DA-1T

BEFORE THE WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION

In Re the Petition of: WHATCOM COUNTY, Petitioner v. BNSF Railway Company, Respondent.	DOCKET NO. TR-180466 **PREFILED TESTIMONY OF DUSTY ARRINGTON**

Q: Please state your full name.

A: Dusty R. Arrington.

Q: Where do you live?

A: Bryan, TX.

Q: What do you do for a living?

A: I am primarily employed as an Accident Reconstruction Specialist at A&M Forensics and Engineering. I also carry an hourly position as an Associate Transportation Researcher at Texas A&M Transportation Institute (TTI).

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Q: Please describe your professional background and work experience.

A: I have obtained a bachelor's and a Master's of Science in Civil Engineering from Texas A&M University. I have over 17 years combined experience in design and testing of roadside safety hardware and reconstruction of vehicular accidents involving passenger and commercial vehicles. Additionally, I have reconstructed many vehicular accidents involving rail crossings.

Q: Do you have a current CV?

A: Yes, it is attached. See Exhibit DA-2.

Q: Have you published in your field, and if so, what are some of your publications?

A: I have authored or co-authored over 30 publicly available articles and reports; I have included a sample listing in my CV. I have also authored many more non-publicly available articles/reports for Departments of State, Departments of Energy, and other private sponsors.

Q: Have you during your education and career studied traffic control devices?

A: Yes, I have studied them, designed them, and tested them as part of my duties at TTI.

Q: What types of traffic control devices have you studied, designed, and tested?

A: I have studied, designed, and tested all manner of traffic control devices, including but not limited to: temporary and permanent small sign stands, temporary and permanent large guide signs, barricades, cones, and products generically referred to as delineators.

Q: Have you studied median barriers, curbs, and channelization devices, during your career?

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A: Yes, I have studied, designed, and tested all manner of barriers, curbs and channelizing devices.

Q: Are you familiar with the term "mountable," or "traversable," curb or median?

A: Yes.

Q: Can you please describe for the Court what that is?

A: Yes, this is a device or structure that is raised above the pavement surface and used to deter vehicles from crossing over a lane or roadway boundary. These devices are designed to deter but not prevent a vehicle from crossing over a lane or roadway boundary. An example is shown in Exhibit DA-3.

Q: Can you describe in what applications these traversable devices are commonly utilized?

A: These devices/structures are utilized in high speed roadway applications where non-traversable/non-mountable devices/structures generally are not used. They are also generally utilized in applications that are temporary in nature. In these cases, the system is used to bound a traffic lane due to a temporary lane shift. These are common in construction zones where temporary lane shifts are common.

Q: What is the purpose of a "non-traversable" / "non-mountable" device/structure?

A: The purpose of non-traversable structures is to provide a physical barrier to deter/prevent a vehicle from crossing a boundary or separation at the edge of a traffic lane or roadway. In this case

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involving a railroad crossing, it would be to prevent a vehicle from crossing into the oncoming traffic lane to circumvent lowered gates at a railroad crossing.

Q: What is an example of a non-traversable/non-mountable device/structure?

A: A standard 6 inch or taller concrete curb is an example of such a structure. See Exhibit DA-4.

Q: Are you familiar with the "channelization devices," often used in conjunction with mountable curbs?

A: Yes.

Q: Please describe to the Court in general what "channelization device" means.

A: Due to the low profile of a mountable curb, mountable curbs are not very visible to drivers. To increase their visibility and to increase the effectiveness of the base curb system, many of these systems are augmented with the use of a series of vertical polymer posts with reflective sheeting attached. These posts, or channelization devices, are generically referred to as delineators. I refer you back to Exhibit DA-3 as an example.

Q: Have you or others tested mountable curbs and channelization devices in particular?

A: Yes, I have performed testing for State Departments of Transportation (DOT) including in Texas and Florida. I have also performed compliance and developmental testing for manufactures of the products in question.

Q: Have you been involved in national committees governing these products?

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A: Yes, I was the founding Co-Chair of AASHTO Task Force 13 (TF13) Subcommittee #11 – Standardization of Roadside Delineation.

Q: Have you given presentations on the testing you have done on these products?

A: Yes, I have presented multiple presentations on the standard development and testing of delineators to NTPEP's TTCD committee and AASHTO's TF13.

Q: In your research did you look at the behavior of drivers in response to delineator installations?

A: Yes, I visited multiple installations in Texas and Florida to witness how the delineators were performing in the real world.

Q: What type of installations did you visit?

A: At the time I was primarily focused on delineator installations utilized to separate traffic going in the same direction. In these cases, the delineators were utilized to separate the high-speed traffic of an express and/or HOV lane from normal traffic.

Q: Did you ever witness drivers crossing these delineator installations?

A: Yes, I have reviewed a significant amount of video footage of delineator impacts in real world installations. I also witnessed a vehicle cross into a work zone I was in. To get into the work zone the driver had to pass through cones and a delineator installation. This was in Miami on I-95. After crossing the crew work area, I witnessed the vehicle cross back into traffic.

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Q: Are you aware that Whatcom County, in an effort to establish a Railroad Crossing Quiet Zone, has petitioned the Washington Utilities and Transportation Commission for approval to install mountable medians with channelization devices at the Cliffside Drive railroad crossing?

A: I am. I have reviewed the County's petition to the WUTC.

Q: What is your understanding of why the County proposes installing mountable medians with channelization devices?

A: The County intends them to be an enhanced safety measure to deter drivers from going around crossing gate arms.

Q: Do you have a professional opinion, based on your training and experience, on the effectiveness of mountable curbs with channelization devices versus non-mountable curbs at the Cliffside Drive crossing?

A: Yes.

Q: Please tell the Court your opinion.

A: In my opinion a mountable curb system will only have a limited ability to prevent a drive-around situation.

Q: Why do you say that?

A: A mountable curb system does not physically prevent any class of vehicle from crossing it. In fact, it is designed to allow a vehicle to cross it at high speed without causing instabilities to the vehicle. Drivers generally understand there is little risk of damage to their vehicle when crossing a

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mountable curb system, and a determined driver likely will not be deterred from driving around the gate as intended. The installation of the system will enhance the performance of the lane markings on the road, but in my opinion, it will not have the desired effect of preventing the drive-around condition intended to be prevented by the installation of the system.

Q: So, you are saying that mountable medians are specifically designed to be safe to traverse, even at very high speeds?

A: Yes, these systems are impact tested as part of the compliance standards at speeds as high at 63 mph. As an example, here is a link to the video on a manufacture's website showing the MASH Compliance testing of their product. https://www.youtube.com/watch?v=mk67CbTznbg This video shows the system being impacted by a Dodge Light Truck. Additionally, the system was successfully tested (not shown in the video) in the same configuration with a Kia Rio.

Q: Don't channelization devices atop the mountable curbs act as a deterrent to drivers?

A: Not necessarily.

Q: Explain please.

A: The channelizers generically referred to as delineators make the mountable curb more visible to a driver; however, the delineators are designed to fold away and restore when contacted by a vehicle. These products are made of a light weight polymer that at low speeds will generally do little to no damage to an impacting vehicle. The general public understands this, and field studies have shown that some drivers are willing to impact them even at high speeds to cross the system. In short, mountable medians with channelization devices will simply keep honest people

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honest. Non-mountable medians provide a more effective deterrent to drivers who want to go over the median and around the lowered crossing gates.

Q: Are the channelization devices unlikely to damage motorists' cars even if they strike them while crossing a mountable median?

A: In general, there is a low probability of damaging a vehicle due to impacting a delineator at low speeds. As the spacing of the delineators is increased, the drivers are even more willing to cross. This is shown in some studies that I was involved in at TTI. At some point the delineators become completely ineffective as the spacing increases because a vehicle can cross the curb system without contacting a delineator.

Q: How does the durability of the channelization devices affect the performance of the system?

A: Each of the delineators has a given number of average impacts it will resist before it fails. By failure I mean it will become dislodged from the base or it will fail to regain its upright position. At that point the device no longer serves its purpose in preventing a cross over situation, and some speculate that it invites other drivers to cross at that location. Constant maintenance is needed to keep these products in functional condition. A few examples of failures and degradation due to impacts are shown in Exhibits DA-5 (*see e.g.*, pp. 41-42, 54-55, and 64-65), DA-6 (*see e.g.*, pp. 32, 34, and 37), and DA-7 (*see e.g.*, pp. 16, 24, and 30).

Q: Are you familiar with the type of median that Whatcom County installed at the Yacht Club Road crossing in conjunction with its implementation of a Quiet Zone there?

A: Yes.

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Q: What is your understanding of what the County did?

A: In this case a non-mountable 6-inch-tall concrete median was installed with delineators installed on top for higher visibility.

Q: Based on your training and experience, what as a practical matter is the effect on all types of vehicles of installing a non-traversable median at a railroad crossing, such as at Yacht Club Road?

A: Given a sufficient curb height, a non-traversable median will prevent low ground clearance passenger cars from going over the curb system and around the gate. Depending on their ground clearance, light and medium duty trucks will still be able to traverse the curb system; however, it will provide a substantial deterrent to doing so.

Q: Why is that?

A: A sufficiently low ground clearance vehicle cannot physically go over a non-traversable curb system without doing damage to the underside of the vehicle. Higher ground clearance vehicles such as light and medium duty pickups may have enough ground clearance to traverse the curb without contacting the body or drivetrain of the vehicle. That said, the vertical nature of most concrete curb systems makes them difficult for a vehicle to climb up and over. As an example, I have included a photo of a low ground clearance vehicle pulled up to a 6-inch concrete curbed median. See Exhibit DA-8.

Q: Based on your training and experience, what as a practical matter is the effect on emergency vehicles such as police cars, paramedic vans, and fire trucks of installing a non-traversable median at a railroad crossing?

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A: In general, the short length of curb system (100-foot minimum) is a very short section. An emergency vehicle should be able to witness the gates dropping before entering the curb restricted area of the roadway. At that time, the emergency vehicle should be able to turn around in the area in advance of the curb system. If circumstances dictate that the gates come down after the vehicle enters the curb protected area, most emergency vehicles should have enough ground clearance to traverse the curb system without contacting the system. Each vehicle would need to be individually evaluated to see if it is safe to do so. As an example, I have included a video showing a Ford F150 traversing a similar 6-inch concrete curbed median. See Exhibit DA-9.

Q: I want to ask you some questions related to maintenance of mountable curbs with channelization devices. Are you familiar with the various long-term maintenance issues and problems related to installing them?

A: I am.

Q: Can you please explain the long-term maintenance issues related to mountable curbs and channelization devices?

A: As for the curb systems themselves: A lot of systems are set with mechanical fasteners into concrete. This is similar to an oversized screw or a drywall anchors used to hang a picture on your living room wall. Additionally, they can be glued to the roadway surface with epoxy or bitumen tar. All these installation methods present major freeze/thaw issues. In mechanical fastener cases, a hole must be drilled into the roadway surface. Most DOTs don't like this because it allows water to seep into the roadway surface. During cold temperature events the water then freezes and expands. This damages the roadway surface. This causes two problems: the surface cracks and is damaged and will require repair. Additionally, it damages the concrete around the anchors causing the

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anchors to be released. A similar result can be observed when gluing the curb to the surface. In this case water collects between the base and the glue. When the water expands it causes the base to break free from the roadway surface. There are several other failure modes related to the base becoming dislodged from the surface of the roadway.

As for the delineators: the plastic posts require maintenance. They must be cleaned. Over time road grime begins to build up and discolors the plastic and obstructs the reflective sheeting. Additionally, errant and traversing vehicles impact the delineators. This contact causes the delineators to discolor and the reflective sheeting to degrade. This discoloration and degradation are not easily cleaned away and usually require the post to be replaced. When the post is struck by a vehicle the plastic burns from friction and turns black. Also, rubber from the vehicle components will transfer to the delineator, causing them to turn black. After 200 impacts they are essentially black, and the reflective sheeting is mostly gone. Any remaining sheeting will have degraded to the point it will no longer be visible at night. Some of the delineators will fracture away from the bases and will leave pieces on the roadway. Some fall over and don't right themselves. Some will list or lean permanently, making them less effective from a visibility standpoint and will be considered an aesthetic eye sore. In general, these systems are made of plastic and will degrade (discolor and become brittle) over time due to environmental effects such as UV.

In general, the mountable curb and channelization systems look bright and clean when new and can be quicker to install then the concrete system; however, over time they will need more and more maintenance. Even the most durable delineators need replacement for the above-mentioned reasons. These systems are generally cheap to install but expensive to maintain.

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Q: I want you to assume that Whatcom County has represented that it will replace damaged or missing mountable curbs or channelization devices "immediately." Do you think that is realistic?

A: No.

Q: Why not?

A: In my evaluation of real-world installations, they are not repaired unless the public complains about the aesthetics or until a significant portion of the system becomes damaged. I have seen many installations where much of the system has been missing or damaged for extended periods of time.

Q: Are there generally long-term maintenance issues related to non-traversable medians such as those installed at the Yacht Club Road crossing?

A: No.

Q: Why not?

A: Non-traversable median systems are generally constructed of concrete. Concrete in general is a very resilient material. It is resistant to environmental factors such as UV. If augmented with delineators, the system does not need to be painted (with the possible exception of the gore point). There are thousands if not millions of miles of standard unpainted curb and gutter systems in the US that require very little to no maintenance. The concrete system will be subject to the same environmental factors as the roadway surface, and therefore it should be expected to have a similar life span and maintenance need as the roadway itself. Moreover, even if delineators are also

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installed (as they were at Yacht Club Road), the concrete curb prevents the level of maintenance issues that occur with mountable curb systems.

Q: In general, which costs more in the long term, mountable medians with channelization devices or non-traversable medians?

A: I would expect a non-traversable median to have a lower life cycle cost compared to a similar life cycle cost of a traversable median system.

Q: Why is that?

A: In my experience it should be expected that that the polymer systems will be quicker to install, however long-term maintenance cost will grow exponentially. Concrete systems should be expected to have a much lower maintenance cost. The life cycle cost of a polymer system should be expected to be greater than a concrete system.

Q: Changing subjects slightly, have you as part of your document review for this case had a chance to read the Washington Utilities and Transportation Commission's May 17, 2016 response to Whatcom County's Notice of Intent with regard to installing mountable curbs with channelization devices as an enhanced safety measure at the Yacht Club Road crossing? See Exhibit DA-10.

A: I have.

Q: I want to draw your attention to the passage from the WUTC's letter where the Executive Director, Steven W. King, states with regard to mountable medians with channelization devices: "The [diagnostic] team at the February 3, crossing review agreed

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that the preferred treatment would be adding an exit gate for eastbound traffic and installing non-traversable medians on both approaches. It is commission's staff opinion that non-traversable medians provide a much higher disincentive for motorists to drive over them because of the potential damage to vehicles." Do you see that?

A: I do.

Q: Do you agree or disagree with the Washington Utilities and Transportation Commission's staff's opinion that non-traversable medians provide a much higher disincentive for motorists to drive over them because of the potential damage to vehicles?

A: Yes, for the reasons set forth above.

Q: Have you also as part of your document review for this case had a chance to read the Washington Utilities and Transportation Commission's April 18, 2016 response to Whatcom County's Notice of Intent with regard to installing mountable curbs with channelization devices as an enhanced safety measure at the Northwest 122nd Street crossing in Clark County, Washington? See Exhibit DA-11.

A: I have.

Q: I want to draw your attention to the passage from the WUTC's letter on the second page where the Executive Director states with regard to mountable medians with channelization devices: "Currently, the County proposes to install "Qwik Kurb" mountable medians with three-foot-high channelization devices on both approaches to the crossing: 75 feet on the west and 50 feet on the east side. UTC staff acknowledges that FRA regulations accept the use of 'Qwik Kurb' as supplemental or alternative safety upgrades,

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however it is UTC's staff opinion that this type of channelization is less effective than non-traversable median barriers. Qwik Kurb is designed to allow vehicles to drive over them resulting in little or no damage to the vehicle. Non-traversable medians provide a higher disincentive for drivers to disregard them because of the potential resulting damage to the vehicle." Do you agree?

A: I do, for the reasons set forth above.

Q: To summarize, would you expect traversable or non-traversable medians to more effectively deter improper motorist behavior at the Cliffside Drive railroad crossing?

A: Non-traversable medians. I would recommend augmenting the beginning of the concrete non-traversable curb median with delineators and/or paint to increase the visibility of the system. This will help mitigate accidental contact with the barrier by inattentive motorists. The non-traversable concrete median alone should sufficiently deter the drive around condition.

DECLARATION

I, DUSTY ARRINGTON, declare under penalty of perjury under the laws of the State of Washington that the foregoing PREFILED TESTIMONY OF DUSTY ARRINGTON is true and correct to the best of my knowledge and belief.

DATED this 20th day of December, 2018, at 3:20 pm CST.

DUSTY ARRINGTON

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DATED this 21st day of December, 2018.

Montgomery Scarp & Chait PLLC

s/Kelsey Endres

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CERTIFICATE OF SERVICE

I am over the age of 18 and not a party to this action. I am the assistant to an attorney with Montgomery Scarp & Chait PLLC, whose address is 1218 Third Avenue, Suite 2500, Seattle, Washington, 98101.

I hereby certify that the original PREFILED TESTIMONY OF DUSTY ARRINGTON has been submitted to www.utc.wa.gov/e-filing for filing with the WUTC. I also certify that true and complete copies have been sent to the following interested parties via email:

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I declare under penalty under the laws of the State of Washington that the foregoing information is true and correct.

DATED this 21st day of December, 2018, at Seattle, Washington.

s/Pamela Ruggles
Pamela Ruggles, Paralegal

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