DRAFT ENVIRONMENTAL IMPACT STATEMENT
SR 520 BRIDGE REPLACEMENT AND HOV PROGRAM

MAY 2010

SR 520 Pontoon Construction Project

Cultural Resources Discipline Report

Washington State Department of Transportation

U.S. Department of Transportation
Federal Highway Administration

THE INFORMATION IN THIS REPORT IS ACCURATE; HOWEVER, THE PONTOON CONSTRUCTION PROJECT DRAFT ENVIRONMENTAL IMPACT STATEMENT IS THE SOURCE OF THE MOST CURRENT PROJECT INFORMATION AND ANALYSIS.

SR 520 Pontoon Construction Project Cultural Resources Discipline Report and Technical Reports

Prepared for

Washington State Department of Transportation
Federal Highway Administration

Lead Author

CH2M HILL

Consultant Team

HDR Engineering, Inc.
Parametrix, Inc.
CH2M HILL
Parsons Brinckerhoff
ICF Jones & Stokes
Michael Minor and Associates
Cherry Creek Environmental
J. Irwin Writing/Editing

April 2010

Washington State Department of Transportation

U.S. Department of Transportation Federal Highway Administration

Preparer's Note

Per provisions of Section 106 of the National Historic Preservation Act, this document evaluates cultural resources that might be affected by the Washington State Department of Transportation's (WSDOT) State Route (SR) 520 Pontoon Construction Project, which is a component of the SR 520 Bridge Replacement and High-Occupancy Vehicle (HOV) Program. Per federal and state regulations, this document identifies historic properties (those listed or eligible for listing in the National Register of Historic Places) within the project Area of Potential Effects (APE), and then provides an assessment of this undertaking's effects on those historic properties.

WSDOT proposes building a casting basin facility at one of two alternative sites in the Grays Harbor area to manufacture large concrete floating bridge pontoons. These pontoons would be built to replace the floating portion of the Evergreen Point Bridge in the event of a catastrophic failure or to support the planned replacement of the bridge. The proposed build alternative sites for the new casting basin are the Aberdeen Log Yard in Aberdeen, Washington, and the Anderson & Middleton property in Hoquiam, Washington; one of these sites would possibly be used in conjunction with an existing facility in Tacoma, Washington, and would involve the use of a proposed pontoon moorage area and a wetland mitigation site.

This document is divided into three volumes:

- **Volume I**, prepared by ICF Jones & Stokes, is the **Cultural Resources Discipline Report**, and it studies the two alternative sites in Aberdeen and Hoquiam, the existing facility in Tacoma, and their associated truck haul routes.
- **Volume II**, prepared by ICF Jones & Stokes, is the **Cultural Resources Technical Addendum in Support of the Grass Creek Wetland Mitigation Site**, and it studies the proposed wetland mitigation site at Grass Creek.
- **Volume III**, prepared by Golder Associates, is the **Report on the Results of the Cultural Geophysical and Historic Archaeological Resource Investigations at the Pontoon Moorage Site, Grays Harbor, WA**, and it studies the proposed pontoon moorage area.

All three reports were prepared by professional cultural resources specialists who meet Secretary of the Interior Standards for their respective disciplines. Separating the studies into two distinct volumes allowed us to capitalize on expertise, budgets, and schedule, and ultimately resulted in a comprehensive assessment of all cultural resources within the project APE.

1

Volume I

SR 520 Pontoon Construction Project

Prepared for

Washington State Department of Transportation
Federal Highway Administration

Lead Author

CH2M HILL

Consultant Team

HDR Engineering, Inc.
Parametrix, Inc.
CH2M HILL
Parsons Brinckerhoff
ICF Jones & Stokes
Michael Minor and Associates
Cherry Creek Environmental
J. Irwin Writing/Editing

April 2010

Washington State Department of Transportation

U.S. Department of Transportation Federal Highway Administration

Summary

The Washington State Department of Transportation (WSDOT) proposes building a concrete casting basin and associated facilities and potentially using an existing facility to manufacture floating bridge pontoons for the Pontoon Construction Project, a component of the State Route (SR) 520 Bridge Replacement and High-Occupancy Vehicle (HOV) Program. The proposed Grays Harbor build alternative sites for the new casting basin are the Aberdeen Log Yard in Aberdeen, Washington, and the Anderson & Middleton property in Hoquiam, Washington; one of these sites would possibly be used in conjunction with an existing facility in Tacoma, Washington.

The historic properties that might be affected by a proposed action within the project area comprise the affected environment. The area of potential effects (APE) is the geographic area within which a project undertaking might directly or indirectly alter the character or use of such historic properties, if any such properties exist (Code of Federal Regulations Title 36, Part 800.16 [36 CFR 800.16]). The APE for this project was defined by WSDOT in consultation with affected tribes and the Washington State Department of Archaeology and Historic Preservation (DAHP). The APE contains four distinct, discontiguous areas that include the two build alternative sites, haul routes to and from the two sites, the proposed pontoon moorage areas, the Concrete Technology Corporation, Inc. (CTC) facility in Tacoma, and one tax parcel or 200 feet, whichever is less, beyond the boundary of these proposed sites and haul routes. The vertical dimension of the APE is confined to the proposed sites and is defined as the area between the existing ground surface and the maximum depth at which potential archaeological sites might be found.

ICF Jones & Stokes excavated 483 archaeological trenches at both the Aberdeen Log Yard and Anderson & Middleton alternative sites (ICF Jones & Stokes 2009). Three archaeological sites were identified in the APE. Archaeological investigations identified two archaeological resources within the Anderson & Middleton Alternative part of the APE: a precontact fish weir site (AM-1) and an industrial sawmill (AM-2). The remnants of an industrial sawmill (ALY-1) were identified at the Aberdeen Log Yard Alternative site. ICF Jones & Stokes archaeologists have recommended that all three sites are eligible for listing on the National Register of Historic Places (NRHP). However, WSDOT, acting on behalf of the Federal Highway Administration (FHWA), determined that only

one of the three archaeological sites, AM-1, is NRHP-eligible under significance Criterion D due to its potential to address important research questions.

Six significant historic resources were identified in the project APE; these include two historic resources in the CTC facility part of the APE: Fire Station 15 at 3510 East 11th Street and a portion of the CTC facility at 1123 Port of Tacoma Road. Fire Station 15 is listed in the NRHP. The CTC part of the APE also contains the Hylebos Waterway Bridge, which was previously evaluated as eligible for listing in the Washington Heritage Register but found not eligible for the NRHP. The other four significant historic resources are located along the proposed haul routes associated with the Aberdeen Log Yard and Anderson & Middleton alternatives parts of the APE. The six historic resources were evaluated as historically significant based on the criteria for listing in the NRHP and are considered historic properties under Section 106 of the National Historic Preservation Act (NHPA). Despite an increase in visual and audible intrusions and vibrations, the proposed project would have no adverse effects on the six identified historic properties in the APE.

The proposed project involves potential ground-disturbing activities at both the Aberdeen Log Yard and Anderson & Middleton alternative sites, WSDOT Cultural Resources Specialists have determined that only the Anderson & Middleton alternative site contains an NRHP-eligible archaeological resource, AM-1, the precontact fish weir. Therefore, the project will have an *adverse effect* on a historic property only if the Anderson & Middleton alternative site is selected. If the Aberdeen Log Yard alternative site is selected, the project will have *no adverse effect* on historic properties

If the Anderson & Middleton site is selected, WSDOT will need to execute a Memorandum of Agreement with the State Historic Preservation Officer (SHPO) and affected tribes and develop a treatment plan (and have it approved by DAHP and tribes) before the casting basin is constructed.

WSDOT will implement a treatment plan (including archaeological data recovery before construction). Archaeological monitoring by a professional archaeologist during casting basin construction will occur for either build alternative site due to the scale of ground disturbance in a setting considered to have a high probability for archaeological resources.

Credits and Acknowledgments

Many individuals were involved in this project, and all contributed to its successful completion. The contributions of the numerous authors are foremost in this effort, but others greatly supported these efforts with the many research, fieldwork, and writing tasks that this report represents. Foremost are the contributions of Tait Elder, Kurt Perkins, Rori Perkins, and Erica Hall, who truly helped pull it all together. Thanks are also in order to Meredith Mullaley and Melissa Cascella for their diligence regarding the historical document and photograph research, as well as interviews with knowledgeable individuals. We also recognize the individuals who conducted the fieldwork and collected project data: Tait Elder, Kurt Perkins, Keith Syda, Melissa Cascella, Meredith Mullaley, Alex Stevens, Pat Reed, Pat Elliot, Mike McKillop, Steve Dies, Joanne Grant, Kate Serpa, Leven Kraushaar, and Danny Gilmour. In addition to doing excellent fieldwork, each contributed other talents and insights.

We wish to acknowledge the generous time and information provided by Justine James of the Quinault Indian Nation, as well as the coordination and help provided by Richard Bellon of the Confederated Tribes of the Chehalis Reservation. Also, site visits by Dr. Richard D. Daugherty and Ruth Kirk provided information, support, and a link to the tradition of Pacific Northwest coast archaeology.

We also acknowledge those individuals who contributed historical information to this project: John Lawson of the Polson Museum in Hoquiam and Hank Soike, who contributed information about his time in Grays Harbor. Also, a special appreciation goes out to the Quigg Brothers for being so generous with their time and for being the “keepers of local knowledge.”

We thank the staff of Henderson Associates, Landau Associates, and Ken Miller Enterprises for their excellent work. We especially want to acknowledge Ken Miller and his equipment operators at Ken Miller Enterprises, Inc. for their considerable talents and helpful attitudes.

Special thanks to Scott Williams, WSDOT Cultural Resources Program Manager, Philip Narte, WSDOT Tribal Liaison, and Ken Juell and Connie Walker-Gray, WSDOT Cultural Resources Specialists, for their numerous contributions and expert advice; to Michelle Dewey, Project 106 Coordinator, who provided us with valuable guidance and management support throughout the entire process; and to Bill Bumback, Deputy EIS

Manager, who assisted us with a tremendous amount of fieldwork and reporting logistics. Also, special thanks to Matthew Sterner and Lance Wollwage at DAHP for their support, interest, and advice on this project and for the many field visits to witness our progress.

Contents

Appendices

Exhibits

[Note: All exhibits are compiled at the end of the report after Chapter 11, References, and before the appendices.]

Abbreviations and Acronyms

ACHP	Advisory Council on Historic Preservation
AD	anno Domini
APE	Area of Potential Effects
BC	before Christ
BP	Before Present
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CTC	Concrete Technology Corporation
DAHP	Department of Archaeology and Historic Preservation
Draft EIS	Pontoon Construction Project Draft Environmental Impact Statement
FHWA	Federal Highway Administration
GHLC	Grays Harbor Lumber Company
GHNWR	Grays Harbor National Wildlife Refuge
GIS	Geographic Information System
GLO	General Land Office
GPS	global positioning system
ha	hectares
HOV	high-occupancy vehicle
HRA	Historical Research Associates
HRHP	Hoquiam Register of Historic Places
IDD #1	Port of Grays Harbor Industrial Development District #1
IWW	Industrial Workers of the World
MOA	Memorandum of Agreement

N/A	not applicable
NADB	National Archaeological Database
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NRHP	National Register of Historic Places
NRIS	National Register Information System
PCPACT	pontoon construction project agency coordination team
RCYBP	radiocarbon years before present
SAFETEA-LU	The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SEPA	State Environmental Policy Act
SHPO	State Historic Preservation Officer
SR	State Route
TCP	traditional cultural property
TOGH	Tacoma, Olympia, & Grays Harbor
TRHP	Tacoma Register of Historic Places
US 101	U.S. Highway 101
USACE	U.S. Army Corps of Engineers
USC	United States Code
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WDFW	Washington State Department of Fish and Wildlife
WHR	Washington Heritage Register
WISAARD	Washington Information System for Architectural and Archaeological Records Data
WSDOT	Washington State Department of Transportation
YBP	years before present

YMCA	Young Men's Christian Association

1. Introduction

The Washington State Department of Transportation (WSDOT) proposes building a casting basin facility at one of two alternative sites in the Grays Harbor area to manufacture large concrete floating bridge pontoons. These pontoons would be built to replace the floating portion of the Evergreen Point Bridge in the event of a catastrophic failure or to support the planned replacement of the bridge. The Concrete Technology Corporation, Inc. (CTC) casting basin in Tacoma would be used primarily to build smaller pontoons while the Grays Harbor casting basin is being built. The completed pontoons would be moored at approved locations in Grays Harbor and in Puget Sound until needed. This Draft Cultural Resources Discipline Report has been prepared to assess the effects of the project alternatives on cultural resources at these proposed sites.

Project Description

Project Alternatives

The *Pontoon Construction Project Draft Environmental Impact Statement* (Draft EIS) evaluates two build alternatives that would involve constructing a new casting basin in Grays Harbor and one No Build Alternative. Two waterfront sites in the Grays Harbor area are being evaluated for the new casting basin facility:

- Anderson & Middleton property in Hoquiam
- Aberdeen Log Yard property in Aberdeen

The new Grays Harbor casting basin facility could produce all 33 pontoons needed for this project: 21 longitudinal pontoons (360 feet long by 75 feet wide), 10 supplemental stability pontoons (98 feet long by 60 feet wide), and 2 cross pontoons (240 feet long by 75 feet wide). To expedite pontoon construction, however, each build alternative could include using the existing CTC casting basin facility in Tacoma to build pontoons while the new casting basin facility at Grays Harbor is being constructed. If used, the CTC facility, which has a limited operations area, could build up to three longitudinal pontoons and up to ten supplemental stability pontoons.

> **What is a casting basin facility?**
>
> Pontoons for this project would be built at a casting basin facility. The facility would consist of a casting basin (a large chamber in which pontoons are constructed, see the next text box for a more thorough description) and several supporting facilities, such as a batch plant to produce concrete, access roads, storage and laydown areas, office space for workers, and water treatment facilities.

WSDOT would float most of the completed pontoons built at the new casting basin facility out of the casting basin and tow them to a moorage location in the Grays Harbor area. The last pontoons built would be stored in the casting basin until needed. Any pontoons constructed at the CTC facility would be moored at existing marine berths in Puget Sound.

After the project is completed, the new casting basin would be available to produce additional pontoons needed for the planned Evergreen Point Bridge replacement, a component of the I-5 to Medina: Bridge Replacement and High-Occupancy Vehicle (HOV) Project. Pontoons for other WSDOT bridge replacement projects in the future could also be produced at this facility.

Each alternative is described below. For more details, see the Description of Alternatives and Construction Techniques Discipline Report (WSDOT 2009a).

Anderson & Middleton Alternative

The 105-acre Anderson & Middleton Alternative Site is on the north shore of Grays Harbor in Hoquiam, Washington (Exhibits 1-1 and 1-2). This generally flat property is privately owned and is zoned for industrial use. The site is surrounded by industrial maintenance shop buildings to the west, railroad tracks to the north, and vacant industrial property to the east; a rock berm borders the shoreline. The Anderson & Middleton site has no structures on it except for an existing small office building on the northern edge of the property. The site also has some gravel roads and an asphalt pad remaining from its former use as a log sorting yard. WSDOT would purchase 95 acres of this site for the project, and the casting basin and support facilities would occupy the eastern half of the site, amounting to approximately 55 acres.

Historically this site has been used for lumber industry activities. In the early twentieth century there was a sawmill and other related facilities, such as machine shops and burners, west of what was then an extension of 8th Street. Over the next several decades, fill from harbor dredging and refuse accumulation increased the land area of the site. By the late 1960s, the former mill structures were all gone. Since then, the site has been used for timber storage.

Aberdeen Log Yard Alternative

The 51-acre Aberdeen Log Yard Alternative Site lies on the north shore of Grays Harbor in Aberdeen, Washington, near the mouth of the Chehalis River (Exhibits 1-3 and 1-4). This generally flat site is zoned industrial and is currently owned and used for log storage by Weyerhaeuser Corporation. There are no structures on the site now but there is a system of unpaved access roads connecting to East Terminal Road to the west and

State Street to the northeast. Immediately west of the site is paved Port of Grays Harbor industrially zoned property, the City of Aberdeen wastewater treatment plant borders the eastern boundary, and the Puget Sound & Pacific Railroad mainline and siding run along the northern boundary of the site. WSDOT would purchase all 51 acres, and the casting basin and support facilities would occupy the entire site.

Two sawmills operated on the site in the last century, but since 1971, the site has been used mostly for log storage. All former sawmill-related structures have been demolished. Between 1971 and 1981, the shoreline was extended to the south through backfilling with sediments dredged from the Chehalis River, accumulated wood waste, and other fill material.

No Build Alternative

For the Pontoon Construction Project, the No Build Alternative is to continue existing conditions and uses at all proposed alternative sites. Specifically, this means that WSDOT would not construct or store any pontoons—either at a new Grays Harbor facility or at the existing Tacoma CTC facility—needed to respond to a catastrophic failure of the Evergreen Point Bridge. As a result, any environmental effects resulting from the proposed project activities would not occur.

For this Draft EIS, WSDOT assumes that, if unused by this project, the alternative site properties would continue to be used as they are today: the Aberdeen Log Yard would remain an active log yard, the Anderson & Middleton site would remain largely inactive, and the CTC site would be used as a casting basin for other projects and clients. While either Grays Harbor site could be developed for new uses should this project not occur, the use of these properties has remained unchanged since the 1990s. Potential future uses for these two properties, other than our proposed project, are speculative and therefore not considered under the No Build Alternative.

What is a casting basin?

A casting basin is a construction facility built next to a navigable waterway that consists of a concrete slab built deep below ground level and surrounded by high concrete walls. The interior area of the casting basin provides a flat dry space where several pontoons can be constructed side by side at the same time. After the pontoons are completed, the basin is flooded. The basin walls contain the flood water, allowing the pontoons to float. When the pontoons are floating, a gate is opened and the pontoons are towed from the casting basin into navigable waters.

Key Components of Both Build Alternatives

Both build alternatives would carry out the proposed action by constructing a casting basin in the Grays Harbor area. Use of the existing CTC facility in Tacoma to produce pontoons while the new casting basin is constructed could also occur.

Please see Exhibit 1-5 for the Project Alternative conceptual site layout.

Potential Use of the Existing CTC Casting Basin Facility

The existing CTC facility is adjacent to the Blair Waterway on the eastern edge of Commencement Bay in Tacoma (Exhibits 1-6 and 1-7). This casting basin is too small to accommodate the timely construction of the pontoons required for the Pontoon Construction Project, but WSDOT could use this facility to supplement pontoon construction at the larger casting basin proposed in the Grays Harbor area. The pontoons manufactured at the CTC facility would most likely be the smaller supplemental stability pontoons.

WSDOT would moor the pontoons built at the CTC facility at existing marine berths in Puget Sound, subject to availability (Exhibits 1-8 and 1-9).

Proposed Grays Harbor Casting Basin

The design of the proposed Grays Harbor casting basin would be basically the same at both build alternative sites, with variations depending on site-specific features. (See the Description of Alternatives and Construction Techniques Discipline Report [WSDOT 2009a] for information on the casting basin conceptual design.) The casting basin would be positioned a few hundred feet from the shoreline and partitioned into two separate work areas—called chambers—connected to the water by a single launch channel. The launch channel would consist of an onshore portion excavated between the casting basin and shoreline, a breach in the shoreline berm, and a dredged channel extending offshore to the federal navigation channel in Grays Harbor.

Up to four concrete pontoons could be cast and cured in each of the two chambers of the partitioned casting basin, allowing pontoon construction to be phased for efficiency. That is, while the second chamber is under construction, pontoon construction could be initiated in the first partitioned chamber as soon it was completed. Two reinforced floating concrete gates leading to each chamber would allow each to be independently flooded and drained, as well as control access to the launch channel.

Constructing a casting basin facility at either Grays Harbor build alternative site would require heavy construction activities to transform the vacant land into an industrial facility. Such activities include, but would not be limited to, the following:

- Grading (leveling) the site and excavating the casting basin
- Pile-driving to install support piles for the casting basin floor
- Paving onsite access roads

- Making multiple truck trips for hauling materials to and from the site
- Dewatering the soils during casting basin construction

All stormwater, process water, and groundwater collected onsite would be handled and treated in accordance with state water quality requirements and discharged to Grays Harbor. Project engineers are designing a water supply, distribution, and treatment system for each site to meet state standards.

Dewatering

WSDOT would install two different dewatering systems to remove groundwater from the casting basin work area at either build alternative site. Before and during casting basin construction, a temporary construction dewatering system would operate at the site. During pontoon-building operations and after the Pontoon Construction Project is completed (but while the site is still maintained by WSDOT), a permanent operation dewatering system would operate.

Operational Support Facilities

To support the use of the casting basin, each build alternative would include onsite operational support facilities such as an access road, a concrete batch plant, large laydown areas, water handling and treatment areas, office space, a rail spur, and a designated parking area for workers**.**

Pontoon Towing and Moorage

If WSDOT uses the existing CTC facility in Tacoma, it would moor the pontoons built there at existing marine berths in Puget Sound. Using these berths would be subject to availability, but there are several locations in the Puget Sound region that could accommodate this project's needs. The first two cycles of eight pontoons manufactured at the new Grays Harbor casting basin facility would be towed from the casting basin and moored in the Grays Harbor area outside of navigation channels. The last construction cycle of pontoons could be stored in the dry casting basin behind the closed gate.

For the pontoons to be moored in the Grays Harbor area, there are several existing berths that WSDOT could lease for pontoon moorage, if available when needed. In addition, WSDOT has identified another potential moorage location—open water moorage in Grays Harbor. Please see the Description of Alternatives and Construction Techniques Discipline Report (WSDOT 2009a) for more information on these potential moorage locations.

The constructed pontoons would be stored together until they are needed to replace the Evergreen Point Bridge in the event of a catastrophic failure, and they would be identified with navigation lighting in compliance with U.S. Coast Guard requirements.

Construction Schedule

If WSDOT uses the existing CTC facility, pontoon construction would take 2 years to complete. WSDOT would start site development for the new Grays Harbor casting basin facility about the same time pontoon construction begins at the CTC facility. For the Grays Harbor facility, casting basin construction would take 2 years, as would pontoon construction. In total, overall pontoon project construction would span 4 years.

WSDOT anticipates that it would take approximately 6 to 9 months to complete a pontoon construction cycle at either the existing Tacoma facility or at the new Grays Harbor facility. The new Grays Harbor facility could produce eight pontoons during one cycle; as a result, two and a half pontoon construction cycles would be required to produce 20 pontoons. At the existing CTC facility, five supplemental stability pontoons could be constructed during each pontoon construction cycle, and one longitudinal pontoon could be constructed during a cycle. As a result, three construction cycles would be needed to produce ten supplemental stability pontoons and one longitudinal pontoon.

Project Background

Personnel

Stacy Schneyder, MA, Christopher Hetzel, MA, and Thomas Barrett, PhD, are the Principal Investigators for this project and the primary authors of this Cultural Resources Discipline Report. Numerous coauthors assisted with this report, including Tait Elder, Kurt Perkins, Melissa Cascella, and Meredith Mullaley. Appendix A lists the duties and qualifications of project personnel.

Location

The two build alternative sites being considered for the Pontoon Construction Project are located on the north shore of Grays Harbor, a large bay in southwestern Washington. One of these alternative sites would be selected and used for pontoon construction, possibly along with the CTC facility. Following are the locations of the build alternative sites and the CTC facility:

- **CTC facility.** Section 34, Township 21, Range 3 East, North Tacoma United States Geological Survey (USGS) Quadrangle; Parcels: 5000350040, 6965000020, 6965000051, and 06965000251
- **Anderson & Middleton Alternative.** Section 11, Township 17 North, Range 10 West; Hoquiam USGS Quadrangle; Parcels: 056400600103, 056400600201, 056400600202, 056400700200, 056400900100, and 056400900400
- **Aberdeen Log Yard Alternative.** Section 08, Township 17, Range 09 West; Aberdeen USGS Quadrangle; Parcels: 029902000101, 029902000102, 029901800401, 029901800405, 029901800406, 317090834001, 317090834003

Area of Potential Effects

For archaeological resources, traditional cultural properties (TCPs), and historic resources, an Area of Potential Effects (APE) has been established that includes both build alternative sites within four distinct, discontiguous areas. The APE is defined as areas specific to each alternative and consists of vertical and horizontal components. The vertical APE for both build alternatives includes the maximum proposed below- and above-ground construction extent for the proposed casting basin. The horizontal APE for both the Anderson & Middleton and Aberdeen Log Yard alternatives include their entire properties; the proposed truck haul routes to and from their entrances and exits to existing truck routes along U.S. Highway 101 (US 101) and State Route (SR) 109; the CTC casting basin facility; the proposed pontoon moorage location; and a buffer of 200 feet (61 meters) or one tax parcel—whichever is less—added to all sides of the horizontal extent of both sites and the truck haul routes (Exhibits 1-1 through 1-4, 1-6, and 1-7). The additional buffer allowed the analysts to consider the build alternative sites' potential effects on buildings, structures, and other resources in the built environment. The CTC facility is considered part of the APE because it could be used as part of either Grays Harbor build alternative. No haul routes are included within the part of the APE for the existing CTC facility because the entrances to the properties are on existing, designated haul routes routinely used as such.

WSDOT consulted with the Washington State Department of Archaeology and Historic Preservation (DAHP) and affected tribes to develop the Pontoon Construction Project APE. WSDOT conducted preliminary outreach and held informal briefings with DAHP and area tribes in 2005 and 2006 before the project was formally initiated. Affected tribes were formally invited to participate in the National Environmental Policy Act (NEPA) process Section 106 consultation in December 2007, except for the Puyallup Tribe, which was formally invited in August 2009. WSDOT initiated formal consultation with DAHP under Section 106 of the National Historic Preservation Act (NHPA) in February 2009. The initial consultation with DAHP included a request for concurrence on the initial APE, and DAHP formally concurred with the initial APE in March 2009. WSDOT formally requested concurrence on revisions to the APE in May 2009 and October 2009, and DAHP concurred with the revised APEs in June 2009 and October 2009, respectively. Appendix B includes all WSDOT APE correspondence.

WSDOT sent letters of request to eight area tribes to initiate government-to-government consultation:

- The Confederated Tribes of the Chehalis Reservation
- The Hoh Tribe
- The Puyallup Tribe
- The Quileute Nation
- The Quinault Indian Nation
- The Shoalwater Bay Tribe
- The Skokomish Tribal Nation
- The Squaxin Island Tribe

While initiating formal consultation, WSDOT also invited these eight tribes to participate in the NEPA process as participating agencies under Section 6002 of Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). In December 2007 and August 2009, respectively, the Squaxin Island Tribe and the Quileute Nation declined participating agency status and informed the Federal Highway Administration (FHWA) that they would require no further consultation on this project. In January 2008, the Quinault Indian Nation formally accepted participating agency status. The other tribes did not provide formal correspondence declining or accepting participation; however, the Quinault Indian Nation, the Confederated Tribes of the Chehalis Reservation, and other tribes have been participating in the Pontoon Construction Project Agency Coordination Team (PCPACT) meetings, which are coordination meetings that are held as part of the NEPA process. Appendix B includes all tribal consultation correspondence.

Both the Anderson & Middleton and Aberdeen Log Yard alternatives are within the federally adjudicated Usual and Accustomed fishing area of the Quinault Indian Nation. Their Usual and Accustomed fishing grounds include Salmon Management Area 28 within Grays Harbor and its tributaries. The Quinault Indian Nation, the Confederated Tribes of the

Chehalis Reservation and other tribes have gathering interests in upland areas that are owned by the federal government, most notably the Grays Harbor National Wildlife Refuge (GHNWR) in Hoquiam, and are interested in habitat areas that might affect salmon migration and salmonid populations on or near the Chehalis River.

Regulatory Context

Federal, state, and local regulations recognize the public's interest in cultural resources and the public benefit of preserving them. These laws and regulations require analysts to consider how a project might affect cultural resources and take steps to avoid or reduce potential damage to them. A cultural resource can be considered as any property valued (be it monetary, aesthetic, religious, or other value) by a group of people. Valued properties can be historical in character or date to the prehistoric past—the time prior to written records.

The Pontoon Construction Project involves federal funding and permits; therefore, this project is required to satisfy requirements established under NEPA (United States Code Title 42, Chapters 4321 through 4347 [42 USC 4321-4347]) and Section 106 of the NHPA of 1966, as amended (16 USC 470 et seq.). The NHPA is the primary mandate governing projects under federal jurisdiction that might affect cultural resources. The purpose of this Cultural Resources Discipline Report is to identify and evaluate cultural resources in the project APE in order to fulfill the requirements of NEPA and Section 106 of the NHPA and to assess the potential effects of the build alternatives on cultural resources.

Federal Regulations

National Environmental Policy Act

NEPA requires that all major actions sponsored, funded, permitted, or approved by federal agencies (generally referred to as federal undertakings) undergo planning to ensure that environmental considerations, such as impacts on historical, cultural, and archaeological resources, are given due weight in decision-making. The federal implementing regulations for NEPA are in the Code of Federal Regulations, Title 40 Part 1500s through 1508 (40 CFR 1500-1508; Council on Environmental Quality [CEQ]), and for FHWA actions, 23 CFR 771. The CEQ regulations include sections on urban quality, historic and cultural resources, and the design of the built environment [Sec. 1502.16(g)].

National Historic Preservation Act Section 106

Section 106 of the NHPA requires federal agencies to consider the effects of actions they fund or approve on any district, site, building, structure, or object that is listed in or eligible for listing in the NRHP, defined as "historic properties." The regulations implementing Section 106 are codified at 36 CFR 800. The Section 106 review process involves four steps:

1. Initiate the Section 106 process by establishing the undertaking, developing a plan for public involvement, and identifying other consulting parties.
2. Identify historic properties within an APE, and evaluating their eligibility for inclusion in the NRHP.
3. Assess adverse effects by applying the criteria for adverse effect to historic properties.
4. Resolve adverse effects by consulting with the State Historic Preservation Officer (SHPO) and other consulting agencies, including the Advisory Council on Historic Preservation (ACHP), if necessary, to develop an agreement that addresses the treatment of historic properties.

To determine whether an undertaking could affect historic properties, cultural resources (including archaeological, historic, and ethnographic properties) must be inventoried and evaluated for listing in the NRHP.

State Regulations: State Environmental Policy Act

Washington's State Environmental Policy Act (SEPA) requires that all major actions sponsored, funded, permitted, or approved by state and/or local agencies be planned so that environmental considerations—such as impacts on historic and cultural resources—are considered when state agency-enabled projects affect properties of historical, archaeological, scientific, or cultural importance (Washington Administrative Code Title 197, Chapter 11, Section 960 [WAC 197-11-960]); these regulations closely resemble NEPA. Similar to NEPA, SEPA considers cultural resources to be properties listed in or eligible for the Washington Heritage Register (WHR), which is the state equivalent of the NRHP and sets forth similar criteria for evaluating cultural resources. The WHR, which is administered by the DAHP, identifies and records significant historic and prehistoric resources at the state level. Any NRHP-eligible property is automatically eligible for the WHR.

Local Regulations

The City of Hoquiam and the City of Tacoma maintain local registers of historic places, which include individually registered city landmarks, historic districts, or conservation districts. The Tacoma Landmarks Commission maintains the Tacoma Register of Historic Places (TRHP) and the Hoquiam Historic Preservation Commission is responsible for the Hoquiam Register of Historic Places (HRHP). Properties are nominated to these registers by the respective commissions and designated by city council resolution. Changes to the exteriors of listed properties are subject to review by the respective commissions. The City of Aberdeen currently does not have a local historic preservation program.

2. Environmental and Cultural Setting

Grays Harbor is a large, shallow estuary on the Pacific coast of Washington, about 45 miles (72.5 kilometers) north of the Columbia River and 110 miles (177 kilometers) south of the Strait of Juan de Fuca. The estuary covers an area of 62,000 acres (25,000 hectares), including water, tidal marsh, and partially developed shoreline.

The build alternative sites are located in Grays Harbor County, within the Chehalis River basin, on the Grays Harbor estuary. The Grays Harbor estuary is a bar-built estuary, meaning that it was formed by the accumulation of sand along bars, restricting water flow to coastal embayments (Seliskar and Gallagher 1983). Both sites are located on filled land overlying mudflats derived from Holocene alluvium. The Aberdeen Log Yard Alternative site is located approximately 1.25 miles west of where the Wishkah River flows into Grays Harbor, and the Anderson & Middleton Alternative site is located approximately 2,000 feet west of where the Hoquiam River flows into Grays Harbor.

The Grays Harbor region has a maritime climate, which consists of cool, wet winters and mild summers. Annual precipitation, predominantly rain, near the city of Aberdeen is around 85 inches per year, with most of this occurring between October and March (Kruckeberg 1995). Average water salinity at both areas build alternative sites ranges between 0 percent to 5 percent in the winter, and 10 percent to 20 percent in the summer (Herrmann 1972).

Regional Geology

The build alternative sites are located in the northwestern margin of the Willapa Hills physiographic province, within Grays Harbor at the mouth of the Chehalis River, and are bordered by the Olympic Mountains to the north, the Willapa Hills to the south, and the Black Hills to the east. Both sites are located on historic-period fill overlying mudflats in the Grays Harbor estuary. The Grays Harbor estuary is underlain by Eocene flow basalts, pillow basalts, and sedimentary rock derived from sediment accumulation on the ocean floor (Alt and Hyndman 1994, WDNR 2009). The surrounding hills comprise upper tertiary sedimentary rock and basalt (WDNR 2009).

During the Pleistocene epoch, glacial melt and stream water that had accumulated against the southern margin of the continental ice sheet overflowed through the lower Chehalis River. During the last glacial retreat, two meltwater lakes, Lake Russell and Lake Nisqually, formed along the southwest and south end of the retreating ice lobe near present day Olympia and Tacoma. These lakes drained through the lower Chehalis River as well, depositing outwash sands and gravels. As sea level began to rise at the end of the Pleistocene, the lower course of the Chehalis River became inundated, forming an estuary (Alt and Hyndman 1995).

Over the past 13,000 years, sea level has risen nearly 110 meters (Peterson and Phipps 1992) in the Grays Harbor area. Sea level rose from -110 to -10 meters (100 meters) between 13,000 and 6,000 years before present (YBP) and from -10 to 0 meters (10 meters) over the past 6,000 years. The sedimentation rate, affected in part by changes in gradient caused by sea-level change, was very rapid between 13,000 and 6,000 YBP and slowed significantly in the past 6,000 years. Sea levels have stabilized in the last 3,000 years, rising 5 meters in this period of time (Peterson and Phipps 1992). Exhibits 2-1 and 2-2 depict the historical shoreline in relation to the build alternative sites.

Geotechnical Sonicores® in the Grays Harbor region have identified the presence of Pleistocene gravels 100 feet below the surface. Pleistocene gravels were found 125 to 130 feet below the surface at a property immediately adjacent to the Anderson & Middleton property and 120 to 150 feet below the surface at the Aberdeen Log Yard and the Anderson & Middleton sites (BOAS, Inc. 2007).

Evidence of repeated episodes of Holocene earthquake-induced subsidence has been found along the Northwest Pacific coast from Vancouver Island to the Salmon and Nehalem rivers drain on the Oregon coast, an area known as the Cascadia Subduction Zone. Research indicates that the coastal margin has, in some locations, subsided between 0.5 and 2.0 meters in conjunction with Late Holocene earthquakes (Atwater 1987:943; Dareienzo and Peterson 1990:18; Nelson 1992:297). At least eight subsidence events have been recognized in the Grays Harbor area between 500 and 5,400 YBP. Evidence of such subsidence events comes from the study of buried marsh and forest soils beneath the estuarine wetlands and tidal marshes. Tectonic activity resulted in the lowering of forests into the intertidal zone and triggered tsunamis that deposited sand on the newly subsided lowlands (Atwater 1992). Rapid sedimentation after coseismic subsidence has been identified in cores and cutbanks throughout the Grays Harbor area and is distinguishable because of the sharp contrast of the material to intertidal sediment layers (Phipps 2007). According to a recent report by James Phipps, a more recent earthquake in January, AD (anno Domini) 1700 caused the eastern Grays Harbor area to sink 1 to 2 meters below the surface (Phipps 2007).

In addition to coseismic subsidence, less catastrophic natural processes are also occurring in Grays Harbor. Diurnal wave action, tides, currents, and storms all cause coastal sediments to be stirred into the water column and deposited in lower energy environments along the shoreline. Different processes cause sediments to be deposited in strata that record the process of deposition in sediment size and shape and the layering.

The U.S. Soil Conservation Service describes the soils in the APE as the Ocosta series, which are silty clay loam that formed on clayey alluvium deposited in quiet coastal bay waters where the natural vegetation was mostly grasses and sedges—very deep, poorly drained, nearly level soils on floodplains and deltas protected from tidal overflow (Pringle 1986).

Regional Flora and Fauna

Grays Harbor is located within the sitka spruce (*Picea sitchensis*) vegetation zone, a long narrow area that stretches along the Washington and Oregon coast. Forests in this area are typically very dense, and most commonly consist of sitka spruce, western hemlock (*Tusga heterophylla*), and western red cedar (*Thuja plicata*). Red alder (*Alnus Rubra*) is most abundant in recently disturbed sites (Franklin and Dyrness 1988). Understory shrubs of potential food value for Native Americans within the sitka spruce zone include, but are not limited to, salal (*Gaultheria shallon*); blueberries and huckleberries (*Vaccinium* sp.); blackberry, salmonberry, and thimbleberry (*rubus* sp.); and red elderberry (*Sambucus racemosa)*. Geophytes, such as common camas (*Camassia quamash*) and tiger lily (*Lilium columbianum*), were collected by Native Americans when available (Pojar and Mackinnon 1994; Gunther 1945).

Terrestrial faunal resources in the region include, but are not limited to, mule deer (*Odocoileus hemionus*), elk (*Cervus elaphus*), black bear (*Ursus americanus*), squirrels (*Scirius* sp.), muskrat (*Ondatra* sp.), and raccoon (*Procyon lotor*). Aquatic faunal resources include the river otter (*Lontra canadensis*); ducks, and geese (*Anas sp.*) (Ames and Maschner 1999); Chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), and chum (*O. keta*) salmon; and steelhead (*O. gairdnerii*). The Hoquiam River, near the Anderson & Middleton Alternative site, has fall Chinook, chum, and both late and early coho runs (Phinney and Bucknell 1975). Marine faunal resources in the harbor include the cutthroat (*Oncorhynchus clarki clarki*) and steelhead trout (*O. mykiss*), eulachon (*Thaleichthys pacificus*), starry flounder (*Platichthese stellatus*), Pacific herring (*Clupea pallasi*), white

(*Acipenser transmontanus*) and green sturgeon (*Acipenser medirostris*), Northern anchovy (*Engraulis mordax*), Pacific lamprey (*Lampetra tridentatus*), and English sole (*Pleronectes vetulus*) (Pacific State Marine Fisheries Commission 1996).

Grays Harbor has shellfish resources in addition to vertebrate faunal resources. Because of the varying levels of salinity in Grays Harbor, the variety of shellfish species decreases to the east, towards the mouth of the Chehalis River. Herrmann (1972) indicates that no shellfish that burrow in sediment are located within the APE. Mya (*Mya arinaria*), an introduced species, and Macoma (*Macoma spp*.) were identified on the shoreline at the Anderson & Middleton Alternative site during the current archaeological investigations. Van Syckle (1982) notes that the Hoquiam River—very near the Anderson & Middleton site—was known for its large numbers of bay mussels (*Mytilus trossulus*) in the early historical period. Finally, past shellfish ranges might have differed from their present locations because of historical land modification practices such as channel dredging, which affects the water gradient, and logging, which affects runoff speed.

Cultural Setting

Regional Context: Pacific Northwest Coast and Grays Harbor

A prehistoric context for the build alternative sites begins at the largest scale for archaeological research: the region. As numerous prominent anthropologists have noted, the Pacific Northwest coast can be characterized as a large area with regional similarities, local diversity, and varied adaptive strategies (Ames and Maschner 1999; Donald 2003; Kroeber 1939). Grays Harbor is located on the Pacific Northwest coast and shares its broad cultural patterns, but at the same time, it is ecologically and culturally distinct with unique characteristics.

Prehistoric archaeological research on the Pacific Northwest coast tends to occur on shell midden sites and modern shorelines, and this pattern holds true for investigations in Grays Harbor. This pattern of archaeological research, argues Wessen (1990, 2006), reflects a notable bias from survey efforts influenced primarily by site access and surface visibility.

Previous prehistoric investigations in Grays Harbor include inventory survey, site excavations, impact assessments (some with excavations), intertidal feature mapping, and ethnohistoric interviews (oral history). These investigations were conducted over the past 60 years, initially by university or government archaeologists, but mainly by private archaeology consulting firms throughout the last three decades. The following sections present a context for the current undertaking, from a broad regional scale to more focused local investigations, with the ultimate goal of assessing their potential to inform our reconstructions at the build alternative sites presented in this report.

Regional Prehistoric Research

In some of the earliest research in the region, Albert Reagan surveyed most of the Olympic Peninsula coastline before World War I. Although he did not survey in Grays Harbor itself, his research formally defined the archaeological expectations for subsequent work in the region. Reagan (1917) characterized the outer coast (from the Hoh River northward) as having three main site types: shell middens, oven mounds, and burial mounds. Middens were classified as either “recent,” ”old,” or “ancient.” The recent sites were the best preserved, and their assemblages included glass beads or other Euro-American trade goods. Reagan noted that the old middens and underlying ancient middens had been eroded and their original sizes were indeterminate. The ancient middens contained decayed shell, ashes, burnt animal bones, fire-altered rocks, and trees several hundred years old on their surfaces. Reagan also noted the relatively small number of total artifacts and, especially, the scarcity of lithics; most formal tools were made of bone, antler, or shell. Because reliable dating methods were unavailable at the time, the absolute ages of these assemblages are unknown. In addition, the terms used to describe midden site age are both nominal and relative. Since “old” and “ancient” do not represent a particular interval of time, then these terms might not represent a wide time range. Radiocarbon dating methods, however, have since revealed that shell middens in the San Juan Islands and the Olympic Peninsula middens date to 1,000 YBP and later (Stein 2000). Notable exceptions would be the few sites on the Olympic Peninsula that are 3,500 to 4,500 years old, and one that might be nearly 7,000 years old (based on a single radiocarbon sample) (Kirk and Daugherty 2007).

Prehistoric archaeological sites from the Pacific Northwest have a relatively high frequency of tools constructed with organic materials (bone, antler, and shell) and a paucity of stone tools (which are the most abundant artifacts found in prehistoric archaeological sites from other regions). This distribution is characteristic of the artifact assemblage recovered from the Ozette site, one of the most famous sites on the Pacific Northwest coast of Washington state. Ozette was a late-prehistoric village that was buried by a mudslide; this mudslide preserved artifacts made from organic materials in anaerobic conditions.

Grays Harbor Research

The first archaeological site survey in Grays Harbor was conducted by Richard Daugherty in 1947 as part of his research inventory of the Washington coast (Daugherty 1948). Daugherty, currently a respected archaeologist and professor emeritus, was a student at the University of Washington when he conducted the survey. In Grays Harbor, he recorded 13 shell midden sites (45GH1, -2, -3, -4, -6, -7, -9, -10, -11, -12, -13, -15, and -16) and two postcontact graveyards (45GH14 and 45GH17) (Exhibit 2-3).

Dr. Daugherty observed that most sites existed near creeks or rivers and that the largest were found at the mouths of major streams (1948). He drew attention to the limited depth of cultural deposits at most sites, as well as the high incidence of erosion. His site inventory provided few details (in keeping with then-current standards), but he indicated that at least two of the shell midden sites in Grays Harbor had evidence of house pits (45GH4 and 45GH15) and that locals reported they had uncovered human skeletal remains during construction or plowing at two sites (45GH6 and 45GH15).

Minard Site Investigations (1969 to 1974)

The only formal archaeological excavation in Grays Harbor was conducted 30 years ago at the Minard Site (45GH15), the largest shell midden recorded by Daugherty in the harbor. [redacted] Excavations at Minard were conducted in 1969 and 1970 by Washington State University doctoral candidate Tom Roll under Daugherty's guidance. The results of these investigations formed the core of Roll's dissertation (1974); also, selected data have been further analyzed and reported upon by Fancher (2001) and Bovy (2005).

The Minard excavations documented intermittent cultural deposits over an 1,150-feet-by-330-feet (350-meters-by-100-meters) area to a maximum depth of 5 feet (1.5 meters) below surface. Finds include 827 stone, bone, antler, and shell artifacts and large quantities of unmodified faunal remains, as well as post molds, hearths, ash concentrations, and pits excavated into underlying noncultural sands. The artifact assemblage includes a large proportion of bone and antler tools (points, wedges, and awls) and relatively little chipped stone. Human burials were encountered in one area of the site. Radiocarbon dates give a 1,000-year maximum age estimate for the shell midden. Euro-American artifacts from the upper layers attest to postcontact use of the site (Roll 1974). Subsequent inspection of an adjacent property identified probable burial features that appear to be part of the Minard site (Reid 1988; Roll 1988).

As part of his doctoral research, Roll (1974) analyzed the Minard artifacts and faunal remains to reconstruct the environmental habitats represented by the food procurement technology. The Minard data indicated a broad range of resources harvested from throughout the Grays Harbor estuary. Roll characterizes the tool kit as narrow with exceptionally little stylistic variability. Roll also compared the Minard finds with excavated assemblages from other west coast shell middens and found differences. Notably, unlike Minard, where chipped stone was scarce, the Martin site (45PC7) in Willapa Bay yielded a large proportion of lithic tools and debitage (stone tool manufacturing waste). The faunal remains were similar at the two sites. Since the Martin site is located in a similar environmental setting as Minard, with access to similar resources, the implication is that different tools were being used for the same purpose. Roll (1974) attributes this difference to cultural factors. In their synthesis of Pacific Northwest coast prehistory, Matson and Coupland (1995:262–264) suggest that the Martin site is (somewhat) older than Minard and that the differing quantities of chipped stone might represent temporal variation.

More recently, two graduate students reexamined Minard site faunal remains excavated in the 1970s. Jason Fancher (2001) analyzed the mammal bones for his Master's thesis research at Washington State University. Kristine Bovy's (2005) PhD research at the University of Washington includes a detailed analysis of bird remains from Minard and two other sites in western Washington. Among other research questions, the two faunal studies sought evidence for reconstructing the season of occupation represented at Minard. Fancher (2001) concludes from the mammal remains that Minard had been a winter village. Bovy's (2005) analysis of the Minard site's bird bones suggests year-round occupation, perhaps more intensively in some seasons. As part of her research, Bovy (2005) obtained 12 radiocarbon dates on bone and shell to supplement the three previous dates on charcoal. The new dates all fall within the past 1,000 years confirming Roll's (1974) site chronology. The refined sequence of dates revealed a significant shift in abundance of two species of water birds at circa AD 1100 to 1400. Bovy's (2002 and 2005) explanations attribute the change to nonlocal natural and cultural environmental effects on water bird populations.

Hoquiam Test Excavations (1975)

In 1975, U.S. Army Corps of Engineers (USACE) archaeologist David Munsell conducted a cultural resource survey of what is now known as Industrial Development District No. 1 (IDD # 1) (a site formerly considered as a project build alternative site, [redacted] this survey included assessing the intertidal area and test excavations. The archaeological investigation preceded the Port of Grays Harbor's conversion of a largely wetland property to upland suitable for development. Munsell looked for subsurface prehistoric remains along the northern edge of the property, which he believed had been upland (and possibly occupied) before the contact era (Munsell 1976). He did not find evidence of prehistoric deposits, however; instead, the stratigraphy indicated late nineteenth century or early twentieth century fill on top of intertidal deposits. The test excavations yielded postcontact materials, which represent historical industrial archaeological remains (Munsell 1976). DAHP records identify the area of these subsurface investigations as 45GH58; however, there is no site form in the records, so it is not clear that Munsell recorded the area south of the railroad tracks as a site. Because the number also refers to the mill site north of the railroad tracks, there is some confusion regarding this record (Munsell and Storm 1981). This same area was subsequently tested by BOAS, Inc. in 2007 as part of an earlier investigation; no prehistoric sites or features were identified at that time (BOAS, Inc. 2007).

Newskah Creek Fish Trap Complex (1981, 1999)

In 1981, USACE archaeologists recorded the Newskah Creek Fish Trap site (45GH73) during a reconnaissance of proposed dredge disposal locations in Grays Harbor. [redacted] They researched historical maps and aerial photographs to assist in documenting the features (Munsell and Storm 1981; Schalk and Burtchard 2001); however, further documentation did not occur until 1999 when the USACE retained a private firm to survey the site, map the features, and collect samples for radiometric dating. Archaeologists Greg Burtchard and Randall Schalk conducted the 1999 investigations.

[redacted]

[redacted] At least some of these alignments are prehistoric as evidenced by four radiocarbon dates with an age range of circa 900 to 500 YBP. Seven sets of historic pilings were interspersed with the stake alignments. Historical maps indicate that the pilings are remains of late nineteenth century commercial fish traps (Schalk and Burtchard 2001). Exhibit 2-4 shows a photograph of the stake alignment and nineteenth century pilings.

The 45GH73 site is interpreted to represent remains of tidal fish traps spanning the past 1,000 years or more. Multiple episodes of building and maintenance are inferred from the overlapping positions of features. The Newskah Creek site is one of the largest and most complex fish trap sites reported on the Pacific Northwest coast (Schalk and Burtchard 2001). [redacted]

Cultural Resource Management Investigations (1976 to 2007)

Between 1979 and 2007, at least 29 cultural resource reconnaissance surveys and assessments examined various terrestrial locations near the Grays Harbor shoreline, mainly inland along transportation routes. Several sought prehistoric remains but only encountered historic archaeological resources (BOAS, Inc. 2007; Larson 1987; Laybolt and Demuth 2005; Munsell 1976). Survey of a property adjacent to the Minard shell midden did identify possible burial features, but they did not investigate them at that time (Reid 1988; Roll 1988). Overall, most surveys failed to identify evidence of significant prehistoric cultural resources (Goetz 1997, 1998, 1999; Kent 2003; Kwarsick and Gill 2004; Leavitt 1980; Maas 1980; Munsell 1980; Rice 1982, 1984; Robinson 1979, 1982, 1984, 1985, 1992, 1998; Rooke 2002a, b, c, d; Spencer 1983; Stilson 1987).

A few surveys in Grays Harbor involved inspecting tideflats. In the early 1980s, USACE archaeologists recorded two fish trap sites in Grays Harbor [redacted] The inventory record describes this site as a stake alignment associated with scattered fire-altered rocks, bone, shell, lithic debitage (stone discarded during tool making), and modern flotsam (Maas and Munsell 1984).

Oral History Studies

As an important supplement to the archaeological research in Grays Harbor, several individuals undertook to systematically record the tribal and local memory of how things were, and how they were said to have been, by collecting oral histories. In the mid-1980s, anthropologists Karen James and Victor Martino were retained by the USACE to prepare a cultural study of Native American land use of Grays Harbor during the early historical period. [redacted] Jay Miller, PhD, has conducted a series of interviews with several individuals that focus on the current proposed project (Appendix C).

Prehistoric Archaeological Resource Potential

[redacted]

[redacted]

Chronology

Age estimates are available for two prehistoric archaeological sites in Grays Harbor: the Minard shell midden and the Newskah Creek Fish Trap complex. Radiocarbon assays indicate that they were contemporaneous, and both locations were in use during the past 1,000 years. The Minard village site comprises a single cultural component beginning about 1,000 years ago and continuing, perhaps with interruptions, into early postcontact times. Twelve radiocarbon dates support comparative dating of the artifact assemblage (Bovy 2005; Roll 1974) and correlate well with regional findings. Most dated archaeological sites on Washington's ocean coast are shell middens from the past 1,500 years (Wessen 1990).

Schalk and Burtchard (2001) suggest continuous use of the Newskah Creek Fish Trap site throughout the past millennium. As they note, however, four radiocarbon dates are insufficient to confirm continuity. They further note a possible pattern in age distribution of features: the two older dates (circa 1,000 YBP) were obtained from stakes 1,475 feet (450 meters) apart in the low intertidal zone, whereas the younger two (circa 600 YBP) are from stakes 1,312 feet (400 meters) apart higher on the tideflat. With the caveat that the sample is small, Schalk and Burtchard speculate that the age distribution could reflect trap rebuilding after seismic subsidence. In addition to, or instead of, subsidence other preservation factors might influence the archaeological record.

Other methods of age determination for prehistoric fish trap features in Grays Harbor might become viable in the future. Dating features according to diagnostic characteristics is possible elsewhere. For example, in Southeast Alaska, heart-shaped fish traps are known to be circa 2,000 years old (Mobley and McCallum 2001). For the southern Pacific Northwest coast, available data are insufficient to attempt comparative dating. Although there are numerous recorded and dated features in Oregon estuaries, nearly 90 percent are from the past 1,200 years (Byram 2002). Some stakes and poles are dated to the postcontact era based on characteristics such as scars from metal tools or embedded nails. The absence of such chronological clues, however, does not establish that they are prehistoric.

Regional Congruence

From Grays Harbor south, including Willapa Bay and the mouth of the Columbia River, shell middens are relatively numerous (Daugherty 1948). Subsistence activities in the southern subarea focused on a broad array of estuarine resources (shellfish, fish, water birds, and terrestrial mammals) (Roll 1974). In contrast, prehistoric coastal shell middens to the north of

Grays Harbor, including the west coast of Vancouver Island, typically contain large quantities of sea mammal remains, indicating a focus on marine mammal hunting and little or no chipped stone (Roll 1974; Wessen 1983, 1990).

There is little comparative archaeological evidence about possible cultural differences within Grays Harbor. For the Columbia River estuary, Rick Minor (1983) identified a difference in subsistence orientation and settlement pattern corresponding to location within the estuary—a coastal orientation near the river mouth versus a riverine orientation in the upper estuary. The Chehalis River in Grays Harbor exhibits a similar landscape orientation, but whether the archaeological record follows the pattern discovered by Minor in the Columbia River estuary remains unexplored.

Fish trap intertidal features are common along the Pacific Northwest coast but investigations are limited and mainly recent; the most extensive research has been in Oregon and Alaska. Moss and Erlandson (1998) analyzed chronological data for more than 60 sites and demonstrated a significant difference between the northern and southern areas of the coast. In Oregon, most fish traps date from the past millennium, and in southeast Alaska, fish trap features have yielded dates within the past 4,000 years with many in the 2,500 YBP to 1,500 YBP range. Moss and Erlandson (1998) suggest that coastal subsidence on the southern region of the Pacific Northwest has affected the visibility of intertidal features. They note that further interpretation requires data for the intervening coastal areas of British Columbia and Washington.

The Newskah Creek Fish Trap site in Grays Harbor fits the south coast pattern described by Moss and Erlandson (1998). In addition to its late age, many characteristics of the features are like those at Oregon sites described by Byram (1998, 2002). Yet, the large site area and presence of numerous sets of overlapping features resemble a fish trap complex in Comox Harbor on the east coast of Vancouver Island (Greene 2005). One characteristic that sets the Newskah Creek features apart is the species of the wood used to make the stakes; the Schalk and Burtchard (2001) report that all identified samples are western red cedar *(Thuja plicata)*. Both to the south and north of Grays Harbor, fish trap features of all ages have an extremely low incidence of cedar. The most common wood in Alaska, British Columbia, and Oregon is hemlock *(Tsuga heterophyla)* (Bernick 2003).

Depositional Context Considerations

The potential presence of ancient sites depends on the survival of the landforms on which any such sites were located. Depending on location, estuarine settings can be dynamic due to hydrologic cycles of scour and deposition. Changing sea levels, coseismic subsidence, tsunamis, storms, and tidal currents might significantly affect topographic features, including any cultural deposits; these events might erode the landform altogether. Additional impacts might result from dredging, boat traffic, diking, and foreshore development.

[redacted]

Alluvial deposits require particular care when interpreting inclusions (artifacts), especially buoyant objects that might have floated in. Unless the stratigraphic context is established securely, objects cannot be assumed to be meaningfully associated with one another or with any features they might be near. Although this might seem to be an elementary observation, historically archaeologists have been lax about establishing associations (Bernick 2007).

[redacted]

The build alternative sites are located in a dynamic estuary. If any mobile ancient artifacts exist, then their depositional history would need to be reconstructed to ascertain whether they represent activities that had occurred at the location where they were found. If they were washed in from another location, then their presence would not indicate human use of the site in the past. Culturally modified items that washed in would not necessarily be associated with features or artifacts; they might represent one or more habitats upstream from the site.

Fish Weir Features

In the past two decades there has been an increase in the number of wood-stake “fish weir” features recorded on the Pacific Northwest coast; most of these are represented only by remnants of stakes embedded in the tideflats. The proximal (top) ends have decayed, and the distal (bottom) ends survive in waterlogged condition. Documentation tends to center on mapping the configurations and measuring stake diameter, supplemented by radiometric dating and wood-species determinations for selected specimens. Some researchers, notably Scott Byram (2002), report additional details of stake morphology and trap components.

The recency of archaeological “fish weir” research is reflected in the lack of commonly recognized terminology to describe types of features and their components. The terms “weir” and “trap” are not always used in the same sense—and sometimes they are used interchangeably—as they are for the Newskah Creek features. Moreover, the historical and ethnographic literature is plagued with inconsistent, undefined usage, and differentiating the archaeological remains of fish dams, fences, and enclosures (all are types of weirs) from traps (which can be large enclosures) is not always possible (Bernick 1998).

Evidence of the horizontal barriers associated with stake alignments has been recovered at a few sites on the Pacific Northwest coast but without sufficient integrity to reconstruct how the fish trap or weir operated. At the Wapato Creek site in southern Puget Sound, fencelike “netting” was found partly attached to stakes (Munsell 1976). Excavations in the mud near stake features in Oregon have yielded remains of brush barriers, lattice panels, and basket traps (Byram 2002). No evidence of horizontal barriers was reported from Newskah Creek.

Interpreting fish weir construction details, operation method, and targeted fish species based on ethnographic analogy is not consistently reliable. For example, Byram (1998, 2002) recovered 300-year-old rigid lattice panels at the Osprey site in Oregon where the ethnographic literature had indicated basket traps only. Although it might seem that compilations of aboriginal fishing methods such as Stewart (1977) include the range of devices, recent archaeological finds (e.g., Byram 2002; Greene 2005; Schalk and Burtchard 2001; Stevenson 1998) illustrate an even more varied assortment of fish traps, weirs, and related features. There is also a growing body of research indicating that weirs and traps on the Pacific Northwest coast targeted a variety of fishes, not always salmon (Bernick 2001). Environmental setting and hydrology define the type of structure that will be effective at a particular place, a relationship that appears to be supported by available archaeological and ethnographic information.

Summary

Overall, the prehistoric archaeological context for the Grays Harbor build alternative sites shares a relationship with the larger Pacific Northwest coast; specifically, two main types of sites are common: shell middens and fish weir features. Either for cultural or environmental reasons, sites of these types in the region do not appear to have a time depth greater than roughly 1,000 to 1,500 YBP. In some cases, erosion (or subsidence) has evidently occurred and some sites from this or earlier periods might have been scoured (or deeply buried) resulting in an underrepresentation in our survey sample. On the other hand, this material culture and settlement pattern might reflect a cultural change on the part of the previous populations. In either case, archaeological investigations conducted at the build alternative sites will contribute information to assist in answering these and other regional questions.

Ethnography[1] SECTION REDACTED

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

History[2]

Euro-American Exploration

Maritime explorers and fur traders first entered Grays Harbor during the late eighteenth century. Sailing the American ship Columbia Rediviva, Captain Robert Gray became the first Euro-American to enter the mouth of the Columbia River on May 7, 1792, seeking to establish a fur trade foothold for Boston merchants (Scofield 1993; Van Syckle 1982). Upon arrival, Gray's crew was met by local Indians and traded blankets and irons for furs and fish. Gray next traveled to another river entrance further north, where he named a bay Bulfinch's Harbor after his ship's owner Charles Bulfinch. Six months after Gray first explored the region Lieutenant Joseph Whidbey from the Captain George Vancouver expedition followed the explorer's route, renaming the area Grays Harbor in his honor (Hanable 2004; Hayes 1999; Van Syckle 1982).

Euro-Americans next visited Grays Harbor 32 years later, when in 1824 a Hudson Bay Company crew traveling to the Puget Sound via the Columbia River passed through the present-day Aberdeen and Hoquiam area. Expedition clerk John Work predicted that the area's dense conifer forests would hinder settlement efforts in the area. What Work overlooked

[2]This section was adapted in part from the historic contexts in *Historic Resources Survey and Inventory of Central Business Districts and Portions of the Cities of Aberdeen and Hoquiam, Washington* (Harvey and Krafft 1987), prepared for the Washington State Department of Community Development, Office of Archaeology and Historic Preservation and the *Cultural Resource Study Report of the Port of Grays Harbor Industrial Development District Parcel No. 1 Hoquiam, Washington* (BOAS, Inc. 2007).

was, however, the great economic potential of this local resource that would soon be realized.

Settlement

Once Washington joined the United States in 1846, many pioneers arrived in Grays Harbor (Douglas 1914; Wilkes 1845; Wilma 2006; Work 1912). Although in time Grays Harbor would become the sawmill capital of Western Washington, the early settlers in the area were cattle and dairy farmers who sought to clear the "thick growth of timber and bushes" (General Land Office [GLO] 1958). Gold rushes occurring at the time, including the Fraser River strike in British Columbia, helped spur the region's settlement due to the increased demand for beef and butter; Grays Harbor cattle farmers often shipped cattle to the Fraser mining communities and camps.

William O'Leary (1821-1901) was the first Euro-American settler in Grays Harbor. O'Leary arrived in 1848 and lived "on the south shore of Grays Harbor beside the tidal stream that preserves his name" (Wheeler 1937; Van Syckle 1982). Territorial status was granted to Washington in 1853, and the following year Chehalis County (changed in 1915 to Grays Harbor County) was established, leading to a steady increase in settlement in Grays Harbor. Cosmopolis, a lumber-company town and one of the first communities on the harbor, was founded in the early 1850s on the south shore of the Chehalis River 3.5 miles east of present-day Aberdeen. In 1858, government engineers surveyed Township 17 North, which encompassed the mouth of the Hoquiam River. The township was opened to entry either by homestead or "cash entry at $1.25 per acre, quantity unlimited" (Welsh 1942) and led to the founding of Hoquiam.

Early Hoquiam

Hoquiam was built on the west bank of the Hoquiam River at the confluence of the Chehalis River. A significant early settlement involved claims made by the Samuel James family in 1857 and structures built along the north shore of Grays Harbor. In the same year John Rogers James "filed on a 160-acre claim, which embraced nearly all the business and residential sections of present-day Hoquiam" (Van Syckle 1982). James's claim was at the mouth of the Hoquiam River on the site that later became the Northwestern Lumber Mill. Another early pioneer, Edward Campbell, staked a claim in 1858 (Homestead Entry 1820; Lamb 1948). James A. Karr arrived in 1859 and became Hoquiam's first permanent Euro-American settler with his claim that adjoined James's claim in present-day North Hoquiam (Lamb 1948; Van Syckle 1982). In 1859, the town was named Hoquiam, and soon settlers Edward Campbell and

Selucius Garfield acquired land on the east side of the Hoquiam River. Alexander Campbell, Edward's brother, acquired land upriver adjacent to Garfield's claim (Van Syckle 1982). By the mid-1860s, the land along the lower Hoquiam was largely settled, increasing demand for infrastructure such as roads, schools, and mail service. Hoquiam was later incorporated in 1889 (Van Syckle 1982; Washington Secretary of State Office 1987).

In its early days, Hoquiam and most of the Grays Harbor communities remained isolated with only a few scattered farms. Commercial communication and transportation outlets soon improved, allowing the region to profit from and exploit its vast timber and fishing resources. The 1879 arrival of the steam schooner Kate & Ann introduced "an improved and more efficient outlet" (Birks 1938) for sharing local products. Trade with Portland, Oregon, and an increasing number of cities nationwide directly enabled the logging and timber industry to develop. The rivers and sea primarily served as commercial avenues for trade because the region's overland routes were not efficient or dependable, and the railroad had not yet arrived in the area.

Abundant timber resources and accessible shipping lanes drew the interest of lumber barons nationwide to Grays Harbor. Captain Asa M. Simpson, a prominent California lumberman who sought to expand his timber empire to the Pacific Northwest, was one of the first to exploit the economic potential of the local natural resources. Simpson sent George Emerson on a scouting trip to Grays Harbor, and in 1881 he purchased the 300-acre James homestead at the mouth of the Hoquiam River. Simpson and Emerson's purchase became the nucleus of the first sawmill on Grays Harbor and was one of three original mills that dominated Hoquiam—the "Northwestern [Simpson-Emerson], the E.K. Wood, and the Lytle brother's Hoquiam Lumber and Shingle Company" (Weinstein 1978).

Early Aberdeen

Aberdeen is located on the west side of the Wishkah River and is the youngest and largest city on Grays Harbor. Founder Samuel Benn traded his late 1850s claim in the Chehalis River valley for Reuben Redman's place at the mouth of the Wishkah River, the site of modern Aberdeen. Benn ultimately owned 600 acres, and by 1875 the James Stewart and Alexander Young families joined him with claims along the Wishkah. The small settlement would consist of these three families for 9 years. The turning point for Aberdeen occurred in 1883 when civil engineer D.W. Fleet surveyed and platted the town site of Wishkah on the east side of the river. Later that year Fleet also platted a townsite on the west side of the Wishkah for Samuel Benn. The new town, Aberdeen, was named by some of the stockbrokers of the Aberdeen Packing Co., which established a cannery at the mouth of the Wishkah in 1877. Their home city of Aberdeen, Scotland, featured a similar cannery also built at the mouth of a river.

Aberdeen's population increased from three families in 1875 to 1,400 people by 1890, despite the fact that the town had been rebuilt twice by 1890 due to devastating fires. As late as 1882 the future townsite was primarily populated by timber and by 1884 had only six buildings. The town's potential, however, existed from its original platting, as Fleet approved lot sizes that were much bigger than average—50 feet by 130 feet, or 6,500 square feet—as well as much wider streets than most early Washington communities. More importantly, Fleet reserved additional unplatted areas for industrial sites along the waterfront that later would be the location for several sawmills that, for the next three to four decades, would produce a monumental quantity of lumber.

Recognizing the potential of the harbor's vast timber resources, Benn provided the necessary land inducements for lumber barons to establish their mills in Aberdeen. A.J. West established the first sawmill in Aberdeen in 1884, and he was soon followed by J.M. Weatherwax (the Anderson-Middleton Mill), Emery, Mack & Wood (the American Mill), and the Wilson Brothers Mill (on the present site of the Wishkah Mall).

By the turn of the century, the lumber industry was turning Aberdeen into an industrial giant, with six sawmills, a stave factory, one cooperage, sash and door factories, salmon canneries, and two shipyards. In 1900 "…the mills' daily output was 450,000 board feet of lumber…a staggering total of 250 million logs were delivered to the mills" (Weinstein 1978:25). Industrial development led to an expanded population, with 14,000 residents in Aberdeen by 1909. By the end of World War I, Aberdeen had 20,000 residents and became one of the world's leading lumber shipping seaports.

Logging Industry

Harvesting and processing local natural resources, primarily timber, has defined the communities of Grays Harbor. In the early 1900s, the area was one of the most productive lumber ports on the West Coast. As a region enhanced by foothills heavy with fir, hemlock, cedar, spruce, and deep wide rivers, the area was quickly discovered by enterprising lumbermen. Benjamin C. Armstrong started the first sawmill in Grays Harbor on the bank of the Chehalis River early in 1852, employing three men who cut logs for settler's homes (James circa 1916; Van Syckle 1980, 1982). Other small mills were soon established to supply lumber for the ever-expanding local communities. By 1881, local lumber mills began to export lumber to distant markets. When the Simpson-Emerson Mill was completed in 1882, it became the first sawmill in the area created specifically for export (Lamb 1948; Pettit 1939; Van Syckle 1980, 1982). In short time, the company was cutting 100,000 board feet of lumber daily, and schooners waited their turn in the bay to load their cargoes.

By 1890, the local lumber industry had evolved into a large-scale commercial business and had diversified to include wood shingles and ship building. Growth continued with completion of the railway in 1898, which connected Grays Harbor to new markets and provided access to regional and national rail transport (Cox 1974). By the end of the nineteenth century, Grays Harbor was among the most important lumber-shipping ports on the West Coast (Andrews 1957; Cox 1974; Lucia 1965).

The lumber-dependent economy of Grays Harbor thrived in the early 1900s and peaked in the 1920s. Responding to the insatiable demands of East Coast and Asian markets and California builders, especially after the 1906 San Francisco earthquake, Grays Harbor became the leading exporter of timber and finished lumber on the West Coast during the first two decades of the twentieth century. At the start of World War I, Grays Harbor was home to dozens of sawmills, long skid roads that fed the rivers and splash dams, and the ever-lengthening railroad lines spanning from the river valleys to the retreating forests (BOAS, Inc. 2007). Wood was used locally and elsewhere for all kinds of infrastructure, including the construction of roads, bridges, wharves, and support pilings for structures on marshy terrain; wood was also made into pulp and paper products. Related industries also developed and succeeded in direct relation to the mills. Hoquiam's first electric light plant was built on the Simpson-Emerson Mill yard in 1883. In 1891, the North Shore Electric Company was built on the tideflats west of the shingle mill (Sanborn Fire Insurance Map 1902; Van Syckle 1982). Electric plants in the area provided power to the mills and electric railways alike (Van Syckle 1982). Alexander and Robert Polson of Hoquiam expanded a logging railroad into the largest milling operation on the harbor—which today is the ITT-Rayonier Corporation—and logging blocks and mill machinery from the Lamb Machinery Company were sold worldwide (BOAS, Inc. 2007).

During the Great Depression of the 1930s, nine Grays Harbor mills ceased operations and closed due to the collapse in the housing industry (Pettit 1939; Van Syckle 1980). Despite the slowdown, this period saw significant technological advances in creating new wood products (such as plywood) from tree fibers. Grays Harbor became the leading plywood-producing center on the West Coast. In 1927, the E.M. Mills established the Grays Harbor Pulp Company in Hoquiam, and soon expanded it into a paper and plywood mill. In 1928, the Rayonier Corporation lumber yard was established immediately north of the Northwestern Lumber Company.

Despite the advancements of the plywood industries during the 1930s, the timber and lumber industries never regained their original momentum. Old-growth forests were decimated from years of unchecked harvesting and Washington hillsides remained bare decades later. In the 1940s, modern forest management practices emerged, including the Forest Practices Act of 1946, which promoted reforestation and harvest management in an effort to stabilize timber resources and the industry (Wilma 2006). Foreign demand and lower labor costs overseas posed a substantial threat to the industry. During Asia's economic boom in the 1960s, Japan's government-subsidized mills were able to outbid the American mills time and again. As a result, Washington lost as much as 40 percent of its wood-processing capacity between 1965 and 1975 (Wilma 2006). Today, the lumber and wood products industry is Washington's third-largest manufacturing sector, accounting for 10 percent of all manufacturing output. As a part of Washington's gross state product, the lumber and wood products industry has declined steadily between 1977 and 1997. By 2020, jobs within the industry are expected to decline by 3.5 percent ("Industry Profiles: Lumber and Wood Products" 2000).

Laborers

While in other lumbering areas of the United States union organization was not always looked to as a solution to the problems faced in the industry, they thrived in the American West. Unions were "fought ruthlessly…by employers…and sometimes succumbed to force" (Jensen 1945:114). Since they were mostly native-born Americans or northern Europeans, loggers were ideal candidates for unionization because they "spoke English, lived together, drank together, …[and were] isolated in the woods or primitive mill towns, they were bound by ties much stronger than their separate skill or job classification" (Dubofsky 2000:73).

The first organized meeting of lumbermen to occur on the west coast was in October 1891. Although "standards for grading lumber were adopted," the depression of the 1890s soon disintegrated the group (Jensen 1945: 115). Throughout the 1890s, other unions were formed only to quickly evaporate, possibly due to the early volatility of the industry. However, lumbermen had begun to understand the importance and influence of their organization when they were able to accomplish certain objectives, such as reducing shipping rates for lumber, during this time (Jensen 1945:115).

The turn of the century brought one of the most well-known unions to the area: the Industrial Workers of the World (IWW). In 1905, a year after the union was first established, the IWW local in Seattle had 800 members. By 1907, locals were created in various mill towns, including Aberdeen and Hoquiam (Dubofsky 2000:73).

On March 4, 1912, IWW local in Hoquiam began a strike that would soon cover the Grays Harbor area and impact lumbermen and citizens alike. The demand of the strikers was a raise in pay from $2 to $2.50 a day. When their demands were rejected, the strike quickly spread to Aberdeen and Raymond (Reider 2005; Jensen 1945:121). After the Aberdeen Trades Council refused to endorse the strike on March 24, a citizens committee was established on March 27 to resolve the impasse between the lumbermen and mill operators. Actions quickly turned to vigilantism, as the IWW headquarters in Aberdeen was raided and the leaders present were arrested and escorted from the city (Foner 1965: 222). In Hoquiam, “150 strikers were loaded into boxcars for deportation” (Jensen 1945: 121); only after the mayor opposed the act were the detainees released. Sentiment siding with the strikers did not last, however, and soon the vigilantes were following “a program of systematic deportation throughout the area,” particularly targeting Greek and Finnish workers (Jensen 1945:121). Finally, the citizens committee proposed a compromise of $2.25 a day wage with preference given to native-born Americans; the operators accepted, and the strike was effectively broken and called off by the IWW on May 7 (Reider 2005; Jensen 1945:121).

Industrial developments in Aberdeen and Hoquiam had attracted large numbers of European immigrants, especially Finns and Swedes, and a smaller number of Asian nationals. Of Aberdeen’s 13,600 permanent residents before World War I, more than a thousand of these were Finnish-born (Lewarne 1975). Despite tensions between native-born Americans and these European and Asian newcomers, the Finns maintained a strong presence in the community after the strike and many buildings still remain, including churches and social halls, which were cultural, educational, and political centers for the Finns at the turn of the century. The Randall Street Hall (Finnish Brotherhood Association Hall) was the main social and political center for the Finnish community in Aberdeen for more than 80 years; it also housed the first Finnish public library and was the setting for entertainment as well as labor and political meetings.

Organized labor continued to play an important role in Grays Harbor after the IWW strike of 1912, as lumbermen struggled to obtain better working conditions and wages. While occasional scuffles occurred, it was not until 1935 that another major strike took place in the harbor. In response to demands for higher wages and union recognition, calls for a strike were made by both unions and enthusiastic followers if demands were not met by May 6 (Ficken 1987: 210). Negotiations to settle the strike threat faltered and by mid-May, "90 percent of the Northwest industry's capacity was shut down and 30,000 workers had walked the picket line" (Ficken 1987:210). The U.S. National Guard was called to Tacoma in June and then to Grays Harbor on July 7 (Ficken 1987:211; Jensen 1945:181). In Grays Harbor, "the wives and children of strikers stoned guardsmen, houses and stores were bombed, and employers hired teamsters to escort strikebreakers through the picket lines" (Ficken 1987:212). Amid the violence, an agreement was reached in August establishing a minimum wage of $.50 an hour, a forty-hour week, union collective bargaining, and the rehiring of strikers (Ficken 1987: 211-212). Although lumbermen continued to pressure employers in the twentieth century, after World War I fewer industrial mills and the introduction of machines that replaced unskilled labor jobs decreased the bargaining power of organized labor (Ficken 1987).

Transportation

Since Grays Harbor was not the primary consumer of most of its wood products, transporting the milled and raw lumber played a key role in the development of the industry and local economy. The two primary modes of transportation were ship and rail. Both developed rather early and faced challenges but have overcome financial and natural barriers to transport Grays Harbor products around the world.

Shipping

The primary method for getting finished lumber to Grays Harbor's increasingly distant customers—before railroads were developed—was by boat. Navigating the waters of Grays Harbor, however, was no easy task. At low tide, approximately nine-tenths of Grays Harbor was exposed tideflats, making it nearly impossible for ships to access the shoreline (Davidson 1889). Early captains soon discovered that "good natural channels…have existed at many times, but they change in location and entirely disappear with remarkable rapidity" (Abbot 1897). By 1889, A.B. Bowers, inventor of the hydraulic system of dredging and filling, had licensed the Grays Harbor Co. to use his patented equipment (Bowers 1899).

Dredging continued in Grays Harbor in order to provide safe passage for ships well into the twentieth century (War Department 1911:2626-2630, 1916:3248-3250, 1920:2950-2951). In fact, there were still calls for solutions to the problem in the 1920s. A Washington congressman noted in 1920 that there were not enough sailing ships to transport all of the finished lumber in the harbor, but freighters were unable to enter the harbor due to its depth (State of Washington 1920). That same year, plans were developed by the Grays Harbor port engineer to construct a $250,000 dredge with a “22-inch section type and operated by electricity” (“Marine Construction News of the Month: Port Improvements” 1920:1027). In recent years, dredging remains necessary on an annual to biannual basis in order to maintain the navigable waters of Grays Harbor (Soike 2009).

Given the quantity of lumber products to be shipped and the emphasis placed on the shipbuilding trade regionally, some of the country’s best-known shipbuilders were attracted to the region. The first vessel built in Grays Harbor, a schooner, was constructed in 1887 at the Northwestern Mill in Hoquiam and designed by well-known West Coast shipbuilder Thomas McDonald. Ships built locally included “sleek three- and four-masted schooners, and later...steam schooners…” (Van Syckle 1980). The San Francisco earthquake of 1906 created a large demand for lumber from Grays Harbor to rebuild the city and, therefore, increased demand for ships. Soon, finished lumber was transported to destinations around the world by ships built in Grays Harbor. During the 20 years before World War I some 50 vessels were built at local yards (Van Syckle 1980). At the height of the war, “…the two Aberdeen shipyards, the Grays Harbor Motorship Company and the Grant-Smith Company had nearly 4,000 men on the payrolls” (Van Syckle 1980).

Railroad

Both Aberdeen and Hoquiam were platted in the mid-l880s. Leading citizens, including James Karr of Hoquiam and Samuel Benn of Aberdeen, offered free commercial parcels to encourage industrial development of their communities. Whereas the communities had only about 400 residences each, by the following year the populations had increased almost fourfold. This growth was partially influenced by the suggestion that the Northern Pacific Railroad was considering locating a terminus on Grays Harbor.

In 1890, the Tacoma, Olympia, & Grays Harbor (TOGH) Railroad was constructed southward from Tacoma to Montesano on the north shore of the Chehalis River. In 1892, the Northern Pacific Railroad extended the line west to Junction City near Aberdeen, but then turned south over the Chehalis River to Cosmopolis, bypassing Aberdeen and Hoquiam and terminating at the speculative boom city of Ocosta-By-The-Sea. Despite its billing as the “Metropolis of the West,” Ocosta was hit hard by the Depression of 1893, the railroad strike of 1894, and the failure to dredge the south channel of the bay adjacent to Ocosta. Soon, Northern Pacific abandoned Ocosta to search for a more viable terminus.

Resourceful Aberdeen and Hoquiam citizens recognized the opportunity to finally have railroad service and decided to build a connecting spur to the Northern Pacific line at Junction City. In Aberdeen, lumbermen J.M. Weatherwax, A.J. West, and Henry Wilson donated track and ties, and founder Sam Benn offered free lots to those that volunteered their labor. Benn also donated the land in East Aberdeen along Wishkah Street for the first railroad yard and depot. The line was completed in 1895 and turned over to Northern Pacific. Hoquiam would not secure rail linkage until four years later, when, in 1898, tracks built on a wooden trestle over the tideflats of Hoquiam were completed (replaced by a steel bridge in 1909), along with a rail spur connecting to a wooden railway bridge across the Hoquiam River. In 1899, a passenger terminus was built in Hoquiam, just north of the Anderson & Middleton property (BOAS, Inc. 2007).

Physical Development

Hoquiam

With the construction of the Simpson-Emerson Mill in 1883, Hoquiam transformed from a community of several farms into an industrial city. Like Aberdeen, Hoquiam's initial development was impacted by the high tides that frequently flooded sections of the city. Nevertheless, by 1890, construction was proceeding at an active pace. Sidewalks were raised above the tidewaters; 8th, I (Simpson), J, and K streets were planked and filled in with sawdust; and the city was linked to Aberdeen by a planked roadway. Hoquiam grew and developed west and north from the river, rather than the bay, which lacked deep water.

Hoquiam's population, spurred by new sawmills, logging camps, and the potential for a local Northern Pacific terminal, increased from 400 to 1,500 between 1889 and 1890. From 1890 to 1900 Hoquiam's population doubled in size, and by 1910 the population was 8,200. By 1910, "Hoquiam had three theatres, nine churches, two banks, a public library, a Young Men's Christian Association (YMCA) facility, three major hotels, numerous boarding houses, and dozens of up-scaled residences" ("Hoquiam Has Ups and Down Since First Post Office in 1867" date unknown). In 1913, the city had 14,000 residents and the largest payroll per capita in the state.

During this boom period, "specialty stores and offices were established in the east two blocks on 8th Street and on Simpson between 10th and 7th streets. Residences were confined mostly to the streets south and east of 6th and L Streets…the office buildings and stores erected on 8th and Simpson were of wood frame and false front construction…" (Lamb 1948). Like Aberdeen, "Nearly half of the business places were liquor saloons… (Lamb 1948). Hoquiam's central business district expanded from its initial development close to industrial sites on the Hoquiam River northwestward along Simpson Avenue (then I Street) toward 8th Street. The district remained much smaller than Aberdeen's, however, and Aberdeen's port proved more advantageous with its deeper channel and narrower area of tidal overflow land, which required less filling and piling for docks.

The same economic and social forces that affected Aberdeen's central business district also affected Hoquiam's downtown. Several substantial architect-designed commercial buildings were constructed in the 1920s, when the community was relatively affluent. Despite the economic strength of Hoquiam at the time, a "Hooverville" community was established south of the railroad line along an upland area of the tideflats before or during the Depression. While Hooverville shanty towns were built on otherwise unoccupied land across the United States to shelter the unemployed and homeless, the Hoquiam community contained approximately 50 to 60 drift- and scrapwood structures—including some substantial structures—that housed loggers on the days they were not working and living in logging camps.

No major commercial development occurred after 1930, and by the 1960s many structures were abandoned or underused. While both Aberdeen and Hoquiam attempted downtown renewal efforts in the 1960s, Hoquiam officially participated in a federal urban renewal program administered and largely paid for by the U.S. Housing and Home Finance Agency. While the city originally wanted renewal to encompass 25 acres of downtown, a compromise of 9 acres was agreed upon, and a five-block area in the heart of the central business district was demolished. When new construction began in 1969, Hoquiam was the only small city in Washington attempting to revitalize its downtown area through urban renewal.

Today, most intact historic buildings in the central business district were constructed post-1920. A few relatively intact residences from the initial settlement period are located adjacent to vacant former industrial sites south of the business district and near the mouth of the Hoquiam River.

Anderson & Middleton Alternative

The area that encompasses the Anderson & Middleton site consisted of unoccupied tideflats and was not developed until the early 1900s (Sanborn Fire Insurance map 1890: Sheet 1). In 1903, the construction firm of Mourant & Watson built a sawmill for the Grays Harbor Lumber Company (GHLC) on the eastern half of the Anderson & Middleton property (Fredericksen 1987; "How a Western City Grows: Hoquiam, Washington" 1903:214; Hunt and Kaylor 1917:28; Van Syckle 1980: 264; Sanborn Fire Insurance map 1907: Sheet 21). The company used "refuse fill" to reclaim the tideflats for industrial development, including the construction of the sawmill, planked drives, a lumber yard, and various storage sheds (Sanborn Fire Insurance map 1907: Sheet 21; Exhibit 2-5). The sawmill and wharf extended approximately 1,100 feet from the original shoreline to the southern edge of the tideflats, allowing access to the northern shipping channel of Grays Harbor (Blagen 1982:50). A "planked drive on piles," also known as the 8th Street Extension, extended directly south from the intersection of 8th and N streets. Most of the planked drives associated with the lumber company's sawmill operations were built on 4-foot (1.2-meter) posts above a refuse fill (Sanborn Fire Insurance map 1907: Sheets 16 and 21). The new mill promised "to become one of the city's leading industries," employing 100 men and producing 125,000 board feet of timber a day ("How a Western City Grows: Hoquiam, Washington" 1903:214). This new enterprise was led by D.B. Hanson as president and manager, J.O. Davenport as vice-president, Geo. L. Davis as secretary, and F.F. Williams as treasurer ("How a Western City Grows: Hoquiam, Washington" 1903:214).

The original builder of the GHLC was quickly "dissatisfied with their investment and operation of the mill" (Blagen 1982: 76), so in 1905, N.J. Blagen bought the mill (Blagen 1982:76; Hunt and Kaylor 1917:125; Van Syckle 1980:211-212). Blagen was born in Denmark and trained in the carpenter trade, and then immigrated to the United States in 1871. Within 4 years of entering the country, Blagen began contracting work on his own and undertook several large projects, including the construction of large water pipelines for the cities of Boston and New Bedford, Massachusetts, several flour mills in Oregon, and a particularly challenging section of railroad grade for the Northern Pacific Railway in Washington (Hunt and Kaylor 1917:125; Van Syckle 1980:211). These jobs led him to seek a steady supply of lumber, and thus by 1905, Blagen found himself in the sawmilling business.

Blagen ran the GHLC as president and general manager with the help of William L. Adams as vice-president and Blagen's three sons: C.G. Blagen as secretary and assistant manager, Henry W. Blagen as sales manager, and Frank N. Blagen as mechanical engineer and draftsman (Hunt and Kaylor 1917:33; Van Syckle 1980:211-212; Exhibit 2-6). Gradually, the Blagens built the GHLC into a profitable business, but it was not without occasional struggles. N.J. Blagen lamented that "in the first day after buying the plant a frightful storm occurred that caused the water and waves to rise so high that nearly everything was under water or afloat" (Blagen 1982:77). Nevertheless, the Blagen's continued to forge ahead with the GHLC.

Shortly after acquiring the mill, the Blagens began a series of improvements aimed at acquiring and maintaining only "the best possible equipment" and cutting edge technology for their facilities (Hunt and Kaylor 1917:126). In July 1913, the GHLC was preparing to install a "500-kw Curtis turbo-generator, with transformers, switchboard equipment, etc" ("The Machinery Markets: Pacific Coast" 1913:63); these generators were placed in a new boiler and engine house made of reinforced concrete and were complemented with fully contained conveyors and compartments, thus "preventing the dust nuisance of so many mills" ("Lumber Manufacturing a Science" 1913). Another improvement, also made in 1913, was the construction of a enormous storage shed which could hold 20,000,000 feet of lumber, cost $20,000 to build, and enabled the GHLC to dry lumber year round ("Lumber Manufacturing a Science" 1913). By 1916, the mill had completely converted from steam to electric power (H. Blagen date unknown). In 1920, the GHLC had moved from horse-drawn lumber buggies to straddle carriers (H. Blagen date unknown). These straddle carriers were then updated once again in the 1920s and the old narrow-gauge track was shipped down to Blagen's new sister mill in California's Sierra Mountains (F. Blagen date unknown).

To accommodate the progressive mill expansion, the GHLC property was expanded by filling more tideflats. Between the sawmill and the shore, more refuse was deposited to aid land development. The log storage areas extended up to the shoreline and to the west of a railroad spur used for log dumping, which extended from the primary railroad line that followed the original shoreline between 6th and 7th streets; this was a log-dumping tract. The area to the west of the GHLC's property—the western third of the Anderson & Middleton site—was still tideflats in 1916 (Sanborn Fire Insurance map Fire Insurance Map 1907: Sheets 16 and 21; Sanborn Fire Insurance map 1916; Sheets 1 and 18; Exhibit 2-7). Fill was continually added along the shoreline through the 1920s and 30s. By 1940, the Anderson & Middleton site was entirely useable land (Exhibit 2-8).

Under the Blagen leadership, the GHLC thrived. Early mill production turned out a little less than originally touted, ranging from 80,000 to 100,000 board feet per day and employing 65 to 100 men ("Hoquiam, Wash., Grays Harbor: Gateway to the World of Commerce." 1910:51; Hunt and Kaylor 1917:125; "In Southwestern Washington: Where Lumbering and Agriculture Go Hand-in-Hand" 1906:25; Lockley

1907:726; "Travels of a Paper Man" 1905:56). By 1912, the GHLC employed 150 men, and in 1917, these numbers reached 400 men working for GHLC in the mills and 150 in logging camps (Hunt and Kaylor 1917:125; State of Washington 1912:392). With the mill operating 24 hours a day from 1906 to 1917, GHLC's production by 1917 was "the largest output of lumber on the Pacific coast controlled by one firm" at a whopping 740,000 board feet per day (Hunt and Kaylor 1917:125-126; Exhibit 2-9).

The Blagens also had a unique relationship and approach to their employees. Hunt and Kaylor write that Blagen "[paid] a good living wage and [treated] his men with fairness, justice, and consideration" (1917:126). While no definitive accounts exist to back up Blagen's treatment of employees, statistical information indicates that the GHLC indeed paid their employees slightly more per worker than other Grays Harbor sawmills (Lockley 1907:726). Undoubtedly, this novel treatment of employees led GHLC to have more worker loyalty and consequently increased productivity per employee as men were willing to "fight to work for [Blagen]" (Hunt and Kaylor 1917:126).

Transporting their finished product was also a problem for the GHLC. With one million feet of lumber loaded onto ships from the GHLC's docks daily in 1917, it is easy to understand the overwhelming volume ship captains and railroads had to contend with (Hunt and Kaylor 1917:126). In 1917, the GHLC owned two of their own ships, which were transporting lumber nonstop (Hunt and Kaylor 1917:126). In 1921, the GHLC had 75,000,000 feet of lumber in its yards and couldn't move it out for lack of ships and rail cars to transport it (State of Washington 1920:2750).

In 1950, the Brownsville Timber Company purchased the mill. Headed by C.G. Blagen and J.W. Fish, the company's office headquarters was located in Portland, Oregon ("Forest Industries News" 1950). In November 1962, the Anderson & Middleton Company acquired the property containing the sawmill and lumber storage operations. The company shut down the sawmill in 1965 and finally dismantled it in 1966, fully converting the site to primarily processing and sorting logs ("Skeleton of a Harbor Giant." 1966; Exhibit 2-10). In the mid-1960s, hydraulic filling took place under what is now the asphalt pad in the center of the property. Over the hydraulic fill, crushed rock was placed throughout the site to raise the elevation and provide a good surface for paved and gravel roadways. The site has been largely dormant for the past 3 to 5 years (Settler et al. 2009b:3).

Aberdeen

Aberdeen was initially built on or near the tideflats on both sides of the mouth of the Wishkah River, requiring its early buildings and plank sidewalks to be constructed on pilings. Aberdeen streets consisted of a bottom layer of wood slabs covered with sawdust and then planks. Given this unusual construction, the city was given the name “Plank Island.”

Along with the lumber schooners docked in Aberdeen, the community also included eight salmon canneries, six clam-packing plants, and a large number of saw, shingle, and lathe mills. The city was initially built for and populated by single men who worked in the nearby mills, shipyards, and logging camps. At one time there were up to 2,000 single men living on lower Heron and Wishkah streets. Boarding houses and workingmen hotels occupied the upper floors of Aberdeen’s early buildings and housed the workers, while retail businesses on the ground floor met their transient needs.

By 1890, the intersection of H and Heron streets was commercially developed, while the intersection of I and Heron streets was still primarily forest. Aberdeen was connected to neighboring Hoquiam by a plank road in 1891. During the boom years from 1890 to 1910, most of Aberdeen’s business occurred along the “line,” or Heron Street, encompassing an area west from F and Heron streets to H Street, north to Wishkah Street, south to Hume (State) Street, and east to the Wishkah River. By the turn of the century there were approximately 30 stores, saloons, and hotels in the two-block business center of Aberdeen on lower Heron Street.

In 1903, a fire ravaged Aberdeen, claiming 22 blocks of buildings and leading to Aberdeen’s transformation into the manufacturing and shipping center of the Grays Harbor region. While the main core of the central business district would remain in this section of town for several years, the fire stimulated construction in other parts of downtown and influenced the expansion of the central business district during the next three decades. During this expansion, a stable new style of concrete foundations was introduced and first used over marshy alluvium. Future development might have been stalled if this revolutionary foundation technique that used friction-supported, concrete-capped pilings as foundations, which ensured greater structural stability, had not been introduced. The permit record for Aberdeen shows the town’s impressive extent of growth and development, as building permits in 1906 were greater in percentage according to population than those of any other city in Washington except for Seattle (Schater 1956).

The fire also caused city fire codes to be revised, restricting the construction of wooden commercial buildings in the central business district. False-front wood frame buildings were replaced with mainly two- or three-story brick or stone masonry buildings, although the new construction was similarly designed in the still prevailing Romanesque revival style, with features such as arch-headed windows, ornate cornices, and rusticated precast concrete, stone, or brick masonry. In 1907, concrete sidewalks replaced the flammable wooden walkways. Although the city's first brick street was completed in 1909, there were still 26 miles of plank streets as late as 1920.

Lower Heron Street faced a setback when Prohibition shut down the saloons, shipbuilding ceased in the 1920s, and the Depression halted the lumber market. New construction had already shifted from the old section of town by 1915, with the central business district expanding further west on Heron and Wishkah streets and north to Market Street. During the 1910s and 1920s, taller and more substantial reinforced concrete commercial buildings clad with terra cotta or brick with terra cotta ornament began to be built. By the 1920s the core of the central business district included these new buildings along Heron and Wishkah streets between Broadway and I streets. Following the Depression through 1960, relatively little change or development occurred downtown.

Changes to transportation and the logging industry have greatly affected Aberdeen's built environment over the last 20 years. The introduction of log trucking, which allowed loggers to commute to work from home, allowed families to move into town, giving rise to the middle class and diminishing the need for logging camps. The original central business district had begun to deteriorate, having lost its original function, but also because logging trucks use the historical corridor along Heron and Wishkah streets as their main arteries, causing Heron and Wishkah streets to be converted to one-way streets to allow faster traffic flow. Meanwhile, demolition, new development, and urban renewal involving City Hall, banks, the library, and parking lots have occurred along the old two-way street system north of this corridor.

Despite changes to the central business district, Aberdeen's outlying residential areas generally remained intact. Initial residential development occurred near industrial and commercial activity along the east and west banks of the Wishkah River, now known as East Aberdeen. As the business district expanded westward and northward, residential development followed. By 1905, lumber barons and mill owners began to build substantial architect-designed homes in prevailing popular styles in the North Broadway area (also called Knob Hill) on lots some distance from the business district and overlooking the harbor. During the boom years of 1890 to 1910, residential development included modest vernacular house types. In the 1910s and especially the 1920s, the North Broadway district was substantially developed with distinctive houses designed by local architects in the popular Colonial Revival and Tudor Revival styles and modest, well-built houses constructed by builders in the popular bungalow style, which reflected the community's economic prosperity.

Aberdeen Log Yard Alternative

The Aberdeen Log Yard Alternative site, located west of downtown Aberdeen and to the east of Cow Point, has undergone substantial modification and filling since 1859. The historical shoreline was located north of the site in an 1859 GLO map, and the entire site was tidal mudflats. The mill operations at the site changed ownership several times in the early twentieth century. In 1905, Fred A. Hart and W.H. Wood partnered and bought the mill located at the end of Heron Street (S.J. Clarke Publishing Company date unknown). The result of their partnership was the Hart-Wood Lumber Company sawmill, which appears on the 1906 Sanborn Fire Insurance map of Aberdeen (Exhibit 2-11). The mill employed 65 men and produced 75,000 board feet a day in 1906 ("In Southwestern Washington: Where Lumbering and Agriculture Go Hand-in-Hand" 1906). The Hart-Wood partnership found the "transportation problem a serious one" and consequently bought their own sailing vessel and later built a steamer (S.J. Clarke Publishing Company date unknown). This enabled them to ensure that a vessel would be available for transporting their lumber, and at the same time, enabled them to sell directly to customers. In its first year of operation, the steamer, which was competed right before the 1906 San Francisco earthquake, earned a profit of 50 percent on the partnership's investment (S.J. Clarke Publishing Company date unknown).

In 1909, San Francisco capitalists bought the mill and the adjacent 60 acres for $250,000 ("Business News: Lumber and Woodworking" 1909). These new owners continued to operate the mill under the name Federal Mill Company. While the number of employees increased to 80 men by 1912, the sawmill and wharf were largely unchanged except for the addition of a new sorting shed, several small outbuildings, and some additional dock space surrounding the mill (Sanborn Fire Insurance map 1914; State of Washington 1912:391; Exhibit 2-12).

In 1916, the mill entered a period of more stable ownership. In January of that year, Edward Hulbert purchased the Federal Mill and continued operating it under the name Hulbert Mill Company (Hunt and Kaylor

1917:334). Hulbert acted as president of the mill, with his son A. E. Hulbert serving as the manager. Edward Hulbert was also involved in, and owned an interest in, the American Mill Company, which had been operating in the harbor since 1898. By 1917, the Hulbert Mill was consolidated into the American Mill Company holding, but nevertheless continued to be operated separately and primarily by the Hulberts (Hunt and Kaylor 1917:334; Exhibit 2-13). After its consolidation, the mill was known as the American Mill B, although many still commonly referred to it as the Hulbert Mill (Fredericksen 1987; Sanborn Fire Insurance map 1928; Exhibit 2-14). In 1924, the American Mill B produced 121,000 board feet a day ("Lumber Production Billion and Half Feet" 1926). Edward Hulbert relinquished his duties within the company and gave it to his sons by 1924. At this time, A.E. Hulbert was president, G.H. Hulbert was vice-president, and F.H. Hulbert was secretary and manager of both American Mill Company sawmills ("Lumber Production Billion and Half Feet" 1926; Exhibit 2-15).

Sometime between 1951 and 1956, the West Tacoma Newsprint Company moved onto the site ("Late Forest Industries News" 1956; "The Lumberman's handbook and directory of the western forest industries" 1951:12; Sanborn Fire Insurance map 1963; Van Syckle 1980:264), where it worked for many years but was no longer in operation in Aberdeen by 1962 ("Index of Operating Firms: Washington" 1962). USACE aerial photographs from 1969 and 1974 show the Aberdeen Log Yard being used for log storage, except the lower southeast corner, which was water and marsh. This shoreline appears to have followed the southeast line of the old wharf and sawmill.

Port of Tacoma

By the mid-nineteenth century, British and American settlement in the southern Puget Sound region near Tacoma had drastically affected local Native American groups and their traditions. Many area tribes were relocated during this period. In 1854, the Medicine Creek Treaty called for the abandonment of most southern Puget Sound villages and required Native Americans to relocate to the Puyallup, Muckleshoot, or Squaxin Island Reservations (Ruby and Brown 1992). The Puyallup reservation included the area now encompassed by the Port of Tacoma and the CTC facility part of the APE.

As Tacoma emerged as a prominent center for commerce and industry in the late nineteenth century, much of the reservation land previously assigned to the Puyallup Tribe was encroached upon by the community's urban and industrial growth. The tribal landowners eventually lost much of this property through land sales, auctions, or approval by the U.S.

government for its automatic inclusion in railroad right-of-ways. In 1873, the Northern Pacific Railroad (then the Milwaukee and Union Pacific Railroads) extended the region's first transcontinental railroad line into Tacoma. Terminating at Commencement Bay near the foot of present-day Division Avenue, the railroad line directly connected Tacoma with Milwaukee, Wisconsin, and the Great Lakes region and initiated a period of economic growth in the city. The city of Tacoma grew around this focal point of trade and distribution on Commencement Bay, which served as a transfer point for goods from the railroad to steamships (Fairbanks and Martinez 1981).

At the time of the railroad's arrival, much of the Port of Tacoma as it exists today was not yet developed. The mouths of Wapato and Hylebos creeks were located to the north and south of the CTC facility part of the APE, and areas to the west and northwest of East 11th Street still remained under the waters of Commencement Bay.

Beginning in 1889, the Thea Foss (formerly City) Waterway was the first waterway in the former tideflats of Commencement Bay to be dredged to increase accessibility to industries established around the terminus of the railroad line. A total of eight waterways have been dredged in the former tideflats since this time, significantly changing the land forms in the area (Morgan 1979). Efforts to control flooding had additional effects on Port of Tacoma development, beginning with dam construction to block the west channel of the Puyallup River in 1891 (Weaver 2003). By 1895, half of the land previously assigned to the Puyallup Reservation was in private ownership, having been acquired for a variety of industrial and commercial purposes, including to construct a large network of railways, sawmills, and shipping facilities (Cultural Resource Consultants 2008).

By the turn of the twentieth century, much of the northern portion of the tideflats had been filled in with dredge materials. Privately owned docks were constructed over the remaining tideflats to reach the bay's deeper waters, and by 1905 Lincoln Avenue had been constructed to provide increased access. Private development of Commencement Bay continued until the late 1910s, when the Port of Tacoma was established on November 5, 1918, by a countywide referendum. The port was established during a period of economic prosperity, largely sustained by the local timber industry. Other industries on the Tacoma waterfront included lumber and shingle mills, shipyards, flour mills, and electrometallurgical and electrochemical plants (Fairbanks and Martinez 1981).

The Port of Tacoma began developing 240 acres of the Commencement Bay tideflats in 1919. At this time, dredged materials from the enlarged waterways were redeposited on top of wetland areas to provide suitable land for development (Long 2003). This and subsequent dredging activities have created an artificial cap of imported fill material between at least 5 and 10 feet thick across most of the port's property (Cultural Resource Consultants 2008). The Blair Waterway (formerly the Wapato Waterway, then Port Industrial Waterway) extended to East 11th Street when it was first constructed. Both the Blair and Hylebos waterways were dredged several times in the 1930s through the 1960s, extending both farther southeast.

The existing Hylebos Waterway Bridge was constructed in 1939, and this bridge coupled with a wood trestle bridge erected across the Blair Waterway farther south on East 11th Street to provide northeast Tacoma residents with a direct link to the city center (HRA 2006). The wood trestle East 11th Street Bridge was removed in 1951, and the Blair Waterway deepened and further extended. A new bridge (known as the Port Industrial Waterway Bridge) was constructed in 1951 to provide increased access for vessels to pass through the waterway, while maintaining the important north-south linkage; this bridge was demolished in January 1997 (Long 2008).

The port served as a major center of wartime industry—focusing on shipbuilding and chemical production—between 1939 and the end of World War II. Developing the port has continued through the present, and today the port remains a principal shipping hub in the region and is known as the major distribution point for goods being shipped through Alaska.

3. Methods

This chapter describes the research and field methods used to identify and evaluate cultural resources for the proposed project.

Research Methods

For this project, portions of the general historical context were adapted from the historical context in the "Historic Resources Survey and Inventory of Central Business Districts and Portions of the Cities of Aberdeen and Hoquiam, Washington," prepared by David W. Harvey and Katheryn H. Krafft for the Washington State Department of Community Development, DAHP in 1987. In addition, numerous informational repositories were queried, and individuals with specific knowledge on the area were contacted to develop a property-specific context. Comparative research was also conducted on previous archaeological studies within or near the APE, as well as on similar properties located in other parts of the state or region.

Historical Context

ICF Jones & Stokes conducted general and property-specific archival research to further document the history of the lumber mills formerly located at the Anderson & Middleton and Aberdeen Log Yard sites. Materials examined included the previous studies, as well as primary and secondary resources including maps and photographs. Research was conducted at the following locations:

- Aberdeen Museum of History
- Polson Museum in Hoquiam
- Aberdeen Branch of the Timberland Regional Library
- Tumwater Branch of the Timberland Regional Library
- Sierra Nevada Logging Museum
- California State Library
- Oregon Historical Society
- Grays Harbor County Tax Assessor
- Historylink.org
- Washington State Library
- Special Collections Division University of Washington Libraries
- Digital Collections of the University of Washington
- Washington State Archives

- The WAGenWeb Project
- Jones Photo Collections
- ICF Jones & Stokes cultural resources library

Through the course of research, several individuals, listed below, with unique knowledge of the mills were identified and contacted for the purpose of conducting oral history interviews:

- Frank Blagen Jr. (grandson of N.J. Blagen, the Blagen Mill's primary owner in the early 1900s)
- Hank Soike (Manager and Executive Director of the Port of Grays Harbor between 1963 and 1988)
- Eddy Hulbert (employee of the Hulbert Mill for several years before it closed and descendent of Edward Hulbert, the Hulbert Mill's primary owner in the early 1900s)
- Brian McIntosh (employee of the Blagen Mill for several years before it closed and descendent of N.J. Blagen, the Blagen Mill's primary owner in the early 1900s)

On November 9, 2009, ICF Jones & Stokes historian Melissa Cascella and senior archaeologist Thomas Barrett met with Mr. Soike at his home in Hoquiam, Washington. The resulting interview was recorded and the digital files are stored at the ICF Jones & Stokes Portland office.

Comparative Research

ICF Jones & Stokes conducted comparative research to identify investigations conducted on archaeological sites similar to those located within the APE. Materials examined included previous cultural resource reports and masters theses. Research was conducted at the Portland State University, the archaeological database of the Oregon State Historic Preservation Office, the archaeological database of the DAHP, the histarch listserv, and the Local History and Genealogy Annex Branch of the Sonoma County Library.

Field Methods

Sonicore® boreholes and trenching were used to determine the depositional history of the APE and to assess the potential for buried archaeological resources within the Anderson & Middleton and Aberdeen Log Yard sites prior to the archaeological investigations. Archaeological investigations were conducted July through October 2009 and consisted of systematic trench excavation throughout the build alternative sites and exploratory trenching to characterize historical archaeological deposits.

CTC Facility

Archaeological Investigations

No archaeological investigations were conducted at CTC because it is an existing developed property constructed on fill material in an area of former tideflats and because no new ground disturbance would be required. The current use of the CTC facility would continue unchanged.

Historic Resources Survey

The historic resources survey involved examining and photographing all buildings and structures within the APE determined to be 45 years of age or older. The target age of 45 years old was selected to include all resources 50 years old at time of survey, plus any that might become 50 years old through the course of the site development or initial use. ICF Jones & Stokes senior architectural historian, Christopher Hetzel, MA, surveyed and evaluated all identified properties in the APE to determine their eligibility for NRHP-listing.

A parcel-by-parcel reconnaissance-level field survey of properties in the APE, including both build alternative sites, was conducted in February and September 2009. Construction dates were established using data from the Grays Harbor and Pierce County Tax Assessors and based upon visual inspection. Properties built before 1964 were identified and information collected about their physical characteristics. The data collected included one or more photographs of each property from the public right-of-way, the architectural style of each resource (if identifiable), the type and materials of significant features, and the existence of alterations and overall physical integrity.

Properties identified as 45 years of age or older were evaluated to determine their eligibility for listing in the NRHP and recorded in the Washington State Historic Property Inventory Form Database, per DAHP and WSDOT reporting standards. Printed record forms for each property are provided in Appendix E of this report. The completed forms and a disk containing the dataset exported from the inventory form database will be transmitted to WSDOT.

Grays Harbor Build Alternatives

Geological Investigations

A series of Sonicore® boreholes were drilled at both the Anderson & Middleton Aberdeen Log Yard sites to locate subsided landforms that could potentially contain significant archaeological resources. The information from the coring program was used to determine the depths of historical filling episodes to allow the archaeological trenching program to be modified (if needed) to achieve targeted depths to locate anticipated resources.

The Sonicore® drilling program was designed to detect evidence of coseismic subsidence with particular focus on subsidence events that might have buried terrestrial surfaces. Such events are recorded in sedimentary sequences both east (Elliot Slough) and west (Johns River) of the APE, as well as in the IDD#1 immediately east of the Anderson & Middleton Alternative site (BOAS, Inc. 2007). The drilling program attempted to address whether terrestrial environments, such as forest floors, existed at the Anderson & Middleton and Aberdeen Log Yard sites at the time of the subsidence. Sonicore® drill rigs were used to acquire continuous cores (5- to 10-foot sections, 3.5 inches in diameter) of sediment, terminating once glacial outwash gravels were reached. These gravels lie at depths of 100 to 150 feet (30 meters to 45 meters).

Seven boreholes were excavated at the Anderson & Middleton Alternative site, and six boreholes were excavated at the Aberdeen Log Yard Alternative site in June and July 2009. Three holes were excavated across the northern end of both build alternative sites where the probability of finding terrestrial material was the greatest. One hole was excavated in the centralmost portion of the sites for comparison with IDD #1. Cores were contained in Lexan® polycarbonate (or other suitable material) tubes that were transported from the drill rig to an onsite core-processing area. Core-processing involved splitting the core longitudinally, first by cutting the plastic with a circular saw and then by running a large knife through the sediment. Once the cores were split and laid open, one-half was occasionally sprayed with water, when necessary, and cut with a knife edge to remove any smearing remaining from the saw cutting (spraying brings out the bedding and other subtle features of the cores that might otherwise be missed); cores were then photographed and described. The remaining sediment was redeposited on site while the plastic tubing was taken off site for disposal. Using a trowel, an archaeologist cross-cut the sediment core at approximately 5-centimeter intervals to look for cultural materials and then logged the geomorphology and redeposited the sediments on-site.

The core descriptions included lithology, color, grain size, and sediment bedding, as well as megafossils and any unusual structures like clay pebbles. These were visual descriptions with the goal of establishing the deposition environments. Carbon-14 dates were taken to connect this work with the IDD #1 site as well as with regional geology and archaeology. The results of the coring program are presented in the document prepared by James Phipps (Phipps 2009) and are presented in Appendix D.

Archaeological Investigations

Mechanical excavation was conducted at regular intervals based on a grid system consisting of 100-foot (30-meter) grid squares (see Exhibits 3-1 and 3-2 for the 100-foot [30-meter] grid system). One trench was excavated within each 100-foot (30 meter) grid square. Surface obstacles, such as concrete foundations and piles of logs, did not obstruct the excavation program. Piles of logs were removed before the archaeological investigations and concrete foundations were cut through prior to trenching. While the above interval of one trench per grid square was maintained, the orientations and sizes of the trenches were determined in the field based on the following factors:

- Trench proximity to historical shoreline (trenches were placed perpendicular to anticipated shoreline, except where surface topography precluded this orientation)
- Mapped locations of historic buildings and structures known from the Sanborn Fire Insurance maps
- Available light to provide the best opportunities to draw and photograph the profiles
- Locations of subsurface utilities
- Locations of wetlands and riparian habitat (mapped locations of wetlands at the Anderson & Middleton Alternative site were not excavated [see Exhibit 3-1])
- Location of known cultural features (for example, sawmill foundations from Sanborn maps)

The size of the mechanical excavations ranged from 10 feet long by 10 feet wide (approximately 3 meters by 3 meters) to 30 feet (9 meters) long by 6 feet (2 meters) wide. The size of each trench was based on the following considerations:

- Longer trenches were excavated where a buried shoreline might be intersected.
- Longer trenches were sometimes necessary to reach sufficient depths beneath the historical fill and to expose possible precontact sites.

- Wider trenches were necessary to allow physical access to deep deposits as necessary to step the sides of excavations to allow physical access.

Each exposure was excavated as deeply as possible, unless a precontact cultural feature was located in an adjacent trench (see below). In this case, trenches were excavated to the bottom of the historical fill layer. Depth of trenches was determined by the following criteria:

- Safety and mechanical constraints, including but not limited to water table and sidewall stability
- Depth at which water began to fill the trench
- Depth at which Holocene deposits are recognized
- Proximity to known Native American produced features

All trenches were excavated in successive shallow sweeps, when possible, so as not to gouge any cultural deposits or seriously damage any feature associations. When excavators were at or near their maximum arm reach, the mechanical constraints of the excavator prevented the excavator operator from making shallow sweeps. As a result, soil was excavated in one or two large scoops at the bottom of the trench.

The goal of the trenching program was to excavate at least 1 percent of the total surface area at each build alternative site to sufficiently inventory the sites for archaeological resources and to establish the integrity and significance of the historical archaeological sites (Schneyder and Livingston 2009a).

Precontact sites found during this investigation were considered eligible for the NRHP. Historical archaeological sites identified were further investigated using a combination of mechanical and manual excavation techniques (when possible) to establish integrity and significance. Data recovery was not conducted for this phase of archaeological investigations. Subsurface deposits were exposed using a John Deere® 330 or Caterpillar® 240, 315, 330, or 345 excavators; excavator bucket widths ranged from 4 to 6 feet (1.2 to 2 meters).

All backhoe trenches were photographed and plotted using the line function found on a handheld GPS unit. All trench profiles were photographed. A profile of the trench wall, or plan view map, documenting important stratigraphy was completed for several of the trenches. If Native American cultural features, such as fish weir stake alignments, were encountered in the tideflats sediments then they were described, photographed, otherwise documented, and collected for later analyses. The features were exposed over an area so that an accurate description and reliable interpretation could be obtained, when possible. Radiocarbon dating was conducted on several weir elements and associated materials to obtain relative dates for the features. Finally, WSDOT and their consultants kept the Chehalis Confederated Tribes and Quinault Indian Nation informed about field investigations, including new discoveries.

Following the discovery of two precontact fish weirs (trenches AM-94 and AM-125), all work was stopped at the Anderson & Middleton Alternative site, and an addendum to the work plan was created and implemented after September 14, 2009 (Schneyder and Livingston 2009a). The objective of the modified excavation methods, based on consultation with tribes and SHPO, was to limit excavations in trenches directly adjacent to discoveries to avoid additional disturbance to weir features that were informally deemed to be historically significant (eligible). The conditions of the addendum are as follows:

- Upon the discovery of a Native American cultural feature (precontact fish weir), the adjacent trench locations, which were spaced at a distance of 100 feet (30 meters) in the cardinal directions (along grid rows and columns) from the trench with the precontact archaeological feature, would be excavated to a depth sufficient to document any historical archaeology, but no further.
- The trench locations diagonal to, on the 100-foot (30-meter) grid, an identified precontact archaeological feature were investigated to full depth, because these locations are 141 feet (43 meters) from the feature.

Trench excavation was terminated once trench stability had been compromised, maximum excavator arm length was reached, the trench was inundated with groundwater, or if a precontact site was encountered.

Historic Resources Survey

Please refer to the methods in the “historic resources survey” section under “CTC Facility” previously discussed in this chapter.

Geomorphological Trenching

Exploratory trenching was conducted to analyze sediments at the Aberdeen Log Yard to assess the potential for buried archaeological sites. Given the seismic history of coastal Washington, including Grays Harbor where coseismic subsidence events have been recorded (Atwater and

Hemphill-Haley 1997; Phipps 2007), this analysis was designed to establish the stratigraphic sequence of sediments underlying the site.

A backhoe trenching plan was designed to establish the depositional history of the sediments underlying the historical fill on the site to determine whether there were buried soils and/or buried terrestrial landforms where large prehistoric sites (e.g., villages or cemeteries) could be preserved.

The trenching plan focused on the northern portion of the site because an 1882 GLO map suggests that terrestrial landforms might exist in the northernmost 100 to 150 feet of the site, while the 1859 GLO map indicates that the historical shoreline was north of the property boundary (Exhibit 3-3). Trenching was used to establish whether terrestrial deposits existed in the northern part of the property; if so, this would dramatically increase the likelihood that one or more waterfront archaeological sites might exist. Maps from the nineteenth century (GLO 1859 and 1882; Wilkes 1841) also indicate that most of the site was tidal mudflats, which persisted until most of the log yard was filled. Historical maps and aerial photographs from the 1930s through the 1950s were used to determine where the historical shoreline (prefilling) was in relation to the modern landform.

The evidence that would be accepted as indicating the potential for buried archaeological sites was defined as the following:

- Buried soils and/or upland landforms where significant precontact archaeological sites might have been present and preserved; and/or
- Artifacts or other archaeological materials that indicate the actual presence of archaeological sites.

Trench locations and orientations were initially planned to be perpendicular to the historical shoreline near the northern boundary of the site, which abuts a railway line. The property is an active log yard with surface obstacles (for example, log piles, standing water, concrete platform, and utility lines) that would have had to be moved to excavate trenches in a north-to-south orientation. Surface obstacles did not affect the trench distribution, but they did affect some trench orientations.

On December 15, 2008, preferred areas for trenching were marked by cultural resources staff from ICF Jones & Stokes and WSDOT (with the aid of the Aberdeen utilities inspector). Trench orientation was limited by the following surface obstructions:

- A utility line parallel to the site fence

- Dense vegetation
- Possible wetlands
- Large piles of logs (logs covered the ground and posed a safety hazard—vibrations could dislodge the logs—so trenching was kept at a distance from the log piles and the directions they would fall);
- Large areas of standing water on the site
- A concrete slab

These obstructions were on private land and could not be removed at the time of trenching. Although the plan was to excavate the trenches north-south (perpendicular to the historical shoreline), the surface obstructions did not allow that orientation for ten of the twelve trenches. The east-west oriented trenches were excavated in open spaces between piles of logs. Trench distribution and placement were not affected by the surface obstacles.

Trench sizes ranged from approximately 10 feet long by 3 feet wide to 30 feet long by 6 feet wide (3 meters long by 1 meter and 9 meters by 1.8 meters wide). Trench sizes were determined by soil conditions and the field crew in consultation with the Principal Investigator and/or WSDOT Cultural Resource Specialist. Trench depths were determined by level of local water table and sediment conditions but were in all cases excavated as deep as possible to expose the maximum profile of subsurface sediments. Trenches were excavated in successive, shallow sweeps to avoid gouging of any cultural deposits or seriously damaging buried features. Cultural resources staff examined trench profiles for evidence of terrestrial landforms, with soils identified as two or more superimposed layers defined by color, texture created by particle-size sorting, iron oxidation (indicating a B [accumulated mineral] sediment horizon) and leaching (indicating an E [leached mineral] sediment horizon), capped with an organic-rich horizon or thin organic layer strongly, indicating a buried soil.

Characteristics used to recognize terrestrial sediments were one or more of the following characteristics: angular gravel, woody debris that is not water-worn, buried soils, and/or strata that are lying at an angle, as on a hill slope. Buried soils were considered one of the most important characteristics in the stratigraphic evidence because soil development reflects a surface that has been stable for a period of time. They are recognizable in a stratigraphic profile as a dark layer, which is interpreted as a buried A or O horizon. This darker layer can range in appearance from a 0.4 to 0.8 inch (1 to 2 centimeters) thick deposit of mud, to a 0.8 to 4 inches (2 to 10 centimeters) thick peat and mud horizon. Because soils develop only on stable landforms, they often have growth-position roots attached to tree stumps or herbaceous stems and leaves in the upper horizon (Atwater and Hemphill-Haley 1997).

Intertidal sediments, which are deposited by hydrological processes, generally lie in horizontal strata, and the organic debris found in these strata are expected to be fine and included in fine layers. Woody debris found in intertidal sediments is expected to show water wear, as in driftwood. Although shells are often a tell-tale sign of a precontact-period archaeological site, shells (in archaeological sites) are generally disarticulated bivalves that occur in distinct lenses or larger deposits. Shells that occur in trace amounts or as complete pairs generally represent intertidal and/or intact deposits.

A member of the cultural resources staff was present to monitor all trenching for the presence of subsurface archaeological materials. All trench profiles were hand-drawn and photographed, and the trench locations mapped using a global positioning system (GPS) unit (Exhibit 3-3). If access was prohibited for safety reasons, then a stadia rod was lowered into those trenches to measure the strata depths. If necessary, trench profiles were prepared from the surface of the excavation area. All artifacts found were returned to the trench in which they were found after being recorded and photographed; no artifacts were permanently removed from the site. The trenches were backfilled after the stratigraphic profiles were drawn, described, and photographed.

4. Literature Review

Records and Archival Research

ICF Jones & Stokes archaeologist Amy Jordan, MA, conducted record searches at DAHP in Olympia, Washington, in February 2009 for the APE, including both build alternative sites, to determine if previously recorded archaeological, ethnographic, or historical resources existed in or near the APE and to establish a context for assessing the significance of any resources that might be found. National, state, and local inventories of archaeological and historical resources were examined to identify significant local historic events and personages, development patterns, data regarding prehistoric populations, ethnography, historic buildings and structures, and the environmental history of both build alternative sites. The following inventories and sources were consulted:

- DAHP Archaeological Site and Survey Electronic Geographic Information System (GIS) Database
- NRHP
- National Register Information System (NRIS)
- Washington Information System for Architectural and Archaeological Records Data (WISAARD)

Data on all previously recorded archaeological and historical sites and surveys located within 1 mile of both proposed pontoon construction sites were collected using the DAHP GIS database and consulting the USGS quadrangles on file. Relevant site and previous investigation report information was photocopied and is currently on file at the Seattle office of ICF Jones & Stokes.

CTC Facility

Fourteen cultural resources surveys were previously conducted within a 1-mile radius of the CTC part of the APE (Exhibit 4-1). During the cultural resources surveys, no significant cultural resources were identified. One previously identified historic resource is located in the CTC part of the APE. Fire Station 15 at 3510 East 11th Street is individually listed in the NRHP and the TRHP. Two other NRHP-listed properties and two archaeological sites have also been previously recorded within 1 mile of the CTC part of the APE (Exhibit 4-2). Of the archaeological sites, one is a prehistoric fish weir and one is a historical debris scatter.

In addition to the record search at DAHP, ICF Jones & Stokes reviewed the Cultural Resources Assessment and Final EIS prepared for the Blair-Hylebos Terminal Redevelopment Project (Port of Tacoma 2009; Cultural Resource Consultants 2008), the cultural resource assessment of the Hylebos Bridge prepared for the Hylebos Bridge Rehabilitation Project (HRA 2006), and the Tacoma Historic Property Database (Tacoma Culture 2008).

The cultural resources assessment for the Blair-Hylebos Terminal Redevelopment Project (Cultural Resource Consultants 2008), involved surveying and inventorying potential cultural resources in a large APE between the Blair and Hylebos waterways that encompasses the entire northern section of the CTC part of the APE. The study recorded two resources that were 50 years of age or older in this area: Fire Station 15 at 3510 East 11th Street, which is individually listed in the NRHP and the TRHP, and the American Fast Freight Warehouse at 901 Alexander Avenue. The cultural resources assessment also determined that all of the other properties in the northern section of the CTC part of the APE were less than 50 years old. These findings have not yet been formally submitted to DAHP.

Historic Research Associates, Inc., conducted a cultural resources assessment of the Hylebos Bridge to fulfill requirements of Section 106 of the NHPA for the Hylebos Waterway Bridge Replacement Project (HRA 2006), currently being undertaken by the City of Tacoma Public Works Department. The assessment determined that the Hylebos Waterway Bridge is not eligible for listing in the NRHP but recommended that it is eligible for listing in the WHR; DAHP formally concurred with these findings. A copy of the DAHP determination letter is provided in Appendix F.

Fire Station 15 at 3510 East 11th Street is the only property recorded in the Tacoma Historic Property Database.

Anderson & Middleton Alternative

Four cultural resources surveys and one historic resources survey were previously conducted within a 1-mile radius of the Anderson & Middleton Alternative part of the APE (Exhibit 4-3). During the cultural resources surveys, no significant cultural resources were identified; however, the previously conducted historic resources inventory (Harvey and Krafft 1987) recorded 69 historic resources, including 17 that still exist in the

Anderson & Middleton Alternative part of the APE. These resources include those resources listed as within the Aberdeen Log Yard Alternative part of the APE (Exhibit 4-2), plus the Northern Pacific Railroad Depot at 719 8th Street in Hoquiam. The depot was not previously evaluated to determine its eligibility for listing in the NRHP. In addition, ten other NRHP-listed properties and two archaeological sites have been previously recorded within 1 mile of the Anderson & Middleton Alternative part of the APE (Exhibit 4-4). [redacted]

Aberdeen Log Yard Alternative

One cultural resources survey and one historic resource survey were previously completed within a 1-mile radius of the Aberdeen Log Yard part of the APE (Exhibit 4-5). During the cultural resources survey, Goetz (1997, 1998, 1999) did not identify any significant cultural resources; however, the historic resources survey (Harvey and Krafft 1987) recorded 249 historic resources, including 16 that still exist in the Aberdeen Log Yard Alternative part of the APE (Exhibit 4-6). The Harvey and Krafft survey did not evaluate these 16 historic resources to determine their eligibility for listing in the NRHP. In addition, one prehistoric archaeological site (45GH73) and four historic resources (45GH67, 45GH72, 45GH82, and 45GH122) have been previously recorded within a 1-mile radius of the Aberdeen Log Yard part of the APE (Exhibit 4-7).

5. Archaeological Research Design

This chapter describes the archaeological research design necessary for evaluating the three archaeological resources identified within the Aberdeen Log Yard Alternative and Anderson & Middleton Alternative sites. The research design is the analytical framework for understanding the significance of an archaeological site within the broader historical context and determining the potential for the site to contribute important information. A specific research design for both prehistoric and historical archaeology is presented below. The research design includes a comparative study of similar site types and research themes and research questions to provide an evaluation framework for the prehistoric archaeology as well as historical archaeology. The research design development included coordination with DAHP and tribes in summer 2009.

Prehistoric Archaeology

Expectations

The original research design for prehistoric property types initially anticipated within the APE may be found in the Archaeological Work Plan (Schneyder and Livingston 2009a). This research design for prehistoric archaeological resources was revised to include a focused discussion on research themes and questions specific to the prehistoric fish weir site (AM-1 is the temporary designation for the archaeological site identified at the Anderson & Middleton Alternative site) identified during the field investigations at the Anderson & Middleton site. Foremost in this revision is the relationship of the resource procurement site to its cultural and natural environment, during both its period of construction and use in prehistory, and its postdepositional context since that time (e.g., the effects of land reclamation and/or historical erosion on site preservation).

Comparative Studies

One of the many fish-harvesting techniques used by the native peoples of the Pacific Northwest coast was the use of fish trapping or diversion devices, known as fish weirs. Following accepted convention, fish weirs are defined as any structure that has been made as a guide or obstacle to direct or entrap fish in an area where they can be easily harvested (Connaway 2007:5). Such features are commonly located in estuaries, within river or stream channels, or occasionally along shorelines. The structural barrier created concentrates fish in a limited area, thereby making possible the mass harvesting of aquatic resources (Stewart 1977).

Three basic types of fish weirs are defined by their location and orientation relative to the flow of water: stream, tidal, and longshore (Connaway 2007). The stream fish weir is set within a river or stream channel and is oriented perpendicularly to water flow. These weirs might funnel fish into basket traps or they might serve as a barrier to allow dip-netting of fish entrapped alongside the weir. The second type, a tidal fish weir, is located in estuarine environments and is placed either perpendicular or parallel to the flow of tidal water. With high tide the weir is submerged, allowing fish to swim onto the upstream side of the feature, thus trapping the fish when the tide recedes, allowing the fish to be easily harvested with nets or other gear. The third type of weir, a longshore fish weir, is constructed in non-tidal environments, along marine and lacustine shorelines and river mouths and serves as a barrier or funnel for schooling fish that can be diverted into an awaiting basket or other enclosed trap (Connaway 2007).

Based on a comparative study of the Pacific Northwest coast, several research avenues were identified as relevant to the study of prehistoric fish weirs in the Grays Harbor area, including chronology, geographic distribution, social complexity, and site formation. These avenues are discussed in the following sections, and specific research questions for Site AM-1 are presented below.

Fish Weir Chronology

The chronological dating of prehistoric fish weirs is one of the most important goals of the archaeological research of these features. Because many fish weir elements are often constructed of organic materials, they are subject to potential decay but also to potential radiocarbon dating. Prior to ICF Jones & Stokes fieldwork, sufficient samples from archaeological examples in Grays Harbor were notoriously lacking (only four elements at Newskah Creek were dated out of thousands of exposed stakes); however, at the Newskah Creek site, radiometric dating of four samples yielded dates ranging from 1,040 +/- 50 YBP to 600 +/-60 YBP (Schalk and Burtchard 2001).

Beyond Grays Harbor, some patterning in chronological dating of fish weirs is emerging. Using data from Southeast Alaska, Moss compiled unpublished radiocarbon dates from fish weir sites, determining that their remains could preserve for as long as 3,000 years in tideflat settings (Moss et al 1990). Eldridge and Acheson (1992) ran radiocarbon dates from probable weir stakes near the mouth of the Fraser River [redacted]

[redacted] yielding the oldest radiocarbon dates on the Pacific Northwest coast, ranging from 4,500 to 3,900 YBP.

Along the Oregon coast, 72 fish weir sites have been identified with most identified after the mid 1990s (Byram 2002). Byram (2002:327) notes that 81 radiocarbon dates have been taken for estuarine weirs, suggesting at least 3,400 years of wood-stake weir-building. The vast majority (90 percent) of radiocarbon dates in this region are from the last 1,200 years, with two smaller clusters around 2,100 YBP and 3,300 YBP (Byram 2002:222). The oldest dates were collected from the Coquille Estuary, while the younger dates were collected from the Yaquina Estuary.

Compared with Alaska, British Columbia, and Oregon, far fewer fish weirs have been recorded and dated in Washington. [redacted]

Moss and Erlandson (1998) noted that fish weirs from British Columbia and Alaska show a wide age range and tend to be older than fish weirs from Washington and Oregon. From 71 radiocarbon dates collected from Alaskan fish weirs, sites ranged from modern to 3,940 YBP (49-CRG-433) in age, with most dating to around 2,000 YBP. Thirty-one samples from fish weir sites from the Oregon coast, by comparison, ranged from modern to 2,400 YBP in age, with most dating to the last 500 years (Moss and Erlandson 1998). More recent efforts by Byram (2002) produced an additional 50 radiocarbon dates from Oregon fish weir sites, extending the range of fish weir use to around 3,400 YBP. The vast majority of sites, however, still are less than 1,000 years old (Byram 2002:14; Moss and Erlandson 1998). Since only five radiocarbon dates have been taken from fish weirs (all of which are 1,000 years old or younger) on the Washington coast before this investigation, the sample size is probably not appropriate for generalizing the chronology of fish weir use. A coarse-grained pattern of fish weir use over space and time, however, has emerged. Moss and Erlandson (1998) noted that fish weirs are older, on the average, in the northern Pacific Northwest (Alaska and British Columbia) than in the southern Pacific Northwest (Washington and Oregon). Whether this difference in age indicates that fish weir use developed much later on the southern Pacific Northwest coast, or that there are issues with resource preservation, remains unclear.

Geographic Distribution on the Pacific Northwest Coast

Globally, fish weirs are found in a variety of climates and cultures, and these differences are reflected in construction methods and time depths (Connaway 2007). In the Pacific Northwest, observable regional differences in these archaeological features sufficiently divide them into three coast variants: northern, central, and southern. Grays Harbor on the Washington coastline is in the middle of the central area, midway between the north and south regions. However, as each area has distinct geographic features and no true boundary between them has been established, all have bearing on the present study.

In the northern area, stone weirs are abundant in intertidal areas around the mouths of streams with salmon runs in British Columbia (Pomeroy 1976). But to the south, no stone weirs have ever been recorded in Washington or Oregon. Rather, on the southern Pacific Northwest coast it appears that fish weirs sites mainly comprised multiple vertically set wood stakes, ranging from small clusters to very large alignments; also, while split cedar was often used, different small limbs of other species have been found as well (Tveskov and Erlandson 2003).

Closer to Grays Harbor, a fish weir with other associated features and artifacts is still in the process of being investigated in Mud Bay, near Olympia. This site is unique in that it provides an opportunity to research a fish weir and the associated midden. Most of the vertebrate faunal materials collected from the midden has been identified as fish—and almost exclusively salmon (Croes et al. 2007). Radiocarbon dates obtained from materials associated with the fish weir indicate that the site could be at least 700 years old (Croes et al. 2005:142).

Closer still, the Newskah Creek Fish Trap Complex (45GH73 [redacted] This site was first recorded during an archaeological survey of the area for potential dredge spoil impoundment for the USACE and was ultimately found to contain 170 distinct stake alignments. These alignments were composed almost entirely of split cedar stakes, [redacted] (Schalk and Burtchard 2001). Stake alignments were highly variable in their orientation relative to tidal movement, relationships to other alignments, and the spacing of individual stakes within alignments (Schalk and Burtchard 2001:vi).

Social Organization and Resource Intensification

The household is assumed to have been the primary economic unit on the Pacific Northwest coast and was the center of production (Ames and Maschner 1999). Ethnographically, resource procurement specialization is documented along the Pacific Northwest coast and is often associated with high social status. Daily subsistence activities generally fell to lower status household members. Daily food procurement was probably as important, if not more so, to the day-to-day survival of the household resources procured during specialized, often seasonally discrete resource procurement.

Estuarine fish weirs are assumed to have been communally used and maintained and provided contributions to a household's subsistence regime (Tveskov and Erlandson 2003). Often, they were used to take resident fish (e.g., perch and flounder) but were also useful in procuring seasonally available fish (e.g., salmon and herring). Taking resident fish signals a greater reliance on marine resources than that traditionally discussed within the Pacific Northwest coast culture area. Resident fish would have provided a more consistent resource base and would probably have been less variable and more reliable than seasonally available fish.

Seasonally available resources along with their storability have been cited as drivers for sedentism and cultural complexity on the Pacific Northwest coast (Ames 1994; Fladmark 1975; Schalk 1977). While undoubtedly important, salmon are only available within riverine systems during limited periods each year and must be processed within days of harvesting. Runs are unreliable and possibly temporally limited, lasting only a few days in places on the northern Pacific Northwest coast. While runs are generally longer on the southern Pacific Northwest coast, their unpredictable nature makes other resources much more important for day-to-day living. The nature and source of aquatic resources to be procured are important issues for studying the development of Pacific Northwest coast social organization.

Fish weirs have also been linked to the phenomenon of resource intensification, which has both natural and cultural resource implications (Moss and Erlandson 1998; Tveskov and Erlandson 2003). Resource intensification has been defined in different ways (see Broughton 1994; Butler and Campbell 2004), but an important component is usually assumed to be increased technological investment. Such investment might indicate decreased efficiency of prior methods that were the result of natural resource depression or over-hunting of valuable resources. Butler and Campbell (2004) have demonstrated that this cultural depletion does not appear archaeologically along the southern Pacific Northwest coast. In fact, natural resources appear to have been quite stable over time. However technological innovation (e.g., weir construction) might have been used to support larger households or communities and might have also contributed to the procurement of more reliable but less valuable resources. In either case, fish weirs had natural and cultural consequences for Pacific Northwest coast societies.

Formation Processes and Site Preservation

Perhaps the most important research issues related to prehistoric fish weirs on the Pacific Northwest coast surround site formation processes. This is primarily because most examples were initially placed upon shifting sediments and subsequently subjected to ongoing environmental effects. Before 5,000 years ago, the sea level rose dramatically because of the melting continental glaciers. As a result of sea-level rise and the associated sediment accumulation, archaeological sites on floodplains and coastal areas older than 5,000 years, might be deeply buried and/or in locations that now lie below contemporary sea level.

Along the shoreline, site and artifact preservation are affected by the presence of shell midden or anaerobic conditions, wave erosion, eustatic or isostatic change in sea level, tectonic subsidence, and estuarine habitat succession (Tveskov and Erlandson 2003). On the southern Pacific Northwest coast, large-scale tectonic events, generated by plate movements along the Cascadia Subduction Zone, have caused periodic subsidence along the coast, which has generated earthquakes and tsunamis. The associated change in elevation and gradient has led to rapid sedimentation, likely burying archaeological sites that were once exposed and preserving them.

Comparatively, gradual shoreline uplift, caused by the friction generated by plate movement, exposes previously buried deposits to erosion. In more heavily developed areas along the southern Pacific Northwest coast, sites located in estuaries or shallow water might have been buried or destroyed by increased sedimentation from logging, dike construction, and channel dredging. In addition, winter storm events tend to cause severe erosion along the coast (Erlandson and Moss 1999).

Artifact preservation tends to be poor on the Washington coast, partially as a result of precipitation, acidic soils, and erosion. While most archaeological sites on the coast are considered “dry” or intermittently wet and dry sites, most of our knowledge of prehistoric cultures on the coast comes from "wet" sites, which provide conditions that allow organic materials to be preserved (Wessen 1990). Even with preserved fish weirs, it is difficult to determine the scale and complexity of a fish weir site, since their overall complexity is just as likely to be the product of long-term maintenance as it is of episodic use (Tveskov and Erlandson 2003). Stake distribution in a fish weir site, then, can represent a palimpsest of features and renders all the more important the collection of numerous secure dates for such sites.

Several important research issues related to archaeological fish weirs have been discussed, including chronology, geographic distribution, social organization, and formation processes. From each of these issues, research themes and questions are developed in the following section that will be tested with archaeological data from the Grays Harbor build alternative sites in subsequent chapters of this report.

Prehistoric Archaeology Research Themes

Archaeological investigations conducted for this project, along with documentary research and comparative studies, identified the following potential prehistoric property types: Villages, Cemeteries, Resource Extraction, Isolated Artifacts (Schneyder and Livingston 2009a; Table 2). Based on the background research, comparative study, and the preliminary results of fieldwork at the build alternative sites, a Resource Extraction property was identified. For this site (AM-1), four prehistoric research themes can be defined for prehistoric archaeological resources in the area:

- Chronology
- Geographic distribution
- Social organization
- Formation processes

The research themes listed above were derived from a review of comparative investigations, focusing on those research issues that proved relevant when investigating similar property types. The anticipated property types, research themes and questions, and data requirements are fully discussed in the Archaeological Work Plan (Schneyder and Livingston 2009a).

Chronology

Chronology is the most basic archaeological research issue in any region, particularly in relation to questions about human adaptation to environmental, technological, and population changes and interactions between cultural groups. There is evidence for prehistoric fish weirs in the Pacific Northwest coast that dates back 1,000, 3,000 and even 7,000 years, but the origin and sequence of development remain very unclear (Byram 2002). Although several sites record prehistoric activity in the area, most archaeological information is from contexts that do not include materials that can be used to estimate age. Further, little is known of the lifeways of people living in the region between the earliest arrivals and the early 1800s. Archaeological evidence, which has been interpreted to reflect population growth and evolving cultural complexity, is most abundant for the last 1,000 years, during which regional differences in this growth and cultural complexity reflecting diverse adaptations is apparent.

Artifacts and/or features related to fish weirs are amenable to radiocarbon dating techniques—most commonly, split cedar stakes—and are essential for addressing these questions. If the site has several diagnostics that suggest reuse and/or repair over time, then sample concentrations need to be functionally distinct in order to provide the site's clear chronological use.

Research Questions

Relevant research questions about chronology include, but are not limited to, the following:

- Does this resource contain materials amenable to radiocarbon dating?
- Does this resource exhibit single or multiple construction dates?
- Was this fish weir reused during different time periods?
- What is the relationship between the construction and use of the fish weir and the development of "native" tideflats?

Geographic Distribution

Assumptions that prehistoric activities occurred in predictable locations in direct relationship to landscape features and resource distributions are requisite to interpreting prehistoric use of the natural environment. "Land use" refers to the manner in which people disperse themselves across the landscape to provide access to the natural resources available in the area that are routinely used for shelter, food, tool development and other material culture, or for religious or aesthetic reasons. Information about spatial variation in soils, landforms, food resources (plant and animal distributions), tool-stone sources, and water and an understanding about changes in these geographic patterns over time provide insight into the way the landscape was used prehistorically. Coastal and inland landform, water, and vegetation zone differences are assumed to be the most significant factors in determining the locations of prehistoric cultural activities and, consequently, site distributions. Site distributions, in turn, provide insight into resource acquisition strategies, mobility patterns, and how these might have changed through time.

Information regarding site location and functional layout would help address these questions. Where sites are found relative to landscape features (ridge versus valley bottom), vegetation zone type, and the type of resource being collected provide general patterns about land use adaptive strategies and crucial data for prehistoric site location predictive models.

Research Questions

Relevant research questions about geographic distribution include, but are not limited to the following:

- What type of fish weir is located at the Anderson & Middleton Alternative site: stream, tidal, or longshore?
- Does this resource fit into the general regional pattern, and does it appear similar to northern or southern Pacific Northwest coast examples?
- To what extent did the patterns of resource distribution (resident and migratory fish and shellfish) change relative to the resource (in other words, did salinity or channelization alter the location of the fish weir over time)?
- Is there a discernible difference in the physical setting of this resource compared with the Newskah Creek example on the far bank of the river?
- Does the site appear to have been in persistent use, reflecting the importance of certain parts of the landscape for specific resources, or does it reflect a more ad hoc, less planned use?

Social Organization

Objects of material culture that can be recognized as having originated in a particular area (because of the raw materials from which they are made), a particular style or technology of manufacture, or other distinguishing character can be used to recognize distinct cultural (ethnic) groups who lived in the past. The distribution of such markers throughout time can be used to trace population movements and trade networks involving neighboring groups. Many issues remain to be clarified regarding the distribution of prehistoric ethnic groups and movements and the social context within resource extraction that occurred. In large part, this tremendous gap in understanding the prehistory of the Pacific Northwest coast is because very little is known of the lifeways of people living in the region between the earliest arrivals and 1,000 years ago. At some point during that time, significant population growth occurred and cultural complexity appears to have increased by many orders of magnitude reflecting diverse adaptations to local environments and resources. Social complexity is also recognized in site organization where activity areas are separated spatially and in artifact assemblages in which there is a disparity in the inferred cost of making the object, procuring the materials, or other economic indicators. Data from the AM-1 fish weir site might be used in conjunction with data from other coastal sites to address questions regarding social complexity and ethnicity in prehistoric coastal populations.

Research Questions

Relevant research questions about prehistoric social organization and resource intensification include, but are not limited to, the following:

- Does the resource reflect any indicators of social complexity, such as task specialization, economic stratification, or group construction and/or maintenance?
- What is the most likely natural resource(s) procured at this fish weir? Is there any evidence for year-round collection, or was it likely 'episodic'?
- Is there evidence of more than one group living in the area? Is it possible this was an 'open' fish weir (i.e., no restrictions on use) or was it controlled?

Formation Processes

Although this theme does not directly relate to past human activities, understanding site formation and preservation greatly affects our understanding about the human past in Grays Harbor. Finding sites that will provide data that can be used to address research questions in the preceding themes depends on the survival of the landforms on which people were living at any particular time in the past and the deposition of sediments on those landforms that will bury—and keep buried—the material remains (artifacts, features, and sites) left by those people. Geomorphic processes that cause erosion and deposition in the Grays Harbor estuarine environment include changing sea levels, coseismic subsidence, storms and tsunamis, and tidal currents. Such geomorphic processes can erode the landform altogether, bury sites and preserve them for long periods of time, or rework sites into deposits representing mixed time periods and mixed associations of cultural and natural materials.

The confluence of rivers and streams are places of dense natural resources used by prehistoric people and have been recognized as loci of many prehistoric village sites (Daugherty 1948); these areas are also good places to control access to mass collected resources, such as salmon (Schalk 1977). Fluvial processes, like estuarine processes, however, can affect the preservation of cultural materials through cyclical erosion and deposition. Further, rivers are known for frequent shifts in course, which might obscure or rework prehistoric sites.

The current understanding of the project APE is that the prehistoric environments represented under the historical period fill at each site is most likely intertidal. While it is commonly accepted that intertidal environments are the most resource rich areas available to prehistoric peoples in the Pacific Northwest, extracting the resources does not necessarily include depositing significant numbers of artifacts or artifacts that are of large size that would be readily preserved or discovered. Some activities that undoubtedly occurred in the Intertidal Zone include harvesting grass for basket-making, hunting waterfowl with raised nets, digging shellfish, and fishing. Because these activities involved using tools that could be made from organic materials that decay rapidly and the activities leave little or no lasting evidence on the landscape, research on how to recognize that these activities occurred is critical but only beginning to develop. More information about archaeological sites preserved in stratigraphic contexts that can be interpreted in terms of geomorphic processes is needed.

Research Questions

Relevant research questions about site formation and preservation processes include, but are not limited to, the following:

- What geomorphic processes led to the development of a “native” tideflat environment, and when did that occur?
- What sedimentary processes led to the preservation of the archaeological site?
- Is there any evidence that suggests geomorphic processes might have eroded or removed some portions of the site or changed the distribution of materials within the site?
- How have these processes changed over time?

Historical Archaeology

The complete research design for the historic property types initially anticipated within the APE is described in the Archaeological Work Plan (Schneyder and Livingston 2009a). What follows is a more focused discussion on research themes and questions specific to the historical archaeological sites identified during the archaeological investigations for the current project.

Expectations

Information from virtually all available archival sources (historical maps, photographs, and documents) for the APE is incorporated into this revised research design section. This research revealed that dramatic alterations of the landscape had occurred on of both build alternative sites as a result of the reclamation and filling of the tidal mudflats to create useable land in order to develop industrial parcels to support the sawmill facilities. Additionally, large-scale changes were made to both build alternative sites in the 1960s and 1970s, including the demolition of the old sawmills and associated facilities and additional reclamation.

Comparative Studies

To assist in determining the research potential and significance of historical archaeological resources within the APE, archaeological studies of similar sawmills were compared. This comparative study revealed that most archaeological investigations of sawmill sites have focused on forested environments, and few investigations of sawmills located near shorelines or near water transportation have been conducted. The different settings for sawmills are important in terms of research potential and avenues in that construction methods, adaptations to available technology, and presence and preservation of features are likely to vary in the different locales.

Archaeological research on sawmills is relatively limited when compared with other areas of historical archaeology (e.g., ceramic studies, race, and ethnic identity). The fact that archaeological sites must be at least 50 years old (75 years in Oregon) to be considered significant has led to the common perception that sawmills are not important archaeological properties (Douglass 2002). Sawmills of the twentieth century sometimes operated until the 1960s and are remembered by some older community members. Nevertheless, sawmill archaeology has been conducted within the industrial archaeology subfield and is frequently coupled with extensive documentary research (Nixon et al. 2000). Common research themes include the following: 1) industrial construction and sawmill technology; 2) social issues of the workforce; and 3) corroboration of historical and archaeological records. While the social aspect of sawmills is not a common focus of industrial archaeology (Douglass 2002:170), the subfield has contributed a great deal of technological knowledge about the design and operation of historical sawmills.

In the following sections, common research themes surrounding the archaeology of sawmills are presented that will form a comparative framework for the NRHP evaluation of the historical sawmills identified at both Grays Harbor build alternative sites. These themes include Industrialization/Technology, Sawmill Location, and Reclamation.

Industrialization/Technology

Sawmills are not a static property type. Sawmill components, spatial arrangement, and size all changed as technological innovations were introduced to the timber industry. The technological and spatial characteristics of a sawmill indicate a level of industrialization that has implications for understanding labor issues and practices, production and transportation infrastructure, and how the industry affected community development. Research on sawmill technology and spatial layout has identified differences between preindustrial and industrial mills (Nixon et al. 2000). As a result of the technological focus of industrial archaeology, there is a large pool of information about sawmill machinery and construction techniques for comparison.

The technological and spatial organizational differences between preindustrial and industrial mills are demonstrated by an Applied Earthworks Inc. archaeological investigation of three sawmills as part of the mitigation phase for the Crown Pacific and Deschutes National Forest Land Exchange Project. These sites—the Spoo Mill, the Pine Tree Mill, and the McKinley Mill—date to the 1910s and 1920s, and all are located in the forest away from developed towns (Nixon et al. 2000). Common archaeological features associated with early sawmill and timber harvesting practices include structural features (mill and communities), wood products and waste (sawdust piles), splash dams, horse or oxen gear, and machinery items (Lebow and Marschall 2005: 12-13). Also, an earthen dam identified during the surface survey supplied water retention and waterpower for the Pine Tree Mill (Nixon et al. 2000).

In general, the remote locations of timber and, hence, sawmills required roads and railroads to be constructed in order to transport the milled lumber from the source to the location of demand. In early Pacific Northwest history, lumber was moved from inland sawmills and then transported via ships. Eventually, the railroads provided a land-based transportation system for lumber and the Pacific Northwest sawmills were finally able to reliably access the national and international market. For example, the Bradwood Mill and Pine Tree Mill sites included railroad trestles and rails built specifically to transport logs to the mill from the forests and connected with main railways like the Burlington Northern Railroad (Nixon et al. 2000; Bowden et al. 2006). Historical documents show a railroad spur connecting the vicinity of this early mill to Bradwood. The Bradley-Woodward Mill extended the Seattle, Portland, and Spokane railroad to their mill by 1932, allowing workers to catch the train to company logging sites. Logs from the Bradley-Woodward Mill were hauled in railcar by a Shay locomotive engine from forest to mill. The Bradley-Woodward Mill operation ceased in 1938 (Bowden et al. 2006:23-24).

The early sawmills in Hoquiam and Aberdeen produced lumber to meet the needs of the local community (settlers). The first sawmills designed for commercial export came on the scene in the mid-1880s, and by the turn of the century sawmill operations in Hoquiam and Aberdeen were considered a large-scale commercial industry that supplied the East Coast, Asia, and California demands (Lamb 1948; Pettit 1939; Van Syckle 1980, 1982). The Hoquiam and Chehalis rivers area was considered a prime location for large industrial mills because of the deep water for docking transport ships and railroad transportation (Cox 1974:295).

Sawmill Location and Spatial Organization

The historical placement of mills was often a socioeconomic decision that considered different factors, including resource location, the available labor force, and transportation limitations. Currently, most archaeological sawmill sites are identified during forest and timber sale surveys (Nixon et al. 2000; Lebow and Marschall 2005; Day and Kerr 1998; Douglass 2002) resulting in most sawmill archaeological research occurring within forested areas (or former forests). On forest lands owned by Oregon State University, approximately 20 mills dating between 1890 and 1955 have been found (Lebow and Marschall 2005:12). Many of these mills were steam-powered and located near a water source. Roads linking mills with the major roadways were commonly made of logs and wooden planks. Some of these mill sites included nearby work camps.

On the other hand, the sawmills on the Anderson & Middleton and Aberdeen Log Yard build alternative sites were poised at the shoreline of Grays Harbor, away from the logging camps but nearest the available transportation—sea vessels. Minimal sawmill archaeology has taken place in Grays Harbor, and few archaeological investigations address waterfront sawmill locations. One sawmill archaeological site dating to the late 1800s to the 1930s is located adjacent to the Anderson & Middleton Alternative Site on IDD #1 (Blukis Onat and Lykowski 2007).

Technology is not the only change that accompanied the industrial transition. Larger mill operations required more labor and a more specialized spatial organization. Archaeological investigations of sawmill sites show that the operations were supported by a variety of associated structures such as residential areas and service buildings such as blacksmith shops, post offices, and stores (Blukis Onat and Lykowski 2007; Nixon et al. 2000). An analysis of the spatial organization of features at 20 late nineteenth and early twentieth century sawmills in Australia identified "Industrial," "Intermediate," and "Domestic" "zones" at industrial sawmills. The Industrial zone contained the sawmill and other industrial services that supported the operations and the workers, like a store or a blacksmith's shop. Residences of the manager and single men were located in the intermediate zone, while dwellings for workers who brought families were in a more distant "domestic zone" (Rae 2005).

Industrial-level timber production required a larger labor force. At the forest-bound sawmills, a domestic artifact deposit is often interpreted as the worker's camp, home to the mill and logging crews and sometimes their families (Nixon et al. 2000:29). In Clatsop County, Oregon, Bradwood was a company town established in support of the Bradwood Mill. Archaeological investigations that focused on the northwestern portion of the town and mill revealed a consistent stratum of dredge sands overlying a dark brown or black deposit containing milled lumber, architectural debris (window glass, wire nails, screws, rubber, plastic, and lumber), and the occasional vessel glass and ceramic fragments (Bowden et al. 2006:40; Bradwood Landing, Inc. 2006:7). Like the build alternative sites, Bradwood was bulldozed and covered in river dredge, affecting the preservation of intact residential features.

At the edge of two incorporated cities, the Blagen Mill (Anderson & Middleton Alternative) and Hulbert Mill (Aberdeen Log Yard Alternative) did not have residential communities on site; instead, their labor force lived in the towns. An improvised residential area, interpreted as the known Hoquiam Hooverville, was identified on IDD #1 in Hoquiam (Blukis Onat et al. 2007). During the Great Depression shanty towns and "Hoovervilles" sprang up around the nation as many people lost jobs and their homes. Hoovervilles often functioned as labor pools for industrial facilities; also, the residents of the Hoquiam Hooverville likely worked at some of the still-operating sawmills.

Reclamation and Engineering

Euro-American settlement began on the “uplands” surrounding the Grays Harbor region. The tideflats were considered undesirable because the constant tidal inundation dissuaded most forms of development. When the tideflats began to be reclaimed and developed, a new stage of industrial development had begun. Unique site formation processes not generally active at forested sawmill sites need to be considered for understanding and analyzing sawmill archaeological sites that were developed on tideflats.

As seen in examples from various sites in Oregon and Washington, the act of filling in tideflats is a conscious attempt to advance development by modifying and controlling the natural setting. In Seattle, Washington, and Portland, Oregon, the low, flood-prone waterfront areas were the last to be settled and developed as they were occupied by the low-income residences and industrial properties (Rose et al. 2007; Northwest Archaeological Associates 2007). Seattle developed a plan to fill the tidelands in the southeast portion of Elliot Bay during the 1890s with the primary goal of turning the waterfront into a massive freight and industrial area (Northwest Archaeological Associates 2007). The stratification of former tideflats is characterized by fill events deposited before, during, and after industrial development on the tideflats. Archaeological and geological investigations in South Seattle have identified refuse fill deposits containing bricks, wood, general refuse, and sediments from the many Seattle regrade events. Another example of reclamation is from the Bradley-Woodard Lumber Company in Clatsop County, Oregon. The mill owners contracted with the USACE to fill the future site of the Bradley-Woodward Mill and Bradwood town with Columbia River dredge materials. The multiple fill events that turned the tideflats into “uplands” effectively capped the historical mill.

In Grays Harbor, the Hoquiam and Chehalis rivers were regularly dredged to keep the navigation channels open for ships. Only two episodes of dredge filling were identified in trench profiles at the IDD #1 excavations in Hoquiam: one from the early 1900s and one from the 1970s following the sawmill’s demolition (Blukis Onat et al. 2007:133). The sediments between these fill deposits contained large amounts of wood and milled lumber debris. Sanborn Fire Insurance maps from 1907 show planked surfaces (roads and walkways) built on piers over refuse fill. Excavations by BOAS, Inc. in 2005 on the IDD #1 property (adjacent to the Anderson & Middleton site) uncovered large quantities of wood debris, sawdust, and milled lumber 5 feet (1.5 meters) below the surface. (Blukis Onat et al. 2007).

Even when filled with dredging and wood waste, the "former" tideflats were still susceptible to tidal fluctuations. Sawmill structures were built on piers and pilings to avoid inundation by the tides (Blukis Onat et al. 2007). Wood was used for sawmill infrastructure, including the construction of roads, bridges, wharves, and support piling for structures on marshy terrain. Constructed planked wood surfaces were found in two trenches on top of the wood debris layer (Blukis Onat et al. 2007). Pilings, planked roads, and milled debris were anticipated beneath the modern fill layers that converted the Grays Harbor tideflats into solid "uplands."

The Bradwood Mill, in Clatsop County, Oregon, like those at the Aberdeen Log Yard site and Anderson & Middleton site was built at the shoreline on top of recent river dredge fill. During a 2005 pedestrian survey, structural remains that had not been burned and bulldozed when the town and sawmill were shut down in the 1960s were visible and partially exposed under the loose sand dunes (former river dredge). The archaeological remains of loading dock piers, the sawmill concrete foundations, and pilings from the train trestle that connected the mill to the Burlington Northern and Portland and Astoria Railroad were identified (Bowden et al. 2006).

Historical Archaeology Research Themes

Archaeological investigations conducted for this project, along with archival research and comparative studies, identified the following property type (including anticipated property types): Industrial Architecture, Industrial Activity Areas, and Landscape Features. Based on the background research and comparative study, three themes can be defined for industrial archaeological resources in the area:

- Industrialization/Technology
- Sawmill Location and Spatial Organization
- Reclamation and Engineering

The research themes listed above were derived from a review of comparative investigations, focusing on those research issues that proved relevant when investigating similar property types. The Archaeological Work Plan (Schneyder and Livingston 2009a) fully discusses the anticipated property types, research themes and questions, and data requirements.

Industrialization/Technology

Industrial archaeology initially focused on preserving and interpreting industrial structural and technological remains. Investigations at industrial sites were typically salvage-oriented and focused primarily on social aspects of the sites, including ethnic relationships (Teague 1987). Industrial archaeological studies over the past 20 years have been more focused on sites where the written record is sparse and where less is known and was more focused on the industrial components to the site in contrast to the social aspects. George Teague has discussed the fact that, although the industrial architecture and machinery are more visually appealing, waste products are often better sources of information about undocumented technologies (Teague 1987). Interesting studies of industrial archaeological sites by Council, Will, and Honerkamp (1982) have offered valuable information about the technological innovations as well as the processes and materials used at particular industrial sites in a way that would not have been possible through archival research alone (Walker and Ziesing 2002).

Research Questions

There are a variety of specialized industries located within a sawmill complex (machine shops, blacksmith shops, refuse burners, and wood processing) that could answer questions associated with this research theme. These questions include the following:

- Does this resource contain evidence of undocumented or poorly documented industrial processes that could significantly add to our knowledge of the development of sawmills in the Grays Harbor region?
- Does this resource contain evidence of local innovation or technology as opposed to the adoption of industry standard technologies?
- Is there evidence of reuse of equipment, buildings, or artifacts?
- Does this resource demonstrate the impact of industrialization on the landscape and/or environment?
- How is the source of capital used to finance the mill visible in the archaeological record and how did this change over time?

Sawmill Location and Spatial Organization

Based on ICF Jones & Stokes' comparative study of sawmill sites and similar site types, the location, geographical layout, and organization of these industries has received limited study. Comparative research of sawmill archaeological sites has indicated that most investigations have focused on sawmills located in forests and that studies on sawmills in proximity to more urbanized areas and adjacent to waterways are extremely limited. The location of a sawmill (forest versus urban) directly affects the layout and spatial organization of the industrial complex.

Layout and design would have been the result of the size of the useable land on the property, the distance to the primary transportation network, and the permanence of the industrial complex. Mills located within forested environments were sited because of their close proximity to the resource (timber), and their development was likely more restricted because of the topography and finite nature of the trees in a particular area. Once trees in a particular area were removed and processed at the local mill, it became more expensive to transport the resource from the logging area to a distant sawmill than it was to move the mill closer to the logging operation. In contrast, more permanent industrial lumber operations were established adjacent to major waterways in the western United States. The close proximity to major waterways connected to global markets, and the cheap cost of land in the region allowed more permanent sawmills and large industrial complexes to be established.

Grays Harbor was a major economic hub of the lumber industry in the early twentieth century and was the largest exporter of lumber at one time. Sawmills in Grays Harbor were major corporate endeavors that were well financed and likely contained modernized technology of the time. The archaeological relationship between the activity areas (including, but not limited, to mills, refuse disposal areas, transportation lines, and fuel burners) and how they might have changed over time has not been explored. Additionally, the extensive transportation networks identified through both archival and field investigations were likely constructed to connect specific areas of the industrial complex to each other and the outside world. The location and spatial organization of the Blagen Mill (originally the GHLC) at the Anderson & Middleton site and the Hulbert Mill (originally the Hart-Wood Lumber Company) at the Aberdeen Log Yard site offer a window into the past for researching specific industrial organization and planning on a level that is unattainable though historical research alone.

Research Questions

The following research questions regarding spatial organization and location might be addressed from the archaeological properties at the Alternative Sites:

- Was the layout of the sawmill intentionally organized during its inception, and if so, what does it say about planning and functionality?
- How does the spatial organization of the sawmill compare with other similar sites in the region?

- How does the spatial organization of the sawmill compare with those located in forested environments?
- Can organizational differences between structures and within subdivisions of the sawmill be recognized? For example, what are the differences and similarities between structures, features, and material culture?
- Is there evidence of adaptive reuse of equipment, artifacts, or buildings?
- Were there separate temporal sawmill phases that occurred during different time periods that are visible by a change in the mill technology or in the cultural material present on the sites?
- Was the sawmill expanded, or were there several different mills that once stood on the site and were subsequently demolished to build a larger mill?
- As modernized equipment was introduced to the mill, did the skill sets of the labor force and the tools of the trade change in response to the modernization?
- Are the historically documented production techniques accurate?
- Do the roads contain myriad intersections, providing numerous alternate routes, or does it lead toward a single central area?

Reclamation and Engineering

This research theme encompasses the reclamation of the tidal mudflats in order to develop and expand the industrial landscape. Large-scale land filling operations on both the Aberdeen Log Yard and Anderson & Middleton sites began in the early twentieth century as a result of the development and subsequent gradual expansion of the Hulbert and the Blagen mills. Evidence of early reclamation efforts as well as roadways, shipping wharves, and/or railroad lines is visible in the archaeological record at both build alternative sites. Transportation lines and features might provide information on regional civil engineering and the sawmills' day-to-day operations. Little archaeological research has specifically focused on large-scale land engineering operations. The few archaeological studies conducted on reclamation activities have been on refuse landfills that resulted from direct refuse disposal or the construction and operation of a sanitary landfill rather than on the result of land reclamation.

More comprehensive documentation and analysis of engineering efforts might be able to document how the landscape of the Anderson & Middleton and Aberdeen Log Yard sites was engineered over time and how the engineering and development periods were affected by technological advances.

Research Questions

Research questions include the following:

- Does this resource contribute to the understanding of how industrial landscape modifications altered the natural environment?
- How were these modifications implemented (single versus multiple phases)?
- What types of civil engineering are evident?
- How were reclamation activities affected by technological innovations (dredging, hydraulic filling, refuse disposal, landfilling) and how did this change over time?
- How did economic factors affect the engineering and infrastructure development?
- Are the filling sequences documented in the historical record supported by archaeological evidence?

6. Results

This chapter presents the results of the archaeological investigations and historic resources inventory conducted within the APE. ICF Jones & Stokes excavated a combined total of 483 archaeological trenches at both the Aberdeen Log Yard and Anderson & Middleton sites. The reconnaissance-level historic resources survey likewise evaluated a combined total of 253 properties at both Grays Harbor build alternative sites and the CTC facility parts of the APE.

CTC Facility

Archaeological Investigation

No archaeological investigations were conducted at CTC because there would be no change in the present use and function of CTC facility associated with the build alternatives. No site excavation and no new construction would be expected as part of either build alternative at CTC.

Historic Resources Survey

The reconnaissance-level historic resources survey of CTC identified 17 properties in the CTC part of the APE. A cultural resources assessment previously prepared for the Blair-Hylebos Terminal Redevelopment Project Final EIS (Port of Tacoma 2009; Cultural Resource Consultants 2008) surveyed five of these properties, all located in the northern section of the CTC part of the APE along the Hylebos Waterway. Of these, only Fire Station 15 at 3510 East 11th Street, which is individually listed in the NRHP and the TRHP, and the American Fast Freight warehouse at 901 Alexander Avenue were identified as 45 years of age or older. All other properties were determined to be less than 45 years old. The cultural resources assessment previously prepared for the Hylebos Waterway Bridge Rehabilitation Project (HRA 2006) inventoried the Hylebos Bridge and recommended that the bridge is eligible for listing in the WHR, but it is not individually eligible for listing in the NRHP; DAHP formally concurred with the eligibility determinations (Appendix F includes a copy of the DAHP determination).

Considering these results and using Pierce County tax assessor data and field observations, the reconnaissance-level historic resources survey identified six resources in this part of the APE that are 45 years of age or older (Exhibit 6-1); Appendix E presents the inventory forms for the resources not previously inventoried. All other resources in this part of the

APE contain buildings and/or structures that have been determined to be less than 45 years old (Exhibit 6-2).

The six properties identified as being 45 years of age or older were evaluated to determine their eligibility for listing in the NRHP (Exhibit 6-3). Based on NRHP evaluation criteria (36 CFR 60.4), one property in this part of the APE appears to be eligible for listing in the NRHP. This property is in addition to Fire Station 15 at 3510 East 11th Street, which is already individually listed in the NRHP and the TRHP. The eligible property consists of a historic district that encompasses a portion of the CTC facility at 1123 Port of Tacoma Road—including the administrative building, two research and development laboratory buildings, and the structural plant. The historic district is considered historically significant for its role in the development of the prestressed concrete industry in the United States and many large capital improvement projects in the Pacific Northwest and for its association with well-known Tacoma architect Robert B. Price and engineers Thomas and Arthur Anderson. The existing graving dock at the CTC facility was constructed in the 1970s and is not considered historically significant nor a contributing element of the historic district. The Hylebos Bridge likewise does not appear to be eligible for listing in the NRHP, but was previously recommended as eligible for listing in the WHR. Exhibit 6-2 lists the properties less than 45 years of age.

Anderson & Middleton Alternative

Archaeological investigations and a historic resources inventory and evaluation were conducted for the Anderson & Middleton Alternative site. Geological coring was completed prior to the archaeological trenching program to help assess the depositional environmental and to develop the methods used for the archaeological trenching program.

Geological Investigations

Dr. James Phipps conducted a geological study of the Anderson & Middleton Alternative site in June 2009 to locate evidence of coseismic subsidence with particular focus on subsidence events that might have buried terrestrial surfaces. Seven boreholes were excavated at this site. The study results indicate that the Anderson & Middleton site has been a tidal mudflat for the last 10,000 years and the depositional environment for glacial outwash before that; no evidence of terrestrial landforms from the late Pleistocence or Holocene was discovered. Appendix D presents the results of the coring program (Phipps 2009).

Archaeological Investigations

Systematic mechanical excavation was used to locate archaeological resources at the Anderson & Middleton site. Both historic-period and precontact archaeological resources were discovered as a result of the trenching program. The historical archaeological resources were further investigated to establish significance and integrity. Precontact features that were discovered during the exploratory trenching were recorded and considered significant. In an effort to minimize disturbance to the precontact resources, no further archaeological investigations were conducted on trenches where precontact resources were identified.

A 100-foot (30-meter) square grid was laid out at the Anderson & Middleton site with one trench excavated per grid square (Exhibit 6-4). Additional trenches were excavated to characterize and assess the significance of the historical archaeological resources.

In July through October 2009, 249 trenches were excavated at the Anderson & Middleton site (Exhibits 6-5 and 6-6). Trench AM-175 was not excavated due to buried electrical lines as well as the presence of a substantial truck scale comprising much of the 30-meter square area. Eight additional trenches were excavated (H-1 through H-8) to characterize the historical archaeological resources and to assess their significance. Trenches were approximately 25 to 30 feet (7.6 to 9.1 meters) long, 6 feet (1.8 meters) wide, and between 19 and 29 feet (5.8 and 8.8 meters) deep. A maximum depth of 29 feet (8.8 meters) was only reached in one trench, AM-65. Appendix G fully describes the trenches, including size, stratigraphic descriptions, and findings.

Excavations were terminated prior to encountering natural sediments in 59 trenches. Reasons for the early terminations included continuous slumping of sidewalls causing trenches to infill, water inundation, impassable objects (e.g., concrete pads, plank roads, and railroad tracks), the presence of contaminants (creosote and oil), and the discovery of a precontact fish weir. Slumping sidewalls occurred throughout the site with the southern portion having the most prominent slumping. Trenches AM-135 and AM-205 were both possibly contaminated by creosote resulting in an early termination (Exhibits 6-7 and 6-8).

Naturally deposited sediments were identified in 147 of the 249 trenches excavated [redacted] Historic-period features were identified in 83 trenches (Exhibit 6-9). A total of 38 wood pilings were located across the Anderson & Middleton site, making them the most widely noted feature (Exhibit 6-

10); planked surface features were also found in abundance throughout the area (Exhibit 6-11). Other historical archaeological features included building foundations and two sets of narrow-gauge railroad track (Exhibits 6-12 and 6-13).

Precontact features were found in nine trenches on the Anderson & Middleton site (Exhibits 6-14 and 6-15). The precontact features consisted solely of wood fish weir elements. [redacted]

As a result of the protocol established after the fish weirs were initially discovered, in consultation among regulatory agencies and tribes (FHWA, WSDOT, SHPO, DAHP, Quinault Indian Nation, and Chehalis Confederated Tribes), and following expressed tribal concerns about damaging fish weir features, trenches located in the cardinal directions of any newly discovered fish weirs would not be excavated to their maximum depth (see Addendum to Workplan [Schneyder and Barrett 2009b]). Instead, the trenches located to the north, south, east, and west of fish weir discoveries were only excavated to the depth of the historical fill and not the depth of the adjacent fish weir discovery. A total of nine trenches were terminated before reaching their maximum depth because of their proximity to discovered fish weirs.

[redacted] Also found in association to the split cedar sticks were other types of wood twigs, shell and bark. These other materials were collected as were the cedar sticks for dating and comparative purposes. A total of 23 samples from the various trenches were submitted to Beta Analytic for radiocarbon dating. The breakdown of trenches describing the number of fish weir elements and their depths can be found in Chapter 7. More detail on the nature and analysis of the fish weir elements can be found in Chapter 7 of this report.

Trench Discussion

The Anderson & Middleton Alternative Site is located in an area that was previously tidal mud flats. It was later filled to bring it to its current elevation above sea level. The native mudflat is characterized by silts and fine sands that generally contain shellfish valves and interbeds of organic materials. The formation of the tidal mudflats is a low-energy process that leads to the formation of beds or layers of the sands and silts. This bedding was generally observed in those trenches that reached native sediments. In order to raise the area's elevation and create more usable land, hydraulic fill (noted as laminated sands and silts) was added to the area. Land was also created through dumping and pushing dredge sediments and was characterized by sands and silts that had a blocky texture and contained mixed historical debris (Exhibit 6-18). Wood debris, such as dimensional lumber, branches, bark, and saw dust from the sawmill, was dumped or pushed onto the filled areas to create a level of wood debris of varying thickness across the Anderson & Middleton site (Exhibit 6-19). An overview of the stratigraphy of the Anderson & Middleton site can be seen in the north-south and east-west profiles for the site (Exhibits 6-20 through 6-27). These figures are a composite sketch representing a cross section (north-south and an east-west) of the stratigraphic profiles of the site, as interpreted from the trenches profiles.

Across the Anderson & Middleton site, the general trench profile was one of asphalt or modern fill rock underlain by geofabric cloth, underlain by more gravel, underlain by sand and gravel, underlain by wood fragments, underlain by fill that was either dumped or hydraulically transported in, underlain by mudflat. Although this was the general look of the trenches, there was variation within the trenches excavated. [redacted]

[redacted]

considered to be native sediments. A representative profile can be seen in [redacted]

The trenches in the northern and western portion of the site included a profile of 3 to 5 feet (1 to 1.5 meters) of modern fill, including gravels and quarry fill generally with a sheet of geotechnical fabric underneath. The next layer comprised dense woody debris that acted as a conduit for groundwater. Following the wood layer was dark gray silt to silty clay, often with woody debris intermixed. The native mudflat was located anywhere from 15 to 25 feet (4.6 to 7.6 meters) below the surface. Trench AM-212 shows a representative profile of the stratigraphy (Exhibit 6-30).

Fish Weir Locations SECTION REDACTED

[redacted]

[redacted]

[redacted]

Trench H-1

Trench H-1 was excavated in the south central portion of the Anderson & Middleton site near trenches AM-36, -46, and -67. Trench H-1 was excavated in a north-south orientation to further expose a railroad track that was observed on the surface near Trench AM-36. Trench H-1 revealed several other iron railroad tracks mounted on concrete footings running in a north-south direction.

Trench H-2

Trench H-2 was excavated near trenches AM-31 and -32 and was excavated to expose a concrete slab that was slightly exposed on the surface. Trench H-2 was expanded to further expose foundations that were identified in it; this expanded trench was identified as Trench H-2B.

Trench H-3

Trench H-3 was excavated just south of Trench AM-45 in order to try to locate the old wharf road. A planked feature was located; however, after expanding the trench to the north and south the planked feature quickly disappeared.

Trench H-4

Trench H-4 was an exploratory trench excavated in the hope of finding the boiler room noted on the 1906, 1916, and 1928 Sanborn Fire Insurance maps. A variety of historical-period debris, a concrete pad, and two pilings were observed in the trench, likely associated with the boiler room.

Trenches H-5 through H-8

Trenches H-5 through H-8 were exploratory trenches to locate the wharf road. Trench H-6 was the only one to contain a planked feature, and because of wetland constraints, the trench could not be opened any further to expose the planked feature. Trenches H-5, H-6, and H-7 all contained wood pilings as well, but no planked features were identified in H-5 and H-7.

Trench Summary

As a result of the excavations at the Anderson & Middleton site, two archaeological sites—one precontact and one historical—were recorded (assigned temporary numbers AM-1 and AM-2, respectively, trinomials pending). Site AM-1 comprised the locations where fish weir elements were identified. [redacted]

[redacted] Site AM-2 consists of various pilings, planked features, concrete foundations, structural remnants, and railroad tracks located in trenches across the site as well as the historical log decks still visible on the surface. These historic-period features were located during the initial trenching and then further exposed to further define and determine the site's NRHP eligibility. Appendix I presents the complete archaeological site forms for sites AM-1 and AM-2, and Chapter 7 presents a more detailed analysis of the precontact archaeological site.

Prehistoric Archaeological Site AM-1

Mechanical excavation revealed the presence of a precontact feature—a cedar stake fish weir—at the Anderson & Middleton Alternative [redacted] As these features were identified, their locations were mapped using GPS and documented on the appropriate field forms. The precise locations of feature alignments were identified and recorded in the field whenever possible from limited deep trench exposures. [redacted]

[redacted]

[redacted] Adjusted radiocarbon ages ranged from around 220 YBP to around 1,220 YBP; Chapter 7 (and Appendix H) fully discusses the radiocarbon results, and Appendix I presents the site record.

Historical Archaeological Site AM-2

Site AM-2 is located along the shore of Grays Harbor, near the Hoquiam River, [redacted] Site AM-2 includes the remnants of an early twentieth century sawmill mill complex (Exhibit 6-38). Most of the complex was demolished in the 1960s; however, the remains of foundations from the boiler room, engine room, and several associated buildings were identified during the archaeological investigations (Locus

A). Associated mill features, including planked roads and walkways, a railroad, and structural pilings, were also discovered; Appendix I includes the site record.

Mechanical excavation initially revealed the presence of historical archaeological materials at the Anderson & Middleton Alternative site (Exhibit 6-39). These archaeological features were identified, recorded, and compared with the locations of rooms, buildings, and industrial from the earliest Sanborn Fire Insurance maps (Exhibits 6-39 and 6-40). Overlays using modern aerial photographs, historical Sanborn Fire Insurance maps, and the GPS coordinates of the archaeological features confirmed that the archaeological features identified during the investigations were, in fact, the remains of the Blagen Mill (originally the Grays Harbor Lumber Company) (Exhibits 6-41 and 4-42). The extent of these historically mapped structures—and the modern limits of lumber features (for example, log roads and laydowns)— were used to define the site boundary for AM-2.

Historical archaeological features and deposits were identified in trenches (Exhibit 6-41). Structural remains of the mill were identified in five trenches: AM-31, AM-23, AM-24, H-2 and H-4. The additional 78 trenches contained the remains of planked roads, walkways, and pilings. The archaeological site was identified at depths ranging from 1 to 12 feet (0.3 to 4 meters) below the surface across the Anderson & Middleton Site.

Boiler Room

Remnants of a foundation associated with the mill boiler room were identified [redacted]

The 1907 Sanborn Fire Insurance map documents three bays, indicating that three boilers operated during the early operations of the Grays Harbor Lumber Company (Exhibit 6-42). The 1916 Sanborn Fire Insurance map documents a total of four bays (Exhibit 6-42). By 1928, the Sanborn Fire Insurance map indicates that the boiler room had been expanded and an additional two bays were constructed, for a total of six operating boilers (Exhibit 6-43).

Engine Room

Remnants of the engine room were identified [redacted] Analysts identified structural debris containing remnants of a concrete foundation and pipes associated with the engine room's mapped location. Debris also included concrete fragments, rebar, bricks, fire bricks, and assorted timbers and two concrete pipes [redacted] During mill operations, the engine room housed a steam-powered engineer (or engines) to run the various machines necessary for mill operations (Exhibit 6-42).

Planked Roads and Walkways

Features identified as plank roads or planked surfaces generally consisted of multiple large dimensional timbers (from 4 inches by 8 inches [10 centimeters by 20 centimeters] to 4 inches by 12 inches [10 centimeters by 30 centimeters) lying parallel on the historical surface. Features were generally identified as planked roads if they had associated timbers running perpendicular to the direction of the planked surface, associated with structural support. Planked surfaces were often identified when these perpendicular boards were not found. Plank features were identified in 28 trenches [redacted]

- [redacted]

Pilings

Numerous pilings were found across Site AM-2. The pilings recorded during excavations had their ends oriented vertically, ranged from 10 to 16 inches (25 to 41 centimeters) in diameter [redacted] Generally, the tops of pilings would be bare wood, but a few were recorded as having cement or sheet metal covering the piling tops. The function of each individual piling discovered during the archaeological investigations was not determinable. The pilings locations overlap with the mapped locations of walkways, roads, wharves, and buildings. [redacted]

Railroads

Two sets of railroad tracks were located within the Anderson & Middleton site. The first set is associated with the Blagen Mill from the 1940s and includes a large log-moving crane adjacent to the primary mill complex. The tracks consist of seven north-south running rails comprising steel rails set in a 35-inch (89-centimeter) concrete footing [redacted] In total, seven steel tracks, perpendicular concrete footings, and rebar were exposed. The tracks are set approximately 6 foot, 6 inches (1.8 meters 15 centimeters) apart and in an eastern exposure of the feature next to the drainage ditch. Footings were approximately 12 inches (30 centimeters) thick, and concrete piers were located every 7 feet.

The second set of railroad tracks was discovered [redacted] there were two steel rails running parallel to each other with 5-foot (1.5-meter) spacing, oriented across the trench at a 70-degree/250-degee angle. A wood plank layer (the planks running parallel to the railroad tracks) covered the area beneath the two railroad tracks. Railroad ties were noted every 22 inches below the planked surface. [redacted] No other portions of this railroad line were located in any of the surrounding trenches.

Historic Resources Survey

The reconnaissance-level historic resources survey of the Anderson & Middleton Alternative identified 235 properties in this part of the APE, except for the 10 identified properties located on Hood Street. (This total includes 153 properties identified in the Aberdeen Log Yard Alternative part of the APE, which are discussed later in this chapter and are listed in Exhibits 6-84 and 6-85.)

The literature and records search revealed that David W. Harvey and Katheryn W. Krafft previously recorded 17 properties that are in this part of the APE in a 1987 historic resources survey conducted for the Washington State Department of Community Development, DAHP (Harvey and Krafft 1987). The 17 properties include the Northern Pacific Railroad Depot in Hoquiam at 719 8th Street in Hoquiam and 16 other properties (these are also located in the Aberdeen Log Yard Alternative part of the APE and are depicted on Exhibit 4-6). None of the previously surveyed properties were evaluated to determine their eligibility for listing in the NRHP as part of the prior survey effort.

Based on Grays Harbor County Tax Assessor data and field observations, the survey identified 57 properties in this part of the APE that are 45 years of age or older (Exhibit 6-43). Appendix E includes the inventory forms for these resources, and Exhibit 6-83 lists those in the Aberdeen Log Yard part of the APE except for properties located on Hood Street, for a total of 157 properties. All other resources in this part of the APE contain buildings and/or structures that have been determined to be less than 45 years old (Exhibits 6-47 and 6-48).

The 57 properties identified as being 45 years of age or older were evaluated to determine their eligibility for listing in the NRHP (Exhibit 6-45a, 6-45b, 6-45c, and 6-45d). Based on NRHP evaluation criteria (36 CFR 60.4), four of the identified properties appear to be individually NRHP-eligible. The eligible properties include the Northern Pacific Railroad Depot at 719 8th Street in Hoquiam, (built in 1899) and residential houses west of Aberdeen's central business district along the designated truck haul routes at 411 22nd Street, 201 South Washington Street, and 1101 West Wishkah Street. (The latter two properties are also located within the Aberdeen Log Yard Alternative part of the APE.) No other identified properties in this part of the APE are eligible for listing in the NRHP individually or as contributors to a potential historic district.

Other Values

Outside the boundaries of the Anderson & Middleton Alternative part of the APE, large beds of sweetgrass are known to grow in the area along the shoreline of Bowerman Basin, within the Grays Harbor National Wildlife Refuge. The largest and most accessible beds lie west of the Anderson & Middleton Alternative part of the APE, and smaller beds were identified within the APE along the designated truck haul route on Paulson Road.

Sweetgrass is one of the most important plant resources in Grays Harbor for native weavers from the Chehalis, Quinault, and other regional tribes. According to an ethnographic study prepared for the IDD No. 1 Project (James 2007), these existing beds could be the remnant of a much larger stand of these plants along the north shore of the harbor. Other plants traditionally important to weavers and found in Grays Harbor include cattail, swamp grass, and stinging nettle. None of the traditional plant resources identified in the APE are eligible for the NRHP.

Aberdeen Log Yard Alternative

Archaeological investigations and a historic resources inventory and evaluation were conducted for the Aberdeen Log Yard Alternative site. Geomorphological trenching and geological coring was completed before the archaeological trenching program to help assess the depositional environment and to develop the methods for the archaeological trenching program.

Initial Geomorphological Investigations

On December 15 through 17, 2008, ICF Jones & Stokes archaeologists excavated 12 trenches to expose stratigraphic profiles at the Aberdeen Log Yard Alternative (Exhibit 3-3). These stratigraphic profiles were examined for archaeological deposits and geomorphic information, which would indicate the presence of buried terrestrial sediments that could include large prehistoric village sites or cemeteries. The trenches ranged in length from 10 to 42 feet (3 to 12.8 meters) and were excavated to a depth of between 9 and 19 feet (2.7 and 5.8 meters); these dimensions were mostly dictated by the onsite conditions, including the location of obstructions such as log piles and other surface impediments, buried utility lines, and the water table.

Trenching was focused in the northern portion of the log yard because background research indicated the historical shoreline ran parallel to the railroad line to the north of the property. The southern portion of the log yard was under the Chehalis River until it was filled beginning in the 1920s through 1960s (Schneyder and Livingston 2009a). Landau Associates also collected geotechnical borehole samples at the central and southern areas of the Aberdeen Log Yard site and sampled and classified the materials from all trenches and boreholes (Settler et al. 2009a).

Results from interpreting the sedimentary profiles revealed in the trenches appear to be consistent with the geotechnical borehole analyses; both indicate that the geological history of the sediments underlying the historical fill does not include a significant terrestrial landform. However, correlation of the two subsurface deposit investigations is not detailed because the goals of the two analyses were significantly different, which led to different interpretations. The geotechnical borehole investigations were conducted for engineering purposes, to determine if pilings driven into the sediments would support the casting basins. The analysis looked at the deposits in terms of their structure but was not interpreted in terms of depositional environments.

The profile analysis did not identify any deposits that exhibited a clear weathering profile, with the exception of the surface stratum. A clear weathering profile would have indicated a stable surface on which a soil could develop. All strata exposed in the trench profiles—other than this surface stratum—are believed to owe their distinctive character to differences in depositional processes.

[redacted]

[redacted]

[redacted]

[redacted]

- [redacted]
- [redacted]
- [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Organic materials, such as those observed in the trench profiles, could have formed as a result of storms where logs, driftwood, and other flotsam could have blown ashore and formed microdepositional environments, which are floating or emergent vegetation (for instance reeds, marsh grasses, and/or algae and seaweeds) trapped behind windrows of flotsam and sediments quickly trapped in and on the vegetation. Profiles of such deposits can appear as variously thick and continuous layers of organics that range from intermixed sediments with fine organics, to thin laminae of fine organic materials and pockets of root mats, to distinct inclusions of pieces of wood (logs and driftwood, but no milled wood) and shell fragments. The size of these deposits can vary in thickness and areal extent, depending on factors such as the position along the shoreline when buried, a storm's duration and intensity, and the amount of material available to be blown ashore. Distinguishing the precise deposition process of the organic layers in these profiles would provide an excellent record of the area's storm cycles. Such an effort, however, would require numerous radiocarbon dates on the organics and a more precise analysis of sediment sizes and laminae orientation, which are beyond the scope of the current effort.

No paleosols or coseismically subsided landforms were identified in trench profiles. Also, no prehistoric archaeological sites or geological landforms where prehistoric sites could be preserved were found during the initial geomorphological investigations in 2008.

Historical period artifacts were found in two of the 12 [redacted] The historical artifacts were identified within the imported fill and do not represent an intact archaeological feature. Further, the artifacts are not in primary context and, thus, are not associated with a significant archaeological deposit. A few artifacts (glass bottles) can be dated based on manufacture methods and maker's marks, confirming fill was laid down in the early twentieth century. Materials possibly associated with the industrial and sawmill activities were found in five other trenches (Exhibit 6-46).

Profiles of these 12 trenches are also provided in the geotechnical analysis conducted by Landau Associates (Settler et al. 2009a), although matrix descriptions and interpretations differ from those provided in this document because of the differences in analysis goals. Overall, the focus of their investigation was to determine whether the landform would support pontoon construction.

[redacted]

Geological Investigations

Dr. James Phipps conducted a geological study of the Aberdeen Log Yard site to locate evidence of coseismic subsidence with particular focus on subsidence events that might have buried terrestrial surfaces. For this study, he excavated six boreholes. The investigation results indicate that the Aberdeen Log Yard site has been a tidal mudflat for the last 10,000 years and the depositional environment for glacial outwash before that; no evidence of terrestrial landforms from the late Pleistocence or Holocene was discovered. Appendix D presents the results of the coring program (Phipps 2009).

Archaeological Investigations

Systematic mechanical excavation was used to locate archaeological resources at the Aberdeen Log Yard site, and historical archaeological sites identified during systematic trenching were further investigated to establish integrity and significance. A grid consisting of 98-feet (30-meter) squares was used to lay out trench locations, and one trench was excavated within each 98-foot (30-meter) grid square (Exhibit 6-47 and 6-48).

Additional trenches were excavated to further explore and evaluate historical archaeological sites and to explore the lateral sediment distribution across the site.

In August and September 2009, 226 trenches were excavated at the Aberdeen Log Yard Alternative site (Exhibit 6-49). Of these, 223 were excavated as a part of the 98-foot (30-meter) grid trenching program, two were excavated to explore and evaluate historical archaeological sites, and one 150-foot-long trench (referred to as LT-1) was excavated to explore the lateral sediment distribution across the site. Trenches were commonly around 7 feet (2.1 meters) wide, between 20 and 25 feet (6 and 7.6 meters) long, and between 20 and 26 feet (6 and 7.9 meters) deep. A maximum depth of 28.5 feet (8.7 meters) was achieved in one trench. Records for Trench ALY-196 were lost when an excavator backed over a backpack containing these notes. Appendix G includes complete descriptions of the trenches, including size, stratigraphic descriptions, and findings. Exhibit 6-50 summarizes the trenches excavated.

Excavations were terminated before reaching the extent of the excavator arm in 37 trenches for several reasons, including continuous slumping of sidewalls causing trenches to infill, water inundation, impassible objects (e.g., concrete structures, large logs), and the presence of possible contaminants (e.g., creosote). Water inundation primarily occurred along the southern margin of the site, adjacent to Grays Harbor (Exhibit 6-51). Slumping sidewalls occurred most often in the northcentral and northeast portions of the property (Exhibit 6-52). Two trenches (ALY-14 and -114) had possible creosote contamination, resulting in their early termination. Naturally deposited sediments were identified in 122 of the remaining 186 trenches. The mean depth of the interface between naturally deposited sediments and historical fill was found at approximately 17.5 feet (5.3 meters) below surface. Historical features were identified in 28 trenches, some of which had multiple types of features (Exhibit 6-53). Pilings were the most commonly identified historical feature (found in 17 trenches, an example is shown in Exhibit 6-54). Planked surfaces were the second most commonly identified feature (found in nine trenches, Exhibits 6-55 through 6-61), and intact building foundations were identified in two trenches (ALY-84, 87).

Trench Discussion

The Aberdeen Log Yard Alternative site is located on filled land overlying mudflats, characterized by silts and fine sands with *in situ*, vertically oriented shellfish valves and interbeds of organics (e.g., twigs, moss, leaves, and needles). Unlike the very low-energy alluvium that characterizes the mudflats, the land added during the historical period is characterized by discreet fill events. Across the site, however, land was added using hydraulic filling, characterized by laminated sands and silts, overlying and/or including historical debris (Exhibit 6-57). In some areas, land was added by dumping and/or pushing imported and/or redeposited fill, characterized by sediments with a blocky texture, mixed debris, and/or mottles, following fractures in sediment structure (Exhibit 6-58). Throughout the property, a layer of mixed milled and unmilled wood fragments of variable thickness overlies fill sediments. The wood layer often acted as a conduit for groundwater because of its high level of permeability. As a result, groundwater would begin flowing into trenches once the wood layer was breached. Finally, angular pebbles and cobbles cover the surface of the log yard. The following profiles represent the log yard's sample stratigraphy (Exhibit 6-59 and 6-54).

While the profile of angular gravels, underlain by wood fragments, underlain by pushed and/or hydraulic fill, underlain by mudflat deposits was ubiquitous throughout the property, three distinct profiles were most commonly recorded. In the southeast portion of the property, trenches typically consisted of approximately 5 feet (1.5 meters) of angular pebbles and cobbles, underlain by mixed wood, silt, and gravels, grading to milled lumber and wood fragments at 10 feet (3 meters) below surface. Below this point—to the extent of the excavator arm's reach—ranging from 24 to 28.5 feet (7.3 to 8.7 meters) below surface, sediments consisted of blocky silt, silty clay, or clayey silt and were oftentimes mottled near the upper interface. Historical debris and wood fragments were occasionally identified in backfill deposits; naturally deposited sediments (mudflat deposits) were rarely reached. Trench ALY-30 (Exhibit 6-66) represents a typical profile from the southeast portion of the property.

In the northcentral and northeast portion of the property, trenches typically consisted of approximately 3 feet (0.9 meter) of angular gravel, underlain by sawdust with milled and unmilled wood fragments to around 5 feet (1.5 meters) below surface. Below this point, gray, coarse-grained sand, oftentimes laminated, was identified to around 10 (3 meters) feet below surface. The sand layer was very unstable and would often slough from the sidewalls into the trench. Trenches with sediments that continued to slough would be terminated before the sloughing undercut the monitors or the excavators. When sands were stable enough to excavate deeper, dark gray silt with laminae of sawdust, wood fragments, and middle wood was identified between 10 and 12 feet (3 to 3.6 meters) below surface. Trenches in this location often did not reach naturally deposited sediments.

Trench ALY-76 (Exhibit 6-67) represents a typical profile from the northcentral and northeast section.

On the west side of the property, trenches typically consisted of approximately 3 feet (0.9 meter) of angular gravel underlain by milled and unmilled wood with sawdust to around 5 feet (1.5 meters) below surface. Underlying the wood layer, to approximately 17 feet (5 meters) below surface, was gray, blocky, laminated silt with interbeds of dense organics. In many trenches, two distinct layers of *in situ* grass rhizomes were identified at around 10 and 15 feet (3 and 4.5 meters) below the surface. The presence of *in situ* grass rhizomes across the west side of the property suggests that at least two discrete filling events occurred, with enough time separating the events that grasses were able to colonize the newly formed surface. Naturally deposited sediments, defined by massive and laminated silt which grade into sandy silt with laminae of organics, were encountered at around 17 feet (5 meters) below surface. Interestingly, along the southwest corner of the site (the furthest point from the historical shoreline), naturally deposited sediments were encountered at a shallower depth (between 12 and 15 feet [3 and 3.5 meters] below surface) than any other location on site. Trench ALY-218 (Exhibit 6-68) represents a typical profile from the west section.

Trench ALY-LT1

A long trench, measuring 150 feet (46 meters) north to south, was excavated in the northwest portion of the property to explore the lateral sediment distribution across the log yard. Sediments encountered in this trench represented the typical trench profile on the west side of the project area (see above). In addition, the trench analysis revealed discrete filling episodes, ranging from 20 to 25 feet (6 to 7.6 meters) below surface, beginning in the northern portion of the property and extending south toward the existing shoreline (Exhibit 6-69). The fill sediment orientation suggests dumping events, followed by a scraping or land moving event.

Trench ALY-84

Excavation of Trench ALY-84, located in the southcentral portion of the log yard, revealed a large circular foundation with two parallel courses of bricks running across the surface (Exhibit 6-70). A horizontal opening, aligning with the space between the two brick courses, was located on the foundation’s west-northwest side (Exhibits 6-71 and 6-72). Fire-altered sediments were identified within the central depression of the foundation and in pockets around the exterior. In addition to fire-altered sediments, refuse metal was located along the outer margin of the foundation. Wood forms were still attached to the base of the outer margin of the foundation

(Exhibit 6-73). Further excavation just outside of the southernmost end of the foundation revealed a void underlying the structure, which had infilled with water. Numerous red bricks with mortar were found west of the structure and appeared to be the remnants of a wall that had been pushed over.

Trench ALY-87

Excavation of Trench ALY-87, also located in the southcentral portion of the log yard, revealed a fire and red brick-covered concrete foundation with two raised parallel concrete and mortar structures (Exhibits 6-74 and 6-75). A large square hole in the foundation, filled with light-colored sand, was located at the structure’s center; this sand was also located between the concrete and mortar structures. Numerous fire bricks were located above and around the concrete structure.

Trench ALY-224 and ALY-225

Excavation of additional exploratory and evaluative trenches (ALY-224 and -225) revealed that no additional intact foundations were located near ALY-84 and -87. Trench ALY-224 was excavated to determine whether the foundation of an engine room, located on the 1906 and 1928 Sanborn Fire Insurance maps, was intact. Numerous tile bricks and concrete rubble fragments were identified in this trench. Trench ALY-225 was excavated to determine whether a blacksmith shop, located on the 1906 and 1928 Sanborn Fire Insurance maps, was intact; however, no intact structural remains were found.

Trenches ALY-18, ALY-23, ALY-89, and ALY-141

Fifty-two culturally modified branches and split cedar were collected from trenches ALY-18, -23, -89, and -141 for analysis. These artifacts were located above the historical fill and naturally deposited sediment interface and did not align with other wood fragments recovered from the same depth. No subsurface stratigraphic variation—relative to other trenches—was observed in trenches that yielded stakes. Two stakes, from trenches ALY-23 and -141, were sent to Beta Analytic for radiocarbon analysis after being measured and photographed. Radiocarbon analysis revealed that both stakes are from the precontact period (Appendix H).

Trench Summary

As a result of the excavations at the Aberdeen Log Yard site, a large historical archaeological site was recorded (assigned temporary number ALY-1 pending trinomial). In addition, culturally modified stakes were recorded from four trenches (ALY-18, -23, -89, and -141) in disturbed context. The historical archaeological portion of the site consists of various pilings, planked features, concrete foundations, and structural remnants. These historical-period features were located during the initial trenching and then further exposed in order to further define and determine the site's NRHP eligibility.

Archaeological Site ALY-1

Mechanical excavation revealed the presence of historical-period features at the Aberdeen Log Yard Alternative site (Exhibit 6-76). As features were identified, their locations were mapped using GPS and documented on the appropriate field forms. The precise locations of rooms, buildings, and industrial features of the Hulbert Mill identified from the earliest Sanborn Fire Insurance maps were compared to the archaeological features identified and recorded in the field (Exhibit 6-76 and Exhibit 6-77). Overlays using modern aerial photographs, historical Sanborn Fire Insurance maps, and the GPS coordinates of the archaeological features confirmed that the archaeological features identified during the investigations were in fact the remains of the Hulbert Mill (originally the Hart-Wood Lumber Company, but commonly referred to as the Hulbert Mill) (Exhibit 6-78). The extent of these historically mapped structures and the archaeological features were used to define the site boundary for ALY-1 [redacted] Foundations from the refuse burner, boiler room, and engine room were identified during the archaeological investigations (recorded as Locus A). Associated mill features included planked roads, walkways, and pilings. Appendix I includes the complete site form for ALY-1.

Refuse Burner

A large circular foundation associated with the mill refuse burner was identified in Trench ALY-84 (Exhibits 6-70, 6-79, 6-80, and 6-81). The exposed areas of the burner feature cover a 12 by 28 feet (3.6 by 8.5 meters) area, with foundation thickness ranging from 2 to 2.5 feet (0.61 to 0.76 meters). Two parallel courses of fire bricks (1.5 feet [0.45 meters] high) extended 2 feet (0.61 meter) apart across the surface of the foundation (Exhibit 6-70); also, a horizontal opening, aligning with the space between the two brick courses, was located on the west-northwest side of the foundation (Exhibits 6-71 and 6-72). Wood forms, used to construct the concrete foundation, were still attached to the base of the foundation's outer margin (Exhibit 6-73). Further excavation just outside of the southernmost end of the foundation revealed a void underlying the structure, which had infilled with water. The void suggests that the refuse burner was originally built on pilings over the mudflat when the mudflat was filled; the void remained because the area beneath the refuse burner was inaccessible. Numerous red bricks with mortar, exposed in a 7-by-6-foot (2.1-by-1.8-meter) area, were found approximately 6 feet (1.8 meters) west of the structure and appeared to be the remnants of a wall that had been pushed over.

Refuse burners, known commonly as “wigwam burners” or “teepee burners,” were used to dispose of waste materials produced in the wood manufacturing industry. These conical burners were typically lined with fire brick and had a flared base that kept the flames away from the walls. Refuse burners were typically connected to a conveyor belt to transport the mill waste from the mill to be incinerated; the structure was topped with a screened cap. The passage of the Federal Clean Air Act of 1970 resulted in these types of burners being abandoned and subsequently demolished. These towering burners were once icons for lumber towns and sawmills and have been slowly disappearing from the industrial landscape of the American West.

Boiler Room

A substantial foundation associated with the mill boiler room was identified in Trench ALY-87 (Exhibits 6-74, 6-78, and 6-79). The foundation consisted of a brick-covered concrete foundation (both fire brick and standard brick) with two raised, parallel 3-foot-wide (0.9-meter-wide) concrete and mortar structures (6 feet apart) that functioned as “bays” (Exhibits 6-74 and 6-75). These bays extended the entire width of the 5.7-foot (1.7-meter) trench, but could be longer. Three bays were discovered during the archaeological investigations, and the 1906 Sanborn Fire Insurance map documents the three bays, indicating that three boilers operated at that time. By 1928, the Sanborn Fire Insurance map indicates that the boiler room had been expanded and an additional two bays were constructed, for a total of five boilers. A large, square hole (5 feet by 5.7 feet [1.5 by 1.7 meters]) in the foundation was located at the structure’s center. Numerous isolated fire bricks were located above and around the concrete structure. The boiler room foundation was constructed with both fire brick and standard brick, possibly indicating that fire brick was likely the preferred construction material but sometimes substituted with standard bricks. The fire bricks also could have been left over from previous construction and were used because they were readily available for the boiler room. Because the boiler room would have been highly flammable, it would have been logical to construct the room out of fire bricks.

Evidence that a cylindrical boiler was used at the Hulbert Mill is limited and primarily circumstantial. Cylindrical boilers are housed on top of a boiler platform with an adjacent external flue. Evidence from Trench ALY-87 indicates that a depression adjacent to the concrete bay suggests a flue at the end of the boiler platform.

Boilers produced the steam necessary to run an engine. A fire was maintained under the boiler and was directed around the outside of the boiler by a series of flues to increase the surface area exposed to the heat. Steam was transferred to the engine room via a series of pipes. Water-filled boilers were too heavy and would have created too much of a fire hazard to be located on a wooden floors. As a result, bases for boilers were constructed of brick and concrete. Typically, fire bricks were used to line the firebox, and red bricks were used to help provide a tight seal around the boiler's cast-iron doors and faceplate (Praetzellis and Praetzellis 1993).

Engine Room

Engine room remnants were identified in Trench ALY-224 (Exhibit 6-78). Specifically, numerous tile bricks and concrete rubble fragments were discovered; however, the engine room appears to have been largely demolished. The presence of thin, brick tile fragments and sections of what appears to have been a brick-tiled wall confirm the information on the Sanborn Fire Insurance map that the engine room was tiled (Exhibit 6-78). During mill operations, the engine room housed a steam-powered engineer (or engines) to run the various machines necessary for mill operations. Engines rooms were highly flammable and tiled walls helped to contain fires from spreading if a spark or fire were ignited.

Planked Roads and Walkways

Features identified as plank roads or planked surfaces generally consisted of multiple large-dimensional timbers (from 4 inches by 8 inches [10 centimeters by 20 centimeters] to 4 inches by 12 inches [10 centimeters by 30 centimeters]) lying parallel on the historical surface. Features were generally identified as planked roads if they had associated timbers running perpendicular to the direction of the plank surface, associated with structural support. A planked surface found in Trench ALY-3 was built with 1-foot-wide lumber ranging from 5 to10 feet in length. A planked road discovered in Trench ALY-79 was constructed with 2-by-12-inch (5-by-30-centimeter) planks (unknown length) and supported by underlying crossbeams (14 inches by 7 inches [36 by 18 centimeters] and unknown length) (Exhibit 6-53). Planks in Trench ALY-89 measure 3 inches by 9 inches by 8 inches (7.6 centimeters by 23 centimeters by 20 centimeters) (Exhibit 6-82).

Pilings

Across Trench ALY-1 numerous pilings were found (Exhibit 6-82), consisting of vertical wooden posts that were used as structural supports for roadways, walkways, buildings, wharves, and piers. The function of each individual piling discovered during the archaeological investigations was not determinable. The locations of the pilings overlap with the mapped locations of walkways, roads, wharves, and buildings. One piling pulled out of Trench ALY-40 was 28 feet (8.5 meters) long. Several pilings were exposed only when the trench walls caved in (ALY-77, -78, and ALY-89). Many pilings had an average diameter of 16 inches (40.64 centimeters).

Refuse Concentration

[redacted] a discrete deposit of historical artifacts was observed [redacted] The encompassing matrix was identified as gray, clayey silt with a mixture of organics. This deposit was imbedded between two layers of milled lumber, mulch, sawdust, and log pieces (Figures 9 and 10).

A total of 36 ceramic fragments were identified and collected. Earthenware was the most common ceramic type (24), with 10 porcelain fragments (likely tea cups and saucer fragments) and 2 terra-cotta flower pot fragments. The earthenware ceramics were predominantly fragments from six bowls, a chamber pot, and two saucers.

A total of 21 whole and fragmentary glass bottles (12 complete bottles, 2 canning liners, and 7 bottle portions) were also identified in this refuse deposit. Medicine bottles, toiletry items, condiments, and canning materials were represented. Only one alcohol bottle and two soda bottles were identified. Personal and domestic functional categories were represented, particularly health and grooming and food preparation or storage. Two 1930s bleach bottles were also discovered.

The refuse deposit is likely the result of a single refuse disposal event. The refuse appears to have been intentionally disposed into an undeveloped area adjacent to the elevated planked road. This area of the site had not been entirely reclaimed until the 1950s. The refuse concentration comprises almost entirely of domestic and personal artifacts that were deposited sometime after the 1930s and before the 1950s. Archaeological investigations discovered isolated domestic and personal artifacts within fill layers; however, this artifacts concentration [redacted] is the only nonindustrial archaeological concentration identified.

Map Disclaimer

A mapping error was identified on the 1906 Sanborn Fire Insurance map. Trenches that contained specific archaeological features—such as the boiler room and refuse burner—aligned with their respective locations on the 1928 Sanborn Fire Insurance map (Sanborn Fire Insurance Company 1928). When overlaid onto the 1906 map, however, trench locations for ALY-84 and -87 did not align with the locations of the refuse burner and boiler room (Exhibit 6-83). Trench ALY-84, where the refuse burner was located, appeared to be 150 feet (46 meters) southwest of the 1928 mapped location of the refuse burner (Exhibit 6-83). The locations of the refuse burner and boiler room have likely not been altered since they were originally constructed and were likely expanded in place to accommodate increased production. Sanborn Fire Insurance maps often have inaccuracies and should be viewed more as a guide. Archaeological investigations and mapping technology have allowed us to reinterpret the 1906 Sanborn Fire Insurance map in light of our archaeology interpretations.

Historic Resources Survey

The reconnaissance-level historic resources survey of the Aberdeen Log Yard Alternative part of the APE identified 153 properties. Of these, 16 properties were previously recorded in a 1987 historic resources survey conducted by David W. Harvey and Katheryn W. Krafft for the Washington State Department of Community Development, DAHP (Harvey and Krafft 1987) (Exhibit 4-6). None of the previously surveyed properties were evaluated to determine their NRHP eligibility as part of the prior survey effort. All 153 identified properties—except for the ten properties located on Hood Street—also fall within the Anderson & Middleton Alternative part of the APE.

Based on Grays Harbor County Tax Assessor data and observations in the field, 104 resources were identified in this part of the APE that are 45 years of age or older (Exhibit 6-84); Appendix E includes the inventory forms for these resources. All other resources in this part of the APE contain buildings and/or structures that have been determined to be less than 45 years old (Exhibit 6-85).

The 104 properties identified as being 45 years of age or older were evaluated to determine their NRHP eligibility (Exhibit 6-86). Based on NRHP criteria for evaluation (36 CFR 60.4), two identified properties in this part of the APE appear to be individually NRHP eligible. The single-family residences at 201 South Washington Street and 1101 West Wishkah Street are considered eligible for NRHP listing under Criterion C as highly intact examples of residential architecture from the 1900s through the 1920s, which remain in the neighborhood west of Aberdeen's central business district. These two properties are also within the Anderson & Middleton Alternative part of the APE. No other identified properties in the Aberdeen Log Yard Alternative part of the APE are eligible for NRHP listing individually or as contributors to a potential historic district.

Pontoon Moorage Area

No known historic properties have been identified in the proposed pontoon moorage area.

7. Analysis

This chapter presents the analysis of the results presented in Chapter 6, specific to the stratigraphy identified in the archaeological trenches and the precontact artifacts recovered from the Aberdeen Log Yard and Anderson & Middleton Alternative sites. The environmental and artifact analysis are necessary for assessing the significance of the archaeological sites identified in the APE and the overall archaeological sensitivity of the Grays Harbor build alternative sites.

Environmental Analysis

The long-term environmental conditions at both the Aberdeen Log Yard Alternative site and the Anderson & Middleton Alternative site are very similar. Prior to 10,000 radiocarbon years before present (RCYBP), coarse-grained sediments (sands and gravels) associated with the large volumes of glacial meltwater draining through the Chehalis River, were deposited at both sites (Phipps 2009). As the volume of water flowing through the Chehalis River decreased and rising sea levels flooded the lower Chehalis River Valley, an estuary was formed. Over the next 10,000 years, until anthropogenic land alteration occurred to both sites in the late 1800s, fine sediments (silts and fine sands) were deposited at both sites, forming tidal mudflats. The presence of tidal mudflats indicates a low-energy, tidal influenced alluvial environment. The tideflats at both Sites vacillated between supratideflats (located above the high tide line), indicated by an increased organic content associated with developing salt and low marshes, and intertideflats, which have little to no peat content (Phipps 2009; Reading and Collinson 1996). The presence of sand indicates that flow velocity, gradient, and/or elevation relative to mean sea level was sufficient to sustain bed, as well as suspended, load (Reading and Collinson 1996).

[redacted]

[redacted]

An interbed of organics, including alder and cedar leaf, moss, detrital wood, and shell fragments, was located across the Aberdeen Log Yard site in areas where naturally deposited sediment was recorded, within a few feet of the recorded historical fill and naturally deposited sediment interface. Cross-site radiocarbon analysis of wood and organics from this interbed at the Aberdeen Log Yard site revealed a wide range of dates, from 230 +/-40 YBP (Beta-267596) to 1,970 +/- 40 YBP (Beta-267601). This, combined with Phipps' (2009) observed discontinuity from 3,000 YBP to present, might suggest a very low-energy fluvial environment with minimal suspended-sediment load between 3,000 YBP and the present. Examples of this kind of landform include an embayment formed by an abandoned stream channel or a lagoon.

Sediments at the Anderson & Middleton site were fairly uniform, becoming uniformly sandier with depth. The property's proximity to the Hoquiam River likely accounts for the increased stream velocity necessary for depositing fine sands. A pair of radiocarbon samples was collected from just below the historical fill and naturally deposited sediment interface at the Anderson & Middleton site. Of these samples, one—consisting of organic sediments—was dated to 2,110 +/- 40 YBP (Beta-267627), while the other—consisting of a shell fragment—was dated to 1,340 +/- 40 YBP (Beta-267628). The antiquity of sediments very close to the historical fill and naturally deposited sediment interface might, like at the Aberdeen Log Yard site, indicate very low-energy fluvial environment with minimal suspended-sediment bed load between around 2,000 YBP and the present.

Precontact Artifact Analysis

Anderson & Middleton Alternative

[redacted] archaeologists were often able to determine general feature alignment using the location and orientation within the excavator bucket from which it was identified. Stake-spacing was identified often since it was not disturbed through excavation. Stake-spacing ranged from multiple stakes tightly packed together (Exhibit 7-5), to semiregular 2-inch (5-centimeter) intervals (Exhibit 7-6).

A total of 486 wood stakes, including associated branches and bark, were collected from nine trenches at the Anderson & Middleton Alternative site. Unfortunately, provenience was not recorded for one box of stakes, and it is unknown if these came from one of the known trenches or a tenth trench (Exhibit 6-14). Trench records, however, indicated that stakes were collected from only nine trenches.

Twenty-four wood stakes were collected from nine trenches and submitted to Beta Analytic for radiocarbon analysis (Appendix H presents the complete analysis report). Since only portions of stake alignments were exposed during the trenching program—resulting in a lack of information relating to the extent and shape of identified features—the trench from which stake alignments were identified became the organizational unit for this study.

Bark fragments and branches were selected over split cedar, when possible, to avoid the "old wood" problem (Schiffer 1972). As trees grow and develop additional rings, the older rings stop getting nutrients, resulting in a halt to the transport of new carbon to these rings. With a particularly old tree, however, if the heartwood and outermost rings of a tree were radiocarbon dated, then two different dates would emerge. Five pieces of bark or branches were selected for radiocarbon analysis from four trenches. Exhibit 7-7 summarizes the radiocarbon results.

Across the site, adjusted radiocarbon ages ranged from around 220 YBP to around 1,220 YBP. [redacted] Unfortunately, without knowing the shape and size of the stake alignments, whether the stakes collected from the various trenches represent a single or multiple features was not determinable. Based on the presence of multiple fish alignments at archaeological site 45GH73 [redacted] however, the stakes collected from various trenches likely represent multiple fish weir features (Exhibit 5-1). Either way, a radiocarbon date analyses indicate that the older alignments or alignment sections are located closer to shoreline than younger alignments (Exhibit 7-8); this pattern contrasts with the observed pattern at 45GH73 (Schalk and Burtchard 2001) [redacted]

Environmental factors that could account for the pattern of fish weir features becoming younger further away from shore include sediment deposition and coastal uplift. The Anderson & Middleton Alternative site likely receives a steady supply of sediment, given that it is located close to and downriver of the Hoquiam River's interface with Grays Harbor. Over time, the sediment deposition along the Anderson & Middleton site would increase the amount of surface area that could be used to trap fish. Coastal uplift, caused by the interseismic strain generated by the subduction of the Juan De Fuca plate under the North American plate, could also increase the amount of usable surface area by exposing mudflats that were once too far below sea level to access. Coastal uplift rates range between 0.2 and 0.9 meters per thousand years along the Pacific Northwest coast (Kelsey and Brockheim 1994). While this rate of coastal uplift would not likely make deep underwater surfaces accessible, the combination of these processes could make some newly accessible land. There also could, however, simply be no geomorphologic pattern to fish weir locations within the Anderson & Middleton site, especially given the opposing age distribution patterns found at two sites in close proximity. Fish weir locations might represent cultural and familial land associations, repair work, or simply available unused space.

Of the 486 stakes collected at the Anderson & Middleton site, 102 exhibited some kind of cultural modification (Exhibits 7-9 and 7-10). Individual stakes ranged from 1.5 to 57.7 centimeters in length with a mean length of 7.8 inches (19.93 centimeters). Widths ranged from 0.2 to 3 inches (0.6 to 7.4 centimeters), with a mean width of 2.8 centimeters. Stake thickness ranged from 0.04 to 2 inches (0.1 to 5.1 centimeters), with a mean thickness of 0.6 inches (1.6 centimeters).

By far, the most frequently identified cultural modification was the presence of wedge marks on cedar stakes (n=65; Exhibit 7-11). If all modification marks associated with the use of a wedge are counted, then 70 of all identified modification marks resulted from using a wedge. This is an expected outcome, given that the most collected stakes are split cedar, which requires using a wedge tool to construct the stake.

Most collected stakes had no discernable cultural modification at either end; this lack of discernable modification could have resulted from the process by which fish weir stakes were made or from the excavation methods used. For example, if stake construction is an expedient process, then branches could be segmented by simply breaking the limb, leaving no clear indication of human modification. In addition, trench excavation methods consisted of excavating in 6-inch (15-centimeter) lifts, when possible. Using this excavation method, stakes were likely fragmented into multiple smaller pieces after deposition, increasing the number of stakes with no discernable cultural modification. Of stakes that had a discernable end modification, the most commonly identified cultural modification to the end of a stake was a “cut,” resulting in a flat end perpendicular to the length of the stake (n=14; Exhibit 7-12). Pointed or rounded stakes were less prevalent (n=4; Exhibits 7-12 and 7-13).

Three stakes had multiple types of cultural modification, all of which were cut, and had a cut end. Fourteen stakes had been modified along the length or shaft. Cut marks were the most common type of shaft modification (n=9), followed by notching (n=2). During analysis, there was no clear indication of metal tool use on any stakes.

Aberdeen Log Yard Alternative

Culturally modified branches and split cedar were identified in trenches ALY-18, -23, -89, and -141. Branches located in ALY-23, -89, and -141 were located above the historical fill and naturally deposited sediment interface and did not align with other wood fragments recovered from the same depth. Multiple wood fragments were recovered from Trench ALY-23 in addition to the culturally modified branch. These wood fragments, however, exhibited no clear cultural modification or association with the culturally modified branch. The two clearly culturally modified stakes from ALY-23 (Exhibit 7-11) and ALY-141 (Exhibit 7-13) were measured, photographed, and then sent to Beta Analytic for radiocarbon analysis. Analysis of the stake from ALY-23 (Beta-267595) yielded a calibrated radiocarbon date of 660 +/- 40 YBP, while analysis of the stake from ALY-141 (Beta-267597) yielded a calibrated radiocarbon date of 470 +/- 40 YBP. In all three cases, the branches did not indicate intact orientation or association with other clearly culturally modified wood pieces; further, they were located within fill deposits.

[redacted]

Of the 51 branches collected, 20 exhibited some kind of cultural modification (Exhibit 7-14). The most frequently identified cultural modification was the presence of wedge marks (n=13, 65 percent). Additional cultural modifications included cuts (n=2), notches (n=1), end cuts (n=1), and pointed ends (n=3).

Individual stakes ranged from 0.6 to 14.7 inches (1.5 to 37.4 centimeters) in length, with a mean length of 6.19 inches (15.73 centimeters). Widths ranged from 0.3 to 2.2 inches (0.8 to 5.7 centimeters), with a mean width of 0.9 inches (2.4 centimeters). Stake thickness ranged from 0.1 to 1.5 inches (0.3 to 3.7 centimeters), with a mean thickness of 0.5 inches (1.3 centimeters).

Eight samples were submitted to Beta Analytic for radiocarbon analysis (Exhibit 7-15). These samples were selected to either represent the fish weir elements from primary context or to clarify stratigraphic associations and secondary context elements from the Aberdeen Log Yard Alternative site.

Notably, because the culturally modified stakes identified at the Aberdeen Log Yard Alternative site were found in disturbed historical and modern layers and not found in primary context, the stakes were not considered or recorded as an intact archaeological site. Consequently, no NRHP eligibility assessment is necessary.

8. NRHP Eligibility Assessment

The NRHP recognizes properties that are significant at the national, state, and local levels. According to the NRHP, the quality of significance in American history, architecture, archaeology, engineering, and culture exists in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, meet one or more of the four criteria listed below, and retain physical integrity. In addition, unless a property possesses exceptional significance, it must also have attained an age of at least 50 years old to be considered eligible for NRHP listing. A building or site can be considered for inclusion in the NRHP if it meets at least one of the following criteria:

A. The property is associated with events that have made a significant contribution to the broad patterns of our history.

B. The property is associated with the lives of persons significant in our past.

C. The property embodies the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components might lack individual distinction.

D. The property has yielded, or might be likely to yield, information important in prehistory or history.

The NRHP specifies seven additional criteria—Considerations A through G—that provide special requirements for determining the eligibility of special property types. Ordinarily, the following are not considered eligible for the NRHP, unless they satisfy certain conditions:

- Properties owned by religious institutions or used for religious purposes
- Structures that have been moved from their original locations
- Birthplaces or graves of historical figures
- Cemeteries
- Reconstructed historic buildings
- Properties primarily commemorative in nature

- Properties that have achieved significance within the past 50 years

Historic districts must meet the same criteria as individually eligible properties. Historic districts are defined as those areas that contain a significant concentration, linkage, or continuity of sites, buildings, structures, or objects that form a unified entity, historically or aesthetically, by plan or physical development. The interrelationships of the resources that contribute to a historic district form the basis of a district's historical significance.

For both individually eligible properties and historic districts, evaluating the integrity according to the NRHP is grounded in an understanding of a property's or district's physical features and how these features relate to its historical significance. By retaining key, character-defining features, the significance of a resource is conveyed. The NRHP recognizes seven aspects or qualities that, in various combinations, define the integrity of a property.

Historic-era properties might be found eligible for the NRHP under any of the four criteria listed previously (A through D), but precontact archaeological sites are usually evaluated solely in terms of Criterion D. To provide an analytical framework in which a property's significance can be evaluated for information value, a context—a broad pattern of historical development—must be developed that includes topical research questions and addresses issues regarding the site's integrity and the potential of subsurface deposits to exist. A site eligible under Criterion D must have the potential to yield the following:

> *Important information about some aspect of prehistory or history, including events, processes, institutions, design, construction, settlement, migration, ideals, beliefs, lifeways, and other facets of the development or maintenance of cultural systems…Any consideration of a property's eligibility under Criterion D must address (1) whether the property has information to contribute to our understanding of history or prehistory and (2) whether that information is important* (National Park Service 1982:28).

Archaeological sites with assemblages that include numerous tools, features, ground stone, and living structures are most likely to address numerous research issues, but other attributes of a site might also be considered. All sites have been affected by postuse processes, the severity of which are often most severe on the oldest sites. If the site, however, retains enough integrity that its relative age and some indication of the kinds of activities that occurred at the site can be ascertained, then the site is generally considered to have adequate integrity to be evaluated further in terms of the kinds of data it can provide that would be useful in addressing one or more relevant research questions.

Integrity refers to a property's ability to convey its significance. In other words, a historic property must have enough intact physical characteristics or features to communicate its significance under one or more of the NRHP criteria. NRHP guidelines recognize seven aspects, or qualities, that define integrity. The Secretary of the Interior defines these aspects as follows:

- Location: Involves the site location where the resource was originally constructed
- Design: Includes the form, plan, and style of a property;
- Setting: Comprises the physical surroundings of a property
- Materials. The physical components used in the property's construction
- Workmanship: The evidence of the craftsmanship or ability of a culture
- Feeling: The property's ability to express a sense of time
- Association: The "direct link" evident between the property and an important event or person

CTC Facility

Historic Resources Evaluations

Research and fieldwork investigations indicate that two historic properties are located at the CTC facility part of the APE for both build alternatives (Chapter 6): Fire Station 15 at 3510 East 11th Street in Tacoma (already listed in the NRHP) and elements of the CTC facility located at 1123 Port of Tacoma Road (which are considered NRHP eligible as a historic district). The NRHP-eligible elements of the CTC facility include the administrative building, two research and development laboratory buildings, and the structural plant. The Hylebos Bridge, which was built in 1939, is not NRHP eligible but has been determined eligible for the WHR, making it a significant cultural resource at the state level.

CTC Facility, 1123 Port of Tacoma Road, Tacoma

The buildings and structures that comprise the CTC facility at 1123 Port of Tacoma Road at the Port of Tacoma were evaluated at a reconnaissance level during the historic resources survey of the CTC part of the APE. The facility's contributing elements include the administrative building, two research and development laboratory buildings, and the structural plant.

Administrative Building

The two-story administrative building was constructed circa 1956—based on its appearance in aerial photographs in the collections of the Tacoma Public Library—and was designed by Robert B. Price, a well-known Tacoma architect. The building's integrity is fair due to possible alterations to the existing fenestration, including the full-height, mirror-glass curtain wall at the south elevation.

Research and Development Laboratory Buildings

The two research and development laboratory buildings—one is one-story and the other two—were constructed in 1951, based on historical information and their appearance in aerial photographs in the collections of the Tacoma Public Library. The buildings appear to be essentially unaltered.

Structural Plant

Our investigation determined that the structural plant was constructed in 1956 through 1960, based on historical information and its appearance in aerial photographs in the collections of the Tacoma Public Library. Some of the plant's fenestration has been modified and several small additions added, but overall it appears to have good integrity.

Historical Context

The CTC facility is recognized as being historically significant for having pioneered the development of the prestressed concrete industry in the United States. After serving in World War II, where he directed testing of a prototype of the United State's first prestressed concrete bridge (the Walnut Lane Bridge in Philadelphia), Arthur R. Anderson and his brother Thomas Anderson moved back to Tacoma and founded CTC and ABAM Engineers. The brothers, both engineers with degrees from the Massachusetts Institute of Technology, established the company's initial production facility in 1951 at the Port of Tacoma. The initial production facility appears to have consisted of what are now one of the research buildings and an adjacent two-story building immediately to the south.

Prestressed concrete was a new technology in the United States, and the Andersons' Tacoma facility was the country's first prestressing factory plant. According to the company's website, the modest four-employee company was the culmination of a yearlong investigation by the Andersons throughout Europe to see the few prestressed concrete structures in existence at that time.

The Andersons developed and promoted the technology of prestressed elements for construction throughout the 1950s and 1960s. The company invented and marketed the Anderson Posttensioning System, developed a family of bridge I-girders that was adopted by WSDOT as a construction standard, and devised new methods for producing long-hollow concrete members and segmental bridge construction, among other innovations. CTC's success led to growth in sales and demand and the company's involvement in many significant, large capital improvement projects in the Pacific Northwest and across the country.

This success resulted in the expansion of the company's facilities at the Port of Tacoma. The original production facility, which is now the research and development laboratory, was constructed in 1951. The company's expansion in the 1950s included constructing two office and administrative buildings circa 1956 and completing the main structural plant between 1956 and 1960. CTC added a second major production building to its Port of Tacoma facility in 1967 to accommodate the rising demand for precast building elements. Production expansion in the 1970s included adding facilities for semiautomated casting of hollow-core slabs and constructing the existing 150-foot by 500-foot graving dock used to construct floating concrete structures.

Thousands of bridges, buildings, piers, tanks, floats, and other structures throughout the Pacific Northwest and Alaska, in addition to other projects throughout the United States, have been constructed with CTC products. The company manufactured structural members for the original Seattle monorail, the Disney World monorail, the Interstate 90 lid, Freeway Park in Seattle, as well as many other freeway overpasses in the region. The facility was also involved in casting beams for Safeco Field and Husky Stadium. The company now focuses on beams and pilings.

Significance Conclusion

The property was evaluated according to the eligibility criteria for listing in the NRHP and appears eligible as a historic district under Criteria A and C at the local level of significance and possibly at the state or national levels as well. Under NRHP Criterion A, the property is considered historically significant for its association with CTC and its pioneering role in developing the prestressed concrete industry in the United States. Under NRHP Criterion C, the property embodies the characteristics and construction method of a prestressed concrete industrial plant from the early 1950s and is recognized as being the first of its kind in the United States.

Anderson & Middleton Alternative

Archaeological Resources Evaluations

Archaeological Site AM-1

Archaeological Site AM-1 was evaluated to determine its eligibility for listing in the NRHP under Criterion D. To determine the appropriate measures for avoiding or mitigating potential damage to AM-1, the site's scientific and cultural significance were assessed. Information about the site obtained through background research for this study and from the archaeological investigations can be used to determine whether AM-1 is eligible for listing on the NRHP.

The discussion presented below assesses the prehistoric resources identified in the Anderson & Middleton Alternative site from a viewpoint of the themes identified in the research design in Chapter 5. Specifically, these themes are fish weir chronology; geographic distribution; social organization; and site formation. The discussion is organized into four separate topic sections that address each research theme.

Chronology

With regard to the chronological research questions, the prehistoric feature identified during these investigations was amenable to radiocarbon dating, and 35 samples were submitted to Beta Analytic for analysis. Overall, samples were selected to either represent the fish weir elements from primary context or to clarify stratigraphic associations and secondary context elements; these analysis results are summarized in Exhibit 8-1 below.

As can be seen in the table above, a relatively wide date range was returned for the archaeologically recovered fish weir elements at the Anderson & Middleton Alternative site. Specifically for cedar stakes, these dates ranged from approximately 650 to 1,220 years in age; given the "old wood" problem noted for cedar (i.e., multiple dates possible from within the same tree), these dates might not accurately represent the weir's initial construction time but nevertheless place it securely within the time period referred to as "precontact."

These data also indicated that the fish weir was most likely constructed and/or repaired over a period of time and, therefore, represents its long-term use in this location. Given the multiple and disparate dates, this feature was likely constructed and maintained for upwards of a millennia before the time of Euro-American contact in the Pacific Northwest. Unfortunately, without a more representative sample of weir elements for dating and a wider exposure of the feature for sampling, precise statistical analysis of the date of this feature was not possible at this time. However, the overall date ranges expressed by this analysis fit well with the radiocarbon dating of the Newskah Creek site (45GH73), which had a date range from four stake samples of between 600 and 1,000 years in age. In any case, our study has more than quadrupled the number of dated elements from the Grays Harbor area.

Geographic Distribution

The prehistoric resource identified at the Anderson & Middleton Alternative site likely represents a tidal fish weir, given its context and alignment; that is, this resource likely served as a passive restraint for aquatic resources to have been trapped by the outflow of tidal waters. In this regard, Archaeological Site AM-1 appears very similar to the Newskah Creek site (45GH73) and fits well within the observable variation of such sites on the Washington coastline. Unlike the northern area of the Pacific Northwest, where stone alignments are most commonly found, no portion of this exposed feature contained any stone elements. And, in contrast with the fish weirs identified on the southern Pacific Northwest coast, this site evidently comprised mostly cedar stake elements and had very limited (if any) noncedar portions in its construction. As well, no evidence was uncovered to suggest that any woven or tied elements were part of the overall feature, although these could have been removed aboriginally or been subject to a lack of preservation. Given the excellent preservation of the cedar elements, associated bark, and other organics near the feature, it is unlikely that stone elements were part of this feature in prehistory.

An important consideration in all fish weir analysis is the nature of the resource. Most of these features were assumed to be used to collect large numbers of spawning salmon and that they were communally operated during these runs to handle the episodic volume of fish. Recent research in Oregon (Byram 2002), however, has suggested that a wide variety of resources were collected at some fish weirs, especially the tidal variants, and that these resources could have been effectively collected year round by a limited number of local residents working the weir. In the case of the fish weir identified at Anderson & Middleton Alternative site, its location on a former tidal mudflat and its association with likely low-energy hydraulic flows over time suggests that this example could have been operated to collect a variety of prey species over the course of the year. Currently, the number and variety of fish and shellfish available at this location within Grays Harbor would potentially support an interpretation of a resident species-based tidal weir. Also, considering that the relative salinity regime of this portion of the harbor has likely changed over time due to increased runoff from Euro-American forest clearing, the native species' range could have been altered; however, this change unlikely severely limited the potential for multiple species procurement at this location.

In a general comparison to the Newskah Creek site (45GH73) [redacted] the AM-1 fish weir setting and potential layout appears to be very similar. While limited portions of the total alignment were exposed in our mechanical excavations, sufficient orientation information was recovered to suggest that a series of alignments exist at AM-1, with some running roughly parallel to the shore while others perpendicular to the main channel. Unfortunately, without further exposure and mapping fully reconstructing the prehistoric fish weir alignment and determining its full function is not possible at the Anderson & Middleton site. Given the relatively long time frame suggested by the radiocarbon dates, however, this feature was evidently in place and operating at this location for a considerable portion of late prehistory in Grays Harbor.

Social Organization and Resource Intensification

Prehistoric fish weirs are commonly assumed to have been large-scale cooperative efforts that required the participation of large groups of people and a complex level of social organization. However, a growing body of research suggests that this might not be the case (Byram 2002). In some ethnographic examples from the region—and according to ethnohistoric accounts—many weirs were constructed by limited numbers of individuals and access was open to all in the nearby community (see the ethnography section in Chapter 2 and Appendix C). Although the construction of the stream variant of fish weirs, where anadromous fish are blocked from moving upstream, might have been a large group activity requiring complexity, stratification, or specialization, tidal fish weirs (such as the example identified at the Anderson & Middleton site) evidently did not require much in the way of personnel or direction to procure resources. Therefore, from the available evidence at AM-1, very little can be discerned regarding the level of social complexity required to operate the fish weir. Further supporting evidence for this complexity would necessarily be required from other sources—most notably, nearby village sites (which have not yet been identified archaeologically). From ethnohistoric accounts, there were several villages in the Grays Harbor area, and one was reported on the far shore of the Chehalis River across from AM-1, as well as one in the Hoquiam vicinity, so there was likely a sufficient population to support a level of social complexity. Despite this evidence, the relationship between any specific village and the fish weir site remains unclear.

The construction and use of AM-1 would certainly support the common definition of resource intensification, which includes technological investments clearly represented by the prehistoric fish weir. Although constructing and operating this feature would not necessarily have required a large number of people, it would have very likely provided a larger marine resource return than would be expected from other individual procurement efforts. As a result, its very nature is evidence of resource intensification. The total numbers and various species that could have been collected from this feature over a given season or year is not currently known, but its size and location would suggest some considerable return on investment.

Site Formation

Questions regarding formation processes and site preservation are perhaps the most paramount issues identified during this investigation. The nature of local intertidal mudflats is not currently well understood, let alone the nature of cultural features placed upon such a landscape. Dual processes of erosion (removal) and sedimentation (accumulation) account for the development of the tideflats, and this dynamic was very likely highly localized by channelization, runoff, vegetation development, and human actions. The specific geomorphic processes that led to the development of a 'native' tideflat environment is not entirely clear at present, but this surface had evidently stabilized by at least 3,000 YBP. This date is necessarily approximate, but evidence from radiocarbon dating suggests that the fish weir was constructed after sea levels had risen to near modern elevations. Furthermore, excavated trenches at both build alternative sites identified and recorded the interface level between this natural landscape and the beginnings of historic-period fill events (Exhibits 7-1 through 7-4). Although significant historical deposition and disturbance at the site location occurred throughout the twentieth century due to the activities of the sawmill, the prehistoric feature was surprisingly well preserved, suggesting that limited actual ground disturbance occurred that would have affected the fish weir; alternatively, capping the feature by a large amount of fill materials likely led to its relatively good state of preservation. Certainly some portions of the prehistoric fish weir were impacted by the historical development of the sawmill industrial complex, most notably in the central portion of the Anderson & Middleton site where excavation recovered no evidence of the fish weir. However, to the east and west of this portion of the property, the fish weir was apparently still intact and remained in its original alignment. The full extent of this alignment is not currently known, given the feature's limited exposure, but some portions of the weir were likely affected by erosion and channel-cutting that most likely occurred across the tideflat over its long history.

Most notably, while most researchers refer to prehistoric and historical depositional processes as if they were distinctly different, our experience indicates that once the historic sawmill was developed, much of the same natural landscape development continued to occur; sedimentation, erosion, channel cutting, and initial vegetative growth all were observed in the sawmill's excavated sediments and historical photographs (see Exhibits 2-6, 2-8, 2-10, 2-13, and 2-15). In any case, our research has shown that many processes that were thought to be 'stabilizing' such as natural tidal action—were actually potentially destructive to the prehistoric feature (via erosion and scouring); conversely, other processes, such as historical filling events, were not nearly as destructive as first assumed. Clearly, these investigations have opened the door to further research and refinement of our understanding to the formation and preservation of fish weir features on the Pacific Northwest coast.

Site Integrity

Important in determining site significance are the physical condition and integrity of AM-1 and whether the site can, in its current state of preservation, fulfill its data potential. [redacted] integrity is judged based on three observations: (1) evidence concerning the site's overall condition, including the vertical disposition of the fish weir in various trench exposures; (2) evidence of stratigraphic preservation; and (3) the physical effects of the archaeological investigations on the remaining site matrix.

First, weir stake alignments were definitively identified in nine trenches, indicating that the site remains in good condition despite having been heavily used historically [redacted]. Fish weir stakes that were found in trenches were extremely well preserved. [redacted] Heavy historical use might have damaged or obscured fish weir alignments along the central portion of the

Anderson & Middleton site, but numerous trenches revealed intact alignments on the east and west side of the property.

[redacted]

Second, the orientation of weir stakes relative to laminations in the sediment and the direction of rootlets indicate that they have retained their orientation over time. In addition, weir stakes were often found in sediments with a massive, laminated, or interbedded structure, suggesting that the sediments had not been disturbed through any kind of land-movement event. Excavations at the Anderson & Middleton and Aberdeen Log Yard sites revealed that land-movement events resulted in differential pressure, which fractured sediment structure and caused blocky texture in the sediments.

Third, the effects of the present archaeological investigations have caused little damage to the fish weir site. Based on the lateral distribution of trenches with stake alignments across the site, the later distribution likely extends the width of Anderson & Middleton site (around 500 meters east-west). While nearly 250 trenches were excavated on the property, accounting for around 1 percent of the total surface area, not all trenches were excavated to a depth that would allow fish weir alignments to be detected. Additionally, many trenches had to be terminated before reaching naturally deposited sediments because of water inundation or trench wall collapse. Nine trenches, however, definitively impacted small portions of stake alignments. Given the small total surface area disturbed through excavation and the even smaller percentage of trenches that could have accessed deposits containing fish weirs, the remainder of the site likely is intact.

Other Values

"Other values" are those attached to historic properties by Native Americans culturally associated with the property or region. These values are not necessarily those associated with TCPs (as defined by the National Park Service [NPS] and the ACHP) because they do not depend on the continuity of knowledge or use. Native Americans might attribute values to properties based on their belief systems and/or might reflect qualities such as identity, origin, and place. Richard Bellon, Confederated Tribes of the Chehalis Reservation, suggested that the Tribe sees continuity between the natural and cultural worlds and, therefore, view the fish weir as a "living organism" in itself (Bellon 2009).

Significance Conclusion

All of the above considered, Site AM-1 is undoubtedly a significant archaeological site. Not only is it one of the few known fish weir sites in Washington, but it also has been well preserved given that it is found in an anaerobic environment. Also, considering that it is rare in the local archaeological record, Site AM-1 could offer data important to a regional understanding of the chronology of fish weir use in the Pacific Northwest, as well as a local understanding of structural variation and site use, local geomorphology, and methodological issues.

The site also appears to retain good physical integrity. More specifically, the site evidently was not graded or otherwise damaged when covered with fill in the late 1800s and early 1900s, and it seems to have escaped serious impact from historical and modern construction activities. The midden also demonstrates intact horizontal and vertical stratigraphy, [redacted]

WSDOT has determined that archaeological site AM-1 is eligible for inclusion in the NRHP under Criterion D and might also be significant for other values it represents to the Chehalis community.

Archaeological Site AM-2

To assess the significance of Archaeological Site AM-2, data from extensive archival research and from the archaeological investigations were used to determine eligibility for listing in the NRHP. Archaeological sites are typically evaluated under Criterion D of the NRHP (CFR 60.4) because they have yielded, or may be likely to yield, information important in prehistory or history. Determinations made under Criterion D are based on a site's potential to provide additional, important scientific data beyond that already obtained during its evaluation (testing). In addition to meeting one of the four NRHP criteria, a site must also retain sufficient integrity to convey that significance. For archaeological resources, integrity is measured by the extent to which potential information is sufficiently intact, either physically or contextually, to be archaeologically meaningful. Considerations of integrity might hinge on a site's depositional context (i.e., original or secondary), its overall condition (degree of previous impacts), and its stratigraphic composition (intact or mixed).

Site AM-2 was also evaluated under the other three NRHP criteria. Although subsurface structural remains exist and are representative of the early industrial development of the Grays Harbor area, AM-2 has no known association with events (Criterion A) or persons (Criterion B) important to the history of Aberdeen, Grays Harbor, Washington, or the nation in general. As a result, AM-2 does not appear to meet Criteria A or B of the NRHP. The structural features do not employ the characteristics of a type, period, or method of construction, nor are they the works of a master. Therefore, AM-2 does not appear to be architecturally significant under Criterion C.

AM-2 Research Potential

ICF Jones & Stokes archaeologists offered the following analysis to support their recommendation that WSDOT determine AM-2 NRHP-eligible. WSDOT Cultural Resources Specialists did not agree with the recommendation, and determined the site not eligible for the NRHP, for reasons presented at the end of this section.

As part of this study, the research potential of Archaeological Site AM-2 was measured by its ability to contribute to pertinent research themes, as outlined in Chapter 5. The investigation results are relevant to all aspects of the research design and can be reviewed here to assess the site's remaining data potential.

Industrialization/Technology

The Blagen Mill (AM-2) meets NRHP eligibility criteria because it is a rare example of an industrial sawmill in the Grays Harbor area. The site contains intact archaeological deposits associated with the mill buildings, planked roads and walkways, and the railroad; has research potential; and retains integrity. AM-2 affords an opportunity to study the process of how large corporate sawmills were developed in coastal environments and were modified over time. The earliest and most prominent mills in the area—the Simpson-Emerson Mill and the Northwestern Lumber Company—have been demolished, and subsequent development has likely destroyed most of the historical archaeological resources associated with the early mills. AM-2 still provides the opportunity to study the technological innovations and industrial processes and materials used at this mill complex in a way not possible through archival research alone.

The largely structural features of AM-2, including the planked roads and walkways, railroad, and remnants and remains of the building and activity areas, are also important when studying the area's industrialization and the local ties to the national lumber economy. The Blagen Mill was inextricably linked to the lumber-dependent economy of Grays Harbor and the national demands from the East Coast and California builders, especially after the 1906 San Francisco earthquake. Peaks in the Grays

Harbor economy were likely translated into increased operations at the Blagen Mill. This period of "boom" in the lumber economy is likely visible in the archaeological record at AM-2 and would be marked by an increase in development and expansion in the first two decades of the twentieth century. Documenting datable construction and expansion periods of construction and expansion and new technology is critical for determining how the lumber boom in the early twentieth century was expressed archaeologically. Only a small portion of the mill was exposed at AM-2, and it likely retains considerable potential to provide additional structural features and industrial activity areas to better understand the undocumented and poorly documented industrial complexes and processes in the Grays Harbor region.

Sawmill Location and Spatial Organization

The Blagen Mill can significantly contribute to the study of large industrial twentieth century mills in Washington. AM-2 provides an excellent opportunity to determine if mill design was intentionally organized during its inception, and if so, a substantial amount of information can be gleaned regarding the planning and functionality of a large mill from this time period. The foundation remnants of specific rooms within the mill could address research questions regarding construction and expansion of the mill and the technology changes over time. The archaeological relationship between the buildings and activity areas (including the refuse disposal areas, transportation lines, refuse burner, and mill buildings) and how they might have changed over time can be further explored.

The intact transportation network at AM-2 could greatly inform how internal transportation networks at industrial sites were developed. Documenting how this transportation infrastructure was constructed and understanding if it corresponded to key booms in the lumber industry could greatly expand the body of knowledge for industrial sites. The spatial organization of the mill complex was likely influenced by the level of reclamation and financing that was available at the time. Transportation networks were related to specific mill activities and the best way to connect them (most expedient, cheapest, or safest). Understanding how the transportation infrastructure developed in response to expansion, layout, and engineering challenges presents a unique opportunity to study the extensive internal transportation network of an industrial mill complex that operated for more than 60 years.

Conclusions must remain tentative at this point due to the limited area of the mill site that was exposed, but AM-2 likely stands to contribute a significant quantity of data concerning Blagen Mill's design and layout. The location and spatial organization of AM-2 is also important to the study of mill sites from both forested environments and urban areas from a comparative perspective. Long-term patterns in the similarities and difference in development, technology, production, and functionality at sawmill archaeological sites can be addressed by studying the locations of archaeological deposits at AM-2.

Reclamation

The well-preserved stratigraphy at AM-2 creates a unique window into the land use history of the Grays Harbor area where AM-2 is located. The mill's geographic placement, function, and size could inform the amount of reclamation and engineering that was required to develop the land at this particular location. AM-2 contains a variety of stratigraphic layers that can be used to develop a precise chronology of the various episodes of reclamation and the large-scale engineering efforts needed to reclaim the land. Documenting and analyzing the multiple episodes of reclamation, development, and engineering, as well as the relationships among the three, has already provided insight into how substantial industrial landscape modifications were necessary in order to develop a mill in this location. Evidence of early reclamation efforts visible in the archaeological record might provide information on regional civil engineering and day-to-day operations of mills in the Grays Harbor region. Few archaeological studies have specifically focused on analyzing the large-scale land engineering operations. More comprehensive documentation and analysis of engineering efforts may be able to document how the landscape of AM-2 was engineered over time and how technological advances influenced engineering and development periods. Documenting stratigraphy and analyzing soil samples have already provided some information about AM-2's multiple phases of reclamation and development of AM-2 and about the reuse of the wood waste to fill in areas of the mill complex.

Site Integrity

An important consideration in determining site significance relates to the physical condition and integrity of Site AM-2 and whether it can—in its current state of preservation—fulfill its data potential. For a buried site like AM-2, integrity is assessed based on the following observations:

- Evidence concerning the site's overall condition
- Evidence of stratigraphic preservation

- The physical effects of modern disturbances and archaeological investigations on the remaining site

The exposure of remnants of the boiler room, engine room, planked and walkways, and railroad lines demonstrate that AM-2 remains in good condition despite the area's extensive historical and modern uses. The structural remains and stratigraphic evidence of associated activity areas are very well preserved. The presence of pilings and planked roads and walkways across the site indicate that most of AM-2 is in good condition.

Stratigraphic profiles for trenches H-2, H-2B, and AM-31 show several distinct cultural lenses in association with the foundations of the boiler room and the engine room's structural remnants. These distinct cultural lenses are evidence of past industrial operations and stratigraphic preservation of important activity areas. Distinct layering within these trenches indicates that stratigraphic variation at AM-2—including the layers of historical and modern fill, industrial activities, mill design and footprint, and reclamation—have been preserved.

The total impact to AM-2 from archaeological investigations and modern disturbances has been minimal. Physical damage to the site has occurred; however archaeological investigations have proven that a substantial portion of the mill is intact and retains stratigraphic integrity. Further, the site's overall condition and integrity are exceptionally good. Current investigations have examined a limited portion of the site, and it is likely that additional intact archaeological deposits are present.

Significance Conclusion

Considering all of the above, ICF Jones & Stokes archaeologists recommended that Archaeological Site AM-2 undoubtedly is a significant archaeological site and is eligible under NRHP Criterion D. This site is not only one of three known industrial archaeological sites in the Grays Harbor area, but it is also extremely well preserved since having been buried 50 to 80 years ago. The site clearly could significantly contribute important information regarding the industrial history of the local area, as well as the role of the Grays Harbor lumber economy on the national and global scales. The preservation of archaeological deposits containing structural remnants of specific rooms within the mill complex and indications of activity areas are remarkable. The archaeological features and deposits within the context of the mill's development and expansion could substantially inform a wide range of local and regional research issues, particularly those relating to understanding the mill's industrialization, technology, location, spatial organization, and reclamation efforts.

The site also appears to retain good physical integrity. It was evidently not completely demolished or graded when the mill was closed in the late 1950s and it seems to have escaped serious effect from historical and modern construction activities. AM-2 also demonstrates intact horizontal and vertical stratigraphy despite being periodically inundated by water during tidal fluctuations. Archaeological Site AM-2, the remains of the former Blagen Mill, is recommended eligible for inclusion in the NRHP by ICF Jones &Stokes.

WSDOT Cultural Resources Specialists disagreed with the results of this evaluation, and on behalf of FHWA have determined that AM-2 is not NRHP-eligible, for the following reasons.

According to National Register Bulletin 36, *Guidelines for Evaluating and Registering Historic Properties*, a property must meet two requirements: "the property must have, or have had, information that can contribute to our understanding of human history of any time period; [and] the information must be considered important." The ICF Jones & Stokes analysis suggests that the remains of the Blagen Mill can contribute information on technology, spatial organization, and reclamation activities that cannot be gleaned from other sources. However, extensive documentary material is available about the mill's history and changes through time. This material includes detailed maps and photographs that document the mill's spatial organization as well as historical documents related to the mill's operations. Interviews with living persons knowledgeable about the mill and its role in the development of the Aberdeen community provide yet another source of existing information.

Though it is possible that there were formal or expedient changes that are not reflected on Sanborn maps or aerial photos, such changes have not been demonstrated by the excavated features. The archaeological features that have been discovered are structural and provide little more than the mill's footprint. This information has verified the location of mill components that have been identified in the existing historical record. No associated artifacts have been discovered that would allow for a better understanding of the activities that took place within the mill or the changes that occurred to the mill complex over its use history.

It can be argued that little of the mill's area was excavated and alterations might be present in unexcavated areas. However, even if previously undocumented changes are discovered, it would be difficult to ascertain their importance given that they would likely consist solely of foundations and footings. Crucial data, including machinery and associated artifacts, would be needed to interpret such undocumented modifications.

Furthermore, it is to be expected that the machinery and spatial organization of an industrial mill (without associated habitation sites) would undergo maintenance and various alterations. Some of these may be in response to boom cycles in the logging industry or technological challenges and innovations, but it has not been demonstrated that the archaeological record of these economic and technological changes would offer anything more than correlation with existing documentary sources.

As to the archaeological record of land reclamation, fill episodes without associated artifact-bearing stable surfaces have not been considered to have the potential to yield important data on similar projects. The information potential of a "precise chronology of various episodes of reclamation" has not been demonstrated.

Finally, the ICF Jones & Stokes analysis notes that waterfront mill sites in Gray's Harbor are rare. The two sites discovered and reported within this document demonstrate that this assertion may not be accurate. Furthermore, the similarity between AM-2 and ALY-1 provides evidence that such sites show little differentiation. It would be expected that identical sites exist in many locations in the Grays Harbor area where mills were once common.

In summary, WSDOT disagrees with the characterization that industrial mill complexes in the Gray's Harbor area are "poorly documented" and "rare." Though little archaeological investigation has taken place, archaeological data is unlikely to offer significant and important challenges or corrections to the written and oral history record.

Historic Resources Evaluations

The historic resources survey of the Anderson & Middleton Alternative part of the APE identified four NRHP-eligible historic properties (Chapter 6). One historic property is the Northern Pacific Railroad Depot at 719 8th Street in Hoquiam, built in 1899. The other properties are residential houses west of Aberdeen's central business district along the designated truck haul routes at 411 22nd Street, 201 South Washington Street, and 1101 West Wishkah Street. The latter two properties are also within the Aberdeen Log Yard Alternative part of the APE and were described as part of the historic resources evaluations for the Aberdeen Log Yard Alternative; each property is associated with Aberdeen's growth and development in the 1890s and 1900s.

Northern Pacific Railroad Depot, 719 8th Street

The former Northern Pacific Railroad Depot at 719 8th Street in Hoquiam was evaluated at a reconnaissance level during the historic resources survey of the Anderson & Middleton Alternative part of the APE. The depot was constructed in 1899 to serve the town of Hoquiam along the Northern Pacific Railroad line (established 1892 through 1898) to Grays Harbor.

In 1898, the Northern Pacific Railroad extended a spur of their Grays Harbor Branch railroad line 4.6 miles over the Wishkah and Hoquiam rivers, through central Aberdeen and to Hoquiam. This segment was the continuation of a previously completed portion of the line from Junction City to Aberdeen in 1895. Constructing the railroad included a wood bridge over the Hoquiam River, a wood trestle over the tideflats, and Hoquiam's Northern Pacific Railroad Depot.

The Hoquiam rail extension was reportedly financed with a construction loan from the Grays Harbor Company, which on occasion used the name "Grays Harbor Northern Railroad." Henry Heermans and George Emerson of Hoquiam and Chester Congdon of Duluth, Minnesota, were the company's principal financiers. The Grays Harbor Company's construction loan covered the costs of preparing the railroad bed in order to lay rails and constructing bridges over the Wishkah and Hoquiam rivers.

The railroad serviced the mills and industries along the waterfront in Hoquiam. Likewise, the Hoquiam Railroad Depot likewise provided freight and passenger service between Grays Harbor and the Seattle/Tacoma area. The depot was a central point for conveying people and goods in and out of Hoquiam throughout the early twentieth century and served as an important connection for the community with the outside world. Regularly scheduled passenger service continued through the 1950s, until the Northern Pacific canceled the Seattle-Hoquiam passenger trains in February 1956. Eventually, the depot was acquired by the City of Hoquiam. After sitting vacant for many years and being threatened with demolition, the building was fully restored in 2008; currently, the former Northern Pacific Depot houses offices and a service center for the Washington State Department of Licensing.

The Hoquiam Northern Pacific Railroad Depot was evaluated according to the eligibility criteria for listing in the NRHP, and it appears eligible under Criteria A and C at the local level of significance. Under NRHP Criterion A, the depot is considered historically significant due to its association with the Northern Pacific Railroad and its role in Hoquiam's development as well as the development of surrounding Grays Harbor region. Under

NRHP Criterion C, the building embodies the characteristics and method of construction of a Northern Pacific Railroad depot built with Arts & Crafts-style influences and is a good example of this architectural style and form in the Grays Harbor region of western Washington from the turn of the nineteenth century. The depot strongly exhibits this style, and—except for alterations to the roof cladding—the building remains essentially unaltered and retains good integrity.

411 22nd Street

The property at 411 22nd Street in Aberdeen was evaluated at a reconnaissance level during the historic resources survey of the Anderson & Middleton Alternative part of the APE. The existing house was constructed in 1906, according to the Grays Harbor County tax assessor, and the original owner, architect, and builder are unknown. The residence's front porch has been slightly modified, but it otherwise appears to be essentially unaltered.

The property was evaluated according to the eligibility criteria for listing in the NRHP and appears eligible under Criterion C at the local level of significance. Under NRHP Criterion C, the residence embodies the characteristics and method of construction of a simple Queen Anne-style, front-gable residential type, and it is a good example of this architectural style and form in the vicinity of Aberdeen and Hoquiam, Washington, from the early twentieth century. During the boom period of 1890 through 1910, local residential development in these communities was characterized primarily by the construction of modest houses in popular styles and vernacular house types. Relatively common to the local community at the time of the property's construction, local examples of this type and style of residence that have retained a high level of integrity are now few. This residence is one of the last intact vestiges of the residential character that typified the neighborhood during Aberdeen's ascendancy as the manufacturing and shipping center on Grays Harbor. While there is no evidence that the property is associated with a significant designer or craftsman, the building strongly exhibits its style, and its character-defining features have retained good integrity.

Aberdeen Log Yard Alternative

Archaeological Resources Evaluation

Archaeological Site ALY-1

To assess the significance of Archaeological Site ALY-1, data from extensive archival research and from the archaeological investigations were used to determine whether the site is eligible for NRHP listing.

Archaeological sites are typically evaluated under NRHP Criterion D (CFR 60.4) because they have yielded, or might be likely to yield, information important in precontact or history. Determinations made under Criterion D are based on a site's potential to provide additional, important scientific data beyond that already obtained during its evaluation (testing). In addition to meeting one of the four NRHP criteria, a site must also retain sufficient integrity to convey that significance. For archaeological resources, integrity is measured by the extent to which potential information is sufficiently intact, either physically or contextually, to be archaeologically meaningful. Considerations of integrity might hinge on a site's depositional context (i.e., original or secondary), its overall condition (degree of previous impacts), and its stratigraphic composition (intact or mixed).

ALY-1 was evaluated under NRHP Criteria A, B, C, and D. Although subsurface structural remains exist and represent the early industrial development of the Grays Harbor area, ALY-1 has no known association with events (Criterion A) or persons (Criterion B) important to the history of Aberdeen, Grays Harbor, Washington, or the nation in general. As a result, ALY-1 does not appear to meet NHRP Criterion A or B. The structural features do not employ the characteristics of a construction type, period, or method, nor are they the works of a master. Therefore, ALY-1 does not appear to be architecturally significant under Criterion C.

ALY-1 Research Potential

ICF Jones & Stokes archaeologists offered the following analysis to support their recommendation that WSDOT determine ALY-1 NRHP-eligible. WSDOT Cultural Resources Specialists did not agree with the recommendation, and determined the site not eligible for the NRHP, for reasons presented at the end of this section.

As part of this study, the research potential of ALY-1 was measured by its ability to contribute to pertinent research themes, as outlined in the archaeological research design described in Chapter 5. The investigation results are relevant to all aspects of the research design and can be reviewed here to assess the site's remaining data potential.

Industrialization/Technology

The Hulbert Mill (ALY-1) meets NRHP eligibility criteria because it is a rare example of an industrial sawmill site in the Grays Harbor area and retains a high degree of integrity, containing numerous intact structural features. The earliest and most prominent mills in the area—the Simpson-Emerson Mill and the Northwestern Lumber Company—were demolished, and subsequent development has likely destroyed most of the historical archaeological resources associated with these mills. ALY-1 still affords the opportunity to study the technological innovations and industrial processes and materials used at this mill complex in a way not possible through archival research alone.

The intact structural features of ALY-1, as well as the remnants of the activity areas, are also important in studying industrialization and the local ties to the national lumber economy. The Hulbert Mill was inextricably linked to the lumber-dependent economy of Grays Harbor and the national demands from the East Coast and California builders, especially after the 1906 San Francisco earthquake. Peaks in the Grays Harbor economy were likely translated into increased mill operations. This period of "boom" in the lumber economy is likely visible in the archaeological record at ALY-1 and would be marked by an increase in development and expansion in the first two decades of the twentieth century. Documenting a datable period of construction and expansion and any new technology is critical in determining how the lumber boom in the early twentieth century was expressed archaeologically.

ALY-1 could also demonstrate how the impact of industrialization affected the local landscape and coastal environment. The intact foundations at ALY-1 could significantly add to the comparative knowledge of how these mills developed, the activities being conducted at this sites, and how sawmills changed over time. Although only a small portion of the mill was exposed, it still could provide additional structural features and industrial activity areas to better understand the undocumented and poorly documented industrial complexes and processes in the Grays Harbor region.

Sawmill Location and Spatial Organization

The Hulbert Mill could also significantly contribute to the study of large industrial twentieth century mills in Washington. ALY-1 provides an excellent opportunity to determine if the mill design was intentionally organized during its inception and, if so, a substantial amount of information can be gleaned regarding a large mill's planning and functionality during this time period. The intact foundations of specific rooms within the mill could address research questions regarding mill construction and expansion as well as technology changes over time. The archaeological relationship between the buildings and activity areas (including the refuse disposal areas, transportation lines, refuse burner, and mill buildings) and how they might have changed over time needs to be explored.

Conclusions must remain tentative due to the limited area of the mill site that was exposed, but ALY-1 will likely contribute a significant quantity of data concerning the Hubert Mill design and layout. Data already obtained from ALY-1 clearly is relevant to more completely understanding the spatial organization of the Hulbert Mill from an archaeological perspective. Archaeological findings were compared with the 1906 Sanborn Fire Insurance map and indicate that the 1906 Sanborn Fire Insurance map inaccurately represents the spatial organization of the mill structures (Sanborn Fire Insurance Company 1906).

The location and spatial organization of ALY-1 is also important when studying mill sites for both forested environments and urban areas from a comparative perspective. Long-term patterns in the similarities and difference in development, technology, production, and functionality at sawmill archaeological sites can be addressed by studying the archaeological deposits at ALY-1.

Reclamation

The well-preserved stratigraphy at ALY-1 creates a unique window into the land use history of the Grays Harbor area where ALY-1 is located. The mill's geographic placement, function, and size implicate the amount of reclamation and engineering that was required to develop the land at this particular location. ALY-1 contains a variety of stratigraphic layers that can help to develop a precise chronology of the various reclamation episodes and the large-scale engineering efforts needed to reclaim the land. Documenting and analyzing the multiple episodes of reclamation, development, and engineering, as well as the relationships among the three, have already provided insight into how substantial industrial landscape modifications were necessary to develop a mill in this location. Evidence of early reclamation efforts visible in the archaeological record might provide information on regional civil engineering and day-to-day Grays Harbor regional mill operations. Since few archaeological studies have specifically focused on analyzing large-scale land engineering operations, engineering efforts need to be more comprehensively documenting and analyzed to determine how the landscape of ALY-1 was engineered over time and how the engineering and development periods were influenced by technological advances. The stratigraphy documentation and soil sample analyses have also provided some information about the multiple ALY-1 reclamation and development phases.

Site Integrity

An important consideration in determining site significance relates to ALY-1's physical condition and integrity and whether it can, in its current state of preservation, fulfill its data potential. For a buried site like ALY-1, integrity is assessed based on the following observations:

- Evidence concerning the site's overall condition
- Evidence of stratigraphic preservation
- The physical effects of modern disturbances and the archaeological investigations on the remaining site

The exposure of the intact foundations of the refuse burner and the boiler room demonstrate that ALY-1 remains in good condition despite the area's extensive historical and modern uses. The structural remains and stratigraphic evidence of associated activity areas are very well preserved; further, presence of pilings and planked roads and walkways across the site indicate that most of ALY-1 is in good condition.

Stratigraphic profiles for trenches ALY-84, -87, and -224 show several distinct cultural lenses directly about the foundations of the refuse burner, boiler room, and structural remnants of the engine room; these lenses are evidence of past industrial operations and the stratigraphic preservation of important activity areas. Distinct layering within these trenches indicates the preservation of stratigraphic variation at ALY-1, including the layers of historical and modern fill, industrial activities, mill design and footprint, and reclamation.

The total impact to ALY-1 from archaeological investigations and modern disturbances has been minimal. Physical damage to the site has occurred, however, archaeological investigations have proven that a substantial portion of the mill is intact and retains stratigraphic integrity; additionally the site's overall condition and integrity is exceptionally good. Current investigations have examined only a limited portion of the site, and additional intact archaeological deposits are likely present.

Significance Conclusion

Considering all of the above, ICF Jones & Stokes archaeologists recommended that Archaeological Site ALY-1 undoubtedly is a significant archaeological site and eligible under NRHP Criterion D. This site is not only one of three known industrial archaeological sites in the Grays Harbor area, but it is also extremely well preserved despite having been buried 50 to 80 years ago. The site clearly could significantly contribute important information regarding the local area's industrial history, as well as the role of the Grays Harbor lumber economy on the national and global scales. The preservation of intact foundations, structural remnants of specific rooms within the mill complex, and indications of activity areas are remarkable. The archaeological features and deposits within the context of the mill's development and expansion could offer important information about a wide range of local and regional research issues, particularly those relating to understanding the mill's industrialization and technology, location, spatial organization, and reclamation efforts.

The site also appears to have retained good physical integrity. The site was evidently not completely demolished or graded when the mill was closed in the late 1950s, and it seems to have escaped serious impact from historical and modern construction activities. ALY-1 also demonstrates intact horizontal and vertical stratigraphy despite being periodically inundated by water during tidal fluctuations. Archaeological Site ALY-1, the remains of the former Hulbert Mill, is recommended as eligible for listing in the NRHP by ICF Jones & Stokes.

WSDOT Cultural Resources Specialists disagreed with the results of the evaluation, and on behalf of FHWA have determined that ALY-1 is not NRHP-eligible, for much the same reasons that AM-2 was determined not NRHP-eligible. WSDOT Cultural Resources Specialists asserted that:

- Changes in remaining industrial features would not yield significant, important information that cannot be gleaned from existing documentary and oral history sources:
- There is minimal potential for significant, important data to be recovered by tracing the history of strata associated with reclamation; and
- The ALY-1 Hulbert Mill is not unique or rare.

Furthermore, the refuse deposit in Locus B has minimal data potential and lacks integrity. The deposit was interpreted as a single episode of dumping that cannot be tied to the mill, or any other particular group or significant time period. For this reason, it lacks significant data potential and integrity of association.

In summary, WSDOT disagrees with the characterization that industrial mill complexes in the Gray's Harbor area are "poorly documented" and "rare." Though little archaeological investigation has taken place, archaeological data is unlikely to offer significant and important challenges or corrections to the written and oral history record.

Historic Resources Evaluations

Two residential houses in the Aberdeen Log Yard Alternative part of the APE were identified in the historic resources survey and evaluated as historic properties eligible for NRHP listing (see Chapter 6). The properties are considered historically significant because of their association with the development of residential architecture west of Aberdeen's central business district from the 1900s through the 1920s. They are located within the APE west of Aberdeen's central business district along the designated haul routes at 201 South Washington Street and 1101 West Wishkah Street. These two properties are also within the Anderson & Middleton Alternative part of the APE.

201 South Washington Street

The property at 201 South Washington Street in Aberdeen was evaluated at a reconnaissance level during the historic resources survey of the Aberdeen Log Yard Alternative part of the APE. The existing residence was constructed in 1909, according to the Grays Harbor County tax assessor, and was one of three similarly designed residences on the parcel. This residence is the only one of the three to remain fully intact. The original owner is unknown, as are the original architect and builder. The exterior of the residence appears essentially intact, retains good integrity, and continues to convey its original architectural character; overall, the physical integrity of the residence is considered good.

The property was evaluated according to the eligibility criteria for NRHP listing and appears eligible under Criterion C at the local level of significance. Under NRHP Criterion C, the building embodies the construction characteristics and method of a front-gable, vernacular-style residence and is a good example of this architectural style and form in a working-class neighborhood in the vicinity of Aberdeen, Washington, from the early twentieth century.

During the boom period of 1890 to 1910, local residential development was characterized primarily by the construction of modest houses in popular styles and vernacular house types. In the 1910s and especially the 1920s, architect- and builder-designed houses in the Colonial Revival, Craftsman, or other vernacular styles were built in the neighborhood, indicating general economic expansion and prosperity. Common to the local community at the time of the property's construction, local examples of this residence type and style of residence that have retained a high level of integrity are now few. This residence is one of the last intact vestiges of the residential character that typified the neighborhood during Aberdeen's ascendancy as the manufacturing and shipping center on Grays Harbor.

While there is no evidence that the property is associated with a significant designer or craftsman, the building strongly exhibits its style, and its character-defining features have retained good integrity.

The property at 201 South Washington Street has good integrity and exists as a highly intact example of residential architecture from the early 1900s in the neighborhood west of Aberdeen's central business district. For these reasons, the property is considered individually eligible for listing in the NRHP under Criterion C at the local level of significance.

1101 West Wishkah Street

The property at 1101 West Wishkah Street in Aberdeen was evaluated at a reconnaissance level during the historic resources survey of the Aberdeen Log Yard Alternative part of the APE. According to the Grays Harbor County tax assessor, the existing residence was constructed in 1904; also, the original owner, architect, and builder are unknown. The exterior of the residence appears essentially intact, retains good integrity, and continues to convey its original architectural character. Also, the physical integrity of the residence is considered good.

The property was evaluated according to the eligibility criteria for listing in the NRHP and appears eligible for listing under Criterion C at the local level of significance. Under NRHP Criterion C, the building embodies the characteristics and method of construction of a Colonial Revival-style residence and is a good example of this architectural style and form in a working class neighborhood near Aberdeen, Washington, from the early twentieth century. While there is no evidence that the property is associated with a significant designer or craftsman, the house strongly exhibits its style, and its character-defining features have retained good integrity.

During the boom period of 1890 to 1910, local residential development was characterized primarily by the construction of modest houses in popular styles and vernacular house types. In the 1910s and especially the 1920s, architect and builder designed houses in the Colonial Revival, Craftsman, or other vernacular styles were built in the neighborhood, indicating general economic expansion and prosperity. Common to the local community at the time of the property's construction, local examples of this type and style of residence that have retained a high level of integrity are now few. This residence is one of the last intact vestiges of the residential character that typified the neighborhood during Aberdeen's ascendancy as the manufacturing and shipping center on Grays Harbor.

The property at 1101 West Wishkah Street has good integrity and exists as a highly intact example of residential architecture from the early 1900s in the neighborhood west of Aberdeen's central business district. For these reasons, the property is considered individually eligible for listing in the NRHP under Criterion C at the local level of significance.

9. Effects Analysis

Under Section 106 of the NHPA, an adverse effect is found when an undertaking alters, directly or indirectly, any characteristic of a historic property (architectural, historical, or archaeological) that qualifies the property for inclusion in the NRHP. All qualifying characteristics of a historic property are considered, including those that might have been identified subsequent to the original evaluation of the property's eligibility for listing in the NRHP. Adverse effects might include reasonably foreseeable effects caused by the undertaking that could occur later in time, be farther removed in distance, or be cumulative.

Adverse effects on historic properties include, but are not limited to, the following (36 CFR 800.5):

- Physical destruction of or damage to all or part of the property
- Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the U.S. Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR 68) and applicable guidelines
- Removal of the property from its historical location
- Changing the character of the property's use or of physical features within the property's setting that contribute to its historical significance
- Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historical features
- Neglect of a property, which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization
- Transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historical significance

The Aberdeen Log Yard, Anderson & Middleton, and No Build alternatives were analyzed for their potential to have direct, indirect, and cumulative impacts on identified historic properties in the APE. According to the regulatory requirements of Section 106 of the NHPA, as outlined in 36 CFR 800 and the WSDOT Programmatic Agreement (2009b), those effects considered to be adverse would need to be mitigated.

The range of potential effects to historic properties (significant archaeological sites and historic properties that are eligible for the NRHP) that might be introduced by this project includes the following:

- Physical destruction of the archaeological site at the Anderson & Middleton Alternative site (AM-1))
- Alteration of the physical setting by excavating and constructing a new pontoon casting basin and support facilities at the Aberdeen Log Yard or at the Anderson & Middleton property.
- Alteration of the physical setting by increasing truck traffic along the designated haul routes entering and exiting a new pontoon casting basin facility at the Aberdeen Log Yard or the Anderson & Middleton property.
- Increased visual and audible intrusions caused by increased truck traffic along the designated haul routes entering and exiting a new pontoon casting basin facility at the Aberdeen Log Yard or at the Anderson & Middleton property.
- Continued use of CTC for pontoon production.

The effects analysis presented in this chapter reflects the determinations made by WSDOT Cultural Resources Specialists on behalf of FHWA.

Effects Common to Both Grays Harbor Build Alternatives

Either build alternative would use the existing CTC casting basin facility. The literature search and archaeological and historic resources surveys identified the presence of two historic properties in the CTC part of the APE. The historic properties include Fire Station 15 at 3510 East 11th Street—which is listed in the NRHP—and portions of the CTC facility at 1123 Port of Tacoma Road. The fire station is considered historically significant for its association with the development of Tacoma’s port and industrial areas, the growth of the city’s vital municipal services, and as an important local example of the innovations in fire station design that followed the motorization of firefighting equipment in the 1920s. The CTC facility is considered historically significant for its role in the development of the prestressed concrete industry in the United States and many large capital improvement projects in the Pacific Northwest and for its association with well-known Tacoma architect Robert B. Price and engineers Thomas and Arthur Anderson.

The literature search and field surveys also identified the Hylebos Waterway Bridge as a historic property. Although not considered a historic property under Section 106 of the NHPA, the Hylebos Waterway Bridge was previously evaluated as eligible for listing in the WHR and would be considered a historic resource under SEPA.

The fire station is located in the center of a parcel southeast across East 11th Street from the CTC facility on the Hylebos Waterway (3533 East 11th Street). The Hylebos Waterway Bridge is located northeast of the same parcel. Similarly, NRHP-eligible portions of the CTC facility—consisting of the administrative building, two research and development laboratory buildings, and the structural plant—are adjacent to but not in the areas proposed for use under the build alternatives.

Because the identified historic properties are physically separated from the proposed project activities at CTC, continuing to use the CTC facility for the Pontoon Construction Project is expected to have no adverse effect on historic properties in the CTC part of the APE. The fire station, CTC facility, and bridge do not appear to have been adversely affected by CTC's current operations, and this use is not expected to change with either build alternative. No other cultural resources have been identified in the CTC part of the APE. Continuing to use the CTC facility as part of either build alternative is not expected to have an adverse effect on cultural resources.

Anderson & Middleton Alternative

Direct Effects

Archaeology

Archaeological investigations identified two significant archaeological resources within the Anderson & Middleton part of the APE: a precontact fish weir site, AM-1. AM-1 is an important resource that could address research questions regarding Native American resource procurement and subsistence in the region, as well as provide information about how these types of precontact features were constructed and operated. WSDOT determined that the fish weir is eligible under NRHP Criterion D for its data potential, specifically its ability to address important research questions. Constructing the casting basin at the Anderson & Middleton

Alternative site would disturb many of the feature's elements and adversely affect the site's data potential.

The proposed project would involve extensive ground-disturbing activities. If developed at Anderson & Middleton—which contains two known NRHP-eligible archaeological sites—then the project would impose an adverse effect on two historic properties located in the APE. If this alternative is selected, then an archaeological treatment plan would need to be developed to mitigate for this adverse effect, and ground-disturbing activities might need to be monitored during construction.

Historic Properties

During the historic resources survey, 157 properties determined to be 45 years of age or older were identified in the Anderson & Middleton Alternative part of the APE. These properties include 100 identified properties that are also within the Aberdeen Log Yard Alternative part of the APE. Of these, four properties were evaluated as historically significant based on the criteria for listing in the NRHP and are considered historic properties under Section 106 of the NHPA. The NRHP-eligible properties include the Northern Pacific Railroad Depot at 719 8th Street in Hoquiam (built in 1899) and residential houses west of Aberdeen's central business district along the designated truck haul routes at 411 22nd Street, 201 South Washington Street, and 1101 West Wishkah Street. The latter two properties are also located within the Aberdeen Log Yard Alternative part of the APE. All other properties in this part of the APE identified as being 45 years of age or older do not meet the eligibility criteria for listing in the NRHP.

The Northern Pacific Railroad Depot is situated along the north side of the railroad alignment that runs along the site's northern boundary. The property is eligible under NRHP Criteria A and C. Under Criterion A, the depot is historically significant for its association with the Northern Pacific Railroad and its role in the development of the city of Hoquiam and the surrounding Grays Harbor region. Under Criterion C, the building embodies the characteristics and method of construction of a Northern Pacific Railroad depot built with Arts and Crafts-style influences and is a good example of turn-of-the-century this architectural style and form in the Grays Harbor region of western Washington.

Potential direct effects on the Northern Pacific Railroad Depot would include an increase in visual and audible intrusions caused by potential rail and truck traffic associated with developing the Anderson & Middleton Alternative site. The railroad station is already located on an active railroad line and was originally constructed with this activity in mind;

otherwise, the building is physically separated from the build alternative site and is not located on one of the site's designated truck haul routes. Despite an increase in visual and audible intrusions and vibrations, the railroad depot also does not appear to possess features or characteristics that would be adversely affected by audible intrusions or low-level vibrations; therefore, its historical significance would remain unaffected. As a result, changes in the property' physical setting likely would be minimal under the Anderson & Middleton Alternative.

The three residential houses are located in the APE at 411 22nd Street, 201 South Washington Street, and 1101 West Wishkah Street in the cities of Hoquiam and Aberdeen along the proposed truck haul routes east of the Anderson & Middleton Alternative site; they are each eligible under Criterion C of the NRHP because they are good examples of their respective architectural styles and forms from the early twentieth century near the cities of Aberdeen and Hoquiam. Local examples of these types and styles of residences that have retained a high level of integrity are now few.

The residential house at 411 22nd Street is near the designated truck haul route along 22nd Street. This street has an approximate width of 80 feet, and the residence is set back 10 to 20 feet from the curb. The residential houses at 201 South Washington Street and 1101 West Wishkah Street are also near the proposed truck haul routes along West Heron and West Wishkah streets. Both of these streets are wide thoroughfares, each with an approximate width of 100 feet. The residences on these streets themselves are generally set back 10 to 20 feet from the curbs.

Potential direct effects on the residences would include an increase in visual and audible intrusions caused by truck traffic associated with developing the Anderson & Middleton Alternative site. Because the properties are physically separated from the build site and setbacks from the truck haul route, changes in the properties' physical settings likely would be minimal under this alternative due to the distance from the roadway. Despite an increase in visual and audible intrusions and vibrations, the historic properties do not appear to possess features or characteristics that would be adversely affected by audible intrusions or low-level vibrations; therefore, their historical significance would remain unaffected. More specific information on noise effects is included in Section 3.10, Noise, of the Pontoon Construction Project Draft EIS and the project noise technical memorandum (WSDOT 2009c). Developing the Anderson & Middleton Alternative would not likely adversely affect the historic properties in this part of the APE.

Indirect Effects

No indirect effects to cultural resources would be expected as a result of the Anderson & Middleton Alternative.

Cumulative Effects

Asignificant archaeological resource within the APE would be directly affected by the project, and there is a potential for the discovery of unanticipated resources during project construction. However, this would be a minor contribution to the overall cumulative impacts to archaeological resources that have likely occurred in the Grays Harbor regions since the early nineteenth century.

Aberdeen Log Yard Alternative

Direct Effects

Archaeology

WSDOT determined that no NRHP-eligible archaeological resources were located at the Aberdeen Log Yard Alternative site.

Historic Resources

During the historic resources survey, 104 properties determined to be 45 years of age or older were identified in the Aberdeen Log Yard Alternative part of the APE. Of these, two properties were evaluated as historically significant based on the criteria for listing in the NRHP and are considered historic properties under Section 106 of the NHPA. The properties are the residential houses at 201 South Washington Street and 1101 West Wishkah Street. All other properties in this part of the APE identified as being 45 years of age or older do not meet the eligibility criteria for listing in the NRHP.

The two identified historic properties in the Aberdeen Log Yard Alternative part of the APE are along the proposed truck haul routes designated for trucks entering and exiting the proposed casting basin facility or are near the proposed site's boundaries; they are not located on the site itself. Potential direct effects on these properties would include an increase in visual and audible intrusions and vibrations caused by truck traffic associated with proposed development at the Aberdeen Log Yard.

Both historic properties are sited on the designated truck routes for the build alternative along West Heron Street and West Wishkah Street, and both of these streets are wide thoroughfares, each with an approximate width of 100 feet. The residences on these streets themselves are generally setback 10 feet to 20 feet from the curbs.

Despite an increase in visual and audible intrusions and vibrations, developing the Aberdeen Log Yard Alternative would not likely adversely affect the two identified historic properties in this part of the APE. The proposed truck haul routes are principal transportation corridors through downtown Aberdeen, and the routes are already trafficked by a relatively high volume of heavy truck traffic to the industrial areas to the west of the central business district, including the Port of Grays Harbor. Changes in the properties' physical settings likely would be minimal under the Aberdeen Log Yard Alternative due to the observed effects of current conditions and their distance from the roadway. The historic properties also do not appear to possess features or characteristics that would be adversely affected by audible intrusions or low-level vibrations. Due to these conditions, their historical significance would remain unaffected. More specific information on noise impacts might be found in the noise technical memorandum prepared for the Pontoon Construction Project Draft EIS (WSDOT 2009c).

Indirect Effects

No indirect effects to cultural resources would be expected as a result of the Aberdeen Log Yard Alternative.

Cumulative Effects

No cumulative effects to cultural resources would be expected as a result of the Aberdeen Log Yard Alternative.

No Build Alternative

The No Build Alternative would result in both proposed alternative sites retaining their current functions and use. There would be no change in activities associated with either site, and the physical settings of the APE would not be altered. Because no change in use would occur under the No Build Alternative, no adverse effects would likely occur to cultural resources under this alternative.

Mitigation

Mitigation is required if project activities directly or indirectly cause adverse effects to recognized historic properties. The review process stipulated under Section 106 of the NHPA provides a procedure to seek ways to avoid, minimize, or mitigate adverse effects on historic properties. Participants in the Section 106 review process include agency officials; the ACHP; Native American tribes; local government representatives; and the public.

At the conclusion of the Section 106 process, a Memorandum of Agreement (MOA) is executed; this document records the terms and conditions agreed upon to mitigate the adverse effects of the project on historic properties and is signed by the sponsoring agency or agencies, the SHPO, and other consulting parties, as appropriate. Chapter 10 discusses in detail the mitigation and the resolution of adverse effects in order to comply with Section 106 of the NHPA.

Recommended mitigation for the project's potential adverse effects includes the following measures:

- Developing and implementing an archaeological treatment plan; this plan should be implemented before or simultaneous with project construction
- Developing an archaeological monitoring plan and an unanticipated discovery plan to be followed during project construction
- Conducting archaeological monitoring during project construction

Developing and implementing an archaeological treatment plan that details a data recovery program within the selected alternative site would reduce project effects to less than significant levels for the purpose of NEPA and would be considered appropriate mitigation for compliance with Section 106 of the NHPA.

10. Conclusions and Recommendations

WSDOT Cultural Resources Specialists, on behalf of FHWA, determined that there are seven historic properties in the APE for the two Grays Harbor build alternatives. The conclusions and recommendations in this chapter have been made by WSDOT Cultural Resources Specialists on behalf of FHWA.

These historic properties include one archaeological site and six historic properties that were evaluated as eligible for listing in the NRHP. An analysis of the project's potential effects on these historic properties has determined that the Anderson & Middleton Alternative would have an adverse effect on cultural resources; the Aberdeen Log Yard and No Build alternatives would not.

Archaeological Resources

ICF Jones & Stokes excavated 483 archaeological trenches in both the Aberdeen Log Yard and Anderson & Middleton build alternative sites; from these, one significant archaeological site wasdiscovered within the Anderson & Middleton part of the APE: a precontact fish weir site (AM-1). The archaeological site wasdetermined to be eligible under Criterion D of the NRHP for its potential to address project research questions.

The proposed project involves potential ground-disturbing activities at both the Aberdeen Log Yard and Anderson & Middleton alternative sites. If the Aberdeen Log Yard Alternative is selected for the project, the project will have no adverse effects on historic properties.

If the Anderson & Middleton Alternative is selected for the project, there will be an adverse effect to site AM-1.The adverse effect would need to be resolved per the requirements of Section 106 of the NHPA (36 CFR 800.6). This process would involve further consultation with the SHPO and affected tribes, notifying the ACHP of the adverse effect, and developing and executing an MOA among FHWA, WSDOT, the SHPO, tribes, and other consulting parties to address the project's adverse effect on cultural resources. Stipulations of the MOA would likely include developing and implementing an archaeological treatment plan, as well as other possible mitigation measures to address the adverse effect.

Implementing an archaeological treatment plan (including a data recovery program) is recommended for the Anderson & Middleton site. Monitoring by a professional archaeologist is recommended for the planned construction of the casting basin at either the Aberdeen Log Yard or Anderson & Middleton site, due to the scale of ground disturbance in a setting considered to have a high probability for archaeological resources.

Historic Resources

The historic resources survey identified six historic properties located near the alternative sites, along the designated truck haul routes, and at the CTC facility. Of these, two are in both the Aberdeen Log Yard Alternative and Anderson & Middleton Alternative parts of the APE (201 South Washington Street and 1101 West Wishkah Street in Aberdeen); two are only in the Anderson & Middleton Alternative part of the APE (the Northern Pacific Railroad Depot at 719 8th Street and 411 22nd Street in Hoquiam); and three are in the CTC part of the APE (Fire Station 15 at 3510 East 11th Street, the Hylebos Waterway Bridge at 3600 East 11th Street, and a portion of the CTC facility at 1123 Port of Tacoma Road in Tacoma).

Potential direct effects to these identified historic properties might include an increase in visual and audible intrusions and vibrations caused by truck traffic or project activities. None of the identified historic properties would be altered by the build alternatives, and most of the historic properties are separated by a measurable distance from proposed project-related activities. Despite a possible increase in visual and audible intrusions and vibrations, the build alternatives would not likely adversely affect any of the identified historic properties. Further, changes in the properties' physical settings likely would be minimal due to their distance from designated haul routes and project activities, because they are already subject to conditions that would be the same or similar to those possibly introduced by the build alternatives, or because the historic properties do not possess features or characteristics that would be adversely affected by audible intrusions or low-level vibrations.

11.0 References

Abbot, F.V. 1897. Correspondence on Single Jetty Harbor Improvement. In: *Transactions of the American Society of Civil Engineers*. Volume 36. American Society of Civil Engineers, New York. pp. 132-138.

Adamson, T. 1969. *Folk Tales of the Coast Salish*. Kraus Reprint Company, New York. Originally published 1934, American Folk-Lore Society, New York.

Alt, D. and D.W. Hyndman. 1994. *Roadside Geology of Washington*. Mountain Press Publishing Company, Missoula, Montana.

Alt, D. and D.W. Hyndman. 1995. *Northwest Exposures a Geologic Story of the Northwest*. Mountain Press Publishing Company, Missoula, Montana.

Ames, K.M. 1994. The Northwest Coast: Complex Hunter-Gatherers, Ecology and Social Evolution. *Annual Review of Anthropology* 23:209-229.

Ames, K.M. and D.G. Maschner. 1999. *Peoples of the Northwest Coast: Their Archaeology and Prehistory*. Thames and Hudson, London, England.

Andrews, R.W. 1957. *This Was Sawmilling*. Superior Publishing, Seattle, Washington.

Atwater, B.F. 1987. Evidence for Great Holocene Subduction Zone Earthquakes along the Outer Coast of Washington State. *Science* 236:942-944.

Atwater, B.F. 1992. Geologic Evidence for Earthquakes During the Past 2000 Years Along the Copalis River, Southern Coastal Washington. *Journal of Geophysical Research* 97(B2):1901-1919.

Atwater, B.F. and E. Hemphill-Haley. 1997. *Recurrence Intervals for Great Earthquakes of the Past 3,500 Years at Northeastern Willapa Bay, Washington*. U.S. Geological Survey Professional Paper 1576. 108 pp.

Austin, K.A. 1987. *45GH114: Seventh Street Theatre*. National Register of Historic Places Inventory Nomination Form. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Baldwin, G. 2006. *Executive Order 05-05 Consultation, Hoquiam Power Substation DAHP Concurrence of Project Review*. NADB Report 1348014. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Baldwin, G., G.A. Brown, and P.J. Trautman. 2007. *Archaeological Assessment of the Pointe at Northshore, North Shore Golf Course and Country Club, Tacoma, Washington*. Technical Report 1106A, NADB Report 1348857. Prepared by Drayton Archaeological Research. Prepared for Northshore Properties, LLC. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Bellon, R. 2009. Consulting Archaeologist, Confederated Tribes of the Chehalis Reservation. Personal Communication with Tom Barrett, Senior Archaeologist, ICF International, Seattle, Washington.

Berger, M. 2007a. *Cultural Resources Assessment for the Transfer Line Replacement Project, Tacoma, Pierce County, Washington*. Technical Report No. 315, CRC Project No. 0706, NADB Report 1349632. Prepared by Cultural Resource Consultants, Inc. Prepared for US Oil and Refining Co. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Berger, M. 2007b. *Cultural Resources Survey for the US Oil & Refining Co's TK 2002 Replacement, Biofuels Blending & Storage, and Asphalt Railcar Loading Projects, Tacoma, Pierce County, Washington*. Technical Report No. 320, CRC Project No. 0706Q, NADB Report 1350004. Prepared by Cultural Resource Consultants, Inc. Prepared for US Oil and Refining Co. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Berger, M. and J. Chambers. 2006. *Cultural Resources Assessment for the Tacoma Grinding Plant Project, 1220 Alexander Avenue, Tacoma, Pierce County, Washington.* Technical Report No. 284, NADB Report 1348809. Prepared by Western Shores Heritage Services, Inc. Prepared for Graymont Western US, Inc. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Bernick, K. 1998. Introduction to Part 3: Fishing Technologies on the Northwest Coast. In: *Hidden Dimensions: The Cultural Significance of Wetland Archaeology*. K. Bernick, editor. UBC Press, Vancouver, British Columbia. pp. 175-179.

Bernick, K. 2001. Time and Tides: Wet-Site Evidence for Fishing Technologies on the Northwest Coast of America. In: *Recent Developments in Wetland Research*. B. Raftery and J. Hickey, editors. Department of Archaeology, University College Dublin, Ireland. pp. 215-226.

Bernick, K. 2003. *Wood Artifacts from Northwest Coast Wet Sites*. Presented at the Northwest Anthropological Conference, Bellingham, Washington, March 20, 2003.

Bernick, K. 2007. Identifying Anthropogenic Deposits in Alluvial Settings on the Northwest Coast. In: *Archaeology from the Wetlands: Recent Perspectives*. J. Barber, C. Clark, M. Cressey, A. Crone, A. Hale, J. Henderson, R. Housley, R. Sands, A. Sheridan, editors. Proceedings of the 11th WARP Conference, Edinburgh 2005 (WARP Occasional Paper 18). Society of Antiquaries of Scotland, Edinburgh, Scotland. 2007. pp. 127-133.

Birks, R. 1938. *History of Grays Harbor County*. Western Washington College of Education, Polson Museum, Hoquiam, Washington.

Blagen, F. Jr. Date unknown. *The Frank Blagen Jr. Story*. http://snlm.wordpress.com/our-community/the-white-pines-story/the-frank-blagen-story/. Accessed November 2, 2009.

Blagen, H. Date unknown. *The Howard Blagen Story: Howard Woodworth Blagen (1913-1993), Life History Autobiography*. http://snlm.wordpress.com/our-community/the-white-pines-story/the-blagen-story/. Accessed November 2, 2009.

Blagen, N. J. 1982. A Short History of the Life of N.J. Blagen. *The Bridge* [Journal of the Danish-American Heritage Society] 5 (2):46-78.

Blukis Onat, A. 1976. A Fishtown Site, 45SK99. In: *The Excavation of Water-Saturated Archaeological Sites (Wet Sites) on the Northwest Coast of North America*. D. R. Croes, editor. National Museum of Man Mercury Series 50, National Museums of Canada, Ottawa. pp. 122-145.

Blukis Onat, A. and L.B. Lykowski. 2007. *45GH130: Hoquiam Hooverville and Industrial Tidelands*. Archaeological Site Inventory Form. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

BOAS, Inc. 2007. *Cultural Resource Study Report of the Port of Grays Harbor Industrial Development District Parcel No. 1 Hoquiam, Washington*. Prepared for the Washington State Department of Transportation, Olympia, Washington.

Boersema, J.L. 2008. *Cultural Resources Assessment for Storey Surface Mine Tacoma, Washington*. NADB Report 1351022. Prepared by Cascadia Archaeology. Prepared for Woodworth & Company, Inc. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Bovy, K.M. 2002. Differential avian skeletal part distribution: explaining the abundance of wings. *Journal of Archaeological Science* 29:965-978.

Bovy, K.M. 2005. *Effects of Human Hunting, Climate Change and Tectonic Events on Waterbirds along the Pacific Northwest Coast during the Late Holocene*. PhD Disseration for the Department of Anthropology. University of Washington, Seattle, Washington.

Bowden, B., D. Strohmaier, and C.M. Bialas. 2006. C*ultural Resources Survey for the Bradwood Landing Terminal Project in Clatsop County, Oregon*. On file at the Oregon State Historic Preservation Office, Salem, Oregon.

Bowers, A.B. 1899. Advertisement. *Overland Monthly* 34 (203): November.

Brack, M.L. 1985. *45PI650: Fire Station No. 15*. Historic Property Inventory Form. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Bradwood Landing, Inc. 2006. *Bradwood Landing Terminal Resource Report 4: Cultural Resources, Volume 1*. Prepared for NorthernStar Natural Gas, Oregon.

Broughton, J. 1994. Late Holocene Resource Intensification in the Sacramento Valley, California: The Vertebrate Evidence. *Journal of Archaeological Science* 21:501-514.

Bryan, A. 1963. An Archaeological Survey of the Northern Puget Sound. Occasional Papers of the Idaho State University Museum No. 11, Pocatello, Idaho.

"Business News: Lumber and Woodworking." 1909. *Pullman Herald* November 19, Pullman, Washington.

Butler, V.L. and S.K. Campbell. 2004. Resource Intensification and Resource Depression in the Pacific Northwest of North America: A Zooarchaeological Review. *Journal of World Prehistory* 18(4):327-405.

Byram, R.S. 2002. *Brush Fences and Basket Traps: The Archaeology and Ethnohistory of Tidewater Weir Fishing on the Oregon Coast*. PhD Dissertation for the Department of Anthropology, University of Oregon, Eugene, Oregon.

Byram, S. 1998. Fishing Weirs in Oregon Coast Estuaries. In: *Hidden Dimensions: The Cultural Significance of Wetland Archaeology*. K. Bernick, editor. UBC Press, Vancouver, British Columbia. pp. 199-219.

Chambers, J. 2006a. *Phase I: Cultural Resources Assessment for the Port of Tacoma's Lincoln Avenue Grade Separation Project, Pierce County, Washington*. Technical Report No. 267, NADB Report 1347346. Prepared by Western Shores Heritage Services, Inc. Prepared for Widener and Associates. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Chambers, J. 2006b. *Cultural Resources Assessment for the Concrete Technology Corporation's New Hollow Core and Crane Project Pierce County, Washington*. WSHS Report No. 278, NADB Report 1348031. Prepared by Western Shores Heritage Services, Inc. Prepared for Concrete Technology Corporation, Inc. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Chambers, J. 2006c. *Archaeological Monitoring for Lincoln Avenue Grade Separation Project, Tacoma, Washington*. WSHS Letter Report 30608E-1, NADB Report 1349632. Prepared by Western Shores Heritage Services, Inc. Prepared for Widener and Associates. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Cole, S.C., B.F. Atwater, P.T. McCutcheon, J.K. Stein, and E. Hemphill-Haley. 1996. Earthquake-Induced Burial of Archaeological Sites along the Southern Washington Coast about A.D. 1700. *Geoarchaeology* 11:165-177.

Connaway, J. M. 2007. *Fishweirs: A world perspective on the fishweirs of Mississippi*. Archaeological Report No. 33. Mississippi Department of Archives and History, Jackson, Mississippi.

Council, R.B., M.E. Will, N. Honerkamp. 1982. *Bluff Furnace: Archaeology of a Nineteenth Century Blast Furnace*. Jeffrey L. Brown Institute of Archaeology, University of Tennessee at Chattanooga, Tennessee.

Cox, T.R. 1974. *Mills and Markets: A History of the Pacific Coast Lumber Industry to 1900*. University of Washington Press, Seattle, Washington.

Croes, D., K.M. Kelly, and M. Collard. 2005. Cultural Historical Context of Qwu?gwes (Puget Sound, USA): a Preliminary Investigation. *Journal of Wetland Archaeology* 5:141-154.

Croes, D.R., R. Foster, L. Ross, M. Diedrich, N. Hubbard, K. Kelly, M. McCullough, T. McCullough, K. Myers, C. Sharron, B. Vargo, R. Wigen, and L. Valley. 2007. Qwu?gwes–a Squaxin Island Tribal Heritage Wet Site, Puget Sound, USA. In: *Archaeology from the Wetlands: Recent Perspectives*. J. Barber, C. Clark, M. Cressey, A. Crone, A. Hale, J. Henderson, R. Housley, R. Sands, A. Sheridan, editors. Proceedings of the 11th WARP Conference, Edinburgh 2005 (WARP Occasional Paper 18). Society of Antiquaries of Scotland, Edinburgh, Scotland. 2007. pp 135-156.

Cultural Resource Consultants, Inc. 2008. *Cultural Resources Overview for the Blair-Hylebos Terminal Redevelopment Project, Tacoma, Pierce County, Washington*. Technical Report No. 350, CRC Project No. 0710G. Prepared for Grette Associates, Tacoma, Washington.

Darienzo, M.E. and C.D. Peterson. 1990. Episodic Tectonic Subsidence Recorded in Late Holocene Salt Marshes, Northern Oregon Central Cascadia Margin. *Tectonics* 9:18.

Daugherty, R. 1948. *Survey of the West Coast of Washington from Cape Flattery to the Columbia*. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Davidson, G. 1858. Appendix 44: Directory for the Pacific Coast of the United States. In: *Report of the Superintendent of the Coast Survey Showing the Progress of the Survey during the Year 1858*. Washington, DC.

Davidson, G. 1889. *Pacific Coast. Coast Pilot of California, Oregon, and Washington.* Fourth Edition. United States Coast and Geodetic Survey, Washington, DC.

Day, G.L. and J.P. Kerr. 1998. *Footprint of an Historic Sawmill: Archaeological Investigations of the Crawford Nurre Sawmill in Williamsburg, Kentucky*. Prepared by Cultural Resource Analysts, Inc., Lexington, Kentucky.

Dewey, M. and S. Schneyder. 2009. *Results of Trenching at Aberdeen Log Yard Site*. Prepared by ICF Jones & Stokes, Seattle, Washington. Prepared for Robert Rosain, Parametrix, Inc., SR 520 Program Office, Seattle, Washington.

Donald, L. 2003. The Northwest Coast as a Study Area: Natural, Prehistoric, and Ethnographic Issues. In: *Emerging from the Mist: Studies in Northwest Coast Culture History*. R.G. Matson, G. Coupland, and Q. Mackie, editors. UBC Press, Vancouver, British Columbia. pp. 289-327.

Douglas, D. 1914. *Journal of David Douglas*. Horticultural Society, London, England.

Douglass, R.G. 2002. *The Sawmill in Miller Gulch: History and Archaeology on the Redwood Coast*. Master's Thesis for Sonoma State University, Rohnert Park, California.

Dubofsky, M. 2000. *We Shall Be All: A History of the Industrial Workers of the World*. J.A. McCartin, editor. University of Illinois Press, Champaign, Illinois.

Elderidge, M. and S. Acheson. 1992. The Antiquity of Fish Weirs on the Southern Coast: A Response to Moss, Erlandson, and Stuckenrath. *Canadian Journal of Archaeology* 16:112-116.

Elmendorf, W.W. 1960. *The Structure of Twana Culture. Research Studies, Monograph Supplement No. 2*. Washington State University, Pullman, Washington.

Erlandson, J.M. and M.L. Moss. 1999. The Systematic use of Radiocarbon Dating in Archaeological Surveys in Coastal and Other Erosional Environments. *American Antiquity* 64(3):431-443.

Fairbanks, E. and M. Martinez. 1981. *Port of Tacoma . . . an Introduction*. League of Women Voters of Tacoma-Pierce County, Tacoma, Washington.

Fancher, J. 2001. *An Analysis of the Minard (45GH15) Faunal Assemblage*. MA Thesis for the Department of Anthropology, Washington State University, Pullman, Washington.

Ficken, R.E. 1987. *The Forested Land: A History of Lumbering in Western Washington*. University of Washington Press, Seattle, Washington.

Fladmark, K.R. 1975. *A Paleoecological Model for Northwest Coast Prehistory*. Mercury Series Paper 43. Archaeological Survey of Canada.

Foner, P.S. 1965. *History of the Labor Movement in the United States*. Volume IV: The Industrial Workers of the World 1905-1917. International Publishers Co., Inc., New York.

"Forest Industries News." 1950. *The Lumberman* 77 (9).

Franklin, J.F. and C.T. Dyrness. 1988. *Natural Vegetation of Oregon and Washington*. General Technical Report PNW-GTR-008. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Oregon State University Press, Portland, Oregon. 427 pp.

Fredericksen, A. 1987. Screeching Sawmills Everywhere in the 1920s. *The Daily World*, Aberdeen, Washington. July 12. pp. A5.

Garfield, L. 1990. *45GH116: Joseph Lytle Mansion*. National Register of Historic Places Inventory Nomination Form. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

George, O.R. 2001. *45GH 122.* Archaeological Site Form. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Gibbs, G. 1853-56. *Indian Nomenclature of localities in Washington and Oregon Territories.* American Ethnology Manuscript 714. National Anthropological Archives, Smithsonian Institution, Washington, DC.

Gibbs, G. 1877 [1855]. Part II: Tribes of Western Washington and Northwestern Oregon. *Contributions to North American Ethnology* 1(2):157-361. John Wesley Powell, editor. U.S. Department of the Interior. U.S. Geographical and Geological Survey of the Rocky Mountain Region. Washington: Government Printing Office. (Reprinted: Shorey, Seattle, Washington, 1970.)

GLO. 1859. *Map of Grays Harbor*. On file at the University of Washington Library, Seattle, Washington. U.S. Department of the Interior, Bureau of Land Management, General Land Office.

GLO. 1882. *Map of Grays Harbor*. On file at the Hoquiam Museum, Hoquiam, Washington. U.S. Department of the Interior, Bureau of Land Management, General Land Office.

GLO. 1958. *Map of Grays Harbor*. On file at the University of Washington Library, Seattle, Washington. U.S. Department of the Interior, Bureau of Land Management, General Land Office.

Goetz, L.N. 1997. *Cultural Resources Assessment of the Stafford Creek Corrections Center Facility, Grays Harbor County, Washington*. Prepared by Historical Research Associates, Seattle, Washington. Prepared for Huckell/Weinman Associates, Kirkland, Washington. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Goetz, L.N. 1998. *Cultural Resources Assessment of the Stafford Creek Corrections Center Fabrication and Fill Disposal Areas, Grays Harbor County, Washington*. Prepared by Historical Research Associates, Seattle, Washington. Prepared for Huckell/Weinman Associates, Kirkland, Washington. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Goetz, L.N. 1999. *Cultural Resources Assessment of the Stafford Creek Corrections Center Fill Disposal and Wetland Mitigation Area, Grays Harbor County, Washington*. Letter report February 3, 1999. Prepared by Historical Research Associates, Seattle, Washington. Prepared for Huckell/Weinman Associates, Kirkland, Washington. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Grays Harbor County. 2006. *Road GIS data*. http://www.ghc-gis.org/info/GIS/download.html. Accessed December 22, 2006. Grays Harbor County, Geographic Information Systems, Montesano, Washington.

Grays Harbor County. 2006. *Street GIS data*. http://www.ghc-gis.org/info/GIS/download.html. Accessed December 22, 2006. Grays Harbor County, Geographic Information Systems, Montesano, Washington.

Grays Harbor County. 2006. *Waterbody GIS data*. http://www.ghc-gis.org/info/GIS/download.html. Accessed December 21, 2006. Grays Harbor County, Geographic Information Systems Department, Montesano, Washington.

Grays Harbor County. 2007. *City limit GIS data*. http://www.ghc-gis.org/info/GIS/download.html. Accessed April 9, 2007. Grays Harbor County, Geographic Information Systems, Montesano, Washington.

Grays Harbor County. 2007. *Parcel GIS data*. http://www.ghc-gis.org/info/GIS/download.html. Accessed February 12, 2007. Grays Harbor County, Geographic Information Systems, Montesano, Washington.

Greene, N.A. 2005. *A New Angle on Northwest Coast Fish Trap Technologies: GIS Total Station Mapping of Intertidal Wood-Stake Features at Comox Harbour, BC*. http://www.canadianarchaeology.com/comox/Comox_Harbour.html. Accessed April 7, 2006.

Gunther, E. 1945. *Ethnobotany of Western Washington: The Knowledge and Use of Indigenous Plants by Native Americans*. University of Washington Publications in Anthropology, Volume 10, No. 1. University of Washington Press, Seattle, Washington.

Hajda, Y. 1990. Southwestern Coast Salish. In: *Handbook of North American Indians, Vol.7: Northwest Coast*. W.C. Sturtevant, W. Suttles, editors. Smithsonian Institution, Washington, DC. pp. 503-517.

Hanable, W.S. 2004. *Grays Harbor Lighthouse*. Historylink.org Essay 5714. http://www.historylink.org/essays/output.cfm?file_id=5714. Accessed March 21, 2007.

Harvey, D.W. and K.H. Krafft. 1987. *Historic Resources Survey and Inventory of Central Business Districts and Portions of the Cities of Aberdeen and Hoquiam, Washington*. Prepared for the Department of Community Development, Office of Archaeology and Historic Preservation.

Hayes, D. 1999. *Historical Atlas of the Pacific Northwest: Maps of Exploration and Discovery*. Sasquatch Books, Seattle, Washington.

Herrmann, R.B. 1972. *The Distribution and Abundance of Clams in Grays Harbor as Related to Environmental Conditions*. Publication No. 72-e28. Prepared by the Weyerhaeuser Environmental Research Group and the Weyerhaeuser Pulp Mill, Cosmopolis, Washington.

Homestead Entry WAOAA 103113, April 24, 1820.

"Hoquiam Has Ups and Downs Since First Post Office in 1867." Date unknown. Urban Renewal Files, Hoquiam Public Library.

"Hoquiam, Wash., Grays Harbor: Gateway to the World of Commerce." 1910. *Hoquiam Sawyer, Industrial Edition*. Hoquiam, Washington.

"How a Western City Grows: Hoquiam, Washington." 1903. *The Coast* 5(6): 206-219.

HRA. 2006. *Hylebos Bridge Rehabilitation Project Historic, Cultural, and Archaeological Discipline Report*. Prepared by Historical Research Associates, Seattle, Washington. Prepared for Parsons Brinckerhoff Quade & Douglas, Inc., and the City of Tacoma, Washington.

Hudson, L. and W. White. 2006. C*ity of Tacoma Standard Operating Procedures for Cultural/Archaeological Investigations Technical Memorandum Simpson Tacoma Kraft Company Cogeneration Building Tacoma, Washington, Pierce County*. NWAA Report No. WA06-71. NADB Report 1348084. Prepared by Northwest Archaeological Associates, Inc. Prepared for Simpson Tacoma Kraft Company. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Hunt, H. and F.C. Kaylor. 1917. *Washington, West of the Cascades: Volume III*. The S. J. Clarke Publishing Company, Seattle, Washington.

ICF JSA. 2009. *1859 historic shoreline map of Hoquiam, Washington*. Bureau of Land Management General Land Office, Portland, Oregon. Digital files from ICF Jones & Stokes, Seattle, Washington.

ICF JSA. 2009. *1866 historic shoreline map of Hoquiam, Washington*. Bureau of Land Management General Land Office, Portland, Oregon. Digital files from ICF Jones & Stokes, Seattle, Washington.

"In Southwestern Washington: Where Lumbering and Agriculture Go Hand-in-Hand." 1906. *The Coast* 12(1):18-26.

"Index of Operating Firms: Washington." 1962. *The Lumberman* 63(6):85.

James, J.R. ca. 1916. *Reminiscences of John R. James*. On file at the Polson Museum, Hoquiam, Washington.

James, J.R. ca. 1924. *Memoirs of John R. James*. James Family Archives, Bainbridge Island, Washington.

James, K. 2007. Appendix B: The Hoquiam Indians. In: *Cultural Resource Study Report of the Port of Grays Harbor Industrial Development District Parcel No. 1, Pontoon Construction Project, SR 520 Bridge Replacement and HOV Program*. Report No. 200511.03. Prepared by BOAS, Inc. Prepared for the Washington State Department of Transportation, Olympia, Washington.

James, K. and V. Martino. 1986. *Grays Harbor and Native Americans*. Prepared as part of Contract No. DACW67-85-M-0093. Prepared for the U.S. Army Corps of Engineers District, Seattle, Washington.

Jensen, V.H. 1945. *American Labor: From Conspiracy to Collective Bargaining*. 1971 Reprint Edition. J.J. Little and Ives Company, New York.

Jones Photo Historical Collection. 2008. Historical photograh collection. http://www.jonesphotocollection.com. Accessed November 12, 2009.

Kelsey, H.M. and J.G. Brockheim. 1994. Coastal Landscape Evolution as a Function of Eustacy and Surface Uplift Rate, Cascadia Margin, Southern Oregon. *GSA Bulletin* 106(6):840-854.

Kent, R.J. 2003. *Cultural Resource Reconnaissance Survey for the Half Moon Bay Transition Gravel and Cobble Replacement Project, Westport, Grays Harbor County, Washington*. U.S. Army Corps of Engineers, Seattle District, Environmental Resources Section, Washington.

Kent, R.J. 2004a. *Cultural Resources Reconnaissance Survey for the U.S. Army Reserve's Pier 23 Project Tacoma, Pierce County, Washington*. NADB Report 1343131. Prepared for U.S. Army Corps of Engineers, Seattle District, Washington. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Kent, R.J. 2004b. *45PI706*. Archaeological Site Inventory Form. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Kent, R.J. 2004c. *Cultural Resources Reconnaissance Survey for the U.S. Army Corps of Engineers Puyallup River Flood Control Project Tacoma, Pierce County, Washington*. NADB Report 1343948. U.S. Army Corps of Engineers, Seattle District, Washington. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Kinkade, M.D. 1985. Letter report October 16, 1985. James and Martino files.

Kinkade, M.D. 1991. *Upper Chehalis Dictionary: University of Montana Occasional Papers in Linguistics No. 7*. Linguistics Laboratyr, University of Montana, Missoula. 378 pp.

Kirk, R. and R. Daugherty. 2007. *Archaeology in Washington*. University of Washington Press, Seattle, Washington.

Kolva, H.J. 1989. *45GH119: Hoquiam Main Post Office*. National Register of Historic Places Inventory Nomination Form. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Kroeber, A.L. 1939. *Cultural and Natural Areas of Native North America*. University of California Publications in American Archaeology and Ethnology 38. University of California Press, Berkeley, California.

Kruckeberg, A.R. 1995. *The Natural History of Puget Sound Country*. University of Washington Press, Seattle, Washington.

Kwarsick, K. and M. Gill. 2004. *Cultural Resources Survey for the Washington State Department of Transportation's Bass Avenue Bridge Replacement (TA2244) and Ocean Lake Way Bridge Replacement (TA2277), Grays Harbor County, Washington*. Technical Report 0183. Agreement Y-7898, Task Assignment Document BR. Prepared by Western Shore Heritage Services Inc. Bainbridge Island, Washington, Prepared for the Washington State Department of Transportation, Olympic Region, Tumwater, Washington.

Lamb, F.H. 1948. *Fifty Years in Hoquiam: The Memoirs of Frank Haines Lamb 1875–1951*. On file at the Timberland Regional Library, Hoquiam, Washington.

Larrson, J.T. 2004. *45GH115: Judge Charles W. Hodgdon House*. National Register of Historic Places Inventory Nomination Form. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Larrson, J.T. 2005. *45GH128: Hoquiam Olympic Stadium*. National Register of Historic Places Inventory Nomination Form. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Larrson, J.T. 2007. *45GH129: Hoquiam Masonic Temple*. National Register of Historic Places Inventory Nomination Form. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Larson, L.L. 1987. *Cultural Resources Reconnaissance and Testing at Mill Creek, South Aberdeen/Cosmopolis Flood Control, Washington*. Prepared by BOAS, Inc. Seattle, Washington. Prepared for the U.S. Army Corps of Engineers, Seattle District, Washington.

"Late Forest Industries News." 1956. *The Lumberman* 83(2).

Laybolt, A.D. 2005. *45GH58: Kaiser Site.* Archaeological Site Inventory Form. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Laybolt, A.D. and K. Demuth. 2005. *Historic Properties Survey and Assessment of the Simpson Avenue Bridge*. Prepared by Entrix, Seattle, Washington. Prepared for the Washington State Department of Transportation, Olympic Region, Tumwater, Washington. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Leavitt, J. 1980. *An Archaeological Reconnaissance of SR 105: Westport Wye to Johns River Bridge, L-6104*. Prepared by Washington Office of Public Archaeology, Olympia, Washington. Prepared for the Washington State Department of Transportation, District III, Washington. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Lebow, C.G. and M.E. Marschall. 2005. *Archaeological Survey of the Boiler 3 and Boiler 5 Timber Sale Units in the McDonald-Dunn Research Forest Corvallis, Oregon*. On file at Oregon State Historic Preservation Office, Salem, Oregon.

Lewarne, C.P. 1975. The Aberdeen, Washington, Free Speech Fight of 1911-12. *Pacific Northwest Quarterly* 66(1).

Lockley, F. 1907. Gray's Harbor, the Largest Shipping Port in the World. *The Pacific Monthly* 17(6):720-729.

Long, P. 2003. *Pierce County voters create Port of Tacoma on November 5, 1918*. HistoryLink.org Essay 5077. http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=5077.

Long, P. 2008. *Tacoma's Blair Bridge is closed and demolition begins on January 23, 1997*. HistoryLink.org Essay 8638. http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=8638.

Lucia, E. 1965. *Head Rig: Story of the West Coast Lumber Industry*. Overland West Press, Portland, Oregon. 246 pp.

"Lumber Manufacturing a Science." 1913. *Grays Harbor Washingtonian, Annual Edition*. Supplement to the *Daily Washingtonian* January 25.

"Lumber Production Billion and Half Feet." 1926. *Aberdeen Daily World* March 10. Aberdeen, Washington.

"[The] Lumberman's handbook and directory of the western forest industries." 1951. *The Lumberman*.

Maas, J. 1980. *Cultural Resources Reconnaissance of Three Dredge Materials Disposal Sites (16, 17, and 18), Grays Harbor and Chehalis River Navigation Improvement Project, Grays Harbor County, Washington*. Prepared by the U.S. Army Corps of Engineers, Seattle District, Washington. On file at Department of Archaeology and Historic Preservation, Olympia, Washington.

Maas, J. and D. Munsell. 1984. *Inventory Record for Archaeological Site Number 45GH86.* Cultural Resources Site Survey Record. Prepared by the U.S. Army Corps of Engineers, Seattle District, Washington. On file at Department of Archaeology and Historic Preservation, Olympia, Washington.

"[The] Machinery Markets: Pacific Coast." 1913. *The Iron Age* 92(1):56-64.

"Marine Construction News of the Month: Port Improvements." 1920. *Marine Engineering* 25(12):1025-1028.

Mathison, S.A. 1979. *45GH66: F: Arnold Polson House & Alex Polson Grounds*. National Register of Historic Places Inventory Nomination Form. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Mathison, S.A. and G.A. Lee. 1983. *45GH 82*. Archaeological Site Form. On file at On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Matson, R.G. and G. Coupland. 1995. *The Prehistory of the Northwest Coast*. Academic Press, San Diego, California.

Miller, J. 2009. *Ethnography Technical Memorandum, Pontoon Construction Project, SR 520 Bridge Replacement and HOV Progam*. Prepared for Washington State Department of Transportation, Olympia, Washington and the Federal Highway Administration.

Minor, R. 1983. Settlement and Subsistence at the Mouth of the Columbia River. In: *Prehistoric Places on the Southern Northwest Coast.* R.E. Gringo, editor. Thomas Burke Memorial Washington State Museum, University of Washington, Seattle, Washington. pp.195-206.

Mobley, C.M. and W. M. McCallum. 2001. Prehistoric Intertidal Fish Traps from Central Southeast Alaska. *Canadian Journal of Archaeology* 25:28-52.

Morgan, M. 1979. *Puget's Sound: A Narrative of Early Tacoma and the Southern Sound.* University of Washington Press, Seattle. 388 pp.

Moss, M. and J. Erlandson. 1998. A Comparative Chronology of Northwest Coast Fishing Features. In: *Hidden Dimensions, the Cultural Significance of Wetland Archaeology*. Kathryn Bernick, editor. University of British Columbia, Laboratory of Archaeology Occasional Papers, Volume 1, Vancouver, British Columbia. pp 180-198.

Moss, M.L., J.M. Erlandson, and R. Stuckenrath. 1990. Wood Stake Weirs and Salmon Fishing on the Northwest Coast: Evidence from Southeast Alaska. *Canadian Journal of Archaeology* 14:143-158.

Munsell, D.A. 1976. *Cultural Resources Survey: Three Sites on Grays Harbor, Grays Harbor County, Washington*. Prepared by the U.S. Army Corps of Engineers, Seattle District, Washington. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Munsell, D.A. 1980. *Grays Harbor FY 1980 Channel Widening, Cultural Resources: Reconnaissance and Testing of Dredge Disposal Area "A."* Technical Memorandum for Record. Prepared by the U.S. Army Corps of Engineers, Seattle District, Washington. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Munsell, D.A. 1981. *45PI47.* Archaeological Site Form. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Munsell, D.A. and L. Storm. 1981. *45GH 73.* Archaeological Site Form. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

National Park Service. 1990. *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation.* U.S. Department of the Interior, National Park Service, National Register of Historic Places, Washington, DC.

Nelson, A.R. 1992. Discordant 14C Ages from Buried Tidal-Marsh Soils in the Cascadia Subduction Zone, Southern Oregon Coast. *Quarternary Research* 38(1):74-90.

Nixon, J. M., W. Tonsfeldt, and M.C. Hamilton. 2000. *Investigations of Three Sawmill Sites in Deschutes County, Oregon: Crown Pacific and Deschutes National Forst Land Exchange Project*. Prepared by Applied EarthWorks, Inc., Hemet, California. Prepared for Crown Pacific Limited Partnership, Bend, Oregon. Draft submitted to U.S.Department of Agriculture, Deschutes National Forest, Bend, Oregon. Report on file at the Oregon State Historic Preservation Office, Salem, Oregon.

Nordquist, D. 1976. 45SN100: The Biderbost Site, Kidd's Duval Site. In: *The Excavation of Water-Saturated Archaeological Sites (Wet Sites) on the Northwest Coast of North America*. D.R. Croes, editor. National Museum of Man Mercury Series 50, National Museums of Canada, Ottawa.

Northwest Archaeological Associates. 2007. *The Alaska Way Viaduct & Seawall Replacement Project: Research Design for Identification of Archaeological Properties: Part II Historical Properties*. Prepared for Washington State Department of Transportation, Olympia, Washington.

Olson, R.L. 1936. *The Quinault Indians*. University of Washington Publications in Anthropology, Volume 6, No. 1. University of Washington Press, Seattle, Washington.

Pacific States Marine Fisheries Commission. 1996. *Estuarine and Wetland Dependent Fish of the Pacific Northwest*. F.I.S.H. Habitat Education Program, Gladstone, Oregon.

Parvey, M. 2007. *Summary of 2006 Archaeological Monitoring Activities for the Blair Inner Reach Turning Basin Expansion Area and Southwest Corner Cutback.* NADB Report 1343948. Prepared by Northwest Archaeological Associates, Inc., Seattle, Washington. Prepared for the Port of Tacoma, Washington. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Parvey, M. and C.J. Miss. 2005. *Cultural Resources Assessment for the Port of Tacoma's Blair Waterway Infrastructure Improvement Project and Gog-le-hi-te II Mitigation Action Area*. NWAA Report Number WA05-48. NADB Report 1346288. Prepared by Northwest Archaeological Associates, Inc., Seattle, Washington. Prepared for the Port of Tacoma, Washington. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Peterson, C.D. and J.B. Phipps. 1992. Holocene Sedimentary Framework of Grays Harbor Basin, Washington, USA. In: *Quaternary Coasts of the United States: Marine and Lacustrine Systems*. C.H. Fletcher III and J. Wehmiller, editors. SEPM (Society for Sedimentary Geology) Special Publication No. 48, pp. 273-285.

Pettit, W.C. 1939. *History of the Northwestern Lumber Company*. Historic files drawers, Lumber Industry and Trade, Hoquiam Public Library, Hoquiam, Washington.

Phinney, L.A. and P.Bucknell. 1975. *A Catalog of Washington Streams and Salmon Utilization: Volume 2 Coastal Region*. Washington Department of Fisheries, Olympia, Washington.

Phipps, J.B. 2007. *Geologic Review and Historic Landform Study of the Port of Grays Harbor Industrial Development District Parcel No. 1, Hoquiam, Washington*. Addendum to BOAS Research Report 20511.02al. Prepared for the Washington State Department of Transportation, Olympia, Washington.

Phipps, J.B. 2009. *Field Notes on the Geology of the Anderson & Middleton and the Aberdeen Log Yard Potential Pontoon Construction Sites.*

Pierce County. 2007. *Parcel GIS data*. http://yakima.co.pierce.wa.us/ GeoDataExpress/main.html. Accessed April 24, 2008. Pierce County GIS Data Express, Tacoma, Washington.

Pierce County. 2007. *Street GIS data*. http://yakima.co.pierce.wa.us/GeoDataExpress/main.html. Accessed May 9, 2007. Pierce County GIS Data Express, Tacoma, Washington.

Pojar, J. and A. Mackinnon. 1994. *Plants of the Pacific Northwest Coast: Washington, Oregon, British Columbia, and Alaska*. Lone Pine Publishing, Edmonton, Alberta. 528 pp.

Pomeroy, J.A. 1976. Stone Fish Traps of the Bella Bella Region. In: *Current Research Reports*. R.L. Carlson, editor. Department of Archaeology, Simon Fraser University, Burnaby, British Columbia. pp. 165-173

Port of Tacoma. 2009. *Blair-Hylebos Terminal Redevelopment Project Final Environmental Impact Statement*. Prepared by Blumen Consulting Group, Inc., Tacoma, Washington. Prepared for the Port of Tacoma, Washington.

Praetzellis, A. and M. Praetzellis. 1993. *Life and Work at the Cole and Nelson Sawmill, Sierra County, California: Archaeological Data Recovery for the Granite Chief Land Exchange*. Prepared by the Anthropological Studies Center, Sonoma State University, Rohnert Park, California. Prepared for the Tahoe National Forest, Nevada City, California.

Pringle, R.F. 1986. *Soils Survey of Grays Harbor County Area, Pacific County, and Wahkiakum County Washington*. U.S. Department of Agriculture, Soil Conservation Service ; Washington State Department of Natural Resources; and Washington State University, Agriculture Research Center, Pullman, Washington.

Rae, E.M. 2005. *Uncovering Mill Point: Understanding Concepts of Space at Australian Historic Sawmills*. Unpublished Master's Thesis, School of Social Sciences, University of Queensland, Australia.

Ray, V. 1938. *Lower Chinook Ethnographic Notes*. University of Washington Publications in Anthropology Volume 7, No. 2. University of Washington Press, Seattle, Washington. pp. 29-165.

Reading, H.G. and J.D. Collinson. 1996. Clastic Coast. In: *Sedimentary Environments, Processes, Facies and Stratigraphy*. H.G. Reading, editor. Blackwell Science, Oxford, England. pp. 154-231.

Reagan, A.B. 1917. Archaeological Notes on Western Washington and Adjacent British Columbia. *Proceedings of the California Academy of Sciences* 7(1):1–31.

Reid, K.C. 1988. *Archaeological inspection of possible burial grounds.* Letter report November 17, 1988. Prepared by Kenneth C. Reid, Center for Northwest Anthropology, Washington State University, Pullman, Washington. Prepared for Dr. Geoffrey L. Gamble, Department of Anthropology, Washington State University, Pullman, Washington. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Reider, R. 2005. *Forest & Lumber Workers Union of IWW strike sawmills in Hoquiam on March 4, 1912*. HistoryLink.org Essay 733. http://www.historylink.org/index.cfm?DisplayPage=pf_output.cfm&file_id=7333. Accessed November 19, 2009.

Rice, H.S. 1982. *A Cultural Resource Survey of SR 105, Grays Harbor College to SR 101, Grays Harbor County, Washington (L-7270)*. Prepared by Archaeological and Historic Services, Eastern Washington University. Cheney, Washington. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Rice, H.S. 1984. *A Survey for Cultural Resources at the Newskah River Bridge SR 105, Grays Harbor County, Washington (TAD 304)*. Prepared by Archaeological and Historical Services, Eastern Washington University. Cheney, WA. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Robinson, J.M. 1979. *An Archaeological Reconnaissance of the West Fork Hoquiam River Bridge Area: SR 101*. Ms. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Robinson, J.M. 1982. *Cultural Resource Investigation of the Proposed Ocean Shores Airport Site, Grays Harbor County, Washington*. Letter report October 13, 1982. Prepared by the University of Washington, Office of Public Archaeology, Seattle, Washington. Prepare for the City of Ocean Shores, Washington. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Robinson, J.M. 1984. *Archaeological Monitoring of SR 109, West Hoquiam Connection, Grays Harbor County, Washington (TAD 250)*. Prepared for the Washington State Department of Transportation, Olympia, Washington. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Robinson, J.M. 1985. *Archaeological Monitoring of SR 105 from Johns River to Grays Harbor College, Grays Harbor County, Washington*. Task Assignment Document 312. Prepared by Archeological and Historical

Services, Eastern Washington University, Cheney, Washington. Prepared for the Washington State Department of Transportation, Olympia, Washington. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Robinson, J.M. 1992. *A Cultural Resource Survey of SR12: Aberdeen Vicinity Bluffs to Sargent Road, Grays Harbor County, Washington.* Task Assignment Document BU Contract Y-5070. Prepared by Archaeological and Historical Services, Eastern Washington University, Cheney, Washington. Prepared for the Washington State Department of Transportation, Olympia, Washington. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Robinson, J.M. 1998. *A Cultural Resources Survey of Washington State Department of Transportation's SR12: East Aberdeen Slope Revision Project, Grays Harbor County, Washington*. Agreement Y-5070, Task Assignment Document JM. Prepared by Archaeological and Historical Services, Eastern Washington University, Cheney, Washington. Prepared for the Washington State Department of Transportation, Olympia, Washington. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Rodrigues, S. and G.F. Petershagen. 2005. *45PI742: MV Kalakala/ Ferry Peralta*. National Register of Historic Places Registration Form. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Roll, T.E. 1974. *The Archaeology of Minard: A Case Study of a Late Prehistoric Northwest Coast Procurement System*. PhD Dissertation for the Department of Anthropology, Washington State University, Pullman, Washington. University Microfilms, Ann Arbor, Michigan.

Roll, T.E. 1988. *Archaeological inspection of possible burial grounds.* Letter report November 2, 1988. Prepared by Tom E. Roll, Department of Anthropology, Washington State University, Pullman, Washington. Prepared for Dr. Ken Reid, Center for Northwest Anthropology, Washington State University, Pullman, Washington. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Rooke, L.C. 2002a. *Cultural Resources Survey of Cingular Wireless Project Site WA-733 (Emerson Manor).* Letter report July 17, 2002. Prepared by Cascadia Archaeology, Seattle, Washington. Prepared for Vertex Engineering Services Inc., Burlingame, California. On file at

Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Rooke, L.C. 2002b. *Cultural Resources Survey of Cingular Wireless Project Site WA-735 (Rayonier)*. Letter report dated 17, 2002. Prepared by Cascadia Archaeology, Seattle, Washington. Prepared for Vertex Engineering Services Inc., Burlingame, California. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Rooke, L.C. 2002c. *Cultural Resources Survey of Cingular Wireless Project Site WA-736-02 (Fire Station)*. Letter report July 17, 2002. Prepared by Cascadia Archaeology, Seattle, Washington. Prepared for Vertex Engineering Services Inc., Burlingame, California. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.On file at DAHP. Olympia, WA.

Rooke, L.C. 2002d. *Cultural Resources Survey of Cingular Wireless Project Site WA-737 (Westport).* Letter report July 17, 2002. Prepared by Cascadia Archaeology, Seattle, Washington. Prepared for Vertex Engineering Services Inc., Burlingame, California. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Rose, C., C.L. Ruiz, T. Connolly, and J. Schablitsky. 2007. *Portrait from a Privy: A Nineteenth Century Working Household Naito Parkway, Portland, Oregon*. Museum Report 23007-049. Prepared by University of Oregon Museum of Natural and Cultural History, Eugene, Oregon. On file at State Historic Preservation Office, Salem, Oregon.

Ruby, R.H. and J.A. Brown. 1992. *A Guide to the Indian Tribes of the Pacific Northwest*. University of Oklahoma Press, Norman and London. 312 pp.

S.J. Clarke Publishing Company. Date unknown. *Multnomah County, Oregon Archives Biographies: Hart, Fred 1866-*. http://files.usgwarchives.org/or/multnomah/bios/hart429gbs.txt. Accessed November 10, 2009.

Sanborn Insurance Company. 1890. *Fire Insurance Map of Hoquiam*. Sanborn Insurance Company, Chicago, Illinois.

Sanborn Insurance Company. 1902. *Fire Insurance Map of Hoquiam.* Sanborn Insurance Company, Chicago, Illinois. Digital database, Seattle Public Library, Seattle, Washington.

Sanborn Insurance Company. 1906. *Fire Insurance Map of Aberdeen.* Sanborn Insurance Company, Chicago, Illinois. On file at the University of Washington, Seattle, Washington.

Sanborn Insurance Company. 1907. *Fire Insurance Map of Hoquiam.* Sanborn Insurance Company, Chicago, Illinois. Digital database, Seattle Public Library, Seattle, Washington.

Sanborn Insurance Company. 1914. *Fire Insurance Map of Aberdeen.* Sanborn Insurance Company, Chicago, Illinois.

Sanborn Insurance Company. 1916. *Fire Insurance Map of Hoquiam.* Sanborn Insurance Company, Chicago, Illinois. Digital database, Seattle Public Library, Seattle, Washington.

Sanborn Insurance Company. 1928. *Fire Insurance Map of Aberdeen.* Sanborn Insurance Company, Chicago, Illinois. Environmental Data Resources, Inc., Milford, Connecticut.

Sanborn Insurance Company. 1963. *Fire Insurance Map of Aberdeen.* Sanborn Insurance Company, Chicago, Illinois.

Schalk, R.F. 1977. The Structure of an Anadromous Fish Resource. In: *For Theory Building in Archaeology: Essays on Faunal Remains, Aquatic Resources, Spatial Analysis, and Systemic Modeling (Studies in Archeology*. L.R. Binford, editor. Academic Press, Orlando, Florida. pp. 207-249.

Schalk, R.F. and G.C. Burtchard. 1999. *45GH 73*. Archaeological Site Form. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Schalk, R.F. and G.C. Burtchard. 2001. *The Newskah Creek Fish Trap Complex, Grays Harbor, Washington*. Contract No. DACW67-97-D-1010, Delivery Order No.7. Submitted to U.S. Army Corps of Engineers, Seattle District, Washington.

Schater, L. 1956. Report from Aberdeen. *Pacific Northwest Quarterly* 47(1).

Schiffer, M. 1972. Archaeological Context and Systemic Context. *American Antiquity* 37(2):156-165.

Schneyder, S. and S. Livingston. 2009a. *Work Plan for Archaeological Investigations at the Anderson & Middleton Alternative Site and Aberdeen Log Yard Alternative Site*. Final Report ICF J&S #00383.09. Prepared by

ICF Jones & Stokes, Seattle, Washington. Prepared for the Washington State Department of Transportation, Olympia, Washington. July.

Schneyder, S.L. and T. Barrett 2009b. *Addendum to Cultural Resource Work Plan for Archaeological Investigations at the Anderson & Middleton Alternative Site and Aberdeen Log Yard Alternative Site*. Prepared by ICF Jones & Stokes, Seattle, Washington. Prepared for the Washington State Department of Transportation, Olympia, Washington.

Scofield, J. 1993. *Hail Columbia: Robert Gray, John Kendrick and the Pacific Fur Trade*. Oregon Historical Society Press, Portland, Oregon.

Seliskar, D.M. and J.L. Gallagher. 1983. *The Ecology of Tidal Marshes of the Pacific Northwest Coast: A Community Profile*. FWS/OBS-82/32.U.S. Department of the Interior, U.S. Fish and Wildlife Service, Division of Biological Services, Washington, DC. 65 pp.

Settler, D.R., J.J. Brown, and R. Mikhail. 2009a. *SR 520 Pontoon Construction Project, Alternate Sites Evaluation, Aberdeen Log Yard, Grays Harbor, Washington*. Prepared by Landau Associates, Seattle, Washington. Prepared for Washington State Department of Transportation, Olympia, Washington.

Settler, D.R., J.J. Brown, and R. Mikhail. 2009b. *SR 520 Pontoon Construction Project, Alternate Sites Evaluation, Anderson & Middleton Site, Grays Harbor, Washington*. Prepared by Landau Associates, Seattle, Washington. Prepared for Washington State Department of Transportation, Olympia, Washington.

"Skeleton of a Harbor Giant." 1966. *Aberdeen Daily World* February 17. Aberdeen, Washington.

Soderberg, L. 1980. *45PI260: Puyallup Waterway Crossing*. Archaeological Site Inventory Form. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Soike, H. 2009. General Manager and Executive Director of the Port of Grays Harbor from 1974 to 1988. Personal communication. November 9.

Spencer, A.C. 1983. *Cultural Resources Assessment of Proposed Soil Conservation Service Technical Assistance, Westport RC&D Measure, Westport, Washington.* Letter report August 1, 1983, Prepared by Alan C. Spencer, Cultural Resource Specialist, West National Technical Center, U.S. Dept. of Agriculture, Portland, Oregon. Prepared for Washington State Office of Archaeology and Historic Preservation, Olympia, Washington. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

State of Washington. 1912. *First Annual Report of the Industrial Insurance Department for the Twelve Months Ending September 30th 1912*. The Workman's Compensation Act. E.L. Boardman, Public Printer, Olympia, Washington.

State of Washington. 1920. *For Establishment of Lightship at Grays Harbor, Wash.: Statement of Hon. Albert Johnson, A Representative in Congress from the State of Washington*. 1921. pp 2747-2754. In: Sundry Appropriation Bill, 1921. Hearings Before Subcommittee of House Committee on Appropriations Consisting of Messrs. James W. Good (Chairman), William S. Vare, Walter W. Magee, Joseph W. Byrns, and James A. Gallivan in Charge of the Sundry Civil appropriation Bill for 1921. Sixty-Sixth Congress, Second Session, Part 2. pp. 1557a-2834. Government Printing Office, Washington.

Stein, J.K. 2000. *Exploring Coast Salish Prehistory: The Archaeology of San Juan Island*. University of Washington Press, Seattle.

Stevenson, A. 1998. Wet-Site Contributions to Developmental Models of Fraser River Fishing Technology. In: *Hidden Dimensions: The Cultural Significance of Wetland Archaeology*. K. Bernick, editor. UBC Press, Vancouver, British Columbia. pp 220-238.

Stevenson, S. 1985. *45GH113: Lachlin McTaggert House*. National Register of Historic Places Inventory Nomination Form. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Stewart, H. 1977. *Indian Fishing: Early Methods on the Northwest Coast.* J.J. Douglas, Vancouver, British Columbia.

Stilson, M.L. 1987. *Cultural Resource Assessment of Hyper-Fix Navigational Beacon Antenna at the U.S. Coast Guard Lighthouse, Westport, Grays Harbor County, Washington*. Submitted to Naval Sea Combat System Engineering Station, Naval Station Code 422, Norfolk, Virginia. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Swan, J.G. 1977. *The Northwest Coast*; or *Three Years' Residence in Washington Territory*. Reprint. University of Washington Press, Seattle. Originally published 1857, Harper, New York.

Symons, T.W. 1897. Correspondence on Single Jetty Harbor Improvement. In: *Transactions of the American Society of Civil Engineers*. 36(786): 35-138. American Society of Civil Engineers, New York.

TacomaCulture. 2008.Tacoma Historic Property Inventory Database. http://wspdsmap.ci.tacoma.wa.us/website/HistoricMap/viewer.htm. Accessed February 2009.TacomaCulture, City of Tacoma, Washington.

Takada, K. and B. F. Atwater. 2004. Evidence for Liquefaction Identified in Peeled Slices of Holocene Deposits along the Lower Columbia River, Washington. *Bulletin of the Seismological Society of America* 94:550-575.

Teague, G.A. 1987. *The Archaeology of Industry in North America*. Unpublished dissertation, University of Arizona, Tucson, Arizona.

"Travels of a Paper Man." 1905. *The Coast*. 10(2):52-62.

Tveskov, M.A. and J.M. Erlandson. 2003. The Haynes Inlet Weirs: Estuarine Fishing and Archaeological Site Visibility on the Southern Cascadia Coast. *Journal of Archaeological Science*: 30:1023-1035.

U.S. Fish Commission. 1891. *Chart Showing the Fisheries in Grays Harbor and Chehalis River, State of Washington: Season of 1889*. http://content.wsulibs.wsu.edu. Washington State University Libraries Digital Collection. Governing Printing Office, Washington DC.

USDA-FSA. 2006. *Pierce County aerial photograph*. University of Washington, Department of Earth and Space Sciences, Geomorphological Research Group data download. http:// rocky2.ess.washington.edu/data/ raster/naip2006/Pierce/. Accessed September 2009. U. S. Department of Agriculture, Farm Services Agency, Aerial Photography Field Office, Salt Lake City, Utah.

USGS. 1994. *Aberdeen 1:24k topographic map GIS data*. University of Washington, Department of Earth and Space Sciences, Geomorphological Research Group data download. http:// gis.ess.washington.edu/data/raster/ drg/hoquiam/index.html. Accessed February 23, 2009. U.S. Geological Survey, Denver, Colorado.

USGS. 1994. *Hoquiam 1:24k topographic map GIS data*. University of Washington, Department of Earth and Space Sciences, Geomorphological Research Group data download. http://gis.ess.washington.edu/data/raster/drg/hoquiam/index.html. Accessed February 23, 2009. U.S. Geological Survey, Denver, Colorado.

USGS. 1994. *Tacoma North 1:24k topographic map GIS data*. University of Washington, Department of Earth and Space Sciences, Geomorphological Research Group data download. http://gis.ess.washington.edu/data/raster/drg/seattle/index.html. Accessed February 23, 2009. U.S. Geological Survey, Denver, Colorado.

Van Syckle, E. 1980. *They Tried to Cut it All: Grays Harbor-Turbulent Years of Greed and Greatness*. Friends of the Aberdeen Public Library, Aberdeen, Washington.

Van Syckle, E. 1982. *The River Pioneers: Early Days on Grays Harbor*. Pacific Search, Seattle.

Vancouver, G. 1798. A Voyage of Discovery to the North Pacific Ocean, and Round the World. In: *Which the Coast of North-west America Has Been Carefully Examined and Accurately Surveyed*. London: G.G. and J. Robinson, London, England.

Vancouver, G. 1801. *A Voyage of Discovery to the North Pacific Ocean, and Round the World*. John Stockdale, London, England.

Vandermeer, J.H. 1981. *45GH87: Carnegie Library/ Hoquiam Timberland Library*. National Register of Historic Places Inventory Nomination Form. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Walker, M. and G.H. Ziesing. 2002. *The San Francisco Central Freeway Replacement Project—Alternative 8B: Archaeological Research Design and Treatment Plan*. Prepared by the Anthropological Studies Center, Sonoma State University, Rohnert, California. Prepared for the California Department of Transportation, District 4, Oakland, California.

War Department. 1911. *Report of the Chief of Engineers U.S. Army 1911*. Part 3. Government Printing Office, Washington, DC.

War Department. 1916. *Report of the Chief of Engineers U.S. Army 1916*. Part 3. Government Printing Office, Washington, DC.

War Department. 1920. *Report of the Chief of Engineers U.S. Army 1920*. Part 2. Government Printing Office, Washington, DC.

Washington Secretary of State Office. 1987. *Frontier Justice: Guide to the Court Records of Washington Territory, 1853–1889*. http://www.digitalarchives.wa.gov/RecordSeriesInfo.aspx?rsid=13. Accessed March 22, 2007. State of Washington, Office of the Secretary of State, Division of Archives and Records Management. Olympia, Washington.

Washington State Employment Security Department. 2000. Industry Profiles: Lumber and Wood Products. http://www.wa.gov/esd/lmea/sprepts/indprof/lumber.htm. Accessed November 19, 2009. Labor Market and Analysis, Washington State Employment Security Department, Olympia, Washington.

Watson, R.E. 1972. *45GH71: Hoquiam's Castle/ Robert Lytle Mansion.* National Register of Historic Places Inventory Nomination Form. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

WDNR. 2009. *Geologic Map of Washington.* Washington State Department of Natural Resources, Division of Geology and Earth Resources, Olympia, Washington.

Weaver, R. 2003. *Puyallup River side Channel Habitat Restoration Project Cultural Resources Section 106 Assessment*. EHC Report Number 03-0106.00. NADB Report 1342566. Prepared by the Environmental History Company, Seattle, Washington. Prepared for the City of Tacoma, Washington. On file at Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Weinstein, R.A. 1978. *Grays Harbor 1885-1913*. Penguin Books, New York. 190 pp.

Welsh, W.D. 1942. *A Brief Historical Sketch of Grays Harbor, Washington*. Produced from the Manuscript of Ed. Van Syckle. Presented by the Chambers of Commerce of Hoquiam and Aberdeen, Washington. Rayonier Incorporated.

Wessen, G. 1983. Prehistoric Places on the Ocean Coast of Washington. In: *Prehistoric Places on the Southern Northwest Coast*. R.E. Gringo, editor. Thomas Burke Memorial Washington State Museum, University of Washington, Seattle. pp.43-54.

Wessen, G. 1990. Prehistory of the Ocean Coast of Washington. In: *Handbook of North American Indians*, Volume 7: Northwest Coast. W. Suttles, editor. Smithsonian Institution, Washington, DC. pp.412–421.

Wessen, G. 2006. *Terrestrial Paleoshoreline Sites: Implications and Conclusions.* Presented at the 59th Annual Northwest Anthropological Conference, Seattle, Washington, March 29-April 1, 2007,.

Wheeler, E. 1937. Sixty Years of Silence: Grays Harbor County's Robinson Crusoe. In: *Told by the Pioneers: Tales of Frontier Life As Told by Those Who Remember the Days of the Territory and Early Statehood of Washington* (Volume 1). F.I. Trotter, F.H. Loutzenhiser, and J.R. Loutzenhiser, editors. U.S. Works Project Administration and the Washington Pioneer Project, Washington State Office of the Secretary of State, Olympia, Washington. 108 pp.

White, F.M. 1972. *45GH 6.* Archaeological Site Form. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Wilkes, C. 1841. *Map of Grays Harbour, Oregon Territory, United States Exploring Expedition 1838-1842*. On file at the Hoquiam Museum, Hoquiam, Washington.

Wilkes, C. 1845. *Narrative of the United States' Exploring Expedition during the Years 1838, 1839, 1840, 1841, and 1842.* Whittaker, London, England.

Wilma, D. 2006. *Grays Harbor County: Thumbnail History*. Historylink.org Essay 7766. http://www.historylink.org/essays/ output.cfm?file_id=7766. Accessed March 21, 2007.

Work, J. 1912. Journal of John Work, November and December 1824. T.C. Elliot, editor. *Washington Historical Quarterly* 3:198-228.

WSDOT. 2004. S*tate route GIS data*. Washington State Department of Transportation GeoData Distribution Catalog. http://www.wsdot.wa.gov /mapsdata/geodatacatalog/. Accessed February 4, 2004. Washington Department of Transportation, Geographic Services and Transportation Data Office, Olympia, Washington.

WSDOT. 2005. *Aberdeen graving dock orthophotograph*. http://www.wsdot.wa.gov/MapsData/Aerial/default.htm. Accessed May 29, 2008. Washington State Department of Transportation, Aerial Photography Branch, Olympia, Washington.

WSDOT. 2006. *SR 101 City of Aberdeen orthophotograph*. http://www.wsdot.wa.gov/MapsData/Aerial/default.htm. Accessed May 29, 2008. Washington State Department of Transportation, Aerial Photography Branch, Olympia, Washington.

WSDOT. 2009a. *Description of the Alternatives and Construction Techniques Technical Memorandum, Pontoon Construction Project, SR 520 Bridge Replacement and HOV Program*. Washington State Department of Transportation. Olympia, Washington.

WSDOT. 2009b. *Programmatic Agreement: Implementing Section 106 of the National Historic Preservation Act for the Federal-Aid Highway Program in Washington State Administered by the Federal Highway Administration, between the Washington State Department of Transportation, the Federal Highway Administration, the Department of Archaeology and Historic Preservation, and the Advisory Council on Historic Preservation*. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

WSDOT. 2009c. *Noise Technical Memorandum, Pontoon Construction Project, SR 520 Bridge Replacement and HOV Program*. Washington State Department of Transportation, Olympia, Washington.

Youmans, P.D. 1973. *45GH 72.* Archaeological Site Form. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Zuccotti, M. 2008. *Cultural Resources Section 106 Review: WDFW Lands in Grays Harbor County, Washington, within Olympic Wildlife Area (OWA) and the Johns River Wildlife Area (JRWA) Project*. On file at the Washington State Department of Archaeology and Historic Preservation, Olympia, Washington.

Exhibits

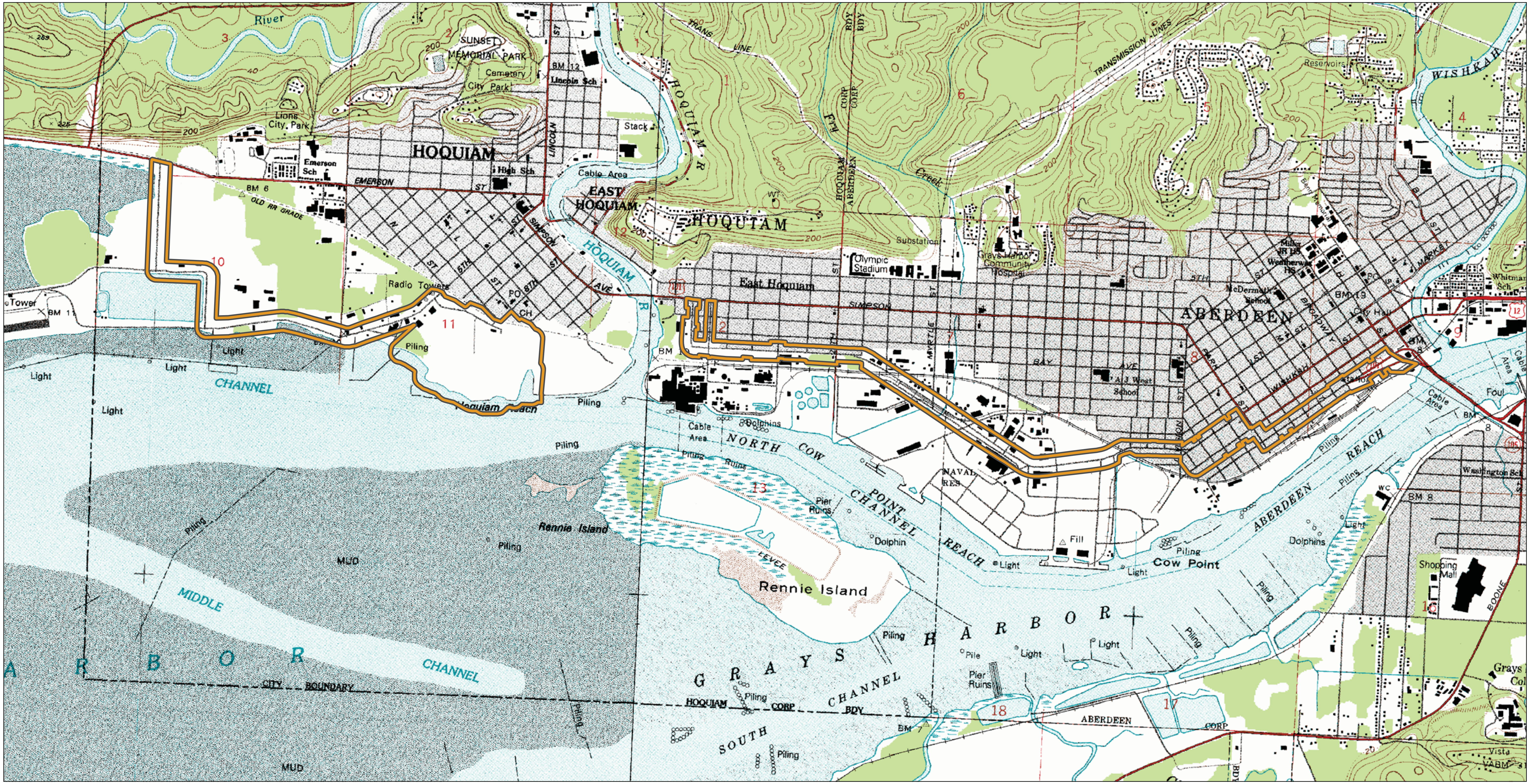
INTERNAL USE ONLY - DRAFT

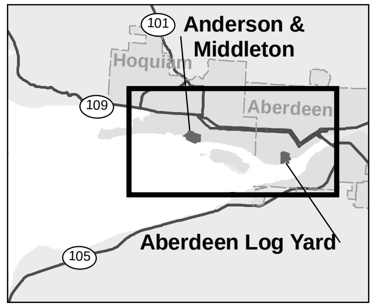
Exhibit 1-1. **Anderson & Middleton Alternative Area of Potential Effects**

Pontoon Construction Project

Washington State Department of Transportation

\\JAFAR\PROJ\PARAMETRIX_400707\MAPFILES\PONTOON\DR_TM\CULTURALRESOURCES\PON_DR_CULT_APE_AM.MXD 3/11/2010





Area of Potential Effects

INTERNAL USE ONLY - DRAFT

N 0 1,000 2,000 feet
1:24,000

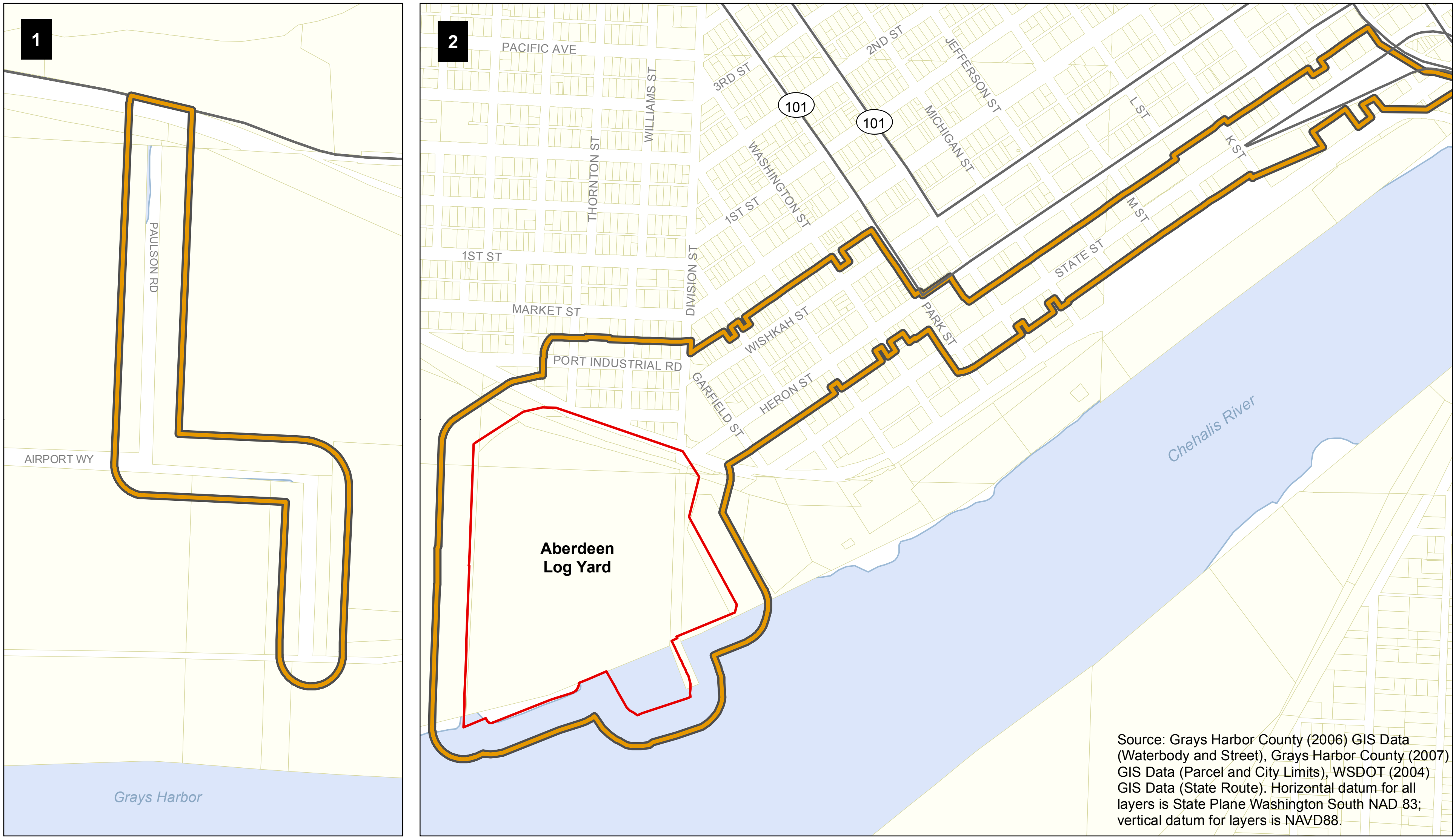
Source: USGS (1994) Aberdeen, Hoquiam Quadrangle Maps. Horizontal datum for all layers is State Plane Washington South NAD 83; vertical datum for layers is NAVD88.

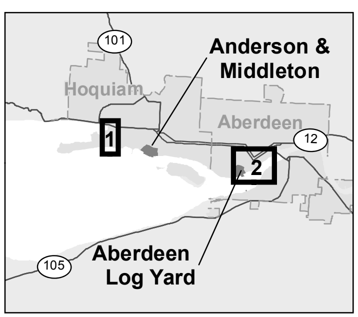
Exhibit 1-2. **USGS Quadrangle Map: Anderson & Middleton Alternative Area of Potential Effects**

Pontoon Construction Project

Washington State Department of Transportation

\\JAFAR\PROJ\PARAMETRIX_400707\MAPFILES\PONTOON\DR_TM\CULTURALRESOURCES\PON_DR_CULT_USGS_AM.MXD 3/11/2010





Area of Potential Effects

Build Alternative Site

Parcel

N

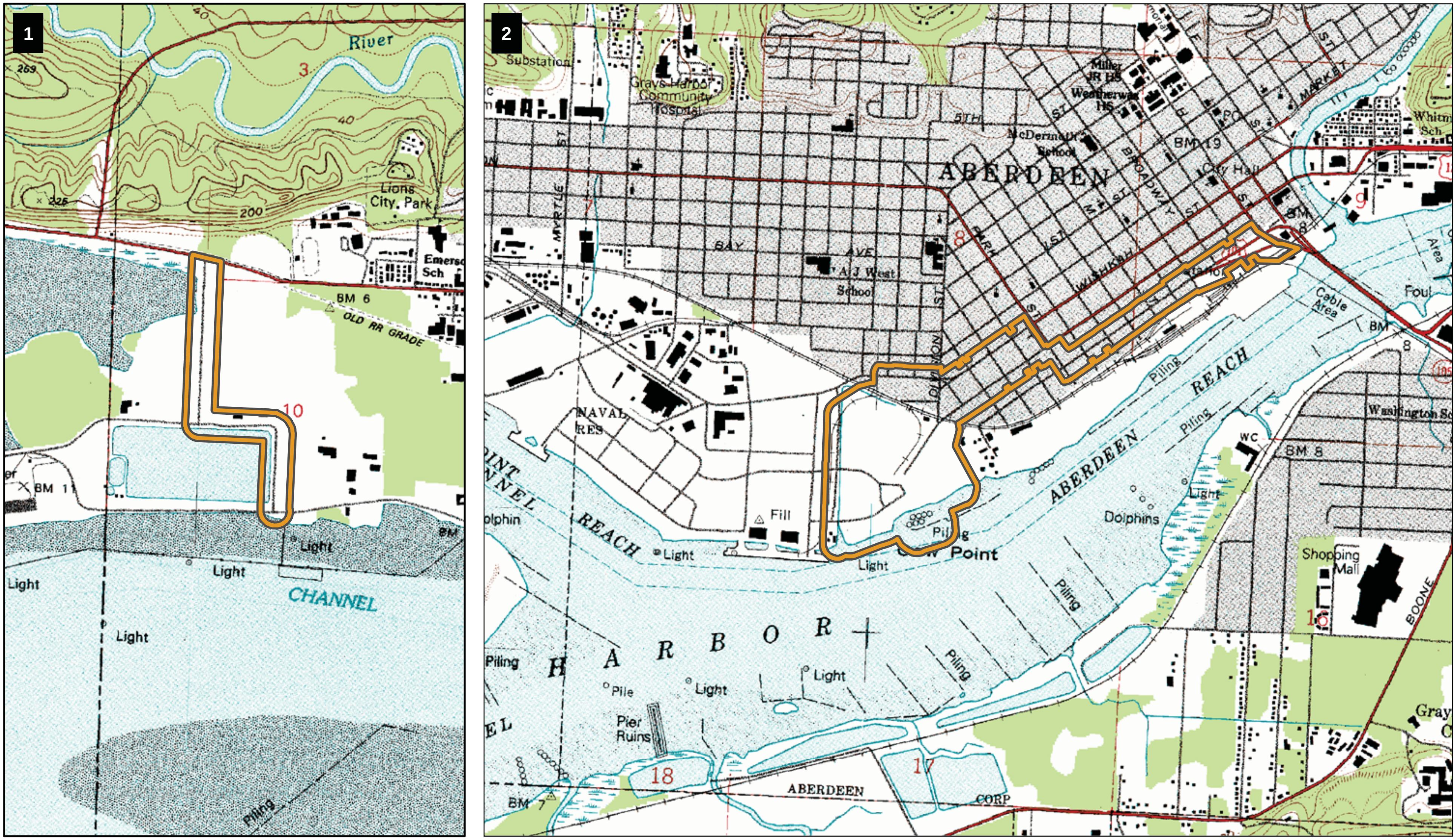
0 250 500 1,000 feet

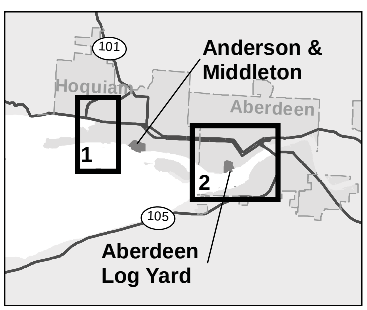
Exhibit 1-3. **Aberdeen Log Yard Alternative Area of Potential Effects**

Pontoon Construction Project

Washington State Department of Transportation

\\JAFAR\PROJ\PARAMETRIX_400707\MAPFILES\PONTOON\DR_TM\CULTURALRESOURCES\PON_DR_CULT_APE_ALY.MXD 3/11/2010





Area of Potential Effects

Source: USGS (1994) Hoquiam, Aberdeen Quadrangle Maps. Horizontal datum for all layers is State Plane Washington South NAD 83; vertical datum for layers is NAVD88.

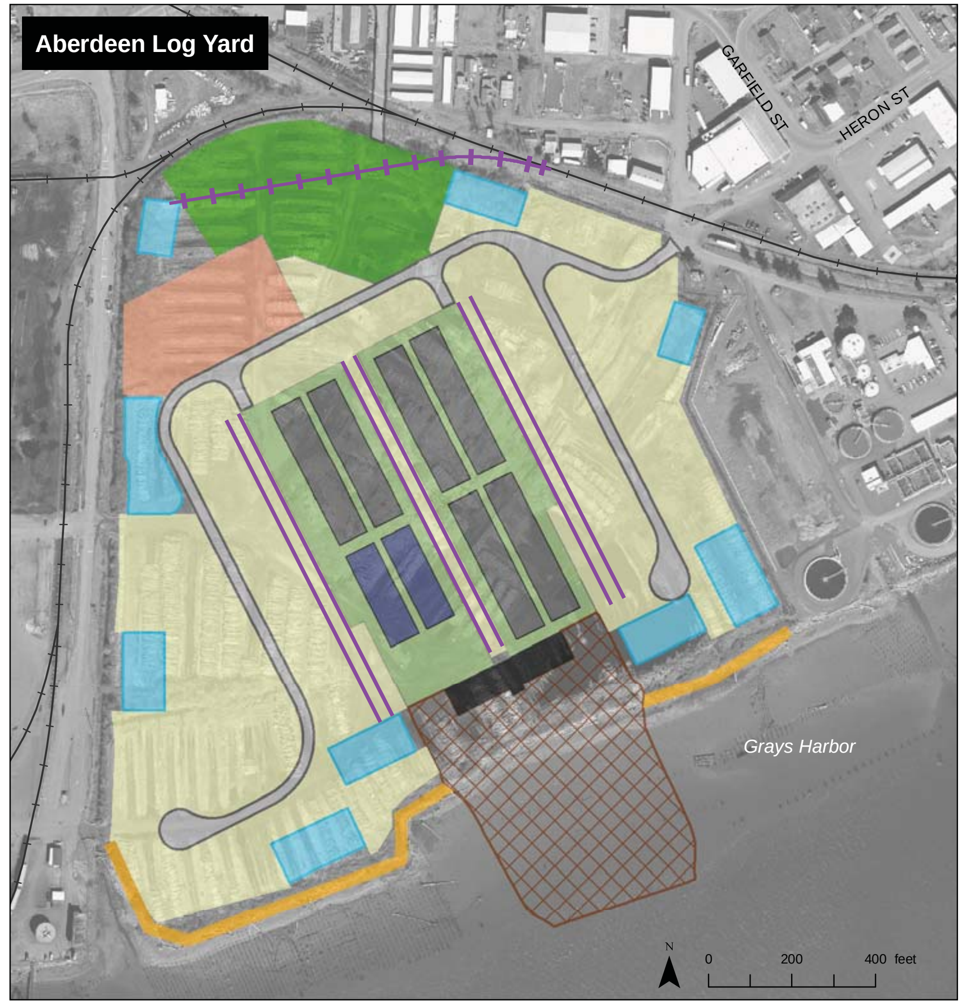
N 0 1,000 2,000 feet
1:24,000

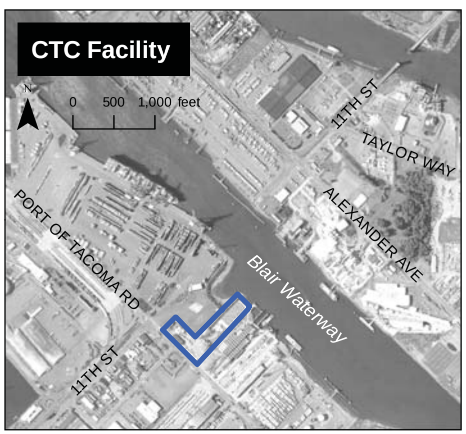
Exhibit 1-4. **USGS Quadrangle Map: Aberdeen Log Yard Alternative Area of Pontential Effects**

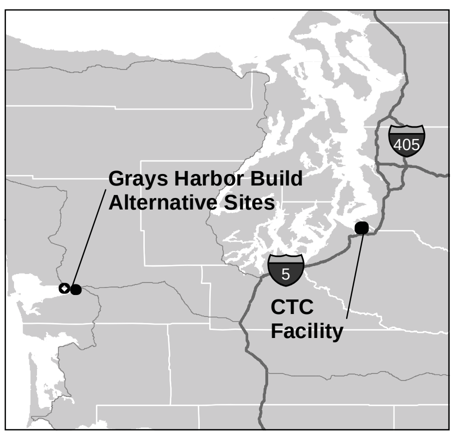
Pontoon Construction Project

Washington State Department of Transportation

\\JAFAR\PROJ\PARAMETRIX_400707\MAPFILES\PONTOON\DR_TM\CULTURALRESOURCES\PON_DR_CULT_USGS_ALY.MXD 3/11/2010







INTERNAL USE ONLY - DRAFT

- Crane rail
- Proposed rail spur
- Existing railroad
- CTC facility
- Cross pontoon
- Longitudinal pontoon
- Water treatment area
- Access road
- Batch plant
- Berm
- Casting basin
- Dry storage and laydown area
- Gate
- Launch channel
- Office and parking

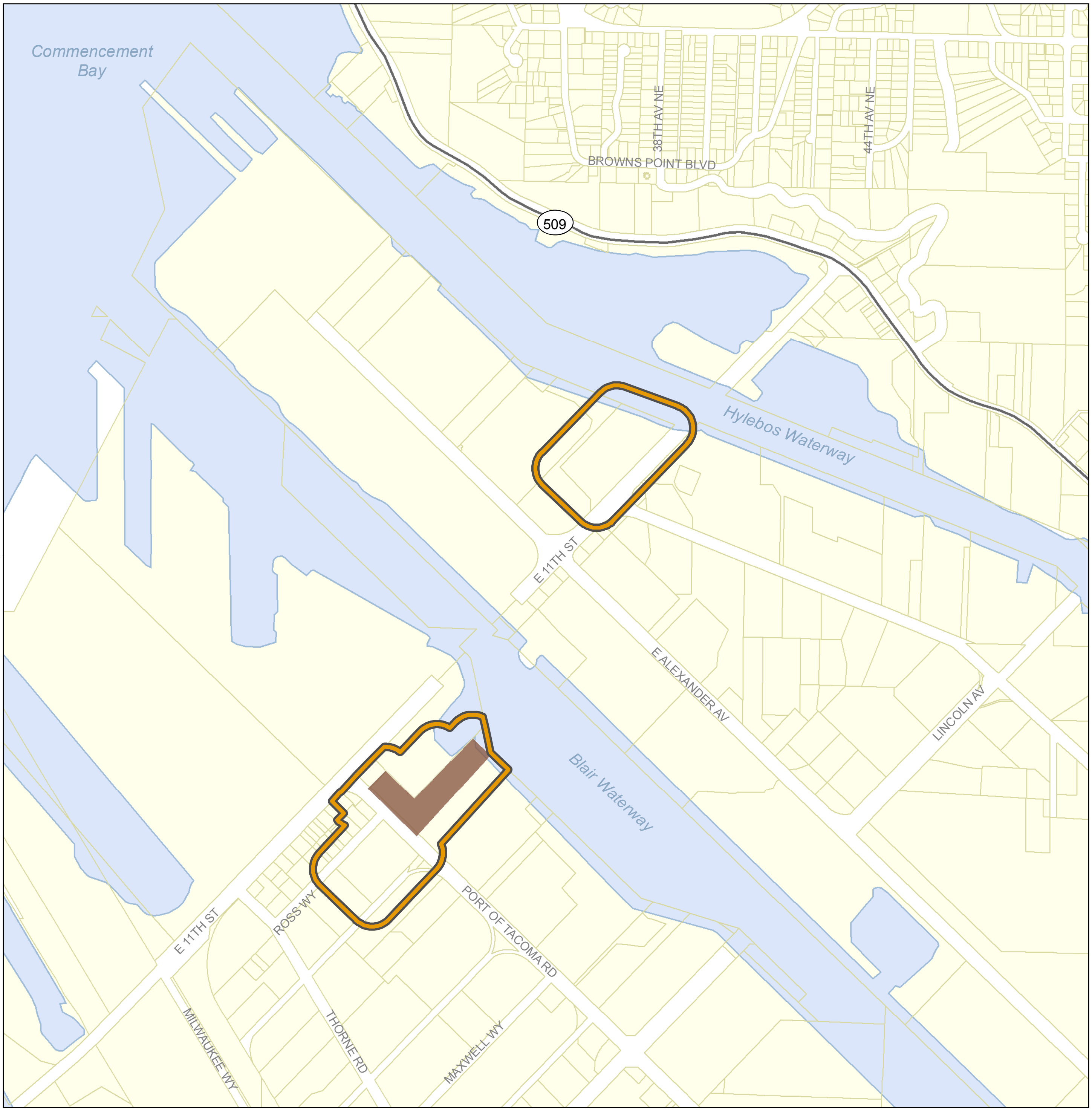
Source: WSDOT (2005, 2006) Aerial Photo, USDA-FSA (2006) Aerial Photo, Grays Harbor County (2006) GIS Data (Road), Horizontal datum for all layers is State Plane Washington South NAD 83; vertical datum for layers is NAVD88.

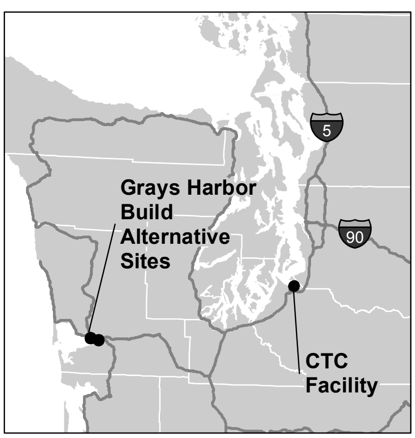
Exhibit 1-5. **Locations and Conceptual Layouts for Grays Harbor Build Alternative Sites**

Pontoon Construction Project

Washington State Department of Transportation

\\JAFAR\PROJ\PARAMETRIX_400707\MAPFILES\PONTOON\DR_TM\CULTURALRESOURCES\PON_DR_CULT_CONCEPTUALDESIGN.MXD 3/11/2010





Area of Potential Effects

CTC facility

Parcel

Source: Pierce County (2007) GIS Data (Street and Parcel), WSDOT (2004) GIS Data (State Route). Horizontal datum for all layers is State Plane Washington South NAD 83; vertical datum for layers is NAVD88.

INTERNAL USE ONLY - DRAFT

N

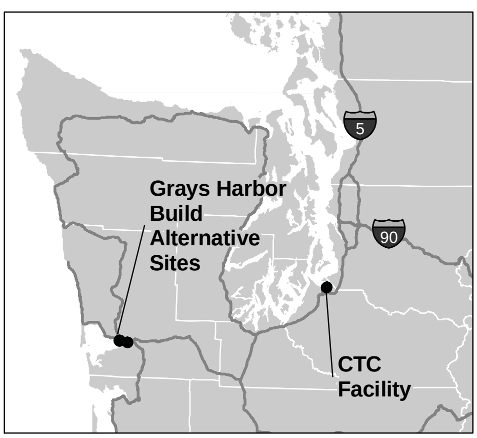
0 500 1,000 2,000 feet

Exhibit 1-6. **CTC Facility Area of Potential Effects**

Pontoon Construction Project

Washington State Department of Transportation

\\JAFAR\PROJ\PARAMETRIX_400707\MAPFILES\PONTOON\DR_TM\CULTURALRESOURCES\PON_DR_CULT_APE_CTC.MXD 3/11/2010



Area of Potential Effects

CTC facility

Source: USGS (1994) Tacoma USGS Quadrangle Map. Horizontal datum for all layers is State Plane Washington South NAD 83; vertical datum for layers is NAVD88.

INTERNAL USE ONLY - DRAFT

N

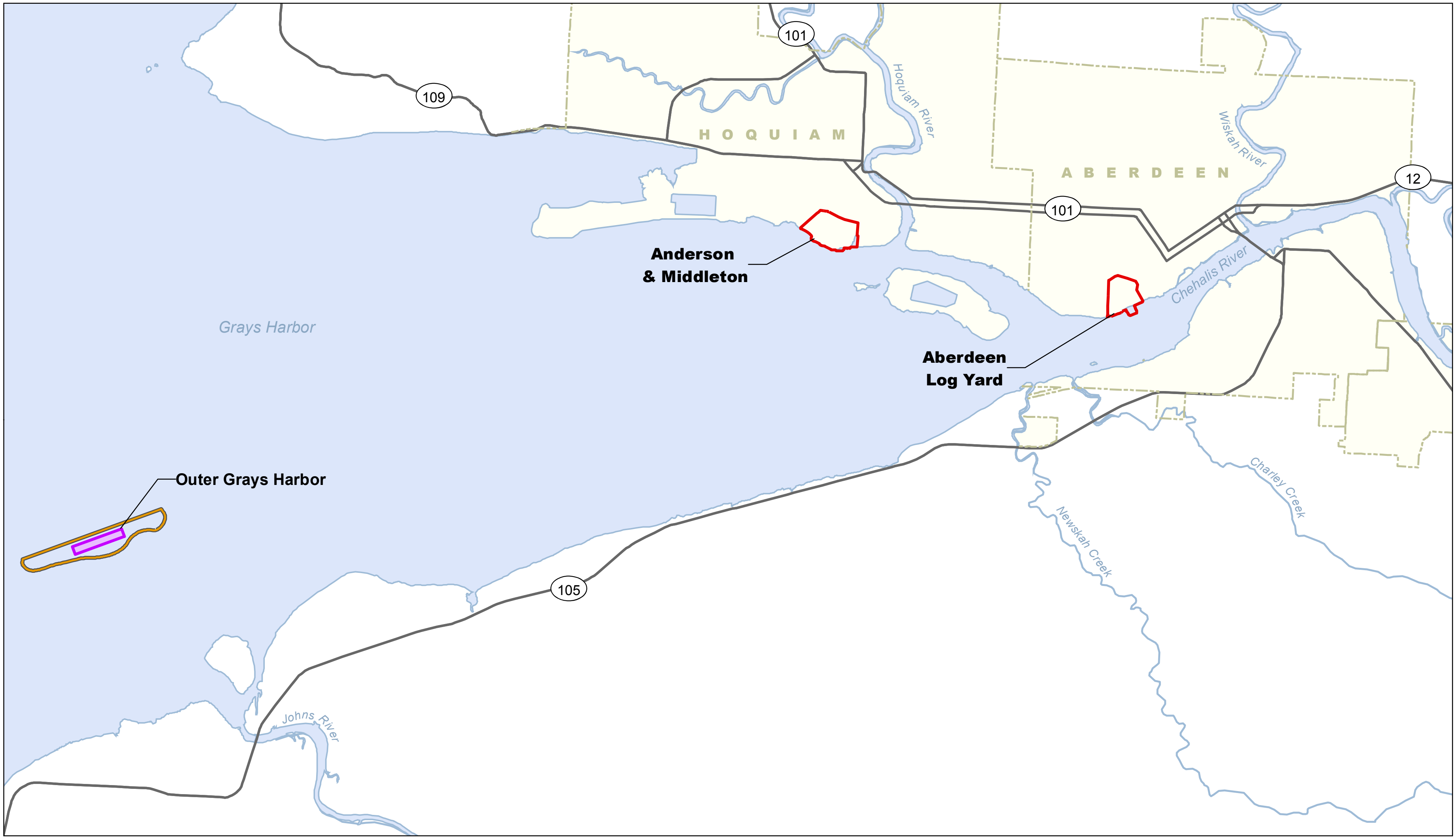
0 500 1,000 2,000 feet

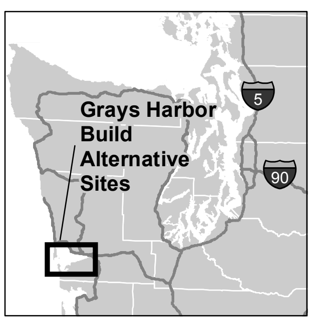
1:24,000

Exhibit 1-7. **USGS Quadrangle Map: CTC Facility Area of Potential Effects**

Pontoon Construction Project

Washington State Department of Transportation





- Area of Potential Effects
- Proposed pontoon moorage location
- Build Alternative Site

INTERNAL USE ONLY - DRAFT

N

0 0.5 1 2 miles

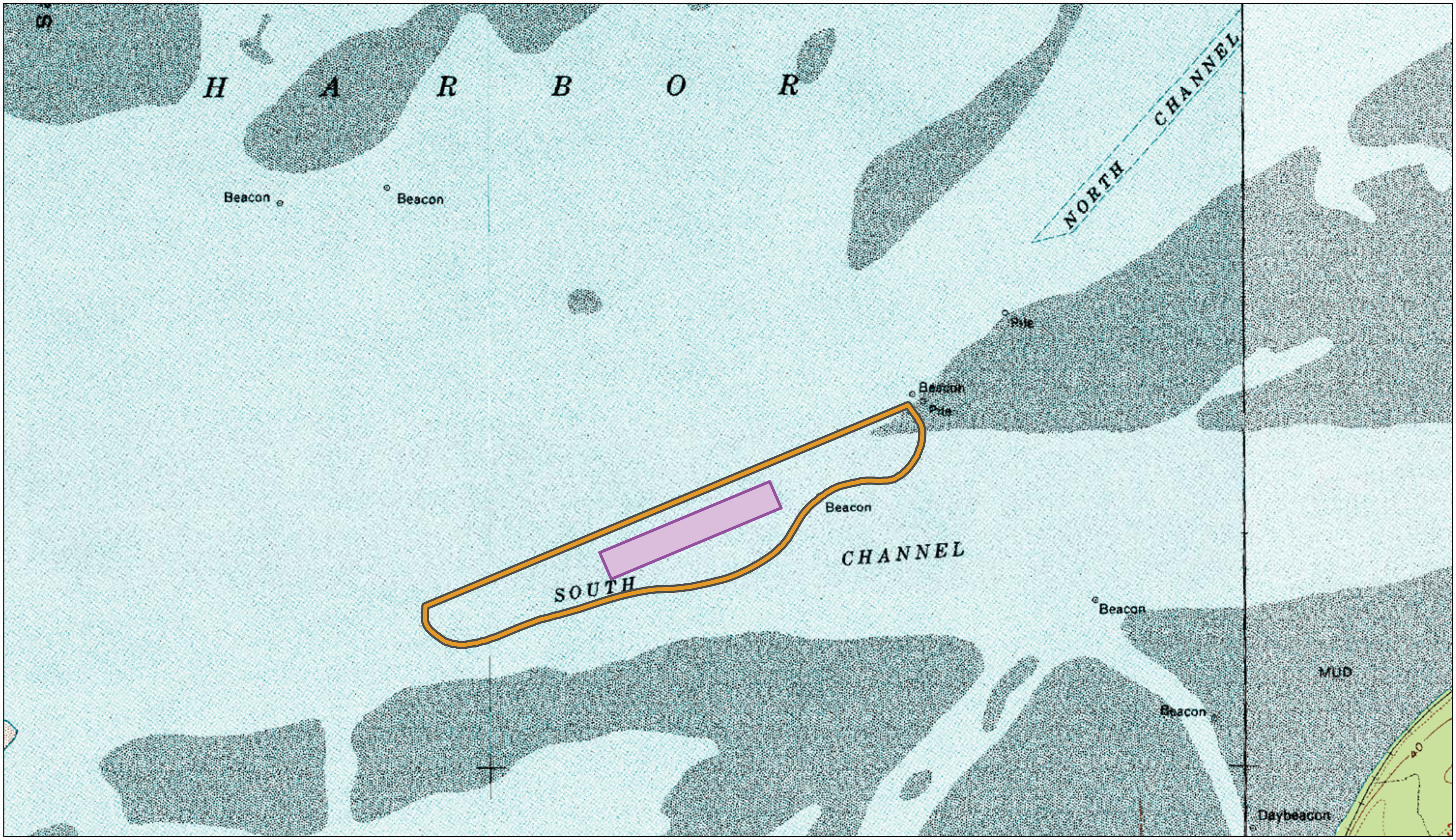
Source: Grays Harbor County (2006) GIS Data (Waterbody and Street). Horizontal datum for all layers is State Plane Washington South NAD 83; vertical datum for layers is NAVD88.

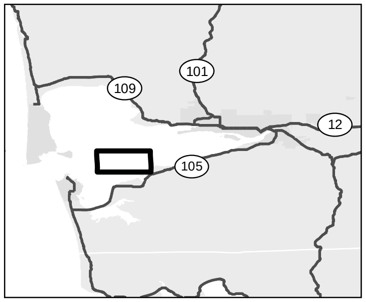
Exhibit 1-8. **Proposed Pontoon Moorage Location Area of Potential Effects**

Pontoon Construction Project

Washington State Department of Transportation

\\JAFAR\PROJ\PARAMETRIX_400707\MAPFILES\PONTOON\DR_TM\CULTURALRESOURCES\PON_DR_CULT_APE_MOORAGELOCATIONS.MXD 3/11/2010





Proposed pontoon moorage location

Area of Potential Effects

Source: USGS (1994) Hoquiam, Aberdeen Quadrangle Maps. Horizontal datum for all layers is State Plane Washington South NAD 83; vertical datum for layers is NAVD88.

INTERNAL USE ONLY - DRAFT

Exhibit 1-9. **USGS Quadrangle Map: Proposed Pontoon Moorage Location Area of Pontential Effects**

Pontoon Construction Project

N 0 1,000 2,000 feet
1:24,000

Washington State Department of Transportation

\\JAFAR\PROJ\PARAMETRIX_400707\MAPFILES\PONTOON\DR_TM\CULTURALRESOURCES\PON_DR_CULT_USGS_MOORAGE.MXD 3/11/2010