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**THE STATE OF OHIO vs FERAS HAMDAN (CR-25-703449-A)**
**Expert Witness - Acoustical Analysis**

I was retained by the Pattakos Law Firm to provide an expert opinion on acoustics concerning the criminal complaints filed against Dr. Feras Hamdan. More specifically, the prosecution claims that statements were vocalized by Dr. Hamdan and directed at Congressman Max Miller while driving in separate vehicles on I-90 during the morning of June 19, 2025. I was retained to examine the likelihood of the audibility of said statements. The following provides a summary of my qualifications, the questions I was asked to provide my opinion on, the methodology used to prepare my opinions, the findings of my analysis, and expert opinion based on my findings.

## QUALIFICATIONS AS EXPERT ACOUSTICAL WITNESS

Mr. Jeff Cerjan holds a Bachelor of Science degree in Aerospace Engineering from the University of Kansas (1994) and is a full member of the Institute of Noise Control Engineering (INCE) and the Acoustical Society of America (ASA). With a career spanning over 25 years in structural dynamics and acoustics, Mr. Cerjan has conducted comprehensive noise studies across the United States and internationally. His extensive expertise covers a broad spectrum of noise and vibration sectors, including architectural, traffic, materials testing, oil and gas facilities, diverse power generation sources (e.g., wind turbines, conventional power plants, solar farms), various industrial facilities (e.g., LNG, chemical plants, cryptocurrency data centers), land development projects, mining operations (gold and gravel), and performance venues.

Specifically applicable to this analysis, Mr. Cerjan acoustically measures and models noise using some of the most advanced software and equipment including SoundPLAN v9.1, INSUL v10, and Larson Davis Model 831 Sound Level Meter. He has measured and modeled various complex acoustical situations regarding traffic noise, pavement noise, aircraft materials effectiveness, architectural noise, performance venue audibility, etc. Mr. Cerjan has been utilized as an expert witness in acoustics in about seven lawsuits and dozens of governmental hearings. His most recent testimony was for a shooting range in Kentucky and is currently retained for a data center in Texas.

Jeffrey Cerjan’s resume is provided in Attachment A. Some general noise information is provided in Attachment B.

## QUESTIONS ASKED TO PROVIDE OPINION

I have been retained to provide an expert analysis regarding the audibility and intelligibility of vocal communications between two moving vehicles. Specifically, I have been asked to determine whether a driver operating a Dodge Ram 1500 TRX could comprehend verbalizations from an individual in the driver's seat of a Tesla Model Y via the passenger-side window. This evaluation accounts for two distinct variables: (1) with the Tesla Model Y passenger window fully closed, and (2) with the Tesla Model Y passenger window fully open. In both scenarios, the Dodge Ram 1500 TRX driver-side window is assumed to be fully open while both vehicles are in motion at highway speeds.

## METHODOLOGY

Since it wasn't practical to get these two specific vehicles side-by-side for a live test, we used a "measured-modeling" approach. Essentially, we gathered real-world sound data and plugged it into a professional simulation to estimate how much noise travels from one car to the other.

### 1. Getting the "Real World" Baseline

First, I needed to know how loud it already is inside a Dodge Ram at highway speeds. I took a 2026 Dodge Ram 1500 Tungsten out on the road at 55 mph and used a professional-grade sound meter (Larson Davis 831) to record the noise levels where the driver’s head would be. I did this with the window up and then again with it down to get a full range of the "background noise".

### 2. Sizing Up the Vehicles

I used a Dodge Ram SHO for the physical measurements as this vehicle’s dimensions are effectively the same as a TRX. I measured a Tesla Model Y to get the size and placement of the passenger window.

### 3. Passenger Window Noise Reduction

The Tesla Model Y commonly uses a laminated double-pane window, but we assumed a single pane for this assessment which provides about 3 dBA less noise reduction. We used our acoustics software (INSUL v10) to determine the amount of noise reduction for a 6mm laminated window.

### 4. Defining the "Yell"

I used a specific "vocal spectrum" from SoundPLAN which references an international standard (ISO 3382-3) that mimics the frequencies of a human voice. I then increased the “yelling” sound level to 80 dBA and then 90 dBA to see how those levels performed. Note while typical yelling noise is in these ranges, a personal test with our sound level meters suggest 90 dBA is on the higher range.

### 5. Running the Simulation

Finally, I put the vehicle sizes, the window types, the highway noise, and the yelling into SoundPLAN v9.1. The simulation was setup so the Tesla passenger window was directly across from the Dodge driver’s window. This represents the loudest the yell would be expected for the other driver.

## FINDINGS OF THE ANALYSIS

When we look at the results in the table below, we are comparing the sound of the yell reaching the truck against the "noise floor" or background noise which is the combined sound of the wind, tires on the pavement, and engine while driving at 55 mph.

In acoustics, there is a big difference between something being audible (hear a noise) and intelligible (actually understand the words). For example, car horns (tonal) are designed to pierce through broadband background noise even when they are quieter. Speech, however, is broadband and gets "masked" or drowned out as speech its frequencies are similar to highway background noise.

**TABLE 1 – Noise Analysis Results**

| Condition | Tesla Window | Ram Window | Sound of the Yell (Inside the Ram) | Background Noise | Notes |
|---|---|---|---|---|---|
| Windows Up | Closed | Closed | Under 22 dBA | 73 dBA | A person would not hear the yelling over the background noise. Inaudible and unintelligible. . |
| Windows Down | Open | Open | 63 to 73 dBA | 73 dBA | Maybe a muffled sound. Possibly a faint noise if the cars are perfectly aligned, but you almost certainly couldn't make out the words. |

## EXPERT OPINION

The following are my professional conclusions, stated to a degree of professional certainty:

### 1. Closed Tesla Windows

If the Tesla's windows are closed, a person yelling inside that car simply cannot be heard by someone in an adjacent vehicle. Between the car's insulation, the laminated glass, and the 73 dBA of wind and road noise at 55 mph, the sound of a voice is masked.

### 2. Open Tesla and Ram Windows

If the Tesla's passenger window is open and someone yells, the driver in the other vehicle with their window down could possibly hear a sound. However, there is a difference between hearing a noise and understanding a sentence. At highway speeds, the "white noise" of the wind and tires acts as a mask. Because the yell is roughly the same volume and frequency as the road noise, the words would likely be scrambled and unintelligible.

### 3. Horn Noise

It is important to note that you can't compare a human voice to a vehicle horn. A horn is "tonal" and it is a sharp, piercing sound specifically designed to cut through background noise, even when it's technically quieter. A human voice is "broadband" and soft by comparison; it doesn't have that piercing quality, which is why it gets drowned out by the road more than a horn or a siren.

# Attachment A – Jeffrey Cerjan's Résume

# Professional Qualifications

Jeffrey M. Cerjan

ACOUSTICS Cerjan

## Education:

B.S., Aerospace Engineering
University of Kansas, 1994

## Professional Affiliations:

Institute of Noise Control Engineering
Acoustical Society of America

## Agency Experience:

Federal Highway Administration
Federal Aviation Administration
Departments of Transportation (several)
Occupational Health and Safety Administration
Environmental Protection Agency
California Energy Commission
Montana Dept of Environmental Quality
World Bank
Ghana Environmental Protection Agency

## Background:

Mr. Cerjan has been practicing in the field of noise and vibration engineering for over twenty-four years.

Mr. Cerjan worked for Raytheon Aircraft in design, systems, structural dynamics and acoustics. At Raytheon, he gained extensive experience in aircraft interior noise and vibration measurements, analysis and design as well as take-off noise testing, analysis and certification.

Mr. Cerjan then worked for The NORDAM Group where he established an acoustical engineering position for this principle supplier of integrated aircraft interiors.

At Hankard Environmental Inc, he has added industrial, mining, transportation, oil and gas, power generation, renewable energy, shooting ranges, music venues, architectural, etc. Mr. Cerjan has completed or supported well over 250 projects. He has also supported clients at governmental hearings, conducted audio demonstrations, and has provided expert witness testimony in lawsuits.

## Experience

### Renewable and Fossil Fuel Power Facilities

Conducted noise analyses in support of permitting for utility scale wind and solar facilities as well as for battery energy storage systems (BESS). This includes acoustical modeling for construction and operations, ambient and source measurements, mitigation design, permitting, and testimony in support of projects. This was also followed up with the development of compliance protocols and measurements.

### Transportation Noise Analysis and Mitigation Design

Includes acoustical analysis using TNM noise modeling software to predict noise levels near highways or roadways, as well as the use of these models to design and predict the impact of any required noise mitigation. Technical noise reports were prepared in support of the EA or EIS as well as presentations to engineering personnel and the public. Co-authored the TNM User's Guide for the State of Colorado which included in-depth testing of the TNM model.

### Shooting Ranges

Measured and/or modeled indoor and outdoor shooting ranges on behalf of proponents and occasionally opponents which at times can be controversial. Reviewed and provided formal responses to technical noise reports prepared by others. Successfully interpreted and applied numerous state and local noise ordinances to shooting range projects. These projects were both for private and public ranges including work for the United States Air Force Academy.

### Industrial

Measured, modeled, and analyzed several various industrial sources and facilities including power plants (coal, oil, gas, biomass, cogen, peaking, etc.), gravel pits, and gold mines. Familiar with a variety of noise regulations both nationally and internationally including experience with World Bank Group and the associated International Finance Corporation Noise Guidelines. Experience working directly with lender representatives and the public to explain our clients position and compliance with the applicable regulations.

### Land Development

Worked with developers regarding land development issues relating to local noise guidelines, re-zoning applications, etc. Very familiar with the variety of noise ordinances across the country. Have provided support for clients in front of City and County Commissioners, Planners, etc.

### Expert Witness Testimony

Testimony on acoustics with regard to sound propagation, mitigation, measurements, and data interpretation has been provided for civil lawsuits. Preparation for these cases included conducing measurements and analysis for our clients. The results of these findings were used as evidence in their cases. Both depositions and in court testimony have been provided. Successfully defended the operation of an agricultural "hail cannon" in a civil lawsuit.

### Software and Equipment

SoundPLAN® - Acoustical Modeling Software (v9.1)
Larson Davis - Noise Measurement Equipment
Bruel & Kjaer - Noise, Vibration, and Sound Intensity Measurement Equipment
Davis - Meteorological Measurement Equipment
Vaisala - Meteorological Measurement Equipment

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## Attachment B – General Noise Information

## Common Noise Levels

Environmental noise is most commonly measured and reported as A-weighted (dBA), which is considered to best represent what humans hear. This is different from flat-weighted (dB) as dBA filters the influence in the lower frequencies. The table below provides some examples of common noise levels.

**Common Noise Levels**

| Noise Source | Noise Level (dBA) |
|---|---|
| Amplified rock band | 115 – 120 |
| Commercial jet takeoff at 200 feet | 105 – 115 |
| Community warning siren at 100 feet | 95 – 105 |
| Busy urban street | 85 – 95 |
| Construction equipment at 50 feet | 75 – 85 |
| Freeway traffic at 50 feet | 65 – 75 |
| Normal conversation at 6 feet | 55 – 65 |
| Typical office interior | 45 – 55 |
| Soft radio music | 35 – 45 |
| Typical residential interior | 25 – 35 |
| Typical whisper at 6 feet | 15 – 25 |
| Human breathing | 5 – 15 |
| Threshold of hearing | 0 – 5 |

*Ref: Cerjan Acoustics*

## Noise Level Sensitivity

Human sensitivity to noise varies, but there are some common guidelines for how humans perceive noise. The following provides how a change in the noise or sound level is perceived by humans.

- 3 dB = just perceptible
- 5 dB = noticeable by all
- 10 dB = twice as loud