Columbia River Crossing
Health Impact Assessment

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Portland Health Impact Assessment Workgroup

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This report is the response of the Portland Health Impact Assessment Workgroup to the Columbia River Crossing Draft Environmental Impact Statement issued on May 2, 2008.

Background on the Portland Health Impact Assessment Workgroup

The Portland Health Impact Assessment Workgroup was convened in 2007 to understand the role of health impact assessment in estimating and evaluating the potential human health impact of social, economic, and environmental policies and programs being implemented in the greater Portland area. The Workgroup includes representatives from local non-profit agencies, health care systems, academia, and a variety of state and county government entities including Oregon Public Health Division and Multnomah County Health Department. Over the course of a year, the Workgroup met regularly to understand the methodology of health impact assessment and its value nation-wide in encouraging policy-makers to maximize positive and minimize negative public health outcomes of their policy or program choices. An explicit focus on social justice, equity and participation is a hallmark of HIA.

Health Impact Assessment

The Workgroup selected the Columbia River Crossing (CRC) Draft Environmental Impact Statement (DEIS) as the subject of its first health impact assessment (HIA). Both the magnitude and reach of the project and the need for additional information about health impacts made the CRC project an ideal candidate. Multnomah County Health Department took primary responsibility for reviewing pertinent scientific literature on the anticipated health effects of the CRC project and documenting the findings of its HIA. The analysis formed the basis of a letter submitted recently by the Health Department in response to the CRC DEIS during the public comment period. This letter can be viewed at http://mchealth.org/documents/CRC_%20DEIS_response.pdf. HIA Workgroup members provided feedback, process guidance, and health expertise to the analysts. The resulting report is a compilation of health evidence that can be used by HIA Workgroup partners, community members and other public health stakeholders to inform the CRC health effects dialogue in their own work.

The CRC project proposes four alternatives to the present I-5 bridge that spans the Columbia River and connects southwest Washington to Portland, Oregon. As representatives of agencies committed to improving the health and well-being of our residents, the HIA Workgroup has an interest in promoting those bridge and highway improvement features that enhance the health of our communities and avoid or mitigate negative health impacts. Consequently, we have examined the draft Environmental Impact Statement for this project through a public health lens to understand the scope and magnitude of these potential health effects.

The DEIS process has been crafted to meet federal standards outlined in the National Environmental Policy Act (NEPA) of 1969, which requires a DEIS to "promote efforts that will prevent or eliminate damage to the environment and biosphere, and stimulate the health and welfare of man." [1] To satisfy NEPA requirements, the CRC project has focused on meeting

minimum standards set by federal and state governments for air quality and noise. We believe CRC staff has an opportunity to not simply meet minimum standards, but to plan a project to maximize positive impacts on regional health. This will require project staff to go beyond the health scope of DEIS precedents, examine current scientific literature, and, in some instances, to set standards that are stricter than current federal and state requirements when they do not adequately safeguard the public's health.

It is our hope that after considering our remarks the Columbia River Crossing (CRC) staff, members of the public, and all decision-making entities will give public health effects significant weight in evaluating the relative merits of the bridge alternatives. We also hope that health impact will be used as an evaluation criterion in other transportation projects in our county. The primary goal of this work is to ensure that public health is a priority concern in the DEIS process.

This report is divided into two major sections. The first addresses potential health impacts of the proposed I-5 bridge alternatives. The second outlines our recommendations for improving the health impacts associated with the CRC project. Within each section, transportation, safety, air quality, noise and environmental justice issues are addressed.

1. Potential health impacts of proposed I-5 bridge alternatives

a) Transportation

i) Traffic volumes in 2030 and beyond are likely to affect human health through air quality, noise pollution, obesity, and unsafe conditions.

The population growth in the region and the demand for use of the I-5 bridge are likely to continue beyond 2030. It will only be a matter of time before an expanded highway bridge again reaches capacity and congested conditions occur. According to the DEIS the traffic volumes that the replacement bridge will accommodate are 26% higher during AM peak hours and 39% higher during the PM peak hours than present day conditions. If population growth in the region continues at a similar rate beyond 2030, we can expect 30,240 vehicles attempting to cross the bridge southbound during the AM peak, and almost 40,000 northbound during the PM peak by the year 2055. The motor vehicle congestion that the CRC project is designed to address will be alleviated only temporarily during the lifespan of the new bridge. With an increase in the volume of vehicles in the bridge area, congested conditions are likely to yield more severe health impacts from air pollution, noise, and motor vehicle collisions than the present day conditions.

Increasing incentives and capacity for single occupancy vehicle (SOV) use may contribute to the problem of obesity in the region. Public health research shows that the amount of time spent in cars has an inverse relationship with physical activity and a direct relationship with obesity. In one study, every extra 30 minutes of commuting time per day was associated with a 3% greater likelihood of obesity.[2] In another study, each additional hour spent in a car per day was associated with a 6% increase in the likelihood of obesity.[3]

ii) Bridge alternatives that encourage the use of mass transit or bicycles instead of cars will have a positive effect on health by increasing physical activity and reducing obesity.

Obesity and related conditions are a serious problem in the United States and have reached epidemic proportions. In the Portland-Vancouver Metropolitan Area, 24% of residents are obese, and an additional 37% are overweight. Physical activity can contribute to a decreased risk of obesity, heart disease, high blood pressure, diabetes, and some types of cancer.[4]

A growing body of research shows that certain features in the built environment can help people attain the daily minimum requirements for physical activity by encouraging participation in active modes of transportation including cycling, walking, and using mass transit.[5-8] The Centers for Disease Control's (CDC) Guide to Community Preventive Services states that improving access to non-motor vehicle transportation can increase the number of people who are physically active 3 times a week by 25%.[4] Walking to public transit also helps people meet physical activity recommendations.[8] In the US walking and bicycling levels fell 67% between 1960 and 2000, while obesity levels increased 241%.[9] States with the highest levels of cycling and walking have a greater percentage of the population meeting the recommended 30-plus minutes a day of physical activity.

The Portland Health Impact Workgroup commends CRC staff for including options that expand the transportation alternatives available to commuters traveling between Washington and Oregon to include light rail or bus rapid transit. We are also pleased to note the inclusion of options for safer bike and pedestrian facilities that will also encourage physical activity and provide health benefits.

iii) The inclusion of increased options for public transportation will improve the mobility of vulnerable populations.

Public transportation is a preferable alternative to SOV trips. In addition to alleviating traffic congestion and counteracting the problem of overweight and obesity, public transportation plays a significant role in the lives of many vulnerable groups including the elderly, people with disabilities, and members of our community who cannot afford or do not have access to a car. The provision of accessible, safe public transportation options is necessary to provide equitable access to regional resources for all segments of the population. From the perspective of providing greater access to an array of public transportation options for vulnerable populations all of the "build" alternatives of the CRC project are laudable as they all expand mass transit options.

iv) The introduction of a toll on the I-5 bridge together with quality public transportation will have a beneficial impact on health to the extent that a toll would encourage travelers to shift from using SOVs to public transportation.

The health benefits of using public transportation including increasing physical activity and reducing obesity have been discussed above. The institution of a toll or any commuter trip

reduction policy that creates an incentive for travelers to use public transportation options rather than motor vehicles will result in better health for our communities.

v) Light Rail Transit (LRT) is substantially more beneficial to health than Bus Rapid Transit (BRT).

We strongly support the addition of LRT over BRT. LRT has the potential to be more convenient and accessible, and has greater overall health benefits. LRT produces less air pollution and noise than BRT, and is less subject to congestion problems. In addition, the benefits that use of public transportation may have on overall physical activity rates could be maximized due to the speed and higher capacity of LRT (7,250 daily users in the Replacement option as compared with 6,100 on BRT), which would likely increase attractiveness and encourage higher rates of use. The DEIS also indicates that safety concerns with LRT have been successfully mitigated in Portland with simple improvements (traffic control, signage, etc.).

b) Safety

i) Bridge alternatives that provide opportunities for more cars to travel faster may increase the number and severity of collisions.

Research has established that the severity of collisions increases with speed and volume, both of which will increase with the "build" alternatives. The probability of an injury versus a serious injury versus a fatality can be calculated based on the speed of travel. Reduction in speeds of 2 to 9 mph has reduced the number of fatalities between 6 and 34%, and in a crash with an impact speed of 50 mph, the likelihood of death is 20 times greater than with an impact speed of 20 mph.[10]

Increases in speed also increase the likelihood of collisions. A meta-analysis found a 2% decrease in the number of crashes for every 1km/h (0.6 mph) reduction in average speed at levels above 50km/h (31 mph), and that the risk of crash at least doubles for each 5km/h (3 mph) increase over 60 km/h (37 mph).[10] Interstate highways, with faster speeds, comprise 1% of all road nationally but contribute a disproportionate 14% of all road fatalities.[11]

The DEIS analysis of safety considers only the frequency of collisions. It shows that during the study period (2002-2006), the crash rates in the project area were twice the rate of average collisions on other urban interstate highways. While the frequency of crashes is expected to decline with the proposed bridge alternatives, the severity of the crashes may increase given the higher speeds of travel projected.

Motor vehicle accidents are a serious public health concern as they comprise the leading cause of death in people ages 1-44 in the United States.[12] In 2003, there were 42,643 fatalities and almost 3 million injuries on roads in the United States,[13] and the number has increased in recent years. There are 500,000 hospitalizations and four million emergency department visits each year due to motor vehicle crashes. The economic burden of motor vehicle-related injuries and fatalities costs the United States over $150 billion each year.[12] The National Traffic Safety Administration (NHTSA) calculates the economic impact of motor vehicle crashes in 2000 at

$230.6 billion. This includes $61 billion for loss of productivity, $59 billion for property damage, $32.6 billion for medical expenses, and $25.6 billion travel delay.[14]

ii) Wider bicycle and pedestrian paths separated from the freeway, adequate signage and lighting, and increased connectivity of routes in the project area will decrease the number of crashes involving cyclists and pedestrians.

Bikes and pedestrians suffer a disproportionate amount of injury and fatality due to crashes with motor vehicles. This is evidenced in the project area, where 100% of the fatalities in the study period were to cyclists and pedestrians. Nationally, 12.6% of traffic fatalities were pedestrians.[15] Above 35 mph, most crashes resulting in pedestrian injury are fatal.[16] Pedestrians involved in a motor vehicle crash have an 80% risk of being killed at 31 mph, and a 10% risk at 19 mph.[10]

Roadway width and design affect the risk of injury to pedestrians.[15] Given the potentially disastrous consequences of crashes with motorists, the Portland Health Impact Workgroup supports the widening of bicycle and pedestrian routes across all of the bridge alternatives to a minimum of 20' per route as recommended by the Bicycle Transportation Alliance. We also support physical separation from motorists on the road and specific plans for better signage, lighting and access to the bridge from local streets.

c) Air quality

i) Air pollution has the potential to affect a large proportion of the population in the project area and should be a major criterion in the final selection of the bridge.

Approximately 77% of air pollution in Multnomah County comes from mobile sources.[17] In terms of illness and premature death, the toll of increased exposure to traffic-related air toxics is of concern for residents of the Portland-Vancouver area, for the families of those who are affected, and for the economy of the area.

Based on the Federal Highway Administration (FHWA) guidance the DEIS states that there will be a reduction of 30 to 90% in emissions associated with gas or diesel engines in the study area due to cleaner fuels and new combustion and emission control technology by 2030. However, a recent report by the Health Effects Institute (HEI) cautions that the alternative fuels and emissions control technology being adopted may themselves contribute to increases in other mobile source air toxics (MSATs) and particulate matter.[18] For example, the report states that it is likely that acetaldehyde concentrations will rise as a result of increased use of ethanol. Another example is provided by the increase in ambient levels of formaldehyde associated with an increase in the number of vehicles fuelled by compressed natural gas.

While new fuels and emission control technologies will greatly reduce particulate matter in newer engines, older diesel vehicles will continue to pose a health risk until they are phased out. The HEI report urges readers to evaluate the exhaust from the newer engines "in particular to ensure that possible new emission species will not cause new adverse effects on human health".[18]

Given that any new bridge alternative will be designed to last several decades, we urge the CRC staff to consider the potential environmental and health effects of alternative fuels beyond 2030. This particularly supports alternatives that maximize the use of LRT.

ii) Significant improvements in health are possible if air pollution levels are reduced well below the National Ambient Air Quality Standards. Project alternatives that lower air toxics below the federal standards should be given greater consideration.

The DEIS projects that none of the bridge alternatives will result in a violation of National Ambient Air Quality Standards and that air toxics that meet the maximum levels allowed by state and federal law (NAAQS) need not be examined further. However, peer reviewed scientific articles indicate that even a small reduction in certain air toxic levels *below* the federally set maximum allowable levels results in a significant decrease in premature mortality and illness associated with air pollution. Even at levels below federal standards, higher levels of air pollution lead to increasingly adverse health risks. Specifically, a reduction in the NAAQS for particulate matter (PM 2.5) from 15 to14 $\mu g/m^3$ is estimated to result in 1,900 fewer premature deaths, 3,700 fewer non-fatal heart attacks, and 2,000 fewer emergency room visits for asthma per year.[19] We ask CRC staff to examine such evidence and use standards for emissions that are more stringent than federal or state requirements in determining which of the proposed alternatives has the least harmful impact on human health. In addition, The DEIS states that federal maximum acceptable levels have not been set for MSATs. However, the state of Oregon Department of Environmental Quality has Ambient Benchmark Concentrations for MSATs. These can be used as a guideline in the absence of federal standards.

iii) The cumulative effect of criteria pollutant and mobile source air toxics has the potential to cause health problems for community members.

Clearly, residents of urban areas are exposed to multiple air pollutants simultaneously rather than a single air pollutant. Thus, health risks are a result of exposure to the total air toxics level in any given area. Further, the bridge influence area in Portland includes industrial and airport emissions in addition to pollution from mobile sources. Bridge alternatives that raise cumulative ambient levels of air toxics will increase the risks posed to human health. Considering the impacts of the CRC project in isolation does not take into account the contribution the project makes to the overall levels of air toxics already present. Conversely, options which minimize air toxics will have positive impacts on human health.

d) Noise

i) Harmful noise levels from traffic are associated with increases in chronic diseases and cognitive functioning. Bridge options and mitigation strategies that decrease the number of residents exposed to transportation noise as well as the level of noise will avoid these adverse health outcomes.

Thirty million people in the United States are exposed to harmful noise levels daily.[20] Of particular concern is the finding that increases in transportation noise are associated with increases in hypertension and cardiovascular disease.[21-24] Noise is of particular concern where

children are present, as it interferes with children's concentration, cognitive development, learning, and reading comprehension.[25-28] Other common complaints from noise include sleep disturbances and annoyance.[29-32]

The FHWA noise abatement criteria require mitigation for highway project noise impacts that exceed 67 dBA in sensitive areas outdoors (residences, parks, and schools), and 72 dBA for developed areas, such as commercial centers. According to the DEIS there are 234 locations in the CRC study area that exceed acceptable noise thresholds. With the "no build" alternative, this increases to 268. With the "build" alternatives, this increases to 329-334 without mitigation. With the inclusion of sound walls and residential improvements, the "build" alternatives potentially reduce the unacceptable noise impacts to 52 locations.

The health risks of noise occur at lower levels than the FHWA thresholds. While the FHWA recommends mitigation for residences, schools and parks above 67 dBA, the thresholds at which health effects occur are actually much lower. In a review of the state of the existing evidence of noise impacts on health around the world, the World Health Organization (WHO)[22,26] estimated that sleep disturbances occur over 30dB, annoyance is associated with 50dB, heart disease and hypertension are associated with noise in the 65-70 dB range, and hearing impairment over 75 dB. The WHO recommended outdoor acceptable noise level for health is 55 dB. This is substantially lower than the FHWA guidelines used in this project (67 dBA). Using the lower noise threshold would result in identification of a greater number of areas at unacceptable noise levels that increase the risk of adverse health impacts on area residents.

Providing alternatives to motor vehicle use, such as public transportation or safe and accessible bike and pedestrian facilities have been examined in depth in the DEIS and provide an alternative to driving for a significant number of people. Tolling would also reduce the incentives to drive and thus reduce motor vehicle volumes. All alternatives that decrease motor vehicles on the highway and local streets could reduce noise and avoid negative health impacts.

e) Environmental justice

The CRC project poses the potential for disproportionate adverse health impacts on susceptible populations as a result of all of the concerns stated above. The CRC project area includes neighborhoods with high proportions of populations of color, low income residents, and populations with disabilities. Therefore, it is possible that the health impacts due to air pollution and excessive noise will be felt most acutely by these susceptible populations.

Previous regional studies have shown that the air and noise pollution in these neighborhoods are directly attributable to traffic on I-5.[33-34] Although the CRC project has conducted extensive public outreach with stakeholders, and has engaged a Community and Environmental Justice advisory group and tribal liaisons to assist with the analysis, some concerns remain.

i) Air pollution

In the Portland Neighborhood Survey, 32% of North and Northeast Portland residents reported that the air quality in their neighborhoods was sometimes or always bad.[35] The Portland Air

Toxics Assessment (PATA) report issued in 2006 suggests that the health effects of certain criteria air pollutants and MSATs disproportionately affect communities in the I-5 corridor in North and Northeast Portland.[33] These areas include higher percentages of low-income residents and populations of color. The pattern of distribution clearly showed that the higher concentrations of these toxics were attributable to pollution from I-5. Although levels of certain air toxics from motor vehicles may decline by 30 to 90% in the coming years, concerns about the negative health impact of other air pollutants are warranted as outlined in the air quality section above (part c). These air pollutants are likely to have the same disproportionate impact on communities in North and Northeast Portland that is described in PATA. The subarea analysis in the DEIS was not sensitive enough to uncover the neighborhood variations in air toxics in the project area found in the PATA report. We, therefore, request that you consider the PATA report in your analyses.

ii) Noise

The larger 23-mile geographic area examined in the Transportation section of the DEIS includes several Environmental Justice populations that currently bear the unequal impact of noise from the I-5 corridor, but are not included in the noise analysis. In the North Portland Noise Study, the City of Portland examined noise impacts in 21 neighborhoods in North and Northeast Portland.[36] These neighborhoods currently experience excess noise from I-5, as well as from the Portland International Raceway and railways. Thus, the cumulative effects of environmental noise in these neighborhoods are large. Although the CRC project is not responsible for mitigating noise impacts from other sources, CRC staff should consider the portion of the overall noise levels that is attributable to the new bridge and how this contributes to human health.

In addition to noise measurements, a survey was conducted in North and Northeast Portland neighborhoods in 2006. The four Portland neighborhoods in the CRC project area that were included in the survey (Kenton, Bridgeton, Hayden Island, and East Columbia) reported that they were more affected by noise than residents of other study neighborhoods. Overall, 45% of residents said they were affected by noise, and 37% said they were most aware of it when they were outdoors. Further, 75% of residents said that they spend at least a couple of days a week outdoors in their yard.[34]

The locations that do not meet criteria for mitigation of noise impacts in the "build" alternatives include 36 residences, apartment buildings and a hotel in downtown Vancouver, and a hotel in Portland that all house low income and minority residents.

2. Recommendations for improving the health impacts of the Columbia River Crossing project

In making our recommendations to the CRC project staff and the decision-making agencies, the goal of the Portland Health Impact Workgroup is to encourage the development of bridge characteristics that improve the health of our residents while simultaneously minimizing the potential for harmful health consequences. Based on our assessment of the health impacts of the

proposed bridge alternatives The Workgroup makes the following recommendations to the CRC project staff and decision-making agencies:

Support the following project components:

- Maximize use of Light Rail Transit
- Transit alignments that serve low income and minority populations without severing community cohesion
- Roadway and interchange improvements that increase safety
- Safe and accessible bike and pedestrian facilities
- Tolling to discourage motor vehicle use, particularly single occupancy motor vehicle use
- Alternatives that do not increase SOV capacity on the roadway, especially during peak periods

Conduct additional analysis in the following areas:

f) Transportation

i) Use population and freight traffic projections well beyond 2030 in forecasting the number of trips across the I-5 bridge, duration of travel, length of peak congestion periods, etc.

Conducting such analysis is likely to reveal significant information on how long it will be before the new bridge no longer meets the CRC goals of alleviating traffic congestion and safety problems and facilitating the efficient movement of freight along I-5. It will also allow the selection of a locally preferred alternative with a clearer understanding of the long term needs of our community.

g) Safety

i) Include analysis of predicted collision rates and the impact of increased speed and volume on collision severity and associated injuries.

ii) *Ensure that routes through North Portland and downtown Vancouver on local streets are well connected, accessible and safe.*

Adequate accessibility to the bridge by bike or foot involves safe connections to the bridge from local neighborhoods in Portland and Vancouver. The Bike and Pedestrian Advisory Committee has identified problem areas for the connectivity of routes.

iii) Widen bridge bicycle and pedestrian paths beyond the dimensions presented in the proposed alternatives and incorporate better separation of these from motorized vehicles and High Capacity Transit.

h) Air Quality

i) Include analysis of possible unanticipated increase of air toxics that have not been considered in the air quality analysis of the DEIS.

We urge the CRC staff to follow the recommendations of the Health Effects Institute by considering the effects on air quality and on human health of alternative fuels and emission control technologies that are likely to be implemented in the coming decades. We encourage CRC staff to take a proactive approach in analyzing the impacts on air quality instead of focusing solely on air toxics that are of current concern.

ii) Include analysis of the health impacts of cumulative exposure to air toxics emitted by vehicles.

We strongly recommend a more complete analysis of the project's impact on human health which requires a higher standard than merely an examination of whether individual federal and state air quality standards will be met. This is particularly important in the areas identified to currently experience unsafe levels of air pollution.

i) Noise

i) Analyze the impacts of traffic noise of the proposed bridge alternatives using a lower threshold for noise levels than the current federal standard.

Health consequences of noise including heart disease and hypertension occur at noise levels that are lower than the federal threshold. We recommend an analysis of the effects of noise using the WHO recommended outdoor noise threshold of 55 dBA.

ii) Re-examine mitigation measures for 35 locations that will not meet noise standards with the build alternatives as a way of protecting the health of residents in these areas.

j) Environmental Justice

i) *Analyze the effects of noise, air quality, and safety in the area of impact used for the transportation analysis.*

The populations in the 23-mile project area used in the transportation analysis will experience air quality and noise impacts from both the I-5 and the increased vehicles on local streets accessing the bridge. The health and safety of bikes and pedestrians on local streets will also be impacted by this traffic. The air quality, noise, and safety analyses should use this expanded area of analysis. Otherwise, environmental justice populations are not consistently considered throughout the DEIS.

k) Establishing health-based standards for the CRC project

l) In evaluating the merits of proposed bridge alternatives set standards (e.g. for acceptable air toxic and noise levels) that are more stringent than federal or state standards where there is scientific evidence that this is necessary to protect the health of the public.

As we have pointed out in the air quality and noise sections some federal standards do not protect human health adequately. We urge the CRC staff to examine available peer-reviewed literature to determine whether stricter standards are necessary to prevent harmful health impacts in our community rather than simply following NEPA requirements.

In closing, the Health Impact Assessment Workgroup recognizes that the CRC project staff is facing a considerable challenge in balancing environmental, economic, and health and safety considerations in designing an alternative to the current I-5 bridge. Once again, we commend the inclusion in the proposed bridge alternatives of those characteristics that support the health of our communities. The protection of public health is at the heart of the law that requires this environmental assessment and we encourage you to incorporate our suggestions as the project moves forward.

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