



Session 10

Construction Noise and Vibration and Pre-Construction Evaluation

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- ▶ Participants:
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 - ▶ Darlene Reiter, Bowlby & Associates, Inc. (Caltrans manual)
 - ▶ Discussant: Mariano Berrios, Florida DOT

NOISE AND WILDLIFE

Challenges in Analysis, Assessment,
Monitoring and Mitigation

Cora Helm



Affected Wildlife

T&E species

- Grizzly bear
- Sage Grouse
- Bald & Golden Eagle
- Bull Trout
- Sturgeon
- Sprague's Pipit
- Least Tern



Biological Assessment

- ▣ Threatened & Endangered Species
 - Adversely Effect
 - Potential Adverse Effect
 - Formal Consultation 60 days
 - Informal Consultation 30 days



Avoid, Minimize, Mitigate



Avoid – Bull Trout Ex

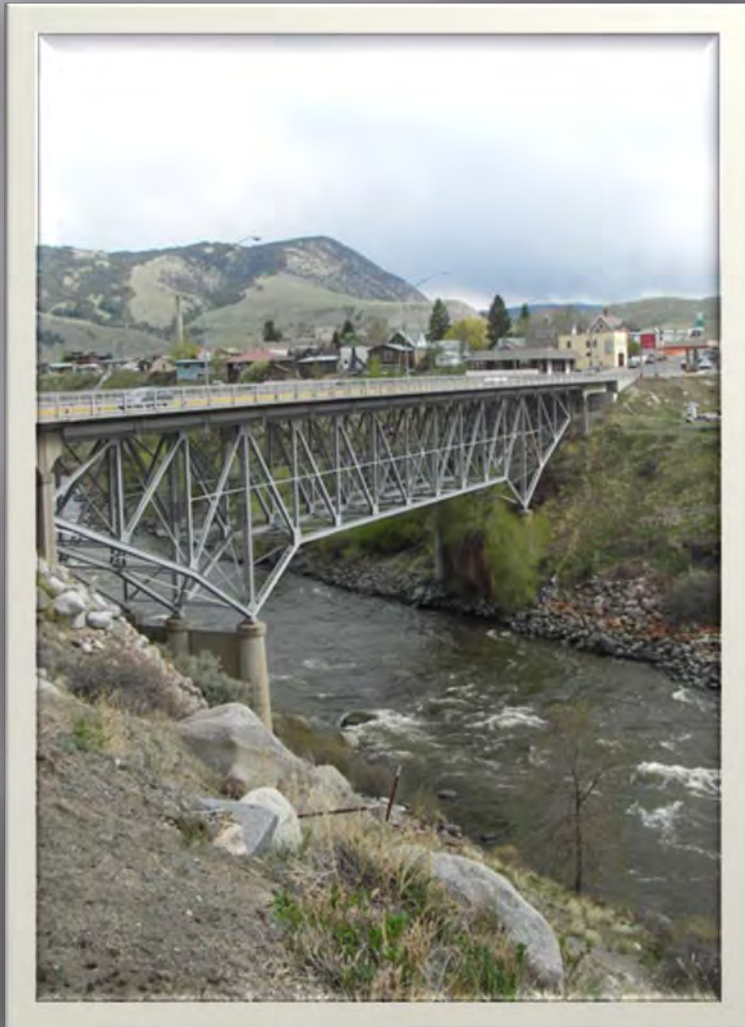
- Avoid – use of timing restrictions

USFWS Preliminary Comment Letter - October 29, 2014 (FWP Data)											
Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	overwintering										
	juvenile downstream migration										
	adult upstream migration										
USFWS Comment Letter - June 23, 2015											
Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	noise restriction (no pile driving unless sound attenuation measures are in place)										

Notice that USFWS timing restrictions do not align with habitat/behavior. MDT needs to drive pile in winter and pave in summer.



Minimize



- ▣ Upfront design to avoid in-stream work – like clear-spanning
- ▣ Building a work bridge without pile driving
- ▣ Use of drilled shafts instead of pile driving

Mitigate

- Bubble curtains
- Excel Calculator
- Use vibrating pile driver and finish with hammer for fewer strikes.



4	Stationary Fish				
5					
6	Fill in green cells: estimated sound levels and distances at which they were measured, estimated				
7	number of pile strikes per day, and transmission loss constant.				
8					
9		Acoustic Metric			
10	Measured single strike level (dB)	Peak	SEL	RMS	Effective Quiet
11	Distance (m)	204	170	190	150
12		10	10	10	
13	Estimated number of strikes	500			
14					
15	Cumulative SEL at measured distance				
16	197				
17		Distance (m) to threshold			
18		Onset of Physical Injury			Behavior
19		Peak	Cumulative SEL dB**		RMS
20		dB	Fish ≥ 2 g	Fish < 2 g	dB
21	Transmission loss constant (15 if unknown)	206	187	183	150
22	15	7	46	86	4642
23					
24					
25	** This calculation assumes that single strike SELs < 150 dB do not accumulate to cause injury (Effective Quiet).				
26					
27	Notes (source for estimates, etc.)				

Photo: 2007, Illingworth & Rodkin, Compendium of Pile Driving Sound Data

Better Science Needed



Behavior studies –
what do the fish do?

- ▣ We already have timing restrictions for other T&E such as Eagles.
- ▣ USFWS is requiring all states to meet this noise criteria – based on studies in much different environments and on different species.



Night Construction Special Provision & Online Training

Noise Practitioners Summit October 21–22, 2015

Marilyn Jordahl Larson, P.E.
MnDOT

We all have a stake in **A  B**



Today's Presentation:

- ▶ Review of the Special Provision
- ▶ Online training highlights
- ▶ Questions



Overview

In this e-Learning session you will learn about the Night Construction provision including the Night Construction definition and the requirements for performing Night Construction activities.

The following topics will be discussed in this e-Learning.

- Topic 1 - Introduction
- Topic 2 - MnDOT Special Provision 1803
- Assessment



Night Construction Noise Impacts

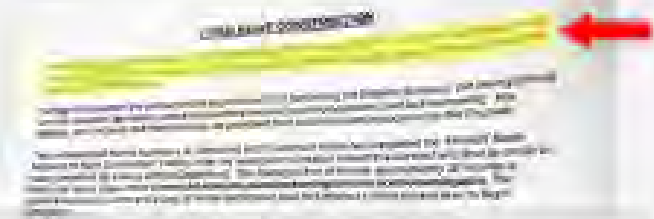
To maintain a good relationship with the public and ensure public support for highway projects among the local communities, it is critical that the owner and the contractors make every effort to minimize the adverse effects of Night Construction. This can be accomplished through relatively minor measures being taken by the contractor and the owner.



Night Construction Defined

In order to get a clear understanding of Night Construction, let's take a look at the definition.

Click on the highlighted area for more information. Click again to minimize.



Night Construction shall be defined as construction between the hours of 6:00 p.m. to 7:00 a.m. where the work will occur within 500 feet of any sensitive areas such as hospitals, homes for the aging, private residences, apartments, businesses, and hotels/motels.

The work location is important. The contractor shall identify work within 500 feet of any sensitive area(s).

It is important for the contractors to identify the appropriate hours for which a project will take place. Night Construction is not defined by the lightness or darkness of the sky. This is important because construction activities in the summer months could occur at 6:00 p.m. when it is still light outside or 7:00 a.m. when the sun is rising.

Click the Next button to continue.



Typical Prohibited Activities

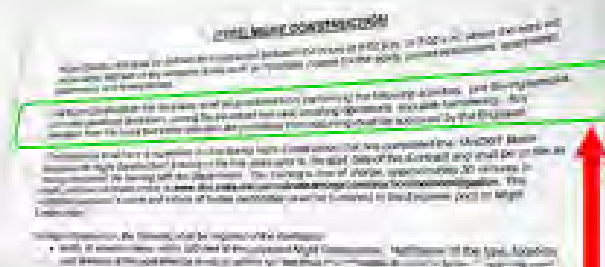
Special Provision 1803 Night Construction defines prohibited activities unless otherwise specifically allowed in the contract.

Be sure to refer to the specific prohibited activities contained in the Night Construction special provision for each project(s).

Distances, timeframes and prohibited activities may change depending on your contract for a specific project. Be sure to refer to the specific requiren

prohibit

For Night Construction, the contractor shall be prohibited from performing the following activities: pile driving/removal, concrete pavement demolition, sawing for pavement removal, crushing operations, and jack-hammering. Any deviation from the hours that these activities are prohibited from occurring must be approved by the Engineer:



Click on the text to read the contractor requirements.



Requirements and Procedures

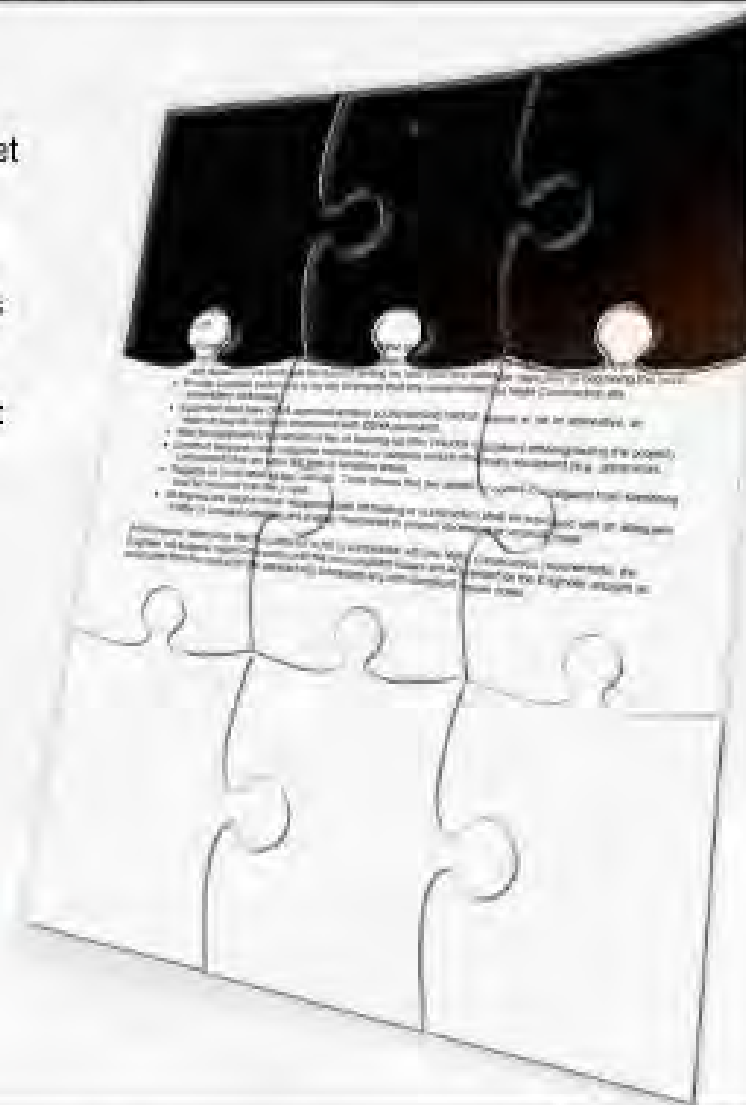


Notify all sensitive areas within 500 feet of the proposed Night Construction. Notification of the type, location, and duration of the work shall be made in writing no later than five calendar days prior to beginning the work.

Sensitive areas may include:

- Hospitals
- Homes for the aging
- Private residences
- Apartments
- Businesses
- Hotels/motels

Click on the next puzzle piece.



Additional Measures for Mitigating Noise During Night Construction

Contractors should take additional steps, such as the following, to mitigate noise during night construction.

- Keep staging areas away from sensitive areas.
- Use rubber gaskets on the boxes of tailgates to reduce/eliminate loud noises from slamming tailgates.
- Use belly dumps in lieu of end dumps.
- Turn off equipment during non use.





MnDOT Noise Mitigation for Night Construction Training:

www.dot.state.mn.us/onlinelearning/construction/noisemitigation

Questions?

Thank You!

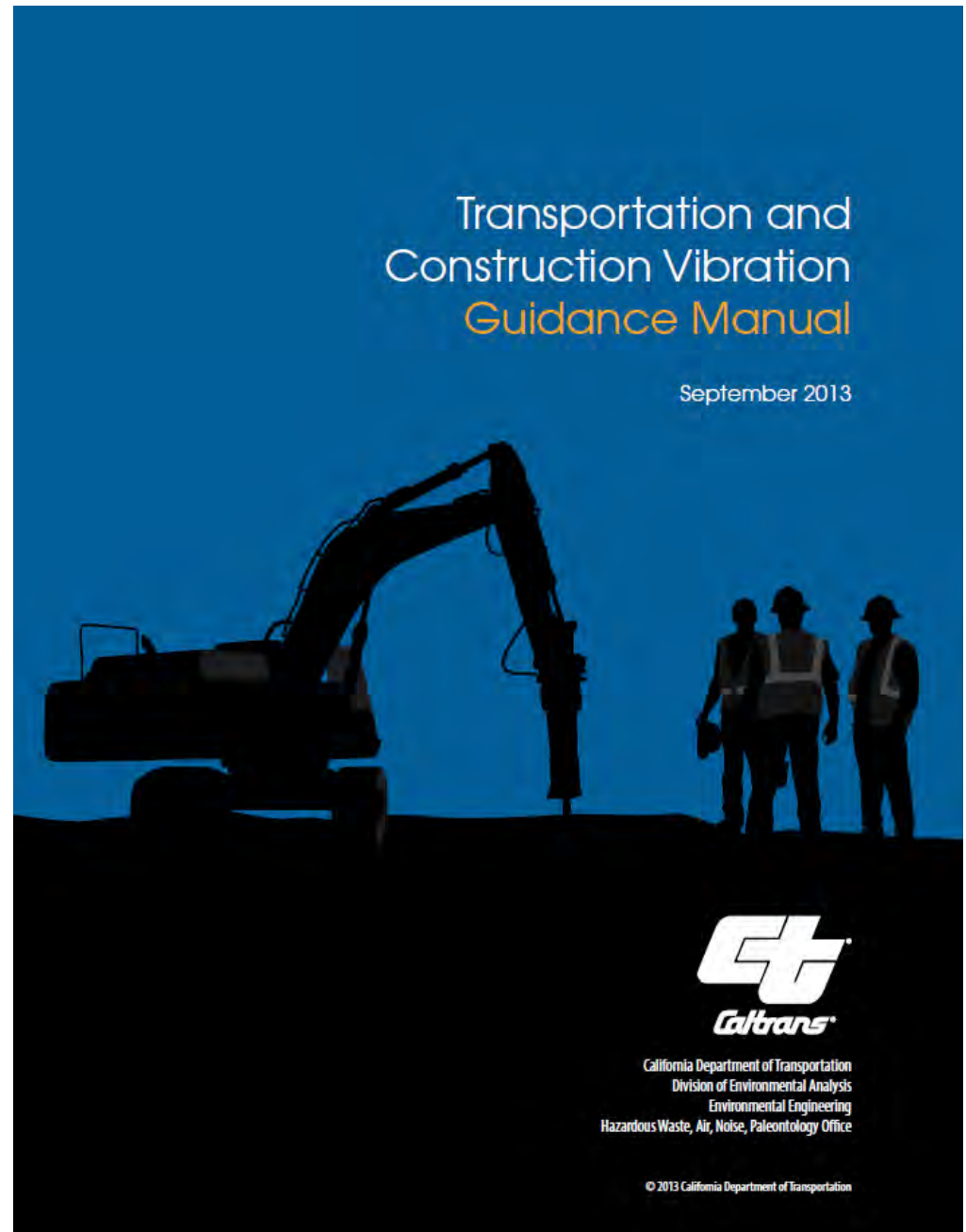
We all have a stake in **A  B**

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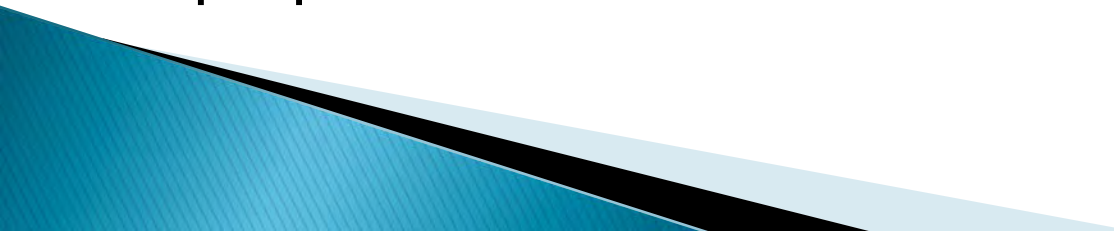


Caltrans *Transportation and Construction Vibration*

Developed over
almost two decades
– based on early
work by Rudy
Hendriks



Contributors

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Appendix A. Technical Advisory TAV-02-01-R9601

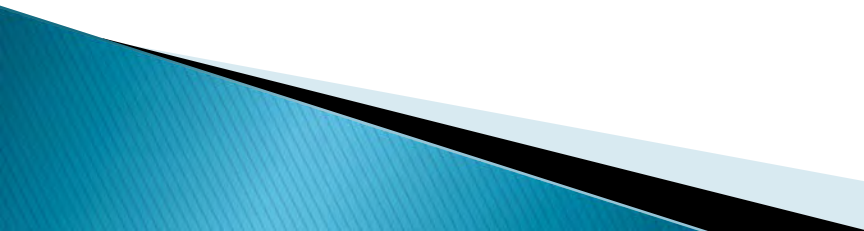
Appendix B. Sample Vibration screening procedure and Vibration Complaint Form

Appendix C. Sample Vibration Specifications

Appendix D. Sample Blasting Vibration Specifications

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Upcoming Publications

- ▶ New *Technical Guidance for the Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish*: A 500+ page reference for assisting biologists and engineers in assessing hydroacoustic impacts of pile driving work on fish for the permitting process
 - ▶ Update to a 2007 Caltrans reference: *Technical Guidance for the Assessment and Mitigation of the Effects of Traffic Noise and Road Construction Noise on Birds*
 - ▶ New *Technical Guidance for the Assessment and Mitigation of the Effects of Traffic Noise and Road Construction Noise on Bats*
 - ▶ Expected by end of November, downloadable and available to the other DOTs
- 



Session 10 - Questions

- ▶ Hanf, MI: Are there any planned revisions or updates to the Construction Noise Handbook?
- ▶ Burcham, MO: Has noise impacts on Section 6(f) land that has hunting as one of its uses been an issue?
- ▶ Use of TNM for biological noise purposes. Is anyone using TNM results in impact determinations to animals? Is the A-weighting and height a problem?



Session 10 - Questions

- ▶ Moch, ND: NDDOT has dealt with terrestrial and aquatic species in regard to noise analysis requirements. Sharptail grouse leks were identified within ½ mile of project and noise analysis proved a negligible increase in noise levels. Pallid Sturgeon (endangered species) noise monitoring was required for bridge pier placement as commitment in Environmental Assessment.
- ▶ NDDOT would like to hear ideas for modeling this in project development.
- ▶ Alcala, OH: What triggers the requirement for construction noise and vibration studies?



Session 10 - Questions

- ▶ Newvine, OR: What kind of effort are DOTs giving to review of vibration impact documents?
- ▶ Vibration Effects on structures, including historic and sensitive manufacturing
- ▶ Construction noise:
 - ▶ Level of effort for analysis
 - ▶ Discussion in reports
 - ▶ Types of mitigation
 - ▶ Implementation of mitigation measures