore a speed limit that is unrealistically too low or too high. A realistic speed limit is voluntarily obeyed by the reasonable majority and more enforcement effort can be applied to the unreasonable few who drive too fast or too slow. When reasonably set, speed limits establish a middle ground for all drivers encouraging some to speed up while influencing others to slow down. This middle ground reduces turbulence within the traffic stream and limits conflict points and reduces accidents.

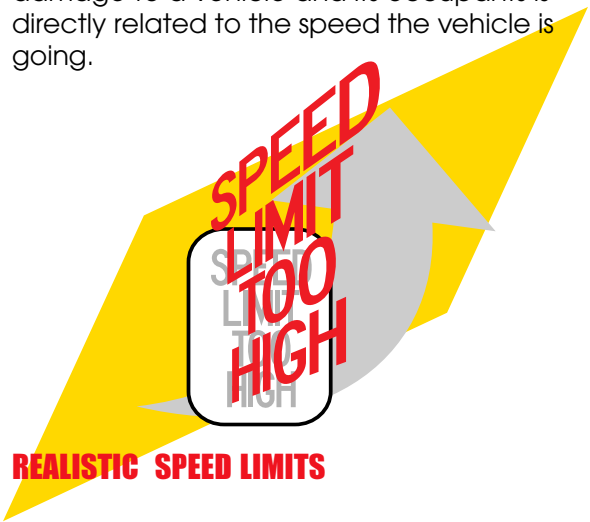
Q-21: Will this study consider future transit along Wadsworth Boulevard?

A-20: Transit along Wadsworth Boulevard is included in DRCOG's long-range plan. However, it is not included in the fiscally constrained plan, that is, the list of projects likely to be implemented within the next 25 years. The City of Lakewood and some metro-area residents would like to see transit along Wadsworth Boulevard in the shorter term. The implementation of transit along Wadsworth Boulevard is not part of the US 6/Wadsworth study; however, the ability of the interchange to accommodate transit along Wadsworth Boulevard is a high-priority consideration in the evaluation of alternatives for the interchange. The most important feature in accommodating future transit is a sufficiently long bridge on US 6 to allow additional travel or transit lanes on Wadsworth Boulevard.

Speed as it relates to accident causality is primarily related to speed differentials. Speed differential is the range of vehicle speeds within the traffic stream. A large variation in these speeds complicates the driving task and necessitates sudden braking, multiple lane changes and other compensating driving maneuvers.

A speed limit properly set, will establish a middle ground for all drivers encouraging some to speed up while enticing others to slow down. This then reduces turbulence within the traffic stream and limits conflict points and reduces accidents.

There is no question, however, that speed plays a role in accident severity. Once an accident has begun to occur the degree of damage to a vehicle and its occupants is directly related to the speed the vehicle is going.



REALISTIC SPEED LIMITS

An appropriate, "just right" speed limit will result in the maximum number of vehicles traveling at about the same speed, thus reducing conflicts caused by speed differentials. The 85th percentile speed, that speed at or below which 85% of the traffic is moving, is widely accepted as being closest to that "just right" speed limit - a case of Majority Rule. Of course, other Traffic Investigation factors must be taken into consideration.

Following are some reasons for establishing realistic speed limits:

A) To provide guidance to the driver, especially strangers to the area, as to what is a suitable speed for normal conditions;

B) Reasonable speed limits with adequate signing tend to reduce the speed difference between vehicles. The accident rate is less when the majority of vehicles are traveling at about the same speed;

C) To furnish enforcement personnel with a guide as to what is an appropriate speed for a segment of road so that enforcement actions may be consistent and fair;

D) To improve the overall credibility of all traffic control devices.

WHAT YOU CAN DO

Anyone may report a road segment where the speed limit seems to be too high or too low. If the segment is a portion of county road or city street, contact should be made with that county or municipality. If the segment is a portion of the State Highway System, including U.S. and Interstate routes, contact should be with the Region's Traffic and Safety Engineer of the Colorado Department of Transportation.

DOT
DEPARTMENT OF TRANSPORTATION

Safety and Traffic Engineering Branch
4201 East Arkansas Avenue
EP Suite 770
Denver, Colorado 80222

8/02

Establishing Realistic SPEED LIMITS

Why Speed Limits?

Speed limits are supposed to do two things. The primary purpose of speed limits is to enhance safety by reducing risks imposed by drivers speed choices. The intent is to reduce disparities in speeds and reduce the potential for vehicle conflicts. A related function of speed limits is to provide the basis for enforcement and sanctions for those who drive at speeds excessive for conditions and endanger others.

LAW

Prima facie speed limits are those which, "on the face of it," are reasonable and prudent under normal conditions. Normally a driver may exceed a prima facie limit if it is safe to do so; however it is up to the driver to prove that he was driving in a safe manner under existing conditions.

In Colorado, basic prima facie speed limits are:

- 20 mph on narrow, winding mountain roads
- 25 mph in any business district
- 30 mph in any residential district
- 40 mph on open mountain highways

Absolute speed limits are those which may not be legally exceeded under any circumstances. These are:

- 65 mph on open highways
- 75 mph on rural interstate routes

Section 42-4-1102, Colorado Revised Statutes, requires that speed limits are not to be higher or lower than the basic prima facie speed limits unless a Traffic Investigation has justified the change. This law applies to all State Highways, County Roads and City Streets. For State Highways, including portions within municipal corporate limits, the Investigation to justify an increase or decrease of existing speed limits is normally conducted by, and approved by, the Safety and Traffic Engineering Branch of the Colorado Department of Transportation.

Each Investigation to determine an appropriate speed limit should consider the following factors applicable to the portion of road being studied.

- Prevailing speed data (85th percentile)
- Roadside development
- Accident experience
- Road characteristics
- Pace speed
- Parking practices/pedestrian activity

The use of vehicle speed data as one of the factors evaluated for selecting a suitable speed limit is based upon the following fundamental concepts deeply rooted in the United States system of government and law:

A) Laws cannot be effectively enforced without the consent and voluntary compliance of the public;

B) Laws are established for the protection of the public and the regulation of the unreasonable behavior of a few individuals;

C) The normally careful and competent actions of a reasonable person should be considered legal;

D) Most drivers are reasonable people who will drive carefully at a speed which is suitable for existing conditions.

MISCONCEPTIONS

It is a popular misconception that reducing the speed limit will automatically slow the speed of traffic, while raising the speed limit will automatically cause an increase in the speed of traffic.

"Before and After" speed studies show that there are no significant changes in vehicle speeds after speed limits are changed. "Before and After" accident studies usually do not show any significant change in accident rates after speed limits are increased or decreased. National studies go further and say that "it is generally at the upper boundary of a speed range where crash involvement rates are lowest."

UNREALISTIC SPEED LIMITS

Traffic investigations have shown that most people will drive the roadway as they perceive the conditions and will ignore a speed limit that is unrealistically too low or too high. A realistic speed limit is voluntarily obeyed by the reasonable majority and more enforcement effort can be applied to the unreasonable few who drive too fast or too slow.

An unrealistic speed limit that is "too low" will:

A) Make the behavior of the majority unlawful;

B) If enforced - cause antagonism toward enforcement personnel and traffic laws in general;

C) Create a bad image of the community for visitors and tourists;

D) Result in speed differentials in the traffic flow.

A barrier is feasible if it can be constructed without major engineering or safety issues and provide a substantial noise reduction to the adjacent receivers. Reasonableness deals with whether or not the barrier can be constructed in a cost-effective manner, the percentage of residential-type development, overall noise level increases and the desire of the community.

What is a "substantial noise reduction"?

A noise barrier must provide at least a readily perceptible decrease in noise levels to adjacent receivers to be effective. This is defined as a noise decrease of at least five decibels. As noise level changes of three decibels or less are not generally perceivable, it is not prudent to construct a noise barrier that only gives a one-or-two decibel benefit to adjacent properties.

What types of noise barriers are constructed?

Noise barriers are commonly constructed as walls, earth berms, or a combination of the two. Walls are most common, and are usually constructed out of dense material, such as concrete or masonry block. Earth berms are a natural alternative to walls, but require much more land to construct. Walls can be constructed on top of berms in order to raise the overall height of the barrier.

How do noise barriers work?

Noise barriers reduce noise by blocking the direct travel of sound waves from a source (highway) to adjacent homes or businesses, forcing them over the top or around the barrier. The barrier must be high enough and long enough to block the view (line of sight) of the highway. This is the phenomenon that allows a noise barrier to provide a perceivable noise reduction. Noise barriers do very little good for homes on a hillside overlooking a road or for buildings which rise above a barrier. Openings or gaps in barriers for driveway connections or street intersections reduce barrier effectiveness. Noise barriers are most effective for the first one or two rows of homes at distances up to 200 to 300 feet from the barrier. As noise levels decrease with distance, there is a point away from the highway at which noise barriers are no longer effective. They are not designed to eliminate or block all noise.

Will planting vegetation help reduce noise levels?

Vegetation is only effective for reducing noise levels if it is as least 100 to 200 feet deep, high enough that it cannot be seen over, and dense enough that it cannot be seen through. It is not feasible to plant enough vegetation along a highway to achieve this type of reduction, however, planting trees or shrubs can provide aesthetic benefit and visual screening.

How does pavement type effect noise levels?

Research regarding pavement influence on noise levels has been an ongoing process. In general, the use of certain types of asphalt pavements or texturing of concrete pavements can give an initial noise reduction benefit to properties 200 to 300 feet from the highway. Over a long period of time, however, it is not known if these benefits continue to be realized. As a result, pavement type, in and of itself, cannot be considered as an alternative to conventional noise mitigation measures at this time.

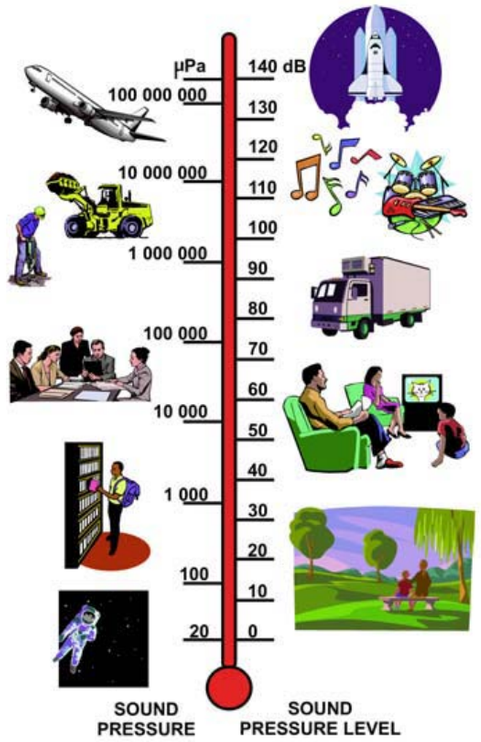
For more information about highway traffic noise and the environment, please visit the FHWA Web site at http://www.fhwa.dot.gov/environment/noise/index.htm or visit the CDOT noise Web site at http://www.dot.state.co.us/environmental/CulturalResources/Noise.asp.

Highway Traffic Noise: Assessment and Abatement

Taking Care To Get You There

DOT

Traffic noise is an important consideration that must be taken into account when the Colorado Department of Transportation (CDOT) embarks on environmental studies that involve major highway improvements. For these projects, a noise study is required to assess existing noise levels and predict future noise levels (usually 20 years into the future) to determine noise impacts.



All traffic noise studies and analyses prepared for CDOT projects must adhere to procedures and requirements as established by Federal law, US Department of Transportation regulations and CDOT noise analysis guidelines. This assures that the policies are uniformly and consistently applied and provided equitable treatment for those impacted by highway traffic noise.

If noise impacts are identified during a traffic noise analysis, CDOT is required to examine and consider noise mitigation measures. If these measures are found to be feasible and reasonable in accordance with CDOT defined criteria, they must be included as part of the project.

How are noise level changes perceived?

Studies have shown that changes in noise levels of three decibels or less are not typically detectable by the average human ear. An increase in five decibels is generally readily noticeable by anyone, and a 10-decibel increase is usually felt to be "twice as loud" as before.

How do changes in traffic or roadway geometry affect noise levels?

Due to the nature of the decibel scale, a doubling of traffic will result in a three-decibel increase in noise levels, which in and of itself would not normally be a perceivable noise increase. Traffic would need to be increased at least three times to result in a readily perceivable (five decibel) increase in noise.

Using the same reasoning, if a highway is moved to half as close to existing homes (i.e. 200 to 100 feet), the noise levels will increased by three decibels. Conversely, if a highway is moved double the distance from existing homes, the noise levels will decrease by three decibels. Noise level increases due to highway projects are usually due to a combination of increased traffic and changes in the roadway alignment.

When is a noise analysis required?

A noise analysis is required for a proposed CDOT project if that project consists of:

- A new highway built on a new location,
- An existing highway is significantly altered by substantially changing the horizontal or vertical characteristics of the road, or
- The number of through traffic lanes is being increased.

Minor projects, such as normal roadway resurfacing (without adding new lanes), do not require a noise analysis.

Does CDOT analyze noise levels on existing highways?

In the absence of a major highway project as described above, CDOT does not perform noise studies or mitigate noise for existing highways.

What constitutes a traffic noise impact?

A "noise sensitive receiver" (defined as homes, parks, schools, business, etc.) is considered to be impacted by noise if either future (generally a 20-year projection) noise levels approach or exceed the CDOT *Noise Abatement Criteria*, or if there is a substantial increase in future noise levels over existing noise levels from a proposed CDOT project as described above. These are the noise levels that are experienced at the commonly used exterior portions of the property on the lowest ground level for each home or individual unit.

For residences, schools and parks, impact is defined when the *hourly equivalent sound level* (essentially the average noise level over a time period), *or* **Leq** is 66 decibels or higher, and 71 decibels for businesses and other commercial properties. A substantial increase impact occurs when there is a projected 10-decibel increase over existing levels. Impacts such as these require mitigation consideration and analysis, which will construct noise barriers if they are determined to be feasible and reasonable.

What does CDOT consider "feasible and reasonable"?

A noise barrier must be both feasible and reasonable if it is to be constructed with the highway project. Feasibility and reasonableness are determined by criteria that are quantifiable but flexible, and judgements for special and/or unusual circumstances are made on a case-by-case basis. As a result, noise mitigation is not automatically provided where noise impacts have been identified.

Cost
SMA is significantly cheaper while still providing similar benefits as asphalt rubber and OGFC.

Durability
In CDOT's pavement noise inventory, it was determined that SMA has a slightly higher initial noise level than OGFC, but as the pavement aged, the noise levels did not increase as quickly. A SMA constructed in 2002 had a noise decibel level of 96.15 and in 2003 the decibel level was 96.28. This change of 0.1 decibels is likely within the repeatability of the testing. To be noticeable by the human ear, it takes a change of three decibels or more.

Long-term durability
While short-term studies show that OGFC can be slightly quieter than other pavement types such as Superpave, SMA or concrete, the noise mitigating qualities of any pavement deteriorate over time. CDOT has gathered an inventory of all their pavement types ranging in different ages and have found that the noise level of an ultra-thin bonded wearing surface (a type of OGFC) pavement built in 2003 was only 95 decibels. On the other hand, the noise level of one built in 2002 was approximately 99 decibels. That is an increase of four decibels in one year. Although these are different designs, there is an increase of four decibels in one year. More research is clearly needed.

Concrete
When CDOT chooses concrete as the pavement type for a project, two types of methods will often be used that have noise-reducing benefits.

Tining and Grooving

Tining is the creation of shallow channels in a concrete roadway to enhance weather traction of an otherwise smooth surface. While tining is necessary for safe driving conditions in wet weather, it does affect roadway noise. CDOT has conducted several studies that look at different ways of applying tining. The results show that some tining patterns, including longitudinal tining, can help produce lower levels of pavement noise. Through various studies, it has been demonstrated that longitudinal tining is quieter than transverse tining and is, thus, the standard tining pattern of choice. In CDOT's inventory of pavement type, it was discovered that noise levels in a concrete roadway with longitudinal tining only increased by one decibel over several years, which is below the level that the human ear can distinguish. Grooving the surface produces an even quieter pavement at a nominal cost increase.

Research
With new technology emerging constantly, CDOT will continue to monitor experiments around the world and continue to conduct experiments when funding allows. CDOT's goal is to maintain the safety and durability of the existing highway system and the methods to reach this goal must fall within funding abilities. Experimentation will continue when possible to enhance secondary goals, such as noise.

Highway Traffic Noise: Effect of Pavement Types

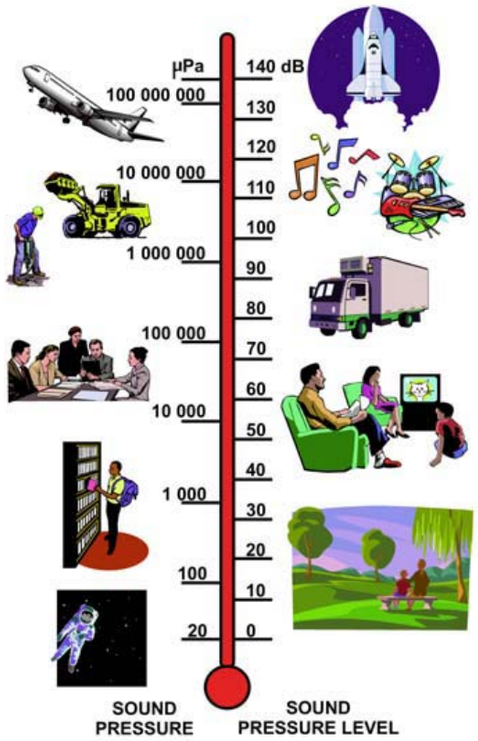
Taking Care To Get You There
DOT

Pavement Types
There are several standard types of pavement that the Colorado Department of Transportation (CDOT) can choose from when constructing or resurfacing a roadway including Superpave Hot Mix Asphalt (HMA), Stone Matrix Asphalt (SMA), and Portland Cement Concrete.

Pavement Type Selection Process
CDOT conducts a 40-year life cycle cost analysis when selecting a particular type of pavement to be used on a project. The analysis includes the initial construction cost, maintenance costs, rehabilitation costs and even user costs like traffic delays for motorists. If the life cycle cost analysis of certain pavement types is a tie, then secondary factors relating to unique project goals, such as noise can be considered to break the tie.

Noise
Before embarking on a major transportation improvement, an environmental study is conducted to assess the potential impacts an improvement may have on the social, economic and natural environmental conditions as well as on the lives of residents and commuters. This study is required as part of the National Environmental Policy Act (NEPA). Noise is a major consideration as part of this process. For these projects, a noise study is required to assess existing noise levels and predict future noise levels. Noise studies and mitigation efforts are not required on minor projects or on existing highways in the absence of proposed major projects.

If a noise impact is identified during a noise analysis, CDOT then examines and considers noise mitigation options. The most common measures of mitigating noise are noise barriers, which include either walls or earth berms. Other options such as traffic management measures, acquisition of property to provide a buffer zone between the roadway and impacted areas or planting vegetation are not normally practical nor effective.



FHWA does not recognize pavement type, in and of itself, as a noise abatement measure, and noise, therefore, is not a primary factor when selecting a pavement. This is due to the fact that there are several components to the noise generated from a roadway facility including tire-surface contact, engine, brakes (including truck jake brakes) and wind drag around vehicles. The application of quieter surface materials would only address one component of this spectrum.

Will Adding Rubber to Asphalt Make Pavements Quieter?

What is Asphalt Rubber?
Wasted tires are turned into crumb rubber, which is then processed and blended with asphalt. Aggregate is heated and the asphalt/rubber blend is added to it. This mix is often used with OGFC and is believed to reduce noise. Although aggregate size and porosity clearly impact noise, asphalt rubber's contribution is not significant. Many studies are being conducted to gather more information in this area as the product is still being tested.

In addition to the questions regarding the effectiveness of asphalt rubber, CDOT has other concerns including cost, placement temperature, safety, and long-term noise mitigation. These additional questions make it difficult for CDOT to move its entire pavement program towards this one product.

Cost
There is a significant cost variance for different pavement types. Cost of materials and placement is more than $4.00 a square yard per inch of thickness, making asphalt rubber one of the most costly asphalt products. It is 50% more than the cost of a regular HMA.

Climate
Construction temperatures are a critical factor in the placement of asphalt rubber. To ensure the highest quality, the placement temperatures must be 65 degrees and rising. This makes night paving in Colorado virtually impossible. Since traffic congestion requires most construction in Colorado, especially in urban areas such as Denver and Colorado Springs, to be conducted at night, there is a very small window of opportunity to pave.

Additionally, asphalt rubber has not been proven to ensure a safe riding surface for Colorado's extreme winters and variable temperatures resulting in numerous freeze-thaw cycles.

Open-Grade Friction Course
As mentioned earlier, OGFC is often used in combination with asphalt rubber. OGFC also has some safety issues having to do with preferential icing. This pavement type is designed to collect water and drain out to the sides. Due to the nature of the design, the pavement often gets clogged with road sand or other grit, preventing drainage from occurring. When the pavement cannot drain, the remaining water freezes, creating patches of black ice. This preferential icing creates safety hazards for motorists and emergency crews that have to work on these roadways. After a one-year experiment encompassing two winters, this is no longer a viable option in Colorado due to safety concerns.

Stone Matrix Asphalt
One standard pavement type that CDOT currently uses frequently is SMA, which provides a rut resistant pavement with a skid resistant surface. Other reported benefits include better drainage, reductions in glare and lower tire noise than normal Superpave mixes.

Noise Meeting Comment Form

First Name: _____ Last Name: _____

Address: _____ City: _____ Zip Code: _____

Email Address: _____ ☐ Yes, add me to the US 6/Wadsworth mailing list

Do you support the construction of noise walls along US 6 as part of improvements to the US 6 and Wadsworth Boulevard interchange? ☐ Yes ☐ No

Comments?

_____

_____

_____

_____

_____

Do you have any comments about the aesthetics/appearance of noise walls along US 6?

_____

_____

_____

_____

_____

_____

Please provide any additional comments here.

_____

_____

_____

_____

_____

_____

_____

Noise Meeting Comment Form

Please leave this comment form in one of the comment boxes on your way out. A comment box is located at the Sign-In table near the entrance. You may also fold this form into thirds, tape or staple it, and mail it to the address printed below. Please affix a stamp before mailing the form. For additional project information, please visit the project website, www.US6Wadsworth.com, or call Colleen Kirby Roberts, public involvement manager, at 303-573-5385, ext. 205.

Return Address:

_____

_____

_____

Affix stamp here

US 6/Wadsworth EA
CH2M HILL
C/o Colleen Kirby Roberts
535 16th Street, Suite 800
Denver, CO 80202

APPENDIX G

Written Comments

Noise Meeting Comment Form

First Name: [redacted] Last Name: [redacted]

Address: [redacted] City: Lakewood Zip Code: 80214

Email Address: [redacted]

☒ Yes, add me to the US 6/Wadsworth mailing list (already on it, I think)

Do you support the construction of noise walls along US 6 as part of improvements to the US 6 and Wadsworth Boulevard interchange? ☒ Yes ☐ No

Comments?

Please consider more absorptive (less reflective) materials or surface treatments on both sides of the wall as a longer reflective surface on the outside of the Hwy. Noise Wall changes noise impacts from the frontage road traffic

Do you have any comments about the aesthetics/appearance of noise walls along US 6?

Yes - Please consider community input on noise wall aesthetics, again on both sides, and mindful of long-term maintenance

Please provide any additional comments here.

Concerned about "ideal" 2010-2012 construction timeline overlapping with the RTD West Corridor construction (the nightmare of having Wads closed at the same time as Sheridan + Garrison is unacceptable)

Noise Meeting Comment Form

First Name: [redacted] Last Name: [redacted]

Address: [redacted] City: Lakewood Zip Code: 80226

Email Address: _____ ☐ Yes, add me to the US 6/Wadsworth mailing list

Do you support the construction of noise walls along US 6 as part of improvements to the US 6 and Wadsworth Boulevard interchange? ☑ Yes ☐ No

Comments?

Extend the noise walls westward to go over the Garrison Street intersection. I was not persuaded that you understand the noise coming off of the overpass. Your purpose / cause appears short and you do not seem willing to address that problem.

Do you have any comments about the aesthetics/appearance of noise walls along US 6?

Please provide any additional comments here.

Your study stopped too soon, short of a meaningful solution.

Noise Meeting Comment Form

First Name [redacted] Last Name: [redacted]

Address: [redacted] City: Lakewood Zip Code: 80214

Email Address: [redacted] ☐ Yes, add me to the US 6/Wadsworth mailing list

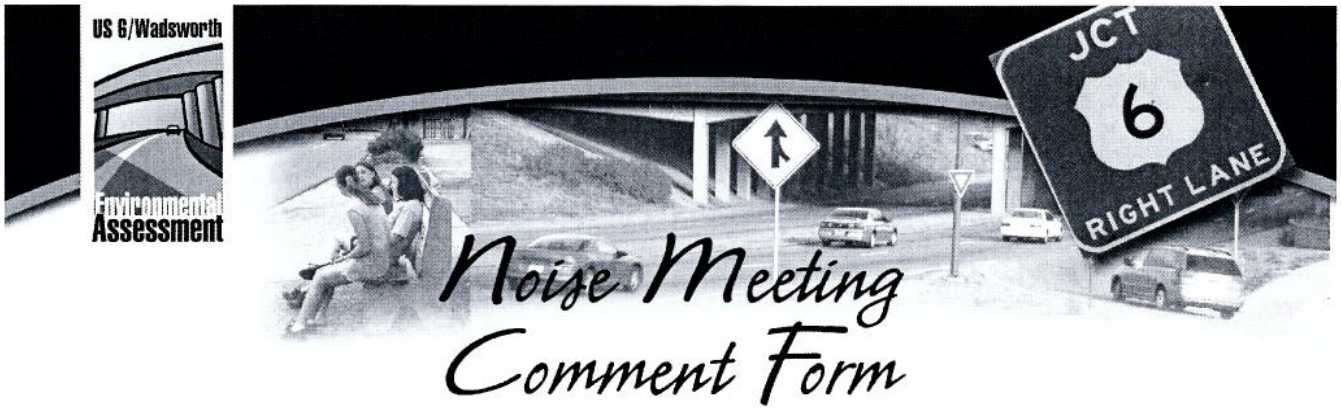
Do you support the construction of noise walls along US 6 as part of improvements to the US 6 and Wadsworth Boulevard interchange? ☐ Yes ☐ No

Comments?

Put a Light so you can make a Left (going south) from Highline onto Wadsworth

Do you have any comments about the aesthetics/appearance of noise walls along US 6?

Please provide any additional comments here.



Noise Meeting Comment Form

First Name: [redacted] Last Name: [redacted]

Address: [redacted] City: LAKEWOOD Zip Code: 80214

Email Address: [redacted] ☐ Yes, add me to the US 6/Wadsworth mailing list

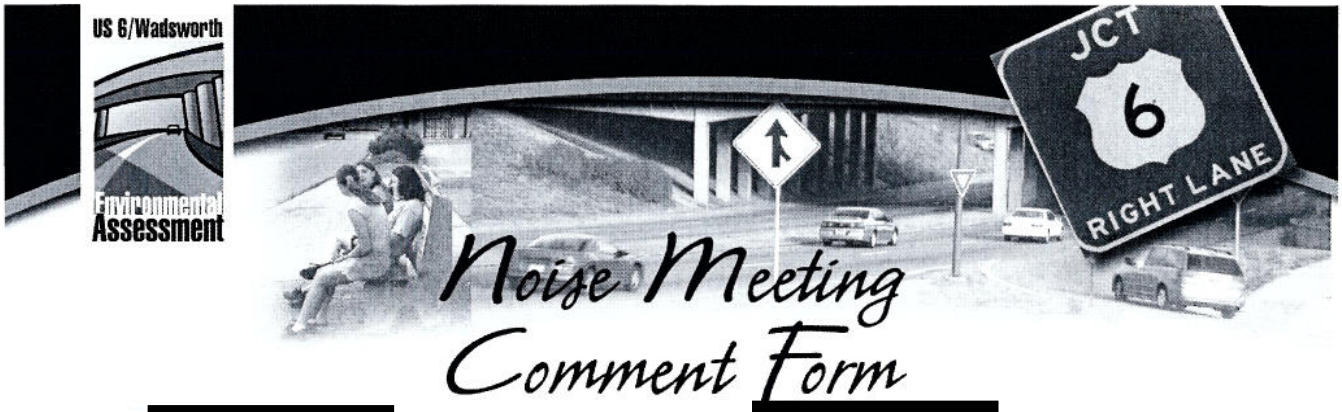
Do you support the construction of noise walls along US 6 as part of improvements to the US 6 and Wadsworth Boulevard interchange? ☒ Yes ☐ No

Comments?

Your preliminary Plans look good.

Do you have any comments about the aesthetics/appearance of noise walls along US 6?

Please provide any additional comments here.



Noise Meeting Comment Form

First Name: [redacted] Last Name: [redacted]

Address: [redacted] City: LK Zip Code: _____

Email Address: [redacted] ☐ Yes, add me to the US 6/Wadsworth mailing list

Do you support the construction of noise walls along US 6 as part of improvements to the US 6 and Wadsworth Boulevard interchange? ☐ Yes ☐ No

Comments?

What is going to happen to snow off 6th Ave? There will be a retaining wall - so they will not be able to plow on to Frontage Rd then to our Driveway?

Do you have any comments about the aesthetics/appearance of noise walls along US 6?

Concern about safety of Resident while they are plowing Front Rd

Please provide any additional comments here.

SEYED To Follow up with RE maintenance 4-4-08

Noise Meeting Comment Form

First Name: [redacted] Last Name: [redacted]

Address: [redacted] City: Lkwd Zip Code: 8023[redacted]

Email Address: _____ ☐ Yes, add me to the US 6/Wadsworth mailing list

Do you support the construction of noise walls along US 6 as part of improvements to the US 6 and Wadsworth Boulevard interchange? ☐ Yes ☐ No yes, yes, yes.

Comments?

Has been necessary for years. Has had negative impact on quality of life & the prices for resale of homes close to it.

Do you have any comments about the aesthetics/appearance of noise walls along US 6?

N/A

Please provide any additional comments here.

The corner, the better. Some of us have waited a long time for some relief. Do something about motorcycles. They are beyond acceptable.

Noise Meeting Comment Form

First Name: [redacted] Last Name: [redacted]

Address: [redacted] City: Littl Zip Code: 80226

Email Address: _____ ☒ Yes, add me to the US 6/Wadsworth mailing list

Do you support the construction of noise walls along US 6 as part of improvements to the US 6 and Wadsworth Boulevard interchange? ☐ Yes ☐ No Absolutely

Comments?

We have tried for ages to get noise reduction measures. I worked with the 6th Ave Summit Committee with Ramey Johnson trying to get some help with this. Dudley St had the highest level of noise which was shown on the noise study done for this committee. We hope this will be done soon as many of us have waited for a long time. Everyday is noisy.

Do you have any comments about the aesthetics/appearance of noise walls along US 6?

Please provide any additional comments here.

Please address the ridiculous noise level from the many motorcycles ~~[illegible]~~ racing up + down 6th.

Noise Meeting Comment Form

First Name: [redacted] Last Name: [redacted]

Address: [redacted] City: LAKEWOOD Zip Code: 80214

Email Address: [redacted] ☑ Yes, add me to the US 6/Wadsworth mailing list

Do you support the construction of noise walls along US 6 as part of improvements to the US 6 and Wadsworth Boulevard interchange? ☑ Yes ☐ No

Comments?

Our house is just north of the proposed frontage road at 10th Ave (North) exit, so we definitely support the construction of noise walls.

They really are essential for residents.

We support noise walls continuing north on Wadsworth to Highland Dr. also.

Do you have any comments about the aesthetics/appearance of noise walls along US 6?

Landscaping & visually interesting design are very important!

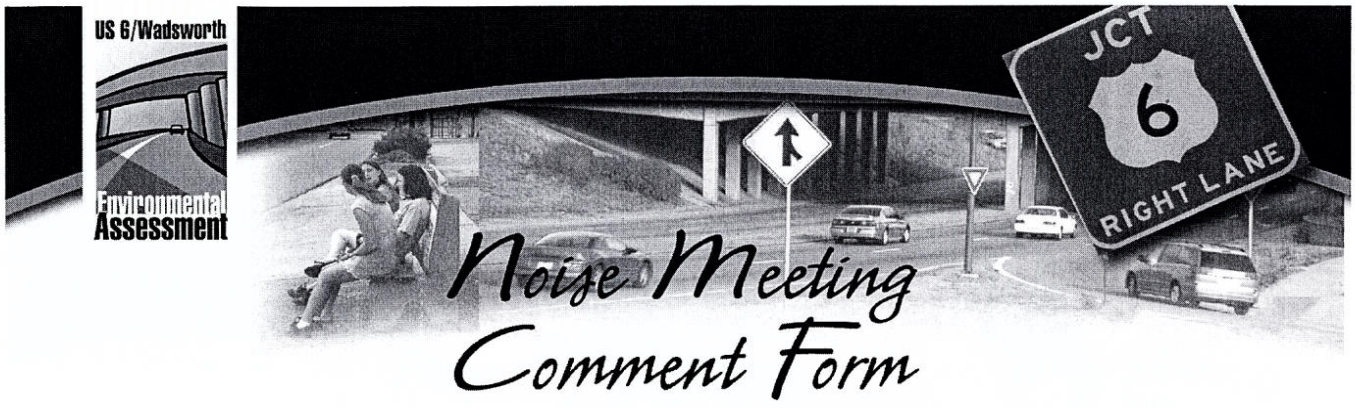
Natural-looking & effective are key.

Please provide any additional comments here.

THANK you for listening to our concerns - We are so pleased with the new plan for the Frontage Road on North 10th Ave onto Northbound Wadsworth - Because it does not compromise our home or back yard.

Again, thank you for listening & providing creative & thoughtful solutions.

Rosa & Susie Fitzgerald



Noise Meeting Comment Form

First Name: [redacted] Last Name: [redacted]

Address: [redacted] City: Lakewood Zip Code: 80214

Email Address: ~~[redacted]~~ already on list ☐ Yes, add me to the US 6/Wadsworth mailing list

Do you support the construction of noise walls along US 6 as part of improvements to the US 6 and Wadsworth Boulevard interchange? ☒ Yes ☐ No

Comments?

Yes - noise walls plan makes sense to us.

One comment re: safety + noise walls: please be sure that noise walls along US6 at entrance points (on-ramps) don't extend too far - ~~that~~ my concern is that some noise walls last so long that people entering the highway (like at Sheridan + US 6 Eastbound) and drivers already on the highway can't see each other until both parties have to scramble to adjust. This ~~makes~~ lowers the effectiveness of longer on-ramps. ~~much~~

Do you have any comments about the aesthetics/appearance of noise walls along US 6?

Please provide any additional comments here.

I would like the EA team to re-consider ~~some~~ adding no noise control along Wadsworth's NE quadrant. There are 4 reasons we believe mitigation is necessary for our neighborhood: ① two additional lanes on Wadsworth - an invitation for much more traffic. ② creation of a frontage road along a stretch of Wads that previously had none. ③ said frontage road being ~~two~~ - way and ④ said frontage road curving into previously residential area - significant encroachment.

This noise mitigation should exist and should be on the E side of the frontage road, as mitigation btwn Wads + frontage road would be pointless. Thank you.

seemingly

Noise Meeting Comment Form

First Name: [redacted] Last Name: [redacted]

Address: [redacted] City: Lakewood Zip Code: 80226

Email Address: [redacted] ☐ Yes, add me to the US 6/Wadsworth mailing list

Do you support the construction of noise wa[illegible]ong US 6 as part of improvements to the US 6 and Wadsworth Boulevard interchange? ☐ Yes ☒ No

Comments?

1) They make the noise loud 1½ - 2 blocks away. My property is at a higher elevation than 6th Ave
2) On the south side of 6th Ave west (slow lane) the snow & ice builds up - requires removal every snowstorm.

Do you have any comments about the aesthetics/appearance of noise walls along US 6?

1) The noise walls are ugly awful like a tunnel & the view is ugly
2) Driving on highway is c[illegible]

Please provide any additional comments here.

1) Use something to block noise
2) Or [illegible] something that absorbs noise not just displacing it.
3) cut the speed limit back to 55 mph - this is a residential neighborhood.

The original comment form was mangled in the mail. The following text records the comments on the form.

Noise Meeting Comment Form

First Name: [redacted] Last Name: [redacted]

Address: [redacted] y: Lakewood Zip Code: 80226

Email Address: [redacted]

Do you support the construction of noise walls along US 6 as part of improvements to the US 6 and Wadsworth Boulevard interchange? no

Comments?

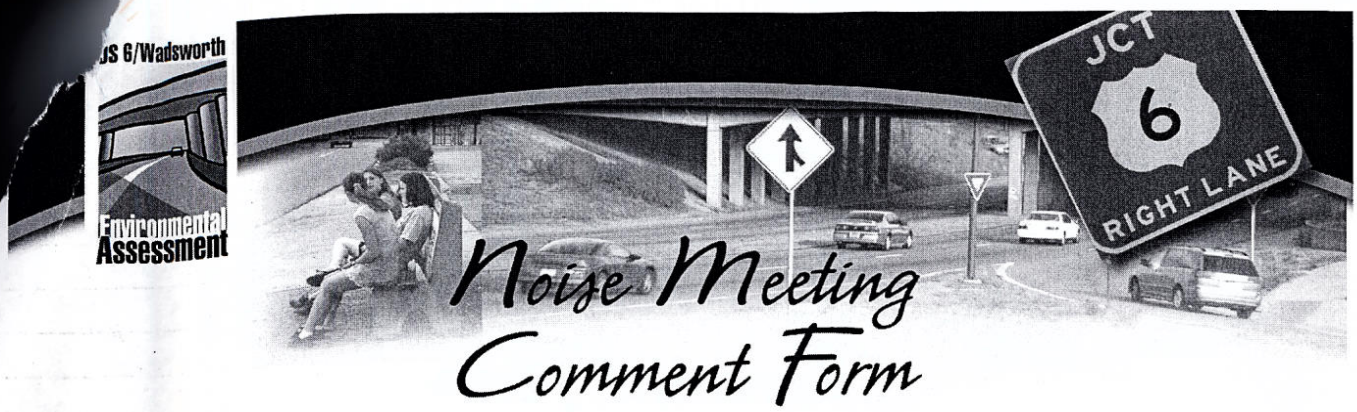
1. They make the noise loud 1 ½ blocks away. My property is at a higher elevation than 6th Avenue.
2. On the south side of 6th Ave. West (slow lane) the snow and ice builds up – requires removal every snow storm.

Do you have any comments about the aesthetics/appearance of noise walls along US 6?

1. The noise walls are ugly!
2. Driving on highway is awful like a tunnel and the view is ugly.

Please provide any additional comments here.

1. Use scrubbery [sic] to block noise.
2. Or use something that absorbs noise not just displacing it.
3. Put the speed limit back to 55 mpg – this is a residential neighborhood.



Comment Form

First Name: [redacted] Last Name: [redacted]

Address: [redacted] City: CENTENNIAL Zip Code: 80122

Email Address: [redacted] ☒ Yes, add me to the US 6/Wadsworth mailing list

Do you support the construction of noise walls along US 6 as part of improvements to the US 6 and Wadsworth Boulevard interchange? ☐ Yes ☒ No

Comments?

I AM THE MANAGING AGENT FOR THE 6TH AVENUE BUSINESS CENTER ON THE NORTH SIDE OF 6TH AVE. JUST WEST OF WADSWORTH ON THE FRONTAGE ROAD. WE PREFER EXPOSURE TO 6TH AVENUE SINCE WE ARE A COMMERCIAL ENTERPRISE. WE HAVE NOT RECEIVED COMPLAINTS FROM TENANTS ABOUT NOISE LEVELS ALONG 6TH AVE.

Do you have any comments about the aesthetics/appearance of noise walls along US 6?

ONLY THAT THEY HAVE SURFACE WHICH CAN EASILY BE CLEANED OF GRAFITTI

HAVE CONCERN ABOUT ICE FORMATION ON NORTH SIDE OF WALL CLOSE TO FRONTAGE ROAD ON NORTH SIDE OF 6TH.

Please provide any additional comments here.

HAVING SEEN THE PREFEFFED TIGHT DIAMOND WITH LOOP PLAN FOR THE FIRST TIME AT JUNE 4, 2008 MEETING WE NOTED PROBABILITY OF LOSS OF ONE OR TWO OF OUT BUILDINGS TO ACCOMODATE REROUTED ENTRANCE TO FRONTAGE ROAD ON THE NORTH SIDE OF 6TH WEST OF WADSWORTH BUT SUPPORT TWO WAY TRAFFIC REORIENTATION. WE HAVE SCHEDULE MEETING WITH YOUR REPRESENTATIVES JUNE 24, 2008 AT 3:00 P.M. AT JEFF COUNTY ASSN. OF REALTORS TO DISCUSS DETAILS AND POSSIBLE MODIFICATION OF PROPSED PLAN TO SAVE TAKING OF OUR BUILDINGS WHILE KEEPING NEW TWO WAY TRAFFIC ADVANTAGE.

Noise Meeting Comment Form

First Name: [redacted] Last Name: [redacted]

Address: [redacted] City: Lakewood Zip Code: 80215

Email Address: None ☒ Yes, add me to the US 6/Wadsworth mailing list

Do you support the construction of noise walls along US 6 as part of improvements to the US 6 and Wadsworth Boulevard interchange? ☒ Yes ☐ No

Comments?

I live only 3 houses north of the service road on the north side of 6th ave. I've lived here 30 yrs. and my neighbors + I have waited at least this many years for a noise wall to be erected

Do you have any comments about the aesthetics/appearance of noise walls along US 6?

I'm curious/anxious to know what the walls will look like. Hopefully, the design will compliment the neighborhood. (I've recently (April 9th) had eye surgery, so my writing isn't too legible — sorry!

Please provide any additional comments here.

The large postcard re: the meeting on 6/4/08 re: the noise walls along W. 6th was the very 1st mtg. announcement re: the interchange construction and noise walls I've rec'd. I understand several mtgs. were held previously, but very few received these announcements. I do not have a computer or e-mail, but I'd certainly appreciate being notified by mail.