

STATE ENVIRONMENTAL POLICY ACT (SEPA) ENVIRONMENTAL CHECKLIST

A. BACKGROUND

1. Name of the proposed project:

Ballard Bridge Seismic Retrofit

2. Name of Applicant:

Seattle Department of Transportation (SDOT)

3. Address and telephone number of applicant and contact person:

Connie Zimmerman
Seattle Department of Transportation
PO Box 34996
Seattle, WA 98124-4996
(206) 684-5184

4. Date checklist prepared:

March 25, 2011

5. Agency requesting checklist:

SDOT

6. Proposed timing or schedule (including phasing, if applicable):

Project construction is anticipated to begin during the first quarter of 2012 and last up to 15 months. All in-water work will take place within the October 1 and April 15 fish window for work within the Lake Washington Ship Canal. Out-of-water construction activities will occur along the length of the bridge throughout the entire construction period.

7. Do you have plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

There are no plans for future additions, expansions, or further activity related to or connected with this project.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal:

Several preliminary geotechnical studies were prepared to help inform the extent and design of the seismic retrofits necessary for the Ballard Bridge. These are on file with SDOT. In addition SDOT has taken samples to characterize upland soils and underwater sediment for proper disposal and is in the process of completing a report on its findings.

A Joint Aquatic Resources Permit Application (JARPA) has been prepared for submittal to regulatory agencies to obtain permission to conduct in-water work on the bridge columns. As part of the JARPA

application an analysis of potential impacts to threatened and endangered fish species was prepared using the *Seattle Biological Evaluation* (City of Seattle). Please see question B.5 for more detail.

9. Do you know whether applications are pending for governmental approvals or other proposals directly affecting the property covered by your proposal? If yes, explain.

There are no known applications pending for government approvals or other proposals directly affecting the property covered by the proposal.

10. List of governmental approvals or permits that will be needed for the proposal:

- Section 9 Permit Amendment – U.S. Coast Guard (USCG)
- Section 401 Water Quality Certification – Washington Department of Ecology (Ecology)
- Hydraulic Project Approval – Washington Department of Fish and Wildlife (WDFW)
- Shoreline Substantial Development Permit Exemption – Seattle Department of Planning and Development (DPD)
- Noise Variance, DPD

11. Brief, complete description of the proposal, including the proposed uses and the size of the project and site:

The project will add various structural strengthening elements to the Ballard Bridge in order to prevent collapse of the structure during an upper-level seismic event. The project will strengthen transverse diaphragms, add blocking between adjacent floor beams, replace knee bracing with plate girder diaphragms, install steel jackets around bridge columns, add seat extenders, and notch the backwall. In addition to the seismic retrofits the project will replace the street lights and poles along the bridge deck.

These elements will be installed with the use of mechanized equipment such as cranes operating on land or from work barges, as well as by hand from work platforms suspended below the bridge. Excavation will be necessary to install steel column jackets around bridge columns on land and in water, described below. All construction material and debris will be contained so as not to enter the Lake Washington Ship Canal or shoreline habitat areas below the bridge.

In-water work will include the addition of reinforcements around the base of the 22 bridge columns south of the bascule. The top of each column plinth will be retrofitted with a rod encasement collar and a steel column jacket will be added to the base of each column above the encasement collar. Voids between the column jackets and columns will be filled with grout. In order to perform this work, the contractor will need to dewater the work areas around each column being retrofitted.

In order to dewater the work area the contractor may choose to install cofferdams around each of the 11 bents (or pairs of columns) that support the south bridge approach. If cofferdams are used, the preferred construction method would be to vibrate in interlocking steel sheet pile sections to form a dam around each bent. If needed, foam backer rod or a water-safe hydrophilic polyurethane seal would be added at joints to minimize water inflow into work areas. The water level inside each cofferdam would be lowered and sediment would be removed around each bridge column to pour a concrete seal between the base of each column plinth and the inside wall of the cofferdam.

Construction staging, access, and loading activities will occur on shore, within right-of-way and temporary easement locations adjacent to the bridge. Equipment and materials will be mobilized from floating barges or from upland access.

12. Location of the proposal, including street address, if any, and section, township, and range; legal description; site plan; vicinity map; and topographical map, if reasonably available:

The Ballard Bridge supports 15th Ave NW between W Nickerson St and NW 45th St in Seattle, Washington. Construction activities will occur along the length of the bridge and directly within, over, and adjacent to the Salmon Bay Waterway segment of the Lake Washington Ship Canal. The project is located in Section 13, Township 25 N, Range 3 E (see [Figure 1 for a Vicinity Map](#)).

B. ENVIRONMENTAL ELEMENTS

1. Earth

- a. General description of the site (underline): Flat, rolling, hilly, steep slopes, mountainous, other...**

The site covers the Ballard Bridge and the Lake Washington Ship Canal and is generally flat.

- b. What is the steepest slope on the site (approximate percent slope)?**

There is a small, six- to eight-foot-high bank beneath the south approach south of the Burlington Northern Santa Fe (BNSF) railroad tracks with a slope of approximately 25 percent.

- c. What general types of soils are found on the site (for example clay, sand, gravel, peat, muck)? Specify the classification of agricultural soils and note any prime farmland.**

The subsurface soils found on the site are characterized by artificial fill underlain by tideflat and glacial deposits. The depth of the fill ranges from 15 feet at the southern approach to between 5 and 15 feet at the northern approach. The fill is underlain by a thick sequence of soft lake clay and peat deposits on the south end of the bridge, which overlies 5 to 55 feet of recessional outwash and lake deposits consisting of medium to very dense sandy silt, gravelly sand, very soft to medium stiff silty clay, and silty fine sand.

These soils are further underlain by glacially overridden deposits, which vary along the length of the bridge. The overridden soils encountered under the southern one-third of the bridge consist of non-glacial fluvial deposits of very dense silty sand to gravelly silty sand to fine sandy silt. The soils beneath the middle one-third of the bridge consist of hard clay or clayey sand overlain and underlain by granular deposits. These deposits also exist under the northern one-third of the bridge but are overlain by layers of glacial till consisting of very dense gravelly silty sand and advance outwash consisting of very dense slightly silty sand.

- d. Are there any surface indications or a history of unstable soils in the immediate vicinity? If so, describe.**

The project site is within an Environmentally Critical Area (ECA) for liquefaction. However, there are no surface indications or history of unstable soils in the immediate vicinity.

- e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate the source of the fill.**

The project includes potential excavation and filling both on land and within the Ship Canal. On land, there will be approximately 555 cubic yards (CY) of excavation over 3,900 square feet of area to add steel jackets to the bridge columns of one bent beneath the north bridge approach and two bents beneath the south approach. Any soil removed will be replaced with native fill or gravel borrow.

Within the Ship Canal, there may be additional excavation and filling around the support columns beneath the south approach—please see question B.3.a.3 for quantities and more detail about possible in-water excavations.

- f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.**

It is possible that erosion of exposed soils could occur during excavation around bridge columns to install steel column jackets. However, the excavations will take place beneath the bridge deck, which will provide some protection from storm water.

- g. About what percent of the site will be covered with impervious surfaces after project construction (for example buildings or asphalt)?**

The project will add structural improvements to existing bridge components and will not change the amount of impervious surface on the site.

- h. Describe the proposed measures to reduce or control erosion, or other impacts to the earth, if any.**

The project will follow City of Seattle *Standard Specifications for Road, Bridge, and Municipal Construction*, as well as best management practices (BMPs), to prevent or reduce erosion and pollution of water caused by construction activities. The specifications require the contractor to develop a Construction Stormwater and Erosion Control Plan (CSECP) and a Tree, Vegetation, and Soil Protection Plan (TVSPP) to protect soil, prevent erosion, and to control sediment transport from the project site.

2. Air

- a. What types of emissions to the air would result from the proposal (e.g. dust, automobile, odors, industrial, wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities, if known.**

During project construction, air emissions may be generated from soil disturbing activities, operation of heavy-duty equipment, traffic delays, and preparation of metal surfaces. The total emissions and the timing of the emissions from these sources will vary depending on the phasing of the project and construction methods. Typical sources of emissions during construction of transportation projects such as this include:

- Fugitive dust generated during excavation, grading, sanding, and other construction activities;

- Engine exhaust from construction vehicles, worker vehicles, and construction equipment; and
- Increased motor vehicle emissions associated with traffic congestion during construction.

The project is estimated to result in an increase of approximately 482 metric tons of carbon dioxide equivalent (MTCO_{2e}), which accounts for fuel use by workers and equipment and the production of the materials used in construction. Please see the Greenhouse Gas Emissions Worksheet (**Figure 2**) for an explanation of how the MTCO_{2e} was calculated.

The project addresses modifications to the structural components of the bridge and will not increase motor vehicle capacity or change traffic patterns. Therefore it is not expected to result in a permanent increase of emissions to air, including greenhouse gas.

b. Are there any off-site sources of emissions or odors that may affect your proposal? If so, generally describe.

There are no off-site sources of emissions or odor that would affect the proposed project.

c. Describe proposed measures to reduce or control emissions or other impacts to air, if any.

During construction, impacts to air quality will be reduced and controlled through implementation of *City of Seattle Standard Specifications for Road, Bridge and Municipal Construction*. The City's specifications require that the contractor maintain air quality to comply with the National Emission Standards for Hazardous Air Pollutants. The following is a list of actions that may be used to reduce and control fugitive dust and vehicle emissions:

- Reduce exhaust emissions by minimizing vehicle and equipment idling;
- Promptly clean up spills of transported material on public roads;
- Schedule work to avoid peak traffic times whenever possible;
- Cover dirt, gravel, and debris piles as needed to reduce dust and wind-blown debris; and
- Install and work within containment structures to prevent construction dust and debris from being emitted to the atmosphere.

3. Water

a. Surface:

1. Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, and wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

The project will take place within and over the Salmon Bay Waterway section of the Lake Washington Ship Canal, which is a manmade watercourse that connects Puget Sound with Lake Union and Lake Washington.

- 2. Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.**

Yes, the project will require work over, in, and adjacent to the Salmon Bay Waterway as described in question A.11 above.

- 3. Estimate the amount of fill and dredge material that could be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill materials.**

As described above, the project will reinforce the foundation plinths of the in-water support columns beneath the south approach, which may require construction of a cofferdam around each bridge bent, or pair of columns. If used, each cofferdam would measure approximately 32 feet x 56 feet (some are estimated to be smaller) for a total of approximately 19,300 square feet for all 11 cofferdams.

As a result, the project may excavate a maximum total of approximately 4,860 cubic yards (CY) of sediment from within the cofferdams. A maximum total of approximately 4,100 CY of concrete seal would be added between the cofferdam walls and the bases of the columns to minimize water infiltration between the cofferdam and the floor of the excavation. Last, a maximum of approximately 760 CY of uncontaminated native material or new earth fill would be used to fill in around the retrofitted columns to restore the bottom of the Ship Canal to its original contours. All fill materials would come from approved commercial sources.

Regardless of whether cofferdams are used, the column retrofits—concrete rod encasement collars and steel column jackets—will add approximately another 65 CY of material to the Ship Canal.

- 4. Will the proposal require surface water withdrawals or diversion? Give general description, purpose, and approximate quantities, if known.**

Depending upon the construction method, the project may withdraw up to approximately 10,900 CY of water from within cofferdams to access the bridge column footings and install the column retrofits as described above. While most of this water may be pumped directly back into the Ship Canal, some water may need to be disposed off-site as dewatering activities begin to disturb the underlying sediment.

- 5. Does the proposal lie within a 100-year flood plain? If so, note location on the site plan.**

Although some project activities will take place in and adjacent to water, the Salmon Bay Waterway is not considered to be within the 100-year flood plain as its water level is controlled in part through the Hiram M. Chittenden Locks.

- 6. Does the proposal involve discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.**

The project will not involve any discharges of waste materials to surface waters.

b. Ground

- 1. Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.**

The project will not withdraw ground water or discharge water to ground water. There may be some limited dewatering during construction around upland bridge columns if excavations encounter groundwater.

- 2. Describe waste material that will be discharged into the ground from septic tanks or other sources, if any. Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) is expected to serve.**

Not applicable.

c. Water Runoff (including storm water)

- 1. Describe the source of runoff (including storm water) and method of collection and disposal, if any (including quantities if known). Where will this water flow? Will this water flow into other waters? If so, describe.**

The primary source of runoff at the project site is storm water, which is discharged to the Ship Canal directly from the bridge deck. The project will not alter existing drainage patterns or affect the quality or quantity of runoff from the bridge.

- 2. Could waste materials enter ground or surface waters? If so, generally describe.**

There is a potential for waste material to enter surface waters during work within or directly over the Ship Canal. Construction materials and debris could spill or fall into the Ship Canal while structural retrofits are being added beneath the bridge or during the in-water retrofitting of support columns. However, the project will employ protective measures to ensure containment of all construction material and debris, as described in question B.3.d below.

d. Describe proposed measures to reduce or control surface, ground, and runoff water impacts, if any.

The project will follow City of Seattle *Standard Specifications for Road, Bridge, and Municipal Construction*, as well as best management practices (BMPs), to prevent conveyance of pollutants and sediments into surface waters and drainage systems. The specifications require the contractor to develop a CSECP to prevent erosion and to control sediment transport from the project site and a TVSPP to protect existing vegetation and soil, a Spill Plan (SP) that details the contractor's response procedures in the event of any material spills, and a Temporary Discharge Plan (TDP) for management of groundwater and stormwater that may be encountered during construction.

In addition, the contractor will be required to comply with the conditions of the Shoreline Substantial Development Permit Exemption from DPD, the Hydraulic Project Approval from WDFW, the Water Quality Certification from Ecology, and the Section 9 Permit Amendment from the USCG. These conditions will include specific measures the contractor must take to ensure the

protection of water quality and habitat, including, but not limited to, prevention of any construction material or debris from entering the Ship Canal or impacting any shoreline habitat areas.

4. Plants

a. Types of vegetation found on-site:

Deciduous trees: yes
Evergreen trees: no
Shrubs: yes
Grass: yes
Pasture: no
Wet Soil Plants: no
Water Plants: yes

b. What kind and amount of vegetation will be removed or altered?

The project will remove milfoil from around some of the in-water bridge columns. The area of milfoil removal will be restricted to those bridge columns being retrofitted and any areas of excavation within cofferdams, as applicable. However, milfoil is considered an invasive species and removal of the plant will not adversely impact the aquatic environment.

c. List threatened or endangered species or critical habitat known to be on or near the site.

There are no threatened or endangered plant species known to be on or near the site.

d. Describe proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on-site.

The project will follow BMPs for the removal of milfoil as outlined by WDFW and the King County Noxious Weed Control Program, which may include, but not be limited to, the following:

- Detached plants and plant fragments shall be disposed of at an upland site so as not to reenter state waters.
- Every effort shall be made to avoid the spread of plant fragments through equipment contamination. Persons or firms using any equipment to remove or control aquatic plants shall thoroughly remove and properly dispose of all viable residual plants and viable plant parts from the equipment prior to the equipment's use in a body of water.

5. Animals

a. Underline any birds and animals which have been observed on or near the site or are known to be on or near the site:

Fish: bull trout (*Salvelinus confluentus*); Puget Sound/ESU Chinook salmon (*Oncorhynchus tshawytscha*); Puget Sound steelhead (*Oncorhynchus mykiss*); Coho salmon (*Oncorhynchus kisutch*); sockeye salmon (*Oncorhynchus nerka*); and coastal resident/searun cutthroat (*Oncorhynchus clarki clarki*)

Amphibians:

Reptiles:

Birds: song birds, Peregrine falcons

Mammals: squirrels, other small urban animals

b. List any threatened or endangered species or critical habitat near the site.

The threatened or endangered species listed under the federal Endangered Species Act that are present near the site include coastal bull trout, Puget Sound/ESU Chinook salmon, and Puget Sound steelhead. The Ship Canal also contains designated critical habitat for Chinook and bull trout. Coho salmon is listed as a “federal species of concern” that could also be present in the project area.

c. Is the site part of a migratory route? If so, explain.

Project construction activities will take place within, over, and adjacent to the Lake Washington Ship Canal, which is a migratory corridor for several species of anadromous fish, including threatened and endangered species, that migrate between Puget Sound and the freshwater streams that feed Lake Washington.

The Puget Sound area is located within the Pacific Flyway, which is a flight corridor for migrating waterfowl and other avian fauna. The Pacific Flyway extends south from Alaska to Mexico and South America. However, the project will not disturb any vegetation such as shrubs or trees that would provide habitat for migratory birds and will therefore not impact any migratory bird species.

d. Proposed measures to preserve or enhance wildlife, if any.

As described above, the contractor will be required to develop and implement a CSECP plan to prevent sediment and stormwater runoff from entering the Ship Canal. In addition, project construction activities will follow all permit conditions stipulated by the USCG, Ecology, and WDFW and the shoreline permit exemption conditions from DPD. These conditions will include specific measures the contractor must take to ensure the protection of water quality and habitat, including, but not limited to, prevention of any construction material or debris from entering the Ship Canal or impacting any shoreline habitat areas.

As part of the USCG Permit Amendment, the project will follow several conservation measures to minimize the impacts of construction to threatened and endangered fish species. These conservation measures follow the recommendations for work area delineation and startup, in-water work isolation, and bridge foundation and footing repair as outlined in the *Seattle Biological Evaluation* (City of Seattle).

All in-water work will take place during the October 1 to April 15 fish window for work within the Ship Canal, when Chinook and bull trout are least likely to migrate through the corridor. If cofferdams are utilized, the contractor will be required to take measures to protect water quality during installation and removal, avoid trapping fish within the dams, and minimize the levels of underwater noise. After the retrofits have been completed, the floor of the Ship Canal will be restored to its original contours.

Onsite temporary erosion and sediment controls will be established for ground disturbance activities and all construction activities over water and shoreline habitat areas will use a containment system to capture all construction material and debris, preventing impacts to the aquatic environment below. All equipment to be used below the ordinary high water mark will be inspected and cleaned prior to use, and oil-absorbing booms and spill kits will be kept on site.

Last, measures will be taken to avoid impacting the pair of Peregrine falcons that typically nest on the bridge between March and July. SDOT has been in ongoing consultation with WDFW to develop criteria for protecting the falcons and their nest. If necessary, project activities may be suspended or revised if it appears that construction activities are disturbing the falcons or their young.

6. Energy and Natural Resources

- a. **What kinds of energy (electric, natural gas, oil, wood, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.**

The project will require the use of electricity and oil-based energy to fuel the equipment needed for construction. Once completed, the project will require the use of energy for operation of the bascule and street lights and to conduct routine maintenance and repairs.

- b. **Would the project affect the potential use of solar energy by adjacent properties? If so, explain.**

The project would not affect the potential use of solar energy by adjacent properties.

- c. **What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any.**

The project will replace the existing street lights with new, more efficient models.

7. Environmental Health

- a. **Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spills, or hazardous waste that could occur as a result of this proposal? If so, describe.**

The project area contains contaminated soils and sediments of varying levels. Some sediment contains contaminant levels that exceed Washington State Sediment Quality Standards (SQS). The SQS correspond to sediment quality that will result in no adverse affects to biological resources or significant risk to human health. In addition, sampling performed for the purpose of characterizing soils and sediments for off-site upland disposal found soil and sediment contamination by metals, semi-volatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs). A few samples contained contamination in excess of the Model Toxics Control Act (MTCA) Method A cleanup levels.

Construction workers and the public could be exposed to hazardous materials that could be uncovered, released, or spilled during construction. Workers would be more at risk than the public because of their proximity to contaminated soils, lead paint dust, and spills during construction operations. The most likely spill materials that a worker could be exposed to are petroleum-based products such as fuels and hydraulic fluids. The common routes of exposure are inhalation, ingestion, and skin contact. Petroleum products could cause damage to the eyes, exposed skin, or lungs.

Public health impacts from construction would be related to exposure to a release of hazardous materials. A spill of materials brought onsite or encountered during construction may expose the public to hazardous substances that pose a health risk. The most likely type of material that may be released is petroleum-based product, such as fuels and lubricants. The product could be released to the soil, surface water, groundwater, or air. The most likely route of exposure to the public would be through inhalation or direct contact.

The overall impact of a release on the public could include illness and discomfort from exposure to the hazardous substance and may also include lost wages for those exposed and health care costs for treating the symptoms of the exposure.

1. Describe special emergency services that might be required.

Emergency response services would be required in the event of a construction accident or hazardous material spill from construction activity. Due to the nature and location of the work activity, special emergency services may be required for incidents that occur below the Ballard Bridge deck or in the water. This may include the use of specialty equipment to access the bridge deck and response by the Seattle Fire Department Marine Emergency Response Team for incidents in the Ship Canal.

2. Describe proposed measures to reduce or control environmental health hazards.

Prior to construction, the contractor will be required to demonstrate how sediments and soils will be controlled during excavation, transport, and stockpiling to prevent any material from entering the Ship Canal or otherwise spilling from containment structures. If cofferdams are used, excavation of sediments from within the cofferdams would be isolated from the Ship Canal waterway by the dams, which would prevent the migration of sediment into the water. Regardless of the construction methods used, excavated sediment and soil will be characterized and disposed of according to all applicable laws and regulations.

To address possible accidents related to hazardous materials used during construction, SDOT requires contractors to have a Spill Plan prior to starting site work. Construction specifications will contain provisions for contractors to follow if unanticipated contamination is discovered. If field personnel observe on-site contamination resulting from off-site sources and/or past activities, specific mitigation measures would then be developed, in coordination with the City, based on the magnitude of contamination identified and the nature of site development plans.

b. Noise

1. What types of noise exist in the area which may affect your project (for example: traffic, equipment operation, other)?

The project will take place adjacent to several heavy industrial and commercial marine facilities. However, the noise levels generated by these facilities will not affect the project.

2. What types and levels of noise would be created by or associated with the project on a short-term or long-term basis (for example: traffic, construction, operation, other)?

Project construction will create a new, short-term source of noise in the project area. If cofferdams are used, the preferred vibratory method of installation may generate noise levels of up to 101 decibels (dB). Other construction activities such as equipment operation and removal and replacement of bridge structural elements are expected to generate noise levels generally between 74 dB and 96 dB (USDOT 2006).¹

Based on studies of vibratory pile installation by the Washington State Department of Transportation (WSDOT 2010a, 2010b), construction of the sheet pile cofferdams, if utilized by the contractor, may result in peak underwater noise levels up to 200 dB, which is below the 206 dB injury threshold for fish. Root mean square (RMS) pressure—a statistical average of the sound pressure level—may be as high as 176 dB (measured at 11 meters), which is above WSDOT's threshold of 150 dB for adverse behavioral disruption to fish for impact pile driving. However, the sound waves generated by vibratory hammers differ from impact hammers and therefore are not expected to adversely affect fish, as described in question B.7.b.3 below.

Once completed, the project will not create any new, long-term sources of noise.

3. Describe proposed measures to reduce or control noise impacts, if any.

If the contractor decides to construct cofferdams, the preferred method of installation would be by vibratory hammer. In contrast to impact pile driving, vibratory pile driving has not been shown to result in mortality, injury, or behavioral changes to salmonids. There are no documented cases of fish kill or death as a result of vibratory pile installation.

As described above, the RMS pressure may exceed WSDOT's threshold of 150 dB for adverse behavioral disruption for impact pile driving. However, the sound pressure wave for vibratory pile driving is much shallower than for impact pile driving—there is not a steep, rapid increase and decrease in sound pressure—which may result in less adverse behavioral impacts. The sounds from vibratory hammers also differ in frequency and impulse energy, which is the total energy content of the pressure wave. Most of the energy in the sound

¹ Average maximum noise levels at 50 feet. These figures are based on construction noise emission data found in the Federal Highway Administration (FHWA) *Construction Noise Handbook*. This data is often cited by FHWA and the Washington State Department of Transportation in discussions of impacts from construction noise.

produced by vibratory hammers is at around 20 to 30 hertz, near the range of infrasound, which fish have been shown to avoid. Further, in-water construction activities will take place during the Lake Washington Ship Canal fish window, between October 1 and April 15, when Chinook and bull trout are least likely to migrate through the canal.

Construction activities will comply with the City of Seattle Noise Ordinance, which may affect the sequencing and methodology of the project. SDOT will obtain a noise variance for any work anticipated to exceed permissible noise levels or for nighttime work outside permitted construction hours.

8. Land and Shoreline Use

a. What is the current use of the site and adjacent properties?

The Ballard Bridge supports 15th Ave W/15th Ave NW, a major north-south transportation arterial and freight corridor between the Queen Anne, Interbay, and Magnolia neighborhoods (and areas south) to the Ballard neighborhood and other points north of the Ship Canal. The corridor is heavily used by commercial traffic and is a designated freight route.

Adjacent properties include commercial and industrial uses that support the fishing and other maritime industries of the region that rely on the Ship Canal. The Port of Seattle's Salmon Bay Terminal is immediately west of the bridge, on the south shore of the Ship Canal. In addition, the Muckleshoot Tribe has traditional fishing rights beneath the Ballard Bridge, including areas directly beneath the bridge approaches.

b. Has the site been used for agriculture? If so, describe.

The site has not been used for agricultural purposes.

c. Describe any structures on the site.

The Ballard Bridge, originally built in 1917 and reconstructed in 1939, is a 2,854-foot concrete and steel bridge that consists of a north and south approach and a 204-foot double-leaf bascule drawbridge. The north approach connects to a concrete overpass (Leary Way Overpass) that extends several blocks further north. There are docks and other moorage facilities adjacent to the bridge.

d. Will any structures be demolished? If so, what?

No structures will be demolished during construction.

e. What is the current zoning classification of the site?

The site is zoned Industrial General 2 Unlimited/45 (IG2 U/45), IG1 U/45, and Industrial Buffer U/45 on the south side of the Ship Canal and IG1 U/65 and IG2 U/65 on the north side of the Ship Canal.

f. What is the current comprehensive plan designation of the site?

The site is designated as part of the Ballard-Interbay-Northend Manufacturing/Industrial Center.

g. If applicable, what is the current shoreline master program designation of the site?

The site is within the Urban Industrial shoreline zone.

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

The site lies within liquefaction and shoreline habitat ECAs.

i. Approximately how many people would reside or work in the completed project?

No people will reside or work in the completed project.

j. Approximately how many people would the completed project displace?

The project will not displace any people.

k. Describe proposed measures to avoid or reduce displacement impacts, if any.

No impacts are expected; therefore, no measures are necessary.

l. Describe proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any.

The seismic retrofits will not change the existing use of the bridges or conflict with any existing or projected land uses or plans.

During construction the contractor will be required to coordinate with adjacent property and business owners and their tenants in order to access the site through temporary construction easements. SDOT will work with the Muckleshoot Tribe to coordinate construction activities or provide other measures to address any concerns over potential impacts to their fishing rights.

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

The project will not include any housing.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

No housing units will be eliminated with the proposed project.

c. Describe proposed measures to reduce or control housing impacts, if any.

No impacts are expected; therefore, no measures are necessary.

10. Aesthetics

a. What is the tallest height of any of the proposed structure(s), not including antennas? What is the principal exterior building material(s) proposed?

While the project will add structural components to the Ballard Bridge and replace existing light poles, it will not change the height of any portion of the Ballard Bridge. The structural components will be made of concrete and steel to match the existing bridge structure.

b. What views in the immediate vicinity would be altered or obstructed?

The project will add additional support structures beneath the Ballard Bridge, which will not obstruct any views.

c. Describe proposed measures to reduce aesthetic impacts, if any.

The project will not impact aesthetics; therefore, no measures are necessary. Most of the work will concern structures below the bridge deck, out of view for most users and from most perspectives. The appearance of the new steel column jackets will be comparable to column jackets that were added to the bridge approaches in the past.

11. Light and Glare

a. What type of light and glare will the proposal produce? What time of day would it mainly occur?

Approximately 33 street lights and poles will be replaced with new, more efficient models along the bridge as part of the project.

During construction, the contractor will use construction lights to illuminate work areas if it determines that certain activities are more feasible during nighttime hours.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

The street lights illuminate the roadway and will not pose a safety hazard or interfere with views.

c. What existing off-site sources of light or glare may affect your proposal?

There are no off-site sources of light or glare that would affect the proposed project.

d. Describe the proposed measures to reduce or control light and glare impacts, if any.

The new street lights will have shields mounted at the back of the light which will direct light away from the water and onto the roadway to minimize light and glare impacts to the Ship Canal below the bridge.

12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?

The Ballard Bridge is part of a signed bicycle and pedestrian route that provides a link between the Ballard neighborhood and access to the Burke-Gilman Trail on the north and the Magnolia and Queen Anne neighborhoods to the south, including access to the Interbay/Elliott Bay and Ship Canal trails. The Lake Washington Ship Canal is used for recreational boating, fishing, and other water-related recreational activities. The Port of Seattle Fishermen's Terminal marina is located immediately adjacent to the west side of the south bridge approach.

b. Would the proposed project displace any existing recreational uses? If so, describe.

The project will not permanently displace or alter any existing recreational uses. During construction the project may periodically divert bicycle and pedestrian traffic (as well as vehicle traffic) crossing the bridge and block bicycle and pedestrian travel along the Ship Canal Trail near the W Nickerson St underpass. In addition, boating and fishing activities may be periodically blocked from active work areas beneath the bridge approaches. However, these impacts will be temporary and transitory in nature as work progresses along the bridge. The project will not block boat traffic beneath the drawbridge portion of the Ballard Bridge.

c. Describe proposed measures to reduce or control impacts on recreation, including recreational opportunities to be provided by the project or applicant.

The project will provide clearly marked detour routes during any temporary lane, trail, or sidewalk closures during construction.

13. Historic and Cultural Preservation

a. Are there any places or objects listed on or eligible for national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

The Ballard Bridge and the Ballard Historic District—the commercial strip of buildings on either side of Ballard Ave NW—are both listed on the National Register of Historic Places. There will be no construction activities within or adjacent to the Ballard Historic District.

b. Generally describe any landmarks or evidence of historic, archeological, scientific, or cultural importance known to be on or next to the site.

The Ballard Historic District is composed of two and three story Italianate brick buildings that housed banks, retail stores, saloons, and hotels built in the late 1800s to accommodate the influx of Scandinavian and other European immigrants that supported the growth of Ballard's sawmilling, boat building/repair, and fishing industries along Salmon Bay.

c. Describe proposed measures to reduce or control impacts, if any.

No impacts on cultural and historic resources are expected. The Washington Department of Archaeology and Historic Preservation has reviewed the plans for the seismic retrofits and

determined that the project will not adversely impact the historic integrity of the Ballard Bridge or impact the Ballard Historic District. Construction will follow the City of Seattle standard specifications for archeological and historic preservation, which includes suspension of activity if any unanticipated artifacts, skeletal remains, or other cultural or archaeological resources are discovered until the proper authorities can be consulted.

14. Transportation

- a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on-site plans, if any.**

The underside of the north approach of the Ballard Bridge can be accessed from Shilshole Ave NW and certain sections of the south approach can be accessed from the W Nickerson St/15th Ave W on-ramp. 15th Ave W/NW travels over the Ballard Bridge, which is accessed by NW Leary and NW Ballard Way on the north side of the Ship Canal and W Emerson St and W Nickerson St on the south side.

- b. Is the site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?**

King County Metro routes 15, 17, 18, and 81 all travel on 15th Ave W/NW across the Ballard Bridge and have northbound and southbound stops between NW Ballard Way and NW Leary Way near the north end of the bridge and within the 15th Ave W/W Emerson St/W Nickerson St interchange near the south end of the bridge.

- c. How many parking spaces would the completed project have? How many would the project eliminate?**

The project will not create or eliminate any parking spaces.

- d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe.**

The project will not require any new roads or streets or improvements to existing roads or streets.

- e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.**

Construction will occur within the immediate vicinity of water and rail transportation facilities. As described, the project involves work over and within the Lake Washington Ship Canal, which is a major shipping and boating corridor. BNSF has spur tracks that cross beneath the bridge near the south abutment and the Ballard Terminal Railroad (BTRR) has tracks that cross beneath the bridge along Shilshole Ave NW on the north side of the Ship Canal.

- f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.**

The completed project will not change any roadway lane configurations or access and therefore will not generate additional motor vehicle trips.

g. Describe proposed measures to reduce or control transportation impacts, if any.

The project may need to temporarily close lanes of traffic along the Ballard Bridge during some construction activities, which may impact the traffic travelling over the bridge, including public transit. Similarly, the project may periodically interrupt railroad traffic on the BNSF and BTRR tracks. The contractor will be required to develop a Traffic Control Plan, approved by SDOT, in accordance with the City of Seattle *Standard Specifications for Road, Bridge, and Municipal Construction*, and coordinate with and provide advanced notice to the railroads before interrupting any service.

The project will temporarily create additional boat traffic beneath the Ballard Bridge during construction. The contractor will be required to follow the Seattle Water and Boating Regulations for operating the work vessels or barges within the Lake Washington Ship Canal, including within Fishermen's Terminal. This includes yielding the right of way to other watercraft when appropriate and following posted speed limits. The contractor will be required to protect the in-water construction areas by markers or other means to prevent boaters from entering active work zones.

SDOT will work with the contractor to conduct advance and continued public outreach during construction to notify residents, businesses, local agencies, school districts, transit agencies and other stakeholders of expected disruptions or changes in traffic flow. If necessary, alternative routes for motor vehicles, pedestrians, bicyclists, and those with disabilities will be established and clearly identified. The contractor will be required throughout construction to coordinate with any adjacent property and business owners and their tenants with whom they have temporary construction easements in order to access the site.

15. Public Services

a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally explain.

The project will not result in an increased need for public services. It will not change the existing configuration or capacity of the street network or generate additional motor vehicle trips beyond that existing.

b. Describe proposed measures to reduce or control direct impacts on public services.

No impacts to public services are anticipated; therefore, no measures are necessary.

16. Utilities

a. Underline utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.

There is electrical service to the bridge to power the street lights and an underwater telecommunications cable beneath the south bridge approach for bridge operations.

- b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

There are no new utilities or alterations to existing utilities proposed as part of this project. The contractor will be required to preserve and protect the existing utilities during construction.

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature:



Name (print):

CONSTANCE ZIMMERMAN

Title:

PROJECT MANAGER

Date Submitted:

3.25.2011

References

- City of Seattle. Unpublished. *Seattle Biological Evaluation 2011 Update Draft*. Seattle, WA.
- U.S. Department of Transportation (USDOT). 2006. *FHWA Roadway Construction Noise Handbook* (FHWA-HEP-06-015; DOT-VNTSC-FHWA-06-02; NTIS no. PB2006-109102). Prepared by the USDOT Research and Innovative Technology Administration, John A. Volpe National Transportation Systems Center. Cambridge, MA. August, 2006. Online: http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/.
- WSDOT. 2010a. *Keystone Ferry Terminal – Vibratory Pile Monitoring Technical Memorandum*. Olympia, WA. May 4, 2010. Online: <http://www.wsdot.wa.gov/Environment/Air/PileDrivingReports.htm>.
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SDOT Ballard Bridge Seismic Retrofits



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Coordinate System:
State Plane, NAD83-91,
Washington, North Zone
Orthophoto Source:
Pictometry 2007

PLOT DATE : August 10, 2010
AUTHOR : Mark Mazzola



Figure 1 - Vicinity Map

Ballard Bridge Seismic Retrofit
Figure 2

Greenhouse Gas Emissions Worksheet

	<i>VMT for project¹</i>	<i>gallons fuel/mile²</i>	<i>lbs CO₂e/ gallons fuel³</i>	<i>MTCO₂e for fuel use</i>
Material haul	24,000	0.250	26.55	73
Worker commute	122,000	0.050	24.30	68
Construction equipment	4,100 (hours)	4 (gal/hour)	26.55	13
Total				154
	<i>Cubic yards of concrete</i>	<i>lbs cement/cubic yard of concrete</i>	<i>MTCO₂e/ ton of cement⁴</i>	<i>MTCO₂e for cement use</i>
Seat Extensions	85	600	0.97	25
Concrete Restrainer	30	600	0.97	9
Pier Diaphragm Bolster	150	600	0.97	44
Girder Strengthening	295	600	0.97	86
Plinth Retrofits	60	600	0.97	18
Total	620	600	0.97	182
	<i>Pounds of steel</i>	<i>Metric tons of steel</i>	<i>MTCO₂e/metric tons of steel</i>	<i>MTCO₂e for steel</i>
Structural Steel Elements	360,000	159	0.92	146
Total	360,000	159	0.92	146
Total Metric Tons of CO₂ equivalent				482

Data sources:

1. Vehicle miles travelled (VMT) for bridge component demolition, placement of retrofit concrete, construction of steel components and column jackets, and other items, and worker commute over the 12-month construction period.
2. Gallons of fuel per mile: This is the assumed average fuel consumption for heavy trucks (diesel fuel) importing and exporting material, and personal vehicles (gasoline fuel) for worker commuting. On-site construction equipment such as cranes and earth moving equipment is assumed to consume diesel fuel at a 4 gallon per hour rate.
3. Pounds of CO₂ equivalent per gallon of fuel: The CO₂ emissions estimates include the extraction, transport, and refinement of petroleum as well as their combustion. (*Life-Cycle CO₂ Emissions for Various New Vehicles*. 2006. RENew Northfield.)
4. Metric tons of CO₂ equivalent per ton of cement: This figure represents a national weighted average for cement production in the U.S., as presented in *CO₂ Emissions profile of the U.S. Cement Industry* (L. Hanle, US EPA; K. Jayaraman, ICF Consulting), presented at the 13th International Emission Inventory Conference, "Working for Clean Air in Clearwater" in 2004. Available: <<http://www.epa.gov/ttn/chief/conference/ei13/index.html#ses-2>>.
5. Metric tons of CO₂ equivalent per metric ton of steel: Based on World Steel Association values as reported by REIDsteel at <<http://www.reidsteel.com/environmentally-friendly-steel-buildings.htm>>.