INTERSTATE 5 COLUMBIA RIVER CROSSING

Aviation Technical Report

May 2008

Columbia River CROSSING

TO: Readers of the CRC Technical Reports

FROM: CRC Project Team

SUBJECT: Differences between CRC DEIS and Technical Reports

The I-5 Columbia River Crossing (CRC) Draft Environmental Impact Statement (DEIS) presents information summarized from numerous technical documents. Most of these documents are discipline-specific technical reports (e.g., archeology, noise and vibration, navigation, etc.). These reports include a detailed explanation of the data gathering and analytical methods used by each discipline team. The methodologies were reviewed by federal, state and local agencies before analysis began. The technical reports are longer and more detailed than the DEIS and should be referred to for information beyond that which is presented in the DEIS. For example, findings summarized in the DEIS are supported by analysis in the technical reports and their appendices.

The DEIS organizes the range of alternatives differently than the technical reports. Although the information contained in the DEIS was derived from the analyses documented in the technical reports, this information is organized differently in the DEIS than in the reports. The following explains these differences. The following details the significant differences between how alternatives are described, terminology, and how impacts are organized in the DEIS and in most technical reports so that readers of the DEIS can understand where to look for information in the technical reports. Some technical reports do not exhibit all these differences from the DEIS.

Difference #1: Description of Alternatives

The first difference readers of the technical reports are likely to discover is that the full alternatives are packaged differently than in the DEIS. The primary difference is that the DEIS includes all four transit terminus options (Kiggins Bowl, Lincoln, Clark College Minimum Operable Segment (MOS), and Mill Plain MOS) with each build alternative. In contrast, the alternatives in the technical reports assume a single transit terminus:

- Alternatives 2 and 3 both include the Kiggins Bowl terminus
- Alternatives 4 and 5 both include the Lincoln terminus

In the technical reports, the Clark College MOS and Mill Plain MOS are evaluated and discussed from the standpoint of how they would differ from the full-length Kiggins Bowl and Lincoln terminus options.

Difference #2: Terminology

Several elements of the project alternatives are described using different terms in the DEIS than in the technical reports. The following table shows the major differences in terminology.

DEIS terms	Technical report terms
Kiggins Bowl terminus	I-5 alignment
Lincoln terminus	Vancouver alignment
Efficient transit operations	Standard transit operations
Increased transit operations	Enhanced transit operations

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Difference #3: Analysis of Alternatives

The most significant difference between most of the technical reports and the DEIS is how each structures its discussion of impacts of the alternatives. Both the reports and the DEIS introduce long-term effects of the full alternatives first. However, the technical reports then discuss "segment-level options," "other project elements," and "system-level choices." The technical reports used segment-level analyses to focus on specific and consistent geographic regions. This enabled a robust analysis of the choices on Hayden Island, in downtown Vancouver, etc. The system-level analysis allowed for a comparative evaluation of major project components (replacement versus supplemental bridge, light rail versus bus rapid transit, etc). The key findings of these analyses are summarized in the DEIS; they are simply organized in only two general areas: impacts by each full alternative, and impacts of the individual "components" that comprise the alternatives (e.g. transit mode).

Difference #4: Updates

The draft technical reports were largely completed in late 2007. Some data in these reports have been updated since then and are reflected in the DEIS. However, not all changes have been incorporated into the technical reports. The DEIS reflects more recent public and agency input than is included in the technical reports. Some of the options and potential mitigation measures developed after the technical reports were drafted are included in the DEIS, but not in the technical reports. For example, Chapter 5 of the DEIS (Section 4(f) evaluation) includes a range of potential "minimization measures" that are being considered to reduce impacts to historic and public park and recreation resources. These are generally not included in the technical reports. Also, impacts related to the stacked transit/highway bridge (STHB) design for the replacement river crossing are not discussed in the individual technical reports, but are consolidated into a single technical memorandum.

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Cover Sheet

Interstate 5 Columbia River Crossing

Aviation Technical Report:

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Appendices

ACRONYMS

Acronym	Description
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
API	Area of Potential Impact
AQMA	Air Quality Management Area
BMP	Best Management Practice
BNSF	Burlington Northern Santa Fe Railroad
BPA	Bonneville Power Administration
BRT	Bus Rapid Transit
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
ft	feet/foot
HUC	Hydrological Unit Code
LRT	Light Rail Transit
NEPA	National Environmental Policy Act
ROW	right-of-way
TDM	Transportation Demand Management
WRD	Oregon Department of Water Resources
WSDOT	Washington State Department of Transportation

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1. Summary

1.1 Introduction

The CRC project is looking at ways to improve the I-5 bridge to benefit the motorists, transit users, cyclists, and pedestrians who depend on it. However, other forms of transportation are also affected by the crossing. Air traffic to and from nearby airports must avoid tall structures such as the bridge lift towers.

When proposing changes to the river crossing, it is important to consider the beneficial or adverse effects to aviation and navigation as well as transportation on the bridge. One goal of the CRC project is to minimize hazards to Columbia River navigation and air navigation from Pearson Field. However, these efforts conflict, as recommended clear heights for river navigation overlap with recommended clear airspace for Pearson Field. Some obstruction of river and air traffic is inevitable, but the project has worked to balance the two interests fairly.

1.2 Description of the Alternatives

The alternatives being considered for the CRC project consist of a diverse range of highway, transit and other transportation choices. Some of these choices – such as the number of traffic lanes across the river – could affect transportation performance and impacts throughout the bridge influence area or beyond. These are referred to as "system-level choices." Other choices – such as whether to run high-capacity transit (HCT) on Washington Street or Washington and Broadway Streets – have little impact beyond the area immediately surrounding that proposed change and no measurable effect on regional impacts or performance. These are called "segment-level choices." This report discusses the impacts from both system- and segment-level choices, as well as "full alternatives." The full alternatives combine system-level and segment-level choices for highway, transit, pedestrian, and bicycle transportation. They are representative examples of how project elements may be combined. Other combinations of specific elements are possible. Analyzing the full alternatives allows us to understand the combined performance and impacts that would result from multimodal improvements spanning the bridge influence area.

Following are brief descriptions of the alternatives being evaluated in this report, which include:

- System-level choices,
- Segment-level choices, and
- Full alternatives.

1.2.1 System-Level Choices

System-level choices have potentially broad influence on the magnitude and type of benefits and impacts produced by this project. These options may influence physical or

operational characteristics throughout the project area and can affect transportation and other elements outside the project corridor as well. The system-level choices include:

- River crossing type (replacement or supplemental)
- High-capacity transit mode (bus rapid transit or light rail transit)
- Tolling (no toll, I-5 only, I-5 and I-205, standard toll, higher toll)

This report compares replacement and supplemental river crossing options. A replacement river crossing would remove the existing highway bridge structures across the Columbia River and replace them with three new parallel structures – one for I-5 northbound traffic, another for I-5 southbound traffic, and a third for HCT, bicycles, and pedestrians. A supplemental river crossing would build a new bridge span downstream of the existing I-5 bridge. The new supplemental bridge would carry southbound I-5 traffic and HCT, while the existing I-5 bridge would carry northbound I-5 traffic, bicycles, and pedestrians. The replacement crossing would include three through-lanes and two auxiliary lanes for I-5 traffic in each direction. The supplemental crossing would include three through-lanes and one auxiliary lane in each direction.

Two types of HCT are being considered – bus rapid transit and light rail transit. Both would operate in an exclusive right-of-way through the project area, and are being evaluated for the same alignments and station locations. The HCT mode – LRT or BRT – is evaluated as a system-level choice. Alignment options and station locations are discussed as segment-level choices. BRT would use 60-foot or 80-foot long articulated buses in lanes separated from other traffic. LRT would use one- and two-car trains in an extension of the MAX line that currently ends at the Expo Center in Portland.

Under the efficient operating scenario, LRT trains would run at approximately 7.5 minute headways during the peak periods. BRT would run at headways between 2.5 and 10 minutes depending on the location in the corridor. BRT would need to run at more frequent headways to match the passenger-carrying capacity of the LRT trains. This report also evaluates performance and impacts for an increased operations scenario that would double the number of BRT vehicles or the number of LRT trains during the peak periods.

1.2.2 Segment-Level Choices

1.2.2.1 *Transit Alignments*

The transit alignment choices are organized into three corridor segments. Within each segment the alignment choices can be selected relatively independently of the choices in the other segments. These alignment variations generally do not affect overall system performance but could have important differences in the impacts and benefits that occur in each segment. The three segments are:

- Segment A1 – Delta Park to South Vancouver
- Segment A2 – South Vancouver to Mill Plain District
- Segment B – Mill Plain District to North Vancouver

In Segment A1 there are two general transit alignment options - offset from, or adjacent to, I-5. An offset HCT guideway would place HCT approximately 450 to 650 feet west of I-5 on Hayden Island. An adjacent HCT guideway across Hayden Island would locate HCT immediately west of I-5. The alignment of I-5, and thus the alignment of an adjacent HCT guideway, on Hayden Island would vary slightly depending upon the river crossing and highway alignment, whereas an offset HCT guideway would retain the same station location regardless of the I-5 bridge alignment.

HCT would touch down in downtown Vancouver at Sixth Street and Washington Street with a replacement river crossing. A supplemental crossing would push the touch down location north to Seventh Street. Once in downtown Vancouver, there are two alignment options for HCT – a two-way guideway on Washington Street or a couplet design that would place southbound HCT on Washington Street and northbound HCT on Broadway. Both options would have stations at Seventh Street, 12th Street, and at the Mill Plain Transit Center between 15th and 16th Streets.

From downtown Vancouver, HCT could either continue north on local streets or turn east and then north adjacent to I-5. Continuing north on local streets, HCT could either use a two-way guideway on Broadway or a couplet on Main Street and Broadway. At 29th Street, both of these options would merge to a two-way guideway on Main Street and end at the Lincoln Park and Ride located at the current WSDOT maintenance facility. Once out of downtown Vancouver, transit has two options if connecting to an I-5 alignment: head east on 16th Street and then through a new tunnel under I-5, or head east on McLoughlin Street and then through the existing underpass beneath I-5. With either option HCT would connect with the Clark College Park and Ride on the east side of I-5, then head north along I-5 to about SR 500 where it would cross back over I-5 to end at the Kiggins Bowl Park and Ride.

There is also an option, referred to as the minimum operable segments (MOS), which would end the HCT line at either the Mill Plain station or Clark College. The MOS options provide a lower cost, lower performance alternative in the event that the full-length HCT lines could not be funded in a single phase of construction and financing.

1.2.2.2 *Highway and Bridge Alignments*

This analysis divides the highway and bridge options into two corridor segments, including:

- Segment A – Delta Park to Mill Plain District
- Segment B – Mill Plain District to North Vancouver

Segment A has several independent highway and bridge alignment options. Differences in highway alignment in Segment B are caused by transit alignment, and are not treated as independent options.

There are two options for the replacement crossing – it could be located either upstream or downstream of the existing I-5 bridge. At the SR 14 interchange there are two basic configurations being considered. A traditional configuration would use ramps looping

around both sides of the mainline to provide direct connection between I-5 and SR 14. A less traditional design could reduce right-of-way requirements by using a "left loop" that would stack both ramps on the west side of the I-5 mainline.

1.2.3 Full Alternatives

Full alternatives represent combinations of system-level and segment-level options. These alternatives have been assembled to represent the range of possibilities and total impacts at the project and regional level. Packaging different configurations of highway, transit, river crossing, tolling and other improvements into full alternatives allows project staff to evaluate comprehensive traffic and transit performance, environmental impacts and costs.

Exhibit 1-1 summarizes how the options discussed above have been packaged into representative full alternatives.

Exhibit 1-1. Full Alternatives

	Packaged Options				
Full Alternative	River Crossing Type	HCT Mode	Northern Transit Alignment	TDM/TSM Type	Tolling Method[a]
1	Existing	None	N/A	Existing	None
2	Replacement	BRT	I-5	Aggressive	Standard Rate
3	Replacement	LRT	I-5	Aggressive	Two options[b]
4	Supplemental	BRT	Vancouver	Very Aggressive	Higher rate
5	Supplemental	LRT	Vancouver	Very Aggressive	Higher rate

[a] *In addition to different tolling rates, this report evaluates options that would toll only the I-5 river crossing and options that would toll both the I-5 and the I-205 crossings.*

[b] *Alternative 3 is evaluated with two different tolling scenarios, tolling and non-tolling.*

Modeling software used to assess alternatives' performance does not distinguish between smaller details, such as most segment-level transit alignments. However, the geographic difference between the Vancouver and I-5 transit alignments is significant enough to warrant including this variable in the model. All alternatives include Transportation Demand Management (TDM) and Transportation System Management (TSM) measures designed to improve efficient use of the transportation network and encourage alternative transportation options to commuters such as carpools, flexible work hours, and telecommuting. Alternatives 4 and 5 assume higher funding levels for some of these measures.

Alternative 1: The National Environmental Policy Act (NEPA) requires the evaluation of a No-Build or "No Action" alternative for comparison with the build alternatives. The No-Build analysis includes the same 2030 population and employment projections and the same reasonably foreseeable projects assumed in the build alternatives. It does not include any of the I-5 CRC related improvements. It provides a baseline for comparing the build alternatives, and for understanding what will happen without construction of the I-5 CRC project.

Alternative 2: This alternative would replace the existing I-5 bridge with three new bridge structures downstream of the existing bridge. These new bridge structures would carry Interstate traffic, BRT, bicycles, and pedestrians. There would be three through-lanes and two auxiliary lanes for I-5 traffic in each direction. Transit would include a BRT system that would operate in an exclusive guideway from Kiggins Bowl in Vancouver to the Expo Center station in Portland. Express bus service and local and feeder bus service would increase to serve the added transit capacity. BRT buses would turn around at the existing Expo Station in Portland, where riders could transfer to the MAX Yellow Line.

Alternative 3: This is similar to Alternative 2 except that LRT would be used instead of BRT. This alternative is analyzed both with a toll collected from vehicles crossing the Columbia River on the new I-5 bridge, and with no toll. LRT would use the same transit alignment and station locations. Transit operations, such as headways, would differ, and LRT would connect with the existing MAX Yellow Line without requiring riders to transfer.

Alternative 4: This alternative would retain the existing I-5 bridge structures for northbound Interstate traffic, bicycles, and pedestrians. A new crossing would carry southbound Interstate traffic and BRT. The existing I-5 bridges would be re-striped to provide two lanes on each structure and allow for an outside safety shoulder for disabled vehicles. A new, wider bicycle and pedestrian facility would be cantilevered from the eastern side of the existing northbound (eastern) bridge. A new downstream supplemental bridge would carry four southbound I-5 lanes (three through-lanes and one auxiliary lane) and BRT. BRT buses would turn around at the existing Expo Station in Portland, where riders could transfer to the MAX Yellow Line. Compared to Alternative 2, increased transit service would provide more frequent service. Express bus service and local and feeder bus service would increase to serve the added transit capacity.

Alternative 5: This is similar to Alternative 4 except that LRT would be used instead of BRT. LRT would have the same alignment options, and similar station locations and requirements. LRT service would be more frequent (approximately 3.5 minute headways during the peak period) compared to 7.5 minutes with Alternative 3. LRT would connect with the existing MAX Yellow Line without requiring riders to transfer.

1.3 Long-Term Effects

Long-term effects to aviation were evaluated using a combination of federal regulations and Federal Aviation Administration (FAA) procedures. The following list highlights the regulations used to evaluate long-term effects.

- Federal Aviation Regulation (FAR) 14 Code of Federal Regulations (CFR) Part 77 surfaces – these surfaces, sometimes called the imaginary surfaces, are used to evaluate all obstructions around an airport that may be hazardous to aviation at that facility.
- United States Standard for Terminal Instrument Procedures **(**TERPS) Obstacle Clearance Surfaces (OCS) – One of the OCS surfaces involves obstacle

clearances for aircraft departing a runway using Instrument Flight Rules (IFR) procedures. This surface, sometimes called the departure surface, is used to determine instrument departure procedures, including calculation of climb gradients and identification of potentially hazardous obstructions.

- One engine operative (OEI) obstacle identification surface – This surface is similar to the OCS departure surface. It is used only at airports that support air carrier operations. For the purposes of the I-5 CRC project this surface only applies to Portland International Airport. The OEI has a shallower, more stringent, slope than the OCS to account for aircraft engine failure at takeoff.

Other criteria used for evaluation of effects to aviation include dust or emissions that may limit visibility, electronic interference to communication and navigation systems, lights or glare that may affect visibility, and fostering of wildlife that may increase the probability of aircraft strikes.

1.3.1 System-wide Effects

The long-term effects to both facilities are summarized below.

Portland International Airport (PDX)

None of the alternatives under consideration by the Columbia River Crossing Project will have long-term effects on aviation activities at PDX. PDX is located approximately three miles southeast of the I-5 CRC project. At the project location, the most critical surface is above the existing interstate bridge tower and any alternative under consideration by the I-5 CRC project.

Pearson Field (VUO)

Aviation operations into and out of Pearson Field will be improved for the replacement alternatives. The degree of improvement is dependent on the associated profile, superstructure section, signing, lighting, and configuration of the SR 14 interchange that the replacement uses. The replacement alternative and bridge types proposed will obstruct the Pearson Field Obstacle Clearance Surface, but to a lesser degree than the existing Interstate Bridges. Long-term effects on aviation at Pearson Field are not necessarily due to the river crossing structure type. The greatest effects, for the structure types and alignments analyzed are due to ramps within the SR 14 interchange.

Neither The alternative nor any proposed bridge types obstruct the Part 77 imaginary surfaces, assuming careful placement of luminaries and sign bridges. This is a benefit over the existing Interstate Bridges, which currently penetrate the Part 77 imaginary surfaces. The replacement alternative, and bridge types make an improvement when compared with existing conditions.

Supplemental alternatives, in which a new bridge would be constructed and the existing interstate bridges would be reused, will adversely affect aviation at Pearson Field. The existing I-5 Interstate Bridges penetrate Pearson's Part 77 imaginary surfaces. Airspace affected by the existing Interstate Bridges will be further restricted by the supplemental

bridge used for southbound I-5 traffic. A proposed southbound I-5 structure would not affect the Part 77 surfaces, but it would further constrict the westbound departure OCS.

Perhaps the most significant long-term concern to aviation at Pearson Field will be wildlife hazard management. Large bird populations at the end of the runway increase the probability of an aircraft striking one of the birds.

The existing Interstate Bridges truss structures have historically fostered bird populations, creating a hazard to aviation at Pearson Field. Recently, sound canons have been used to reduce the bird populations on the existing Interstate Bridges. Replacement bridges could be designed to prevent supporting bird populations, thereby reducing the hazard to aviation. Keeping the existing bridge and building a supplemental would maintain or increase bird populations compared with the existing conditions.

Open stormwater ponds holding water for more than 48-hours within the wildlife hazard zone can create bird habitat that, in turn, can lead to an aviation hazard. Such ponds are anticipated within the wildlife hazard zone, but proposed open ponds in and around the SR 14 Interchange are particularly hazardous because they are close to the end of Pearson Field's runway. All alternatives will have similar effects with regard to stormwater ponds.

Dust, emissions, or electronic interference that could affect navigation are not anticipated to change from the existing conditions and will not create hazardous conditions for aviation at Pearson Field. This is anticipated to be true for all alternatives.

1.3.1.1 *River Crossing Alternative and Capacity: How does the Supplemental 8-lane crossing compare to the Replacement 10-lane crossing?*

The supplemental 8-lane crossing will maintain or adversely affect aviation activities at Pearson Field when compared with the No Build alternative. The towers on the existing Interstate Bridge's lift spans will remain the prominent feature obstructing airspace. A supplemental bridge could further constrict Pearson Field's airspace, most notably the airspace above the I-5 interchange with SR 14.

Replacement bridges could beneficially affect aviation at Pearson Field. Removal of the existing Interstate Bridges would eliminate obstructions into the Part 77 surfaces. The replacement bridges would not penetrate the Part 77 surfaces. Therefore, the replacement 10-lane crossing alternative would have a beneficial effect on aviation at Pearson field.

Both river crossing alternatives and capacities would have no known effect on aviation at PDX.

1.3.1.2 *Transit Mode: How does BRT compare to LRT?*

There are no effects, as the overhead catenary system for LRT can fit within the 28.5 ft envelope used in this study.

1.4 Temporary Effects

Temporary effects on aviation will result from construction of new Columbia River Bridges, construction of the SR 14 Interchange, and deconstruction or rehabilitation of the existing Interstate Bridges. All temporary effects will be due to construction equipment extending higher than the proposed Columbia River Bridge and existing Interstate Bridges, especially cranes.

The temporary effects to both airports are summarized below.

1.4.1 Portland International Airport (PDX)

The Columbia River Crossing Project will likely not have any temporary effects on aviation activities at PDX.

1.4.2 Pearson Field (VUO)

Short-term effects will be dependent on techniques and equipment required to construct structures, interchanges, and deconstruct the existing bridge. These effects will be present throughout the anticipated three to six year construction project. Cranes used in deconstruction or rehabilitation of the existing bridges and construction of a replacement or supplemental bridge would likely obstruct the Part 77 imaginary surfaces and westbound departure surface more than the existing condition. Construction of the SR 14 interchange may also penetrate the Part 77 surfaces in addition to the westbound departure surface. Temporary obstructions in the SR 14 interchange area will likely be greater than what currently exists. Stockpiling or surcharging of soil, if required, could also further obstruct aviation surfaces compared with the existing condition.

The duration of the temporary effects may be longer with a supplemental alternative, while the replacement could have shortest duration of temporary effects. The seismic retrofit of the existing Interstate Bridges for a supplemental alternative may require cranes that penetrate the Part 77 surfaces for a longer time than the downstream supplemental alternative.

Construction dust or emissions from construction equipment could pose a short-term hazard to aviation by reducing visibility at the end of runway.

Electronic equipment may also cause interference with radio communications.

Temporary stormwater ponds around the SR 14 interchange construction area may also provide a place for birds to land and congregate increasing the potential for an aircraft strike.

1.5 Mitigation

Since PDX will be unaffected by the I-5 Columbia River Crossing (CRC) project, all of the mitigation measures presented below only apply to Pearson Field.

1.5.1 Mitigation of Long-Term Effects

Form 7460-1 (Appendix A) and supporting documentation must be submitted to the FAA, initiating an aeronautical review of the proposed construction. The FAA will thoroughly review proposed construction and its effects on aviation into and out of Pearson Field and PDX. The outcome of the aeronautical review will be a finding of either "No Hazard to Aviation" or "Hazard to Aviation". The FAA will also determine what obstacle marking is appropriate and where to place the obstacle marking. All proposed construction obstructing FAA surfaces must comply with FAA standards for marking obstructions.

No long-term effects are anticipated from dust, emissions, or electronic interference.

As previously mentioned, open stormwater ponds near the airport can lead to increased bird populations, thus increasing the probability of an aircraft striking a bird. Birds can be discouraged from landing on these ponds by many different methods including placing wire mesh over ponds or planting special vegetation to conceal open water.

1.5.2 Mitigation of Short-Term Effects

Any temporary obstructions by cranes, stockpiles, or other construction related equipment must also submit Form 7460-1 to the FAA, initiating and aeronautical review. This submission is required in addition to the process required for permanent structures. Temporary obstruction markings must also comply with FAA standards. This may include, but is not limited to flagging equipment and placing obstruction-warning lights on equipment as required by the FAA.

Dust on the construction site may be controlled by means of watering or other methods that ensure dust does not rise and create a hazard to aviation. Emissions from construction related equipment must also be controlled so that visibility is not reduced.

Temporary stormwater ponds will likely be used within or near the SR 14 Interchange. Wire mesh or other measures may be taken to prevent birds from landing on temporary stormwater ponds near Pearson Field.

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2. Methods

2.1 Introduction

The purpose of this technical report is to identify potential effects the I-5 CRC project could have on aviation activities and Pearson Field and Portland International Airport. Several alignments, bridge types, and interchange configurations were investigated to determine the worst-case effects on aviation at both airports.

FAA surfaces, described in section 2.3, and any other conditions including dust, emissions, electronic interference, and wildlife that may affect aviation were investigated. Potential mitigation measures, if any reasonable measures exist, are presented for undesirable conditions. This project has assumed that impacts in which the Part 77 surfaces or westbound departure surfaces are further compromised when compared to the existing condition will be considered significant.

2.2 Study Area

The analysis area was limited to the primary Area of Potential Impact (API). Further, it was limited to the portion of the API associated with the Columbia River Bridge and SR 14 Interchange for Pearson Field and from the Marine Drive Interchange to the SR 14 Interchange for PDX. Exhibits 2-1 and 2-2 show the portion of the API used for analysis of I-5 CRC project effects on aviation at Pearson Field and PDX.

Effects on aviation were not sensitive to the mode of high capacity transit used, which is the primary differentiator between the I-5 CRC project transit alternatives defined in Section 1.1. Overhead catenary systems used for LRT can fit within the envelopes used for this analysis, which will be described in a later section. Effects to aviation varied by alternative, alignment, and bridge structure type, but they are not sensitive to the mode of high capacity transit.

One replacement and one supplemental bridge were evaluated. Two general bridge types were evaluated for each of the alignments; bridges with all structure beneath the roadway surface such as a deck-arch or concrete segmental bridge, and an extradosed bridge with structure above the roadway surface. Each of the I-5 CRC project alternatives, in conjunction with the various bridge types, was investigated to determine beneficial and adverse effects on aviation.

Exhibit 2-1. Portion of the API Affecting Aviation at Pearson Field

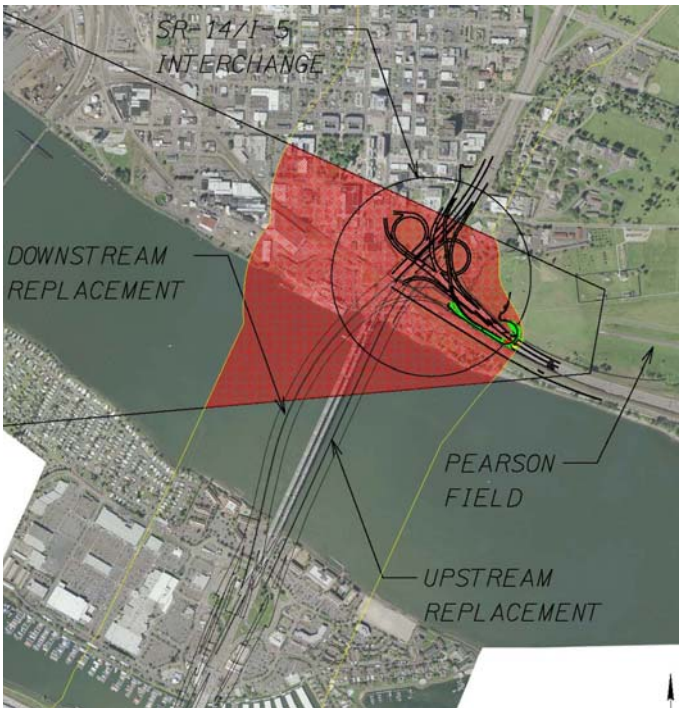

Exhibit 2-2. Portion of the API Affecting Aviation at PDX

Pearson Field (VUO)

Operations at Pearson Field are comprised primarily of piston engine aircraft. Pearson Field is a B-1 small aircraft (weighing 10,000 lbs or less) general aviation airport. There are no plans for future expansion of Pearson Field's facilities or for larger or different types of aircraft to use the airport. Therefore, analysis was based on the Pearson Field as it currently operates.

Portland International Airport (PDX)

PDX was investigated to determine what conditions will exist in the foreseeable future. Plans at PDX include extension of runway 10R-28L and the addition of a future runway south of 10R-28L. All analysis is based on the currently planned build-out of PDX including the runway extensions and additions.

2.3 Effects Guidelines

The following list contains applicable regulatory procedures and guidelines from the FAA, City of Vancouver, and City of Portland. Below each document is a brief description of applicable portions of the document used for this study.

Advisory Circular (AC) 70/7460-2K Proposed Construction or Alteration of Objects that May Affect Navigable Airspace and FAR 14 CFR Part 77 Imaginary Surfaces

FAR Part 77 is the standard by which obstructions in navigable airspace are determined. Any object that penetrates the Part 77 surfaces may be deemed a hazard to aviation. This document establishes standards for determining obstructions in navigable airspace, sets forth the requirements for notice to the FAA of proposed construction or alteration, provides for aeronautical studies of obstructions to air navigation to determine their effect on the safe and efficient use of airspace, and provides for public hearings on the hazardous effect of proposed construction or alteration on air navigation.

Pearson Field is categorized as a general utility runway, therefore the Part 77 surfaces were constructed using a 20:1 approach slope, starting at the end of runway, with a horizontal surface 150 feet above the Pearson Field NAVD88 elevation of 33.47 ft.

United States Standard for Terminal Instrument Procedures (TERPS) Departure Procedure Construction.

TERPS describes how to construct the departure OCS and outlines how to develop departure procedures and calculate climb gradients when an obstacle penetrates the OCS. The OCS for departures is defined as a 40:1 slope beginning at the end of runway. Any object penetrating this obstacle clearance surface must be evaluated. If the OCS is penetrated, then specific departure procedures can usually be developed for that runway. Such procedures include departure routes and climb gradients. Climb gradients greater than 200 ft/Nautical Mile (NM) need to be noted, and climb gradients greater than 500 ft/NM need special consideration from the Flight Standards Service. Climb gradients and departure procedures are developed by the Flight Standards Service.

AC 150/5300-13 Airport Design

AC 150/5300-13 encompasses all airport design procedures. FAR 14 CFR Part 77 and TERPS are both referenced by this document. Change 10 of this document supplements TERPS, stating that beginning January 1, 2008 any runway supporting air carrier operations will require all objects to be evaluated using a one-engine inoperative (OEI) obstacle identification surface defined by a 62.5:1 slope extending from the departure end of runway (DER). This slope allows for commercial aircraft engine failure during departure. Pearson Field does not support air carriers and therefore the OEI obstacle identification surface is not applicable. However, effects on PDX were evaluated using this more stringent criterion.

AC 150/5200-33A Hazardous Wildlife Attractants on or Near Airports

Creating features or habitat which foster birds or other wildlife populations may create a hazard for aviation, increasing the likelihood that aircraft will strike wildlife. This advisory circular establishes a zone, 5,000' from the centerline and runway ends, in which hazardous wildlife attractant should be mitigated, identifies land uses that could promote wildlife populations, and suggests possible mitigation measures for some wildlife attractants. The hazardous wildlife exclusion zone is shown in Exhibit 2-3. It shows that the wildlife exclusion zone is large, extending well beyond the limits of the I-5 CRC project. The areas of primary interest for this project are the bridges and the area in and around the I-5 and SR 14 interchange. These areas are especially sensitive because they are so close to the end of Pearson Field's runway.

Exhibit 2-3. Pearson Field Hazardous Wildlife Exclusion Zone

City of Portland Code (CPC). 2002. "Aircraft Landing Zone." CPC 33.400, as amended. Portland, OR.

The City of Portland restricts the allowable height of structures and vegetation within the FAR Part 77 imaginary surfaces established by the FAA for Portland International Airport. These surfaces define where aircraft generally approach and depart the airport. Exceptions to these restrictions may be approved by the FAA in consultation with the Port of Portland.

City of Vancouver – Vancouver Municipal Code (VMC). 2002. "Vision & Airport Height Overlay District". VMC 20.560, as amended. Vancouver, WA.

The City of Vancouver prohibits development within the Vision & Airport Height Overlay District that could interfere with aircraft operations at Pearson Field. This includes structures that produce light and glare and vertical intrusions into aircraft flight paths.

2.4 Analysis Methods

Potential cumulative effects from this project are evaluated in the Cumulative Effects Technical Report. Please refer to this for an evaluation of possible cumulative effects.

The analysis done for this report and values obtained should not be used for aviation purposes. Values presented in this report are used for comparison and discussion of the CRC project alternatives only. Values presented are not the result of a formal FAA aeronautical study and are not intended to replace the formal FAA Form 7460-1 process.

Profiles and sections of the CRC alternatives were created showing the westbound departure surface and Part 77 imaginary surfaces from both Pearson Field and PDX. FAA AC 70/7460-2K requires that a minimum 17 ft envelope above the roadway surface be created to account for vehicle height. However, other fixed objects such as signs, sign bridges, and luminaries must be accounted for. The envelope used for this analysis was constructed using the required WSDOT bridge clearance of 16.5 ft and adding an additional 12 ft to account for other fixed objects above the 17 ft envelope required for traffic. This results in a design envelope height of 28.5 ft. While this is more stringent than what is required by the FAA, it more accurately represents anticipated conditions on the Columbia River Bridge and SR 14 Interchange.

The 28.5 ft envelope was superimposed onto the section and profiles for all alternatives. In any place where the westbound departure surface was penetrated by the envelope, a climb gradient was calculated from the high point to the end of runway in accordance with procedures defined in TERPS. The maximum climb gradient was reported for each alignment or feature that penetrated the westbound departure surface. If an object or envelope obstructs the Part 77 surfaces, the point and penetration height was recorded.

A review of likely structure types, surface features, and drainage systems was conducted to identify any potential environments that may foster birds or other wildlife. Possible construction methods and staging were investigated for any short-term effects on aviation.

2.4.1 Pearson Field

A preliminary aeronautical study was performed on three alternatives by the FAA in which they stated that the existing departure gradient is 650 ft/NM. If the existing Interstate Bridges were removed, the controlling gradient would be 269 ft/NM due to existing transmission towers on the west end of Hayden Island. If the existing I-5 bridges are removed, the transmission towers on Hayden Island will be the controlling feature. In order for the any CRC project bridges or features not to be a controlling feature, the climb gradient to any new features must be below 269 ft/NM.

2.4.2 Portland International Airport

The OEI obstacle identification surface used for analysis was derived using the extended runway 10R-28L and the future runway. An OEI obstacle identification surface was constructed using a 62.5:1 slope from the end of each runway, in accordance with FAA AC 150/5300-13. The OEI is the lowest, most critical surface from PDX in the API. If there is no penetration of this surface by the CRC project, then the Part 77 surface will also not be affected.

3. Coordination

Several meetings were held with CRC project staff, FAA, Pearson Field Airport Manager, Vancouver Aviation Advisory Committee, and WSDOT Aviation Division to introduce CRC project concepts, identify concerns and conduct a preliminary review of some conceptual level alternatives. These meeting were held on November 7, 2005, December 9, 2005, and a teleconference on July 25, 2006. The subject of these meetings centered on discussion of applicable standards and general discussion of what options and what concept would be more or less likely to constitute a hazard to aviation.

In a meeting May 8, 2007 meeting with the FAA, the question was asked, "how high can the structure go?" The FAA stated that they would not say how high. They reaffirmed FAA procedure in stating that once a proposal is submitted the FAA aeronautical review will issue a finding of "hazard to aviation" or "no hazard to aviation". The FAA also stated that they would prefer not to have decorative features above the deck; they prefer open space above the deck. They also noted that it is ultimately up to the community to determine the preferable mode of transportation and service to Pearson may be affected if proposed improvements are not safe for aviation. The FAA noted that the project needs to consider crane heights during construction.

Once a locally preferred alternative (LPA) is identified, FAA Form 7460 can be submitted to the FAA. This form initiates the formal FAA aeronautical review process. FAA will review proposed construction and how it affects the Part 77 imaginary surface. After a period of public comment and communication with stakeholders, FAA will issue either a determination of "no hazard to aviation" or "hazard to aviation". These determinations are not a rejection or approval of the project. FAA may also require obstructions to be marked.

FAA will also conduct a review of the 40:1 westbound departure surface for Pearson Field and the 62.5:1 OIS for PDX. Flight rules can then be adjusted to address air navigation concerns for changes including removal of the existing bridges and new obstacles created by the I-5 CRC project.

At the May 8, 2007 meeting, the FAA agreed to perform another conceptual review of CRC alternatives. The I-5 CRC project will submit conceptual plans to the FAA in August 2007. Future meetings will discuss the findings of this second round of preliminary reviews.

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4. Affected Environment

4.1 Introduction

The I-5 CRC project has the potential to affect aviation activities at Portland International Airport and Pearson Field. The following section provides a brief description of the existing conditions at both facilities.

4.2 Regional Conditions

4.2.1 Pearson Field

The lift span tower on the existing Interstate Bridges currently penetrate 98 ft into the Part 77 imaginary surface 20:1 slope and 70 ft above the horizontal surface.

A preliminary aeronautical study was performed by the FAA in which they determined that the existing departure gradient is 650 ft/NM due to the lift-span towers on the existing Interstate Bridges. If the existing Interstate Bridges were removed, the controlling gradient would be 269 ft/NM due to existing transmission towers on the west end of Hayden Island.

The Land Bridge is currently under construction. Crossing over SR 14 at the end of the Pearson Field runway, the Land Bridge is a pedestrian structure that will connect Historic Fort Vancouver to the Columbia River waterfront. This structure does not penetrate the Part 77 imaginary surface, but the structure does penetrate Pearson Field's westbound departure surface.

4.2.2 Portland International Airport

Both the Part 77 imaginary surface and 62.5:1 OEI obstacle identification surface are unaffected by any existing feature within the API.

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5. Long-Term Effects

The aviation related areas affected by the CRC project are Pearson Field and PDX. Long-term effects for each of those areas are presented below.

5.1 Regional and System-wide Impacts

5.1.1 No Build

Pearson Field would continue to use the current arrival and departure procedures in the No-Build Alternative. The lift span towers of the existing Interstate Bridges have historically been an aviation hazard. Therefore, the "No-Build" alternative would neither beneficially nor adversely affect aviation now and for the near future. The status quo of the historical hazard to aviation would be maintained.

The existing Interstate Bridges do not affect aviation at PDX. Therefore, the No-Build Alternative would not affect aviation at PDX.

5.1.2 Replacement Crossing

5.1.2.1 *Pearson Field*

Exhibit 5-1 summarizes how a replacement bridge would affect Pearson Field's aviation surfaces. If an obstruction into the FAR 14 CFR Part 77 imaginary surfaces were identified, then the depth of the penetration was identified along with what object is causing the obstruction. Likewise, if the westbound departure OCS is obstructed then a new climb gradient to the obstruction is calculated and the object causing the obstruction is identified.

Exhibit 5-1. Long-Term Effects on Pearson Field Aviation Surfaces

	Replacement Alignment	
Aviation Surface	**Concrete Segmental or Arch**	**Extradosed**
FAR 14 CFR Part 77 Imaginary Surfaces	No obstructions identified	No obstructions identified
TERPS Obstacle Clearance Surface (OCS) for westbound departure procedure	275 ft/NM climb gradient due to 28.5 ft tall envelope on I-5 NB to C St. ramp[1]	275 ft/NM climb gradient due to 28.5 ft tall envelope on I-5 NB to C St. ramp[1]

1 – Obstruction or climb gradient not dependent on bridge structure type.

5.1.2.2 *Columbia River Bridge*

The goal of the proposed alignments and structures is to minimize effects to both Columbia River navigation and air navigation from Pearson Field. However, the river navigation envelope for the Columbia River and the westbound departure OCS for

Pearson Field overlap. In order to maintain equity between the two interests, portions of both the maritime and aviation envelopes were used for the bridge and roadway. Therefore, obstruction of the westbound departure OCS is unavoidable by any bridge type or alignment alternative. All proposed I-5 CRC project replacement will penetrate the Pearson Field westbound departure OCS.

While obstruction of the westbound departure OCS is inevitable, analysis has shown that it is possible to avoid penetrating the Part 77 imaginary surfaces. Exhibit 5-2 shows clearances from the roadway deck of 55 ft and 54 ft for the replacement. These clearances represent alignments constructed using a concrete segmental or arch bridge. An extradosed bridge would allow the deck to be lowered approximately ten feet because it has a shallower superstructure depth for the same span. This would allow 64 ft of clearance available for the replacement structures. These clearances can accommodate the estimated 60 ft tall extradosed towers. See Exhibit 5-2.

It is important to note that cables used above the roadway surface on the extradosed structure type are a potential aviation hazard. Cables may not be easily seen be pilots, creating an “invisible wall”. This hazard is only present on the extradosed structure type.

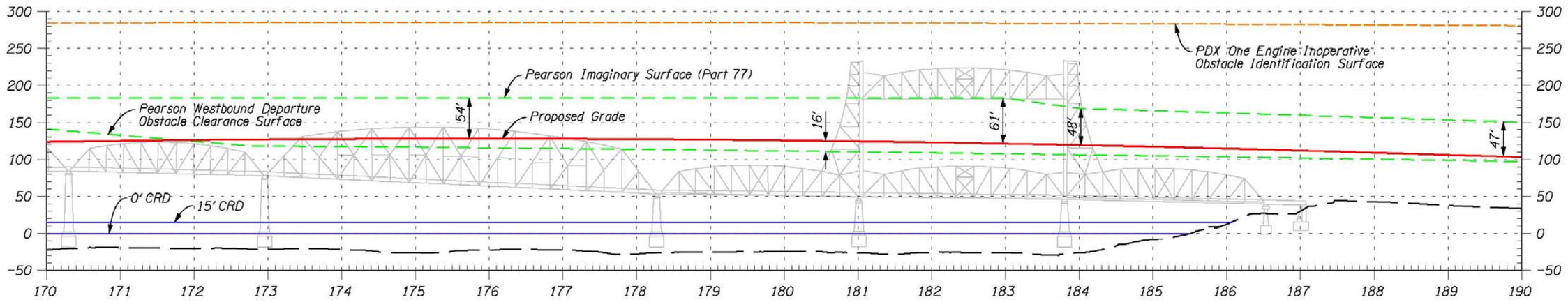
The concrete segmental or arch bridge has less impact than the extradosed bridge type and all replacement bridge alternatives under consideration have less impact than the No-Build condition.

5.1.2.3 *SR 14 Interchange*

If sign bridges and luminaries are excluded from the obstructed areas, then the 16.5 ft FAA required vehicle envelope would not penetrate the Part 77 surfaces.

SR 14 ramps transitioning to and from the I-5 mainlines structure penetrated the westbound departure OCS. This is due, in part, because all ramps must maintain clearance over the BNSF railroad lines before beginning their decent. The most stringent climb gradient from Pearson Field due to the replacement alternative is 275 ft/NM resulting from the I-5 NB to SR 14 ramp. Both of the I-5 CRC project alignments would be a significant improvement over the 650 ft/NM climb gradient due the lift towers of the existing Interstate Bridges. However, the climb gradients to features in the replacement alternative would be the controlling climb gradient. Both gradients will exceed the 269 ft/NM resulting from existing transmission towers on Hayden Island.

Exhibit 5-2. Clearances from Roadway to Aviation Surfaces for the Replacement Alternative.



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5.1.2.4 *Wildlife*

Wildlife in and around airports is a hazard to aviation. In fact, wildlife hazards may be the most significant long-term concern to aviation at Pearson Field. Aircraft striking wildlife can cause significant damage to an airplane and even loss of life. The I-5 CRC project may create habitat that attracts birds near Pearson Field, increasing the probability of a wildlife strike. The open truss framing of the existing Interstate Bridges have historically fostered bird roosting and nesting. Recently, ODOT has been using sound cannons to reduce the numbers of birds on the structures. All structure types currently under consideration will reduce the areas on which birds can land and roost when compared to the existing Interstate Bridges.

Stormwater ponds are likely within or near the SR 14 Interchange. Open water has the potential for attracting birds and thereby increasing the likelihood of an aircraft strike. Exhibit 2-3 shows the hazardous wildlife exclusion zone for Pearson Field as defined by FAA AC 150/5200-33A. All I-5 CRC stormwater ponds within the hazardous wildlife exclusion zone must be addressed, but those near the SR 14 Interchange are close to the Pearson Field runway and have the potential for creating the greatest aviation hazard.

5.1.2.5 *Other Aspects Affecting Aviation*

Long-term emissions, dust, or electronic interference resulting from the CRC project is not expected in affect aviation.

5.1.2.6 *Portland International Airport*

Neither of the replacement alternatives will have long-term effects on aviation activities at PDX. PDX is located approximately three miles southeast of the I-5 CRC project. At the project location, the critical OEI obstacle identification surface is approximately at elevation 275 ft. The elevation of the top of the existing Interstate Bridge lift span towers are approximately 240 ft. Since the replacement alternatives are shorter than the existing Interstate Bridges, they will have no long-term effects on aviation at PDX.

5.1.3 Supplemental Crossing

5.1.3.1 *Pearson Field*

Exhibit 5-4 summarizes how a supplemental bridge would affect Pearson Field's aviation surfaces. If an obstruction into the FAR 14 CFR Part 77 imaginary surfaces was identified, then the depth of the penetration was identified along with what object is causing the obstruction. Likewise, if the westbound departure OCS is obstructed then a new climb gradient to the obstruction is calculated and the object causing the obstruction is identified.

Exhibit 5-3. Long-Term Effects on Pearson Field Aviation Surfaces

	Supplemental Alternative	
Aviation Surface	**Concrete Segmental**	**Existing Interstate Bridges**
FAR 14 CFR Part 77 Imaginary Surfaces	No obstructions identified	Lift span towers penetrate 67 ft into surface
TERPS Obstacle Clearance Surface (OCS) for westbound departure procedure	280 ft/NM climb gradient due to 28.5 ft tall envelope on I-5 NB to C St. ramp[1]	650 ft/NM climb gradient due to existing lift span tower

1 – Obstruction or climb gradient not dependent on bridge structure type.

5.1.3.2 *Columbia River Bridge*

As previously mentioned, the alignments were developed to minimize adverse effects to both the navigation and aviation surface. Similar to the replacement bridge alternative the supplemental bridge will penetrate the Pearson Field OCS. However, the existing I-5 Interstate bridges will remain a greater obstruction into the westbound departure OCS and obstruct the Pearson Field's Part 77 surfaces.

Exhibit 5-5 shows a 55 ft clearance from the roadway deck of the supplemental bridge. This clearance is based on the deck elevation of a concrete segmental bridge. (The 600 ft span is required for navigation purposes in a supplemental scenario.) This would allow 36 ft of clearance available above the supplemental structure's deck.

Analysis has shown that it is possible to construct a supplemental bridge that does not penetrate the Part 77 imaginary surfaces. While a supplemental bridge does not penetrate the Part 77 imaginary surfaces, the existing I-5 Interstate Bridges penetrates 67 ft into the Part 77 imaginary surfaces.

Retaining the existing I-5 Interstate Bridges and constructing a supplemental bridge would further restrict an already congested area for aviation. In addition to the existing Part 77 surfaces' penetrations from the existing Interstate Bridges, the supplemental bridge would further restrict the airspace above the SR 14 interchange.

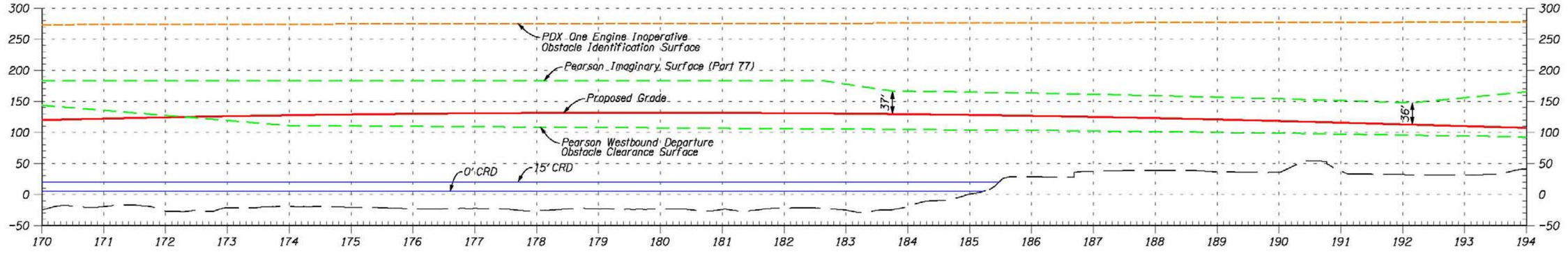
The supplemental bridge option adversely affects aviation, creating a situation worse than both the "No-Build" and replacement alternatives.

5.1.3.3 *SR 14 Interchange*

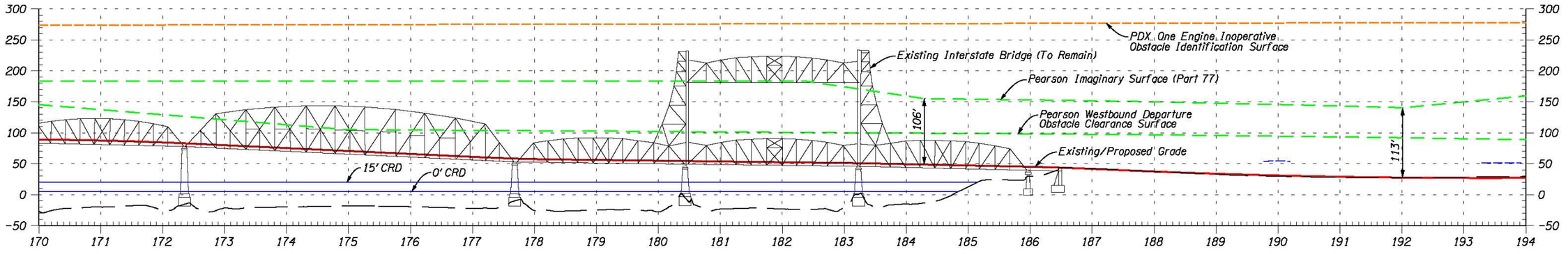
None of the ramps in the SR 14 interchange penetrate Pearson Field's Part 77 surfaces.

Overall, the supplemental alternative has a greater adverse effect on aviation at Pearson Field when compared to either of the replacement alternatives.

Exhibit 5-4. Supplemental Alternative Profiles



(a) I-5 SB Supplemental Bridge Profile



(b) I-5 NB Interstate Bridge Profile, Reused in Supplemental Alternative

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5.1.3.4 *Wildlife*

Wildlife in and around airports is a hazard to aviation. Aircraft striking wildlife can cause significant damage to an airplane and even loss of life. The I-5 CRC project may create habitat that attracts birds near Pearson Field, increasing the probability of a wildlife strike. The open truss framing of the existing Interstate Bridges have historically fostered bird roosting and nesting. Recently, ODOT has been using sound cannons to reduce the numbers of birds on the structures. Since the supplemental option will retain the existing Interstate Bridges in addition to constructing a supplemental, the available areas for birds to roost will be increased over both the No-Build and the replacement alternatives.

Stormwater ponds are likely within or near the SR 14 Interchange. Open water has the potential for attracting birds. Exhibit 2-3 shows the hazardous wildlife exclusion zone for Pearson Field as defined by FAA AC 150/5200-33A. All I-5 CRC stormwater ponds within the hazardous wildlife exclusion zone must be addressed, but stormwater ponds near the SR 14 Interchange are close to the Pearson Field runway and have the potential for creating the greatest aviation hazard. Potential wildlife hazards resulting from the supplemental alternative will be similar to hazards from the replacement alternative.

5.1.3.5 *Other Aspects Affecting Aviation*

As with the replacement alternatives, there will be no long-term emissions, dust, or electronic interference affecting aviation, resulting from the supplemental alternative.

5.1.3.6 *Portland International Airport*

The supplemental alternative will not have any long-term effects on aviation activities at PDX. PDX is located approximately three miles southeast of the I-5 CRC project. At the project location, the critical OEI obstacle identification surface is approximately at elevation 275 ft. The elevation of the top of the existing Interstate Bridge lift span towers are approximately 240 ft. Since the highest point in the supplemental alternative will continue to be the Interstate Bridges, the alternative will have no long-term effects on aviation at PDX.

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6. Temporary Effects

6.1 Introduction

The aviation related areas affected by the I-5 CRC project are Pearson Field and PDX. The temporary effects for each of those areas with regard to each alternative are presented below.

Temporary effects will be due to cranes and other construction equipment, temporary facilities, and construction methods. The degree to which aviation will be affected depends on the bridge type and construction methods employed for that bridge type. The following sections are a summary of some of the potential temporary effects.

6.2 Regional and System-wide Impacts

6.3 Pearson Field

6.3.1 Impacts Common to All Alternatives

Temporary effects on aviation due to a replacement bridge will depend, in large part, on techniques and equipment required to construct proposed structures, interchanges and deconstruct the existing bridges. The greatest effect could result from methods used to deconstruct or rehabilitate the existing Interstate Bridges' towers. The equipment required for these activities would likely be the tallest required for the I-5 CRC project. Cranes used for work on the existing Interstate Bridges would need to be taller than those towers, and would temporarily affect the Pearson surfaces greater than the existing condition. The actual degree of additional intrusion into the Part 77 surfaces and westbound departure OCS will depend on the actual deconstruction or rehabilitation methods used and associated crane(s).

Construction of the SR 14 will also penetrate the Part 77 surfaces and westbound departure OCS. Temporary storage of fill, cranes, or other construction related materials and equipment might also temporarily pierce the aviation surfaces. As with Columbia River Bridge construction, the actual degree of penetration will depend on the equipment and construction methods used. Short-term obstructions in the SR 14 interchange area could be significantly greater than what currently exists.

Construction dust or emissions from construction equipment could pose a short-term hazard to aviation by reducing visibility at the end of runway. Dust could result from wind disturbing uncovered fills or open excavations. Unimproved construction roads could also stir up dust, impairing visibility.

Electronic interference with aviation related instruments and communications is not anticipated as a result of the CRC project.

Temporary stormwater ponds that fall within the limits of the hazardous wildlife exclusion zone, especially near the SR 14 interchange, may provide a place for birds to land and congregate increasing the potential for aircraft to strike a bird.

6.3.2 Impacts Unique to River Crossing Alternatives

Temporary effects on aviation due to a supplemental bridge will be similar to what was described for a replacement bridge, except the duration of the obstruction will be longer. The increase in duration will be due to seismic rehabilitation and retrofit of the existing Interstate Bridges, which might require taller cranes for longer periods when compared to a downstream replacement alternative.

6.4 Portland International Airport

Construction activities are not anticipated to affect the aviation surfaces at PDX. At the project location, the critical OEI obstacle identification surface is approximately at elevation 275 ft. The elevation of the top of the existing Interstate Bridge lift span towers is approximately 240 ft, leaving approximately 35 ft above the towers available for cranes. Cranes used for deconstruction or rehabilitation of the Interstate Bridges will likely fit within this 35 ft clearance and have little or no obstruction of the OEI obstacle identification surface.

It is important to note that the PDX Part 77 surface is at approximately 380 ft in the vicinity of the Interstate Bridges' lifts pan towers. This leaves approximately 140 ft between the top of the lift span towers and the PDX Part 77 surface. Therefore, the I-5 CRC project will not affect the PDX Part 77 surfaces.

All potential construction related effects will be evaluated by the FAA upon submission of Form 7460-1 for construction activities.

7. Mitigation for Long-Term Effects

7.1 Introduction

Long-term effects resulting from the mid-level replacement bridge options improve conditions for aviation at Pearson Field. The supplemental alternative will have adverse long-term effects on aviation at Pearson Field. Effects from all alternatives, whether beneficial for adverse, will require FAA review.

Mitigation measures for each of the I-5 CRC project alternatives are presented below.

7.2 Mitigation Common to All Build Alternatives

Many of the long-term effect are similar among all of the I-5 CRC alternatives. Furthermore, the mitigation for these effects will also be similar.

All I-5 CRC project replacement alternatives obstruct the westbound departure OCS. Preliminary climb gradients previously listed show the final long-term conditions will be improved over "No-Build" condition. New construction and removal of the existing Interstate Bridges will result in a review of the departure procedures from Pearson Field. The FAA may issue new approach and departure procedures for Pearson Field.

The towers of the existing Interstate Bridges in the supplemental alternative penetrate the Part 77 imaginary surfaces. The replacement bridge does not penetrate the Part 77 surfaces. For all cases, the FAA will conduct an aeronautical review upon submission of FAA Form 7460-1. The FAA will issue a finding of "hazard to aviation" or "no hazard to aviation" upon completion of the aeronautical review. In addition, the FAA will have requirements for marking obstacles, this will likely include marking according to FAA AC 70/7460-1K "Obstruction Marking and Lighting" using equipment specified in AC 150/5345-43E "Specification for Obstruction Lighting Equipment". The FAA encourages sponsors to be familiar with the various types of marking systems available and suggest what type of system they would prefer.

Proposed roadway or accent lighting on the bridge and surrounding interchanges should be designed to limit light or glare that could affect aviation at Pearson field or PDX. If an extradosed structure were to be used, special attention would be needed for lighting and marking cables, making them easily visible to pilots. If the mode of HCT chosen requires the use of overhead catenary cables, then these cables may be designed to be shorter than surrounding luminaries, or otherwise accented to make them visible to pilots.

No long-term dust, emissions, or electronic interference associated with the project are anticipated beyond what is already present. Disturbed soils will be re-seeded upon completion of construction and appropriate dust control measures taken. Otherwise, no mitigation measures will be necessary for emissions or electronic interference.

Permanent stormwater ponds will likely be incorporated into the SR 14 interchange. In order to prevent birds from congregating on the open water of a pond several mitigation measures are available. Mitigation measures could include placing wire mesh over the water to prevent birds from landing, or using selective plantings within ponds to conceal open water when they are full.

Proposed structures and features of the project will incorporate designs that minimize locations for birds to roost or nest, resulting in an improvement over the "No-Build" condition. This is expected to have no effect or slightly decrease bird populations, near Pearson Field, compared to the No Build option.

8. Mitigation for Temporary Effects

8.1 Introduction

Temporary effects will result from deconstruction or rehabilitation and construction activities in the area of the Columbia River Bridge and the SR 14 Interchange. Mitigation of temporary hazards to aviation will be required in these areas only.

8.2 Mitigation Common to All Build Alternatives

All construction activities must adhere to FAA Advisory Circular AC 70/7460-1 "Obstruction Marking and Lighting". FAA From 7460-1 must be submitted to the FAA for all cranes or other construction related equipment that will potentially penetrate the Part 77 imaginary surfaces. Submission of Form 7460-1 will initiate an aeronautical review of the proposed temporary effects construction equipment and activates will have on aviation at Pearson Field. The aeronautical review will take approximately 90 days. The result of the study will be a finding of "hazard to aviation" or "no hazard to aviation" due to the proposed activities. In addition, the FAA will identify requirements for marking obstructions.

The Form 7460-1 process described above is in addition the Form 7460-1 procedure required for permanent structures, as will be discussed in Section 9.

Aviation at Pearson Field will be temporarily affected by all I-5 CRC project alternatives. The primary difference between the alternatives will be the duration of the temporary effects. Temporary effects will likely last longer for the supplemental alternatives. Therefore, the replacement alternative will likely have the shortest duration of temporary obstructions to aviation.

Construction in the SR 14 area has the potential to stir up dust that may impair visibility. Dust control measures such as watering exposed soil and using gravel surfacing on temporary construction roads can effectively mitigate dust.

Any electronic devices communication related or otherwise cannot interfere with equipment required for air navigation and communication.

Temporary stormwater ponds may be used during construction. Wire mesh or other deterrents may be placed over the top of stormwater ponds to prevent birds from landing on open water.

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9. References

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10. Permits and Approvals

10.1 Federal

FAA From 7460-1 Notice of Proposed Construction or Alteration (See Appendix A)

Notice must be filed as early as possible in the planning stage but no less than 90 days before construction will begin. FAA will not issue a determination for conceptual plans.

The FAA will acknowledge receipt. FAA will likely initiate an aeronautical study, during which comment will be received from agencies, organizations, or others with known aeronautical interests.

FAA will issue a determination of either “Hazard to Air Navigation” or “No Hazard to Air Navigation”. The determination is not an approval or disapproval of the project. The determination is based on the projected impact of the project on safe and efficient use of navigable airspace. FAA usually recommends marking for any obstruction that is greater than 200 ft above ground level or penetrated the Part 77 surface.

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