Exhibit No. _____
Docket No. TR-100127
Witness: Eugene "Buzz" Berger

BEFORE THE WASHINGTON STATE
UTILITIES AND TRANSPORTATION COMMISSION

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION, Petitioner, v. CENTRAL PUGET SOUND REGIONAL TRANSPORTATION AUTHORITY; and CITY OF LAKEWOOD, Respondents.	DOCKETS TR-100127, TR-100128, TR-100129, and TR-100131 *(Consolidated)*

WRITTEN DIRECT TESTIMONY OF

Eugene "Buzz" Berger, P.E.

RAIL PROJECT MANAGER
HDR ENGINEERING, INC.

April 16, 2010

EUGENE "BUZZ" BERGER testifies as follows:

I submit this testimony in support of the Washington State Department of Transportation's petitions in the above-referenced dockets.

Q. Please state your name and business address.

A. My name is Eugene "Buzz" Berger. My business address is in care of HDR Engineering, Inc., 500 – 108th Avenue NE, Bellevue, Washington 98004. Telephone is (425) 468-1547. My email address is Buzz.Berger@hdrinc.com.

Q. By whom are you employed and in what capacity?

A. I am a Rail Project Manager at HDR Engineering, Inc. (HDR) and will have been with HDR for 5 years in July 2010. HDR serves as a consultant to Washington State Department of Transportation (WSDOT) on the Point Defiance Bypass Project.

Q. Please describe your educational background and work history that qualifies you to provide your expertise in this matter.

A. I have a Bachelor's degree in history from the University of California at Davis and later returned to earn a degree in civil engineering, also from the University of California at Davis, in 2004. Beginning in 1995, I worked directly for railroads in various capacities where I gained first-hand experience in construction and maintenance of railroad track and signal systems, including grade crossings.

At the time I left the railroad industry in 2002 in order to pursue a degree in civil engineering, I was serving as District Engineer, but during my tenure, my duties included track laborer, heavy equipment operator, assistant foreman, railroad signalman apprentice, railroad signalman, and relief signal maintainer and relief foreman. In 2004, I obtained a degree in civil engineering from the University of California at Davis. Since that time I have been employed by HDR as a Rail Project Manager.

Q. Please describe your role in the Point Defiance Bypass Project.

A. I serve as HDR's project manager on the Point Defiance Bypass Project, interacting with WSDOT's project manager. In this capacity, I develop railroad track designs, coordinate railroad civil with railroad signal designs, and coordinate the roadway geometric designs.

I. ROADWAY DESIGN

Q. What concerns must be considered when a railroad upgrades a grade crossing?

A. Typically, when a railroad upgrades the tracks and warning devices at a grade crossing, the railroad concerns itself with upgrades only to the warning devices, the tracks, and the roadway surface at the tracks themselves. The scope of this project addresses those elements.

Q. In addition to these typical concerns, were other considerations taken into account in designing the four crossings that are part of this petition?

A. Other improvements to the roadway, such as profile and channelization improvements, and improvements to the traffic signal systems, are generally left to the roadway authority. However, as the project sponsor, WSDOT recognized the benefits of revised roadway geometry and revised traffic signal systems which, together, would allow for smoother traffic flow at the crossings and would improve the safety of the crossings. The scope of the current project includes making improvements to the roadway geometry, pedestrian access, and channelization features at the Clover Creek Drive SW, North Thorne Lane SW, Berkeley Street SW, and Barksdale Avenue SW crossings. In their current configuration, the Clover Creek Drive SW, North Thorne Lane SW, and Berkeley Street SW crossings each have narrow lanes which could restrict traffic flow, they lack medians. The design improvements to mitigate these issues are discussed in more detail below.

Please refer to Exhibits EBB01 through EBB04, which illustrate the proposed configuration of the crossings, and which highlight some of the improvements proposed at each crossing.

Q. Were you involved in developing the roadway designs at the Clover Creek Drive SW, North Thorne Lane SW, Berkeley Street SW, and Barksdale Avenue SW?

A. My involvement with the roadway designs was to oversee engineers and designers as they developed the plans, to work to ensure the roadway and railroad track designs were coordinated geometrically, and to coordinate the bid documents. I provided general direction to roadway design specialists, and assisted in development of technical specifications for roadway design elements.

Q. Did you obtain input from local agencies and other professionals to ensure that all due care was taken to meet the safety needs of the traveling public at these grade crossings?

A. Yes, the grade crossings in the Point Defiance Bypass Project, and the best methods to achieve the highest levels of safety, have been the subject of a series of meetings. The meeting participants came from a variety of agencies and municipalities with interests in the crossings.

Q. Can you discuss how such meetings contributed to the designs process?

A. Throughout 2007 and 2008, several meetings were held with the City of Lakewood to discuss the project and, specifically, the grade crossings and traffic at the crossings.

A grade crossing field diagnostic meeting was held on September 20, 2006. Attendees from affected agencies included John Howe and Don Carney from the City of Lakewood; Carolyn Simmonds, Abe Sahari, Ahmer Nizam, and Ken Burt from WSDOT; and Vern Page who represented Pierce County Traffic which, at the time, provided traffic services for both the City of Lakewood and the City of DuPont. At the request of the WUTC, Mr. Nizam attended as their representative since the WUTC representative was unable to attend.

Q. Were measures taken to address comments received from the City of Lakewood?

A. On July 19, 2007, Kevin Jeffers, Desiree Winkler, John Howe, and I met at the City of Lakewood offices to review the plans and, in particular, the roadway geometric designs. The City had provided comments on the 60 percent civil plans, and we met to address those

comments. The resolutions discussed were incorporated into subsequent versions of the plans. Examples of the City's comments include requests for modifications to the asphalt paving depth at the crossings, revision of concrete curb geometry, and depth and width of the granular layers (crushed surfacing base course) underneath the sidewalk. At Bridgeport Way, the City was in the midst of a roadway improvement project; the City provided comments on our design that would help us coordinate with the City's proposed work. These comments were either incorporated in the design, or were resolved during the meeting on July 19, 2007.

Q. Did WSDOT coordinate with other agencies to ensure that appropriate safety measures would be taken at the crossings at issue in this petition?

A. Since the WUTC was not present at the initial field diagnostic meeting, another field meeting was held on June 12, 2008, to ensure WUTC representatives (Paul Curl and Kathy Hunter) and Sound Transit representatives (Jodi Mitchell and Melissa Saxe) had the opportunity to review the crossings in the field and to discuss the traffic simulations.

Q. Please describe the efforts at coordination with the City of DuPont.

A. A representative from Pierce County Traffic attended the September 20, 2006 field diagnostic meeting. At that time, Pierce County was responsible for maintaining the traffic signals (other than the ramp terminal signals) in the vicinity of the crossing.

On September 15, 2009, I participated in a conference call with Peter Zahn from the City of DuPont, Kevin Jeffers from the WSDOT Rail and Marine Office, and Jodi Mitchell from Sound Transit to discuss the project status with the City and to review the proposed plans for the Barksdale Avenue SW crossing and, in particular, utility impacts (since few roadway modifications were proposed at Barksdale Avenue).

During that conference call, the items discussed were the disposition of a catch basin near the tracks, which was found to not interfere with the project, as well as acceptable haul routes for construction traffic, since the City did not want the contractor to use Wilmington

Drive in the vicinity of the Transit Center. The traffic signal phasing plan was also discussed, though the City made no comments about it at the time.

Q. Can you explain what is meant by "geometric configuration" as that term relates to this design?

A. The term "geometric configuration" refers to the physical layout of the roadway features on the site, such as the alignment of the roadways, the width of lanes, and the locations of sidewalks. While the geometric configuration of each the crossings has been discussed in the respective WUTC crossing modification applications, several comments about the general design characteristics and processes follow. These pertain to the specific constraints and improvements at each crossing.

Q. What are the safety improvements that have been designed as part of the geometric configuration?

A. The roadways at Clover Creek Drive SW, North Thorne Lane SW, and Berkeley Street SW have all been widened at the crossings to allow for new, wider lanes, and a wider, safer turning radius. The areas shaded in green on Exhibits EBB01, EBB02, and EBB03 indicate the new, wider lanes and wider turn radii to be provided at the crossings at Clover Creek Drive SW, North Thorne Lane SW, and Berkeley Street SW, respectively.

At North Thorne Lane SW, Berkeley Street SW, and Barksdale Avenue SW, improved pedestrian access has also been provided. Currently, there is no sidewalk across the tracks at either location; pedestrians are forced to walk along the edge of the roadway embankment and step across the rails (or walk in the roadway itself) if they desire to cross the tracks. The Point Defiance Bypass Project will provide new sidewalks along one side of each roadway so that pedestrians can cross the tracks. The new sidewalks will connect with existing sidewalks at the north end of the improvements. These sidewalk improvements are indicated by the blue shading on Exhibits EBB02, EBB03, and EBB04 respectively.

Q. Does widening the roadway at the crossing lead to improved safety and public convenience?

A. Wider roadway lanes will reduce the chance that motorists will collide with each other. In addition, when driving in narrow lanes, it is sometimes a driver's natural tendency to reduce their speed, thus slowing down traffic through the crossing. By widening the existing narrow lanes, drivers would be able to pay more attention to other factors, including the signage indicating the presence of the railroad tracks. Further, the wider lanes would allow large vehicles, such as trucks, additional maneuvering room, thus speeding their transit over the tracks. Both the AASHTO publication *A Policy on Geometric Design of Highways and Streets* and the Transportation Research Board's *Highway Capacity Manual* refer to the tendency for motorists to drive faster in wider lanes.

Q. What authorities were consulted in determining the type of changes to the geometric configuration at these crossings?

A. Design at the grade crossings has been informed by several sources, including the WSDOT Design Manual, the Manual on Uniform Traffic Control Devices (MUTCD), the American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets*, the American Railway Engineering and Maintenance-of-Way Association (AREMA) *Manual of Railway Engineering*, and the FHWA-USDOT *Railroad-Highway Grade Crossing Manual* (2007 ed.). Regulatory agencies having authority over various aspects of these crossings include the Federal Railroad Administration (FRA) and the Washington Utilities and Transportation Commission.

Q. What specific changes to the roadway are proposed for the crossing at Clover Creek Drive SW and how will they improve safety at that crossing?

A. At Clover Creek Drive SW, the roadway is being widened by several feet at the crossing, 1' wide medians comprised of WSDOT-standard dual-faced traffic curb are being provided to deter motorists from evading the crossing gates. Curb and gutter is being provided

to deter motorists from colliding with the new crossing gates by providing a vertical barrier that would tend to guide vehicles away from the gates. The resulting lanes are 12' wide from face of median to face of curb. *See* Exhibit EBB01 (proposed condition at Clover Creek Drive SW). In Exhibit EBB01, the red circles indicate the location of new grade crossing warning equipment. The green shaded areas in the exhibit indicate the approximate extent of the widened roadway, while the yellow shaded areas indicate the location of the new medians.

Q. What specific changes to the roadway are proposed for the crossings at North Thorne Lane SW and at Berkeley Street SW and how will they improve safety at those crossings?

A. In the case of the crossings at both North Thorne Lane SW and Berkeley Street SW, the existing configurations have southbound right turn lanes which are approximately 8' wide; this width is narrower than the width (over mirrors) of a truck. It appears that there was originally only a single southbound lane, but that the channelization for the southbound lanes was altered at some point to include two lanes in an area which really only had space for a single lane. The green shading in Exhibits EBB02 and EBB03 illustrates the widening of the roadway pavement.

The proposed configuration widens the turn lanes while maintaining alignment of the through lanes at the ramp terminal intersections. Because intersections have no "through" striping or fog lines to guide motorists, it would be undesirable to have the lanes at the "far" side of the intersection narrower than the lanes at the "near" side for southbound traffic. Such a configuration might encourage southbound drivers to collide with the curb on the far side of an intersection if the lane appears to narrow "suddenly" on the far side of the intersection. Thus, the proposed southbound through lanes are 11' and 11.5' wide at North Thorne Lane SW and Berkeley Street SW, respectively. These new widths preserve the lanes' alignment with the southbound lanes at the freeway overpass, and minimize the "narrowing" of the lanes through the intersection (where there is no lane striping). The proposed southbound right turn

lanes (leading to SB Interstate 5) are 12' wide. These lane widths are consistent with AASHTO recommendations for urban arterials (10'-12' wide). *See* Exhibits EBB02 (North Thorne Lane – Proposed Condition) and Exhibit EBB03 (Berkeley Street SW – Proposed Condition).

At both North Thorne Lane SW and Berkeley Street SW, 1' wide medians, comprised of WSDOT-standard dual-faced traffic curb, are proposed north of the tracks. *See* yellow shading on Exhibits EBB02 and EBB03 for location of new medians. Like typical curbs found alongside many streets, these medians are intended to dissuade motorists from evading crossing gates by creating a vertical barrier that is difficult for cars to traverse. On the south side of these two crossings, in the middle of the roadway, a low curb is proposed, either mountable C-curb, or a product similar to "Qwik Kurb," which features a low mountable curb topped with flexible plastic guideposts, also intended to dissuade motorists from evading lowered crossing gates. *See* Exhibit EBB05. However, this configuration would be mountable for emergency vehicles.

Q. What specific changes to the roadway are proposed for the crossing at Barksdale Avenue SW and how will they improve safety at that crossing?

A. At Barksdale Avenue SW, a short median and flexible guideposts are proposed for the south side of the crossing (*see* yellow shading on Exhibit EBB04), with existing medians on the north side remaining. The existing sidewalk on the east side of the roadway is being modified slightly to accommodate geometric changes at the crossing. Other aspects of the roadway at this crossing have already been reconstructed with wider lanes, a median on the north side of the tracks, and crossing gates. *See* Exhibit EBB04 (Barksdale Avenue SW – Proposed Condition).

Q. What considerations have been made to address the large trucks that use these crossings?

A. Several measures have been taken to address large trucks at the North Thorne Lane SW and Berkeley Street SW intersections. Currently, large vehicles exiting Interstate 5 from the southbound off ramps at North Thorne Lane SW and Berkeley Street SW have a difficult time turning onto northbound Thorne and Berkeley because their rear axles tend to "off-track" to the unpaved areas on the inside of the turns. The proposed configuration will provide additional lane width to accommodate trailer off-tracking, and thus will reduce the chance for a large vehicle to become "stuck" while turning. During the meeting on July 19, 2007, the City of Lakewood advised that their design vehicle was a WB-50 truck (wheelbase of 50 feet with assumed overall length of approximately 55 feet); the proposed design increases the curb radii, thus moving the edge of pavement further from the roadway centerline, in order to accommodate the City's design vehicle. Larger trucks, such as WB-67 (wheelbase of 67 feet with an overall length of approximately 73.5 feet), should also be able to negotiate these turns, but with little room to spare. Vehicle turning movements were developed based on AutoTurn (TM) software, with stock settings for WB-50 and WB-67 vehicles. W-beam guardrail has been provided at both locations to protect the pedestrian curb ramps from encroaching vehicles. *See* green shading on Exhibits EBB01-EBB03.

Q. Will signage and pavement marking be implemented to improve safety at these crossings?

A. Signage has been provided to alert motorists of the upcoming grade crossing, as well as "stop here when lights flash" and "do not stop on tracks" signage, in accordance with the Manual on Uniform Traffic Control Devices (MUTCD). Pavement marking is proposed, also in accordance with the MUTCD, to replace worn or missing markings. In addition, pedestrian crosswalk markings are proposed for the intersections at the ramp terminals where, today, there are no such markings.

Q. Please explain the Railroad Crossing Warning Devices as they currently exist, and how the proposed modifications will improve safety.

A. The existing grade crossings have various combinations of warning devices. At Clover Creek Drive SW, the existing warning devices are passive—crossbucks only. At North Thorne Lane SW and Berkeley Street SW, there are currently only flashing lights and bells, with cantilever-mounted lights for northbound traffic. At Barksdale Avenue SW, there is currently a combination of bells, flashing lights, cantilevers for southbound traffic, and gates for all directions.

The existing electrical circuitry for the warning devices is based on fixed-length approach circuits which provide variable warning times. "Variable warning times" refers to the duration that the grade crossing warning devices are activated. At a crossing with variable warning times, the warning devices activate whenever a train reaches a specific point along the track, located a fixed distance from the crossing, regardless of the train's speed. This point is the end of an electrical circuit, formed in part by the railroad rails, which is used to detect the presence of a train.

When a train arrives at the outer limit of the electrical circuit, the warning devices will become active, and remain active until the train leaves the crossing. Since the electrical circuit that activates the warning devices is a fixed length, when a slower moving train enters the circuit, the warning devices will be active for a longer time than for a faster moving train (since the faster train would cover the same distance in less time). Some of the drawbacks to such a system are obvious. For example, in an area where freight trains move at half the speed of passenger trains, in order to provide the minimum required crossing warning times for the faster passenger trains, the warning devices will be activated for slower freight trains for approximately twice the minimum required time. This has the potential to create confusion for motorists, since drivers may become accustomed to evading the crossing gates based on the slower moving freight trains.

For example, for a passenger train operating at 79 mph, the warning devices might begin operating when the train is 2,500 feet away from the crossing, in order to provide 20 seconds of warning time at the crossing. A freight train moving at 40 mph—roughly half the speed of the passenger train—would activate the crossing when it passes the same location 2,500 feet away from the crossing, resulting in approximately 40 seconds of warning time. Over time, drivers who become accustomed to the longer warning times for some trains may exhibit reckless behavior.

An additional drawback to variable warning time devices is the limited options for traffic signal pre-emption. Since variable warning time devices can provide no information of a train's actual arrival time at a crossing, the pre-emption information is transmitted to the traffic signals as soon as the warning devices become active, regardless of the amount of time until a train reaches the crossing. This is known as "simultaneous pre-emption."

In contrast, the proposed configuration is known as "constant warning time," which uses electrical circuitry (sometimes called a "predictor") to calculate the speed and location of an approaching train. From the train's speed and location, the constant warning time circuitry can determine when the warning devices should be activated in order to provide consistent warning times, which tends to result in consistent driver expectations at the crossing. Thus, for a crossing equipped with constant warning time circuitry, the warning time for a freight train and for a passenger train would always be about 20 seconds.

In addition, information on train speed, train location, and the length of time until a train reaches a crossing also allows for a consistent traffic signal pre-emption time, which can be initiated prior to the activation of the crossing warning devices. This configuration allows extra time for the traffic signal changes which encourage motorists to clear the tracks.

The existing warning devices at North Thorne Lane SW, Berkeley Street SW, and Barksdale Avenue SW provide variable warning time. As mentioned, there are currently only passive warning devices at Clover Creek Drive SW. The proposed configuration will include

constant warning time equipment at each crossing, with active warning devices (including bells, flashing lights, and gates) at each crossing. North Thorne Lane SW and Berkeley Street SW will receive upgraded cantilevers. The new warning devices are shown in Exhibits EBB01-EBB04 in red circles.

The upgraded crossing circuitry has been designed in accordance with standard railroad practices, which are generally outlined in the AREMA signal manual. As recommended by the MUTCD, the railroad grade crossing warning devices are proposed to be interconnected with the adjacent traffic signals (for traffic signals within 200' of the crossing) in order to assist in clearing vehicles that might be queued on the tracks.[1] Each crossing will also receive an automated horn system (AHS), which relieves locomotive engineers of the responsibility of blowing the train horns, and replaces the train horn with a fixed, wayside horn, mounted on a mast adjacent to the crossing. The wayside horns focus the sound energy along the roadway, and reduce noise impacts for neighbors. To provide an audible warning to motorists approaching the crossing from all directions, the AHS will also be audible along the freeway off ramps.

Based on my experience in reviewing and coordinating the design of grade crossings, as well as on my experience working directly for the railroad, I believe that all of the proposed work will improve the safety conditions at the crossings by improving roadway geometry over current conditions, providing sidewalks for pedestrians, improving the crossing warning devices and the associated detection circuitry, and allowing for advanced pre-emption of traffic signals. The current configuration is deficient in each of these areas.

Q. Does this conclude your testimony?

A. Yes, it does.

[1] Please refer to the testimony of Cary P. Stewart for a more detailed discussion of the traffic signal pre-emption and phasing plan.

I declare under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct to the best of my knowledge.

DATED this 15 day of April 2010, at Bellevue, Washington.

EUGENE "BUZZ" BERGER