U.S. Department
of Transportation
**Federal Transit
Administration**

REGION X
Alaska, Idaho, Oregon,
Washington

915 Second Avenue
Federal Bldg. Suite 3142
Seattle, WA 98174-1002
206-220-7954
206-220-7959 (fax)

February 1, 2011

Mr. Don Wagner
Mr. Richard Brandman
Columbia River Crossing
700 Washington St., Suite 300
Vancouver, WA 98660

**RE: Columbia River Crossing: Steel Bridge LRT System Modification Project
Confirmation of Documented Categorical Exclusion**

Dear Mr. Wagner and Mr. Brandman:

The Federal Transit Administration (FTA) has received the Columbia River Crossing (CRC) *Categorical Exclusion and Documented Categorical Exclusion Worksheet* dated November 8, 2010 regarding the Steel Bridge LRT System Modification Project. Based on the Worksheet and supplemental information, we understand that CRC proposes to use FTA funds to modify certain rail and system features on the Steel Bridge in Portland, OR to allow light rail vehicles to travel across the bridge at higher speeds than are now possible.

Based on the information provided, FTA concurs that the project qualifies as a categorical exclusion as described in the Department of Transportation's Final Rule concerning Environmental Impact and Related Procedures, 23 CFR Section 771.117(d).

This action applies only to the project as described in the above-referenced Worksheet and supporting materials. Any changes to the proposed action which would result in significant environmental impacts not identified in the DCE worksheet, including the disclosure of new information or environmental concerns not previously identified will require re-evaluation of this action.

This confirmation of categorical exclusion does not provide FTA commitment that future Federal funds will be approved for this project. Any costs incurred under FTA pre-award authority must

meet all Federal requirements prior to those costs being incurred in order to retain eligibility of those costs for future FTA grant assistance.

Please contact Dan Drais (206-220-4465) if you require additional information.

Sincerely,

Linda M. Gehrke

for R.F. Krochalis
Regional Administrator

cc: Heather Wills

JOINT FTA & FHWA
CATEGORICAL EXCLUSION and
DOCUMENTED CATEGORICAL EXCLUSION WORKSHEET

Note: The purpose of this worksheet is to assist sponsoring agencies in gathering and organizing materials for environmental analysis required under the National Environmental Policy Act (NEPA), particularly for projects that may qualify as a documented Categorical Exclusion (DCE). The use and submission of this particular worksheet is NOT required. The worksheet is provided merely as a helpful tool in gathering and providing information deemed needed by FTA. It is designed to provide FTA with information needed to do an environmental analysis. In lieu of the worksheet, the sponsoring agency may submit the same information in a different format. **NOTE: Fields are expandable, so feel free to use more than a line or two to describe descriptions.**

Submission of the worksheet by itself does not meet NEPA requirements. FTA (and FHWA if a co-lead project) must concur in writing in the sponsoring agency's NEPA recommendation. Project activities may not begin until this process is complete. Contact the FTA Region 10 office at (206) 220-7954 if you have any questions or require assistance. If this is the first time you have filled out this form, FTA encourages you to contact us for guidance. **Please see the end of this document for new submittal procedures.** Check out Region 10's Environment web site (see link at the end of this document) with a list of topical resources.

I. PROJECT DESCRIPTION

Sponsoring Agency	Date Submitted	FTA / FHWA Grant Number(s) (if known)
TriMet	11/8/10	/
Project Title Steel Bridge LRT System Modifications		
Project Description (brief, 1-2 sentences) Modifications to the existing light rail transit track and electrical system on the Steel Bridge.		
Purpose and Need for Project (brief, 1-2 sentences, include as an attachment if adopted statement is lengthy) The Steel Bridge has a lift span that requires lift joints in the MAX rails within the track bed. These lift joints limit the crossing speed of LRVs to no more than 10 mph across the bridge and 5 mph specifically at the lift joint itself. This limitation is because the vibrations at these joints disrupt the signaling and electrification system. Modifications to reduce the wheel rise from the lift joint would decrease the bridge vibration, allowing MAX trains a maximum speed of 15 mph on the Steel Bridge, thus improving the speed of the Yellow Line MAX and, as a by-product, all MAX lines crossing the bridge. There is also an existing signal case on the lift span that cannot withstand high levels of vibration. The overhead catenary system (OCS) that supplies electrical power to the trains is also not designed to withstand the high levels of vibration that are generated with speeds above 5 & 10 mph.		
Project Location (include City and Street address) Steel Bridge, Portland Oregon		
Project Contact (include phone number, mailing address and email address) Heather Wills, 700 Washington Street, #300, Vancouver WA 98660. Willsh@columbiarivercrossing.org		
If your project involves construction, include the following maps: • Project Vicinity • Project Site Plan • USGS quad		

II. NEPA Class of Action

Answer the following questions to determine the project's potential class of action. If the answer to any of the questions in Sections A or B is "YES", contact the FTA Regional office to determine whether the project requires preparation of a NEPA environmental assessment (EA).

A. Will the project significantly impact the natural, social and/or economic environment?

☐ YES (contact FTA Regional office)
☒ NO (continue)

B.1 Is the significance of the project's social, economic or environmental impacts unknown?

☐ YES (contact FTA Regional office)
☒ NO (continue)

B.2 Is the project likely to require detailed evaluation of more than a few potential impacts?

☐ YES (contact FTA Regional office)
☒ NO (continue)

B.3 Is the project likely to generate intense public discussion, concern or controversy, even though it may be limited to a relatively small subset of the community?

☐ YES (contact FTA Regional office)
☒ NO (continue)

C.1 Does the project appear on the following list of potential Categorical Exclusions (CEs)?

The projects listed below are generally categorically excluded from further NEPA analysis under 23 CFR 771.117(c) unless certain circumstances exist, such as the presence of wetlands, historic buildings and structures, parklands and floodplains in the project area.

☒ YES (If checked AND there are no special circumstances, mark the applicable checkbox and briefly describe the activity below. Then, proceed to the signature block on the back page.)
☐ NO (continue to Section D)

☐ Activities not involving or directly leading to construction (technical studies, planning, preliminary engineering, etc.)

☐ Utility installations along or across a transit facility

☐ Construction of bicycle and pedestrian facilities, excluding those requiring construction in new right-of-way

☐ Installation of noise barriers or alterations to existing publicly-owned buildings to provide for noise reduction

- ☐ Landscaping
- ☐ Installation of fencing, signs, pavement markings, toll facilities, control centers, vehicle test centers, small passenger shelters, traffic signals, railroad warning devices, and signal controls with no substantial land acquisition or traffic disruption
- ☐ Emergency repairs under 23 USC 125
- ☐ Acquisition of scenic easements
- ☐ Ridesharing activities
- ☐ Bus, ferry, and rail car rehabilitation (including conversions to alternative fuels)
- ☐ Alterations to facilities or vehicles to make them accessible to elderly or handicapped persons
- ☐ Program administration (including safety programs), technical assistance, and operating assistance to continue existing service or increase service to meet routine changes in demand
- ☐ Purchase and lease of vehicles and equipment for use on existing facilities or new facilities that also qualify as CEs (including the capital cost of contracts for transit services)
- ☒ Track, railbed, and wayside system maintenance and improvements when carried out in existing right-of-way
- ☐ Purchase and installation of operating, maintenance and Intelligent Transportation Systems (ITS) equipment to be located solely within the transit facility and with no significant off-site impacts
- ☐ Mitigation banking
- ☐ Resurfacing and restriping
- ☐ Routine maintenance

C.2 Brief Activity Description

Include a brief description of the activity and the reasoning for its categorical exclusion.

The Steel Bridge has a lift span that requires lift joints in the MAX rails within the track bed. These lift joints limit the crossing speed of LRVs to no more than 10 mph across the bridge and 5 mph at the lift joints themselves. The work needed to increase the speed limits from 5 & 10 mph to 15 mph over the Steel Bridge as a whole and at the lift spans would include the following:

1. Grind the transit rails within the track bed to remove the lift joint bumps, rail corrugation, and any rough field welds. Some repair and reconstruction of the hardware that fastens the lift joints to the bridge deck will also be required.
2. Install a vibration pad under the signal case to dissipate vibration.
3. Stiffen the OCS brackets to allow for greater impact as the catenary transfers from the fixed to movable span.
4. Make light rail transit and traffic signal adjustments for NW Everett Street and N Interstate Avenue to accommodate the higher speeds.

The Steel Bridge is a NRHP-eligible through-truss, double-lift bridge across the Willamette River in Portland, Oregon. The proposed modifications would not alter character-defining features of the bridge or introduce new visual components. The changes are very modest and will only be made to elements of the light rail infrastructure not original to the bridge design. There will be no Adverse Effect to this historic resource.

No traffic impacts are expected from the track work or from the traffic signal modifications. Once the Columbia River Crossing Project is completed trains would travel more frequently over the bridge. Traffic impacts from any additional trains are assessed in the Final Environmental Impact Statement of the Columbia River Crossing Project.

D. Does the project appear on the following list of potential documented Categorical Exclusions?

These projects may be categorical exclusions under 23 CFR § 771.177(d), but require additional documentation demonstrating that the specific conditions or criteria for the CEs are satisfied and that significant effects will not result.

☐ YES (Check and continue to Part III)
☒ NO (Contact FTA Regional Office)

☐ Grade separations requiring land acquisition to replace existing at-grade railroad crossings and bridge rehabilitation (including approaches to bridges and excluding historic bridges or bridges providing access to ecologically sensitive areas)

☐ Corridor Fringe Parking facilities (generally located adjacent to a mass transportation corridor such as an Interstate highway system)

☐ Carpool programs and activities requiring land acquisition and construction

☐ Safety improvements including seismic retrofit and mitigation of wildlife hazards

☐ Construction of new bus storage and maintenance facilities and new ITS control centers in areas used predominantly for industrial or transportation purposes where such construction is consistent with existing zoning and located on a street with adequate capacity to handle anticipated traffic

☐ Rehabilitation or reconstruction of existing rail and bus buildings and ancillary facilities where only minor amounts of additional land are required and there is not a substantial increase in the number of users

☐ Construction of bus transfer facilities (an open area consisting of passenger shelters, boarding areas, kiosks, and related street improvements) when located in a commercial area or other high activity center in which there is adequate street capacity for projected bus traffic

☐ Construction of rail storage and maintenance facilities (or other similarly sized support facilities) in areas used predominantly for industrial or transportation purposes where such construction is consistent with existing zoning and where there is no significant noise impact on the surrounding community

☐ Area-wide coordination of multiple ITS elements

☐ Advance land acquisition including:

- Acquisition of underutilized private railroad rights-of-way (ROW) to ensure that adjacent land uses remain generally compatible with the continued transportation use of the ROW
- Acquisition of land for hardship or protective purposes, consistent with 23 CFR 771.117 (D)(12)

(Note: the eligibility of hardship and protective buys is very limited and must be approved, in writing, by the Regional FTA office before proceeding with any acquisition activities. Failure to do so will render the project ineligible for Federal participation.)

III. Information Required for Documented Categorical Exclusions

If you checked "Yes" to any of the options in Part II, Section D, complete Part III and submit to FTA.

A. Detailed Project Description

Include a project description and explain how the proposal satisfies the purpose and need identified in Part I.

This project would include minor modifications to a critical element of the existing MAX light rail transit system which will be part of the Yellow Line MAX planned for extension as part of the Columbia River Crossing Project. These modifications would improve the existing light rail transit track and electrical system on the Steel Bridge over the Willamette River in Portland, Oregon. These improvements would allow the Yellow Line trains, as well as all other MAX line trains, to increase their travel speed over the Steel Bridge.

Currently, all light rail transit lines within the regional MAX system cross the Willamette River via the Steel Bridge. The Steel Bridge was built in 1912 and was retrofitted to receive LRVs in 1984. In 1986, when the first light rail line opened, 40 LRVs crossed the bridge during the 4-hour PM peak period; in 2007, with the Red and Yellow Lines opened, 116 LRVs crossed the bridge during the 4-hour PM peak period. In 2009, TriMet opened the I-205 South Corridor Project, increasing the number of vehicles that cross the Steel Bridge to 152 during the 4-hour PM peak period. With a peak headway of 7.5 minutes, the Columbia River Crossing (CRC) project would increase the number of LRVs that cross the Steel Bridge in 2030 during the 4-hour PM peak period to 176 trains. To accommodate these additional trains, this modification project would retrofit the existing rails on the Steel Bridge to increase the allowed light rail transit speed over the bridge, increasing the speed of the line and helping ensure adequate LRV throughput of the bridge.

The Steel Bridge has a lift span that requires lift joints in the MAX rails within the track bed. These lift joints limit the crossing speed of LRVs to no more than 10 miles per hour (mph) across the bridge and no more than 5 mph at the lift joint itself. This limitation is because the vibrations at these joints disrupt the signaling and electrification system. Modifications to reduce the wheel rise from the lift joint would decrease the bridge vibration, allowing MAX trains a maximum speed of 15 mph on the Steel Bridge, thus improving the speed of all MAX lines crossing the bridge. There is also an existing signal case on the lift span that cannot withstand high levels of vibration. The overhead catenary system (OCS) that supplies electrical power to the trains is also not designed to withstand the high levels of vibration that are generated with speeds above 5 & 10 mph. The work needed to increase the speed limits from 5 & 10 mph to 15 mph over the Steel Bridge lift spans would include the following:

1. Grind the transit rails within the track bed to remove the lift joint bumps, rail corrugation, and any rough field welds. Repair and reconstruction of the hardware that fastens the lift joint to the bridge deck will also be required.
2. Install a vibration pad under the signal case to dissipate vibration.
3. Stiffen the OCS brackets to allow for greater impact as the catenary transfers from the fixed to movable span.
4. Make light rail transit and traffic signal adjustments for NW Everett Street and N Interstate Avenue to accommodate the higher speeds.

B. Location and Zoning

Attach a map identifying the project's location and surrounding land uses. Note any critical resource areas (historic, cultural or environmental) or sensitive noise or vibration receptors (schools, hospitals, churches, residences, etc). Briefly describe the existing zoning of the project area and indicate whether the proposed project is consistent. Include a description of the community (geographic, demographic, economic and population characteristics) in the vicinity of the project.

See attached map and Location and Zoning exhibit.

C. Traffic

Describe potential traffic and parking impacts, including whether the existing roadways have adequate capacity to handle increased bus or other vehicular traffic. Include a map or diagram if the project will modify existing roadway configurations. Describe connectivity to other transportation facilities and modes.

The light rail tracks occupy the center lanes of the Steel Bridge. Automobile traffic is excluded all days and all hours from these lanes. Therefore, no traffic impacts are expected from the track work or from the traffic signal modifications. Once the Columbia River Crossing Project is completed trains would travel more frequently over the bridge. Traffic impacts from any additional trains are assessed in the Final Environmental Impact Statement of the Columbia River Crossing Project.

D. Aesthetics

Will the project have an adverse effect on a scenic vista?

☒ No
☐ Yes, describe

Will the project substantially degrade the existing visual character or quality of the site and its surroundings?

☒ No
☐ Yes, describe

Will the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

☒ No
☐ Yes, describe

E. Air Quality

Does the project have the potential to impact air quality?

☒ NO
☐ YES, describe

Is the project located in an Environmental Protection Agency (EPA)-designated non-attainment or maintenance area?

☐ NO

☒ YES, indicate the criteria pollutant and contact FTA to determine if a hot spot analysis is necessary.

- ☒ Carbon Monoxide (CO)
- ☐ Ozone (O_3)
- ☐ Particulate Matter (PM_{10})

If the non-attainment area is also in a metropolitan area, was the project included in the MPO's Transportation Improvement Program (TIP) air quality conformity analysis?

☐ NO

☒ YES

Date of USDOT conformity finding: February 29, 2008

F. Coastal Zone

Is the proposed project located in a designated coastal zone management area?

☒ No

☐ Yes, describe coordination with the State regarding consistency with the coastal zone management plan and attach the State finding, if available.

G. Environmental Justice

Indicate whether the project will have disproportionately high and adverse impacts on minority or low-income populations. Describe any potential adverse effects. Describe outreach efforts targeted specifically at minority or low-income populations.

As addressed in this document herein, the project will not have adverse impacts on the surrounding communities therefore there will be no impact to minority, low-income, or any other EJ populations.

H. Floodplains

Is the proposed project located within the Federal Emergency Management Agency (FEMA) 100-year floodplain?

☒ No

☐ Yes, describe potential impacts and include the FEMA map with the project location identified.

I. Hazardous Materials

Is there any known or potential contamination at the project site?

☐ No, describe the steps taken to determine whether hazardous materials are present on the site.

☒ Yes, note mitigation and clean-up measures that will be taken to remove hazardous materials from the project site.

The Oregon Department of Environmental Quality (DEQ) facility profiler (http://deq12.deq.state.or.us/fp20/StartPage.aspx) and the EPA environmapper (http://www.epa.gov/emefdata/em4ef.home) web sites were used to determine the location of identified hazardous material site in the vicinity of the Steel Bridge project site. There are no known sites on the bridge itself. There are sites on either bank of the Willamette River. However, these sites will not be affected because all work is confined to the small area around the lift joints on the bridge and therefore are not a concern to the project.

The project will involve grinding metal from rails. The metal debris from this rail grinding will be recovered as described in Section Q (Construction Impacts). Waste will be determined as hazardous or non-hazardous as defined in 40 CFR 262.11 and Oregon Administrative Rule (OAR 340-102-0011) and OAR 340-101-0033.

Based on the hazardous waste determination, the material will be disposed of as a hazardous waste according to 40 CFR Part 264/265 and OAR 340-104 at a permitted hazardous waste landfill, or it will be disposed as a solid waste according to 40 CFR, Part 258 and OAR 340-094-0040. Chemical Waste Management in Arlington, Oregon is the nearest such facility. Although the upright structural members of the bridge are painted with potentially metal-containing paint, none of the work is planned to touch or disturb these painted surfaces. Painted metal surfaces are not planned to be disturbed as part of the project; however, prudent containment measures will be employed. Any debris coming from the metal surfaces of the bridge will be recovered and disposed in a manner consistent with local, state, and federal requirements for metal containing materials (as referenced below).

J. Navigable Waterways

Does the proposed project cross or have the potential to impact a navigable waterway?

☐ No

☒ Yes, describe potential impacts and any coordination with the US Coast Guard.

The project is on a bridge that crosses a navigable waterway, but since work would only make modifications to trackway at lift joints it would not affect clearance on the waterway. There would be no in-water work or closures of the waterway during construction.

K. Noise and vibration

Does the project have the potential to increase noise or vibration?

☐ NO

☒ YES, describe impact and provide map identifying sensitive receptors such as schools, hospitals, parks and residences. If the project will result in a change in noise and vibration sources, you must use FTA's "Transit Noise and Vibration Impact Assessment" methodology to determine impact.

The resulting change in noise levels related to the increased light rail traffic across the Steel Bridge was calculated at 6 dBA L_{eq} during peak-hour and the 24-hour L_{dn} increase is approximately 5 dBA. There are no noise sensitive receivers located within 350 feet of the alignment and no noise impacts are projected.

Wheel squeal is not predicted to result in any noise impacts because squeal is associated with track curvature and not related to the number or trains. The track at the site of work at the lift joints is not curved.

The closest building to the light rail alignment is the Oregon Department of Transportation Region 1 headquarters on NW Flanders at NW 1st Ave. Current vibration levels are projected to range from 65 to 68 VdB at this location. The building is adjacent to the retained fill and elevated structure that connects to the Steel Bridge and is approximately 60 to 70 feet from the near track. Because no modifications are proposed in this area, the vibration levels are not predicted to change from the 65 to 68 VdB projections, which are well below the FTA criteria of 75 VdB for a commercial building.

For more information about noise and vibration, please see *Noise and Vibration Impact Analysis* attached to this document.

L. Prime and Unique Farmlands

Does the proposal involve the use of any prime or unique farmlands?

☒ No

☐ Yes, describe potential impacts and any coordination with the Soil Conservation Service of the U.S. Department of Agriculture.

M. Resources

Does the project have the potential to impact any of the resources listed below?

☐ NO

☒ YES, if checked, describe resource and impacts. Impacts to cultural, historic, or recreational properties may trigger Section 4(f) evaluation, which requires consideration of avoidance alternatives.

☐ Natural

☐ Cultural

☒ Historic—Indicate whether there are any historic resources in the vicinity of the project. Attach photos of structures more than 45 years old that are within or adjacent to the project site. The Steel Bridge is a NRHP-eligible through-truss, double-lift bridge across the Willamette River in Portland, Oregon. The proposed modifications would not alter character-defining features of the bridge or introduce new visual components. The changes are very modest and will only be made to elements of the light rail infrastructure not original to the bridge design. There will be no Adverse Effect to this historic resource.

☐ Recreational

☒ Biological--The project sponsor must obtain a list of threatened and endangered species in the project area from the US Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration-Fisheries (NOAA-Fisheries). Attach a current species map (within six (6) months. Describe any critical habitat, essential fish habitat or other ecologically sensitive areas. Check out Region 10's Environment web site (see below for link) more information. No water quality impacts will result from proposed project activities. No debris will enter the Willamette River. Noise levels resulting from the rail grinding activities are not expected to exceed ambient levels for fish or terrestrial species, and noise is expected to be similar to existing ambient noise levels from traffic associated with the light rail trains and automotive vehicles that currently use the bridge.

No indirect effects will result from this project. There will be no habitat disturbance, and no effects to prey resources.

Therefore, the modifications would have no effect to ESA-listed fish and no effect on designated critical habitat. For more information, please see the technical memo that describes the Analysis and Findings Regarding a No Effect Determination to Threatened and Endangered Species included with this document.

☐ Other, describe

N. Seismic

Are there any unusual seismic conditions in the project vicinity? If so, indicate on project map and describe the seismic standards to which the project will be designed.

☒ No
☐ Yes, describe

The Pacific Northwest is a geologically active region that experiences occasional earthquakes. However, there is nothing unusual about the Steel Bridge with respect to seismic conditions compared to other locations in the region. Geological hazards will not affect the proposed modifications to the Steel Bridge because the work would not impact the structural integrity of the bridge.

O. Water Quality

Does the project have the potential to impact water quality, including during construction.

☒ No
☐ Yes, describe potential impacts

Will there be an increase in new impervious surface or restored pervious surface?

☒ No
☐ Yes, describe potential impacts and proposed treatment for stormwater runoff.

Is the project located in the vicinity of an EPA-designated sole source aquifer?

☒ No
☐ Yes, describe potential impacts and include a map of the sole source aquifer with project location identified.

P. Wetlands

Does the proposal temporarily or permanently impact wetlands or require alterations to streams or waterways?

☒ No
☐ Yes, describe potential impacts

Q. Construction Impacts

Describe the construction plan and identify impacts due to construction noise, utility disruption, debris and spoil disposal, and staging areas. Address air and water quality impacts, safety and security issues, and disruptions to traffic and access to property.

Estimated costs of the improvements are $220,000. A total of 12 hours of rail grinding would occur for 4 hours each night over 3 nights. Depending on noise level, a noise variance from the City of Portland may be required. The grinding equipment has a built-in vacuum system that operates during grinding. The machine is also skirted to direct debris into that system. A small percentage (approximately 5 percent) of grinding debris does not make it into the vacuum. The remaining debris will likely settle on the roadway or in the track flange. Manual vacuuming and sweeping will capture the remaining rail grindings. Fine mesh material will be installed around and under the work area to prevent wastes from entering the Willamette River.

On-site spill containment materials will be present in case work materials are spilled or dropped.

No in-water work or ground disturbance will occur with this element of the project. All activities will take place on the top deck of the Steel Bridge, and mostly within the existing LRT guideway.

Utilities would not be disrupted and staging areas, if necessary, would be located within the right-of-way.

There would be no road or rail closures and no traffic impact from construction. No impacts to property access would occur.

TriMet would be required to follow all safety and security measures required to do any maintenance or improvement project.

R. Cumulative and Indirect Impacts

Are cumulative and indirect impacts likely?

☒ No

☐ Yes, describe the reasonably foreseeable:

a) Cumulative Impacts, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

b) Indirect impacts, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect impacts may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air, water and other natural systems, including ecosystems.

S. Property Acquisition

If property is to be acquired for the project, indicate whether acquisition will result in relocation of businesses or individuals.

Note: To ensure the eligibility for federal participation, grantees may not acquire property with either local or federal funds prior to completing the NEPA process and receiving written concurrence in the NEPA recommendation. For acquisitions over $500,000, FTA concurrence in the property's valuation is also required.

No property acquisition is expected for this project.

T. Public Notification

Describe public outreach efforts undertaken on behalf of the project. Indicate opportunities for public hearings, (e.g. board meetings, open houses, special hearings). Indicate any significant concerns expressed by agencies or the public regarding the project.

Due to the minimal impacts of this improvement within existing right of way with no road or rail closures public notification has not been deemed necessary.

U. Mitigation Measures

Describe all measures to be taken to mitigate project impacts.

The above sections describe the measures and practices that will be included during construction to ensure that any potential impacts are avoided or minimized. No additional mitigation would be required beyond the measures that are already part of the project construction approach, as described above.

V. Other Federal Actions

Provide a list of other federal NEPA actions related to the proposed project or in the vicinity.

The Steel Bridge LRT modification project is related to the Columbia River Crossing and project. The purpose of the aforementioned modifications to the Steel Bridge is to allow for greater speeds of LRVs traveling over the bridge.

W. State and Local Policies and Ordinances

Is the project in compliance with all applicable state and local policies and ordinances?

☐ No, describe

☒ Yes

X. **Related Federal and State/Local Actions**

- ☐ Corps of Engineers (Section 10, Section 404)
- ☐ Coast Guard Permit
- ☐ Coastal Zone Management Certification
- ☐ Critical Area Ordinance Permit
- ☐ ESA and EFH Compliance
- ☐ Flood Plain Development Permit
- ☐ Forest Practice Act Permit
- ☐ Hydraulic Project Approval
- ☐ Local Building or Site Development Permits
- ☐ Local Clearing and Grubbing Permit
- ☐ National Historic Preservation Act-Section 106
- ☐ National Pollutant Discharge Elimination System Baseline General for Construction
- ☐ Shoreline Permit
- ☐ Solid Waste Discharge Permit
  Sole Source Aquifer
- ☐ Section 4(f) or 6(f) (Recreational and Historic Properties)
- ☐ Section 106 (Historic Properties)
- ☐ Stormwater Site Plan (SSP)
- ☐ Temporary Erosion and Sediment Control Plan (TESC)
- ☐ Water Rights Permit
- ☐ Water Quality Certification—Section 401
- ☐ Tribal Permits (if any, describe below)
- ☒ Other

Describe as applicable:
City of Portland Noise Variance

Y. Submitted By:

Hahn/Vus	**Date:** 11/8/10

Z: Approved By:

Federal Transit Administration	**Date:**
Federal Highway Administration	**Date:**

Submit two paper copies of this form, attachments, and a transmittal letter recommending a NEPA finding to the address below, or submit an electronic version to deborah.ensor@dot.gov. Contact FTA at the number below if you are unsure of these procedures. Modifications are typically necessary. When the document is approved, FTA may request additional copies.

Federal Transit Administration, Region 10
915 2nd Avenue, Suite 3142
Seattle, WA 98174-1002

phone: (206) 220-7954
fax: (206) 220-7959

For additional links to other agencies or for further topical guidance go to Region 10's Environment web site.

Location and Zoning Supplement

Attach a map identifying the project's location and surrounding land uses. Note any critical resource areas (historic, cultural or environmental) or sensitive noise or vibration receptors (schools, hospitals, churches, residences, etc). Briefly describe the existing zoning of the project area and indicate whether the proposed project is consistent. Include a description of the community (geographic, demographic, economic and population characteristics) in the vicinity of the project.

Land Use and Zoning

The Steel Bridge stretches over the Willamette River connecting downtown Portland to the west with the Rose Quarter/Convention Center to the east side of the river. On the west side of the bridge the surrounding land uses are typical of the downtown area, with low to high-level buildings and surface parking lots. Zoning is Central Commercial (CX), which the City of Portland Zoning Code describes as:

> The CX zone is intended to provide for commercial development within Portland's most urban and intense areas. A broad range of uses is allowed to reflect Portland's role as a commercial, cultural and governmental center. Development is intended to be very intense with high building coverage, large buildings, and buildings placed close together. Development is intended to be pedestrian-oriented with a strong emphasis on a safe and attractive streetscape.

North of the west bridge approach along the water are residential condominiums and apartments. The condominiums are located in the Central Residential Zone (RX), described in City of Portland Code as:

> The RX zone is a high density multi-dwelling zone which allows the highest density of dwelling units of the residential zones. Density is not regulated by a maximum number of units per acre. Rather, the maximum size of buildings and intensity of use are regulated by floor area ratio (FAR) limits and other site development standards. Generally the density will be 100 or more units per acre. Allowed housing developments are characterized by a very high percentage of building coverage. The major types of new housing development will be medium and high rise apartments and condominiums, often with allowed retail, institutional, or other service oriented uses. Generally, RX zones will be located near the center of the city where transit is readily available and where commercial and employment opportunities are nearby. RX zones will usually be applied in combination with the Central City plan district.

South of the west bridge approach along the water is a waterfront park located in the Open Space Zone (OS), described as follows:

> The Open Space zone is intended to preserve and enhance public and private open, natural, and improved park and recreational areas identified in the Comprehensive Plan. These areas serve many functions including:
>
> - Providing opportunities for outdoor recreation;
> - Providing contrasts to the built environment;
> - Preserving scenic qualities;
> - Protecting sensitive or fragile environmental areas;
> - Preserving the capacity and water quality of the stormwater drainage system; and
> - Providing pedestrian and bicycle transportation connections.

The east end of the bridge is an area known as the Rose Quarter/Convention Center. Interstate 5 runs north-south above grade about 500 feet from the bridge approach. The area directly at the end of the bridge is mainly road way and a few industrial parcels. A large industrial storage facility sits on the waterfront north of the bridge ramps. The zoning in this area is General Industrial 1 (IG1), described as:

> The General Industrial zones are two of the three zones that implement the Industrial Sanctuary map designation of the Comprehensive Plan. The zones provide areas where most industrial uses may locate, while other uses are restricted to prevent potential conflicts and to preserve land for industry. The development standards for each zone are intended to allow new development which is similar in character to existing development. The intent is to promote viable and attractive industrial areas.
>
> **1. General Industrial 1. IG1** areas generally have smaller lots and a grid block pattern. The area is mostly developed, with sites having high building coverages and buildings which are usually close to the street. IG1 areas tend to be the City's older industrial areas.

The Oregon Convention Center, Rose Garden Arena and Memorial Coliseum are located very near the bridge. These are large buildings used for events such as conventions and professional sporting events. They are within the CX zone.

An approximately 6 block residential area, zoned RX, is located approximately 1000 feet northeast of the bridge approach, surrounded by the CX zone. A hospital, church, hotels and office buildings are located within the RX zone.

A park and access to the esplanade is on the river south of the bridge. It is within the OS zone.

The proposed project would not affect land use or zoning in the area because the work would be done entirely within existing right-of-way that already carries light rail.

Surrounding Community Characteristics

As outlined in the land use section above, the community in the vicinity of the project is mainly commercial, with some residential, industrial, and parks. The closest residences to the area where work will be done are the condominiums on the west side of the river, northwest of the bridge, over 350 feet away. The geography is generally flat, with a major river, the Willamette, running NW-SW under the bridge. The river in this area is used for recreation, tourism, and shipping.

Census data from 2000 shows that the block groups within ½ mile of each end of the bridge there are about 8,000 residents. The percent of population whose income is below the poverty level is 36.5%, compared to 13.1% in the city of Portland as a whole.

Population in the surrounding community is 75.5% White, 10.9% Black, 2.6% American Indian and Alaska Native, 2.5% Asian, 0.4% Pacific Islander, 2.7% some other race, and 5.3% two or more races. Persons of Hispanic or Latino origin make up 7.3%.

Population in Portland as a whole is 77.8% White, 6.4% Black, 1.0% American Indian and Alaska Native, 2.5% Asian, 6.4% Pacific Islander, 3.6% some other race, and 4.5% two or more races. Persons of Hispanic or Latino origin make up 6.8%.

Exhibit 1. Zoning and Land Use
Steel Bridge, Portland

Analysis by J. Koloszar; Analysis Date: July 7, 2010; File Name: PublicServices_FEIS_SteelBrdg.mxd

Noise and Vibration Impact Analysis

Steel Bridge Improvements
New Starts Portion of CRC Project

July 2010

Prepared for:

Metro
Portland, Oregon

Prepared by:

Michael Minor & Associates
Portland, Oregon

Contents

Summary

Tables

Figures

Appendices

Acronyms and Abbreviations

dB	decibel
dBA	A-weighted decibel
FTA	Federal Transit Administration
Hz	hertz
L_{eq}	equivalent sound level
Ldn	24-hour equivalent sound level with 10 dB penalty factor for nighttime hours
USDOT	U.S. Department of Transportation

1. Introduction

This noise analysis was prepared at the request of Metro, the FTA and Parametrix, Inc. The purpose of the study is to provide an analysis of potential noise and vibration related issues and impacts associated with the proposed improvements to the Steel Bridge light rail alignment.

1.1. Project Description

Currently, all Light Rail Transit (LRT) lines within the regional TriMet MAX system cross over the Willamette River in downtown Portland via the Steel Bridge. The Steel Bridge was built in 1912 and retrofitted to receive light rail vehicles in 1984 to accommodate the TriMet Blue Line MAX light rail to Gresham. In 1986, when the light rail opened, there were 40 light rail vehicles that crossed the bridge during the 4-hour PM peak period; in 2007, with the Red and Yellow Lines constructed, 116 light rail vehicles crossed the bridge during the 4-hour PM peak period. Currently, TriMet has completed constructing the I-205 South Corridor Project that extended LRT to Clackamas Town Center increasing the number of vehicles that cross the Steel Bridge to 152 during the 4-hour PM peak period. With a peak period headway of 8 minutes, the CRC Project will increase the number of light rail vehicles that cross the Steel Bridge in 2030 during the 4 hour PM peak period to 176 trains counting both directions of travel. Included in the New Starts portion of the CRC project is a retrofit to the existing rails within the Steel Bridge to increase the allowed LRT speed over the Willamette River on the Steel Bridge.

The Steel Bridge lifts to allow large boats to navigate the Willamette River. Currently, the lift joints in the rails limit the crossing speed of LRT vehicles to 10 miles per hour (mph) or less. This is due to the vibrations at these joints disrupting the signaling and electrification system. Modifications to reduce the wheel rise from the lift joint would decrease the bridge vibration, allowing an increase to the travel speed over the bridge to 15 mph and improving the speed of the regional LRT system as a whole.

There is an existing signal case on the lift span that cannot withstand high levels of vibration. Furthermore, the OCS (overhead catenary system) is not designed to withstand the high levels of vibration that are generated with speeds above 10 mph.

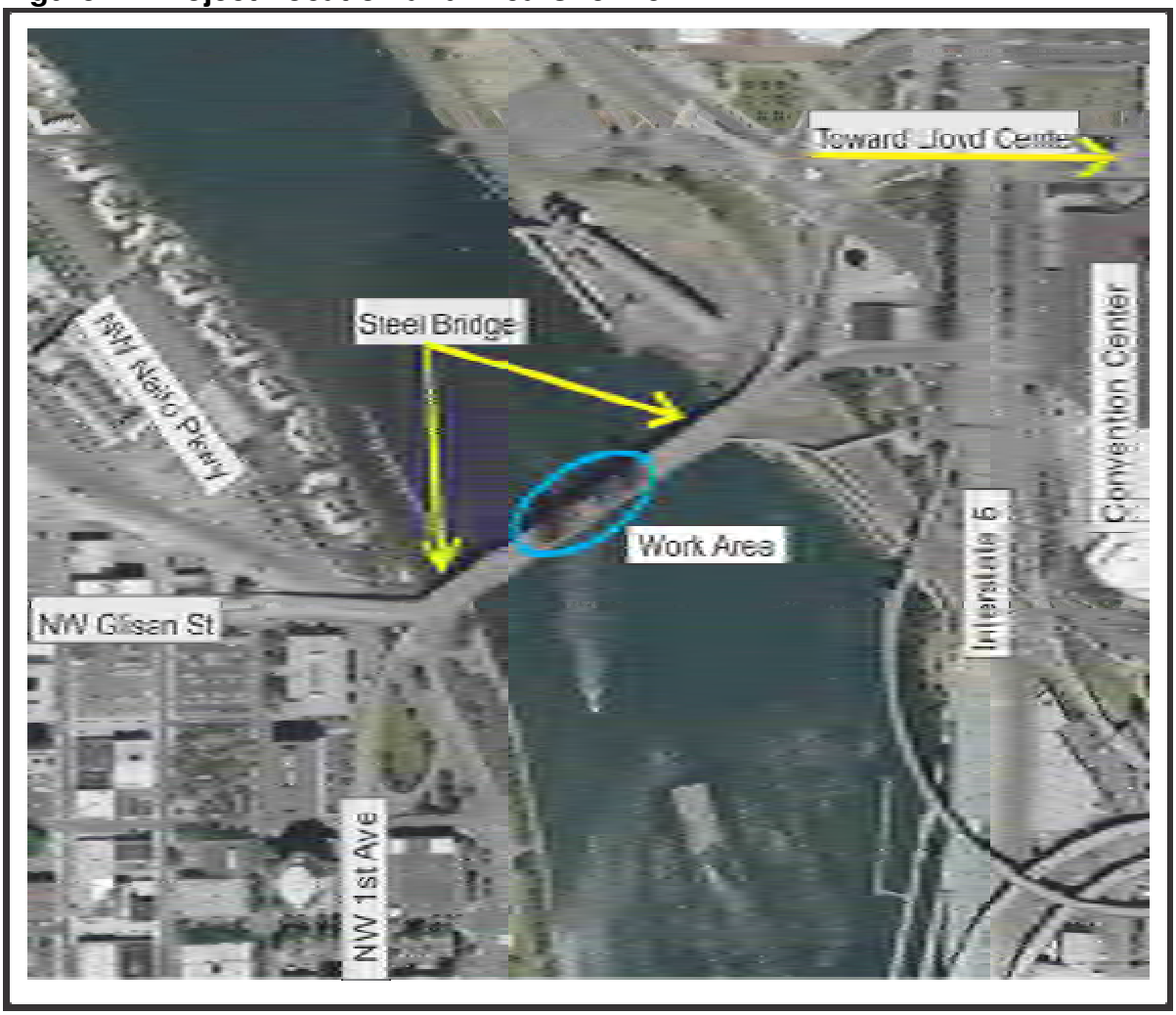
The work needed to increase the speed limits to 15 mph over the lift spans would include the following:

1. Grind the rails to remove the lift joint bumps. Also, grind all of the existing rail on the tangent portion of the Steel Bridge to remove rail corrugation and any rough field welds.
2. Install a vibration pad under the signal case to dissipate vibration.
3. Stiffen the OCS brackets to allow for greater impact as the catenary transfers from the fixed to movable span.
4. Make LRT signal adjustments and traffic signal adjustments for NW Everett Street and N Interstate Avenue to accommodate the higher speeds.

1.2. Analysis Requirements

This report was prepared as required the FTA. A complete description of the procedures and methodology used in the analysis is given in the Methodology Section. A bibliography of the technical support documents used for this report is in Appendix A.

Figure 1: Project Location and Area Overview



2. Methodology

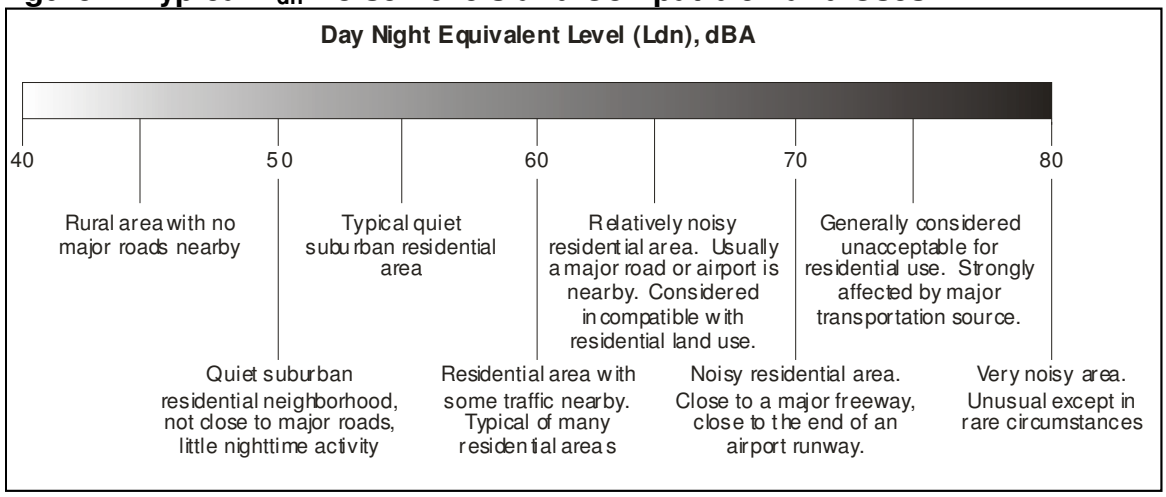
This section provides the results of the noise and vibration impact assessment conducted for the Steel Bridge Improvement Project. The following sections provide an introduction to noise and vibration, the FTA criteria and analysis methods.

2.1. Introduction to Noise

Noise is defined as unwanted sound, which is measured in terms of sound pressure level and is usually expressed in decibels (dB). The human ear is less sensitive to higher and lower frequencies than to mid-range frequencies. Therefore, a weighting system that filters out higher and lower frequencies in a manner similar to the human ear was developed. Measurements made with this weighting system are termed "A-weighted" and are specified as "dBA" readings.

The L_{max} is the loudest instantaneous noise level during a pre-set measurement period. The equivalent sound level (L_{eq}) is the level of a constant sound for a specified period of time that has the same sound energy as an actual fluctuating noise over the same period of time. The day-night sound level (L_{dn}) is an L_{eq} over a 24-hour period, with a 10 dBA penalty factor added to nighttime sound levels occurring between 10 p.m. and 7 a.m. The L_{dn} is the primary noise level descriptor for light rail noise at residential land uses. The peak-hour L_{eq} is used for all traffic and light rail noise analysis for locations with daytime use, such as schools and libraries. Figure 2 is a graph of typical L_{dn} noise levels and residential land use compatibility.

Figure 2. Typical L_{dn} Noise Levels and Compatible Land Uses



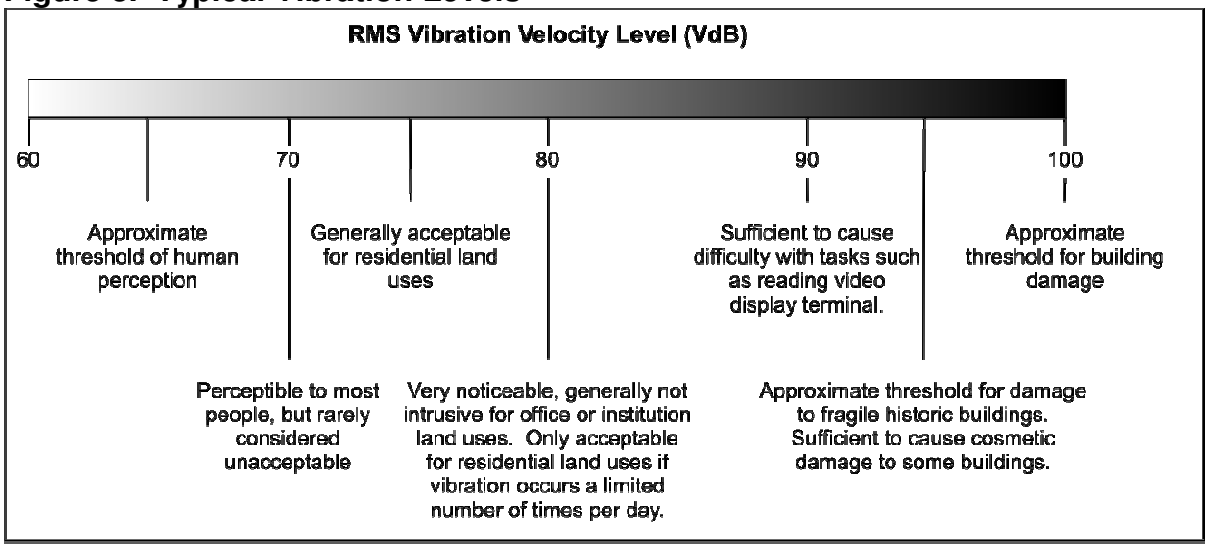
Source: FTA 2006.

2.2. Introduction to Vibration

There are two components of vibration, ground-borne noise and ground-borne vibration. Ground-borne noise is normally associated with subway systems and is not an issue on this

project because all alignments are at-grade or elevated. Ground-borne vibration is defined as a rapidly fluctuating motion that is transmitted through the ground from the vibration source to a receiver. Although ground-borne vibration attenuates over distance, some soil types transmit the vibration quite efficiently, while others do not. The response of humans, buildings, and sensitive equipment to vibration is described in this section in terms of the root-mean-square (RMS) velocity level in decibel units (VdB). As a point of reference, the average person can just barely perceive vibration velocity levels below 70 VdB. Figure 3 compares typical ground-borne vibration levels.

Figure 3. Typical Vibration Levels



Source: FTA 2006.

2.3. FTA Noise and Vibration Criteria

The impact criteria given in the Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration (FTA, revised May 2006), is based on research of community reaction to noise, and it reflects changes in noise exposure by using a sliding scale. The vibration criteria is also based on use, and for most land uses is based on a single number, however the vibration criteria also has several categories of special use buildings, such as recording studios and concert halls, where vibration and ground-borne noise can impact the facilities operations.

2.3.1. FTA Noise Impact Criteria

The FTA Noise Impact Criteria group noise-sensitive land uses into the following three categories that are taken directly from the FTA Manual:

- **Category 1.** Buildings or parks where quiet is an essential element of their purpose.

- **Category 2.** Residences and buildings where people normally sleep. This includes residences, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance.
- **Category 3.** Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, and churches.

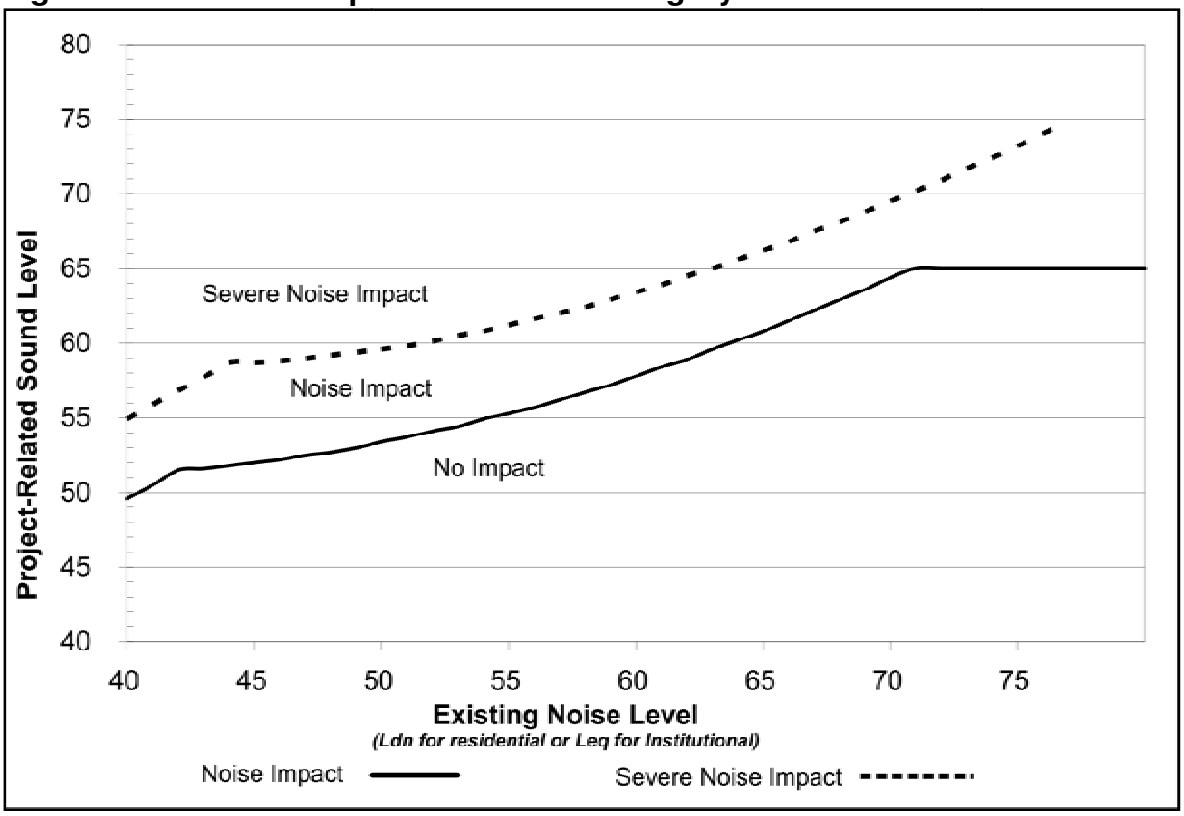
The L_{dn} descriptor is used to characterize noise exposure for residential areas (Category 2). Maximum one-hour L_{eq} during the period that the facility is occupied is used for other noise-sensitive land uses, such as school buildings (Category 3). The Portland-Milwaukie Light Rail Project corridor was examined extensively, and the only Category 1 land use identified in the corridor is the Digital One production studio. There are no noise impact criteria for commercial or industrial land use under FTA criteria.

There are two levels of impact—severe and moderate—included in the FTA noise criteria. The interpretation of these two levels of impact is summarized below:

- **Severe.** Severe noise impacts are considered "significant," as this term is used in the National Environmental Policy Act (NEPA). Noise mitigation will normally be specified for severe, or significant, impact areas unless there is no practical method of mitigating the noise.
- **Moderate.** In this range, other project-specific factors, such as the types and number of noise-sensitive land uses that are affected, existing outdoor-indoor sound insulation, and the cost-effectiveness of mitigating noise, must be considered to determine the magnitude of the impact and the need for mitigation.

The noise impact criteria for light rail operations are summarized in Figure 4. The bottom axis of the graph represents the existing L_{dn} at the receiver location, and the side axis represents the noise resulting from the project. The graph shows that as the existing noise exposure increases, the amount of the allowable increase in the overall noise exposure caused by the project decreases. For example, a receiver with an existing L_{dn} of 65 dBA would have an impact if project noise levels equaled, or were greater than, 61 dBA L_{dn}, and the impact would be considered severe if the project L_{dn} was greater than 66 dBA L_{dn}.

Figure 4. FTA Noise Impact Criteria for Category 1 or 2 Land Uses



2.3.2. Ground-Borne Vibration and Ground-Borne Noise Criteria

FTA has developed impact criteria for acceptable levels of ground-borne noise and vibration. Experience with ground-borne vibration from rail systems and other common vibration sources suggest that:

- Ground-borne vibration from transit trains should be characterized in terms of the RMS vibration velocity amplitude. A one-second RMS time constant is assumed. This is in contrast to vibration from blasting and other construction procedures that have the potential of causing building damage. When looking at the potential for building damage, ground-borne vibration is usually expressed in terms of the peak particle velocity (PPV).
- The threshold of vibration perception for most humans is around 65 VdB, levels in the 70 to 75 VdB range are often noticeable but acceptable, and levels greater than 80 VdB are often considered unacceptable.
- For urban transit systems with 10 to 20 trains per hour throughout the day, limits for acceptable levels of residential ground-borne vibration are usually between 70 and 75 VdB.
- Ground-borne vibration from any type of train operations will rarely be high enough to cause any sort of building damage, even minor cosmetic damage. The only real concern is that the vibration will be intrusive to building occupants or interfere with vibration-sensitive equipment.

Table 1 summarizes the FTA impact criteria for ground-borne vibration and ground-borne noise. These criteria are based on previous standards, criteria, and design goals, including ANSI S3.29 and the noise and vibration guidelines of the American Public Transit Association. Land use categories are described in the following paragraph.

Table 1. Criteria for Vibration Impacts

Land Use Category	Category Comment	Ground-borne Vibration (VdB re 1 micro in/sec)		Ground-borne Noise (dBA re 20 micro Pa)	
		Events*			
		Frequent	Infrequent	Frequent	Infrequent
1	Low interior vibration and noise is essential	65	65	n/a	n/a
2	Residential & sleep	72	80	35	43
3	Institutional & daytime	75	83	40	48

* Frequent is defined as greater than or equal to 70 events per day.

** See section 12.2.2 of FTA Manual re: potential for structural damage to fragile structures if operational during transit events.

Source: FTA 2006

As shown in Table 1, some land use activities are more sensitive to vibration than others. The FTA assigns sensitive land uses to the following three categories:

- Vibration Category 1: High Sensitivity – Buildings where low ambient vibration is essential for the interior operations in the building. Vibration levels may be below the level of human perception.
- Vibration Category 2: Residential – Residences and buildings where people normally sleep. This includes private dwellings, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance. It is common practice to also use this category as a standard for some special uses such as auditoriums or theaters.
- Vibration Category 3: Institutional – Land uses with primarily daytime use including schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment.

2.3.2.1. Light Rail Noise and Vibration Analysis Methods

The light rail noise and vibration analysis was performed in accordance with the Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration (FTA, revised May 2006). Models were developed to predict noise and vibration using the methods given in the FTA Manual. Inputs to the models include the track type (elevated, at-grade, and embedded), distance from the light rail tracks to sensitive properties, train speed, number of trains per hour per day, and special trackwork such as switches. The FTA manual provides the following factors for special and elevated trackwork:

- At-grade ballast and tie track + 0 dBA
- Jointed track and switches + 5 dBA
- Elevated trackway + 4 dBA
- Embedded trackway + 3 dBA

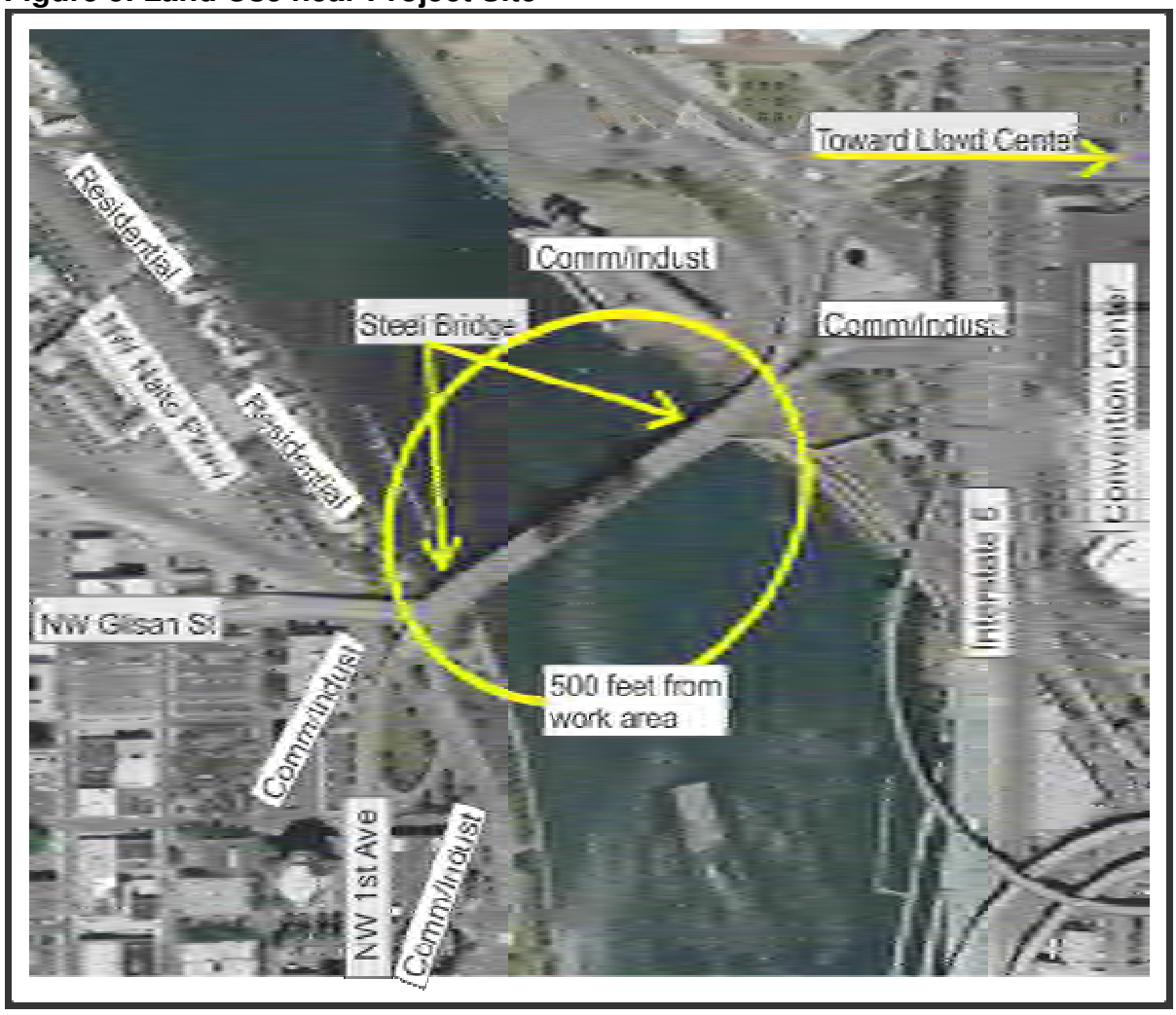
Light rail vibration impacts were determined using the equations provided by the FTA and the measured vibration levels from TriMet's light rail vehicles. The measured levels were adjusted to the specific location and track type. The corrected vibration levels were compared to the appropriate vibration criteria, and vibration impacts were identified.

3. Noise and Vibration Analysis

3.1. Land Use

Land use near the work area includes a large multi-family community that is over 600 feet from the light rail alignment along with several commercial and industrial uses. The residences are located on the west side of the bridge, north of the alignment. All other uses are commercial and industrial or well shielded from the site. Figure 5 is an aerial view with nearby land use identified.

Figure 5. Land Use near Project Site



3.2. Noise Analysis

Peak hour noise levels were predicted for the existing conditions and future build conditions. Currently, the number of vehicles that cross the Steel Bridge is 152 during the 4-hour PM peak period. With a peak period headway of 8 minutes, the CRC Project will increase the number of light rail vehicles that cross the Steel Bridge in 2030 during the 4 hour PM peak period to 176 trains counting both directions of travel. This would result in one two car train crossing the bridge every 3 minutes.

Included in the New Starts portion of the CRC project is a retrofit to the existing rails within the Steel Bridge to increase the allowed LRT speed over the Willamette River on the Steel Bridge. Currently, the lift joints in the rails limit the crossing speed of LRT vehicles to 10 miles per hour (mph) or less. This is due to the vibrations at these joints disrupting the signaling and electrification system. Modifications to reduce the wheel rise from the lift joint would decrease the bridge vibration, allowing an increase to the travel speed over the bridge to 15 mph and improving the speed of the regional LRT system as a whole.

The resulting change in noise levels related to the increased light rail traffic across the Steel Bridge was calculated at 6 dBA L_{eq} during peak-hour and the 24-hour L_{dn} increase is approximately 5 dBA. Figure 6 is a graph of the peak-hour L_{eq} versus distance and Figure 7 provides the results for the L_{dn}. There are no noise sensitive receivers located within 350 feet of the alignment and no noise impacts are projected.

3.2.1. Wheel Squeal Noise

Wheel squeal occurs on tight radius curves and is a result of the inner wheels slipping on the rails. It typically happens on curves with a radius of 300 feet or less, but has, on occasion, been identified on larger curves when combined with elevation changes or super elevations. The only two curves near this site are the curves on either side of the bridge. Both of these curves have radii of around 500 feet or more and have been in use for several years, and no major wheel squeal was identified. Because the squeal is associated with track curvature, and not related to the number or trains, wheel squeal is not predicted to result in any noise impacts.

Figure 6. Peak Hour L_{eq} Noise Levels versus Distance

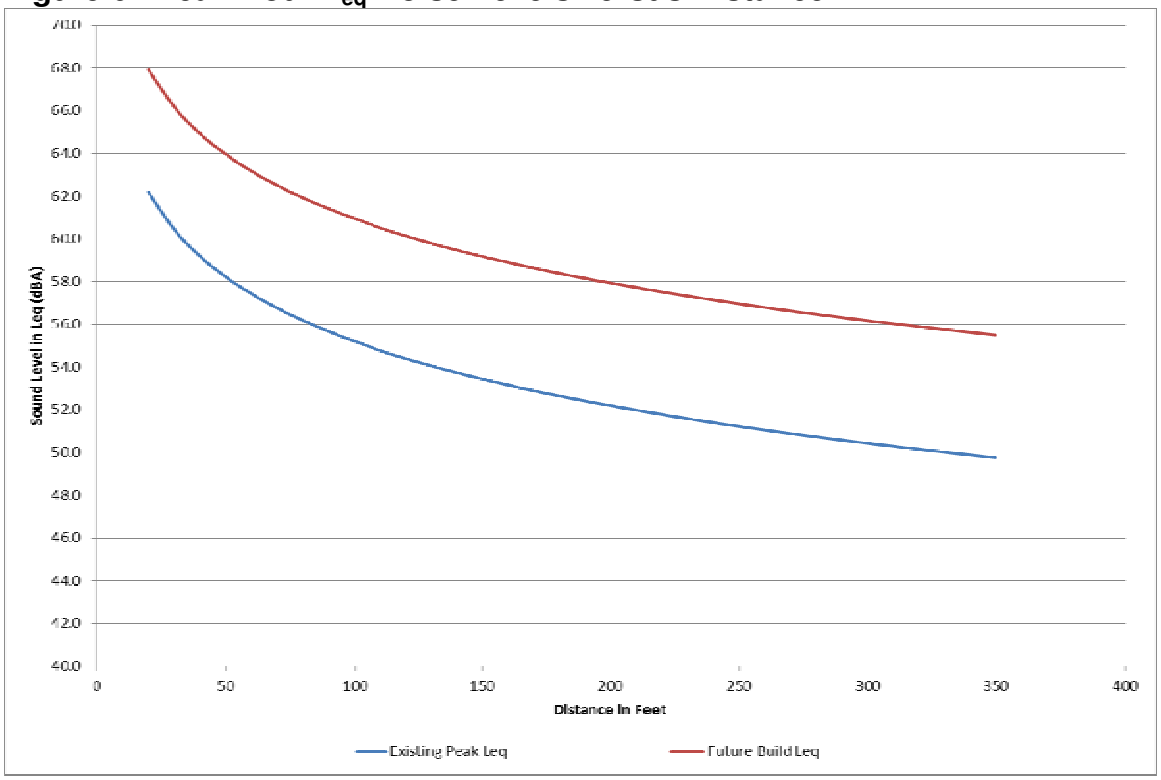
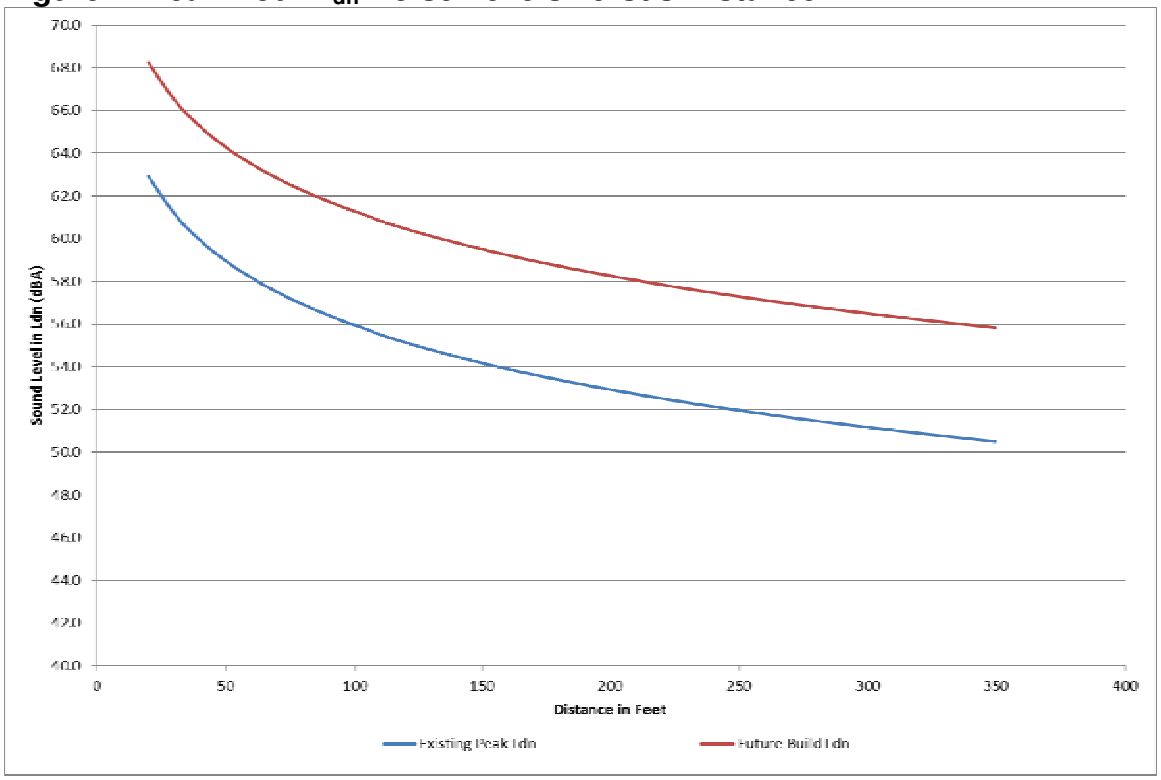


Figure 7. Peak Hour L_{dn} Noise Levels versus Distance



3.3. Vibration Analysis

There is a break in the rail required for lift span operation. The break in the rails leaves a small gap that produces a vibration peak when the train wheels cross over. By modifying the break in the rail on the structure with a flange bearing, the usual impact that occurs when the train crosses over the opening will be greatly reduced. Vibration reductions of up to 5 Vdb are typical for this type of modification.

The closest building to the light rail alignment is the Oregon Department of Transportation Region 1 headquarters on NW Flanders at NW 1st Ave. Current vibration levels are projected to range from 65 to 68 VdB at this location. The building is adjacent to the retained fill and elevated structure that connects to the Steel Bridge and is approximately 60 to 70 feet from the near track. Because no modifications are proposed in this area, the vibration levels are not predicted to change from the 65 to 68 VdB projections, which are well below the FTA criteria of 75 VdB for a commercial building.

The only other concern is for vibration levels on the bridge causing issues with the electronics that control the bridge functions. Current vibration levels are predicted at 82 to 84 VdB at the control box. With the switch modifications, vibration reducing mats, and increased speed, vibration levels are actually predicted to reduce to between 77 and 80 VdB or lower. Since the future vibration levels are predicted to be lower than the current levels, the proposed project is not predicted to cause any issues with the overhead catenary system. The vibration mats under the existing signal case on the lift span are also predicted to reduce overall vibration levels for the equipment to less than the current levels.

4. Noise and Vibration Mitigation

No noise or vibration impact was identified and no mitigation is proposed.

5. Construction Noise Analysis

Construction noise and vibration as related to the project are given in the following sections. Information provided includes potential construction noise levels and construction noise mitigation.

5.1. Construction Noise Levels

Construction noise would be generated by equipment used during modifications to the bridge structure. Construction activities would be limited to the bridge structure. Equipment required for the project could include generators, metal grinders, fork lifts, welders, compressors and light plants. The nearest noise sensitive properties would be the multi-family units located to the north of the bridge, approximately 450 feet from the worksite.

There are currently no criteria for construction noise during daytime hours in the City of Portland. Therefore, if the work can be performed during daytime hours, no construction noise impacts would be predicted. However, given the volume of trains using the bridge daily, it is

unlikely that the project could be completed with daytime only work. If nighttime work was proposed, a noise variance from the City of Portland would be required.

5.2. Construction Mitigation Measures

Several construction noise abatement methods can be implemented to limit the impacts. All engine-powered equipment can be required to have mufflers installed according to the manufacturer's specifications, and all equipment can be required to comply with pertinent equipment noise standards of the U.S. Environmental Protection Agency.

If specific noise complaints are received during construction, the contractor, at his own expense, may be required to implement one or more of the following noise mitigation measures, as directed by the project manager:

- Locate stationary construction equipment as far from nearby noise-sensitive properties as possible.
- Shut off idling equipment.
- Reschedule construction operations to avoid periods of noise annoyance identified in the complaint.
- Notify nearby residents whenever extremely noisy work will be occurring.
- Install temporary or portable acoustic barriers around stationary construction noise sources.

Finally, because of the local noise ordinance, construction activities outside the hours of 7:00 a.m. and 10:00 p.m. on weekdays, and 9:00 a.m. and 10:00 p.m. on weekends may require a noise variance.

5.3. Construction Vibration Methods and Impact Guidelines

There are no specific regulations or criteria that are applicable to vibration related to construction activities. However, SEPA and NEPA guidelines allow federal, state, and local agencies the authority to determine acceptable levels of construction vibration using guidelines, research, and professional standards. The USDOT guidelines for acceptable vibration levels from construction activities recommend that the maximum peak-particle velocity levels remain below 1.27 inches per second at structures nearest the construction site. Vibration levels above 1.27 inches per second have the potential to cause architectural damage to normal dwellings. The USDOT also states that vibration levels above 0.64 inch per second can be annoying to people and disrupt normal working or living environments (USDOT 1978). No vibration related issues are predicted during construction.

Appendix A

References

FTA. 2006. *Transit Noise and Vibration Impact Assessment*. See U.S. Department of Transportation, 1995.